

— DRAINAGE

SML PRODUCT RANGE.

EFFICIENT DRAINAGE TECHNOLOGY.



Cast iron drainage pipe systems
for building drainage

EXCELLENT.
WATER.
SOLUTIONS.

DÜKER SML PIPE SYSTEM

 GENERAL INFORMATION

 FIRE PROTECTION

 ACOUSTIC PROTECTION

 PIPES AND FITTINGS

 COUPLINGS

 INSTALLATION INSTRUCTIONS

 DESIGN AND PIPE LAYING

 SPECIFYING TEXTS



TABLE OF CONTENTS

GENERAL INFORMATION		02	COUPLINGS PROGRAMME
Aspects in Favour of Cast Iron	4–5	Dükorapid® coupling	61
Application, Standards	6–7	Rapid Inox coupling	62
Quality and Safety	8–10	CV coupling	62
Environmental Protection	11–12	CV Inox coupling	63
Material Properties	13	Connect-F Inox coupling	63
Coatings and Linings	14	Connect-G Inox coupling	64
		Kombi grip collar	65
		Düker EK Fix coupling	66
		Konfix Multi coupling	66
		Multiquick coupling / Transition coupling	67
		SML fire protection branch	68
		Düker Fire protection coupling BSV 90	68
		Doyma Curaflam® Konfix Pro	69
		SML couplings: recommended application areas	70–71
FIRE PROTECTION		03	INSTALLATION INSTRUCTIONS
Standards and Approvals	16–17	Assembling and Installation Instructions	
Wall Penetrations		for Düker Couplings	73–74
for Cast Iron Pipe Installations	18–21	Dükorapid® / Rapid Inox	75
Ceiling Penetrations		CV / CV Inox coupling	76
for Cast Iron Pipe Installations	22–23	Connect-F Inox / Connect-G Inox coupling	77
Special Case: Mixed Installations	24–27	Kombi grip collar	78
Clearances between Pipe Penetrations	28–29	Düker EK Fix coupling / Konfix Multi coupling	79
Pipelines Installed in Escape and		Multiquick coupling	80
Emergency Routes	30	Transition coupling	81
ACOUSTIC PROTECTION		04	DESIGN AND PIPE LAYING
Guidelines and Requirements	32	Cutting Pipes	83
Test Certificate	33	Cut Edge Protection	84
Measures, Acoustic Decoupler	34–35	Maintenance and Pipe Cleaning	84
		Imbedding Cast Iron Pipes in Concrete	85
		Underground Installation of Cast Iron	
		Drainage Pipelines	85
		Installation Outside of Buildings	85
		Fixings	86–87
		Flow Capacities	88
		Information on Nominal Diameter DN 80	89
		Design Rules for DN 80/d _i = 75 mm	89
		Aquaperfect	90–93
		CAD Product Data	94–95
01	SML DELIVERY PROGRAMME	05	SPECIFYING TEXTS
SML pipes and fittings – construction dimensions	37	Specifying Texts	97–100
SML pipes	38	Tender Specifications in Accordance	
Düker pro-cut tape	38	with STLBB	102–103
SML reducers	38		
SML down pipe supports and bearing rings	39		
SML ring console	39		
SML bends	40–43		
SML offsets / S-bends	44		
SML branches	45–49		
SML inspection pipes	50		
SML plugs	51		
SML siphons, installation examples	52–53		
SML rain water stand pipes	53		
Doyma wall penetrations	54		
SML roof penetration	55		
Düker sealing flange	55		
SML adaptors with short socket and seal	56		
SML floor connection bend and SML double branch	56		
Rubber connectors	57		
WC connectors	57		
SML flanged adaptors	58		
Connecting SML pipes to sewer pipes	58–59		

ASPECTS IN FAVOUR OF CAST IRON



Düker Cast Iron Pipes are Fire Protection Pipes

- non-combustible construction product – no contribution to the development of fires (flashover), no thermal loads
- Düker SML has building material class A according to DIN 4102-1
- open installation in escape routes
- no formation of smoke – smoke is the fastest and most frequent cause of death in a fire
- penetration seals with well-tried German MLAR solutions are easy and low-priced
- fire transmission into lower storeys is prevented without fail
- the functionality is maintained throughout a fire if pure cast iron installations are chosen

Düker Cast Iron Pipes are Acoustic Protection Pipes

- cast iron with flake graphite is extremely sound-absorbent due to its structure and mass
- with the acoustic decoupler, Düker SML reached unrivaled low values (11 dB(A) at 4 l/s, quieter than falling snow)

Düker Cast Iron Pipes are Easy to Handle and to Install

- with suitable tools, cast iron can be cut easily, fast and accurately (page 83)
- no danger of cracks due to handling at low temperatures
- Rapid couplings ensure a fast, accurate and axially restrained connection (page 75)
- the comprehensive range of fittings offers solutions for all problems of building installation (pages 38–59)
- due to the stability of the pipes, few brackets need to be installed (pages 86–87)
- thanks to the inferior thermal length expansion, no deflection legs, expansion sockets, anchored and sliding fixings etc. need to be considered (page 13)
- laying in concrete is possible without any problems (page 85)
- even for siphonic drainage, no particular fixing (trace railing or similar) needs to be used (pages 90–93)
- special versions are available for underground installation or bridge drainage (page 14)
- different cast iron drainage pipe versions are always compatible among each other and do not require any special transition pieces (page 14)

Düker Cast Iron Pipes are Stable and Resistant

- cast iron pipes are resistant to positive and negative interior pressure, even in larger diameters (pages 37 and 73–74)
- the pressure resistance is not interdependent with medium or environment temperature, neither at high nor at low temperatures
- cast iron pipes are absolutely UV-resistant, no material embrittlement
- cast iron pipes do not show the typical plastic phenomenon of thermal shrinkage (shortening of plastic pipes after exposure to heat, therefore withdrawing from the socket)
- cast iron pipes are “vandalism-safe”

Düker Cast Iron Pipes are Environmentally Friendly

- cast iron pipes are manufactured from practically 100% recycling material (cast iron scrap)
- cast iron pipes do not emit any volatile organic compounds (VOC) (page 12)
- due to the socketless construction, even smaller pipe cuttings can still be used, therefore reduction of waste
- waste remaining after installation or after the end of life of the drainage pipe system can be recycled without any problems

When considering and evaluating all positive aspects of Düker cast iron pipes, one will inevitably arrive at the conclusion that Düker cast iron pipe systems offer an excellent priceperformance ratio, also compared with the alternatives. Bear in mind the inexpensive solutions for acoustic and fire protection, bracketry etc. In particular in larger residential and administrative buildings, hotels, hospitals and special-care facilities, **Düker cast iron pipe systems are your first choice!**

Areas of Application

The European standard EN 877 is valid for prefabricated parts of cast iron pipes for construction – normally as non-pressure pipelines – of building drainage systems as well as connecting drains. The nominal diameter range covers DN 50 up to and including DN 600. This standard contains requirements for material, dimensions and tolerances, mechanical features, composition, standard coatings for cast iron pipes, fittings and accessories. Further it contains functional requirements for all prefabricated parts including couplings. It is valid for pipes, fittings and accessories which are manufactured by casting process, no matter which type, or from cast parts, and for the corresponding couplings. Düker SML drainage pipe systems are in accordance with this standard and exceed its requirements by far in many respects.

Planning and Installation

The planning and installation of SML pipe systems must comply with the technical regulations and standards set out in DIN 1986 Parts 100, 3, 4, and 30, as well as DIN EN 12056 and DIN EN 752.

DIN 1986 – Drainage Systems for Buildings and Properties

Part 100: Requirements in conjunction with DIN EN 752 and DIN EN 12056

Part 3: Operation and maintenance guidelines

Part 4: Applications for waste water pipes and fittings made of different materials

Part 30: Maintenance

DIN EN 12056 – Gravity Drainage Systems Inside Buildings

Part 1: General and performance requirements

Part 2: Wastewater systems – planning and calculation

Part 3: Roof drainage – planning and design

Part 4: Wastewater lifting plants – planning and design

Part 5: Installation and testing – instructions for operation, maintenance and use

In addition to the above standards for drainage systems within buildings, the following applies:

DIN EN 752 – Drainage Systems Outside Buildings – Sewer System Management

The following standards must also be observed in their currently valid versions:

DIN EN 1610 = Drain and sewer systems outside buildings; guidelines for the installation of underground pipelines

DIN 4102 = Fire protection in building construction

DIN 4108 = Thermal insulation in building construction

DIN 4109 = Sound insulation in building construction

DIN 18381 = Gas, water and waste water installation works inside buildings

This standard forms part of section C of the German Construction Contract Procedures (VOB) and includes the general technical regulations for gas, water and waste water installation works inside buildings, along with guidance on service specifications, execution and invoicing.

Please note: At the time of printing, all applicable standards, regulations and guidelines were taken into account in their valid versions. Changes may occur. Düker's Technical Service will endeavour to inform you of any updates and revise the information accordingly.

Approval as a Drainage Pipe System

Cast iron drainage pipe systems were, until a few years ago, listed in Building Rules List A, Part 1, and therefore bore the Ü mark. In December 2008, they were moved to Building Rules List B, Part 1, resulting in a transition from the Ü mark to the CE marking. Since autumn 2009, Düker has manufactured pipes and fittings exclusively with the CE marking.

Products bearing the CE marking are governed by European regulations. In 2014, the European Court of Justice criticised the German practice of imposing additional national requirements on certain CE-marked products. As a result, Building Rules List B, Part 1 (construction products with CE marking under the Construction Products Directive) was repealed, and work began on a new regulatory framework.

The Building Rules Lists A, B and C were officially repealed on 1 April 2019. The regulations were incorporated into the Model Administrative Regulation on Technical Building Rules (MVV TB, introduced in August 2018) and the respective federal state regulations based on it. In many cases, the previous requirements for products were reformulated as requirements for buildings or construction methods.

In accordance with the Model Building Code (MBO, version of November 2002, last amended by resolution of the Conference of Building Ministers on 27 September 2019), section 16c, construction products bearing the CE marking under the Construction Products Regulation may be used, provided that the performance declared in the manufacturer's Declaration of Performance complies with the requirements for the intended use.

No additional proof of fitness for use – such as construction authority approvals – are required for cast iron drainage pipe systems in accordance with DIN EN 877.

For fire protection approvals for firestop systems used with cast iron drainage pipe systems, please see page 16 onwards.

Approval – Switzerland



Düker cast iron SML drainage pipe systems comply with Swiss testing standard SN 592012; Approval No. ZE 23005.

International Approvals and Certificates



Approval Decision No. 4/1
for Düker SML DN 50-400



Kitemark No. KM 613082
for Düker/Harmer SML DN 50-300



GOST Certificate POCC DE.E01.H38694
for Düker SML DN 50-300

Historic Test Certificate

Düker has been manufacturing cast iron drainage pipes and fittings at its Karlstadt plant since 1913. In the early years, socketed pipes such as LNA or GA pipes were produced. In 1967, Düker was granted Germany's first ever test certificate for socketless drainage pipe systems, under certificate number PA-I 1609. Since then, Düker has continuously manufactured the SML drainage pipe system, with ongoing improvements to its product range, connection technology, coating systems and services.

CE Marking



The latest edition of the DIN EN 877 product standard includes the Annex A1, which addresses the topic of CE marking.

Following a transitional period ending in August 2009, all manufacturers of cast iron drainage pipe systems were required to replace the previous "Ü" mark with the CE marking on their product labelling.

Unfortunately, this change effectively eliminated the obligation for external testing. The quality assurance process previously associated with the Ü mark – such as initial type testing by an accredited test institute – is no longer mandatory. With the exception of a fire resistance test for the European classification "non-combustible," all testing is now carried out and documented solely by the manufacturer. As a result, in the case of cast iron drainage pipe systems, the CE marking cannot be regarded as a meaningful indicator of product quality. Rather, it functions as a free-trade symbol for the European authorities. This makes voluntary quality inspections and marks, such as the GEG mark, all the more important.

Since autumn 2009, Düker has been manufacturing pipes and fittings exclusively with CE marking.

As of 1 July 2013, the Construction Products Regulation (CPR) applies to all construction products covered by a harmonised EN standard. Since then, CE marking has been based on what is known as a Declaration of Performance.

You can always find the latest Declarations of Performance (DOP) from Düker at www.dueker.de/dop

IZEG – Information Centre for Cast Iron Drainage Technology



Low-cost suppliers undermine the high quality standards that buyers of cast iron drainage pipe systems have come to expect. To counter this trend and meet the growing safety expectations of partners in the trades, specialist wholesalers, design offices and public authorities, the European cast iron pipe industry – together with suppliers of connection technology and accessories – founded the IZEG. In addition to ensuring product quality – demonstrated by the new quality mark – IZEG members regard providing detailed information and expert advice as their most important ways of supporting market partners.

The Information Centre's wide-ranging activities are organised into three main areas: the Cast Iron Drainage Technology Quality Association (GEG), the Info Centre and the Technical Service.

For further information, visit www.izeg.de

GEG – Cast Iron Drainage Technology Quality Association



Under the guidance of the German Institute for Quality Assurance and Labelling (RAL), based in Sankt Augustin, the Cast Iron Drainage Technology Quality Association (GEG) was established. The primary role of the Association is to coordinate quality assurance for cast iron drainage pipes and fittings, connections, and accessories through both internal and external monitoring.

Holders of this quality mark are subject not only to initial testing by an accredited test institute, but also to regular third-party inspections at their own production facilities. Moreover, the requirements for the RAL-GEG Quality Mark – particularly regarding the resistance of internal coatings – are significantly stricter than those of EN 877. This quality mark guarantees consistently high quality for cast iron drainage pipe systems.

Suggestions for incorporating the RAL-GEG Quality Mark into tender specifications can be found on page 98 (private tenders) and page 102 (public tenders).

In the most recent edition of RAL-GZ 698 (2022), the GEG has defined quality and testing specifications for the following areas:

1. General provisions for cast iron drainage technology, including requirements for initial testing, internal and external monitoring, documentation and labelling
2. Specific provisions for pipes and fittings – see also the tables on the next page
3. Specific provisions for connections
4. Specific provisions for pipes and fittings used for the discharge of corrosive waste water
5. Implementation provisions for the use of the quality mark

As part of the annual external inspection, not only are products tested on a random-sample basis, but the in-house quality management system is also subjected to thorough review.

The specific provisions for pipes and fittings define quality requirements that go beyond those of DIN EN 877 and DIN 19522. Compliance with these enhanced requirements is a prerequisite for the award of the RAL Quality Mark for Cast Iron Drainage Technology.





Test Frequency of Pipes and Fittings:

Test Criteria	Internal initial type testing and production control ¹⁾		Initial test and yearly third-party monitoring ²⁾
	DIN EN 877 DIN 19522	CE	GEG
Surface condition Roughness, cavities, lumps, misalignment, burrs, unevenness of end faces	-	-	
Material Cast iron with flake graphite EN-GJL-200 (pipes) and EN-GJL-150 (fittings) as per EN 1561		-	
Dimensions and weights Outside diameter, wall thickness, sealing zones			
Admissible tolerances Lengths, straightness of pipes, angles		-	
Dry coating thickness of coatings conformity with initial test and factory standards			
Adherence of coatings			
Absence of pores and blisters in the coating			
Chemical resistance of inside coatings as per EN 877*			-
Superior chemical resistance of inside coatings as per GEG provisions*	-	-	
European classification of the reaction to fire	-	Initial test ³⁾	-

¹⁾ Initial type testing by the manufacturer; possibly voluntary additional type testing by an accredited laboratory; factory production control and product inspection by the manufacturer

²⁾ Initial test and yearly third-party monitoring by an accredited laboratory

³⁾ Initial test by a notified laboratory

* Chemical resistance tests on the inside coating of pipes and fittings:

Medium/ Solution	Concentration (N = normal solution)	pH value	Duration of test (d=days; h=hours)	Temperature in °C	EN 877 CE	GEG
Phosphoric acid	25%	1.0	72h	40		x
Acetic acid	10%	2.0	48h	25		x
Hydrogene pyroxide solution	10%	3.5	48h	25		x
Sulphuric acid		2.0	30d	23	x	x
	0.1N	1.0	30d	50		x
Lactic acid	1%	2.0	48h	25		x
Citric acid	5%	1.5	30d	50		x
Waste water according to EN 877		7.0	30d	23	x	x
		7.0	30d	50		x
Sodium hydrogen carbonate solution		12	30d	23	x	x
	0.1N	11.4	30d	50		x
Salt water		5.6	10d	50		x
Water (fully desalinated)		6.4	30d	50		x
Salt spray			350h	35	x	x
			1500h	35		x

SML Drainage Pipe Systems – Warranty



Based on the warranty agreement in place since 1 January 1988 between Düker and the German Central Association for Sanitation, Heating and Air Conditioning (ZVSHK), St. Augustin,

Düker guarantees that the pipes, fittings and couplings it supplies are manufactured in accordance with the DIN standards, construction and testing principles, official test certificates, approvals, and DVGW regulations applicable at the time of manufacture. Düker also confirms that the installation instructions and application guidelines it provides are accurate.

This allows certified installation contractors to submit warranty claims directly to Düker. Liability for damages – including removal and reinstallation costs as well as direct consequential losses – arising from non-fulfilment of these conditions is limited to a maximum of €1.5 million per incident for property damage and personal injury. This represents a significant advantage for products installed “behind the wall”, as wholesalers are not legally obliged to cover replacement and consequential costs for defective products. Normally, there is no direct legal relationship between the installer and the manufacturer – only a warranty agreement enables certified installers to assert claims directly against the manufacturer in the event of damage.



A corresponding €1.5 million warranty agreement is also in place with the BTGA (German Association for Building Services Engineering; formerly

BHKS). The BTGA is the oldest and one of the most influential trade associations in the sector, representing both large and medium-sized companies with around 45,000 employees.

Düker Management Systems

As early as in 1993, Düker introduced a certified quality management system as per EN ISO 9001. By now, the Düker system has developed into an integrated certified management system as per

- EN ISO 9001 Quality Management
- EN ISO 14001 Environmental Management
- EN ISO 50001 Energy Management
- ISO 45001:2023 Occupational Health and Safety Management

Düker Drainage Pipe Systems – Award-Winning Quality

In 1999, the Bavarian State Minister for Economic Affairs, Transport and Technology awarded Düker's quality management in the field of drainage technology the Bavarian State Prize. Out of 150 applicants, our company was selected by a panel of experts led by the Technical University of Munich as one of just 16 prize-winners. This quality award – the first national distinction of its kind since 1993 – reinforces our commitment to what we set out to do decades ago: to uphold the high quality standards of cast iron drainage pipes manufactured in Germany. We continue to achieve this through fresh ideas, reliable system solutions and a premium product finish.



Sustainability Mission

Düker feels obliged to the environment as well as the economic and social needs of their staff and of society. Sustainability, an integral part of business culture and of everyday activities, is based on three pillars:

- Economy of all activities for securing and developing the company
- Social responsibility to the staff (e.g. occupational health and safety), business partners and society
- Environmental responsibility and energy efficiency as a contribution to a moderate use of all natural resources.

For the detailed Mission Statement please refer to the Düker web page www.dueker.de

Environmental Protection and Energy Efficiency

In 2011 Düker introduced an environmental and an energy management system as per ISO standards. For Düker, environmental protection and energy efficiency are fundamental for achieving the company goals and an important aspect of each staff member's activities. The use of energy-efficient technologies ranks high in the company. The observance of legal requirements at the place of manufacture in Karlstadt/Germany is only considered a minimum standard.

Reduction of CO₂ Emissions

At the turn of the year 2013/2014, Düker invested in a new cupola furnace in the Karlstadt works, which now melts down the cast iron for the centrifugal casting plant and the moulding plant. The new furnace is a modern hot-blast cupola furnace with long-term refractory lining. Compared to the old furnace, the CO₂ emissions are reduced by 25% with equal melting performances, with simultaneous saving of energy as well as maintenance and refractory repair expenditures.

Recycling

Grey cast iron, the material that Düker drainage pipes and fittings are made of, is 100% recyclable. Scrapped cast iron pipe systems can be processed to new cast iron pipe systems without any trouble. Furthermore, all cast iron pipes and fittings manufactured by Düker today already consist of 100% recycled cast iron. Cast iron scrap does not pose any problems in its disposal. On the contrary, it is a sought-after and expensive raw material.

For plastic materials, normally only "down cycling" is possible, as the material quality decreases significantly through recycling and does not allow to manufacture the same type of products out of the same material twice. However, the majority of plastic waste is not recycled, but is utilized thermally, which means that it is burnt.

Packaging Materials

interzero[®]
zero waste solutions

Düker participates in the SHK (sanitation, heating and air conditioning) industry solution and has entered into a corresponding agreement with the waste and recycling service provider Interzero. This enables installers to have any transport packaging from Düker products collected at no cost by a disposal service provider appointed by Interzero.

REACH

The European chemicals regulation (EC) No. 1907/2006 (REACH) says that chemical substances may only be made available on the market within the area of validity if they were registered beforehand. This is valid from a volume of 1 ton/year. For those chemical substances that are used during manufacturing, Düker, as a so-called "downstream user", has contacted the suppliers of the substances concerned by REACH in order to ensure the registration and evaluation of those substances.

In case of a noteworthy content of SVHC substances (substances of very high concern) in a product, article 33 of the REACH regulation says that suppliers are obliged to transmit corresponding information to the client. Our drainage pipe products do not contain any substances mentioned in the candidate list in concentrations of more than 0.1 % weight by weight (w/w).

Safety Data Sheets

For all paints and coatings that Düker delivers for use on site, Düker makes the safety data sheets available on the web page www.dueker.de/SDB

Green Building Systems

More and more new building projects in Europe are certified to one of the existing green building systems. Alongside the British BREEAM and the Swiss Minergie system, the American LEED and the German DGNB system are predominant. Outside of Europe, the Singapore Green Mark is also a well-known certification system for building projects.

Although energy saving during the operation of the building is the main aspect of most systems, other aspects are also a part of the evaluation and should be considered when selecting products for the installation systems.

Green Building systems mostly also aim at health protection, protection of water resources and ecosystems, promotion of sustainable material resources and similar aspects.

Düker SML pipes in Green Building Systems

Düker cast iron drainage pipe systems can add a positive influence to a building's environmental aspects in many ways:

1. Influence on the building environmental profile

The ecobalance of a building is the sum of the ecobalances of all building products contained in it. In average, pipes represent 80% of a typical SML building installation, fittings 20%. For Düker SML pipes, there is an up-to-date product eco-balance, which considers the environmental aspects, e.g. CO₂ footprint, of raw material extraction and transport as well as pipe production ("cradle to gate"). Unlike some generic ecobalance documents that are available from various databases, this ecobalance offers trustworthy and exact data which can be integrated positively in the building ecobalance.

2. Dangerous and harmful substances

Furthermore, most Green Building Systems also make a point of avoiding or reducing dangerous and harmful substances. Important aspects are for example:

- heavy metals
- halogens
- SVHC as per REACH (substances of very high concern)
- volatile organic compounds VOC

Düker drainage pipe systems are in no way problematic with regard to these substances. Heavy metals, halogens and SVHC are contained neither in the material cast iron nor in the formulations of the various Düker pipe and fitting coatings in relevant quantities. VOC are on principle contained in the solvents of the coatings before and during application; however on the finished pipes and fittings, these coatings are completely hardened and no longer emit any VOC to the air inside the buildings where they are installed.

DGNB (German Sustainable Building Council)

For construction projects seeking DGNB certification, the required performance data and certificates for building products are requested by the appointed auditor based on a criteria matrix that depends on the building type.

We have compiled the product-specific environmental life cycle assessment and all other relevant data for Düker SML drainage pipes in a dedicated DGNB sustainability data sheet, available on the Düker website.

Important: if these documents have already been included with the installer's tender, they are generally required to commit to using the specified product brand in the event of contract award. Substitutions or mixing with other brands is not permitted in such cases.

LEED

For construction projects aiming for LEED certification, a corresponding sustainability data sheet for Düker SML drainage pipes is available on the Düker website – in both German and English.



Material Characteristics

Düker drainage pipe systems are manufactured of grey cast iron GG according to EN 1561 – type at least EN-GJL-150 (formerly GG 15 according to DIN 1691) which means an iron and carbon alloy with high graphite content which is integrated in lamella form and finely distributed within the metallic base compound. This Düker-typical crystalline structure gives the material high strength, wear and temperature resistance, excellent corrosion resistance, and a very high damping capacity.

Düker SML drainage pipe systems distinguish themselves by robustness, durability, fire resistance and silent operation – even without special insulation or soundproofing.

Density:

approx. 7,2 kg/dm³ (71,5 KN/m³)

Minimum tensile strength:

150 MPa for fittings, 200 MPa for pipes

Compressive strength:

approx. to 4 times the value of the minimum tensile strength

Shearing strength:

1.1 to 1.6 times the value of the minimum tensile strength

Crushing strength:

350 MPa (for DN < 250) or 332 MPa (for DN ≥ 250)

Poisson's number:

0.3

Coefficient of length expansion:

0.0105 mm/mK (between 0° and 100 °C)

Thermal conduction coefficient:

50 – 60 W/mK (at 20 °C)

Modulus of elasticity:

8 x 10⁴ to 12 x 10⁴ N/mm²

Temperature resistance:

Cast iron doesn't burn! This was already confirmed in the introductory decree to the North Rhine-Westphalia Model Building Code.

Interior Coating Resistance

Interior Coating Resistance of Düker SML Pipes for Domestic Applications with Discontinuous Use

	up to 23 °C	up to 50 °C	up to 80 °C
pH 0			
pH 1 (except organic acids)			
pH 2 (except organic acids)			
lime-dissolving substances			
cleaning products			
detergents			
disinfectants			
stain removers			
oxidants			
water, salts			
drain clearing products			
solvents			
pH 12			
pH 13			

requirements of EN 877

resistance exceeding EN 877

Chemical resistance:

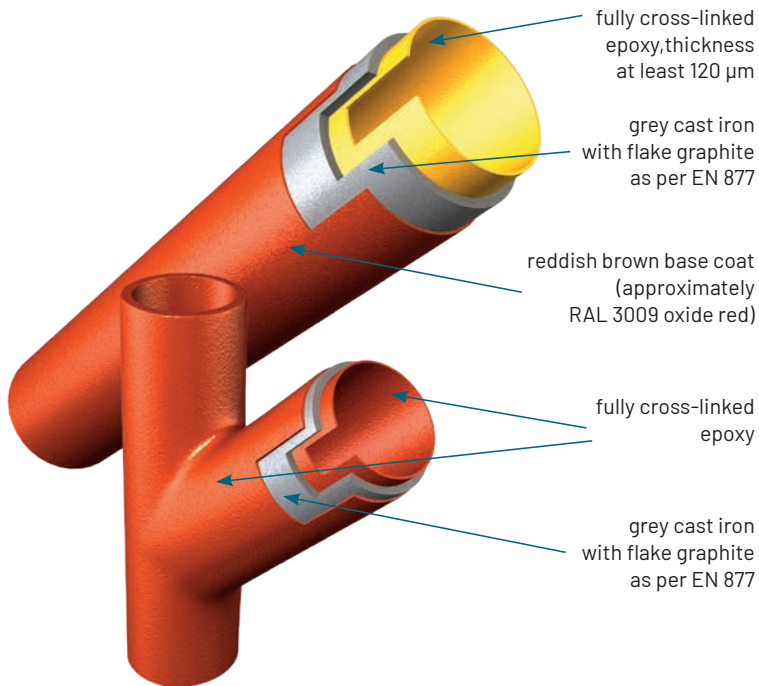
For use with domestic effluents within a range of pH 2 – pH 12. Well above the values required by EN 877.

For commercial applications and for the discharge of aggressive waste water, please consult our advisory service. If necessary, they will then suggest a different coating variant.

SML Coatings

The SML drainage pipes are coated with a reddish brown base coat on the outside according to the current standard. In areas at risk of corrosion (e.g. multi-storey car parks) we recommend an on-site top coat. On the inside, the pipes are provided with a permanent cross-linked epoxy coating which distinguishes itself by high resistance against chemical and mechanical influences. The features of this high-quality coating go beyond the requirements of EN 877. This particularly protects Düker SML drainage pipe systems against domestic effluents which are becoming increasingly aggressive.

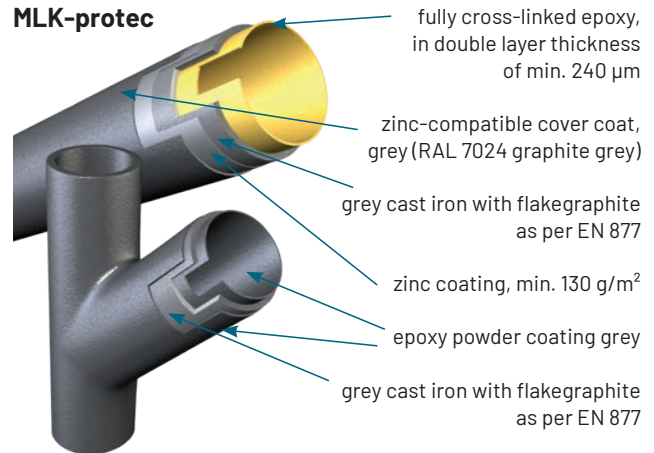
The Düker hot permanent mould centrifugal casting process used in the production of our pipes guarantees extremely smooth inside surfaces – the ideal basis for a uniform, blister-free interior coating with fully cross-linked, elastic epoxy material.



DN 50 up to DN 300 / 400

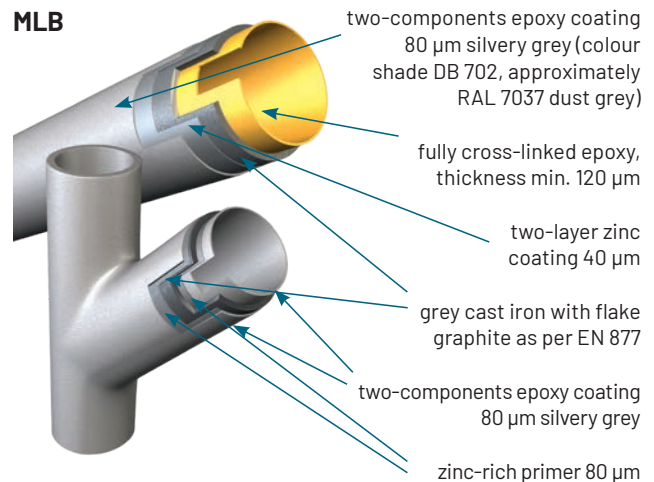
Application: domestic sewage and rain water drainage inside buildings and on outside walls of buildings.

Further Coating Versions



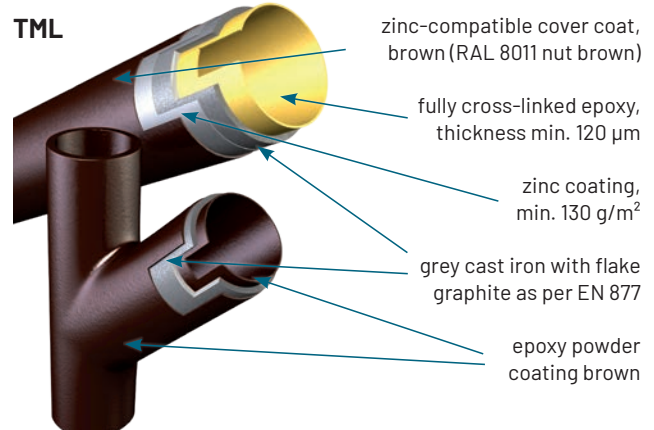
DN 50 up to DN 400

Application: aggressive domestic sewage inside and outside of buildings and in underground installation, e.g. grease-containing sewage from canteen kitchens



DN 100 up to DN 500 / 600

Application: Rain water drainage for bridges; also suitable for underground installation.



DN 100 up to DN 200

Application: domestic sewage and rain water drainage in underground installation

MB0 – Model Building Code

Structural fire protection in Germany is fundamentally based on the Model Building Code (MBO). The 2002 edition, as revised in 2019, now serves as the basis for nearly all state building codes across the 16 German federal states. Section 40 of the MBO, entitled Service Installations, Shafts and Ducts, states: “Services may only be routed through room-enclosing components for which fire resistance is required if the spread of fire can be reliably ruled out for a sufficient period of time, or if appropriate preventive measures have been taken (...)”.

Deviations from the MBO are not permitted! The protection objectives of the MBO must be met in all cases.

MVV TB – Model Administrative Regulation on Technical Building Rules

In its latest edition, the Model Building Code (MBO) refers in section 85a to Technical Building Regulations, which specify the basic requirements – including, for example, that buildings must be constructed in such a way that life and health are not endangered. These rules are published by the DIBt (German Institute for Construction Technology) as an administrative regulation. This resulted in the Model Administrative Regulation – Technical Building Rules (MVV TB), which came into effect in summer 2018. It has since been revised several times and has been transposed into state law in the various federal states.

The MVV TB annex includes, among other things, a technical regulation concerning “Building control requirements, classification, use of construction products and application of construction methods.” Chapter 6 covers “Firestop systems for cables and pipes”.

MLAR – Model Guideline for Service Installations

The Model Guideline for Service Installations (MLAR) continues to define the specific technical fire protection requirements for service installations. It has now been adopted into building law by all German federal states as the Service Installations Guideline (LAR), without significant changes to the original wording.

The MLAR addresses three key areas:

- Service installations in escape routes – see page 30
- Routing of services through room-enclosing elements
- Maintenance of function for electrical systems in the event of fire (not covered further here)

Routing of services through room-enclosing elements

According to section 4.1 of the MLAR, pipework must generally be routed through firestop systems that provide at least the same degree of fire resistance as the room-enclosing element (wall or ceiling) through which they pass. If the installation is within a shaft, the shaft walls and the firestop systems at the shaft exit must also meet the same fire resistance requirements.

Simplifications under MLAR sections 4.2 and 4.3

In deviation from MLAR section 4.1, it is possible in certain cases to dispense with tested firestop systems. Further details can be found on the following pages.

Definition of simplifications:

The term “simplifications” is often misunderstood in practice as a relaxation of effort or due diligence.

In building law, however, “simplifications” refer specifically to a simplification of the rules governing the verification of fire protection compliance. Where the boundary conditions described in the MLAR (...) are met, there is no need to carry out a fire test, affix a type label or complete a declaration of conformity.

“The issuance of a certificate of compliance by the installer confirming adherence to the MLAR (...) is recommended.”

(Source: MLAR Commentary*, 2018 edition, Part I, Chapters I–III)

These simplifications should not be seen as “second-class solutions” or as involving a lower safety standard. On the contrary – they are proven and reliable enough that no additional verification is required.

Deviations from the MLAR

Deviations from the MLAR are generally permitted, provided that the protection objective of section 40 of the Model Building Code (MBO) is fulfilled and the alternative solution is equivalent in effect. Any such minor deviation from an MLAR provision must be justified by the party responsible for the installation.

* Reference: MLAR Commentary: Lippe · Czepuck · Möller · Reintsema, commentary with application recommendations and practical examples relating to the MLAR, MSysBöR, and EltBauVO, 5th fully revised edition, 2018, published by Heizungsjournal Verlag.



Tested Firestop Systems with Proof of Fitness for Use

As an alternative to the simplifications under MLAR sections 4.2 and 4.3, certified firestop systems may be used.

These firestop systems have undergone fire testing to verify their suitability in accordance with MLAR section 4.1. For such systems, the installer must be provided with valid proof of their fitness for use, such as an abP (General Test Certificate for Construction Products), aBG (General Construction Technique Approval*), abZ (General Building Authority Approval), or ETA (European Technical Assessment). After the installation has been completed, a Declaration of Conformity must be submitted by the party carrying out the installation – usually the installer – to confirm compliance with the approved system.

* Since the introduction of the MVV TB in 2018, a clearer distinction has been made between construction products and construction techniques. According to section 2 (11) of the MBO, a construction technique ("Bauart") is defined as "the assembly of construction products into structures or parts of structures." Firestop systems for pipes are generally classified as construction tech-

niques. As a result, since mid-2018, newly issued DIBt approvals for pipeline firestop systems are granted as abZ and aBG. abZ approvals remain valid unless expired or withdrawn.

Major and Minor Deviations from the Proof of Fitness for Use

Minor deviations from the verified proof of fitness for use are permissible if they are structurally necessary and do not compromise the fire-resistance duration of the firestop system. Such deviations must be documented by the party responsible for the installation in the Declaration of Conformity.

Project-Specific Construction Technique Approval

In cases of major deviations from the MLAR or from an approved proof of fitness for use, a project-specific construction technique approval (VBG) – formerly known as individual project approval (ZiE) – must be obtained from the relevant state's supreme building authority.

Building Classes According to the MBO (Model Building Code) and State Building Regulations

Building class*	Description	Examples	Fire protection requirements for service penetrations
GK 1	a) Detached buildings up to 7 m in height ¹ with no more than two occupancy units totaling max. 400 m ²	Single-family dwelling	None
	b) Detached buildings used for agricultural or forestry purposes	Stables, barns	
GK 2	Buildings up to 7 m in height ¹ with no more than two occupancy units totaling max. 400 m ²	Two-family dwelling	Primarily R30, depending on the location and function of the wall or ceiling
GK 3	Other buildings up to 7 m in height ¹	Multi-family dwelling	
GK 4	Buildings up to 13 m in height ¹ with occupancy units no larger than 400 m ² each	Multi-family dwelling, office building	Primarily R90, depending on the location and function of the wall or ceiling
GK 5	Other buildings, including underground structures	Office building, other uses	
Special buildings**	e.g. assembly spaces for over 200 people, open-air sports facilities, restaurants with more than 40 seats, hotels with more than 12 beds, care homes, dormitories, day-care centres, schools, universities, correctional facilities, etc.		

* according to MBO section 2 (3) ** according to MBO section 2 (4)

¹ Height measured from the upper edge of the floor of the highest occupied room to the average ground level

walls of required stairwells or to fire-separating partition walls on upper floors in buildings of Class GK 2 and GK 3. Shaft walls must also meet F30 requirements if the shaft runs through F30-rated floors or along F30-rated walls.

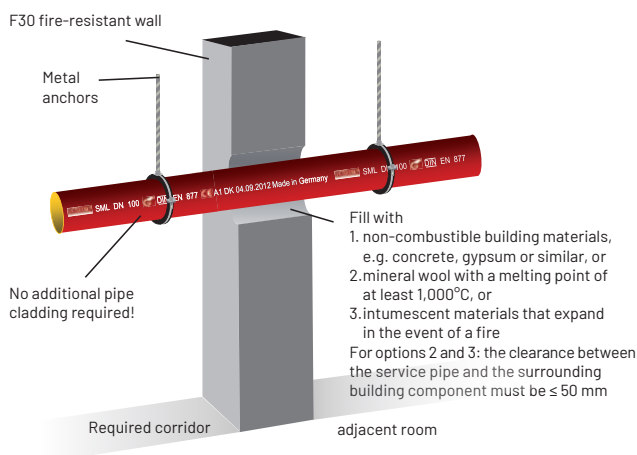
There are no minimum wall thickness requirements in this case.

18

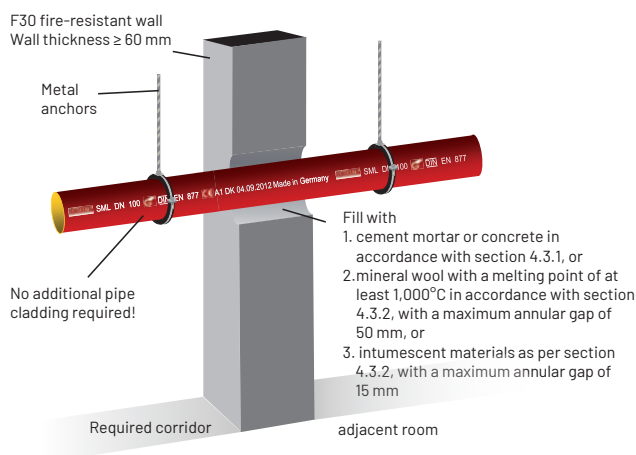
WALL PENETRATIONS FOR CAST IRON PIPE INSTALLATIONS

Special case: Escape Routes With MLAR Simplifications

According to MLAR section 4.2, the regulation applies to required corridors or other escape routes regardless of pipe diameter



According to MLAR section 4.3.1 or 4.3.2, applicable to all escape routes for DN 50 to DN 150

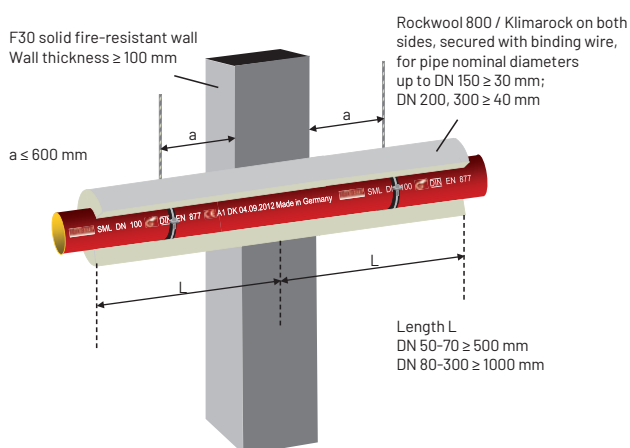


Note: MLAR section 4.2 **may not** be applied to walls of required stairwells or to rooms between required stairwells and exits to the outside. For clearance requirements, see left-hand side.

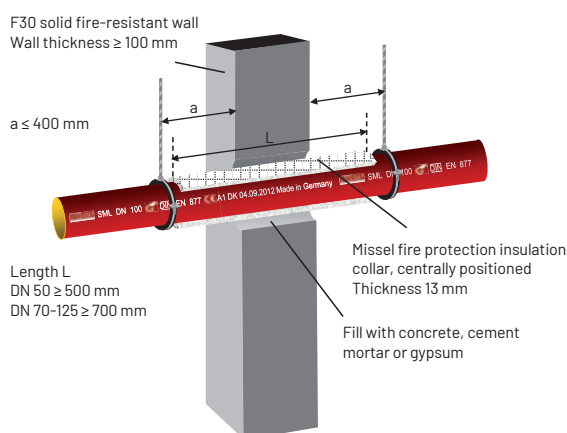
Clearances: For installations using the solutions described in MLAR sections 4.3.1 and 4.3.2, the rules set out in Box 3 on page 29 apply. If other systems are installed alongside them, the minimum clearance specified in the corresponding proof of fitness for use applies. If no minimum distance is specified – or if the system is based on MLAR section 4.3.3 or 4.2 – the general rule in Box 2 on page 29 applies.

2. Certified Systems for F30 Walls (examples)

Rockwool 800 / Rockwool Klimarock
DN 50 to DN 300
abP P-3725/4130-MPA



Missel fire protection insulation collar
DN 50 to DN 125
abP P-BWU03-I 17.6.4



Clearances: Zero clearance to other Rockwool solutions permitted

WALL PENETRATIONS FOR CAST IRON PIPE INSTALLATIONS

F60 / F90 walls

F90 fire resistance requirements for walls – and the corresponding requirements for service penetrations – apply, for example, in buildings of classes GK 3 to GK 5 and in special-purpose buildings, particularly for the walls of escape routes in basements, required stairwells, or fire-separating partition walls on upper floors.

The same applies to separating or fire compartment walls as defined in MBO section 30. Shaft walls must also meet F90 requirements if the shaft runs through F90-rated floors or along F90-rated walls. In the less common case of F60-rated walls, firestop systems for pipes with an R90 classification must be used.

1. Simplifications according to MLAR section 4.3.1 und 4.3.2

Individual cast iron pipes up to DN 150 may pass through F60-rated walls with a minimum thickness of 70 mm and F90-rated walls with a minimum thickness of 80 mm without firestop systems, provided that the gap between the pipe and the wall is filled along the full wall thickness with one of the following materials:

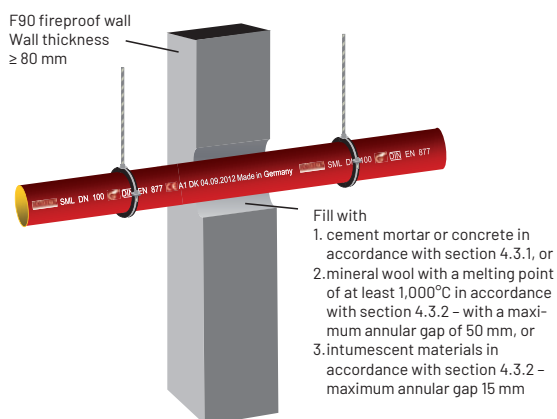
If mineral wool is used (melting point at least 1,000°C), the gap around the pipe must not exceed 50 mm. The mineral wool may be loosely packed, hand-tight with a density of min. 90 kg/m³, or a pre-formed mineral wool shell may be used. We recommend a mineral wool thickness of approx. 2 cm.

If intumescent material is used, the annular gap must not exceed 15 mm.

If the gap exceeds this size, it may of course be reduced to the required dimension by restoring the wall using cement mortar or concrete.

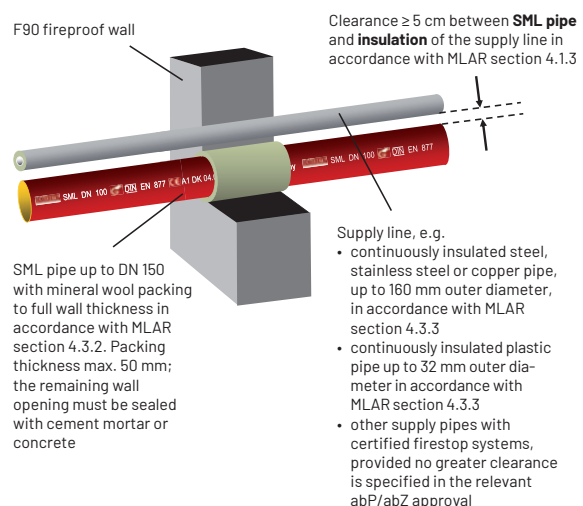
Cement mortar or concrete without mineral wool or intumescent material may only be used in solid walls. However, for acoustic reasons, this is generally not recommended.

In accordance with MLAR section 4.3.1 or 4.3.2 DN 50 – DN 150



Clearances: For installations using the solutions described in MLAR sections 4.3.1 and 4.3.2, the rules set out in Box 3 on page 29 apply. If other systems are installed alongside them, the minimum clearance specified in the corresponding proof of fitness for use applies. If no minimum distance is specified – or if the system is based on MLAR section 4.3.3 or 4.2 – the general rule in Box 2 on page 29 applies.

Suggested clearance optimisation:



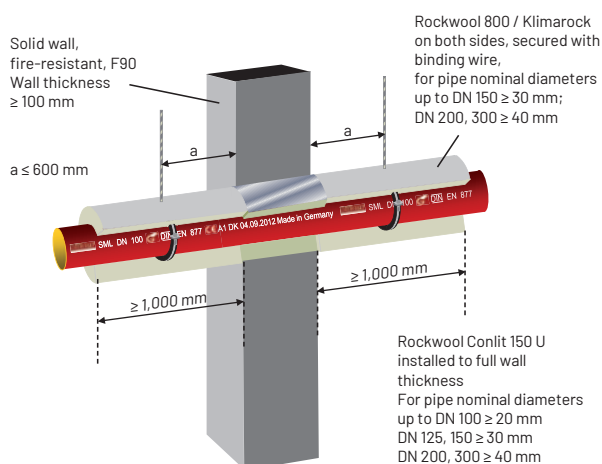
WALL PENETRATIONS FOR CAST IRON PIPE INSTALLATIONS

2. Certified Systems for F60/F90 Walls (example)

Rockwool 800 / Rockwool Klimarock

DN 50 to DN 300

abP P-3725/4130-MPA



Clearances: Zero clearance to other Rockwool solutions permitted



CEILING PENETRATIONS FOR CAST IRON PIPE INSTALLATIONS

F90 Ceilings

F90 is the most common fire resistance requirement for ceilings. It applies to virtually all ceilings in buildings of classes GK 4, GK 5 and special-purpose buildings, as well as in basement levels of buildings in class GK 3.

1. Simplifications according to MLAR section 4.3.1 und 4.3.2

Individual cast iron pipe runs up to DN 150 can be installed through F90 ceilings with a minimum thickness of 80 mm, or through F30 ceilings with a minimum thickness of 60 mm, without a firestop. It is sufficient for the gap between the pipe and the wall (to the depth of the wall thickness) to be filled with one of the following materials:

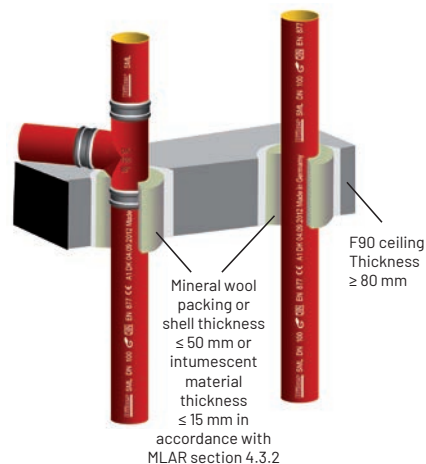
If mineral wool is used (melting point at least 1,000°C), the gap sealed around the pipe must not exceed 50 mm. The mineral wool may be loosely packed, hand-tight with a minimum density of 90 kg/m³, or a pre-formed mineral wool shell may be used. We recommend a mineral wool thickness of approx. 2 cm.

If intumescent material is used, the annular gap must not exceed 15 mm (in accordance with MLAR section 4.3.2).

If the gap exceeds this size, it may of course be reduced to the required dimension by restoring the wall using cement mortar or concrete.

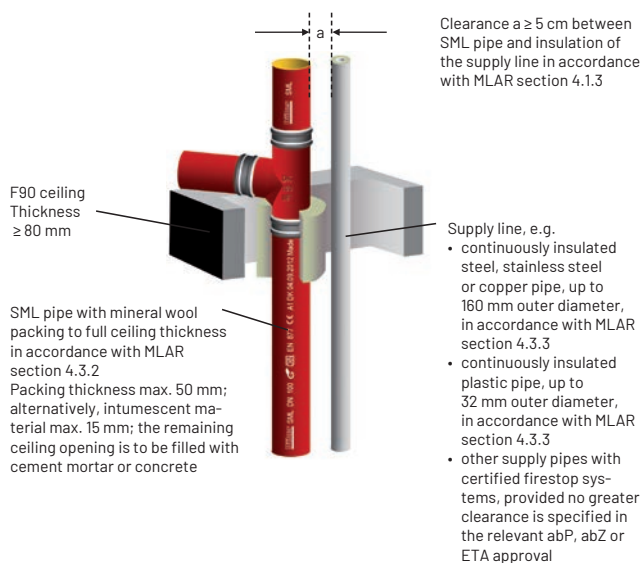
In accordance with MLAR section 4.3.1, the annular gap around the pipe may also be sealed directly with cement mortar or concrete, without the use of mineral wool or intumescent material. However, for acoustic reasons, this is generally not recommended.

In accordance with MLAR section 4.3.1 or 4.3.2
DN 50 – DN 150



Clearances: For installations using solutions in accordance with sections 4.3.1 and 4.3.2, the clearance requirements set out in MLAR section 4.3.1 apply (see Box 3 on page 29).

Suggested clearance optimisation:

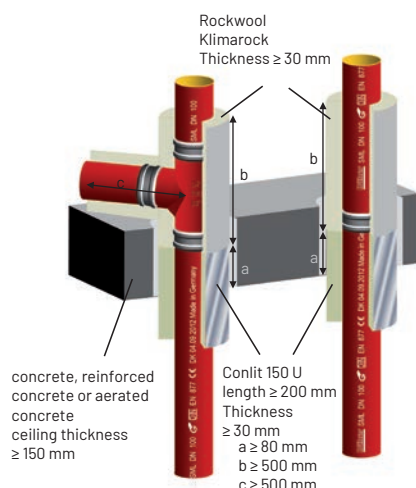


CEILING PENETRATIONS FOR CAST IRON PIPE INSTALLATIONS

2. Certified Systems for F90 Ceilings (examples)

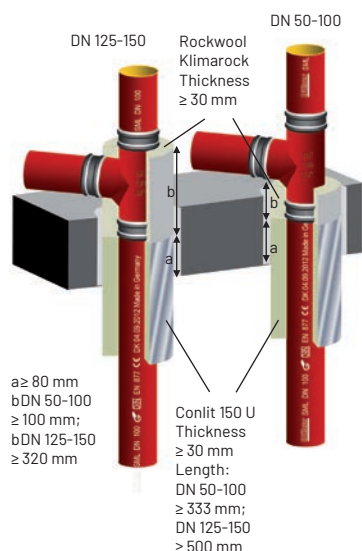
Rockwool Conlit and Klimarock

R90 for ceiling penetrations DN 50 to DN 150 abP P-3725/4130-MPA BS



These firestops can be installed in a suitable core-drilled hole without grouting; otherwise, the remaining gap must be sealed with concrete or mortar.

Clearances: Zero clearance to other Rockwool solutions permitted under Rockwool abPs P-3726/4140-MPA BS, P-3940/2554-MPA BS and P-3941/2564-MPA BS. For all other firestop systems, the clearance requirements as per the MLAR apply.



F30 Ceilings

F30 fire resistance requirements for ceilings – and the corresponding requirements for service penetrations – apply only in rare cases. One example is ceilings on upper storeys in buildings of class GK 3.

1. Simplifications under the MLAR

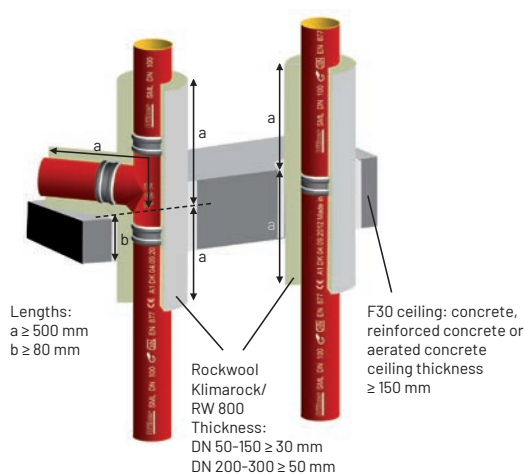
For F30 ceilings with a minimum thickness of 60 mm, the simplifications described in sections 4.3.1 and 4.3.2 of the MLAR may be applied – see F90 ceilings.

2. Certified Systems for F30 Ceilings (example)

Rockwool 800 / Rockwool Klimarock

DN 50 to DN 300

abP P-3725/4130-MPA



Clearances: Zero clearance to other Rockwool solutions permitted.

SPECIAL CASE: MIXED INSTALLATIONS

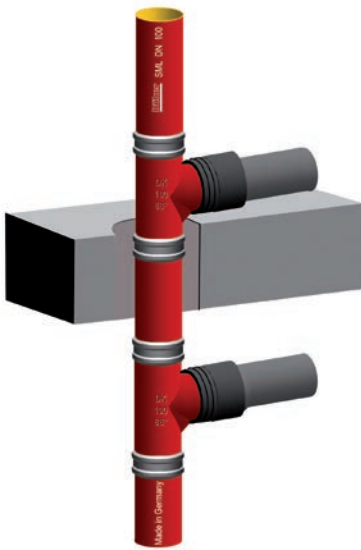
For typical mixed installations (downpipes made of cast iron, horizontal collector pipes made entirely of plastic), the simplifications under the MLAR may not be used. Solutions based on an abP (General Test Certificate for Construction Products) have also not been permitted

since 2013 (see DIBt Newsletter 2012-2). Instead, systems must use solutions with an abZ (General Building Authority Approval) and aBG (General Construction Technique Approval), both issued by the DIBt (German Institute for Construction Technology, Berlin).

Definition: Mixed Installation

Mixed installation – solution based on abZ and aBG

Downpipe and branch in the downpipe made of cast iron, with plastic pipe connected directly at the branch

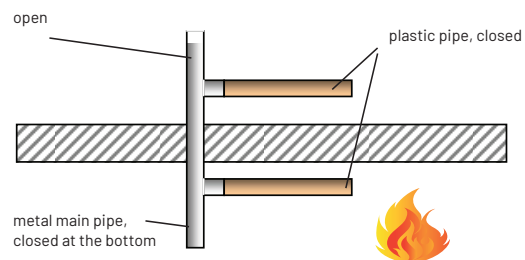


Mixed installation

**Solution based on
abZ and aBG
required!**

See following pages

See DIBt Newsletter 2012/2:



One of the possible fire test configurations for the approval of mixed installation solutions.

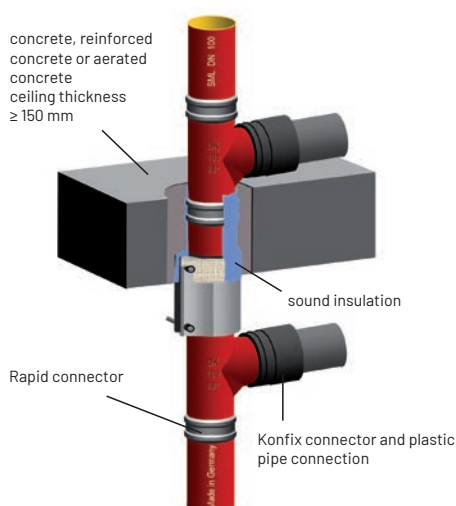
Certified Solutions for F90 Ceilings in Mixed Installations (examples)

Düker BSV 90 fire protection connector

R90 for vertical ceiling penetrations

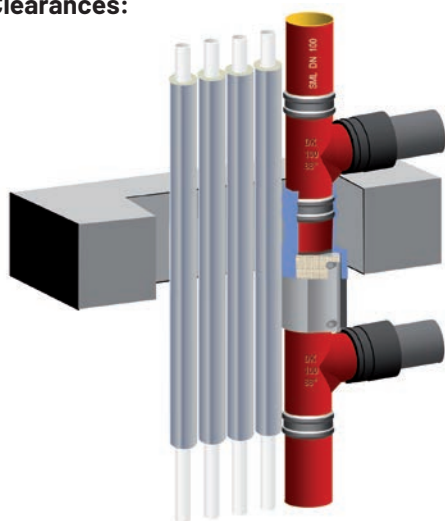
Cast iron pipe DN 80 to DN 150, abZ DIBt Z-19.17-1893
and abG Z-19.53-2666

See also page 68.



Detailed installation instructions are included with the delivery.

Clearances:



Zero clearance to supply lines permitted

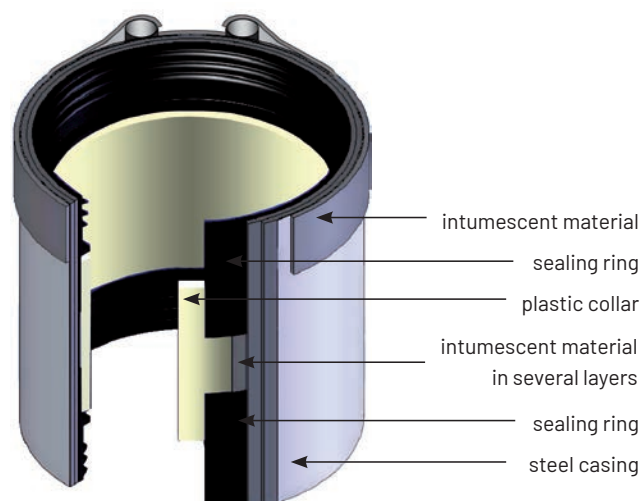
e.g. to Viega steel, stainless steel, copper and multi-layer composite pipes

Zero clearance confirmed with abP P-2400/003/15-MPA BS

e.g. to Rockwool solutions for combustible and non-combustible supply lines in accordance with abP P-3726/4140-MPA BS and abP P-3725/4130-MPA BS (zero clearance with Rockwool confirmed through testing)

Details on the Düker BSV 90 fire protection connector

The BSV 90 fire protection connector effectively prevents excessive heat transfer and chimney effects. In the fire test conducted by MPA Braunschweig, the BSV 90 withstood the test requirements for over four hours – even in the critical configuration with a plastic pipe connection (open test).



Inside the fire protection connector, the cast iron pipe is interrupted by a short section of plastic pipe. Around this section, the connector contains high-performance intumescent material, which expands significantly when exposed to heat. This causes the pipe opening to be completely sealed in the event of a fire.

The pipe layout is barely restricted when using the BSV 90. The branch above the ceiling can be positioned just as low as with an unsealed pipe penetration. The BSV 90 must protrude 20–40 mm into the ceiling from below. Thanks to pre-assembly and insertion from below, handling within the ceiling opening is kept to a minimum. A sound insulation layer of up to 5 mm thick PE foam may be installed in the ceiling penetration.

The BSV 90 is approved without the need for a water trap in the plastic branch pipe or the installation of a service wall. This makes the BSV 90 suitable even for special cases such as mixed installations with a vent hose.

The detailed installation instructions are included with the product and available at www.dueker.de



A video installation guide
is also available here:

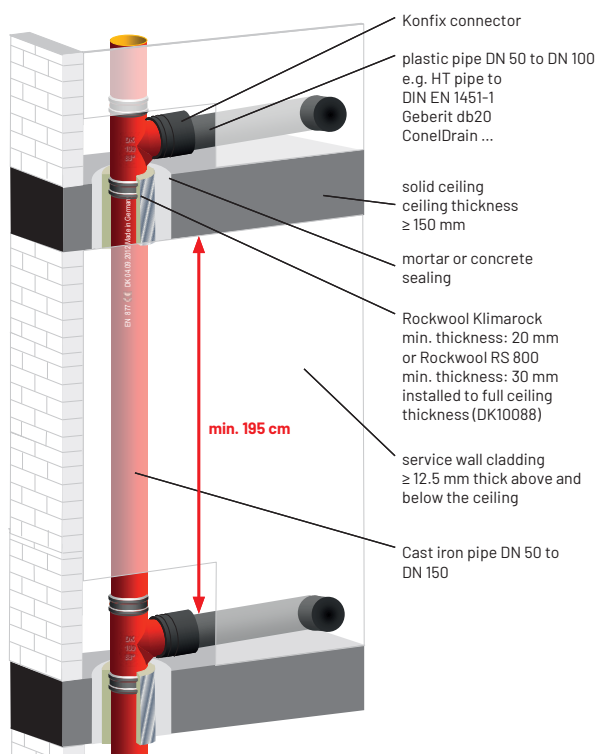
<http://tinyurl.com/46mdj8bv>

SPECIAL CASE: MIXED INSTALLATIONS

Fire-resistant firestop system for metal pipework with connection to plastic pipes "Viega mixed installation – drainage"

R90 for vertical ceiling penetrations

Cast iron pipe DN 50 to DN 150, aBG DIBt Z-19.53-2259



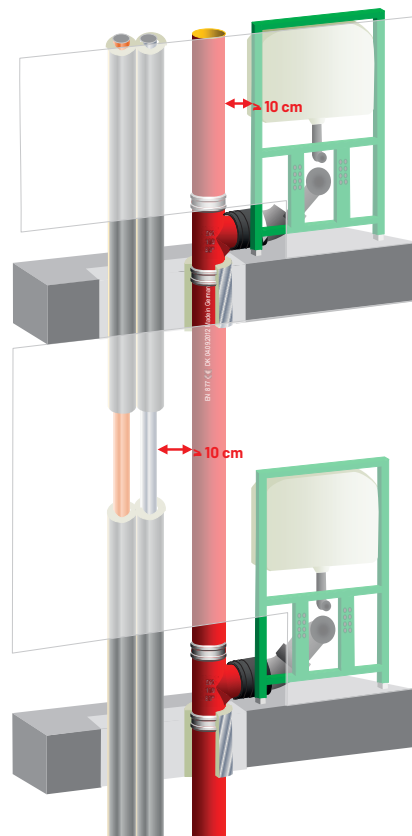
Background information: The approval of the system mentioned above has demonstrated that the "standard" mixed installation method used in multi-family residential buildings – with a near-floor plastic branch pipe – is far less problematic than the approval requirement introduced in 2013 might suggest. In essence, the approval confirms that the simple solutions commonly used before this requirement came into force still provide adequate compartmentation in the event of fire. Although heat is transferred through the cast iron pipe due to the chimney effect, this does not automatically cause the connected plastic pipe to ignite.

Heat emission into the room is negligible. A standard 12.5 mm plasterboard wall mounted around 5 cm from the cast iron pipe provides sufficient insulation to block any heat transfer. This 5 cm spacing occurs automatically when plasterboard is fixed to standard framing profiles. Plastic pipe systems can easily be connected in the lower third of the room. In a fire, air pressure in this area is lower than at ceiling level, which reduces the chimney effect and keeps temperatures in and around the cast iron pipe low enough to prevent the connected plastic pipe from igniting.

If connections are planned higher up in the room, they must be made entirely using cast iron pipe.

Clearances: Small clearances are permitted between elements located behind the same service wall:

- e.g. minimum 10 cm to Viega service-wall elements
- minimum 10 cm to non-combustible Viega supply lines with non-combustible continuous insulation* in the ceiling area. The clearance is measured between the pipes themselves, not between their insulation. Other non-combustible Viega pipes may be installed directly adjacent to each other (zero clearance).



Variants

Basement version: The system can also be used where a continuous cast iron pipe is installed on the lower floor – for example, in a basement.

Cast iron branch pipe: Alternatively, cast iron can be used in place of plastic for the branch pipe, with the switch to plastic taking place only at the drainage fixture, if preferred.

It is also possible to integrate multiple branches, double branches or corner branches into the downpipe, provided that the minimum clearance from the uppermost

*Relevant Viega approval numbers:

- abP for pipeline firestop systems, zero-clearance installation and ceiling closure: P-2400/003/15-MPA BS
- aBG for supply lines used in mixed installations: Z-19.53-2258
- aBG for waste pipes and Viega service-wall elements: Z-19.53-2277
- abZ: approval for shut-off devices in WC ventilation systems

SPECIAL CASE: MIXED INSTALLATIONS

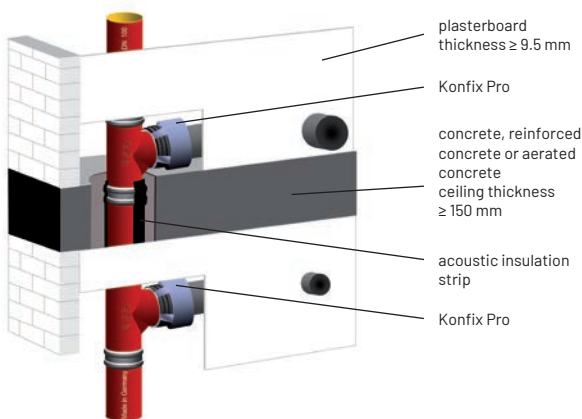


branch to the ceiling (as specified in the drawings) is maintained. For DN 125 x 100, any number of branches is allowed. For DN 150 x 100, up to 2 branches may be used, for DN 150 x 80, up to 3, and for DN 150 x 50, up to 8 branches. As a general rule, the distance from the

underside of the ceiling to the bottom edge of the plastic pipe should be at least 200 mm. A lower installation is also permitted, provided that at least 70 mm of the ceiling remains intact.

Doyma Curaflam® Konfix Pro

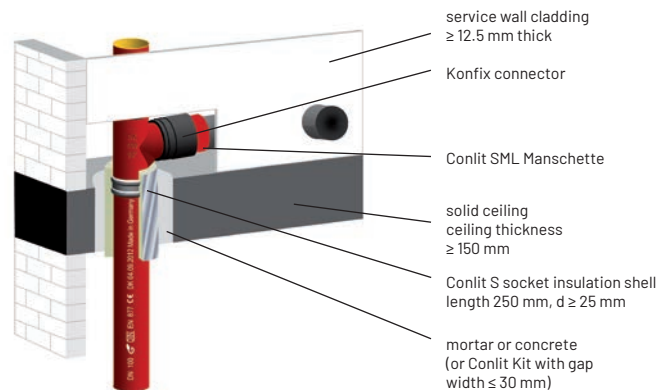
R90 for vertical ceiling penetrations Cast iron pipe up to DN 150, connection pipe DN 50 to DN 100 abZ DIBt Z-19.17-2074 and aBG DIBt Z-19.53-2637
Distributed by Düker! **See page 69.**



Clearances: Please refer to the current version of the aBG or the documentation provided by Doyma for the required clearances to the service wall and to other pipe penetrations behind the wall. Zero-clearance installation is permitted, among others, for non-combustible supply lines with non-combustible insulation, for multilayer composite pipes from Fränkische Rohrwerke, and for ventilation ducts fitted with geba AVR fire dampers.

Rockwool solutions for mixed installations

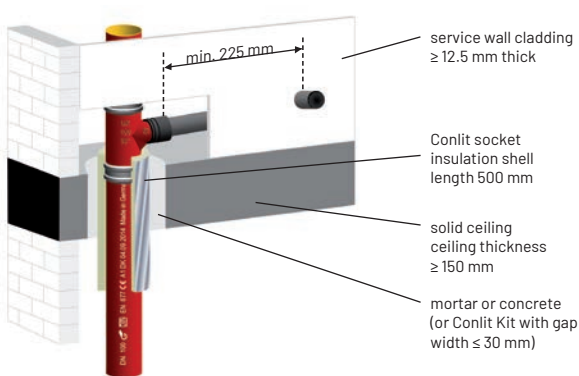
cast iron pipe up to DN 150, connection pipe up to DN 100 abZ DIBt Z-19.17-2084 and aBG DIBt Z-19.53-2657



Clearances: Zero clearance to other Rockwool solutions permitted

Simplified solution for DN 50 connection pipe:

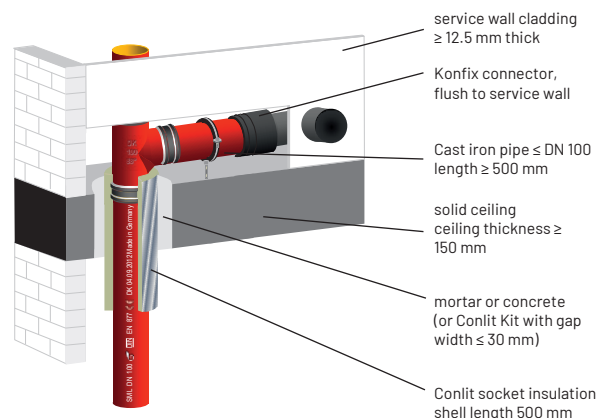
Cast iron pipe up to DN 100, connection pipe up to DN 50 abZ DIBt Z-19.17-2084 and aBG DIBt Z-19.53-2657



Clearances: Zero clearance to other Rockwool solutions permitted

Mixed installation

Cast iron pipe up to DN 100, connection pipe up to DN 100 abZ DIBt Z-19.17-2084 and aBG DIBt Z-19.53-2657



Clearances: Zero clearance to other Rockwool solutions permitted

CLEARANCES BETWEEN PIPE PENETRATIONS

General Information

Especially in residential construction, less and less space is being allocated for building services, while at the same time requirements, such as thermal insulation, are increasing, along with the space they require. Questions regarding minimum clearance are therefore becoming increasingly important and “zero clearance” has become something of a buzzword.

However, depending on the type of firestop system used, closely spaced pipe penetrations can negatively affect each other's performance. To receive approval for zero clearance or a reduced spacing between two firestop systems, both systems must be tested side by side under fire conditions. Given the sheer number of possible combinations – and the high cost of fire testing and certification – many combinations are never formally tested, meaning standard safety distances must be maintained by default.

Note: Even if “zero clearance” is permitted according to the documentation, it is usually difficult to execute cleanly in practice. If mortar is used for sealing, every

remaining gap must be fully filled – which typically requires at least 1-2 cm of clearance. Genuine zero-clearance installation is only feasible with adjacent core-drilled openings that are not mortared, such as when using Rockwool solutions.

Where is the Minimum Clearance Specified?

Whenever two firestop systems are installed side by side, the relevant proof of fitness for use or application guideline (such as the MLAR) must be reviewed for each individual penetration. For each firestop system, the required minimum clearance to adjacent installations can be specified.

When assessing two firestop systems in combination, you must determine the minimum clearance for each one – and the greater of the two values must be used!

You will also find our clearance specifications and optimisation suggestions for the individual solutions on pages 18–27.

Reference document		Adjacent firestop system	Applicable clearances
Proof of fitness for use abP, abZ and aBG		According to the same proof of fitness for use	Clearance requirements stated in the proof of fitness for use
		Other firestop systems explicitly named in the proof of fitness for use	If other firestop systems are explicitly named, the clearance requirements are also stated in the proof of fitness for use
		Other firestop systems of any kind	Various options: 1. According to current DIBt guidelines, provided they are referenced in the proof of fitness for use; in most cases this means at least 100 mm (see Box 1) 2. Other clearance values mentioned in the proof of fitness for use 3. For older approvals with no clearance information: minimum 50 mm in accordance with MLAR section 4.1.3 (see Box 2)
Simplifications	MLAR section 4.2 (see pages 22 and 25)	MLAR section 4.2	No minimum clearances
		Other firestop systems (including those under MLAR section 4.3.1, 4.3.2 and 4.3.3)	In accordance with MLAR section 4.1.3: minimum 50 mm (see Box 2) Note: The 50 mm clearance must be measured from the pipe installed in accordance with MLAR section 4.2, not from any mineral wool packing that may be present.
	MLAR section 4.3.1 and 4.3.2 (see pages 24, 26 and 27)	MLAR section 4.3.1 and 4.3.2	Clearance requirements in accordance with MLAR section 4.3.1 (see Box 3)
		Other firestop systems (including those under MLAR section 4.2 and 4.3.3)	In accordance with MLAR section 4.1.3: minimum 50 mm (see Box 2) Note: The 50 mm clearance must be measured from the pipe installed in accordance with MLAR section 4.3.2, not from the mineral wool packing (for example).
	MLAR section 4.3.3 (insulated pipes – usually not applicable to drainage systems)	MLAR section 4.3.3	Minimum 50 mm between insulation layers in the area of the wall or ceiling
		Other firestop systems (including those under MLAR section 4.2, 4.3.1 and 4.3.2)	In accordance with MLAR section 4.1.3: minimum 50 mm (see Box 2)

CLEARANCES BETWEEN PIPE PENETRATIONS



Box 1 – Current DIBt Clearance Requirements in Approvals

Unless specific clearance tests have been carried out, the DIBt currently includes the following standard clearance values in its approvals:

Between firestop systems for pipes, or between a firestop system for pipes and a firestop system for cables:

Size of firestop system	Clearance
both firestop systems $\leq 40 \times 40$ cm	10 cm
at least one firestop system $> 40 \times 40$ cm	20 cm

This also applies between firestop systems for pipes and other firestop systems (e.g. fire doors, fire dampers, etc.).

Size of firestop system	Clearance
both firestop systems $\leq 20 \times 20$ cm	10 cm
at least one firestop system $> 20 \times 20$ cm	20 cm

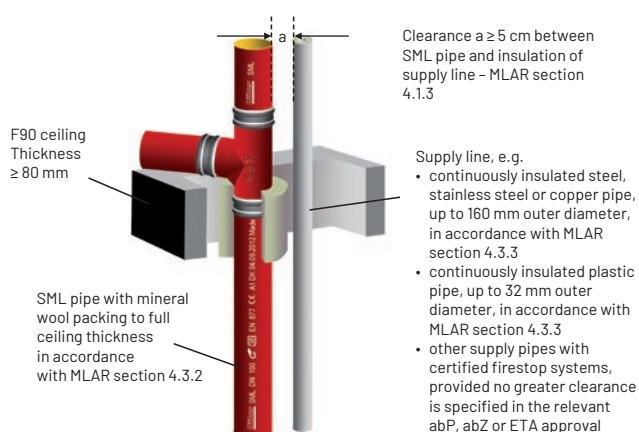
Box 2 – Clearance Requirements in Accordance with MLAR section 4.1.3

Quote from MLAR: “The minimum clearance between firestop systems, installation shafts or ducts, as well as the required clearance from other penetrations (e.g. ventilation ducts) or other closures (e.g. fire doors), is determined by the provisions of the relevant approval or proof of fitness for use. If no such provisions are specified, a minimum clearance of 50 mm is required.”

The 50 mm clearance should generally to be measured between the outer edges of the firestop systems in the area of the ceiling penetration.

Please note: for solutions as per MLAR section 4.2 or 4.3.2 (uninsulated pipes, annular gap seals using mineral wool or intumescent material), the measurement must be taken from the pipe itself – not from the outer edge of the mineral wool packing. This packing merely

serves as a ceiling closure and is not a firestop or insulation in the true sense. See also MLAR Commentary* 2011 edition, page 219, figure I–VIII, variant 4.



Box 3 – Clearance Requirements in Accordance with MLAR sections 4.3.1 and 4.3.2 (for Uninsulated Pipes)

Penetration 1	Penetration 2	Clearance requirement according to MLAR section 4.3.1
in accordance with MLAR section 4.3.1 b) Cast iron pipe up to DN 150 (see pages 20, 22 and 23) or other pipework with an external diameter of up to 160 mm made from non-combustible building materials – excluding aluminium and glass – including those with a combustible coating (classification B2 up to 2 mm thick and B1 up to 3 mm thick), e.g. stainless steel, copper, steel	in accordance with MLAR section 4.3.1 b) (see definition on the left)	at least the larger of the two external diameters
	in accordance with MLAR section 4.3.1 a) Electrical cables, e.g. power cables, fibre optic cables, telephone cables, IT cables	at least the external diameter of the non-combustible conduit
	in accordance with MLAR section 4.3.1 c) Pipes for non-combustible liquids, vapours, gases or dusts, and installation conduits for electrical cables with an external diameter of up to $d=32$ mm, made of combustible building materials, aluminium or glass, e.g. PE, HD-PE, PVC, composite pipes, installation conduits for electrical cables	The minimum clearance is the greater of the following: – the diameter of the metallic pipe, and – five times the diameter of the combustible pipe

Please note: these spacing requirements apply specifically to penetrations installed in accordance with MLAR section 4.3.1 and 4.3.2 in relation to one another. No statements are made here regarding penetrations based on a proof of fitness for use, or those installed

in accordance with MLAR section 4.2 or MLAR section 4.3.3. For these combinations, the basic rule from MLAR section 4.3.1 applies – i.e. a minimum clearance of 50 mm (see Box 2).

PIPELINES INSTALLED IN ESCAPE AND EMERGENCY ROUTES

Pipelines within Escape and Emergency Routes

The national building codes will also provide for escape and emergency routes within buildings. For example, German MBO says that the installation of pipes and cables within escape and emergency routes is only admissible if the use of the relevant gangways or stairways in case of a fire is possible for a sufficient length of time.

The same MBO allows for cast iron drainage pipe installations to be installed without any cladding or insulation in escape routes. It is also admissible that connections and sealants consist of combustible materials (e.g. rubber), and combustible pipe coatings up to 0.5 mm thickness are allowed. All Düker cast iron drainage pipe systems are covered by these clauses.

If insulations are used, they must be of non-combustible material. The fixing of pipelines to the wall or ceiling must be carried out with metal plugs.

For comparison: **combustible pipes** must be installed behind claddings such as plastered installation slits, false ceilings, false floors or similar.

Penetrations through Walls of Escape and Emergency Routes

Section 36 (4) of the MBO: "The walls of necessary corridors must provide fire resistance (F30) as room-enclosing elements; in basement storeys, where load-bearing and bracing components must be fire-resistant, a fireproof (F90) rating is required."

In principle, all solutions shown on the previous pages for fire-resistant walls (F30) and fireproof walls (F90) may be used here. Only penetrations in accordance with MLAR section 4.2 are subject to restrictions – see page 19.

ACOUSTIC PROTECTION



ACOUSTIC PROTECTION

Applicable guidelines

DIN 4109-1 sets out the statutory minimum requirements for permissible sound pressure levels in noise-sensitive rooms.

VDI 4100 contains various proposals for enhanced sound insulation that can be contractually agreed in private-law contexts.

Statutory Minimum Requirements

Excerpt from Table 8 of DIN 4109-1: Permissible sound pressure levels in noise-sensitive rooms (in other dwellings) caused by building services installations

Noise source	Living and sleeping rooms	Classrooms and work-rooms
Water installation (water supply and waste water systems combined)	$\leq 30^{a,b,c}$	$\leq 35^{a,b,c}$
Other domestic installations	$\leq 30^c$	$\leq 35^c$

a) Isolated, short-term noise peaks caused by operating fittings and appliances are currently not taken into account.

- b) Requirements for compliance with the permissible sound pressure level:
- The design documents must take sound insulation requirements into account; i.e. appropriate sound insulation verifications must be provided for the building components.
 - In addition, the responsible site management must be named and involved in a partial inspection before the installation is enclosed or covered.

c) In deviation from DIN EN ISO 10025:2010-10, section 6.3.3, no measurement is required in the loudest corner of the room (see also DIN 4109-4)

Proposals for Enhanced Sound Insulation to be Contractually Agreed

DIN 4109 Part 5 specifies a value of 25 dB(A) for enhanced sound insulation. VDI 4100 proposes the following values in Tables 2 and 3 for enhanced sound insulation against noise from other residential units. These apply to all rooms with a floor area of at least 8 m², including sanitary rooms.

Sound insulation level (SSt)	SSt I	SSt II		SSt III	
Maximum dB(A)	30	27	25	24	22
Building type		1	2	1	2

1: Multi-family dwelling 2: Semi-detached and terraced house

Please note: according to current case law, the minimum requirements of DIN 4109 do not necessarily reflect the generally accepted rules of technology. If the minimum requirements of DIN 4109 have not been explicitly agreed, the higher requirements may be applied in the event of a dispute.

Calculation-Based Verification

DIN 4109-36, section 6.4.4.1:

"A calculation-based verification using the acoustic performance values of building components and installations cannot currently be carried out, as neither the calculation methods nor the required data for the installations are available."

Therefore, section 6.4.4 of DIN 4109-36 defines model installation walls, construction features and boundary conditions that, if met, can be used to demonstrate compliance with the requirements.

Model Installation Walls

Requirements of DIN 4109-36 for model installation walls: for single-leaf solid walls, a surface-related mass of at least 220 kg/m² is required, taking plaster layers into account. Additional requirements are stipulated in sections 6.4.4.2.3 to 6.4.4.2.5 of DIN 4109-36. For lightweight partition walls, sections 6.4.4.3.2 to 6.4.4.3.5 apply.

Verification using these model installation walls can only be carried out for installations that do not border directly on noise-sensitive rooms (diagonal transmission). Installation walls that do not meet these requirements must be verified through building acoustics measurements.



Building Acoustics Measurements

DIN 4109-36, section 6.1:

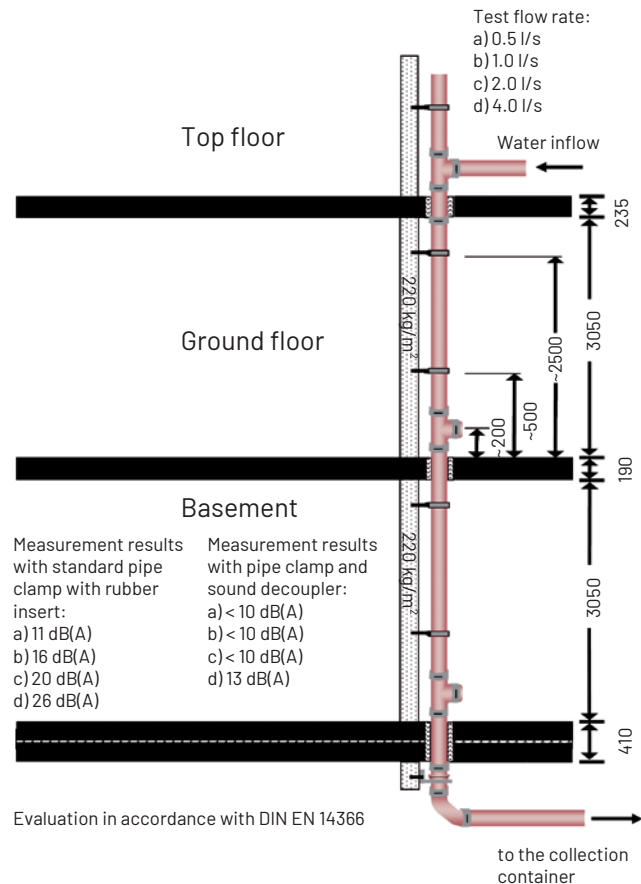
"Compliance with sound insulation requirements for a specific sanitary installation in connection with a given construction situation can be verified through measurement-based testing in a realistic setting (e.g. installation test stand). The effectiveness of specific acoustic measures (...) must be demonstrated by the product manufacturer. As a form of quality control, compliance with sound insulation requirements for a specific on-site construction situation (...) can also be verified." Further details are provided in DIN 4109-4, and the measurement itself is carried out in accordance with DIN EN ISO 10052.

Test Certificates

Current tests are carried out in accordance with DIN EN 14366, "Laboratory measurement of noise from waste water installations". The standard defines procedures for measuring airborne and structure-borne sound generated by waste water and rainwater systems under laboratory conditions. It applies to waste water pipeline systems and their components, but not to the actual sources of wastewater (e.g. washbasins, toilets, bathtubs) or to pipes with natural ventilation. It covers all commonly used materials and standard pipe diameters. The results can be used to compare products and materials and to assess the performance of waste water systems in buildings under defined conditions.

DIN EN 14366 specifies the test setup in detail. This consists of a vertical waste water pipeline in a three-storey arrangement along a wall with a surface density of 220 kg/m^2 . In each storey, a branch connection is integrated into the pipeline, which is typically sealed with an end cap. Below the lowest floor, the pipeline includes a bend to the horizontal. The pipeline must be properly and professionally fixed in place, and the ceiling penetrations must be sealed. Measurements are taken at flow rates of 0.5, 1.0, 2.0 and 4.0 l/s. Test certificates issued in accordance with DIN EN 14366 include various sound level values. For compliance with DIN 4109, the relevant value is the installation sound level L_{in} in the rear basement room (noise-sensitive room). According to certificate no. P-BA 214/2010 from November 2010 issued by the Fraunhofer Institute in Stuttgart, Düker SML achieves an **installation sound level in the rear basement room of less than 10 dB(A)** at 2 l/s (roughly corresponding to a WC flush) when using steel pipe clamps without an elastomer insert and with a sound decoupler. When using standard steel pipe clamps with an elastomer insert, the level is **20 dB(A)**.

Test setup – Fraunhofer Institute:



The values achieved under laboratory conditions can only be transferred if the actual on-site conditions closely match the test setup.

As explained in section 5 of DIN 4109-36, the sound level occurring in noise-sensitive rooms cannot currently be predicted quantitatively due to structure-borne sound excitation, which cannot yet be calculated.

Compliance with the requirements assumes that those responsible for:

- floor plan design,
- structural design and construction,
- design and installation of building services,
- design and implementation of specific sound insulation measures and
- selection and placement of noise-generating equipment

work together to ensure adequate sound insulation, and that effective coordination between all parties involved is maintained. If the necessary expertise is lacking, a qualified acoustic consultant should be brought in.

ACOUSTIC PROTECTION

Measures to Obtain or Improve the Acoustic Protection

Structure-borne sound

In order to avoid structure-born sound, contact to the masonry must be avoided:

- The pipe system should not touch walls or ceilings at any point. Wall or ceiling penetrations should be closed with non-combustible mineral wool. Shafts should be stuffed with mineral wool or be lined with noise-absorbing material.
- Fixing brackets should be rubber-lined. When closing the brackets, the rubber lining should not be pressed too tightly to the pipe. Plastic spacers between the two bracket halves may help reduce the pressure.
- In very sensitive areas, it may be advisable to use special noise-damping fixing brackets; e.g. the acoustic decoupler.
- In vertical pipes, down pipe supports should not be spaced too far apart in order to avoid too high pressure on the rubber ring.

Airborne sound

The water flow in the pipes must be eased to reduce flow noises:

- The transition from a down pipe of a height of 10 m or more to a horizontal pipe should be carried out using using flowcalming bends with steadying distance.
- The connection of a horizontal pipe to a down pipe should be carried out with 88° branch with 45° access angle.

Installation in a sensitive room:

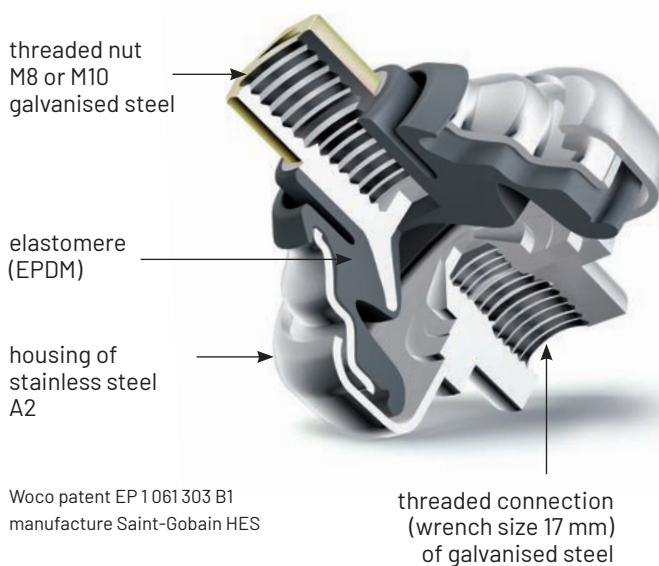
- As per German DIN regulations, drainage pipes may not be installed openly on the walls of a sensitive room such as living rooms, bedrooms, workrooms etc.
- In case of installation between the ceiling and a suspended ceiling, the suspended ceiling should be sealed, e.g. gypsum cardboard with sealed seams and mineral wool. Alternatively, the drainage pipeline may be covered, e.g. with a casing made of gypsum cardboard and mineral wool.

Fixing and Noise Protection

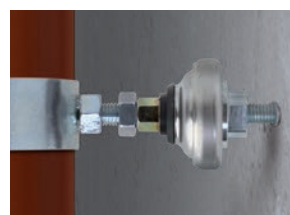
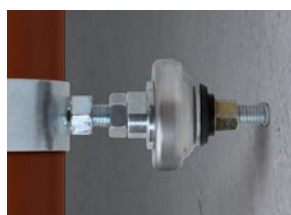
The choice of the pipe bracketing can be decisive for noise protection. For SML, standard pipe brackets with rubber inserts are sufficient in most cases.

Acoustic Decoupler

In order to observe increased noise protection requirements, it may be advisable to use the acoustic decoupler together with pipe brackets without rubber insert. The decoupler is screwed between two short threaded bars M8 or M10 between the pipe bracket and the wall/ceiling. Its special construction ensures an effective decoupling from structure-born sound. It is suitable for vertical or suspended horizontal Düker SML pipes (suspended from the ceiling or from a mounting console) in DN 50 up to DN 150. In case of horizontal pipelines, an acoustic decoupler can carry max. 1000 N, in case of vertical lines max. 400 N. Superiour weights must be compensated for with down pipe supports, grip collars etc.



The acoustic decoupler can face the bracket with any of its two sides.

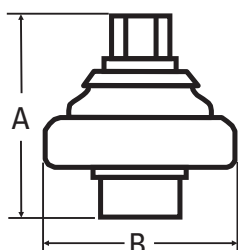
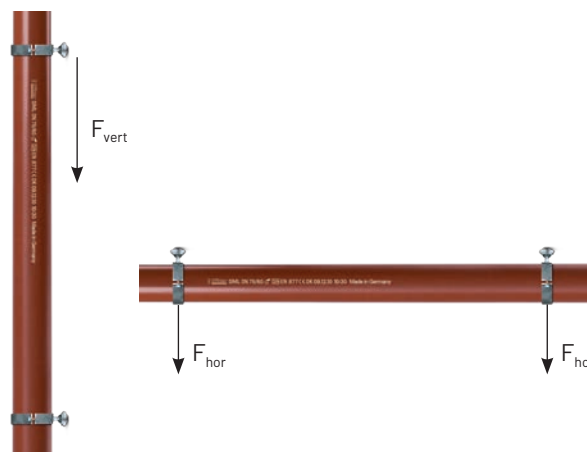


Vertical Installation

- pipelines DN 40 up to DN 150
- on a length of 3 m you require 2 acoustic decouplers
- the maximum charge F_{vert} per decoupler is 400 N

Horizontal Installation

- pipelines DN 40 up to DN 150
- on a length of 3 m you require 2 acoustic decouplers
- the pipelines must be suspended either from the ceiling or from a console. A fixing direct to a wall is not admissible
- the maximum charge F_{hor} per decoupler is 1,000 N



DN	A	B	kg	Item no.
50 – 150	48	49	0.1	239681

both sides internal thread M10 and M8

wrench sizes 13 or 17

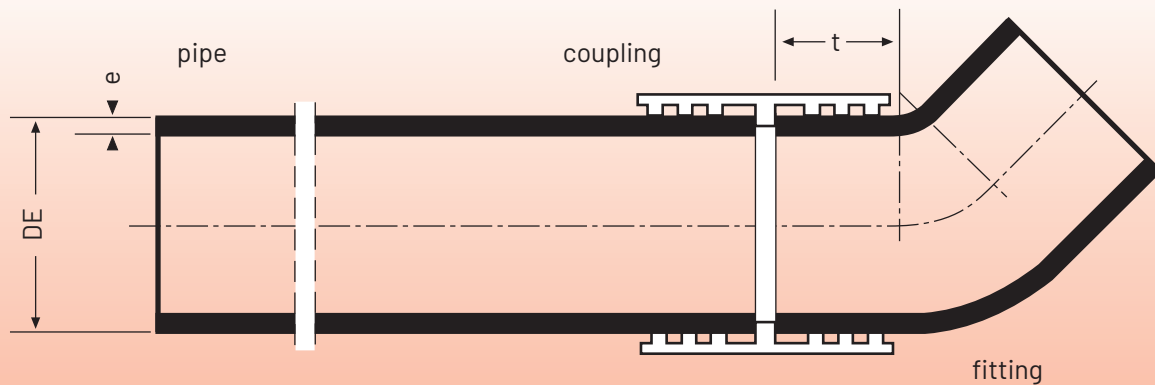
How heavy is a wall? (wall thickness 11.5 cm), values according to DIN 1055 and manufacturer specifications

Building material	Perforated clay brick (HLz)			Sand-lime brick (Ks)			Solid clay brick (Mz)
Block density class	0.8	1.2	1.4	1.4	1.6	1.8	1.8
 Unplastered wall	94	135	154	156	177	198	198
 Bare wall + 10 mm gypsum/lime plaster on both sides (20 kg/m ²)	114	155	176	176	197	218	218
 Bare wall + 15 mm cement/lime plaster on both sides (50 kg/m ²)	144	195	206	206	227	248	248

Not suitable as installation wall
 Suitable with acoustic performance verification
 Suitable as installation wall in accordance with DIN 4109





**Construction dimensions:**

Pipe diameter
Wall thickness
Insertion lengths (sealing zone)

Pipe weights
Surface

**SML pipes and SML fittings (EN 877 and DIN 19 522)**

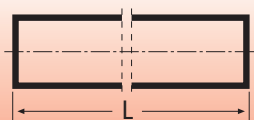
nominal diameter	exterior diameter		wall thickness pipes and fittings e		insertion length (sealing zone)	admissible interior pressure		pipe weight empty	pipe weight full	surface ca. m ²
DN	DE	tolerance	nominal	minimum	t	pipes up to	fittings** up to	ca. kg/m	ca. kg/m	per m
50	58	+2.0/-1.0	3.5	3.0	30	10 bar	10 bar	5.3	7.3	0.18
80*	83	+2.0/-1.0	3.5	3.0	35	10 bar	10 bar	6.7	11.1	0.26
100	110	+2.0/-1.0	3.5	3.0	40	10 bar	10 bar	8.5	16.8	0.35
125	135	+2.0/-2.0	4.0	3.5	45	10 bar	10 bar	11.7	24.4	0.42
150	160	+2.0/-2.0	4.0	3.5	50	10 bar	5 bar	14.3	32.5	0.50
200	210	+2.5/-2.5	5.0	4.0	60	10 bar	5 bar	23.8	55.3	0.65
250	274	+2.5/-2.5	5.5	4.5	70	10 bar	3 bar	30.3	84.6	0.85
300	326	+2.5/-2.5	6.0	5.0	80	10 bar	3 bar	41.7	119.1	1.02
400	429	+2.0/-3.0	6.3	5.0	80	10 bar	2 bar	58.5	194.7	1.35
500***	532	+2.0/-3.5	7.0	5.2	80	6 bar	2 bar	83.3	294.5	1.67
600***	635	+2.0/-4.0	7.7	5.8	80	4 bar	2 bar	108.5	410.0	1.99

* The nominal diameter DN 80 with a minimum interior diameter of 75 mm corresponds to DN 80 as per EN 12056-2 as well as to DN 75 as per EN 877 (product standard).

** except inspection pipes, siphons, hermetic plugs and connection pieces.
*** on request, see MLB programme
All dimensions in mm.

For CAD drawings 2D and 3D
(dxf and VDI 3805 format)
please consult
www.dueker.de/vdi3805
See also page 94.

SML Pipes



SML pipe DIN 19522 – DN 50 x 3000

L = 3000 mm

DN	kg	Item no.
50	15.8	660004
80	20.2	235145
100	25.6	660184
125	35.0	660274
150	42.8	660364
200	71.5	660454
250	91.0	660654
300	125.2	660664
400	175.5	660604
500*		
600*		

* on request (see MLB programme)

Note: Variable values in the article description are indicated by underlining.
(Example: **SML pipe DIN 19522 – DN 50 x 3000**).

Düker pro-cut tape as cut edge protection



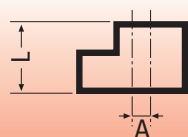
Düker pro-cut tape

	Item no.
Spool with 20 m each	239100

Butyl rubber tape. 20 m are sufficient for approx. 60 cut edges DN 100.

Reducers

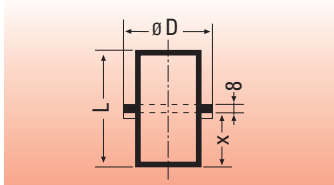
(Adaptor pipes)



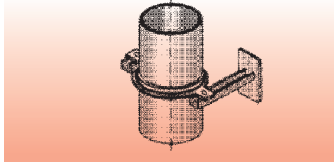
SML reducer DIN 19522 – 80 x 50 R

DN	A	L	kg	Item no.
80 x 50	12.5	80	0.7	235159
100 x 50	25	80	0.9	662514
100 x 80	13.5	90	1.0	235161
125 x 50	38.5	85	1.4	662534
125 x 80	26	95	1.7	235162
125 x 100	12.5	95	1.5	662554
150 x 50	51	95	2.0	662564
150 x 80	37.5	100	2.3	235417
150 x 100	25	105	2.2	662584
150 x 125	12.5	110	2.2	662594
200 x 100	50	115	4.1	662604
200 x 125	37.5	120	4.1	662614
200 x 150	25	125	4.3	662624
250 x 150	57	140	6.8	662634
250 x 200	32	145	7.0	662644
300 x 150	83	150	9.7	662494
300 x 200	58	160	11.4	662714
300 x 250	26	170	10.9	662724
400 x 300	51.5	180	15.1	662444

SML Down Pipe Supports



Sound tested DIN 4109



Installation Example with
Console (available in the trade)

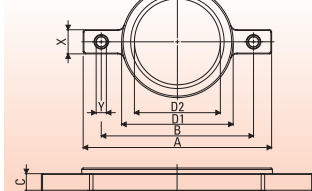
SML down pipe support DIN 19522 - 100 FS

DN	D	X	L	kg	Item no. without bearing ring
50	87	96	200	1.3	661544
80	114	96	200	1.8	235164
100	145	96	200	2.3	661564
125	170	96	200	3.3	661574
150	195	96	200	4.0	661584
200	245	96	200	6.2	661594
250	340	146	300	14.0	100242
300	390	146	300	25.7	100244

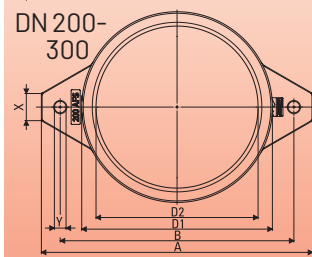
Please observe the fixing guidelines for Düker waste water pipeline systems – see pages 86/87.

Bearing Rings

DN 80-150



DN 200-300

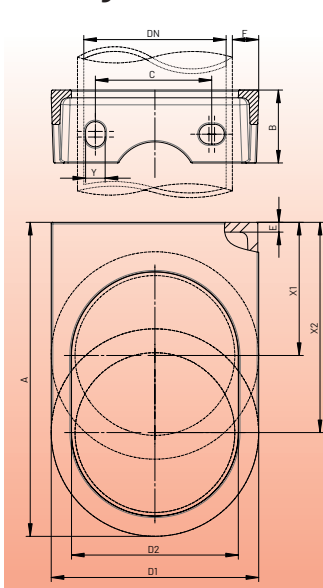


DN	D ₁	D ₂	A	B	C	X	Y	kg	Item no.
50	93	61	193	148	17	32	13.5	0.8	666314
80	120	86.5	214	166	18	32	13.5	1	235344
100	148	114	250	202	20	33	13.5	1.3	666334
125	174	139	275	225.5	32	33	13.5	1.6	666344
150	200	164	301	253.5	22	33	13.5	1.9	666354
200	253	215	360	310	22	36	15.5	3.2	666374
250	344	279	442	392	25	40	15.5	7.5	227152
300	392	331	495	445	30	40	15.5	9.5	227153

Bearing ring incl. rubber for down pipe supports.

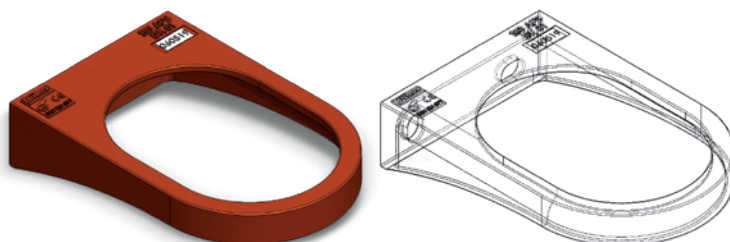
The shape of the fixing lug is presently being modified from rectangular to trapezoidal. The modification of the larger diameters has already been carried out, further diameters will follow.

SML Ring console

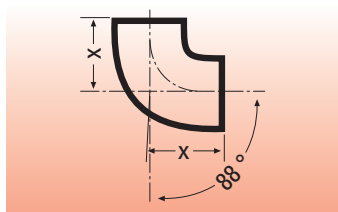


SML Ring console

DN	D ₁	D ₂	X ₁	X ₂	A	B	C	E	F	Y	kg	Item no.
50	93	61	69	124	170	48	40	7	17	12	0.8	666365
80	120	87	82	137	197	49	66	7	18	12	1.1	666385
100	148	119	95	150	224	52	83	7	19	14	1.4	666395
125	174	139	108	163	250	58	108	7	19	14	1.7	666435
150	200	164	121	176	276	65	134	8	20	14	2.1	666445



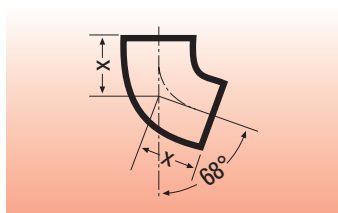
SML Bends 88°



S ML bend DIN 19522 – 100 – 88

DN	X	kg	Item no.
50	75	0.7	661054
80	95	1.2	235150
100	110	2.1	661174
125	125	3.2	661234
150	145	4.8	661294
200	180	8.8	662784
250	225	15.5	233621
300	260	24.5	233622

SML Bends 68°



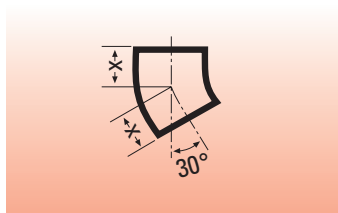
DN	X	kg	Item no.
50	65	0.7	661034
80	80	1.2	235149
100	90	1.9	661154
125	105	2.9	661214
150	120	4.3	661274
200	145	7.7	661334

SML Bends 45°



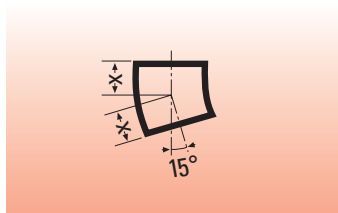
DN	X	kg	Item no.
50	50	0.5	661024
80	60	0.9	235148
100	70	1.5	661144
125	80	2.3	661204
150	90	3.5	661264
200	110	5.5	661324
250	130	10.3	661374
300	155	17.0	661394
400	257	38.3	661284

SML Bends 30°



DN	X	kg	Item no.
50	45	0.5	661014
80	60	0.9	235147
100	60	1.2	661134
125	70	2.0	661194
150	80	3.1	661254
200	95	5.2	661314
250	110	9.1	661364
300	130	14.7	661384

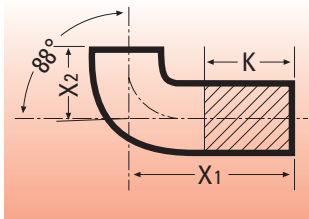
SML Bends 15°



DN	X	kg	Item no.
50	40	0.4	661004
80	50	0.7	235146
100	50	1.0	661124
125	60	1.7	661184
150	65	2.5	661244
200	80	4.6	661304

SML Bends 88°

with 250 mm spigot

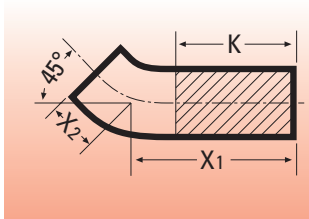
**SML bend with long spigot DIN 19522 – 100 – 88 – LB**

DN	X ₁	X ₂	K*	kg	Item no.
80	250	95	155	2.6	236348
100	250	110	140	3.5	662084

*dimension for maximum cut-back

SML Bends 45°

with 250 mm spigot

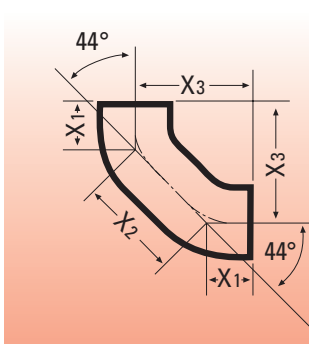
**SML bend with long spigot DIN 19522 – 100 – 45 – LB**

DN	X ₁	X ₂	K*	kg	Item no.
80	250	60	190	2.5	236347
100	250	70	180	4.2	662074

*dimension for maximum cut-back

SML Double Bends 88°

from 2 bends 44°

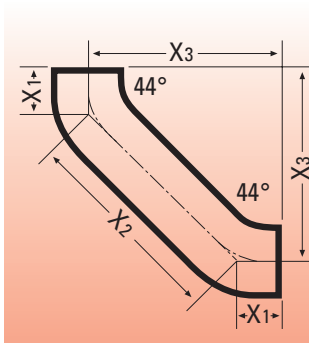
**SML double bend DIN 19522 – 100 – 88 – DB**

DN	X ₁	X ₂	X ₃	kg	Item no.
50	50	100	121	1.2	661484
80	60	120	145	1.8	235151
100	70	140	170	3.2	661504
125	80	160	195	4.6	661514
150	90	180	219	7.0	661524

As per German DIN 1986, turns of base and collecting pipes may only be carried out with premanufactured bends. Each single bend may only have 45°. Normally, two bends 45° must be installed for this case. With the double bend, one coupling is no longer necessary and installation is simplified. Furthermore, this fitting offers the possibility of fixing a bracket in the middle. The bend is also suitable for transition from a down pipe to a horizontal pipe and vice versa.

SML Flow-calming Bends 88°

with 250 mm steadying distance for adapting down pipes to draft pipes

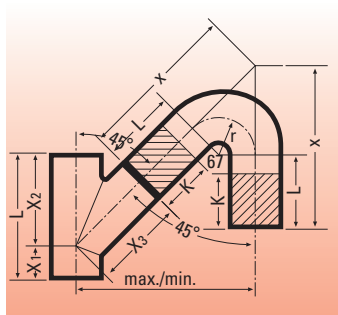
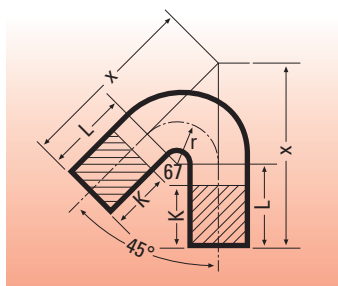
**SML flow-calming bend DIN 19522 – 100 – 88 – BB**

DN	X ₁	X ₂	X ₃	kg	Item no.
80	60	301	273	3.4	236349
100	70	312	291	4.8	662744
125	80	322	308	6.8	662754
150	90	334	326	9.6	662764

German DIN 1986 says that for down pipes running through four to eight storeys or with a length of 10 to 22 m, special arrangements must be taken. Supply and running bend of a draft pipe are to be resolved with a separator of 250 mm length.

SML Bends 135°

for ventilation



SML bend 135° for ventilation DIN 19522 – 100 – 135

DN	X	K*	L	kg	Item no.
100	312	100	150	5.0	662774

* dimensions for maximum cut-back

Combinations of SML branches 45° and SML bends 135° for bypasses

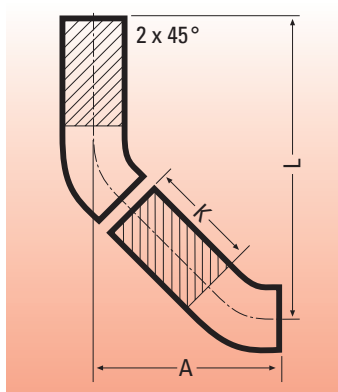
DN	max.	min.
100 x 100	370	300
125 x 100	380	310
150 x 100	395	325
200 x 100	410	340

German DIN 1986-100 requires bypass lines for ventilation purposes in the following cases:

- down pipes over 10 m height with a sideways offset of more than 2m
 - down pipes over 22 m height at any offsets and at the transition into a horizontal line
- The upper connection between the bypass and the downpipe is executed with a 135° bend.

Deviation

made of 2 SML bends 45° with 250 mm spigots



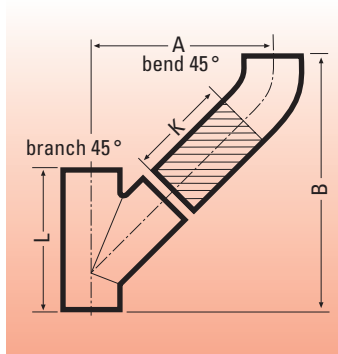
Bend combinations

DN	A max.	A min.	L max.	L min.	K*
80	283	148	473	338	190
100	300	173	480	353	180

* Dimension for maximum cut-back

Due to cut-back possibilities, even the deviation made of 2 SML bends 45° with 250 mm spigots shown here allows good adaptation of the pipes to the structure. Reducing quotient as in the previous example 1:1.5. This also is only one example out of 4 different combination possibilities. These combinations equal a hydraulically favourable and installation-friendly pipe direction with all deviations: vertical-horizontal, horizontal-vertical and horizontal-horizontal. The overall lengths "L" can also be lessened by cutting back the long supplying or draining spigots.

Combination Examples branch 45° - bend 45°



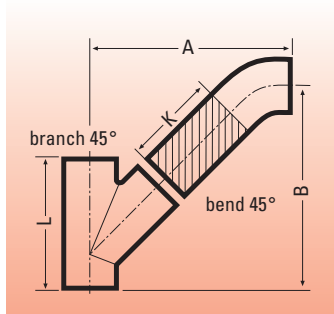
Combinations of SML bends and SML branches (bend with 250 mm spigot)

branch 45° DN	bend 45° DN	A max.	A min.	B max.	B min.	L	K*
80 x 80	80	293	159	418	284	225	190
100 x 80	80	304	170	419	285	230	190
100 x 100	100	315	187	455	327	260	180
125 x 80	80	322	187	422	287	240	190
125 x 100	100	329	202	459	332	270	180

* Dimension for maximum cut-back

The reducing quotient is 1:1.5 in site praxis. In order to decrease the distances A and B by 1 cm (both change at the same time), the bend must be cut back by 1.5 cm.

Combination Examples branch 45° - bend 45°

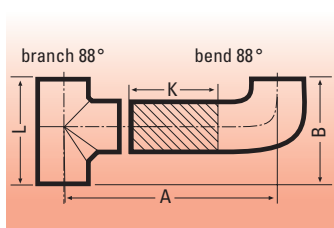


Combinations of SML bends and SML branches (bend with 250 mm spigot)

branch 45° DN	bend 45° DN	A max.	A min.	B max.	B min.	L	K*
80 x 80	80	353	219	358	224	225	190
100 x 80	80	364	230	359	225	230	190
100 x 100	100	385	257	385	257	260	180
125 x 80	80	382	247	362	227	240	190
125 x 100	100	399	272	389	262	270	180

* Dimension for maximum cut-back

Combination Examples branch 88° - bend 88°

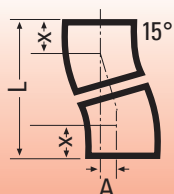


branch 88° DN	bend 88° DN	A max.	A min.	B	L	K*
80 x 80	80	350	195	197	180	155
100 x 80	80	365	210	207	190	155
100 x 100	100	370	230	225	220	140
125 x 80	80	380	225	213	205	155
125 x 100	100	385	245	235	235	140

* Dimension for maximum cut-back



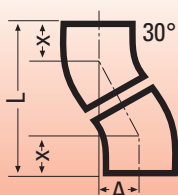
SML S-Bends made of 2 SML bends 15°



Fitting/bend combinations

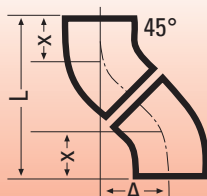
DN	X	A	L
50	40	27	162
80	50	26	197
100	50	27	201
125	60	32	241
150	65	35	260
200	80	43	319

SML S-Bends made of 2 SML bends 30°



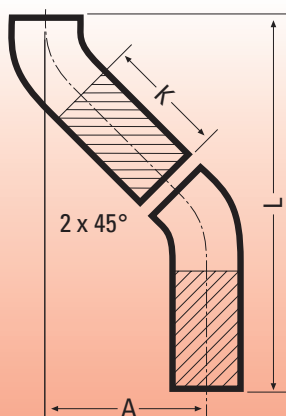
DN	X	A	L
50	45	48	172
80	60	60	224
100	60	63	228
125	70	73	266
150	80	83	303
200	95	98	359
250	110	113	415
300	130	133	489

SML S-Bends made of 2 SML bends 45°



DN	X	A	L
50	50	74	174
80	60	85	205
100	70	103	243
125	80	117	277
150	90	131	311
200	110	159	379
250	130	187	447
300	155	223	533

SML S-Bends made of 2 SML bends 45° with 250 mm spigots



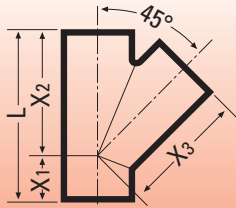
Bend combinations

DN	A max.	A min.	L max.	L min.	K*
80	223	88	533	398	190
100	230	103	550	423	180

* Dimension for maximum cut-back

Bends with 250 mm spigots can be reduced by the K-dimension at the most. This allows optimum adaptation of the pipes to the structure. A reducing quotient of 1:1.5 can be used in site practice for 45° bends. This means: for a decrease of the distance dimensions A and L by 1 cm, the diagonally running longer spigot is to be shortened by 1.5 cm. In the above chart, 5 mm were added for the distance of the coupling. Because of the simple calculation method we dispense with the illustration of the three further combination possibilities of these bends (long spigots with long, short with short or one long spigot above).

SML Branches 45°



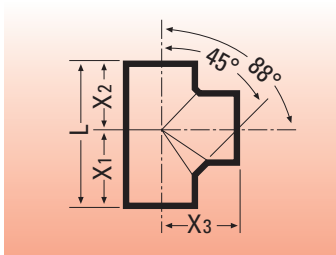
The introduction of the German standard DIN 19522: 2000-01 (supplement to EN 877) led to dimensional changes on some fittings such as branches 45°, double branches and corner branches. Such fittings of older manufacture may therefore deviate from the dimensions stated in this document.

SML single branch DIN 19522 – 80 x 50 – 45

DN	X ₁	X ₂	X ₃	L	kg	Item no.
50 x 50	50	135	135	185	1.4	663004
80 x 50	50	140	140	190	1.7	235152
80 x 80	65	160	160	225	2.4	235154
100 x 50	35	165	165	200	2.5	663094
100 x 80	55	175	175	230	3.3	235156
100 x 100	70	205	205	275	4.2	663154
125 x 50	20	185	185	205	3.4	663184
125 x 80	40	200	200	240	3.6	235342
125 x 100	60	220	220	280	5.2	663244
125 x 125	80	240	240	320	6.4	663274
150 x 80	45	215	215	260	5.2	235415
150 x 100	55	240	240	295	6.4	663364
150 x 125	70	255	255	325	8.3	663394
150 x 150	90	265	265	355	9.2	663424
200 x 80	20	240	240	260	8.5	235416
200 x 100	40	265	265	305	10.0	663514
200 x 125	55	280	280	335	11.9	663544
200 x 150	75	300	300	375	12.4	663574
200 x 200	115	340	340	455	17.2	663604
250 x 100	15	310	310	325	15.4	663634
250 x 125	35	335	335	370	17.7	664504
250 x 150	55	350	350	405	20.4	664514
250 x 200	90	385	385	475	25.1	663644
250 x 250	130	430	430	560	31.5	663654
300 x 100	5	345	345	350	19.0	663664
300 x 125	15	360	360	375	21.5	664524
300 x 150	35	380	380	415	23.0	664534
300 x 200	70	415	440	485	34.0	664444
300 x 250	115	465	465	580	42.1	663674
300 x 300	155	505	505	660	50.1	663684
400 x 300	105	555	565	660	60.0	663694



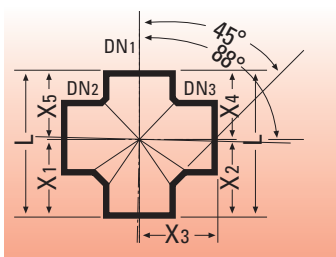
SML Branches 88° entry angle 45°



SML single branch DIN 19522 – 80 x 50 – 88

DN	X ₁	X ₂	X ₃	L	kg	Item no.
50 x 50	79	66	80	145	0.9	663024
80 x 50	95	85	90	180	1.4	235153
80 x 80	95	85	95	180	1.8	235155
100 x 50	94	76	105	170	2.1	663114
100 x 80	105	85	110	190	2.5	235157
100 x 100	115	105	120	220	2.9	663174
125 x 50	98	82	120	180	3.0	663204
125 x 80	110	100	125	205	3.1	235158
125 x 100	125	110	130	235	4.0	663264
125 x 125	137	123	135	260	4.6	663294
150 x 50	100	100	140	200	4.4	663324
150 x 80	115	105	149	220	4.2	235473
150 x 100	130	115	145	245	5.5	663384
150 x 125	147	128	150	275	6.2	663414
150 x 150	158	142	155	300	6.9	663444
200 x 200	205	175	210	380	10.1	234752

SML Double Branches 88° entry angle 45°

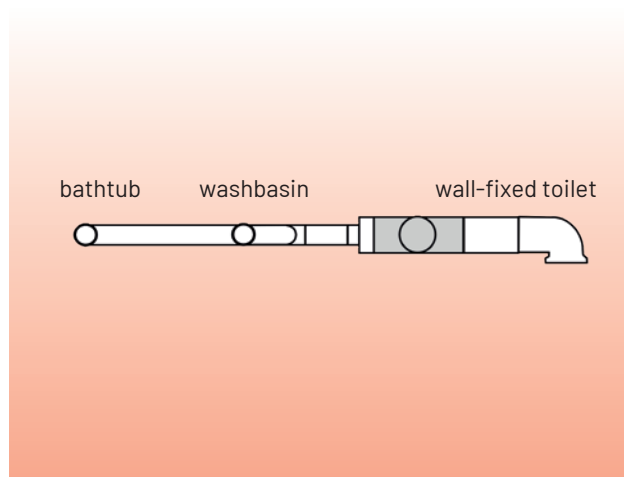
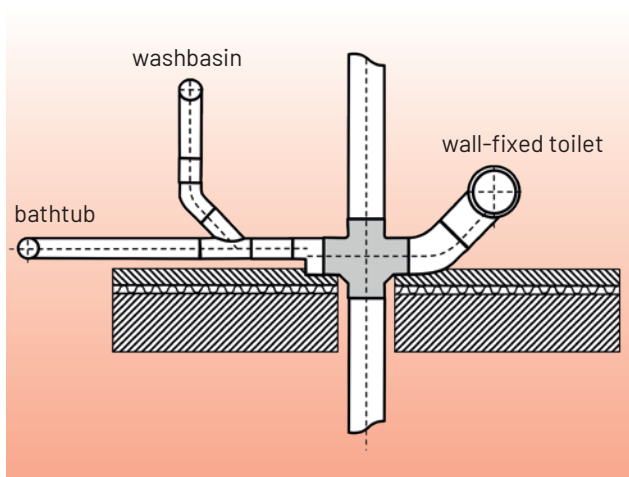


SML double branch DIN 19522 – 150 x 100 – 88 D

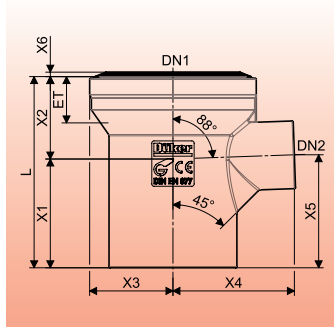
DN ₁	DN ₂	DN ₃	X ₁	X ₂	X ₃	X ₄	X ₅	L	kg	Item no.
100 x 50 x 50			100	100	105	80	80	180	2.2	663814
100 x 80 x 80			110	110	120	95	95	205	3.2	236353
100 x 100 x 100			120	120	120	110	110	230	3.4	663874
150 x 100 x 100			130	130	145	115	115	245	5.9	664084

The German standard DIN 1986-100, a national amendment to EN 12056, used to forbid the connection of waste water containing excrements facing a connection of waste water without excrements. It was feared that excrements might be washed into the bathtub siphon. However, after extended experiments, the new version of DIN 1986-100 allows the installation as shown below with double bends 88° with 45° entry angle.

Installation example SML Double Branch 88°



SML branch with short socket entry angle 45°



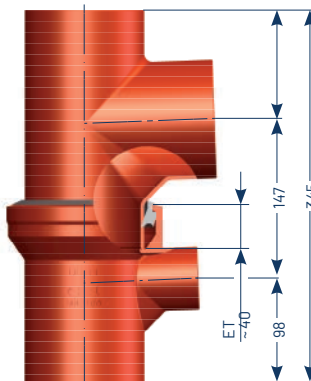
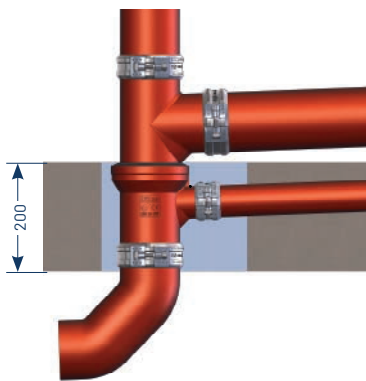
SML branch with short socket

Type	DN ₁	DN ₂	L	ET*	X ₁	X ₂	X ₃	X ₄	X ₅	X ₆	kg	Item no.
Standard	100	50	165	40	94	71	72	105	98	4	2.0	300727

* insertion depth

Developed in particular for the connection of floor drains or floor-level showers within the ceiling. The push-in socket minimises the distance between the connection in the ceiling and e.g. a WC drain above the ceiling. The branch above the ceiling can be offset to the branch in the ceiling.

Installation example



Installation

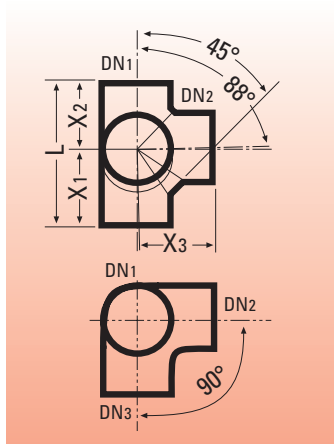
Apply suitable lubricant to the rubber seal, push in pipe spigot or fitting.

On cut pipes, break sharp edges before pushing in. Chamfering is not required.

Advantages

- Approved for building drainage: fitting as per EN 877, with CE marking and Declaration of Performance as per CPR.
- Approval for fire-rated ceilings: test passed for EI 120 with Düker fire protection coupling BSV 90.
- Can be installed with cast iron or plastic connecting lines.
- Connecting line above the ceiling can be installed very low.
- Connection in the ceiling can be positioned optimally for a sufficient descent within the ceiling.
- The branch above the ceiling can be offset to the branch in the ceiling

SML Corner Branches 88° entry angle 45°, corner angle 90°



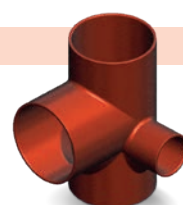
SML corner branch DIN 19522 - 100 x 80 - 88 EA

DN ₁	DN ₂	DN ₃	X ₁	X ₂	X ₃	L	kg	Item no.
80 x 80 x 80			105	90	105	195	2.2	235850
100 x 50 x 100 right			115	105	104	220	3.1	662024
100 x 80 x 80			110	95	120	205	2.5	on request
100 x 100 x 50 left			89	131	120	220	3.1	662114
100 x 100 x 100			115	105	120	220	3.4	662034
125 x 100 x 100			125	110	130	235	4.6	662014
150 x 100 x 100			130	115	145	245	4.9	664434



left version

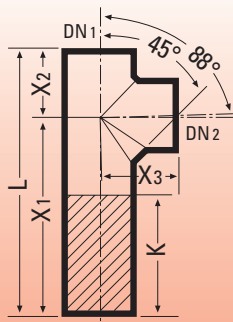
Horizontal pipes DN 50 and DN 100 can be connected at the same bottom height.



right version

SML Branches 88°

with long spigot,
entry angle 45°

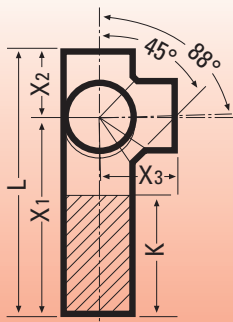
**SML single branch DIN 19522 – 100 x 100 – 88 AL**

DN	X ₁	X ₂	X ₃	L	K*	kg	Item no.
100 x 100	325	105	115	430	210	4.6	on request

* dimension for maximum cut-back
especially suited for ceiling penetrations

SML Corner Branches 88°

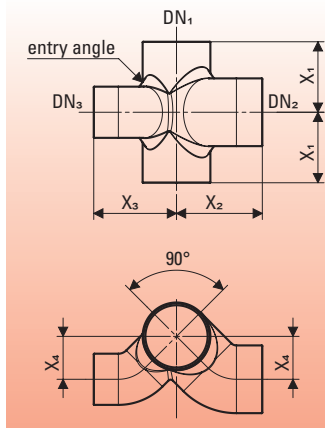
with long spigot
entry angle 45°,
corner angle 90°

**SML corner branch DIN 19522 – 100 x 100 x 100 – 88 EAL**

DN	X ₁	X ₂	X ₃	L	K*	kg	Item no.
100 x 100 x 100	325	105	115	430	210	5.2	664464

* dimension for maximum cut-back
especially suited for ceiling penetrations

SML Combination Branches entry angle 45°

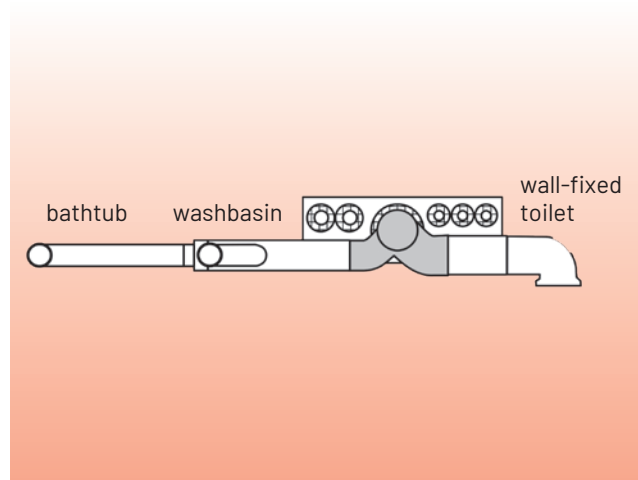
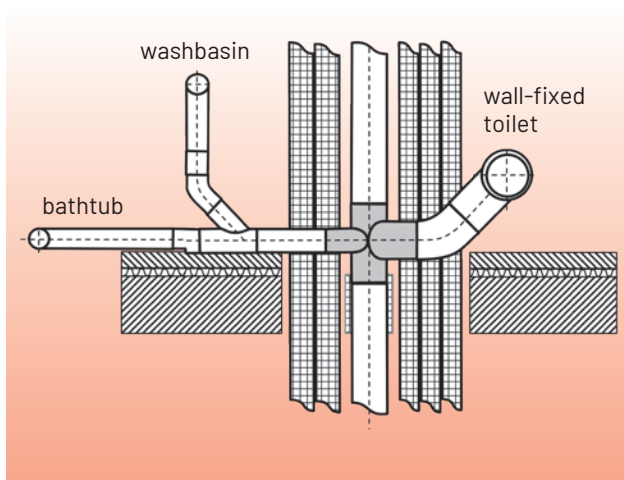


SML combination branch DIN 19522 - 100 x 100 x 80 - 90 K

DN	X ₁	X ₂	X ₃	X ₄	kg	Item no.
100 x 100 x 80	115	140	135	70	4.1	235345
100 x 100 x 100	115	140	140	70	5.0	665924

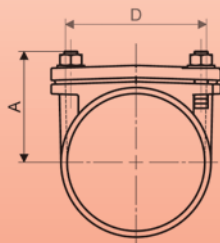
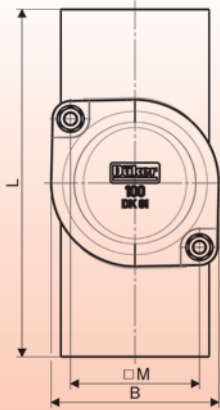
The easy-flow designed double branch for space-saving waste water supplies to down pipes in pipe shafts, behind faced brickwork or in sanitary blocks allows simultaneous connection to various sanitary objects. Because of the double-sided arrangement of the access angles at 45°, this branch can be installed laterally reversed by vertical turning of 180°. It allows the level connection of WC and, for example, bathtub. Drinking water or heating supply lines or other pipelines can be installed next to the downpipe without conflicts with the waste water connection lines.

Installation example SML combination branch



SML Inspection Pipes

with round opening
for down pipes



SML inspection pipe round DIN 19522 100 RRrd

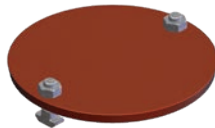
DN	A	B	D	L	□ M	kg	Item no.
50	58	90	53	190	60	1.8	669580
80	69	110	78	220	80	3.2	235166
100	82	125	104	260	96	3.8	669586

With toroidal sealing ring in EPDM.

Torque at the cover screws: 15 Nm

Note: the cover shape, cover seat on the body, sealing and bolts were modified from manufacturing date January 2017.

When ordering replacements for cover, sealings and fixing materials please indicate the required cover version:



Manufactured until autumn 2016

Circular cover with flat outside surface with marking „Deckelsitz nach Montage prüfen“

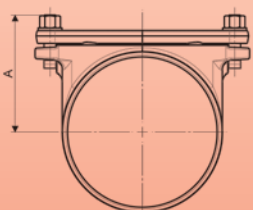
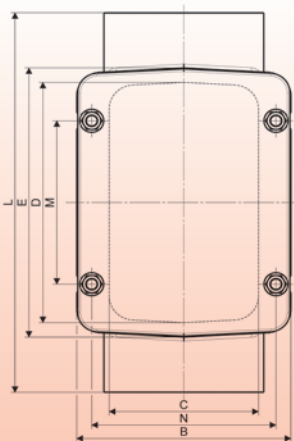


Manufactured from January 2017

Circular cover with fixing lugs, outside surface recessed

Inspection Pipes

with rectangular opening
for horizontal and down pipes



SML inspection pipe rectangular DIN 19522 100 RRrk

DN	A	B	E	C	D	L	M	N	kg	Item no.
100	82	160	230	100	200	340	136	130	6.0	669624
125	99	190	255	125	225	370	163	150	8.2	669627
150	111	215	280	150	250	395	188	170	12.0	669630
200	136	265	330	200	300	465	238	216	19.0	669633
250	165	330	380	259	350	540	304	250	31.0	669612
300	193	380	430	310	400	610	350	280	45.5	669615

DN 100 to DN 200 with toroidal sealing ring in EPDM. DN 250 and 300 with flat sealing in EPDM. Bolts galvanised.

Note: cover shape, cover seat on the body, sealing and bolts have been changed for sizes DN 100 to DN 200 from production September 2018. When ordering replacements for cover, sealings and fixing materials please indicate the required cover version:

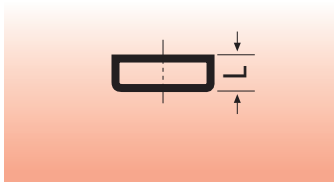


Cover with smooth surface



Outside surface recessed
DN 100 - DN 200 from 09/2018

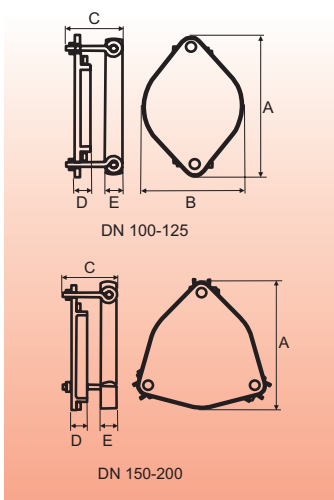
SML Plugs



SML plug DIN 19522 – 100 ED

DN	L	kg	Item no.
50	30	0.2	665504
80	35	0.5	235163
100	40	0.5	665524
125	45	1.1	665534
150	50	1.7	665544
200	60	2.7	665554
250	70	6.0	665564
300	80	9.5	665574
400	82	17.0	665594

SML Hermetic Plugs



SML hermetic plug incl. sealing ring

DN	A	B	C	D	E	kg	Item no.
100	179	122	86	24	25	1.3	664804
125	204	145	86	24	25	1.8	664814
150	200	–	85	24	25	2.7	664824
200	248	–	71	24	25	3.7	664834



New version, rubber sealing
chambered inside and outside

rubber seal in EPDM (spare part)

DN	kg	Item no.
100	0.05	100700
125	0.07	100701
150	0.09	100702
200	0.11	100703

Resistance to interior pressure

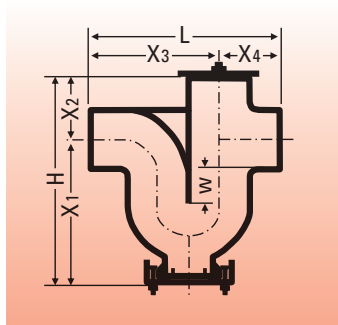
Old version up to manufacturing date 2017, sealing not chambered on the outside:
max. 0.5 bar.

New version from manufacturing date approx. 2018, sealing chambered inside and
outside:

DN 100 up to DN 150: 1.5 bar

DN 200: 0.5 bar

SML Odour Traps



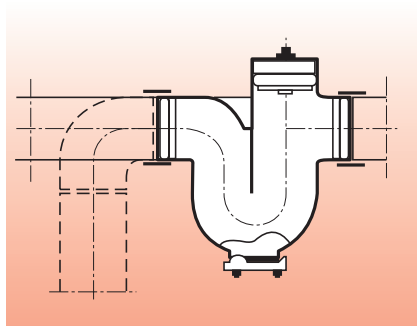
SML odour trap horizontal/vertical DIN 19522 - 100 - G

DN	L	H	X ₁	X ₂	X ₃	X ₄	W	kg	Item no.
50	190	250	182	68	122	68	60	3.0	669562
80	265	293	200	93	172	93	60	5.8	235165
100	325	390	280	110	215	110	100	9.9	669564
125	390	446	316	130	260	130	100	13.0	669565
150	470	501	356	145	325	145	100	19.5	669566
200	600	608	428	180	400	200	100	36.5	669567

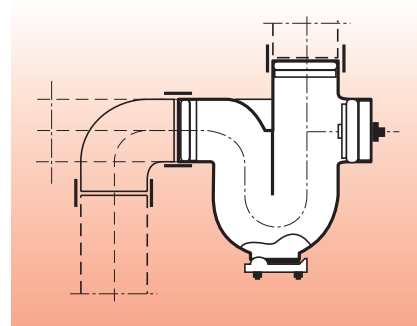
Cleaning trap below

The supplying side of the SML odour traps DN 50 to DN 200 may be connected either to the horizontal or the vertical pipe. Bends can guide the outlet into different directions. The supply opening not used is to be closed with the hermetic plug with press-sealing automatically supplied.

Installation examples

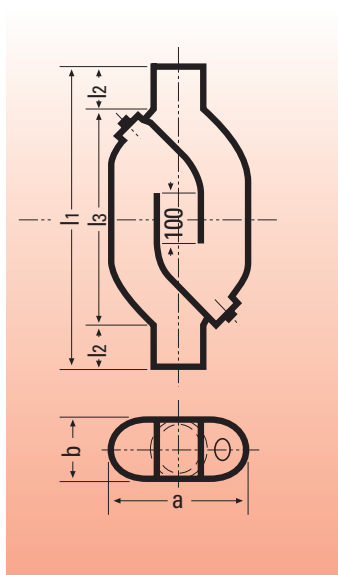


horizontal supply



vertical supply

SML Down Pipe Odour Traps (rain water siphon)



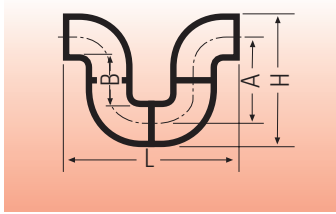
SML down pipe odour trap DIN 19522 - 100 - RGV

DN	a	b	l ₂	l ₃	l ₁	kg	Item no.
80	195	90	70	333	472	9.6	236357
100	276	124	90	408	588	16.0	669558
125	344	144	100	487	687	28.5	669559
150	374	179	110	522	742	38.0	669560

100 mm sealing height, vertical version with upper and lower cleaning hole for installation in rain water down pipes. Use of this odour trap is necessary when run-off areas (e.g. balcony or patio drainage) are connected to the rain water pipes which join mixed water pipes. Installation must be carried out in a frost-protected area - we advise above the cleaning hole before junction of the down pipe into the base pipe.

Odour trap

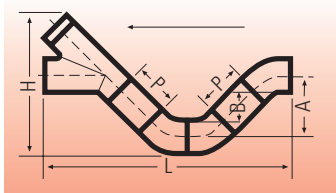
as a combination of bends and fittings with a minimum sealing height of 100 mm

**Example 1:**

DN 80 to DN 150 with 4 bends 88°

Example 2:

DN 200 to DN 300 with
1 branch 45°, 3 bends 45°,
1 hermetic plug, 2 pipe cuttings

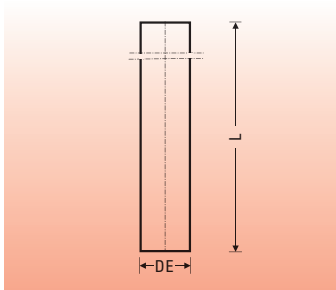
**SML fittings combinations**

DN	A	B	H	L
80	190	108	272	393
100	225	125	335	457
125	255	130	390	518
150	295	145	455	600

DN	A	B	H	L	P
200	300	100	766	1280	195
250	350	100	941	1525	225
300	400	100	1096	1775	246

SML Rain Water Stand Pipes

without socket

**SML rain water stand pipe without socket**

DN	DE	L	kg	Item no.
50	58	1000	5.3	660084
80	83	1000	6.7	237916
100	110	1000	8.5	660264
125	135	1000	11.7	660354
150	160	1000	14.3	660444

DN 100 for connection to pipes of other materials (zinc, copper etc) in dimension 80 - 100 mm. Pipes inside with yellow epoxy coating, outside with a reddish brown primer coating. Fixing: with normal pipe clamps.

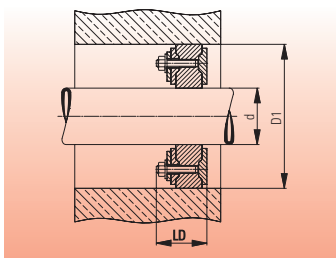
Attention: For a durable good appearance we recommend to coat rainwater stand-pipes after installation. Suitable paints are alkyd or acrylic varnishes with corrosion protection additive



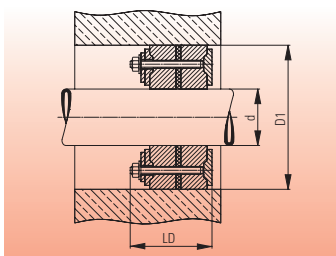
Doyma Curaflex® Quick IN sealing inserts

For use as wall and floor penetrations in watertight concrete structures (Type B protection)

Quick IN A



Quick IN C



Doyma Curaflex® Quick IN A for non-pressurised water

DN	D ₁	LD	Doyma Item no.
50	125	60	1012 063 125 00
80	150	60	1012 078 150 00
100	200	60	1012 110 200 00
125	200	60	1012 135 200 00
150	250	60	1012 160 250 00

Doyma Curaflex® Quick IN C for pressurised water

DN	D ₁	LD	Doyma Item no.
50	125	85	1032 063 125 00
80	150	85	1032 078 150 00
100	200	85	1032 110 200 00
125	200	85	1032 135 200 00
150	250	85	1032 160 250 00

Hinged sealing insert with quick-release closure for installation in core drill holes or wall sleeves. Gas-tight.

Split, asymmetrically profiled steel rings: electro-galvanised, yellow chromated and sealed. Elastomer: 27 mm EPDM seal (Quick IN A 1x, Quick IN C 2x).

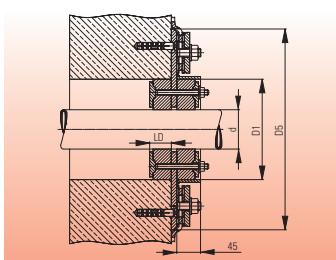
Centre ring in Quick IN C: EPDM.

Note: Doyma sealing inserts are available through distributors, supplied by Doyma: www.doyma.de

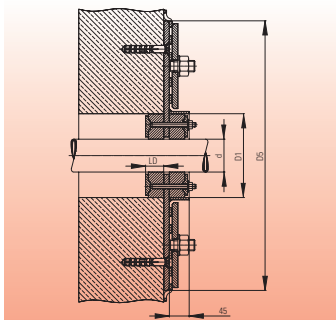
Doyma Curaflex® C/2/SD

Sealing inserts for use as wall or floor penetrations in structures with sheet membrane* or thick coating** waterproofing systems (Type A protection)

C/2/SD/5



C/2/SD/6



Doyma Curaflex® C/2/SD/5 for non-pressurised water

DN	D ₁	D ₂	LD	Doyma Item no.
50	125	285	40	1035 063 125 00
80	150	310	40	1035 078 150 00
100	200	360	40	1035 110 200 00
125	200	360	40	1035 125 200 00
150	250	410	40	1035 160 250 00

Doyma Curaflex® C/2/SD/6 for pressurised water

DN	D ₁	D ₂	LD	Doyma Item no.
50	125	465	40	1036 063 125 00
80	150	490	40	1036 078 150 00
100	200	540	40	1036 110 200 00
125	200	540	40	1036 125 200 00
150	250	590	40	1036 160 250 00

Sealing kit for installation in wall sleeves or core drill holes. Gas-tight.

Asymmetrically profiled steel rings: electro-galvanised, yellow chromated and sealed. Elastomer: 2 × 27 mm EPDM seals.

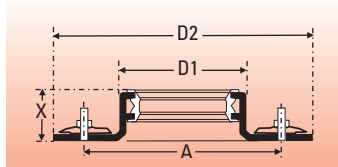
* For sealing membranes made of very thin and/or very rigid materials, DIN 18195-9 specifies the use of additional support layers. We recommend using the Doyma Curaflex® 1775 inserts (not included in the standard scope of delivery).

** For thick coatings, a fabric reinforcement must be embedded in the coating around the penetration area. In this case, we recommend the Curaflex® 1778 accessory set.

Note: Doyma sealing inserts are available through distributors, supplied by Doyma: www.doyma.de

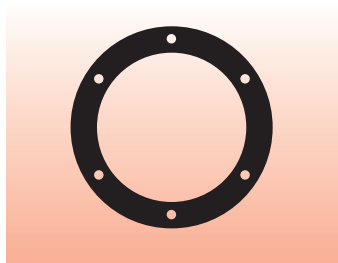
SML Roof Penetrations

as per DIN 18195-5 with fixed and loose flange with inserted profiled sealing for waterproof sealing between pipe and penetration fitting



Sealings

to pinch in highly polymeric roofing paper



SML roof penetration

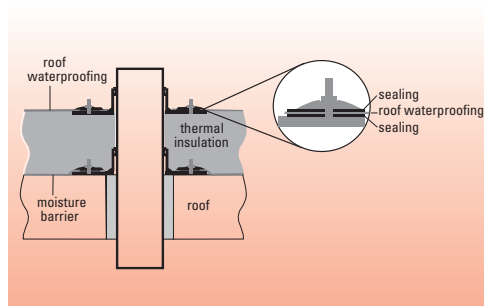
DN	D ₁	D ₂	A	X	kg	Item no.
80	135	286	215	60	6.1	238836
100	158	324	246	60	6.6	238837
125	188	349	271	60	7.5	238838
150	212	379	296	60	10.5	238839

For roofs with one sealing level, one SML roof penetration fitting is required per pipe-line. In case of warm roof penetrations, two penetration fittings are to be used.

sealing for SML roof penetration

DN	kg	Item no.	
		EPDM	NBR
80	0.2	238830	238833
100	0.3	238831	238834
125	0.3	238832	238835
150	0.4	238840	238841

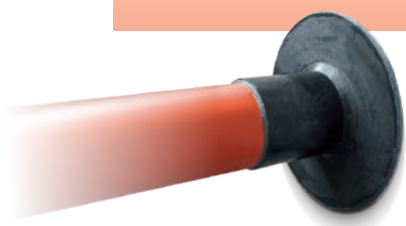
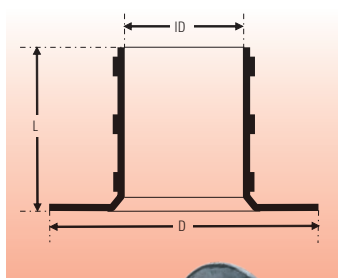
installation example



For each SML roof penetration, two sealings are to be used. The material of the sealings (EPDM or NBR) should be decided in co-operation with the manufacturer of the roof waterproofing. The sealings are not automatically included in the delivery of the roof penetration.

Düker Sealing Flange

Water and gas-proof sealing for wall and roof penetrations



Düker sealing flange, resistance to pressurized water, tested up to 2.5 bar

DN	for outside diameter	D	L	designation sealing flange	kg	Item no. black	Item no. transparent
50	45 – 63	145	150	ID 67	1.0	326825	326829
80	64 – 86	167	150	ID 89	1.2	326826	326830
100	111 – 125	320	150	ID 128	1.2	326827	326831
125	135 – 160	320	150	ID 163	1.3	326828	326832
150	135 – 160	320	150	ID 163	1.3	326828	326832

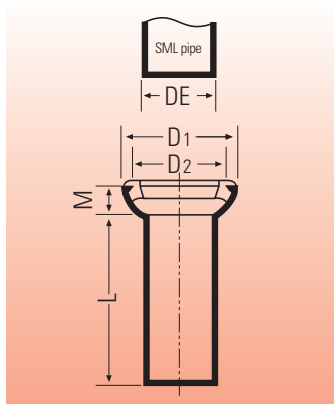
Available on request

Suitable for penetrations through water-tight concrete or in combination with waterproofing sheeting or coating.

The installation of the Düker sealing flange is very easy and fast, even on a finished pipe installation. For wall penetrations there is a transparent version „T“, for roof penetrations a UV-resistant black version „S“. Delivered as an installation set including sealing glue and bonding agent.

SML Connections

with short socket and inserted rubber profile seal



SML connection with short socket

DN	D ₁	D ₂	L	M	DE	kg	Item no.
100	144	125.5	250	40	110	3.4	662194
125	172	151.5	250	42.5	135	4.6	662204
150	201	178.5	250	45	160	6.1	on request

SML connections at the bare ceiling

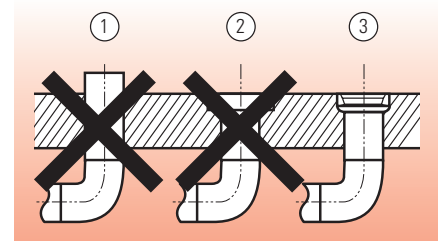
SML pipe imbedded in concrete, where the continuation above the bare ceiling can only be carried out later.

Example 1:

Pipe openings are easily tripped over, which can lead to injuries or damage.

Example 2:

The space is saved for the coupling. An enlargement is usually inevitable.

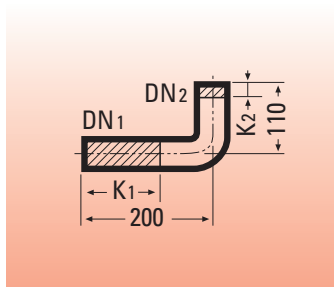


Example 3:

The socket connection piece is imbedded in concrete at the same level with the upper edge of the bare ceiling and protected by a sealing hood. The inserted sealing guarantees an easy and unproblematic later continuation.

SML Connecting Bends 90°

for sinks and urinals



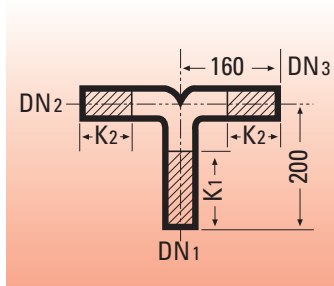
SML connecting bend long DIN 19522 - 50 x 40 - 90 - 0L

DN	K ₁ *	K ₂ *	kg	Item no.
1 2				
50 x 50 long	120	25	1.5	661754

* dimension for maximum cut-back

SML Connecting Y-Pipes 90°

for wash basins etc.

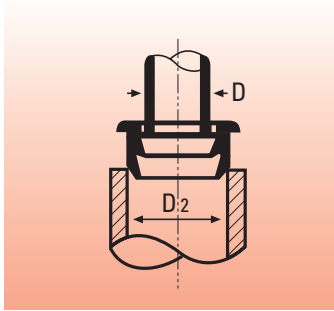


SML connecting Y-pipe DIN 19522 - 50 x 50 x 50 - 90 - 0H

DN	K ₁ *	K ₂ *	kg	Item no.
1 2 3				
50 x 50 x 50	125	85	2.5	661794

* dimension for maximum cut-back

Rubber connections



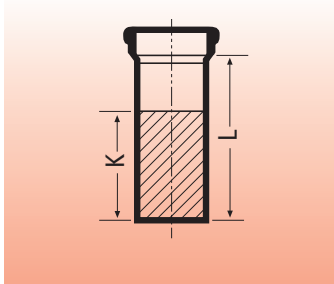
Rubber connections

for SML bend DN	D ₂ (connecting pipe)	D	marks**	Item no.
50 x 50	50	28-34	40 / 30 large	100125
50 x 50	50	38-44	40 / 40	100089

** Please note: the rubber push-in connectors for the bends 40x50, 50x50 and 50x60 bear marks which differ from the nominal widths.

WC Connections DN 100 with Special Sockets and Rubber Seals as per DIN 4060

SML WC Pipes

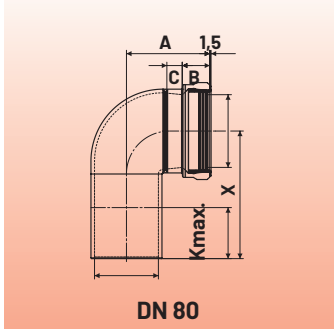


SML WC pipe

DN		plastic pipe connection DN	L	K*	kg	Item no.
80	long	90 (OD 90)	400	300	4.0	663724

*dimension for maximum cut-back

SML WC Bends 90°

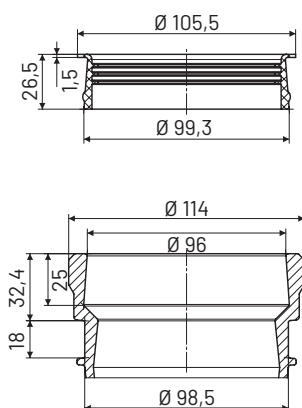


SML WC bend

DN	plastic pipe connection DN	X	A	B	C	K max.*	kg	Item no.
80	90 (OD 90)	150	98	32	18	60	2.2	662794

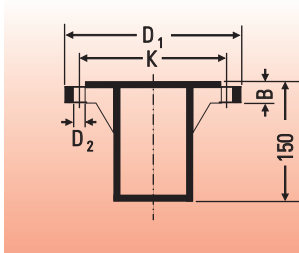
*dimension for maximum cut-back

Dimensions of Special Sockets and Rubber Joints



WC socket for plastic pipe connection DN 90
Item no. rubber joints separately: 236685

SML Connectors with Flange



SML connector with flange DIN 19522 - 150 - FL

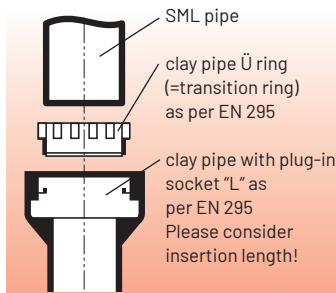
DN	D ₁	D ₂	B	K*	screws 8 pcs each	kg	Item no.
100	220	18	24	180	M16	6.2	665934
125	250	18	26	210	M16	8.4	on request
150	285	22	26	240	M20	9.5	665954
200	340	22	26	295	M20	14.5	665964

Delivery without screws and seals

* 8 holes, DN 100 up to DN 150: PN 10/16; DN 200: PN 10; as per EN 1092-2

Connections of SML Pipes to other Soil Pipes

SML Pipe to Vitrified Clay Pipe with push-in socket "L" as per EN 295 DN 100 to 200



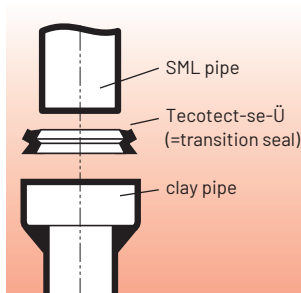
Clay pipe Ü ring DIN EN 295 (UR)

DN	Item no.
100	100295
125	100296
150	100297
200	100298

Clay pipe transition ring "clay pipe Ü ring" EN 295 (UR) for connecting SML to clay pipes with push-in socket "L" as per EN 295-1, jointing system "F".

For connection SML DN 200 and DN 250 to clay pipe with push-in socket "K" as per EN 295-1, jointing system "C", we recommend the transition ring of company Muecher (www.muecher.com).

SML Pipe to Vitrified Clay Pipe (normal wall thickness) without pre-finished seal DN 100 to 200

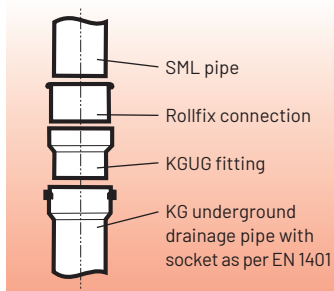


Tecotect-se-Ü sealing

DN	Item no.
100	102573
125	102574
150	102575
200	102576

Tecotect-se-Ü-seal for connecting SML to clay pipes without pre-finished sealing.

PVC underground sewage pipe with socket

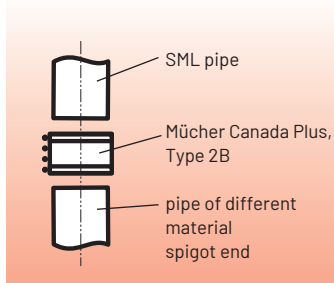


Rollfix joint and KGUG fitting

DN	Item no.
100	–
125	–
150	–
200	–

available e.g from the company Otto Haas KG, www.haas.de

Various pipe materials (spigot end)



Muecher Canada Plus, Type 2B

large choice of diameters and pipe materials
when used with compensation rings also for differences in outside diameters
available from the company Muecher Dichtungen GmbH & Co.KG. www.muecher.com



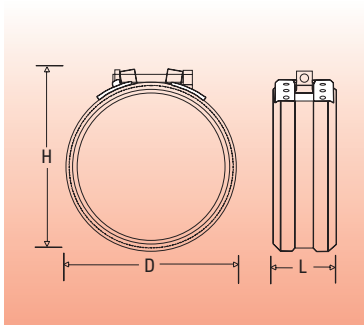
02 COUPLINGS DELIVERY PROGRAMME



**Dükorapid® coupling**

DN	D≈	H≈	L≈	Item no.
50	71	83	47	218592
80	96	107	47	235494
100	123	135	47	214405
125	152	164	54	218594
150	177	189	54	218595
200	230	240	62	240168

≈ maximum dimensions after installation

One screw coupling

**! OUR
RECOMMENDATION !**

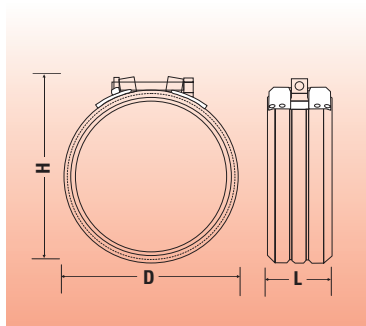
- Material metal collar:** W2, stabilised stainless steel, 1.4510/1.4511 as per EN 10088-2;
- Material locking parts:** locks 1.4301 or 1.4510/1.4511, bolt and square nut steel with zinc lamellae coating, washer 1.4301 as per EN 10088-2
- Material sealing:** EPDM
- Axial restraint:** up to 0,5 bar
- Screw size:** cylinder head bolt with hexagon socket;
- Torque:** DN 50 - 150: M 8; DN 200: M 10
DN 50-150: 18 Nm; DN 200: 28 Nm;
if the locks should touch do not tighten any more!

**with RAL GEG
quality seal**



Installation instructions see page 75





**OUR RECOMMENDATION
FOR SOIL INSTALLATION
AND OUTSIDE OF BUILDINGS**

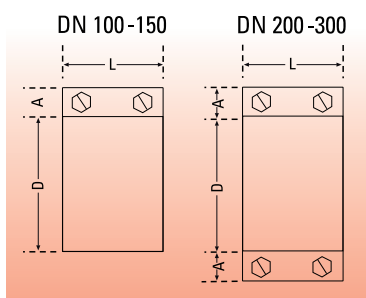
Rapid Inox coupling

DN	D≈	H≈	L≈	Item no.
50	70	80	40	234826
80	95	105	40	235472
100	125	135	46	234828
125	147	162	55	234829
150	172	187	55	234830
200	227	244	70	234831
250	278	306	91	234832
300	330	359	91	234833

One screw coupling for soil installation without additional corrosion protection and for installation outside of buildings.

Attention: particularly aggressive soils may call for an additional corrosion protection (e.g. shrinking hose)

Material metal collar: W5, austenitic stainless steel, 1.4571 as per EN 10088-2; locks 1.4571
 Material locking parts: bolt, washer, square nut A4
 Material sealing: EPDM. NBR on request for waste water containing oil, animal grease, solvents or petrol
 Axial restraint: DN 50-200: up to 0.5 bar; DN 250-300: up to 0.3 bar
 Screw size: hexagon socket screw;
 DN 50-150: M 8; DN 200-300: M 10
 Torque: until both fastening heads come together
 Marking: marking W5 on the metal collar
 Installation instructions see page 75



two parts from DN 200

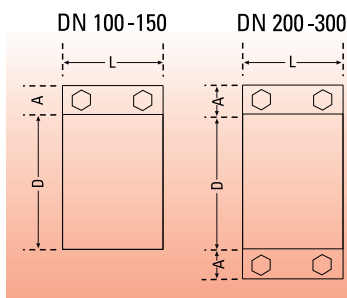
CV coupling

DN	A	D≈	L	Item no.
50*	14	65	48	659436
80*	14	88	48	235859
100*	18	115	54	659438
125*	18	140	65	659439
150*	18	170	65	659440
200*	18	220	78	659441
250*	18	286	78	659442
300*	18	338	78	659443

≈ maximum dimensions after installation * obsolete model

Double screw coupling. The metal collar is opened completely for installation, therefore the coupling is suitable for use in situations with reduced space. Attention: not suitable for installation near ceiling and wall penetrations with fire rating.

Material metal collar: W2, stabilised stainless steel, 1.4510/1.4511 as per EN 10088-2
 Material locking parts: bolts galvanised steel
 Material sealing: EPDM
 Axial restraint: none; seal integrity with claw clamp installation:
 DN 50-200: 5 bar; DN 250-300: 3 bar
 Screw size: slotted hexagonal screws; M8, AF 10
 Torque: DN 50-80: 6-8 Nm; DN 100-150: 10-12 Nm;
 DN 200-300: 15-20 Nm
 Installation instructions see page 76



two parts from DN 200

CV Inox coupling

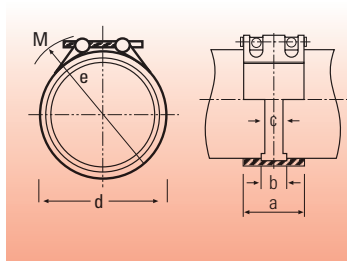
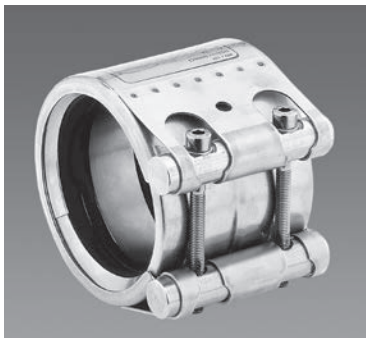
DN	A	D≈	L	Item no.
100	18	115	54	239777
125	18	140	65	239778
150	18	170	65	239779
200	18	220	78	239780
250	18	286	78	239781
300	18	338	78	239782

Double screw coupling. Suitable in particular for bridge drainage applications with Düker MLB pipes and fittings.

Material metal collar: W5, austenitic stainless steel, 1.4571 as per EN 10088-2;
locks 1.4571 as per EN 10088-2
Material locking parts: bolts A4 / 1.4401 as per EN 10088-2
Material sealing: EPDM
Axial restraint: -
Screw size: hexagonal screws M 8, SW13
Torque: hand-tight
Marking: CV Inox, 1.4571 - W5

Installation instructions see page 76

Available on request

**Connect-F Inox coupling**

DN	a	b	c	d≈	e≈	Item no.
100	98	40	25	130	150	234834
125	113	50	35	165	195	234835
150	113	50	35	185	215	234836
200	138	74	35	240	270	234837
250	138	74	35	305	335	234838
300	138	74	35	360	390	234839
400	139	74	35	460	490	234840
500	140	74	35	565	595	234841
600	139	74	35	665	695	234842

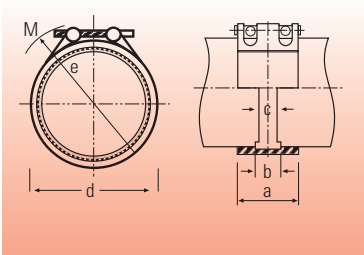
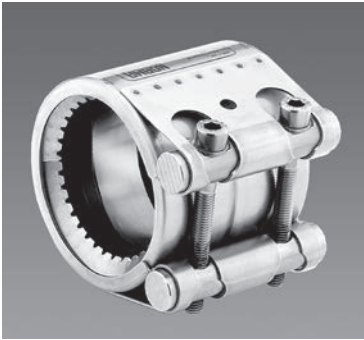
≈ maximum dimensions after installation

Coupling for installation in the soil or outside of buildings

Attention: particularly aggressive soils may call for an additional corrosion protection (e.g. shrinking hose)

Material metal collar: 1.4571
Material locking parts: bolts 1.4401, screws 1.4404
Material sealing: EPDM
Axial restraint: -
Screw size: DN 100: M 8; DN 125 - 150: M 10; DN 200 - 600: M 12
Torque: as stated on the coupling
Installation instructions see page 77



**Connect-G Inox coupling**

DN	a	b	c	d≈	e≈	Item no.
50	78	29	17	85	105	234843
80	98	40	25	105	125	235482
100	98	40	25	130	150	234845
125	115	50	35	165	195	234846
150	115	50	35	185	215	234847
200	140	67	35	240	270	234848
250	140	67	35	305	335	234849
300	140	67	35	360	390	234850
400	142	67	35	460	490	234851
500	142	67	35	565	595	234852
600	142	67	35	665	695	234853

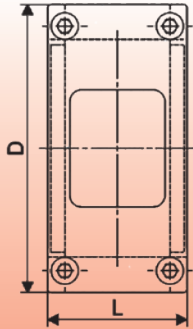
≈ maximum dimensions after installation

Coupling with axial restraint for installation in the soil or outside of buildings

Attention: particularly aggressive soils may call for an additional corrosion protection (e.g. shrinking hose)

Material metal collar:	W5, austenitic stainless steel, 1.4571 as per EN 10088-2
	locks 1.4571, claw ring 1.4310 as per EN 10088-2
Material locking parts:	bolts 1.4401, screws 1.4404
Material sealing:	EPDM
Axial restraint:	DN 50 – 400: up to 10 bar; DN 500: up to 6 bar; DN 600: up to 4 bar
Screw size:	DN 50: M 8; DN 80 – 100: M 10; DN 125 – 150: M 12; DN 200 – 600: M 16
Torque:	as stated on the coupling

Installation instructions see page 77



! OUR RECOMMENDATION !
FOR INCREASED INSIDE PRESSURE

Kombi grip collar

DN	D	L	Item no.
50	111	72	235360
80	136	72	235498
100	172	82	235280
125	202	96	235315
150	226	96	235316
200	284	110	235281
250	364	130	216888
300	416	130	100304

Security collar with axial restraint for all Rapid and CV/CE couplings

Material metal collar: galvanised steel

Material locking parts: galvanised steel

Axial restraint: DN 50 – 100: up to 10 bar; DN 125 – 150: up to 5 bar;

DN 200: up to 3 bar; DN 250 – 300: up to 1 bar

(Note: observe the sealing specifications for CV/CE types!)

Screw size: DN 50 – 150 cylinder head screws with hexagon socket DIN 912 8.8;

DN 50 – 80: M 8 x 30, DN 100 – 150: M 10 x 35.

DN 200 – 300 cylinder head screws with hexagon socket DIN 912 10.9, galvanized washers, galvanized nuts according to DIN 557;

M 12 x 55.

Torque: DN 50 – 80: 20 Nm*; DN 100 – 150: 25 Nm;

DN 200 – 300: 65 Nm

* Nominal width DN 50 is currently still undergoing modification. In the course of this modification, the torques will also be changed. Please observe the torques stated on the installation instructions delivered with the product.

Installation instructions see page 78





Düker EK Fix coupling

DN	D ₁	D ₂	D ₃	D ₄	D ₅	L	L ₁	L ₂	Ø connection	Item no.
50	72	56	30	57	68	63	19	42	40 – 56	100270
80	92	75	41	81	91	77	19	55	56 – 75	236756
80*	108	90	41	81	93	88	19	60	75 – 90	235346
100	128	110	78	108	118	95	21	65	104 – 110	100272
125	145	125	90	132	145	103	21	75	125	100273

* reducing DN 90 plastic pipe to DN 80 cast iron pipe is only admissible on a WC connection bend, but not in all countries!

For connecting pipes of PE-HD/PP to cast iron sewage pipes

German Approval no.: Z-42.5-299

Material: EPDM

Material locking parts: W2, worm thread clamp stainless steel 1.4016, screw free of chrome (VI)

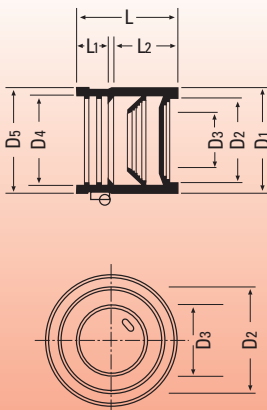
Axial restraint: –

Screw size: cross-slit screw, width 7

Torque: ca. 2 Nm

Insertion lengths: DN 50: 42 mm; DN 80: 55 – 60 mm;
DN 100: 65 mm; DN 125: 75 mm

Installation instructions see page 79



Konfix Multi coupling

DN	D ₁	D ₂	D ₃	D ₄	D ₅	L	L ₁	insertion	Item no.
100	134	connections see illustration		108	116	90.5	35.5	40	100030

For connecting pipes of other materials to cast iron sewage pipes, up to three connecting pipes

Material: EPDM

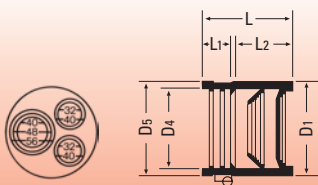
Material locking parts: worm thread clamp stainless steel 1.4016, screw galvanised steel

Axial restraint: –

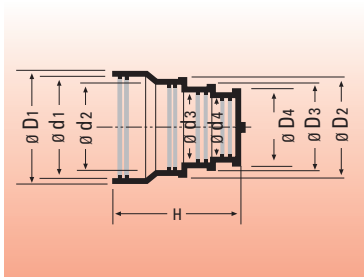
Screw size: worm thread screw SW7

Torque: 5.0 + 0.5 Nm

Installation instructions see page 79



For further connection possibilities from plastic pipelines to SML please consider e.g. the Mücher adapter coupling MAC, www.muecher.com

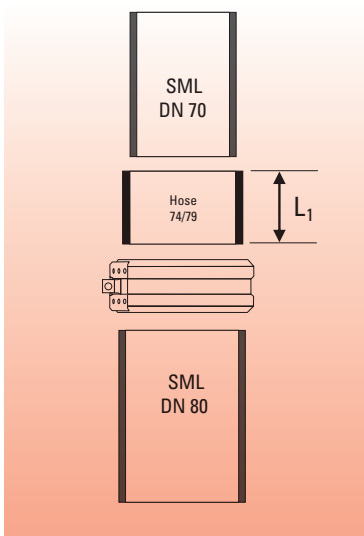
**Multiquick coupling**

DN	ØD ₁	ØD ₂	ØD ₃	ØD ₄	Ød ₁	Ød ₂	Ød ₃	Ød ₄	H	Item no.
100 x 70	117	111	101	81	108	104	93	74	107	234859

Transition coupling for socketless cast iron sewage pipes DN 100 or old cast iron socket pipes DN 100 with an exterior diameter of max. 115 mm to other materials with an exterior diameter of 72 - 110 mm.

Material: EPDM
 Material locking parts: worm thread clamps stainless steel 1.406, screw galvanised steel
 Axial restraint: -
 Screw size: worm thread screw SW7
 Torque: 5.0 + 0.5 Nm

Installation instructions see page 80

**Transition coupling**

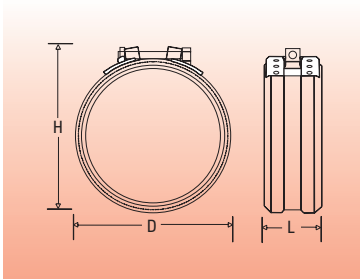
DN	D≈	H≈	L	L ₁	Item no.
70 x 80	96	107	47	30	235347

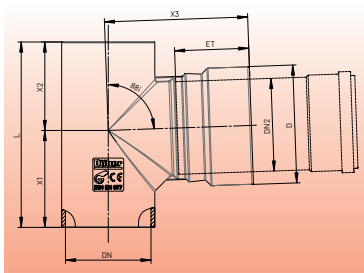
≈ maximum dimensions after installation

Transition coupling for socketless cast iron drainage pipes and fittings DN 70 and DN 80

Material metal collar: W2, stabilised stainless steel, 1.4510/1.4511 as per EN 10088-2
 locks 1.4301 or 1.4510/1.4511
 Material locking parts: bolt and square nut steel with zinc lamellae coating, washer 1.4301 as per EN 10088-2
 Material sealing: EPDM
 Axial restraint: -
 Screw size: cylinder head bolt with hexagon socket, M8
 Torque: 18 Nm

Installation instructions see page 81




SML Fire protection branch 100 x 100 - 88

DN	DN2	L	X1	X2	X3	ET	D	kg	Item no.
50	50/56	155	75	80	144	93/81	85	1.8	663535
75/80	50/56	166	80	86	156	93/81	85	2.2	663555
100	50/56	176	85	91	170	93/81	85	2.8	663985
100	90	205	107	98	170	88	119	3.5	663965
100	110	220	115	105	165	88	140	4.0	663925
125	50/56	190	93	97	186	93/81	85	3.6	663825
125	90	215	112	103	185	88	119	4.3	663785
125	110	235	125	110	185	88	140	4.9	663895
150	90	230	120	110	200	88	119	5.5	663885
150	110	245	130	115	200	88	140	6.1	663935

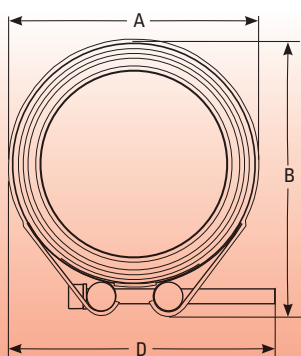
The fire protection branch is available for downpipe nominal diameters from DN 50 to DN 150 – and for connecting plastic pipes with an outside diameter of 50 mm, 56 mm, 90 mm or 110 mm.


Düker Fire protection coupling BSV 90

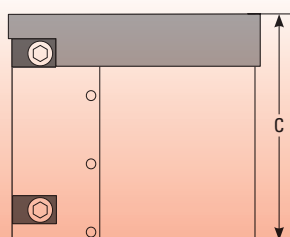
DN	A≈	B≈	C	D≈	core drilling ≈	Item no.
80	106	115	135	125	160	237693
100	133	145	135	140	180	237694
125	160	175	150	155	200	237695
150	188	198	150	170	240	237696

≈ maximum dimensions after installation

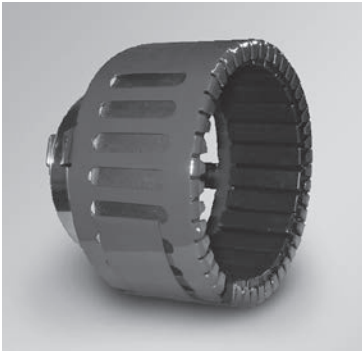
Two-screw coupling for installation in ceiling penetrations with fire rating



German Approval no.: abZ DIBt Z-19.17-1893 and aBG DIBt Z-19.53-2666
 Material metal collar: stabilised stainless steel, 1.4510/11 as per EN 10088
 Material locking parts: galvanised steel
 Material sealing: EPDM
 Material plastic pipe insert: PE-HD / PP
 Intumescence material: expandable graphite on glass fibre fabric, intumescent at approx. 150°C
 Axial restraint: –
 Screw size: M 8
 Torque: 15-17 Nm (use torque wrench)

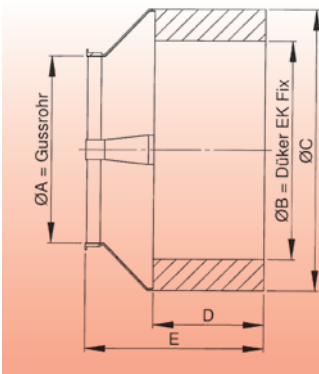


The upper section, which features an externally mounted intumescent strip, **must be installed 20-40 mm deep into the ceiling**, with the remainder protruding beneath it. For further details, please refer to the installation instructions supplied with the product and the DIBt general approval Z.19.17-1893.


Doyma Curaflam® Konfix Pro

DN	Cast iron pipe branch or Düker EK Fix DN	Ø plastic pipe mm	A	B	C≈	D	E≈	Item no.
50	50	45-56	58	72	105	45	74	240317
100	70	56-75	78	92	145	65	92	240318
	80	56-75	83	108	145	65	96	
	80	75-90	83	108	145	65	96	
	100	104-110	110	128	165	65	105	

≈ approx. dimensions after installation



Firestop system for installation above the Düker EK Fix connector in mixed installations (cast iron downpipe / plastic branch pipe)

German Approval no.:

abZ DIBt Z-19.17-2074 and
aBG DIBt Z-19.53-2637

Metal collar material:

Powder-coated steel

Locking component material:

Galvanised steel

Intumescent material:

Intusit pro

Scope of delivery:

Curaflam® Konfix Pro and worm-drive
hose clamp; installation instructions
and fire protection label



SML couplings: recommended application areas

		Nominal size DN	Axial restraint up to bar	in the building	in concrete
1.	Dükorapid® coupling	50 – 200*	0.5		
2.	Rapid Inox coupling	50 – 200*/250 – 300	0.5/0.3		
3.	Düker CV coupling	50 – 300	–		
4.	CV Inox coupling	100–600	–		
5.	Connect-F Inox coupling	100 – 600	–		
6.	Connect-G Inox coupling	50 – 400/500/600	10/6/4		
7.	Düker EK Fix coupling	50 – 125	–		
8.	Multiquick coupling	100	–		
9.	Kombi grip collar	50–100/125–150/200/250–300	10/5/3/1		

In case of unclarity
please consult
with the factory

*DN 200:
grip collars of changes
of direction

	in soil	outside of building	flat roof drainage (siphonic system)	connection to plastic roof drain	connection to plastic pipes
	*				

* with corrosion protection
e.g. petrolatum tape of company
Denso (DENSO® plast, possibly
together with DENSO® Mastic PF)



03 INSTALLATION INSTRUCTIONS



Assembling and Installation Instructions for Düker Couplings

Waste water and ventilation pipelines are on principle sloping pipelines without interior pressures. However, it is not impossible for pressure to develop in the pipelines under certain circumstances.

The installation standard says the following:

EN 12056-1, section 5.4.2, water and gas tightness

Drainage systems shall be water and gas tight against the operational pressures. Pipework systems installed inside buildings shall not release vapours and foul air into the building.

DIN 1986-100:2016-12, section 6.1.2 – Watertightness of waste water pipelines and their joints

Waste water pipelines must be permanently watertight under internal and external overpressure of up to 0.5 bar, taking into account potential interactions between the pipes and their surroundings.

EN 12056-5, section 6.3, fixing and supporting

Pipelines with joints, which allow longitudinal movement, shall be fixed and/or supported in such a way as to ensure that during service the joint cannot become unintentionally disconnected. Reaction forces shall be considered.

DIN 1986-100:2016-12, section 6.1.3 – Securing pipes against longitudinal separation

For pipelines with non-axially restrained joints, in which internal pressure is expected by design or may occur due to overload, suitable measures must be taken to prevent the pipes – particularly at changes in direction – from separating or deviating from their axis. (...) Pipe support intervals and measures to prevent separation or deviation from the axis must be defined in accordance with the installation instructions provided by the pipe system manufacturer.

According to **EN 877 (product standard), section 4.7.5 water tightness**, couplings may not exhibit any visible leakage under test conditions with hydrostatic inside pressure, under the following conditions:

- fall tests are done in a strain-relieved state, i.e. the pipes are secured against excessive axial displacement
- joints up to and including DN 200, aligned or deflected up to 3°: up to 5 bar
- joints surpassing DN 200, aligned or deflected up to 1°45': up to 3 bar

- joints subject to shear force of 10 DN in newtons, aligned: up to 1 bar
- joints which will only carry limited pressures because of the intended use and installation, aligned or deflected up to 3°: up to 0.5 bar.
- joints connecting to sanitary ware: up to 0.1 bar

As these tests are carried out while the pipes are secured against axial displacement, these test pressures cannot be applied directly to installations in a building. For the actual application, rather than the pressure tightness, what counts is the thrust resistance or axial restraint of the couplings, or the information what measure can be taken in order to obtain the required axial restraint. These measures can be grip collars, fixings, abutments etc. The table of page 70 gives the required information.

Installation instructions and admissible pressure loads on Düker SML couplings

Special requirements are to be considered for drainage pipelines which can be exposed to higher inside pressures than 0.5 bar. This concerns e.g.

- pipelines in the back water area
- overload areas of rain water pipelines inside buildings
- pipelines of a siphonic system
- waste water pipelines leading through several basement storeys without further outlets
- pressure pipelines at waste water pumps

Pipelines in the Back Water Area

Pressure that is caused by a backflow from the canalisation can make connections slip. Therefore pipelines below the back water level must be treated as follows:

Waste water up to 0.5 bar: On Düker Rapid couplings DN 100 to DN 150, no additional measures are required. On Düker Rapid couplings DN 200, changes of directions must be secured with appropriate Düker grip collars.

Waste water above 0.5 bar: All Düker couplings must be secured with appropriate grip collars.

Waste water pipelines connected to a mixed water canalization: All Düker couplings must be secured with appropriate grip collars.



Gravity Drainage Rainwater Pipelines

EN 12056-3, section 7.6.4 says:

Internal rainwater pipes shall be able to withstand the head of water likely to occur in the event of a blockage.

In vertical rainwater stacks open above, the water column cannot exert any axial forces even in case of a blockage. Here, the pipes need only be secured against sideways movement out of the axis, through sufficient fixing.

Collection and connection lines below the roof do not need any securing with grip collars either.

However, at offsets in the rainwater stack, at changes of direction, in the lower part of rainwater collection lines as well as pipeline sections in the back water area, the couplings must be secured with appropriate grip collars.

If special information for high-risers should be required, please ask for our Technical Specifications waste water or rain water in high-risers.

Siphonic Drainage Systems

Please refer to pages 90 to 93.

Waste Water Pipelines Leading Through Several Basement Storeys

If there are no outlets over the length of several storeys, the pressure conditions correspond to those of a gravity drainage rainwater pipeline, and the same measures are to be taken.

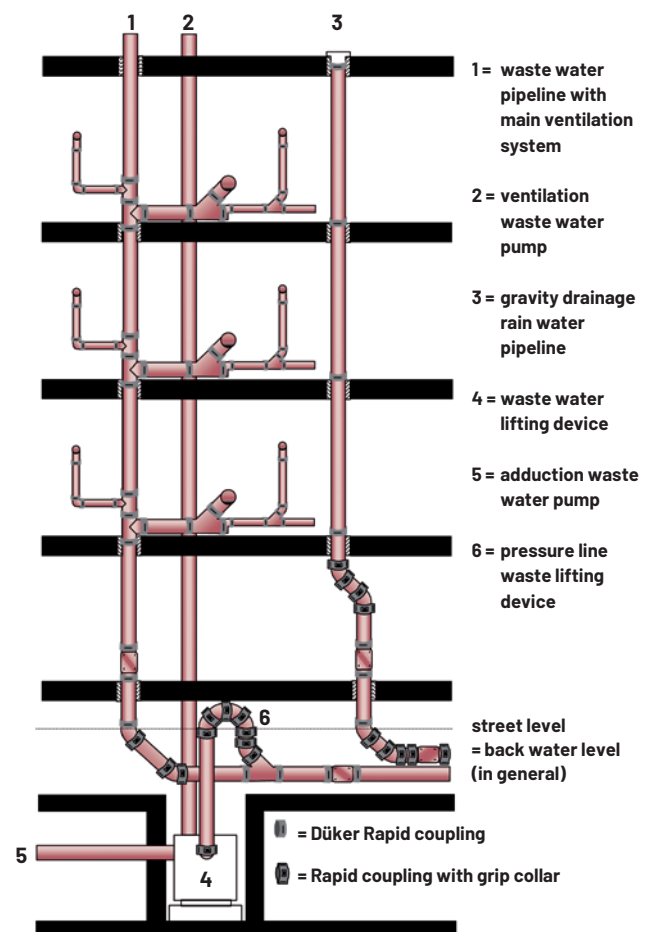
Pressure Pipelines at Waste Water Lifting Devices

Pressure pipelines can be made of Düker cast iron drainage pipes and fittings with Rapid couplings and Kombi grip collars up to DN 100. As an alternative Connect-G couplings DN 50 – 400 can be used. The admissible pressure load is max. 10 bar in both cases. The reason for the assumption of 10 bar pressure load is that when the pump is switched off, there are often pressure peaks that can be much higher than the normal pump pressure. In order to reduce these pressure peaks, it is recommendable to have floating backflow preventers with a counter weight available from suppliers of waste water pumps.

On principle it is necessary to have compensators in order to prevent the waste water pump's vibrations from being transmitted onto the pressure pipe. The fixings must be carried out in accordance with the Düker instructions. Pipe clamps should be mounted either direct to the wall or ceiling or in case of larger distances onto corresponding rails or supports. The clamps must be fixed with M16 rods.

Reducers may not be installed directly at the pressure outlet (elastic pipe coupling) of the waste water pump.

In case of doubts on the pressure line we recommend to consult us or the manufacturer of the pump..



Dükorapid® / Rapid Inox



Dükorapid®



Rapid Inox

Installation Instructions:



1. Slide the complete coupling onto the end of the pipe or fitting, up to the central ring of the sealing.



2. Push the second pipe or fitting into the other end of the coupling.



3. Tighten the hexagon socket screw with a screw wrench, a ratchet or a customary powered screw driver.

Installation Instructions Rapid Inox DN 250 - 300:



1. Slide the rubber sealing onto the pipe, up to the central ring of the sealing.



2. Push in the second pipe end or fitting and set it onto the central ring.



3. Lay the metal collar around the sealing. The collar may be opened no more than twice onto a width of 120% of the pipe outside diameter.



4. Insert the bolt head with the washer disc into the fastening head.



5. Tighten the hexagon socket screw with a screw wrench, a ratchet or an impact wrench until both fastening heads come together.

Dükorapid®

DN 50 - 150: 18 Nm; DN 200: 28 Nm
If the locks should come together do not tighten any more

Rapid Inox:

until both fastening heads come together



CV / CV Inox coupling



Installation Instructions:



1. First of all, push the sealing collar onto the lower pipe end so that the inner sealing ring rests on top of the cut edge of the pipe.



2. Fold over the upper half of the sealing collar.



3. Place the next pipe or fitting even onto the inner ring and fold back the sealing collar.



4. Wrap the metal sleeve around the sealing collar.



5. Alternately tighten both bolts. The plates must push together parallel in order to avoid deformation.

Torque:

DN 50-80: 6-8 Nm

DN 100-150: 10-12 Nm

DN 200-300: 15-20 Nm

Tools: screwdrivers, socket wrenches, ratchets, electric impact wrenches

Connect-F Inox / Connect-G Inox coupling

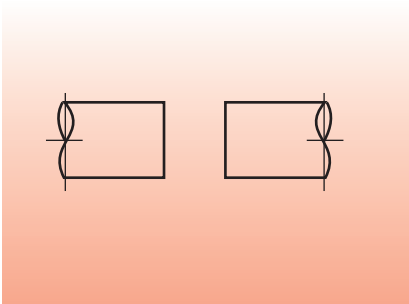


Connect-F: not resistant to axial forces; pressure-resistant up to 10 bar if the axial forces are absorbed by anchorage

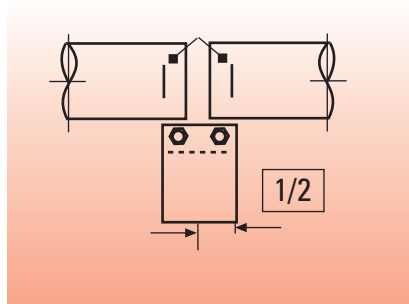


Connect-G: resistant to axial forces up to 10 bar

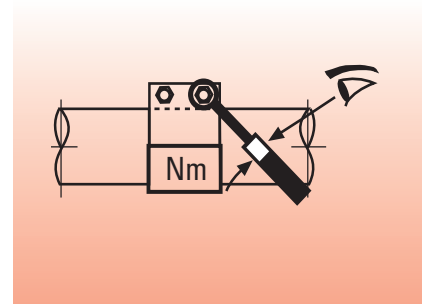
Installation Instructions:



1. Remove any burrs and clean the pipe ends thoroughly in the sealing zones.



2. Mark half the coupling's width on both pipe ends.



3. Slide the coupling on one pipe and push the other pipe end into it. Align the coupling between the marks. Tighten the bolts loosely and alternately with a ratchet spanner or an Allen key. Connect-G may not be twisted after the teeth have engaged with the pipe. Tighten the bolts alternately with the torque wrench in accordance with the torque stated on the type plate (see coupling).



Kombi grip collar



Kombi grip collar
Security collar with axial restraint
for all Rapid and CV couplings at
more than 0.5 bar internal pressure

The axial force resistance necessary for SML pipes and fittings is obtained by the added protection of the coupling with a grip collar.

These security collars with axial restraint take up the reaction forces which may occur at an internal pressure load of up to 10 bar (see table) = 100 m water column.

This means: the SML pipes and fittings which are connected with a coupling and additionally with a grip collar are protected against slipping due to internal pressure without need of a special fastening to the solidium at the connections.

For the permissible internal pressure load of pipes and fittings, please refer to the table on pages 70-71; for CV couplings, see page 62.

Please also note the information on pages 73-74.

Installation instructions:

1. The claw segments must evenly wrap around the pipe couplings. Therefore screw the segments together loosely at first and watch out that the claw inserts do not touch the metal collar of the coupling.
2. Then alternately crosswise tighten the screws or nuts, so that the fastening parts are drawn together parallel and with the same distances. Adhere to the torques stated with the installation instructions supplied with the product for each screw, even if the fastening parts already touch at inferior torques.

Item	DN	Axial restraint up to ... bar
Kombi grip collar	50	10
	80	
	100	
	125	5
	150	
	200	3
	250	1
	300	

Düker EK Fix coupling / Konfix Multi coupling



Düker EK Fix coupling

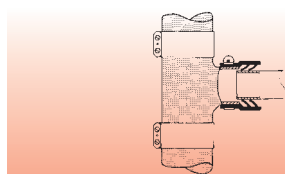
With the Düker EK Fix coupling, pipes and drainage pieces of PP as per EN 1451-1 and DIN 19560-10 as well as PE-HD as per EN 1519-1 and DIN 19535-10 can be connected easily and safely to SML pipes DN 50 to DN 125. The connecting pipe is securely in place thanks to the double lip sealing and large insertion depths.

Material: hot water resistant synthetic rubber EPDM. The Düker EK Fix couplings DN 100 and DN 125 are especially suited for connecting plastic roof drains.



Konfix Multi coupling

SML pipe DN	connecting pipe outside Ø	insertion depth
50	40 – 56 mm	42
80	56 – 75 mm	55
80	75 – 90 mm	60
100	104 – 110 mm	65
125	125 mm	75



Düker EK Fix connection made of EPDM, with worm-drive hose clamp made of stainless steel 1.4016; for connecting non-SML pipes to SML systems.

Installation instructions:



1. Push the Düker EK Fix coupling with opened clamp onto the SML pipe against the stop, then secure to the pipe with the clamp.



2. Grip the projecting rubber neck with a pair of tongs and carefully pull it out so that the opening is set free.



3. Mark the connecting pipe at the depth of insertion, apply lubricant and insert into the coupling.



4. The plastic pipe used illustrates the installation process. Attention: Please observe the table of acceptable outside diameters of pipes.

Konfix Multi coupling only:

use a knife to cut into the grooved front, choosing the groove according to the exterior diameter of the connecting pipe, and without injuring the sealing lip underneath, and open)

Attention:

The connecting pipe may have to be fixed in order to avoid slipping due to internal pressure.



Multiquick coupling



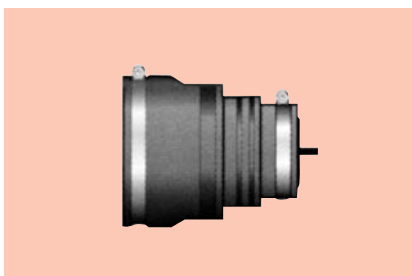
Connection possibilities

Düker SML pipes and fittings DN 100 to inherently stable other materials with an exterior diameter of 72 up to 110 mm.

Düker SML pipes and fittings DN 100 to cast iron socket pipes DN 100 with an exterior diameter up to 115 mm.

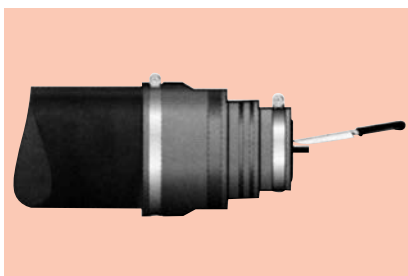
The coupling is delivered with two identical worm thread clamps, which are both adequate for the large diameter tolerance.

Installation instructions:

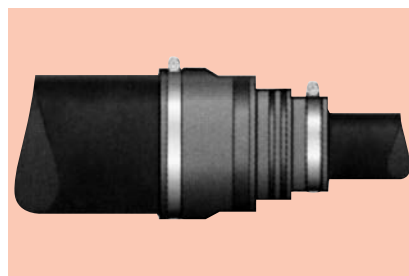


1. Push the open end of the Multiquick coupling over the cast iron pipe end and position the worm thread clamp in the groove intended for it.

Then tighten the worm thread clamp without displacing it. Use a knife to cut open the closed side or to cut the coupling back according to the outer diameter of the connecting pipe. Cut the coupling in front of the step to the required diameter.



2. Now slide the second worm thread clamp over the connecting pipe, push the pipe into the Multiquick coupling and tighten the worm thread clamp in the intended position.



3. Watch out for a flawless and clean sealing zone on the pipes or fittings. Paint lumps or mortar must be removed completely with sand paper.

The worm thread clamps must be tightened exclusively by hand with a screw driver in order to avoid damages to the Multiquick coupling.

Attention:

The connecting pipe may have to be fixed in order to avoid slipping due to internal pressure.

Transition Coupling DN 70 – DN 80 for SML Pipe Systems as per DIN EN 877 and DIN 19522**Application**

Transition coupling for SML pipe systems as per EN 877 DN 70 to DN 80 (also called DN 75/80).

Material

metal collar stainless steel
material no. 1.4510/11 W2
EPDM rubber

Attention:

The transition from DN 80 to DN 70 in the flow direction is only admissible for repair and modernization of old DN 70 lines where DN 70 is no longer available.

Installation instructions:

1. Push the Rapid coupling DN 80 onto the SML pipe or fitting DN 80.



2. Push hose 74/79 onto the SML pipe or fitting DN 70.



3. Push SML pipe DN 70 with the hose into the coupling DN 80.



4. Tighten the screw on the Rapid coupling (10–20 Nm).

Attention:

If the locks should come together do not tighten any more.





Cutting Pipes

Düker hubless cast iron drainage pipes can be cut readily with the following tools:

1. Exact PipeCut pipe saw

This pipe saw ensures a precise, fast and safe cut without flying sparks and hot chips.



Düker cast iron drainage pipes are supplied in standard lengths of 3m. These pipes can be cut on site to the required length.

An excellent tool is the Exact PipeCut pipe saw, e.g. the Exact PipeCut 170E. For more information please consult the web page www.exacttools.com.

Electric belt saws with clamping device also give very good results without flying sparks.

Powered disc cutters with discs for cast iron should only be used with guidance devices, where the pipe is held and moved safely, and a right-angled cut is guaranteed.

Another possibility are wheel cutters e.g. by Ridgid or Virax, which also ensure rightangled cutting.

It is important that the cut is always at a right angle to the pipe axis.

Attention:

Change the cutting discs and saw belts regularly!

2. Belt saw

Portable belt saws cut pipes perfectly.



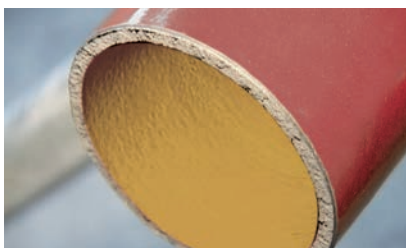
3. Powered disc cutter

The best results with a powered disc cutter can be achieved with a disc appropriate for cast iron and a guidance as shown.



4. Wheel cutter

For use without electricity.



Cut Edge Protection pro-cut Tape

For sewage and waste water pipelines and the corresponding ventilation lines, pipe edges cut on site should be protected. Only the Düker pro-cut tape is to be used for this purpose.

The adhesive pro-cut tape consists of butyl rubber with a PP fleece cover.



1. After cutting the pipe/fitting, trim any sharp edges and clean the surfaces with an appropriate cloth and alcohol so they are absolutely dry and free of dust and grease. The alcohol must evaporate completely before the application of the tape.



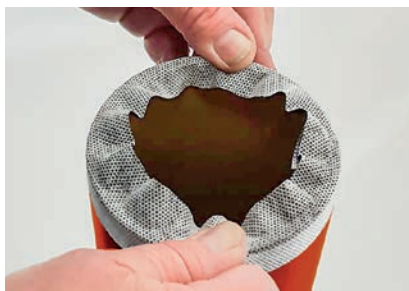
2. Cut pro-cut tape to the length of the pipe inside circumference (the measurements given in the table on the spool are to be observed), warm the tape slightly (heating or other heat source) and lift off the protective film.



3. Lay the sticky side of the pro-cut tape onto the outside of the cut pipe, 20 mm from the edge.



4. Draw the pro-cut tape around the pipe with slight and uniform tension, to a slight overlapping. If there is a gap, loosen both ends separately and draw the tape with higher tension until it overlaps.



5. Fold the tape from the outside to the inside and press it tightly to the inside surface and the pipe edge. On the inside, the tape must fit without tension.



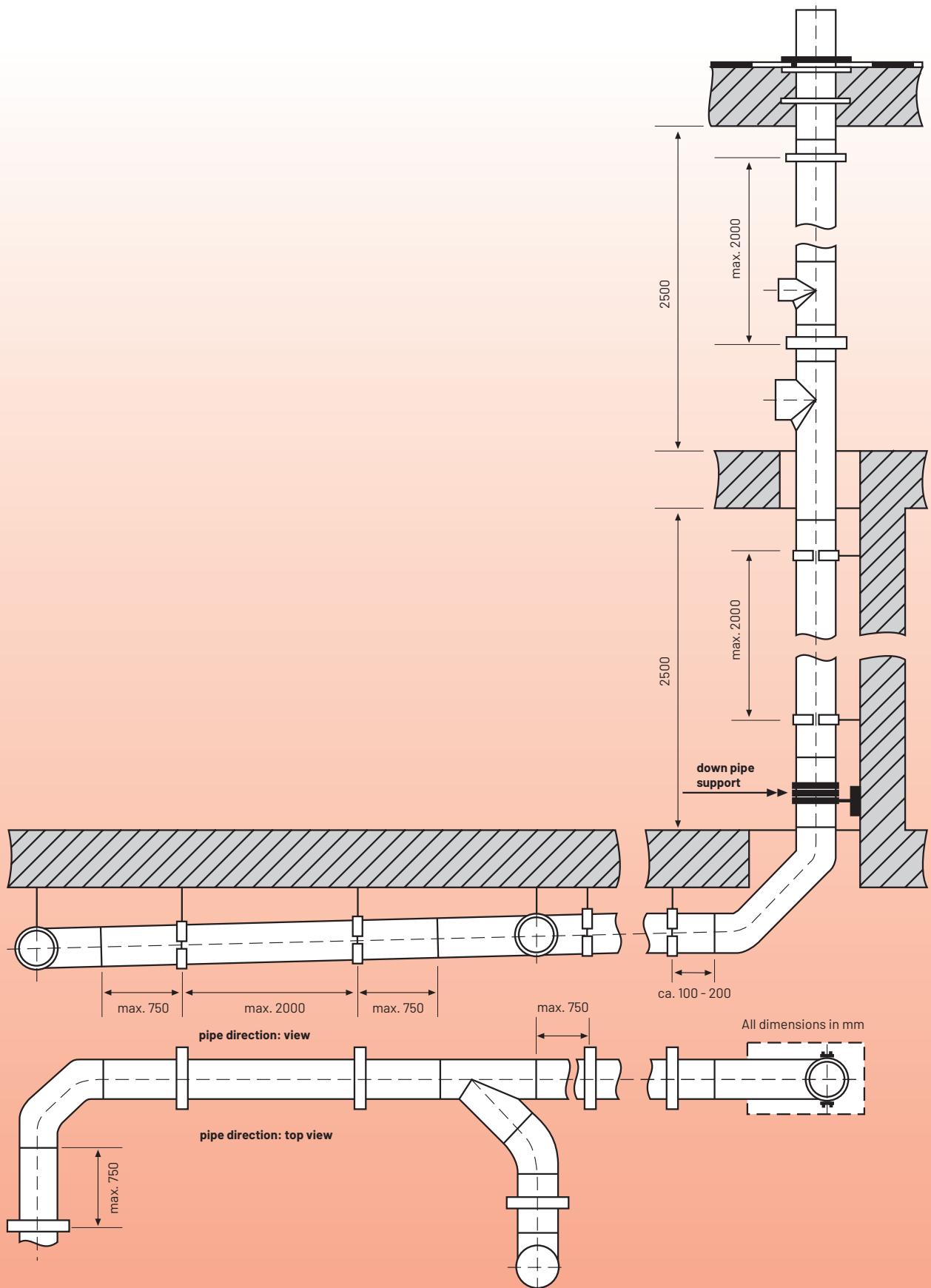
6. Finished cut edge protection. If necessary, apply lubricant to install the coupling. Possibly loosen the coupling screws slightly before pushing it on.

Maintenance and Pipe Cleaning

On principle, installation must already be carried out in a ways that obstructions are prevented. If cleaning should nevertheless be required, we recommend cleaning with a high-pressure cleaning device.

Cleaning with mechanical pipe cleaning tools is not to be recommended due to the possibility of damages to the inside coatings





Fixing SML Pipes

General rules

The distances of the fixings should be even and must not exceed a length of 2 m. 2 to 3 m long pipes should be fixed twice – short pipes, according to the nominal width (or pipe weight) should be fixed once or twice. Fixing is to be carried out in regular distances between the couplings whereas the distance before and after each coupling should not be larger than 0,75 m.

Horizontal pipes must be securely fastened at all changes of direction and branches. Pipes which are pendant-fixed are to be secured against any type of movement in distances of 10 to 15 m with special fixed-point holding devices. This guarantees an excellent directional stability and avoids pushing out of the planned direction by other subassemblies.

Down pipes are also to be fastened at a maximum distance of 2 m. If a storey is 2.50 m high, then fastening is needed twice per storey, among that once directly at all branches that may be installed.

Brackets

Use the customary pipe brackets with the corresponding fastening elements and supports.

We recommend brackets with threaded connections M12 for SML pipes DN 50 to 150 – possibly M 8 for SML pipes up to DN 100. Rain water pipes and SML pipes under pressure should be fastened with brackets with threaded rods M 16. It might be useful to consult the manufacturer of pipe fixings

SML down pipe supports should be fastened as close to the wall as possible in order to avoid large bending moment to the brackets. It is recommended to use a mounting console and the SML bearing ring for down pipe support.

Down pipe supports must carry the weight of the down pipe and should be fastened at the lowest possible point. They can carry as much vertical length as the wall can carry and the plugs can transmit to the wall. After this height, a further down pipe support is to be arranged.

In general we recommend to install a down pipe support in down pipes of DN 100 or larger above the basement ceiling, and further down pipe supports in intervals of 5 storeys or 15 m.

SML pipes under pressure

Waste water pipes without thrust-resistant couplings must be secured against separation or slipping from the axis if internal pressure loads are to be expected.

The demanded axial restraint can be obtained by thrust-resistant grip collars (see table on page 70/71).

See page 83 for instructions on how to cut pipes.

Fixing and Noise Protection

For the observing of noise protection requirements, the choice of bracketry is decisive. Standard brackets with rubber insert are normally sufficient.

For more information please refer to page 34–35.



Filling level 50 % (h/d = 0,5)

SML	DN 50		DN 80		DN 100		DN 125		DN 150		DN 200		DN 250		DN 300	
	d _i =51		d _i =75		d _i =103		d _i =127		d _i =152		d _i =200		d _i =263		d _i =314	
J	Q	V	Q	V	Q	V	Q	V	Q	V	Q	V	Q	V	Q	V
cm/m	l/s	m/s	l/s	m/s	l/s	m/s	l/s	m/s	l/s	m/s	l/s	m/s	l/s	m/s	l/s	m/s
0.5	0.3	0.3	0.9	0.4	2.1	0.5	3.7	0.6	6.0	0.7	12.5	0.8	25.8	1.0	41.3	1.1
0.6	0.4	0.3	1.0	0.4	2.3	0.6	4.1	0.6	6.6	0.7	13.7	0.9	28.3	1.0	45.3	1.2
0.7	0.4	0.4	1.1	0.5	2.5	0.6	4.4	0.7	7.1	0.8	14.8	0.9	30.6	1.1	48.9	1.3
0.8	0.4	0.4	1.1	0.5	2.7	0.6	4.7	0.7	7.6	0.8	15.8	1.0	32.7	1.2	52.3	1.4
0.9	0.4	0.4	1.2	0.6	2.9	0.7	5.0	0.8	8.1	0.9	16.8	1.1	34.7	1.3	55.5	1.4
1.0	0.5	0.5	1.3	0.6	3.0	0.7	5.3	0.8	8.5	0.9	17.7	1.1	36.6	1.3	58.5	1.5
1.1	0.5	0.5	1.4	0.6	3.2	0.8	5.5	0.9	8.9	1.0	18.6	1.2	38.4	1.4	61.4	1.6
1.2	0.5	0.5	1.4	0.6	3.3	0.8	5.8	0.9	9.4	1.0	19.4	1.2	40.1	1.5	64.2	1.7
1.3	0.5	0.5	1.5	0.7	3.4	0.8	6.0	1.0	9.7	1.1	20.2	1.3	41.8	1.5	66.8	1.7
1.4	0.5	0.5	1.5	0.7	3.6	0.9	6.3	1.0	10.1	1.1	21.0	1.3	43.4	1.6	69.3	1.8
1.5	0.6	0.6	1.6	0.7	3.7	0.9	6.5	1.0	10.5	1.2	21.7	1.4	44.9	1.7	71.8	1.9
1.6	0.6	0.6	1.6	0.7	3.8	0.9	6.7	1.1	10.8	1.2	22.4	1.4	46.4	1.7	74.1	1.9
1.7	0.6	0.6	1.7	0.8	3.9	0.9	6.9	1.1	11.1	1.2	23.1	1.5	47.8	1.8	76.4	2.0
1.8	0.6	0.6	1.7	0.8	4.1	1.0	7.1	1.1	11.5	1.3	23.8	1.5	49.2	1.8	78.7	2.0
1.9	0.6	0.6	1.8	0.8	4.2	1.0	7.3	1.2	11.8	1.3	24.5	1.6	50.6	1.9	80.8	2.1
2.0	0.7	0.6	1.8	0.8	4.3	1.0	7.5	1.2	12.1	1.3	25.1	1.6	51.9	1.9	82.9	2.1
2.5	0.7	0.7	2.0	0.9	4.8	1.2	8.4	1.3	13.5	1.5	28.1	1.8	58.0	2.1	92.8	2.4
3.0	0.8	0.8	2.2	1.0	5.3	1.3	9.2	1.5	14.8	1.6	30.8	2.0	63.6	2.3	101.7	2.6

Filling level 70 % (h/d=0,7)

SML	DN 50		DN 80		DN 100		DN 125		DN 150		DN 200		DN 250		DN 300	
	d _i =51		d _i =75		d _i =103		d _i =127		d _i =152		d _i =200		d _i =263		d _i =314	
J	Q	V	Q	V	Q	V	Q	V	Q	V	Q	V	Q	V	Q	V
cm/m	l/s	m/s	l/s	m/s	l/s	m/s	l/s	m/s	l/s	m/s	l/s	m/s	l/s	m/s	l/s	m/s
0.5	0.5	0.4	1.5	0.5	3.6	0.6	6.2	0.7	10.1	0.7	20.8	0.9	43.1	1.1	68.9	1.2
0.6	0.6	0.4	1.7	0.5	3.9	0.6	6.8	0.7	11.0	0.8	22.9	1.0	47.2	1.2	75.5	1.3
0.7	0.6	0.4	1.8	0.5	4.2	0.7	7.4	0.8	11.9	0.9	24.7	1.1	51.1	1.3	81.6	1.4
0.8	0.7	0.5	1.9	0.6	4.5	0.7	7.9	0.8	12.7	0.9	26.4	1.1	54.6	1.3	87.3	1.5
0.9	0.7	0.5	2.1	0.6	4.8	0.8	8.4	0.9	13.5	1.0	28.1	1.2	58.0	1.4	92.6	1.6
1.0	0.8	0.5	2.2	0.7	5.1	0.8	8.8	0.9	14.3	1.1	29.6	1.3	61.1	1.5	97.6	1.7
1.1	0.8	0.5	2.3	0.7	5.3	0.9	9.3	1.0	15.0	1.1	31.0	1.3	64.1	1.6	102.4	1.8
1.2	0.8	0.6	2.4	0.7	5.5	0.9	9.7	1.0	15.6	1.2	32.4	1.4	67.0	1.6	107.0	1.8
1.3	0.8	0.6	2.5	0.7	5.8	0.9	10.1	1.1	16.3	1.2	33.8	1.4	69.7	1.7	111.4	1.9
1.4	0.9	0.6	2.6	0.8	6.0	1.0	10.5	1.1	16.9	1.2	35.0	1.5	72.4	1.8	115.6	2.0
1.5	0.9	0.6	2.7	0.8	6.2	1.0	10.9	1.1	17.5	1.3	36.3	1.5	74.9	1.8	119.7	2.1
1.6	1.0	0.6	2.7	0.8	6.4	1.0	11.2	1.2	18.1	1.3	37.5	1.6	77.4	1.9	123.7	2.1
1.7	1.0	0.7	2.8	0.9	6.6	1.1	11.6	1.2	18.6	1.4	38.6	1.6	79.8	2.0	127.5	2.2
1.8	1.0	0.7	2.9	0.9	6.8	1.1	11.9	1.3	19.2	1.4	39.8	1.7	82.1	2.0	131.2	2.3
1.9	1.1	0.7	3.0	0.9	7.0	1.1	12.2	1.3	19.7	1.5	40.9	1.7	84.4	2.1	134.8	2.3
2.0	1.1	0.7	3.1	0.9	7.2	1.2	12.5	1.3	20.2	1.5	41.9	1.8	86.6	2.1	138.3	2.4
2.5	1.2	0.8	3.4	1.0	8.0	1.3	14.0	1.5	22.6	1.7	46.9	2.0	96.9	2.4	154.7	2.7
3.0	1.3	0.9	3.8	1.1	8.8	1.4	15.4	1.6	24.8	1.8	51.4	2.2	106.1	2.6	169.6	2.9

Filling level 100 % (h/d=1,0)

SML	DN 50		DN 80		DN 100		DN 125		DN 150		DN 200		DN 250		DN 300	
	d _i =51		d _i =75		d _i =103		d _i =127		d _i =152		d _i =200		d _i =263		d _i =314	
J	Q	V	Q	V	Q	V	Q	V	Q	V	Q	V	Q	V	Q	V
cm/m	l/s	m/s	l/s	m/s	l/s	m/s	l/s	m/s	l/s	m/s	l/s	m/s	l/s	m/s	l/s	m/s
0.5	0.6	0.3	1.8	0.4	4.2	0.5	7.4	0.6	12.0	0.7	24.9	0.8	51.6	1.0	82.6	1.1
0.6	0.7	0.3	2.0	0.4	4.7	0.6	8.2	0.6	13.2	0.7	27.4	0.9	56.6	1.0	90.5	1.2
0.7	0.8	0.4	2.1	0.5	5.0	0.6	8.8	0.7	14.2	0.8	29.6	0.9	61.2	1.1	97.8	1.3
0.8	0.8	0.4	2.3	0.5	5.4	0.6	9.4	0.7	15.2	0.8	31.6	1.0	65.4	1.2	104.6	1.4
0.9	0.9	0.4	2.4	0.6	5.7	0.7	10.0	0.8	16.2	0.9	33.6	1.1	69.4	1.3	111.0	1.4
1.0	0.9	0.5	2.6	0.6	6.0	0.7	10.6	0.8	17.1	0.9	35.4	1.1	73.2	1.3	117.1	1.5
1.1	1.0	0.5	2.7	0.6	6.3	0.8	11.1	0.9	17.9	1.0	37.1	1.2	76.8	1.4	122.8	1.6
1.2	1.0	0.5	2.8	0.6	6.6	0.8	11.6	0.9	18.7	1.0	38.8	1.2	80.3	1.5	128.3	1.7
1.3	1.0	0.5	2.9	0.7	6.9	0.8	12.1	1.0	19.5	1.1	40.4	1.3	83.6	1.5	133.6	1.7
1.4	1.1	0.5	3.1	0.7	7.2	0.9	12.5	1.0	20.2	1.1	41.9	1.3	86.7	1.6	138.7	1.8
1.5	1.1	0.6	3.2	0.7	7.4	0.9	13.0	1.0	20.9	1.2	43.4	1.4	89.8	1.7	143.6	1.9
1.6	1.2	0.6	3.3	0.7	7.7	0.9	13.4	1.1	21.6	1.2	44.9	1.4	92.8	1.7	148.3	1.9
1.7	1.2	0.6	3.4	0.8	7.9	0.9	13.8	1.1	22.3	1.2	46.3	1.5	95.6	1.8	152.9	2.0
1.8	1.2	0.6	3.5	0.8	8.1	1.0	14.2	1.1	22.9	1.3	47.6	1.5	98.4	1.8	157.3	2.0
1.9	1.3	0.6	3.6	0.8	8.3	1.0	14.6	1.2	23.6	1.3	48.9	1.6	101.1	1.9	161.7	2.1
2.0	1.3	0.6	3.7	0.8	8.6	1.0	15.0	1.2	24.2	1.3	50.2	1.6	103.8	1.9	165.9	2.1
2.5	1.5	0.7	4.1	0.9	9.6	1.2	16.8	1.3	27.1	1.5	56.2	1.8	116.1	2.1	185.6	2.4
3.0	1.6	0.8	4.5	1.0	10.5	1.3	18.4	1.5	29.7	1.6	61.6	2.0	127.2	2.3	203.3	2.6

Attention: please observe the minimum slope defined in EN 12056.

Information on Nominal Diameter DN 80

The current DIN 1986-100 standard requires a nominal diameter of DN 80 (or DN 90) for water-saving toilet systems with a flush volume of 4.0/4.5 litres.

The nominal diameter DN 100 is no longer permitted for 4.0/4.5-litre toilet systems in single-connection pipes, branch pipelines, or in stacks and collecting pipes where the wastewater discharge rate Q_{ww} does not exceed 2.0 l/s.

To avoid the need to introduce an additional nominal diameter between DN 70 and DN 100, manufacturers of

drainage pipes and fittings were asked to add the new nominal diameter DN 80 to their product ranges and to phase out DN 70 from the market.

Single-family and two-family dwellings with 4.0/4.5- or 6-litre WCs can therefore be drained using just two nominal diameters – DN 50 and DN 80 – up to the first inspection chamber on the property. Where underground drainage pipes beneath buildings are omitted (strongly recommended), this results in a significant space-saving benefit.

Design Rules for DN 80/ $d_i = 75$ mm

Single connection pipe

According to Table 6 of DIN 1986-100: for WCs with 4.0-/4.5-litre cisterns, connection value $DU = 1.8$ l/s. For WCs with 6-litre cisterns, connection value $DU = 2.0$ l/s.

Branch pipeline

Unventilated, according to Table 7 of DIN 1986-100: $\sum DU = 13.0$ for $K = 0.5$, with a minimum gradient of 1 cm/m.

Stack

With main ventilation, according to Table 8 of DIN 1986-100: 88° branches with a 45° inlet angle, $Q_{max} = 2.6$ l/s, equivalent to $\sum DU = 27$. Up to six bathrooms or flats can be drained via a DN 80 stack.

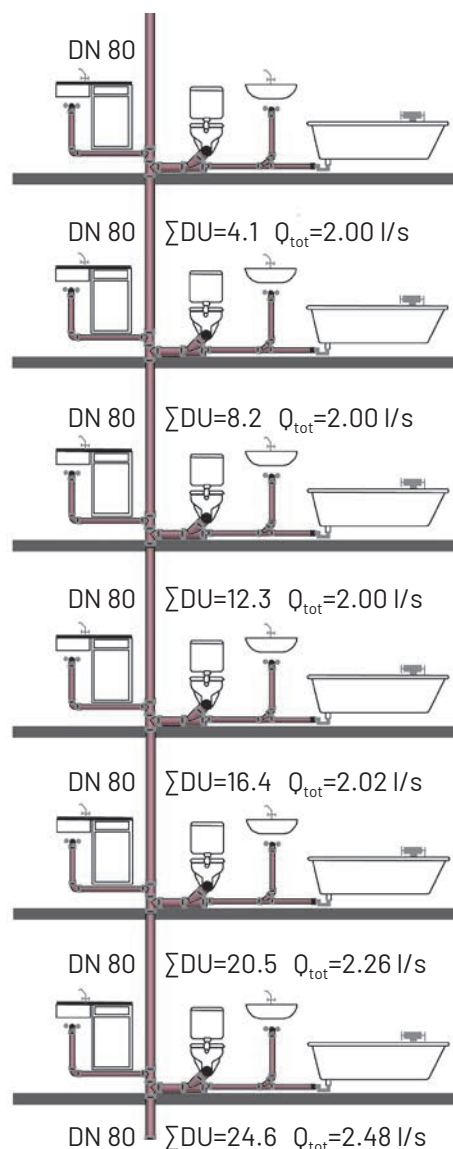
Collecting pipe

If the total waste water discharge Q_{tot} is less than 2.0 l/s, sizing can be carried out in accordance with Table 7 of DIN 1986-100. Only from three dwellings upwards or above 2.0 l/s is sizing required in accordance with DIN 1986-100, section 14.1.5.2.

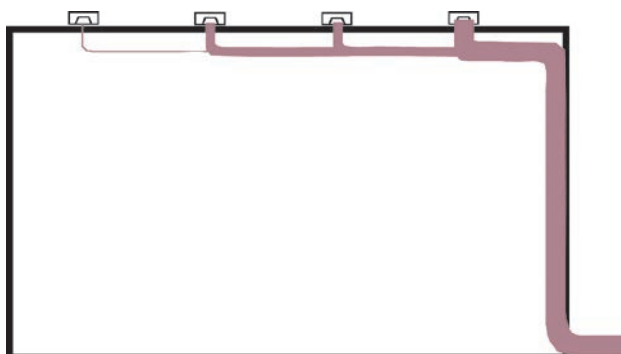
Underground drainage pipes

Must be sized in accordance with DIN 1986-100, section 14.1.5.3.

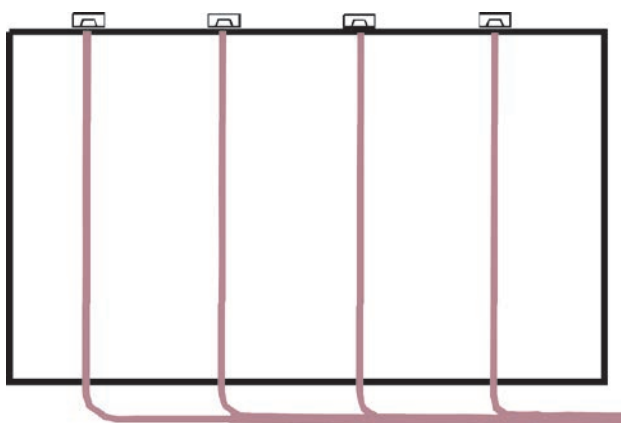
Example: six dwellings connected to a DN 80 downpipe with 6-litre WCs



Aquaperfect Siphonic Flat Roof Drainage



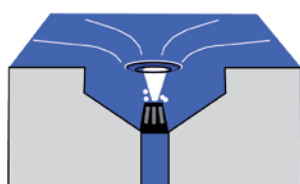
Aquaperfect siphonic system



Gravity drainage



Normal roof drain



Drain for Aquaperfect siphonic system with air sieve when the calculation rainfall is reached

Differences to Gravity Drainage

In a normal gravity roof drainage, the rain water is drained to the public sewage through partly filled pipelines. The filling level of these pipelines is generally at a maximum of 70% in order to ensure air circulation and pressure-free drainage.

In the Aquaperfect siphonic system, starting at a certain rain water quantity (calculation rainfall quantity), the pipeline works without air and with negative pressure. The intake of air is avoided by an air sieve in the roof drain, which prevents the forming of a vortex (Coriolis force).

Advantages and Application

The collection lines in the Aquaperfect siphonic system are installed without slope and therefore save space below the roof construction. Nevertheless, the elevated flow velocities ensure a good selfcleaning effect. Smaller nominal widths, inferior material requirements and the avoidance of pipe trenches and base pipelines save cost and installation time.

Cast iron distinguishes itself by a low thermal expansion coefficient and does not add combustion loads to the building. Very important is the resistance to high negative pressure in the pipe, so it is not necessary to over-dimension the pipelines.

The Aquaperfect siphonic system ought to be considered in the following cases:

- large roof areas, min. 150 m² per drain
- a difference in height of at least 4.2 m between the roof and the back water level
- limited installation space below the ceiling
- long collection pipelines

Standards

The planning and execution of siphonic systems is based on:

- **EN 12056-3** (Layout and calculation of roof drainage)
- **DIN 1986-100** (German supplement to EN 12056)
- **DIN EN 1253** (roof drains)

Functioning

The pressure height corresponds to the difference in height between the roof surface and the gravity drainage part of the rain water installation, which is at or above the back water level (street level). Contrary to this force acts the pressure loss caused by pipe friction and the individual pressure resistance of the pipeline components. At the zero point, both forces cancel each other out, here the negative pressure converts to a positive pressure. After a relaxation length, the drainage has to transform into a gravity drainage at the back water level or in some cases above that level.

The strongest negative pressure is normally to be found at the so-called critical point, the turning of the horizontal collection pipe into the down pipe. The negative pressure may amount to a maximum of -900 mbar.

The flow velocity in the negative pressure area should be at least 0.5 m/s. In the transition area from the siphonic to gravity drainage, the elevated kinetic energy of the siphonic flow must be considered when installing the pipeline (e.g. abutments, grip collars, down pipe support etc.).

The drainage volume of the single roof drains ought to be practically identical within tight tolerances in order to avoid flow breaks, which would lead to delays in reaching the full flow.

The calculation rainfall quantity is to be defined based on local statistical values. For economical reasons and in order to ensure the self-cleansing effect, the full flow calculation is based on the highest rainfall quantity during five minutes which falls statistically within a period of five years (e.g. 300 l/(s·ha)). The highest five-minutes rainfall quantity which is to be expected statistically within a period of 100 years – the so-called century rain (e.g. 600 l/(s·ha)) – cannot be drained through the siphonic pipeline system and might endanger the flat roof construction due to its weight. In case of flat roofs in light-weight construction, emergency drains must be installed for this contingency in any case.

For other roof constructions this must be examined in each case. The drainage is done either by side drains over the facade, or with roof drains with height extensions which allow for the corresponding water level on the roof and dispose of a separate pipeline system. The water will be drained to surfaces near the building that can be flooded without danger.

Calculation

The pressure ratio, flow velocities and drainage volumes must be calculated for each pipeline section and for each drain separately and then adjusted to the requirements. A calculation by hand is possible using among other things the Bernoulli equation. However, this calculating work is time-consuming, error-prone and troublesome: if the required values are not reached, the pipeline must be changed and the calculation must be repeated, if necessary several times.

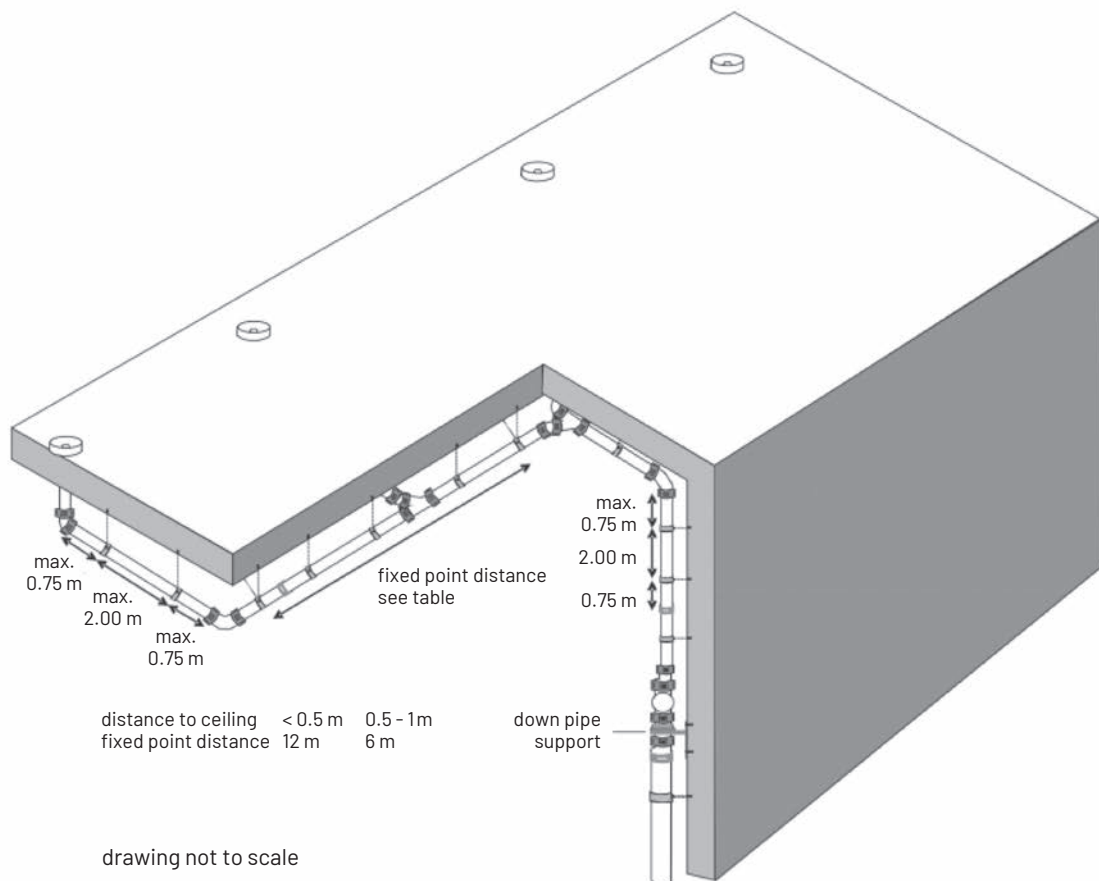
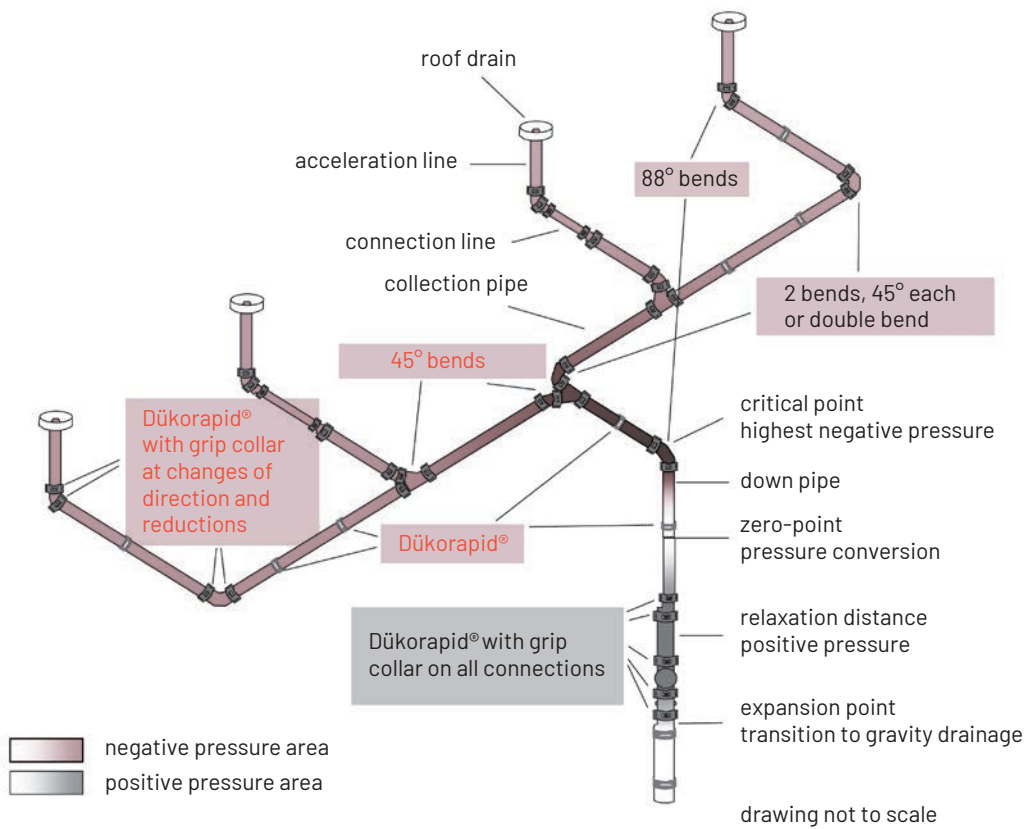
Larger building projects practically have to be planned with an appropriate computer software. Aquaperfect partners – Düker and Aco Passavant – offer you the service of planning and calculating siphonic systems for specific building projects.

Data required for the calculation

- horizontal sections
- sections
- detail of roof construction and insulation
- roof view with notation of the low-level points for drainage
- position of the back water level
- position of the connection points to the gravity system (base or collection pipes) and connection diameters
- Calculation rainfall quantity and roof material calculation value
- position of emergency drains
- effective drainage height, considering the admissible loads on the roof surface

In case of constructional modifications, the siphonic system must be re-calculated!





General Rules for Planning

The following hints make planning easier:

- The pipeline nets ought to be symmetrical where possible.
- The acceleration line ought to be at least 0.4 m.
- The connection pipeline must be sufficiently long and be connected horizontally to the collection pipe.
- The overall length of the longest flow distance (from the roof drain to the base pipeline) should be no more than ten times the height of the down pipe, but in any case no more than 100 m.
- The roof surface per down pipe should be no more than 5000 m².
- The distance between two drains should not surpass 20 m.
- Roof surfaces with a height difference of more than 1 m or with different roof material values should not be connected to the same down pipe.

Rules for Fixing and Installing

The installation must follow EN 12056 part 1, paragraph 5.4.2, part 3, paragraph 7.6.2 as well as German DIN 1986 part 100, sections 5.1.3 and 6.4.

On principle, the pipeline directions, diameters and lengths stated in the specifications must be observed, as otherwise the calculated pressures and volumes will not be reached. The material type must be observed as other materials differ regarding pressure loss and reaction to negative pressure. A minimum of 6 m of the gravity drainage must also be installed in cast iron material. The pipelines in the negative pressure area can be installed without slope.

Fittings

At branchings, branches with 45° angles must be used, for turns bends with 45°, or double bends. Only at the end of the acceleration line (below the roof drain) and at the transition into the down pipe, 88° bends are used.

Couplings

On principle Rapid couplings should be used at all connections.

In the area of negative pressure, all turns, branchings, reductions and the complete acceleration line must be secured with grip collars. In the area of positive pressure, all couplings must be secured with grip collars.

Where the gravity drainage starts, on a length of 6 m all changes of direction are to be secured with grip collars. In case of down pipes of more than 30 m height, the bends must be secured in any case.

Fixings

The basic rules of page 86/87 are to be observed.

Fixed-point devices are to be installed with an in-between distance of no more than 12 m (distance to the ceiling < 0.5 m) or 6 m (distance to the ceiling 0.5 – 1 m). The fixed points can be executed with threaded rods at an angle of at least 30° to the vertical fixing, or with consoles.

Pipelines with risk of water condensation

Pipelines that can be subject to condensation or frost must be insulated accordingly.

Start-off and Maintenance

After installation the roof surface is to be cleaned thoroughly. If considerable dirt accumulation on the roof surface is to be expected later on, it is recommendable to use gravel as a filter layer. Unless the gravel is used on the whole roof, a gravel edge with a width of 0.5 m should be applied around the roof drain.

A maintenance contract covering the removal of dirt, plant growth and dead leaves and the check of the drain components is recommendable.



2D and 3D CAD and Planning Data

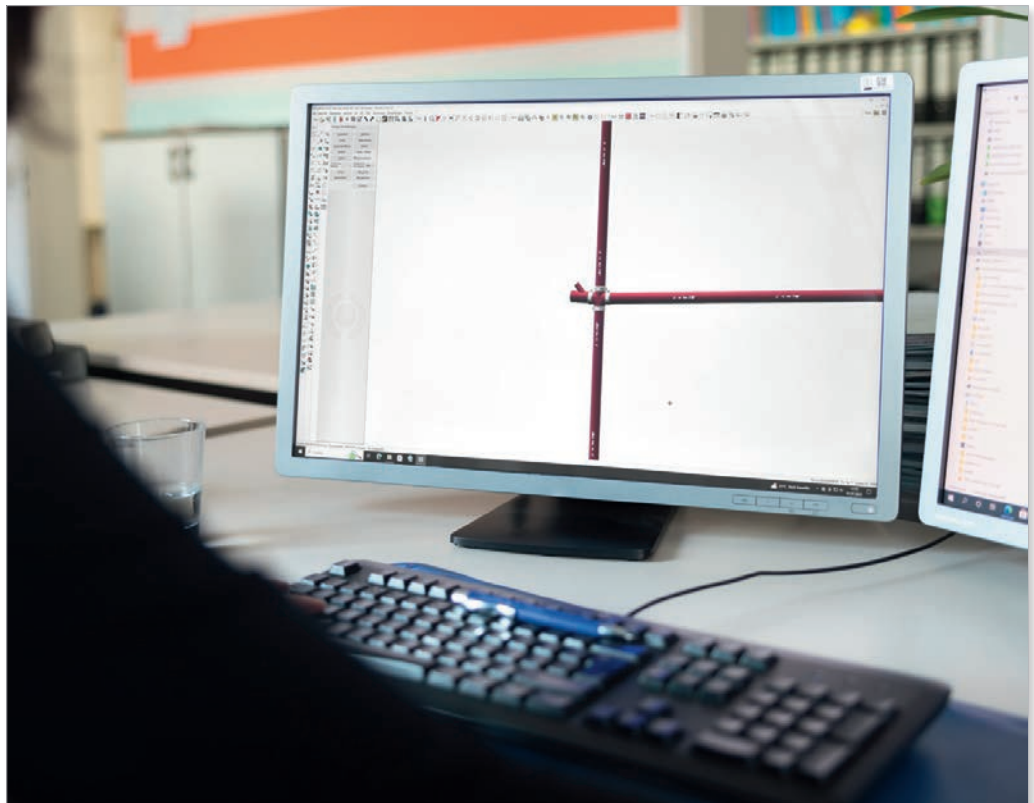
VDI 3805 – The Standard for BIM Product Data in Building Services Engineering

Building Information Modeling (BIM) is an intelligent, 3D model-based process that provides architects, engineers and contractors with the information and tools needed for the efficient planning, design, construction and management of buildings and infrastructure.

When using the BIM method, construction plans are not created once and left unchanged – instead, they are continually updated to incorporate design changes, during the construction phase, and throughout the building's lifecycle. As a result, the digital model accurately reflects the building across all its life phases. The basis for this is that the plans are not created purely as drawings, but include all the necessary data for each project phase relating to the building products used.

This product data is supplied by the manufacturer in a BIM-compatible format alongside the drawings! The VDI 3805 guideline defines a universally valid, open BIM data format for building services product data. Düker relies on this format to provide planners with technical and geometric data for its drainage technology products. The data is available to you free of charge and without registration!

The advantage of VDI 3805: Through the online platforms listed below, the product data and drawings can be converted into other **BIM formats such as Revit or IFC**, as well as into standard 2D and 3D **drawing formats such as STEP or DXF/DWG**.



You Have the Following Options

1. For Users of Planning Software with a VDI 3805 Interface

Users can download the full dataset from the Düker website at www.dueker.de/VDI3805. This gives them access to all technical and commercial data, as well as 3D geometry data within their software (including clearance zones, connection points, flow resistance values, etc.).

2. For Users of Autodesk Revit or AutoCAD MEP

Product data can be imported directly into Revit or AutoCAD MEP once the appropriate plugin – the “VDI 3805 Connector” – has been installed. The plugins and Düker product data are available at: www.vdi3805-portal.de

3. For Users of BIM Software with IFC Import

On the web application VDI3805-Portal, available at www.vdi3805-portal.de/dueker29, all components can be generated and exported in IFC format. Alternative formats such as STEP or DXF/DWG are also available. Tip: start by installing the CAD viewer provided under “Downloads” on that page.

4. For Users of Drawing Programs

All planning data for Düker drainage technology products is available via the Webselector at: www.vdi3805.org/webselektor/dueker. All views can be saved in DXF format (2D or 3D) or dragged and dropped directly into your CAD program – no additional viewer installation required.



Düker specifying texts can also be found on the Düker homepage

<https://www.dueker.de/drainage-ausschreibungstexte>



Drainage pipe system – Düker SML system				
No.	Quantity	Subject	Unit price	Total
		Socketless cast iron drainage pipes and fittings, approved and manufactured as per EN 877, dimensions as per DIN 19 522, with CE marking and Declaration of Performance as per CPR and with RAL quality seal of the GEG (quality association drainage technology cast iron). Reaction to fire A1 (non-combustible) as per EN 13501-1. Short name: Düker – SML pipes and fittings Pipes inside with a fully cross-linked two-component epoxy coating in ochre colour, outside with a reddish brown primer, fittings inside and outside with a fully cross-linked epoxy coating. Range of products DN 50 – 400 as per the latest price-list. Installation: As per Düker installation instructions and in accordance with the technical regulations of EN 12056 / DIN 1986 part 100 / EN 752, EN 1610. Couplings: Dükorapid®, Rapid Inox, CV coupling, Connect-F Inox, Connect-G Inox; Düker EK Fix Z-42.5-299 or Konfix-Multi coupling and Multiquick coupling coupling and Multiquick coupling for connection to pipes, fittings and other elements (e.g. floor drain) made of other materials to SML. The securing of pipelines with the risk of internal pressure and axial restraint require grip collars or Connect couplings. Couplings and grip collars are paid for separately.*		
1		mtrs. Düker SML pipes in trade lengths of 3000 mm, DN, including cutting to length, supply and installation. Material: Wages: Fittings**		
2		pcs. Düker SML bends all angles (15°, 30°, 45°, 68°, 88°), DN, supply and installation. Material: Wages:		
3		pcs. Düker SML branches all angles (45°, 70°, 88°), DN x, supply and installation. Material: Wages:		
4		pcs. Düker SML reducers, DN x, supply and installation. Material: Wages:		
5		pcs. Düker SML plugs, DN, supply and installation. Material: Wages:		
6		pcs. Düker SML inspection pipes with round opening, for down pipes, DN, supply and installation. Material: Wages:		



No.	Quantity	Subject	Unit price	Total
7		pcs. Düker SML-inspection pipes with rectangular opening, for horizontal and down pipes, DN, supply and installation. Material: Wages:		
8		pcs. Düker SML down pipe supports including supporting ring with rubber ring, DN, supply and installation. Material: Wages:		
9		pcs. Dükorapid® couplings, metal collar made of stabilised chromium steel, material no. 1.4510/11 as per EN 10088, lock with only one bolt, locking plates made of material no. 1.4301 as per EN 10088; bolt and square nut steel with zinc lamellae coating, washer steel A2. Sealing collar made of EPDM, DN, supply and installation. Material: Wages:		
11		pcs. Rapid Inox couplings, lock with only one bolt, all parts made of material no. 1.4571/1.4401 as per EN 10088, sealing collar made of EPDM***, DN, supply and installation. Material: Wages:		
12		pcs. Düker CV couplings, metal collar made of stabilised chromium steel, material no. 1.4510/11 as per EN 10088; lock and bolts galvanised, sealing collar made of EPDM, DN, supply and installation. Material: Wages:		
15		pcs. Connect-F Inox couplings, metal collar made of material no. 1.4571, locking parts made of material no. 1.4401, screws made of material no. 1.4404, sealing collar made of EPDM, DN, supply and installation. Material: Wages:		
16		pcs. Connect-G Inox couplings, coupling with axial restraint, metal collar made of material no. 1.4571, locking parts made of material no. 1.4401, screws made of material no. 1.4404, claw ring made of material no. 1.4310, sealing collar made of EPDM, DN, supply and installation. Material: Wages:		



No.	Quantity	Subject	Unit price	Total
17		pcs. Düker EK Fix couplings, approval no. Z-42.5-299, made of EPDM, including clamp straps, for connection of pipes made of other materials to SML, DN, supply and installation. Material: Wages:		
18		pcs. Konfix Multi couplings, made of EPDM, including clamp straps, for connection of pipes made of other materials to SML, DN 100, supply and installation. Material: Wages:		
19		pcs. Multiquick couplings, made of EPDM, including clamp straps, for connection of pipes made of other materials to SML, DN 100, supply and installation. Material: Wages:		
20		pcs. Kombi grip collars, securing grip collar with axial restraint for Dükorapid®, Dükorapid® Inox, Rapid Inox as well as CV and CE couplings on pipelines subject to inside pressure, DN, supply and installation. Material: Wages:		
21		pcs. Düker BSV 90 fire protection coupling, two-bolt coupling for installation in vertical ceiling penetrations with R90 fire protection rating; suitable for cast iron drainage pipe installations and mixed installations (cast iron downpipe / plastic branch pipe). General building approval: abZ DIBt no. Z-19.17-1893 and abG DIBt Z-19.53-2666. Housing made of stabilised chromium steel, material no. 1.4510 / 1.4511 in accordance with DIN EN 10888-2; closure components made of galvanised steel; seal made of EPDM. Supplied with fire protection label and installation instructions. DN, supply and install professionally in accordance with abZ, abG and Düker installation guidelines. Material: Wages:		



No.	Quantity	Subject	Unit price	Total
22		pcs. Doyma Curaflam® Konfix Pro, pipe firestop for ceiling penetrations with fire resistance rating R90, suitable for mixed installations (cast iron downpipe / plastic branch pipe). General building approval: abZ DIBt no. Z-19.17-2074 and abG DIBt Z-19.53-2637. The firestop is installed on the Düker EK Fix connector behind a plasterboard panel with a minimum thickness of 9.5 mm. Comprising a metal housing, worm-drive hose clamp and intumescent material, including fire protection label and installation instructions. DN, supply and install professionally in accordance with the relevant installation guidelines.		
23		pcs. pipe clamps with rubber inlay for sound insulation in accordance with DIN 4109.		
24		pcs. acoustic decouplers for enhanced sound insulation in accordance with DIN 4109.		
25		pcs. pipe clamps without rubber inlay, for installation with acoustic decouplers. The pipe clamps must be itemised and priced separately. * SML joints and fixings are listed under a separate item. According to the German Construction Contract Procedures (VOB), Part C, DIN 18381, couplings and flange connections must be itemised separately by type, nominal pressure and nominal diameter, with quantities stated in units (pcs.). Supports, pipe brackets, consoles and support devices must be listed separately by type and design, with quantities stated in units (pcs.) or by weight (kg). ** For further fittings please refer to the product range. *** If applicable the rubber quality is to be modified to NBR. Public tender specifications in accordance with the Standard Service Book – see pages 102/103.		





Item Description No.: _____

**Cast iron drainage pipe systems
bearing the RAL quality mark of the
Quality Association for Cast Iron Drainage
Technology (GEG)**

Cast iron drainage pipe systems bearing the RAL quality mark of the Quality Association for Cast Iron Drainage Technology (GEG) are subject to quality requirements that far exceed the DIN EN 877 and DIN 19522 manufacturing standards. To this end, the current quality and test specifications were developed in cooperation with RAL – the German Institute for Quality Assurance and Labelling – as a quality-focused technical requirements profile. The quality and test specifications (RAL-GZ 698) are recognised by the relevant professional and trade bodies, the Federal Ministry for Economic Affairs, and the competent authorities.

For cast iron drainage pipes and fittings, significantly higher requirements apply compared to the product standards – particularly regarding the mechanical properties of the cast iron, as well as the surface finish and coatings. The joints between cast iron drainage pipes and fittings are also subject to more stringent testing requirements. These include a watertightness test under internal pressure with angular deflection and shear load, a vacuum test and a flame resistance test lasting 90 minutes. In addition, the elastomer seals undergo high-grade material testing in the form of an olive oil test at elevated temperatures.

The quality mark is awarded following successful initial testing. Thereafter, external inspections are carried out at least once a year by independent, accredited testing institutes. The test reports issued by these institutes are reviewed and assessed by the Quality Committee of the Quality Association for Cast Iron Drainage Technology (GEG). As part of GEG's quality assurance process, this constitutes a two-stage inspection procedure to ensure consistently high quality.

RAL Quality Mark in STLBB-Based Tender Specifications

In tender specifications prepared in accordance with the Standardised Service Book (STLB), reference to the RAL quality mark for cast iron drainage technology can be included via an individual item description. The form shown on the left must be assigned a running number. This number must be entered under:

- Type
 - Design as per item description
 - Execution documents
- “Item description no. – Contracting authority”
- A Word template is available at <http://tinyurl.com/339e8rk2>



Düker Group

Laufach:

Phone +49 6093 87-555

Karlstadt:

Phone +49 9353 791-550

sales.drainage@dueker.de

www.dueker.de