PAG®

CAST IRON DRAINAGE TECHNOLOGY

PIPE, FITTINGS & COUPLINGS CATALOGUE

2025/1

www.aydinglobal.com

contents

PAG®
CAST IRON DRAINAGE TECHNOLOGY

Incorporating 5 different companies, AYDINGROUP, dating back to 1974, is one of the most important establishments leading pipe sector in Turkey for many years.

AYDIN GLOBAL, within Aydın Group, entered into cast iron pipe industry with a new brand upon seeing the demand for innovation in increasingly developing cast iron pipe and fittings industry .

The group puts its power in the field of seamless pipe into the service of mechanical installation sector for waste water and rain drain pipes with PAG® brand.
Long standing market experience of the management of company in the field of cast-iron pipe brought a new alternative to the sector.

Determination of the fact that pvc-based pipes accelerated fire transfer regarding the fires occurred in high buildings in the world, especially in the recent did not escape the attention of public and it was observed that the use of cast iron-pipe in waste water lines has increased every year.

Routine use of cast-iron pipe rapidly increases especially in shopping malls, hospitals, hotels and residences in the category of high buildings where human density is high.

Aydın Global offers high level of inventory, price advantage and full certification thanks to recently created PAG® brand, the first cast-iron pipe brand in our region.

PAG® brand aims to turn the competition in the market to the advantage of installation sector.

ADVANTAGES OF PAG®
CAST IRON DRAINAGE SYSTEMS

Cast iron drainpipes with lameller graphite are the most suitable type of pipe for drainage of rain and wastewater from buildings.

Since the beginning of 80's in Europe, cast-iron waste water systems with couplings replaced old model drainage pipes with socket.

- Included in Class A non-combustible building materials category, cast iron pipes do not contribute to the fire development, they have no thermal load.
- In fires, people generally lose their lives due to intoxication.
  Smoke generation is not available in cast iron pipes.
- Following the tests, it was ascertained that cast iron pipes and fittings maintain their structure and functionality during fire.
- Cast iron pipes are environmentally friendly. They are made of recyclable material and recycled again.
- Cast iron pipes minimizes noise due to drainpipes in the buildings.
- It is possible to cut cast iron pipes quickly in the desired dimensions with proper tools.
- No cracking risk in low temperatures.
- It is easy to lay them into the concrete, it is especially suggested in raft foundation applications.
- PAG Rapid couplings ensure fast and reliable connection with high sealing characteristics.
- Own internal structure of cast iron pipes is rather resistant to positive and negative internal pressure even to a large extent.

- Cast iron pipes never produces thermal expansion as in PVC pipes. (Plastic pipes are likely to become shorter and longer based on temperature and they may cause problems at connection points.
- In comparison to plastic pipes, cast iron pipes are least likely to be broken with impact once fittings have been installed.
- Due to their seamless structure, they are available for cutting and using even in very short lengths, rate of waste is close to almost zero.
- Once the installation is completed, extra parts can be recycled without any problem.
- In comparison to its rivals, PAG cast iron pipes and fittings offers its customers the same quality in better conditions.

SML STANDARTS

EN 877 I This standard covers mechanical specifications, materials, dimensions and tolerances, composition and coating requirements for the pipes, fittings and couplings. Furthermore, requirements of DIN 19522 and ISO 6594 were exceeded with this standard.

EN 12056 I This standard includes design and calculation of in-building gravity wastewater drainage systems. It further covers;

- General and performance requirements
- Roof drainage plan and calculation
- Planning and calculation of wastewater lifting plants
- Instructions for installation, test, operation, maintenance and usage.

EN 752 I Standard for outdoor rainwater and wastewater drainage systems.

CE I This standard is required for certifying compliance of the product with free trade under EU. Implementation of CE mark is subject to a declaration of performance (DOP). CE mark is not based on third party quality tests. Only flammability test is enough. Manufacturer certifies that the product is in compliance with CE.

EN1561 I Standard for the products made of cast iron with lamellar graphite.

EN 14366 I Standard for measuring the level of noise in wastewater installations (German National Standard: DIN 4109)

EN 1610 I Standard for the tests and construction of Contaminated water channels and drain systems.

Moreover, PAG SML piping systems are in compliance with any applicable local, European and International standards.

MATERIAL SPECIFICATIONS (EN 877 Requirements)

Density
Around 7,2 kg/dm ^{3} (71,5 kN/m^3)

Tensile Strength
For fittings ≥ 150 MPa
For pipes ≥ 200 MPa

Compressive Strength
Approx. 3 to 4 times of Tensile Strength

Shear Strength
Approx. 1,1 to 1,6 times of Tensile Strength

Crushing Strength
(Maximum compression strength ≥ 350 MPa

Modulus of Elasticity
Between 8 x 104 ile 12 x 104 N/mm^2

Poisson's Ratio
~(0,3)

Heat Resistance
PAG SML, complies to A2 fire class according to E13501 standard-fireproof*

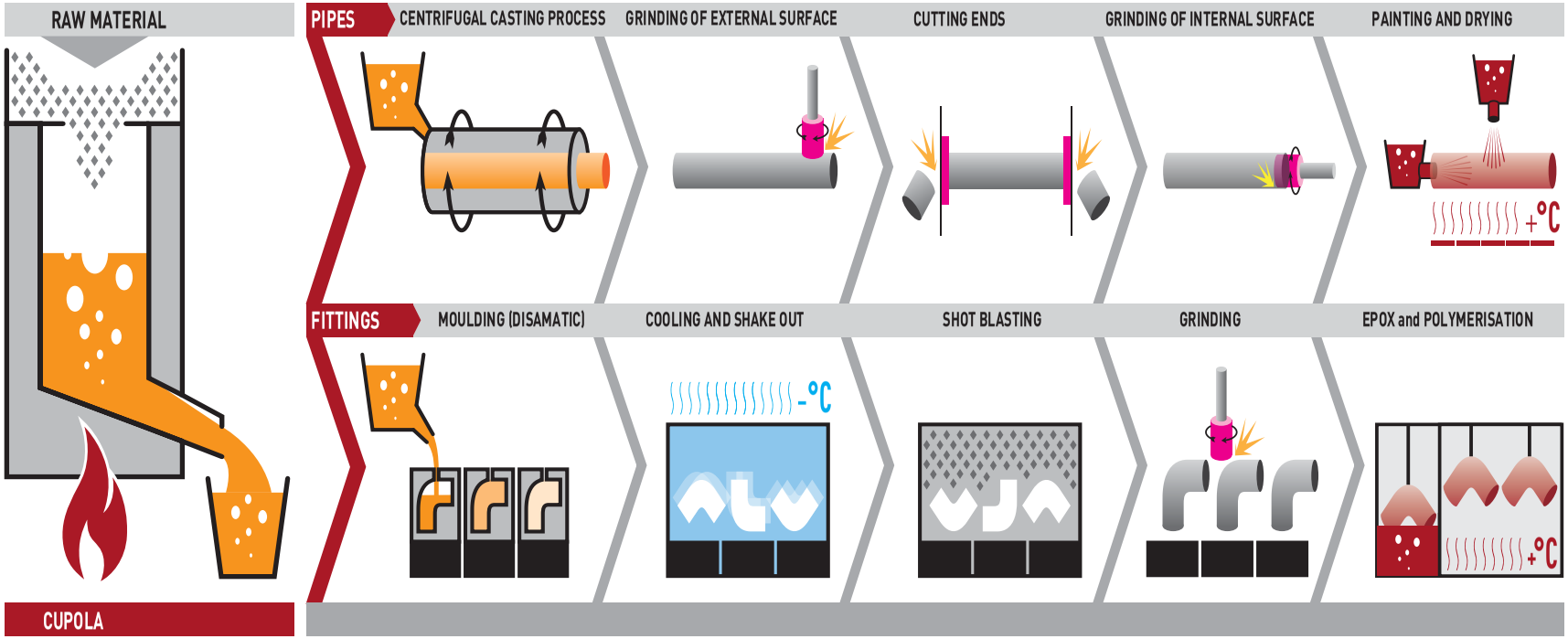
Coefficient of Linear Expansion
Only 0,0105 mm/mK (Between 0 to 100° C) nearly equals to that of concrete; easily reinforced with concrete

Chemical Strength
PAG SML is highly resistible against domestic sewage water with a Ph value between pH2 and Ph12 (EN 877).

Coefficient of thermal conductivity
50-60 W/mK (Under 20°C)

*The following phenomenon was certified in Attachment 2. of EN877standard: "As per this European directive, products made of cast-iron are nonflammable and fireproof products. In case of a fire, they maintain their functional specifications and reliability for hours; that is the pipes are resistant to flames and gases before fractures in their walls, failure or critical deformations occur. Integrity of vertical and horizontal pipes are maintained."

PRODUCTION TECHNOLOGY



PRODUCTION

PAG® SML pipe and fittings produces lamellar graphite cast-iron products in PAG® foundry...

PAG® iron foundry plants carries out an efficeient and eco-friendly production in a way equipped with the cutting-edge equipment. PAG® SML attach great importance to the quality of products thereby monitoring all phases of production and constantly improving the processes.

PAG® SML; uses various measurement systems for product development...

All processes are monitored and audited by international certification bodies...

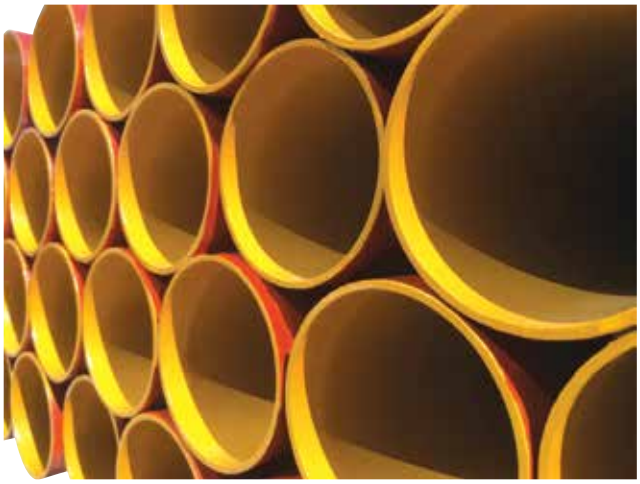
- ISO 9001:2008: Quality Management System Certificate
- ISO 14001:2009: Environmental Management Certificate
- BS OHSAS 18001:2007: Occupational Health and Safety Standard Certificate

COATING TECHNOLOGY FOR SML PIPES AND FITTINGS

A reddish brown, minimum 40 µm, acrylic paint is applied from the exterior surface of PAG® SML pipes in compliance with EN877 standard PAG

As for the interior surface of the pipes, a binary component special epoxy resin with a thickness of 130µm on average is sprayed these parts.

As to fittings, a special epoxy paint with a surface thickness of 70 µm on average is applied. The paint is applied via dipping method and it is extremely long lasting and compatible with pipe coating. Fittings are oven dried approximately for 45 minutes at 180 °C after painting. In this way; an extremely strong connection is ensured between casting element and coating and there occurs a thermal and chemical resistance beyond the values anticipated in EN877.

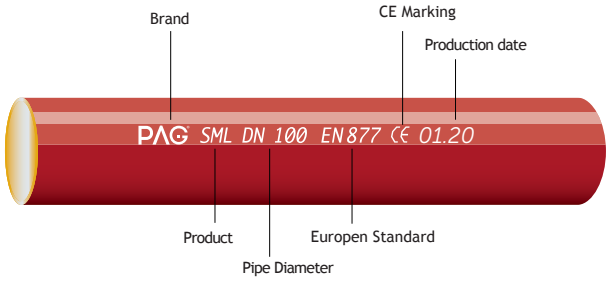


MARKING

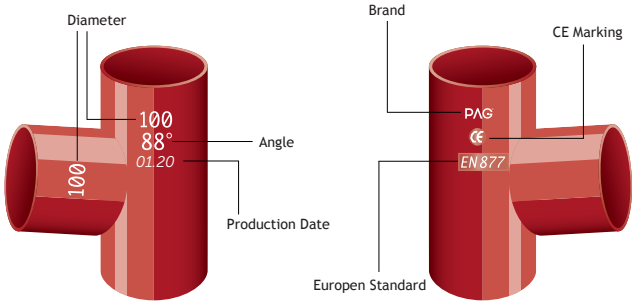
PAG SML pipe and fittings are branded through an informative marking that shows manufacture of the product retrospectively and the branding standard gives information about the quality of the product.

Cast-iron pipe and fittings are branded during the production in accordance with BS EN877 European Standard as is seen below.

Marking Pipes



Marking Fittings



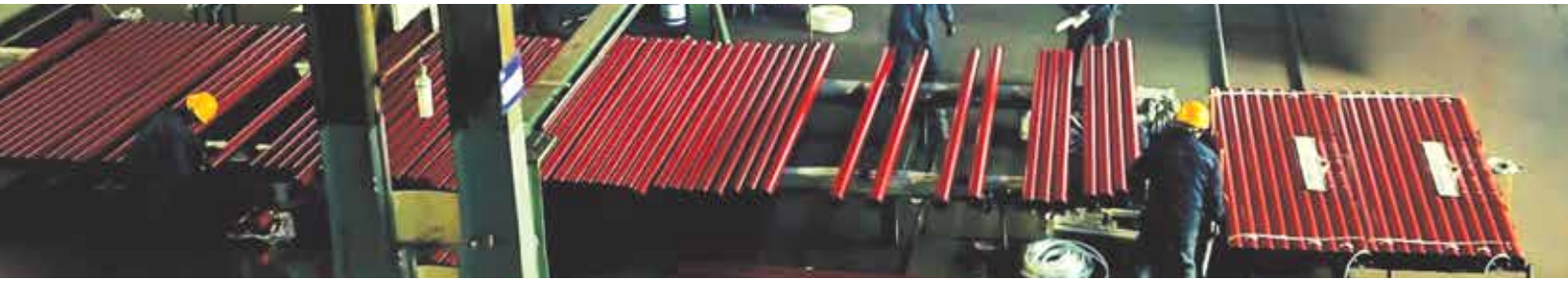
RESISTANCE OF THE INSIDE COATING OF PAG® SML PIPES AND FITTINGS

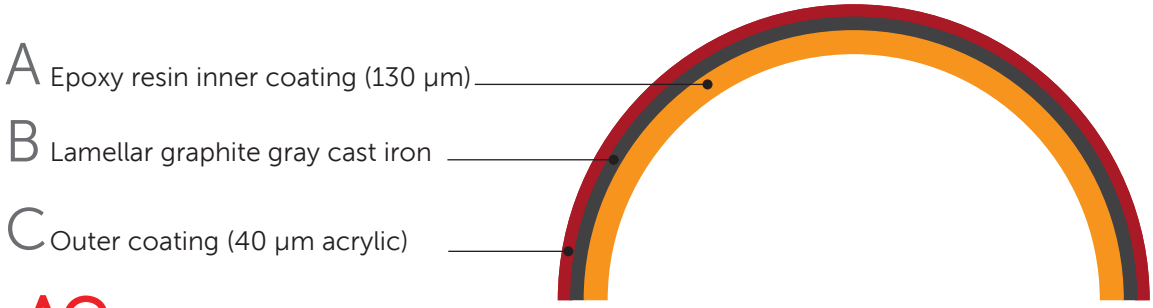
_ Durability of inside coating

= Availability

Durability	Up to 23C	Up to 50C	Up to 80C	Quality
pH0				Inner coating of PAG® Cast Iron pipes is applied so as to be resistant to corrosion and most of the chemicals. Smooth surface prevents accumuation and eliminates waste water drain challenges. Internal expoxy coating of the pipes and fittings are matched in terms of maintenance of the system.
pH1 (except for organic acids)				
pH2 (except for organic acids)	EN 877			
Chemical cleaning agents				
Descaling agents				
Oxydants				
Stain remover				
Disinfectants				
Detergents				
Solvents				
Drain cleaners				
Water, salts				
Ph12				
pH13				

You should ensure that the cast-iron pipe and fittings products of your choice are compatible. The basic principle regarding the coating is that pipes, fittings and any type of accessories show well performance without allowing any weak points. Coatings are main instruments aiming at pipes and fittings to havethe same lifecycle with that of the building. Made of epoxy resin, PAG®, which is constantly tested, provides the coating quality you need with inner coating installations.

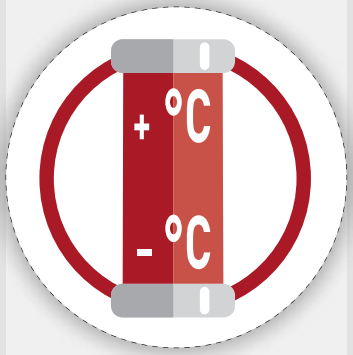




WHY TO USE CAST IRON PIPES!?

Low level of acustic noises reduced sound transmission

Resistant to fire PAG® SML pipe and fittings A1 fireproof



Low thermal expansion not sustectible to temperature changes.Thermal expansion coefficient similar to concrete, so the pipes maybe cemented

Easy installation

100%recyclable environment-friendly material

Anti-Corrosion Coating

High quality internal pipe epoxy coating with two-component system

Smooth inner surfaces ensure excellent flow waste water

Compliance with EN Standards

Outer coating with strong epoxy paint

NOISE INSULATION

_ Noise protection is one of the most important advantages of PAG® SML products.

As stated in Annex-F of EN 877, cast iron pipes in compliance with this standard have very good mechanical characteristics. Based on high masses of pipe wall thicknesses per unit area in addition to design characteristics of joints, cast iron pipe systems ensures significant sound reduction benefits while waste water and rain water inside the building is disposed. No additional sound protection is required. (See EN 877 page 33 Annex F)
In German national standards, acceptable sound levels in residences are described as follows;
- In saloons and bedrooms 30 Db(A)
- In classrooms and offices 35 Db(A)
These values are not valid for the inner part of the mentioned independent section; but for the neighboring independent sections.

Reduction of noise level in real terms depends mainly on correct installation, density of the walls and ceiling as well as the amount of water inside the pipe.
However, cast iron drainpipes are, in any case, adopted as the most suitable wastewater pipes to reduce noise beyond question.

Noise level test must be conducted in consideration of EN14366 "Laboratory measurement standard for the noise in waste water installations."
This standard is only applicable to the pipelines and that regulates the actions regarding the in-laboratory measurement of air-based or structure-based noise, caused by waste water and rainwater installations.

TO PREVENT STRUCTURE-BORNE (WALL) NOISE
-Piping system must not Contact with the wall or the ceiling at any point.
-Fixing couplings must definitely be rubber (elastic).
-It is allowed to use acoustic damper while passing through very sensitive independent sections. Although acoustic damper is not used very commonly, it is able to reduce sound level until 5 Db/A (2 l/sec.)

TO PREVENT AIR-BORNE NOISE
Refers to the sound arising out of the water inside the pipes.
- 88° branches with 45° inlet angle must be used while passing from assemblies to vertical line.
- 45° branch and 45° bend must be used while passing from vertical to assemblies.

Pursuant to international norms, it is strictly forbidden to pass wastewater pipes openly in the areas that pass through living spaces. In addition to suspended ceilings, it is allowed to install gypsum panel or rock-wool coating in pipelines passing through suspended ceiling, thus insulation could be improved.

SOME SOUND VALUES IN NATURAL ENVIRONMENT

- Plane Noise 130 dB(A)
- Music 100 dB(A)
- Traffic 80 dB(A)
- Hour 26 dB(A)
- Snowfall 10 dB(A)

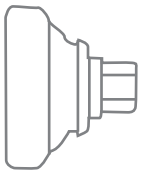
ACOUSTIC PROTECTION

At the bottom of the page, vertical pipe can be seen as unfixed to wall, i.e., the noise level when the four sides of the pipe are open. This test was conducted in order to isolate air back-stroke.

Tests indicate that drainage system from cast iron with rapid coupling has a very low noise level as an independent system.

What is important in sound isolation is to do with wall and ceiling connections, e.g., the connection of piping system with the wall and/or ceiling.
If the sound insulation elements are used additionally, noise level can be significantly reduced up to level that human ears are unable to hear (see the table).

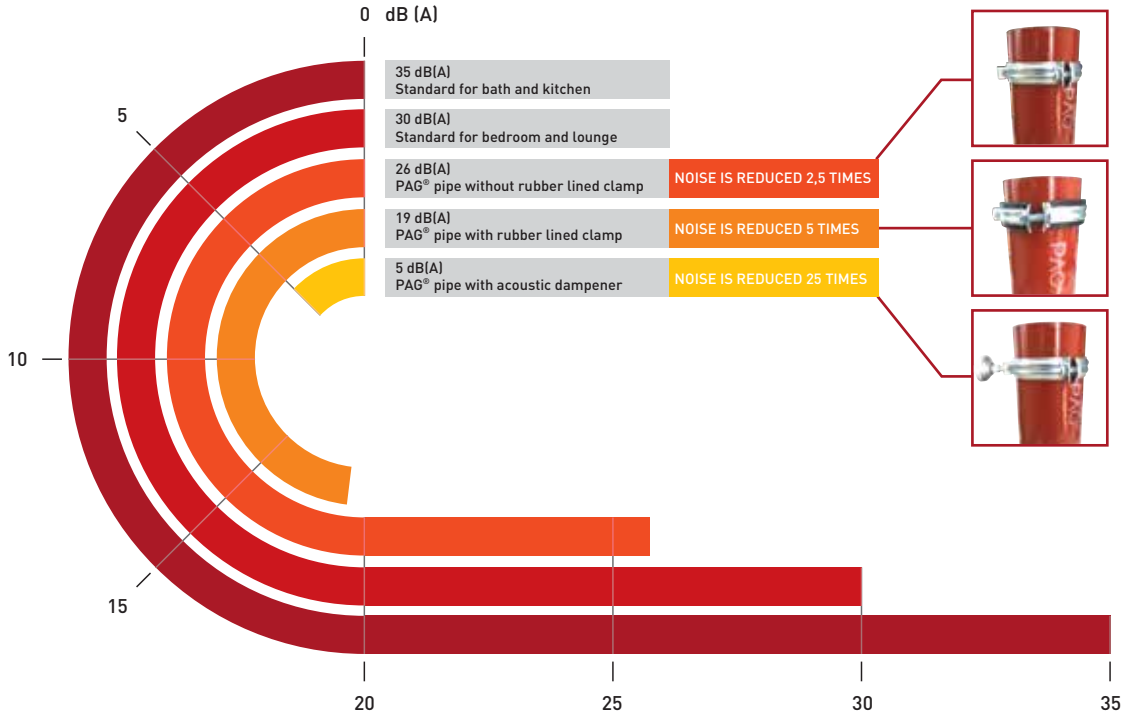
PAG® Acoustic Damper



DN	Kg.
50 - 150	0,12

Load bearing capacity
Horizontal: 400 N
Vertical: 1000 N

PAG® Acoustic Damper, this product, used to minimize structure-based sound level, can be used with any cast-iron fixing coupling between DN 50 and DN 150.
In a flow rate of 2 l/sec. it is possible to obtain low values up to 5 dBr.
A type of damper, this product is mounted between the wall and fixing element.
2 dampers are enough for a pipe, 3 meters in length.



*The test conducts with 2l/sec. and 250±50 kg/m in compliance with EN 14366.

FIRE PROTECTION

CLASS A1

MATERIAL FIRE CLASS

PAG® cast-iron pipes are produced from lamellar graphite cast iron raw material in accordance with EN1561. This product is in the category of Class A1 non-flammable construction material according to DIN1402 and it is strictly fireproof.

FIRE LOAD CONCEPT

Since cast-iron pipe and fittings are in the class of strictly non-flammable products; no fire load rates are available. The definition of fire load; it equals to the amount of energy when a product burns. Such value depends on the type and amount of flammable material used in the manufacture of the product. In the earlier European norms, it was allowed up to 7kWh/m formation of fire load on stairs which are emergency exit routes. However; no fire load is allowed in these parts of the building as per a recent degree in Germany. To make a comparison here; 1KG POLYETHYLENE (PE) creates a 12 kWh fire load; and the energy revealed by lkg fuel oil 11, 7kWh.

THERMAL EXPANSION COEFFICIENT

Thermal expansion coefficient of cast-iron is only 0,0105mm/Mk. In a pipe with DN100 diameter, a 5,3mm expansion can be seen in a 50C9 temperature change. And such expansion is already absorbed by couplings. Again to make a comparison, thermal expansion of a polyethylene plastic pipe 10 meter in length is 45 mm in a 50 Cg temperature change. This is why it is essential to use high-cost fire-arrester couplings in their assembly. It was witnessed that these sockets failed to cover fire zone in some fires.

- Non-combustible
- No smoke is produced due to the system
- There is no material burning or dropping off due to heat

Advantages of PAG® SML cast-iron drainage system are certified by TSE:

EN 877 Annex-F refers to the fact that products with Class A flammability are never combustible and flammable. Structural integrity of pipe walls will not be impaired against flame and gases for a long time and there will not be any major deformations such as fraction or strokes.

That the integrity of pipe line is protected throughout all building refers to the fact that fire transfer due to wastewater pipe will not take place.

Hiding behind the old national classifications and due to the fact that it is easier to fulfill the requirements of these standards, many plastic pipe manufacturers in Europe performs classification declarations on the basis of these standards.

Many plastic pipe manufacturers have not completed their tests on the basis of EN 13501-1 test standard as is required, and that they haven't still declared which fire category they are included in pursuant to this standard.

For instance; a plastic pipe brand, which is indicated as B1 in German national standard, will have to be included in a scale that extends from B to C in the recent EN 13501-1. That is to say; in other words, it is highly likely that a PVC pipe brand, which is considered

FIRE PROTECTION

as B in German National standard, is included in B2 or C Class following the result of a test to be conducted as per EN 13501-1. Furthermore, SMOKE(s) and DROP(d) categories are not included as a breakdown in the old classification. Now, it is not only required to state A-B-C as fire categories but also dropping and smoke categories on the products and declare the same in the catalogues.
EN 13501-1 covers all these details as test specifications.

No flash over in cast iron pipes.

In case of a thermal flow density with a heat release of 15 to 20 Kw/m^2 or a smoke heat of 500-600 C, it will immediately flash with the combustible materials thereabouts. Following the immediate flashover, it becomes impossible to escape from the building or the whereabouts.

No flaming drops in cast iron pipes.

As to plastic pipes, they transmit their flame drops to downstairs after maximum 10 minutes during a fire. In the tests, the fire often effected downstairs as dropping despite the fire stopper couplings in floor transitions; and as a quick flame transfer to upstairs.

Very limited smoke generation in cast iron pipes

When the entire pipe line is mounted correctly with PAG RAPID couplings, piping system remains closed. And the very limited smoke likely to generate in internal coatings remains inside the system. Then it is discharged from ventilation lines out of the building. For instance, 10 kg PE (refers to around 8 m plastic pipe) throws off approximately 23.000 m^3 poisonous smoke, such amount of smoke gives is so strong as not to give any chance of survival in anyone in a building consisting of 100 flats each of which are 100 m^2.

As per Article C of Annex 2, titled "Flammability Categories of Construction Materials according to EN13501-1" of the Regulation once again, A1 refers to non-flammable and A2-sl-d0 refers to "HARDLY FLAMMABLE" class. Since the existence of flammable materials are subject to evaluation in EN13501-1, regardless of their amount, PAG® SML cast-iron pipes are included in class A1. This documented with the fire test, conducted in TSE fire laboratories. However; PAG® SML pipe coatings never include pipe coating to cause fire; this is why PAG® SML is still in Class A1 as per German standard, and it is considered to be NON-FLAMMABLE.
No matter what the duration of fire is; cast iron is non-flammable and FIRE PROOF.

PAG® CAST-IRON PIPE and FITTINGS APPROVALS

ISO 9001:2008

As a matter of principle ISO 9001:2008 is the group of rules aiming to increase the quality of products and services given by internationally accepted companies. IS09001:2008 formalizes IS09000 standards, documents and manuals; currently, there are approximately more than 20 documents, further new and reviewed documents are constantly added in order to meet necessary requirements of the companies and increase business models thereof.

In December 2008, ISO introduced revised Quality Management Standards based on process modeling. The point underlined in this document was the issue of Customer Satisfaction and Continuous development.

ISO 14001:2004 ENVIRONMENTAL MANAGEMENT SYSTEM

ISO14001 Standard is a standard created to minimize the damage to environment.

ISO14001 applications in general show parallelism with fulfillment of legal obligations.

ISO14001 is not a product standard, it deals with how it is produced rather than what is produced.

It is a management system on a volunteer basis which is applicable to any business organizations regardless of sector and scale.

OHSAS 18001:2007

OHSAS is for the following areas;

Hazard identification, risk assessment and risk audit planning

OHSAS management program

Construction and Responsibility

Training, Awareness and capacity

Consultancy, attendance and communication

Process control (control of activities) Preparation for, and response to Emergency

Performance measurement, monitoring and measuring

Owner of PAG® cast-iron pipe brand, AYDINGLOBAL has these three separate quality management system.

EN 877 STANDARD

EN 877 European Standard regarding "Cast-iron pipes fittings and connection elements used for water drain of buildings" defines technical specification and specifies testing methods and product control. EN877 standard regulates all conditions with respect to the quality and engineering of seamless cast-iron pipes.

*Solid Iron Composition

*Dimensions

*High mechanical performance

*Active traceability in production facilities

*Special terms for couplings

*High level of protection against corrosion

*Coating strength including applications within raft foundation

CE MARKING

CE quality mark is used to specify utility of the product and determine the value of the product within the frame of customer-producer relationship and it is optional. However, CE mark, which indicates that the product meets basic quality and safety requirements, is obligatory. Its scope is restricted to health and operational safety. It is in fact intended for the authorities responsible for market supervision. Thanks to CE mark, national customs authorities can determine whether or not the products meet basic safety requirements; and thus they will be allowed to enter into European Community or be transported among candidate countries. It has been essential since September 1, 2009 that cast-iron waste water pipe and fittings have CE marking on them which are produced in compliance with EN877.

PAG®CAST IRON PIPE CUTTING TOOLS

Manufactured as 3 m in standard length according to TS EN 877, it is possible to cut cast iron pipes in the desired length. Just as normal spiral cutting stones can be used for cutting the pipes, Pipe cutting bench of LW1401S model of MAKITA brand in the following picture, can be purchased with proper price for a smooth, guaranteed cutting without any microcracks.

PROTECTING CUT EDGES

As the epoxy paint on the cut edges will disappear; it is important to handle the same again in worksite environment so that the pipeline could be long-lasting.

There are three types of solutions offered for this;

-Repainting the edges with same type of epoxy paint

-Using edge protection spray

-Using edge protection band

PAG®CAST IRON PIPE INSTALLATION (between DN 50 - DN 200)

Slide the entire coupling towards the edge of the pipe or fitting until the protrusion in the center of the gasket.

Push the other pipe or fittings towards the other edge of the coupling.

Apply torque with an allen wrench until the locks contact each other. Stop fixing when contact takes place.

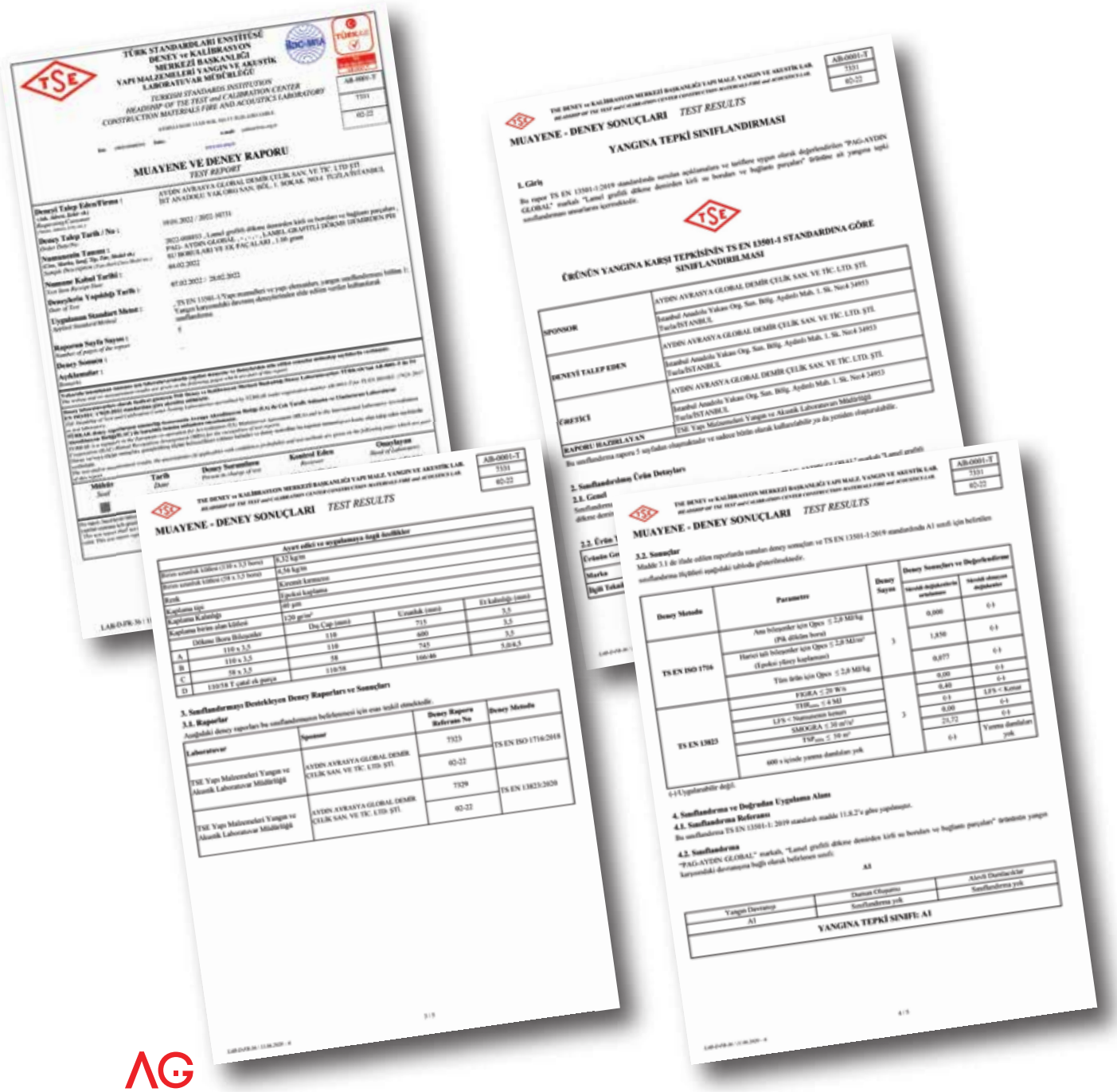
PAG®

for more

PAG®

better cities...

FIRE CLASSIFICATION TEST



TÜRK STANDARDLARI ENSTİTÜSÜ
DENEY ve KALİBRASYON MERKEZİ BAŞKANLIĞI
YAPI MALZEMELERİ YANGIN VE AKUSTİK LABORATUVAR MÜDÜRLÜĞÜ

TURKISH STANDARDS INSTITUTION
HEADSHIP OF THE TEST and CALIBRATION CENTER
CONSTRUCTION MATERIALS FIRE AND ACOUSTICS LABORATORY

MUAYENE VE DENEY RAPORU
TEST REPORT

MUAYENE - DENEY SONUÇLARI TEST RESULTS

YANGINA TEPKİ SINIFLANDIRMASI

ÜRÜNÜN YANGINA KARŞI TEPKİSİNİN TS EN 13501-1 STANDARDINA GÖRE SINIFLANDIRILMASI

SPONSOR	AYDIN AVRASYA GLOBAL DEMİR ÇELİK SAN. VE TİC. LTD. ŞTİ. İstanbul Anadolu Yakası Org. San. Bölg. Aydınlı Mah. 1. Sk. No:4 34953 Tuzla/İSTANBUL
DENEYİ TALEP EDEN	AYDIN AVRASYA GLOBAL DEMİR ÇELİK SAN. VE TİC. LTD. ŞTİ. İstanbul Anadolu Yakası Org. San. Bölg. Aydınlı Mah. 1. Sk. No:4 34953 Tuzla/İSTANBUL
ÜRETİCİ	AYDIN AVRASYA GLOBAL DEMİR ÇELİK SAN. VE TİC. LTD. ŞTİ. İstanbul Anadolu Yakası Org. San. Bölg. Aydınlı Mah. 1. Sk. No:4 34953 Tuzla/İSTANBUL
RAPORU HAZIRLAYAN	TSE Yapı Malzemeleri Yangın ve Akustik Laboratuvarı Müdürlüğü

MUAYENE - DENEY SONUÇLARI TEST RESULTS

MUAYENE - DENEY SONUÇLARI TEST RESULTS

CERTIFICATES

IMBEDDING CAST IRON PIPES IN CONCRETE

In principle, cast iron pipes are easily embedded into concrete. There is no need for any special protection for this. Because, linear expansion coefficient of cast iron pipes (i.e. between 0,0105 mm/Mk..0 and 100°C) equals to that of concrete.

In this application, standard PAG RAPİD couplings are used (same as those, used for in-building applications). While cast iron pipes are imbedded into concrete; an attractive line must be formed as is required.

While PAG cast iron pipes are imbedded into the concrete, they must be suspended between reinforcements with the help of console and pipe hanger couplings. This application will at the same time fix the pipes when concrete is poured and prevent surface movement of the pipes. Filling the pipeline with water before poring the concrete is another additional application to prevent this movement.

Important Note: SML type (in-building) cast iron pipes are not the type of pipes which are suitable for direct underground application. In the lines where the pipes are installed so as to contact directly with the soil; PAG RAPID INOX (wholly-stainless connecting clams including screws) must be used along with fittings and special cast iron pipes (KML), specially produced for underground that are reinforced with electro-galvanized coating.

Please refer to EN610 and EN752 standards for the instructions and requirements regarding direct installation of cast iron pipes under the ground.

In raft foundation, when any PVC-based pipes are used instead of cast iron pipes; it must be definitely envisaged that line blockage may take place due to fractures likely to occur during concreting and cast iron pipes must be strictly used in raft foundation.

Note: Special attention must be paid to perform the application in a way in which 5 cm concrete is placed around the pipes in raft foundation when cast iron pipes are used.

FIXINGS

As the cast iron pipes are relatively heavier than PVC-based pipes, it is essential to pay maximum attention while performing pipe suspensions and use the correct suspension products.

HEAVY DUTY CLAMPS with Rubber are recommended for vertical and horizontal hanging of PAG cast iron pipes. Heavy duty clamps with rubber are divided into two as heavy duty clamps with nut and heavy duty clamps with head.

Due to suspension convenience, we only recommend the primary usage of HEAVY DUTY CLAMPS WITH NUT. The table for suitable couplings regarding the type of cast iron pipes based on the external diameter of the pipes is presented below along with NORM Fixing codes

Heavy Load Coupling with head

Heavy Load Coupling with nut

NORM Fixing Heavy Duty Clamp with head CODE	NORM Fixing Heavy Duty Clamp with nut CODE	Tightening Range [mm]	Cast Iron Pipe Nominal Diameter	Cast Iron Pipe External Diameter [mm]	Diameter of rod suitable for the clamp [Metric]
NAKC040	NASC040	48-56	DN50	58	M8
NAKC047	NASC047	53-59	DN50	58	M8
NAKC065	NASC065	75-81	DN70	78	M8
NAKC075	NASC075	83-91	DN75	83	M8
NAKC095	NASC095	102-112	DN100	110	M8
NAKC110	NASC110	122-138	DN125	135	M10
NAKC140	NASC140	153-164	DN150	160	M10
NAKC180	NASC180	196-209	DN200	210	M10
NAKC250	NASC250	266-274	DN250	274	M10
NAKC300	NASC300	308-324	DN300	326	M12

PAG cast iron pipes must definitely be fixed with a coupling at every 2m as a minimum. Then the pipes can be fixed once or twice based on their diameter. If the suspension couplings are at least 10 cm more than cast-iron couplings, they can be applied at a distance of 75 cm. In horizontal lines, once again fixing must be ensured with heavy duty clamp at the turns (bend) and the points where branch is applied. In vertical lines, if one floor is higher than 2,5 m, suspension couplings must be used for 2 times.

The diameters of the screw rods to be used in heavy duty clamp with nut or head are included in the foregoing table.

Cast iron pipe fixings must be as close to the wall as possible.

Besides, in order to reduce and take the load o pipeline, PAG branded VERTICAL PIPE SUPPORT ELEMENT and SUPPORT RING must be used on the floor along with the covering once in every 5 floors. This will also reduce the load on the suspension couplings

SOUND REDUCTION IN PIPE FIXING

It is strictly recommended to use Heavy Load Couplings with EPDM gasket as they will reduce structural (wall-based) sound in PAG cast iron suspension.

ENVIRONMENTAL PROTECTION

Several designs were determined to specify green building requirements all over the world.

Foremost among these, LEED (Leadership in Energy and Environmental Design) was created by American council of green buildings and it is a certification system that ensures rating of green buildings.

And the total highest potential point was determined to be 110.

PAG cast iron pipes and fittings provide support in many stages for obtaining a LEED certificate.

LEED v4 2016 specifies a material requirement regarding the materials required for sanitary system.

And this refers to the consideration of limit values for VOC – (Volatile Organic Compounds).

No volatile organic compound is released around since the internal and external paint and coatings of PAG cast iron wastewater pipes and fittings have completely been hardened once they have arrived the building where application will be made.

Another criteria is to do with increasing the points of LEED certificate; recyclable construction materials have an increasing effect on the Leed points. Inter alia, PAG SML cast iron pipes are not only produced from recycled materials but they also have an increasing impact on the recycling percentage of the buildings since the scrap centers accept them without any problem once they have been removed.

Another LEED requirement is to do with the condition in which it is required not to contribute to the increase in noise level by construction materials. Just as in all other cast iron pipes, PAG cast iron pipe is the best choice to reduce wastewater-based noises.

4 categories are available in LEED certificate:

- CERTIFIED (40-49 points)
- SILVER (50-59 points)
- GOLD (60-79 points)
- PLATINUM (80 + points)

ELECTRICAL CONTINUITY

Earthing is required so that all open metal items in the buildings do not pose any threat for human and employee health.

Cast iron PAG-branded pipes lack self earthing feature just as welded metal pipes do so. EPDM rubber leak-proof gaskets inside the couplings prevents contact of cast iron pipes or fittings with each other.

However, it is not required to use continuity parts on PAG RAPID couplings.

As the PAG RAPİD couplings (when tightened) directly contact from either of the edges with cast iron pipes, they provide electrical sustainability. In this way, all potential risks have been removed thanks to the earthing to be performed at the end of the line.

VENTILATION LINES

A drainage pipe normally has a neutral air pressure in comparison to the atmosphere. When the wastewater flows through the pipe and pushes the air, it creates a positive pressure which must be released.

The objective of ventilation line is to control the pressure inside the pipe so that the formation of offensive odours from the wastes would be prevented.

According to EN12056-2, it is possible to discharge wastewater or grey water from a single line or individually. The pressure is controlled over the air flow during discharge.

Ventilation lines must be installed so as to be parallel with wastewater lines.In this way, proper ventilation is ensured and potential offensive odours within the building are prevented.

There are 3 types of ventilation line options.

1-MAIN VENTILATION

Vertical pipes are pulled until the top of the roof, their edges are open to atmosphere.

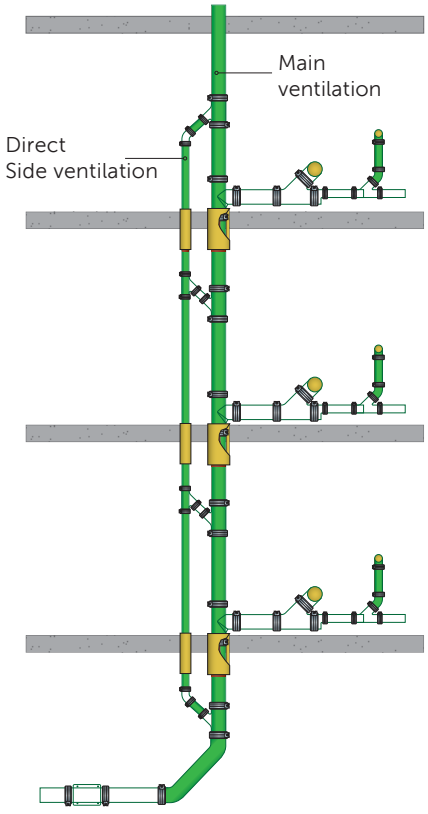
2-DIRECT SIDE VENTILATION

In this type of ventilation, ventilation tasks of vertical pipe are relieved through a parallel line, which is connected to the vertical pipe in each of the floors.

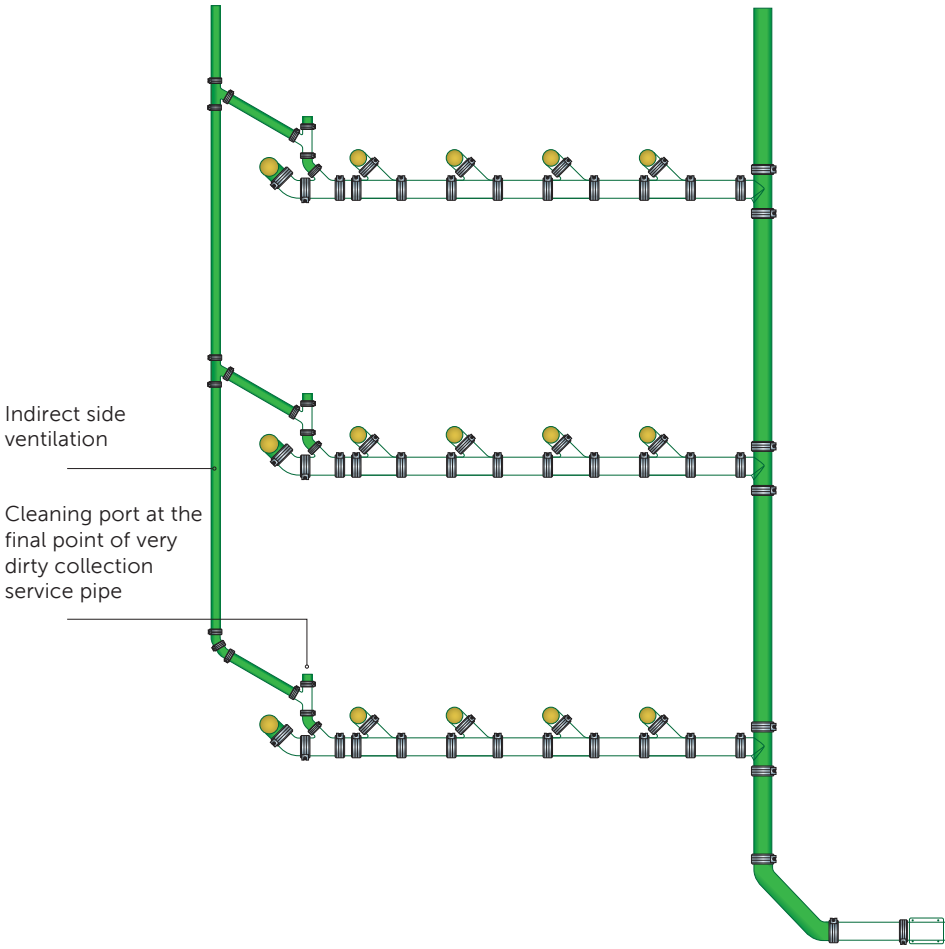
3-INDIRECT SIDE VENTILATION

This refers to an additional ventilation pipe at the top edge of a connection pipe, which is either pulled from over the roof or that terminates in the main ventilation. Maximum discharge capacities are much higher than that of the main ventilation system.

Direct side ventilation



Indirect side ventilation

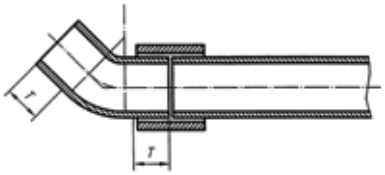


PRODUCTS

_ Pipes / fittings / couplings

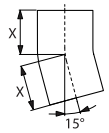
Nominal Diameter DN	External Diameter DE	Tolerated deviation amount	Wall thickness e	Pipes and fittings tolerance	Sealing zone t	Pipe weight empty kg / m	Pipe weight full kg / m	Surface area m² per m
50	58	+2/-1	3,5	-0,5	30	4,33	6,4	0,18
70	78		3,5	-0,5	35	5,9	9,9	0,25
75	83		3,5	-0,5	35	6,3	10,4	0,26
100	110		3,5	-0,5	40	8,4	16,7	0,35
125	135	+2/-2	4,0	-0,5	45	11,8	24,5	0,42
150	160		4,0	-0,5	50	14,1	32,2	0,50
200	210	+2,5/-2,5	5,0	-1,0	60	23,1	54,5	0,65
250	274		5,5	-1,0	70	33,3	87,6	0,85
300	326		6,0	-1,0	80	43,2	120,6	1,02

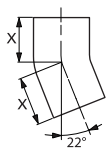
SML pipes and fittings

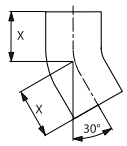


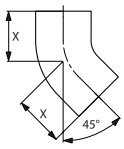
_ Overview

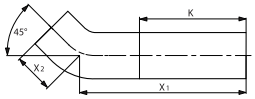
PIPE L=3000 MM	DN	kg/Product	Article No:
	50	13,0	P-17905
	70	17,7	P-17909
	75	18,9	P-87909
	100	25,2	P-17910
	125	35,4	P-17911
	150	42,2	P-17913
	200	69,3	P-18871
	250	99,8	P-18872
	300	129,7	P-18356

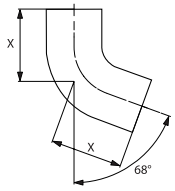
BEND 15°	DN	kg/Product	Article No:	x
	50	0,4	P-11270	40
	70	0,6	P-11269	45
	75	0,8	P-81269	45
	100	1,0	P-10041	50
	125	1,8	P-11268	60
	150	2,6	P-11267	65
	200	4,6	P-19844	80

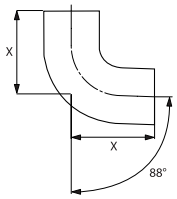
BEND 22°	DN	kg/Product	Article No:	x
	100	1,3	P-25964	50

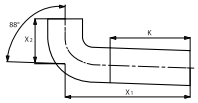
BEND 30°	DN	kg/Product	Article No:	x
	50	0,5	P-11266	45
	70	0,7	P-10042	50
	75	0,8	P-80042	50
	100	1,3	P-10043	60
	125	2,1	P-11265	70
	150	3,0	P-11264	80
	200	5,4	P-19845	95
	250	8,0	P-10045	110
	300	14,0	P-10048	130

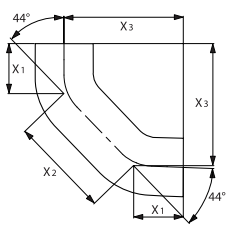
BEND 45°	DN	kg/Product	Article No:	x
	50	0,5	P-10050	50
	70	0,9	P-10067	60
	75	1,0	P-80067	60
	100	1,6	P-10073	70
	125	2,3	P-10076	80
	150	3,5	P-10079	90
	200	5,7	P-10082	110
	250	10,3	P-18242	130
	300	16,5	P-10096	155

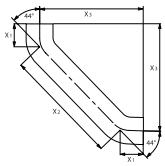
BEND WITH LONG 45° BEND	DN	kg/Product	Article No:	X_1	X_2	K
	70	2,2	P-10105	250	60	190
	75	2,5	P-80105	250	60	190
	100	3,5	P-10101	250	70	180

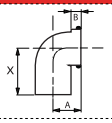
BEND 68°	DN	kg/Product	Article No:	x
	50	0,7	P-19709	65
	70	1,1	P-10112	75
	75	1,2	P-80112	80
	100	1,9	P-10113	90
	125	2,9	P-11263	105
	150	4,1	P-11262	120
	200	7,7	P-10115	145

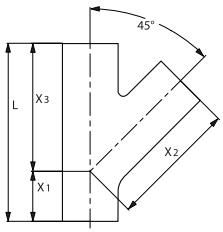
BEND 88°	DN	kg/Product	Article No:	x
	50	0,7	P-10118	75
	70	1,2	P-10121	90
	75	1,3	P-80121	95
	100	2,1	P-10125	110
	125	3,2	P-10129	125
	150	4,3	P-10131	145
	200	8,8	P-18241	180

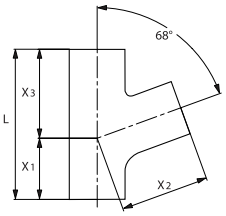
BEND WITH LONG 88° LEG	DN	kg/Product	Article No:	X_1	X_2	K
	70	2,5	P-10108	250	90	160
	75	2,6	P-80108	250	95	155
	100	3,6	P-10109	250	110	140

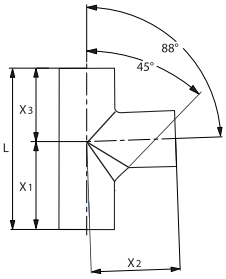
DOUBLE BEND 88°	DN	kg/Product	Article No:	X_1	X_2	X_3
	50	1,0	P-19115	50	100	121
	70	1,8	P-19986	60	120	145
	75	1,9	P-89986	60	120	145
	100	3,2	P-10152	70	140	170
	125	4,3	P-10151	80	160	195
	150	6,2	P-10154	90	180	219

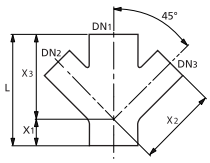
88° BEND WITH STRAIGHT LINE	DN	kg/Product	Article No:	X_1	X_2	X_3
	100	4,8	P-10032	70	312	291
	125	6,4	P-10037	80	322	308
	150	8,7	P-10039	90	334	326

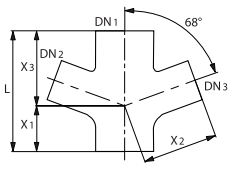
WC BEND	X	DN	kg/Product	Article No:
	150	80 mm	1,7	P-25963
		100 mm	2,6	P-25711

SINGLE BRANCH 45°	DN	kg/Product	Article No:	X_1	X_2	X_3	L
	50 x 50	1,4	P-17017	50	135	135	185
	70 x 50	1,6	P-10002	40	150	150	190
	75 x 50	1,8	P-80002	45	135	135	180
	70 x 70	2,1	P-10028	55	160	160	215
	75 x 75	2,3	P-80028	60	155	155	215
	100 x 50	2,3	P-10029	35	165	165	200
	100 x 70	3,0	P-10030	50	185	185	235
	100 x 75	3,1	P-80030	50	170	170	220
	100 x 100	4,4	P-10033	70	205	205	275
	125 x 50	3,2	P-11301	20	185	185	205
	125 x 70	4,0	P-11302	40	200	200	240
	125 x 75	4,4	P-81302	51	189	189	240
	125 x 100	5,0	P-10034	60	220	220	280
	125 x 125	6,1	P-10035	80	240	240	320
	150 x 70	5,3	P-11300	30	215	215	245
	150 x 75	5,9	P-81300	115	140	105	220
	150 x 100	6,5	P-10060	55	240	240	295
	150 x 125	7,2	P-10061	70	255	255	325
	150 x 150	8,3	P-10062	90	265	265	355
	200 x 75	8,5	P-89835	15	240	240	255
	200 x 100	10,0	P-11299	40	265	265	305
	200 x 125	11,6	P-11298	55	280	280	335
	200 x 150	13,3	P-10063	75	300	300	375
	200 x 200	17,2	P-11297	115	340	340	455
	250 x 100	13,6	P-10064	15	310	310	325
	250 x 125	16,3	P-10065	35	335	335	370
	250 x 150	20,2	P-18246	55	350	350	405
	250 x 200	20,4	P-10068	90	385	385	475
	250 x 250	31,5	P-10071	130	430	430	560
	300 x 100	22,0	P-19836	5	345	345	350
	300 x 125	23,0	P-10072	15	360	360	375
	300 x 150	26,9	P-19837	35	380	380	415
	300 x 200	30,0	P-10074	70	440	415	485
	300 x 250	36,9	P-10075	115	465	465	580
	300 x 300	48,2	P-10077	155	505	505	660

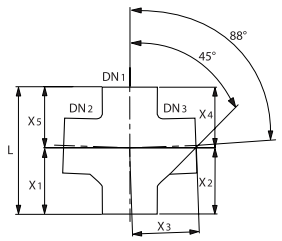
SINGLE BRANCH 68°	DN	kg/Product	Article No:	X_1	X_2	X_3	L
	50 x 50	0,9	P-24870	55	80	80	135
	70 x 50	1,0	P-24869	55	90	90	145
	70 x 70	1,2	P-22405	70	100	100	170
	100 x 50	1,9	P-10080	55	110	100	155
	100 x 70	2,4	P-10081	70	120	110	180
	100 x 100	2,9	P-10083	85	130	130	215
	125 x 100	3,9	P-11257	85	145	140	225
	200 x 100	8,6	P-21109	85	185	170	255
	200 x 200	12,2	P-10084	140	225	225	365

SINGLE BRANCH 88°	DN	kg/Product	Article No:	X_1	X_2	X_3	L
	50 x 50	1,1	P-11296	79	80	66	145
	70 x 50	1,3	P-10086	83	90	72	155
	75 x 50	1,4	P-80086	85	90	75	160
	70 x 70	1,7	P-10087	97	95	83	180
	75 x 75	1,9	P-80087	95	95	85	180
	100 x 50	2,1	P-10088	94	105	76	170
	100 x 70	2,4	P-10089	102	110	88	190
	100 x 75	2,6	P-80089	100	110	90	190
	100 x 100	2,9	P-10090	115	115	105	220
	125 x 50	3,0	P-11295	98	120	82	180
	125 x 70	3,6	P-10097	107	125	93	200
	125 x 75	4,4	P-80097	105	125	100	205
	125 x 100	4,0	P-11294	125	130	110	235
	125 x 125	4,6	P-19841	137	135	123	260
	150 x 50	4,4	P-10095	100	140	100	200
	150 x 100	4,7	P-10099	130	145	115	245
	150 x 125	6,2	P-19842	147	150	128	275
	150 x 150	6,9	P-19843	158	155	142	300
	200 x 100	7,5	P-10091	145	175	125	270

DOUBLE BRANCH 45°	DN	kg/Product	Article No:	X_1	X_2	X_3	L
	100x100x100	3,8	P-21186	70	130	130	215

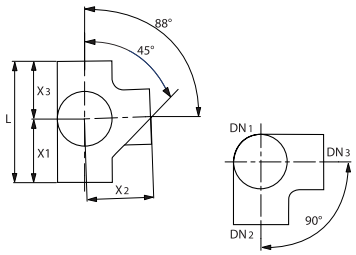
DOUBLE BRANCH 68°	DN	kg/Product	Article No:	X_1	X_2	X_3	L
	100x100x100	3,6	P-20463	85	130	130	215
	125x50x50	2,7	P-10134	56	120	110	166
	125x100x100	5,0	P-28476	85	145	140	225

DOUBLE BRANCH 88°



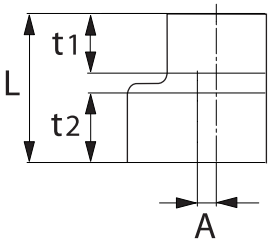
DN	kg/Product	Article No:	X_1	X_2	X_3	L
100x50x50	2,2	P-11288	100	80	105	180
100x70x70	3,0	P-20619	102	88	110	190
100x75x75	3,2	P-80619	110	110	120	205
100x100x100	3,9	P-10138	120	120	120	230
125x100x100	5,0	P-19846	130	115	135	245
150x100x100	7,1	P-19847	130	115	145	245

CORNER BRANCH 88°



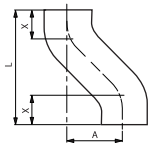
DN	kg/Product	Article No:	X_1	X_2	X_3	L
100x70x70	2,7	P-17480	95	85	95	180
100x75x75	3,2	P-87480	110	110	95	205
100x100x100	3,8	P-10146	115	120	105	220
150x100x100	6,1	P-21826	130	130	145	245

REDUCER



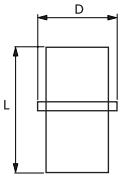
DN	kg/Product	Article No:	A	L
70/50	0,7	P-10139	10	75
75/50	0,7	P-80139	13	80
100/50	0,9	P-10140	25	80
100/70	0,9	P-10142	16	85
100/75	1,1	P-80142	14	90
125/50	1,4	P-19856	38,5	85
125/70	1,6	P-10144	28,5	90
125/75	1,7	P-80144	26,0	95
125/100	1,8	P-10145	12,5	95
150/50	2,0	P-23333	51	95
150/70	2,2	P-11282	41	100
150/75	2,3	P-81282	39	100
150/100	2,4	P-10147	25	105
150/125	2,6	P-10149	12,5	110
200/100	4,1	P-18654	50	115
200/125	4,1	P-19762	37,5	120
200/150	4,3	P-18243	25	125
250/150	6,8	P-18244	57	140
250/200	7,0	P-18245	32	145
300/150	10,7	P-19125	83	150
300/200	11,4	P-20816	58	160
300/250	12,4	P-19126	26	170

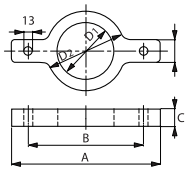
OFFSET (S-BEND)

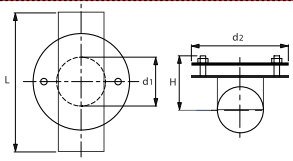


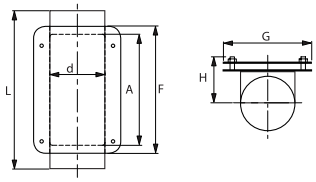
DN	kg/Product	A	L
100	65 mm	2,5	P-11261
	130 mm	3,4	P-11258
	200 mm	4,5	P-19834

PLUG	DN	kg/Product	Article No:	x
	50	0,3	P-11284	30
	70	0,4	P-11287	35
	75	0,5	P-81287	35
	100	0,8	P-10150	40
	125	1,1	P-19114	45
	150	1,6	P-11290	50
	200	3,1	P-19850	60
	250	6,0	P-19851	70
	300	9,5	P-21633	80

DOWNPIPE BRACKET	DN	kg/Product	Article No:	D	L
	50	1,3	P-19852	87	200
	70	1,8	P-11276	106	200
	75	1,8	P-81276	118	220
	100	2,7	P-10106	145	200
	125	3,0	P-11275	170	200
	150	4,0	P-11274	195	200
	200	5,9	P-20499	245	200
	250	18,7	P-19854	340	300
	300	24,0	P-19855	390	300

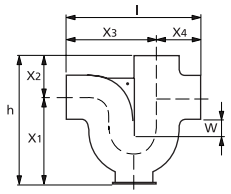
BEARING FOR DOWNPIPE	DN	kg/Product	Article No:	D_1	D_2	A	B	C
	50	0,8	P-10104	61	93	195	148	25
	70	1,0	P-10024	81	114	215	166	26
	75	1,0	P-80024	87	133	218	175	19
	100	1,4	P-10027	115	147	250	202	28
	125	1,5	P-21139	138	171	275	224	28
	150	2,0	P-21918	163	199	300	252	30
	200	3,0	P-21237	215	250	360	310	30

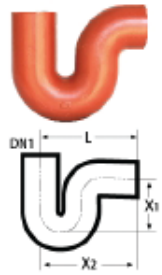
CLEANING PIPE COVER -CIRCULAR	DN	kg/Product	Article No:	H	d_1	d_2	L
	50	2,3	P-13226	59	53	105	190
	70	2,8	P-10133	69	73	125	210
	75	3,1	P-80133	71	73	125	210
	100	4,8	P-10135	84	104	159	260

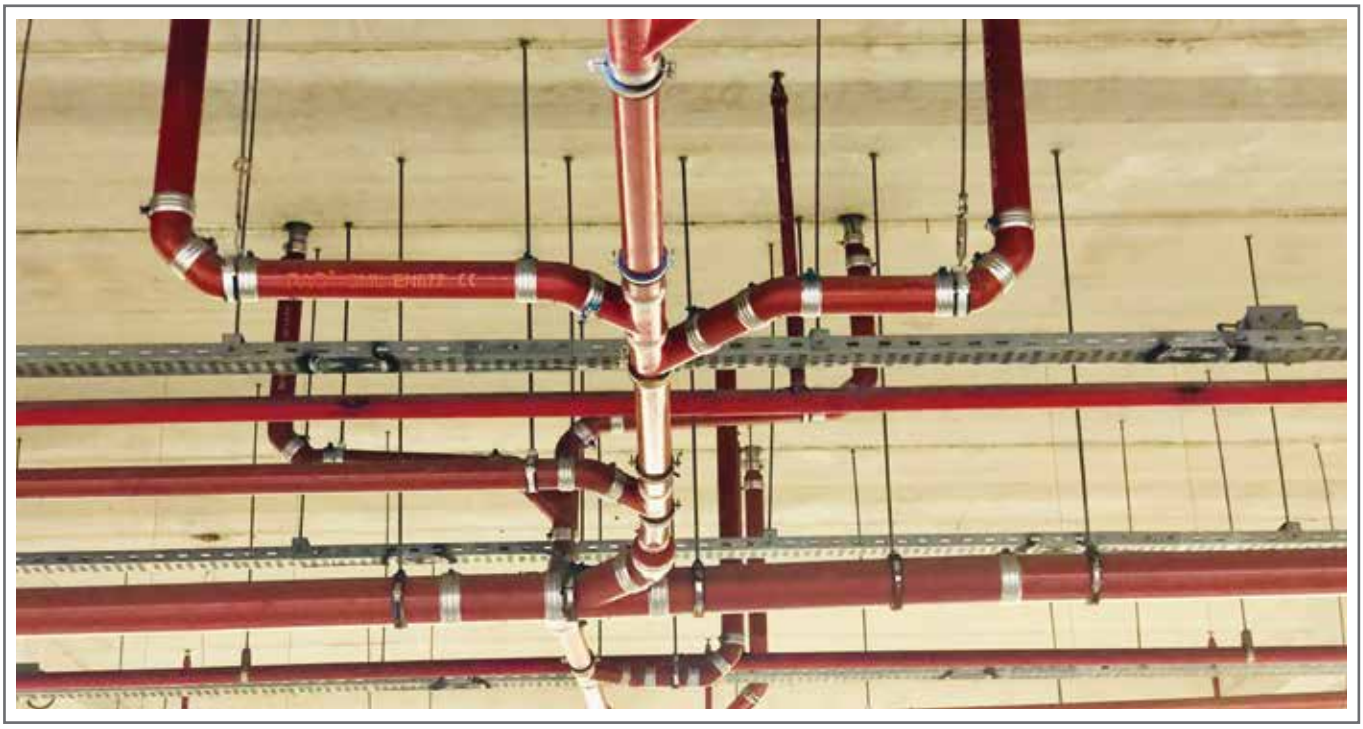
CLEANING PIPE COVER-RECTENGULAR	DN	kg/Product	Article No:	H	G	d	A	F	L
	100	7,0	P-10122	83	160	100	200	230	340
	125	10,0	P-10128	101	190	125	225	255	370
	150	12,8	P-10130	112	215	150	250	280	395
	200	25,2	P-18468	137	265	200	300	330	465
	250	36,5	P-18469	170	330	259	350	426	570
	300	51,0	P-18471	195	380	309	400	476	640

CLEANING PLUG	DN	kg/Product	Article No:	L
	50	0,22	P-42198	47
	70	0,59	P-42199	71
	75	0,9	P-82199	75
	100	1,18	P-42200	77
	125	1,70	P-42201	77
	150	2,40	P-42202	80
	200	5,00	P-42203	87

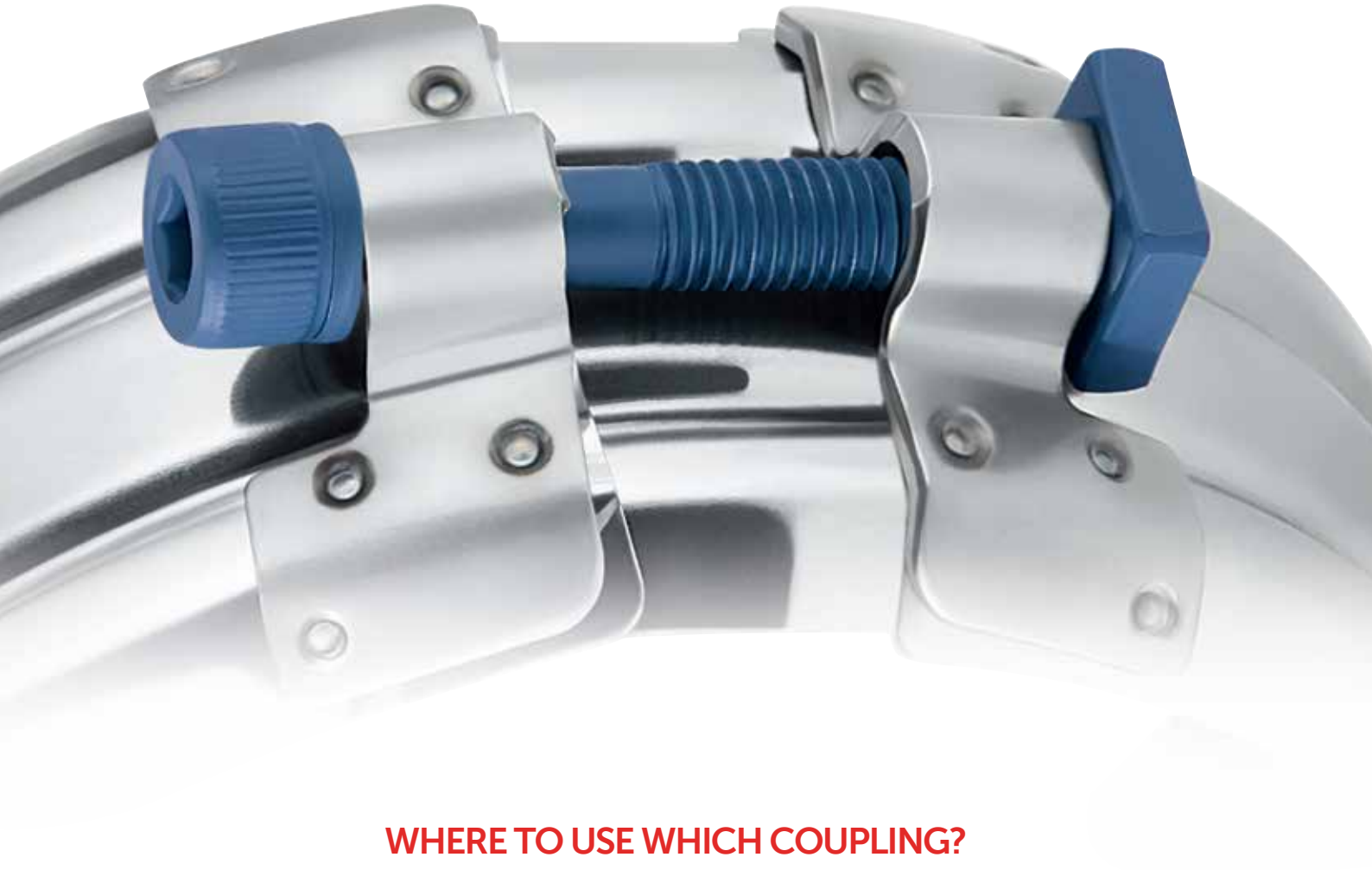
CLEAN OUT	DN	kg/Product	Article No:	A	B	E	F	H	X	Y
	100	4 ±1	AD-529	100	162	-	84	60	-	-

SIPHON-TRAP	DN	kg/Product	Article No:	l	h	X_1	X_2	X_3	X_4	W
Vertical-horizontal	50	2,9	P-20182	190	250	182	68	122	68	60
	70	5,8	P-20170	265	293	200	93	172	93	60
	75	5,8	P-80170	265	293	200	93	172	93	60
	100	9,5	P-17988	325	392	282	110	215	110	100
	125	13,0	P-19859	390	446	316	130	260	130	100
	150	21,8	P-20191	470	493	348	145	325	145	100
	200	38,4	P-20177	600	600	420	180	400	200	100

P TRAP	DN	kg/Product	Article No:	X_1	X_2	L
	50	1,9	P-43000	101	102	191
	75	4,04	P-83001	140	146	230
	100	7,4	P-43002	165	178	267



PAG COUPLINGS - PAG PRESSURE COUPLINGS



WHERE TO USE WHICH COUPLING?

	MATERIAL	IN-BUILDING	IN-CONCRETE	UNDERGROUND	SWITCH TO PVC
PAG RAPID COUPLING	W2				
PAG INOX RAPID COUPLING	W5				
RECORD PRESSURE COUPLING	W1				
COMBI PRESSURE COUPLING	W1				
GRIP COUPLING	W2				
GRIP COUPLING	INOX				
UNIVERSAL COUPLING	W2				
KONFIX	EPDM				

PAG RAPID COUPLING

PAG RAPID are with a single bolt in all diameters. Tork must be applied until locking parts contact with each other. Tightening process must be ended when locking parts contact with each other.

It is possible to perform rather a quick montage and demontage. Fire protection requirements, ordered by the standards, are met.

EPDM gaskets produced in accordance with MPA certified EN 681-1 standard ensure high sealing characteristics for PAG RAPID couplings.

In this respect, all couplings warrant the level, identified in Section 5.4.2. Gas and Water Tightness in EN 12056.

Coupling Body: W2 – STAINLESS STEEL (304)
In compliance with 1.4510/1.4511 EN 10088-2
Clamping Unit: 1.4301 or 1.4510/1.4511 stainless
Bolts and nuts: Nickel cadmium coated steel bolt and nut
Gasket: EPDM (in compliance with EN 681-1) MPA certified
Pressure value: DN50-DN200:0,5 bar
NBR gasket is recommended for wastewaters containing petrol and wastes.
In dimaters DN250 and DN300, PAG RAPID INOX COUPLING is provided.
Place of Application: Pipelines inside the building

Art.Nr./Code	DN	~D [mm]	~H [mm]	~L [mm]	Pmax [bar]	Screw
P-20903	50	70	80	40	0,5	M8
P-20904	70	90	100	40	0,5	M8
P-80904	75	95	105	40	0,5	M8
P-20906	100	125	135	46	0,5	M8
P-20907	125	147	162	55	0,5	M8
P-20908	150	172	187	55	0,5	M8
P-27193	200	227	244	70	0,5	M10

Note: Please apply a tightening torque until the two edges of locking parts touches each other.

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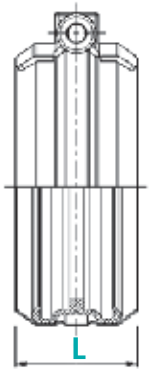

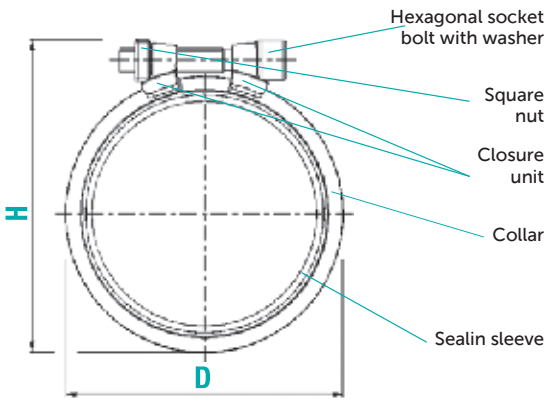

PAG RAPID INOX COUPLING

These couplings are especially suggested for the installations near the sea water where humidty is high and underground wastewater pipelines where the pipes have a direct contact with the land. When KML pipes are to be used, PAG RAPID INOX couplings must definitely be used for connection.

* INOX clamp options not required for inside of building and concrete embedding.

Coupling Body: W5 - STAINLESS STEEL (316)
In compliance with 1.4571 EN 10088-2
Locking Parts: 1.4571 stainless
Bolt and nut: A4 stainless
Gasket: EPDM (in compliance with EN 681-1) MPA certified
Pressure value: DN50-DN200:0,5 bar
DN250-DN300:0,3 bar
NBR gasket is recommended for wastewaters containing petrol and wastes
Place of Application: Underground pipelines (along with KML pipe and fittings)

Art.Nr./Code	DN	~D [mm]	~H [mm]	~L [mm]	Pmax [bar]	Screw
P-21862	50	70	80	40	0,5	M8
P-21863	70	90	100	40	0,5	M8
P-81863	75	95	105	40	0,5	M8
P-29651	100	125	135	46	0,5	M8
P-21866	125	147	162	55	0,5	M8
P-29652	150	172	187	55	0,5	M8
P-21868	200	227	244	70	0,5	M10
P-25785	250	293	306	96	0,3	M10
P-25786	300	345	360	96	0,3	M10

Note: Please apply a tightening torque until the two edges of locking parts touches each other.

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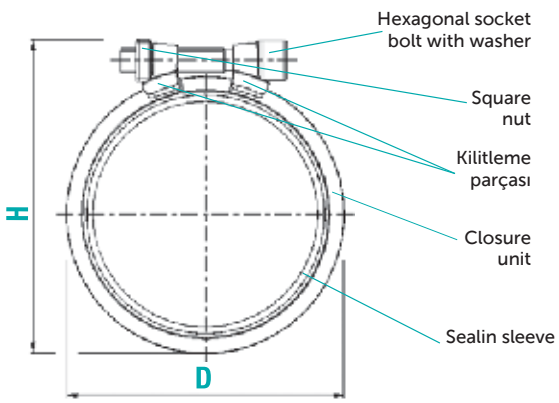


PAG RECORD PRESSURE COUPLING

PAG RAPID COUPLINGS have a pressure resistance up to 0,5 bar. (0,3 bar in DN250 and DN300) Axial load above this is obtained through additional protection of PAG RECORD pressure couplings or PAG RECORD COMBI pressure couplings. In this way, a pressure resistance up to 10 bar is obtained between DN50-DN100. (Please see the Table).

Art.Nr./Code	DN	A [mm]	~D [mm]	~L [mm]	Torque [Nm]	Screw	Pressure [bar]
P-21855	50	21	75	69	12 - 15	M8	10
P-21856	70	21	95	69	12 - 15	M8	10
P-81856	75	21	100	69	12 - 15	M8	10
P-21857	100	25	135	87	25 - 30	M10	10
P-21858	125	25	160	95	30 - 35	M10	5
P-21859	150	25	185	95	30 - 35	M10	5
P-21860	200	30	235	111	60 - 65	M12	3

Under which conditions PAG PRESSURE COUPLINGS must be used?

Available for use in pipelines in accumulation areas.

-Available for use at the points where the rainwater pipelines produce excessive loads.

-Pressure couplings must definitely be used in the lines that pass through several ground floors without taking any branch duct.

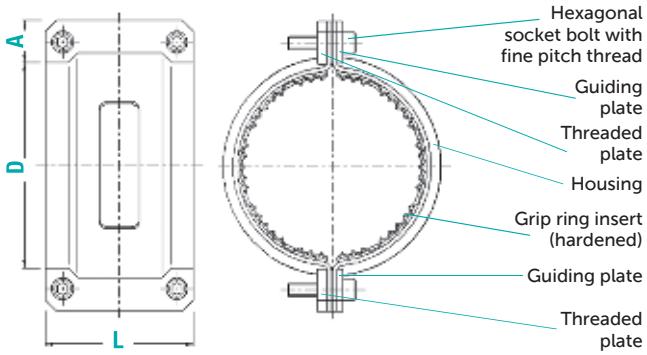
-Available for use with the pipelines, which are fed with wastewater pumps and where the pressure is high.

-It is not required to take any measures up to DN150 in wastewater pipes until 0,5 bar. However, pressure couplings must be definitely used at BENDing points in DN200 lines, included in high building category.

-Wastewater pipelines attached to mixed water sewage lines must be strictly reinforced with PAG RECORD Pressure Coupling.

-Available for use in wastewater pipelines installed under underground water level.

If a pressure amount above 0,5 bar is expected from the pipeline, it is enough to use pressure coupling only at turns (roundups) at elbowing points. You must strictly use PAG RECORD Pressure Coupling if a pressure amount above 0,5 bar is expected.



European production plants of PAG RAPID couplings are member of **IZEG and GEG.**

PAG COMBI PRESSURE COUPLINGS

Axial pressure safety couplings used especially in wastewater and rainwater lines.
While used with rapid coupling in terms of their design, they can also be used with CV type couplings.

Art.Nr./Code	DN	A [mm]	~D [mm]	~L [mm]	Torque [Nm]	Screw	Pressure [bar]
P-25600	50	22	81	72	18 - 20	M8	10
P-25601	70	22	102	72	18 - 20	M8	10
P-85601	75	22	110	72	18 - 20	M8	10
P-25602	100	22	136	82	28 - 30	M10	10
P-25603	125	23,5	162	93	28 - 30	M10	5
P-25604	150	23,5	186	93	33 - 35	M10	5

PAG UNIVERSAL PRESSURE COUPLING

Just as they can be used with rapid coupling, they can also be used with CV couplings.
They are recommended to be used when it is required to resist to high loads.

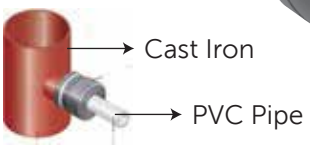
Art.Nr./Code	DN	A [mm]	~D [mm]	~H [mm]	Screw	Pressure [bar]	
						RAPID	CV/CE
P-19990	50	77	85	105	M8	10	5
P-19992	70	77	100	120	M8	10	5
P-89992	75	77	105	125	M8	10	5
P-19994	100	97	130	150	M8	10	5
P-19995	125	97	165	195	M8	10	5
P-19996	150	97	185	215	M8	5	5
P-19997	200	113	240	270	M10	5	5
P-23196	250	139	305	335	M10	3	3
P-23197	300	139	400	490	M10	3	3

KONFIX-For connecting to PVC pipes

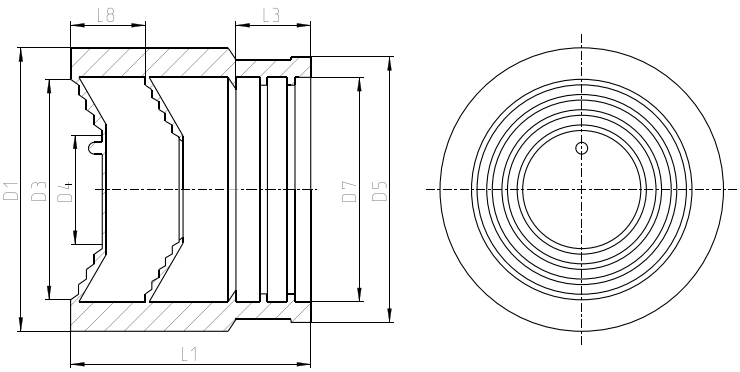
Refers to the EPDM piece that is required to be connected to a different type of pipe with a different dimension (PVC or steel) from PAG SML pipe or fittings. Coupling is carried out with NORMA CLAMP with 12 mm band width. Ensures high sealing.

Application: Cast iron pipe is installed to the open side of Konfix and it is tightened with a clamp. PVC pipe is placed once the closed part is cut and removed.

PVC Transition piece implementation



Art.Nr./Code	DN	D1 [mm]	D3 [mm]	D4 [mm]	D5 [mm]	D7 [mm]	L1 [mm]	L3 [mm]	L8 [mm]
P-18240	50	72	56	30	67,5	57	63	19	19
P-19120	70	92	75	41	86,5	77	77	19	24
P-89120	75	108	90	58	93	81	88	19	23
P-18656	100	128	110	78	118	108	95	21	23
P-19121	125	145	126	90	145	132	103	26	27
AG-19122	100x70	117	101	81	108	104	107	94	74



EN 877
Cast iron pipes and fittings-Joints and accessories used for discharge of water from buildings-

This standard covers the parts of cast iron pipelines, used in the construction of water drain systems in the buildings and normal gravity systems. Nominal size range is from DN 40 to DN 600 (including). This standard specifies material specifications along with the dimensions and tolerances, mechanical specifications, appearances and standard coatings of cast iron pipes, fittings and accessories.

Furthermore, it also determines the performance properties for all parts that also includes joints. As well as related joints, this standard further includes the fabrication of casting parts along with pipes, fittings and accessories manufactured or cast with any casting process.

Issues within the scope of ISO 6594 International Standard are mentioned. The biggest difference is the addition of finished product performance and specifications for the fittings.

1 Scope
This standard covers the parts of cast iron pipelines, used in the construction of water drain systems in the buildings and normal gravity systems. Nominal size range is from DN 40 to DN 600 (including). This standard specifies material specifications along with the dimensions and tolerances, mechanical specifications, appearances and standard coatings of cast iron pipes, fittings and accessories. Furthermore, it also determines the performance properties for all parts that also includes joints. As well as related joints, this standard further includes the fabrication of casting parts along with pipes, fittings and accessories manufactured or cast with any casting process.

3 Tariffs
Following tariffs are implemented for the purpose of this standard.
3.1 Drain system for the buildings refers to the pipes, fittings, accessories and joints that are used for collecting and discharging wastewaters and rain waters from a building. This system consists of drain, ventilation and rain pipes installed within the border of, or conjointly with a building.
4.2.6 Pipe accuracy
When measured pursuant to Article 5.2.5, the highest deviation in pipe accuracy may be:
-0,15% for the lengths regarding nominal sizes higher DN 70; and
0,20% for the nominal sizes equal to or lower than DN 70.
4.2.8 Pipe Lengths
Normally the pipes must be manufactured as 3 m in length.
Note – Other lengths are available and stated with special marks based on the agreement by and between the manufacturer and the customer.
When measured pursuant to Article 5.2.7, pipe lengths must remain within ±20 mm tolerances.
4.2.11 Angles of Fittings
With a design tolerance of ±2 , fittings must be designed in the angles specified below.
Bends : 15, 22, 30, 45, 68, 88,
Single/double Branches: 45, 68, 88

4.6 Coatings for the pipes, fittings and accessories
4.6.1 General cast iron parts must be coated from inside and outside. Before coating, surfaces must be dry, rust-free and there must be no materials to prevent adhesion as well as other materials (e.g., oil, grease).
In coating application systems, natural contact points are allowed.
These coatings must become adhesive when they are exposed to temperatures likely to increase up to 100°C. They must maintain an acceptable appearance up to the installation and must be available for final external coating.
Manufacturer should state the smallest thicknesses of dry inner and outer coatings applied in the manufacturing area and indicate the compliance of the same respectively with Article 4.6.2 and Article 4.6.3. Note – Special terms and conditions for the coatings of embedded systems established outside the building as well as the rain water systems are provided in Article 4.8.3 and Article 4.9.2 respectively.
4.6.2 When inner coatings are subjected to test pursuant to Article 5.7.2, inner coating materials must comply with the following specifications:
-Resistance to salt spray: Minimum 350 hours pursuant to ISO 7253
-Wastewater resistance: Minimum 30 days at 23°C
-Chemical resistance (pH2 - pH12): Minimum 30 days at 23°C
When tested pursuant to Article 5.7.2, inner coating of the finished product must comply with the following specifications:
- Dry coating thickness: Minimal thickness, applied in the manufacturing area, which is smaller than 4000 µm (other than special coatings for special applications) and that is specified by the manufacturer as a minimum (Article 4.6.1).
- Adhesion : In compliance with level 1 pursuant to EN ISO 2409
-Hot water resistance: 24 hours at 95°C
-Resistance to temperature cycle: 1500 cycles between 15°C and 93°C.

4.6.3 Outer Coatings
Outer coatings on the finished products, which are considered as the basic layer must not be easily flammable and shouldn't contain poisonous heavy metals.
When tested pursuant to Article 5.7.3, outer coating materials must comply with the following specifications.
- Color : Three-colored coordinates, specified in ISO 7724-1, ISO 7724-2 and ISO 7724-3 as well as tariff L= 37; a= 24; b= 16; E= 4,0 (approximately red-tinged brown)
- Unification with other paints: Paints, which are normally used on metallic structures
-Resistance to combustion: Not easily flammable when exposed to an external flame.
When tested pursuant to Article 5.7.3, outer coatings of final product must comply with the following specifications.
- Dry coating thickness: Minimal thickness, applied in the manufacturing area by the manufacturer (Article 4.6.1)
- In compliance with Level 2 pursuant to EN ISO 2409.

4.7 Joints
4.7.1 General joints,
Refer to the main components of drainage system of the manufacturer. In compliance with this standard these must ensure the correct connection between the pipes and/or fittings and accessories.
Different fittings design to fulfil the characteristics of this standard are allowed in consideration of different applications regarding cast iron pipeline systems. Joints may be equipped with one or more than one elastomeric gaskets in order to ensure sealing and prevent contact of part edges with each other.
4.7.2 Dimensions the width of sealing parts of joints must not exceed the size of 2 T, included in Figure 1 and Schedule 2. All dimensions of joints are limited with the sizes and angles of fittings.
Pictures of the joints should provide the main dimensions and tolerances of joints and parts thereof.

4.8 Embedded systems
4.8.1 General Article
4.8.2 – Along with the amendments included in Article 4.8.4, the following characteristics included in Article 4.2 - Article 4.7 are applied. Refer to Article 4.10.2 for branding. 4.8.2 Dimension. Dimensions must be as provided in Schedule 1. Note- Other dimensions included in Annex A, are allowed based on the agreement, executed by and between the manufacturer and the customer.
4.8.3 Outer Coatings
4.8.3.1 General Article. Rather than those, specified in 4.6.3, Coatings, in compliance with Article 4.8.3.2 or Article 4.8.3.3 are used. Pipes and fittings, coated in this way, can be embedded in contact with most of the grounds. More information is included about the usage areas of these embedded systems in Annex A.
Applied coatings must be intensive and perpetual and free of defects such as gaps and non-adhesiveness.
4.8.3.2 Pipes
The pipes must have an outer coating that consists of a metallic zinc layer, which was coated with a final paint layer in compliance with zinc. Zinc layer must be free from rust and foreign articles such as oil or grease that prevent adhesion and that must be applied by spraying on the oxidized pipe surfaces. Final layer of the paint can be applied with another proper method.
When tested pursuant to Article 5.9.2; average mass of the zinc in unit area shouldn't be less than 130 g/m2 with minimum 110 g/m2 locally. Basic dry film thickness of the last layer shouldn't be less than 70 m with minimum 50 m locally. It is possible to apply thinner thicknesses on the fine mist zinc (as in flame spray) when tar paints are used together with other paints.
4.8.3.3 Fittings and accessories
Fittings and accessories must have coatings which are similar to that of the pipes in color and equal to minimum that of the pipes in quality (e.g., zinc-rich paints in which 90% of the dry film consists of zinc as a mass or epoxy resin-based coatings). Note – See the note in Article 4.8.3.2.
4.8.4 Joints
4.8.4.1 Materials. all parts of couplings and couplings must be made of cast iron (Article 4.7.3) and coated pursuant to Article 4.8.3.3 or minimum 16,5% chrome and 8,5% nickel austenitic stainless steel or equal or proper material with resistance in compliance with EN 10088-1, EN 10088-2 and EN 10088-3.
4.8.4.2 Water tightness. Internal hydrostatic pressures, included in line a) and b) of Schedule 4 may be limited with 1 bar only for the joints used in embedded systems.
5.4.4 Tensile Strength Test Validity
5.4.4.1 Gray cast iron pipes and fittings; Method A (Article 5.4.2) the results of tensile tests must comply with the specifications in Schedule 3. However, the tests will be considered to be valid when the following conditions are met.
- For the pipes: The average of three values, obtained on one-day manufacture must be at least 200 MPa and maximum one value must be between 180-200 MPa.
For the fittings: All values must be at least 150 MPa.
Rather than the quality of cast iron, a test can be cancelled when wrong results are obtained for the following reasons
- Incorrect connection of test piece or incorrect operation of test machine,
- Incorrect processing of test piece,
- Casting defects arising with the test piece before or after breakage.
Under these conditions, a test piece must be taken from the same casting and defective test results must be cancelled.
5.7.2.4 Coating Thickness
Coating thickness tests must be conducted by using the test instruments in Method 6, specified in ISO 2808 in consideration of the following procedures.
- For the pipe: Average of at least 10 measurements (apart from 20-mm parts from the edges)
- For the fitting: Average of at least five measurements, performed on the different parts of the fitting or surface of the standard panel (EN 605), exposed to the same coating process. Values obtained thereof must be higher than the lowest thickness, specified and applied on site by the manufacturer and less than 400 m (Article 4.6.2) other than special application.

Annex F (Informative)
General information about the properties of some finished products
F.1 Mechanical strength and stability. Cast iron finished products in compliance with this standard have very good mechanical properties (Schedule 3). These products must be as stable as (Schedule 1) to withstand abnormal tensions, envisaged under normal operating conditions (e.g., accidents, strokes and vandalism acts). These products must not be affected from excessive heat changes and impaired in time.
F.2 Fire Safety. Cast iron finished products in compliance with this standard are non-combustible and non-flammable products. When they are exposed to fire, they keep their functional properties, integrity for several hours; for instance, internal walls are flame and gas-proof and there occurs no fractures, distortion and significant deformations.
Furthermore, manufacturer can prove fire resistance of these connections in compliance with EN 1366-3.
F.3 Hygiene, health and environment. Products in compliance with this standard ensures high-level of sealing for internal walls and joints under any usage conditions (Schedule 4). These products are non-poisonous; they do not contain compounds, which are detrimental to the health and hygiene of the employees and the residents of the building. Besides, these products can completely be used again without generating any permanent wastes.
F.4 Sound protection. Cast iron piping systems ensures significant amount of sound reduction benefits while discharging water from the buildings based on their high masses per unit area in addition to their joint design characteristics. Additional protection is not required as a rule.
There is no available European standard until the publication date of this standard for the evaluation of the sound caused by wastewater pipe systems, established with common test mechanisms and test methods.

 15° Bend	 22° Bend	 30° Bend	 45° Bend
 88° Bend	 Double Bend	 45° Double Branch	 45° Single Branch
 88° Single Branch	 88° Double Branch	 Corner Branch	 WC Bend
 Plug	 Cleaning Plug	 Cleaning pipe cover (Rectangle)	 Cleaning pipe cover (Circular)
 Bearing for downpipe	 Down Pipe Bracket	 Downpipe bracket and bearing	
 Reducer	 Siphon	 Rapid Coupling	 Konfix

INSTALLATION INSTRUCTIONS

Produced in modern factory in compliance with EN877 standard, PAG cast iron pipes and fittings passed all tests, ordered by the standard successfully once again. Fittings and pipes are connected to each other with PAG-branded MPA certified EPDM rubber containing couplings and PAG pipes are easily cut in the lengths desired by the installator. It is suggested to apply a protection band to the edges of recently cut pipes in order to increase corrosion resistance.
For the usage of vertical pipe support elements in buildings with more than 5 floors, vertical pipes must be reinforced with a vertical pipe support element and ring against downfall. As for higher buildings, a vertical pipe support element and ring must be applied in every 5th floor in proportion to the number of floors.

Use of fixing couplings
In vertical and horizontal lines, the pipes must be fixed in every 2 meters with a heavy load fixing coupling. Moreover, the line must strictly be fixed in every direction change in horizontal lines and where Branch is used.

Use of pressure coupling
Wastewater lines are designed so as to be sloped and free from pressure. However, pressure formation is possible in certain cases. Pipe couplings are designed according to a pressure rate between 0 and 0,5 bar. As a precaution, it is essential to connect, store and fix pipe pieces as frictional axial force. However, potential cases above 0.5 bar where internal pressure is likely to take place are stated below.
-Rain water pipes
-Pipes in storage areas
-Pressure feeding pipes in wastewater lifting equipment
In cases of additional pressure requirement in cast iron pipes and fittings, we recommend "reinforced pressure coupling." These couplings are coated over normal rapid couplings and their spiked structures ensure that they are attached stronger to the pipe, thus they secure the system up to a potential pressure of 10 bar. It is enough to use this coupling especially in cast iron roundups, turns and at the points where bending is performed.

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