MUFLE
PASSION FOR DRAINAGE

MUFLESYSTEM

GENERAL CATALOGUE

MUFLE

Full woman, fleshly apple, hot moon,
thick smell of seaweed, crushed mud and light,
what obscure brilliance opens between your columns?
What ancient night does a man touch with his senses?
Loving is a journey with water and with stars,
with smothered air and abrupt storms of flour:
Loving is a clash of lightning-bolts
and two bodies defeated by a single drop of honey.
Kiss by kiss I move across your small infinity,
your borders, your rivers, your tiny villages,
and the genital fire transformed into delight
runs through the narrow pathways of the blood
until it plunges down, like a dark carnation,
until it is and is no more than a flash in the night.

Pablo Neruda

Summary

For further updates please check the site www.mufle.com periodically.

Mufle carries the water anywhere

24th June 1996 | Walter Papa feels the need for a new product for water drainage and manufactures MufleDrain, an alternative state-of-the-art High-Density Polyethylene (HD-PE) system that makes it possible to create high-quality systems for all road and building sectors.

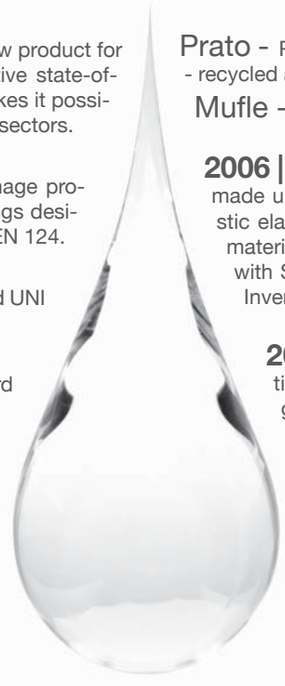
2001 | Mufle begins distributing its own punctual drainage products such as ductile-cast-iron manhole covers and gratings designed and manufactured according to European Standard EN 124.

2004 | Quality System Certification according to Standard UNI EN ISO 9001.

2004 | Quality System Certification according to Standard EN1433.

2005 | Introduction of new product lines:

Asvox - Drainage system completely made of stainless steel AISI 304 in compliance with current EC regulations on hygiene and cleanliness. It can be installed in agroindustrial facilities, hospitals, laboratories, chemical and pharmaceutical factories.



Prato - Protection system for grassy surfaces made of Polypropylene - recycled and thoroughly recyclable.

Mufle - Corporate change from Mufle Srl into Mufle Spa.

2006 | Mufle introduces Twin, a swimming-pool edge cover system made up of grids in two materials: polypropylene PP + thermoplastic elastomer TPE. Thanks to the special combination of the two materials Mufle is awarded the Anti-Slip Certificate in compliance with Standard DIN 51097. It also registers a Patent for Industrial Invention in Italy and Europe.

2008 | The sale and distribution of manhole covers and gratings is entrusted to Tombì, which is subject to Mufle's management and coordination.

TODAY | Mufle has 60 in-house collaborators and a sales network in Italy comprising 60 agencies all over the Italian territory. Its participation in all the most important Exhibitions abroad has boosted the export of its products in Europe thanks to a foreign Division eager to meet the requirements from the different markets and to its own representatives in several EU countries.

Walter Papa, Mufle's President

Corporate certifications

CERTIFICATION SA 8000:2001

Today the products we buy come from all over the world, including countries where social and labour laws are not as advanced as in Italy. In some countries child labour is commonly used in order to make the most of low-cost workforce. No trade-union rights are respected.

Over the last few years a few episodes (such as footballs sewn by Third-World children, subsequently purchased by our own children) have shown that each of us, although unaware, can profit by child labour as a purchaser of products made by children.

Ethically improper circumstances take place in Italy too, although they are less serious: concealed and underpaid labour is quite widespread, as well as child labour on a much smaller scale.
This gave rise to the need to make the public opinion and the companies aware of the duty to respect the principles at the basis of work ethics that make up a company's "Social Responsibility".
Mufle has committed to continuously improving its employees' working conditions, safety and health, thus being granted the Social Responsibility Certificate SA 8000:2001 by the Italian Quality Assurance Institute in December 2007.

IQNet

IQNet Ltd of Switzerland certifies that

MUFLE S.p.A.

Via Santa Maria in Potenza, SNC, 62017 Porto Recanati, Italy

with the following scope:

Design, production and distribution of drainage systems, pits and manhole covers; Distribution of products for the construction industry

complies with the requirements of

SA8000:2001

Social Accountability International Standard

CERTIFICATE

Issued on: 28 December 2007 — Certified since: 28 December 2007
Valid until: 27 December 2010 — Registration Number: SA 1011-IT

Rene Wasmer, Chairman of IQNet Ltd — Antonio Di Pietro, Certification Manager of IQNet Ltd

IQNet Ltd, Bollwerk 31, 3011 Bern/Switzerland

CISQ — IGQ

Dario Agallero, General Director of IGQ

IQNet Ltd acknowledges that CISQ has signed the Representative Agreement in relation to the provision of IQNet SA8000 assessment service. IQNet Ltd has been accredited by Social Accountability International to deliver SA8000 certification globally, through this cooperation with CISQ and other IQNet Partners which have also signed the Representative Agreement.

CERTIFICATION ISO 9001 : 2000

On 31st October 2001 MUFLE was awarded the Certificate of Compliance with Standard EN ISO 9001:2000 by the Italian Quality Assurance Institute IGQ (No. 2B45) for its “design, manufacture and commercial distribution of drainage systems, manhole covers and gratings marked MUFLE – Commercial distribution of products for the building industry”.

The Standards ISO 9000 set forth a series of regulations to be met in order to rationalise work, meet customers’ expectations, maintain and improve the quality system.

The Certificate makes it possible for the Company to cut mistakes and boost its organisation structure by carefully defining its corporate procedures, from resource management to product manufacture, including the definition of responsibilities and the analysis and improvement of its processes.

All processes are handled on a systematic and organic basis in order to increase customer satisfaction and ensure working consistency in the production of goods.

Mufle’s decision to obtain the Certification made it possible to achieve major results such as: systematic nature, method, system soundness, spurs to improvement, customer satisfaction, better internal and external relationships.


IGQ

CERTIFICATO
CERTIFICATE
IGQ 2B45

Mufle Spa

Via Santa Maria in Potenza scn
62017 Porto Recanati MC

UNI EN ISO 9001:2000

2001-10-31
2007-10-31
2010-10-31


IQNet

THE INTERNATIONAL CERTIFICATION NETWORK

CERTIFICATE

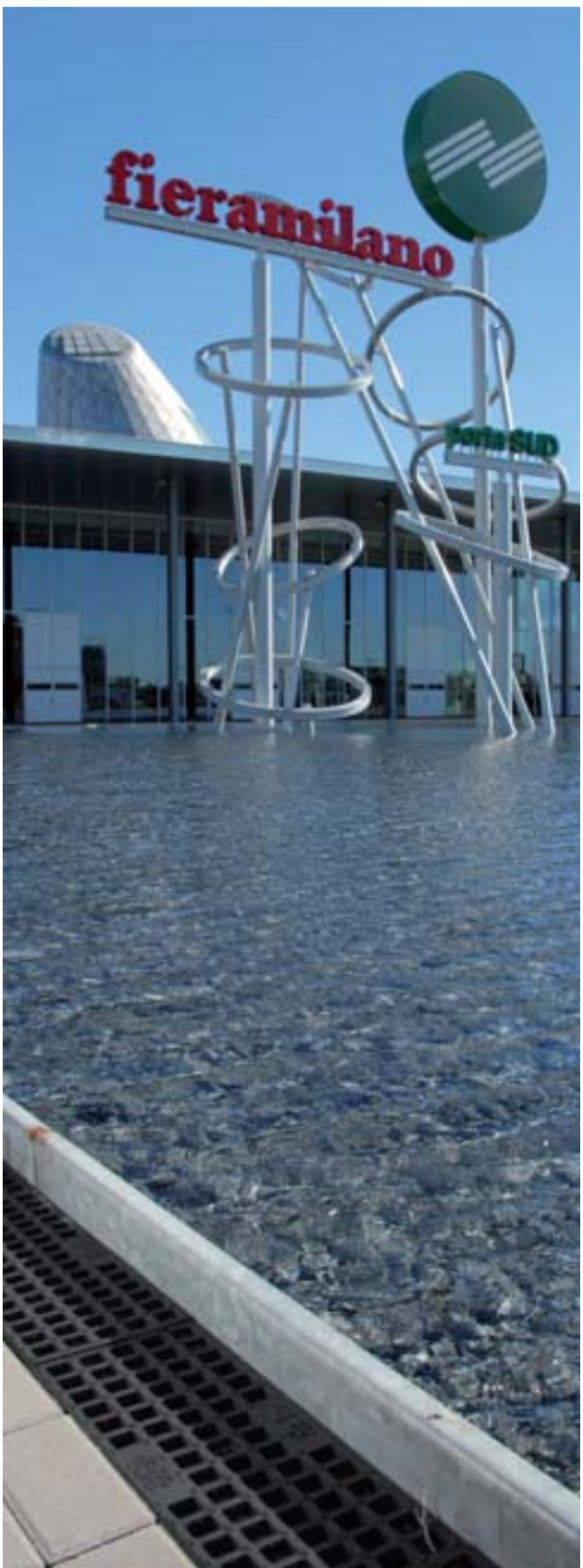
Mufle Spa

Via Santa Maria in Potenza scn
62017 Porto Recanati MC

ISO 9001:2000

IT- 5530 IGQ 2B45


A51 tangenziale est
E 35 A1 BOLOGNA
E 62 A7 GENOVA
MILANO
Linate
A4 MILANO EST - BERGAMO
STIAMO REALIZZANDO LA 4ª CORSIA
(34 Km)
STATO DELL'OPERA
APERTURA AL TRAFFICO PREVISTA
MILANO EST - AGRATE (10 Km) Lavori in corso MAGGIO 2007
AGRATE - TREZZO (9 Km) Lavori in corso OTTOBRE 2006
TREZZO - BERGAMO (14 Km) Lavori in corso LUGLIO 2007
DIMENSIONI DELL'OPERA
Importo dei lavori 345 milioni di €
Importo interventi in favore del territorio 44 milioni di €
Barriere antirumore 29 Km
autostrade per l'italia


fieramilano
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MUFLEDRAIN

WATER CONVEYING SYSTEMS

Thanks to the **wide range** of channels and the different types of covering gratings, the MufleDrain system makes it possible to meet **all drainage requirements** in the civil and industrial sectors.

Today it is even **cheaper and more efficient** thanks to the new male-female coupling system, designed to let you lay the channels with utmost **SIMPLICITY** with **preassembled gratings!**

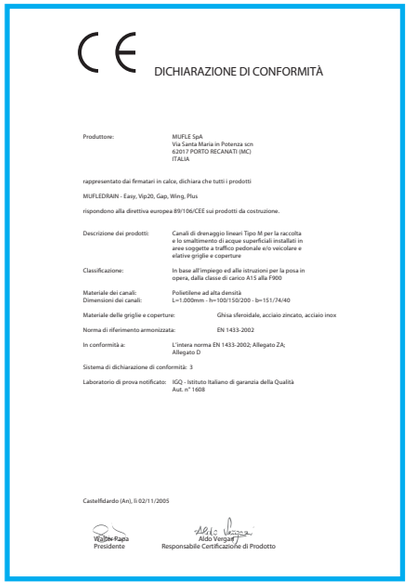
The words “Certified Product” should give rise to two questions: Which features were certified? Who certified them? These words do not show a general quality with the product but the presence of something more (well-defined and verifiable) than in the competing products.

The steps taken to certify a product aim to inform the customer of some major peculiar features that make our products stand out from products from the same category.

To certify a product means highlighting its explicit and implicit features and stating the Company’s commitment to a continuous search for standards able to ensure higher and higher quality requirements. Certified products result from continuous improvement based on well-defined quality standards and continuous monitoring by an independent Certifier.

In short we can say that product certification means that the Company has voluntarily chosen to enter into a trust-based agreement with its customers in order to assure them its products have specified **SAFETY** and quality features.

THE CE MARK



CE

DICHIARAZIONE DI CONFORMITÀ

Produttore: MUFLE SpA
Via Santa Maria in Potenza scn
62017 PORTO RECANATI (MC)
ITALIA

rappresentato dai firmatari in calce, dichiara che tutti i prodotti

MUFLEDRAIN - Easy, Vip20, Gap, Wing, Plus

rispondono alla direttiva europea 89/106/CEE sui prodotti da costruzione.

Descrizione dei prodotti: Canali di drenaggio lineari Tipo M per la raccolta e lo smaltimento di acque superficiali installati in aree soggette a traffico pedonale e/o veicolare e relative griglie e coperture

Classificazione: In base all’impiego ed alle istruzioni per la posa in opera, dalla classe di carico A15 alla F900

Materiale dei canali: Polietilene ad alta densità
Dimensioni dei canali: L=1.000mm - h=100/150/200 - b=151/74/40

Materiale delle griglie e coperture: Ghisa sferoidale, acciaio zincato, acciaio inox

Norma di riferimento armonizzata: EN 1433-2002

In conformità a: L’intera norma EN 1433-2002; Allegato ZA; Allegato D

Sistema di dichiarazione di conformità: 3

Laboratorio di prova notificato: IGQ - Istituto Italiano di garanzia della Qualità Aut. n° 1608

Castelfidardo (An), li 02/11/2005

Walter Rapa
Presidente

Aldo Vergari
Responsabile Certificazione di Prodotto

Certain types of products bear the CE Mark to show that they meet or are compliant with all the applicable European Union Directives.
In order to be marketed in the countries belonging to the European Economic Area (EEA) the laws require the products to bear the Mark. The symbol CE stands for “Conformité Européenne” and shows that the product complies with the essential requirements specified by Directives on safety, public health and protection of consumers.

Said requirements are summarised in the European Directive 89/106/EEC, transposed in Italy with a Decree by the President of the Italian Republic (No. 246/93) aimed to ensure the free movement of construction products and the lifting of all national protectionist barriers in EU countries.

The CE Mark:

- shows that the product underwent conformity assessment procedures;
- ensures the product complies with all applicable EU requirements imposed on the manufacturer;
- can be affixed only when all audits have been completed;
- entitles the product to be marketed, to move freely and to be used on the EC territory;
- must be affixed by the manufacturer;
- is made up of the letters CE and, should a notified body take part in the production audit phase, of the identification number of said body or bodies;
- must be visible, readable, indelible, and must be affixed on the product directly.

European Standard EN 1433 is aimed to define the “terminology, classification, test, design, marking and conformity assessment requirements of linear drainage channels to collect and carry surface water as installed in areas subject to pedestrian and/or vehicular traffic”.

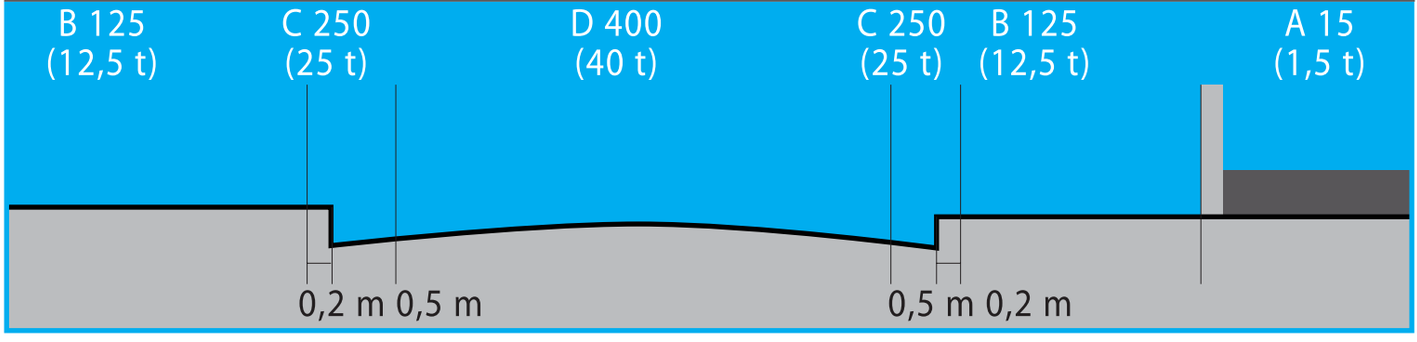
Mufle’s HD-PE drainage channels and the relevant gratings and covers (made of galvanised/stainless steel or ductile cast iron) are certified according to Standard EN 1433 on “Drainage Channels for Pedestrian and Vehicular Areas”.

The certificate, issued by the Italian Quality Assurance Institute IGQ, is a guarantee for the final customer that the products are manufactured with high-quality manufacturing processes (either carried out in-house or outside) and comply with the reference specifications.

This also ensures that the regular checks specified by Standard EN 1433 are carried out, since Mufle continuously performs load tests on its products in its own in-house laboratory, as well as physical and chemical analyses on polyethylene, metallographic analyses and tensile tests on cast iron in external certified laboratories.

	**Class A15**	Areas which can only be used by pedestrians and pedal cyclists, green areas.
	**Class B125**	Footways, pedestrian areas and comparable areas, private car parks and parking decks.
	**Class C250**	Roadyesde areas (kerbs) stretching maximum 0.5 m into the carriageway and maximum 0.2 m into the footway.
	**Class D400**	Carriageways of roads (pedestrian streets included), hard shoulders and parking areas for all types of road vehicles.
	**Class E600**	Areas subject to high loads such ports, industrial areas and areas where goods are unloaded.
	**Class F900**	Areas subject to very high loads such as airports and areas where containers are unloaded.

Example of roadway section showing load classes up to D400



NOT ALL PLASTIC MATERIALS ARE THE SAME

MUFLEDRAIN

All polymers made of hydrocarbons with the formula C_nH_{2n} and double bond are defined as POLYOLEFINS. This group includes, among others, polyethylene (PE) and polypropylene (PP). They are the result of ethylene polymerisation ($CH_2=CH_2$).
The following techniques are currently used for the industrial production of PE:

- high-pressure polymerisation;
- medium/low-pressure polymerisation;

based on which different types of PE are produced:

1. High-density polyethylene (HD-PE).
2. Low-density polyethylene (LD-PE)
3. High-molecular-weight polyethylene (HMW-PE)
4. Ultra-high-molecular-weight polyethylene (UHMW-PE)
5. Linear-low-density polyethylene (LLD-PE)

HD-PE (High Density) is little branched polyethylene (PM=200,000 / 400,000 g/mol) with crystallinity 60/80% and high density (0.942-0.965 g/cm^3).

LD-PE (Low Density) is much more branched than HD-PE (PM=600,000 g/mol), its crystallinity ranging from 40% to 50% and density from 0.915 to 0.935 g/cm^3.

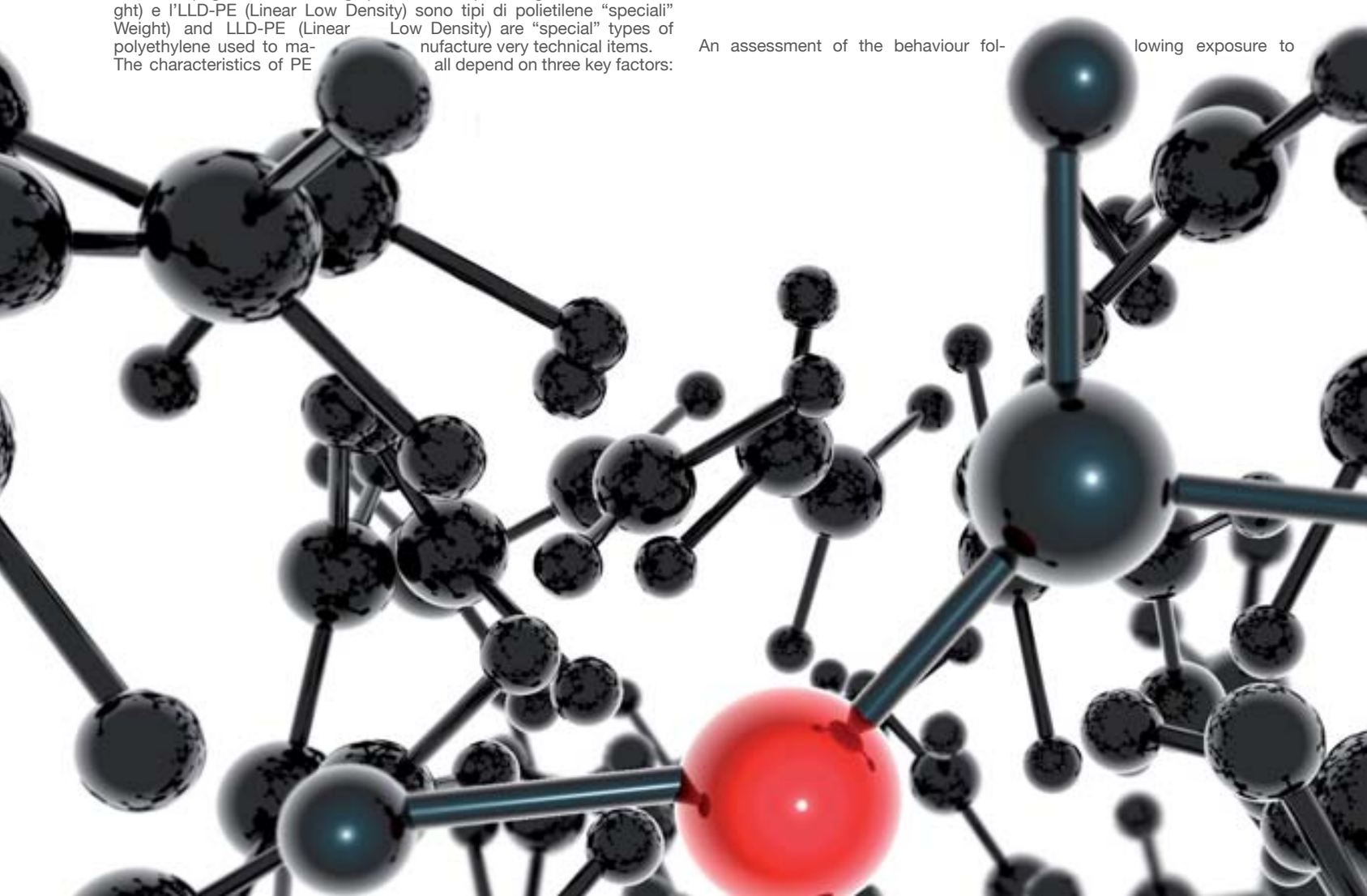
HMW-PE (High Molecular Weight), UHMW-PE (Ultra High Molecular Weight) e l'LLD-PE (Linear Low Density) sono tipi di polietilene "speciali" Weight) and LLD-PE (Linear Low Density) are "special" types of polyethylene used to manufacture very technical items.
The characteristics of PE all depend on three key factors: the branching of the structure, crystallinity and above all density.
Intermolecular forces change according to branching: higher intermolecular forces - and consequently excellent rigidity and hardness values (Table 1) - correspond to less branched arrangements such as in HD-PE.

A high percentage of crystallinity such as in HD-PE ensures the material has more mechanical resistance, high resilience (resistance to shocks) values, high elongation-at-break values, good behaviour against friction and wear - without making it too fragile.
A completely crystalline polymer would be too fragile to be used as a plastic material because the amorphous areas (non-crystalline areas) give it toughness, i.e. make it able to bend without breaking (Table 2).

A high density value such as in HD-PE affects tensile stress (which increases in an almost linear way), water absorption, permeability to water vapour, oxygen, carbon dioxide and a number of odorous and aromatic substances.
The above shows that HD-PE is a material that ensures excellent **ROBUSTNESS**.

PE withstands water, saline solutions, acids, alkalis, alcohol and petrol. It is soluble in all organic solvents up to 60°C. These characteristics increase in proportion to density. That is why HD-PE is used to manufacture oil and fuel containers according to DIN 16904. The formation of cracks due to internal stresses brought about by contact with surface-active agents decreases as density increases too (Tables 1 and 2).
So HD-PE is very **VERSATILE** and can be used in chemically aggressive environments.

An assessment of the behaviour following exposure to



bad weather carried out through usual laboratory methods (DIN 53386, 53387, 53388) shows that the physical and mechanical characteristics of HD-PE do not change over time, unlike PP (whose aging is faster). Nevertheless, the assessment sequence in said artificial methods can differ from the sequence calculated in outdoor use: it is not possible to have results from practical tests on the exposure of products to the external environment for a long enough period of time, since plastic materials have only recently been used in the construction industry.
We can nevertheless infer that HD-PE is a **LONG-LASTING** material.

Mufle's MufleDrain channels are made from HD-PE because the combination of the three key factors (branching of the structure, crystallinity and density) - as can be inferred from the above and as shown in Tables 1 and 2 - ensures the best performance for the finished product.

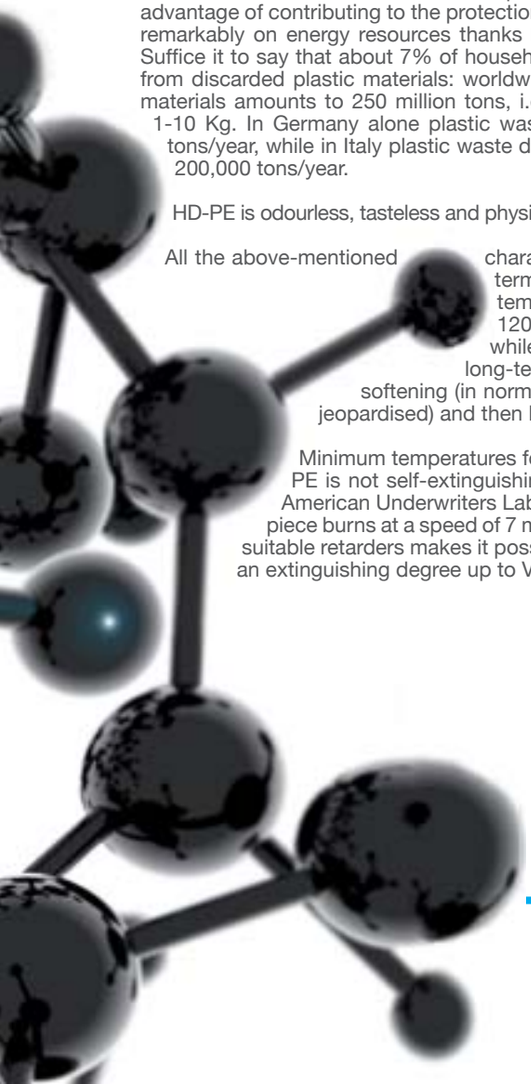
The HD-PE used by Mufle is a regenerated/regranulated material with the addition of a black master that gives the finished product its classical black colour (sky-blue, grey and other colours can be achieved with masters of a different RAL). The addition is needed to prevent the "photo-oxidation" of PE, which is unstable when exposed to UV radiation.

The resulting product has the same characteristics as the virgin material. As they are thermoplastic materials (i.e. they can be modelled several times, which means they can be easily re-formed and re-moulded - unlike the resins, which are thermosetting materials, i.e. they cannot be melted again after being formed for the first time), POLYOLEFINS can be reworked through regeneration and/or regranulation. This makes it possible to derive new reusable "raw material" from scraps and household waste, with the advantage of contributing to the protection of the environment and saving remarkably on energy resources thanks to complete **RECYCLABILITY**. Suffice it to say that about 7% of household and industrial waste results from discarded plastic materials: worldwide yearly production of plastic materials amounts to 250 million tons, i.e. a per-capita consumption of 1-10 Kg. In Germany alone plastic waste amounts to about 3 million tons/year, while in Italy plastic waste due to empty bottles amounts to 200,000 tons/year.

HD-PE is odourless, tasteless and physiologically harmless.

All the above-mentioned characteristics are stable for short-term uses where maximum allowed temperatures range from 80 to 120°C in HD-PE (e.g. asphalting), while the range is 60 to 95°C for long-term uses. In higher temperatures softening (in normal conditions the product is not jeopardised) and then liquefaction are experienced.

Minimum temperatures for use are around -50°C.
PE is not self-extinguishing and it is classified as HB by American Underwriters Laboratories, i.e. a 3 mm-thick test piece burns at a speed of 7 mm/min, although the addition of suitable retarders makes it possible to create a PE mixture with an extinguishing degree up to V0 (the highest degree possible).



Thanks to the addition HD-PE can be put to SPECIAL USES. The HD-PE used to mould the MufleDrain channels has well-defined characteristics - compliance being ensured by the Quality Mark Mufle received from IGQ and by the relevant Product Certification according to Standard EN 1433.

TABLE 1

Dependence of chemical, physical and mechanical properties of POLYOLEFINS, on density and molecular structure

STRUCTURAL PARAMETERS	DENSITY g/cm³		MOLECULAR STRUCTURE	
Threshold values	0,900	0,970	considerably branched	linear
Crystallisation degree	+/-	+/+	-/-	+/+
Fluidity Index	°	°	°	°
Workability	+	-	+	-
Tensile strength and bending strength	→		→	
Elongation at break	←		←	
Rigidity and hardness	→		→	
Shock resistance	←		→	
Resistance to stress-induced cracks	→		→	
Crystal melting field and heat deformation temperature	→		→	
Cold breaking temperature	→		→	
Chemical resistance and resistance to solvents	→		→	
Resistance to gas and vapour diffusion	→		→	

+-: high or low values °: no special effects → : positive effect increasing in the direction of the arrow

TABLE 1

Summary of main characteristics of POLYOLEFINS

STRUCTURAL PARAMETERS	UNIT	LD-PE	HD-PE	PP-H	PP-R
Density	g/cm³	0,915-0,920	0,940-0,960	0,900-0,915	0,895-0,900
Elasticity modulus E (DIN 53457)	MPa	200-400	600-1400	1300-1800	600-1200
Tensile strength (DIN 53455)	N/mm²	8/23	18/35	21/37	21/37
Elongation (DIN 53455)	%	C.a. 20	C.a. 8-12	C.a. 8-18	C.a. 10-18
Melting point	°C	105-118	126-135	162-168	135-155
Thermal expansion coefficient	mm/°C	$20x10^{-5}$	$20x10^{-5}$	$15x10^{-5}$	$15x10^{-5}$
Dielectric constant at 100 Hz	–	2,3	2,4	2,3	2,3
Water absorption at 23°C	%	< 0,05	< 0,05	< 0,20	< 0,20

EXTRA SLICK

The **smooth waterproof surface** lets the water flow quickly away and is easy to clean, thus preventing the formation of putrescible residues.

STRONG GRIP

The special **geometry** of the external structure translates into high **steadiness** and improves the **anchoring** of concrete to HD-PE.

EASY TO CONNECT

The **preassembled drain outlets** on the sides and the bottom are easy to open and permit **quick connection** to the sewer system.

STACKABLE - EASY TO CARRY

The special design makes it possible to **optimise palletisation**, thus taking up **less warehouse space** and allowing **easy carriage and shipping**.

LIGHTWEIGHT

It is much **more lightweight than traditional concrete systems**, even when systems with preassembled gratings are to be handled.

LOW PRICE

Its very low weight permits easy quick installation. Installation costs are reduced, **since no machines** are needed to install the system.

SAFETY

MufleDrain products undergo strict quality checks in all processing stages. They are all **certified EN 1433 and marked CE**.

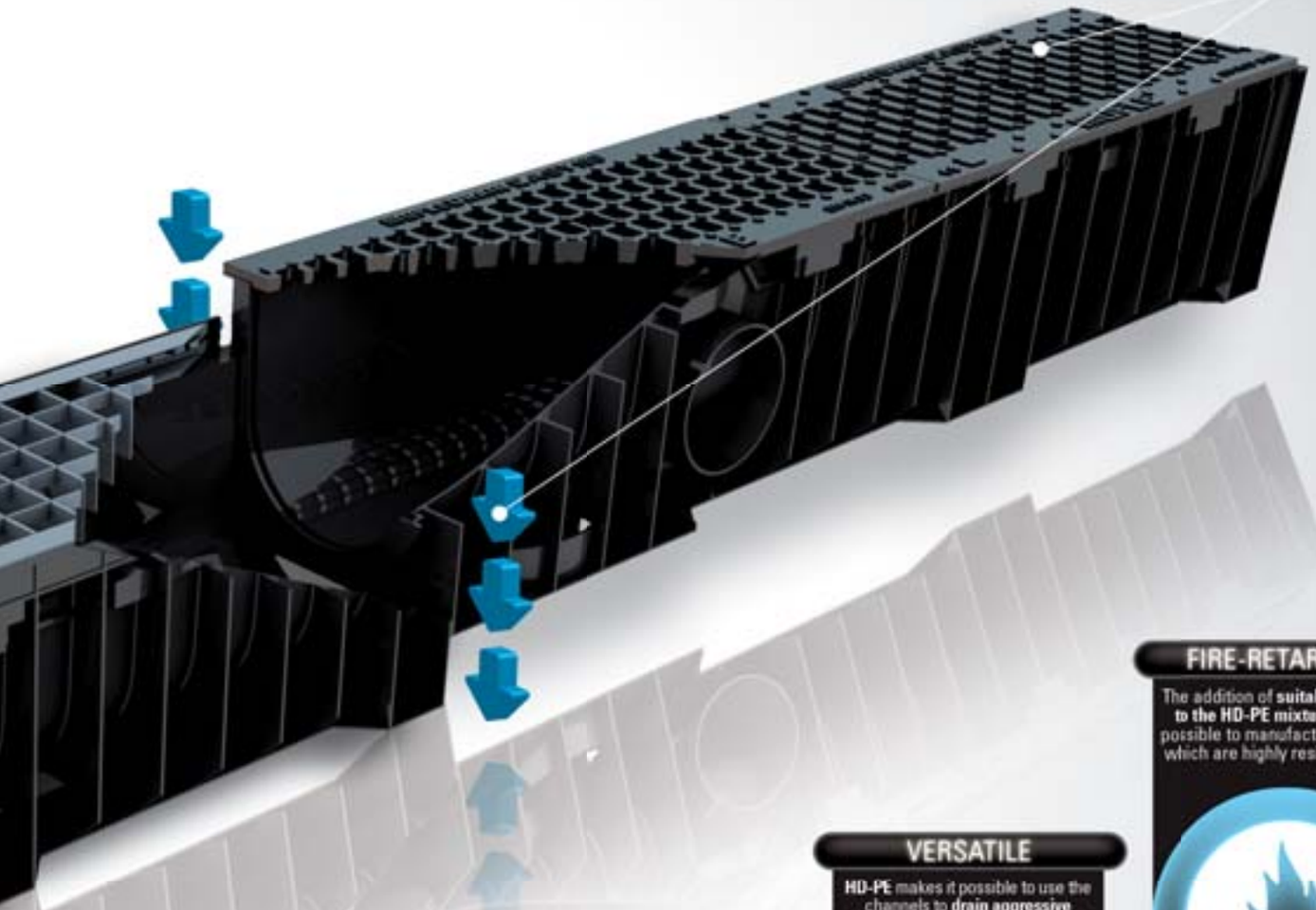
CE
EN 1433

RECYCLABILITY

Completely made from recycled **HD-PE (which can be recycled again)**, MufleDrain channels are eco-friendly products par excellence.

EASY TO ASSEMBLE

MufleDrain channels can be installed with **preassembled gratings** through a convenient **coupling** system!



FIRE-RETARDANT

The addition of **suitable retarders to the HD-PE mixture** makes it possible to manufacture channels which are highly resistant **to fire**.

VERSATILE

HD-PE makes it possible to use the channels to **drain aggressive liquids** too, because it withstands saline solutions, acids, alkalis, alcohol and fuels.

LONG LIFE

HD-PE is slowly affected by deteriorating agents such as air, light, wind, dust, atmospheric pollutants, microorganisms, peculiar environments.

STURDY

HD-PE has high mechanical resistance and it withstands shocks, temperature changes, friction, wear and tear. As a consequence **no material gets lost** during carriage or installation.

MufleDrain channels are characterised by a special geometry on the external surface consisting in walls with stiffening ribs. There are 21 equidistant primary ribs meeting on a flat supporting surface and 12 shorter secondary ribs, all of them perpendicular to the upper edge.

This solution makes the channel highly **STABLE** and allows a number of benefits:

- It makes the finished piece stiff and resistant to compression and torsional stresses, thus permitting the use of small thicknesses. This translates into remarkable benefits, since the product saves energy (less raw material and smaller processing time) and is easy to handle, **LIGHTWEIGHT, CHEAP** and **EASY TO CARRY**.
- It minimises the effects of the differentiated thermal expansions. The thermal expansions in the HD-PE and concrete used for the prop during installation are very different in that the relevant “coefficients” differ by approximately 2 orders of magnitude (HD-PE = 20x10-5 mm/°C; concrete = 14x10-6 mm/°C). When the temperature is very low (below 0) there is no such problem, although the concrete castings must be able to withstand frost and thaw cycles to avoid dangerous cracks. If the channels are exposed to sunrays and subject to temperature changes during the day, dangerous differentiated elongation phenomena may take place. The structure of the channel lets the concrete penetrate between the different ribs and wrap each of them completely, acting as an “obstacle” to differentiated expansion. At the end of the casting process the plastic material will make up just a tiny percentage of the cement.
- It prevents the floating effect of the channel during the casting process. The weight of the concrete resting on the flat supporting surface acts as a counterbalance in order to prevent the channel from moving. The passage of the concrete is also ensured between the supporting surface and the restraining internal surface by special openings, thus making the casting more compact.
- It improves the anchoring between concrete and HD-PE thanks to the large surface available for adherence.

The external geometry of the MufleDrain channels is also characterised by their **EASY CONNECTION** to the sewer system thanks to preinstalled easy-to-open drains on the sides and the bottom. As a consequence the water has several outlets close to one another and does not need high speed to reach them. The channel has a storage capacity that can be useful in the event of large flows, although the main role it plays is that of temporary container for the water to be disposed of through one or two round-section PVC pipes. The pipes will be connected to the channel drains and will discharge the water into either the sewer system or any other final receiving body. The water flow that a channel is able to handle depends on the number of drains opening up as well as on their sections (see table on page 261 of Technical Manual).
Thanks to said operating principle there is no need to use internally-inclined channels to increase the speed of the water flow.
This operation has several benefits, because:

- during installation all MufleDrain channels can be used without distinction - they are not numbered based on the inclination;
- unlike inclined channels, long drainage lines can be made up - the former must comply with manufacturing limits reducing the length of the stretches to approximately 30 metres;
- they are safer from the hydraulic point of view in that the water has several outlets - not only one outlet at the end of the line - which might get clogged up.

The inner section of the MufleDrain channels was designed in order to achieve a very high draining performance. That is why we chose a U shape: it has a perfectly round bottom for flat walls. This unquestionably allows the following benefits:

- greater self-cleaning effect by preventing the formation of deposits of solid bodies (sometimes putrescible), which would dangerously reduce the drainage section;
- increase in water flow speed.

Also, the internal surface is perfectly smooth thanks to the high value of the roughness coefficient of HD-PE, which further improves the **EASY FLOWING** of the water.

THE FLAT SYSTEM: (pg. 25)

- it supports 3 load classes (A15, B125, C250) in compliance with Standard EN 1433
- it is made up of a channel - entirely made from HD-PE - which needs no strengthening frame
- it has a wide usable section for drainage and uses lightweight gratings with optimised sizes
- it has a small size thanks to its flat bottom to which a convenient drain gate can be screwed, if needed. The drain gate is available in two different versions: Ø 100 and Ø 110
- it comprises 4 different types of gratings (with rungs, slots, square mesh, anti-heel mesh) made from galvanised steel, stainless steel and ductile cast-iron. The new FLAT clip makes it possible to fix the rung gratings quickly and safely with neither nuts nor bolts
- it is supplemented with different fixing systems, which are ideal for all requirements and range from the classic tie-rod to a simple locking system using a protrusion inside the channel. Either the tie-rod or the clip system should be used for steady fixing
- it is ideal whenever there is little installation space such as in underground car parks or parking decks, flat roofs, terraces
- it is ideal whenever high-quality aesthetic finishes are to be achieved, since the gratings rest directly on the channel's contact surface, thus covering it completely
- the range is made up of 2 channels with 1 width and 2 heights: 100/55 and 100/80

THE SKIP SYSTEM: (pg. 68)

- it supports 3 load classes (A15, B125, C250) in compliance with Standard EN 1433
- it is made up of a channel - entirely made from HD-PE - which has a 20 mm high toe board and needs no strengthening frame
- it has a wide usable section for drainage and uses lightweight gratings with optimised sizes
- it comprises a wide range of different gratings (with rungs, slots, square mesh, anti-heel mesh) made from galvanised steel, stainless steel, ductile cast-iron and HD-PE. A HD-PE blind cover is available too. The new SKIP clip makes it possible to fix the rung and HD-PE gratings quickly and safely with neither nuts nor bolts
- it is supplemented with different fixing systems, which are ideal for all requirements and range from the classic tie-rod to a simple locking system using a protrusion inside the channel. The locking system does not fix the grating to the channel. Either the tie-rod or the clip system should be used for steady fixing
- grating protection is ensured by the HD-PE edge
- it comes equipped with a convenient drain gate, which minimises its size
- since the edge shows the exact dimensions for the paving, easy and accurate installation is ensured
- it is ideal for residential areas, sport facilities, private car parks
- the range is made up of 2 channels with 1 width and 2 heights: 100/55 and 100/80

THE EASY SYSTEM: (pg. 36)

- it supports 3 load classes (A15, B125, C250) in compliance with Standard EN 1433
- it is made up of a channel - entirely made from HD-PE - which needs no strengthening frame
- it comprises 4 different types of gratings (with rungs, slots, square mesh, anti-heel mesh) made from galvanised steel, stainless steel and ductile cast-iron
- it is supplemented with a whole series of L-shaped and T-shaped longitudinal-slot gratings in class A15. They are not fixed to the channel but use a linking system through hooks and holes
- it comes equipped with a classic tie - rod fixing system
- it is ideal for household and civil uses, pedestrian areas, private car parks, footways, canalisation systems in roads and parking areas
- it is ideal whenever high - quality aesthetic finishes are to be achieved, since the gratings rest directly on the channel's contact surface, thus covering it completely
- it comes complete with drain gullies with siphon
- the range is made up of 6 channels with 3 widths and 2 heights each: 100/100, 100/160, 150/100, 150/160, 200/100, 200/160

THE VIP SYSTEM: (pg. 83)

- it supports 3 load classes (A15, B125, C250) in compliance with Standard EN 1433
- it is made up of a channel - entirely made from HD-PE - which has a 20 mm-high toeboard and needs no strengthening frame
- grating protection is ensured by the HD-PE edge
- since the edge shows the exact dimensions for the paving, easy and accurate installation is ensured
- it comprises a wide range of different gratings (with rungs, slots, square mesh, anti-heel mesh) made from galvanised steel, stainless steel, ductile cast-iron and HD-PE. A HD-PE blind cover is available too
- it comes equipped with a classic tie-rod fixing system and a convenient side coupling system through a tab inside the HD-PE gratings
- it is ideal for civil uses, pedestrian areas, private car parks, footways, canalisation systems in parking areas, sport facilities, synthetic tracks, athletics grounds
- it comes complete with drain gullies with siphon
- the range is made up of 7 channels with 3 widths and 3 heights: 100/100, 100/160, 150/100, 150/160, 200/100, 200/160, 200/250
- The range is supplemented with the VIP35 channel with length 1.5 m and usable dimensions 300 x 300 mm. Designed to drain large surfaces

THE SMART SYSTEM: (pg. 124)

- it supports 2 load classes (B125, C250) in compliance with Standard EN 1433
- it is made up of a HD-PE channel with a strengthening frame
- it is very compact, since the frame is perfectly anchored to the channel body. The frame is made from materials able to resist corrosion due to contact with the surrounding environment and the gratings. The anchoring system was designed to withstand any deformation due shearing or torsional stress
- it is wearproof and very solid thanks to the frame, which ensures a 2.4 mm-thick drive-over edge and a 1.2 mm - thick contact surface
- since the edge shows the exact dimensions for the paving, easy and accurate installation is ensured
- it comprises 3 different types of gratings (with slots, square mesh, anti-heel mesh) made from galvanised steel, stainless steel and ductile cast-iron
- it comes equipped with a classic tie-rod fixing system and a convenient drain gate, available in two versions (Ø 100 and Ø 110)
- it is ideal for private car parks, footways, canalisation systems in roads and parking areas, transversal canalisation systems (road crossings) with low-speed vehicular traffic (max 15 Km/h – in this case the system can support D400 - class gratings, although not in compliance with Standard EN 1433)
- it includes models with small sizes (H 55 and H 80) which are perfect for installation into covered industrial pavings whenever the channel edge needs to be protected during polishing
- it comes complete with drain gullies with siphon
- the range is made up of 8 channels with 3 widths and 4 heights: 100/55, 100/80, 100/100, 100/160, 150/100, 150/160, 200/100, 200/160

THE WING SYSTEM: (pg. 157)

- it supports 4 load classes (C250, D400, E600, F900) in compliance with Standard EN 1433
- it is made up of a HD-PE channel with a strengthening frame
- it is very compact, since the frame is perfectly anchored to the channel body. The frame is made from materials able to resist corrosion due to contact with the surrounding environment and the gratings. The anchoring system was Designed to withstand any deformation due shearing or torsional stress
- it is wearproof and very solid thanks to the frame, which ensures a 4 mm - thick drive-over edge and a 2 mm - thick contact surface in compliance with Standard EN 1433 on classes subject to heavy loads
- it comprises a wide range of standard gratings (with slots, square mesh, anti-heel mesh) made from galvanised steel, stainless steel and ductile cast - iron, as well as galvanised-steel and ductile - cast - iron blind covers, and a cover specially designed for composting systems
- it is supplemented with a whole series of L-shaped and T-shaped longitudinal-slot gratings in load classes from B125 to D400. They are not fixed to the channel but have a linking system through hooks and holes
- it comes complete with an innovative grating for draining asphalt in D400 which has slots in the upper and side sections in order to receive the liquids from the road surface - both surface liquids and liquids absorbed by the draining asphalt
- it has tie-rod and screw fixing systems; and a convenient drain gate
- it is ideal for medium-to-heavy uses, exhibition areas, parking decks, road carriageways, parking areas, service areas, industrial areas, ports and airports, areas where containers are (un)loaded
- It comes complete with drain gullies with siphon
- the range is made up of 9 channels with 3 widths and 5 heights: 100/55, 100/80, 100/100, 100/160, 150/100, 150/160, 200/100, 200/160, 200/250
- the range is supplemented with the WING channel with ductile - cast - iron strengthening frame - length 1.5 m and usable dimensions 300 x 300 mm. Designed to drain large surfaces

THE PLUS SYSTEM: (pg. 208)

- it supports 4 load classes (C250, D400, E600, F900) in compliance with Standard EN 1433
- it is made up of a HD-PE channel with a strengthening frame
- it is supplemented with a galvanised or stainless steel en-bloc frame equipped with 8 external clamps (4 each side) for anchoring it to the concrete and 2 spacers ensuring steadiness against torsional deformation
- it is wearproof and very solid thanks to the frame, which ensures a 4 mm-thick drive-over edge and a 2 mm - thick contact surface in compliance with Standard EN 1433 on classes subject to heavy loads
- it comprises a wide range of standard gratings (with slots, square mesh, anti-heel mesh) made from galvanised steel, stainless steel and ductile cast-iron, as well as steel and ductile-cast-iron blind covers, and a cover specially designed for composting systems
- it comes complete with an innovative grating for draining asphalt in D400 which has slots in the upper and side sections in order to receive the liquids from the road surface - both surface liquids and liquids absorbed by the draining asphalt
- it has tie-rod and screw fixing systems; and a convenient drain gate.
- it is ideal for heavy uses, road carriageways, road crossings with high-speed vehicular traffic (trucks included), service areas, industrial areas, ports and airports, areas where containers are (un)loaded
- it comes complete with drain gullies with siphon
- the range is made up of 8 channels with 3 widths and 4 heights: 100/55, 100/80, 100/100, 100/160, 150/100, 150/160, 200/100, 200/160

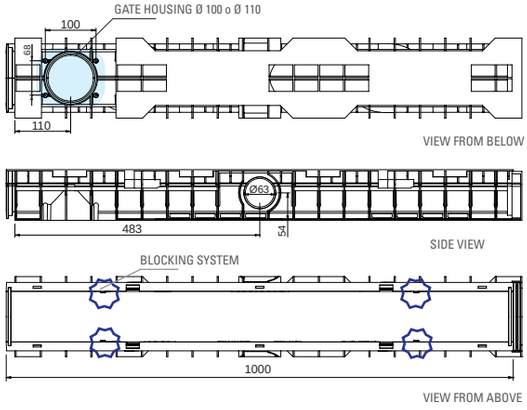
FLAT

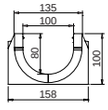
The system:

- it supports 3 load classes (A15, B125, C250) in compliance with Standard EN 1433
- it is made up of a channel - entirely made from HD-PE - which needs no strengthening frame
- it has a wide usable section for drainage and uses lightweight gratings with optimised sizes
- it has a small size thanks to its flat bottom to which a convenient drain gate can be screwed, if needed
- it comprises 4 different types of gratings (with rungs, slots, square mesh, anti-heel mesh) made from galvanised steel, stainless steel and ductile cast-iron
- it is supplemented with different fixing systems, which are ideal for all requirements and range from the classic tie-rod to a simple locking system using a protrusion inside the channel
- it is ideal whenever there is little installation space such as in underground car parks or parking decks, flat roofs, terraces
- it is ideal whenever high-quality aesthetic finishes are to be achieved, since the gratings rest directly on the channel's contact surface, thus covering it completely
- the range is made up of 2 channels with 1 width and 2 heights (100/55 and 100/80)

The product must be laid according to Mufle's specifications. The relevant instructions are available in this Catalogue on page 33 and on the Web site www.mufle.com.

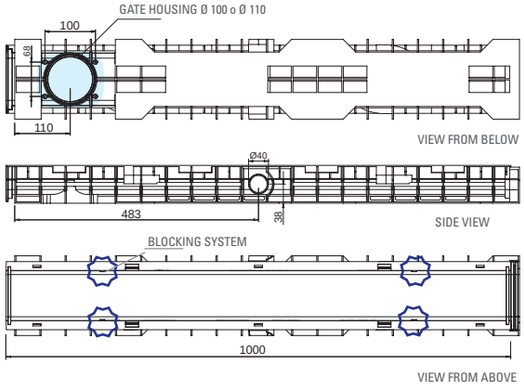
100

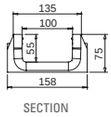




FLAT 100/80

CODE	PRICE	MATERIAL	EXTERNAL DIMENSIONS L x l x h	INTERNAL DIMENSIONS L x l x h	WEIGHT	DRAINAGE SECTION	CAPACITY	PREINSTALLED DRAIN
	€		mm	mm	kg	cm^2	dm^3	mm
706000		HD-PE	1000 x 158 x 100	1000 x 100 x 80	1,60	69,28	6,92	side 2 x Ø 63 bottom*** 1 x Ø 100 ; 1 x Ø 110





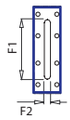
FLAT 100/55

CODE	PRICE	MATERIAL	EXTERNAL DIMENSIONS L x l x h	INTERNAL DIMENSIONS L x l x h	WEIGHT	DRAINAGE SECTION	CAPACITY	PREINSTALLED DRAIN
	€		mm	mm	kg	cm^2	dm^3	mm
706001		HD-PE	1000 x 158 x 75	1000 x 100 x 55	1,40	54,44	5,44	side 2 x Ø 40 bottom*** 1 x Ø 100 ; 1 x Ø 110

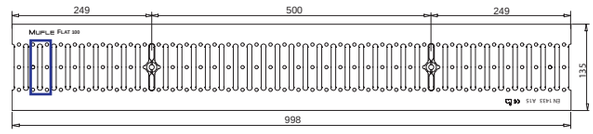
*** For drainage purposes use the drain gate with outlet kit (available in two versions Ø100 and Ø110).
§ Waterproofing: in order to ensure the channels are waterproof, a bituminous adhesive sealant should be used. Heat-sealing the channel joints makes sure there will be no leakages through said joints for a very long time. For further information please contact Mufle's Technical Department.
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF GALVANISED STEEL
Green areas and parks
Pedestrian areas and/or cycle lanes
Sports facilities
Terraces

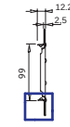
APPLICATIONS OF STAINLESS STEEL
Green areas and parks
Pedestrian areas and/or cycle lanes
Sports facilities
Terraces
Kitchens in hospitals, restaurants and similar facilities.



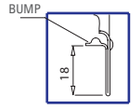
SLOT DETAIL



VIEW FROM ABOVE



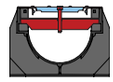
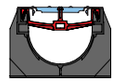
SIDE VIEW



BEND DETAIL

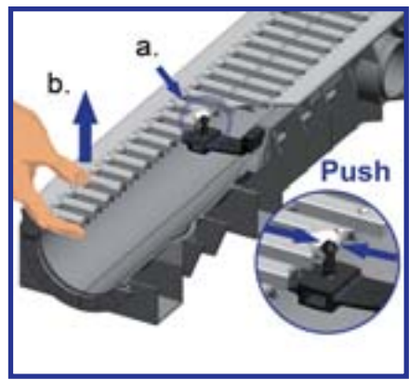
SLOTTED GRATING

12,25 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	clip	protrusion (no fixing)***
506110		galvanised steel DX51D**	998 x 135 x 2,5	1,30	2,35	83,0 x 8,5			
506111		pickled stainless steel AISI 304*							
506112		galvanised steel DX51D**	498 x 135 x 2,5	0,65	1,175				
506113		pickled stainless steel AISI 304*							

GRATING ASSEMBLY BY MEANS OF CLIPS
a. Place the grating on the channel. Match the head of the FLAT clips with the special holes on the grating;
b. Press by hand on the grating until it gets completely hooked.

DISASSEMBLY OF THE GRATING
a. Press slightly on the head of the FLAT clips until the grating gets unhooked;
b. Lift it out.



NEW FEATURE

NEW The new FLAT clip makes it possible to fix the FLAT rung gratings quickly and safely with neither nuts nor bolts!!!

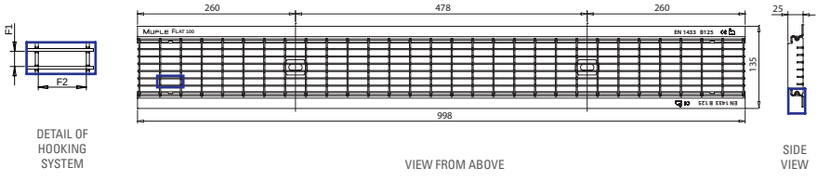
* Classification according to American Standard ASTM.
** Classification according to Standard EN 10142 (issued in July 2002) and symbolic designation according to EN 10027-1 (-2) (issued in September 1993).
*** Hooking system using a protrusion inside the channel. The blocking system does not fix the grating to the channel. Either the tie-rod or the clip system should be used for steady fixing.
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF GALVANISED STEEL

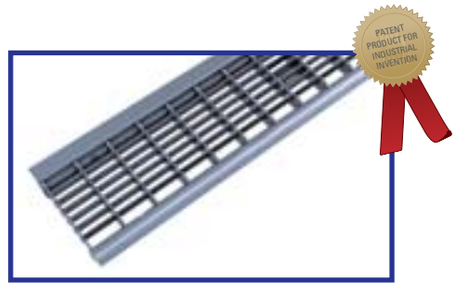
Pavements
Lay-bys and private car parks

APPLICATIONS OF STAINLESS STEEL

Pavements
Lay-bys and private car parks
Food factories
Chemically aggressive environments

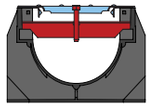


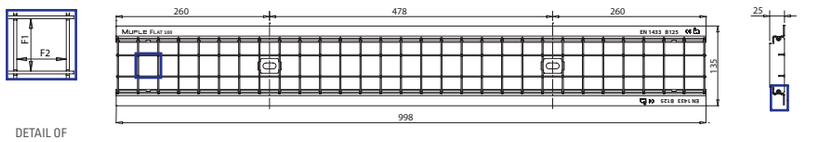
DETAIL OF HOOKING SYSTEM — VIEW FROM ABOVE — SIDE VIEW — DETAIL OF UPRIGHT BEND



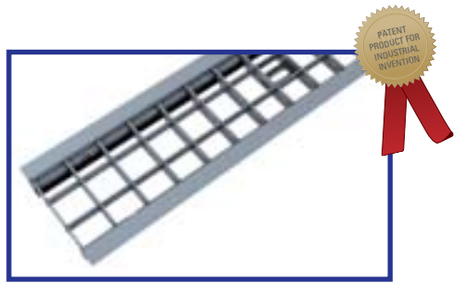
MESH GRATING (11 x 33)

25 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM protrusion (no fixing)***
506102		hot dip galvanised steel DD11 (1.0332)**	998 x 135 x 1,8	3,30	7,05	10,2 x 32,2		
506106		pickled stainless steel AISI 304*						
506104		hot dip galvanised steel DD11 (1.0332)**	498 x 135 x 1,8	1,65	3,525			
506108		pickled stainless steel AISI 304*						

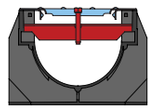


DETAIL OF SQUARE MESH — VIEW FROM ABOVE — SIDE VIEW — DETAIL OF UPRIGHT BEND



MESH GRATING (33 x 33)

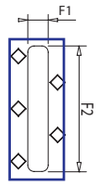
25 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM protrusion (no fixing)***
506103		hot dip galvanised steel DD11 (1.0332)**	998 x 135 x 1,8	2,80	7,10	34,2 x 32,2		
506107		pickled stainless steel AISI 304*						
506105		hot dip galvanised steel DD11 (1.0332)**	498 x 135 x 1,8	1,40	3,55			
506109		pickled stainless steel AISI 304*						

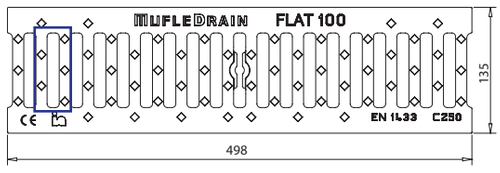
* Classification according to American Standard ASTM.
** Classification according to Standard EN 10111 (issued in March 2000) and symbolic designation according to EN 10027-1 (-2) (issued in September 1993).
*** Hooking system using a protrusion inside the channel. The blocking system does not fix the grating to the channel. Either the tie-rod or the clip system should be used for steady fixing.
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF DUCTILE IRON

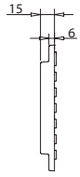
Kerbs
Historical town centres (slow traffic)
Parking areas
Parking decks



SLOT DETAIL



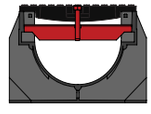
VIEW FROM ABOVE



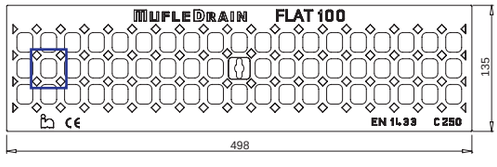
SIDE VIEW

SLOTTED GRATING 13 mm

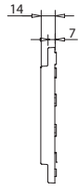
15 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM no fixing
506100		GJS 500/7* ductile iron water based paint coated	498 x 135 x 6	3,50	1,90	13,0 x 80,0		up to Class C250 as per Standard EN 1433

SLOT DETAIL



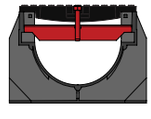
VIEW FROM ABOVE



SIDE VIEW

MESH GRATING

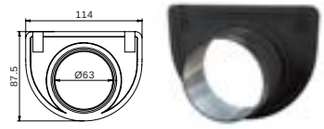
14 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM no fixing
506101		GJS 500/7* ductile iron water based paint coated	498 x 135 x 7	3,30	2,15	21,0 x 17,0		up to Class C250 as per Standard EN 1433

* Classification according to Standard EN 1563 (issued in March 2004).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

End-cap 100/55

Closed end-cap with drain 100/55

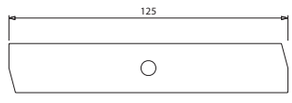


End-cap 100/80

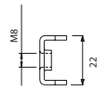
Closed end-cap with drain 100/80

END CAPS

CODE	PRICE	TYPE	MATERIAL	VALID FOR CHANNELS	PREINSTALLED DRAINS
	€				mm
700500		end-cap with drain	HD-PE	100/55	1 x Ø 40
700508		closed end-cap	HD-PE	100/55	-
700501		end-cap with drain	HD-PE	100/80	1 x Ø 63
700509		closed end-cap	HD-PE	100/80	-



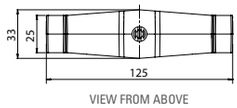
VIEW FROM ABOVE



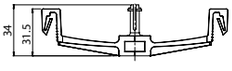
SIDE VIEW

KIT TIE-ROD + SCREWS

CODE	PRICE	MATERIAL	VALID FOR GRATINGS	SCREW	KIT FOR 1 ml
	€				
500412		galvanised steel	FLAT galvanised steel	M8 x 40 TBL combi	2 tie-rods + 2 screws
500413		stainless steel	FLAT stainless steel	M8 x 40 TBL combi stainless steel	2 tie-rods + 2 screws
500414		black galvanised steel	FLAT ductile iron	M8 x 40 black with hexagonal head	2 tie-rods + 2 screws



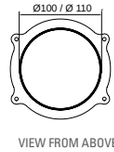
VIEW FROM ABOVE



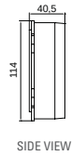
SIDE VIEW

KIT CLIP

CODE	PRICE	MATERIAL	VALID FOR GRATINGS	KIT FOR 1 ml
	€			
511212		HD-PE	FLAT slotted galvanised steel - stainless steel	2 clip



VIEW FROM ABOVE



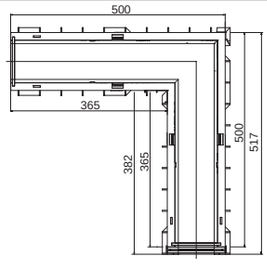
SIDE VIEW

KIT OUTLET + SCREWS

CODE	PRICE	MATERIAL	VALID FOR CHANNELS	DIAMETER	KIT FOR 1 ml
	€			mm	
506114		HD-PE	100/55 - 100/80	Ø 100	1 outlet Ø 100 + 4 screws
506115		HD-PE	100/55 - 100/80	Ø 110	1 outlet Ø 110 + 4 screws

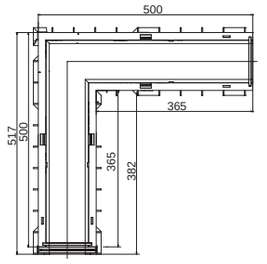
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

LEFT CORNER — FLAT 100



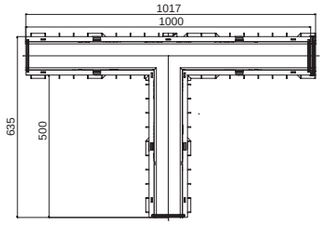
CODE	PRICE €	MODEL
706100		100/80
706101		100/55

RIGHT CORNER — FLAT 100



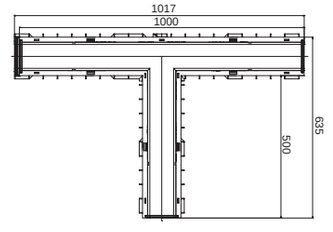
CODE	PRICE €	MODEL
706102		100/80
706103		100/55

LEFT TI — FLAT 100



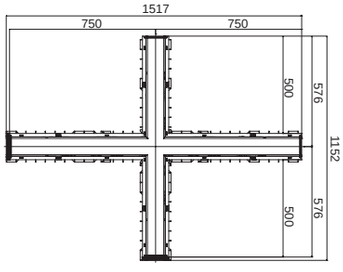
CODE	PRICE €	MODEL
706104		100/80
706105		100/55

RIGHT TI — FLAT 100



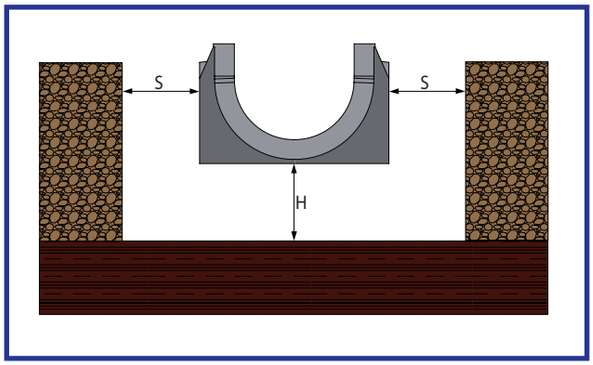
CODE	PRICE €	MODEL
706106		100/80
706107		100/55

CROSS — FLAT 100



CODE	PRICE €	MODEL
706108		100/80
706109		100/55

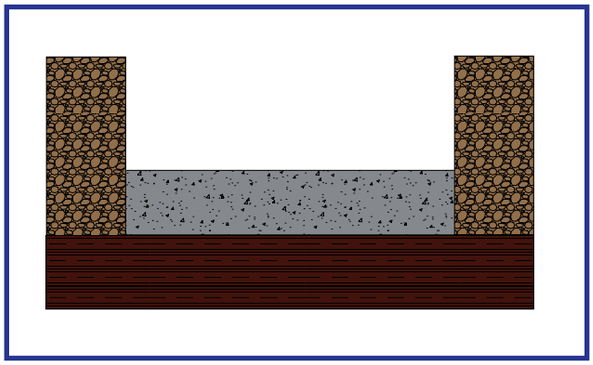
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



Step 1

HOLE SIZE

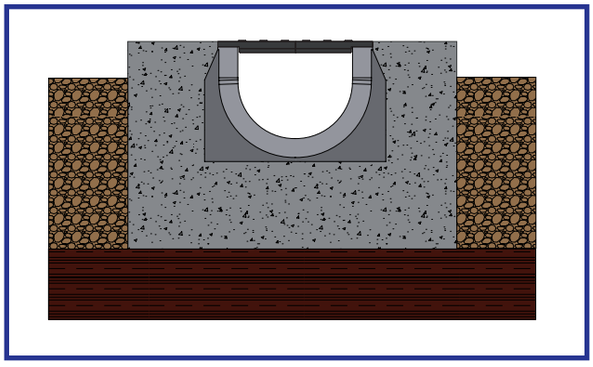
The hole needed to lay the MufleDrain channel must allow not only for the size of the channel and the drain piping but also for adequate space for the base H and the side concrete props S. The dimensions to be followed are shown in the summary table. In this step make sure the underlying layer is suitable to the load it is expected to support.



Step 2

CONCRETE BASE

Cast the concrete base H up to the height specified, allowing for any inclination in the drainage line. If needed, equip the base with stretches of electrowelded mesh or steel rods.

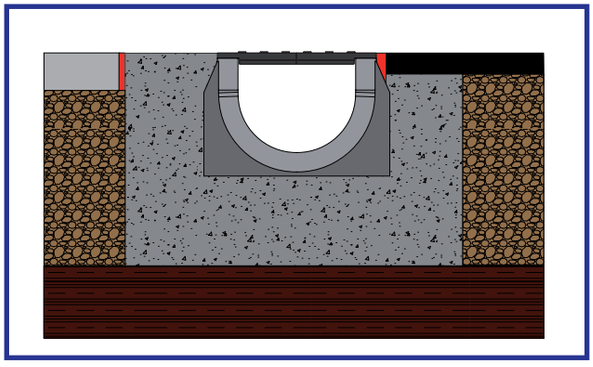


Step 3

CHANNEL ARRANGEMENT

Lay the channels starting from the flow outlet. Allow for the drains required and build the side prop S up to the maximum height allowed by the final coating. Shape it according to the needs based on the drawing. Introduce and fix the grating required beforehand in order to prevent any deformation of the channel due to the thrust of concrete and to speed up installation. Protect the gratings with a PVC film so that no final cleaning must be carried out to remove any concrete residues.

NEW FEATURE:
The channels can be installed with preassembled gratings.

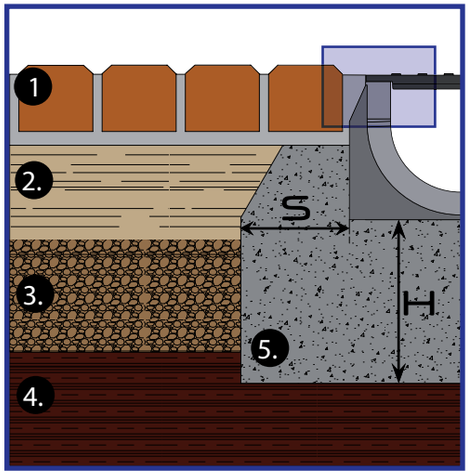


Step 4

FINAL COATING

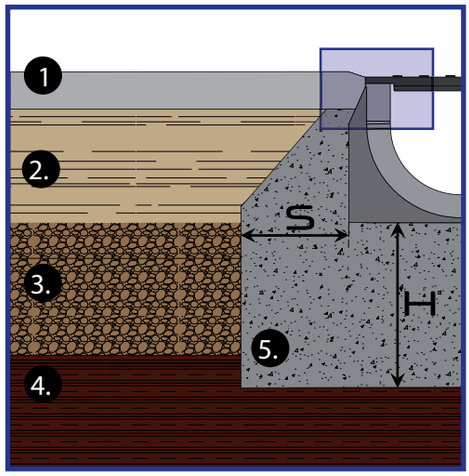
When applying the final coating, make sure its upper profile reaches up to minimum 3/5 mm above the grating's flow plane (see details on the following page). Remove the protection film.

Case 1
Flooring
(A15-B125)



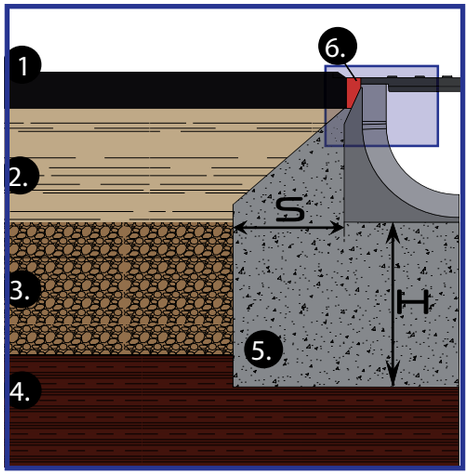
1. Flooring
2. Lower layer
3. Bearing layer
4. Subfloor
5. Concrete reinforcement layer

Case 2
Concrete flooring
(A15-B125-C250)

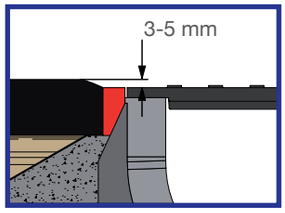


1. Flooring
2. Lower layer
3. Bearing layer
4. Subfloor
5. Concrete reinforcement layer

Case 3
Asphalt
(A15-B125-C250)



1. Flooring
2. Lower layer
3. Bearing layer
4. Subfloor
5. Concrete reinforcement layer
6. Bitumen joint



This Sheet is only aimed to give advice on the installation of channels mod. MufleDrain. In any case, always:
- check the carrying capacity characteristics of the underlying layer
- use concrete and stone aggregate having the characteristics recommended
- comply with the height of the installation surface and the thickness of the prop as specified according to the load classes.

SUMMARY TABLE				
Load class (EN 1433)		A 15	B 125	C 250
Applicable load (EN 1433)	kN	15	125	250
Minimum height H of concrete laying bed	mm	100	100	150
Minimum thickness S of the concrete flanking	mm	100	100	150
Concrete compression strength class (EN 206-1)		C 20/25	C 25/30	C 25/30
Concrete compression strength class* (EN 206-1)		C 30/37 XF4	C 30/37 XF4	C 30/37 XF4

* If concrete can be affected by frost and thaw cycles.
N.B. We recommend using Class S4 concrete (EN 206-1) and stone aggregate with maximum diameter 8 mm.

1. Supply and installation of MufleDrain FLAT type HD-PE drainage channel with external stiffening ribs and male-female coupling system allowing the assembly between one channel and the next with the relevant pre-assembled gratings. The channel will have 2 side drain diaphragms at pre-determined points and it will be designed to house a HD-PE drain gate (diameter 100 mm - 110 mm) on the bottom through 4 screws. The channel surface will be perfectly smooth and have a low roughness coefficient to allow the best water flow. Il will also be perfectly water-tight and devoid of any connection points with the outside. The channel will have 2 protrusions on each side of the internal walls in order to ensure the gratings can be locked in place. The channel will have the following dimensions: length 1.000 mm, internal net gap 100 mm, internal height ___ mm.

2. Supply and installation of ductile cast-iron GJS 500/7 covering gratings according to EN 1563-2004 for MufleDrain FLAT drainage channels with bar fixing system, load class C250 according to EN 1433-2004, slot width 13 mm, length 498 mm, width 135 mm.

3. Supply and installation of ductile cast-iron GJS 500/7 covering gratings according to EN 1563-2004 with mesh for MufleDrain FLAT drainage channel with bar fixing system, load class C250 according to EN 1433-2004, length 498 mm, width 135 mm.

4. Supply and installation of galvanised (stainless) steel square-mesh or anti-heel covering gratings for MufleDrain FLAT drainage channels with bar fixing system, load class B125 according to EN 1433-2004, length 998 mm, width 135 mm. A similar grating will be available upon request with length 498 mm. The dimensions will be 33 x 33 mm in the square mesh and 33 x 11 mm in the anti-heel mesh.

5. Supply and installation of galvanised (stainless) steel rung covering gratings for MufleDrain FLAT drainage channels with bar fixing system (Clip), load class A15 according to EN 1433-2004, length 998 mm, width 135 mm. A similar grating will be available upon request with length 498 mm.

6. Supply and installation of HD-PE end cap for MufleDrain drainage channel with coupling system into the special channel housing.

7. Supply and installation of HD-PE open cap with drainage hole diameter ___mm for MufleDrain drainage channel with coupling system into the special channel housing.

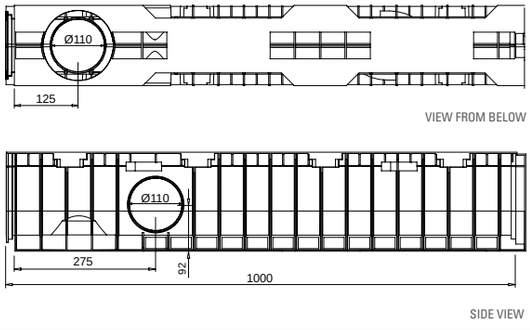
EASY

The system:

- it supports 3 load classes (A15, B125, C250) in compliance with Standard EN 1433
- it is made up of a channel - entirely made from HD-PE - which needs no strengthening frame
- it comprises 4 different types of gratings (with rungs, slots, square mesh, anti-heel mesh) made from galvanised steel, stainless steel and ductile cast-iron
- it comes equipped with a classic tie-rod fixing system
- it is ideal for household and civil uses, pedestrian areas, private car parks, footways, canalisation systems in roads and parking areas
- it is ideal whenever high-quality aesthetic finishes are to be achieved, since the gratings rest directly on the channel's contact surface, thus covering it completely
- it comes complete with drain gullies with siphon
- the range is made up of 6 channels with 3 widths and 2 heights (100/100, 100/160, 150/100, 150/160, 200/100, 200/160)

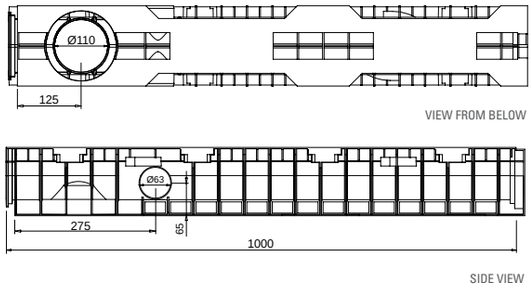
The product must be laid according to Mufle's specifications. The relevant instructions are available in this Catalogue on page 64 and on the Web site www.mufle.com.

100



EASY 100/160

CODE	PRICE	MATERIAL	EXTERNAL DIMENSIONS L x l x h	INTERNAL DIMENSIONS L x l x h	WEIGHT	DRAINAGE SECTION	CAPACITY	PREINSTALLED DRAIN OUTLETS
	€		mm	mm	kg	cm^2	dm^3	mm
700000		HD-PE	1000 x 158 x 194	1000 x 100 x 160	2,40	145,28	14,52	side 2 x Ø 110 bottom 1 x Ø 110



EASY 100/100

CODE	PRICE	MATERIAL	EXTERNAL DIMENSIONS L x l x h	INTERNAL DIMENSIONS L x l x h	WEIGHT	DRAINAGE SECTION	CAPACITY	PREINSTALLED DRAIN OUTLET
	€		mm	mm	kg	cm^2	dm^3	mm
700001		HD-PE	1000 x 158 x 134	1000 x 100 x 100	1,90	89,56	8,95	side 2 x Ø 63 bottom 1 x Ø 110

§ Waterproofing: in order to ensure the channels are waterproof, a bituminous adhesive sealant should be used. Heat-sealing the channel joints makes sure there will be no leakages through said joints for a very long time. For further information please contact Mufle's Technical Department.

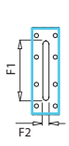
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF GALVANISED STEEL

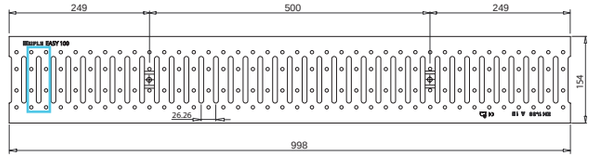
Green areas and parks
Pedestrian areas and/or cycle lanes
Sports facilities
Terraces

APPLICATIONS OF STAINLESS STEEL

Green areas and parks
Pedestrian areas and/or cycle lanes
Sports facilities
Terraces
Kitchens in hospitals, restaurants and similar facilities.

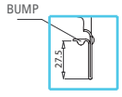


SLOT DETAIL



VIEW FROM ABOVE

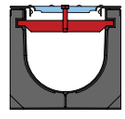
SIDE VIEW



BEND DETAIL

SLOTTED GRATING

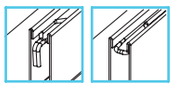
13 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM no fixing
500109		galvanised steel DX51D**	998 x 154 x 2,5	1,80	2,68	83,0 x 8,5		up to Class C250 as per Standard EN 1433
500111		pickled stainless steel AISI 304*						
500170		galvanised steel DX51D**	498 x 154 x 2,5	0,90	1,34			
500172		pickled stainless steel AISI 304*						

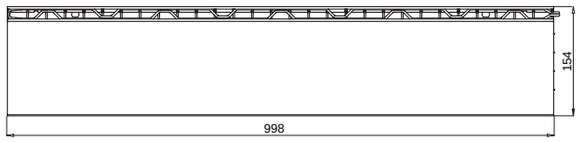
* Classification according to American Standard ASTM.
** Classification according to Standard EN 10142 (issued in July 2002) and symbolic designation according to EN 10027-1 (-2) (issued in September 1993).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF GALVANISED STEEL
Low visual impact drainage in public and private places

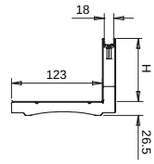
APPLICATIONS OF STAINLESS STEEL
Low visual impact drainage in public and private places



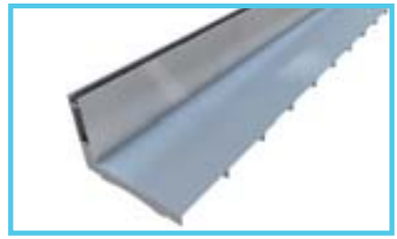
DETAIL OF HOOKING SYSTEM***



VIEW FROM ABOVE

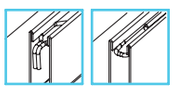


SIDE VIEW

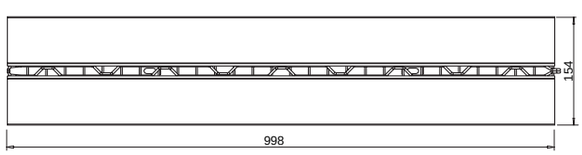


L-SHAPED GRATING

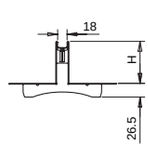
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	HEIGHT OF SLOTS H mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm
500212		hot dip galvanised steel DD11 (1.0332)**	998 x 154 x 106,5	80	5,10	1,80	998 x 18
on request		pickled stainless steel AISI 304*					
500213		hot dip galvanised steel DD11 (1.0332)**	998 x 154 x 146,5	120	6,30	1,80	
on request		pickled stainless steel AISI 304*					



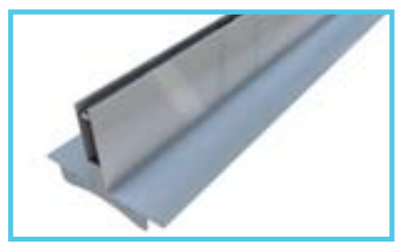
DETAIL OF HOOKING SYSTEM***



VIEW FROM ABOVE



SIDE VIEW



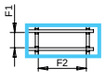
T-SHAPED GRATING

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	HEIGHT OF SLOTS H mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm
500206		hot dip galvanised steel DD11 (1.0332)**	998 x 154 x 106,5	80	4,80	1,80	998 x 18
on request		pickled stainless steel AISI 304*					
500207		hot dip galvanised steel DD11 (1.0332)**	998 x 154 x 146,5	120	5,90	1,80	
on request		pickled stainless steel AISI 304*					

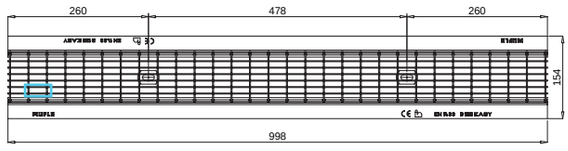
* Classification according to American Standard ASTM.
** Classification according to Standard EN 10111 (issued in March 2000) and symbolic designation according to EN 10027-1 (-2) (issued in September 1993).
*** Hooking System between the gratings through hooks and holes.
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF GALVANISED STEEL
Pavements
Lay-bys and private car parks

APPLICATIONS OF STAINLESS STEEL
Pavements
Lay-bys and private car parks
Food factories
Chemically aggressive environments

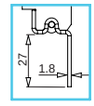


DETAIL OF HOOKING SYSTEM

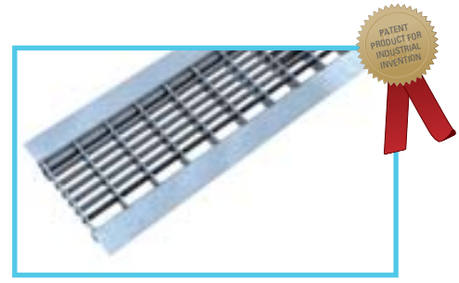


VIEW FROM ABOVE

SIDE VIEW

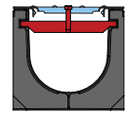


DETAIL OF UPRIGHT BEND

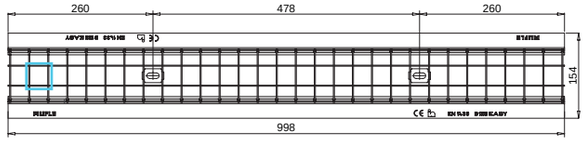


MESH GRATING (11 x 33)

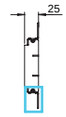

25 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM no fixing
500105		hot dip galvanised steel DD11 (1.0332)**	998 x 154 x 1,8	3,90	6,66	10,2 x 32,2		up to Class C250 as per Standard EN 1433
500104		pickled stainless steel AISI 304*						
500166		hot dip galvanised steel DD11 (1.0332)**	498 x 154 x 1,8	1,95	3,33			
500165		pickled stainless steel AISI 304*						

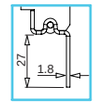
DETAIL OF SQUARE MESH



VIEW FROM ABOVE



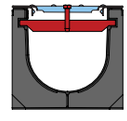
SIDE VIEW



DETAIL OF UPRIGHT BEND

MESH GRATING (33 x 33)


25 mm

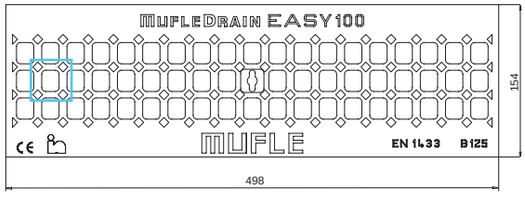
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM no fixing
500106		hot dip galvanised steel DD11 (1.0332)**	998 x 154 x 1,8	3,30	9,50	34,2 x 32,2		up to Class C250 as per Standard EN 1433
500108		pickled stainless steel AISI 304*						
500167		hot dip galvanised steel DD11 (1.0332)**	498 x 154 x 1,8	1,65	4,75			
500169		pickled stainless steel AISI 304*						

* Classification according to American Standard ASTM.
** Classification according to Standard EN 10111 (issued in March 2000) and symbolic designation according to EN 10027-1 (-2) (issued in September 1993).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF DUCTILE IRON

Pavements
Lay-bys and private car parks

SLOT DETAIL



VIEW FROM ABOVE

SIDE VIEW

MESH GRATING

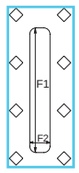
13 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM no fixing
500143		GJS 500/7* ductile iron water based paint coated	498 x 154 x 7	3,00	2,15	21,5 x 17,5		up to Class C250 as per Standard EN 1433

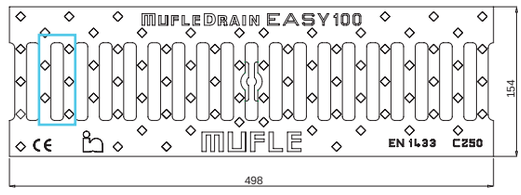
* Classification according to Standard EN 1563 (issued in March 2004).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF DUCTILE IRON

Kerbs
Historical town centres (slow traffic)
Parking areas
Parking decks

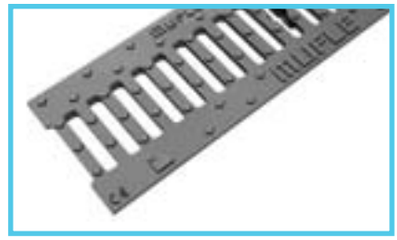


SLOT DETAIL



VIEW FROM ABOVE

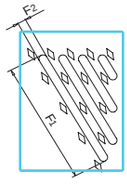
SIDE VIEW



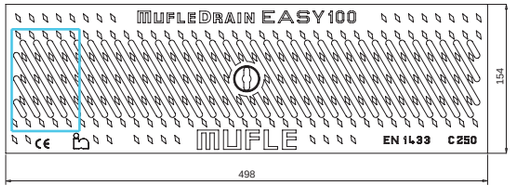
SLOTTED GRATING 13 mm

15 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm²	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM no fixing
500144		GJS 500/7* ductile iron water based paint coated	498 x 154 x 7	4,20	2,10	80,0 x 13,0		up to Class C250 as per Standard EN 1433

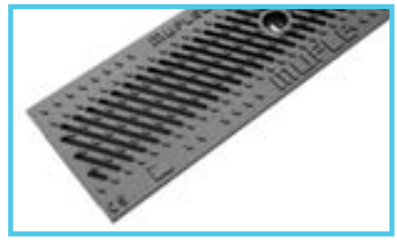


SLOT DETAIL



VIEW FROM ABOVE

SIDE VIEW



SLOTTED GRATING 6 mm

14 mm

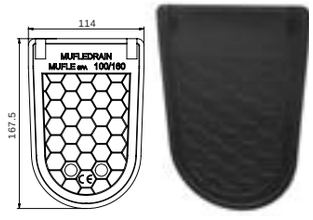
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm²	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM no fixing
500146		GJS 500/7* ductile iron water based paint coated	498 x 154 x 7	3,90	1,90	91,5 x 6,0		up to Class C250 as per Standard EN 1433

* Classification according to Standard EN 1563 (issued in March 2004).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

End-cap 100/100

Closed end-cap with drain 100/100

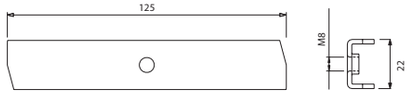
End-cap 100/160



Closed end-cap with drain 100/160

END CAPS

CODE	PRICE	TYPE	MATERIAL	VALID FOR CHANNELS	PREINSTALLED DRAINS
	€				mm
700502		end-cap with drain	HD-PE	100/100	1 x Ø 63
700510		closed end-cap	HD-PE	100/100	-
700503		end-cap with drain	HD-PE	100/160	1 x Ø 63
700511		closed end-cap	HD-PE	100/160	-



VIEW FROM ABOVE SIDE VIEW

KIT TIE-ROD + SCREWS

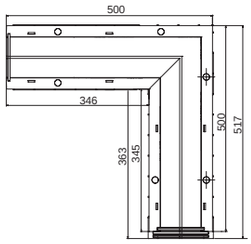
CODE	PRICE	MATERIAL	VALID FOR GRATINGS	SCREW	KIT FOR 1 ml
	€				
500412		galvanised steel	EASY galvanised steel	M8 x 40 TBL combi	2 tie-rods + 2 screws
500413		stainless steel	EASY stainless steel	M8 x 40 TBL combi stainless steel	2 tie-rods + 2 screws
500414		black galvanised steel	EASY ductile iron	M8 x 40 black with hexagonal head	2 tie-rods + 2 screws

N.B. Sizes and weights are subject to usual manufacturing tolerance values.

SPECIAL PIECES AND DRAIN BOX WITH SYPHON

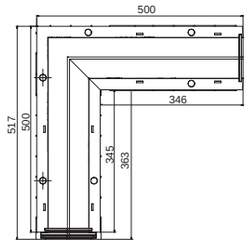
EASY 100

LEFT CORNER — EASY 100



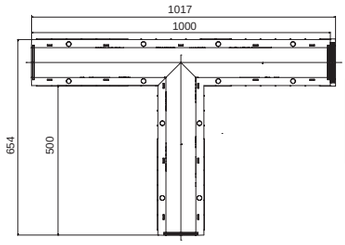
CODE	PRICE €	MODEL
700100		100/160
700101		100/100

RIGHT CORNER — EASY 100



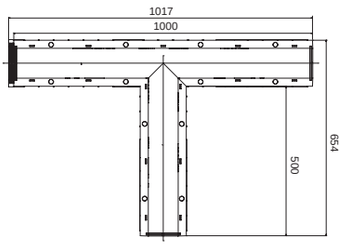
CODE	PRICE €	MODEL
700106		100/160
700107		100/100

LEFT TI — EASY 100



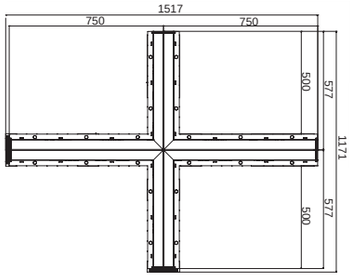
CODE	PRICE €	MODEL
700112		100/160
700113		100/100

RIGHT TI — EASY 100



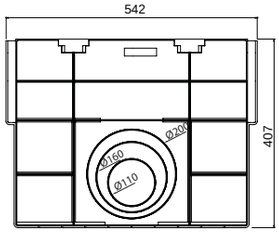
CODE	PRICE €	MODEL
700118		100/160
700119		100/100

CROSS — EASY 100

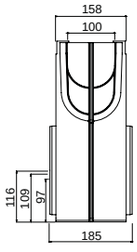


CODE	PRICE €	MODEL
700124		100/160
700125		100/100

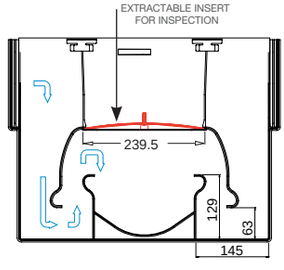
DRAIN BOX WITH SYPHON



FRONT VIEW



SIDE VIEW



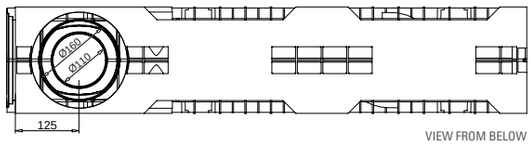
SECTION

EASY 100

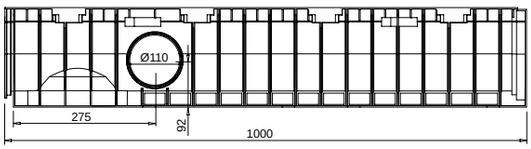
CODE	PRICE €	MATERIAL	EXTERNAL DIMENSIONS L x l x h mm	INTERNAL DIMENSIONS L x l x h mm	MAXIMUM LARGE mm	HEIGHT OF OUTLETS mm	WEIGHT kg	PREINSTALLED DRAIN OUTLETS mm
700008		HD-PE	542 x 158 x 407	500 x 100 x 400	185	116 - 109 - 97	2,50	2 x Ø 110; 2 x Ø 160; 2 x Ø 200

N.B. Sizes and weights are subject to usual manufacturing tolerance values.

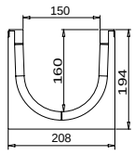
150



VIEW FROM BELOW



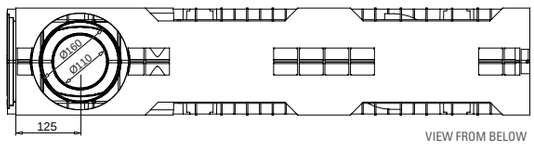
SIDE VIEW



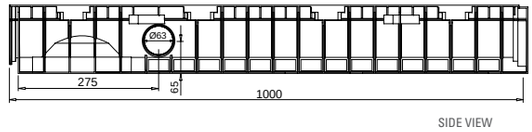
SECTION

EASY 150/160

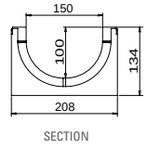
CODE	PRICE	MATERIAL	EXTERNAL DIMENSIONS L x l x h	INTERNAL DIMENSIONS L x l x h	WEIGHT	DRAINAGE SECTION	CAPACITY	PREINSTALLED DRAIN OUTLET
	€		mm	mm	kg	cm^2	dm^3	mm
700002		HD-PE	1000 x 208 x 194	1000 x 150 x 160	2,85	213,04	21,30	side 2 x Ø 110 bottom 1 x Ø 110 ; 1 x Ø 160



VIEW FROM BELOW



SIDE VIEW



SECTION

EASY 150/100

CODE	PRICE	MATERIAL	EXTERNAL DIMENSIONS L x l x h	INTERNAL DIMENSIONS L x l x h	WEIGHT	DRAINAGE SECTION	CAPACITY	PREINSTALLED DRAIN OUTLET
	€		mm	mm	kg	cm^2	dm^3	mm
700003		HD-PE	1000 x 208 x 134	1000 x 150 x 100	2,30	127,32	12,73	side 2 x Ø 63 bottom 1 x Ø 110 ; 1 x Ø 160

§ Waterproofing: in order to ensure the channels are waterproof, a bituminous adhesive sealant should be used. Heat-sealing the channel joints makes sure there will be no leakages through said joints for a very long time. For further information please contact Mufle's Technical Department.

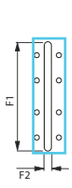
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF GALVANISED STEEL

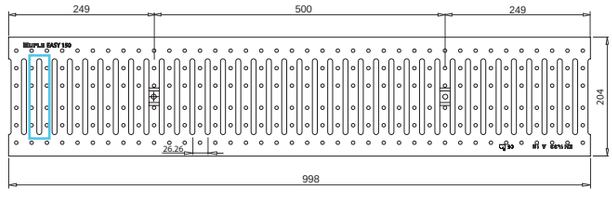
Green areas and parks
Pedestrian areas and/or cycle lanes
Sports facilities
Terraces

APPLICATIONS OF STAINLESS STEEL

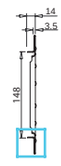
Green areas and parks
Pedestrian areas and/or cycle lanes
Sports facilities
Terraces
Kitchens in hospitals, restaurants and similar facilities.



SLOT DETAIL



VIEW FROM ABOVE

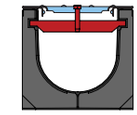


SIDE VIEW

DETAIL OF UPRIGHT BEND

SLOTTED GRATING

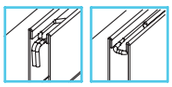
14 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM no fixing
500123		galvanised steel DX51D**	998 x 204 x 3,5	3,30	4,20	130,0 x 8,5		up to Class C250 as per Standard EN 1433
500124		pickled stainless steel AISI 304*						
500184		galvanised steel DX51D**	498 x 204 x 3,5	1,65	2,10			
500185		pickled stainless steel AISI 304*						

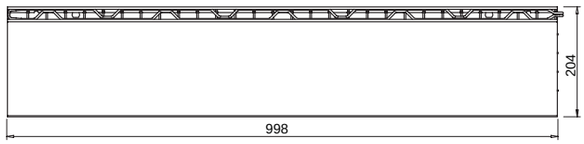
* Classification according to American Standard ASTM.
** Classification according to Standard EN 10142 (issued in July 2002) and symbolic designation according to EN 10027-1 (-2) (issued in September 1993).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF GALVANISED STEEL
Low visual impact drainage in public and private places

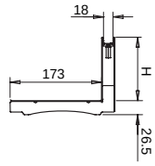
APPLICATIONS OF STAINLESS STEEL
Low visual impact drainage in public and private places



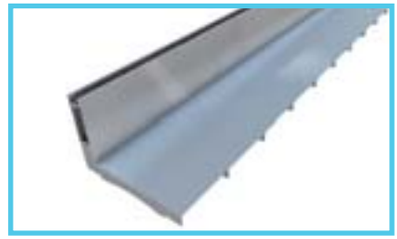
DETAIL OF HOOKING SYSTEM***



VIEW FROM ABOVE

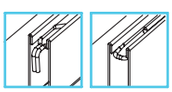


SIDE VIEW

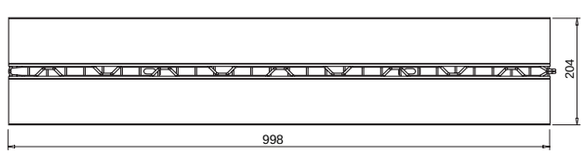


L-SHAPED GRATING

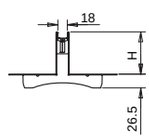
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	HEIGHT OF SLOTS H mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm
500214		hot dip galvanised steel DD11 (1.0332)**	998 x 204 x 106,5	80	5,90	1,80	998 x 18
on request		pickled stainless steel AISI 304*					
500215		hot dip galvanised steel DD11 (1.0332)**	998 x 204 x 146,5	120	6,90	1,80	
on request		pickled stainless steel AISI 304*					



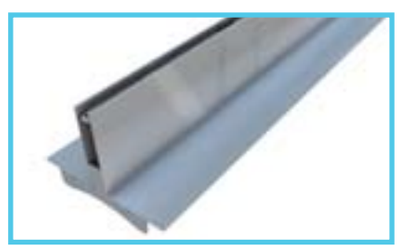
DETAIL OF HOOKING SYSTEM***



VIEW FROM ABOVE



SIDE VIEW



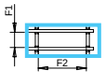
T-SHAPED GRATING

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	HEIGHT OF SLOTS H mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm
500208		hot dip galvanised steel DD11 (1.0332)**	998 x 204 x 106,5	80	5,60	1,80	998 x 18
on request		pickled stainless steel AISI 304*					
500209		hot dip galvanised steel DD11 (1.0332)**	998 x 204 x 146,5	120	6,60	1,80	
on request		pickled stainless steel AISI 304*					

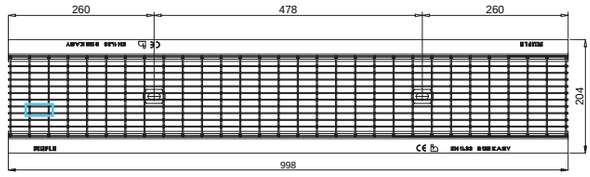
* Classification according to American Standard ASTM.
** Classification according to Standard EN 10111 (issued in March 2000) and symbolic designation according to EN 10027-1 (-2) (issued in September 1993).
*** Hooking System between the gratings through hooks and holes.
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF GALVANISED STEEL
Pavements
Lay-bys and private car parks

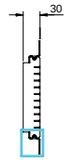
APPLICATIONS OF STAINLESS STEEL
Pavements
Lay-bys and private car parks
Food factories
Chemically aggressive environments



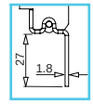
DETAIL OF HOOKING SYSTEM



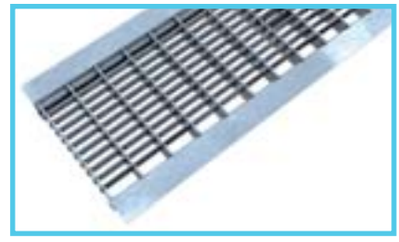
VIEW FROM ABOVE



SIDE VIEW

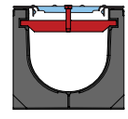


DETAIL OF UPRIGHT BEND

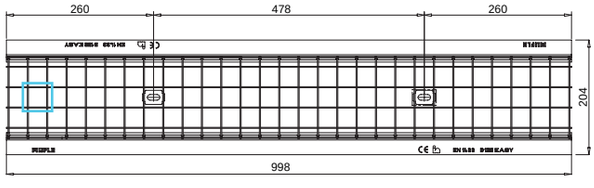


MESH GRATING (11 x 33)

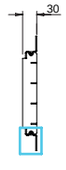
30 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM no fixing
500117		hot dip galvanised steel DD11 (1.0332)**	998 x 204 x 1,8	5,40	10,50	10,2 x 32,2		up to Class C250 as per Standard EN 1433
500119		pickled stainless steel AISI 304*						
500178		hot dip galvanised steel DD11 (1.0332)**	498 x 204 x 1,8	2,70	5,25			
500180		pickled stainless steel AISI 304*						

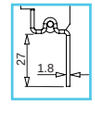
DETAIL OF SQUARE MESH



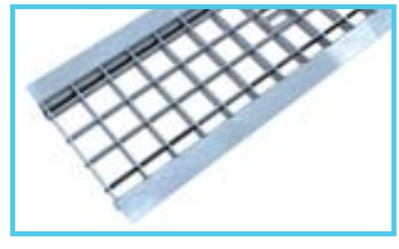
VIEW FROM ABOVE



SIDE VIEW

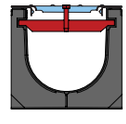


DETAIL OF UPRIGHT BEND



MESH GRATING (33 x 33)

30 mm

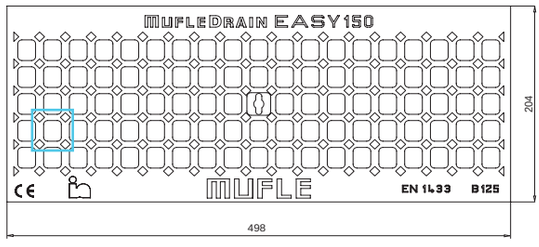
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM no fixing
500120		hot dip galvanised steel DD11 (1.0332)**	998 x 204 x 1,8	4,60	12,77	34,2 x 32,2		up to Class C250 as per Standard EN 1433
500122		pickled stainless steel AISI 304*						
500181		hot dip galvanised steel DD11 (1.0332)**	498 x 204 x 1,8	2,30	6,38			
500183		pickled stainless steel AISI 304*						

* Classification according to American Standard ASTM.
** Classification according to Standard EN 10111 (issued in March 2000) and symbolic designation according to EN 10027-1 (-2) (issued in September 1993).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

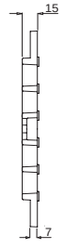
APPLICATIONS OF DUCTILE IRON

Pavements
Lay-bys and private car parks

SLOT DETAIL



VIEW FROM ABOVE



SIDE VIEW

MESH GRATING

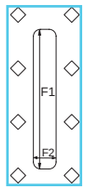
15 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM no fixing
500149		GJS 500/7* ductile iron water based paint coated	498 x 204 x 7	4,70	3,58	21,5 x 17,5		up to Class C250 as per Standard EN 1433

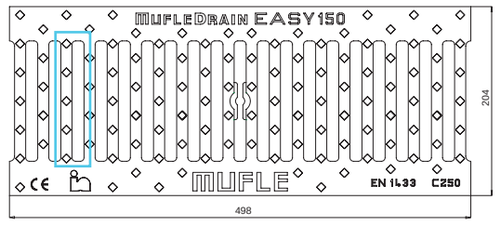
* Classification according to Standard EN 1563 (issued in March 2004).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF DUCTILE IRON

Kerbs
Historical town centres (slow traffic)
Parking areas
Parking decks



SLOT DETAIL



VIEW FROM ABOVE

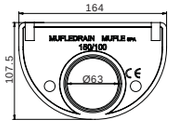
SIDE VIEW

SLOTTED GRATING 13 mm

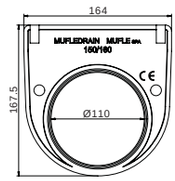
20 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM no fixing
500151		GJS 500/7* ductile iron water based paint coated	498 x 204 x 7	5,50	3,38	130,0 x 13,0		up to Class C250 as per Standard EN 1433

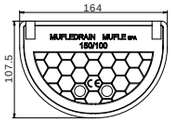
* Classification according to Standard EN 1563 (issued in March 2004).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



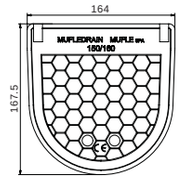
End-cap 150/100



End-cap 150/160



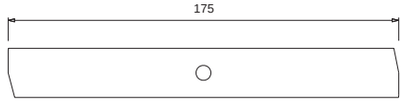
Closed end-cap with drain 150/100



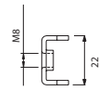
Closed end-cap with drain 150/160

END CAPS

CODE	PRICE	TYPE	MATERIAL	VALID FOR CHANNELS	PREINSTALLED DRAINS
	€				mm
700504		end-cap with drain	HD-PE	150/100	1 x Ø 63
700512		closed end-cap	HD-PE	150/100	-
700505		end-cap with drain	HD-PE	150/160	1 x Ø 110
700513		closed end-cap	HD-PE	150/160	-



VIEW FROM ABOVE



SIDE VIEW

KIT TIE-ROD + SCREWS

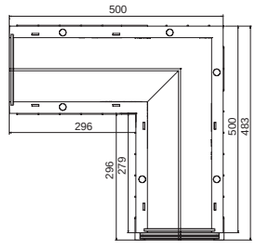
CODE	PRICE	MATERIAL	VALID FOR GRATINGS	SCREW	KIT FOR 1 ml
	€				
500415		galvanised steel	EASY galvanised steel	M8 x 40 TBL combi	2 tie-rods + 2 screws
500416		stainless steel	EASY stainless steel	M8 x 40 TBL combi	2 tie-rods + 2 screws
500417		black galvanised steel	EASY ductile iron	M8 x 40 black with hexagonal head	2 tie-rods + 2 screws

N.B. Sizes and weights are subject to usual manufacturing tolerance values.

SPECIAL PIECES AND DRAIN BOX WITH SYPHON

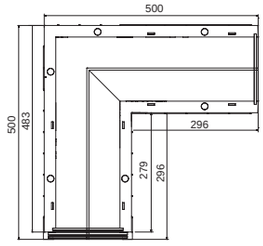
EASY 150

LEFT CORNER — EASY 150



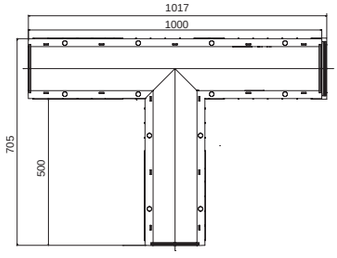
CODE	PRICE €	MODEL
700102		150/160
700103		150/100

RIGHT CORNER — EASY 150



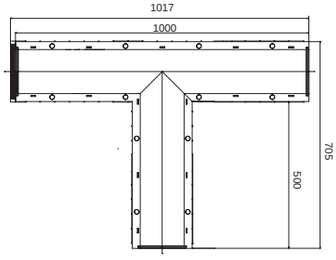
CODE	PRICE €	MODEL
700108		150/160
700109		150/100

LEFT TI — EASY 150



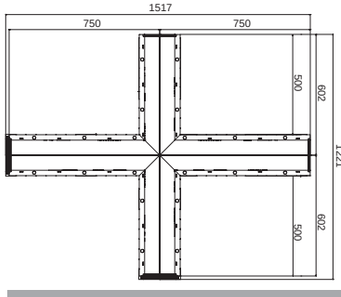
CODE	PRICE €	MODEL
700114		150/160
700115		150/100

RIGHT TI — EASY 150



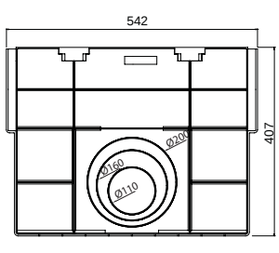
CODE	PRICE €	MODEL
700120		150/160
700121		150/100

CROSS — EASY 150

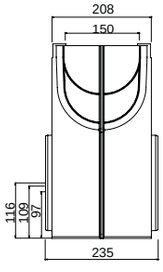


CODE	PRICE €	MODEL
700126		150/160
700127		150/100

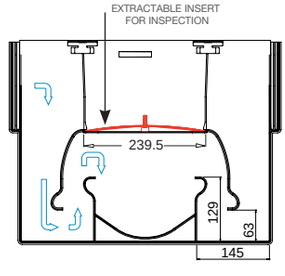
DRAIN BOX WITH SYPHON



FRONT VIEW



SIDE VIEW



SECTION

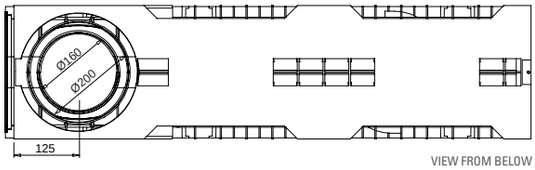
EASY 150

CODE	PRICE €	MATERIAL	EXTERNAL DIMENSIONS L x l x h mm	INTERNAL DIMENSIONS L x l x h mm	MAXIMUM LARGE mm	HEIGHT OF OUTLETS mm	WEIGHT kg	PREINSTALLED DRAIN OUTLETS mm
700009		HD-PE	542 x 208 x 407	500 x 150 x 400	235	116 - 109 - 97	2,78	2 x Ø 110; 2 x Ø 160; 2 x Ø 200

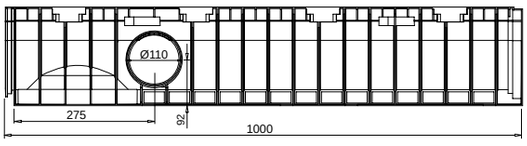
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

MUFLE

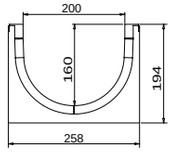
200



VIEW FROM BELOW



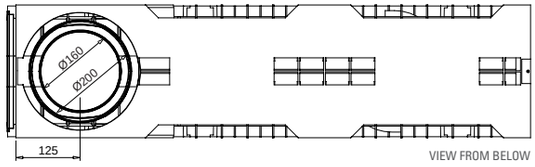
SIDE VIEW



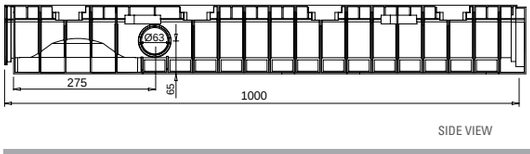
SECTION

EASY 200/160

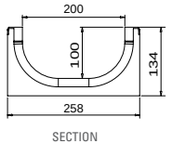
CODE	PRICE	MATERIAL	EXTERNAL DIMENSIONS L x l x h	INTERNAL DIMENSIONS L x l x h	WEIGHT	DRAINAGE SECTION	CAPACITY	PREINSTALLED DRAIN OUTLET
	€		mm	mm	kg	cm^2	dm^3	mm
700004		HD-PE	1000 x 258 x 194	1000 x 200 x 160	3,25	275,87	27,58	side 2 x Ø 110 bottom 1 x Ø 200 ; 1 x Ø 160



VIEW FROM BELOW



SIDE VIEW



SECTION

EASY 200/100

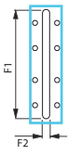
CODE	PRICE	MATERIAL	EXTERNAL DIMENSIONS L x l x h	INTERNAL DIMENSIONS L x l x h	WEIGHT	DRAINAGE SECTION	CAPACITY	PREINSTALLED DRAIN OUTLET
	€		mm	mm	kg	cm^2	dm^3	mm
700005		HD-PE	1000 x 258 x 134	1000 x 200 x 100	2,65	178,73	17,87	side 2 x Ø 63 bottom 1 x Ø 200 ; 1 x Ø 160

§ Waterproofing: in order to ensure the channels are waterproof, a bituminous adhesive sealant should be used. Heat-sealing the channel joints makes sure there will be no leakages through said joints for a very long time. For further information please contact Mufle's Technical Department.

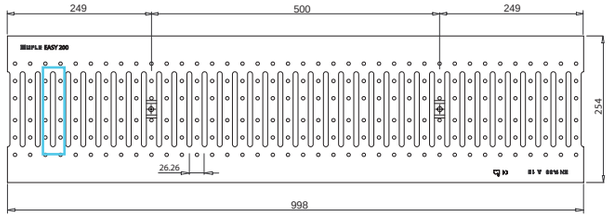
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF GALVANISED STEEL

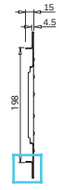
Green areas and parks
Pedestrian areas and/or cycle lanes
Sports facilities
Terraces



SLOT DETAIL



VIEW FROM ABOVE

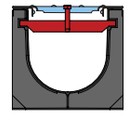


SIDE VIEW

DETAIL OF UPRIGHT BEND

SLOTTED GRATING

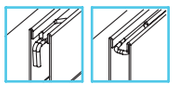
15 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM no fixing
500135		galvanised steel DX51D**	998 x 254 x 4,5	5,20	4,20	130,0 x 8,5		up to Class C250 as per Standard EN 1433
500196		galvanised steel DX51D**	498 x 254 x 4,5	2,60	2,10			

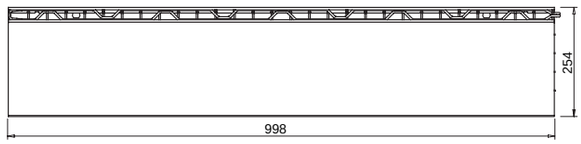
** Classification according to Standard EN 10142 (issued in July 2002) and symbolic designation according to EN 10027-1 (-2) (issued in September 1993).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF GALVANISED STEEL
Low visual impact drainage in public and private places

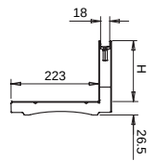
APPLICATIONS OF STAINLESS STEEL
Low visual impact drainage in public and private places



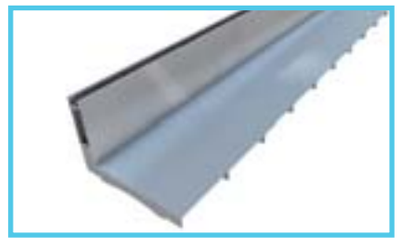
DETAIL OF HOOKING SYSTEM***



VIEW FROM ABOVE

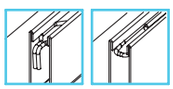


SIDE VIEW

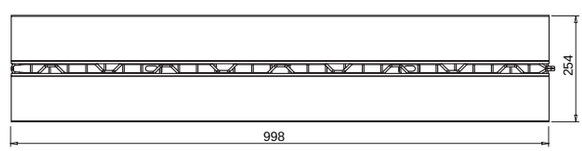


L-SHAPED GRATING

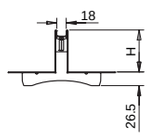
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	HEIGHT OF SLOTS H mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm
500216		hot dip galvanised steel DD11 (1.0332)**	998 x 254 x 106,5	80	6,70	1,80	998 x 18
on request		pickled stainless steel AISI 304*					
500217		hot dip galvanised steel DD11 (1.0332)**	998 x 254 x 146,5	120	7,70	1,80	
on request		pickled stainless steel AISI 304*					



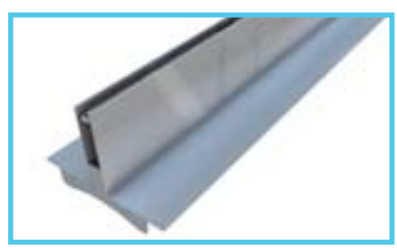
DETAIL OF HOOKING SYSTEM***



VIEW FROM ABOVE



SIDE VIEW



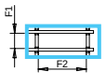
T-SHAPED GRATING

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	HEIGHT OF SLOTS H mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm
500210		hot dip galvanised steel DD11 (1.0332)**	998 x 254 x 106,5	80	6,30	1,80	998 x 18
on request		pickled stainless steel AISI 304*					
500211		hot dip galvanised steel DD11 (1.0332)**	998 x 254 x 146,5	120	7,40	1,80	
on request		pickled stainless steel AISI 304*					

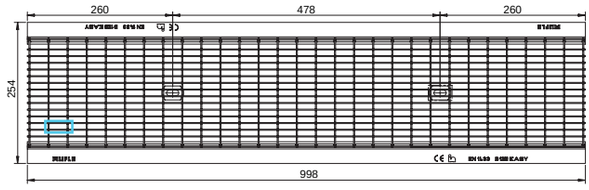
* Classification according to American Standard ASTM.
** Classification according to Standard EN 10111 (issued in March 2000) and symbolic designation according to EN 10027-1 (-2) (issued in September 1993).
*** Hooking System between the gratings through hooks and holes.
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF GALVANISED STEEL
Pavements
Lay-bys and private car parks

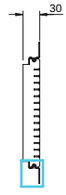
APPLICATIONS OF STAINLESS STEEL
Pavements
Lay-bys and private car parks
Food factories
Chemically aggressive environments



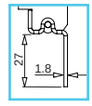
DETAIL OF HOOKING SYSTEM



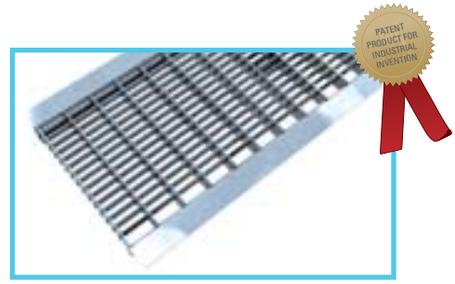
VIEW FROM ABOVE



SIDE VIEW

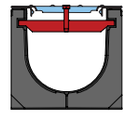


DETAIL OF UPRIGHT BEND

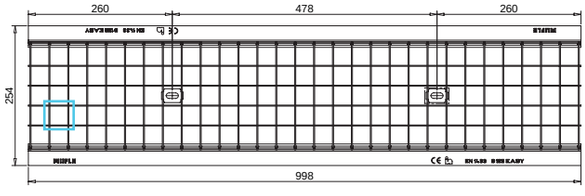


MESH GRATING (11 x 33)

30 mm

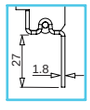
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM no fixing
500131		hot dip galvanised steel DD11 (1.0332)**	998 x 254 x 1,8	6,60	14,00	10,2 x 32,2		up to Class C250 as per Standard EN 1433
500132		pickled stainless steel AISI 304*						
500192		hot dip galvanised steel DD11 (1.0332)**	498 x 254 x 1,8	3,30	7,00			
500193		pickled stainless steel AISI 304*						

DETAIL OF SQUARE MESH



VIEW FROM ABOVE

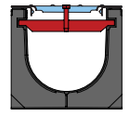
SIDE VIEW



DETAIL OF UPRIGHT BEND

MESH GRATING (33 x 33)

30 mm

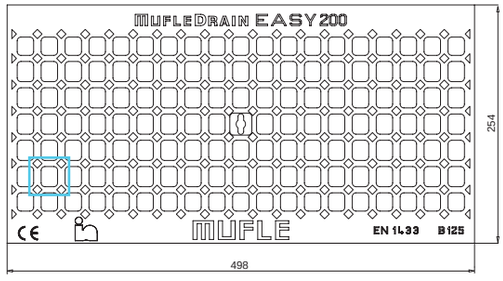
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM no fixing
500133		hot dip galvanised steel DD11 (1.0332)**	998 x 254 x 1,8	5,20	16,00	34,2 x 32,2		up to Class C250 as per Standard EN 1433
500134		pickled stainless steel AISI 304*						
500194		hot dip galvanised steel DD11 (1.0332)**	498 x 254 x 1,8	2,60	8,00			
500195		pickled stainless steel AISI 304*						

* Classification according to American Standard ASTM.
** Classification according to Standard EN 10111 (issued in March 2000) and symbolic designation according to EN 10027-1 (-2) (issued in September 1993).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF DUCTILE IRON

Pavements
Lay-bys and private car parks

SLOT DETAIL



VIEW FROM ABOVE

SIDE VIEW

MESH GRATING

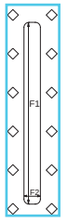
15 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM no fixing
500154		GJS 500/7* ductile iron water based paint coated	498 x 254 x 7	5,85	5,00	21,5 x 17,5		up to Class C250 as per Standard EN 1433

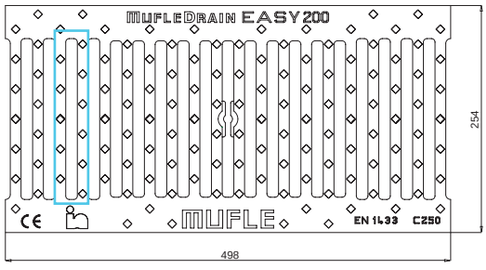
* Classification according to Standard EN 1563 (issued in March 2004).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF DUCTILE IRON

Kerbs
Historical town centres (slow traffic)
Parking areas
Parking decks



SLOT DETAIL



VIEW FROM ABOVE

SIDE VIEW

SLOTTED GRATING 13 mm

30 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM no fixing
500155		GJS 500/7* ductile iron water based paint coated	498 x 254 x 7	7,20	4,68	180,0 x 13,0		up to Class C250 as per Standard EN 1433

* Classification according to Standard EN 1563 (issued in March 2004).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

End-cap 200/100

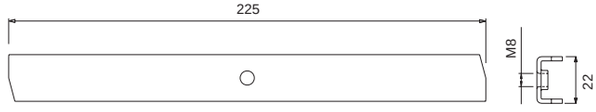
End-cap 200/160

Closed end-cap with drain 200/100

Closed end-cap with drain 200/160

END CAPS

CODE	PRICE	TYPE	MATERIAL	VALID FOR CHANNELS	PREINSTALLED DRAINS
	€				mm
700506		end-cap with drain	HD-PE	200/100	1 x Ø 63
700514		closed end-cap	HD-PE	200/100	-
700507		end-cap with drain	HD-PE	200/160	1 x Ø 110
700515		closed end-cap	HD-PE	200/160	-



VIEW FROM ABOVE

SIDE VIEW

KIT TIE-ROD + SCREWS

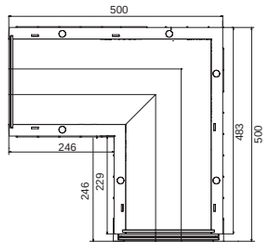
CODE	PRICE	MATERIAL	VALID FOR GRATINGS	SCREW	KIT FOR 1 ml
	€				
500418		galvanised steel	EASY galvanised steel	M8 x 40 TBL combi	2 tie-rods + 2 screws
500419		stainless steel	EASY stainless steel	M8 x 40 TBL combi	2 tie-rods + 2 screws
500420		black galvanised steel	EASY ductile iron	M8 x 40 black with hexagonal head	2 tie-rods + 2 screws

N.B. Sizes and weights are subject to usual manufacturing tolerance values.

SPECIAL PIECES AND DRAIN BOX WITH SYPHON

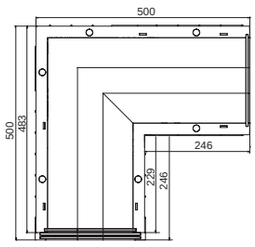
EASY 200

LEFT CORNER — EASY 200



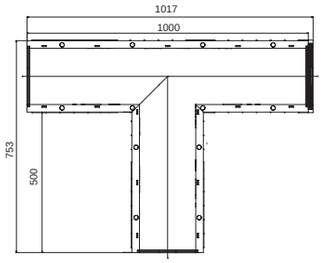
CODE	PRICE €	MODEL
700104		200/160
700105		200/100

RIGHT CORNER — EASY 200



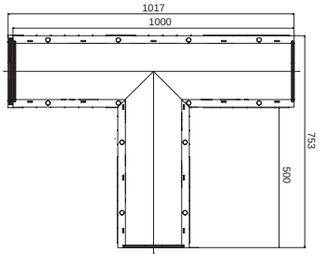
CODE	PRICE €	MODEL
700110		200/160
700111		200/100

LEFT TI — EASY 200



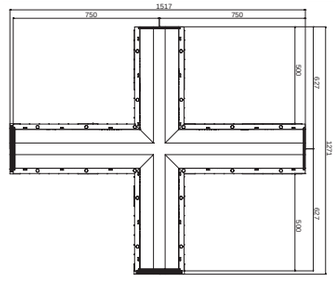
CODE	PRICE €	MODEL
700116		200/160
700117		200/100

RIGHT TI — EASY 200



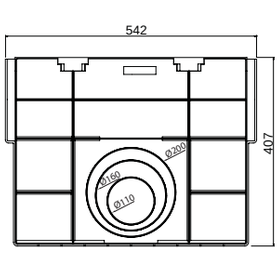
CODE	PRICE €	MODEL
700122		200/160
700123		200/100

CROSS — EASY 200

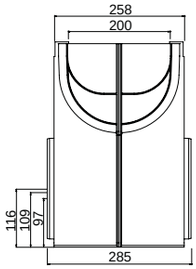


CODE	PRICE €	MODEL
700128		200/160
700129		200/100

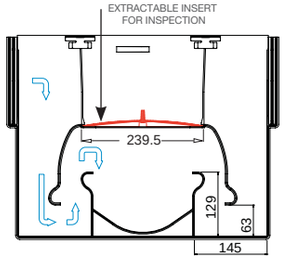
DRAIN BOX WITH SYPHON



FRONT VIEW



SIDE VIEW



SECTION

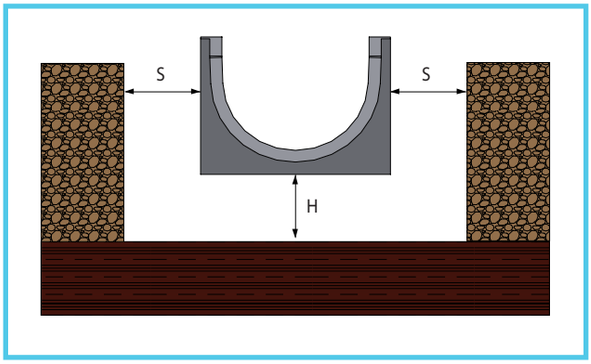
EASY 200

CODE	PRICE €	MATERIAL	EXTERNAL DIMENSIONS L x l x h mm	INTERNAL DIMENSIONS L x l x h mm	MAXIMUM LARGE mm	HEIGHT OF OUTLETS mm	WEIGHT kg	PREINSTALLED DRAIN OUTLETS mm
700010		HD-PE	542 x 258 x 407	500 x 200 x 400	285	116 - 109 - 97	3	2 x Ø 110; 2 x Ø 160; 2 x Ø 200

N.B. Sizes and weights are subject to usual manufacturing tolerance values.

INSTALLATION

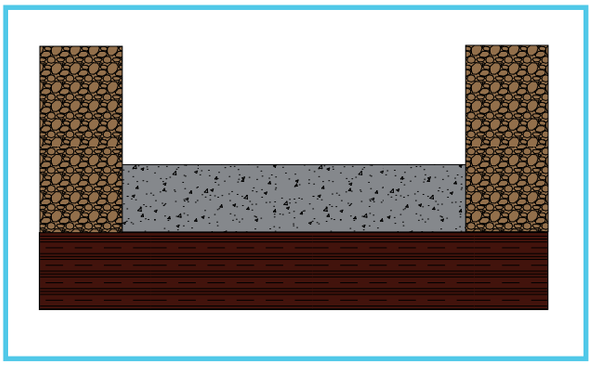
EASY



Step 1

HOLE SIZE

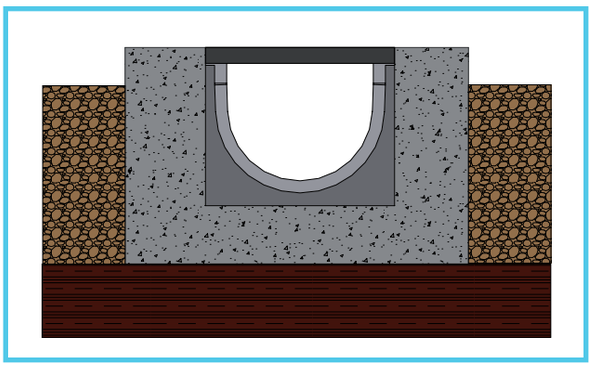
The hole needed to lay the MufleDrain channel must allow not only for the size of the channel and the drain piping but also for adequate space for the base H and the side concrete props S. The dimensions to be followed are shown in the summary table. In this step make sure the underlying layer is suitable to the load it is expected to support.



Step 2

CONCRETE BASE

Cast the concrete base H up to the height specified, allowing for any inclination in the drainage line. If needed, equip the base with stretches of electrowelded mesh or steel rods.

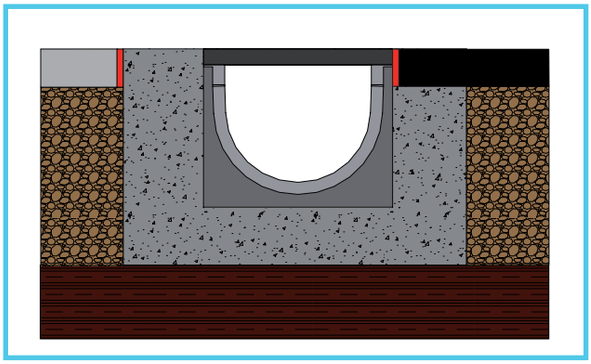


Step 3

CHANNEL ARRANGEMENT

Lay the channels starting from the flow outlet. Allow for the drains required and build the side prop S up to the maximum height allowed by the final coating. Shape it according to the needs based on the drawing. Introduce and fix the grating required beforehand in order to prevent any deformation of the channel due to the thrust of concrete and to speed up installation. Protect the gratings with a PVC film so that no final cleaning must be carried out to remove any concrete residues.

NEW FEATURE:
The channels can be installed with preassembled gratings.

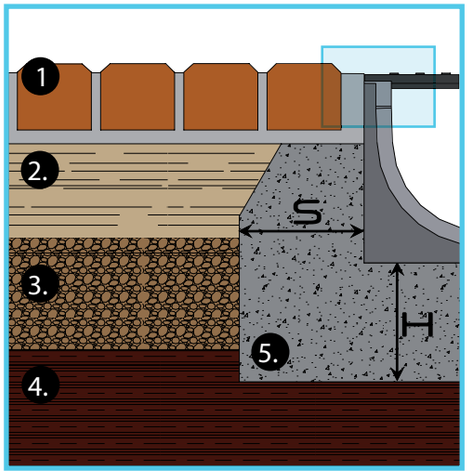


Step 4

FINAL COATING

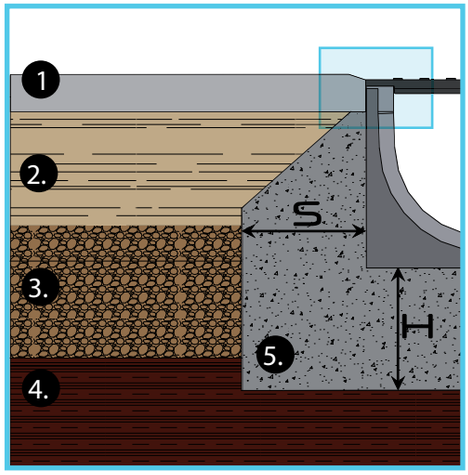
When applying the final coating, make sure its upper profile reaches up to minimum 3/5 mm above the grating's flow plane (see details on the following page). Remove the protection film.

Case 1
Flooring
(A15-B125)



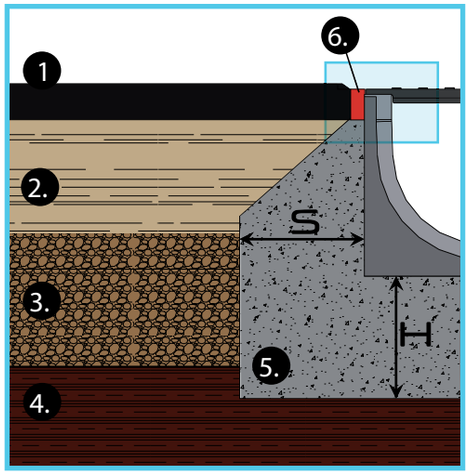
1. Flooring
2. Lower layer
3. Bearing layer
4. Subfloor
5. Concrete reinforcement layer

Case 2
Concrete flooring
(A15-B125-C250)

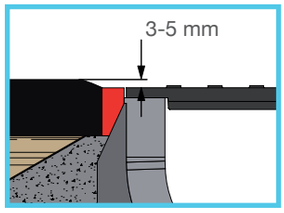


1. Flooring
2. Lower layer
3. Bearing layer
4. Subfloor
5. Concrete reinforcement layer

Case 3
Asphalt
(A15-B125-C250)



1. Flooring
2. Lower layer
3. Bearing layer
4. Subfloor
5. Concrete reinforcement layer
6. Bitumen joint



This Sheet is only aimed to give advice on the installation of channels mod. MufleDrain. In any case, always:
- check the carrying capacity characteristics of the underlying layer
- use concrete and stone aggregate having the characteristics recommended
- comply with the height of the installation surface and the thickness of the prop as specified according to the load classes.

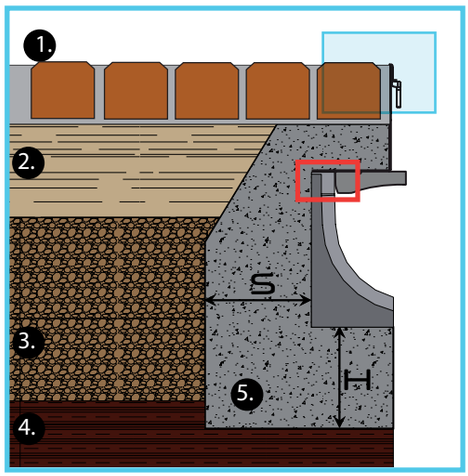
SUMMARY TABLE				
Load class (EN 1433)		A 15	B 125	C 250
Applicable load (EN 1433)	kN	15	125	250
Minimum height H of concrete laying bed	mm	100	100	150
Minimum thickness S of the concrete flanking	mm	100	100	150
Concrete compression strength class (EN 206-1)		C 20/25	C 25/30	C 25/30
Concrete compression strength class* (EN 206-1)		C 30/37 XF4	C 30/37 XF4	C 30/37 XF4

* If concrete can be affected by frost and thaw cycles.
N.B. We recommend using Class S4 concrete (EN 206-1) and stone aggregate with maximum diameter 8 mm.

INSTALLATION OF L-SHAPED AND T-SHAPED GRATING

EASY

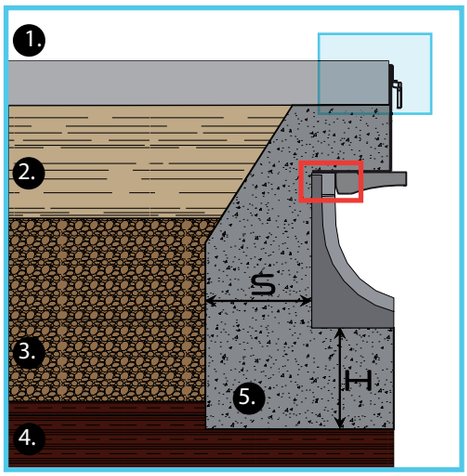
Case 1
Flooring
(A15)



1. Flooring
2. Lower layer
3. Bearing layer
4. Subfloor
5. Concrete reinforcement layer

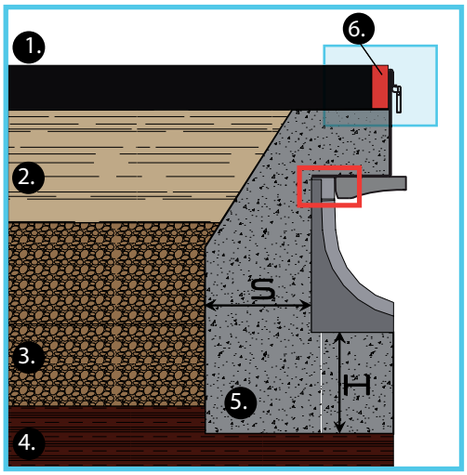
WARNING:
Prevent concrete from flowing into the channel

Case 2
Concrete flooring
(A15)

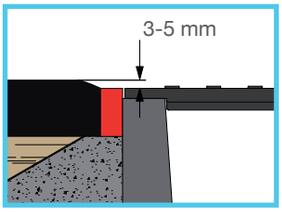


1. Flooring
2. Lower layer
3. Bearing layer
4. Subfloor
5. Concrete reinforcement layer

Case 3
Asphalt
(A15)



1. Flooring
2. Lower layer
3. Bearing layer
4. Subfloor
5. Concrete reinforcement layer
6. Bitumen joint



This Sheet is only aimed to give advice on the installation of channels mod. MufleDrain. In any case, always:
- check the carrying capacity characteristics of the underlying layer
- use concrete and stone aggregate having the characteristics recommended
- comply with the height of the installation surface and the thickness of the prop as specified according to the load classes.

SUMMARY TABLE		
Load class (EN 1433)		A 15
Applicable load (EN 1433)	kN	15
Minimum height H of concrete laying bed	mm	100
Minimum thickness S of the concrete flanking	mm	100
Concrete compression strength class (EN 206-1)		C 20/25
Concrete compression strength class* (EN 206-1)		C 30/37 XF4

* If concrete can be affected by frost and thaw cycles.
N.B. We recommend using Class S4 concrete (EN 206-1) and stone aggregate with maximum diameter 8 mm.

1. Supply and installation of MufleDrain EASY type HD-PE drainage channel with external stiffening ribs and male-female coupling system allowing the assembly between one channel and the next with the relevant pre-assembled gratings. The channel will have 3/4 drainage diaphragms at pre-determined points. The channel surface will be perfectly smooth and have a low roughness coefficient to allow the best water flow. Il will also be perfectly water-tight and devoid of any connection points with the outside. The channel will have the following dimensions: length 1,000 mm, internal net gap ___mm, internal height ___ mm.

2. Supply and installation of ductile cast-iron GJS 500/7 covering gratings according to EN 1563-2004 for MufleDrain EASY drainage channels with bar fixing system, load class C250 according to EN 1433-2004, slot width 13mm, length 498mm, width ___mm.

3. Supply and installation of ductile cast-iron GJS 500/7 covering gratings according to EN 1563-2004 for MufleDrain EASY drainage channels with bar fixing system, load class C250 according to EN 1433-2004, slot inclined 30° to the longitudinal axis, width 6mm, length 498mm, width 154 mm.

4. Supply and installation of ductile cast-iron GJS 500/7 covering gratings according to EN 1563-2004 with mesh for MufleDrain EASY drainage channels with bar fixing system, load class B125 according to EN 1433-2004, length 498 mm, width ___mm.

5. Supply and installation of galvanised (stainless) steel square-mesh or anti-heel covering gratings for MufleDrain EASY drainage channels with bar fixing system, load class B125 according to EN 1433-2004, length 998 mm, width ___mm. A similar grating will be available upon request with length 498mm. The dimensions will be 33 x 33 mm in the square mesh and 33 x 11 mm in the anti-heel mesh.

6. Supply and installation of galvanised (stainless) steel rung covering gratings for MufleDrain FLAT drainage channels with bar fixing system, load class A15 according to EN 1433-2004, length 998 mm, width ___mm. A similar grating will be available upon request with length 498mm.

7. Supply and installation of T-shaped longitudinal-slot gratings made from galvanised (stainless) steel for MufleDrain EASY drainage channels with male-female coupling system between one grating and the next, load class A15 according to EN 1433-2004, length 998mm, width ___ mm, height of “T” ___mm.

8. Supply and installation of L-shaped longitudinal-slot gratings made from galvanised (stainless) steel for MufleDrain EASY drainage channels with male-female coupling system between one grating and the next, load class A15 according to EN 1433-2004, length 998mm, width ___ mm, height of “L” ___mm.

9. Supply and installation of HD-PE end caps for MufleDrain drainage channel with coupling system into the special channel housing.

10. Supply and installation of HD-PE open cap with drainage hole diameter ___mm for MufleDrain drainage channel with coupling system into the special channel housing.

11. Supply and installation of HD-PE gullies with siphon for MufleDrain EASY drainage channels with external stiffening ribs and coupling system. The upper section of the siphon built in the gully may be removed in order to allow inspection and cleaning work. The gully will have preformed drains on both sides with diameter up to 200 mm. The gully dimensions will be as follows: length 542mm, net gap ___ mm, internal height 400 mm.

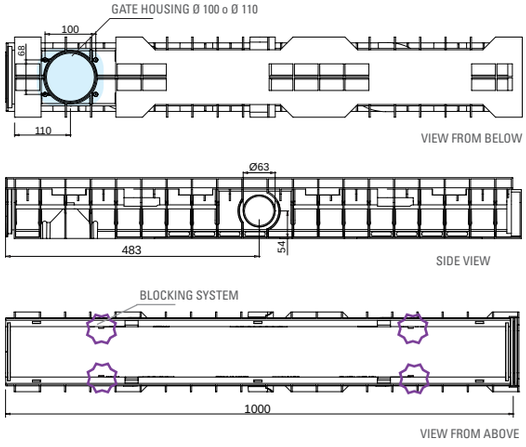
SKIP

The system:

- it supports 3 load classes (A15, B125, C250) in compliance with Standard EN 1433.
- it is made up of a channel - entirely made from HD-PE - which has a 20 mm high toe board and needs no strengthening frame.
- it has a wide usable section for drainage and uses lightweight gratings with optimised sizes.
- it comprises a wide range of different gratings (with rungs, slots, square mesh, anti-heel mesh) made from galvanised steel, stainless steel, ductile cast-iron and HD-PE. A HD-PE blind cover is available too.
- it is supplemented with different fixing systems, which are ideal for all requirements and range from the classic tie-rod to a simple locking system using a protrusion inside the channel.
- Grating protection is ensured by the HD-PE edge.
- it comes equipped with a convenient drain gate, which minimises its size.
- since the edge shows the exact dimensions for the paving, easy and accurate installation is ensured.
- it is ideal for residential areas, sport facilities, private car parks.
- the range is made up of 2 channels with 1 width and 2 heights (100/55 and 100/80).

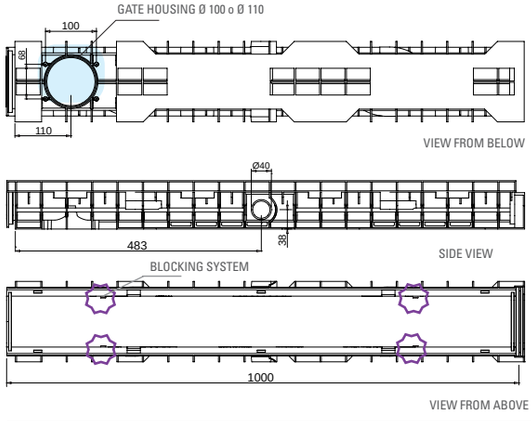
The product must be laid according to Mufle's specifications. The relevant instructions are available in this Catalogue on page 80 and on the Web site www.mufle.com.

100



SKIP 100/80

CODE	PRICE	MATERIAL	EXTERNAL DIMENSIONS L x l x h	INTERNAL DIMENSIONS L x l x h	WEIGHT	DRAINAGE SECTION	CAPACITY	PREINSTALLED DRAIN
	€		mm	mm	kg	cm^2	dm^3	mm
707000		HD-PE	1000 x 158 x 120	1000 x 100 x 80	1,75	69,28	6,92	side 2 x Ø 63 bottom*** 1 x Ø 100 ; 1 x Ø 110



SKIP 100/55

CODE	PRICE	MATERIAL	EXTERNAL DIMENSIONS L x l x h	INTERNAL DIMENSIONS L x l x h	WEIGHT	DRAINAGE SECTION	CAPACITY	PREINSTALLED DRAIN
	€		mm	mm	kg	cm^2	dm^3	mm
707001		HD-PE	1000 x 158 x 95	1000 x 100 x 55	1,55	54,44	5,44	side 2 x Ø 40 bottom*** 1 x Ø 100 ; 1 x Ø 110

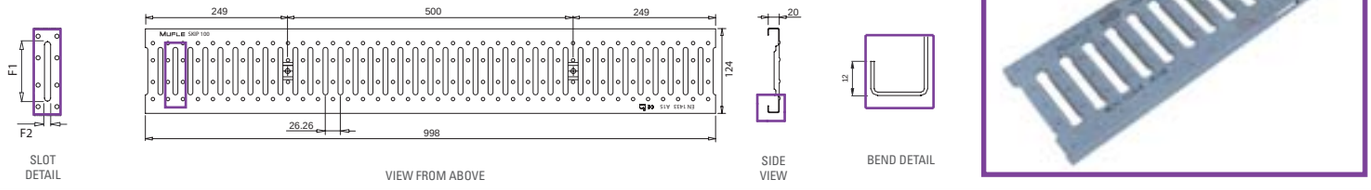
*** For drainage purposes use the drain gate with outlet kit (available in two versions Ø100 and Ø110).
§ Waterproofing: in order to ensure the channels are waterproof, a bituminous adhesive sealant should be used. Heat-sealing the channel joints makes sure there will be no leakages through said joints for a very long time. For further information please contact Mufle's Technical Department.
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF GALVANISED STEEL

Green areas and parks
Pedestrian areas and/or cycle lanes
Sports facilities
Terraces

APPLICATIONS OF STAINLESS STEEL

Green areas and parks
Pedestrian areas and/or cycle lanes
Sports facilities
Terraces
Kitchens in hospitals, restaurants and similar facilities.



SLOT DETAIL — VIEW FROM ABOVE — SIDE VIEW — BEND DETAIL

SLOTTED GRATING

20 mm

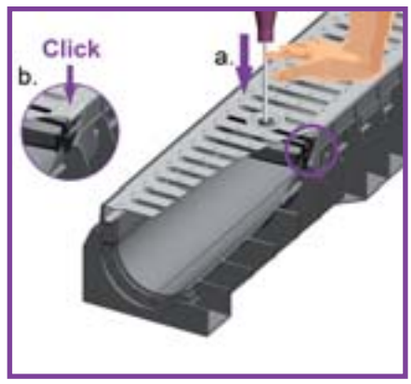
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	clip	protrusion (no fixing)***
507122		galvanised steel DX51D	998 x 124 x 20	1,30	2,35	83,0 x 8,5			
507123		pickled stainless steel AISI 304*							
507124		galvanised steel DX51D	498 x 124 x 20	0,65	1,175				
507125		pickled stainless steel AISI 304*							

GRATING ASSEMBLY BY MEANS OF CLIPS

a. Place the grating on the channel. Match the slots on the back to the hooks of the SKIP clips. Use a screwdriver to apply pressure on the bar;
b. Introduce the grating with one hand until it is completely hooked.

DISASSEMBLY OF THE GRATING

a. Use a screwdriver to apply pressure on the Skip clip until it is released;
b. Lift it out.



NEW FEATURE

The new SKIP clip makes it possible to fix the rung and PE-HD SKIP gratings quickly and safely with neither nuts nor bolts.

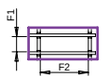
* Classification according to American Standard ASTM.
** Classification according to Standard EN 10142 (issued in July 2002) and symbolic designation according to EN 10027-1 (-2) (issued in September 1993).
*** Hooking system using a protrusion inside the channel. The blocking system does not fix the grating to the channel. Either the tie-rod or the clip system should be used for steady fixing.
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF GALVANISED STEEL

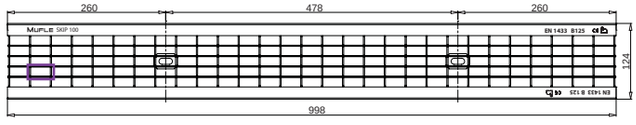
Pavements
Lay-bys and private car parks

APPLICATIONS OF STAINLESS STEEL

Pavements
Lay-bys and private car parks
Food factories
Chemically aggressive environments



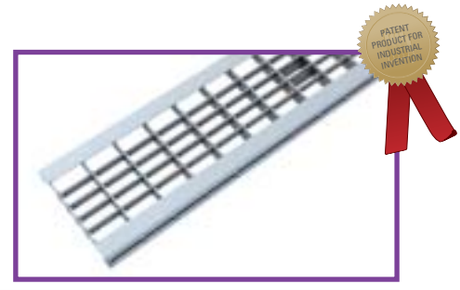
DETAIL OF HOOKING SYSTEM



VIEW FROM ABOVE

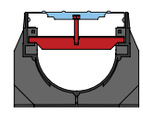
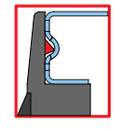
SIDE VIEW

DETAIL OF UPRIGHT BEND

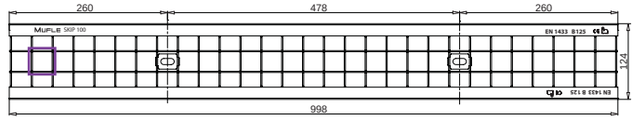


MESH GRATING (11 x 33)

20 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM protrusion (no fixing)***
507104		hot dip galvanised steel DD11 (1.0332)**	998 x 124 x 20	2,90	7,19	15,2 x 32,2		
507112		pickled stainless steel AISI 304*						
507106		hot dip galvanised steel DD11 (1.0332)**	498 x 124 x 20	1,45	3,60			
507116		pickled stainless steel AISI 304*						

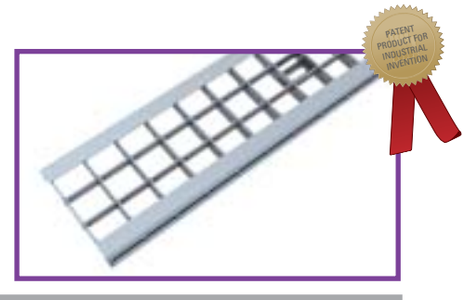
DETAIL OF SQUARE MESH



VIEW FROM ABOVE

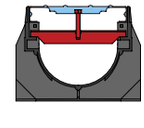
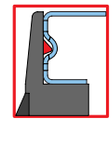
SIDE VIEW

DETAIL OF UPRIGHT BEND



MESH GRATING (33 x 33)

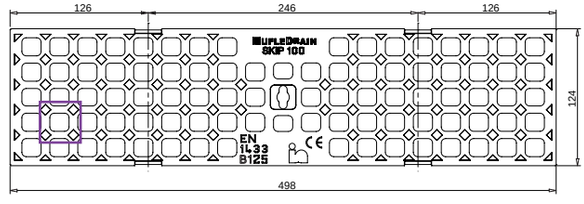
20 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM protrusion (no fixing)***
507105		hot dip galvanised steel DD11 (1.0332)**	998 x 124 x 20	2,60	7,50	32,2 x 32,2		
507114		pickled stainless steel AISI 304*						
507107		hot dip galvanised steel DD11 (1.0332)**	498 x 124 x 20	1,30	3,75			
507118		pickled stainless steel AISI 304*						

* Classification according to American Standard ASTM.
** Classification according to Standard EN 10111 (issued in March 2000) and symbolic designation according to EN 10027-1 (-2) (issued in September 1993).
*** Hooking system using a protrusion inside the channel. The blocking system does not fix the grating to the channel. Either the tie-rod or the clip system should be used for steady fixing.
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF DUCTILE IRON
Pavements
Lay-bys and private car parks

SLOT DETAIL

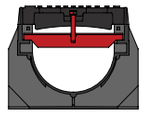


VIEW FROM ABOVE

SIDE VIEW

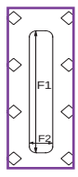
MESH GRATING

20 mm

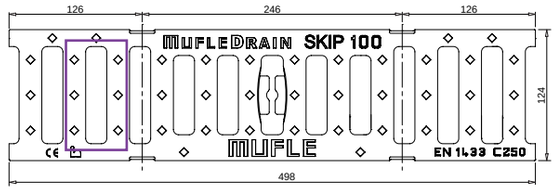
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM no fixing
507100		GJS 500/7* ductile iron water based paint coated	498 x 124 x 20	2,90	2,40	17,5 x 16,5		up to Class C250 as per Standard EN 1433

* Classification according to Standard EN 1563 (issued in March 2004).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

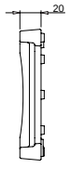
APPLICATIONS OF DUCTILE IRON
Kerbs
Historical town centres (slow traffic)
Parking areas
Parking decks



SLOT DETAIL



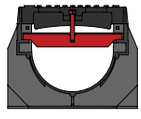
VIEW FROM ABOVE

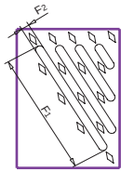


SIDE VIEW

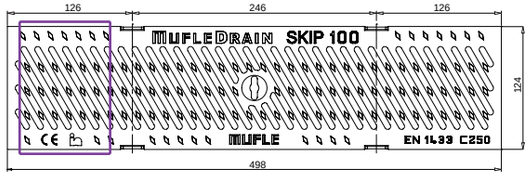
SLOTTED GRATING 20 mm

20 mm

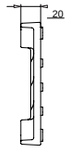
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM no fixing
507102		GJS 500/7* ductile iron water based paint coated	498 x 124 x 20	3,00	1,96	92,0 x 20,0		up to Class C250 as per Standard EN 1433



SLOT DETAIL



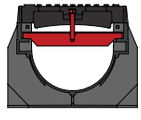
VIEW FROM ABOVE



SIDE VIEW

SLOTTED GRATING 6 mm

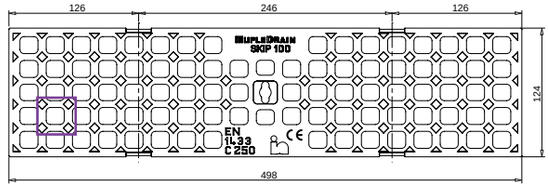
20 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM no fixing
507101		GJS 500/7* ductile iron water based paint coated	498 x 124 x 20	3,10	1,87	95,0 x 6,0		up to Class C250 as per Standard EN 1433

* Classification according to Standard EN 1563 (issued in March 2004).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF DUCTILE IRON
Kerbs
Historical town centres (slow traffic)
Parking areas
Parking decks

SLOT DETAIL

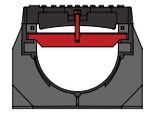


VIEW FROM ABOVE

SIDE VIEW

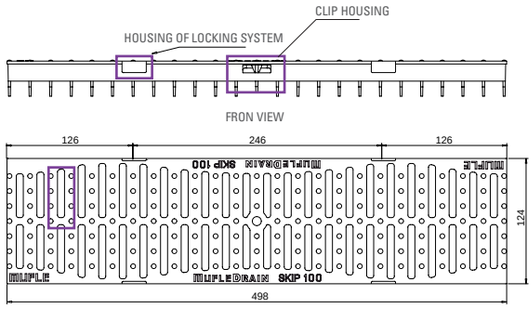
MESH GRATING

20 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM no fixing
507103		GJS 500/7* ductile iron water based paint coated	498 x 124 x 20	3,60	2,40	16,5 x 17,5		up to Class C250 as per Standard EN 1433

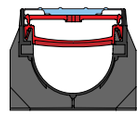
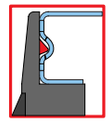
* Classification according to Standard EN 1563 (issued in March 2004).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

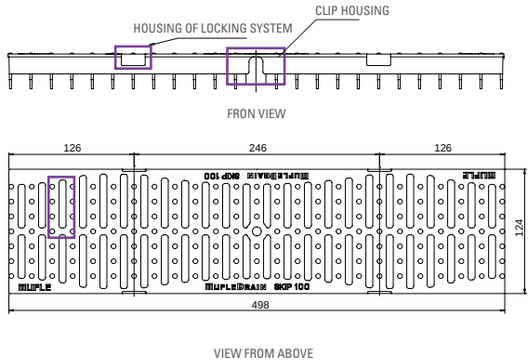
APPLICATIONS OF HD-PE
Residential and condominium areas
Pedestrian areas and/or cycle lanes
Sports facilities
Greenhouses
Green areas



SLOTTED GRATING (7 mm)

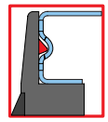
35 mm

CODE	PRICE	MATERIAL	DIMENSIONS L x l x h	WEIGHT	DRAINAGE SURFACE	OPENINGS F1 x F2	FIXING SYSTEM	
	€		mm	kg	dm²	mm	clip	protrusion***
507121		HD-PE black	498 x 124 x 20	0,32	16,05	54,0 x 7,0		



SLOTTED GRATING (7 mm) WITH HOOKS

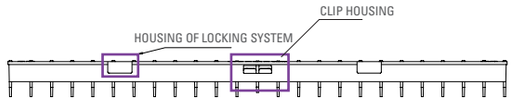
35 mm

CODE	PRICE	MATERIAL	DIMENSIONS L x l x h	WEIGHT	DRAINAGE SURFACE	OPENINGS F1 x F2	FIXING SYSTEM	
	€		mm	kg	dm²	mm	protrusion***	protrusion+hook
507126		HD-PE black	498 x 124 x 20	0,32	16,05	54,0 x 7,0		

*** Hooking system using a protrusion inside the channel. The blocking system does not fix the grating to the channel. Either the tie-rod or the clip system should be used for steady fixing.
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

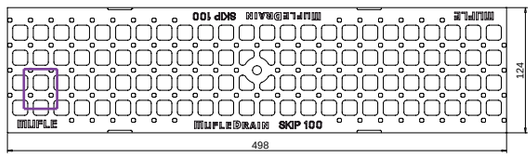
APPLICATIONS OF HD-PE

Residential and condominium areas
Pedestrian areas and/or cycle lanes
Sports facilities
Greenhouses
Green areas

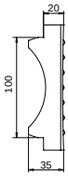


FRON VIEW

SLOT DETAIL



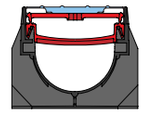
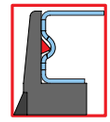
VIEW FROM ABOVE

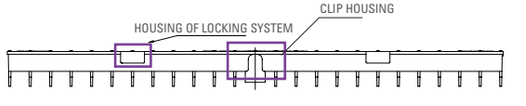


SIDE VIEW

MESH GRATING (33 x 33)

35 mm

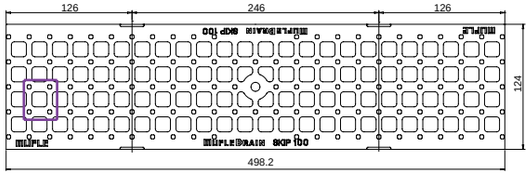
CODE	PRICE	MATERIAL	DIMENSIONS L x l x h	WEIGHT	DRAINAGE SURFACE	OPENINGS F1 x F2	FIXING SYSTEM	
	€		mm	kg	dm^2	mm	clip	protrusion***
507120		HD-PE black	498 x 124 x 20	0,33	20,505	15,0 x 15,0		



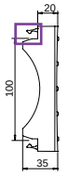
FRON VIEW

SECTION DETAIL

SLOT DETAIL



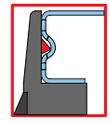
VIEW FROM ABOVE



SIDE VIEW

MESH GRATING (33 x 33) WITH HOOKS

35 mm

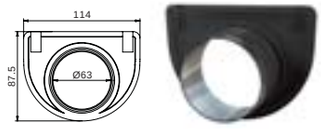
CODE	PRICE	MATERIAL	DIMENSIONS L x l x h	WEIGHT	DRAINAGE SURFACE	OPENINGS F1 x F2	FIXING SYSTEM	
	€		mm	kg	dm^2	mm	protrusion***	protrusion+hook
507127		HD-PE black	498 x 124 x 20	0,33	20,505	15,0 x 15,0		

SKIP HD-PE gratings cannot be certified because Standard EN 1433 does not yet provide for specific tests for plastic-material gratings. The tests carried out by Mufle showed that SKIP HD-PE gratings can be defined as “Walk-Over”.

*** Hooking system using a protrusion inside the channel. The blocking system does not fix the grating to the channel. Either the tie-rod or the clip system should be used for steady fixing.
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

End-cap 100/55

Closed end-cap with drain 100/55

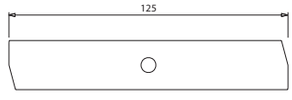


End-cap 100/80

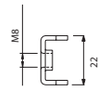
Closed end-cap with drain 100/80

END CAPS

CODE	PRICE	TYPE	MATERIAL	VALID FOR CHANNELS	PREINSTALLED DRAINS
	€				mm
700500		end-cap with drain	HD-PE	100/55	1 x Ø 40
700508		closed end-cap	HD-PE	100/55	-
700501		end-cap with drain	HD-PE	100/80	1 x Ø 63
700509		closed end-cap	HD-PE	100/80	-



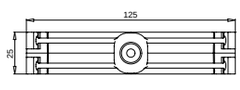
VIEW FROM ABOVE



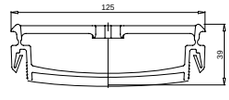
SIDE VIEW

KIT TIE-ROD + SCREWS

CODE	PRICE	MATERIAL	VALID FOR GRATINGS	SCREW	KIT FOR 1 ml
	€				
500421		galvanised steel	SKIP galvanised steel	M8 x 55 TBL combi	2 tie-rods + 2 screws
500422		stainless steel	SKIP stainless steel	M8 x 55 TBL combi stainless steel	2 tie-rods + 2 screws
500423		black galvanised steel	SKIP ductile iron	M8 x 55 black with hexagonal head	2 tie-rods + 2 screws



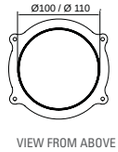
VIEW FROM ABOVE



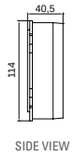
SIDE VIEW

KIT CLIP

CODE	PRICE	MATERIAL	VALID FOR GRATINGS	KIT FOR 1 ml
	€			
510212		HD-PE	SKIP galvanised steel - inox - HD-PE	2 clip



VIEW FROM ABOVE



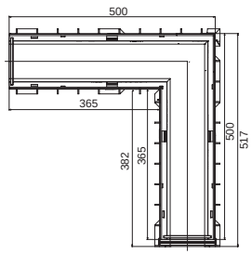
SIDE VIEW

KIT OUTLET + SCREWS

CODE	PRICE	MATERIAL	VALID FOR CHANNELS	DIAMETER	KIT FOR 1 ml
	€			mm	
506114		HD-PE	100/55 - 100/80	Ø 100	1 outlet Ø 100 + 4 screws
506115		HD-PE	100/55 - 100/80	Ø 110	1 outlet Ø 110 + 4 screws

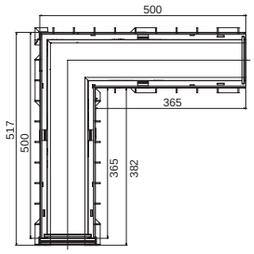
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

LEFT CORNER — SKIP 100



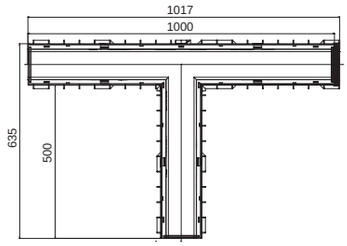
CODE	PRICE €	MODEL
707100		100/80
707101		100/55

RIGHT CORNER — SKIP 100



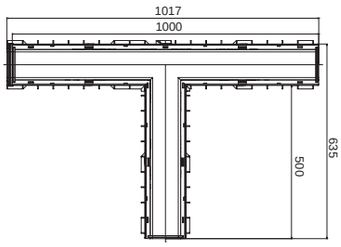
CODE	PRICE €	MODEL
707102		100/80
707103		100/55

LEFT TI — SKIP 100



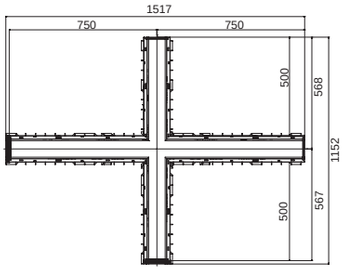
CODE	PRICE €	MODEL
707104		100/80
707105		100/55

RIGHT TI — SKIP 100



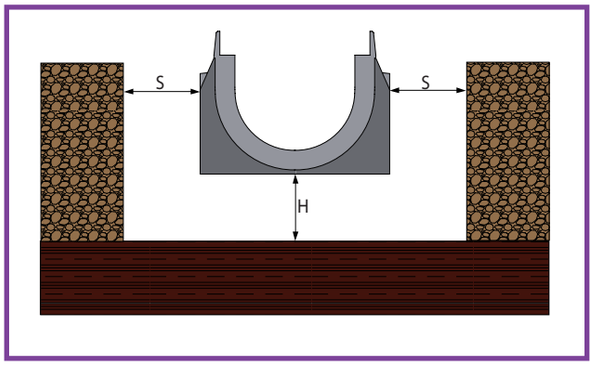
CODE	PRICE €	MODEL
707106		100/80
707107		100/55

CROSS — SKIP 100



CODE	PRICE €	MODEL
707108		100/80
707109		100/55

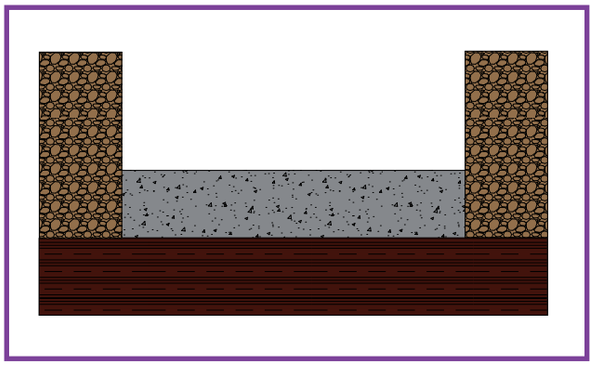
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



Step 1

HOLE SIZE

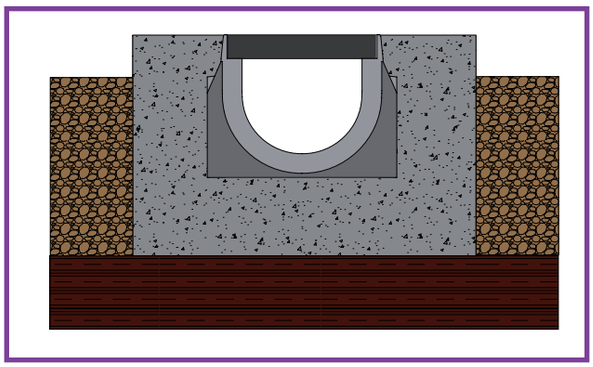
The hole needed to lay the MufleDrain channel must allow not only for the size of the channel and the drain piping but also for adequate space for the base H and the side concrete props S. The dimensions to be followed are shown in the summary table. In this step make sure the underlying layer is suitable to the load it is expected to support.



Step 2

CONCRETE BASE

Cast the concrete base H up to the height specified, allowing for any inclination in the drainage line. If needed, equip the base with stretches of electrowelded mesh or steel rods.

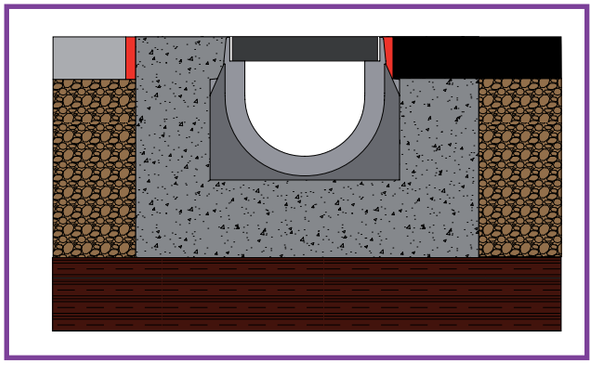


Step 3

CHANNEL ARRANGEMENT

Lay the channels starting from the flow outlet. Allow for the drains required and build the side prop S up to the maximum height allowed by the final coating. Shape it according to the needs based on the drawing. Introduce and fix the grating required beforehand in order to prevent any deformation of the channel due to the thrust of concrete and to speed up installation. Protect the gratings with a PVC film so that no final cleaning must be carried out to remove any concrete residues.

NEW FEATURE:
The channels can be installed with preassembled gratings.

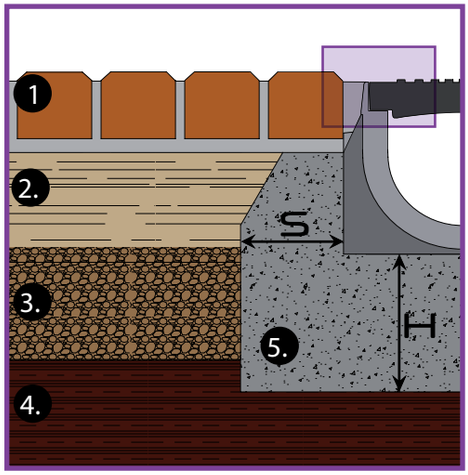


Step 4

FINAL COATING

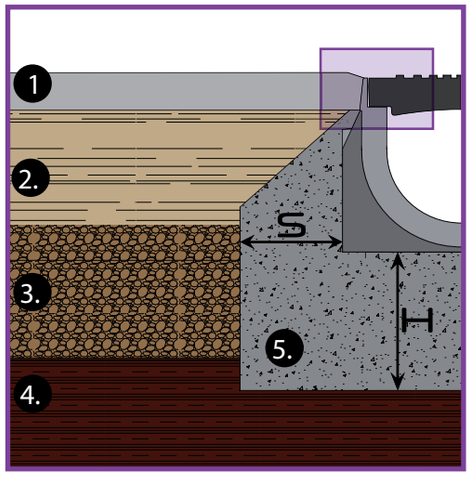
When applying the final coating, make sure its upper profile reaches up to minimum 3/5 mm above the grating's flow plane (see details on the following page). Remove the protection film.

Case 1
Flooring
(A15-B125)



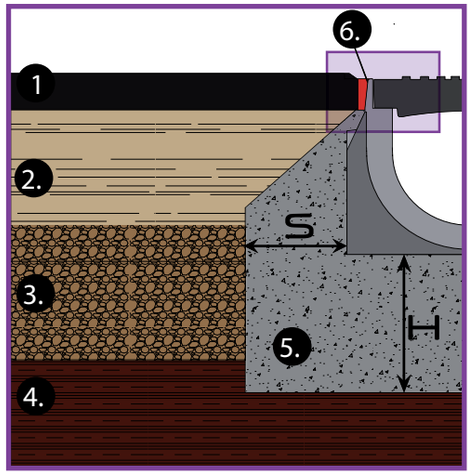
1. Flooring
2. Lower layer
3. Bearing layer
4. Subfloor
5. Concrete reinforcement layer

Case 2
Concrete flooring
(A15-B125-C250)

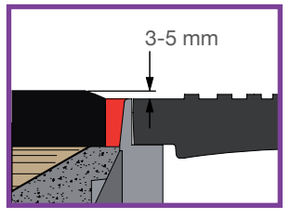


1. Flooring
2. Lower layer
3. Bearing layer
4. Subfloor
5. Concrete reinforcement layer

Case 3
Asphalt
(A15-B125-C250)



1. Flooring
2. Lower layer
3. Bearing layer
4. Subfloor
5. Concrete reinforcement layer
6. Bitumen joint



This Sheet is only aimed to give advice on the installation of channels mod. MufleDrain. In any case, always:
- check the carrying capacity characteristics of the underlying layer
- use concrete and stone aggregate having the characteristics recommended
- comply with the height of the installation surface and the thickness of the prop as specified according to the load classes.

SUMMARY TABLE					
Load class (EN 1433)		A 15	B 125	C 250	D 400**
Applicable load (EN 1433)	kN	15	125	250	400
Minimum height H of concrete laying bed	mm	100	100	150	200
Minimum thickness S of the concrete flanking	mm	100	100	150	200
Concrete compression strength class (EN 206-1)		C 20/25	C 25/30	C 25/30	C 25/30
Concrete compression strength class* (EN 206-1)		C 30/37 XF4	C 30/37 XF4	C 30/37 XF4	C 30/37 XF4

* If concrete can be affected by frost and thaw cycles.
N.B. We recommend using Class S4 concrete (EN 206-1) and stone aggregate with maximum diameter 8 mm.

1. Supply and installation of MufleDrain SKIP type HD-PE drainage channel with external stiffening ribs and male-female coupling system allowing the assembly between one channel and the next with the relevant pre-assembled gratings. The channel will have 2 side drain diaphragms at pre-determined points and it will be designed to house a HD-PE drain gate (diameter 100 mm - 110 mm) on the bottom through 4 screws. HD-PE upper profile with height not smaller than 20 mm. The channel surface will be perfectly smooth and have a low roughness coefficient to allow the best water flow. Il will also be perfectly water-tight and devoid of any connection points with the outside. The channel will have 2 protrusions on each side of internal walls of the upper profile in order to ensure the gratings can be locked in place. The channel will have the following dimensions: length 1,000 mm, internal net gap 100 mm, internal height ___ mm.

2. Supply and installation of ductile cast-iron GJS 500/7 covering gratings according to EN 1563-2004 for MufleDrain SKIP drainage channels with bar fixing system, load class C250 according to EN 1433-2004, slot width 20 mm, length 498mm, width 124 mm.

3. Supply and installation of ductile cast-iron GJS 500/7 covering gratings according to EN 1563-2004 for MufleDrain SKIP drainage channels with bar fixing system, load class C250 according to EN 1433-2004, slot inclined 30° to the longitudinal axis, width 6mm, length 498 mm, width 124 mm.

4. Supply and installation of ductile cast-iron GJS 500/7 covering gratings according to EN 1563-2004 with mesh for MufleDrain SKIP drainage channels with bar fixing system, load class B125 (C250) according to EN 1433-2004, length 498 mm, width 124 mm.

5. Supply and installation of galvanised (stainless) steel square-mesh or anti-heel covering gratings for MufleDrain SKIP drainage channels with bar fixing system, load class B125 according to EN 1433-2004, length 998 mm, width 124 mm. A similar grating will be available upon request with length 498 mm. The dimensions will be 33 x 33 mm in the square mesh and 33 x 15 mm in the anti-heel mesh.

6. Supply and installation of galvanised (stainless) steel square-mesh or anti-heel covering gratings for MufleDrain SKIP drainage channels equipped with screw fixing slots and bar fixing plate, load class C250 according to EN1 433-2004, length 998 mm, width 124 mm. A similar grating will be available upon request with length 498 mm. The dimensions will be 33 x 33 mm in the square mesh and 33 x 15 mm in the anti-heel mesh.

7. Supply and installation of galvanised (stainless) steel rung covering gratings for MufleDrain SKIP drainage channels with bar fixing system (CliP), load class A15 according to EN 1433-2004, length 998 mm, width 124 mm. A similar grating will be available upon request with length 498 mm.

8. Supply and installation of drive-over covering gratings with HD-PE 7-mm slot for MufleDrain SKIP drainage channels with bar fixing system (Clip), length 498 mm, width 124 mm.

9. Supply and installation of drive-over covering gratings with HD-PE square mesh for MufleDrain SKIP drainage channels with bar fixing system (Clip), length 498 mm, width 124 mm.

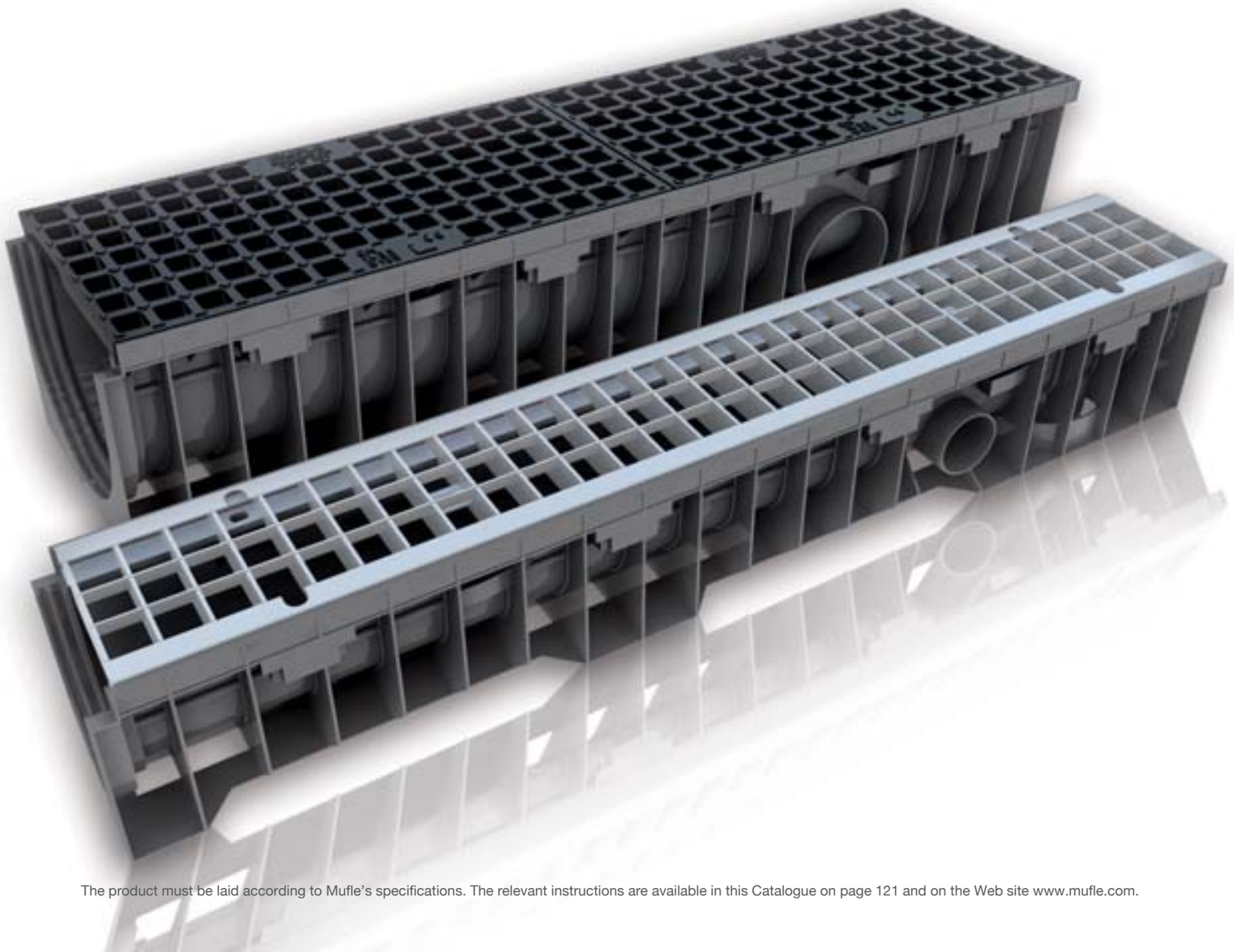
10. Supply and installation of HD-PE end caps for MufleDrain drainage channel with coupling system into the special channel housing.

11. Supply and installation of HD-PE open cap with drainage hole diameter ___mm for MufleDrain drainage channel with coupling system into the special channel housing.

VIP

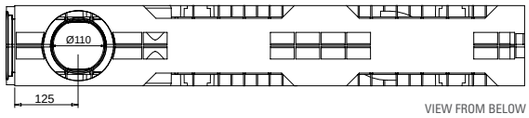
The system:

- it supports 3 load classes (A15, B125, C250) in compliance with Standard EN 1433
- it is made up of a channel - entirely made from HD-PE - which has a 20 mm - high toeboard and needs no strengthening frame
- grating protection is ensured by the HD-PE edge
- since the edge shows the exact dimensions for the paving, easy and accurate installation is ensured
- it comprises a wide range of different gratings (with rungs, slots, square mesh, anti-heel mesh) made from galvanised steel, stainless steel, ductile cast-iron and HD-PE. A HD-PE blind cover is available too
- it comes equipped with a classic tie-rod fixing system and a convenient side coupling system through a tab inside the HD-PE gratings
- it is ideal for civil uses, pedestrian areas, private car parks, footways, canalisation systems in parking areas, sport facilities, synthetic tracks, athletics grounds
- it comes complete with drain gullies with siphon
- the range is made up of 7 channels with 3 widths and 3 heights (100/100, 100/160, 150/100, 150/160, 200/100, 200/160, 200/250)
- the range is supplemented with the VIP35 channel with length 1.5 m and usable dimensions 300 x 300 mm. Designed to drain large surfaces

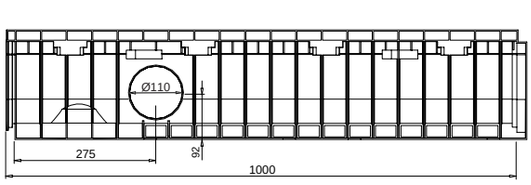


The product must be laid according to Mufle's specifications. The relevant instructions are available in this Catalogue on page 121 and on the Web site www.mufle.com.

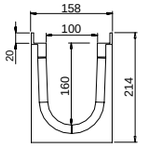
100



VIEW FROM BELOW



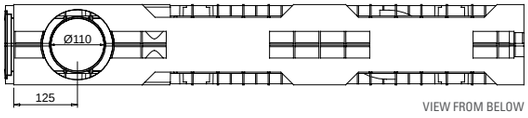
SIDE VIEW



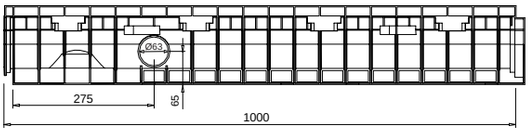
SECTION

VIP20 100/160

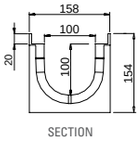
CODE	PRICE	MATERIAL	EXTERNAL DIMENSIONS L x l x h	INTERNAL DIMENSIONS L x l x h	WEIGHT	DRAINAGE SECTION	CAPACITY	PREINSTALLED DRAIN OUTLETS
	€		mm	mm	kg	cm^2	dm^3	mm
702000		HD-PE	1000 x 158 x 214	1000 x 100 x 160	2,55	145,28	14,52	side 2 x Ø 110 bottom 1 x Ø 110



VIEW FROM BELOW



SIDE VIEW



SECTION

VIP20 100/100

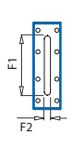
CODE	PRICE	MATERIAL	EXTERNAL DIMENSIONS L x l x h	INTERNAL DIMENSIONS L x l x h	WEIGHT	DRAINAGE SECTION	CAPACITY	PREINSTALLED DRAIN OUTLETS
	€		mm	mm	kg	cm^2	dm^3	mm
702001		HD-PE	1000 x 158 x 154	1000 x 100 x 100	2,05	89,56	8,95	side 2 x Ø 63 bottom 1 x Ø 110

§ Waterproofing: in order to ensure the channels are waterproof, a bituminous adhesive sealant should be used. Heat-sealing the channel joints makes sure there will be no leakages through said joints for a very long time. For further information please contact Mufle's Technical Department.

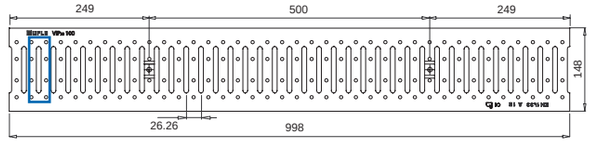
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF GALVANISED STEEL
Green areas and parks
Pedestrian areas and/or cycle lanes
Sports facilities
Terraces

APPLICATIONS OF STAINLESS STEEL
Green areas and parks
Pedestrian areas and/or cycle lanes
Sports facilities
Terraces
Kitchens in hospitals, restaurants and similar facilities.

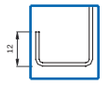


SLOT DETAIL

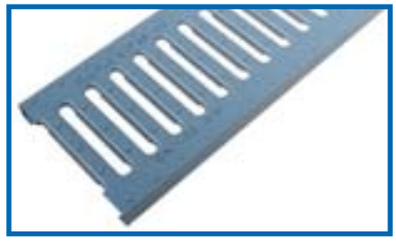


VIEW FROM ABOVE

SIDE VIEW



BEND DETAIL



SLOTTED GRATING

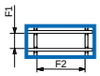
20 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM no fixing
502128		galvanised steel DX51D**	998 x 148 x 20	1,60	2,68	83,0 x 8,5		up to Class C250 as per Standard EN 1433
502129		pickled stainless steel AISI 304*						
502140		galvanised steel DX51D**	498 x 148 x 20	0,80	1,34			
502141		pickled stainless steel AISI 304*						

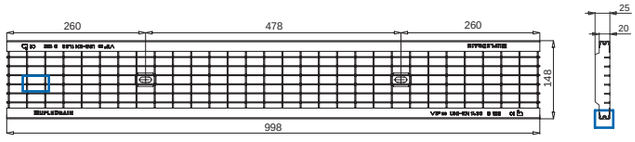
* Classification according to American Standard ASTM.
** Classification according to Standard EN 10142 (issued in July 2002) and symbolic designation according to EN 10027-1 (-2) (issued in September 1993).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF GALVANISED STEEL
Pavements
Lay-bys and private car parks

APPLICATIONS OF STAINLESS STEEL
Pavements
Lay-bys and private car parks
Food factories
Chemically aggressive environments



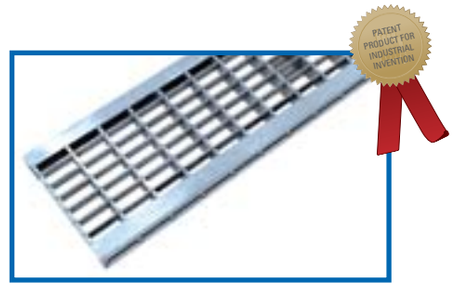
DETAIL OF HOOKING SYSTEM



VIEW FROM ABOVE

SIDE VIEW


DETAIL OF UPRIGHT BEND

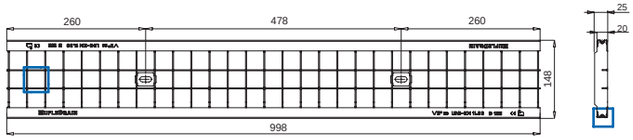


MESH GRATING (11 x 33)

25 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm²	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM no fixing
502126		hot dip galvanised steel DD11 (1.0332)**	998 x 148 x 20	3,60	8,82	15,2 x 32,2		up to Class C250 as per Standard EN 1433
502150		pickled stainless steel AISI 304*						
502138		hot dip galvanised steel DD11 (1.0332)**	498 x 148 x 20	1,80	4,41			
502162		pickled stainless steel AISI 304*						

DETAIL OF SQUARE MESH



VIEW FROM ABOVE

SIDE VIEW


DETAIL OF UPRIGHT BEND

MESH GRATING (33 x 33)

25 mm

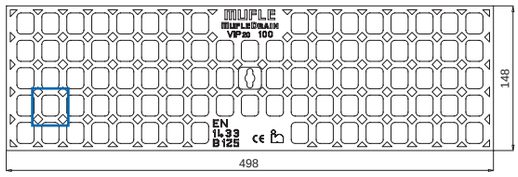
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm²	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM no fixing
502127		hot dip galvanised steel DD11 (1.0332)**	998 x 148 x 20	2,90	9,00	32,2 x 32,2		up to Class C250 as per Standard EN 1433
502157		pickled stainless steel AISI 304*						
502139		hot dip galvanised steel DD11 (1.0332)**	498 x 148 x 20	1,45	4,50			
502163		pickled stainless steel AISI 304*						

* Classification according to American Standard ASTM.
** Classification according to Standard EN 10111 (issued in March 2000) and symbolic designation according to EN 10027-1 (-2) (issued in September 1993).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF DUCTILE IRON

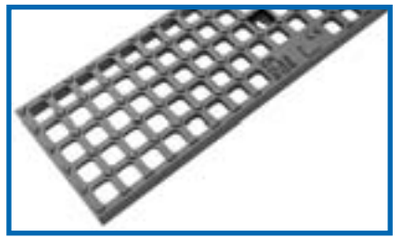
Pavements
Lay-bys and private car parks

SLOT DETAIL



VIEW FROM ABOVE

SIDE VIEW



MESH GRATING

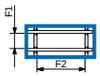
20 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM no fixing
502112		GJS 500/7* ductile iron water based paint coated	498 x 148 x 20	3,40	3,31	21,5 x 17,5		up to Class C250 as per Standard EN 1433

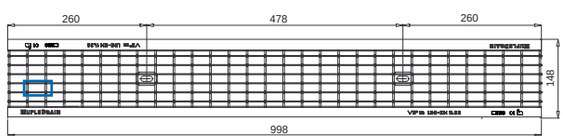
* Classification according to Standard EN 1563 (issued in March
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF GALVANISED STEEL
Kerbs
Historical town centres (slow traffic)
Parking areas
Parking decks

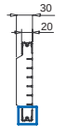
APPLICATIONS OF STAINLESS STEEL
Kerbs
Historical town centres (slow traffic)
Parking areas
Parking decks
Areas with low-load transit in food factories
Areas with low-load transit in chemically aggressive environments



DETAIL OF HOOKING SYSTEM

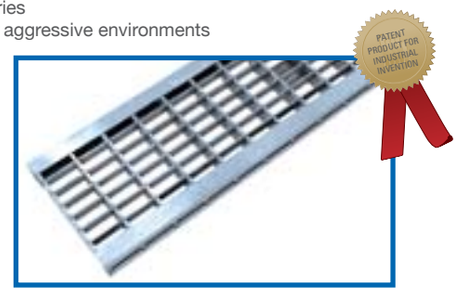


VIEW FROM ABOVE



SIDE VIEW


DETAIL OF UPRIGHT BEND

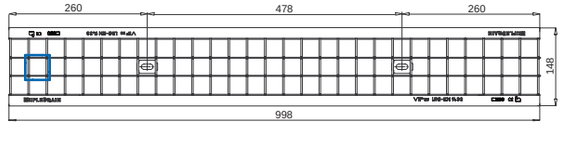


MESH GRATING (11 x 33)

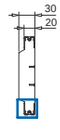

30 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM no fixing
502152		hot dip galvanised steel DD11 (1.0332)**	998 x 148 x 20	5,10	8,82	15,2 x 31,2		up to Class C250 as per Standard EN 1433
502175		pickled stainless steel AISI 304*						
502169		hot dip galvanised steel DD11 (1.0332)**	498 x 148 x 20	2,55	4,41			
502187		pickled stainless steel AISI 304*						

DETAIL OF SQUARE MESH



VIEW FROM ABOVE

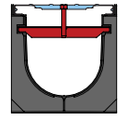


SIDE VIEW


DETAIL OF UPRIGHT BEND

MESH GRATING (33 x 33)


30 mm

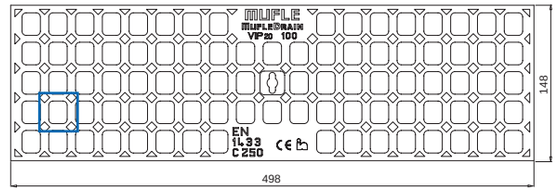
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM no fixing
502151		hot dip galvanised steel DD11 (1.0332)**	998 x 148 x 20	4,60	8,50	31,2 x 31,2		up to Class C250 as per Standard EN 1433
502174		pickled stainless steel AISI 304*						
502168		hot dip galvanised steel DD11 (1.0332)**	498 x 148 x 20	2,30	4,25			
502188		pickled stainless steel AISI 304*						

* Classification according to American Standard ASTM.
** Classification according to Standard EN 10111 (issued in March 2000) and symbolic designation according to EN 10027-1 (-2) (issued in September 1993).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF DUCTILE IRON

Kerbs
Historical town centres (slow traffic)
Parking areas
Parking decks

SLOT DETAIL



VIEW FROM ABOVE

SIDE VIEW

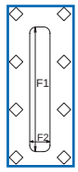
MESH GRATING

20 mm

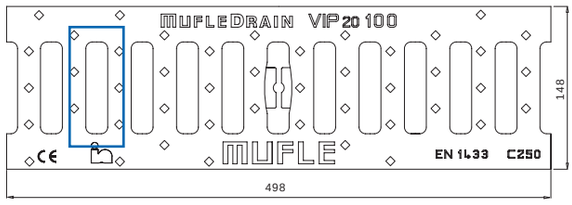
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM no fixing
502115		GJS 500/7* ductile iron water based paint coated	498 x 148 x 20	3,80	3,31	21,5 x 17,5		up to Class C250 as per Standard EN 1433

* Classification according to Standard EN 1563 (issued in March
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF DUCTILE IRON
Kerbs
Historical town centres (slow traffic)
Parking areas
Parking decks

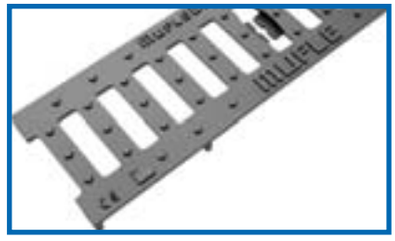


SLOT DETAIL



VIEW FROM ABOVE

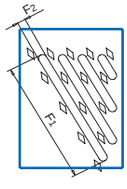
SIDE VIEW



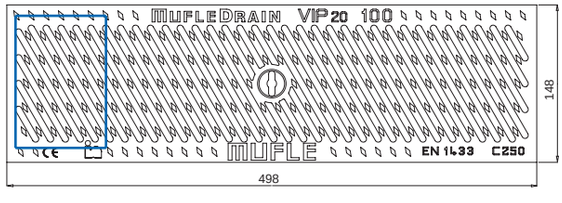
SLOTTED GRATING 20 mm

20 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM no fixing
502113		GJS 500/7* ductile iron water based paint coated	498 x 148 x 20	3,60	1,97	82,0 x 20,0		up to Class C250 as per Standard EN 1433



SLOT DETAIL



VIEW FROM ABOVE

SIDE VIEW

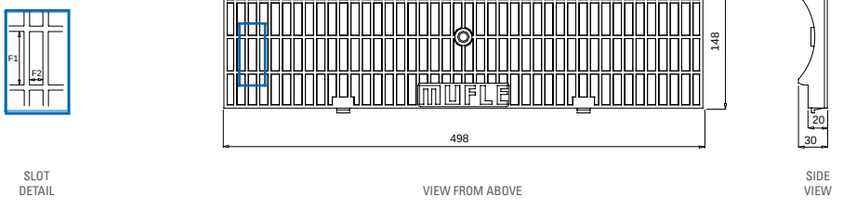
SLOTTED GRATING 6 mm

20 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM no fixing
502114		GJS 500/7* ductile iron water based paint coated	498 x 148 x 20	4,00	2,10	91,5 x 6,0		up to Class C250 as per Standard EN 1433

* Classification according to Standard EN 1563 (issued in March
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

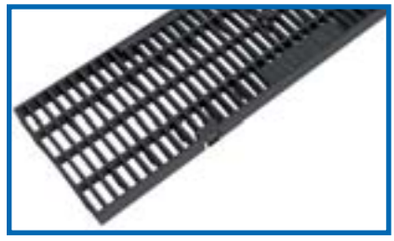
APPLICATIONS OF HD-PE
Residential and condominium areas
Pedestrian areas and/or cycle lanes
Sports facilities
Greenhouses
Green areas



SLOT DETAIL

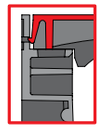
VIEW FROM ABOVE

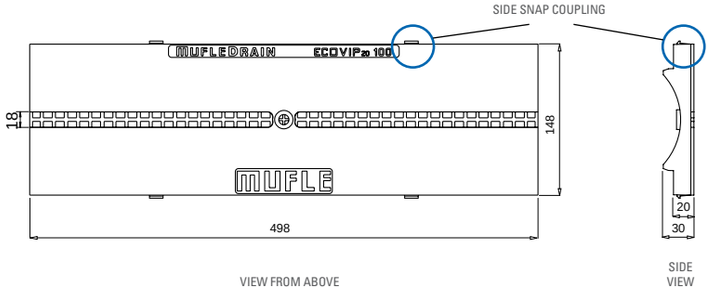
SIDE VIEW



DRIVEWAY GRATING

30 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM side block**
502103		HD-PE black	498 x 148 x 20	0,38	3,80	34,0 x 8,5		

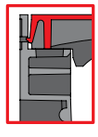


VIEW FROM ABOVE

SIDE VIEW

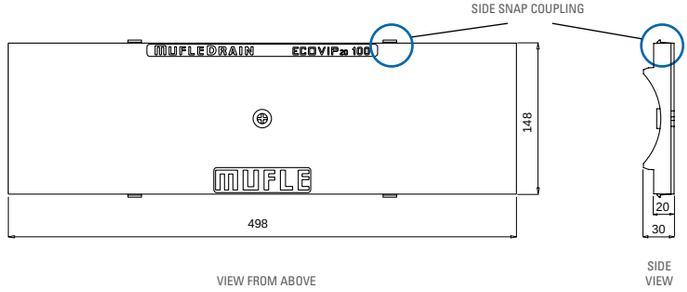
LONGITUDINAL SLOTTED DRIVEWAY GRATING

30 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	DIMENSIONS OF SLOT mm	FIXING SYSTEM tie-rod	FIXING SYSTEM side block**
502149		HD-PE* black	498 x 148 x 20	0,60	0,50	498 x 18,0		

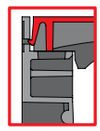
* Photoengraved anti-slip surface finish.
** Coupling system using a tab inside the grating.
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF HD-PE
Cable passageway
Passageway for water
and/or heat systems



DRIVEWAY SOLID TOP COVER

30 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	FIXING SYSTEM tie-rod	FIXING SYSTEM side block**
502100		HD-PE* black	498 x 148 x 20	0,50		

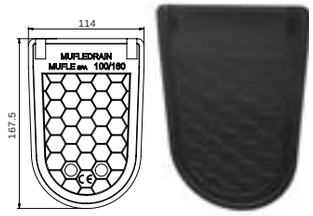
Ecovip solid top covers and gratings cannot be certified because Standard EN 1433 does not yet provide for specific tests for plastic-material gratings. The tests carried out by Mufle showed that Ecovip 100 solid top covers and gratings can be defined as “Car Drive-Over”.

* Photoengraved anti-slip surface finish.
** Coupling system using a tab inside the grating.
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

End-cap 100/100

Closed end-cap with drain 100/100

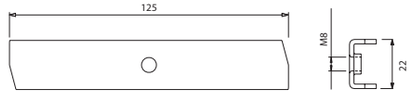
End-cap 100/160



Closed end-cap with drain 100/160

END CAPS

CODE	PRICE	TYPE	MATERIAL	VALID FOR CHANNELS	PREINSTALLED DRAINS
	€				mm
700502		end-cap with drain	HD-PE	100/100	1 x Ø 63
700510		closed end-cap	HD-PE	100/100	-
700503		end-cap with drain	HD-PE	100/160	1 x Ø 63
700511		closed end-cap	HD-PE	100/160	-



VIEW FROM ABOVE SIDE VIEW

KIT TIE-ROD + SCREWS

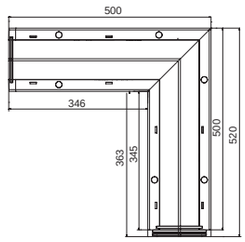
CODE	PRICE	MATERIAL	VALID FOR GRATINGS	SCREW	KIT FOR 1 ml
	€				
500421		galvanised steel	VIP galvanised steel - HD-PE	M8 x 55 TBL combi	2 tie-rods + 2 screws
500422		stainless steel	VIP stainless steel	M8 x 55 TBL combi stainless steel	2 tie-rods + 2 screws
500423		black galvanised steel	VIP ductile iron	M8 x 55 black with hexagonal head	2 tie-rods + 2 screws

N.B. Sizes and weights are subject to usual manufacturing tolerance values.

SPECIAL PIECES AND DRAIN BOX WITH SYPHON

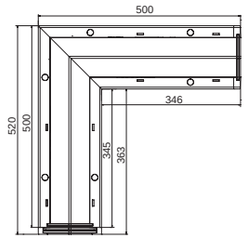
VIP20 100

LEFT CORNER — VIP20 100



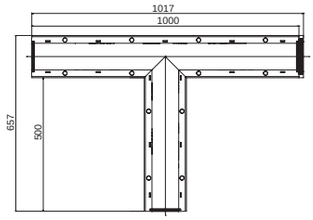
CODE	PRICE €	MODEL
702100		100/160
702101		100/100

RIGHT CORNER — VIP20 100



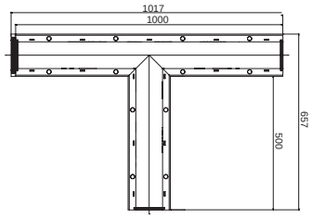
CODE	PRICE €	MODEL
702106		100/160
702107		100/100

LEFT TI — VIP20 100



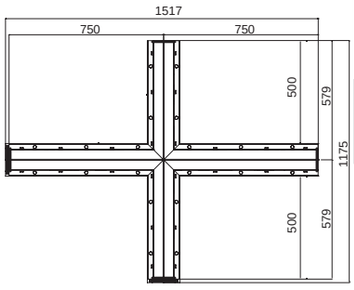
CODE	PRICE €	MODEL
702112		100/160
702113		100/100

RIGHT TI — VIP20 100



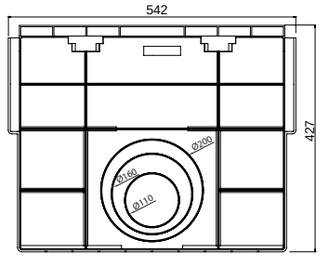
CODE	PRICE €	MODEL
702118		100/160
702119		100/100

CROSS — VIP20 100

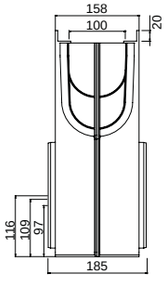


CODE	PRICE €	MODEL
702124		100/160
702125		100/100

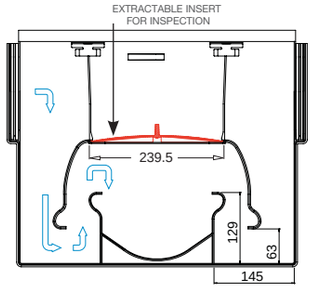
DRAIN BOX WITH SYPHON



FRONT VIEW



SIDE VIEW



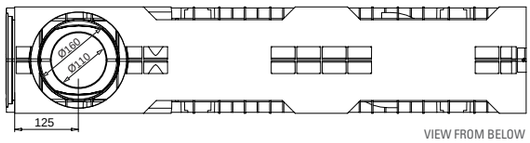
SECTION

VIP20 100

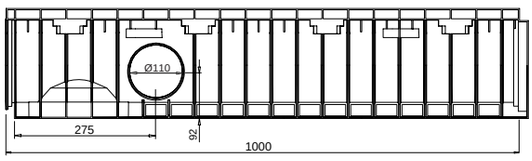
CODE	PRICE €	MATERIAL	EXTERNAL DIMENSIONS L x l x h mm	INTERNAL DIMENSIONS L x l x h mm	MAXIMUM LARGE mm	HEIGHT OF OUTLETS mm	WEIGHT kg	PREINSTALLED DRAIN OUTLETS mm
702006		HD-PE	542 x 158 x 427	500 x 100 x 400	185	116 - 109 - 97	2,60	2 x Ø 110; 2 x Ø 160; 2 x Ø 200

N.B. Sizes and weights are subject to usual manufacturing tolerance values.

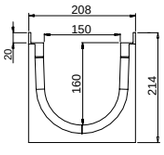
150



VIEW FROM BELOW



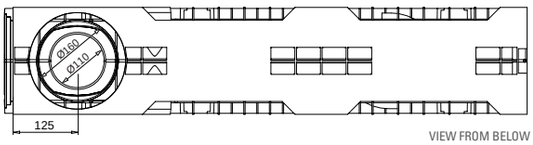
SIDE VIEW



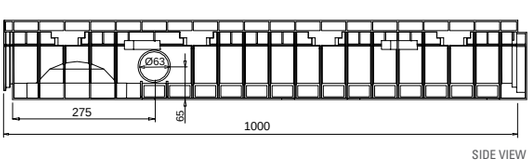
SECTION

VIP20 150/160

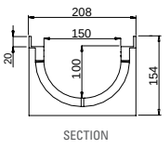
CODE	PRICE	MATERIAL	EXTERNAL DIMENSIONS L x l x h	INTERNAL DIMENSIONS L x l x h	WEIGHT	DRAINAGE SECTION	CAPACITY	PREINSTALLED DRAIN OUTLETS
	€		mm	mm	kg	cm^2	dm^3	mm
702002		HD-PE	1000 x 208 x 214	1000 x 150 x 160	3,00	213,04	21,30	side 2 x Ø 110 bottom 1 x Ø 110 ; 1 x Ø 160



VIEW FROM BELOW



SIDE VIEW



SECTION

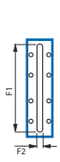
VIP20 150/100

CODE	PRICE	MATERIAL	EXTERNAL DIMENSIONS L x l x h	INTERNAL DIMENSIONS L x l x h	WEIGHT	DRAINAGE SECTION	CAPACITY	PREINSTALLED DRAIN OUTLETS
	€		mm	mm	kg	cm^2	dm^3	mm
702003		HD-PE	1000 x 208 x 154	1000 x 150 x 100	2,45	127,32	12,73	side 2 x Ø 63 bottom 1 x Ø 110 ; 1 x Ø 160

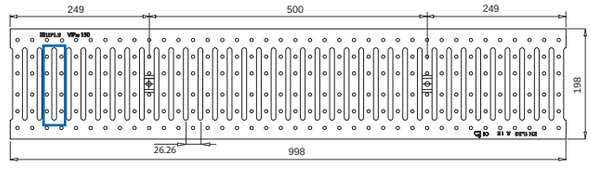
§ Waterproofing: in order to ensure the channels are waterproof, a bituminous adhesive sealant should be used. Heat-sealing the channel joints makes sure there will be no leakages through said joints for a very long time. For further information please contact Mufle's Technical Department.

N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF GALVANISED STEE
Green areas and parks
Pedestrian areas and/or cycle lanes
Sports facilities
Terraces

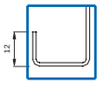


SLOT DETAIL



VIEW FROM ABOVE

SIDE VIEW



BEND DETAIL

SLOTTED GRATING

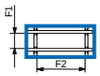
20 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM no fixing
502132		galvanised steel DX51D**	998 x 198 x 20	2,90	4,20	130,0 x 8,5		up to Class C250 as per Standard EN 1433
502133		pickled stainless steel AISI 304*						
502144		galvanised steel DX51D**	498 x 198 x 20	1,45	2,10			
502145		pickled stainless steel AISI 304*						

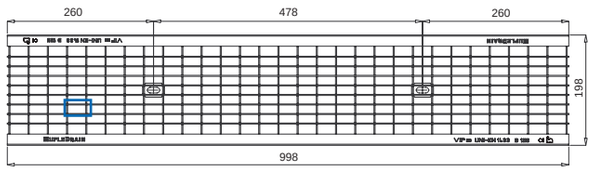
** Classification according to Standard EN 10142 (issued in July 2002) and symbolic designation according to EN 10027-1 (-2) (issued in September 1993).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF GALVANISED STEEL
Pavements
Lay-bys and private car parks

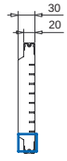
APPLICATIONS OF STAINLESS STEEL
Pavements
Lay-bys and private car parks
Food factories
Chemically aggressive environments



DETAIL OF HOOKING SYSTEM



VIEW FROM ABOVE



SIDE VIEW

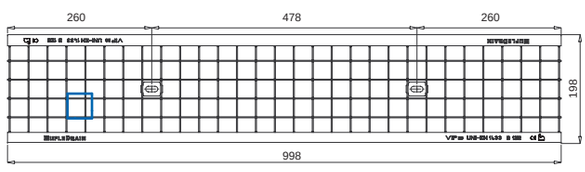

DETAIL OF UPRIGHT BEND

MESH GRATING (11 x 33)

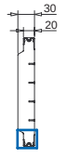
30 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM no fixing
502130		hot dip galvanised steel DD11 (1.0332)**	998 x 198 x 20	5,00	13,08	15,2 x 32,2		up to Class C250 as per Standard EN 1433
502158		pickled stainless steel AISI 304*						
502142		hot dip galvanised steel DD11 (1.0332)**	498 x 198 x 20	2,50	6,54			
502164		pickled stainless steel AISI 304*						

DETAIL OF SQUARE MESH



VIEW FROM ABOVE

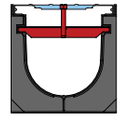


SIDE VIEW


DETAIL OF UPRIGHT BEND

MESH GRATING (33 x 33)

30 mm

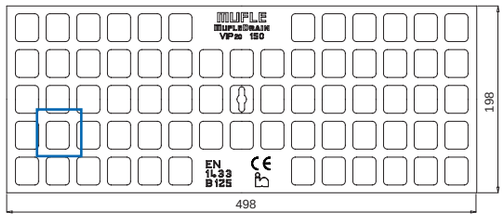
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM no fixing
502131		hot dip galvanised steel DD11 (1.0332)**	998 x 198 x 20	4,10	13,74	32,2 x 32,2		up to Class C250 as per Standard EN 1433
502159		pickled stainless steel AISI 304*						
502143		hot dip galvanised steel DD11 (1.0332)**	498 x 198 x 20	2,05	6,73			
502165		pickled stainless steel AISI 304*						

* Classification according to American Standard ASTM.
** Classification according to Standard EN 10111 (issued in March 2000) and symbolic designation according to EN 10027-1 (-2) (issued in September 1993).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF DUCTILE IRON

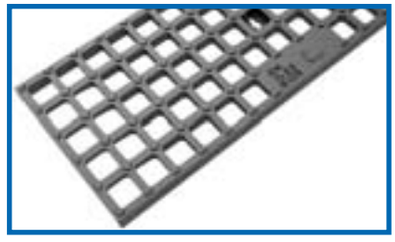
Pavements
Lay-bys and private car parks

SLOT DETAIL



VIEW FROM ABOVE

SIDE VIEW



MESH GRATING

20 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM no fixing
502118		GJS 500/7* ductile iron water based paint coated	498 x 198 x 20	4,90	3,77	29,0 x 24,5		up to Class C250 as per Standard EN 1433

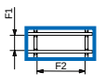
* Classification according to Standard EN 1563 (issued in March 2004).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF GALVANISED STEEL

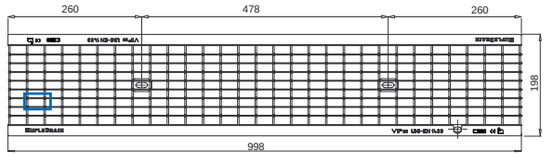
Kerbs
Historical town centres (slow traffic)
Parking areas
Parking decks

APPLICATIONS OF STAINLESS STEEL

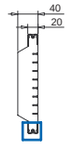
Kerbs
Historical town centres (slow traffic)
Parking areas
Parking decks
Areas with low-load transit in food factories
Areas with low-load transit in chemically aggressive environments



DETAIL OF HOOKING SYSTEM



VIEW FROM ABOVE



SIDE VIEW

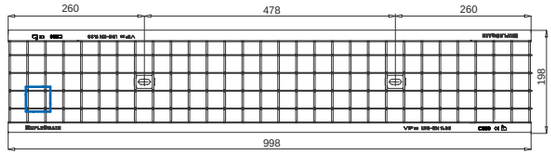
DETAIL OF UPRIGHT BEND

MESH GRATING (11 x 33)

40 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM no fixing
502154		hot dip galvanised steel DD11 (1.0332)**	998 x 198 x 20	7,50	13,08	15,2 x 31,2		up to Class C250 as per Standard EN 1433
502177		pickled stainless steel AISI 304*						
502171		hot dip galvanised steel DD11 (1.0332)**	498 x 198 x 20	3,75	6,54			
502190		pickled stainless steel AISI 304*						

DETAIL OF SQUARE MESH



VIEW FROM ABOVE

SIDE VIEW

DETAIL OF UPRIGHT BEND

MESH GRATING (33 x 33)

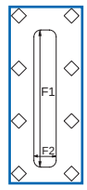
40 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM no fixing
502153		hot dip galvanised steel DD11 (1.0332)**	998 x 198 x 20	7,00	13,47	31,2 x 31,2		up to Class C250 as per Standard EN 1433
502176		pickled stainless steel AISI 304*						
502170		hot dip galvanised steel DD11 (1.0332)**	498 x 198 x 20	3,50	6,73			
502189		pickled stainless steel AISI 304*						

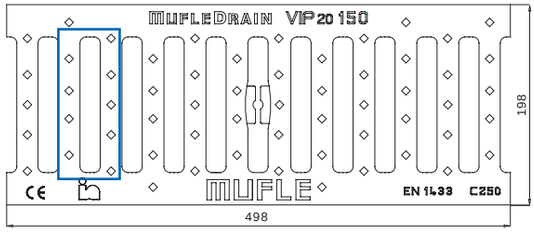
* Classification according to American Standard ASTM.
** Classification according to Standard EN 10111 (issued in March 2000) and symbolic designation according to EN 10027-1 (-2) (issued in September 1993).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF DUCTILE IRON

Kerbs
Historical town centres (slow traffic)
Parking areas
Parking decks

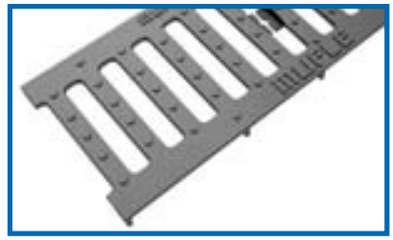


SLOT DETAIL



VIEW FROM ABOVE

SIDE VIEW



SLOTTED GRATING 20 mm

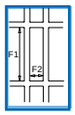
25 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM no fixing
502120		GJS 500/7* ductile iron water based paint coated	498 x 198 x 20	5,20	3,16	132,0 x 20,0		up to Class C250 as per Standard EN 1433

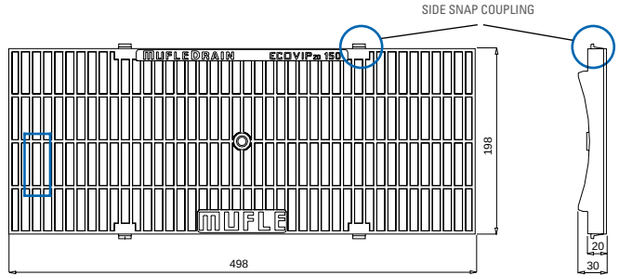
* Classification according to Standard EN 1563 (issued in March
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF HD-PE

Residential and condominium areas
Pedestrian areas and/or cycle lanes
Sports facilities
Greenhouses
Green areas



SLOT DETAIL

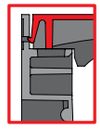


VIEW FROM ABOVE

SIDE VIEW

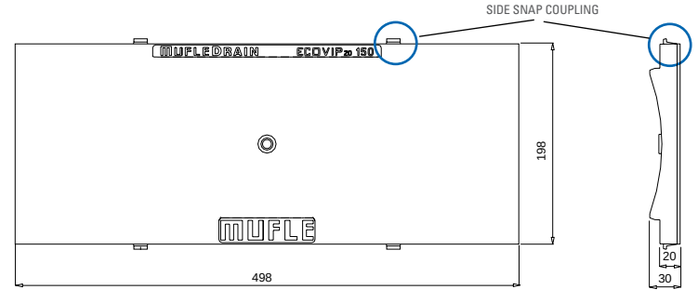
PEDESTRIAN GRATING

30 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM side block**
502104		HD-PE black	498 x 198 x 20	0,68	5,80	46,5 x 8,5		

APPLICATIONS OF HD-PE

Cable passageway
Passageway for water
and/or heat systems

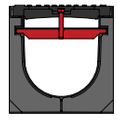
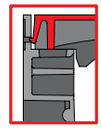


VIEW FROM ABOVE

SIDE VIEW

PEDESTRIAN SOLID TOP COVER

30 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	FIXING SYSTEM tie-rod	FIXING SYSTEM side block**
502101		HD-PE* black	498 X 198 x 20	0,86		

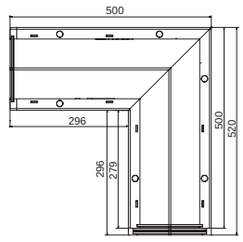
Ecovip solid top covers and gratings cannot be certified because Standard EN 1433 does not yet provide for specific tests for plastic-material gratings. The tests carried out by Mufle showed that Ecovip 150 solid top covers and gratings can be defined as “Walk-Over”.

* Photoengraved anti-slip surface finish.
** Coupling system using a tab inside the grating.
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

SPECIAL PIECES AND DRAIN BOX WITH SYPHON

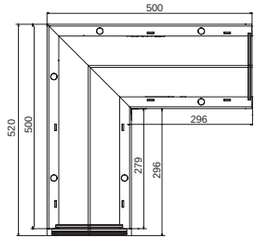
VIP20 150

LEFT CORNER — VIP20 150



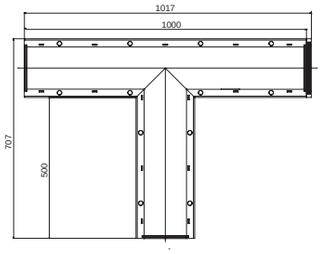
CODE	PRICE €	MODEL
702102		150/160
702103		150/100

RIGHT CORNER — VIP20 150



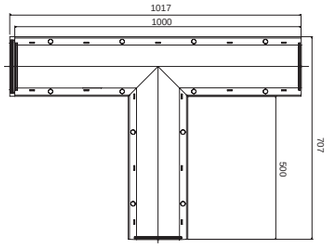
CODE	PRICE €	MODEL
702108		150/160
702109		150/100

LEFT TI — VIP20 150



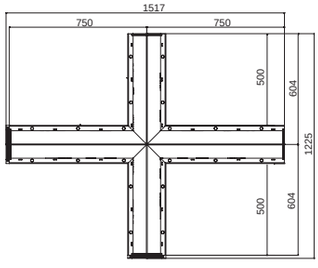
CODE	PRICE €	MODEL
702114		150/160
702115		150/100

RIGHT TI — VIP20 150



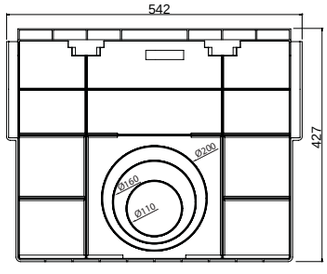
CODE	PRICE €	MODEL
702120		150/160
702121		150/100

CROSS — VIP20 150

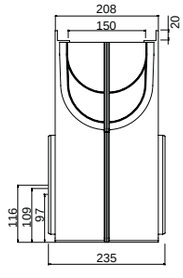


CODE	PRICE €	MODEL
702126		150/160
702127		150/100

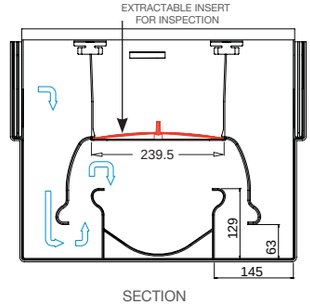
DRAIN BOX WITH SYPHON



FRONT VIEW



SIDE VIEW

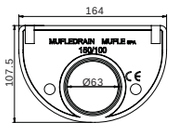


SECTION

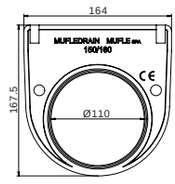
VIP20 150

CODE	PRICE €	MATERIAL	EXTERNAL DIMENSIONS L x l x h mm	INTERNAL DIMENSIONS L x l x h mm	MAXIMUM LARGE mm	HEIGHT OF OUTLETS mm	WEIGHT kg	PREINSTALLED DRAIN OUTLETS mm
702007		HD-PE	542 x 208 x 427	500 x 150 x 400	235	116 - 109 - 97	2,90	2 x Ø 110; 2 x Ø 160; 2 x Ø 200

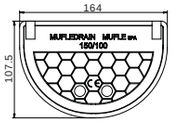
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



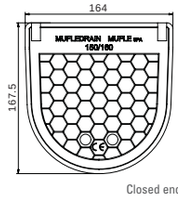
End-cap 150/100



End-cap 150/160



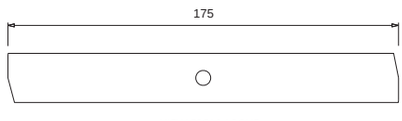
Closed end-cap with drain 150/100



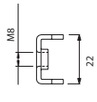
Closed end-cap with drain 150/160

END CAPS

CODE	PRICE	TYPE	MATERIAL	VALID FOR CHANNELS	PREINSTALLED DRAINS
	€				mm
700504		end-cap with drain	HD-PE	150/100	1 x Ø 63
700512		closed end-cap	HD-PE	150/100	-
700505		end-cap with drain	HD-PE	150/160	1 x Ø 110
700513		closed end-cap	HD-PE	150/160	-



VIEW FROM ABOVE



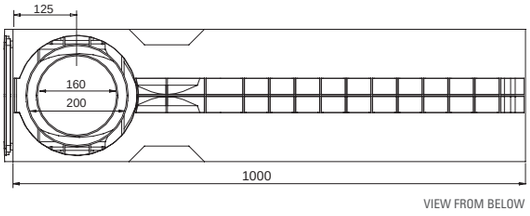
SIDE VIEW

KIT TIE-ROD + SCREWS

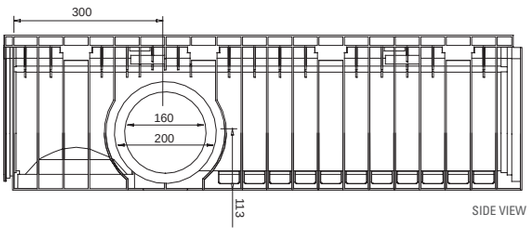
CODE	PRICE	MATERIAL	VALID FOR GRATINGS	SCREW	KIT FOR 1 ml
	€				
500424		galvanised steel	VIP galvanised steel - HD-PE	M8 x 40 TBL combi	2 tie-rods + 2 screws
500425		stainless steel	VIP stainless steel	M8 x 40 TBL combi	2 tie-rods + 2 screws
500426		black galvanised steel	VIP ductile iron	M8 x 40 black with hexagonal head	2 tie-rods + 2 screws

N.B. Sizes and weights are subject to usual manufacturing tolerance values.

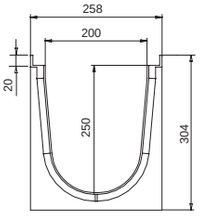
200



VIEW FROM BELOW



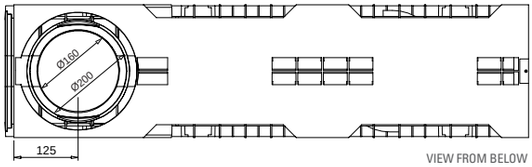
SIDE VIEW



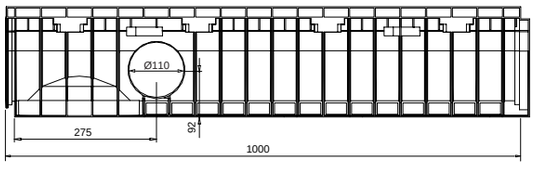
SECTION

VIP 200/250								
CODE	PRICE	MATERIAL	EXTERNAL DIMENSIONS L x l x h	INTERNAL DIMENSIONS L x l x h	WEIGHT	DRAINAGE SECTION	CAPACITY	PREINSTALLED DRAIN OUTLET
	€		mm	mm	kg	cm^2	dm^3	mm
502042		HD-PE	1000 x 258 x 304	1000 x 200 x 250	4,50	430,00	43,00	side 2 x Ø 200 ; 2 x Ø 160 bottom 1 x Ø 200 ; 1 x Ø 160

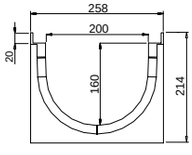
§ Waterproofing: in order to ensure the channels are waterproof, a bituminous adhesive sealant should be used. Heat-sealing the channel joints makes sure there will be no leakages through said joints for a very long time. For further information please contact Mufle's Technical Department.
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



VIEW FROM BELOW



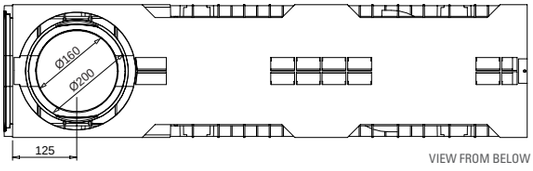
SIDE VIEW



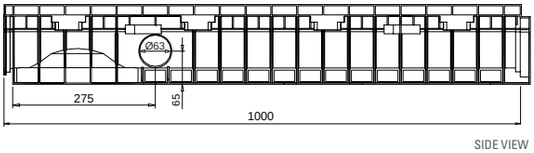
SECTION

VIP20 200/160

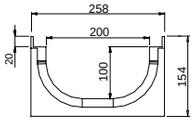
CODE	PRICE	MATERIAL	EXTERNAL DIMENSIONS L x l x h	INTERNAL DIMENSIONS L x l x h	WEIGHT	DRAINAGE SECTION	CAPACITY	PREINSTALLED DRAIN OUTLET
	€		mm	mm	kg	cm^2	dm^3	mm
702004		HD-PE	1000 x 258 x 214	1000 x 200 x 160	3,40	275,87	27,58	side 2 x Ø 110 bottom 1 x Ø 160 ; 1 x Ø 200



VIEW FROM BELOW



SIDE VIEW



SECTION

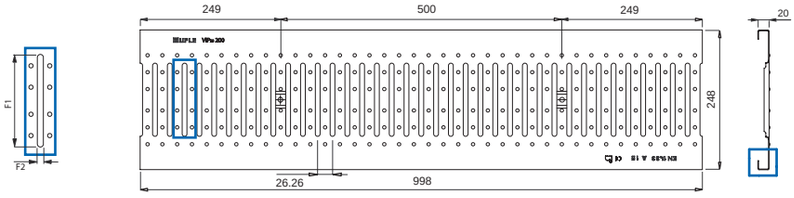
VIP20 200/100

CODE	PRICE	MATERIAL	EXTERNAL DIMENSIONS L x l x h	INTERNAL DIMENSIONS L x l x h	WEIGHT	DRAINAGE SECTION	CAPACITY	PREINSTALLED DRAIN OUTLET
	€		mm	mm	kg	cm^2	dm^3	mm
702005		HD-PE	1000 x 258 x 154	1000 x 200 x 100	2,80	178,63	17,86	side 2 x Ø 63 bottom 1 x Ø 160 ; 1 x Ø 200

§ Waterproofing: in order to ensure the channels are waterproof, a bituminous adhesive sealant should be used. Heat-sealing the channel joints makes sure there will be no leakages through said joints for a very long time. For further information please contact Mufle's Technical Department.

N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF GALVANISED STEEL
Green areas and parks
Pedestrian areas and/or cycle lanes
Sports facilities
Terraces



SLOT DETAIL — VIEW FROM ABOVE — SIDE VIEW — BEND DETAIL

SLOTTED GRATING

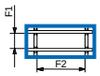
20 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM no fixing
502136		galvanised steel DX51D**	998 x 248 x 20	4,80	4,20	130 x 8,5		up to Class C250 as per Standard EN 1433
502148		galvanised steel DX51D**	498 x 248 x 20	2,40	2,10			

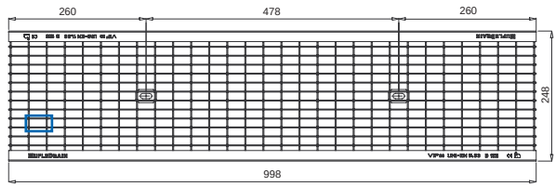
** Classification according to Standard EN 10142 (issued in July 2002) and symbolic designation according to EN 10027-1 (-2) (issued in September 1993).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF GALVANISED STEEL
Pavements
Lay-bys and private car parks

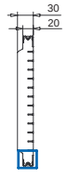
APPLICATIONS OF STAINLESS STEEL
Pavements
Lay-bys and private car parks
Food factories
Chemically aggressive environments



DETAIL OF HOOKING SYSTEM

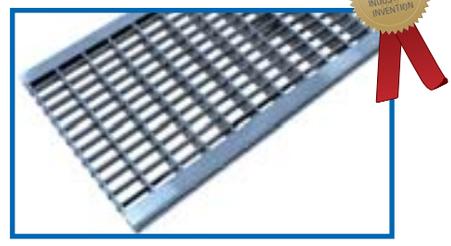


VIEW FROM ABOVE



SIDE VIEW


DETAIL OF UPRIGHT BEND

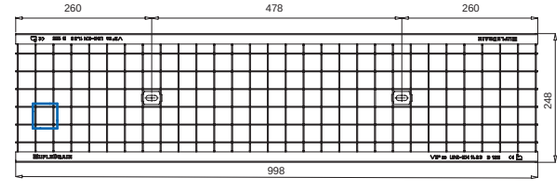


MESH GRATING (11 x 33)


30 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM no fixing
502134		hot dip galvanised steel DD11 (1.0332)**	998 x 248 x 20	6,20	16,98	15,2 x 32,2		up to Class C250 as per Standard EN 1433
502160		pickled stainless steel AISI 304*						
502146		hot dip galvanised steel DD11 (1.0332)**	498 x 248 x 20	3,10	8,49			
502166		pickled stainless steel AISI 304*						

DETAIL OF SQUARE MESH



VIEW FROM ABOVE

SIDE VIEW


DETAIL OF UPRIGHT BEND

MESH GRATING (33 x 33)


30 mm

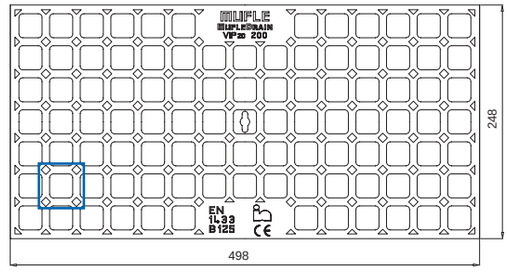
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM no fixing
502135		hot dip galvanised steel DD11 (1.0332)**	998 x 248 x 20	5,20	18,00	32,2 x 32,2		up to Class C250 as per Standard EN 1433
502161		pickled stainless steel AISI 304*						
502147		hot dip galvanised steel DD11 (1.0332)**	498 x 248 x 20	2,60	9,00			
502167		pickled stainless steel AISI 304*						

* Classification according to American Standard ASTM.
** Classification according to Standard EN 10111 (issued in March 2000) and symbolic designation according to EN 10027-1 (-2) (issued in September 1993).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF DUCTILE IRON

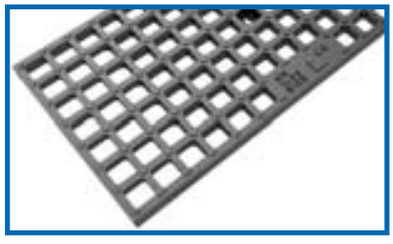
Pavements
Lay-bys and private car parks

SLOT DETAIL



VIEW FROM ABOVE

SIDE VIEW



MESH GRATING								20 mm
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM no fixing
502122		GJS 500/7* ductile iron water based paint coated	498 x 248 x 20	7,30	6,12	25,5 x 24,5		up to Class C250 as per Standard EN 1433

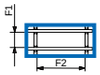
* Classification according to Standard EN 1563 (issued in March 2004).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF GALVANISED STEEL

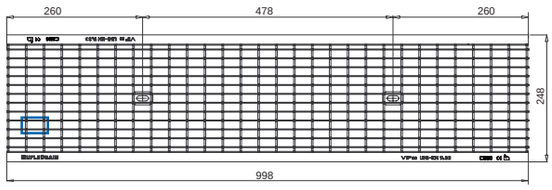
Kerbs
Historical town centres (slow traffic)
Parking areas
Parking decks

APPLICATIONS OF STAINLESS STEEL

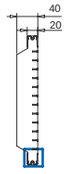
Kerbs
Historical town centres (slow traffic)
Parking areas
Parking decks
Areas with low-load transit in food factories
Areas with low-load transit in chemically aggressive environments



DETAIL OF HOOKING SYSTEM

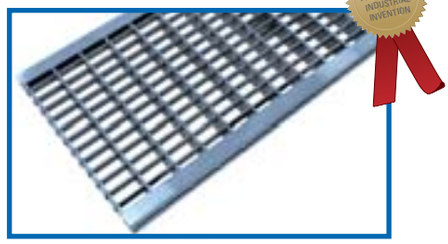


VIEW FROM ABOVE



SIDE VIEW

DETAIL OF UPRIGHT BEND

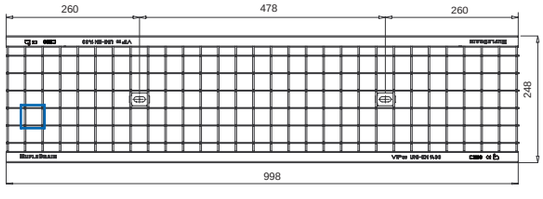


MESH GRATING (11 x 33)

40 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM no fixing
502156		hot dip galvanised steel DD11 (1.0332)**	998 x 248 x 20	9,50	16,98	15,2 x 31,2		up to Class C250 as per Standard EN 1433
502179		pickled stainless steel AISI 304*						
502173		hot dip galvanised steel DD11 (1.0332)**	498 x 248 x 20	4,75	8,49			
502192		pickled stainless steel AISI 304*						

DETAIL OF SQUARE MESH



VIEW FROM ABOVE

SIDE VIEW

DETAIL OF UPRIGHT BEND

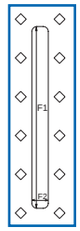
MESH GRATING (33 x 33)

40 mm

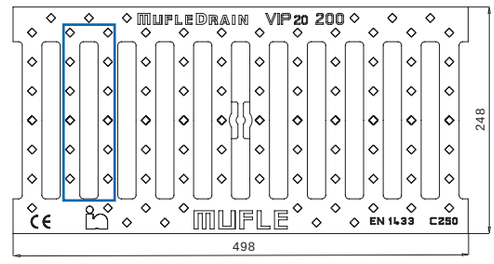
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM no fixing
502155		hot dip galvanised steel DD11 (1.0332)**	998 x 248 x 20	8,70	18,00	31,2 x 31,2		up to Class C250 as per Standard EN 1433
502178		pickled stainless steel AISI 304*						
502172		hot dip galvanised steel DD11 (1.0332)**	498 x 248 x 20	4,35	9,00			
502191		pickled stainless steel AISI 304*						

* Classification according to American Standard ASTM.
** Classification according to Standard EN 10111 (issued in March 2000) and symbolic designation according to EN 10027-1 (-2) (issued in September 1993).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF DUCTILE IRON
Kerbs
Historical town centres (slow traffic)
Parking areas
Parking decks

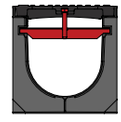


SLOT DETAIL



VIEW FROM ABOVE

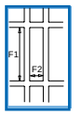
SIDE VIEW

SLOTTED GRATING 20 mm								25 mm
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM no fixing
502124		GJS 500/7* ductile iron water based paint coated	498 x 248 x 20	7,00	4,32	180,0 x 20,0		up to Class C250 as per Standard EN 1433

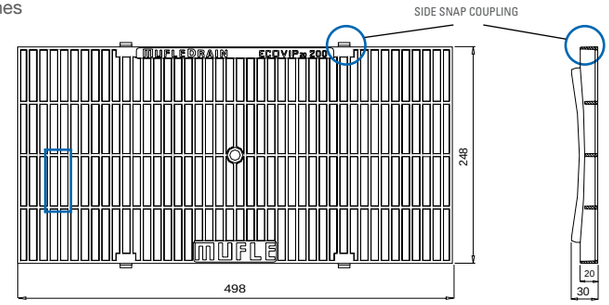
* Classification according to Standard EN 1563 (issued in March 2004).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF HD-PE

Residential and condominium areas
Pedestrian areas and/or cycle lanes
Sports facilities
Greenhouses
Green areas



SLOT DETAIL

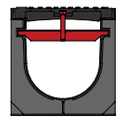
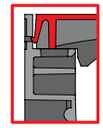


VIEW FROM ABOVE

SIDE VIEW

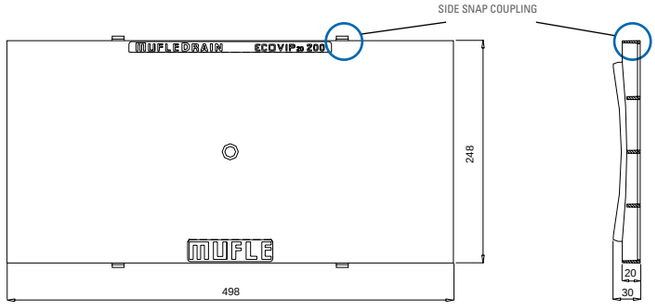
PEDESTRIAN GRATING

30 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM side block**
502106		HD-PE black	498 x 248 x 20	0,78	7,80	58,5 x 8,5		

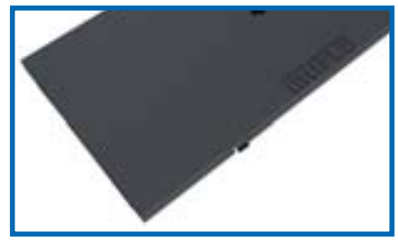
APPLICATIONS OF HD-PE

Cable passageway
Passageway for water
and/or heat systems



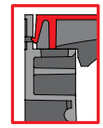
VIEW FROM ABOVE

SIDE VIEW



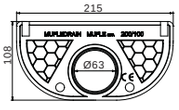
PEDESTRIAN SOLID TOP COVER

30 mm

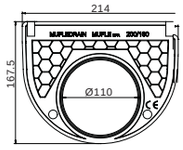
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	FIXING SYSTEM tie-rod	FIXING SYSTEM side block**
502102		HD-PE* black	498 x 248 x 20	0,88		

Ecovip solid top covers and gratings cannot be certified because Standard EN 1433 does not yet provide for specific tests for plastic-material gratings. The tests carried out by Mufle showed that Ecovip 200 solid top covers and gratings can be defined as “Walk-Over”.

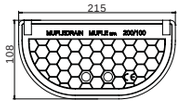
* Photoengraved anti-slip surface finish.
** Coupling system using a tab inside the grating.
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



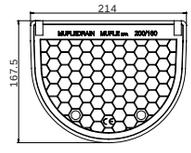
End-cap 200/100



End-cap 200/160



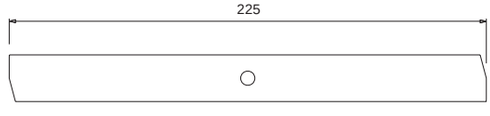
Closed end-cap with drain 200/100



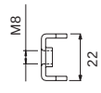
Closed end-cap with drain 2000/160

END CAPS

CODE	PRICE	TYPE	MATERIAL	VALID FOR CHANNELS	PREINSTALLED DRAINS
	€				mm
700506		end-cap with drain	HD-PE	200/100	1 x Ø 63
700514		closed end-cap	HD-PE	200/100	-
700507		end-cap with drain	HD-PE	200/160	1 x Ø 110
700515		closed end-cap	HD-PE	200/160	-
502414		end-cap with drain	galvanised steel and PVC	200/250	1 x Ø 160
502413		closed end-cap	galvanised steel	200/250	-



VIEW FROM ABOVE



SIDE VIEW

KIT TIE-ROD + SCREWS

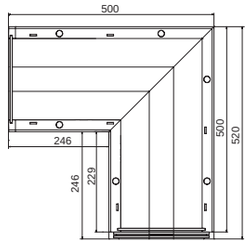
CODE	PRICE	MATERIAL	VALID FOR GRATINGS	SCREW	KIT FOR 1 ml
	€				
500427		galvanised steel	VIP galvanised steel - HD-PE	M8 x 55 TBL combi	2 tie-rods + 2 screws
500428		stainless steel	VIP stainless steel	M8 x 55 TBL combi	2 tie-rods + 2 screws
500429		black galvanised steel	VIP ductile iron	M8 x 55 black with hexagonal head	2 tie-rods + 2 screws

N.B. Sizes and weights are subject to usual manufacturing tolerance values.

SPECIAL PIECES AND DRAIN BOX WITH SYPHON

VIP20 200

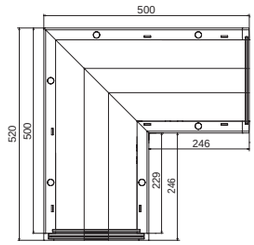
LEFT CORNER



VIP20 200

CODE	PRICE €	MODEL
502246		200/250
702104		200/160
702105		200/100

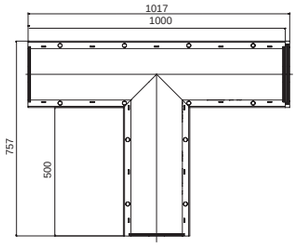
RIGHT CORNER



VIP20 200

CODE	PRICE €	MODEL
502245		200/250
702110		200/160
702111		200/100

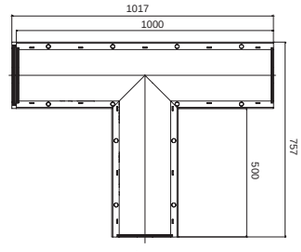
LEFT TI



VIP20 200

CODE	PRICE €	MODEL
502247		200/250
702116		200/160
702117		200/100

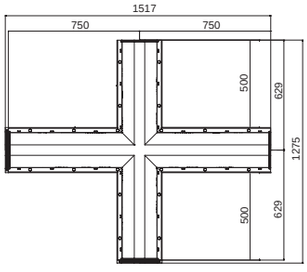
RIGHT TI



VIP20 200

CODE	PRICE €	MODEL
502248		200/250
702122		200/160
702123		200/100

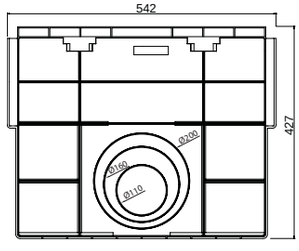
CROSS



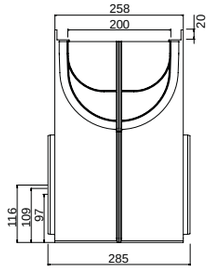
VIP20 200

CODE	PRICE €	MODEL
on request		200/250
702128		200/160
702129		200/100

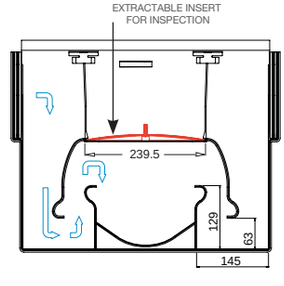
DRAIN BOX WITH SYPHON



FRONT VIEW



SIDE VIEW



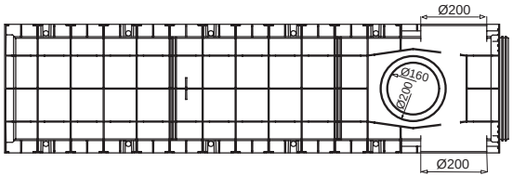
SECTION

VIP20 200

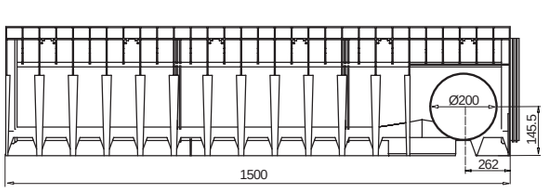
CODE	PRICE €	MATERIAL	EXTERNAL DIMENSIONS L x l x h mm	INTERNAL DIMENSIONS L x l x h mm	MAXIMUM LARGE mm	HEIGHT OF OUTLETS mm	WEIGHT kg	PREINSTALLED DRAIN OUTLETS mm
702008		HD-PE	542 x 258 x 427	500 x 200 x 400	285	116 - 109 - 97	3,10	2 x Ø 110; 2 x Ø 160; 2 x Ø 200

N.B. Sizes and weights are subject to usual manufacturing tolerance values.

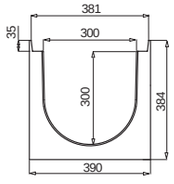
300



VIEW FROM BELOW



SIDE VIEW



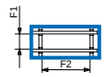
SECTION

VIP35 300/300								
CODE	PRICE	MATERIAL	EXTERNAL DIMENSIONS L x l x h	INTERNAL DIMENSIONS L x l x h	WEIGHT	DRAINAGE SECTION	CAPACITY	PREINSTALLED DRAIN OUTLET
	€		mm	mm	kg	cm^2	dm^3	mm
502018		HD-PE	1500 x 390 x 384	1500 x 300 x 300	9,30	796,00	79,60	side 2 x Ø 200 bottom 1 x Ø 160; 1 x Ø 200

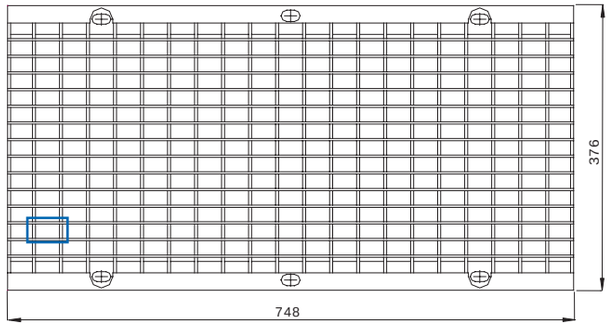
§ Waterproofing: in order to ensure the channels are waterproof, a bituminous adhesive sealant should be used. Heat-sealing the channel joints makes sure there will be no leakages through said joints for a very long time. For further information please contact Mufle's Technical Department.
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF GALVANISED STEEL

Kerbs
Historical town centres (slow traffic)
Parking areas
Parking decks

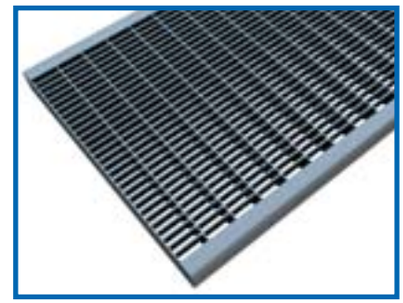


DETAIL OF HOOKING SYSTEM



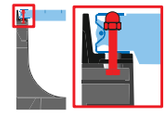
VIEW FROM ABOVE

SIDE VIEW



MESH GRATING (11 x 33)

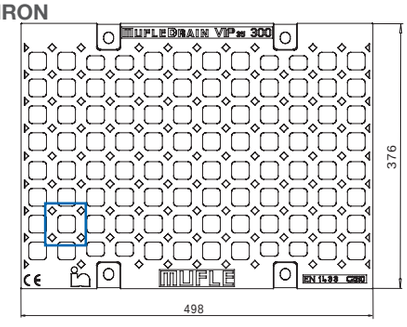
40 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM nut
502137		hot dip galvanised steel DD11 (1.0332)**	748 x 376 x 35	15,30	23,76	33,0 x 20,0	

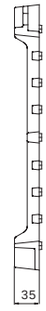
APPLICATIONS OF DUCTILE IRON

Kerbs
Historical town centres (slow traffic)
Parking areas
Parking decks

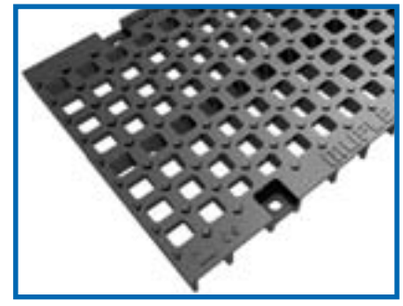
SLOT DETAIL



VIEW FROM ABOVE

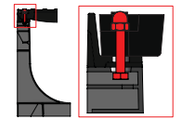


SIDE VIEW

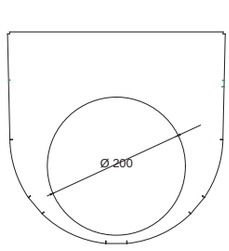


MESH GRATING

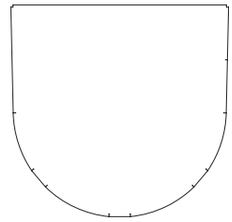
35 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM nut
503117		GJS 500/7* ductile iron water based paint coated	498 x 376 x 35	16,50	5,96	25,0 x 25,0	

* Classification according to Standard EN 1563 (issued in March 2004).
** Classification according to Standard EN 10111 (issued in March 2000) and symbolic designation according to EN 10027-1 (-2) (issued in September 1993).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



End-cap 150/100



Closed end-cap with drain 150/100

END CAPS

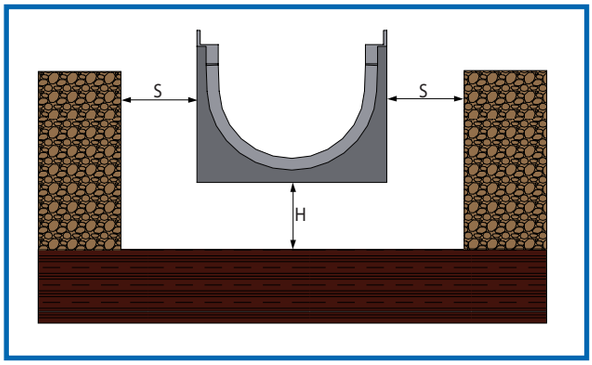
CODE	PRICE	MATERIAL	TYPE END-CAP	PREINSTALLED DRAIN OUTLETS
	€			mm
503411		galvanised steel	closed end-cap 300/300	–
503412		galvanised steel e PVC	end-cap with drain 300/300	1 x Ø 200

KIT NUTS

CODE	PRICE	MATERIAL	VALID FOR GRATINGS	NUT	KIT FOR 1,5 ml
	€				
503309		galvanised steel	VIP_{20} galvanised steel	Blind hexagonal M10 with spherical cap	8 nuts + 8 washer*
503310		black galvanised steel	VIP_{20} ductile iron	Blind hexagonal M10 with spherical cap	12 nuts + 12 washer*

Special pieces, Corners, Ti, Crosses for VIP35 are available upon request. For further information please contact our Technical Department.

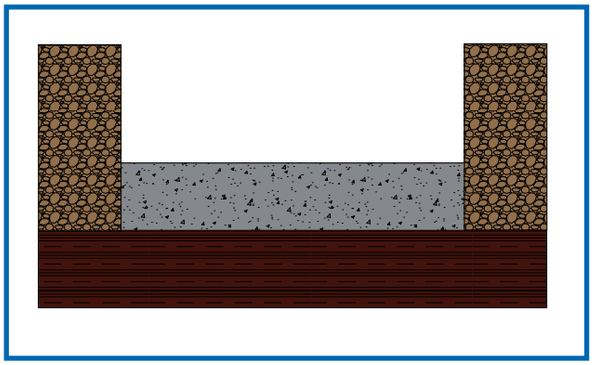
* Screws are included in the channel.
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



Step 1

HOLE SIZE

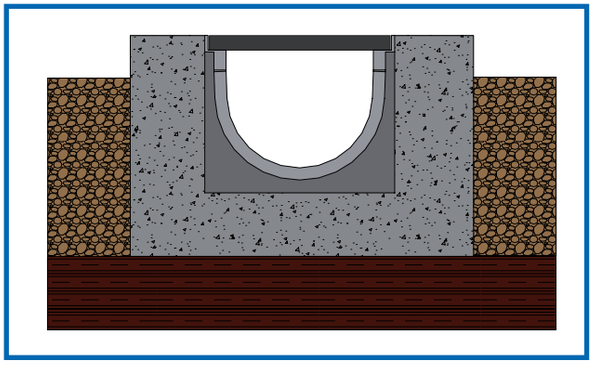
The hole needed to lay the MufleDrain channel must allow not only for the size of the channel and the drain piping but also for adequate space for the base H and the side concrete props S. The dimensions to be followed are shown in the summary table. In this step make sure the underlying layer is suitable to the load it is expected to support.



Step 2

CONCRETE BASE

Cast the concrete base H up to the height specified, allowing for any inclination in the drainage line. If needed, equip the base with stretches of electrowelded mesh or steel rods.

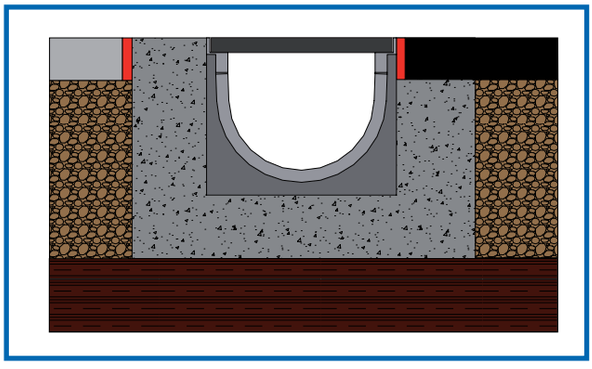


Step 3

CHANNEL ARRANGEMENT

Lay the channels starting from the flow outlet. Allow for the drains required and build the side prop S up to the maximum height allowed by the final coating. Shape it according to the needs based on the drawing. Introduce and fix the grating required beforehand in order to prevent any deformation of the channel due to the thrust of concrete and to speed up installation. Protect the gratings with a PVC film so that no final cleaning must be carried out to remove any concrete residues.

NEW FEATURE:
The channels can be installed with preassembled gratings.

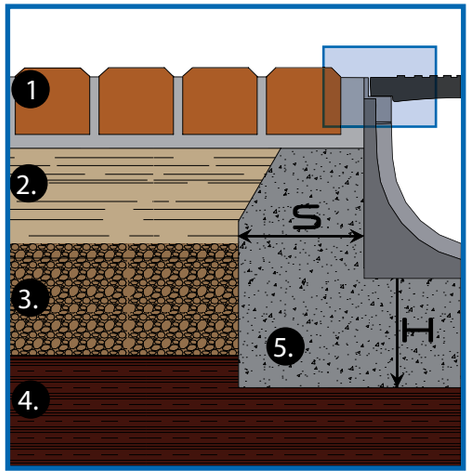


Step 4

FINAL COATING

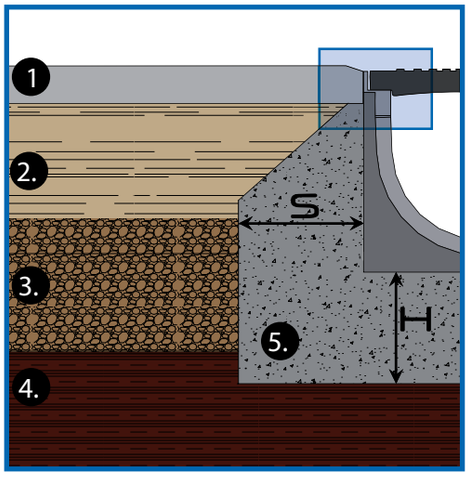
When applying the final coating, make sure its upper profile reaches up to minimum 3/5 mm above the grating's flow plane (see details on the following page). Remove the protection film.

Case 1
Flooring
(A15-B125)



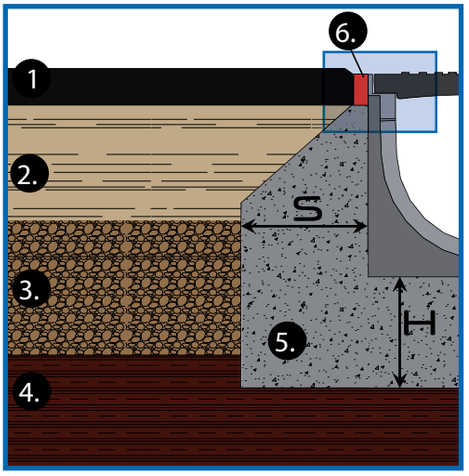
1. Flooring
2. Lower layer
3. Bearing layer
4. Subfloor
5. Concrete reinforcement layer

Case 2
Concrete flooring
(A15-B125-C250)

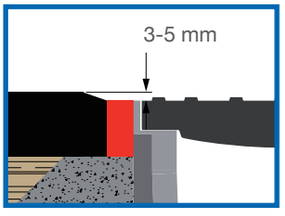


1. Flooring
2. Lower layer
3. Bearing layer
4. Subfloor
5. Concrete reinforcement layer

Case 3
Asphalt
(A15-B125-C250)



1. Flooring
2. Lower layer
3. Bearing layer
4. Subfloor
5. Concrete reinforcement layer
6. Bitumen joint



This Sheet is only aimed to give advice on the installation of channels mod. MufleDrain. In any case, always:
- check the carrying capacity characteristics of the underlying layer
- use concrete and stone aggregate having the characteristics recommended
- comply with the height of the installation surface and the thickness of the prop as specified according to the load classes.

SUMMARY TABLE				
Load class (EN 1433)		A 15	B 125	C 250
Applicable load (EN 1433)	kN	15	125	250
Minimum height H of concrete laying bed	mm	100	100	150
Minimum thickness S of the concrete flanking	mm	100	100	150
Concrete compression strength class (EN 206-1)		C 20/25	C 20/25	C 25/30
Concrete compression strength class* (EN 206-1)		C 30/37 XF4	C 30/37 XF4	C 30/37 XF4

* If concrete can be affected by frost and thaw cycles.
N.B. We recommend using Class S4 concrete (EN 206-1) and stone aggregate with maximum diameter 8 mm.

1. Supply and installation of MufleDrain VIP20 (VIP35) type HD-PE drainage channels with external stiffening ribs and male-female coupling system allowing the assembly between one channel and the next with the relevant pre-assembled gratings. The channel will have 3/4 drainage diaphragms at pre-determined points. HD-PE upper profile with height not smaller than 20 mm (35 mm). The channel surface will be perfectly smooth and have a low roughness coefficient to allow the best water flow. Il will also be perfectly water-tight and devoid of any connection points with the outside. The channel will have the following dimensions: length 1,000 mm (1,500 mm), internal net gap ___mm (300 mm), internal height ___ mm.

2. Supply and installation of ductile cast-iron GJS 500/7 covering gratings according to EN 1563-2004 for MufleDrain VIP20 drainage channels with bar fixing system, load class C250 according to EN 1433-2004, slot width 20 mm, length 498 mm, width ___mm.

3. Supply and installation of ductile cast-iron GJS 500/7 covering gratings according to EN 1563-2004 with mesh for MufleDrain VIP35 drainage channels with nut fixing system, load class C250 according to EN 1433-2004, length 748 mm, width 376 mm.

4. Supply and installation of ductile cast-iron GJS 500/7 covering gratings according to EN 1563-2004 for MufleDrain VIP20 drainage channels with bar fixing system, load class C250 according to EN 1433-2004, slot inclined 30° to the longitudinal axis, width 6mm, length 498 mm, width 148 mm.

5. Supply and installation of ductile cast-iron GJS 500/7 covering gratings according to EN 1563-2004 with mesh for MufleDrain VIP20 drainage channels with bar fixing system, load class B125 (C250) according to EN 1433-2004, length 498 mm, width ___mm (148 mm).

6. Supply and installation of galvanised (stainless) steel square-mesh or anti-heel covering gratings for MufleDrain VIP20 drainage channels with bar fixing system, load class B125 according to EN 1433-2004, length 998 mm, width ___mm. A similar grating will be available upon request with length 498 mm. The dimensions will be 33 x 33 mm in the square mesh and 33 x 15 mm in the anti-heel mesh.

7. Supply and installation of galvanised (stainless) steel square-mesh or anti-heel covering gratings for MufleDrain VIP20 drainage channels equipped with screw fixing slots and bar fixing plate, load class C250 according to EN 1433-2004, length 998 mm, width ___mm. A similar grating will be available upon request with length 498 mm. The dimensions will be 33 x 33 mm in the square mesh and 33 x 15 mm in the anti-heel mesh.

8. Supply and installation of galvanised steel anti-heel covering gratings for MufleDrain VIP35 drainage channels with slots for nut fixing system, load class C250 according to EN 1433-2004, length 748 mm, width 376 mm. The dimensions of the mesh will be 33 x 20 mm.

9. Supply and installation of galvanised (stainless) steel rung covering gratings for MufleDrain VIP20 drainage channels with bar fixing system, load class A15 according to EN 1433-2004, length 998 mm, width ___mm. A similar grating will be available upon request with length 498 mm.

10. Supply and installation of drive-over HD-PE covering gratings for MufleDrain VIP20 drainage channels with bar fixing system or elastic coupling system, length 498 mm, width ___mm.

11. Supply and installation of drive-over HD-PE covering gratings with longitudinal slot for MufleDrain VIP20 drainage channels with bar fixing system or elastic coupling system, length 498 mm, width 148 mm.

12. Supply and installation of drive-over HD-PE covers for MufleDrain VIP20 drainage channels with bar fixing system or elastic coupling system, length 498 mm, width ___mm.

13. Supply and installation of HD-PE end caps for MufleDrain drainage channel with coupling system into the special channel housing.

14. Supply and installation of HD-PE open cap with drainage hole diameter ___mm for MufleDrain drainage channel with coupling system into the special channel housing.

15. Supply and installation of (open) end cap made from galvanised steel (galvanised steel and PVC tube) for MufleDrain drainage channel with coupling system into the special channel housing.

16. Supply and installation of HD-PE gullies with siphon for MufleDrain VIP20 drainage channels with external stiffening ribs and coupling system. HD-PE upper profile with height not smaller than 20 mm. The upper section of the siphon built in the gully may be removed in order to allow inspection and cleaning work. The gully will have preformed drains on both sides with diameter up to 200 mm. The gully dimensions will be as follows: length 542 mm, net gap ___ mm, internal height 400 mm.

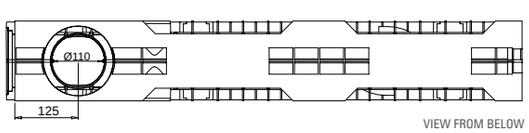
SMART

The system:

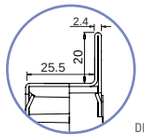
- it supports 2 load classes (B125, C250) in compliance with Standard EN 1433
- it is made up of a HD-PE channel with a strengthening frame
- it is very compact, since the frame is perfectly anchored to the channel body. The frame is made from materials able to resist corrosion due to contact with the surrounding environment and the gratings. The anchoring system was designed to withstand any deformation due shearing or torsional stress
- it is wearproof and very solid thanks to the frame, which ensures a 2.5 mm - thick drive-over edge and a 1.2 mm - thick contact surface
- since the edge shows the exact dimensions for the paving, easy and accurate installation is ensured
- it comprises 3 different types of gratings (with slots, square mesh, anti-heel mesh) made from galvanised steel, stainless steel and ductile cast-iron.
- it comes equipped with a classic tie-rod fixing system and a convenient drain gate
- it is ideal for private car parks, footways, canalisation systems in roads and parking areas, transversal canalisation systems (road crossings) with low - speed vehicular traffic (max 15 km/h – in this case the system can support D400 - class gratings, although not in compliance with Standard EN 1433)
- it includes models with small sizes (H 55 and H 80) which are perfect for installation into covered industrial pavings whenever the channel edge needs to be protected during polishing
- it comes complete with drain gullies with siphon
- the range is made up of 8 channels with 3 widths and 4 heights (100/55, 100/80, 100/100, 100/160, 150/100, 150/160, 200/100, 200/160)

The product must be laid according to Mufle's specifications. The relevant instructions are available in this Catalogue on page 154 and on the Web site www.mufle.com.

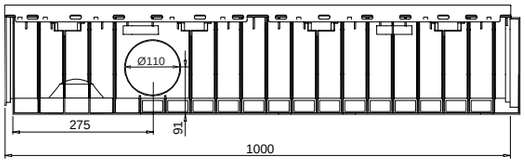
100



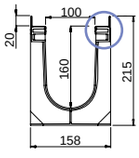
VIEW FROM BELOW



DETAIL SECTION



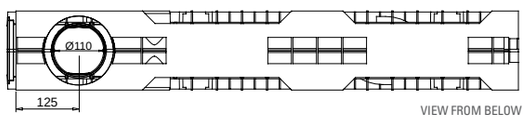
SIDE VIEW



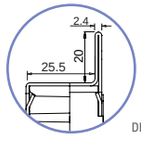
SECTION

SMART 100/160

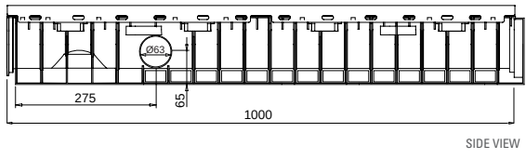
CODE	PRICE	MATERIAL OF FRAME	MATERIAL OF CHANNEL	EXTERNAL DIMENSIONS L x l x h	INTERNAL DIMENSIONS L x l x h	WEIGHT	DRAINAGE SECTION	CAPACITY	PREINSTALLED DRAIN OUTLETS	
	€			mm	mm	kg	cm^2	dm^3	mm	
701000		galvanised steel DX51D**	HD-PE	1000 x 158 x 215	1000 x 100 x 160	4,10	145,28	14,52	side bottom	2 x Ø 110 1 x Ø 110
701008		stainless steel AISI 304*								



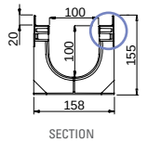
VIEW FROM BELOW



DETAIL SECTION



SIDE VIEW

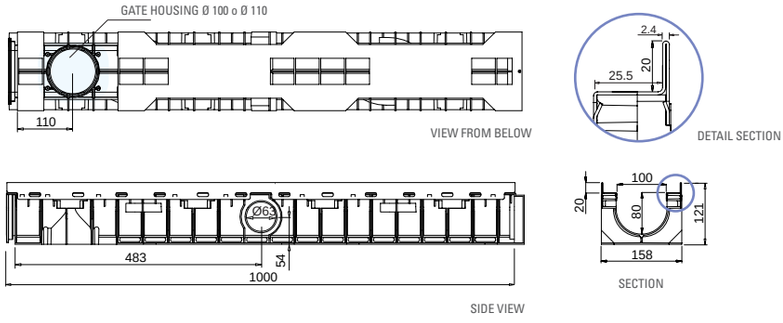


SECTION

SMART 100/100

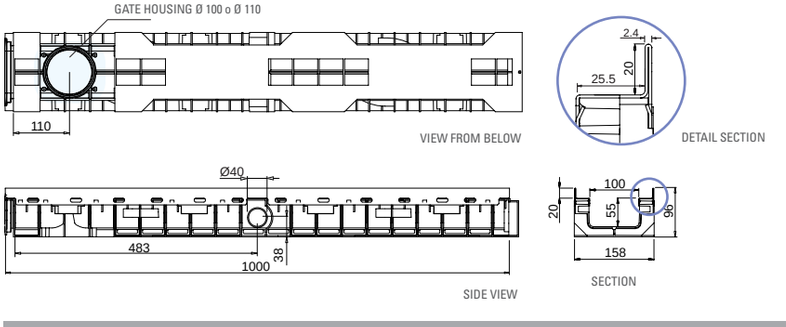
CODE	PRICE	MATERIAL OF FRAME	MATERIAL OF CHANNEL	EXTERNAL DIMENSIONS L x l x h	INTERNAL DIMENSIONS L x l x h	WEIGHT	DRAINAGE SECTION	CAPACITY	PREINSTALLED DRAIN OUTLET	
	€			mm	mm	kg	cm^2	dm^3	mm	
701001		galvanised steel DX51D**	HD-PE	1000 x 158 x 155	1000 x 100 x 100	3,60	89,56	8,95	side bottom	2 x Ø 63 1 x Ø 110
701009		stainless steel AISI 304*								

* Classification according to American Standard ASTM.
** Classification according to Standard EN 10142 (issued in July 2002) and symbolic designation according to EN 10027-1 (-2) (issued in September 1993).
§ Waterproofing: in order to ensure the channels are waterproof, a bituminous adhesive sealant should be used. Heat-sealing the channel joints makes sure there will be no leakages through said joints for a very long time. For further information please contact Mufle's Technical Department.
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



SMART 100/80

CODE	PRICE	MATERIAL OF FRAME	MATERIAL OF CHANNEL	EXTERNAL DIMENSIONS L x l x h	INTERNAL DIMENSIONS L x l x h	WEIGHT	DRAINAGE SECTION	CAPACITY	PREINSTALLED DRAIN OUTLETS
	€			mm	mm	kg	cm^2	dm^3	mm
701002		galvanised steel DX51D**	HD-PE	1000 x 158 x 121	1000 x 100 x 80	3,30	69,28	6,92	side 2 x Ø 63 bottom 1 x Ø 100 ; 1 x Ø 110
701010		stainless steel AISI 304*							



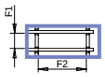
SMART 100/55

CODE	PRICE	MATERIAL OF FRAME	MATERIAL OF CHANNEL	EXTERNAL DIMENSIONS L x l x h	INTERNAL DIMENSIONS L x l x h	WEIGHT	DRAINAGE SECTION	CAPACITY	PREINSTALLED DRAIN OUTLETS
	€			mm	mm	kg	cm^2	dm^3	mm
701003		galvanised steel DX51D**	HD-PE	1000 x 158 x 96	1000 x 100 x 55	3,10	54,44	5,44	side 2 x Ø 40 bottom 1 x Ø 100 ; 1 x Ø 110
701011		stainless steel AISI 304*							

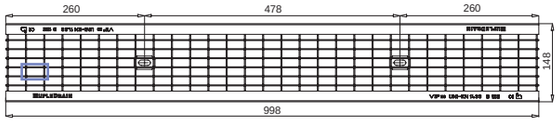
* Classification according to American Standard ASTM.
** Classification according to Standard EN 10142 (issued in July 2002) and symbolic designation according to EN 10027-1 (-2) (issued in September 1993).
*** For drainage purposes use the drain gate with outlet kit (available in two versions Ø100 and Ø110).
§ Waterproofing: in order to ensure the channels are waterproof, a bituminous adhesive sealant should be used. Heat-sealing the channel joints makes sure there will be no leakages through said joints for a very long time. For further information please contact Mufle's Technical Department.
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF GALVANISED STEEL
Pavements
Lay-bys and private car parks

APPLICATIONS OF STAINLESS STEEL
Pavements
Lay-bys and private car parks
Food factories
Chemically aggressive environments



DETAIL OF HOOKING SYSTEM



VIEW FROM ABOVE

SIDE VIEW

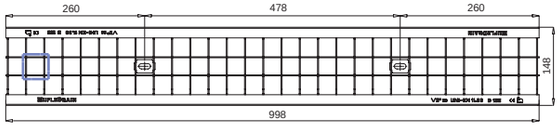

DETAIL OF UPRIGHT BEND

MESH GRATING (11 x 33)

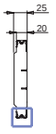
25 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM no fixing
502126		hot dip galvanised steel DD11 (1.0332)**	998 x 148 x 20	3,60	8,82	15,2 x 32,2		up to Class C250 as per Standard EN 1433
502150		pickled stainless steel AISI 304*						
502138		hot dip galvanised steel DD11 (1.0332)**	498 x 148 x 20	1,80	4,41			
502162		pickled stainless steel AISI 304*						

DETAIL OF SQUARE MESH



VIEW FROM ABOVE



SIDE VIEW


DETAIL OF UPRIGHT BEND

MESH GRATING (33 x 33)

25 mm

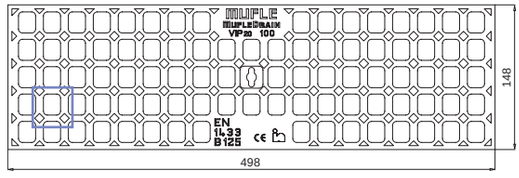
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM no fixing
502127		hot dip galvanised steel DD11 (1.0332)**	998 x 148 x 20	2,90	9,00	32,2 x 32,2		up to Class C250 as per Standard EN 1433
502157		pickled stainless steel AISI 304*						
502139		hot dip galvanised steel DD11 (1.0332)**	498 x 148 x 20	1,45	4,50			
502163		pickled stainless steel AISI 304*						

* Classification according to American Standard ASTM.
** Classification according to Standard EN 10111 (issued in March 2000) and symbolic designation according to EN 10027-1 (-2) (issued in September 1993).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF DUCTILE IRON

Pavements
Lay-bys and private car parks

SLOT DETAIL



VIEW FROM ABOVE

SIDE VIEW

MESH GRATING

20 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM no fixing
502112		GJS 500/7* ductile iron water based paint coated	498 x 148 x 20	3,40	3,31	21,5 x 17,5		up to Class C250 as per Standard EN 1433

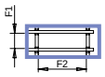
* Classification according to Standard EN 1563 (issued in March 2004).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF GALVANISED STEEL

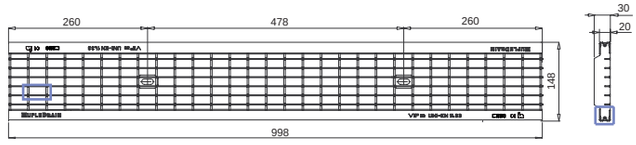
Kerbs
Historical town centres (slow traffic)
Parking areas
Parking decks

APPLICATIONS OF STAINLESS STEEL

Kerbs
Historical town centres (slow traffic)
Parking areas
Parking decks
Areas with low-load transit in food factories
Areas with low-load transit in chemically aggressive environments



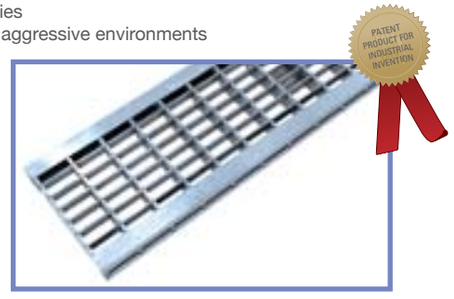
DETAIL OF HOOKING SYSTEM



VIEW FROM ABOVE

SIDE VIEW

DETAIL OF UPRIGHT BEND

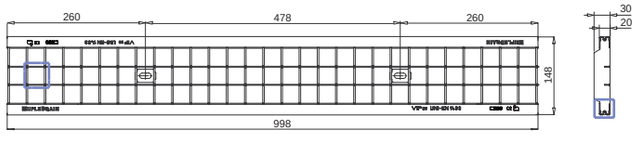


MESH GRATING (11 x 33)

30 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM no fixing
502152		hot dip galvanised steel DD11 (1.0332)**	998 x 148 x 20	5,10	8,82	15,2 x 31,2		up to Class C250 as per Standard EN 1433
502175		pickled stainless steel AISI 304*						
502169		hot dip galvanised steel DD11 (1.0332)**	498 x 148 x 20	2,55	4,41			
502187		pickled stainless steel AISI 304*						

DETAIL OF SQUARE MESH



VIEW FROM ABOVE

SIDE VIEW

DETAIL OF UPRIGHT BEND

MESH GRATING (33 x 33)

30 mm

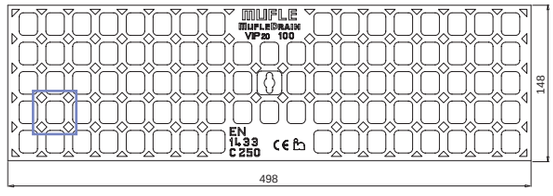
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM no fixing
502151		hot dip galvanised steel DD11 (1.0332)**	998 x 148 x 20	4,60	8,50	31,2 x 31,2		up to Class C250 as per Standard EN 1433
502174		pickled stainless steel AISI 304*						
502168		hot dip galvanised steel DD11 (1.0332)**	498 x 148 x 20	2,30	4,25			
502188		pickled stainless steel AISI 304*						

* Classification according to American Standard ASTM.
** Classification according to Standard EN 10111 (issued in March 2000) and symbolic designation according to EN 10027-1 (-2) (issued in September 1993).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF DUCTILE IRON

Kerbs
Historical town centres (slow traffic)
Parking areas
Parking decks

SLOT DETAIL



VIEW FROM ABOVE

SIDE VIEW

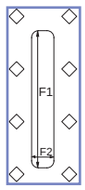
MESH GRATING

20 mm

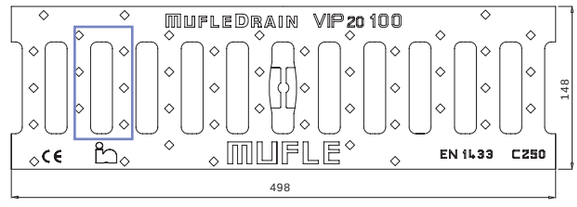
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM no fixing
502115		GJS 500/7* ductile iron water based paint coated	498 x 148 x 20	3,80	3,31	21,5 x 17,5		up to Class C250 as per Standard EN 1433

* Classification according to Standard EN 1563 (issued in March 2004).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF DUCTILE IRON
Kerbs
Historical town centres (slow traffic)
Parking areas
Parking decks

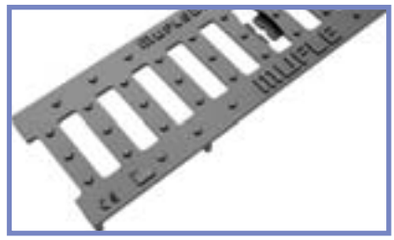


SLOT DETAIL



VIEW FROM ABOVE

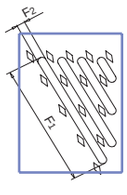
SIDE VIEW



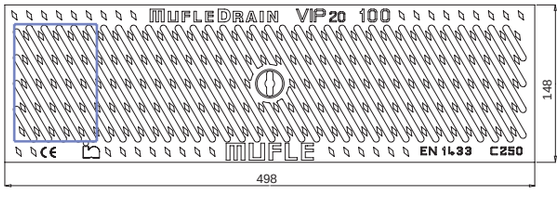
SLOTTED GRATING 20 mm

20 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM no fixing
502113		GJS 500/7* ductile iron water based paint coated	498 x 148 x 20	3,60	1,97	82,0 x 20,0		up to Class C250 as per Standard EN 1433



SLOT DETAIL

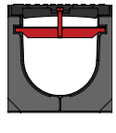


VIEW FROM ABOVE

SIDE VIEW

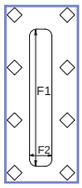
SLOTTED GRATING 6 mm

20 mm

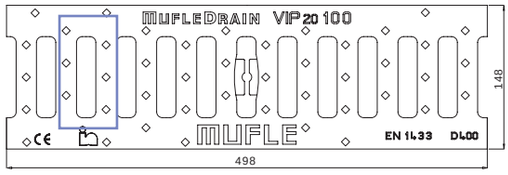
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM no fixing
502114		GJS 500/7* ductile iron water based paint coated	498 x 148 x 20	4,00	2,10	91,5 x 6,0		up to Class C250 as per Standard EN 1433

* Classification according to Standard EN 1563 (issued in March 2004).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF DUCTILE IRON
Road carriageways (not transversal)
Hard shoulders
Lay-bys with thick and heavy-goods traffic
Petrol stations

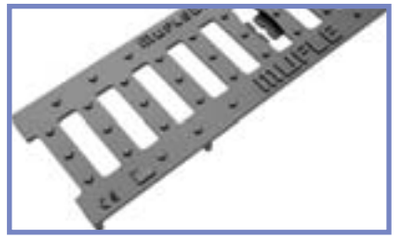


SLOT DETAIL



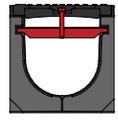
VIEW FROM ABOVE

SIDE VIEW



SLOTTED GRATING 20 mm

30 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod
502116		GJS 500/7* ductile iron water based paint coated	498 x 148 x 20	4,50	1,97	82,0 x 20,0	

Class - D400 ductile iron gratings for SMART channels cannot be certified according to Standard EN 1433 because of the thickness of the edge subject to traffic and the contact surface, which on the contrary is suitable up to Class C250. Nevertheless the gratings passed the load tests specified for Class D400. We recommend using the combination “SMART channel + D400 - Class ductile iron grating” for transversal canalisation systems (road crossings) with low-speed vehicular traffic (max 15 km/h).

* Classification according to Standard EN 1563 (issued in March 2004).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

End-cap 100/55

Closed end-cap with drain 100/55

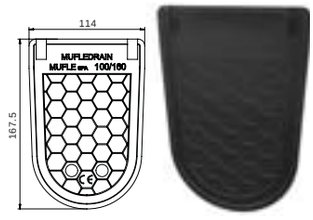
End-cap 100/80

Closed end-cap with drain 100/80

End-cap 100/100

Closed end-cap with drain 100/100

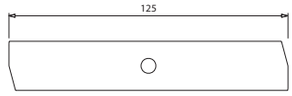
End-cap 100/160



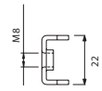
Closed end-cap with drain 100/160

END CAPS

CODE	PRICE	TYPE	MATERIAL	VALID FOR CHANNELS	PREINSTALLED DRAINS
	€				mm
700500		end-cap with drain	HD-PE	100/55	1 x Ø 40
700508		closed end-cap	HD-PE	100/55	-
700501		end-cap with drain	HD-PE	100/80	1 x Ø 63
700509		closed end-cap	HD-PE	100/80	-
700502		end-cap with drain	HD-PE	100/100	1 x Ø 63
700510		closed end-cap	HD-PE	100/100	-
700503		end-cap with drain	HD-PE	100/160	1 x Ø 63
700511		closed end-cap	HD-PE	100/160	-



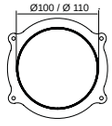
VIEW FROM ABOVE



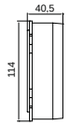
SIDE VIEW

KIT TIE-ROD + SCREWS

CODE	PRICE	MATERIAL	VALID FOR GRATINGS	SCREW	KIT FOR 1 ml
	€				
500421		galvanised steel	SMART galvanised steel	M8 x 55 TBL combi	2 tie-rods + 2 screws
500422		stainless steel	SMART stainless steel	M8 x 55 TBL combi stainless steel	2 tie-rods + 2 screws
500423		black galvanised steel	SMART ductile iron	M8 x 55 black with hexagonal head	2 tie-rods + 2 screws



VIEW FROM ABOVE



SIDE VIEW

KIT OUTLET + SCREWS

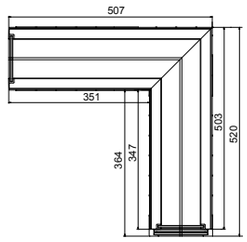
CODE	PRICE	MATERIAL	VALID FOR CHANNELS	DIAMETER	KIT FOR 1 ml
	€			mm	
506114		HD-PE	100/55 - 100/80	Ø 100	1 outlet Ø 100 + 4 screws
506115		HD-PE	100/55 - 100/80	Ø 110	1 outlet Ø 110 + 4 screws

N.B. Sizes and weights are subject to usual manufacturing tolerance values.

SPECIAL PIECES AND DRAIN BOX WITH SYPHON

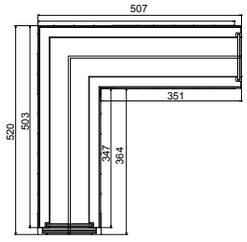
SMART 100

LEFT CORNER — SMART 100



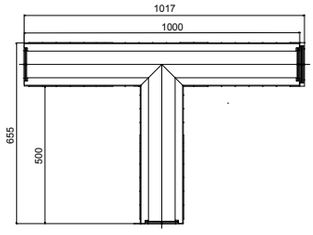
CODE	PRICE €	MODEL
701100		100/160
701101		100/100
701102		100/80
701103		100/55

RIGHT CORNER — SMART 100



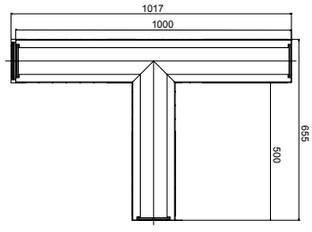
CODE	PRICE €	MODEL
701108		100/160
701109		100/100
701110		100/80
701111		100/55

LEFT TI — SMART 100



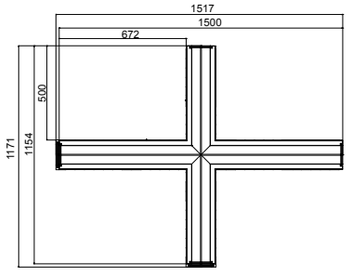
CODE	PRICE €	MODEL
701116		100/160
701117		100/100
701118		100/80
701119		100/55

RIGHT TI — SMART 100



CODE	PRICE €	MODEL
701124		100/160
701125		100/100
701126		100/80
701127		100/55

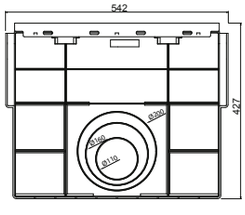
CROSS — SMART 100



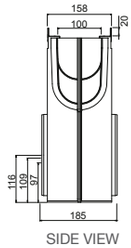
CODE	PRICE €	MODEL
701132		100/160
701133		100/100
701134		100/80
701135		100/55

Special pieces, corners, Ti, crosses in stainless steel are available upon request. For further information please contact our Technical Department.

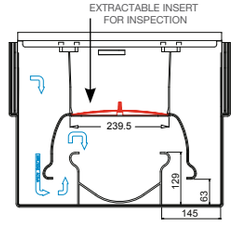
DRAIN BOX WITH SYPHON



FRONT VIEW



SIDE VIEW



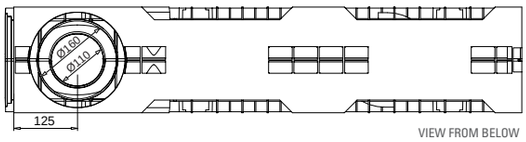
SECTION

SMART 100

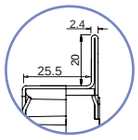
CODE	PRICE €	MATERIAL OF FRAME	MATERIAL OF OUTLET	EXTERNAL DIMENSIONS L x l x h mm	INTERNAL DIMENSIONS L x l x h mm	MAXIMUM LARGE mm	HEIGHT OF OUTLETS mm	WEIGHT kg	PREINSTALLED DRAIN OUTLETS mm
701016		galvanised steel DX51D**	HD-PE	542 x 158 x 434	500 x 100 x 400	185	116 - 109 - 97	3,35	2 x Ø 110; 2 x Ø 160; 2 x Ø 200
701019		stainless steel AISI 304*	HD-PE	542 x 158 x 434	500 x 100 x 400	185	116 - 109 - 97	3,35	2 x Ø 110; 2 x Ø 160; 2 x Ø 200

* Classification according to American Standard ASTM.
** Classification according to Standard EN 10142 (issued in July 2002) and symbolic designation according to EN 10027-1 (-2) (issued in September 1993).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

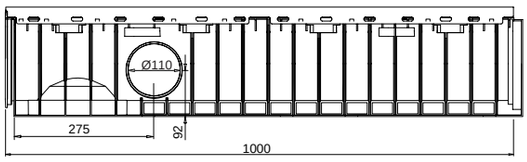
150



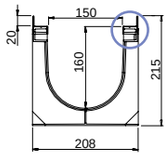
VIEW FROM BELOW



DETAIL SECTION



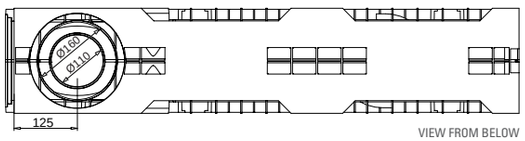
SIDE VIEW



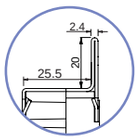
SECTION

SMART 150/160

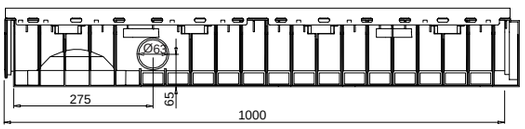
CODE	PRICE	MATERIAL OF FRAME	MATERIAL OF CHANNEL	EXTERNAL DIMENSIONS L x l x h	INTERNAL DIMENSIONS L x l x h	WEIGHT	DRAINAGE SECTION	CAPACITY	PREINSTALLED DRAIN OUTLET
	€			mm	mm	kg	cm^2	dm^3	mm
701004		galvanised steel DX51D**	HD-PE	1000 x 208 x 215	1000 x 150 x 160	4,55	213,04	21,30	side 2 x Ø 110 bottom 1 x Ø 110 ; 1 x Ø 160
701012		stainless steel AISI 304*							



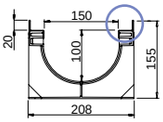
VIEW FROM BELOW



DETAIL SECTION



SIDE VIEW



SECTION

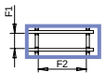
SMART 150/100

CODE	PRICE	MATERIAL OF FRAME	MATERIAL OF CHANNEL	EXTERNAL DIMENSIONS L x l x h	INTERNAL DIMENSIONS L x l x h	WEIGHT	DRAINAGE SECTION	CAPACITY	PREINSTALLED DRAIN OUTLET
	€			mm	mm	kg	cm^2	dm^3	mm
701005		galvanised steel DX51D**	HD-PE	1000 x 208 x 155	1000 x 150 x 100	4,00	127,32	12,73	side 2 x Ø 63 bottom 1 x Ø 110 ; 1 x Ø 160
701013		stainless steel AISI 304*							

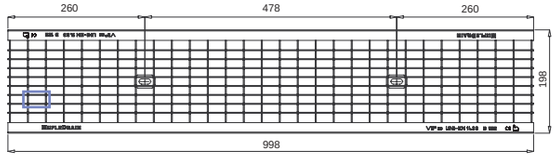
* Classification according to American Standard ASTM.
** Classification according to Standard EN 10142 (issued in July 2002) and symbolic designation according to EN 10027-1 (-2) (issued in September 1993).
§ Waterproofing: in order to ensure the channels are waterproof, a bituminous adhesive sealant should be used. Heat-sealing the channel joints makes sure there will be no leakages through said joints for a very long time. For further information please contact Mufle's Technical Department.
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF GALVANISED STEEL
Pavements
Lay-bys and private car parks

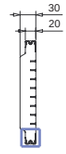
APPLICATIONS OF STAINLESS STEEL
Pavements
Lay-bys and private car parks
Food factories
Chemically aggressive environments



DETAIL OF HOOKING SYSTEM



VIEW FROM ABOVE



SIDE VIEW

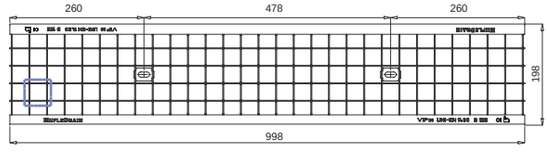

DETAIL OF UPRIGHT BEND

MESH GRATING (11 x 33)

30 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM no fixing
502130		hot dip galvanised steel DD11 (1.0332)**	998 x 198 x 20	5,00	13,08	15,2 x 32,2		up to Class C250 as per Standard EN 1433
502158		pickled stainless steel AISI 304*						
502142		hot dip galvanised steel DD11 (1.0332)**	498 x 198 x 20	2,50	6,54			
502164		pickled stainless steel AISI 304*						

DETAIL OF SQUARE MESH



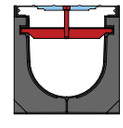
VIEW FROM ABOVE

SIDE VIEW


DETAIL OF UPRIGHT BEND

MESH GRATING (33 x 33)

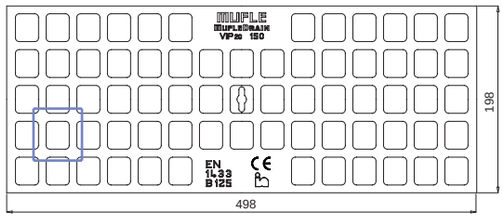
30 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM no fixing
502131		hot dip galvanised steel DD11 (1.0332)**	998 x 198 x 20	4,10	13,74	32,2 x 32,2		up to Class C250 as per Standard EN 1433
502159		pickled stainless steel AISI 304*						
502143		hot dip galvanised steel DD11 (1.0332)**	498 x 198 x 20	2,05	6,87			
502165		pickled stainless steel AISI 304*						

* Classification according to American Standard ASTM.
** Classification according to Standard EN 10111 (issued in March 2000) and symbolic designation according to EN 10027-1 (-2) (issued in September 1993).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF DUCTILE IRON
Pavements
Lay-bys and private car parks

SLOT DETAIL



VIEW FROM ABOVE

SIDE VIEW

MESH GRATING

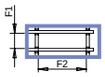
20 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM no fixing
502118		GJS 500/7* ductile iron water based paint coated	498 x 198 x 20	4,90	3,77	29,0 x 24,5		up to Class C250 as per Standard EN 1433

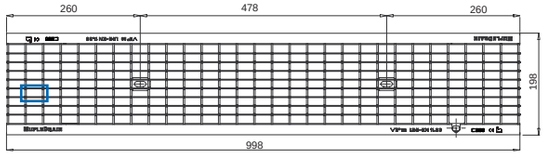
* Classification according to Standard EN 1563 (issued in March 2004).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF GALVANISED STEEL
Kerbs
Historical town centres (slow traffic)
Parking areas
Parking decks

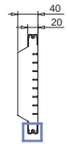
APPLICATIONS OF STAINLESS STEEL
Kerbs
Historical town centres (slow traffic)
Parking areas
Parking decks
Areas with low-load transit in food factories
Areas with low-load transit in chemically aggressive environments



DETAIL OF HOOKING SYSTEM



VIEW FROM ABOVE



SIDE VIEW

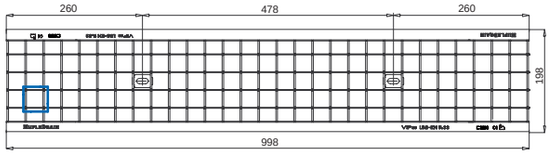

DETAIL OF UPRIGHT BEND

MESH GRATING (11 x 33)

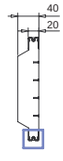
40 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM no fixing
502154		hot dip galvanised steel DD11 (1.0332)**	998 x 198 x 20	7,50	13,08	15,2 x 31,2		up to Class C250 as per Standard EN 1433
502177		pickled stainless steel AISI 304*						
502171		hot dip galvanised steel DD11 (1.0332)**	498 x 198 x 20	3,75	6,54			
502190		pickled stainless steel AISI 304*						

DETAIL OF SQUARE MESH



VIEW FROM ABOVE



SIDE VIEW


DETAIL OF UPRIGHT BEND

MESH GRATING (33 x 33)

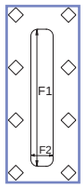
40 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM no fixing
502153		hot dip galvanised steel DD11 (1.0332)**	998 x 198 x 20	7,00	13,47	31,2 x 31,2		up to Class C250 as per Standard EN 1433
502176		pickled stainless steel AISI 304*						
502170		hot dip galvanised steel DD11 (1.0332)**	498 x 198 x 20	3,50	6,73			
502189		pickled stainless steel AISI 304*						

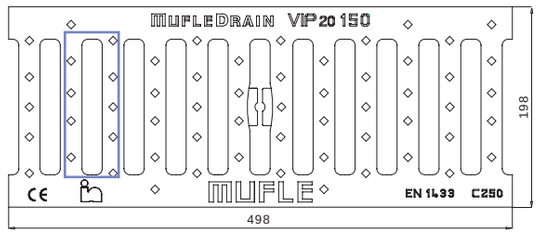
* Classification according to American Standard ASTM.
** Classification according to Standard EN 10111 (issued in March 2000) and symbolic designation according to EN 10027-1 (-2) (issued in September 1993).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF DUCTILE IRON

Kerbs
Historical town centres (slow traffic)
Parking areas
Parking decks



SLOT DETAIL



VIEW FROM ABOVE

SIDE VIEW

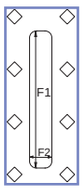
SLOTTED GRATING 20 mm

25 mm

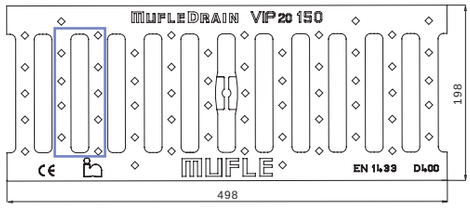
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM no fixing
502120		GJS 500/7* ductile iron water based paint coated	498 x 198 x 20	5,20	3,16	132,0 x 20,0		up to Class C250 as per Standard EN 1433

* Classification according to Standard EN 1563 (issued in March 2004).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF DUCTILE IRON
Road carriageways (not transversal)
Hard shoulders
Lay-bys with thick and heavy-goods traffic
Petrol stations



SLOT DETAIL

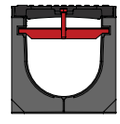


VIEW FROM ABOVE

SIDE VIEW

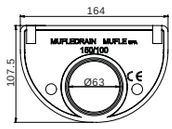
SLOTTED GRATING 20 mm

38 mm

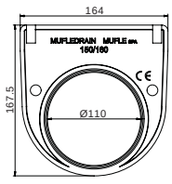
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod
502121		GJS 500/7* ductile iron water based paint coated	498 x 198 x 20	5,90	3,16	132,0 x 20,0	

Class - D400 ductile iron gratings for SMART channels cannot be certified according to Standard EN 1433 because of the thickness of the edge subject to traffic and the contact surface, which on the contrary is suitable up to Class C250. Nevertheless the gratings passed the load tests specified for Class D400. We recommend using the combination “SMART channel + D400 - Class ductile iron grating” for transversal canalisation systems (road crossings) with low-speed vehicular traffic (max 15 km/h).

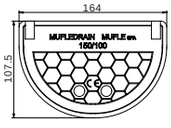
* Classification according to Standard EN 1563 (issued in March 2004).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



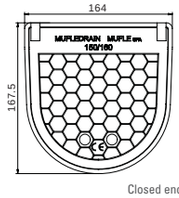
End-cap 150/100



End-cap 150/160



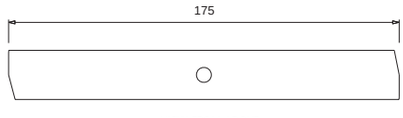
Closed end-cap with drain 150/100



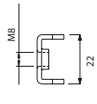
Closed end-cap with drain 150/160

END CAPS

CODE	PRICE	TYPE	MATERIAL	VALID FOR CHANNELS	PREINSTALLED DRAINS
	€				mm
700504		end-cap with drain	HD-PE	150/100	1 x Ø 63
700512		closed end-cap	HD-PE	150/100	-
700505		end-cap with drain	HD-PE	150/160	1 x Ø 110
700513		closed end-cap	HD-PE	150/160	-



VIEW FROM ABOVE



SIDE VIEW

KIT TIE-ROD + SCREWS

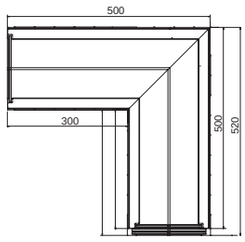
CODE	PRICE	MATERIAL	VALID FOR GRATINGS	SCREW	KIT FOR 1 ml
	€				
500424		galvanised steel	SMART galvanised steel	M8 x 55 TBL combi	2 tie-rods + 2 screws
500425		stainless steel	SMART stainless steel	M8 x 55 TBL combi	2 tie-rods + 2 screws
500426		black galvanised steel	SMART ductile iron	M8 x 55 black with hexagonal head	2 tie-rods + 2 screws

N.B. Sizes and weights are subject to usual manufacturing tolerance values.

SPECIAL PIECES AND DRAIN BOX WITH SYPHON

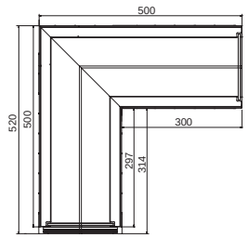
SMART 150

LEFT CORNER — SMART 150



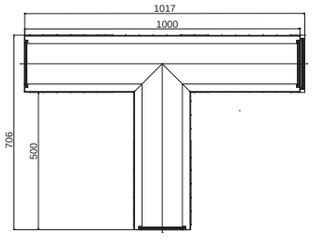
CODE	PRICE €	MODEL
701104		150/160
701105		150/100

RIGHT CORNER — SMART 150



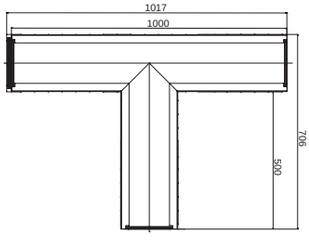
CODE	PRICE €	MODEL
701112		150/160
701113		150/100

LEFT TI — SMART 150



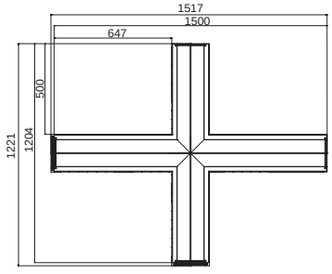
CODE	PRICE €	MODEL
701120		150/160
701121		150/100

RIGHT TI — SMART 150



CODE	PRICE €	MODEL
701128		150/160
701129		150/100

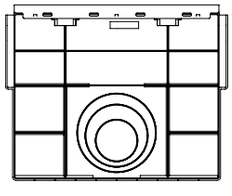
CROSS — SMART 150



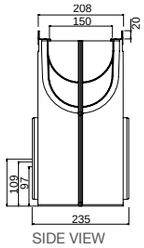
CODE	PRICE €	MODEL
701136		150/160
701137		150/100

Special pieces, corners, Ti, crosses in stainless steel are available upon request. For further information please contact our Technical Department.

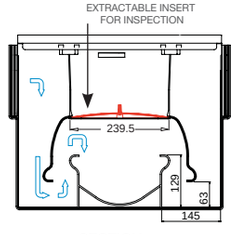
DRAIN BOX WITH SYPHON



FRONT VIEW



SIDE VIEW



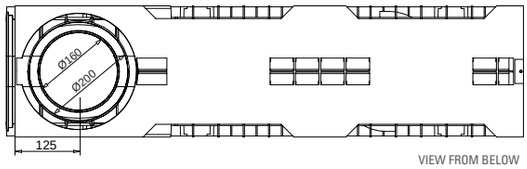
SECTION

SMART 150

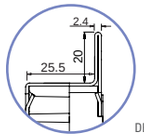
CODE	PRICE €	MATERIAL OF FRAME	MATERIAL OF OUTLET	EXTERNAL DIMENSIONS L x l x h mm	INTERNAL DIMENSIONS L x l x h mm	MAXIMUM LARGE mm	HEIGHT OF OUTLETS mm	WEIGHT kg	PREINSTALLED DRAIN OUTLETS mm
701017		galvanised steel DX51D**	HD-PE	542 x 208 x 427	500 x 100 x 400	185	116 - 109 - 97	3,70	2 x Ø 110; 2 x Ø 160; 2 x Ø 200
701020		stainless steel AISI 304*	HD-PE	542 x 208 x 427	500 x 100 x 400	185	116 - 109 - 97	3,70	2 x Ø 110; 2 x Ø 160; 2 x Ø 200

* Classification according to American Standard ASTM.
** Classification according to Standard EN 10142 (issued in July 2002) and symbolic designation according to EN 10027-1 (-2) (issued in September 1993).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

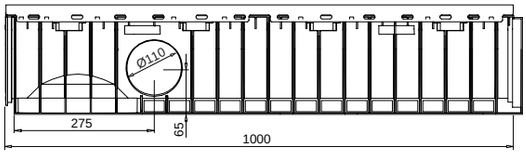
200



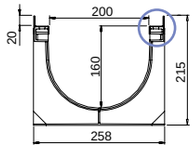
VIEW FROM BELOW



DETAIL SECTION



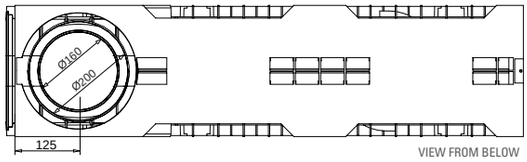
SIDE VIEW



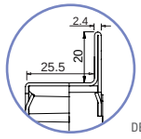
SECTION

SMART 200/160

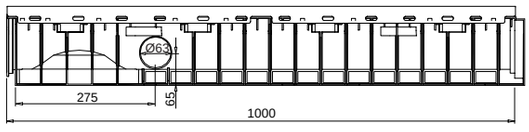
CODE	PRICE	MATERIAL OF FRAME	MATERIAL OF CHANNEL	EXTERNAL DIMENSIONS L x l x h	INTERNAL DIMENSIONS L x l x h	WEIGHT	DRAINAGE SECTION	CAPACITY	PREINSTALLED DRAIN OUTLET
	€			mm	mm	kg	cm^2	dm^3	mm
701006		galvanised steel DX51D**	HD-PE	1000 x 258 x 215	1000 x 200 x 160	4,95	275,87	27,58	side 2 x Ø 110 bottom 1 x Ø 160 ; 1 x Ø 200
701014		stainless steel AISI 304*							



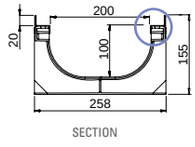
VIEW FROM BELOW



DETAIL SECTION



SIDE VIEW



SECTION

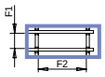
SMART 200/100

CODE	PRICE	MATERIAL OF FRAME	MATERIAL OF CHANNEL	EXTERNAL DIMENSIONS L x l x h	INTERNAL DIMENSIONS L x l x h	WEIGHT	DRAINAGE SECTION	CAPACITY	PREINSTALLED DRAIN OUTLET
	€			mm	mm	kg	cm^2	dm^3	mm
701007		galvanised steel DX51D**	HD-PE	1000 x 258 x 155	1000 x 150 x 100	4,35	178,73	17,87	side 2 x Ø 63 bottom 1 x Ø 160 ; 1 x Ø 200
701015		stainless steel AISI 304*							

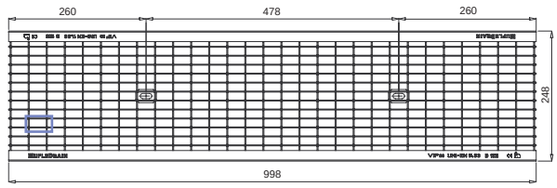
* Classification according to American Standard ASTM.
** Classification according to Standard EN 10142 (issued in July 2002) and symbolic designation according to EN 10027-1 (-2) (issued in September 1993).
§ Waterproofing: in order to ensure the channels are waterproof, a bituminous adhesive sealant should be used. Heat-sealing the channel joints makes sure there will be no leakages through said joints for a very long time. For further information please contact Mufle's Technical Department.
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF GALVANISED STEEL
Pavements
Lay-bys and private car parks

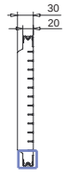
APPLICATIONS OF STAINLESS STEEL
Pavements
Lay-bys and private car parks
Food factories
Chemically aggressive environments



DETAIL OF HOOKING SYSTEM

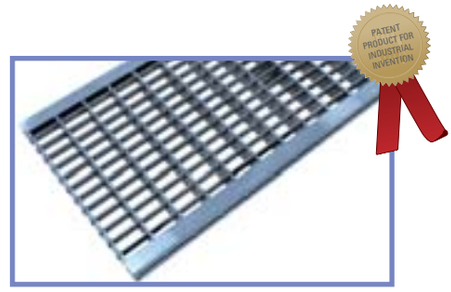


VIEW FROM ABOVE



SIDE VIEW


DETAIL OF UPRIGHT BEND

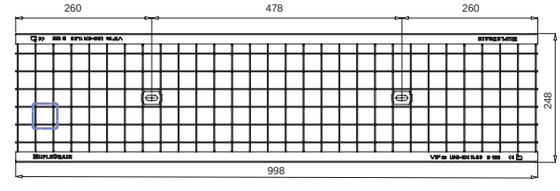


MESH GRATING (11 x 33)


30 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM no fixing
502134		hot dip galvanised steel DD11 (1.0332)**	998 x 248 x 20	6,20	16,98	15,2 x 32,2		up to Class C250 as per Standard EN 1433
502160		pickled stainless steel AISI 304*						
502146		hot dip galvanised steel DD11 (1.0332)**	498 x 248 x 20	3,10	8,49			
502166		pickled stainless steel AISI 304*						

DETAIL OF SQUARE MESH



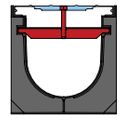
VIEW FROM ABOVE

SIDE VIEW


DETAIL OF UPRIGHT BEND

MESH GRATING (33 x 33)


30 mm

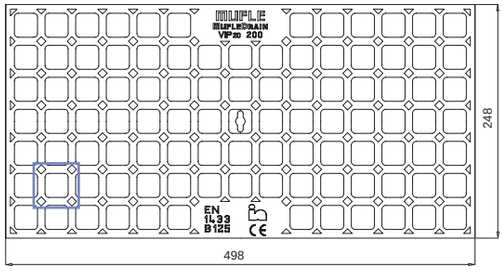
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM no fixing
502135		hot dip galvanised steel DD11 (1.0332)**	998 x 248 x 20	5,20	18,00	32,2 x 32,2		up to Class C250 as per Standard EN 1433
502161		pickled stainless steel AISI 304*						
502147		hot dip galvanised steel DD11 (1.0332)**	498 x 248 x 20	2,60	9,00			
502167		pickled stainless steel AISI 304*						

* Classification according to American Standard ASTM.
** Classification according to Standard EN 10111 (issued in March 2000) and symbolic designation according to EN 10027-1 (-2) (issued in September 1993).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF DUCTILE IRON

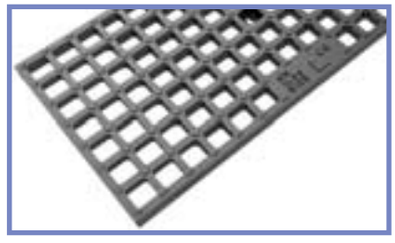
Pavements
Lay-bys and private car parks

SLOT DETAIL



VIEW FROM ABOVE

SIDE VIEW



MESH GRATING

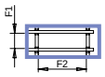
20 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM no fixing
502122		GJS 500/7* ductile iron water based paint coated	498 x 248 x 20	7,30	6,12	25,5 x 24,5		up to Class C250 as per Standard EN 1433

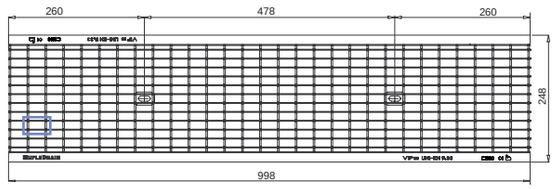
* Classification according to Standard EN 1563 (issued in March 2004).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF GALVANISED STEEL
Kerbs
Historical town centres (slow traffic)
Parking areas
Parking decks

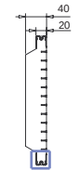
APPLICATIONS OF STAINLESS STEEL
Kerbs
Historical town centres (slow traffic)
Parking areas
Parking decks
Areas with low-load transit in food factories
Areas with low-load transit in chemically aggressive environments



DETAIL OF HOOKING SYSTEM

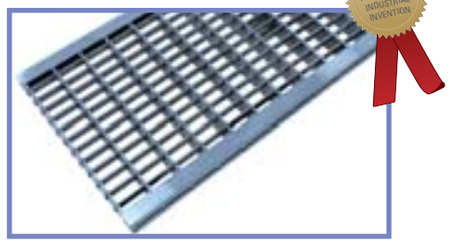


VIEW FROM ABOVE



SIDE VIEW


DETAIL OF UPRIGHT BEND

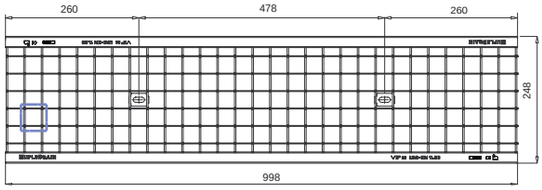


MESH GRATING (11 x 33)

40 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm²	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM no fixing
502156		hot dip galvanised steel DD11 (1.0332)**	998 x 248 x 20	9,50	16,98	31,0 x 15,0		up to Class C250 as per Standard EN 1433
502179		pickled stainless steel AISI 304*						
502173		hot dip galvanised steel DD11 (1.0332)**	498 x 248 x 20	4,75	8,49			
502192		pickled stainless steel AISI 304*						

DETAIL OF SQUARE MESH



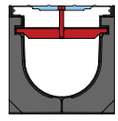
VIEW FROM ABOVE

SIDE VIEW


DETAIL OF UPRIGHT BEND

MESH GRATING (33 x 33)

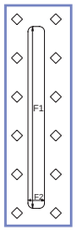
40 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm²	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM no fixing
502155		hot dip galvanised steel DD11 (1.0332)**	998 x 248 x 20	8,70	18,00	31,0 x 31,0		up to Class C250 as per Standard EN 1433
502178		pickled stainless steel AISI 304*						
502172		hot dip galvanised steel DD11 (1.0332)**	498 x 248 x 20	4,35	9,00			
502191		pickled stainless steel AISI 304*						

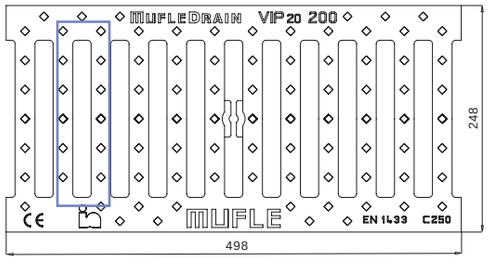
* Classification according to American Standard ASTM.
** Classification according to Standard EN 10111 (issued in March 2000) and symbolic designation according to EN 10027-1 (-2) (issued in September 1993).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF DUCTILE IRON

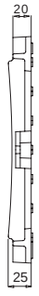
Kerbs
Historical town centres (slow traffic)
Parking areas
Parking decks



SLOT DETAIL



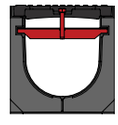
VIEW FROM ABOVE



SIDE VIEW

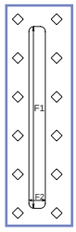
SLOTTED GRATING 20 mm

25 mm

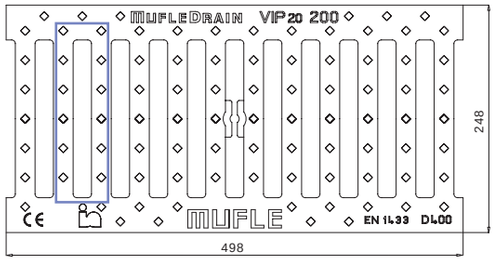
CODE	PRICE	MATERIAL	DIMENSIONS L x l x h	WEIGHT	DRAINAGE SURFACE	OPENINGS F1 x F2	FIXING SYSTEM	
	€		mm	kg	dm^2	mm	tie-rod	no fixing
502124		GJS 500/7* ductile iron water based paint coated	498 x 248 x 20	7,00	4,32	180,0 x 20,0		up to Class C250 as per Standard EN 1433

* Classification according to Standard EN 1563 (issued in March 2004).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF DUCTILE IRON
Road carriageways (not transversal)
Hard shoulders
Lay-bys with thick and heavy-goods traffic
Petrol stations



SLOT DETAIL



VIEW FROM ABOVE

SIDE VIEW

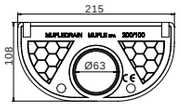
SLOTTED GRATING 20 mm

40 mm

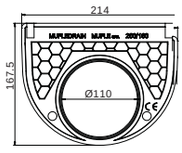
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod
502125		GJS 500/7* ductile iron water based paint coated	498 x 248 x 20	7,70	4,32	180,0 x 20,0	

Class - D400 ductile iron gratings for SMART channels cannot be certified according to Standard EN 1433 because of the thickness of the edge subject to traffic and the contact surface, which on the contrary is suitable up to Class C250. Nevertheless the gratings passed the load tests specified for Class D400. We recommend using the combination “SMART channel + D400 - Class ductile iron grating” for transversal canalisation systems (road crossings) with low-speed vehicular traffic (max 15 km/h).

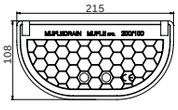
* Classification according to Standard EN 1563 (issued in March 2004).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



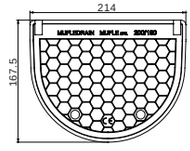
End-cap 200/100



End-cap 200/160



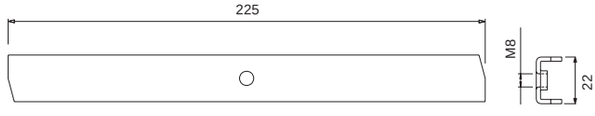
Closed end-cap with drain 200/100



Closed end-cap with drain 200/160

END CAPS

CODE	PRICE	TYPE	MATERIAL	VALID FOR CHANNELS	PREINSTALLED DRAINS
	€				mm
700506		end-cap with drain	HD-PE	200/100	1 x Ø 63
700514		closed end-cap	HD-PE	200/100	-
700507		end-cap with drain	HD-PE	200/160	1 x Ø 110
700515		closed end-cap	HD-PE	200/160	-



VIEW FROM ABOVE

SIDE VIEW

KIT TIE-ROD+SCREWS

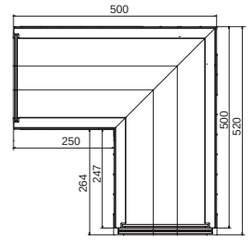
CODE	PRICE	MATERIAL	VALID FOR GRATINGS	SCREW	KIT FOR 1 ml
	€				
500427		galvanised steel	SMART galvanised steel	M8 x 55 TBL combi	2 tie-rods + 2 screws
500428		stainless steel	SMART stainless steel	M8 x 55 TBL combi	2 tie-rods + 2 screws
500429		black galvanised steel	SMART ductile iron	M8 x 55 black with hexagonal head	2 tie-rods + 2 screws

N.B. Sizes and weights are subject to usual manufacturing tolerance values.

SPECIAL PIECES AND DRAIN BOX WITH SYPHON

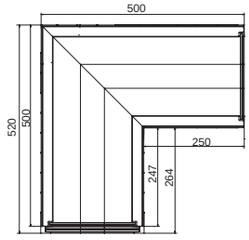
SMART 200

LEFT CORNER — SMART 200



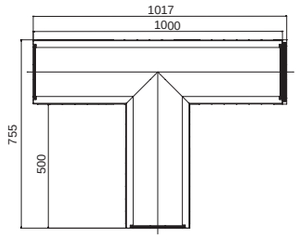
CODE	PRICE €	MODEL
701106		200/160
701107		200/100

RIGHT CORNER — SMART 200



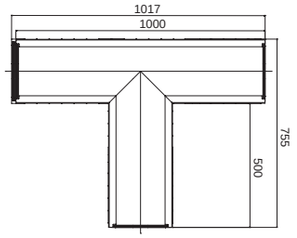
CODE	PRICE €	MODEL
701114		200/160
701115		200/100

LEFT TI — SMART 200



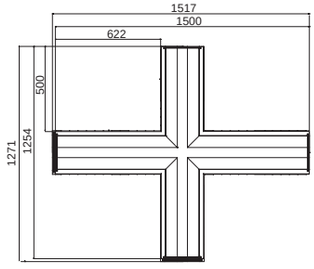
CODE	PRICE €	MODEL
701122		200/160
701123		200/100

RIGHT TI — SMART 200



CODE	PRICE €	MODEL
701130		200/160
701131		200/100

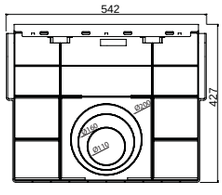
CROSS — SMART 200



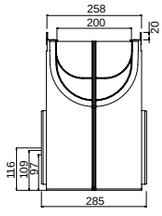
CODE	PRICE €	MODEL
701138		200/160
70139		200/100

Special pieces, corners, Ti, crosses in stainless steel are available upon request. For further information please contact our Technical Department.

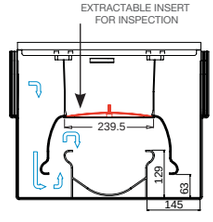
DRAIN BOX WITH SYPHON



FRONT VIEW



SIDE VIEW

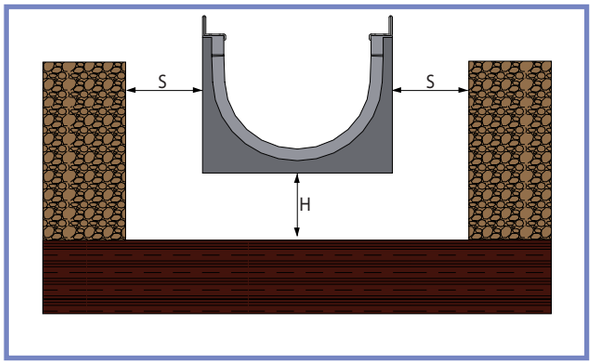


SECTION

SMART 200

CODE	PRICE €	MATERIAL OF FRAME	MATERIAL OF OUTLET	EXTERNAL DIMENSIONS L x l x h mm	INTERNAL DIMENSIONS L x l x h mm	MAXIMUM LARGE mm	HEIGHT OF OUTLETS mm	WEIGHT kg	PREINSTALLED DRAIN OUTLETS mm
701018		galvanised steel DX51D**	HD-PE	542 x 258 x 427	500 x 200 x 400	285	116 - 109 - 97	3,85	2 x Ø 110; 2 x Ø 160; 2 x Ø 200
701021		stainless steel AISI 304*	HD-PE	542 x 258 x 427	500 x 200 x 400	285	116 - 109 - 97	3,85	2 x Ø 110; 2 x Ø 160; 2 x Ø 200

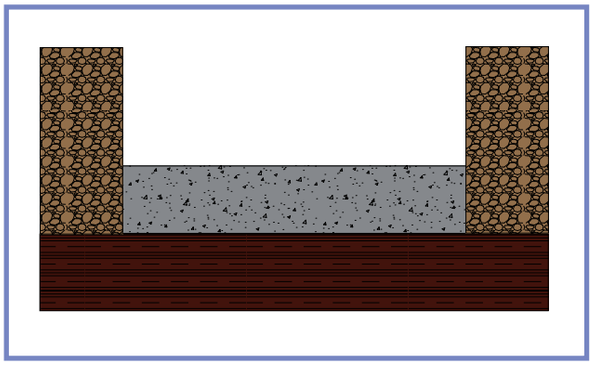
* Classification according to American Standard ASTM.
** Classification according to Standard EN 10142 (issued in July 2002) and symbolic designation according to EN 10027-1 (-2) (issued in September 1993).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



Step 1

HOLE SIZE

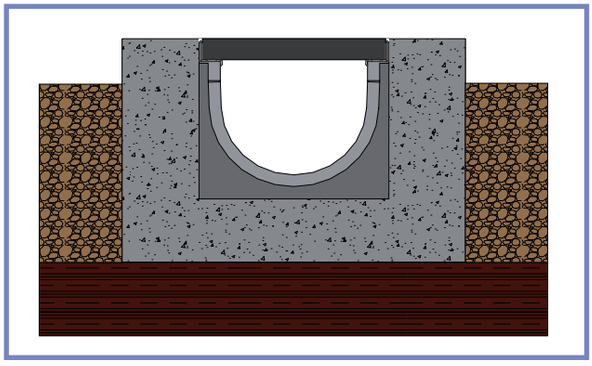
The hole needed to lay the MufleDrain channel must allow not only for the size of the channel and the drain piping but also for adequate space for the base H and the side concrete props S. The dimensions to be followed are shown in the summary table. In this step make sure the underlying layer is suitable to the load it is expected to support.



Step 2

CONCRETE BASE

Cast the concrete base H up to the height specified, allowing for any inclination in the drainage line. If needed, equip the base with stretches of electrowelded mesh or steel rods.

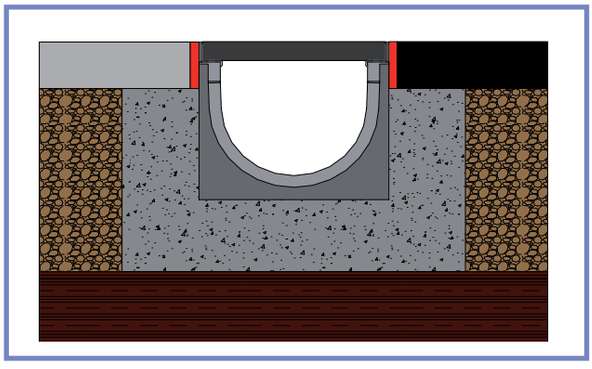


Step 3

CHANNEL ARRANGEMENT

Lay the channels starting from the flow outlet. Allow for the drains required and build the side prop S up to the maximum height allowed by the final coating. Shape it according to the needs based on the drawing. Introduce and fix the grating required beforehand in order to prevent any deformation of the channel due to the thrust of concrete and to speed up installation. Protect the gratings with a PVC film so that no final cleaning must be carried out to remove any concrete residues.

NEW FEATURE:
The channels can be installed with preassembled gratings.

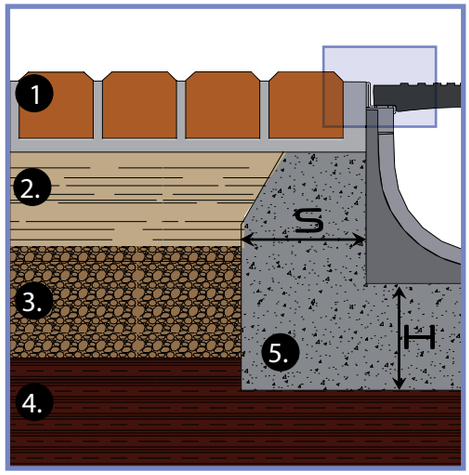


Step 4

FINAL COATING

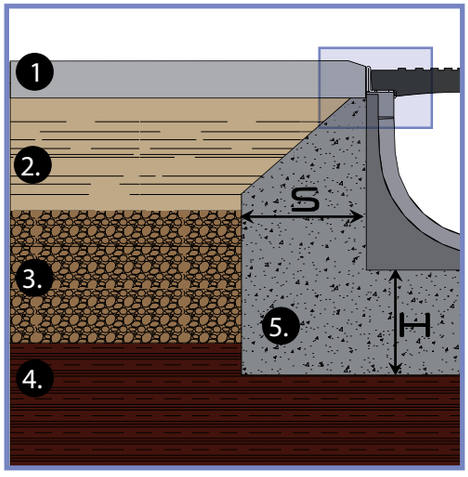
When applying the final coating, make sure its upper profile reaches up to minimum 3/5 mm above the grating's flow plane (see details on the following page). Remove the protection film.

Case 1
Flooring
(A15-B125)



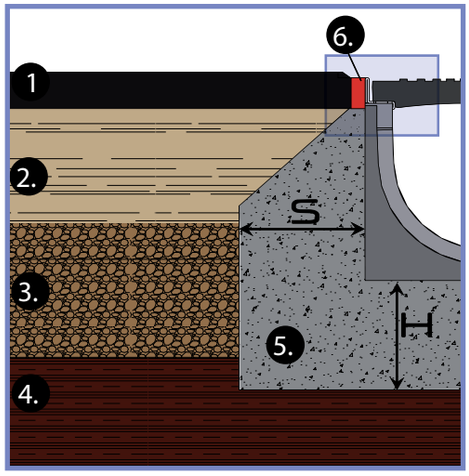
1. Flooring
2. Lower layer
3. Bearing layer
4. Subfloor
5. Concrete reinforcement layer

Case 2
Concrete flooring
(A15-B125-C250)

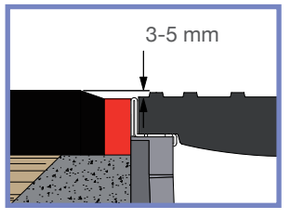


1. Flooring
2. Lower layer
3. Bearing layer
4. Subfloor
5. Concrete reinforcement layer

Case 3
Asphalt
(A15-B125-C250)



1. Flooring
2. Lower layer
3. Bearing layer
4. Subfloor
5. Concrete reinforcement layer
6. Bitumen joint



This Sheet is only aimed to give advice on the installation of channels mod. MufleDrain. In any case, always:
- check the carrying capacity characteristics of the underlying layer
- use concrete and stone aggregate having the characteristics recommended
- comply with the height of the installation surface and the thickness of the prop as specified according to the load classes.

SUMMARY TABLE					
Load class (EN 1433)		A 15	B 125	C 250	D 400**
Applicable load (EN 1433)	kN	15	125	250	400
Minimum height H of concrete laying bed	mm	100	100	150	200
Minimum thickness S of the concrete flanking	mm	100	100	150	200
Concrete compression strength class (EN 206-1)		C 20/25	C 25/30	C 25/30	C 25/30
Concrete compression strength class* (EN 206-1)		C 30/37 XF4	C 30/37 XF4	C 30/37 XF4	C 30/37 XF4

* If concrete can be affected by frost and thaw cycles.
** The grating unit made up of the SMART channel with the grating in class D400 does not comply with Standard EN 1433.
N.B. We recommend using Class S4 concrete (EN 206-1) and stone aggregate with maximum diameter 8 mm.

1. Supply and installation of MufleDrain SMART type HD-PE drainage channel with external stiffening ribs and male-female coupling system allowing the assembly between one channel and the next with the relevant pre-assembled gratings. The channel will have 3/4 drainage diaphragms at pre-determined points. Galvanised (stainless) steel upper profile, 2.4 mm-thick drive-over edge, 1.2 mm-thick contact surface with height not smaller than 20 mm, connection through prearranged coupling to the channel structure. The channel surface will be perfectly smooth and have a low roughness coefficient to allow the best water flow. Il will also be perfectly water-tight and devoid of any connection points with the outside. The channel will have the following dimensions: length 1,000 mm, internal net gap ___mm, internal height ___ mm.

2. Supply and installation of MufleDrain SMART type HD-PE drainage channel with external stiffening ribs and male-female coupling system allowing the assembly between one channel and the next with the relevant pre-assembled gratings. The channel will have 2 side drain diaphragms at pre-determined points and it will be designed to house a HD-PE drain gate (diameter 100 mm - 110 mm) on the bottom through 4 screws. Galvanised (stainless) steel upper profile, 2.4 mm-thick drive-over edge, 1.2 mm-thick contact surface with height not smaller than 20 mm, connection through prearranged coupling to the channel structure. The channel surface will be perfectly smooth and have a low roughness coefficient to allow the best water flow. Il will also be perfectly water-tight and devoid of any connection points with the outside. The channel will have the following dimensions: length 1,000mm, internal net gap 100 mm, internal height ___ mm.

3. Supply and installation of ductile cast-iron GJS 500/7 covering gratings according to EN 1563-2004 for MufleDrain VIP20 drainage channels with bar fixing system, load class C250 according to EN 1433-2004, slot width 20 mm, length 498 mm, width ___mm.

4. Supply and installation of ductile cast-iron GJS 500/7 covering gratings according to EN 1563-2004 for MufleDrain VIP20 drainage channels with bar fixing system, load class C250 according to EN 1433-2004, slot inclined 30° to the longitudinal axis, width 6 mm, length 498 mm, width 148 mm.

5. Supply and installation of ductile cast-iron GJS 500/7 covering gratings according to EN 1563-2004 with mesh for MufleDrain SMART drainage channels with bar fixing system, load class B125 (C250) according to EN 1433-2004, length 498mm, width ___mm (148 mm).

6. Supply and installation of galvanised (stainless) steel square-mesh or anti-heel covering gratings for MufleDrain SMART drainage channels with bar fixing system, load class B125 according to EN 1433-2004, length 998 mm, width ___mm. A similar grating will be available upon request with length 498mm. The dimensions will be 33 x 33 mm in the square mesh and 33 x 15 mm in the anti-heel mesh.

7. Supply and installation of galvanised (stainless) steel square-mesh or anti-heel covering gratings for MufleDrain SMART drainage channels equipped with screw fixing slots and bar fixing plate, load class C250 according to EN 1433-2004, length 998 mm, width ___mm. A similar grating will be available upon request with length 498 mm. The dimensions will be 33 x 33 mm in the square mesh and 33 x 15 mm in the anti-heel mesh.

8. Supply and installation of galvanised (stainless) steel rung covering gratings for MufleDrain SMART drainage channels with bar fixing system, load class A15 according to EN 1433-2004, length 998 mm, width ___mm. A similar grating will be available upon request with length 498 mm.

9. Supply and installation of HD-PE end caps for MufleDrain drainage channel with coupling system into the special channel housing.

10. 1Supply and installation of HD-PE open cap with drainage hole diameter ___mm for MufleDrain drainage channel with coupling system into the special channel housing.

11. 1Supply and installation of HD-PE gullies with siphon for MufleDrain SMART drainage channels with external stiffening ribs and coupling system. Galvanised (stainless) steel upper profile, 2.4 mm-thick drive-over edge, 1.2 mm-thick contact surface with height not smaller than 20 mm, connection through prearranged coupling to the gully structure. The upper section of the siphon built in the gully may be removed in order to allow inspection and cleaning work. The gully will have preformed drains on both sides with diameter up to 200 mm. The gully dimensions will be as follows: length 534 mm, net gap ___ mm, internal height 400 mm.

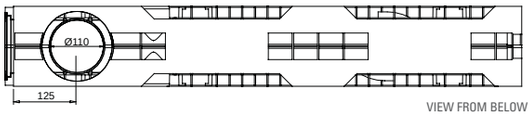
WING

The system:

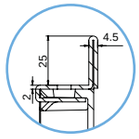
- it supports 4 load classes (C250, D400, E600, F900) in compliance with Standard EN 1433
- it is made up of a HD-PE channel with a strengthening frame
- it is very compact, since the frame is perfectly anchored to the channel body. The frame is made from materials able to resist corrosion due to contact with the surrounding environment and the gratings. The anchoring system was designed to withstand any deformation due shearing or torsional stress
- it is wearproof and very solid thanks to the frame, which ensures a 4 mm - thick drive-over edge and a 2 mm - thick contact surface in compliance with Standard EN 1433 on classes subject to heavy loads
- it comprises a wide range of standard gratings (with slots, square mesh, anti-heel mesh) made from galvanised steel, stainless steel and ductile cast-iron, as well as galvanised-steel and ductile-cast-iron blind covers, and a cover specially designed for composting systems
- it comes complete with an innovative grating for draining asphalt in D400 which has slots in the upper and side sections in order to receive the liquids from the road surface - both surface liquids and liquids absorbed by the draining asphalt
- it has tie-rod and screw fixing systems; and a convenient drain gate
- it is ideal for medium-to-heavy uses, exhibition areas, parking decks, road carriageways, parking areas, service areas, industrial areas, ports and airports, areas where containers are (un)loaded
- it comes complete with drain gullies with siphon
- the range is made up of 9 channels with 3 widths and 5 heights (100/55, 100/80, 100/100, 100/160, 150/100, 150/160, 200/100, 200/160, 200/250)
- the range is supplemented with the WING channel with ductile-cast-iron strengthening frame - length 1.5 m and usable dimensions 300 x 300 mm. Designed to drain large surfaces

The product must be laid according to Mufle's specifications. The relevant instructions are available in this Catalogue on page 201 and on the Web site www.mufle.com.

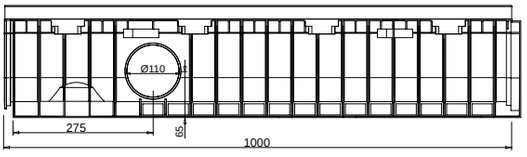
100



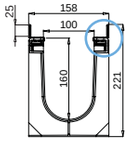
VIEW FROM BELOW



DETAIL SECTION



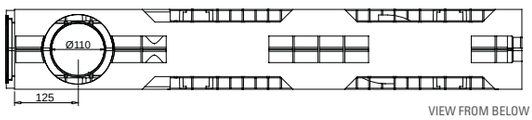
SIDE VIEW



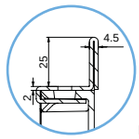
SECTION

WING 100/160

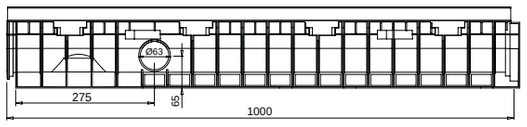
CODE	PRICE	MATERIAL OF FRAME	MATERIAL OF CHANNEL	EXTERNAL DIMENSIONS L x l x h	INTERNAL DIMENSIONS L x l x h	WEIGHT	DRAINAGE SECTION	CAPACITY	PREINSTALLED DRAIN OUTLETS	
	€			mm	mm	kg	cm^2	dm^3	mm	
703000		galvanised steel DX51D**	HD-PE	1000 x 158 x 221	1000 x 100 x 160	4,90	145,28	14,52	side bottom	2 x Ø 110 1 x Ø 110
703008		stainless steel AISI 304*								



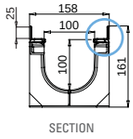
VIEW FROM BELOW



DETAIL SECTION



SIDE VIEW



SECTION

WING 100/100

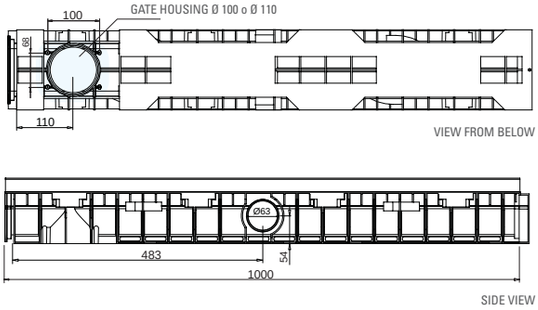
CODE	PRICE	MATERIAL OF FRAME	MATERIAL OF CHANNEL	EXTERNAL DIMENSIONS L x l x h	INTERNAL DIMENSIONS L x l x h	WEIGHT	DRAINAGE SECTION	CAPACITY	PREINSTALLED DRAIN OUTLET	
	€			mm	mm	kg	cm^2	dm^3	mm	
703001		galvanised steel DX51D**	HD-PE	1000 x 158 x 161	1000 x 100 x 100	4,40	89,56	8,95	side bottom	2 x Ø 63 1 x Ø 110
703009		stainless steel AISI 304*								

* Classification according to American Standard ASTM.

** Classification according to Standard EN 10142 (issued in July 2002) and symbolic designation according to EN 10027-1 (-2) (issued in September 1993).

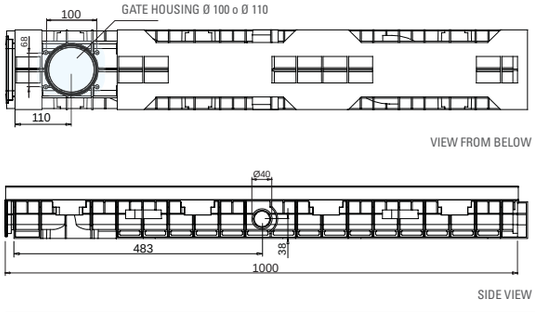
§ Waterproofing: in order to ensure the channels are waterproof, a bituminous adhesive sealant should be used. Heat-sealing the channel joints makes sure there will be no leakages through said joints for a very long time. For further information please contact Mufle's Technical Department.

N.B. Sizes and weights are subject to usual manufacturing tolerance values.



WING 100/80

CODE	PRICE	MATERIAL OF FRAME	MATERIAL OF CHANNEL	EXTERNAL DIMENSIONS L x l x h	INTERNAL DIMENSIONS L x l x h	WEIGHT	DRAINAGE SECTION	CAPACITY	PREINSTALLED DRAIN OUTLETS
	€			mm	mm	kg	cm^2	dm^3	mm
703002		galvanised steel DX51D**	HD-PE	1000 x 158 x 127	1000 x 100 x 80	4,10	69,28	6,92	side 2 x Ø 63 bottom*** 1 x Ø 100 ; 1 x Ø 110
703010		stainless steel AISI 304*							



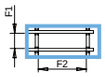
WING 100/55

CODE	PRICE	MATERIAL OF FRAME	MATERIAL OF CHANNEL	EXTERNAL DIMENSIONS L x l x h	INTERNAL DIMENSIONS L x l x h	WEIGHT	DRAINAGE SECTION	CAPACITY	PREINSTALLED DRAIN OUTLETS
	€			mm	mm	kg	cm^2	dm^3	mm
703003		galvanised steel DX51D**	HD-PE	1000 x 158 x 102	1000 x 100 x 55	3,90	54,44	5,44	side 2 x Ø 40 bottom*** 1 x Ø 100 ; 1 x Ø 110
703011		stainless steel AISI 304*							

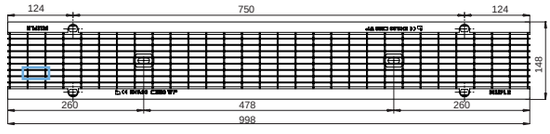
* Classification according to American Standard ASTM.
** Classification according to Standard EN 10142 (issued in July 2002) and symbolic designation according to EN 10027-1 (-2) (issued in September 1993).
*** For drainage purposes use the drain gate with outlet kit (available in two versions Ø100 and Ø110).
§ Waterproofing: in order to ensure the channels are waterproof, a bituminous adhesive sealant should be used. Heat-sealing the channel joints makes sure there will be no leakages through said joints for a very long time. For further information please contact Mufle's Technical Department.
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF GALVANISED STEEL
Kerbs
Historical town centres (slow traffic)
Parking areas
Parking decks

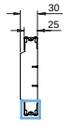
APPLICATIONS OF STAINLESS STEEL
Kerbs
Historical town centres (slow traffic)
Parking areas
Parking decks
Areas with low-load transit in food factories
Areas with low-load transit in chemically aggressive environments



DETAIL OF HOOKING SYSTEM



VIEW FROM ABOVE

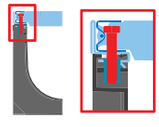


SIDE VIEW

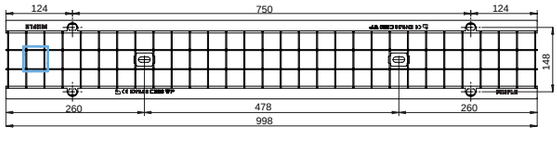

DETAIL OF UPRIGHT BEND

MESH GRATING (11 x 33)

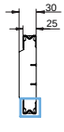
30 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM screw
503121		hot dip galvanised steel DD11 (1.0332)**	998 x 148 x 25	5,50	8,30	10,2 x 31,2		
503122		pickled stainless steel AISI 304*						
503149		hot dip galvanised steel DD11 (1.0332)**	498 x 148 x 25	2,75	4,15			
503150		pickled stainless steel AISI 304*						

DETAIL OF SQUARE MESH



VIEW FROM ABOVE

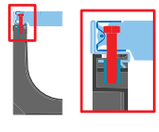


SIDE VIEW


DETAIL OF UPRIGHT BEND

MESH GRATING (33 x 33)

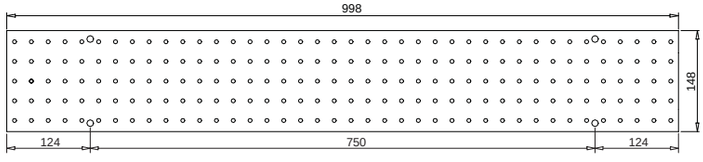
30 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM screw
503123		hot dip galvanised steel DD11 (1.0332)**	998 x 148 x 25	4,80	9,38	34,2 x 31,2		
503124		pickled stainless steel AISI 304*						
503151		hot dip galvanised steel DD11 (1.0332)**	498 x 148 x 25	2,40	4,69			
503152		pickled stainless steel AISI 304*						

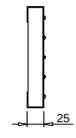
* Classification according to American Standard ASTM.
** Classification according to Standard EN 10111 (issued in March 2000) and symbolic designation according to EN 10027-1 (-2) (issued in September 1993).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS

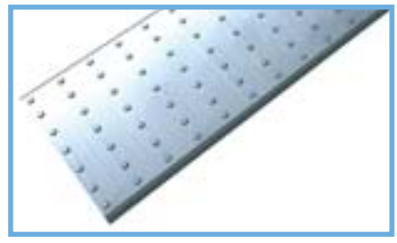
Cable passageway
Passageway for water
and/or heat systems



VIEW FROM ABOVE

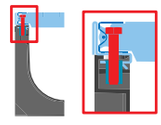


SIDE VIEW



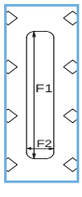
SOLID TOP COVER

25 mm

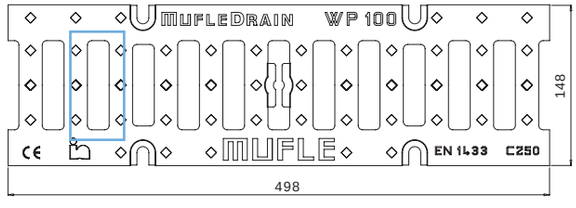
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	FIXING SYSTEM screw
503101		hot dip galvanised steel DX51D**	998 x 148 x 25	3,00	

APPLICATIONS OF DUCTILE IRON

Kerbs
Historical town centres (slow traffic)
Parking areas
Parking decks

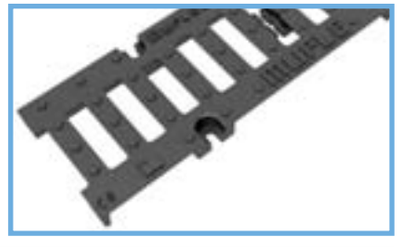


SLOT DETAIL



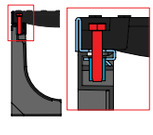
VIEW FROM ABOVE

SIDE VIEW



SLOTTED GRATING 20 mm

25 mm

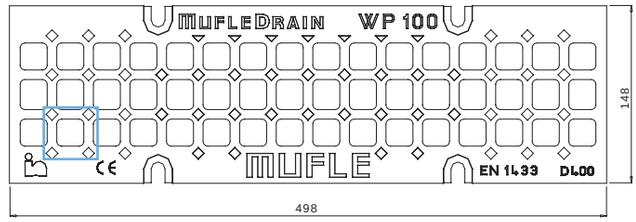
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM screw
503108		GJS 500/7* ductile iron water based paint coated	498 X 148 x 25	4,65	1,94	82,0 x 20,0	

* Classification according to Standard EN 1563 (issued in March 2004).

** Classification according to Standard EN 10142 (issued in July 2002) and symbolic designation according to EN 10027-1 (-2) (issued in September 1993).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF DUCTILE IRON
Road carriageways (not transversal)
Hard shoulders
Lay-bys with thick and heavy-goods traffic
Petrol stations

SLOT DETAIL

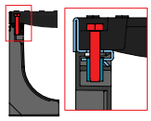


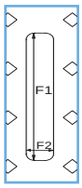
VIEW FROM ABOVE

SIDE VIEW

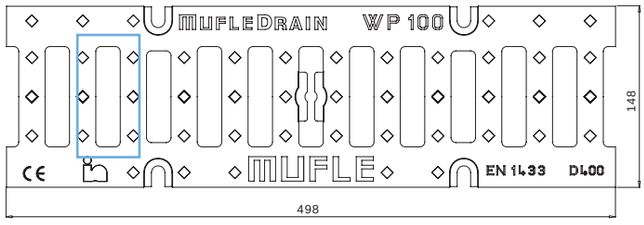
MESH GRATING

25 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM screw
503182		GJS 500/7* ductile iron water based paint coated	498 x 148 x 25	4,80	2,43	22,5 x 22,5	

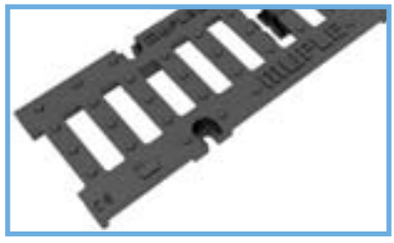


SLOT DETAIL



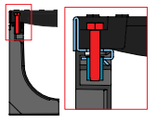
VIEW FROM ABOVE

SIDE VIEW



SLOTTED GRATING 20 mm

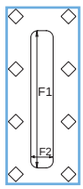
25 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM screw
503109		GJS 500/7* ductile iron water based paint coated	498 x 148 x 25	4,75	1,94	82,0 x 20,0	

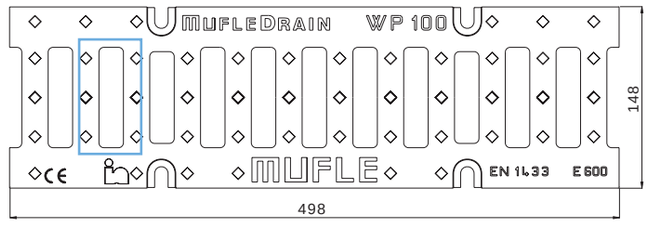
* Classification according to Standard EN 1563 (issued in March 2004).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF DUCTILE IRON

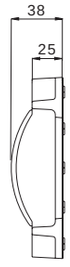
Transversal canalisation systems in carriageways of roads with thick and heavy-goods traffic
Industrial areas with passage of forklift trucks (high axle loads)
Underpasses



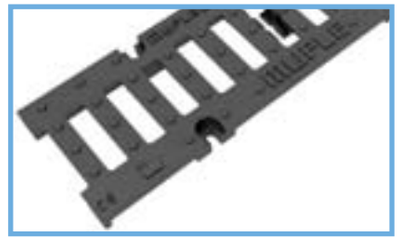
SLOT DETAIL



VIEW FROM ABOVE

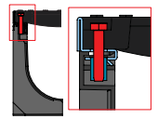


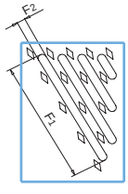
SIDE VIEW



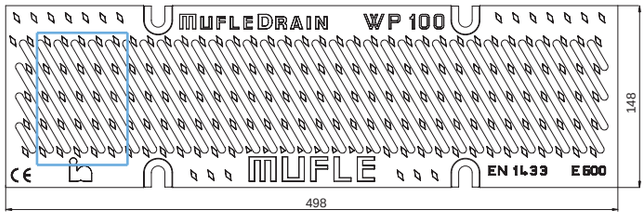
SLOTTED GRATING 20 mm

38 mm

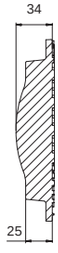
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM screw
503110		GJS 500/7* ductile iron water based paint coated	498 x 148 x 25	5,10	1,94	82,0 x 20,0	



SLOT DETAIL



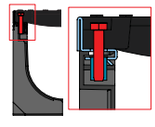
VIEW FROM ABOVE



SIDE VIEW

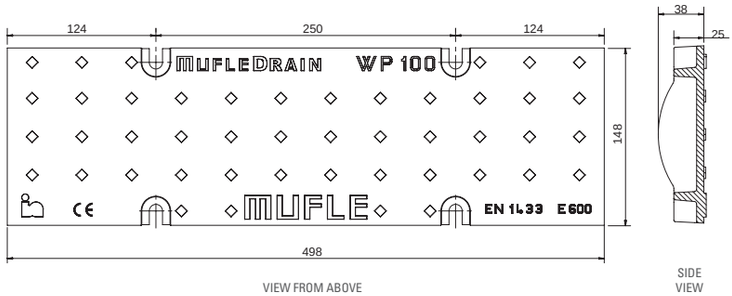
SLOTTED GRATING 6 mm

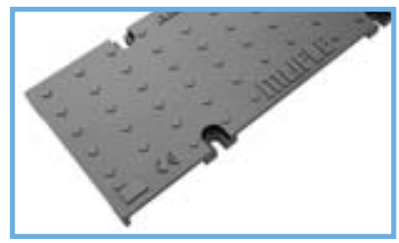
34 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM screw
503418		GJS 500/7* ductile iron water based paint coated	498 x 148 x 25	4,90	2,13	105,5 x 6,0	

* Classification according to Standard EN 1563 (issued in March 2004).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

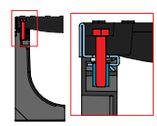
APPLICATIONS
Cable passageway
Passageway for water
and/or heat systems





SOLID TOP COVER

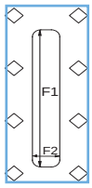
38 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	FIXING SYSTEM screw
503105		GJS 500/7* ductile iron water based paint coated	498 x 148 x 25	6,00	

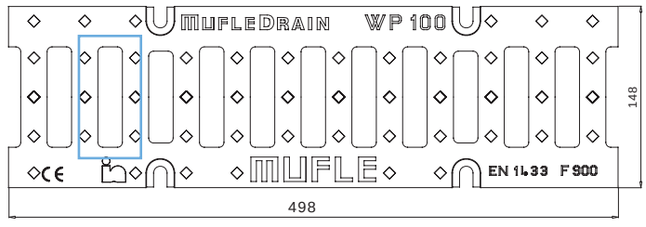
* Classification according to Standard EN 1563 (issued in March 2004).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF DUCTILE IRON

Port and airport areas

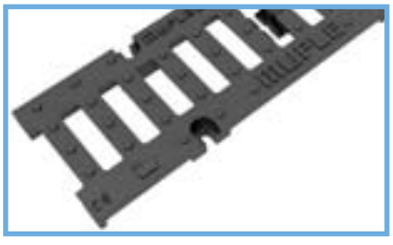


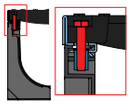
SLOT DETAIL



VIEW FROM ABOVE

SIDE VIEW

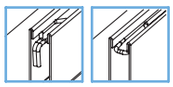


SLOTTED GRATING 20 mm							38 mm
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM screw
503173		GJS 500/7* ductile iron water based paint coated	498 x 148 x 25	6,30	1,94	82,0 x 20,0	

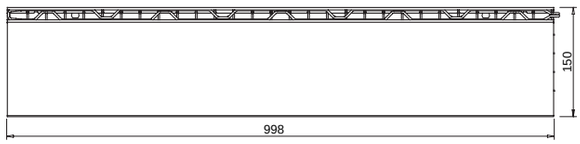
* Classification according to Standard EN 1563 (issued in March 2004).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF GALVANISED STEEL
Low visual impact drainage in public and private places

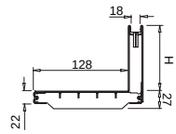
APPLICATIONS OF STAINLESS STEEL
Low visual impact drainage in public and private places



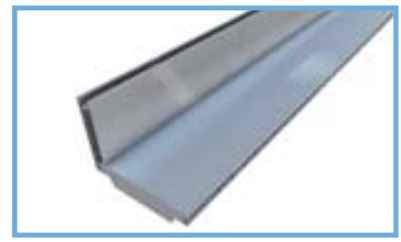
DETAIL OF HOOKING SYSTEM***



VIEW FROM ABOVE

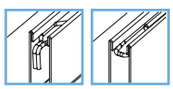


SIDE VIEW

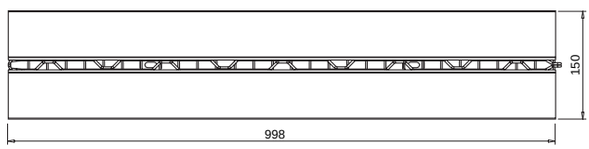


L-SHAPED GRATING

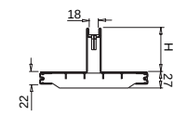
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	HEIGHT OF SLOTS H mm	WEIGHT kg	DRAINAGE SURFACE dm²	OPENINGS F1 x F2 mm
503192		hot dip galvanised steel DD11 (1.0332)**	998 x 150 x 107	80	9,20	1,80	998 x 18
on request		pickled stainless steel AISI 304*					
503193		hot dip galvanised steel DD11 (1.0332)**	998 x 150 x 147	120	10,50		
on request		pickled stainless steel AISI 304*					



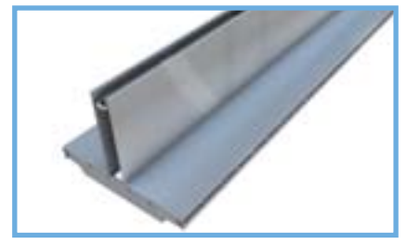
DETAIL OF HOOKING SYSTEM***



VIEW FROM ABOVE



SIDE VIEW



T-SHAPED GRATING

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	HEIGHT OF SLOTS H mm	WEIGHT kg	DRAINAGE SURFACE dm²	OPENINGS F1 x F2 mm
503186		hot dip galvanised steel DD11 (1.0332)**	998 x 150 x 107	80	8,70	1,80	998 x 18
on request		pickled stainless steel AISI 304*					
503187		hot dip galvanised steel DD11 (1.0332)**	998 x 150 x 147	120	10,20		
on request		pickled stainless steel AISI 304*					

* Classification according to American Standard ASTM.
** Classification according to Standard EN 10111 (issued in March 2000) and symbolic designation according to EN 10027-1 (-2) (issued in September 1993).
*** Hooking System between the gratings through hooks and holes.
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

End-cap 100/55

Closed end-cap with drain 100/55

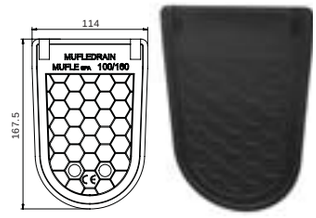
End-cap 100/80

Closed end-cap with drain 100/80

End-cap 100/100

Closed end-cap with drain 100/100

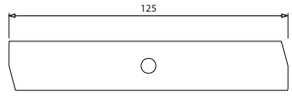
End-cap 100/160



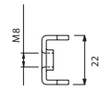
Closed end-cap with drain 100/160

END CAPS

CODE	PRICE	TYPE	MATERIAL	VALID FOR CHANNELS	PREINSTALLED DRAINS
	€				mm
700500		end-cap with drain	HD-PE	100/55	1 x Ø 40
700508		closed end-cap	HD-PE	100/55	-
700501		end-cap with drain	HD-PE	100/80	1 x Ø 63
700509		closed end-cap	HD-PE	100/80	-
700502		end-cap with drain	HD-PE	100/100	1 x Ø 63
700510		closed end-cap	HD-PE	100/100	-
700503		end-cap with drain	HD-PE	100/160	1 x Ø 63
700511		closed end-cap	HD-PE	100/160	-



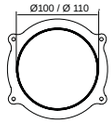
VIEW FROM ABOVE



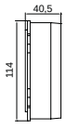
SIDE VIEW

KIT TIE-ROD + SCREWS

CODE	PRICE	MATERIAL	VALID FOR GRATINGS	SCREW	KIT FOR 1 ml
	€				
500421		galvanised steel	WING galvanised steel	M8 x 55 TBL combi	2 tie-rods + 2 screws
500422		stainless steel	WING stainless steel	M8 x 55 TBL combi	2 tie-rods + 2 screws



VIEW FROM ABOVE

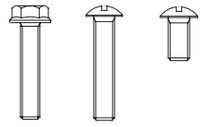


SIDE VIEW

KIT OUTLET + SCREWS

CODE	PRICE	MATERIAL	VALID FOR CHANNELS	DIAMETER	KIT FOR 1 ml
	€			mm	
506114		HD-PE	100/55 - 100/80	Ø 100	1 outlet Ø 100 + 4 screws
506115		HD-PE	100/55 - 100/80	Ø 110	1 outlet Ø 110 + 4 screws

N.B. Sizes and weights are subject to usual manufacturing tolerance values.



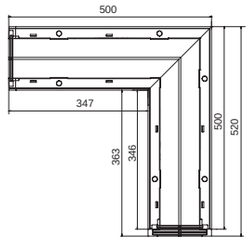
KIT SCREWS					
CODE	PRICE	MATERIAL	VALID FOR GRATINGS	SCREW	KIT FOR 1 ml
	€				
503312		black galvanised steel	WING ductile iron	M8 x 40 black with flanged hexagonal head	8
503313		galvanised steel	WING galvanised steel	M8 x 20 TBL combi	4
503314		stainless steel	WING stainless steel	M8 x 20 TBL combi	4
503315		galvanised steel	galvanised steel solid top cover WING	M8 x 40 TBL combi	4

N.B. Sizes and weights are subject to usual manufacturing tolerance values.

SPECIAL PIECES AND DRAIN BOX WITH SYPHON

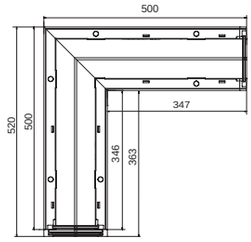
WING 100

LEFT CORNER — WING 100



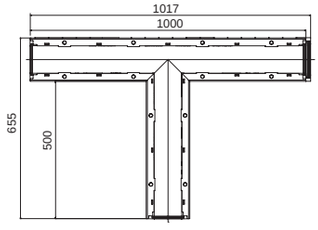
CODE	PRICE €	MODEL
703100		100/160
703101		100/100
703102		100/80
703103		100/55

RIGHT CORNER — WING 100



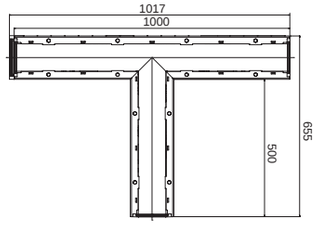
CODE	PRICE €	MODEL
703108		100/160
703109		100/100
703110		100/80
703111		100/55

LEFT TI — WING 100



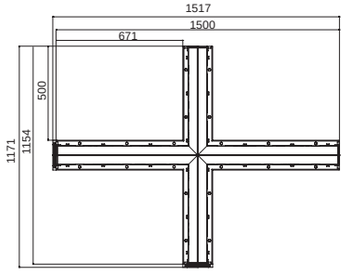
CODE	PRICE €	MODEL
703116		100/160
703117		100/100
703118		100/80
703119		100/55

RIGHT TI — WING 100



CODE	PRICE €	MODEL
703124		100/160
703125		100/100
703126		100/80
703127		100/55

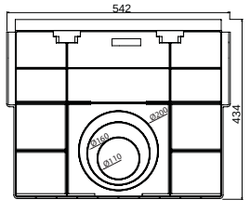
CROSS — WING 100



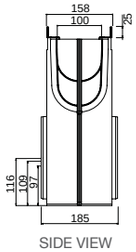
CODE	PRICE €	MODEL
703132		100/160
703133		100/100
703134		100/80
703135		100/55

Special pieces, corners, Ti, crosses in stainless steel are available upon request. For further information please contact our Technical Department.

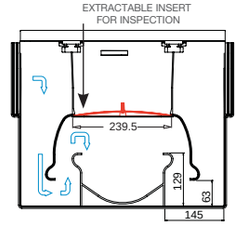
DRAIN BOX WITH SYPHON



FRONT VIEW



SIDE VIEW



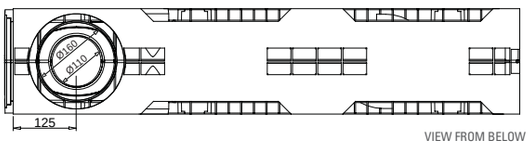
SECTION

WING 100

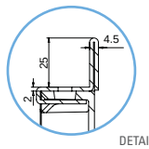
CODE	PRICE €	MATERIAL OF FRAME	MATERIAL OF OUTLET	EXTERNAL DIMENSIONS L x l x h mm	INTERNAL DIMENSIONS L x l x h mm	MAXIMUM LARGE mm	HEIGHT OF OUTLETS mm	WEIGHT kg	PREINSTALLED DRAIN OUTLETS mm
703016		galvanised steel DX51D**	HD-PE	542 x 158 x 434	500 x 100 x 400	185	116 - 109 - 97	3,75	2 x Ø 110; 2 x Ø 160; 2 x Ø 200
703019		stainless steel AISI 304*	HD-PE	542 x 158 x 434	500 x 100 x 400	185	116 - 109 - 97	3,75	2 x Ø 110; 2 x Ø 160; 2 x Ø 200

* Classification according to American Standard ASTM.
** Classification according to Standard EN 10142 (issued in July 2002) and symbolic designation according to EN 10027-1 (-2) (issued in September 1993).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

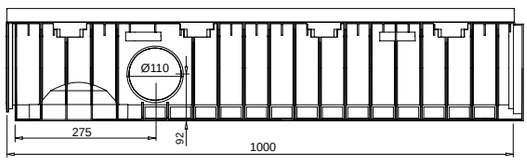
150



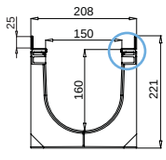
VIEW FROM BELOW



DETAIL SECTION



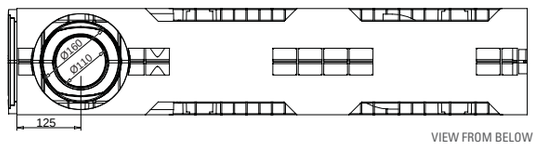
SIDE VIEW



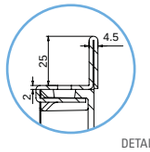
SECTION

WING 150/160

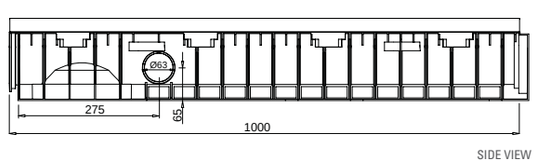
CODE	PRICE	MATERIAL OF FRAME	MATERIAL OF CHANNEL	EXTERNAL DIMENSIONS L x l x h	INTERNAL DIMENSIONS L x l x h	WEIGHT	DRAINAGE SECTION	CAPACITY	PREINSTALLED DRAIN OUTLET
	€			mm	mm	kg	cm^2	dm^3	mm
703004		galvanised steel DX51D**	HD-PE	1000 x 208 x 221	1000 x 150 x 160	5,35	213,04	21,30	side 2 x Ø 110 bottom 1 x Ø 110 ; 1 x Ø 160
703012		stainless steel AISI 304*							



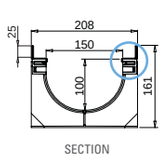
VIEW FROM BELOW



DETAIL SECTION



SIDE VIEW



SECTION

WING 150/100

CODE	PRICE	MATERIAL OF FRAME	MATERIAL OF CHANNEL	EXTERNAL DIMENSIONS L x l x h	INTERNAL DIMENSIONS L x l x h	WEIGHT	DRAINAGE SECTION	CAPACITY	PREINSTALLED DRAIN OUTLET
	€			mm	mm	kg	cm^2	dm^3	mm
703005		galvanised steel DX51D**	HD-PE	1000 x 208 x 161	1000 x 150 x 100	4,80	127,32	12,73	side 2 x Ø 63 bottom 1 x Ø 110 ; 1 x Ø 160
703013		stainless steel AISI 304*							

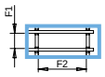
* Classification according to American Standard ASTM.
** Classification according to Standard EN 10142 (issued in July 2002) and symbolic designation according to EN 10027-1 (-2) (issued in September 1993).
§ Waterproofing: in order to ensure the channels are waterproof, a bituminous adhesive sealant should be used. Heat-sealing the channel joints makes sure there will be no leakages through said joints for a very long time. For further information please contact Mufle's Technical Department.
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF GALVANISED STEEL

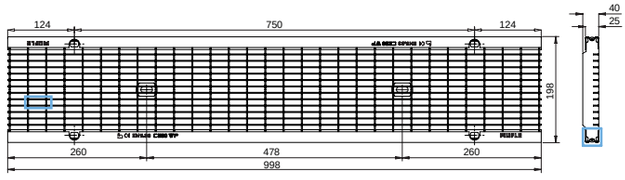
Kerbs
Historical town centres (slow traffic)
Parking areas
Parking decks

APPLICATIONS OF STAINLESS STEEL

Kerbs
Historical town centres (slow traffic)
Parking areas
Parking decks
Areas with low-load transit in food factories
Areas with low-load transit in chemically aggressive environments



DETAIL OF HOOKING SYSTEM



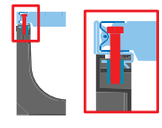
VIEW FROM ABOVE

SIDE VIEW

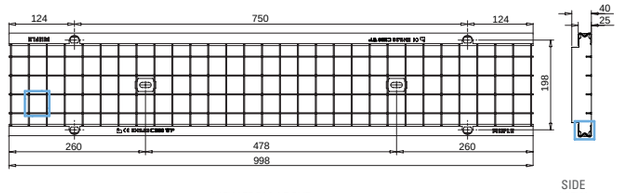
DETAIL OF UPRIGHT BEND

MESH GRATING (11 x 33)

40 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM screw
503125		hot dip galvanised steel DD11 (1.0332)**	998 x 198 x 25	8,40	11,64	10,2 x 31,2		
503126		pickled stainless steel AISI 304*						
503153		hot dip galvanised steel DD11 (1.0332)**	498 x 198 x 25	4,20	5,82			
503154		pickled stainless steel AISI 304*						

DETAIL OF SQUARE MESH



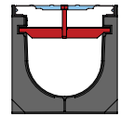
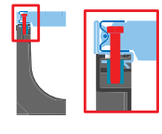
VIEW FROM ABOVE

SIDE VIEW

DETAIL OF UPRIGHT BEND

MESH GRATING (33 x 33)

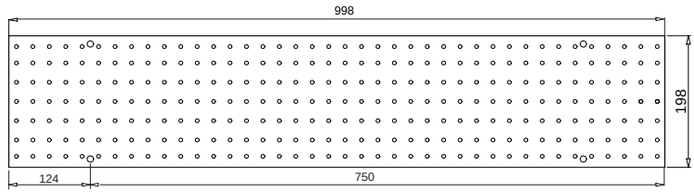
40 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM screw
503127		hot dip galvanised steel DD11 (1.0332)**	998 x 198 x 25	7,30	12,94	34,2 x 31,2		
503128		pickled stainless steel AISI 304*						
503155		hot dip galvanised steel DD11 (1.0332)**	498 x 198 x 25	3,65	6,47			
503156		pickled stainless steel AISI 304*						

* Classification according to American Standard ASTM.
** Classification according to Standard EN 10111 (issued in March 2000) and symbolic designation according to EN 10027-1 (-2) (issued in September 1993).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

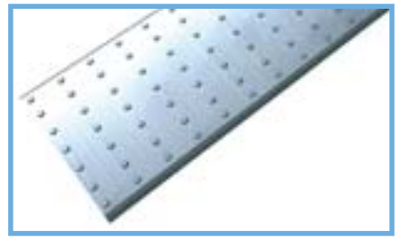
APPLICATIONS

Cable passageway
Passageway for water
and/or heat systems



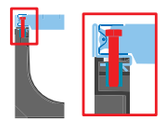
VIEW FROM ABOVE

SIDE VIEW



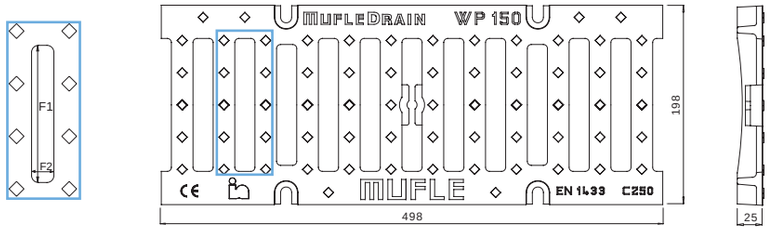
SOLID TOP COVER

25 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	FIXING SYSTEM screw
503102		galvanised steel DX51D**	998 x 198 x 25	4,20	

APPLICATIONS OF DUCTILE IRON

Kerbs
Historical town centres (slow traffic)
Parking areas
Parking decks



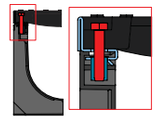
SLOT DETAIL

VIEW FROM ABOVE

SIDE VIEW

SLOTTED GRATING 20 mm

25 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM screw
503111		GJS 500/7* ductile iron water based paint coated	498 x 198 x 25	5,90	3,12	132,0 x 20,0		

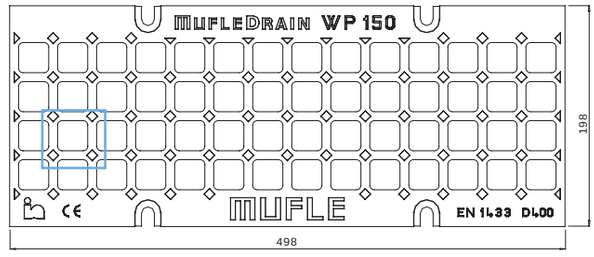
* Classification according to Standard EN 1563 (issued in March 2004).

** Classification according to Standard EN 10142 (issued in July 2002) and symbolic designation according to EN 10027-1 (-2) (issued in September 1993).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF DUCTILE IRON

Road carriageways (not transversal)
Hard shoulders
Lay-bys with thick and heavy-goods traffic
Petrol stations

SLOT DETAIL

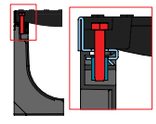


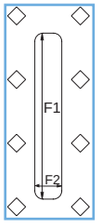
VIEW FROM ABOVE

SIDE VIEW

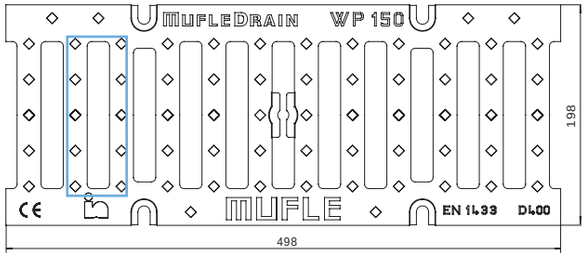
MESH GRATING

34 mm

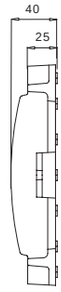
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM screw
503183		GJS 500/7* ductile iron water based paint coated	498 x 198 x 25	7,80	4,08	27,0 x 27,0	



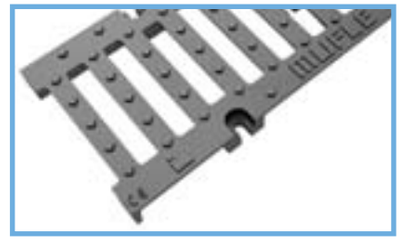
SLOT DETAIL



VIEW FROM ABOVE

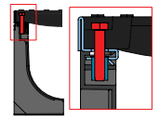


SIDE VIEW



SLOTTED GRATING 20 mm

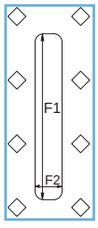
40 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM screw
503112		GJS 500/7* ductile iron water based paint coated	498 x 198 x 25	7,10	3,12	132,0 x 20,0	

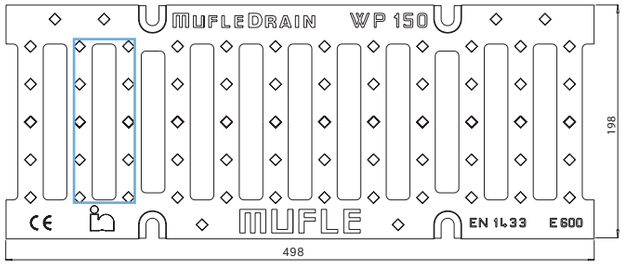
* Classification according to Standard EN 1563 (issued in March 2004).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF DUCTILE IRON

Transversal canalisation systems in carriageways of roads with thick and heavy-good
Industrial areas with passage of forklift trucks (high axle loads)
Underpasses

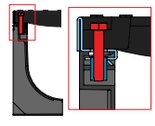


SLOT DETAIL



VIEW FROM ABOVE

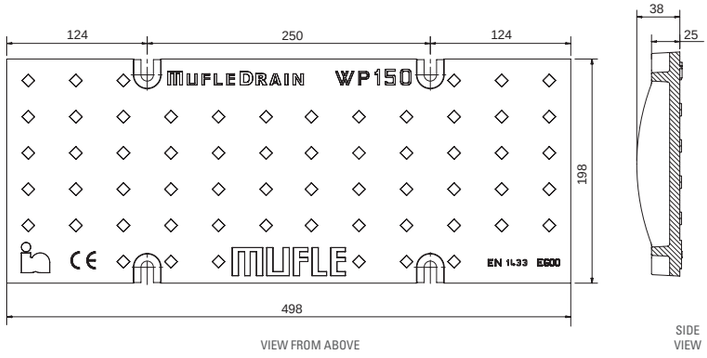
SIDE VIEW

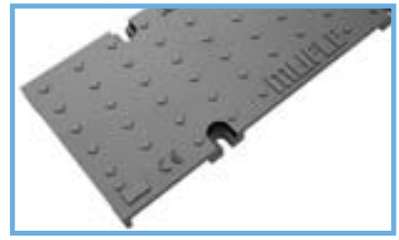
SLOTTED GRATING 20 mm							40 mm
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM screw
503113		GJS 500/7* ductile iron water based paint coated	498 x 198 x 25	7,80	3,12	132,0 x 20,0	

* Classification according to Standard EN 1563 (issued in March 2004).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS

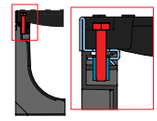
Cable passageway
Passageway for water and/or heat systems





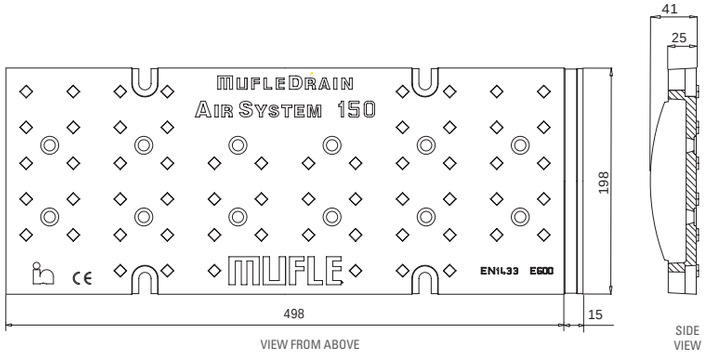
SOLID TOP COVER

38 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	FIXING SYSTEM screw
503106		GJS 500/7* ductile iron water based paint coated	498 x 198 x 25	10.60	

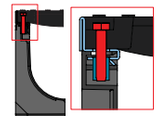
APPLICATIONS

Waste composting systems



SOLID TOP COVER AIR SYSTEM

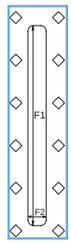
41 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	FIXING SYSTEM screw
503100		GJS 500/7* ductile iron water based paint coated	498 x 198 x 25	10.50	

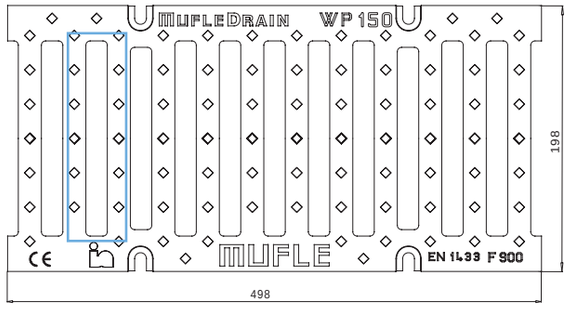
* Classification according to Standard EN 1563 (issued in March 2004).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF DUCTILE IRON

Port and airport areas



SLOT DETAIL

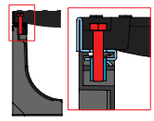


VIEW FROM ABOVE

SIDE VIEW

SLOTTED GRATING 20 mm

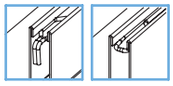
40 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM screw
503174		GJS 500/7* ductile iron water based paint coated	498 x 198 x 25	8,70	3,12	132,0 x 20,0	

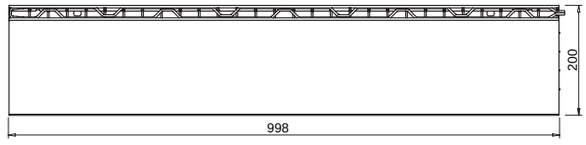
* Classification according to Standard EN 1563 (issued in March 2004).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF GALVANISED STEEL
Low visual impact drainage in public and private places

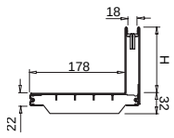
APPLICATIONS OF STAINLESS STEEL
Low visual impact drainage in public and private places



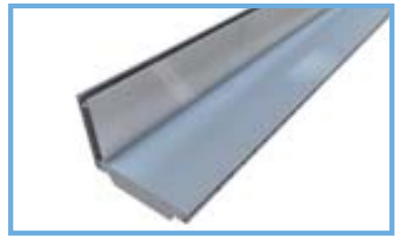
DETAIL OF HOOKING SYSTEM***



VIEW FROM ABOVE

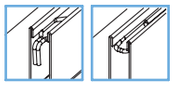


SIDE VIEW

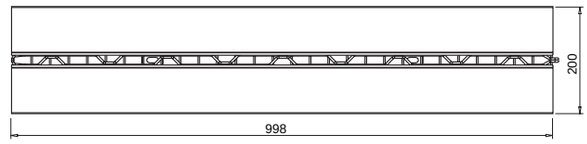


L-SHAPED GRATING

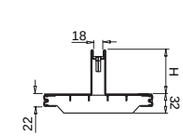
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	HEIGHT OF SLOTS H mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm
503194		hot dip galvanised steel DD11 (1.0332)**	998 x 200 x 112	80	11,30	1,80	998 x 18
on request		pickled stainless steel AISI 304*					
503195		hot dip galvanised steel DD11 (1.0332)**	998 x 200 x 152	120	12,70		
on request		pickled stainless steel AISI 304*					



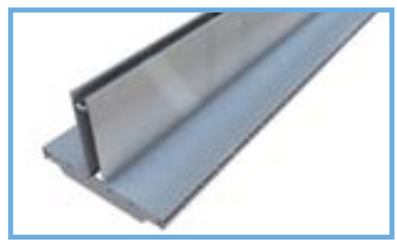
DETAIL OF HOOKING SYSTEM***



VIEW FROM ABOVE



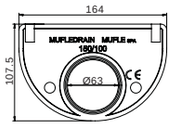
SIDE VIEW



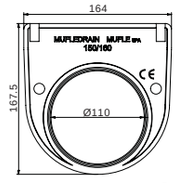
T-SHAPED GRATING

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	HEIGHT OF SLOTS H mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm
503188		hot dip galvanised steel DD11 (1.0332)**	998 x 200 x 112	80	11,00	1,80	998 x 18
on request		pickled stainless steel AISI 304*					
503189		hot dip galvanised steel DD11 (1.0332)**	998 x 200 x 152	120	12,30		
on request		pickled stainless steel AISI 304*					

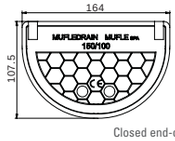
* Classification according to American Standard ASTM.
** Classification according to Standard EN 10111 (issued in March 2000) and symbolic designation according to EN 10027-1 (-2) (issued in September 1993).
*** Hooking System between the gratings through hooks and holes.
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



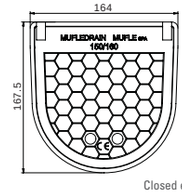
End-cap 150/100



End-cap 150/160



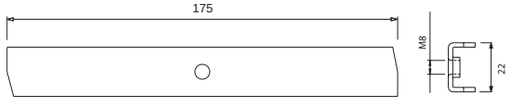
Closed end-cap with drain 150/100



Closed end-cap with drain 150/160

END CAPS

CODE	PRICE	TYPE	MATERIAL	VALID FOR CHANNELS	PREINSTALLED DRAINS
	€				mm
700504		end-cap with drain	HD-PE	150/100	1 x Ø 63
700512		closed end-cap	HD-PE	150/100	-
700505		end-cap with drain	HD-PE	150/160	1 x Ø 110
700513		closed end-cap	HD-PE	150/160	-

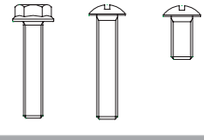


VIEW FROM ABOVE

SIDE VIEW

KIT TIE-ROD + SCREWS

CODE	PRICE	MATERIAL	VALID FOR GRATINGS	SCREW	KIT FOR 1 ml
	€				
500424		galvanised steel	WING galvanised steel	M8 x 55 TBL combi	2 tie-rods + 2 screws
500425		stainless steel	WING stainless steel	M8 x 55 TBL combi	2 tie-rods + 2 screws



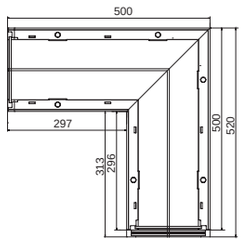
KIT SCREWS

CODE	PRICE	MATERIAL	VALID FOR GRATINGS	SCREW	KIT FOR 1 ml
	€				
503312		black galvanised steel	WING ductile iron	M8 x 40 black with flanged hexagonal head	8
503313		galvanised steel	WING galvanised steel	M8 x 20 TBL combi	4
503314		stainless steel	WING stainless steel	M8 x 20 TBL combi	4
503315		galvanised steel	galvanised steel solid top cover WING	M8 x 40 TBL combi	4

N.B. Sizes and weights are subject to usual manufacturing tolerance values.

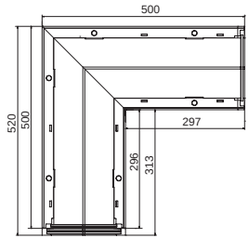
SPECIAL PIECES AND DRAIN BOX WITH SYPHON

LEFT CORNER



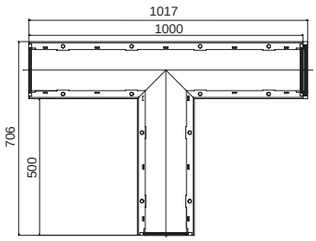
WING 150		
CODE	PRICE €	MODEL
703104		150/160
703105		150/100

RIGHT CORNER



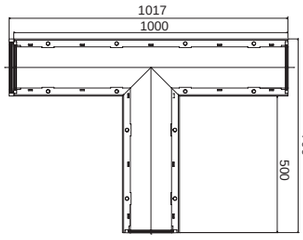
WING 150		
CODE	PRICE €	MODEL
703112		150/160
703113		150/100

LEFT TI



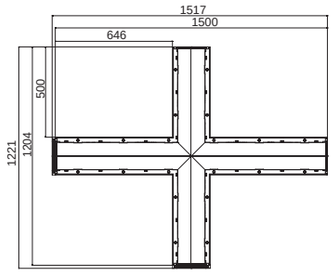
WING 150		
CODE	PRICE €	MODEL
703120		150/160
703121		150/100

RIGHT TI



WING 150		
CODE	PRICE €	MODEL
703128		150/160
703129		150/100

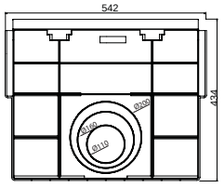
CROSS



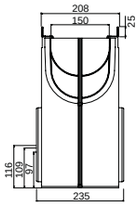
WING 150		
CODE	PRICE €	MODEL
703136		150/160
703137		150/100

Special pieces, corners, Ti, crosses in stainless steel are available upon request. For further information please contact our Technical Department.

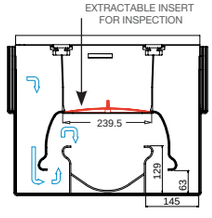
DRAIN BOX WITH SYPHON



FRONT VIEW



SIDE VIEW

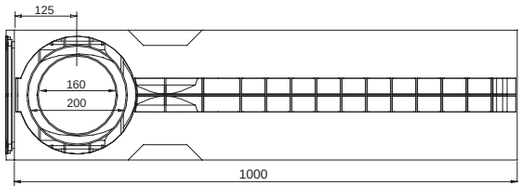


SECTION

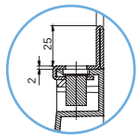
WING 150									
CODE	PRICE €	MATERIAL OF FRAME	MATERIAL OF OUTLET	EXTERNAL DIMENSIONS L x l x h mm	INTERNAL DIMENSIONS L x l x h mm	MAXIMUM LARGE mm	HEIGHT OF OUTLETS mm	WEIGHT kg	PREINSTALLED DRAIN OUTLETS mm
703017		galvanised steel DX51D**	HD-PE	542 x 208 x 434	500 x 150 x 400	235	116 - 109 - 97	4,00	2 x Ø 110; 2 x Ø 160; 2 x Ø 200
703020		stainless steel AISI 304*	HD-PE	542 x 208 x 434	500 x 150 x 400	235	116 - 109 - 97	4,00	2 x Ø 80; 2 x Ø 110; 2 x Ø 160; 2 x Ø 200

* Classification according to American Standard ASTM.
** Classification according to Standard EN 10142 (issued in July 2002) and symbolic designation according to EN 10027-1 (-2) (issued in September 1993).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

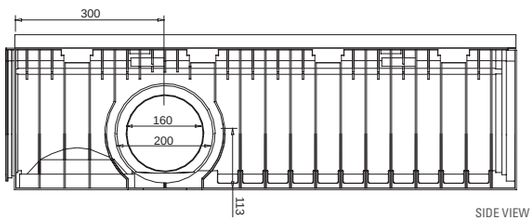
200



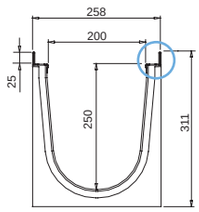
VIEW FROM BELOW



DETAIL SECTION



SIDE VIEW

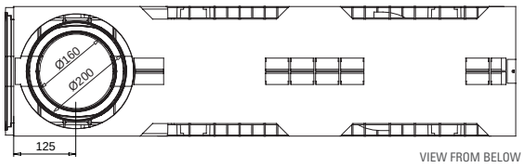


SECTION

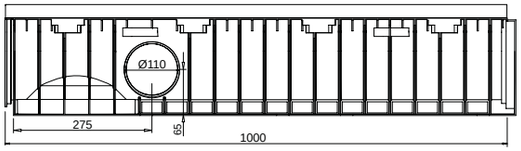
WING 200/250

CODE	PRICE	MATERIAL OF FRAME	MATERIAL OF CHANNEL	EXTERNAL DIMENSIONS L x l x h	INTERNAL DIMENSIONS L x l x h	WEIGHT	DRAINAGE SECTION	CAPACITY	PREINSTALLED DRAIN OUTLET
	€			mm	mm	kg	cm^2	dm^3	mm
503025		galvanised steel DX51D**	HD-PE	1000 x 258 x 311	1000 x 200 x 250	7,50	430,00	43,00	side 2 x Ø 200 ; 2 x Ø 160 bottom 1 x Ø 200 ; 1 x Ø 160
503028		stainless steel AISI 304*							

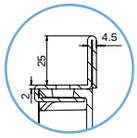
* Classification according to American Standard ASTM.
** Classification according to Standard EN 10142 (issued in July 2002) and symbolic designation according to EN 10027-1 (-2) (issued in September 1993).
§ Waterproofing: in order to ensure the channels are waterproof, a bituminous adhesive sealant should be used. Heat-sealing the channel joints makes sure there will be no leakages through said joints for a very long time. For further information please contact Mufle's Technical Department.
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



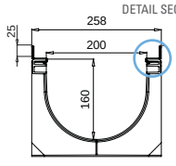
VIEW FROM BELOW



SIDE VIEW



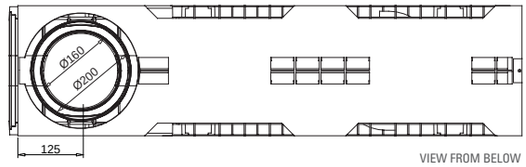
DETAIL SECTION



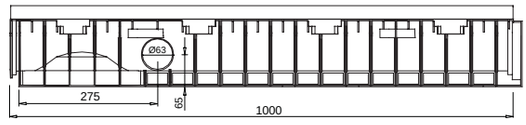
SECTION

WING 200/160

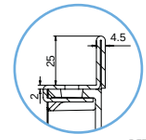
CODE	PRICE	MATERIAL OF FRAME	MATERIAL OF CHANNEL	EXTERNAL DIMENSIONS L x l x h	INTERNAL DIMENSIONS L x l x h	WEIGHT	DRAINAGE SECTION	CAPACITY	PREINSTALLED DRAIN OUTLET
	€			mm	mm	kg	cm^2	dm^3	mm
703006		galvanised steel DX51D**	HD-PE	1000 x 258 x 221	1000 x 200 x 160	5,75	275,87	27,58	side 2 x Ø 110 bottom 1 x Ø 160; 1 x Ø 200
703014		stainless steel AISI 304*							



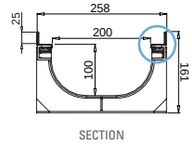
VIEW FROM BELOW



SIDE VIEW



DETAIL SECTION



SECTION

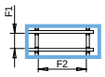
WING 200/100

CODE	PRICE	MATERIAL OF FRAME	MATERIAL OF CHANNEL	EXTERNAL DIMENSIONS L x l x h	INTERNAL DIMENSIONS L x l x h	WEIGHT	DRAINAGE SECTION	CAPACITY	PREINSTALLED DRAIN OUTLET
	€			mm	mm	kg	cm^2	dm^3	mm
703007		galvanised steel DX51D**	HD-PE	1000 x 258 x 161	1000 x 200 x 100	5,15	178,73	17,87	side 2 x Ø 110 bottom 1 x Ø 160; 1 x Ø 200
703015		stainless steel AISI 304*							

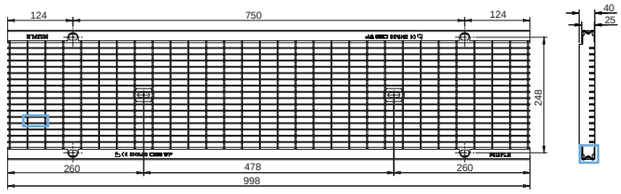
* Classification according to American Standard ASTM.
** Classification according to Standard EN 10142 (issued in July 2002) and symbolic designation according to EN 10027-1 (-2) (issued in September 1993).
§ Waterproofing: in order to ensure the channels are waterproof, a bituminous adhesive sealant should be used. Heat-sealing the channel joints makes sure there will be no leakages through said joints for a very long time. For further information please contact Mufle's Technical Department.
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF GALVANISED STEEL
Kerbs
Historical town centres (slow traffic)
Parking areas
Parking decks

APPLICATIONS OF STAINLESS STEEL
Kerbs
Historical town centres (slow traffic)
Parking areas
Parking decks
Areas with low-load transit in food factories
Areas with low-load transit in chemically aggressive environments



DETAIL OF HOOKING SYSTEM



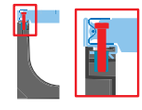
VIEW FROM ABOVE

SIDE VIEW

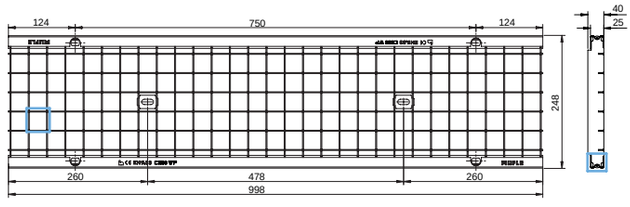

DETAIL OF UPRIGHT BEND

MESH GRATING (11 x 33)

40 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM screw
503129		hot dip galvanised steel DD11 (1.0332)**	998 x 248 x 25	10,30	15,50	10,2 x 31,2		
503130		pickled stainless steel AISI 304*						
503157		hot dip galvanised steel DD11 (1.0332)**	498 x 248 x 25	5,15	7,75			
503158		pickled stainless steel AISI 304*						

DETAIL OF SQUARE MESH



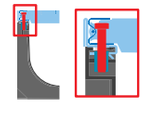
VIEW FROM ABOVE

SIDE VIEW


DETAIL OF UPRIGHT BEND

MESH GRATING (33 x 33)

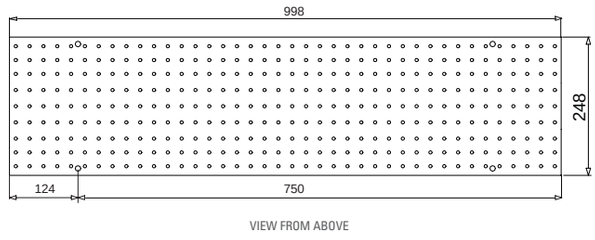
40 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM screw
503131		hot dip galvanised steel DD11 (1.0332)**	998 x 248 x 25	9,10	17,13	34,2 x 31,2		
503132		pickled stainless steel AISI 304*						
503159		hot dip galvanised steel DD11 (1.0332)**	498 x 248 x 25	4,55	8,57			
503160		pickled stainless steel AISI 304*						

* Classification according to American Standard ASTM.
** Classification according to Standard EN 10111 (issued in March 2000) and symbolic designation according to EN 10027-1 (-2) (issued in September 1993).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

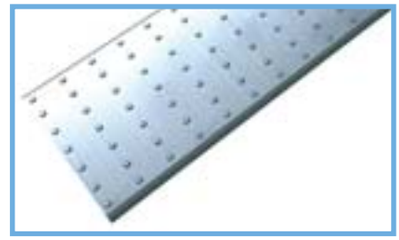
APPLICATIONS

Cable passageway
Passageway for water
and/or heat systems



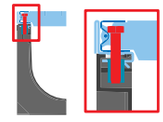
VIEW FROM ABOVE

SIDE VIEW



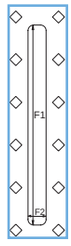
SOLID TOP COVER

25 mm

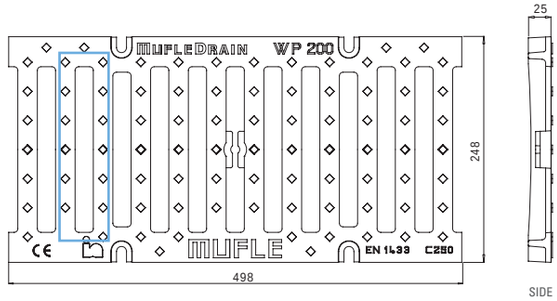
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	FIXING SYSTEM screw
503103		galvanised steel DX51D**	998 x 248 x 25	6,20	

APPLICATIONS OF DUCTILE IRON

Kerbs
Historical town centres (slow traffic)
Parking areas
Parking decks

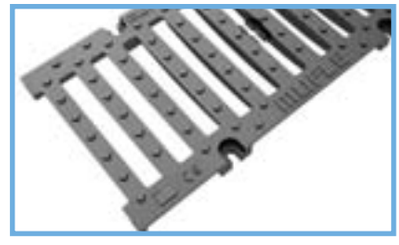


SLOT DETAIL



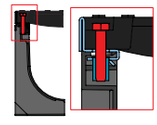
VIEW FROM ABOVE

SIDE VIEW



SLOTTED GRATING 20 mm

25 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM screw
503114		GJS 500/7* ductile iron water based paint coated	498 x 248 x 25	7,00	4,32	182,0 x 20,0	

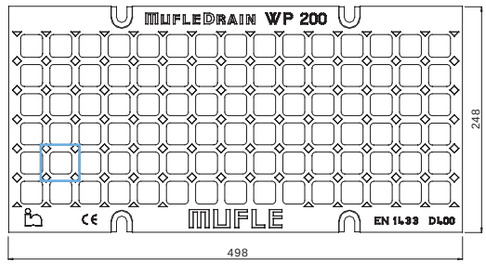
* Classification according to Standard EN 1563 (issued in March 2004).

** Classification according to Standard EN 10142 (issued in July 2002) and symbolic designation according to EN 10027-1 (-2) (issued in September 1993).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF DUCTILE IRON

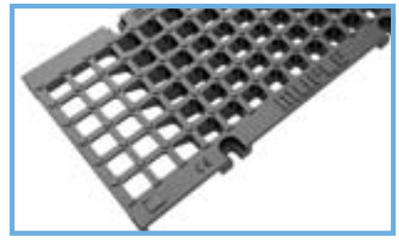
Road carriageways (not transversal)
Hard shoulders
Lay-bys with thick and heavy-goods traffic
Petrol stations

SLOT DETAIL



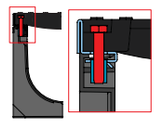
VIEW FROM ABOVE

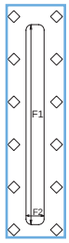
SIDE VIEW



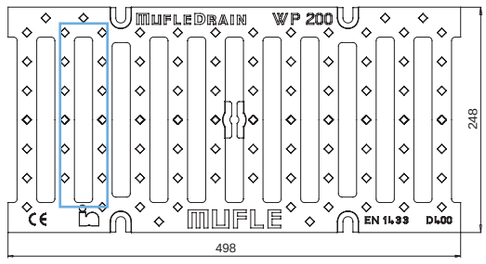
MESH GRATING

37 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM screw
503184		GJS 500/7* ductile iron water based paint coated	498 x 248 x 25	9,40	5,18	24,0 x 24,0	



SLOT DETAIL

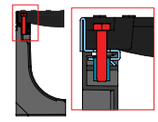


VIEW FROM ABOVE

SIDE VIEW

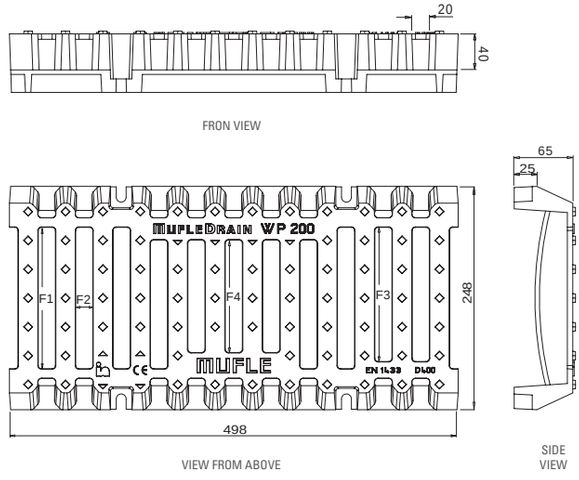
SLOTTED GRATING 20 mm

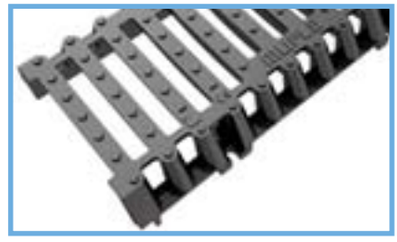
42 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM screw
503115		GJS 500/7* ductile iron water based paint coated	498 x 248 x 25	8,50	4,32	182,0 x 20,0	

* Classification according to Standard EN 1563 (issued in March 2004).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

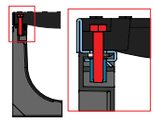
APPLICATIONS OF DUCTILE IRON
Road carriageways with draining asphalt





DRAINING ASPHALT GRATING

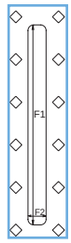
65 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS mm	FIXING SYSTEM screw
503181		GJS 500/7* ductile iron water based paint coated	498 x 248 x 25	11,50	top 4,08 side 1,44	F1 x F2 = 180,0 x 20,0 F3 x F2 = 150,0 x 20,0 F4 x F2 = 126,0 x 20,0 side 40,0 x 20,0 (18,9 x side)	

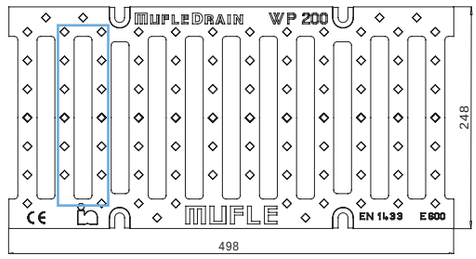
* Classification according to Standard EN 1563 (issued in March
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF DUCTILE IRON

Transversal canalisation systems in carriageways of roads with thick and heavy-good
Industrial areas with passage of forklift trucks (high axle loads)
Underpasses



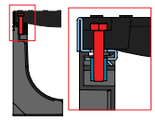
SLOT DETAIL



VIEW FROM ABOVE

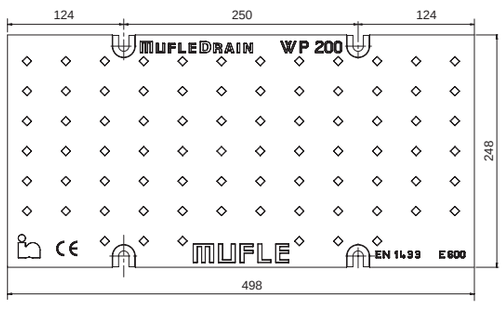
SIDE VIEW

SLOTTED GRATING 20 mm — 45 mm

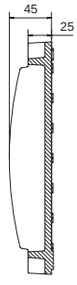
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM screw
503116		GJS 500/7* ductile iron water based paint coated	498 x 248 x 25	9,70	4,32	180,0 x 20,0	

APPLICATIONS

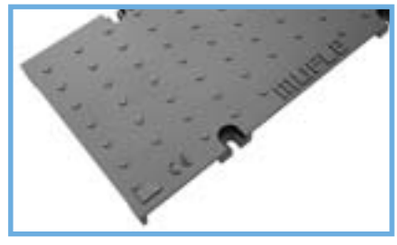
Cable passageway
Passageway for water and/or heat systems



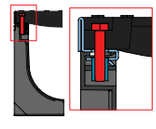
VIEW FROM ABOVE



SIDE VIEW



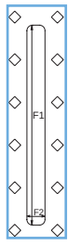
SOLID TOP COVER — 45 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	FIXING SYSTEM screw
503107		GJS 500/7* ductile iron water based paint coated	498 x 248 x 25	12,00	

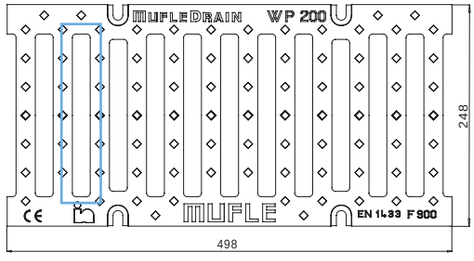
* Classification according to Standard EN 1563 (issued in March 2004).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF DUCTILE IRON

Port and airport areas



SLOT DETAIL

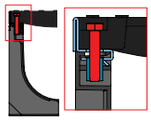


VIEW FROM ABOVE

SIDE VIEW

SLOTTED GRATING 20 mm

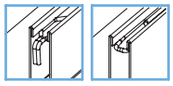
45 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM screw
503175		GJS 500/7* ductile iron water based paint coated	498 x 248 x 25	10,50	4,32	182,0 x 20,0	

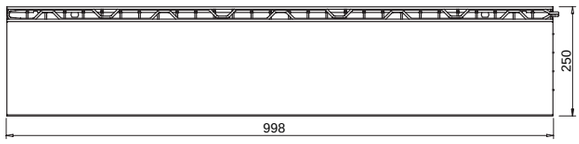
* Classification according to Standard EN 1563 (issued in March 2004).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF GALVANISED STEEL
Low visual impact drainage in public and private places

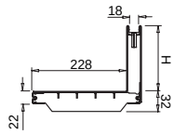
APPLICATIONS OF STAINLESS STEEL
Low visual impact drainage in public and private places



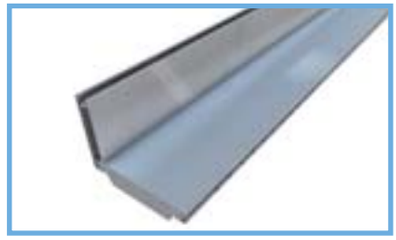
DETAIL OF HOOKING SYSTEM***



VIEW FROM ABOVE

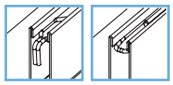


SIDE VIEW

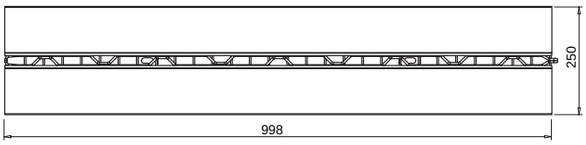


L-SHAPED GRATING

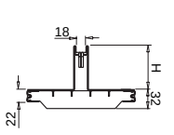
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	HEIGHT OF SLOTS H mm	WEIGHT kg	DRAINAGE SURFACE dm²	OPENINGS F1 x F2 mm
503190		hot dip galvanised steel DD11 (1.0332)**	998 x 250 x 112	80	13,50	1,80	998 x 18
on request		pickled stainless steel AISI 304*					
503191		hot dip galvanised steel DD11 (1.0332)**	998 x 250 x 152	120	14,60		
on request		pickled stainless steel AISI 304*					



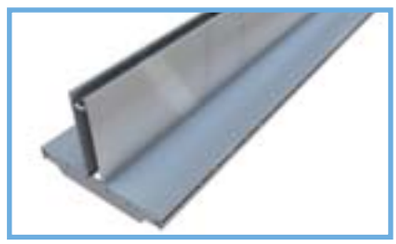
DETAIL OF HOOKING SYSTEM***



VIEW FROM ABOVE



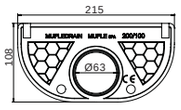
SIDE VIEW



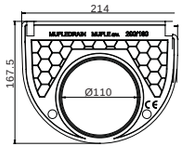
T-SHAPED GRATING

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	HEIGHT OF SLOTS H mm	WEIGHT kg	DRAINAGE SURFACE dm²	OPENINGS F1 x F2 mm
503196		hot dip galvanised steel DD11 (1.0332)**	998 x 250 x 112	80	13,00	1,80	998 x 18
on request		pickled stainless steel AISI 304*					
503197		hot dip galvanised steel DD11 (1.0332)**	998 x 250 x 152	120	14,20		
on request		pickled stainless steel AISI 304*					

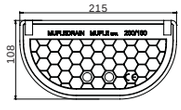
* Classification according to American Standard ASTM.
** Classification according to Standard EN 10111 (issued in March 2000) and symbolic designation according to EN 10027-1 (-2) (issued in September 1993).
*** Hooking System between the gratings through hooks and holes.
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



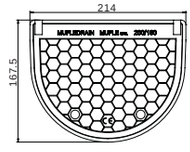
End-cap 200/100



End-cap 200/160



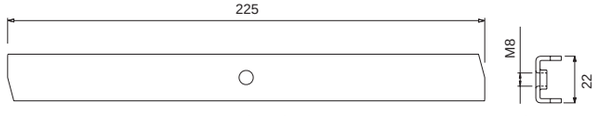
Closed end-cap with drain 200/100



Closed end-cap with drain 200/160

END CAPS

CODE	PRICE	TYPE	MATERIAL	VALID FOR CHANNELS	PREINSTALLED DRAINS
	€				mm
700506		end-cap with drain	HD-PE	200/100	1 x Ø 63
700514		closed end-cap	HD-PE	200/100	-
700507		end-cap with drain	HD-PE	200/160	1 x Ø 110
700515		closed end-cap	HD-PE	200/160	-
502414		end-cap with drain	galvanised steel and PVC	200/250	1 x Ø 160
502413		closed end-cap	galvanised steel	200/250	-

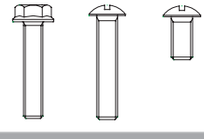


VIEW FROM ABOVE

SIDE VIEW

KIT TIE-ROD + SCREWS

CODE	PRICE	MATERIAL	VALID FOR GRATINGS	SCREW	KIT FOR 1 ml
	€				
500427		galvanised steel	WING galvanised steel	M8 x 55 TBL combi	2 tie-rods + 2 screws
500428		stainless steel	WING stainless steel	M8 x 55 TBL combi	2 tie-rods + 2 screws



KIT SCREWS

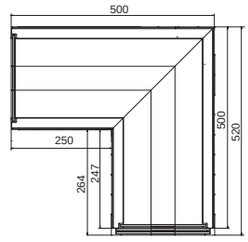
CODE	PRICE	MATERIAL	VALID FOR GRATINGS	SCREW	KIT FOR 1 ml
	€				
503312		black galvanised steel	WING ductile iron	M8 x 40 black with flanged hexagonal head	8
503313		galvanised steel	WING galvanised steel	M8 x 20 TBL combi	4
503314		stainless steel	WING stainless steel	M8 x 20 TBL combi	4
503315		galvanised steel	galvanised steel solid top cover WING	M8 x 40 TBL combi	4

N.B. Sizes and weights are subject to usual manufacturing tolerance values.

SPECIAL PIECES AND DRAIN BOX WITH SYPHON

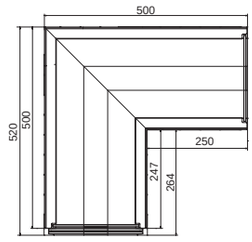
WING 200

LEFT CORNER — WING 200



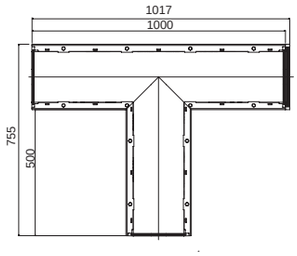
CODE	PRICE €	MODEL
503245		200/250
703106		200/160
703107		200/100

RIGHT CORNER — WING 200



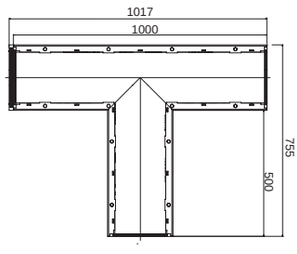
CODE	PRICE €	MODEL
503246		200/250
703114		200/160
703115		200/100

LEFT TI — WING 200



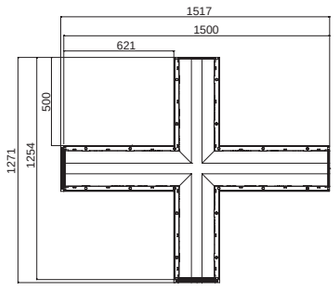
CODE	PRICE €	MODEL
on request		200/250
703122		200/160
703123		200/100

RIGHT TI — WING 200



CODE	PRICE €	MODEL
on request		200/250
703130		200/160
703131		200/100

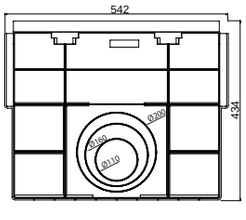
CROSS — WING 200



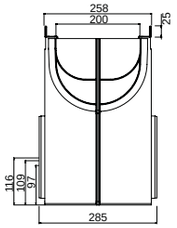
CODE	PRICE €	MODEL
on request		200/250
703138		200/160
703139		200/100

Special pieces, corners, Ti, crosses in stainless steel are available upon request. For further information please contact our Technical Department.

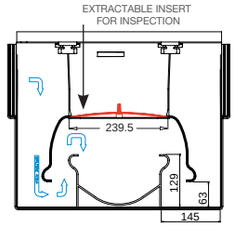
DRAIN BOX WITH SYPHON



FRONT VIEW



SIDE VIEW



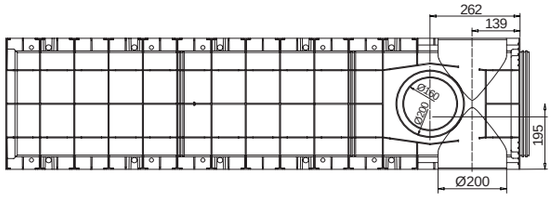
SECTION

WING 200

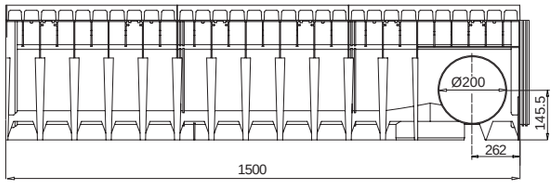
CODE	PRICE €	MATERIAL OF FRAME	MATERIAL OF OUTLET	EXTERNAL DIMENSIONS L x l x h mm	INTERNAL DIMENSIONS L x l x h mm	MAXIMUM LARGE mm	HEIGHT OF OUTLETS mm	WEIGHT kg	PREINSTALLED DRAIN OUTLETS mm
703018		galvanised steel DX51D**	HD-PE	542 x 258 x 434	500 x 200 x 400	285	116 - 109 - 97	4,20	2 x Ø 110; 2 x Ø 160; 2 x Ø 200
703020		stainless steel AISI 304*	HD-PE	542 x 258 x 434	500 x 200 x 400	285	116 - 109 - 97	4,20	2 x Ø 110; 2 x Ø 160; 2 x Ø 200

* Classification according to American Standard ASTM.
** Classification according to Standard EN 10142 (issued in July 2002) and symbolic designation according to EN 10027-1 (-2) (issued in September 1993).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

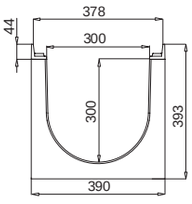
300



VIEW FROM BELOW



SIDE VIEW



SECTION

WING 300/300

CODE	PRICE	MATERIAL OF FRAME	MATERIAL OF CHANNEL	EXTERNAL DIMENSIONS L x l x h	INTERNAL DIMENSIONS L x l x h	WEIGHT	DRAINAGE SECTION	CAPACITY	PREINSTALLED DRAIN OUTLETS	
	€			mm	mm	kg	cm^2	dm^3		mm
503018		GJS 500/7* ductile iron water based paint coated	HD-PE	1500 x 390 x 393	1500 x 300 x 300	20,90	796,00	79,60	side bottom	2 x Ø 200 1 x Ø 160; 1 x Ø 200

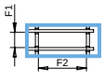
* Classification according to Standard EN 1563 (issued in March 2004).

§ Waterproofing: in order to ensure the channels are waterproof, a bituminous adhesive sealant should be used. Heat-sealing the channel joints makes sure there will be no leakages through said joints for a very long time. For further information please contact Mufle's Technical Department.

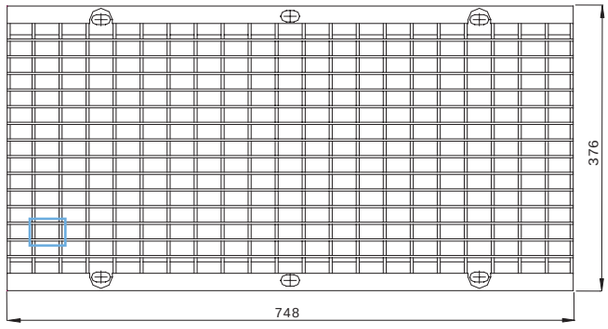
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF GALVANISED STEEL

Kerbs
Historical town centres (slow traffic)
Parking areas
Parking decks

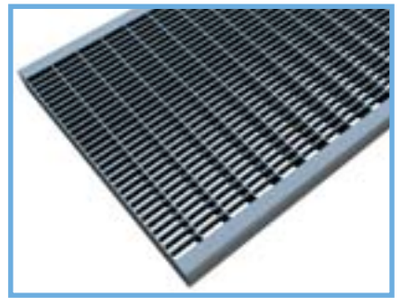


DETAIL OF HOOKING SYSTEM



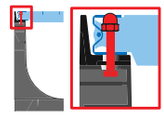
VIEW FROM ABOVE

SIDE VIEW



MESH GRATING (11 x 33)

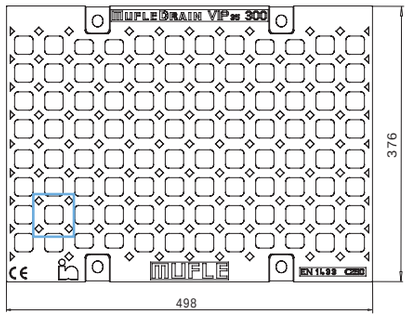
40 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM nut
502137		hot dip galvanised steel DD11 (1.0332)**	748 x 376 x 35	15,30	23,76	20,0 x 33,0	

APPLICATIONS OF DUCTILE IRON

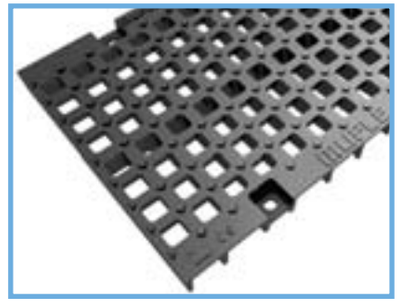
Kerbs
Historical town centres (slow traffic)
Parking areas
Parking decks

SLOT DETAIL



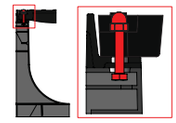
VIEW FROM ABOVE

SIDE VIEW



MESH GRATING

35 mm

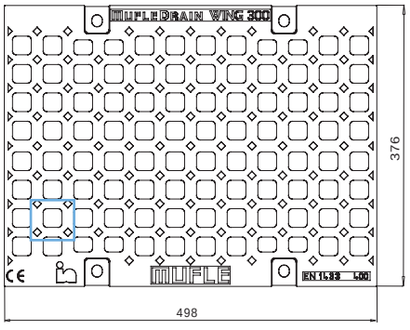
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM nut
503117		GJS 500/7* ductile iron water based paint coated	498 x 376 x 35	16,50	5,96	25,0 x 25,0	

* Classification according to Standard EN 1563 (issued in March 2004).
** Classification according to Standard EN 10111 (issued in March 2000) and symbolic designation according to EN 10027-1 (-2) (issued in September 1993).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF DUCTILE IRON

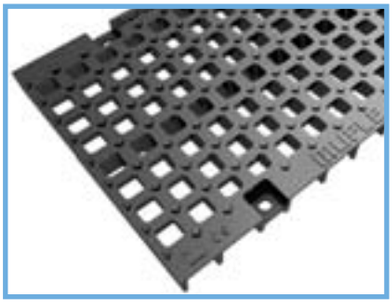
Road carriageways (not transversal)
Hard shoulders
Lay-bys with thick and heavy-goods traffic
Petrol stations

SLOT DETAIL



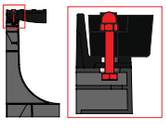
VIEW FROM ABOVE

SIDE VIEW



MESH GRATING

50 mm

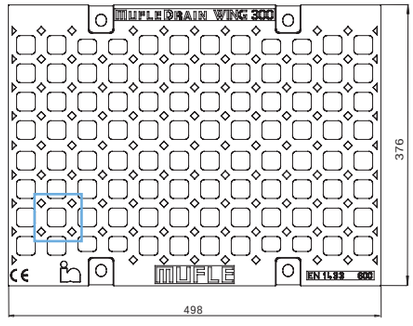
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM nut
503118		GJS 500/7* ductile iron water based paint coated	498 x 376 x 35	21,70	5,96	25,0 x 25,0	

* Classification according to Standard EN 1563 (issued in March 2004).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF DUCTILE IRON

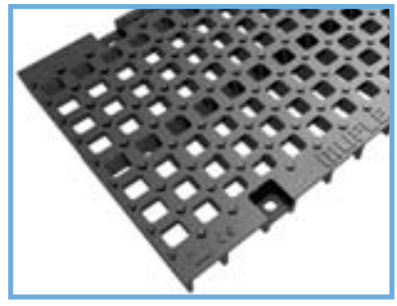
Transversal canalisation systems in carriageways of roads with thick and heavy-goo
Industrial areas with passage of forklift trucks (high axle loads)
Underpasses

SLOT DETAIL



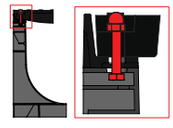
VIEW FROM ABOVE

SIDE VIEW



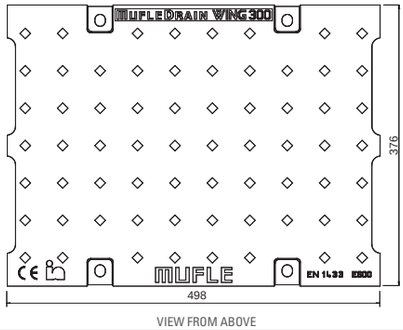
MESH GRATING

50 mm

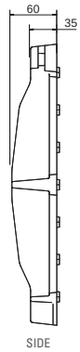
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM nut
503119		GJS 500/7* ductile iron water based paint coated	498 x 376 x 35	21,70	5,96	25,0 x 25,0	

APPLICATIONS

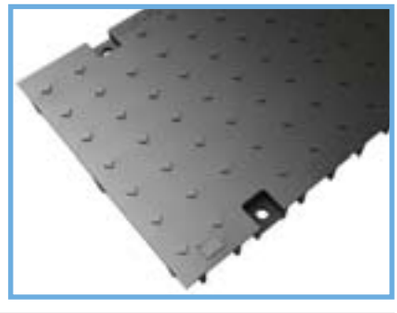
Cable passageway
Passageway for water and/or heat systems



VIEW FROM ABOVE

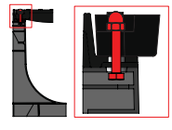


SIDE VIEW



SOLID TOP COVER

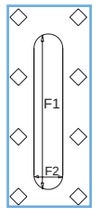
60 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	FIXING SYSTEM nut
503104		GJS 500/7* ductile iron water based paint coated	498 x 376 x 35	26,00	

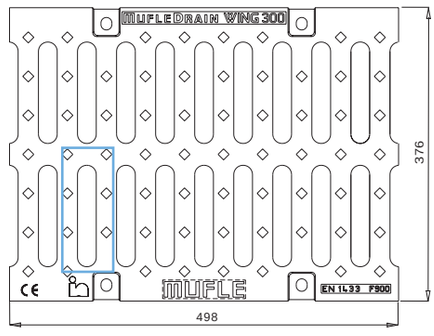
* Classification according to Standard EN 1563 (issued in March 2004).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF DUCTILE IRON

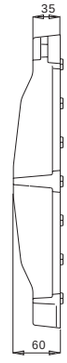
Port and airport areas



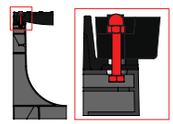
SLOT DETAIL



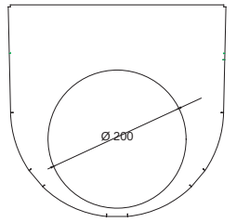
VIEW FROM ABOVE



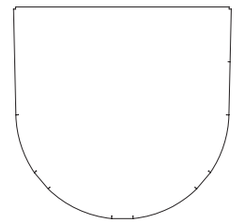
SIDE VIEW

SLOTTED GRATING							60 mm
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM nut
503120		GJS 500/7* ductile iron water based paint coated	498 x 376 x 35	27,50	8,50	130,0 x 24,0	

* Classification according to Standard EN 1563 (issued in March 2004).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



End-cap 150/100



Closed end-cap with drain 150/100

END CAPS

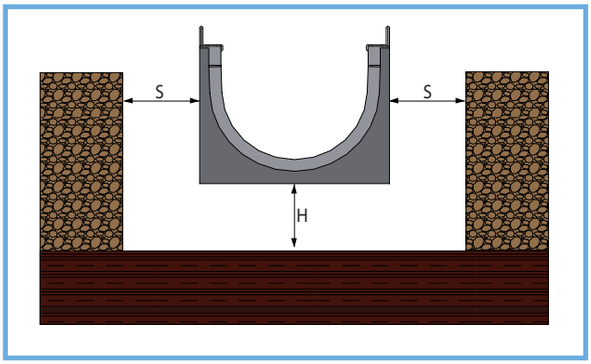
CODE	PRICE	MATERIAL	TYPE END-CAP	PREINSTALLED DRAIN OUTLETS
	€			mm
503411		galvanised steel	closed end-cap 300/300	–
503412		galvanised steel e PVC	end-cap with drain 300/300	1 x Ø 200

KIT NUTS

CODE	PRICE	MATERIAL	VALID FOR GRATINGS	NUT	KIT FOR 1,5 ml
	€				
503309		galvanised steel	WING galvanised steel	Blind hexagonal M10 with spherical cap	8 nuts + 8 washer*
503310		black galvanised steel	WING ductile iron	Blind hexagonal M10 with spherical cap	12 nuts + 12 washer*

Special pieces, Corners, Ti, Crosses for WING 300 are available upon request. For further information please contact our Technical Department.

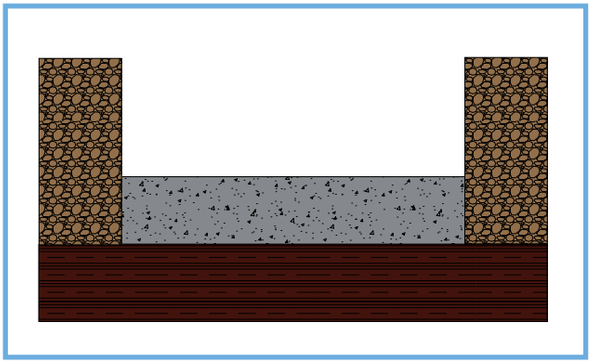
* Screws are included in the channel.
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



Step 1

HOLE SIZE

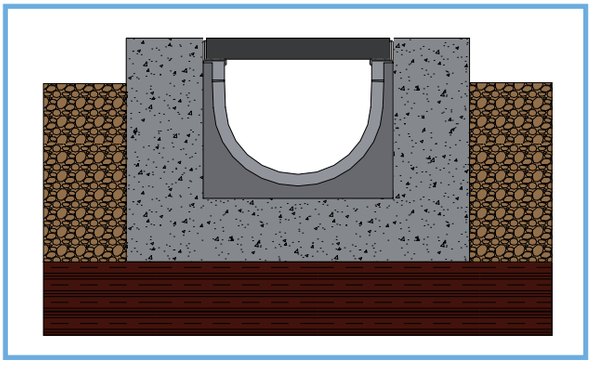
The hole needed to lay the MufleDrain channel must allow not only for the size of the channel and the drain piping but also for adequate space for the base H and the side concrete props S. The dimensions to be followed are shown in the summary table. In this step make sure the underlying layer is suitable to the load it is expected to support.



Step 2

CONCRETE BASE

Cast the concrete base H up to the height specified, allowing for any inclination in the drainage line. If needed, equip the base with stretches of electrowelded mesh or steel rods.

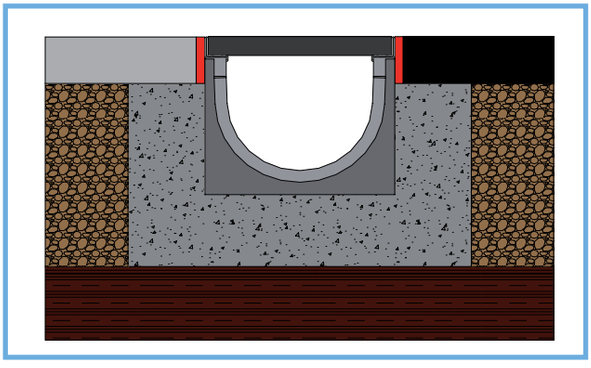


Step 3

CHANNEL ARRANGEMENT

Lay the channels starting from the flow outlet. Allow for the drains required and build the side prop S up to the maximum height allowed by the final coating. Shape it according to the needs based on the drawing. Introduce and fix the grating required beforehand in order to prevent any deformation of the channel due to the thrust of concrete and to speed up installation. Protect the gratings with a PVC film so that no final cleaning must be carried out to remove any concrete residues.

NEW FEATURE:
The channels can be installed with preassembled gratings.

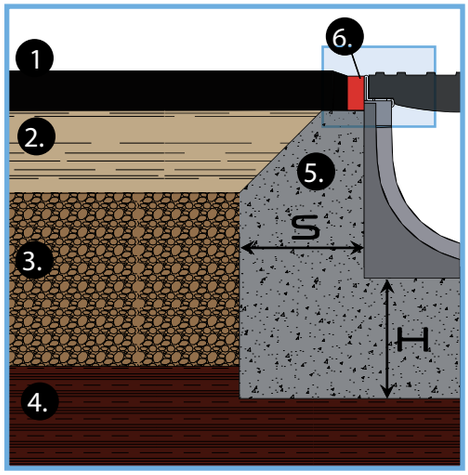


Step 4

FINAL COATING

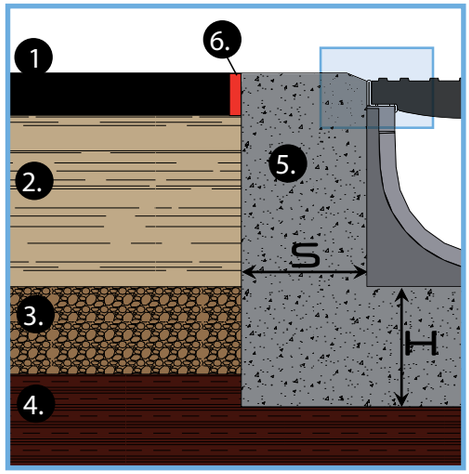
When applying the final coating, make sure its upper profile reaches up to minimum 3/5 mm above the grating's flow plane (see details on the following page). Remove the protection film.

Case 1
Asphalt
(B125-C250)



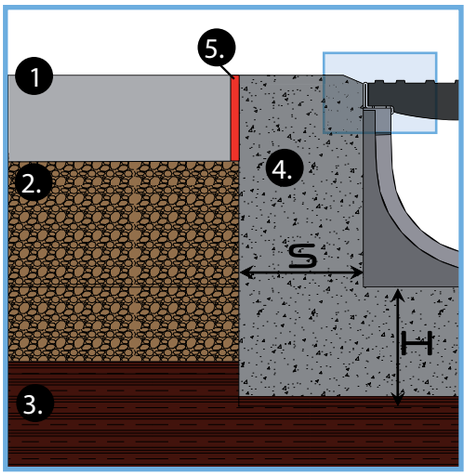
1. Sheet asphalt
2. Lower layer (binder)
3. Bearing layer
4. Subfloor
5. Concrete reinforcement layer
6. Bitumen joint

Case 2
Asphalt
(D400-E600-F900)

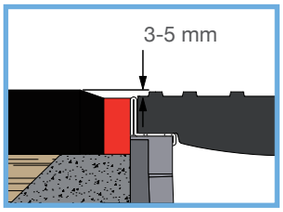


1. Sheet asphalt
2. Lower layer (binder)
3. Bearing layer
4. Subfloor
5. Concrete reinforcement layer
6. Bitumen joint

Case 3
Concrete flooring
(from B125 to F900)



1. Concrete flooring
2. Bearing layer
3. Subfloor
4. Concrete reinforcement layer
5. Bitumen joint



This Sheet is only aimed to give advice on the installation of channels mod. MufleDrain. In any case, always:
- check the carrying capacity characteristics of the underlying layer
- use concrete and stone aggregate having the characteristics recommended
- comply with the height of the installation surface and the thickness of the prop as specified according to the load classes.

SUMMARY TABLE						
Load class (EN 1433)		B 125	C 250	D 400	E 600	F 900
Applicable load (EN 1433)	kN	125	250	400	600	900
Minimum height H of concrete laying bed	mm	100	150	200	200	250
Minimum thickness S of the concrete flanking	mm	100	150	200	200	250
Concrete compression strength class (EN 206-1)		C 25/30	C 25/30	C 25/30**	C 30/37	C 35/45
Concrete compression strength class* (EN 206-1)		C 30/37 XF4	C 30/37 XF4	C 30/37 XF4	C 35/45 XF4	C 40/50 XF4

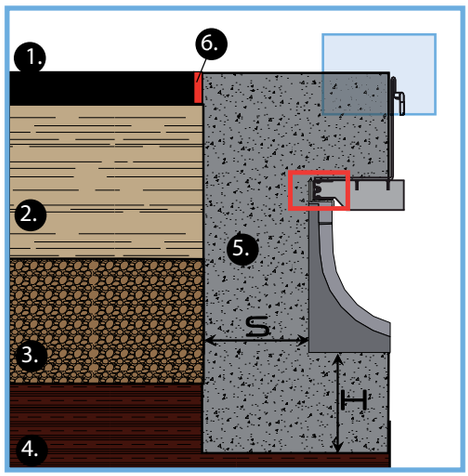
* If concrete can be affected by frost and thaw cycles.
If installation is in road crossings subject to heavy traffic (especially trucks), Class C30/37 concrete should be used.
N.B. We recommend using Class S4 concrete (EN 206-1) and stone aggregate with maximum diameter 8 mm.

INSTALLATION OF L-SHAPED AND T-SHAPED GRATING

WING

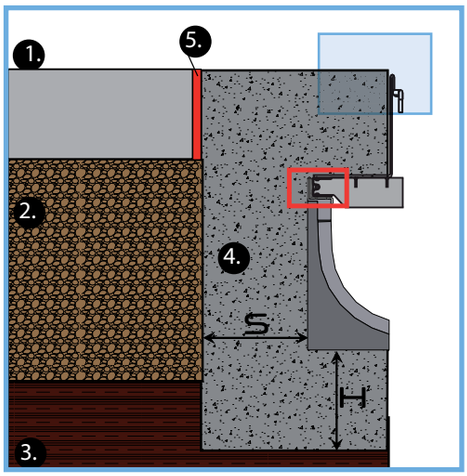
Case 1
Asphalt
(from B125 to D400)

WARNING:
Prevent concrete from flowing into the channel

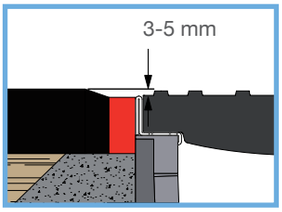


1. Sheet asphalt
2. Lower layer (binder)
3. Bearing layer
4. Subfloor
5. Concrete reinforcement layer
6. Bitumen joint

Case 2
Concrete screed for streets and roads
(from B125 to D400)



1. Concrete flooring
2. Bearing layer
3. Subfloor
4. Concrete reinforcement layer
5. Bitumen joint

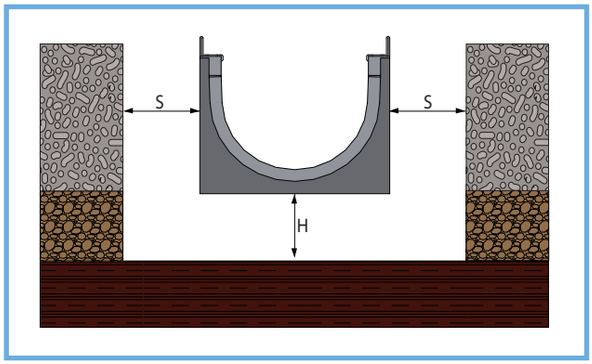


This Sheet is only aimed to give advice on the installation of channels mod. MufleDrain. In any case, always:
- check the carrying capacity characteristics of the underlying layer
- use concrete and stone aggregate having the characteristics recommended
- comply with the height of the installation surface and the thickness of the prop as specified according to the load classes.

SUMMARY TABLE				
Load class (EN 1433)		B 125	C 250	D 400
Applicable load (EN 1433)	kN	125	250	400
Minimum height H of concrete laying bed	mm	100	150	200
Minimum thickness S of the concrete flanking	mm	100	150	200
Concrete compression strength class (EN 206-1)		C 25/30	C 25/30	C 25/30**
Concrete compression strength class* (EN 206-1)		C 30/37 XF4	C 30/37 XF4	C 30/37 XF4

* If concrete can be affected by frost and thaw cycles.
**If installation is in road crossings subject to heavy traffic (especially trucks), Class C30/37 concrete should be used.
N.B. We recommend using Class S4 concrete (EN 206-1) and stone aggregate with maximum diameter 8 mm.

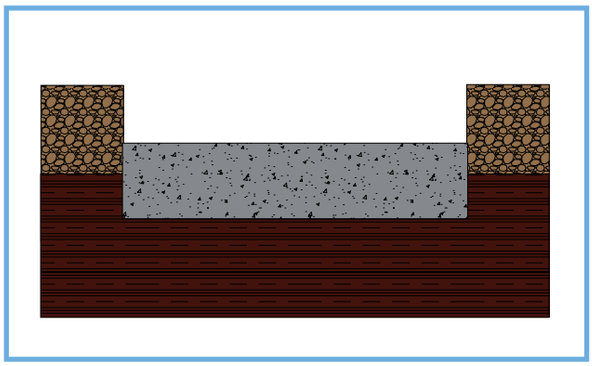
INSTALLATION OF DRAINING ASPHALT GRATING WING 200



Step 1

HOLE SIZE

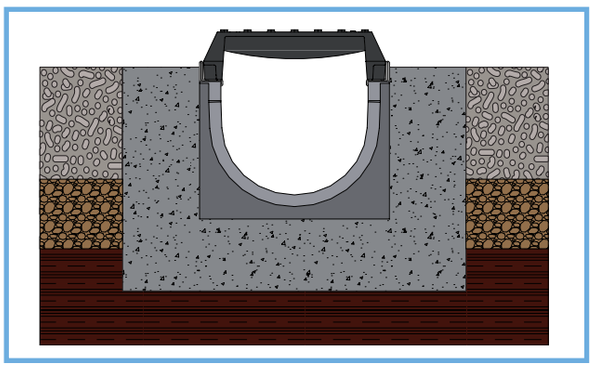
The hole needed to lay the MufleDrain channel must allow not only for the size of the channel and the drain piping but also for adequate space for the base H and the side concrete props S. The dimensions to be followed are shown in the summary table. In this step make sure the underlying layer is suitable to the load it is expected to support.



Step 2

CONCRETE BASE

Cast the concrete base H up to the height specified, allowing for any inclination in the drainage line. If needed, equip the base with stretches of electrowelded mesh or steel rods.

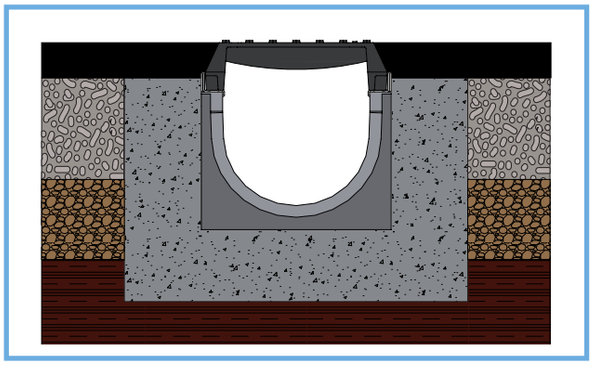


Step 3

CHANNEL ARRANGEMENT

Lay the channels starting from the flow outlet. Allow for the drains required and build the side prop S up to the maximum height allowed by the final coating. Shape it according to the needs based on the drawing. Introduce and fix the grating required beforehand in order to prevent any deformation of the channel due to the thrust of concrete and to speed up installation. Protect the gratings with a PVC film so that no final cleaning must be carried out to remove any concrete residues.

NEW FEATURE:
The channels can be installed with preassembled gratings.

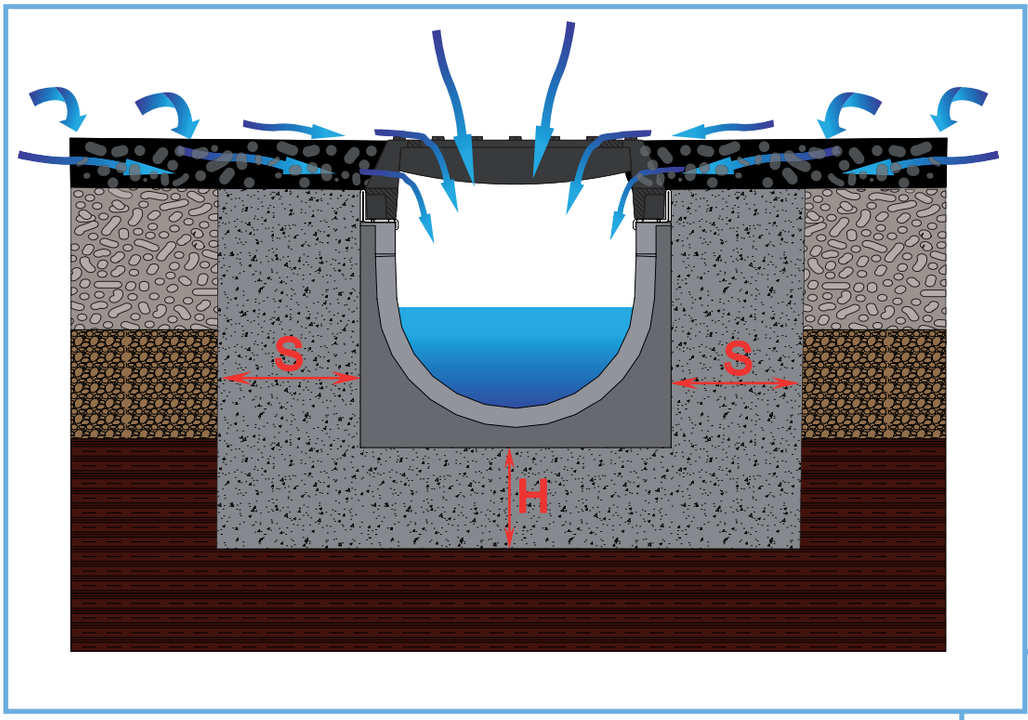


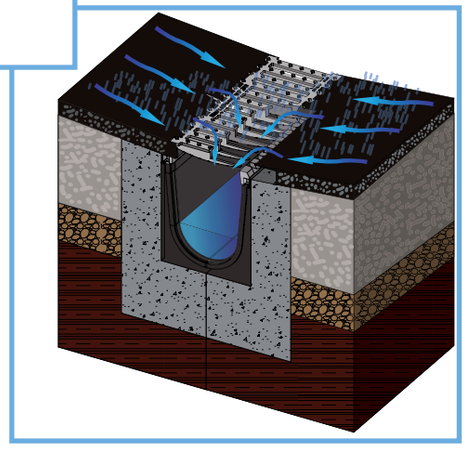
Step 4

FINAL COATING

When applying the final coating, make sure its upper profile reaches up to minimum 3/5 mm above the grating's flow plane (see details on the following page). Remove the protection film.

INSTALLATION OF DRAINING ASPHALT GRATING WING 200





This Sheet is only aimed to give advice on the installation of channels mod. MufleDrain. In any case, always:
- check the carrying capacity characteristics of the underlying layer
- use concrete and stone aggregate having the characteristics recommended
- comply with the height of the installation surface and the thickness of the prop as specified according to the load classes.

SUMMARY TABLE		
Load class (EN 1433)		D 400
Applicable load (EN 1433)	kN	400
Minimum height H of concrete laying bed	mm	200
Minimum thickness S of the concrete flanking	mm	200
Concrete compression strength class (EN 206-1)		C 25/30**
Concrete compression strength class* (EN 206-1)		C 30/37 XF4

* If concrete can be affected by frost and thaw cycles.
**If installation is in road crossings subject to heavy traffic (especially trucks), Class C30/37 concrete should be used.
N.B. We recommend using Class S4 concrete (EN 206-1) and stone aggregate with maximum diameter 8 mm.

1. Supply and installation of MufleDrain WING type HD-PE drainage channel with external stiffening ribs and male-female coupling system allowing the assembly between one channel and the next with the relevant pre-assembled gratings. The channel will have 3/4 drainage diaphragms at pre-determined points. Galvanised (stainless) steel upper profile equipped with M8 threaded insert to which a screw can be secured to fix the gratings, 4 mm-thick drive-over edge, 2 mm-thick contact surface with height not smaller than 25 mm, connection through prearranged coupling to the channel structure. The channel surface will be perfectly smooth and have a low roughness coefficient to allow the best water flow. Il will also be perfectly water-tight and devoid of any connection points with the outside. The channel will have the following dimensions: length 1,000 mm, internal net gap ___mm, internal height ___ mm.

2. Supply and installation of MufleDrain WING type HD-PE drainage channel with external stiffening ribs and male-female coupling system allowing the assembly between one channel and the next with the relevant pre-assembled gratings. The channel will have 2 drain diaphragms at pre-determined points and it will be designed to house a HD-PE drain gate (diameter 100 mm - 110 mm) on the bottom through 4 screws. Galvanised (stainless) steel upper profile equipped with M8 threaded insert to which a screw can be secured to fix the gratings, 4 mm-thick drive-over edge, 2 mm-thick contact surface with height not smaller than 25 mm, connection through prearranged coupling to the channel structure. The internal surface of the channel will be perfectly smooth and have a low roughness coefficient to allow water flow. Il will also be perfectly water-tight and devoid of any connection points with the outside. The channel will have the following dimensions: length 1,000mm, internal net gap ___mm, internal height ___ mm.

3. Supply and installation of MufleDrain WING type HD-PE drainage channel with external stiffening ribs and male-female channel coupling system. The channel will have 4 drainage diaphragms at pre-determined points. Ductile cast-iron upper profile equipped with M10 screw to which a nut can be secured to fix the gratings, 6 mm-thick drive-over edge, 9 mm-thick contact surface with height not smaller than 35 mm, connection through a nut and bolt system to the channel structure. The channel will have the following dimensions: length 1,500mm, internal net gap 300mm, internal height 300 mm.

4. Supply and installation of ductile cast-iron GJS 500/7 covering gratings according to EN 1563-2004 for MufleDrain WING drainage channels with screw fixing system, load class C250 (D400, E600, F900) according to EN 1433-2004, slot width 20 mm, length 498 mm, width ___mm.

5. Supply and installation of ductile cast-iron GJS 500/7 covering gratings according to EN 1563-2004 for MufleDrain WING drainage channels with screw fixing system, load class E600 according to EN 1433-2004, slot inclined 30° to the longitudinal axis, width 6mm, length 498mm, width 148 mm.

6. Supply and installation of ductile cast-iron GJS 500/7 covering gratings according to EN 1563-2004 with mesh for MufleDrain WING drainage channels with screw fixing system, load class D400 according to EN 1433-2004, length 498mm, width ___mm.

7. Supply and installation of ductile cast-iron GJS 500/7 blind covers according to EN 1563-2004 with mesh for MufleDrain WING drainage channels with nut fixing system, load class C250 (D400, E600) according to EN 1433-2004, length 748 mm, width 376 mm.

8. Supply and installation of ductile cast-iron covering gratings for MufleDrain WING drainage channels with nut fixing system, load class F900 according to EN 1433-2004, slot length 24 mm, length 748 mm, width 376 mm.

9. Supply and installation of ductile cast-iron GJS 500/7 blind covers according to EN 1563-2004 with mesh for MufleDrain WING drainage channels with screw fixing system, load class E600 according to EN 1433-2004, length 498 mm, width ___mm.

10. Supply and installation of ductile cast-iron GJS 500/7 blind covers according to EN 1563-2004 with mesh for MufleDrain WING drainage channels with nut fixing system, load class E600 according to EN 1433-2004, length 498 mm, width 376 mm.

11. Supply and installation of ductile cast-iron GJS 500/7 perforated cover Air System according to EN 1563-2004 for composting systems with slots for screw fixing. The cover will have 12 holes (Ø 10) to allow the passage of the air needed for composting. The holes will have a truncated-cone section with the smaller base upwards in order to prevent any clogging due to residues. The load class of the cover will be E600 according to EN 1433-2004, usable length 500 mm, width 198 mm.

12. Supply and installation of galvanised (stainless) steel square-mesh or anti-heel covering gratings for MufleDrain WING drainage channels equipped with screw fixing slots and bar fixing plate, load class B125 according to EN 1433-2004, length 998 mm, width ___mm. A similar grating will be available upon request with length 498 mm. The dimensions will be 30 x 30 mm in the square mesh and 30 x 10 mm in the anti-heel mesh.

13. Supply and installation of galvanised (stainless) steel square-mesh or anti-heel covering gratings for MufleDrain WING drainage channels equipped with slots for screw fixing, load class C250 according to EN 1433-2004, length 998 mm, width ___mm. A similar grating will be available upon request with length 498mm. The dimensions will be 30 x 30 mm in the square mesh and 30 x 10 mm in the anti-heel mesh.

14. Supply and installation of T-shaped longitudinal-slot gratings made from galvanised steel for MufleDrain WING drainage channels with male-female coupling system between one grating and the next, load class B125 to D400 according to EN 1433-2004, length 998 mm, width ___ mm, height of “T” ___mm.

15. Supply and installation of L-shaped longitudinal-slot gratings made from galvanised steel for MufleDrain WING drainage channels with male-female coupling system between one grating and the next, load class B125 to D400 according to EN 1433-2004, length 998mm, width ___ mm, height of “L” ___mm.

16. Supply and installation of galvanised steel blind cover for MufleDrain WING drainage channels with screw fixing system, load class C250 according to EN 1433-2004, length 998 mm, width ___mm. A similar cover will be available upon request with length 498 mm.

17. Supply and installation of galvanised steel anti-heel covering gratings for MufleDrain WING drainage channels with slots for nut fixing system, load class C250 according to EN 1433-2004, length 748 mm, width 376 mm. The dimensions of the mesh will be 33x20mm.

18. Supply and installation of HD-PE end caps for MufleDrain drainage channel with coupling system into the special channel housing.

19. Supply and installation of HD-PE open cap with drainage hole diameter ___mm for MufleDrain drainage channel with coupling system into the special channel housing.

20. Supply and installation of (open) end cap made from galvanised steel (galvanised steel and PVC tube) for MufleDrain drainage channel with coupling system into the special channel housing.

21. Supply and installation of HD-PE gullies with siphon for MufleDrain WING drainage channels with external stiffening ribs and coupling system. Galvanised (stainless) steel upper profile with height not smaller than 25 mm, connection through prearranged coupling to the gully structure. The upper section of the siphon built in the gully may be removed in order to allow inspection and cleaning work. The gully will have preformed drains on both sides with diameter up to 200 mm. The gully dimensions will be as follows: length 542 mm, net gap ___ mm, height 400 mm.

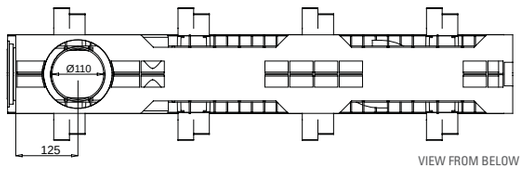
PLUS

The system:

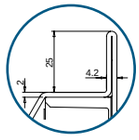
- it supports 4 load classes (C250, D400, E600, F900) in compliance with Standard EN 1433
- it is made up of a HD-PE channel with a strengthening frame
- it is supplemented with a galvanised or stainless steel en-bloc frame equipped with 8 external clamps (4 each side) for anchoring it to the concrete and 2 spacers ensuring steadiness against torsional deformation
- it is wearproof and very solid thanks to the frame, which ensures a 4 mm - thick drive-over edge and a 2 mm - thick contact surface in compliance with Standard EN 1433 on classes subject to heavy loads
- it comprises a wide range of standard gratings (with slots, square mesh, anti-heel mesh) made from galvanised steel, stainless steel and ductile cast-iron, as well as steel and ductile-cast-iron blind covers, and a cover specially designed for composting systems
- it comes complete with an innovative grating for draining asphalt in D400 which has slots in the upper and side sections in order to receive the liquids from the road surface - both surface liquids and liquids absorbed by the draining asphalt
- it has tie-rod and screw fixing systems; and a convenient drain gate
- it is ideal for heavy uses, road carriageways, road crossings with high-speed vehicular traffic (trucks included), service areas, industrial areas, ports and airports, areas where containers are (un)loaded
- it comes complete with drain gullies with siphon
- the range is made up of 8 channels with 3 widths and 4 heights (100/55, 100/80, 100/100, 100/160, 150/100, 150/160, 200/100, 200/160)

The product must be laid according to Mufle's specifications. The relevant instructions are available in this Catalogue on page 241 and on the Web site www.mufle.com.

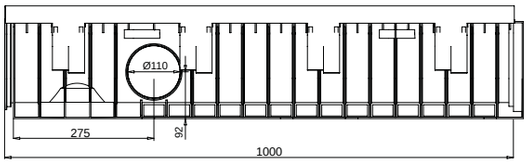
100



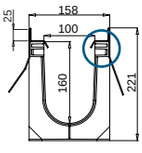
VIEW FROM BELOW



DETAIL SECTION



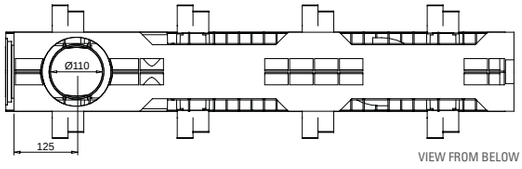
SIDE VIEW



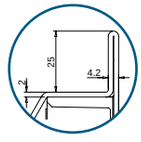
SECTION

PLUS 100/160

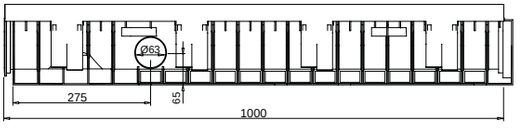
CODE	PRICE	MATERIAL OF FRAME	MATERIAL OF CHANNEL	EXTERNAL DIMENSIONS L x l x h	INTERNAL DIMENSIONS L x l x h	WEIGHT	DRAINAGE SECTION	CAPACITY	PREINSTALLED DRAIN OUTLETS	
	€			mm	mm	kg	cm^2	dm^3	mm	
704000		galvanised steel DX51D**	HD-PE	1000 x 158 x 221	1000 x 100 x 160	6,40	145,28	14,52	side bottom	2 x Ø 110 1 x Ø 110
704008		stainless steel AISI 304*								



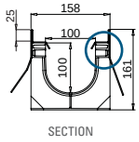
VIEW FROM BELOW



DETAIL SECTION



SIDE VIEW

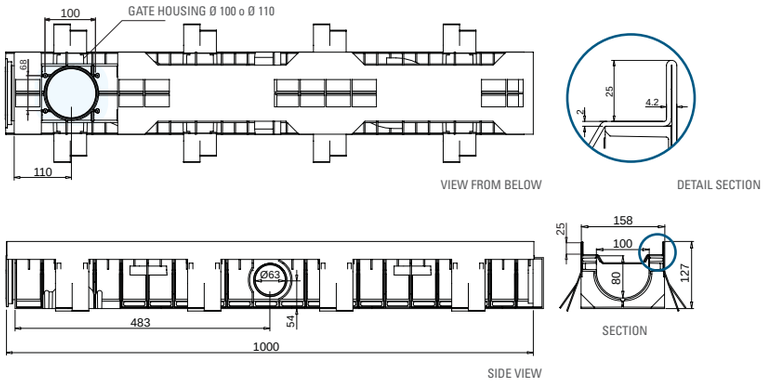


SECTION

PLUS 100/100

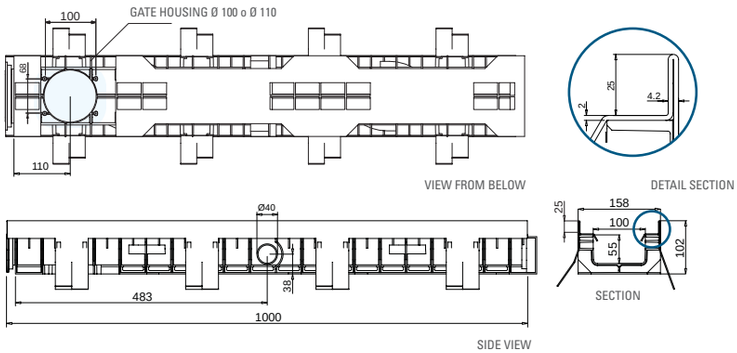
CODE	PRICE	MATERIAL OF FRAME	MATERIAL OF CHANNEL	EXTERNAL DIMENSIONS L x l x h	INTERNAL DIMENSIONS L x l x h	WEIGHT	DRAINAGE SECTION	CAPACITY	PREINSTALLED DRAIN OUTLET	
	€			mm	mm	kg	cm^2	dm^3	mm	
704001		galvanised steel DX51D**	HD-PE	1000 x 158 x 161	1000 x 100 x 100	5,90	89,56	8,95	side bottom	2 x Ø 63 1 x Ø 110
704009		stainless steel AISI 304*								

* Classification according to American Standard ASTM.
** Classification according to Standard EN 10142 (issued in July 2002) and symbolic designation according to EN 10027-1 (-2) (issued in September 1993).
§ Waterproofing: in order to ensure the channels are waterproof, a bituminous adhesive sealant should be used. Heat-sealing the channel joints makes sure there will be no leakages through said joints for a very long time. For further information please contact Mufle's Technical Department.
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



PLUS 100/80

CODE	PRICE	MATERIAL OF FRAME	MATERIAL OF CHANNEL	EXTERNAL DIMENSIONS L x l x h	INTERNAL DIMENSIONS L x l x h	WEIGHT	DRAINAGE SECTION	CAPACITY	PREINSTALLED DRAIN OUTLETS
	€			mm	mm	kg	cm^2	dm^3	mm
704002		galvanised steel DX51D**	HD-PE	1000 x 158 x 127	1000 x 100 x 80	5,60	69,28	6,92	side 2 x Ø 63 bottom 1 x Ø 100 ; 1 x Ø 110
704010		stainless steel AISI 304*							



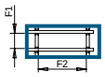
PLUS 100/55

CODE	PRICE	MATERIAL OF FRAME	MATERIAL OF CHANNEL	EXTERNAL DIMENSIONS L x l x h	INTERNAL DIMENSIONS L x l x h	WEIGHT	DRAINAGE SECTION	CAPACITY	PREINSTALLED DRAIN OUTLETS
	€			mm	mm	kg	cm^2	dm^3	mm
704003		galvanised steel DX51D**	HD-PE	1000 x 158 x 102	1000 x 100 x 55	5,40	54,44	5,44	side 2 x Ø 40 bottom 1 x Ø 100 ; 1 x Ø 110
704011		stainless steel AISI 304*							

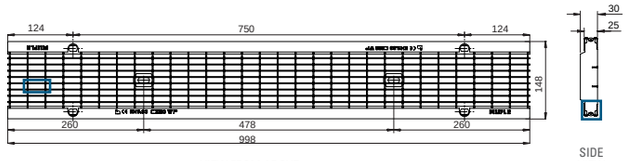
* Classification according to American Standard ASTM.
** Classification according to Standard EN 10142 (issued in July 2002) and symbolic designation according to EN 10027-1 (-2) (issued in September 1993).
*** For drainage purposes use the drain gate with outlet kit (available in two versions Ø100 and Ø110).
§ Waterproofing: in order to ensure the channels are waterproof, a bituminous adhesive sealant should be used. Heat-sealing the channel joints makes sure there will be no leakages through said joints for a very long time. For further information please contact Mufle's Technical Department.
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF GALVANISED STEEL
Kerbs
Historical town centres (slow traffic)
Parking areas
Parking decks

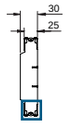
APPLICATIONS OF STAINLESS STEEL
Kerbs
Historical town centres (slow traffic)
Parking areas
Parking decks
Areas with low-load transit in food factories
Areas with low-load transit in chemically aggressive environments



DETAIL OF HOOKING SYSTEM



VIEW FROM ABOVE

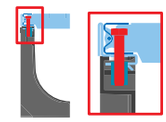


SIDE VIEW

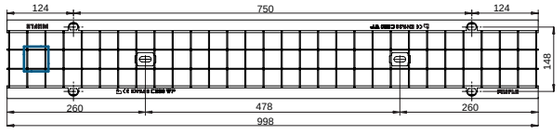

DETAIL OF UPRIGHT BEND

MESH GRATING (11 x 33)

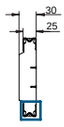
30 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM screw
503121		hot dip galvanised steel DD11 (1.0332)**	998 x 148 x 25	5,50	8,30	10,2 x 31,2		
503122		pickled stainless steel AISI 304*						
503149		hot dip galvanised steel DD11 (1.0332)**	498 x 148 x 25	2,75	4,15			
503150		pickled stainless steel AISI 304*						

DETAIL OF SQUARE MESH



VIEW FROM ABOVE

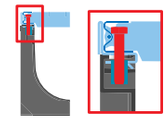


SIDE VIEW


DETAIL OF UPRIGHT BEND

MESH GRATING (33 x 33)

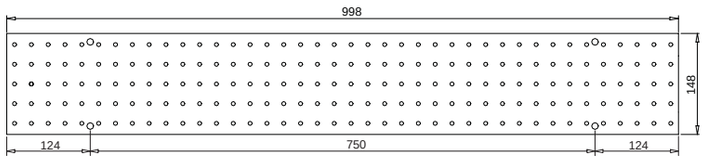
30 mm

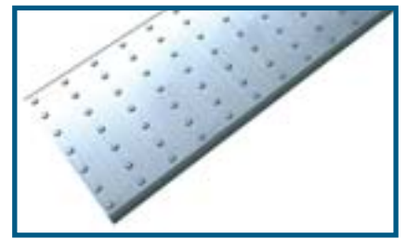
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM screw
503123		hot dip galvanised steel DD11 (1.0332)**	998 x 148 x 25	4,80	9,38	34,2 x 31,2		
503124		pickled stainless steel AISI 304*						
503151		hot dip galvanised steel DD11 (1.0332)**	498 x 148 x 25	2,40	4,69			
503152		pickled stainless steel AISI 304*						

* Classification according to American Standard ASTM.
** Classification according to Standard EN 10111 (issued in March 2000) and symbolic designation according to EN 10027-1 (-2) (issued in September 1993).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS

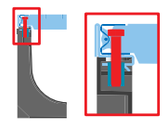
Cable passageway
Passageway for water
and/or heat systems





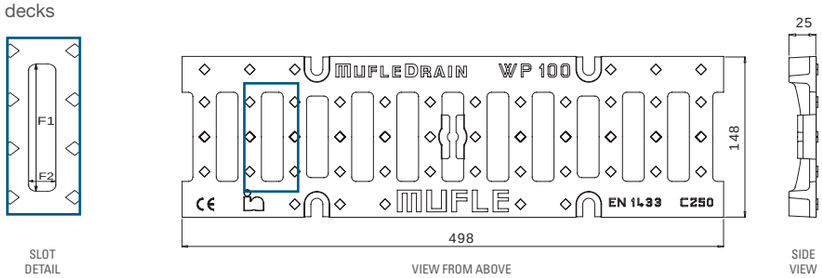
SOLID TOP COVER

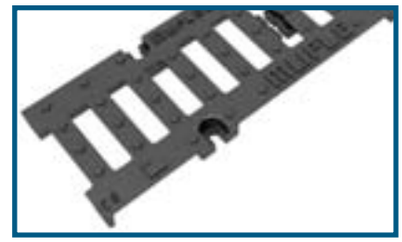
25 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	FIXING SYSTEM screw
503101		galvanised steel DX51D**	998 x 148 x 25	3,00	

APPLICATIONS OF DUCTILE IRON

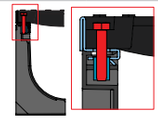
Kerbs
Historical town centres (slow traffic)
Parking areas
Parking decks





SLOTTED GRATING 20 mm

25 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM screw
503108		GJS 500/7* ductile iron water based paint coated	498 x 148 x 25	4,65	1,94	82,0 x 20,0	

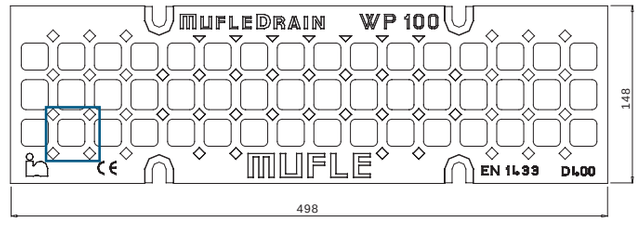
* Classification according to Standard EN 1563 (issued in March 2004).

** Classification according to Standard EN 10142 (issued in July 2002) and symbolic designation according to EN 10027-1 (-2) (issued in September 1993).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF DUCTILE IRON

Road carriageways (not transversal)
Hard shoulders
Lay-bys with thick and heavy-goods traffic
Petrol stations

SLOT DETAIL

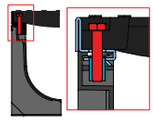


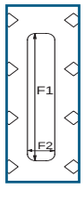
VIEW FROM ABOVE

SIDE VIEW

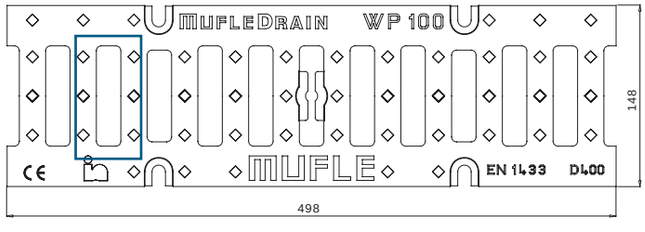
MESH GRATING

25 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM screw
503182		GJS 500/7* ductile iron water based paint coated	498 x 148 x 25	4,80	2,43	22,5 x 22,5	

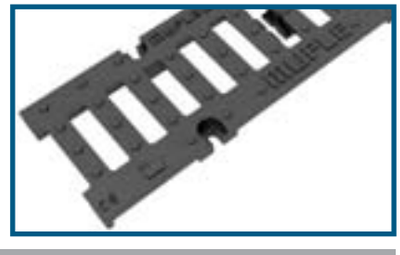


SLOT DETAIL



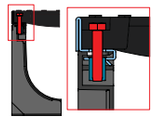
VIEW FROM ABOVE

SIDE VIEW



SLOTTED GRATING 20 mm

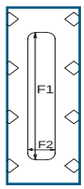
25 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM screw
503109		GJS 500/7* ductile iron water based paint coated	498 x 148 x 25	4,75	1,94	82,0 x 20,0	

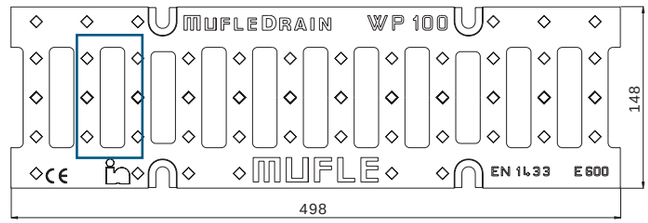
* Classification according to Standard EN 1563 (issued in March 2004).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF DUCTILE IRON

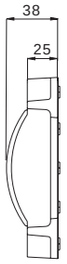
Transversal canalisation systems in carriageways of roads with thick and heavy-gc
Industrial areas with passage of forklift trucks (high axle loads)
Underpasses



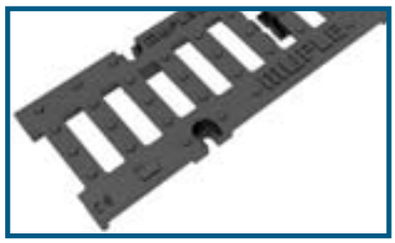
SLOT DETAIL



VIEW FROM ABOVE

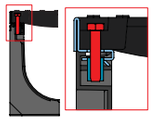


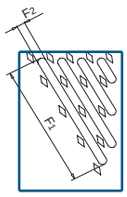
SIDE VIEW



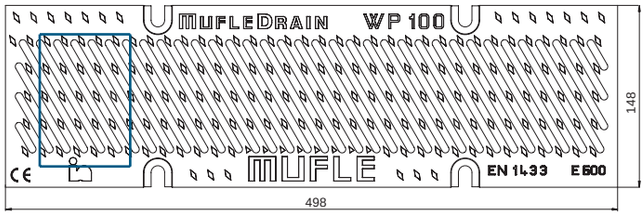
SLOTTED GRATING 20 mm

38 mm

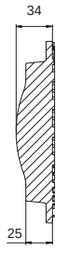
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM screw
503110		GJS 500/7* ductile iron water based paint coated	498 x 148 x 25	5,10	1,94	82,0 x 20,0	



SLOT DETAIL



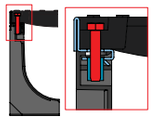
VIEW FROM ABOVE



SIDE VIEW

SLOTTED GRATING 6 mm

34 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM screw
503418		GJS 500/7* ductile iron water based paint coated	498 x 148 x 25	4,90	2,13	105,5 x 6,0	

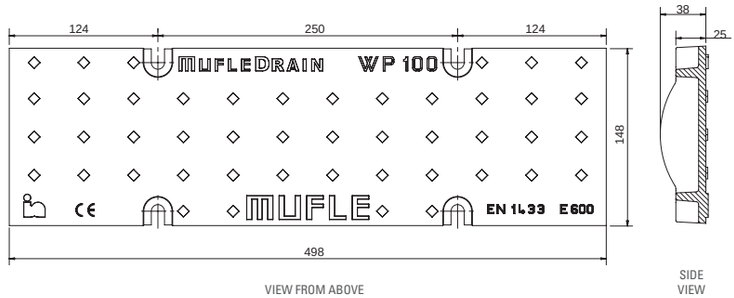
* Classification according to Standard EN 1563 (issued in March 2004).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

SOLID TOP COVERS

E 600

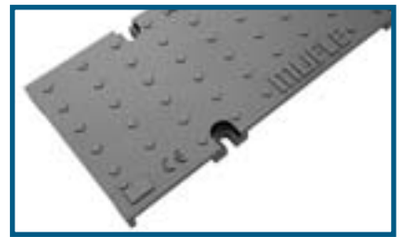
PLUS 100

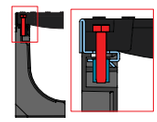
APPLICATIONS
Cable passageway
Passageway for water
and/or heat systems



VIEW FROM ABOVE

SIDE VIEW

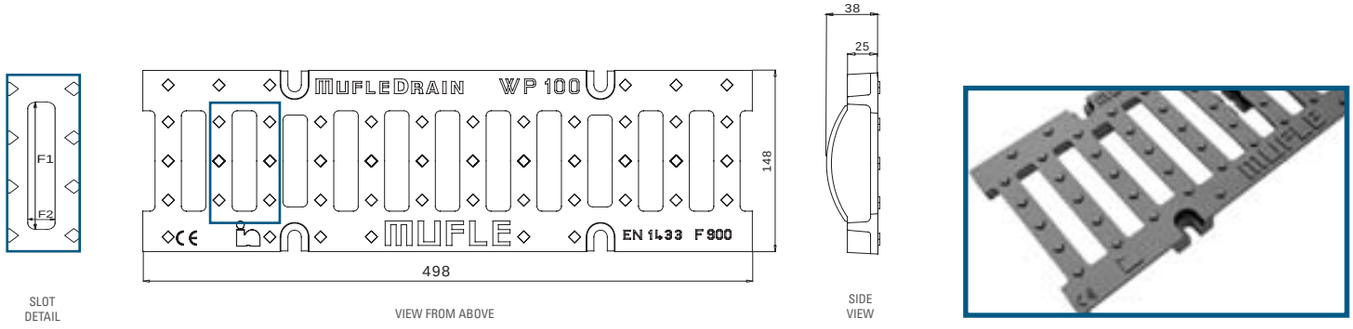


SOLID TOP COVER					38 mm
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	FIXING SYSTEM screw
503105		GJS 500/7* ductile iron water based paint coated	498 x 148 x 25	6,00	

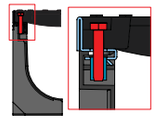
* Classification according to Standard EN 1563 (issued in March 2004).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF DUCTILE IRON

Port and airport areas



SLOT DETAIL — VIEW FROM ABOVE — SIDE VIEW

SLOTTED GRATING 20 mm							38 mm
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM screw
503173		GJS 500/7* ductile iron water based paint coated	498 x 148 x 25	6,30	1,94	82,0 x 20,0	

* Classification according to Standard EN 1563 (issued in March 2004).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

End-cap 100/55

Closed end-cap with drain 100/55

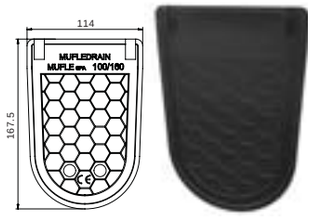
End-cap 100/80

Closed end-cap with drain 100/80

End-cap 100/100

Closed end-cap with drain 100/100

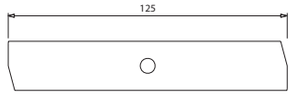
End-cap 100/160



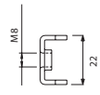
Closed end-cap with drain 100/160

END CAPS

CODE	PRICE	TYPE	MATERIAL	VALID FOR CHANNELS	PREINSTALLED DRAINS
	€				mm
700500		end-cap with drain	HD-PE	100/55	1 x Ø 40
700508		closed end-cap	HD-PE	100/55	-
700501		end-cap with drain	HD-PE	100/80	1 x Ø 63
700509		closed end-cap	HD-PE	100/80	-
700502		end-cap with drain	HD-PE	100/100	1 x Ø 63
700510		closed end-cap	HD-PE	100/100	-
700503		end-cap with drain	HD-PE	100/160	1 x Ø 63
700511		closed end-cap	HD-PE	100/160	-



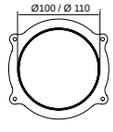
VIEW FROM ABOVE



SIDE VIEW

KIT TIE-ROD + SCREWS

CODE	PRICE	MATERIAL	VALID FOR GRATINGS	SCREW	KIT FOR 1 ml
	€				
500421		galvanised steel	PLUS galvanised steel	M8 x 55 TBL combi	2 tie-rods + 2 screws
500422		stainless steel	PLUS stainless steel	M8 x 55 TBL combi	2 tie-rods + 2 screws



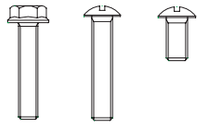
VIEW FROM ABOVE

SIDE VIEW

KIT OUTLET + SCREWS

CODE	PRICE	MATERIAL	VALID FOR CHANNELS	DIAMETER	KIT FOR 1 ml
	€			mm	
506114		HD-PE	100/55 - 100/80	Ø 100	1 outlet Ø 100 + 4 screws
506115		HD-PE	100/55 - 100/80	Ø 110	1 outlet Ø 110 + 4 screws

N.B. Sizes and weights are subject to usual manufacturing tolerance values.



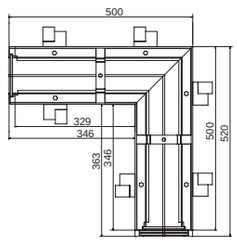
KIT SCREWS					
CODE	PRICE	MATERIAL	VALID FOR GRATINGS	SCREW	KIT FOR 1 ml
	€				
503312		black galvanised steel	PLUS ductile iron	M8 x 40 black with flanged hexagonal head	8
503313		galvanised steel	PLUS galvanised steel	M8 x 20 TBL combi	4
503314		stainless steel	PLUS stainless steel	M8 x 20 TBL combi	4
503315		galvanised steel	galvanised steel solid top cover PLUS	M8 x 40 TBL combi	4

N.B. Sizes and weights are subject to usual manufacturing tolerance values.

SPECIAL PIECES AND DRAIN BOX WITH SYPHON

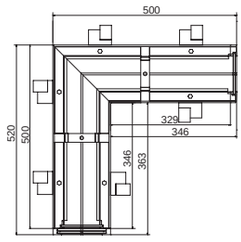
PLUS 100

LEFT CORNER



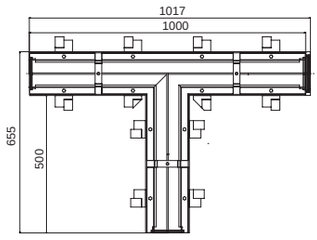
CODE	PRICE €	MODEL
704100		100/160
704101		100/100
704102		100/80
704103		100/55

RIGHT CORNER



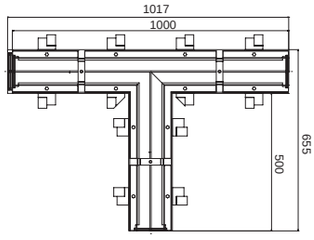
CODE	PRICE €	MODEL
704108		100/160
704109		100/100
704110		100/80
704111		100/55

LEFT TI



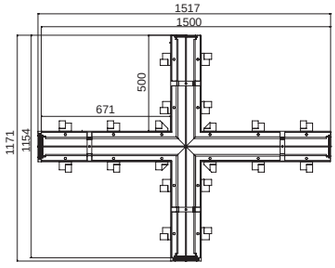
CODE	PRICE €	MODEL
704116		100/160
704117		100/100
704118		100/80
704119		100/55

RIGHT TI



CODE	PRICE €	MODEL
704124		100/160
704125		100/100
704126		100/80
704127		100/55

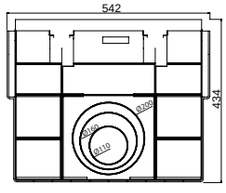
CROSS



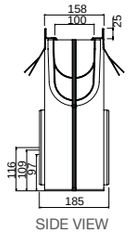
CODE	PRICE €	MODEL
704132		100/160
704133		100/100
704134		100/80
704135		100/55

Special pieces, corners, Ti, crosses in stainless steel are available upon request. For further information please contact our Technical Department.

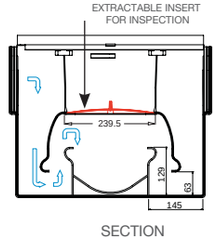
DRAIN BOX WITH SYPHON



FRONT VIEW



SIDE VIEW



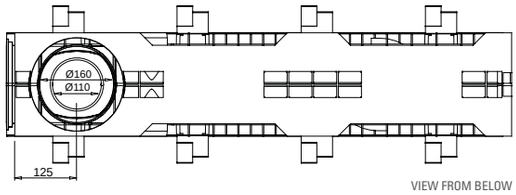
SECTION

PLUS 100

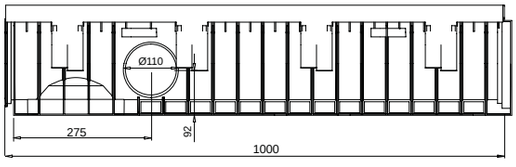
CODE	PRICE €	MATERIAL OF FRAME	MATERIAL OF OUTLET	EXTERNAL DIMENSIONS L x l x h mm	INTERNAL DIMENSIONS L x l x h mm	MAXIMUM LARGE mm	HEIGHT OF OUTLETS mm	WEIGHT kg	PREINSTALLED DRAIN OUTLETS mm
704016		galvanised steel DX51D**	HD-PE	542 x 158 x 434	500 x 100 x 400	185	116 - 109 - 97	4,34	2 x Ø 110; 2 x Ø 160; 2 x Ø 200
704019		stainless steel AISI 304*	HD-PE	542 x 158 x 434	500 x 100 x 400	185	116 - 109 - 97	4,34	2 x Ø 110; 2 x Ø 160; 2 x Ø 200

N.B. Sizes and weights are subject to usual manufacturing tolerance values.

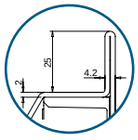
150



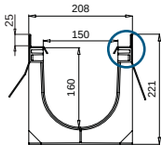
VIEW FROM BELOW



SIDE VIEW



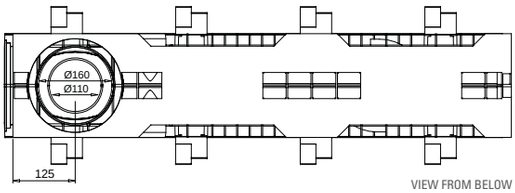
DETAIL SECTION



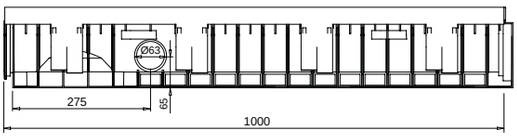
SECTION

PLUS 150/160

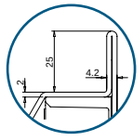
CODE	PRICE	MATERIAL OF FRAME	MATERIAL OF CHANNEL	EXTERNAL DIMENSIONS L x l x h	INTERNAL DIMENSIONS L x l x h	WEIGHT	DRAINAGE SECTION	CAPACITY	PREINSTALLED DRAIN OUTLET
	€			mm	mm	kg	cm^2	dm^3	mm
704004		galvanised steel DX51D**	HD-PE	1000 x 208 x 221	1000 x 150 x 160	6,89	213,04	21,40	side 2 x Ø 110 bottom 1 x Ø 110 ; 1 x Ø 160
704012		stainless steel AISI 304*							



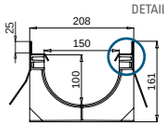
VIEW FROM BELOW



SIDE VIEW



DETAIL SECTION



SECTION

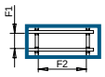
PLUS 150/100

CODE	PRICE	MATERIAL OF FRAME	MATERIAL OF CHANNEL	EXTERNAL DIMENSIONS L x l x h	INTERNAL DIMENSIONS L x l x h	WEIGHT	DRAINAGE SECTION	CAPACITY	PREINSTALLED DRAIN OUTLET
	€			mm	mm	kg	cm^2	dm^3	mm
704005		galvanised steel DX51D**	HD-PE	1000 x 208 x 161	1000 x 150 x 100	6,44	127,32	12,80	side 2 x Ø 63 bottom 1 x Ø 110 ; 1 x Ø 160
704013		stainless steel AISI 304*							

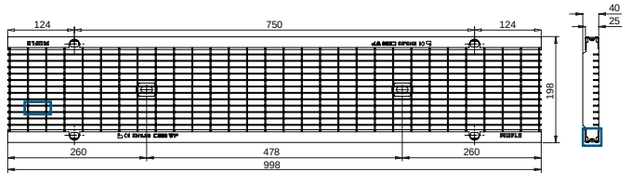
* Classification according to American Standard ASTM.
** Classification according to Standard EN 10142 (issued in July 2002) and symbolic designation according to EN 10027-1 (-2) (issued in September 1993).
§ Waterproofing: in order to ensure the channels are waterproof, a bituminous adhesive sealant should be used. Heat-sealing the channel joints makes sure there will be no leakages through said joints for a very long time. For further information please contact Mufle's Technical Department.
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF GALVANISED STEEL
Kerbs
Historical town centres (slow traffic)
Parking areas
Parking decks

APPLICATIONS OF STAINLESS STEEL
Kerbs
Historical town centres (slow traffic)
Parking areas
Parking decks
Areas with low-load transit in food factories
Areas with low-load transit in chemically aggressive environments



DETAIL OF HOOKING SYSTEM



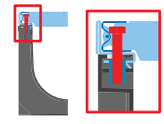
VIEW FROM ABOVE

SIDE VIEW

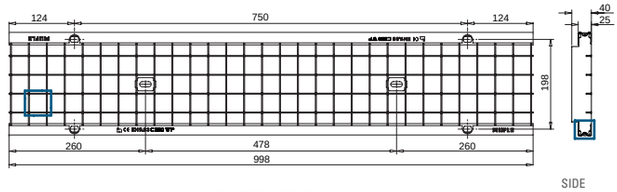

DETAIL OF UPRIGHT BEND

MESH GRATING (11 x 33)

40 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM screw
503125		hot dip galvanised steel DD11 (1.0332)**	998 x 198 x 25	8,40	11,64	10,2 x 31,2		
503126		pickled stainless steel AISI 304*						
503153		hot dip galvanised steel DD11 (1.0332)**	498 x 198 x 25	4,20	5,82			
503154		pickled stainless steel AISI 304*						

DETAIL OF SQUARE MESH



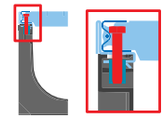
VIEW FROM ABOVE

SIDE VIEW


DETAIL OF UPRIGHT BEND

MESH GRATING (33 x 33)

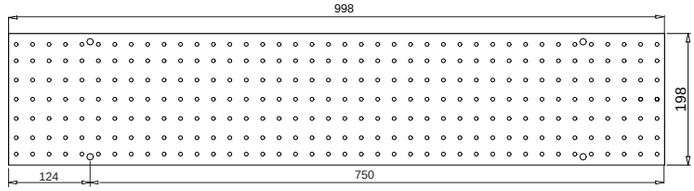
40 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM screw
503127		hot dip galvanised steel DD11 (1.0332)**	998 x 198 x 25	7,30	12,94	34,2 x 31,2		
503128		pickled stainless steel AISI 304*						
503155		hot dip galvanised steel DD11 (1.0332)**	498 x 198 x 25	3,65	6,47			
503156		pickled stainless steel AISI 304*						

* Classification according to American Standard ASTM.
** Classification according to Standard EN 10111 (issued in March 2000) and symbolic designation according to EN 10027-1 (-2) (issued in September 1993).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

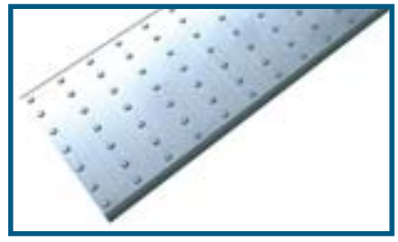
APPLICATIONS

Cable passageway
Passageway for water
and/or heat systems



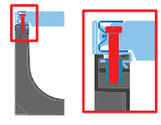
VIEW FROM ABOVE

SIDE VIEW



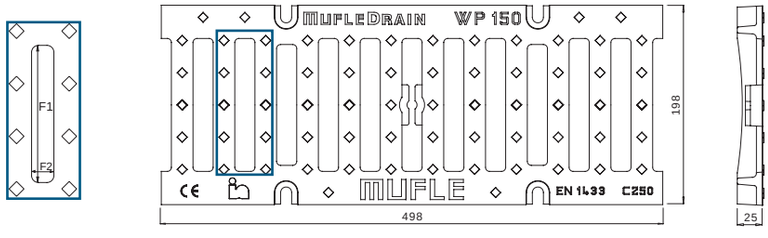
SOLID TOP COVER

25 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	FIXING SYSTEM screw
503102		hot dip galvanised steel DX51D**	998 x 198 x 25	4,20	

APPLICATIONS OF DUCTILE IRON

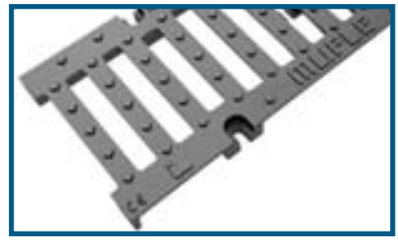
Kerbs
Historical town centres (slow traffic)
Parking areas
Parking decks



SLOT DETAIL

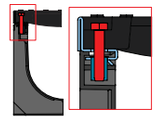
VIEW FROM ABOVE

SIDE VIEW



SLOTTED GRATING 20 mm

25 mm

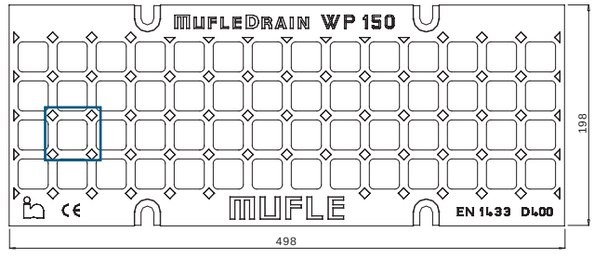
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM screw
503111		GJS 500/7* ductile iron water based paint coated	498 x 198 x 25	5,90	3,12	132,0 x 20,0		

* Classification according to Standard EN 1563 (issued in March 2004).
** Classification according to Standard EN 10142 (issued in July 2002) and symbolic designation according to EN 10027-1 (-2) (issued in September 1993).

APPLICATIONS OF DUCTILE IRON

Road carriageways (not transversal)
Hard shoulders
Lay-bys with thick and heavy-goods traffic
Petrol stations

SLOT DETAIL

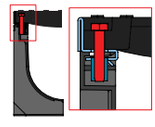


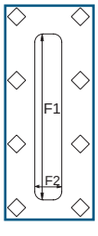
VIEW FROM ABOVE

SIDE VIEW

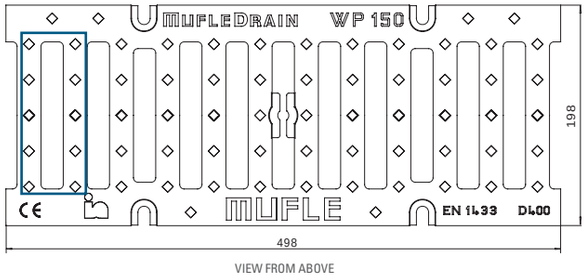
MESH GRATING

34 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM screw
503183		GJS 500/7* ductile iron water based paint coated	498 x 198 x 25	7,80	4,08	27,0 x 27,0	



SLOT DETAIL

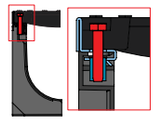


VIEW FROM ABOVE

SIDE VIEW

SLOTTED GRATING 20 mm

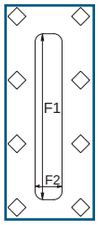
40 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM screw
503112		GJS 500/7* ductile iron water based paint coated	498 x 198 x 25	7,10	3,12	132,0 x 20,0	

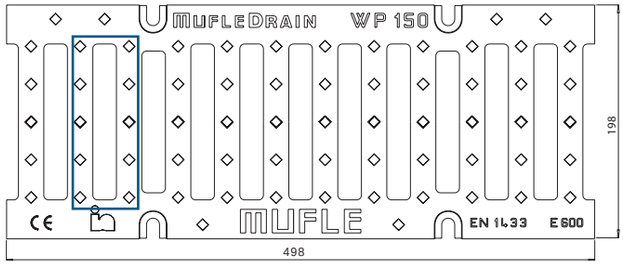
* Classification according to Standard EN 1563 (issued in March 2004).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF DUCTILE IRON

Transversal canalisation systems in carriageways of roads with thick and heavy-goods tı
Industrial areas with passage of forklift trucks (high axle loads)
Underpasses

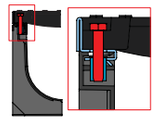


SLOT DETAIL



VIEW FROM ABOVE

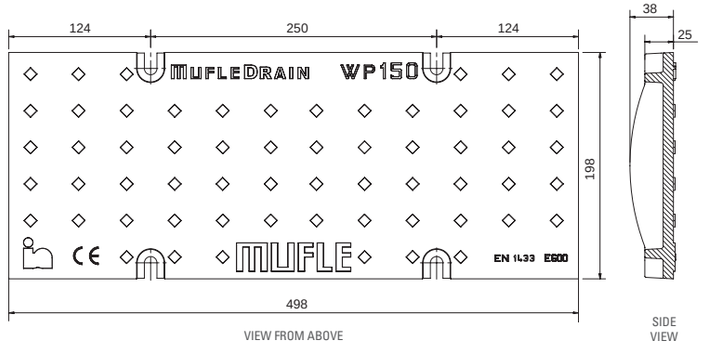
SIDE VIEW

SLOTTED GRATING 20 mm							40 mm
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM screw
503113		GJS 500/7* ductile iron water based paint coated	498 x 198 x 25	7,80	3,12	132,0 x 20,0	

* Classification according to Standard EN 1563 (issued in March 2004).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

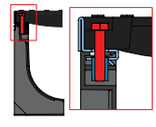
APPLICATIONS

Cable passageway
Passageway for water and/or heat systems



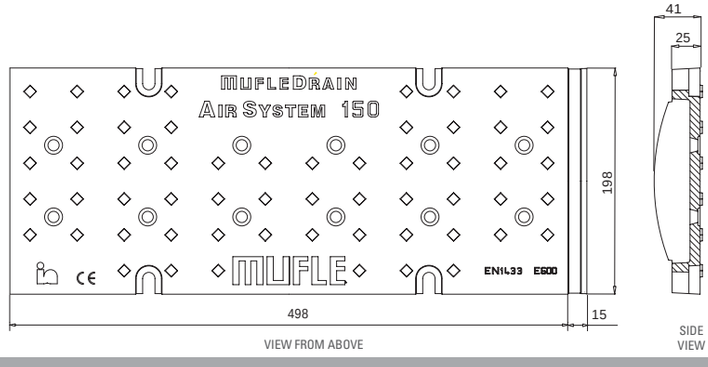
SOLID TOP COVER

38 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	FIXING SYSTEM screw
503106		GJS 500/7* ductile iron water based paint coated	498 x 198 x 25	10,60	

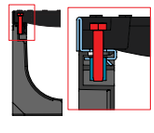
APPLICATIONS

Waste composting systems



SOLID TOP COVER AIR SYSTEM

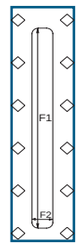
41 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	FIXING SYSTEM screw
503100		GJS 500/7* ductile iron water based paint coated	498 x 198 x 25	10,50	

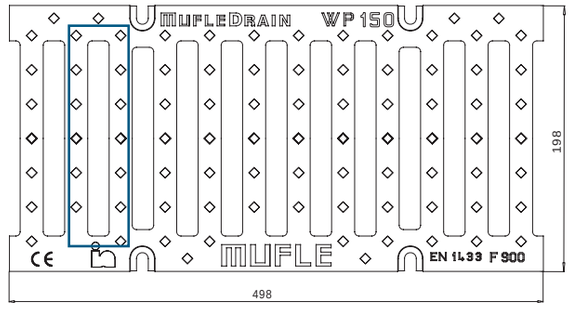
* Classification according to Standard EN 1563 (issued in March 2004).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF DUCTILE IRON

Port and airport areas

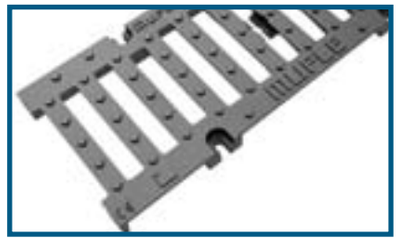


SLOT DETAIL



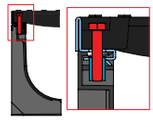
VIEW FROM ABOVE

SIDE VIEW

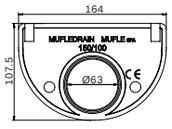


SLOTTED GRATING 20 mm

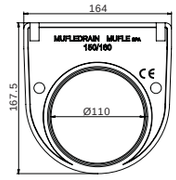
40 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM screw
503174		GJS 500/7* ductile iron water based paint coated	498 x 198 x 25	8,70	3,12	132,0 x 20,0	

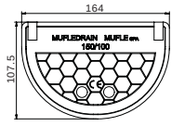
* Classification according to Standard EN 1563 (issued in March 2004).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



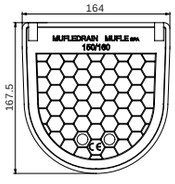
End-cap 150/100



End-cap 150/160



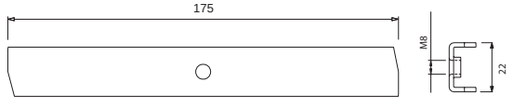
Closed end-cap with drain 150/100



Closed end-cap with drain 150/160

END CAPS

CODE	PRICE	TYPE	MATERIAL	VALID FOR CHANNELS	PREINSTALLED DRAINS
	€				mm
700504		end-cap with drain	HD-PE	150/100	1 x Ø 63
700512		closed end-cap	HD-PE	150/100	-
700505		end-cap with drain	HD-PE	150/160	1 x Ø 110
700513		closed end-cap	HD-PE	150/160	-

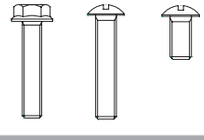


VIEW FROM ABOVE

SIDE VIEW

KIT TIE-ROD + SCREWS

CODE	PRICE	MATERIAL	VALID FOR GRATINGS	SCREW	KIT FOR 1 ml
	€				
500424		galvanised steel	PLUS galvanised steel	M8 x 55 TBL combi	2 tie-rods + 2 screws
500425		stainless steel	PLUS stainless steel	M8 x 55 TBL combi	2 tie-rods + 2 screws



KIT SCREWS

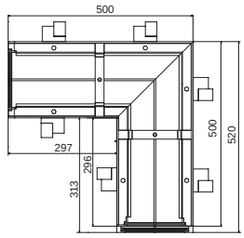
CODE	PRICE	MATERIAL	VALID FOR GRATINGS	SCREW	KIT FOR 1 ml
	€				
503312		black galvanised steel	PLUS ductile iron	M8 x 40 black with flanged hexagonal head	8
503313		galvanised steel	PLUS galvanised steel	M8 x 20 TBL combi	4
503314		stainless steel	PLUS stainless steel	M8 x 20 TBL combi	4
503315		galvanised steel	galvanised steel solid top cover PLUS	M8 x 40 TBL combi	4

N.B. Sizes and weights are subject to usual manufacturing tolerance values.

SPECIAL PIECES AND DRAIN BOX WITH SYPHON

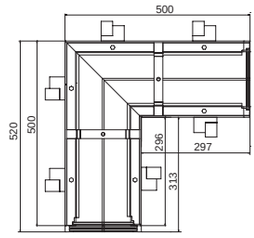
PLUS 150

LEFT CORNER



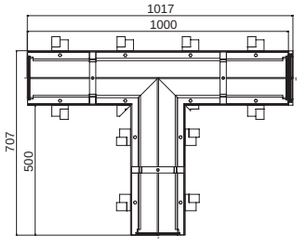
CODE	PRICE €	MODEL
704104		150/160
704105		150/100

RIGHT CORNER



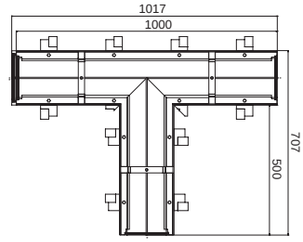
CODE	PRICE €	MODEL
704112		150/160
704113		150/100

LEFT TI



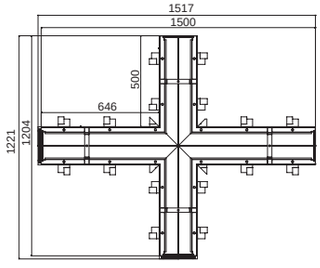
CODE	PRICE €	MODEL
704120		150/160
704121		150/100

RIGHT TI



CODE	PRICE €	MODEL
704128		150/160
704129		150/100

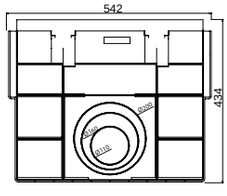
CROSS



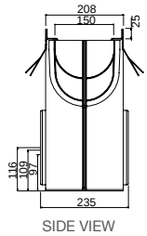
CODE	PRICE €	MODEL
704136		150/160
704137		150/100

Special pieces, corners, Ti, crosses in stainless steel are available upon request. For further information please contact our Technical Department.

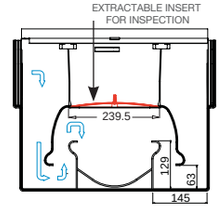
DRAIN BOX WITH SYPHON



FRONT VIEW



SIDE VIEW



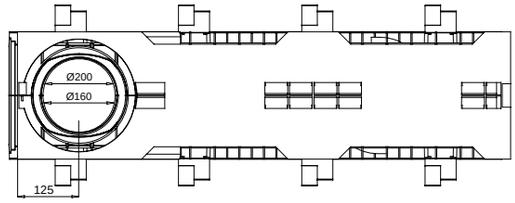
SECTION

PLUS 150

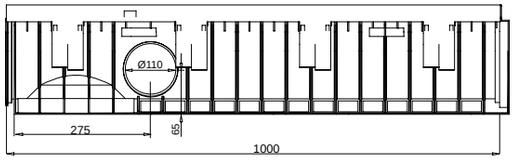
CODE	PRICE €	MATERIAL OF FRAME	MATERIAL OF OUTLET	EXTERNAL DIMENSIONS L x l x h mm	INTERNAL DIMENSIONS L x l x h mm	MAXIMUM LARGE mm	HEIGHT OF OUTLETS mm	WEIGHT kg	PREINSTALLED DRAIN OUTLETS mm
704017		galvanised steel DX51D**	HD-PE	542 x 208 x 434	500 x 150 x 400	235	116 - 109 - 97	4,62	2 x Ø 110; 2 x Ø 160; 2 x Ø 200
704020		stainless steel AISI 304*	HD-PE	542 x 208 x 434	500 x 150 x 400	235	116 - 109 - 97	4,62	2 x Ø 110; 2 x Ø 160; 2 x Ø 200

N.B. Sizes and weights are subject to usual manufacturing tolerance values.

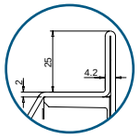
200



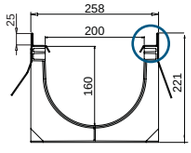
VIEW FROM BELOW



SIDE VIEW



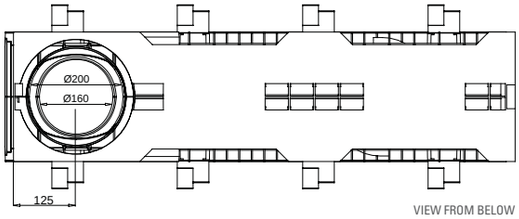
DETAIL SECTION



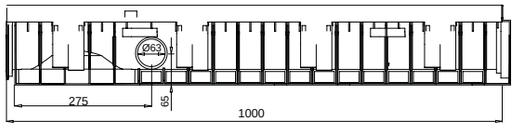
SECTION

PLUS 200/160

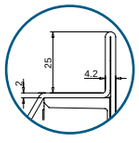
CODE	PRICE	MATERIAL OF FRAME	MATERIAL OF CHANNEL	EXTERNAL DIMENSIONS L x l x h	INTERNAL DIMENSIONS L x l x h	WEIGHT	DRAINAGE SECTION	CAPACITY	PREINSTALLED DRAIN OUTLET
	€			mm	mm	kg	cm^2	dm^3	mm
704006		galvanised steel DX51D**	HD-PE	1000 x 258 x 221	1000 x 200 x 160	7,33	275,87	27,90	side 2 x Ø 110 bottom 1 x Ø 160 ; 1 x Ø 200
704014		stainless steel AISI 304*							



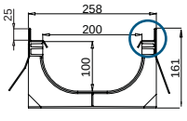
VIEW FROM BELOW



SIDE VIEW



DETAIL SECTION



SECTION

PLUS 200/100

CODE	PRICE	MATERIAL OF FRAME	MATERIAL OF CHANNEL	EXTERNAL DIMENSIONS L x l x h	INTERNAL DIMENSIONS L x l x h	WEIGHT	DRAINAGE SECTION	CAPACITY	PREINSTALLED DRAIN OUTLET
	€			mm	mm	kg	cm^2	dm^3	mm
704007		galvanised steel DX51D**	HD-PE	1000 x 258 x 161	1000 x 200 x 100	6,73	178,73	17,90	side 2 x Ø 63 bottom 1 x Ø 160 ; 1 x Ø 200
704015		stainless steel AISI 304*							

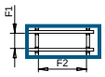
* Classification according to American Standard ASTM.
** Classification according to Standard EN 10142 (issued in July 2002) and symbolic designation according to EN 10027-1 (-2) (issued in September 1993).
§ Waterproofing: in order to ensure the channels are waterproof, a bituminous adhesive sealant should be used. Heat-sealing the channel joints makes sure there will be no leakages through said joints for a very long time. For further information please contact Mufle's Technical Department.
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF GALVANISED STEEL

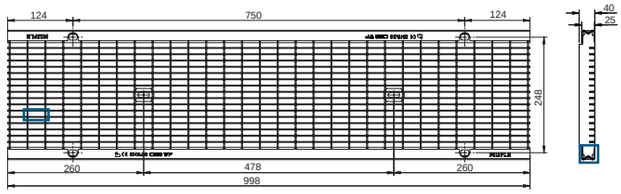
Kerbs
Historical town centres (slow traffic)
Parking areas
Parking decks

APPLICATIONS OF STAINLESS STEEL

Kerbs
Historical town centres (slow traffic)
Parking areas
Parking decks
Areas with low-load transit in food factories
Areas with low-load transit in chemically aggressive environments



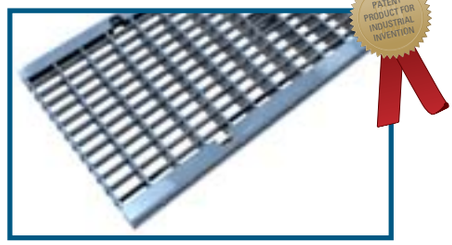
DETAIL OF HOOKING SYSTEM



VIEW FROM ABOVE

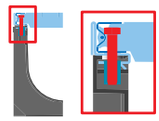
SIDE VIEW

DETAIL OF UPRIGHT BEND

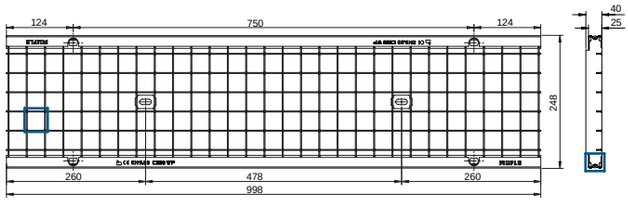


MESH GRATING (11 x 33)

40 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM screw
503129		hot dip galvanised steel DD11 (1.0332)**	998 x 248 x 25	10,30	15,50	10,2 x 31,2		
503130		pickled stainless steel AISI 304*						
503157		hot dip galvanised steel DD11 (1.0332)**	498 x 248 x 25	5,15	7,75			
503158		pickled stainless steel AISI 304*						

DETAIL OF SQUARE MESH



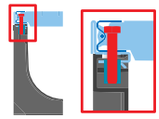
VIEW FROM ABOVE

SIDE VIEW

DETAIL OF UPRIGHT BEND

MESH GRATING (33 x 33)

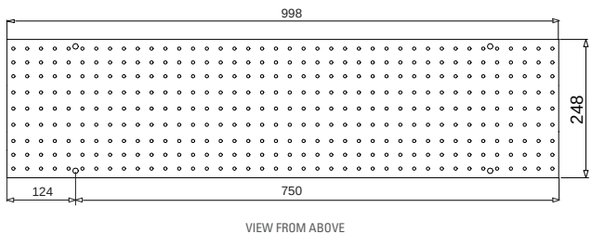
40 mm

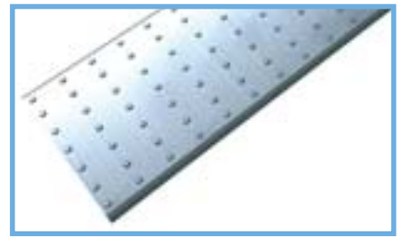
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM screw
503131		hot dip galvanised steel DD11 (1.0332)**	998 x 248 x 25	9,10	17,13	34,2 x 31,2		
503132		pickled stainless steel AISI 304*						
503159		hot dip galvanised steel DD11 (1.0332)**	498 x 248 x 25	4,55	8,57			
503160		pickled stainless steel AISI 304*						

* Classification according to American Standard ASTM.
** Classification according to Standard EN 10111 (issued in March 2000) and symbolic designation according to EN 10027-1 (-2) (issued in September 1993).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS

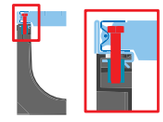
Cable passageway
Passageway for water
and/or heat systems





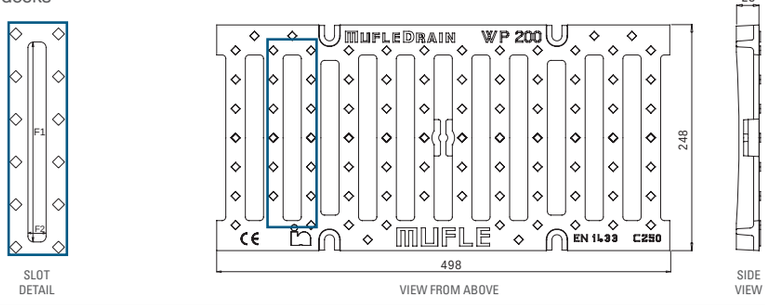
SOLID TOP COVER

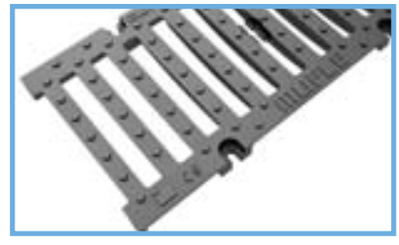
25 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	FIXING SYSTEM screw
503103		hot dip galvanised steel DX51D**	998 x 248 x 25	6,20	

APPLICATIONS OF DUCTILE IRON

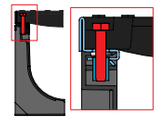
Kerbs
Historical town centres (slow traffic)
Parking areas
Parking decks





MESH GRATING (33 x 33)

25 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM screw
503114		GJS 500/7* ductile iron water based paint coated	498 x 248 x 25	7,00	4,32	182,0 x 20,0	

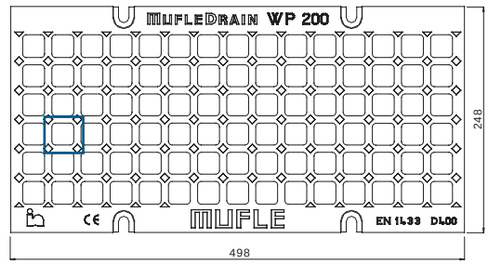
* Classification according to Standard EN 1563 (issued in March 2004).

** Classification according to Standard EN 10142 (issued in July 2002) and symbolic designation according to EN 10027-1 (-2) (issued in September 1993).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF DUCTILE IRON

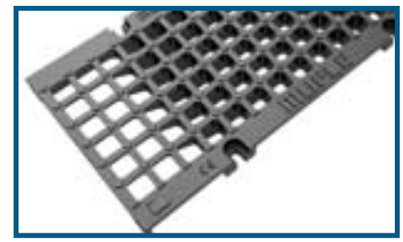
Road carriageways (not transversal)
Hard shoulders
Lay-bys with thick and heavy-goods traffic
Petrol stations

SLOT DETAIL



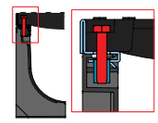
VIEW FROM ABOVE

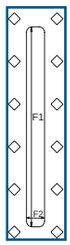
SIDE VIEW



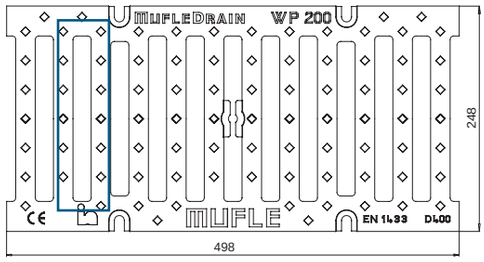
MESH GRATING

37 mm

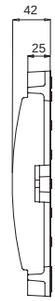
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM screw
503184		GJS 500/7* ductile iron water based paint coated	498 x 248 x 25	9,40	5,18	24,0 x 24,0	



SLOT DETAIL



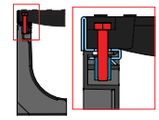
VIEW FROM ABOVE



SIDE VIEW

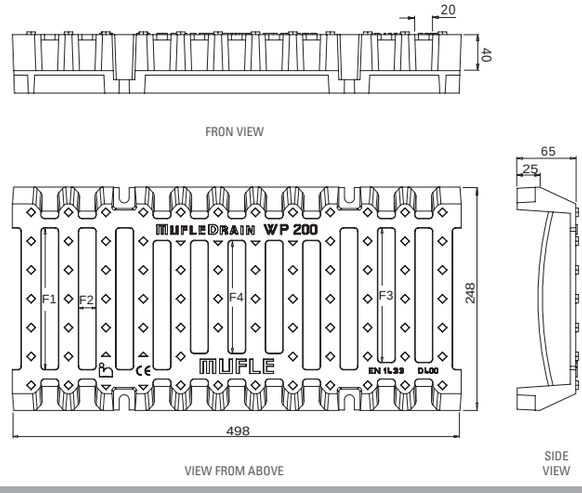
SLOTTED GRATING 20 mm

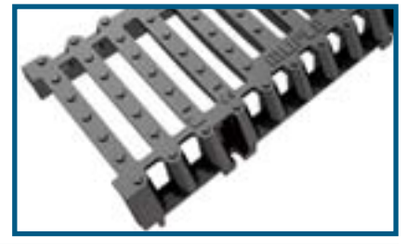
42 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM tie-rod	FIXING SYSTEM screw
503115		GJS 500/7* ductile iron water based paint coated	498 x 248 x 25	8,50	4,32	182,0 x 20,0		

* Classification according to Standard EN 1563 (issued in March 2004).

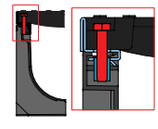
APPLICATIONS OF DUCTILE IRON
Road carriageways with draining asphalt





DRAINING ASPHALT GRATING

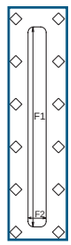
65 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS mm	FIXING SYSTEM screw
503181		GJS 500/7* ductile iron water based paint coated	498 X 248 x 25	11,50	superiore 4,08 laterale 1,44	F1 x F2 = 180,0 x 20,0 F3 x F2 = 150,0 x 20,0 F4 x F2 = 126,0 x 20,0 side 40,0 x 20,0 (18,9 x lato)	

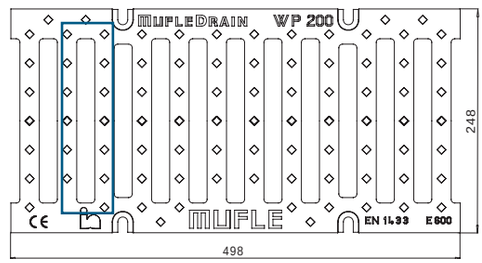
* Classification according to Standard EN 1563 (issued in March 2004).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

APPLICATIONS OF DUCTILE IRON

Transversal canalisation systems in carriageways of roads with thick and heavy-goo
Industrial areas with passage of forklift trucks (high axle loads)
Underpasses



SLOT
DETAIL

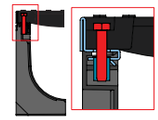


VIEW FROM ABOVE

SIDE
VIEW

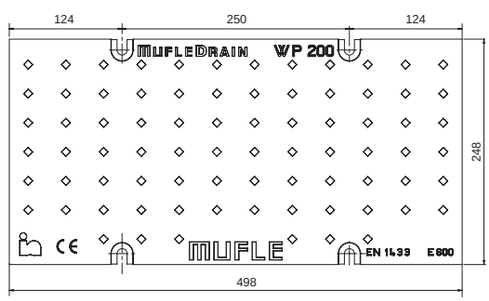
SLOTTED GRATING 20 mm

45 mm

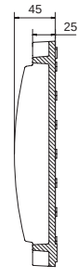
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM screw
503116		GJS 500/7* ductile iron water based paint coated	498 x 248 x 25	9,70	4,32	180,0 x 20,0	

APPLICATIONS

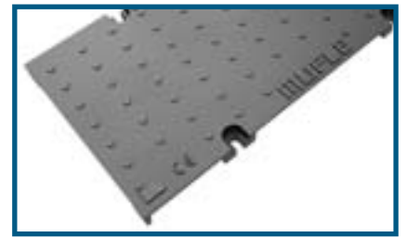
Cable passageway
Passageway for water
and/or heat systems



VIEW FROM ABOVE

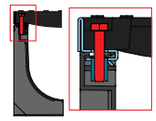


SIDE
VIEW



SOLID TOP COVER

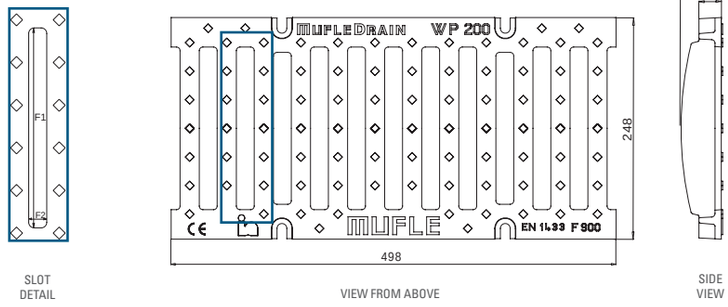
45 mm

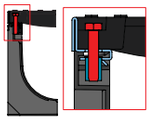
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	FIXING SYSTEM screw
503107		GJS 500/7* ductile iron water based paint coated	498 x 248 x 25	12,00	

* Classification according to Standard EN 1563 (issued in March 2004).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

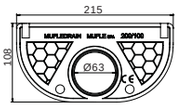
APPLICATIONS OF DUCTILE IRON

Port and airport areas

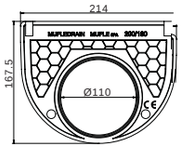


SLOTTED GRATING							45 mm
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm^2	OPENINGS F1 x F2 mm	FIXING SYSTEM screw
503175		GJS 500/7* ductile iron water based paint coated	498 x 248 x 25	10,50	4,32	182,0 x 20,0	

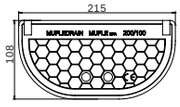
* Classification according to Standard EN 1563 (issued in March 2004).
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



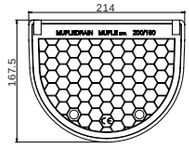
End-cap 200/100



End-cap 200/160



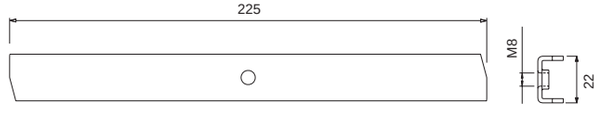
Closed end-cap with drain 200/100



Closed end-cap with drain 200/160

END CAPS

CODE	PRICE	TYPE	MATERIAL	VALID FOR CHANNELS	PREINSTALLED DRAINS
	€				mm
700506		end-cap with drain	HD-PE	200/100	1 x Ø 63
700514		closed end-cap	HD-PE	200/100	-
700507		end-cap with drain	HD-PE	200/160	1 x Ø 110
700515		closed end-cap	HD-PE	200/160	-

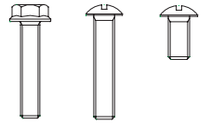


VIEW FROM ABOVE

SIDE VIEW

KIT TIE-ROD + SCREWS

CODE	PRICE	MATERIAL	VALID FOR GRATINGS	SCREW	KIT FOR 1 ml
	€				
500427		galvanised steel	PLUS galvanised steel	M8 x 55 TBL combi	2 tie-rods + 2 screws
500428		stainless steel	PLUS stainless steel	M8 x 55 TBL combi	2 tie-rods + 2 screws



KIT SCREWS

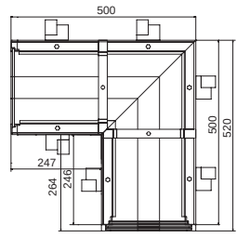
CODE	PRICE	MATERIAL	VALID FOR GRATINGS	SCREW	KIT FOR 1 ml
	€				
503312		black galvanised steel	PLUS ductile iron	M8 x 40 black with flanged hexagonal head	8
503313		galvanised steel	PLUS galvanised steel	M8 x 20 TBL combi	4
503314		stainless steel	PLUS stainless steel	M8 x 20 TBL combi	4
503315		galvanised steel	galvanised steel solid top cover PLUS	M8 x 40 TBL combi	4

N.B. Sizes and weights are subject to usual manufacturing tolerance values.

SPECIAL PIECES AND DRAIN BOX WITH SYPHON

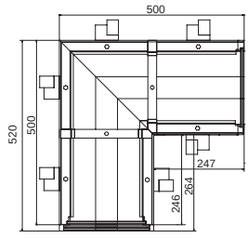
PLUS 200

LEFT CORNER



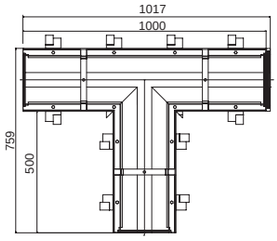
PLUS 200		
CODE	PRICE €	MODEL
704106		200/160
704107		200/100

RIGHT CORNER



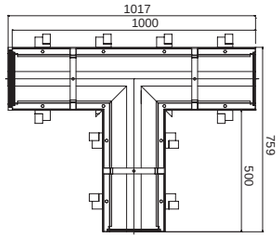
PLUS 200		
CODE	PRICE €	MODEL
704114		200/160
704115		200/100

LEFT TI



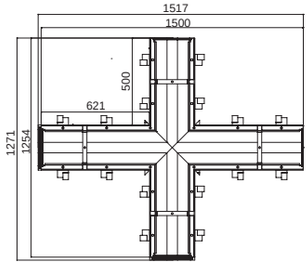
PLUS 200		
CODE	PRICE €	MODEL
704122		200/160
704123		200/100

RIGHT TI



PLUS 200		
CODE	PRICE €	MODEL
704130		200/160
704131		200/100

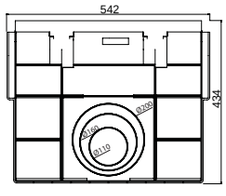
CROSS



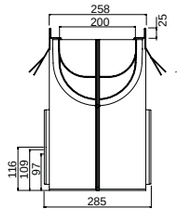
PLUS 200		
CODE	PRICE €	MODEL
704138		200/160
704139		200/100

Special pieces, corners, Ti, crosses in stainless steel are available upon request. For further information please contact our Technical Department.

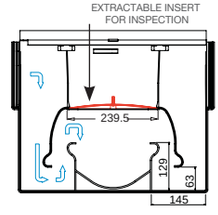
DRAIN BOX WITH SYPHON



FRONT VIEW



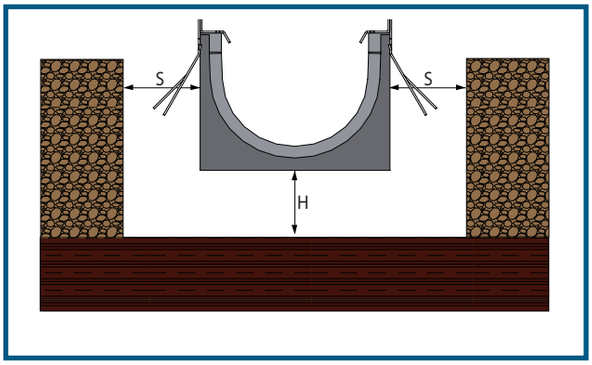
SIDE VIEW



SECTION

PLUS 200									
CODE	PRICE €	MATERIAL OF FRAME	MATERIAL OF OUTLET	EXTERNAL DIMENSIONS L x l x h mm	INTERNAL DIMENSIONS L x l x h mm	MAXIMUM LARGE mm	HEIGHT OF OUTLETS mm	WEIGHT kg	PREINSTALLED DRAIN OUTLETS mm
704018		galvanised steel DX51D**	HD-PE	542 x 258 x 434	500 x 200 x 400	285	116 - 109 - 97	4,84	2 x Ø 110; 2 x Ø 160; 2 x Ø 200
704021		stainless steel AISI 304*	HD-PE	542 x 258 x 434	500 x 200 x 400	285	116 - 109 - 97	4,84	2 x Ø 110; 2 x Ø 160; 2 x Ø 200

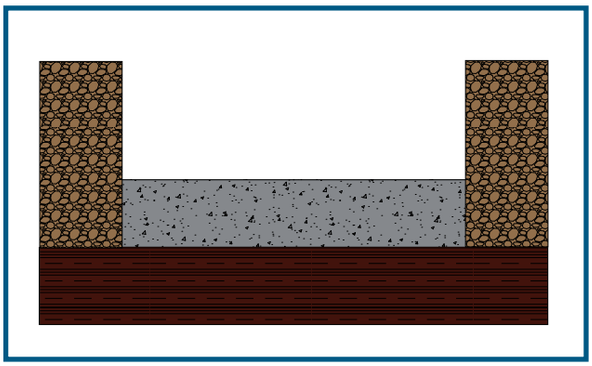
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



Step 1

HOLE SIZE

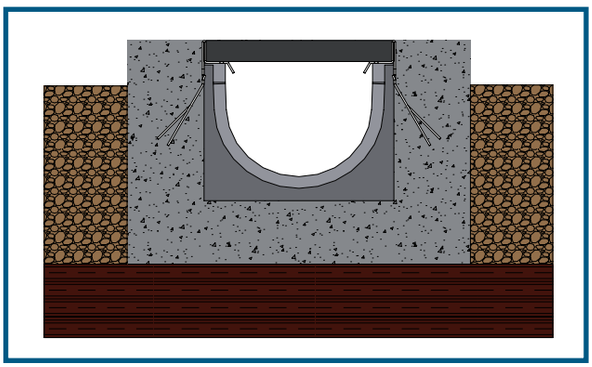
The hole needed to lay the MufleDrain channel must allow not only for the size of the channel and the drain piping but also for adequate space for the base H and the side concrete props S. The dimensions to be followed are shown in the summary table. In this step make sure the underlying layer is suitable to the load it is expected to support.



Step 2

CONCRETE BASE

Cast the concrete base H up to the height specified, allowing for any inclination in the drainage line. If needed, equip the base with stretches of electrowelded mesh or steel rods.

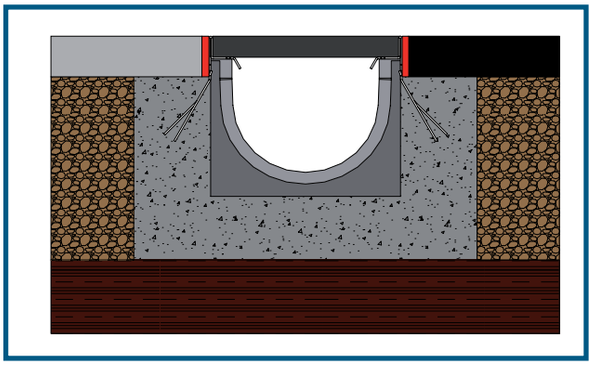


Step 3

CHANNEL ARRANGEMENT

Lay the channels starting from the flow outlet. Allow for the drains required and build the side prop S up to the maximum height allowed by the final coating. Shape it according to the needs based on the drawing. Introduce and fix the grating required beforehand in order to prevent any deformation of the channel due to the thrust of concrete and to speed up installation. Protect the gratings with a PVC film so that no final cleaning must be carried out to remove any concrete residues.

NEW FEATURE:
The channels can be installed with preassembled gratings.

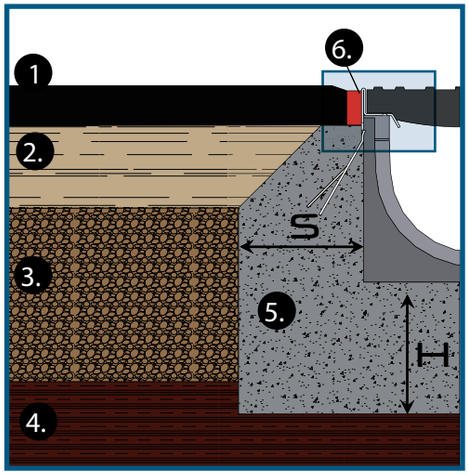


Step 4

FINAL COATING

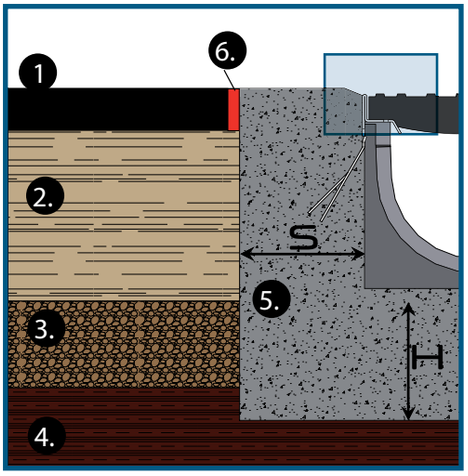
When applying the final coating, make sure its upper profile reaches up to minimum 3/5 mm above the grating's flow plane (see details on the following page). Remove the protection film.

Case 1
Asphalt
(B125-C250)



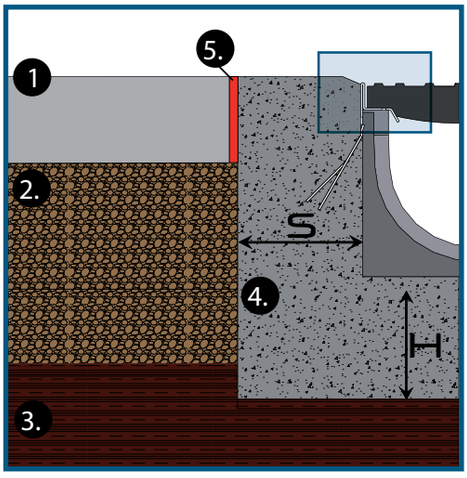
1. Sheet asphalt
2. Lower layer (binder)
3. Bearing layer
4. Subfloor
5. Concrete reinforcement layer
6. Bitumen joint

Case 2
Asphalt
(D400-E600-F900)

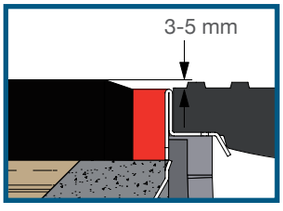


1. Sheet asphalt
2. Lower layer (binder)
3. Bearing layer
4. Subfloor
5. Concrete reinforcement layer
6. Bitumen joint

Case 3
Concrete flooring
(from B125 to F900)



1. Concrete flooring
2. Bearing layer
3. Subfloor
4. Concrete reinforcement layer
5. Bitumen joint



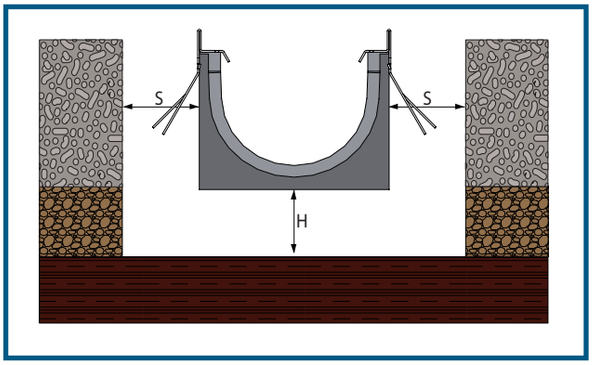
This Sheet is only aimed to give advice on the installation of channels mod. MufleDrain. In any case, always:
- check the carrying capacity characteristics of the underlying layer
- use concrete and stone aggregate having the characteristics recommended
- comply with the height of the installation surface and the thickness of the prop as specified according to the load classes.

SUMMARY TABLE						
Load class (EN 1433)		B 125	C 250	D 400	E 600	F 900
Applicable load (EN 1433)	kN	125	250	400	600	900
Minimum height H of concrete laying bed	mm	100	150	200	200	250
Minimum thickness S of the concrete flanking	mm	100	150	200	200	250
Concrete compression strength class (EN 206-1)		C 25/30	C 25/30	C 25/30**	C 30/37	C 35/45
Concrete compression strength class* (EN 206-1)		C 30/37 XF4	C 30/37 XF4	C 30/37 XF4	C 35/45 XF4	C 40/50 XF4

* If concrete can be affected by frost and thaw cycles.
If installation is in road crossings subject to heavy traffic (especially trucks), Class C30/37 concrete should be used.
N.B. We recommend using Class S4 concrete (EN 206-1) and stone aggregate with maximum diameter 8 mm.

INSTALLATION OF DRAINING ASPHALT GRATING PLUS 200

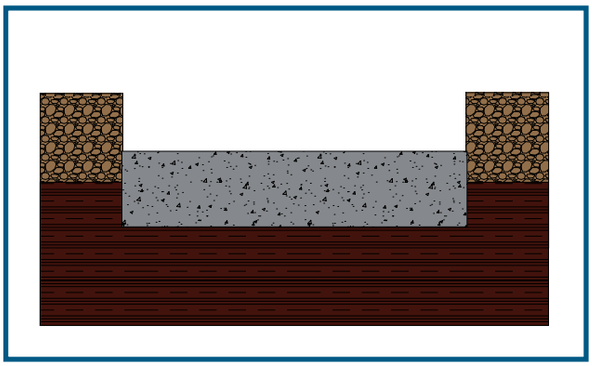
PLUS



Step 1

HOLE SIZE

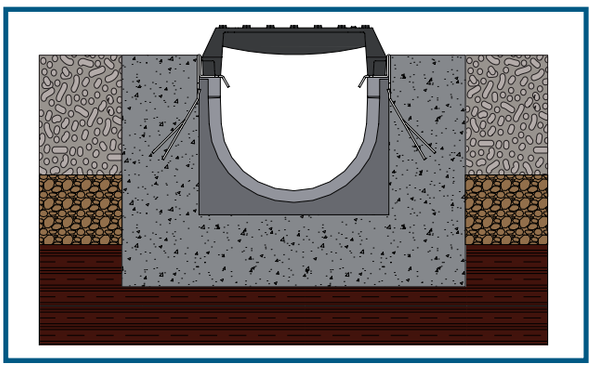
The hole needed to lay the MufleDrain channel must allow not only for the size of the channel and the drain piping but also for adequate space for the base H and the side concrete props S. The dimensions to be followed are shown in the summary table. In this step make sure the underlying layer is suitable to the load it is expected to support.



Step 2

CONCRETE BASE

Cast the concrete base H up to the height specified, allowing for any inclination in the drainage line. If needed, equip the base with stretches of electrowelded mesh or steel rods.

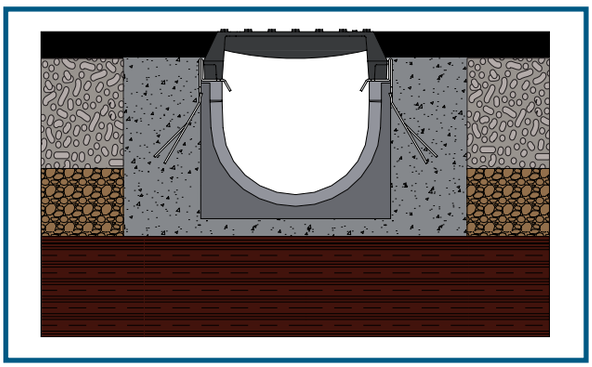


Step 3

CHANNEL ARRANGEMENT

Lay the channels starting from the flow outlet. Allow for the drains required and build the side prop S up to the maximum height allowed by the final coating. Shape it according to the needs based on the drawing. Introduce and fix the grating required beforehand in order to prevent any deformation of the channel due to the thrust of concrete and to speed up installation. Protect the gratings with a PVC film so that no final cleaning must be carried out to remove any concrete residues.

NEW FEATURE:
The channels can be installed with preassembled gratings.



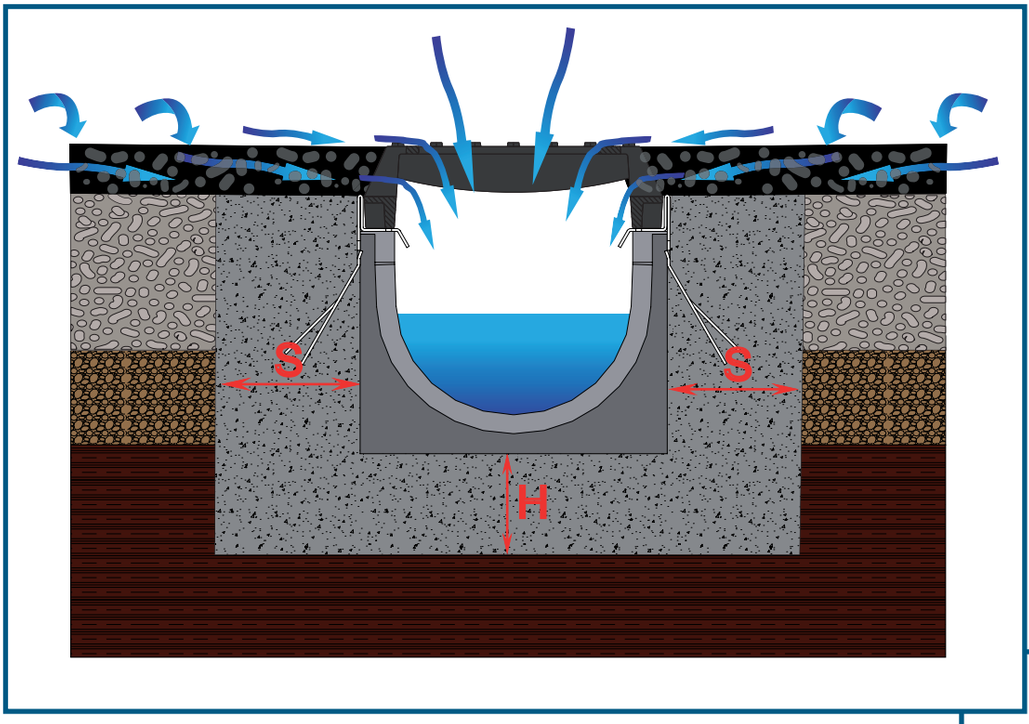
Step 4

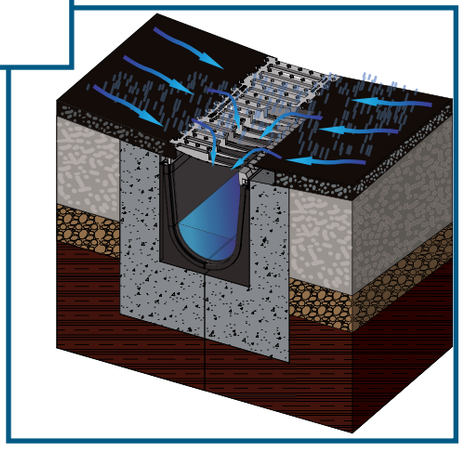
FINAL COATING

When applying the final coating, make sure its upper profile reaches up to minimum 3/5 mm above the grating's flow plane (see details on the following page). Remove the protection film.

INSTALLATION OF DRAINING ASPHALT GRATING PLUS 200

PLUS





This Sheet is only aimed to give advice on the installation of channels mod. MufleDrain. In any case, always:
- check the carrying capacity characteristics of the underlying layer
- use concrete and stone aggregate having the characteristics recommended
- comply with the height of the installation surface and the thickness of the prop as specified according to the load classes.

SUMMARY TABLE		
Load class (EN 1433)		D 400
Applicable load (EN 1433)	kN	400
Minimum height H of concrete laying bed	mm	200
Minimum thickness S of the concrete flanking	mm	200
Concrete compression strength class (EN 206-1)		C 25/30**
Concrete compression strength class* (EN 206-1)		C 30/37 XF4

* If concrete can be affected by frost and thaw cycles.
** If installation is in road crossings subject to heavy traffic (especially trucks), Class C30/37 concrete should be used.
N.B. We recommend using Class S4 concrete (EN 206-1) and stone aggregate with maximum diameter 8 mm.

1. Supply and installation of MufleDrain PLUS type HD-PE drainage channel with external stiffening ribs and male-female coupling system allowing the assembly between one channel and the next with the relevant pre-assembled gratings. The channel will have 3/4 drainage diaphragms at pre-determined points. Galvanised (stainless) steel upper profile equipped with M8 threaded insert to which a screw can be secured to fix the gratings, 4 mm-thick drive-over edge, 2 mm-thick contact surface with height not smaller than 25 mm, connection through prearranged coupling to the channel structure. Four clamps on each side are anchored to the profile - to be buried in the propping concrete. The channel surface will be perfectly smooth and have a low roughness coefficient to allow the best water flow. Il will also be perfectly water-tight and devoid of any connection points with the outside. The channel will have the following dimensions: length 1,000 mm, internal net gap ___mm, internal height ___ mm.

2. Supply and installation of MufleDrain PLUS type HD-PE drainage channel with external stiffening ribs and male-female coupling system allowing the assembly between one channel and the next with the relevant pre-assembled gratings. The channel will have 2 side drain diaphragms at pre-determined points and it will be designed to house a HD-PE drain gate (diameter 100 mm - 110 mm) on the bottom through 4 screws. Galvanised (stainless) steel upper profile equipped with M8 threaded insert to which a screw can be secured to fix the gratings, 4 mm-thick drive-over edge, 2 mm-thick contact surface with height not smaller than 25 mm, connection through prearranged coupling to the channel structure. Four clamps on each side are anchored to the profile - to be buried in the propping concrete. The channel surface will be perfectly smooth and have a low roughness coefficient to allow the best water flow. Il will also be perfectly water-tight and devoid of any connection points with the outside. The channel will have the following dimensions: length 1,000 mm, internal net gap ___mm, internal height ___ mm.

3. Supply and installation of ductile cast-iron GJS 500/7 covering gratings according to EN 1563-2004 for MufleDrain PLUS drainage channels with screw fixing system, load class C250 (D400, E600, F900) according to EN 1433-2004, slot width 20 mm, length 498 mm, width ___mm.

4. Supply and installation of ductile cast-iron GJS 500/7 covering gratings according to EN 1563-2004 for MufleDrain PLUS drainage channels with screw fixing system, load class E600 according to EN 1433-2004, slot inclined 30° to the longitudinal axis, width 6 mm, length 498 mm, width 148 mm.

5. Supply and installation of ductile cast-iron GJS 500/7 mesh covering gratings according to EN 1563-2004 with mesh for MufleDrain PLUS drainage channels with screw fixing system, load class D400 according to EN 1433-2004, length 498 mm, width ___mm.

6. Supply and installation of ductile cast-iron covering gratings for MufleDrain PLUS drainage channels with screw fixing system, class load D400 according to EN 1433-2004. The gratings will have top slots as well as side grooves as a continuation of the main slots in order to let the water collected by draining asphalt flow into the channel below. At the end of the installation the side grooves will be thoroughly filled with asphalt so that an observer will not be able to see them. The dimensions of the gratings will not be smaller than: length 498 mm, width 248 mm, overall height 65mm (of which 25mm recessed into the steel frame of the channel and 40 mm available to spread the draining asphalt), width of top slots 20 mm, dimensions of side slots 20 x h40 mm.

7. Supply and installation of ductile cast-iron GJS 500/7 blind covers according to EN 1563-2004 with mesh for MufleDrain PLUS drainage channels with screw fixing system, load class E600 according to EN 1433-2004, length 498 mm, width ___mm.

8. Supply and installation of ductile cast-iron GJS 500/7 perforated cover Air System according to EN 1563-2004 for composting systems with slots for screw fixing. The cover will have 12 holes (Ø 10) to allow the passage of the air needed for composting. The holes will have a truncated-cone section with the smaller base upwards in order to prevent any clogging due to residues. The load class of the cover will be E600 according to EN 1433-2004, usable length 500 mm, width 198 mm.

9. Supply and installation of galvanised (stainless) steel square-mesh or anti-heel covering gratings for MufleDrain PLUS drainage channels equipped with slots for screw fixing, load class C250 according to EN 1433-2004, length 998 mm, width ___mm. A similar grating will be available upon request with length 498mm. The dimensions will be 30 x 30 mm in the square mesh and 30 x 10 mm in the anti-heel mesh.

10. Supply and installation of galvanised steel blind cover for MufleDrain PLUS drainage channels with screw fixing system, load class C250 according to EN 1433-2004, length 998 mm, width ___mm. A similar cover will be available upon request with length 498mm.

11. Supply and installation of HD-PE end caps for MufleDrain drainage channel with coupling system into the special channel housing.

12. Supply and installation of HD-PE open cap with drainage hole diameter ___mm for MufleDrain drainage channel with coupling system into the special channel housing.

13. Supply and installation of HD-PE gullies with siphon for MufleDrain PLUS drainage channels with external stiffening ribs and coupling system. Galvanised (stainless) steel upper profile with height not smaller than 25 mm, connection through prearranged coupling to the gully structure. Two clamps on each side are connected to the profile - to be buried in the propping concrete. The upper section of the siphon built in the gully may be removed in order to allow inspection and cleaning work. The gully will have preformed drains on both sides with diameter up to 200 mm. The gully dimensions will be as follows: length 542 mm, net gap ___ mm, height 400 mm.

TECHNIK

MUFLEDRAIN TECHNICAL MANUAL

CONTENTS

TECHNIK

The collection and disposal of surface water from either meteoric precipitation or agricultural and industrial processes have always played a major role in man's activities.This need has been increasing considerably over the last few years because of climatic changes and morphological changes in the territory.

The MufleDrain drainage system is an ideal solution in that it combines the technical features required by designers and the practical and cheap installation required by installers.

This Technical Manual is intended to help the designer make up a versatile and efficient drainage system.

For this purpose general designing criteria concerning the calculation of water flow capacity and the construction of concrete supports needed to install drainage channels are described.

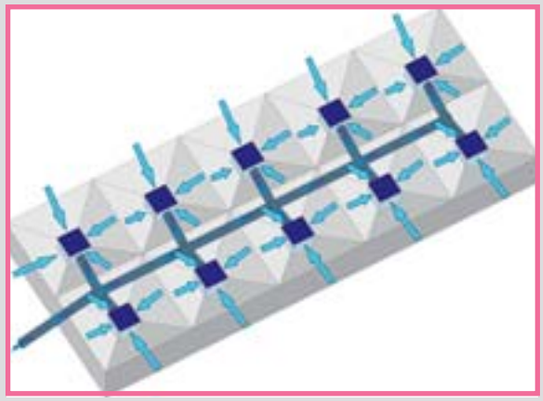
Punctual and linear drainage systems

In order to dispose of surface water (either from meteoric events or urban/industrial waste) on a waterproof surface or a soil with poor drainage, you need to design and construct a suitable collection and disposal system that makes it possible to channel liquids into a final receptacle.
Current solutions are of two different kinds:

1. Punctual drainage;

2. Linear drainage.

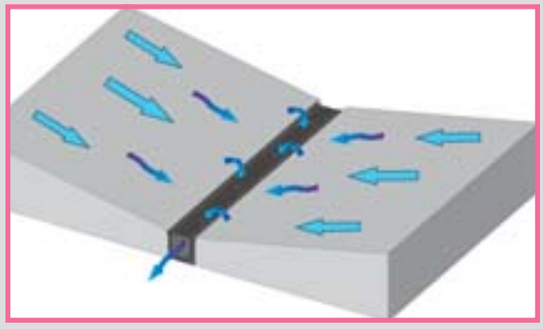
PUNCTUAL DRAINAGE



At predetermined points in the area concerned buried gullies are installed on which a collection grating equipped with a suitable containment frame (cover) will be placed. In this way the drainage area is divided into different subareas, each having the relevant containment frame as its disposal point. All the subareas shall have 4 inclinations in order to convey the liquids into the collection point. All the gullies shall be connected to each other through a thick network of buried pipes leading into the final receptacle.
This type of drainage has disadvantages from the technical and construction points of view as well as from the economic point of view:

- difficult designing due to the complex subdivision of the area into subareas and difficult assignment of different inclinations to each of them;
- difficult designing of correct inclinations;
- difficult construction of the buried piping network and consequently expensive work;
- considerable depth at which the gullies are to be laid;
- difficult and expensive maintenance due to the inaccessibility of the drain pipes, which make the whole system useless if they get clogged with solid material;
- uncomfortable road conditions because the area is characterised by rises once the work has been completed;
- large presence of gullies and gratings in valuable architectural areas which may not look very nice.

LINEAR DRAINAGE



Prefabricated drainage channels to be buried are used. Continuous stretches as long as a few hundred metres can be made up with them. The system is equipped with a proper covering system by means of gratings.
Rainwater is made to flow into the channels, which will collect it with the gratings and convey it to the final receptacle simply by connecting the drain points in the channels to a single properly-sized pipe. So there is no need for a thick network of buried pipes to convey the water.
The system can be positioned according to the natural inclination of the ground. If there is no such inclination, the drainage area can be given a single inclination.
A number of benefits are available with this system:

- easy designing;
- easy construction;
- cheaper product;
- higher operating reliability thanks to the reduced presence of buried pipes (smaller clogging risk);
- very easy maintenance and cleaning work;
- aesthetical compatibility with any application environment.

RESISTANCE OF HD-PE TO CHEMICAL

RESISTANCE OF HD-PE TO CHEMICAL SUBSTANCES

DESCRIPTION	%	DESCRIPTION	%	DESCRIPTION	%
Amyl acetate		Picric acid	1% acqueous	Beer	
Ammonium acetate		Propionic acid		Sodium disulphate	
Butyl acetate	pure	Prussic acid	50%	Sodium disulphite	10%
Methyl acetate	pure	Hydrosulphuric acid		Borax	
Lead acetate		Sulphuric acid		Potassium borate	
Sodium acetate		Sulphuric acid, aqueous		Potassium bromate	10% acqueous
Wine vinegar		Sulphuric acid, aqueous	80% acqueous	Sodium bromate	saturated, cold
Acetone		Sulphurous acid	40%	Potassium bromide	acqueous
Fatty acids	pure	Stearic acid		Sodium bromide	
Bath acids	700 mg.	Succinic acid	pure	Butadiene	pure
Acetic acid	50%	Tannic acid		Butandiol	10%
Dichloroacetic acid	50%	Tartaric acid, aqueous		Butanol - aqueous	
Trichloroacetic acid	50%	Trichloroacetic acid		Ammonium carbonate	50%
Adipic acid		Mineral water		Sodium carbonate	
Arsenic acid	80%	Hydrogen peroxide		Cyanide	
Benzoic acid		Drinking water, chlorinated	10%	Potassium cyanide	
Watery boric acid		Acrylonitrile		Cyclohexane	
Hydrobromic acid	50%	Allyl alcohol		Cyclohexanol	
Butyric acid	pure	Amyl alcohol	96%	Cyclohexanone	pure
Hydrocyanic acid		Benzyl alcohol		Potassium chlorate	
Citric acid	10%	Ethyl alcohol	pure	Sodium chlorate	
Hydrochloric acid	10% acqueous	Ethyl alcohol+Acetic acid	96%	Sodium chlorite	diluted, acqueous
Cloroacetic acid (mono)	50%	Furfuryl alcohol		Chlorine-Ethanol	
Chromic acid	50% acqueous	Fat alcohol, Coconut oil		Aniline chlorydrate	saturated, acqueous
Dichloroacetic acid	50%	Methyl-alcohol	pure	Aluminium chloride	10%
Trichloroacetic acid	pure	Propargyl alcohol		Ammonium chloride	10%
Diglycolic acid	30%	Acetic aldehyde	7%	Antimony chloride	90%
Hydrofluoric acid	40% acqueous	Crotonic aldehyde	pure	Lime chloride	
Siliconfluoric acid	32%	Chromic alum	pure	Calcium chloride	
Formic acid		Starch, aqueous		Magnesium chloride	
Phosphoric acid, aqueous	85%	Ammonia		Potassium chloride	
Phosphoric acid, aqueous	30%	Acetic anhydride		Copper chloride	
Phthalic acid		Carbon dioxide	pure	Sodium chloride	
Glycolic acid	37%	Sulphyric anhydride		Tin chloride	
Lactic acid	10%	Auto Anti-freeze liquid		Zinc chloride	
Maleic acid		Photographic fixers		Ferric chloride	
Malic acid	1%	Benzaldehyde	normal	Cresol - aqueous	90% acqueous
Nitric acid	6.3%	Petrol (Gasoline)		Potassium chromate	acqueous, saturated,
Oleic acid	pure	Sodiumbenzoate		Sodium chromate	cold
Oleic acid		Sodium bicarbonate		Dextrose - aqueous	diluted, acqueous
Oxalic acid, aqueous		Potassium bichromate		Synthetic detergents	
Acid for accumulators	80% acqueous	Carbon dioxide		Diisobutyl ketone	5% acqueous
Perchloric acid, aqueous	70% acqueous	Sulphur dioxide		Dimethlammine - liquid	pure

The substances related below have no influence on the HD-PE at a temperature of 60°, in some cases the maximum concentration is shown. For other substances and/or temperatures and concentrations consult our Technical Office.

RESISTANCE OF HD-PE TO CHEMICAL

RESISTANCE OF HD-PE TO CHEMICAL SUBSTANCES

DESCRIPTION	%	DESCRIPTION	%	DESCRIPTION	%
Dimethylformamide		Isoctane	1% acqueous	Hydrogen peroxide	saturated cold
Dioxan		Isopropanol		Potassium, Sodium persulphate	90% acqueous
Distillations generally		Lanoline	acqueous	Petroleum	
Distilled wine		Milk		Pyridine	pure
Paraffin emulsion	pure	Yeast		Sodium pyrosulphite	
Photographic emulsions	pure	Liqueurs	pure	Potash	acqueous
Tannic vegetable extracts		Jam			saturated cold 90%
Petroleum ether		Molasses		Caustic potash	acqueous
Ethylenediamine		Mercury		Propane	50%
Acetic acid ethyl ester	pure	Metilammina		Photographic developers	pure, liquido
Mono chlorate	700 mg.	Acetic acid methyl ester		Kitchen salt	normal
Phenol	50%	Diclorate		Silver, barium salts	
Potassium ferricyanide	50%	Acetic acid methyl ester		magnesium, mercury, nickel,	
Fertilisers (salts)	50%	Monoclorate		copper, zinc	
Ammonium fluoride		Methyl ethy ketone	32% acqueous	Starch syrup	
Copper fluoride	80%	Sulphurphosphoric mixture		Sugar syrup	
Sodium fluoride		Morpholine		Butyl sebacate	
Formaldehyde	50%	Must of Molasses		Cider	pure
Formamide	pure	Fermented must		Sodium silicate	
Ammonium phosphate		Movilit d	pure	Soda	
Potassium phosphate	10%	Naphtalene	30%	Caustic soda	
Sodium phosphate	10% acqueous	Ammonium nitrate		Aluminium sulphate	10%
Tributylphosphate	50%	Silver nitrate		Aluminium, potassium sulphate	
Phospur chlorate	50% acqueous	Calcium /potassium nitrate		Ammonium sulphate	50%
Petrol (gasoline)	50%	Copper/sodium nitrate	normal	Hydroxylamine sulphate	10%
Glycerine	pure	Sodium nitrite	pure	Potassium sulphate	
Glycol	30%	Nitrobenzene	saturated acqueous	Sodium sulphate	
Butylene glycol	40% acqueous	Nitrotoluene	50%	Sodium sulphite	
Ethylene glycol	32%	N-propanol		Ammonium sulphide	
Propylene glicole		Vegetable oils and greases	acqueous	Sodium sulphide	
Glycine	85%	Lubricating oils	saturated cold	Soap solutions	
Glucose	30%	Mineral oils	pure	Fruit juices	
Chloral hydrate		Coconut, linseed, corn oils	pure	Surfactants	
Hydrazine hydrate	37%	Olive oil		Lead tetraethyl	
Hydrogen	10%	Palm oil		Sodium thiosulphate	pure
Sodium hydrosulphate		Paraffin oil		Tricresyl phosphate	
Ammonium hydroxide	1%	Silicone oil		Triethanolamine	
Barium hydroxide	6.3%	Urine		Urea	
Calcium hydroxide	pure	Sodium oxalate		Wine, white and red	30%
Potassium iodide		Propylenic oxide		Grape sugar	
Sodium iodide		Phosphurous pentoxide			
Calcium hypochlorate	80% acqueous	Potassium perchlorate			
I-propanol	70% acqueous	Potassium permanganate	acqueous		

The substances related below have no influence on the HD-PE at a temperature of 60°, in some cases the maximum concentration is shown. For other substances and/or temperatures and concentrations consult our technical office.

Introduction

This Manual is meant as a simple practical guide as well as a convenient technical support to all those who are faced with the problems involved in designing and installing a surface drainage system.

Surface drainage systems make it possible to collect, channel and dispose of all the water that may accumulate on a given surface. The water can be of meteoric type, i.e. originating from atmospheric precipitation or from human activities connected with industry, construction, agriculture etc.

During the phases involved in the design of a surface drainage system, a clear distinction has to be made between open-air surfaces and covered surfaces.

While the former, comprising roads, squares, gardens etc., require knowledge and analysis of the data related to atmospheric precipitation; the latter include areas used for industrial production. In covered surfaces the drainage system will predominantly have to dispose of liquids deriving from work processes, which sometimes are chemically aggressive.

The project of a drainage network starts therefore from the general data of the surface to be drained (type, nature and size) and the knowledge of the flow rates of the liquids to be drained.

In the case of covered areas such as industrial buildings, the volume and nature of the liquids to be disposed of depend on the type of industrial processes that are carried out. As a consequence the discharge flow data will have to be supplied by the client.

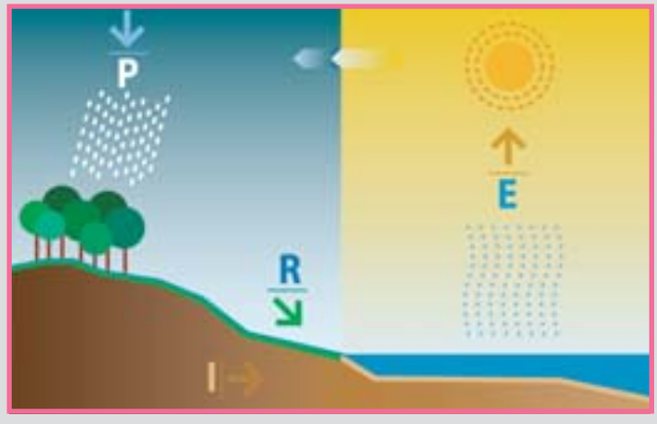
For open-air sites, on the contrary, the volume of water runoff is determined by studying the meteorological data. That is why a few simple hydrologic concepts about rainfall, historical data and the relevant statistical processing are shown below.

The water or hydrologic cycle

The hydrologic cycle is the path the water follows from the oceans through the atmosphere and the ground until it returns to the oceans. In spite of the fact that such a cycle - generated by solar energy - is quite complex, the process of water circulation can be represented as follows (Fig.1) :

- the water evaporates from the oceans surfaces, forming clouds;
- the clouds, driven by the winds even for long distances, give rise to precipitations in the form of rain, snow and hailstones;
- the most precipitations fall over the sea and the rest on the emersed land;
- a certain quantity of that water re-evaporates directly, another part is withheld by the vegetation and then given back to the atmosphere through the plants' evaporation or transpiration, and another part reaches the ground and flows on the surface until it reaches the sea. The remaining part filters into the ground, thus feeding underground water tables: in this way it returns to the sea too.

1. HYDROLOGIC CYCLE



P stands for atmospheric rainfall;
E is the water that evaporates from the ground, vegetation etc.;
R is the surface streaming;
I is the water that filters into the ground.
Therefore the water balance can be expressed through the following relationship:

$$P = E + R + I$$

Rainfall and pluviometric measurements

The quantity of falling water P is measured in rainfall height and is expressed in mm. That is, the height of the layer of water that would rest on the ground, supposing evaporation, surface streaming and evapotranspiration to be zero. This measurement is obtained from the volume of water fallen on a horizontal plane in a given area. One millimetre of rainfall means that an area of one square metre is covered by a 1-millimetre-thick layer of water for a total volume of one litre. Consequently:

$$P\ (mm) = \frac{\text{Volume}}{\text{Area}} = \frac{1\ \text{litre}}{1\ m^2} = \frac{\frac{1}{1000}m^3}{1\ m^2} = \frac{1}{1000}m = 1\ mm$$

The ratio between the precipitation height P and the precipitation duration t defines the average intensity of precipitation I expressed in mm/h:

$$I\left[\frac{mm}{h}\right] = \frac{P}{t}$$

The measurement of the precipitation is carried out with a Pluviometer or Pluviograph. The pluviometer is a simple funnel-shaped receptacle with dimensions such that each litre of water corresponds to 10 mm of rain.

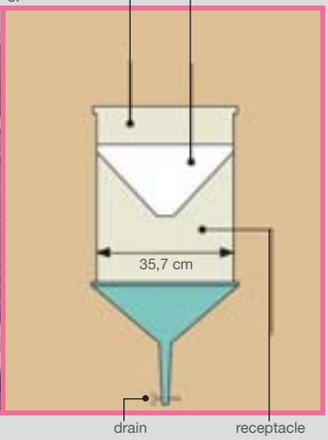
$$\text{Surface} = \pi \cdot r^2 = 3{,}14 \cdot \left[\frac{0357m}{2}\right]^2 = 0{,}1\ m^2$$

$$\Longrightarrow \text{1 lt of water = 10 mm of rain}$$

The water height is taken every 24 hrs, thus obtaining the rainfall height in the previous 24 hrs. The pluviograph is a more complex system, which directly provides a diagram showing the rainfall height instant by instant (pluviogram - 4). The stations equipped with pluviographs are particularly important as they make it possible to derive data for intervals smaller than 24 hrs (Figures 2-3).

2.

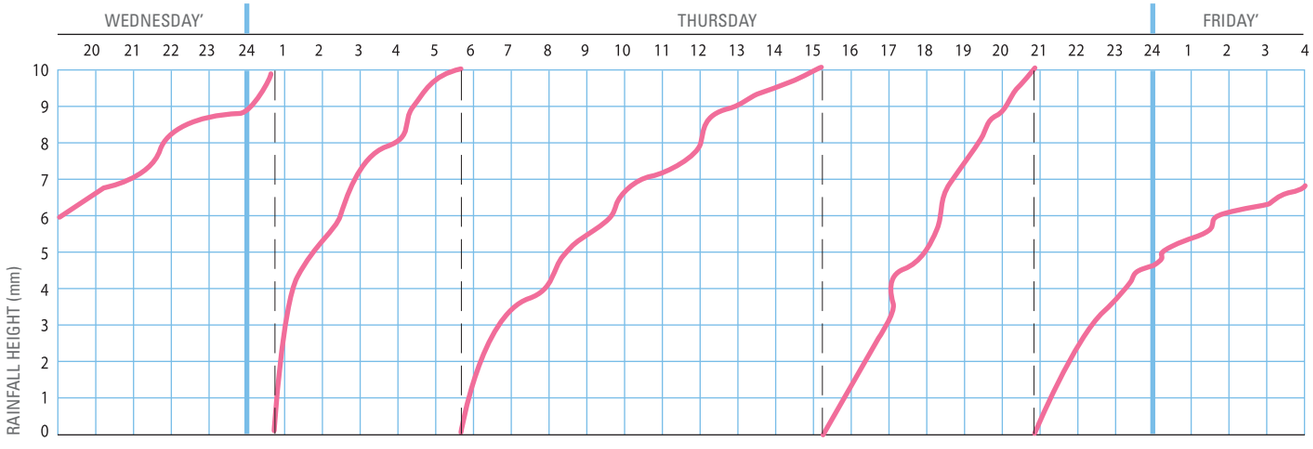
3.



There is a wide network of monitoring stations all over Italy that supply a series of pluviometric data (rainfall height, average intensity of precipitation, rainy days etc.). This data is collected and published annually by the Hydrographic Service or other bodies such as Istat.

4.

Example of pluviogram



Processing pluviometric data

Concentration time t_c

Clearly the volume of the water flow to be drained does not depend only on the precipitation but also on its duration. If the precipitation has height P and duration t (with average intensity P/t) and occurs over the entire draining area, the maximum volume is reached when contributions from all the parts making up the surface reach the runoff section.

This time interval is defined as concentration time t_cIt is simply the time that the most distant drop of water takes to reach the end of the drainage system.
Based on this, when processing the pluviometric data, it is necessary to consider the precipitation according to concentration time in order to determine maximum capacity.

For example, in drainage systems that serve relatively small surface areas, concentration time ranges from few minutes to dozens of minutes. Therefore brief and intense precipitations (showers of rain) should be analysed with maximum duration of 1 hour.

Equations of pluviometric possibility

The processing of the pluviometric data supplied by a monitoring station consists in looking for the mathematical relationship between the height of precipitation P and its duration t:

$$P = P(t)$$

Obviously, from the statistical point of view, its reliability depends on the amount of data available. Consequently the observation period must be long enough. It is believed that an observation period not smaller than 30/35 years can provide valid statistical results, although in some case observations not older than 10 years have to be used.

The many observations available have made it possible to see that, as time passes, rainfall diminishes. So the relationship we are looking for is of exponential type and can be expressed as follows:

$$P = a\, t^n$$

where P and t are usually expressed in mm and hours respectively. The parameters dimensionless n and a ($mm \bullet h^{-n}$) are characteristic of a curve and can be determined from time to time as they depend on the pluviometric characteristics of the area where the monitoring station in located. The exponent n is obviously less than the unit.

Such relationships are called pluviometric possibility equations. They define curves on the Cartesian plane (P, t) known as pluviometric possibility indication curves.

Return time Tr and probability of not exceeding the concerned

In order to determine the functional link between the precipitation height, its duration and the probable frequency with which such height can occur, the relationship becomes:

$$P(Tr) = a(Tr)\, t^{n(Tr)}$$

where Tr is the so-called return time, that is the time poeriod in which the meterological event will on average be equalled or exceeded; it more simply defines the probability that the considered event is not exceeded; this probability results from the Gumbel distribution.

Generally speaking low values of return time (2 to10 years) are used to measure a drainage system for meteorological water.

Statistic analysis of the precipitations

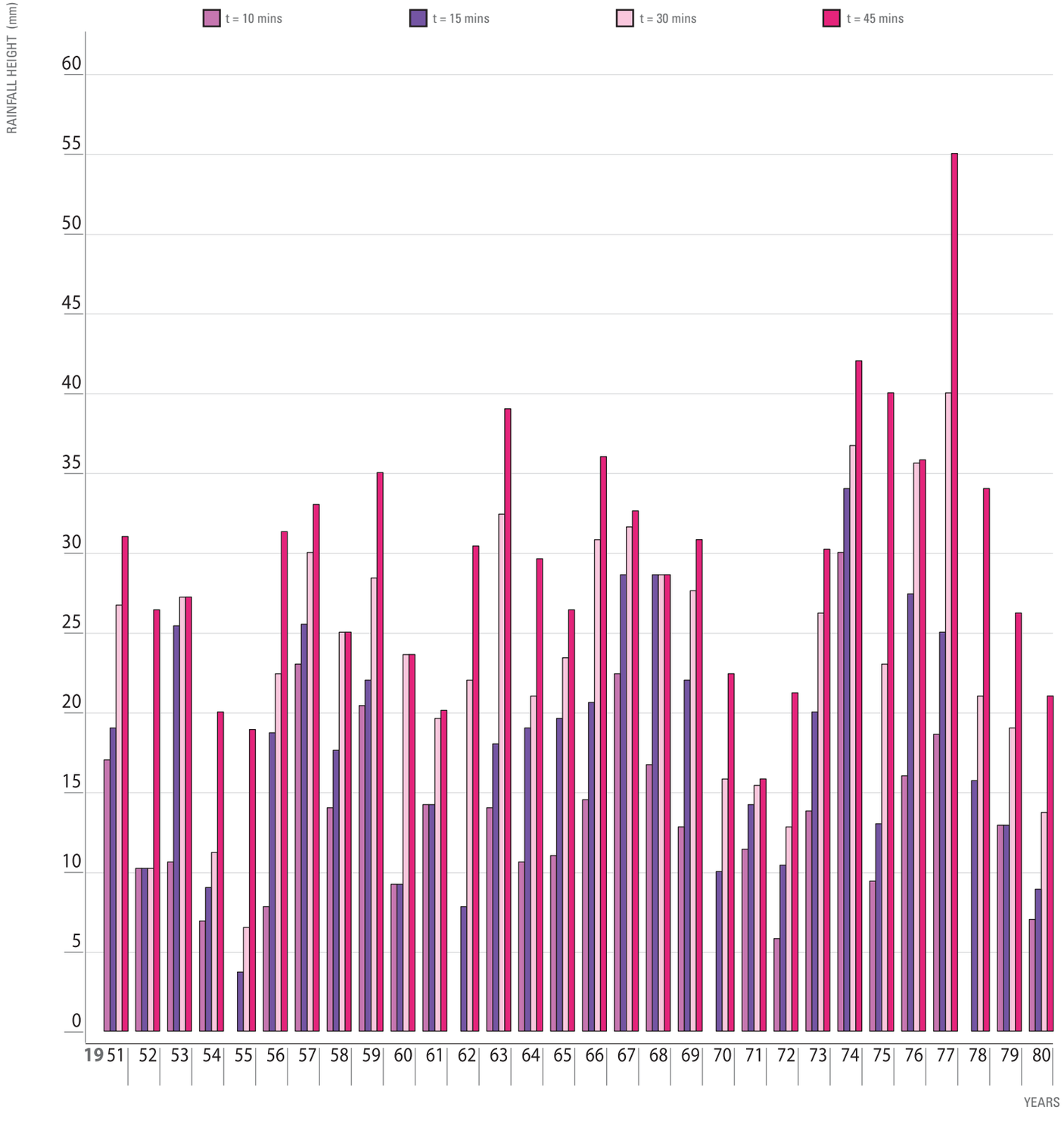
It is supposed that the maximum brief and intense precipitation values recorded by a theoretical pluviometric station X for a certain number of years Y are available.

By ordering this data, a table with a number of lines equal to the observation years Y and a number of columns equal to the lengths of observation (10,15, 30 and 45 minutes) is obtained.

Brief and intense precipitations recorded in a theoretical pluviographic station

DURATION	t = 10 min	t = 15 min	t = 30 min	t = 45 min
OBSERVATION YEAR	Rainfall height P (mm)			
1951	17	19	26.7	31
1952	10.2	10.2	10.2	26.4
1953	10.6	25.4	27.2	27.2
1954	6.9	9	11.2	20
1955	0	3.7	6.5	18.9
1956	7.8	18.7	22.4	31.3
1957	23	25.5	30	33
1958	14	17.6	25	25
1959	20.4	21	28.4	35
1960	9.2	8.2	23.6	23.6
1961	14.2	14.2	19.6	20.1
1962	0	7.8	22	30.4
1963	14	18	32.4	39
1964	10.6	19	21	29.6
1965	11	19.6	23.4	26.4
1966	14.5	20.6	30.8	36
1967	22.4	28.6	31.6	32.6
1968	16.7	28.6	28.6	28.6
1969	12.8	22	27.6	30.8
1970	0	10	15.8	22.4
1971	11.4	14.2	15.4	15.8
1972	5.8	10.4	12.8	21.2
1973	13.8	20	26.2	30.2
1974	30	34	36.7	42
1975	9.4	13	23	40
1976	16	27.4	35.6	35.8
1977	18.6	25	40	55
1978	0	15.7	21	34
1979	12.9	12.9	19	26.2
1980	7	8.9	13.7	21

Rainfall Histogram



For each duration interval the mean value m_t and the standard deviation σ_t of the recorded values are calculated:

STATISTICS	DURATION			
	t = 10 min	t = 15 min	t = 30 min	t = 45 min
	t = 0,167 hours	t = 0,25 hours	t = 0,5 hours	t = 0,75 hours
Mean value m_t	12,60	18,21	24,21	29,90
Standard devation σ_t	7,018	7,535	8,234	8,375

At this point reference is made to the Gumbel probability distribution to process the statistics:

$$G(P_t) = e^{-e^{-y}}$$

where y (called reduced variable) is given by:

$$y = \frac{P_t - M_t}{S_t}$$

with:

$$M_t = m_t - 0{,}577\ \sigma_t$$

mean value of the reduced variable

$$S_t = 0{,}779\ \sigma_t$$

standard deviation of the reduced variable.
So you will get:

STATISTICS	DURATION			
	t = 10 min	t = 15 min	t = 30 min	t = 45 min
	t = 0,167 hours	t = 0,25 hours	t = 0,5 hours	t = 0,75 hours
Mean value M_t	5,47	5,86	6,48	6,52
Standard devation S_t	8,55	13,87	19,41	25,07

Knowing that the probability of not exceeding the event is expressed according to the return time:

$$G(P_t) = \frac{Tr - 1}{Tr}$$

and processing the Gumbel expression, you get:

$$P_t(Tr) = M_t - S_t Ln\left[Ln\left(\frac{Tr}{Tr-1}\right)\right]$$

In this way, having set a return period Tr, it is possible to establish the corresponding maximum value of precipitation P for each time period t, that is the precipitation height that occurs, on average, every Tr years.

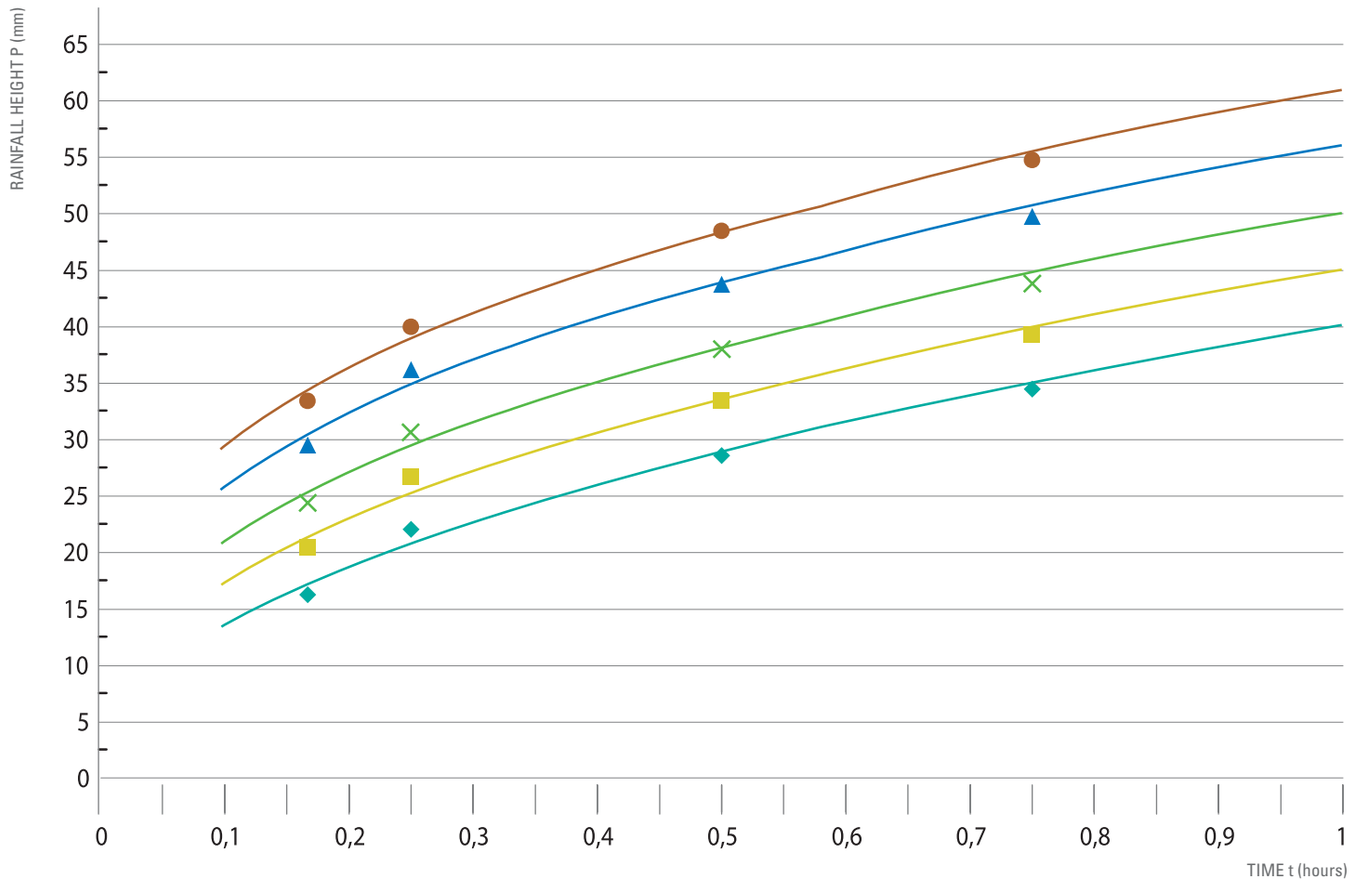
DURATION RETURN TIME Tr	DURATION			
	t = 10 min	t = 15 min	t = 30 min	t = 45 min
	t = 0,167 hours	t = 0,25 hours	t = 0,5 hours	t = 0,75 hours
5 years	16,75	22,66	29,13	34,85
10 years	20,86	27,06	34,00	39,75
20 years	24,79	31,28	38,67	44,45
50 years	29,89	36,74	44,71	50,52
100 years	33,70	40,84	49,24	55,08

By placing the values obtained for each return period Tr into the plane (P,t) it is possible to plot equation regression curves

$$P(Tr) = a(Tr)\ t^{n(Tr)}$$

which represent the pluviometric possibility curves we were looking for.

Pluviometric possibility curves (duration t < 1 hour)



Return Time Tr = 5 years	Return Time Tr = 10 years	Return Time Tr = 20 years	Return Time Tr = 50 years	Return Time Tr = 100 years
$P_{(5)} = 40{,}417t^{0{,}4652}$	$P_{(10)} = 45{,}325t^{0{,}4113}$	$P_{(20)} = 50{,}111t^{0{,}3737}$	$P_{(50)} = 56{,}370t^{0{,}3375}$	$P_{(100)} = 61{,}091t^{0{,}3166}$
$R^2 = 0{,}9775$	$R^2 = 0{,}9803$	$R^2 = 0{,}9820$	$R^2 = 0{,}9834$	$R^2 = 0{,}9841$

The values of the coefficients a and n, obtained by varying the return period Tr for precipitations of less than 1 hr, are shown in the table opposite.

The correlation coefficients of the regressions performed R^2 are shown in the last column.

Return Time Tr	a ($mm \cdot h^{-n}$)	n	Correlation coefficient R^2
5 years	40,717	0,4652	0,9775
10 years	45,325	0,4113	0,9803
20 years	50,111	0,3737	0,9820
50 years	56,370	0,3375	0,9834
100 years	61,091	0,3166	0,9841

Average precipitation intensity I

Apart from obtaining the heights of precipitation that occur on average every Tr years for every rainfall duration t, it is obviously possible to also derive the corresponding average precipitation intensity (I) from pluviometric possibility equations.

Consequently:

$$I = \left(\frac{mm}{h} \right) = \frac{P}{t} = \frac{at^n}{t} = at^{(n-1)}$$

Equations of national pluviometric possibility

Clearly enough, to follow this procedure is extremely complex and articulated. And it is also difficult to collect a sufficient amount of pluviometric data regarding the drainage system area. For these reasons we have tried to concentrate our resources on the search for pluviometric possibility equations that could have general validity, i.e. those that could be used for every area on the Italian territory. The study started from the geographical distribution of the pluviometric data available. We analysed the precipitation as distributed in the areas that have historically shown homogeneity: Northern Italy, Tyrrhenian side of central Italy, Adriatic side of central Italy, Southern Italy, Sardinia.

Subsequent statistical processing made it possible to determine the following relationships for durations t < 1 hour.

Equations of pluviometric possibility
$P\ (Tr = 5) = 37{,}23\ t^{0{,}423}$
$P\ (Tr = 10) = 42{,}84\ t^{0{,}405}$
$P\ (Tr = 20) = 49{,}13\ t^{0{,}396}$
$P\ (Tr = 50) = 56{,}81\ t^{0{,}383}$
$P\ (Tr = 100) = 64{,}57\ t^{0{,}375}$

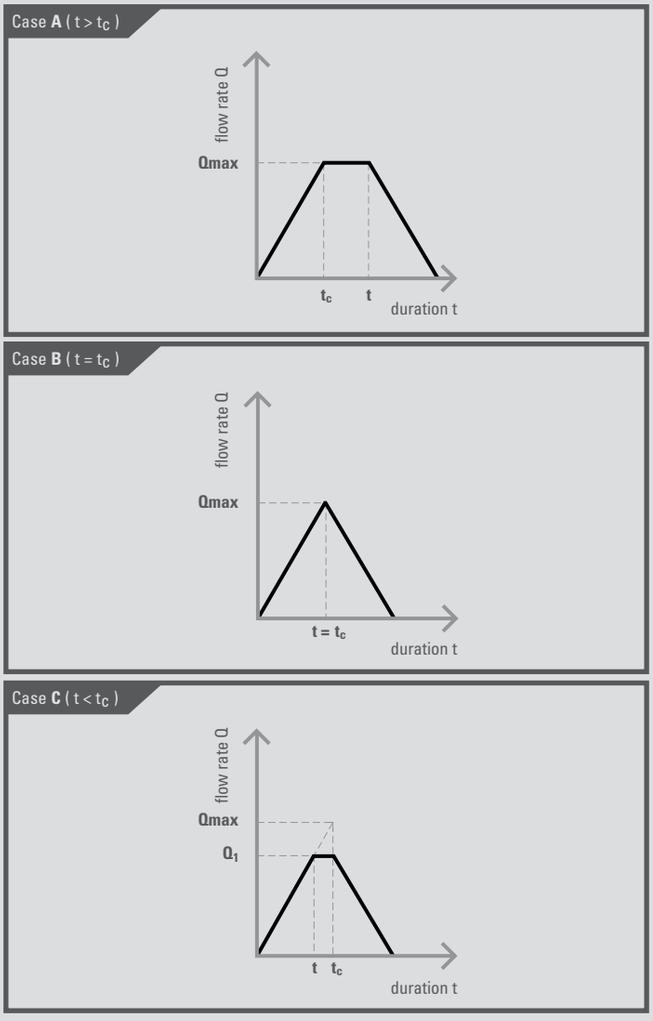
Return Time Tr	a ($mm \cdot h^{-n}$)	n
5 years	37,23	0,423
10 years	42,84	0,405
20 years	49,13	0,396
50 years	56,81	0,383
100 years	64,57	0,375

The application of these equations speeds up the calculation operations but it involves an approximation of about 10 %. Therefore for special projects where accuracy is required, it is advisable to try and find the equation of the local pluviometric possibility.

Calculating maximum runoff capacity

The most popular method to calculate the flow rate resulting from a given precipitation is the kinematic method, also known as the rational method.
It is especially applicable to draining surfaces that are not too extensive and it is very suitable when designing drainage lines.

Flood hydrograph according to the kinematic method



According to this method the condition of maximum flow rate is reached when the precipitation lasts for the same time as the critical rain, that is the concentration time:

$t\,(Q_{max}) = t_c$ critical duration
$I\,(t\,(Q_{max})) = I_{cr}$ critical intensity

The calculation relationship called kinematic formula is:

$$Q_{max} = \phi\, A I_{cr}$$

where:

A is the area of the draining surface;
I_{cr} is the critical intensity;
ϕ is the flow coefficient
(dimensionless size of which is discussed further on).

Knowing that:

$$I_{cr} = \frac{P}{t_c} = \frac{a t_c^{\,n}}{t_c} = a t_c^{(n-1)}$$

Therefore:

$$Q_{max} = \phi\, A a t_c^{(n-1)}$$

Runoff coefficient ϕ

At this point it is important to underline that not all the precipitation water that flows onto a surface contributes to calculating the volume to be drained. Some of this water will be absorbed by the ground - the more permeable the draining surface, the greater this amount will be.
Bituminous conglomerate or concrete pavings are much less permeable than a garden.
The fraction of water that contributes to the calculation of runoff capacity - to be collected by the drainage network - is given by the runoff coefficient ϕ, which will obviously depend on the type of surface.

Values of runoff coefficient ϕ

Types of surfaces	Runoff coefficient ϕ
Roofs and terraces	0,90 - 0,95
Concrete paving	0,90
Asphalt paving	0,85 - 0,90
Stone and brick paving with cemented connections	0,80
Stone and brick paving with non cemented connections	0,60
Gardens, lawns, woods	0,40
City areas completely built up	0,70 - 0,90
City areas averagely built up	0,50 - 0,70
City areas slightly built up	0,40 - 0,50

You will actually find situations in which the draining surface is made up of surface portions of different types, therefore having different runoff coefficients. In such cases it is enough to calculate the weighed average of the runoff coefficients for the various areas.

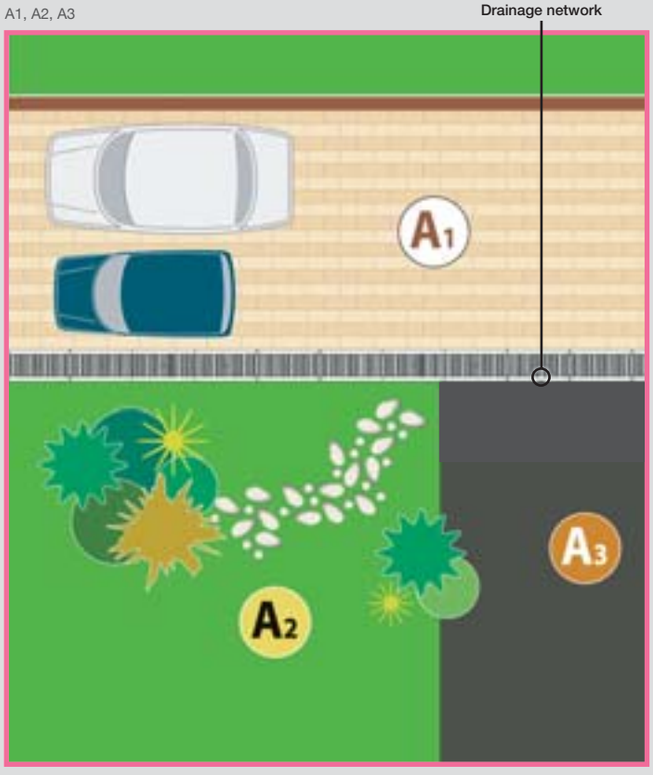
Example

A1 Brick surface
area = A_1
runoff coefficient = $\phi 1$

A2 Grassy surface
area = A_2
runoff coefficient = $\phi 2$

A3 Asphalted surface
area = A_3
runoff coefficient = $\phi 3$

$$\phi = \frac{\Sigma A_i \phi_i}{\Sigma A_i} = \frac{A_1\phi_1 + A_2\phi_2 + A_3\phi_3}{A_1 + A_2 + A_3}$$



Calculating concentration time t_c

Concentration time - see definition above - depends on the average inclination, type and size of the contributing surfaces. To determine its value is not that easy.
A lot of empiric formulas exist in books that, based on experience, have no general validity and may even cause considerable inaccuracy. The following expression makes it possible to calculate the concentration time of a drainage surface as used in road construction. It is suitable to our cases:

$$t_c\,(\text{sec}) = \left[\frac{26^n\left(\frac{L}{K}\right)^{0,6}}{i^{0,3}a^{0,4}}\right]^{\left(\frac{1}{0,6+0,4n}\right)}$$

where:

L (m) is the width of the surface (perpendicular to the drainage line);
i (%) is the average incline of the surface;
a (mh-n) and **n** are the parameters of the equation for the pluviometric possibility for a set return time;
K (m$^{1/3}$/s) is a coefficient that depends on the type of surface;

Surface	K
Asphalt	50 - 75
Bricks	20 - 30
Grass	2 - 2,5

The value of concentration time for very small surfaces is normally in the order of a few minutes and is in no way comparable to effective rainfall time, even if brief and intense. To assume said values would mean to overestimate the flow rates. It can be a precautionary measure if generally valid pluviometric possibility equations are used.

Given the difficulty in accurately calculating concentration time, we propose a direct method of calculation that is user-friendly and applicable in the designing stages. The method, which is based on Mufle's wide experience in different areas in Italy and in the most varied situations, makes it possible to define the unitary maximum flow rate, i.e. by linear metre of drainage system, for a fixed return time Tr through the following formula:

$$q\left(\frac{m^3}{h}\right) = FL^P$$

where:

L (m) is the width of the surface (perpendicular to the drainage line);
F and P are two parameters that depend on the runoff coefficient, the average inclination of the surface and coefficients a and n for a given return time. These values can be derived from the tables on pages 263 and 264, which are valid for return times of 5 and 10 years respectively. You are advised to select the return time Tr using the following criterion:

5 years	Pedestrian areas, terraces, large squares, green zones and car parks
10 years	Road draining, access to car parks, industrial estates and airport areas

Tr = 5 years PARAMETER F												
INCLINE i	RUNOFF COEFFICIENT											
	0,4	0,45	0,5	0,55	0,6	0,65	0,70	0,75	0,80	0,85	0,90	0,95
0,1%	0,0138	0,0289	0,0458	0,0645	0,0852	0,108	0,1332	0,1608	0,1912	0,2246	0,2611	0,301
0,5%	0,0181	0,0377	0,0589	0,0818	0,1067	0,1335	0,1625	0,1938	0,2274	0,2636	0,3026	0,3444
1,0%	0,0204	0,0422	0,0656	0,0907	0,1175	0,1463	0,1771	0,21	0,2451	0,2825	0,3224	0,3649
1,5%	0,0219	0,0451	0,0699	0,0963	0,1244	0,1543	0,1862	0,22	0,256	0,2941	0,3346	0,3775
2,0%	0,023	0,0473	0,0731	0,1004	0,1295	0,1603	0,1929	0,2275	0,264	0,3027	0,3435	0,3867
2,5%	0,0239	0,049	0,0756	0,1038	0,1336	0,1651	0,1983	0,2334	0,2705	0,3095	0,3506	0,394
3,0%	0,0247	0,0505	0,0778	0,1066	0,137	0,1691	0,2029	0,2384	0,2758	0,3152	0,3566	0,4
3,5%	0,0253	0,0518	0,0797	0,1091	0,14	0,1726	0,2068	0,2427	0,2804	0,3201	0,3616	0,4052
4,0%	0,0259	0,053	0,0814	0,1113	0,1427	0,1756	0,2102	0,2465	0,2845	0,3243	0,3661	0,4098
4,5%	0,0265	0,054	0,0829	0,1132	0,145	0,1784	0,2133	0,2499	0,2881	0,3282	0,3701	0,4138
5,0%	0,0269	0,0549	0,0843	0,115	0,1472	0,1809	0,2161	0,2529	0,2914	0,3316	0,3736	0,4175
5,5%	0,0274	0,0558	0,0855	0,1166	0,1492	0,1831	0,2187	0,2557	0,2944	0,3348	0,3769	0,4208
6,0%	0,0278	0,0566	0,0867	0,1182	0,151	0,1853	0,221	0,2583	0,2972	0,3377	0,3799	0,4239
6,5%	0,0282	0,0573	0,0878	0,1196	0,1527	0,1872	0,2232	0,2607	0,2998	0,3404	0,3827	0,4268
7,0%	0,0285	0,058	0,0888	0,1209	0,1543	0,1891	0,2253	0,263	0,3022	0,3429	0,3853	0,4294
7,5%	0,0289	0,0587	0,0898	0,1221	0,1558	0,1908	0,2272	0,2651	0,3044	0,3453	0,3878	0,4319
8,0%	0,0292	0,0593	0,0907	0,1233	0,1572	0,1924	0,229	0,2671	0,3065	0,3475	0,3901	0,4342
8,5%	0,0295	0,0599	0,0915	0,1244	0,1585	0,194	0,2308	0,2689	0,3086	0,3496	0,3923	0,4364
9,0%	0,0298	0,0605	0,0924	0,1254	0,1598	0,1954	0,2324	0,2707	0,3105	0,3516	0,3943	0,4385
9,5%	0,0301	0,061	0,0931	0,1265	0,161	0,1968	0,234	0,2724	0,3123	0,3535	0,3963	0,4405
10,0%	0,0303	0,0615	0,0939	0,1274	0,1622	0,1982	0,2354	0,274	0,314	0,3554	0,3981	0,4424

Tr = 5 years PARAMETER P												
INCLINE i	RUNOFF COEFFICIENT											
	0,4	0,45	0,5	0,55	0,6	0,65	0,70	0,75	0,80	0,85	0,90	0,95
0,1%	0,7134	0,709	0,7046	0,7002	0,6959	0,6915	0,6872	0,6829	0,6787	0,6745	0,6703	0,6661
0,5%	0,7589	0,755	0,7511	0,7472	0,7433	0,7395	0,7357	0,7319	0,7281	0,7243	0,7206	0,7168
1,0%	0,7793	0,7757	0,772	0,7684	0,7648	0,7612	0,7576	0,754	0,7505	0,7469	0,7434	0,7399
1,5%	0,7916	0,788	0,7846	0,7811	0,7776	0,7742	0,7707	0,7673	0,7639	0,7605	0,7571	0,7537
2,0%	0,8003	0,7969	0,7936	0,7902	0,7868	0,7835	0,7802	0,7768	0,7735	0,7702	0,7669	0,7637
2,5%	0,8072	0,8039	0,8006	0,7973	0,7941	0,7908	0,7876	0,7843	0,7811	0,7779	0,7747	0,7715
3,0%	0,8129	0,8097	0,8064	0,8032	0,8	0,7968	0,7937	0,7905	0,7873	0,7842	0,7811	0,7779
3,5%	0,8177	0,8146	0,8114	0,8082	0,8051	0,802	0,7989	0,7958	0,7927	0,7896	0,7865	0,7834
4,0%	0,8219	0,8188	0,8157	0,8126	0,8095	0,8065	0,8034	0,8003	0,7973	0,7943	0,7912	0,7882
4,5%	0,8256	0,8226	0,8195	0,8165	0,8135	0,8104	0,8074	0,8044	0,8014	0,7984	0,7954	0,7925
5,0%	0,829	0,826	0,823	0,82	0,817	0,814	0,811	0,8081	0,8051	0,8022	0,7992	0,7963
5,5%	0,832	0,8291	0,8261	0,8231	0,8202	0,8172	0,8143	0,8114	0,8085	0,8055	0,8026	0,7998
6,0%	0,8348	0,8319	0,8289	0,826	0,8231	0,8202	0,8173	0,8144	0,8115	0,8087	0,8058	0,8029
6,5%	0,8374	0,8345	0,8316	0,8287	0,8258	0,8229	0,8201	0,8172	0,8144	0,8115	0,8087	0,8059
7,0%	0,8398	0,8369	0,834	0,8312	0,8283	0,8255	0,8227	0,8198	0,817	0,8142	0,8114	0,8086
7,5%	0,842	0,8392	0,8363	0,8335	0,8307	0,8279	0,8251	0,8223	0,8195	0,8167	0,8139	0,8112
8,0%	0,8441	0,8413	0,8385	0,8357	0,8329	0,8301	0,8273	0,8246	0,8218	0,819	0,8163	0,8135
8,5%	0,846	0,8433	0,8405	0,8377	0,835	0,8322	0,8294	0,8267	0,824	0,8212	0,8185	0,8158
9,0%	0,8479	0,8451	0,8424	0,8397	0,8369	0,8342	0,8315	0,8287	0,826	0,8233	0,8206	0,8179
9,5%	0,8497	0,8469	0,8442	0,8415	0,8388	0,8361	0,8334	0,8307	0,828	0,8253	0,8226	0,82
10,0%	0,8513	0,8486	0,8459	0,8432	0,8405	0,8379	0,8352	0,8325	0,8298	0,8272	0,8245	0,8219

Tr = 10 years PARAMETER F												
INCLINE i	RUNOFF COEFFICIENT											
	0,4	0,45	0,5	0,55	0,6	0,65	0,70	0,75	0,80	0,85	0,90	0,95
0,1%	0,0278	0,0396	0,0531	0,0684	0,0857	0,1053	0,1272	0,1519	0,1795	0,2246	0,2451	0,2837
0,5%	0,0432	0,0606	0,0799	0,1011	0,1246	0,1504	0,1787	0,2098	0,2438	0,2636	0,3218	0,3662
1,0%	0,0522	0,0727	0,0952	0,1196	0,1463	0,1753	0,2068	0,2411	0,2782	0,2825	0,3618	0,4088
1,5%	0,0583	0,0809	0,1054	0,132	0,1607	0,1918	0,2253	0,2615	0,3004	0,2941	0,3875	0,4359
2,0%	0,0631	0,0873	0,1134	0,1415	0,1718	0,2044	0,2394	0,277	0,3173	0,3027	0,4068	0,4563
2,5%	0,0671	0,0926	0,12	0,1494	0,181	0,2148	0,251	0,2897	0,3311	0,3095	0,4224	0,4727
3,0%	0,0705	0,0971	0,1256	0,1562	0,1888	0,2236	0,2608	0,3005	0,3428	0,3152	0,4357	0,4866
3,5%	0,0735	0,1012	0,1306	0,1621	0,1957	0,2314	0,2695	0,3099	0,353	0,3201	0,4472	0,4987
4,0%	0,0763	0,1048	0,1351	0,1674	0,2018	0,2384	0,2772	0,3184	0,362	0,3243	0,4574	0,5094
4,5%	0,0788	0,1081	0,1392	0,1723	0,2074	0,2447	0,2841	0,326	0,3702	0,3282	0,4666	0,519
5,0%	0,0811	0,1111	0,143	0,1768	0,2125	0,2504	0,2905	0,3329	0,3777	0,3316	0,475	0,5277
5,5%	0,0832	0,1139	0,1465	0,1809	0,2173	0,2558	0,2964	0,3394	0,3846	0,3348	0,4827	0,5358
6,0%	0,0852	0,1166	0,1497	0,1848	0,2217	0,2608	0,3019	0,3453	0,391	0,3377	0,4899	0,5432
6,5%	0,0871	0,1191	0,1528	0,1884	0,2259	0,2654	0,3071	0,3509	0,397	0,3404	0,4966	0,5501
7,0%	0,0889	0,1214	0,1557	0,1918	0,2298	0,2698	0,3119	0,3562	0,4027	0,3429	0,5028	0,5567
7,5%	0,0906	0,1237	0,1584	0,195	0,2335	0,274	0,3165	0,3611	0,408	0,3453	0,5087	0,5628
8,0%	0,0922	0,1258	0,161	0,1981	0,237	0,2779	0,3208	0,3658	0,413	0,3475	0,5143	0,5686
8,5%	0,0938	0,1278	0,1635	0,201	0,2404	0,2817	0,325	0,3703	0,4178	0,3496	0,5196	0,5741
9,0%	0,0953	0,1297	0,1659	0,2038	0,2436	0,2853	0,3289	0,3746	0,4224	0,3516	0,5247	0,5793
9,5%	0,0967	0,1316	0,1682	0,2065	0,2467	0,2887	0,3327	0,3787	0,4268	0,3535	0,5295	0,5843
10,0%	0,0981	0,1334	0,1704	0,2091	0,2496	0,292	0,3363	0,3826	0,4309	0,3554	0,5341	0,5891

Tr = 10 years PARAMETER P												
INCLINE i	RUNOFF COEFFICIENT											
	0,4	0,45	0,5	0,55	0,6	0,65	0,70	0,75	0,80	0,85	0,90	0,95
0,1%	0,7349	0,7334	0,7318	0,73	0,7281	0,726	0,7237	0,7214	0,7188	0,7162	0,7134	0,7106
0,5%	0,7256	0,7271	0,7284	0,7296	0,7306	0,7314	0,7322	0,7327	0,7331	0,7334	0,7335	0,7335
1,0%	0,7216	0,7243	0,7269	0,7294	0,7317	0,7338	0,7358	0,7377	0,7394	0,7409	0,7424	0,7437
1,5%	0,7193	0,7228	0,7261	0,7293	0,7323	0,7352	0,7379	0,7406	0,743	0,7454	0,7476	0,7497
2,0%	0,7176	0,7216	0,7255	0,7292	0,7328	0,7362	0,7395	0,7426	0,7456	0,7485	0,7513	0,7539
2,5%	0,7164	0,7208	0,725	0,7291	0,7331	0,737	0,7407	0,7442	0,7477	0,751	0,7542	0,7573
3,0%	0,7153	0,72	0,7246	0,7291	0,7334	0,7376	0,7416	0,7456	0,7494	0,753	0,7566	0,76
3,5%	0,7144	0,7194	0,7243	0,729	0,7336	0,7381	0,7425	0,7467	0,7508	0,7547	0,7586	0,7623
4,0%	0,7137	0,7189	0,724	0,729	0,7338	0,7386	0,7432	0,7476	0,752	0,7562	0,7603	0,7643
4,5%	0,713	0,7185	0,7238	0,729	0,734	0,739	0,7438	0,7485	0,7531	0,7575	0,7619	0,7661
5,0%	0,7124	0,7181	0,7236	0,7289	0,7342	0,7393	0,7444	0,7493	0,754	0,7587	0,7633	0,7677
5,5%	0,7119	0,7177	0,7234	0,7289	0,7343	0,7397	0,7449	0,75	0,7549	0,7598	0,7645	0,7692
6,0%	0,7114	0,7173	0,7232	0,7289	0,7345	0,74	0,7453	0,7506	0,7557	0,7608	0,7657	0,7705
6,5%	0,7109	0,717	0,723	0,7289	0,7346	0,7402	0,7458	0,7512	0,7565	0,7617	0,7667	0,7717
7,0%	0,7105	0,7167	0,7229	0,7288	0,7347	0,7405	0,7462	0,7517	0,7572	0,7625	0,7677	0,7728
7,5%	0,7101	0,7165	0,7227	0,7288	0,7348	0,7407	0,7465	0,7522	0,7578	0,7633	0,7686	0,7739
8,0%	0,7098	0,7162	0,7226	0,7288	0,7349	0,741	0,7469	0,7527	0,7584	0,764	0,7695	0,7749
8,5%	0,7094	0,716	0,7224	0,7288	0,735	0,7412	0,7472	0,7531	0,7589	0,7647	0,7703	0,7758
9,0%	0,7091	0,7158	0,7223	0,7288	0,7351	0,7414	0,7475	0,7535	0,7595	0,7653	0,7711	0,7767
9,5%	0,7088	0,7156	0,7222	0,7288	0,7352	0,7416	0,7478	0,7539	0,76	0,7659	0,7718	0,7775
10,0%	0,7085	0,7154	0,7221	0,7287	0,7353	0,7417	0,7481	0,7543	0,7605	0,7665	0,7725	0,7783

CALCULATION FLOW RATES

Calculation example

The general characteristics of the area are the basis of proper drainage line projects. You should be able to infer said characteristics either from project drawings or - should they be unavailable - from a detailed description of the place as provided by the client.
The following are required:

- Typology of ground (flat, steep, on a bend etc).
- Nature of ground (asphalt, paved, green, mixed etc.).
- Geometry of ground (length x width, inclination).
- Any peculiarities such as the presence of flat roofs pouring water onto the area concerned, the typology of liquids to be drained into the channel, any constraints due to limited space or unavoidable positions of the final drain, the presence of purification plants etc.

Designing does not consist only in **determining the rain flow rates** and the **drain outlet diameters** to be connected to the drainage line, but also in choosing the **model of channel**, the type of **grating** and the relevant **load class**. This list must include another essential aspect, i.e. you need to know in advance:

- the usage destination of the area (parking lot, airport area, underground rooms, areas for industrial processing etc).

The first distinction to be made is between covered and open-air surfaces to be drained.
Covered areas are used for industrial processing and the water to be disposed of may be polluted by chemicals (even dangerous chemicals). You need to know their typology and concentration in order to be sure about their compatibility with HD-PE (ASVOX stainless-steel drainage channels should be used if compatibility is low), the type of vehicles travelling through the area and the quantity of liquids to be drained in order to determine the size of the channels and the number of drain outlets that need opening up.
As concerns open-air areas, there are many more possibilities - see the following case just as an example.

Parking area in a commercial centre with self-locking pavement	
Area to be drained A	5.000 m^2
Type of ground	Flat
Nature	80% self-locking pavement, 20% green area
Geometry	L=100m, l=50m
Average inclination i	2,5 %
Peculiarities	The parking area has a boundary wall on three sides

As the ground is flat and you can choose the position of the drainage line, you may want to place it along the short side (50 metres) and to give the surface an average inclination of 2.5%.

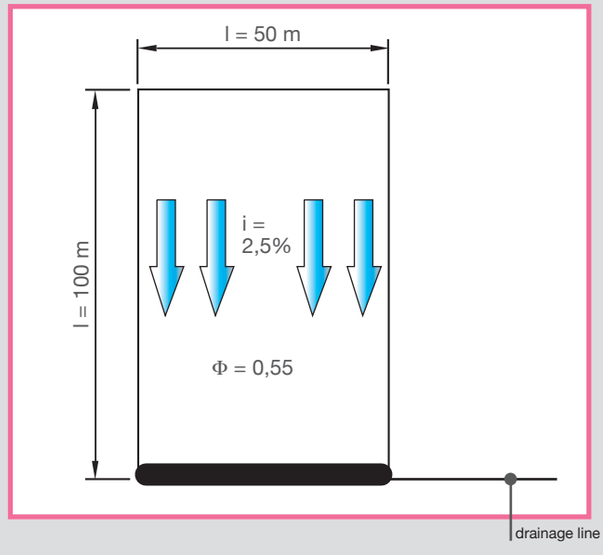
As this is a car park in a commercial centre, return time Tr can be assumed to be = 5 years. The calculation formula on page 257 and the tables on pages 264-265 - with values Φ = 0.55 (calculated as shown on page 263) and i = 2.5 % in the table for Tr = 5 years - make it possible to find that:

F = 0,1038
P = 0,8082

Consequently, unitary runoff capacity will be:

$q = 0{,}1038 \bullet 100^{0{,}8082} = 4{,}29\ (m^3/h) = 1{,}19$ litres/sec

To determine the total capacity to be drained, just multiply value “q” by the width of the surface. Therefore:
Q = q x l = 1,19 (l/sec x m) x 50 (m) = **59.5 l/sec**
The water shall be collected through channels perpendicular to the drainage direction and installed along the whole length of the parking area (l) upstream, as determined at the beginning.
Assuming that the line is installed very close to the boundary wall, we recommend using a MufleDrain channel mod. VIP_{20} 150/160 with its ductile cast iron drainage grating mod. VIP_{20} 150 class B125 with a square mesh. This choice is due to the low inclination of the ground (there is no risk of water growing too fast and bypassing the grating), to the fact that the gratings will not be driven over (installation very close to the wall) and to the fact that it is a self-locking parking area. The choice of a square mesh matches the aesthetical appearance of the environment. As there are no height constraints, the higher grating should be used in order to have more storage capacity and consequently more safety. For further details on the choice of the grating, please see the following page.
Have collected the rainwater, you need to open up a proper number of drain outlets to be connected to each other by means of a PVC round-section pipe connected to the sewer system. In this example, the preinstalled drain outlets on the side of the channel with diameter 110 mm can be opened up. By giving the pipe an inclination of 1% you are able to dispose of about 9.9 l/sec per drain outlet. So 6 of them should be opened up: 1 every 83 metres approximately. In practical terms, we recommend opening up 8 drain outlets (1 every 6 metres approximately) in order to consider any load losses, clogging and other risk factors.



Calculating drainage capacity of gratings and drainage into the sewer system

Having determined the volume of water to be drained (as shown in the example on page 266), it is essential to select the type of grating from those available for the MufleDrain System channel that is capable of meeting the load and drainage characteristics required. The first test to be carried out on the gratings is resistance to the load required. An extract from Standard EN 1433 about the load class to be used in all situations of pedestrian and vehicular traffic is shown on page 17 of MufleDrain's Catalogue. Having identified the type and load class to be used, select the channel to be installed according to absorption capacity per ml as shown in the table below, taking into account possible obstacles such as leaves and residues. MufleDrain channels are available in 4 inner widths: 100, 150, 200, 300 mm. In special cases such as having to drain large flow rates in short stretches or with fast flowing water on the grating, two parallel drainage lines (recommended distance 50-100 cm) should be installed instead of a single wider line.

Characteristics of gratings			Absorption of grating based on channel width		
Type of grating		Class of load	154	204	254
			(litres per second per linear metre)		
Run grating		A15	3,4	4,0	4,6
Mesh grating		B125 C250	9,0	13,0	17,0
Ductill cast iron grating		C250 D400 E600 F900	4,5	7,3	10,0
HD-PE grating		Walkable-Driveable	7,5	10,5	13,5

NOTE: This table only lists some gratings from the MufleDrain range as an example. For further information please contact our Technical Department (address: tecnico@mufle.com).

Flow capacity of PVC round pipes

Before installing the channel selected you need to determine the sizes of the drain outlets to be connected to the drainage line for the sewer system. The flow rates of round PVC pipes normally used in the building industry are shown below. Although the flow rate changes according to the inclination, to avoid load losses and the presence of any residues either drain outlets with a large diameter or several outlets should be used. The MufleDrain channel is equipped with a series of pre-installed drain outlets that speed up connection.

Incline	Ø Pipe				
	100	110	125	160	200
	(litre per second)				
0,5 %	5,0	6,5	9,8	15,9	34,3
1,0 %	7,6	9,9	13,9	22,5	48,5
1,5%	9,2	11,0	17,0	27,5	59,4
2,0 %	10,7	12,1	19,6	31,7	68,6
3,0 %	13,1	15,8	24,0	38,9	84,1
5,0 %	16,9	20,3	31,0	50,2	108,5
10,0 %	23,9	28,7	43,8	71,1	153,4

NOTE: The table of drain outlets that can be applied to channels and gullies is available in the Catalogue.

Introduction

Mufle gives instructions on how to install its channels in compliance with Standard EN 1433 for type-M channels. Dimensions H and S of the installation bed and props are specified together with the concrete class to be used, the details on the reinforcement framework (if any) and advice on proper installation.
This information is shown in the Catalogue for each product family.

Underlying layer and propping

The underlying layer has the function of absorbing and distributing the stresses from the surface without giving way - this would jeopardise the functionality of the water channelling system (fig. 1). For this reason it must be suitably prepared and tamped in order to achieve a bearing capacity suitable to the load classes specified.
Owing to the loads applied the pavings (road, industrial or airport pavings) are subjected to compression and bending traction stresses. They may also break due to fatigue owing to the effects brought about by the cyclical action of the loads (repeated passage of vehicles).

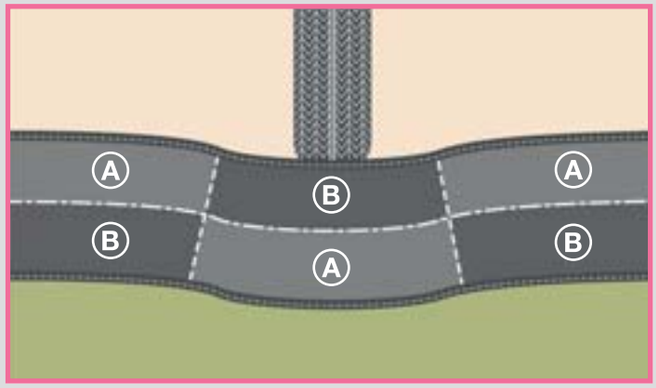
(Fig. 1) • MufleDrain installation underlying layer

Concrete

Compression strength R_{ck}

The concrete used for the channels' installation bed and props needs to be resistant enough to withstand the above-mentioned stresses due to the paving (fig. 2). Although concrete has high compression strength [R_{ck}], it has poor resistance to bending traction [F^{cfm}] (around 10% of R_{ck}): as this is directly proportional to R_{ck}, high compression-strength concrete should be used to oppose tensile stresses. When tensile stresses are very high (load classes E 600, F 900) a lightweight reinforcement framework should be used (electrowelded mesh or Ø8 rods with spacing 15 cm).

(Fig. 2) • Stresses induced in the paving



A = Stetched zone
B = Compressed zone

Consistency Class

The special geometry of the external side surfaces of the channels, made up of anti-torsion ribs and pre-arranged drains (for improved adhesion between concrete and polyethylene), the presence of a reinforcement framework (if any), and the little thickness of the installation layer and props make installation quite difficult.

(Fig. 3) • Segregation phenomena

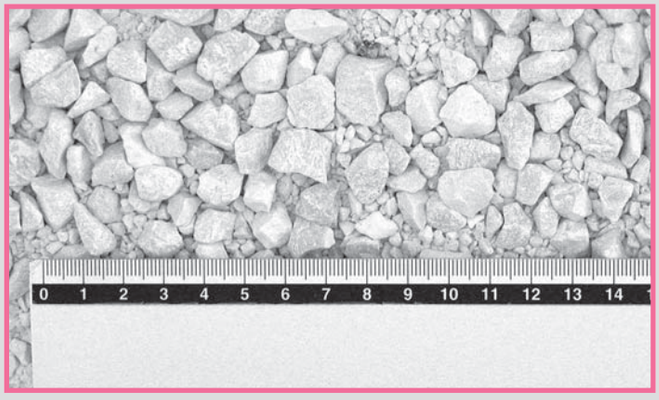
For this reason we recommend using a type of concrete that, when fresh, has high fluidity without causing segregation phenomena in the components (fig. 3).

Thanks to these characteristics the concrete is able to move easily inside the formwork as far as the least accessible areas. It is important to be able to achieve the right compactness in the concrete and to fill the slits completely and with no difficulty, i.e. by means of ordinary vibration means used on all building sites.
It is advisable therefore to use concrete with a class of consistency S4 (fluid) or better even S5 (superfluid) (UNI 9858, Ministry Guideline of LL.PP.) measured with Abrams' cone method (UNI 9418).

Consistency Class S5 is necessary where, for very heavy loads, reinforcement framework is provided for in the concrete used for installation.

Maximum diameter D_{max} of stone aggregate

(Fig. 4) • Maximum diameter D_{max}



The special geometry also requires a suitable maximum dimension or Maximum Diameter D_{max} in the stone aggregate.

To let the concrete reach the least accessible areas we recommend using stone aggregate with Maximum Diameter D_{max} of 15 mm (fig.4).

Fluidity of concrete		
Consistency Classes	**Cone slump (mm)**	**Name**
S1	10 ÷ 40	Damp
S2	50 ÷ 90	Plastic
S3	100 ÷ 150	Semifluid
S4	160 ÷ 210	Fluid
S5	>210	Superfluid

Waterproofness

Concrete is basically made up of a mixture of cement paste and stone aggregate. Each material has internal micro and macro cavities. Therefore it would not be correct to consider concrete a waterproof material in the real sense of the term. Standard UNI 9858 defines waterproofness as resistance against penetration of water (UNI 7699). According to this Standard a mixture is suitable to make waterproof concrete when the result of water penetration gives a maximum value smaller than 50 mm and average values smaller than 20 mm. Furthermore the water/cement ratio must not exceed 0,55.

Please note that Standard UNI 7699, mentioned in UNI 9858, only specifies water permeability; it does not provide for the measurement of waterproofness of water under pressure.
If this measurement is needed reference to ISO 7031 or DIN 1048 should be made. Following these rules, concrete which is almost waterproof will show (28 days after being laid) the following waterproofness value:

Darcy coefficient → $k=1 \bullet 10^{-11}$ [m/s]

i.e. it should have maximum waterproofness of 20 mm under maximum pressure 7 bars.
In practical terms, if waterproof concrete is needed, it is necessary to reduce the number and sizes of the internal cavities, as well as their connections especially with the external environment. This can be achieved with:

- low w/c ratio (0.4 - 0.5 recommended);
- adequate dose of cement (300 - 400 kg/m^3);
- good fluidity and resistance tosegregation so as to achieve adequate compacting of the cement;
- accurate drying and protection of the casting.

Waterproofness of concrete		
Ratio a/c	**Penetration of the water**	**Average penetration of the water**
< 0,55	<50 mm	< 20 mm

Durability

The useful life of a drainage system also depends on the durability of the concrete in which it is set.
Durability of a concrete structure means the ability to last over time while ensuring the function for which it was designed.
Contrary to what is often thought, concrete is not an indestructible material but one that deteriorates more or less quickly over time. For this reason you will need to analyse the deterioration phenomena and how they become apparent in order to increase the durability of concrete.

There are two main degenerative causes affecting concrete durability:

- The aggression due to substances present in the surrounding environment;
- The permeability of the mixture.

The causes of aggression and deterioration due to the external environment are subdivided as follows:

- Chemical
- Physical
- Mechanical

Generally such actions do not occur individually, but there are several causes that contribute to the deterioration of the material, even though it is always possible to detect the main cause that triggered the whole process.
Deterioration shows more or less strongly and quickly according to the permeability or porosity of concrete: a very porous material lets the aggressive agents reach the innermost tissue thus starting and spreading the degradation process much more easily and quickly.

Causes of aggression		
Chemical	**Physical**	**Mechanical**
Sulphatic attack	Ice-Thawing	Shocks
Carbon dioxide action	Hydrometric variations	Erosion
Chloride action	Hydration heat	Abrasion
Alkali action	Fire	
Industrial chemical agent action		

This clearly shows how essential it is to make virtually waterproof cement conglomerate that is able to oppose the penetration of aggressive agents. To this end, we recommend carefully assessing which actions of deterioration will take place during the usage period and using concrete that is able to oppose such actions. Special attention should be paid to the mixing, laying and drying processes.

The standards of reference are as follows: UNI 9858 “Concrete. Performance, production, laying and principles of conformity”, UNI 8981 “Durability of concrete construction and handwork”, Ministry Guideline of LL. PP., UNI EN 206-1 “Concrete. Specification, performance, production and conformity”.
Some schematic information on the most frequent degenerative processes is outlined below together with how to oppose them.

Drainage systems to be used in the Adriatic coastal area: Sensitivity to alkali

It has been seen that in the stone aggregate of the Adriatic coast there can be particular types of amorphous silica, opal and chalcedony which can react with the alkali in the cement thus giving rise to disruptive phenomena that take place through a network of cracks and small surface craters (pop-out) even over quite a long time.
Phenomena of this type can get under way in industrial pavings or along roads where de-icing salt is used. Possible solutions to prevent deterioration are as follows:

- To use stone aggregate not sensitive to alkali (Standard UNI 8520/22)
- Use of pozzolanic or blast furnace cement.

Drainage systems to use in very cold climates: Frost and thaw cycles

The alternate action of frost and thaw cycles can bring about disruptive phenomena caused by the penetration of water into the concrete pores. When the water freezes, its volume increases thus generating internal pressure that can cause cracks and crumbling. In order to prevent this type of degeneration:

- Use an aerating additive that develops air as microbubbles able to mitigate freezing stresses;
- Use frost-proof stone aggregate (Standard UNI 8520/20);
- Reduce concrete porosity.

Drainage systems to be used where sulphates are present

Sulphates - found in the water and in the ground - can react with the concrete mixture thus giving rise to swelling and expansion phenomena that can cause the progressive disruption of concrete even after some time.

In such cases, once the presence of sulphates has been ascertained, we recommend:

- Using sulphate-resistant cement;
- Using the least permeable concrete possible.

Resistance to fatigue

The plastic channel buried in a suitably made cement body can suffer breakage caused by concrete fatigue as a result of the repetitive action of the loads over time. The reasons behind this kind of fracture can be outlined as follows:

- The possible presence of microcracks, defects and cavities mainly located in the cement paste-stone aggregate interface makes the cement matrix weaker due to internal bleeding and the accumulation of calcium hydroxide crystals. Such microcracks can be emphasised by shrinkage and thermal changes (frost and thaw);
- The application of cyclic stresses higher than 50-60% of static-induced breaking stress causes the microcracks in the structure to expand and branch off;
- The increase in microcracks brings about the collapse by fatigue of the concrete matrix and consequently of the channel.

According to the above, we can say that the breaking of concrete due to fatigue occurs only when induced stress exceeds a certain value defined as Fatigue Limit.

If the material is subjected to compression stresses, this limit is equal to 60% of the resistance. It is 50% if breaking by fatigue is caused by bending tensile stresses.

Clearly enough, it is hardly ever possible to determine with sufficient accuracy the number of load cycles (vehicle passages etc.) before the collapse.
The problem can be solved by adopting a security factor S equal to 2. In this way, as the maximum tensile stresses affecting the concrete are equal to the Fatigue Limit (50% of resistance), breaking by fatigue cannot occur over an infinite number of passages

Apart from the number of passages, as a rough estimate during the design stage, a security factor ranging between 1,4 and 2,0 according to the type of load can be assumed.

NOTE
Please see the Sheet at the end of each Chapter about the specific installation of the different product lines.

ASVOX

STAINLESS STEEL WATER CHANNELLING SYSTEMS

MUFLE

STAINLESS STEEL WATER CHANNELLING SYSTEMS

ASVOX

ASVOX drainage systems developed by Mufle's laboratories are entirely made of stainless steel AISI 304. They are suitable for all the environments where hygiene plays a major role.

In particular, slotted and grid channels are equipped with a built-in inclination system which prevents any residues of solid materials and lets draining liquids flow quickly away.

The wide range of ASVOX products (including walk-over drains, drive-over and siphon gullies, slotted and grid channels as well as a wide choice of accessories such as filters and baskets) can be installed wherever large quantities of water must be drained in a short time. Their application is ideal in the following environments:

- agricultural and food industry (slaughterhouses, dairy farms, fish farms)
- food processing and preservation industry
- meat butcher's shops and slaughterhouses
- beverage industry
- chemical factories
- pharmaceutical factories
- industrial kitchens
- restaurant kitchens
- beauty product facilities
- hospitals
- laboratories
- cellars
- fish shops
- swimming pools
- showers

The products are easy to clean, let the water flow quickly away and can be entirely inspected. As a consequence they meet all the hygiene and cleanliness requirements specified in EC Standards.

Stainless-steel AISI 304 ensures high resistance to corrosion, very good mechanical resistance, excellent hygienic conditions, very good weldability, and 100% recyclability (eco-friendly products).

ASVOX stainless-steel drainage systems make it possible to create bespoke solutions suitable to solve any problem and meet any requirement such as depth, length, width, position of discharge outlets and inclination.

Focus on: Drains

- Walk-over drains with siphon made from AISI 304 STAINLESS STEEL
- Surface finish made through a pressure peening technique with AISI304-steel beads for more uniformity, water tightness and stainlessness
- Bell made through a drawing technique in order for the body of the drain not to show any welding, thus ensuring high safety and low proneness to attacks from stray currents - all welded parts may be subject to stray currents and consequently oxidation and breaking over time
- Screw for locking the washer supplied standard with all drains
- Bespoke packaging for higher product protection
- Possible introduction of filter

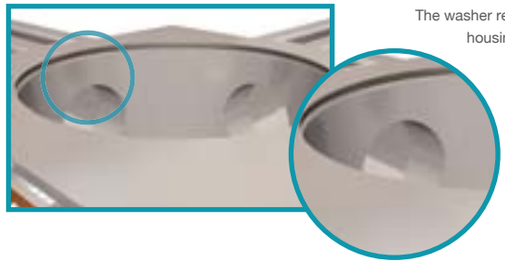
screw for fixing

filter

packaging

Focus on: Gullies

- Drive-over gullies made from AISI 304 STAINLESS STEEL
- Surface finish made through a pressure peening technique carried out with AISI304-steel beads for more uniformity, water tightness and stainlessness
- Bell made through a drawing technique in order for the body of the gully not to show any welding, thus ensuring high safety and low proneness to attacks from stray currents - all welded parts may be subject to stray currents and consequently oxidation and breaking over time
- Packaging for higher product protection
- Filter and/or basket included

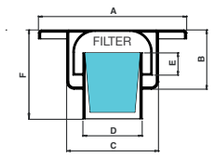


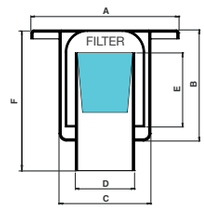
The washer rests on a right-angled housing specially designed for more steadiness.

The special attention paid to design together with the finishes ensure high safety and functionality standards.

SIPHONS FOR PEDESTRIAN

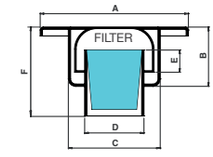
ASVOX

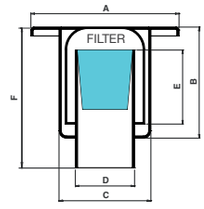




SIPHONS FOR PEDESTRIAN USE WITH VERTICAL OUTLET 100 x 100

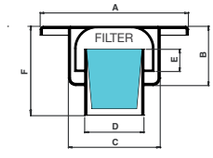
CODE	PRICE €	Frame A mm	Total Height F mm	Height of Bell B mm	Diameter of Bell C mm	Outlet Diameter D mm	Height of Siphon E mm	Flow lt/min
566000		100	70	40	Ø 62	Ø 40	15	12
566002		100	105	75	Ø 62	Ø 40	50	12

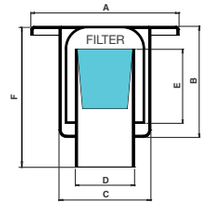




SIPHONS FOR PEDESTRIAN USE WITH VERTICAL OUTLET 150 x 150

CODE	PRICE €	Frame A mm	Total Height F mm	Height of Bell B mm	Diameter of Bell C mm	Outlet Diameter D mm	Height of Siphon E mm	Flow lt/min
566004		150	75	40	Ø 112	Ø 50	15	38
566006		150	110	75	Ø 112	Ø 50	50	38





SIPHONS FOR PEDESTRIAN USE WITH VERTICAL OUTLET 200 x 200

CODE	PRICE €	Frame A mm	Total Height F mm	Height of Bell B mm	Diameter of Bell C mm	Outlet Diameter D mm	Height of Siphon E mm	Flow lt/min
566008		200	80	40	Ø 160	Ø 63	15	46
566010		200	115	75	Ø 160	Ø 63	50	46

FILTERS

CODE	PRICE €	Diameter mm
566400		Ø 40
566401		Ø 50
566402		Ø 63

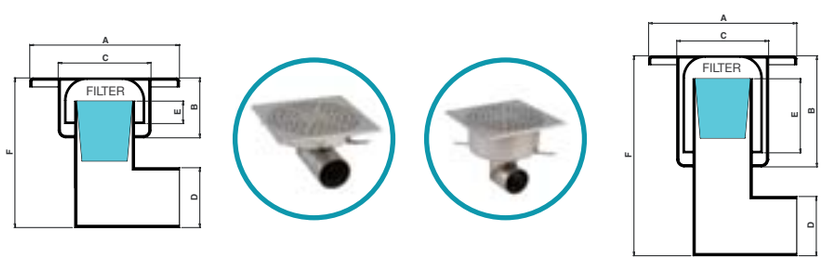
N.B. Dimensions and weights are subjected to the normal tollerance of the manufacturing process.

SIPHONS FOR PEDESTRIAN USE WITH HORIZONTAL OUTLET 100 x 100

CODE	PRICE €	Frame A mm	Total Height F mm	Height of Bell B mm	Diameter of Bell C mm	Outlet Diameter D mm	Height of Siphon E mm	Flow lt/min
566001		100	100	40	Ø 62	Ø 40	15	12
566003		100	135	75	Ø 62	Ø 40	50	12

SIPHONS FOR PEDESTRIAN USE WITH HORIZONTAL OUTLET 150 x 150

CODE	PRICE €	Frame A mm	Total Height F mm	Height of Bell B mm	Diameter of Bell C mm	Outlet Diameter D mm	Height of Siphon E mm	Flow lt/min
566005		150	95	40	Ø 112	Ø 50	15	38
566007		150	145	75	Ø 112	Ø 50	50	38



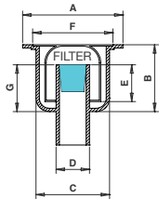
SIPHONS FOR PEDESTRIAN USE WITH HORIZONTAL OUTLET 200 x 200

CODE	PRICE €	Frame A mm	Total Height F mm	Height of Bell B mm	Diameter of Bell C mm	Outlet Diameter D mm	Height of Siphon E mm	Flow lt/min
566009		200	105	40	Ø 160	Ø 63	15	46
566011		200	155	75	Ø 160	Ø 63	50	46

N.B. Dimensions and weights are subjected to the normal tollerance of the manufacturing process.

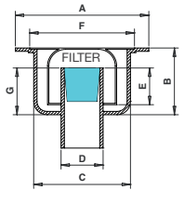
SIPHONS FOR DRIVEWAY USE

ASVOX



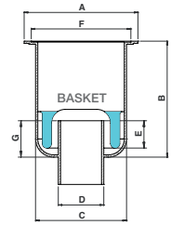
SIPHONS FOR DRIVEWAY USE 150 x 150

CODE	PRICE €	Frame A mm	Height off Bell B mm	Diameter off Bell C mm	Outlet Diameter D mm	Height of Outel G mm	Height of Siphon E mm	Washer Outlet F mm	Concentrated Load kg	Distributed Load kg	Flow lt/min
566500		150	85	Ø 110	Ø 50	70	55	Ø 120	1000	5000	38



SIPHONS FOR DRIVEWAY USE 200 x 200

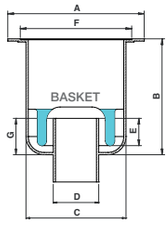
CODE	PRICE €	Frame A mm	Height off Bell B mm	Diameter off Bell C mm	Outlet Diameter D mm	Height of Outel G mm	Height of Siphon E mm	Washer Outlet F mm	Concentrated Load kg	Distributed Load kg	Flow lt/min
566501		200	100	Ø 145	Ø 63	70	55	157	1000	5000	46



SIPHONS FOR DRIVEWAY USE 250 x 250

CODE	PRICE €	Frame A mm	Height off Bell B mm	Diameter off Bell C mm	Outlet Diameter D mm	Height of Outel G mm	Height of Siphon E mm	Washer Outlet F mm	Concentrated Load kg	Distributed Load kg	Flow lt/min
566502		250	130	Ø 200	Ø 100	80	60	219	850	6500	130
566503		250	255	Ø 200	Ø 100	80	60	219	850	6500	130
566504		250	305	Ø 200	Ø 100	80	60	219	850	6500	130

N.B. Dimensions and weights are subjected to the normal tollerance of the manufacturing process.



SIPHONS FOR DRIVEWAY USE 300 x 300											
CODE	PRICE €	Frame A mm	Height off Bell B mm	Diameter off Bell C mm	Outlet Diameter D mm	Height of Outel G mm	Height of Siphon E mm	Washer Outlet F mm	Concentrated Load kg	Distributed Load kg	Flow lt/min
566505		300	130	Ø 220	Ø 100	80	60	245	850	6500	130
566506		300	255	Ø 220	Ø 100	80	60	245	850	6500	130
566507		300	305	Ø 220	Ø 100	80	60	245	850	6500	130

SIPHONS WITH 1-4 COUPLINGS		
Dimension mm	H. Bell B mm	Outel D mm
250 x250	250	Ø 100
250 x 250	300	Ø 100
300 x 300	250	Ø 100
300 x 300	300	Ø 100

For the details of the siphon with coupling please contact our Technical Dept.

N.B. Dimensions and weights are subjected to the normal tollerance of the manufacturing process.

SLOTTED CHANNEL

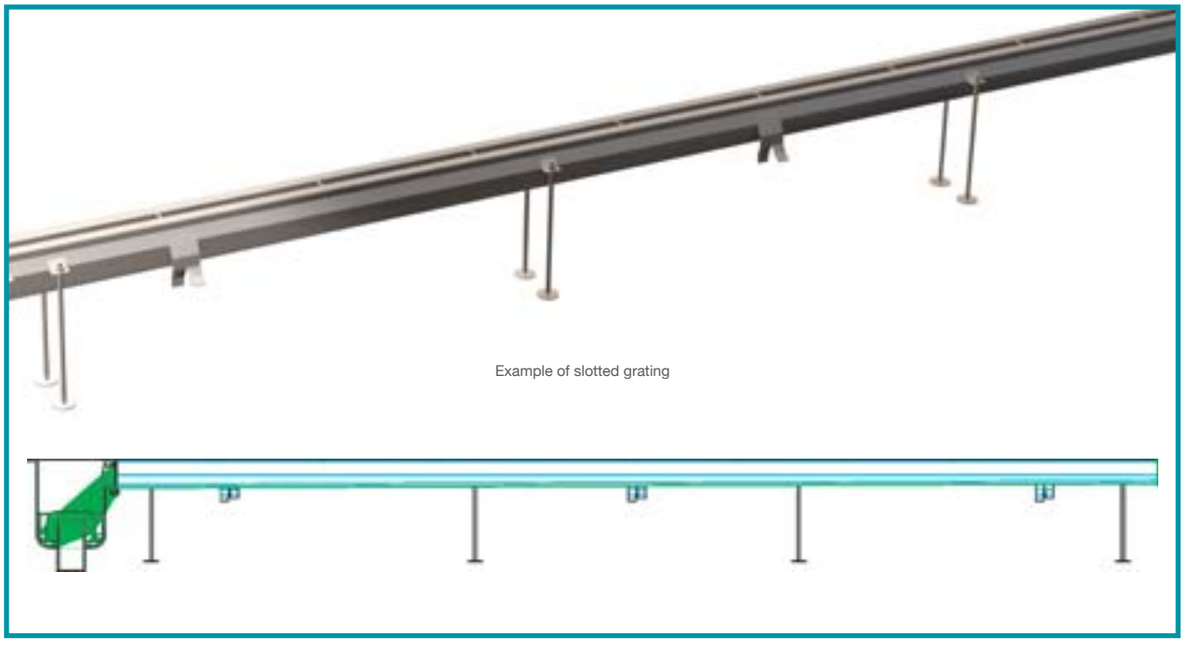
ASVOX

- Slotted channels entirely made from AISI 304 STAINLESS STEEL
- Structure designed to withstand high loads
- Length from 1 to 36 metres in 3-metre modules
- Built-in continuous inclination 0.4% per linear metre
- Assembly through screw flanging and watertight silicone gasket
- Side anchoring clamps supplied standard, adjustment screws and levelling feet for the best position of the channels during installation.

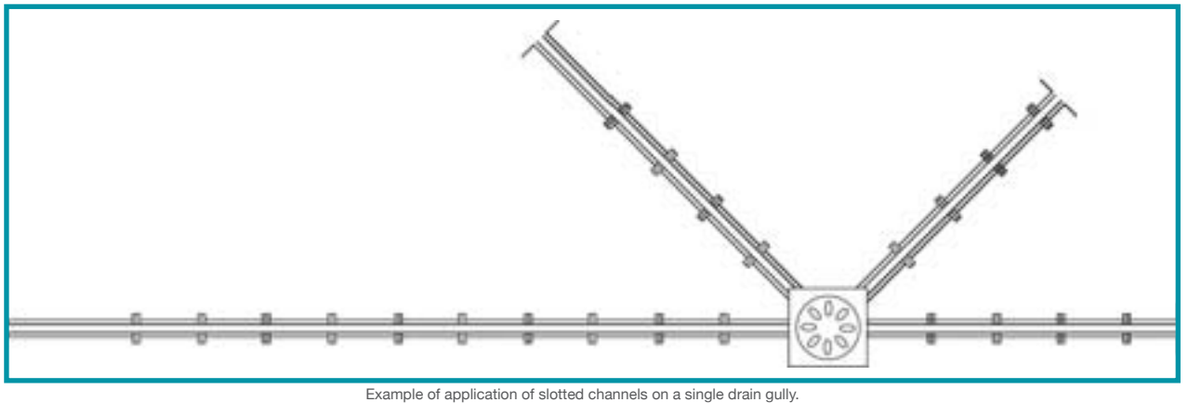
The channels collect the water and convey it to gullies with siphon. The gullies can provide several collection points. They are able to house 1 to 4 couplings and come equipped with an extractable basket. They are thoroughly inspectable.

To ensure utmost safety all Asvox channels undergo technical checks - preassembling and relevant testing - after production.

In order to meet any requirement from our customers, designing and manufacturing can be customised based for bespoke solutions.



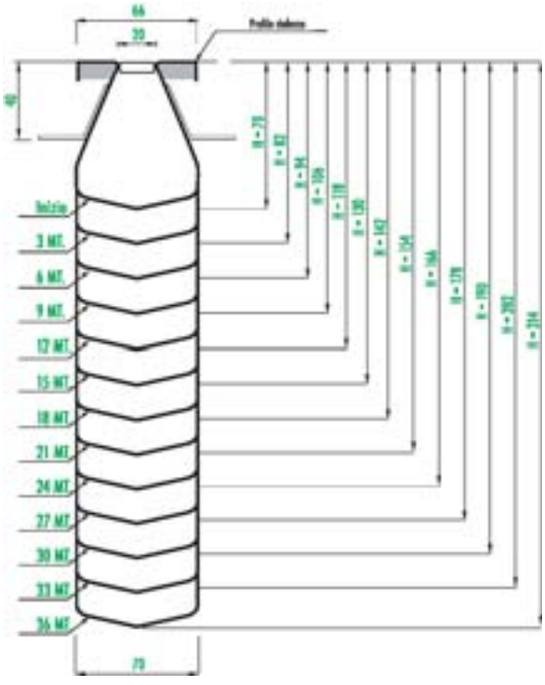
Example of slotted grating



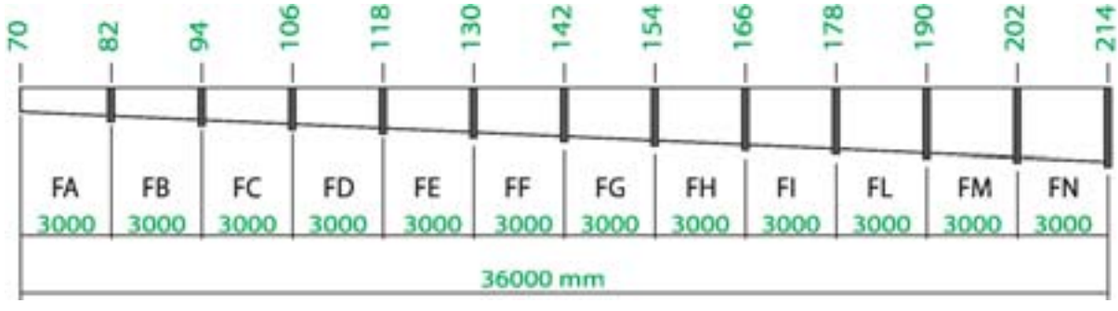
Example of application of slotted channels on a single drain gully.

N.B. Dimensions and weights are subjected to the normal tollerance of the manufacturing process.

CHANNEL ASSEMBLY DIAGRAM



PROFILE OF STRENGTHENING ELEMENT



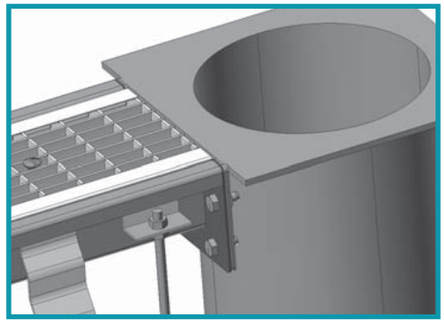
All channels are fitted with flanges, adjustable legs for the positioning and levelling, silicon gaskets and fixing systems like bolts, nuts and washers.

N.B. Dimensions and weights are subjected to the normal tollerance of the manufacturing process.

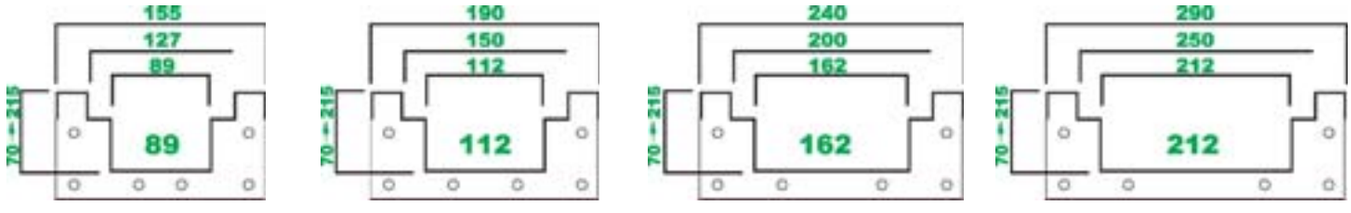
CHANNEL WITH GRATING

ASVOX

- Channels with grating entirely made from AISI 304 STAINLESS STEEL
- Rectangular-section internal structure for higher liquid storage and flow capacities
- Four different modules with inner widths 89, 112, 162 and 212 mm are available
- Lengths 1 to 36 metres
- Built-in continuous inclination 0.4% per linear metre
- Assembly through screw flanging and watertight silicone gasket
- Side anchoring clamps supplied standard; adjustment screws and levelling feet for the best position of the channels during installation.
- The gratings can be chosen and - upon request - can be fixed through a screw and bar system



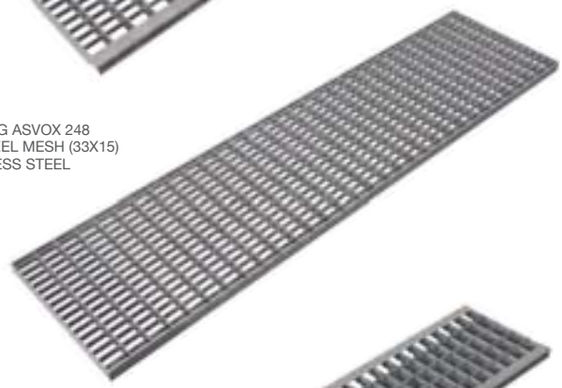
Asvox channels with grating are available in 4 different sizes:



N.B. Dimensions and weights are subjected to the normal tollerance of the manufacturing process.

GRATING ASVOX 198
ANTI-HEEL MESH (33X15)
STAINLESS STEEL

GRATING ASVOX 248
ANTI-HEEL MESH (33X15)
STAINLESS STEEL



GRATING ASVOX 198
SQUARE MESH (33X33)
STAINLESS STEEL

GRATING ASVOX 248
SQUARE MESH (33X33)
STAINLESS STEEL

GRATING VIP$_{20}$ 150
SLOTTED
STAINLESS STEEL

ANTI-HEEL MESH GRATING (33X15)

CODE	PRICE €	DESCRIPTION OF GRATING	LOAD CLASS
566319		ASVOX 125	A15
566313		ASVOX 148	A15
566315		ASVOX 198	A15
566317		ASVOX 248	A15
566320		ASVOX 125	B125
566321		ASVOX 148	B125
566322		ASVOX 198	B125
566323		ASVOX 248	B125
566328		ASVOX 125	C250
566329		ASVOX 148	C250
566330		ASVOX 198	C250
566331		ASVOX 248	C250

SQUARE MESH GRATING (33X33) STAINLESS STEEL

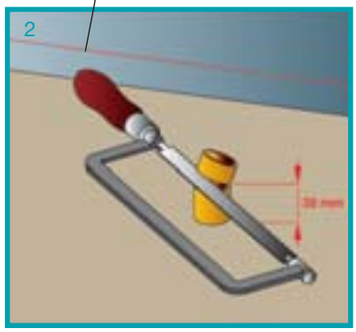
CODE	PRICE €	DESCRIPTION OF GRATING	LOAD CLASS
566318		ASVOX 125	A15
566314		ASVOX 148	A15
566312		ASVOX 198	A15
566316		ASVOX 248	A15
566324		ASVOX 125	B125
566325		ASVOX 148	B125
566326		ASVOX 198	B125
566327		ASVOX 248	B125
566332		ASVOX 125	C250
566333		ASVOX 148	C250
566334		ASVOX 198	C250
566335		ASVOX 248	C250

SLOTTED GRATING STAINLESS STEEL

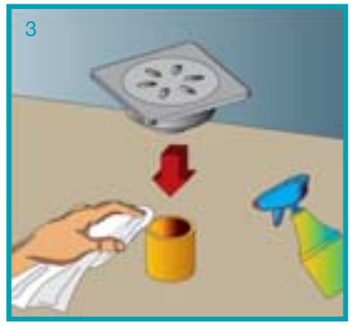
CODE	PRICE €	DESCRIPTION OF GRATING	LOAD CLASS
507123		SKIP 100	A15
502129		VIP$_{20}$ 100	A15
502133		VIP$_{20}$ 150	A15

N.B. Dimensions and weights are subjected to the normal tollerance of the manufacturing process.

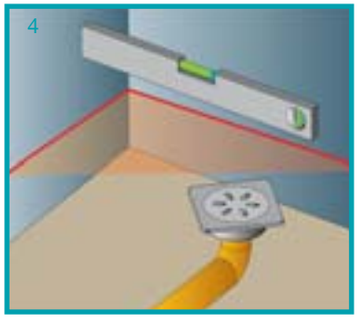
1 - Clean the mouth and apply a protection film on the top section of the drain.
(Fig. 1)



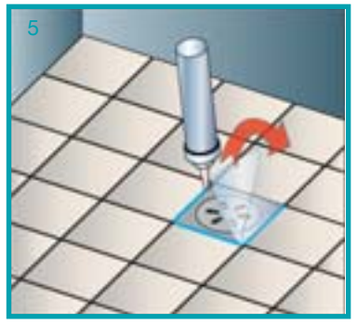
2 - Cut or extend the drain pipe according to the height of the completed flooring.
(Fig. 2)



3 - Lubricate with water or silicone and carefully clean the mouth of the pipe. Carry out the connection to the piping with glue or a coupling system.
(Fig. 3)



4 - Align and level the drain (rotation and adjustment) based on requirements.
(Fig. 4)



5 - Join the drain to the tiles with silicone. Remove the protection film when opening.
Clean the drain with neutral products.
(Fig. 5)

PRATO

PROTECTIVE SYSTEM FOR GRASS AREAS

PROTECTIVE SYSTEM FOR GRASS AREAS

PRATO

PRACTICAL

PRATO is a practical system that makes it possible to turn any surface into a green area.
This innovative product makes it possible to create a “green flooring” where the drive-over lawn is protected by any damage caused by the passage and halts of vehicles, trucks included.

ENVIRONMENTALLY-FRIENDLY

PRATO is the environmentally-friendly system par excellence in that it is completely made of recycled PP (Polypropylene) that can be recycled again.

LIGHTNESS, CHEMICAL RESISTANCE, STURDINESS

PRATO is the epitome of lightness (no machines are need for installation), chemical resistance (contacts with aggressive liquids cause no deterioration) and sturdiness (exceptional resistance to shocks). In the summer PRATO does not bring about any unwanted thermal expansion due to overheating; and in cold winters it is not subject to cracking due to frost and thaw cycles.

TESTS

PRATO is subject to strict laboratory tests. The tests performed (e.g. steady-temperature compression strength) showed the product has a high resistance to loads, even high loads.

IMPROVE THE ENVIRONMENT

PRATO is the ideal solution to improve the environment we live in. To use PRATO means to make room for the green areas, thus remarkably improving the surrounding environment thanks to the creation of more enjoyable environmentally-friendly surfaces. PRATO is hardly visible once the grass has grown - with no impact on the environment.

VERSATILE

PRATO is versatile: it can be easily cut with ordinary tools or removed for inspection/maintenance work, if needed.

LONG LIFE AND HIGH RESISTANCE TO THE EXTERNAL ENVIRONMENT

Fig. 1 • Standard grid surface subject to -40° temperature

The material used ensures excellent performance even in extreme climatic condition from -40°C to +100°C (figures 1 and 2), as the low coefficient of linear thermal expansion of polypropylene does not allow the element to become longer or shorter, as long as it is used in the recommended temperature range. Therefore PRATO is not subject to deformation due to temperature; and the grid surface is uniform and flat (fig. 3).

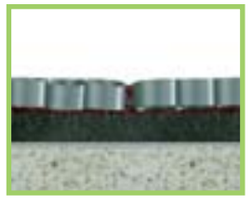


Fig. 2 • Standard grid surface subject to +100° temperature

Finally, the low water absorption coefficient of polypropylene makes sure the elements do not retain any water inside the molecular structure and consequently do not increase in volume in the event of frost, as this could damage their structure.

PRATO also withstands shocks, UV rays, fertilising chemicals and bacteria in the soil.

Fig. 3 • Protection system PRATO subject to extreme climatic conditions

ABSENCE OF MECHANICAL JOINTS

The coupling between one module and the following module is ensured by an overlapping system; no mechanical hooks are needed.

NON-TOXICITY

The product, once in operation, does not release any chemicals harmful to the environment or the stratum.

HIGH COMPRESSION STRENGTH

PRATO was tested in order to determine its resistance to crushing.
The ultimate tensile stress per surface unit was defined through a compression test by means of an oil-pressure press with 20°C conditioned temperature. An average resistance value of over 130 tons/m2 was achieved.

EXCELLENT DRAINING CAPACITY

The wide openings on the bottom (approximately 90% the total area) ensure the passage of rainwater through the soil as far as the stratum below. This allows an excellent exchange of air and nourishing substances at the same time (fig. 4).

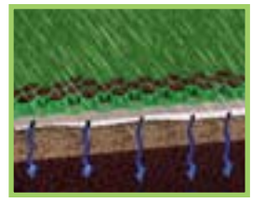


Fig. 4 • PRATO makes it possible to restore the natural draining system in the soil

READY-TO-USE

Immediately after installation it can be walked and driven over.

IDEAL CONDITION FOR THE LAWN ROOTS

Fig. 5 • The hexagonal cells allow the formation of transversal branches from the roots that make them more resistant to uprooting

Thanks to the excellent characteristics of the material PRATO is made of and thanks to its shape, the soil inside each hexagonal cell (fig. 5) is always in ideal thermal and hygrometric condition. This ensures a longer life for the grass tufts, as the roots enjoy the right balance for their survival. The hexagonal cells of each tile are in touch with each other. This results in transversal branches from the roots that make them more resistant to uprooting.

The PRATO green surfaces have a long life, as long as they are turfed according to our instructions: the bulbs are to be buried 1 centimetre away from the upper edge of the cell not to be removed by the cars or washed away by rainwater. Also, when the grass tufts have grown up, they get “mowed” by the wheels of the cars so that the height of the lawn stays the same.

PROTECTION AGAINST ANY FLATTENING

PRATO makes it possible to equip all soil surfaces by protecting the grass against any flattening or sinking (figures 6 and 7).

Fig. 6 • Surface without PRATO

Fig. 7 • Surface with PRATO

EASY TRANSPORTATION AND INSTALLATION

Each PRATO module weighs 800 grams, i.e. just above 4 kg/m2. The whole system is consequently very lightweight and easy to transport and to install without any machines; and it is quickly cut with any tool.

Two operators are enough to install over 200 m2 of PRATO a day!

STABILITY

Each PRATO module is equipped with 9 spikes (fig. 8) to be fitted into the underlying layer to increase grip and stability. Consequently the product can be used in little slopes too.

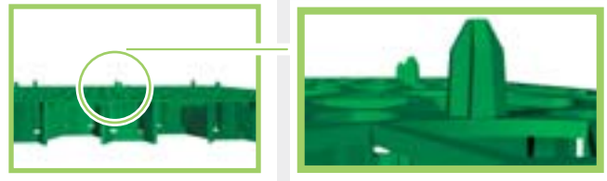
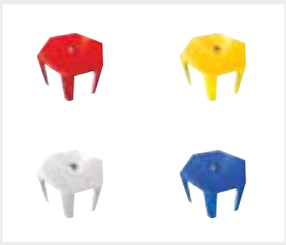


Fig. 8 • The steadiness of PRATO is ensured by 9 spikes in each element

COLOURS

The basic colour is green, but out Technical Department will consider customised colours upon request.

INSERTS



PRATO comes equipped with coloured “Inserts” used to give indications or mark off parking spaces or special areas such as for loading/unloading goods, for disabled persons and/or other reserved areas.
For example, to mark off a parking space from the surrounding area: 40 blue inserts for public or paying parking lots; 40 white inserts for non-paying parking areas; 40 yellow inserts for reserved parking areas*.
The inserts are available in white, yellow and blue according to the safety standards for road signs, as well as in red.

To make stylised drawings on the ground and to identify the relevant usages, ready-made KITS are available which include enough inserts to:

- show the symbol “P” for “PARKING”: 25 inserts (fig. 9);
- create the symbol “R” for “RESERVED”: 29 inserts (fig. 10);
- create the road sign for the area reserved to disabled persons: 40 inserts (fig. 11).

Fig. 10 • Restricted area

Fig. 9 • Parking area only

Fig. 11 • Area reserved to disabled persons

BENEFITS

The consistent height of the hexagonal cells allows the grass to grow uniformly.
(Fig. 12)

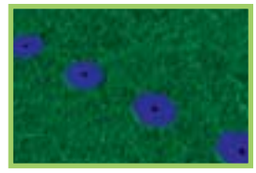


Fig. 12 • Detail of hexagonal shape

The steadiness of the surface is ensured by the height of the cells: 5 centimetres.
(Fig. 13)

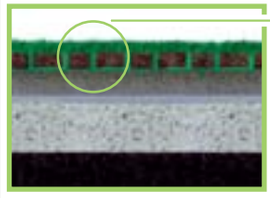


Fig. 13 • Height of cells

The special structure ensures both maximum bulb protection and self-trimming capability when driven over.
(Fig. 14)

Fig. 14 • Self-trimming

The size of the module was optimised to ensure quick installation.
(Fig. 15)

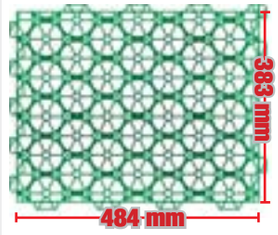
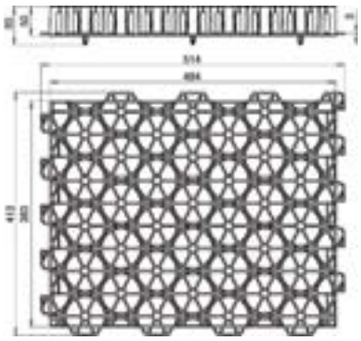


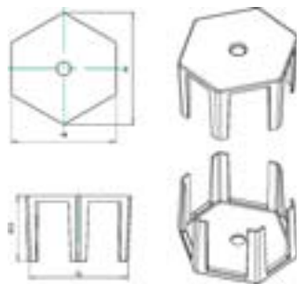
Fig. 15 • Size of module

* Valid for the Italian territory only

GRID	
Length (mm)	484
Width (mm)	383
External heigh (mm)	50
Stud height (mm)	15
Number of studs	9
Material	PP (Polypropylen)
Weight (Kg)	0,800
Pieces per square metre	5,3 ca.
Standard colour	Green
Load capacity 20°C	1.300 kN/ m^2



INSERT	
Length (mm)	76
Width (mm)	81
External heigh (mm)	47,5
Material	PP (Polypropylen)
Weight (Kg)	0,02
Color	White, Yellow, Blue, Red
Pieces per box	20



MATERIAL - POLYPROPYLENE		
CHARACTERISTIC	UNIT	PP
Density	g/cm^3	0,895-0,900
Elasticity modulus E (DIN 53457)	MPa	600-1.200
Tensile strength (DIN 53455)	N/mm^2	21/37
Elongation (DIN 53455)	%	10-18
Melting point	°C	135-155
Thermal expansion coefficient	mm/°C	$15x10^{-5}$
Dielectric constant at 100 Hz	-	2,3
Water absorption at 23°C	%	< 0,2

N.B. Dimensions and weights are subjected to the normal tollerance of the manufacturing process.

TRUCK WITH HIGH LOAD CAPACIT	
Pallet dimension (mm)	1000 x 1200
Pallet height (mm)	2570
Pieces per pallet	294
Square metres for a pallet	55,5

Example: a high-load-capacity truck comprises 28 pallets (1000 x 1200 x 2570 mm) for tot. 8,232 pieces (294 pieces x 28), i.e. 1,554 m^2 (55.5 m^2 x 28).

BILICO	
Pallet dimension (mm)	1000 x 1200
Pallet height (mm)	2370
Pieces per pallet	270
Square metres for a pallet	51,0

Example: a semitrailer comprises 26 pallets (1000 x 1200 x 2370 mm) for tot. 7,020 pieces (270 pieces x 26), i.e. 1,326 m^2 (51.0 m^2 x 26).

INSERT	
Size of box (mm)	300 x 200 x 100
Pieces per standard package	20

Kit Inserts

Driveways and access surfaces for cars and motor vehicles;

Consolidation of small sloping pieces of ground and yielding roadsides;

Sports facilities, hospitals, schools;

Private and public parking areas;

Decorative lay-bys;

Pedestrian precincts and cycle lanes;

Amusement parks and gardens;

Fair and exhibition areas;

Parking areas for caravans and camper vans;

Gravel or crushed - stone pathways*.

CASE 1

PREPARATION OF A DRIVE-OVER DRAINING SURFACE WITH A NATURAL LAWN

1. Preparation and installation of a 15/30 cm-layer made of quarry stabilised material in order to compact the soil and make it possible to drain it and drive over it.

2. Laying of continuous-wire Non Woven Fabric made of a mechanically needlepunched polypropylene mesh (400 gr/m^2) suitable to withstand road loads.

3. Preparation of the installation surface of PRATO by supplying and arranging siliceous sand or fine crushed stone to achieve a thickness of approximately 3/4 cm.

4. Supply and installation of PRATO type elements with the following technical features: PP material (Polypropylene) regenerated, that withstands UV rays and loads over 130 tons/m2, with a free surface able to drain water and let the grass grow that is not less than 90%. Also, it must be perfectly suitable for exchanges between air, water and nourishing substances and free from any mechanical joints in order to allow normal thermal expansion. Inserts may be used to mark off pathways and areas. The dimensions of an individual element will be: length (mm) 484, width (mm) 383, height (mm) 50. At least 9 ground-anchoring spikes will be used for each element.

5. Preparation of a natural-lawn surface with a PRATO type grid, including:
Partial filling (50%) of the PRATO cells with a mixture made up of siliceous sand, peat-enriched vegetable earth, organic humus and manure;
Supply and sowing of lawn essence of the types and in the quantities most suitable to the climatic characteristics of the place;
Subsequent covering of the seeds with vegetable earth for approximately 2 cm in thickness, including all actions needed to optimise the finished product and make it ready to withstand loads.

6. Supply and installation of PP inserts (white, yellow, blue or red) to mark off lay-bys and create road signing. The inserts shall be fitted into the special housings in the PRATO grid according to the Works Management's requests.

CASE 2

PREPARATION OF A DRIVE-OVER DRAINING SURFACE WITH GRAVEL

1-2-3-4 Same operations needed to prepare a drive-over draining surface with a lawn.

5. Preparation of a gravel surface in the grid of PRATO type by supplying and installing either 4/7 mm quarry grit or gravel until the cells are thoroughly filled in.

6. Same operations needed to prepare a drive-over draining surface with a lawn.

* In gravel pathways PRATO tiles prevent crushed-stone dispersal. Consequently there is no need to add crushed stone on a regular basis.

1. Preparation of the underlying layer

The type of underlying layer to be made depends on both the geotechnical characteristics of the ground and the loads affecting the area where PRATO is to be installed. Two different cases are possible:

a. areas subject to vehicular traffic;
b. areas subject to pedestrian traffic.

In case a. prepare the ground by making up a 30 cm-thick permeable quarry stabilised material or gravel mixed material to be compacted and levelled perfectly in 10 cm-thick layers - water drainage through the layer must be ensured.
(fig. 16)
In case b. the preparation is similar to case a., but a 15 cm-thick layer is enough.

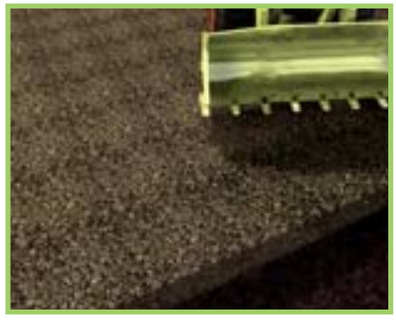


Fig.16 - Preparation of the underlying layer

2. Preparation of NON WOVEN FABRIC installation

The 400 gr/m2 Tessuto non Tessuto layer (fig. 17) has the double function of preventing weeds from growing out of the layers below and holding the finest parts, which make up the layers above (see Par. 3.) and could be carried by infiltration water, thus making the roadway weaker.

Fig.17 - **preparation of Non Woven Fabric installation**

3. Preparation of the installation surface

The installation plane for PRATO will be made of siliceous sand or fine crushed stone with good mechanical resistance and granulometry not above 6/8 mm. This laye, with thickness not lower than 3/4cm, must be properly compacted and levelled.
(fig. 18)

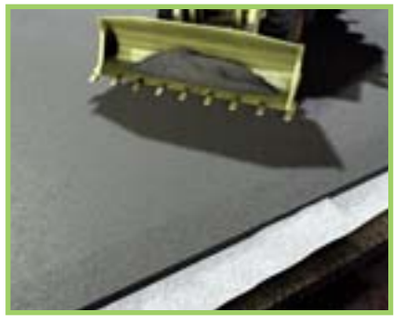


Fig.18 - **Preparation of the installation surface**

4. Installation of the grass grid

To carry out this operation just hook to each other the different elements, which have a smaller size and are consequently lighter in weight and easier to handle.
(fig. 19)
No mechanical tools are needed. Assemble the elements by means of staggered joints (male/female).
(fig. 20)

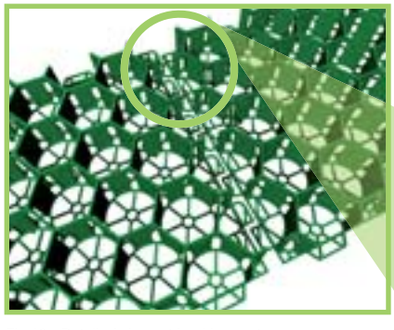


Fig.19 - Detail of element hooking system

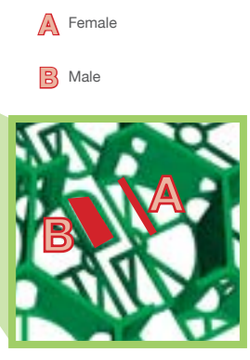


Fig. 20 - Male-female coupling

The mortises along the sides of the PRATO grid must be arranged alternatively above and below the mortises of the adjoining element; they must be held in position and the height must be always the same (fig. 21). PRATO can be easily shaped and adapted to all profiles, but 3/4 cm must be left between the obstacle opposite (such as a well, kerb, pavement etc) and the last row of the grid. In order to overcome any grip problems in slopes, each PRATO element has 9 spikes to be driven into the ground that are able to ensure the grid's stability.

5. Advice on assembling

1. Arrange the grids in the same direction
(considering always the width or always the height as the base)

2. Build the perimeter required (fig. A)

3. Place the following grid starting from point 1

4. Follow the numbers shown in the figure to carry on assembling

6. Filling the cells

The PRATO cells can be filled with a mixture of vegetable earth, peat and sand or gravel (figures 22 and 23). Before sowing the lawn with high-quality grass seeds, remember to irrigate the whole area in order to lower the soil level by approximately 1 cm and thus to prevent the seeds from getting lost - the seeds must be protected inside the cells.

In the days following the sowing operation, we advise manuring and irrigating the soil frequently until the grass tufts have actually taken root.
N.B. Do not carry out any installation work (as described under Par. 1, 2 and 3) if the temperature is lower than 2°C.

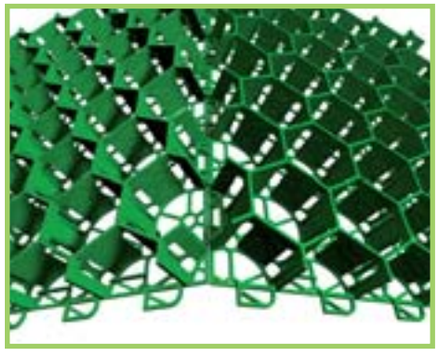


Fig. 21 - Predisposizione elementi/ Preparation of elements

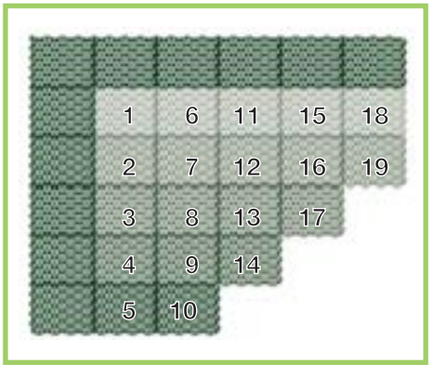
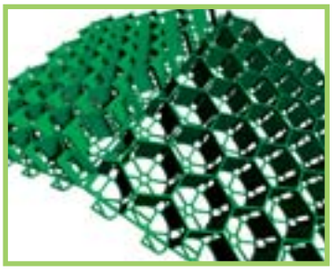
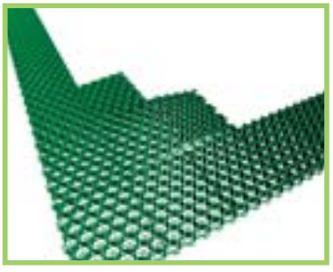


Fig. A



Particolare montaggio di 2 moduli
Detail of assembling of 2 modules



Particolare montaggio di più moduli
Detail of assembling of several modules

Fig. 22 - Riempimento con miscela
Filling with mixture

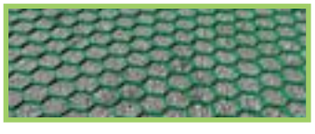
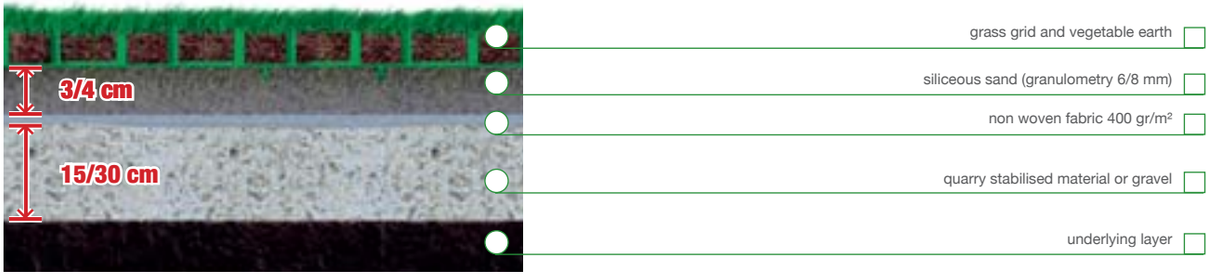


Fig. 23 - Riempimento con ghiaia
Filling with gravel



Arrangement of layers

PRATO has been designed and manufactured in compliance with the quality procedures specified in ISO 9001:2000.

The tests needed to determine the breaking load per surface unit (1 m^2) of PRATO were performed at the LABORATORIO GEO-TECNOLOGICO EMILIANO.

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