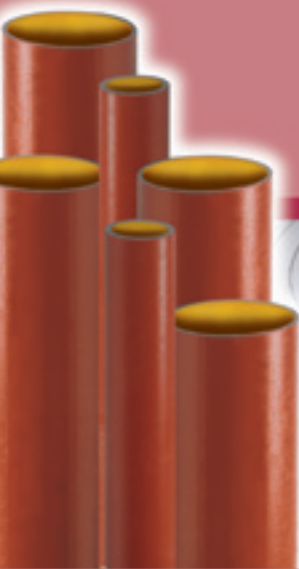


SML



Specifier's manual

Düker cast iron drainage pipe systems
for building drainage



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The background is a solid light red color. A vertical red tube is positioned in the center, with the text 'SML DK DIN ü Made in Germany' written vertically on its side. To the left of the tube, there are several concentric circles and a larger circle with a smaller one inside it. To the right, there are two intersecting arcs and a small circle with a textured, bubble-like surface. A thin red arrow points upwards from the bottom of the tube, and another thin red arrow points from the right towards the center.

SML DK DIN ü Made in Germany

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DÜKER SML PIPELINE SYSTEMS



According to EN 12056
"Gravity drainage within buildings"
as well as EN 752, parts 1 - 7,
"Drainage systems outside of buildings".

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 40 to DN 600 inclusive. 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. Also the demands of DIN 19522 and ISO 6594 are surpassed.

The material features

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 (as compared with steel), and a very high damping capacity. Düker SML drainage pipes distinguish themselves by robustness, durability, fire-resistance and silent operation - even without special insulation or soundproofing.

Planning and installation

Düker SML drainage pipe systems are - without exception - permitted for all ranges of application of drainage systems in buildings. Planning and installation of the SML pipes have to follow EN 12056, the local rules and regulations as well as the Düker installation and fixing instructions (parts 3 and 4 of this brochure).

SML coating

The SML drainage pipes are coated with a reddish brown 40 µm thick base coat on the outside according to the current standard. 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 because of the new regulation that rain water and waste water must be disposed of separately, which means that pipe coatings are facing new challenges. The Düker hot permanent mould centrifugal casting process used in the production of our pipes guarantees a uniform, non-porous interior coating with fully cross-linked, elastic and 120 µm thick epoxy material. It also makes for an extremely smooth interior surface.

The expansion differences of epoxy / cast iron due to changes of temperature are absorbed better. This prevents chipping of the coating when the pipes are cut.

Fittings

SML fittings are given an **interior** and **exterior** dip coating with high proof cross-linked epoxy (layer thickness approx. 60 µm).

APPLICATION, FEATURES, PLANNING

Applicable standards

Düker SML meets the requirements of

ISO 6594
EN 877
DIN 19522

and other international standards.

Approvals

Düker SML is officially approved in

Australia	No. WMKT 20057
Czech Republic	No. J-30-20817-04
Denmark	No. VA 2.11/13104-13105
Finland	No. YM 110/6221/2006
Germany	No. 110001436/01/01
Hungary	No. A-725/2004
Norway	No. 0401 and 0408
Russia	No. POCC DE. E01.B26433
Singapore	No. 030082
Sweden	No. 0041/04
Switzerland	No. 23005
Ukraine	No. UA1.070.0059132-05
United Kingdom	Agrément No. 04/4189

and numerous other countries.

SML drainage pipe systems -Guarantee

Düker guarantees that the pipes, fittings and couplings supplied have been manufactured in accordance with the standards and approvals valid at the time of manufacturing. In the case of defects, Düker will, during a period of 5 years, replace the defective parts free of charge. Without specific agreement, Düker will not accept liability for consequential losses.

IZEG Information centre / GEG quality association

Some non-European manufacturers destroy the quality reputation of cast iron sewage pipe systems. In order to withstand this trend and to fulfil the increasing safety requirements of our partners in plumbing, trade, planning and authorities, the European cast iron pipe industry as well as suppliers of accessories founded the IZEG. IZEG and the integrated quality association GEG award a RAL quality label to cast iron drainage pipes and fittings that have passed, among others, the following tests surpassing the requirements of EN 877:

Table 1-3. from RAL-GZ 698

Additional requirements for the testing of interior coatings				
Medium/solution	concentration	pH-value	duration of test	temperature in °C
Phosphoric acid	25 %	1.0	72 h	40
Acetic acid	10 %	2.0	48 h	25
Hydrogene pyroxide solution	10 %	3.5	48 h	25
Sulphuric acid	0.1 N	1.0	30 d	50
Lactic acid	1 %	2.0	48 h	25
Citric acid	5 %	1.5	30 d	50
Waste water according to EN 877		7.0	30 d	50
Natriumhydrogencarbonat	0.1 N	11.4	30 d	50
Salt water		5.6	10 d	50
(Completely desalted) water		6.4	30 d	50
Salt spray			1500 h	35

N=normal solution; d=days; h=hours



Hubless cast iron drainage pipes from Düker

Since 1913 Düker has been offering all material-related advantages which are proven in cast iron - **high strength of material and resistance to wear, excellent temperature and corrosion resistance, considerable sound damping ability and above all the non-combustibility** - in cast iron drainage pipes.

Düker revolutionised the market in terms of building and laying techniques by developing cast iron spigot end drainage pipes which were approved for Düker for the first time in 1967 with the test certificate PA-I 1609. Just as before, the SML drainage pipe system today distinguishes itself by reliability and quality. For use in high-quality building drainage and on the basis of EN 877.

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			
pH 14			
<div> <div></div> requirements of EN 877 <div></div> resistance exceeding EN 877 </div>			

EURO-NORM EN 877 DIN 19 522

DENSITY:

Approx. 7.2 kg/dm³ (71.5 kN/m³)

MINIMUM TENSILE STRENGTH:

150 MPa for fittings,
200 MPa for pipes

COMPRESSIVE STRENGTH:

Approx. 3 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:

8×10^4 to 12×10^4 N/mm²

CHEMICAL RESISTANCE:

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

For non-domestic applications and for aggressive waste water we recommend to consult with Düker and where applicable to use a different coating such as Düker MLK.

Düker Quality System

Düker was one of the first companies of the trade to achieve the ISO 9001 certification and was even awarded the "Bavarian Quality Award" in 1999. This quality award encourages us to continue doing what we started decades ago: keeping the quality standard of cast iron drainage pipes at a high level with continual new ideas, dependable system solutions and first-class finish of our products.



SML drainage pipe systems and environmental protection

Grey cast iron - the material from which Düker SML pipes are manufactured - is 100 % recyclable. Pipe cuttings can be included in the recycling circle without any trouble of waste disposal, also because **the coating is free of benzo(e)pyrene and other environmentally dangerous chemicals.**

Cost considerations

Cost comparisons between SML pipeline systems and alternative materials must not only compare the cost of pipe per meter. An evaluation must also consider the following advantages of SML:

- Easy and fast installation with no specialists required; normal plumber's skills are sufficient.
- No special equipment required.
- No costly fire protection collars.
- Lower fire insurance premiums.
- Fewer brackets due to superior stability.
- No thermal expansion sockets.
- No calculation of deflection legs with anchored and sliding fixings.
- Excellent sound absorption, no overall noise insulation or additional noise protection walls necessary.
- High resistance to positive and negative pressure, axial restraint up to 10 bar possible, therefore no need to change material in sensitive areas.
- Lower maintenance costs for damages by use or vandalism.
- Full recyclability means lower removal costs at the end of the lifetime of the building.

Pipelines may not cross firewalls, staircase walls or other ceilings and walls that must be fireproof, unless a transmission of fire, water and heat is not to be expected.

European Fire Resistance Regulations

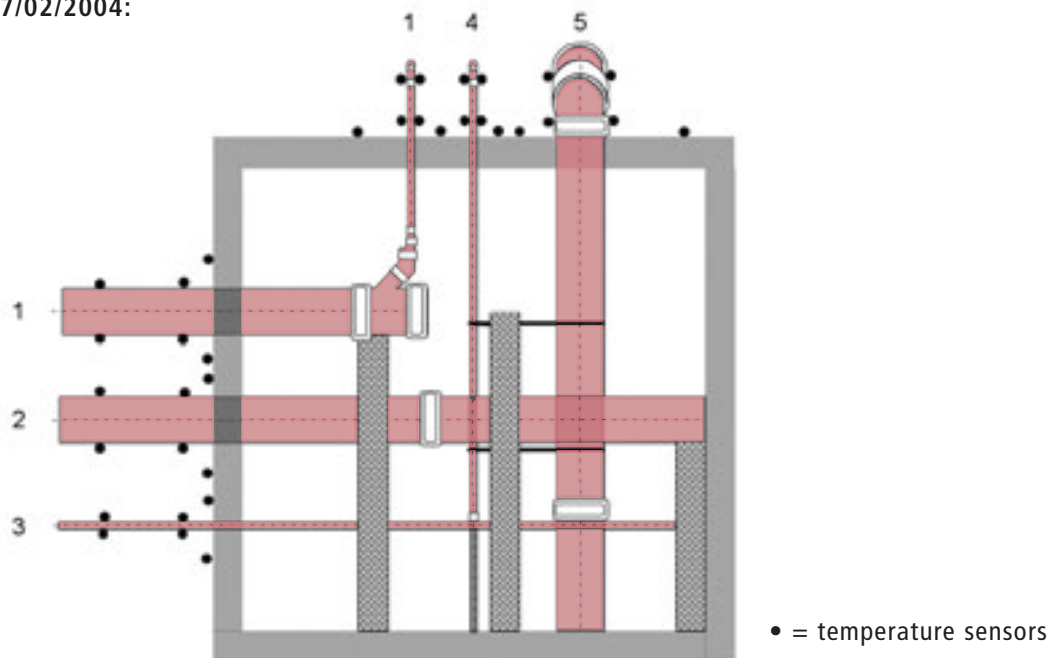
Fire resistance indicates how well and how long a building component can hold back the fire and prevent it from penetrating from one room to another.

The basic criteria are:

- R** load-bearing capacity (capacity to provide stability to the building)
- E** integrity (capacity to remain intact)
- I** insulation (capacity to maintain a low temperature on the unexposed side of the building element)

A product fulfilling these basic criteria for 30 minutes will be classified REI 30.

In a fire test carried out on 04 December 2003 in Italy by CSI S.p.A. Bollate (Milan), Düker SML pipes with Rockwool mineral wool insulation reached the following results, certified by test report CSI 1094RF of 27/02/2004:



Pursuant to the relevant Italian regulations, the fire resistances of the various pipelines submitted to inspection by Düker Germany correspond to the following fire resistance classifications:

pipeline 1	REI 63 RE 180
pipeline 2	REI 180 RE 180
pipeline 3	REI 180 RE 180
pipeline 4	REI 180 RE 180
pipeline 5	REI 139 RE 180

FIRE PROTECTION

In addition to the basic criteria **R**, **E** and **I**, a number of other safety properties can be evaluated, of which we will only consider **S** for smoke leakage.

Non-combustibility (criterion E)

Düker sewage pipes consist of grey cast iron with lamellar graphite and are certified to correspond to EN 877. Annex F of EN 877 says that "Cast iron products in accordance with this European Standard are non-flammable and non-combustible. When exposed to fire they will maintain their functional characteristics and integrity for several hours, i.e. their walls will remain impervious to flames and gases and there will be no fracture, collapse or significant deformation. The integrity of connections through walls and ceilings is maintained." Düker sewage pipe are also classified in building material class A1 "non-combustible" as per German DIN 4102.

In order that the pipeline can be installed openly, the following conditions must be fulfilled:

- thickness of outer coating no more than 0.5 mm
- minor combustible materials for joints and clamps are admissible (rubber gaskets)
- pipes must be fixed with metal plugs
- possible insulations must be made of non-combustible material

Combustion loads

With Düker sewage pipes it is not necessary to consider combustion loads – defined as the energy quantity emitted by a material by combustion. In necessary gangways a maximum of 7 kWh/m used to be allowed, but the latest German regulations forbid any combustion load in gangways and escape routes.

For comparison: polyethylene (PE) emits 12 kWh per kg, fuel oil 11.7 kWh per kg.

Smoke generation (criterion S)

If installed with couplings whose rubber gaskets are completely covered by stainless steel collars (e.g. Dükorapid®), the pipe system remains closed in case of fire. Any smoke generated by heat effects on the inner coating remains in the pipeline and is then evacuated through the ventilation openings over the roof.

For comparison: 10 kg of polyethylene (PE) or polypropylene (PP) generate approx. 23.000 m³ of poisonous smoke consisting of carbon monoxide, carbon dioxide and soot. With that quantity 100 large apartments with 100 m³ each can be filled with enough smoke to leave the inhabitants no chance of survival.*

* taken from Bernd Prümer "Brandschutz in der Haustechnik", Gentner Verlag

Length expansion (criterion R)

The length expansion coefficient of cast iron is only 0.0105 mm/(m·K). In case of a temperature change of 50 K and a pipeline length of 10 m the length expansion is only 5.25 mm. This expansion is compensated by the normal couplings.

For comparison: A 10 m polyethylene pipe in the same circumstances has a length expansion of 45 mm. Therefore special expansion compensators are required.

Fire resistance of wall or ceiling pass-throughs

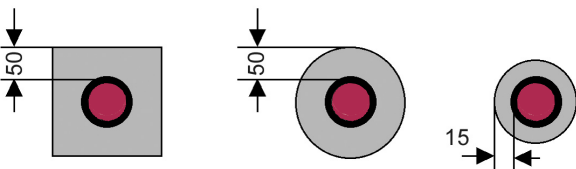
In general, any openings must be kept as small as possible. The opening remaining after pipe installation must be closed with a non-flammable building material.

In most cases it is not recommendable to simply use cement mortar or concrete as this causes noise transmission to the wall.

We recommend to use mineral wool with a density of 90 kg/m³ and a fusion temperature ≥ 1000 °C. Do not use combustible material.

The distance from the outer pipe edge to the wall opening should be:

- no more than 50 mm in case of closing with mineral wool
- no more than 15 mm in case of intumescent material



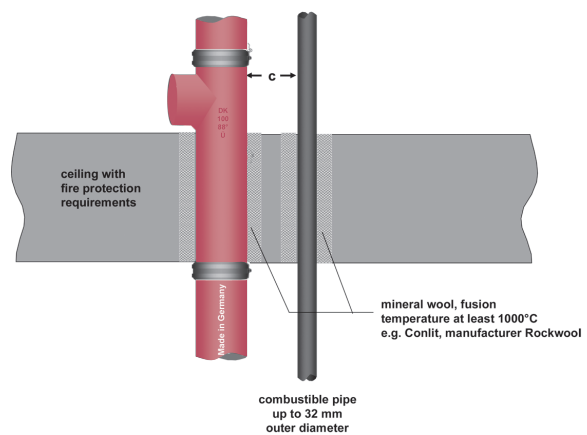
If a branch is required directly above the ceiling, we recommend to use branches with long spigot, which facilitate the application of the mineral wool. However, it is not forbidden to place a coupling in the ceiling.

Heat transmission (criterion I)

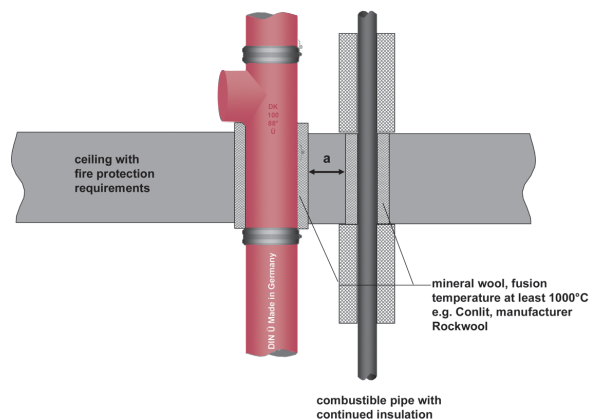
When passing cast iron pipes through walls or ceilings where a certain fire resistance duration is prescribed, the heat transmission through cast iron pipes must be considered. This is particularly important when combustible pipes are passed through the same wall or ceiling next to the cast iron pipe.

The German MLAR prescribes the following distances, which we recommend to observe:

1. DÜKER pipes next to other non-combustible pipes. The minimum distance c between the pipes is the outer diameter of the larger pipe.
2. DÜKER pipes next to combustible pipes up to 32 mm outer diameter without continued insulation. The minimum distance c between the pipes is five times the outer diameter of the combustible pipe and may not pass below the outer diameter of the cast iron pipe.



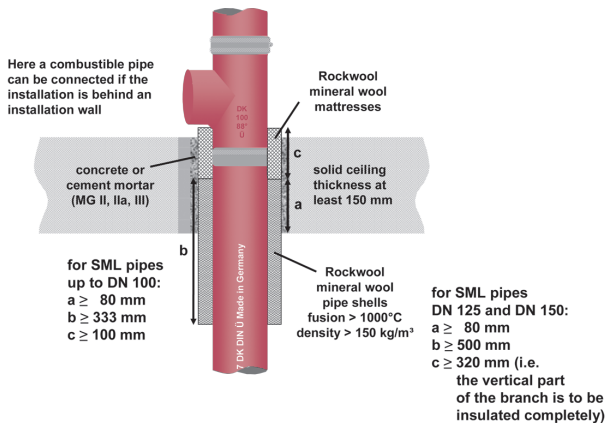
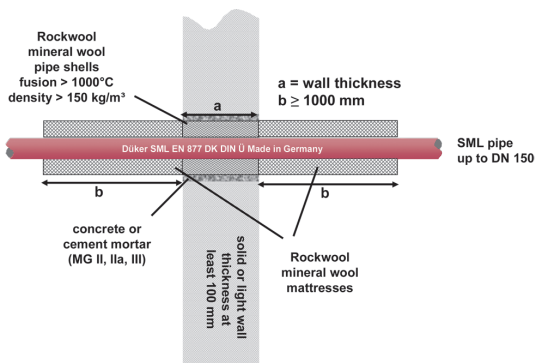
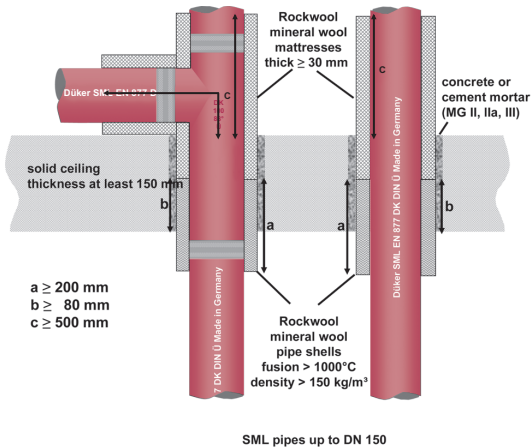
3. DÜKER pipes next to other pipes with continued insulation (prerogative for combustible pipes of more than 32 mm diameter). If the insulation is combustible, the minimum distance a between the pipe insulations is 160 mm, if it is non-combustible, 50 mm.



This also means that mixed installations are not to be recommended. A Düker EK Fix or any other coupling for connection of plastic pipes is not admissible near the break-through.

FIRE PROTECTION

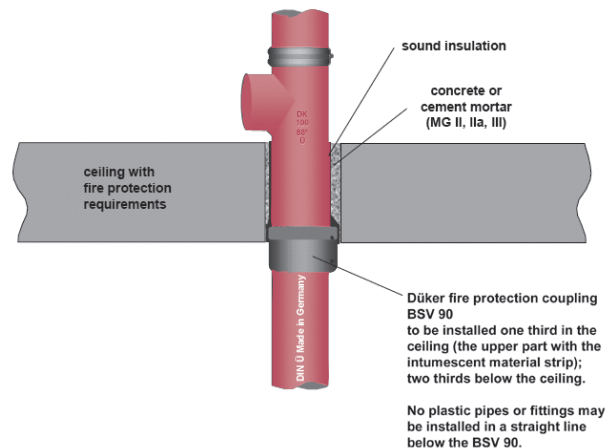
4. Only if the cast iron pipe is insulated as well in order to reduce its heat transmission, the minimum distance can be avoided. Certain solutions have been approved in Germany for this (with Dükorapid® / Rapid couplings only):



5. Düker has presented a new and faster solution for approval: The Düker fire protection coupling BSV 90 (see page 46). This coupling will also pass fire tests based on the future EN 1366-3, which calls for tests with only short open pipe spigots – a scenario that is not to be found in practice.

Inside the BSV coupling, the cast iron pipeline is interrupted by a piece of plastic pipe. Around the pipe piece, there are several layers of intumescent material, which increases its volume enormously when heated.

In case of a fire, the heat coming from the cast iron pipelines or from outside melts away the plastic pipe piece and makes the intumescent material swell so the pipe diameter is closed. The intumescent material gives thermal insulation – therefore prevents excessive heat transmission – and prevents any chimney effects.



Annex F of EN 877 says: "Cast iron pipe systems due to their high mass per unit area of their pipe walls as well as the joint design characteristics provide considerable noise reduction benefits when evacuating waste water within buildings. As a rule additional protection is therefore not required."

The noise reduction is also caused by the special structure of the material grey cast iron with lamellar graphite: Sound is refracted at the graphite lamellae and practically runs itself out of energy in the material.

In order to prevent sound transmission through solids, contact to the masonry should be avoided:

- the pipe system should not touch walls or ceilings at any point. Break-throughs should be closed with non-combustible mineral wool.
- fixing material should be equipped with rubber inserts, which must not be pressed too firmly to the pipe when closing the clamp.
- in very sensitive areas it may be advisable to use special noise-damping fixing clamps
- in vertical pipes, down pipe supports should not be spaced too far from each other in order to avoid too high pressure on the rubber ring.

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

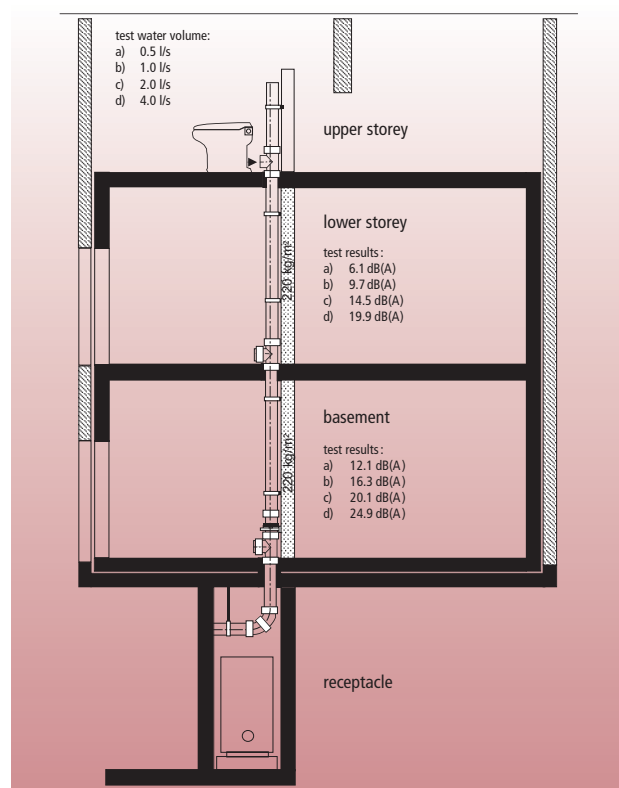
- transition from a down pipe of a height of 10 m or more to a horizontal pipe should be carried out using a bend with steadying distance
- connection of a down pipe to a horizontal line must be carried out with 45° branch and 45° bend
- connection of a horizontal pipe to a down pipe should be carried out with 88° branch with 45° access angle

The actual noise level depends largely on correct installation, but also on the quantity of water and on the weight per m² of walls and ceilings.

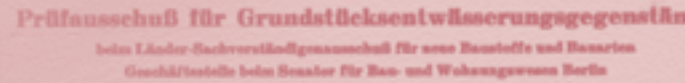
Tests and certificates

As certified by certificate No. P-BA 443/1995 of Fraunhofer Institute, Düker cast iron pipes reached a noise level of 19.9 dB(A) in the room diagonally across from the pipeline. This was measured with walls of 220 kg/m² and a water volume of 4.0 l/s.

Fraunhofer test assembly



Standard noise protection (30 dB(A) in rooms in need of noise protection, as per German regulations) should be no problem for correctly installed SML pipes. In order to observe elevated sound damping requirements (27 or even 24 dB(A) as per German regulations) the whole building structure should be checked. However, cast iron sewage pipes are at present the sewage pipes best-suited for noise-damping.



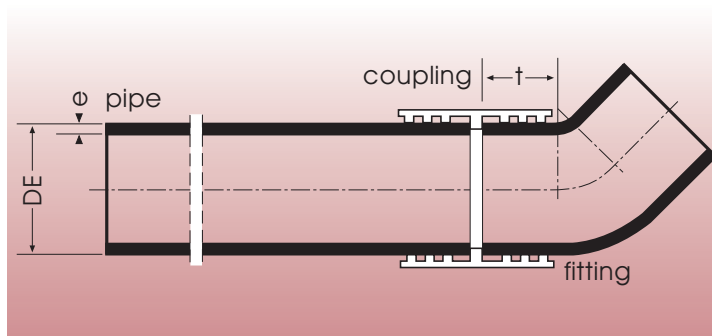
1. Berlin 30, den 30. A
Potodamer Straße 180/18
Telefon 87 05 91 App. 51

Prüfzeichen:

FA-I
1609

§ 10. Die Bestimmungen des § 9 sind unter den nachstehenden Bestimmungen zuge-

Wenn eine Person die Minderjährigkeitsdauer ausgesprochen werden, so ist diese rechtlich nicht mehr als Minderjährige anzusehen.



Construction dimensions:

Pipe diameter
Wall thicknesses
Insertion lengths
(sealing zone)
Pipe weights
Surface

SML-Pipes and Fittings (EN 877 and DIN 19 522)

nominal diameter	interior diameter	exterior diameter		wall thickness pipes and fittings		insertion lengths (sealing zone)	pipe weight empty	surface ca. m ²
DN	d: approx.	DE	tolerance	nominal	minimum	t	ca.kg/m	per m
40	42	48	+2/-1	3,0	2,5	30	3,1	0,15
50	51	58		3,5	3,0	30	4,3	0,18
70*	71	78		3,5	3,0	35	5,9	0,25
80 ¹⁾	75	83		3,5	3,0	35	6,3	0,26
100	103	110	+2/-2	3,5	3,0	40	8,4	0,35
125	127	135		4,0	3,5	45	11,8	0,42
150	152	160		4,0	3,5	50	14,1	0,50
200	200	210	+2,5/-2,5	5,0	4,0	60	23,1	0,65
250	263	274		5,5	4,5	70	33,3	0,85
300	314	326		6,0	5,0	80	43,2	1,02
400	416	429	+2/-3	6,3	5,0	80	60,0	1,35
500**								
600**								

* obsolete model, ** on request (see MLB programme)

All dimensions in mm

¹⁾ 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)

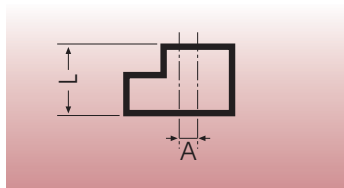
Pipes**SML-Pipe DIN 19522 – DN 40x3000****L = 3000 mm**

DN	kg	item no.
40	10,5	660744
50	13,5	660004
70*	18,3	660094
80	18,9	235145
100	26,5	660184
125	37,0	660274
150	43,5	660364
200	78,0	660454
250	113,0	660654
300	144,0	660664
400	187,7	660604
500**		
600**		

* obsolete model, ** on request (see MLB programme)

"Important notice: variable values in the item indications are printed in italics.
(example: SML-pipe DIN 19522-DN 40x3000)"

Reducers (R) (adapters)



SML-reducer DIN 19522 - 50 x 40 R

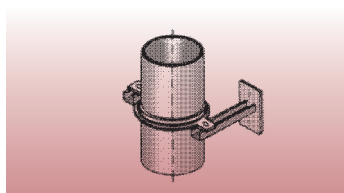
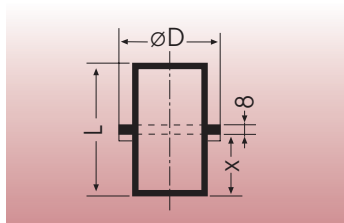
DN	A	L	kg	item no.
50x40	10	65	0,5	662484
70x50*	10	75	0,5	662504
80x50	12,5	80	0,7	235159
100x50	25	80	0,9	662514
100x70*	16	85	0,9	662524
100x80	13,5	90	1,1	235161
125x50	38,5	85	1,4	662534
125x70*	28,5	90	1,5	662544
125x80	26	95	1,7	235162
125x100	12,5	95	1,5	662554
150x50	51	95	2,0	662564
150x70*	41	100	2,0	662574
150x80	37,5	100	2,3	235417
150x100	25	105	2,2	662584
150x125	12,5	110	2,2	662594
200x100	50	115	4,1	662604
200x125	37,5	120	4,1	662614
200x150	25	125	4,3	662624
250x150	57	140	6,8	662634
250x200	32	145	7,0	662644
300x150	83	150	10,7	662494
300x200	58	160	11,4	662714
300x250	26	170	12,4	662724
400x300**	51,5	180	15,0	662444

* obsolete model ** on request

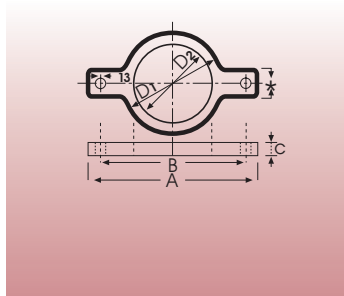
SML-down pipe support DIN 19522-100 FS

DN	D	X	L	kg	item no.		
					support without bearing ring	support without bearing ring	support incl. bearing ring
50	87	96	200	1,3	661544	223825	
70*	106	96	200	1,6	661554	223830	
80	114	96	200	1,8	235164	235343	
100	145	96	200	2,3	661564	223834	
125	170	96	200	3,0	661574	223839	
150	195	96	200	4,0	661584	223841	
200	245	96	200	6,0	661594	223843	
250	340	146	300	19,5	100242	230053	
300	390	146	300	25,5	100244	230054	

Down pipe supports (FS)



Bearing ring

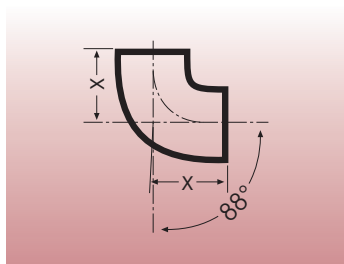


Bearing rings with rubber for down pipe supports (FS)

DN	D2	D1	A	B	C	*	kg	item no.
50	61	93	193	148	25	33	0,8	666314
70*	81,5	114	214	166	26	33	1,0	666324
80	86,5	120	214	175	31	32	1,0	235344
100	115	147	250	202	28	33	1,3	666334
125	138	171	275	225,5	28	33	1,5	666344
150	163	199	301	253,5	30	33	2,0	666354
200	215	250	360	310,5	30	36	3,0	666374
250	280	344	442	392	34	40	5,6	227152
300	332	393	495	445	39	40	7,4	227153

* obsolete model

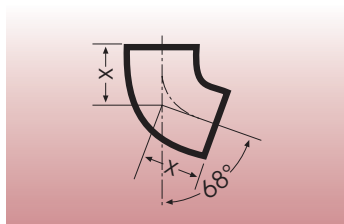
Bend 88°



SML-bend DIN 19522-100-88

DN	X	kg	item no.
40	70	0,5	661414
50	75	0,7	661054
70*	90	1,1	661114
80	95	1,4	235150
100	110	2,1	661174
125	125	3,2	661234
150	145	4,9	661294
200	180	8,8	662784
250	225	13,8	233621
300	260	28,0	233622

Bends 68°



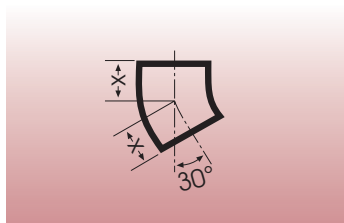
DN	X	kg	item no.
50	65	0,7	661034
70*	75	1,1	661094
80	80	1,2	235149
100	90	1,9	661154
125	105	2,9	661214
150	120	4,9	661274
200	145	7,7	661334

Bends 45°



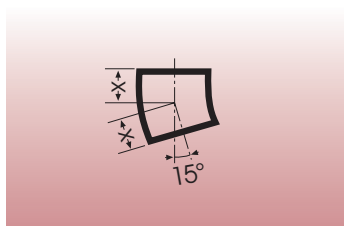
DN	X	kg	item no.
40	50	0,4	661404
50	50	0,5	661024
70*	60	0,9	661084
80	60	1,0	235148
100	70	1,2	661144
125	80	2,3	661204
150	90	3,5	661264
200	110	6,5	661324
250	130	10,3	661374
300	155	17,3	661394
400**	257	36,0	661284

Bends 30°



DN	X	kg	item no.
50	45	0,5	661014
70*	50	0,7	661074
80	60	0,8	235147
100	60	1,3	661134
125	70	2,0	661194
150	80	3,0	661254
200	95	5,4	661314
250	110	9,7	661364
300	130	15,5	661384

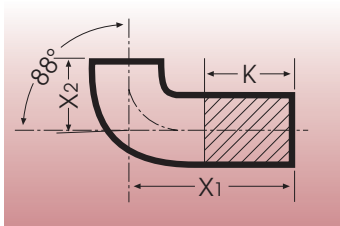
Bends 15°



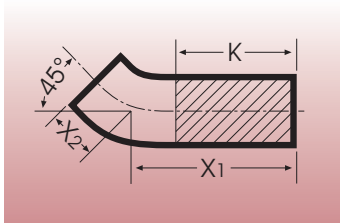
DN	X	kg	item no.
50	40	0,4	661004
70*	45	0,6	661064
80	50	0,7	235146
100	50	1,0	661124
125	60	1,7	661184
150	65	2,5	661244
200	80	4,6	661304

* obsolete model ** on request

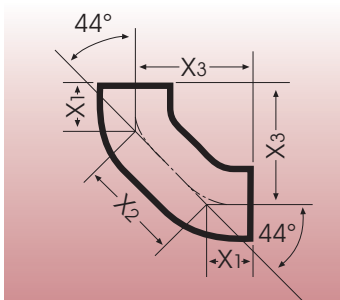
Bends 88° with 250 mm spigot (LB)



Bends 45° with 250 mm spigot (LB)



Double bends 88° from 2 bends 44° (DB)



SML-bend DIN 19522-100-88-LB

DN	X ₁	X ₂	K**	kg	item no.
70*	250	90	160	2,8	662064
80	250	95	155	2,6	236348
100	250	110	140	4,6	662084

SML-bend DIN 19522-100-45-LB

DN	X ₁	X ₂	K**	kg	item no.
70*	250	60	190	2,6	662054
80	250	60	190	2,5	236347
100	250	70	180	4,2	662074

SML-bend DIN 19522-100-88-DB

DN	X ₁	X ₂	X ₃	kg	item no.
50	50	100	121	1,2	661484
70*	60	120	145	1,8	661494
80	60	120	145	2,0	235151
100	70	140	170	3,2	661504
125	80	160	195	4,6	661514
150	90	180	219	7,0	661524

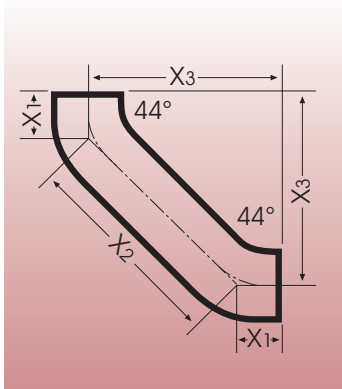
* obsolete model, ** dimension for maximum cut-back

As per German DIN 1986, turns of base and collecting pipes may only be carried out with pre-manufactured bends. Each single bend may only have 45°.

The bend is also suitable for transition from a down pipe to a horizontal pipe and vice versa.

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.

Bends 88° (BB) with 250 mm steadying distance for adapting down pipes to draft pipes



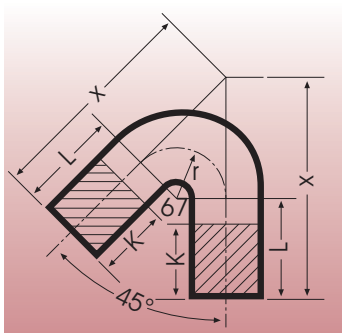
SML-bend DIN 19522-100-88-BB

DN	X ₁	X ₂	X ₃	kg	item no.
70*	60	301	273	3,2	662734
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.

Bends 135° for ventilation (bypass)

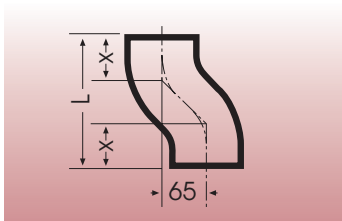


(see installation hint on page 22)

SML-bend DIN 19522-100-135

DN	X	K**	L	kg	item no.
100	312	100	150	5,0	662774

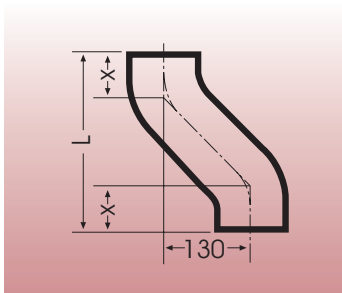
S-bends (SP)
offset (A) = 65 mm



SML-S-bend DIN 19522-100-65 SP

DN	X	L	kg	item no.
100	70	205	2,5	662864

S-bends (SP)
offset (A) = 130 mm

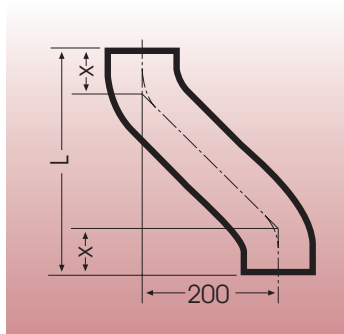


SML-S-bend DIN 19522-100-130 SP

DN	X	L	kg	item no.
100	70	270	3,5	662874

* obsolete model, ** dimension for maximum cut-back

S-bends (SP)
offset (A) = 200 mm

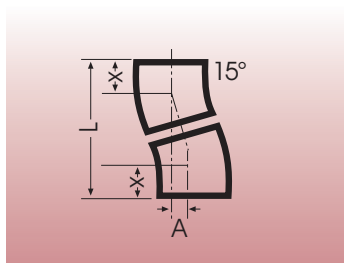


SML-S-bend DIN 19522-100-200 SP

DN	X	L	kg	item no.
100	70	340	4,5	662884

* obsolete model

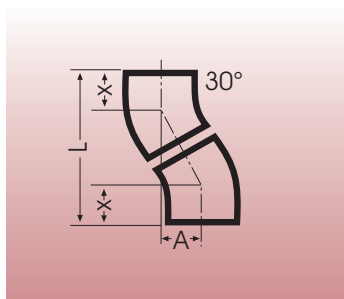
S-bends made of
2 bends 15°



Fitting/Bend combinations

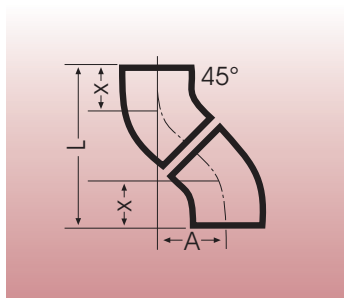
DN	X	A	L
50	40	27	162
70	45	25	182
80	50	26	197
100	50	27	201
125	60	32	241
150	65	35	260
200	80	43	319

S-bends made of
2 bends 30°



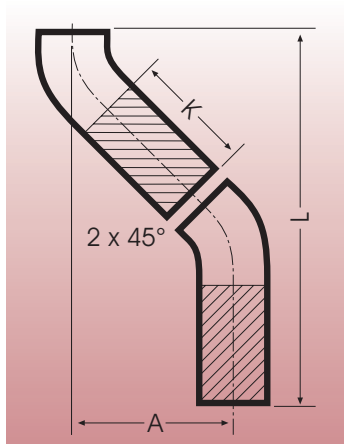
DN	X	A	L
50	45	48	172
70	50	53	191
80	60	60	224
100	60	63	228
125	70	73	266
150	80	83	303
200	95	98	359
250	110	113	415
300	130	133	489

S-bends made of
2 bends 45°

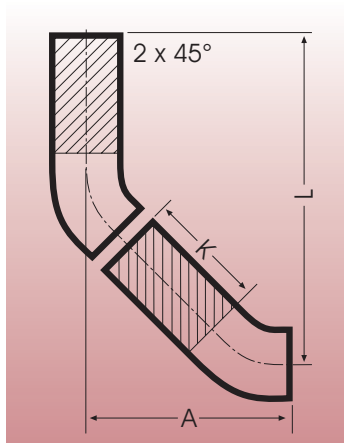


DN	X	A	L
50	50	74	174
70	60	88	208
80	60	85	205
100	70	103	243
125	80	117	277
150	90	131	311
200	110	159	379
250	130	187	447
300	155	223	533

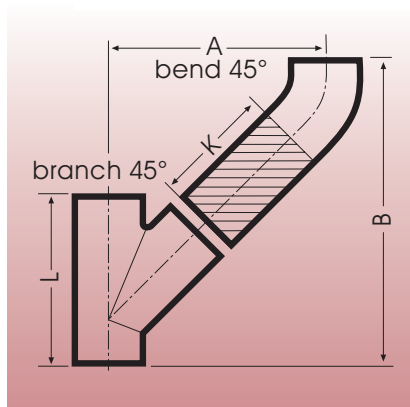
S-bends made of
2 bends 45° with
250 mm spigots



Deviation made of
2 bends 45° with
250 mm spigots



Combination examples
branch 45° - bend 45°



Bend combinations

DN	A max.	A min.	L max.	L min.	K**
70	223	88	533	398	190
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 solidium. 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).

DN	A max.	A min.	L max.	L min.	K**
70	283	148	473	338	190
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 solidium. 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.

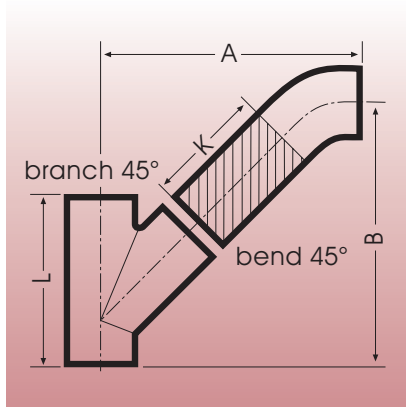
Combinations of SML bends and branches (bend with 250 mm spigot)

branch 45° DN	bend 45° DN	A max.	A min.	B max.	B min.	L	K**
70x70	70	283	149	398	264	200	190
80x80	80	293	159	418	284	225	190
100x70	70	301	166	406	271	215	190
100x80	80	304	170	419	285	230	190
100x100	100	315	187	455	327	260	180
125x70	70	311	177	411	277	225	190
125x80	80	322	187	422	287	240	190
125x100	100	329	202	459	332	270	180

** Dimension for maximum cut-back

The reducing quotient 1:1.5 in site praxis is also permitted here. When decreasing the distances A and B by

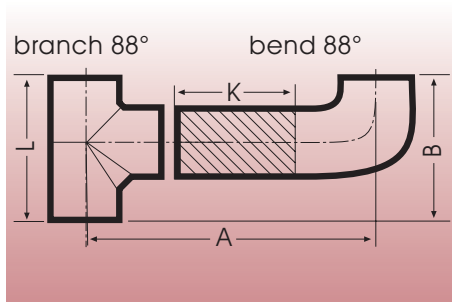
1 cm (both change at the same time), the bend must be cut back by 1.5 cm.



branch 45° DN	bend 45° DN	A max.	A min.	B max.	B min.	L	K**
70x70	70	343	209	338	204	200	190
80x80	80	353	219	358	224	225	190
100x70	70	361	226	346	212	215	190
100x80	80	364	230	359	225	230	190
100x100	100	385	257	385	257	260	180
125x70	70	371	237	351	217	225	190
125x80	80	382	247	362	227	240	190
125x100	100	399	272	389	262	270	180

** Dimension for maximum cut-back

Combination examples
branch 88° - bend 88°

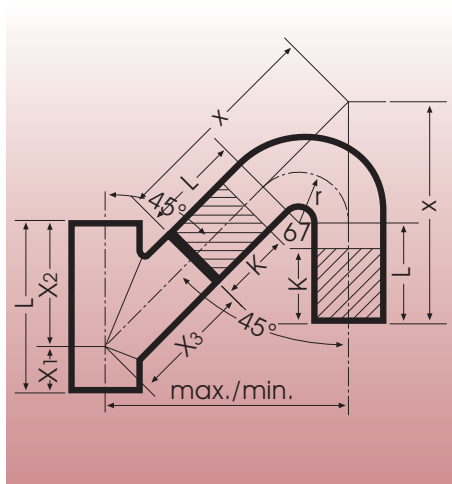


branch 88° DN	bend 88° DN	A max.	A min.	B	L	K*
70x70	70	350	190	187	180	160
80x80	80	350	195	197	180	155
100x70	70	365	205	192	190	160
100x80	80	365	210	207	190	155
100x100	100	370	230	225	220	140
125x70	70	380	220	197	200	160
125x80	80	380	225	213	205	155
125x100	100	385	245	235	235	140

** Dimension for maximum cut-back

In this case, the reducing quotient is 1:1. The distance A changes identically to the reduction of the bend.

Dimensional tolerances for distance B which theoretically result from the descent are unimportant for installation practice.



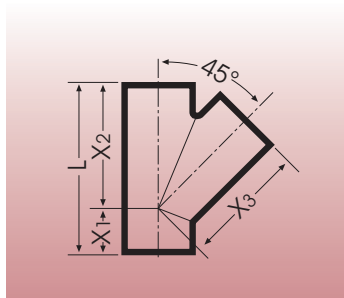
Combinations of SML branches 45° and SML bends 135° for bypasses

DN	max.	min.
100x100	370	300
125x100	380	310
150x100	395	325
200x100	410	340

As per German DIN 1986, special laying arrangements are necessary for waste water down pipes which run through more than 4 storeys if change

of direction takes place due to the thus developing pressure ratio. This makes it necessary to use a bypass with 135°.

branches 45°



Due to the appearance of the European standard for SML pipes and fittings EN 877, the new version of German DIN 19522 also had to be changed regarding dimensions and measures of SML fittings (values in brackets=old standard version)

Düker produces these items exclusively as per the latest version of DIN 19522. Due to possible stocks of the old standard version please check the actual dimensions of delivered fittings when pre-manufacturing or pre-installing.

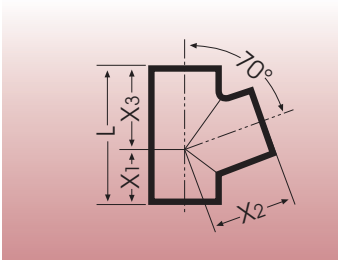
SML-branch DIN 19522-70x50-45

DN	X ₁	X ₂	X ₃	L	kg	item no.
40x40	45	115	115	160	1,0	664544
50x40	45	115	115	160	1,1	664554
50x50	50 (45)	135 (115)	135 (115)	185 (160)	1,4 (1,2)	663004
70x50*	40	150 (130)	150 (130)	190 (170)	1,6	663034
80x50	50	140	140	190	1,8	235152
70x70*	55	160 (145)	160 (145)	215 (200)	2,3 (2,1)	663064
80x80	65	160	160	225	2,4	235154
100x50	35 (30)	165 (150)	165 (150)	200 (180)	2,5 (2,3)	663094
100x70*	50 (45)	185 (170)	185 (170)	235 (215)	3,3 (3,0)	663124
100x80	55	175	175	230	3,3	235156
100x100	70	205 (190)	205 (190)	275 (260)	4,2 (3,8)	663154
125x50	20	185 (170)	185 (170)	205 (190)	3,4 (3,2)	663184
125x70*	40	200 (185)	200 (185)	240 (225)	4,3 (4,0)	663214
125x80	40	200	200	240	4,4	235342
125x100	60	220 (210)	220 (210)	280 (270)	5,2 (5,0)	663244
125x125	80 (75)	240 (230)	240 (230)	320 (305)	6,4 (6,1)	663274
150x70*	30	215 (205)	215 (205)	245 (235)	5,6 (5,3)	663334
150x80	30	215	215	245	5,9	235415
150x100	55	240 (225)	240 (225)	295 (280)	6,8 (6,5)	663364
150x125	70	255 (245)	255 (245)	325 (315)	8,0 (7,7)	663394
150x150	90	265	265	355	9,2	663424
200x70*	15	240 (235)	240 (235)	255 (250)	8,1 (8,0)	663484
200x80	15	240	240	255	8,5	235416
200x100	40	265 (260)	265 (260)	305 (300)	10,0 (9,8)	663514
200x125	55	280	280	335	11,9	663544
200x150	75	300	300	375	13,3	663574
200x200	115	340	340	455	17,2	663604
250x100	15	310 (305)	310 (305)	325 (320)	15,4	663634
250x125	35	335 (330)	335 (330)	370 (365)	17,7	664504
250x150	55	350	350	405	20,2	664514
250x200	90	385 (380)	385 (380)	475 (470)	25,1 (24,8)	663644
250x250	130	430	430	560	31,5	663654
300x100	5	345	345	350	22,0	663664
300x125	15	360	360	375	23,9	664524
300x150	35	380	380	415	26,9	664534
300x200	70	415	440	485	34,0	664444
300x250	115	465	465	580	42,1	663674
300x300	155	505	505	660	50,1	663684
400x300**	105	555	565	660	60,0	663694

* obsolete model

** on request

Branches 70°
(no longer listed in the new
German standard version)

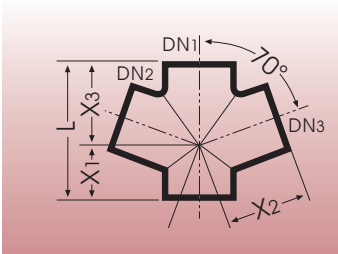


SML-branch DIN 19522-70x50-70

DN	X ₁	X ₂	X ₃	L	kg	item no.
50x50	55	80	80	135	0,9	663014
70x50*	55	90	90	145	1,2	663044
70x70*	70	100	100	170	1,6	663074
100x50	55	110	100	155	1,9	663104
100x70*	70	120	110	180	2,3	663134
100x100	85	130	130	215	3,0	663164
125x50	55	120	110	165	2,7	663194
125x70*	70	130	120	190	3,2	663224
125x100	85	145	140	225	4,8	663254
125x125	100	155	155	255	4,8	663284
150x100	85	155	150	235	5,3	663374
150x125	100	170	165	265	6,2	663404
150x150	115	180	180	295	7,2	663434
200x100*	85	185	170	255	8,6	663524
200x125*	100	195	185	285	9,8	663554

* obsolete model

Double branches 70°
(no longer listed in the new
German standard version)



SML-double branch DIN 19522-100x100x100-70 D

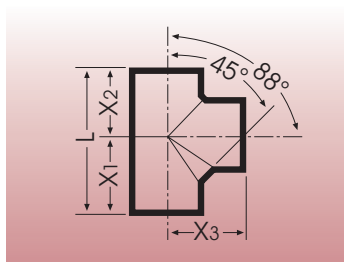
DN	X ₁	X ₂	X ₃	L	kg	item no.
100x100x100	85	130	130	215	3,5	663864
125x100x100	85	145	140	225	5,0	663954

Important note on 70° branches:

As per German DIN 1986, for connection of horizontal pipes up to DN 70 to down pipes, branches of 88° are to be used. This is to prevent underpressure in the connecting pipes. SML branches 88° with an access angle of 45° also allow to connect larger diameters from DN 100 up to the down

pipe. This is space-saving and guarantees connecting pipes without negative pressure. Therefore 70° branches are no longer required and are no longer contained in German DIN 19522. As 70° branches are however still on demand, we sell a reduced range of 70° branches until further notice.

Branches 88°
access angle 45°

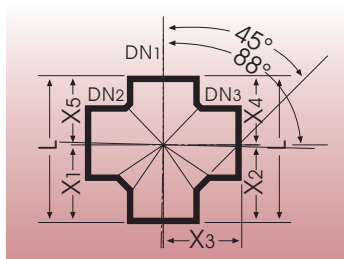


SML-branch DIN 19522-70x50-88

DN	X ₁	X ₂	X ₃	L	kg	item no.
50x50	79	66	80	145	0,9	663024
70x50*	83	72	90	155	1,4	663054
80x50	95	85	90	180	1,5	235153
70x70*	97	83	95	180	1,7	663084
80x80	95	85	95	180	1,7	235155
100x50	94	76	105	170	2,1	663114
100x70*	102	88	110	190	2,4	663144
100x80	105	85	110	190	2,6	235157
100x100	115	105	120	220	2,9	663174
125x50	98	82	120	180	3,0	663204
125x70*	107	93	125	200	3,4	663234
125x80	110	94	125	205	3,4	235158
125x100	125	110	130	235	4,0	663264
125x125	137	123	135	260	4,6	663294
150x50	100	100	140	200	4,4	663324
150x100	130	115	145	245	5,5	663384
150x125	147	128	150	275	6,2	663414
150x150	158	142	155	300	6,9	663444

* obsolete model

Double branches 88°
access angle 45°

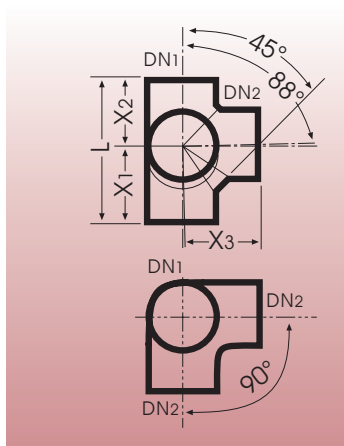


SML-double branch DIN 19522-150x100-88 D

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 (94)	100 (94)	105	80 (76)	80 (76)	180 (170)	2,2	663814
100 x 70 x 70*			102	102	110	88	88	190	2,7	663844
100 x 80 x 80			110	110	120	95	95	205	3,2	236353
100 x 100 x 100			120 (115)	120 (115)	120 (115)	110 (105)	110 (105)	230 (220)	3,2	663874
150 x 100 x 70*			130	112	145	133	115	245	6,3	664184
150 x 100 x 100			130	130	145	115	115	245	7,1	664084

* obsolete model

Corner branches 88° (EA)
access angle 45°;
corner angle 90°

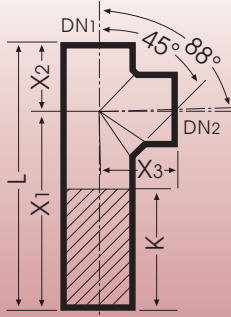


SML-corner branch DIN 19522-100x70-88 EA

DN ₁	DN ₂	X ₁	X ₂	X ₃	L	kg	item no.
80	x 80	105	90	105	195	2,2	235850
100	x 70*	102	88	110	190	2,7	662044
100	x 80	110	95	120	205	2,9	236346
100	x 100	115	105	120 (115)	220	3,4	662034
125	x 80	125	110	140	235	4,2	235846
125	x 100	125	110	130	235	5,0	662014
150	x 100	130	115	145	245	7,1	664434

* obsolete model

branches 88°(AL)
with long spigot
access angle 45°

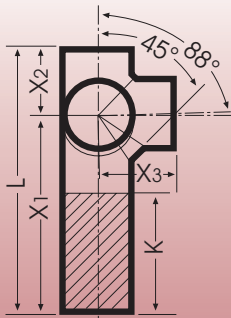


SML-branch DIN 19522 - 100x100-88 AL

DN	X ₁	X ₂	X ₃	L	K**	kg	item no.
100x100	325	105	115	430	210	4,6	664454

** dimension for maximum cut-back
especially suited for ceiling break-throughs

Corner branches 88° (EAL)
with long spigot
access angle 45°;
corner angle 90°

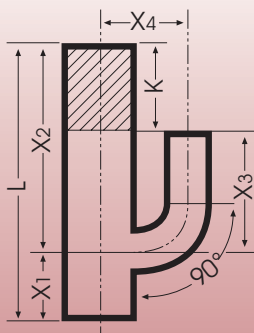


SML-corner branch DIN 19522 - 100x100x100-88 EAL

DN	X ₁	X ₂	X ₃	L	K**	kg	item no.
100x100x100	325	105	115	430	210	5,2	664464

** dimension for maximum cut-back
especially suited for ceiling break-throughs

Parallel branches (P)

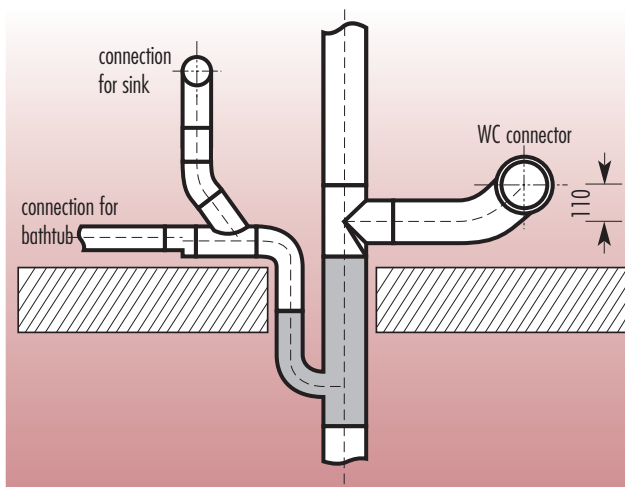
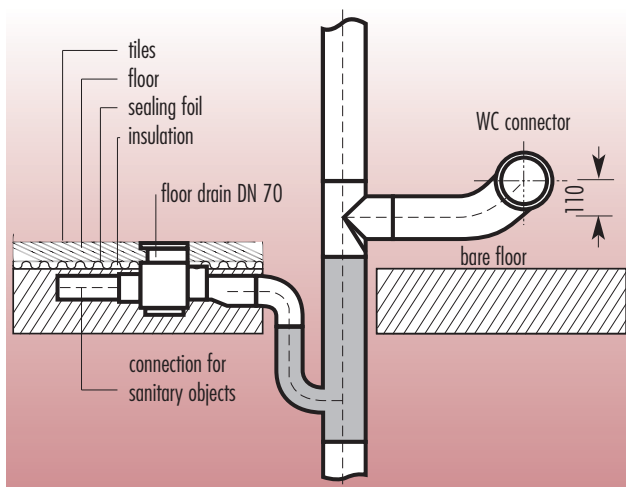


SML-parallel branch DIN 19522-100x70 P

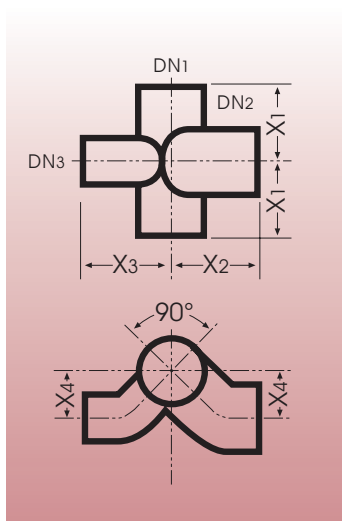
DN	X ₁	X ₂	X ₃	X ₄	L	K**	kg	item no.
100x70*	100	300	175	125	400	125	6,5	664474

* obsolete model
** dimension for maximum cut-back

Installation examples SML parallel branch



Combination branches (K)
access angle 45°



SML-combination branch DIN 19522 - 100x100x80-90 K

DN	X ₁	X ₂	X ₃	X ₄	kg	item no.
100x100x70*	115	140	130	70	4,5	665834
100x100x80	115	140	135	70	4,7	235345
100x100x100	115	140	140	70	5,0	665924

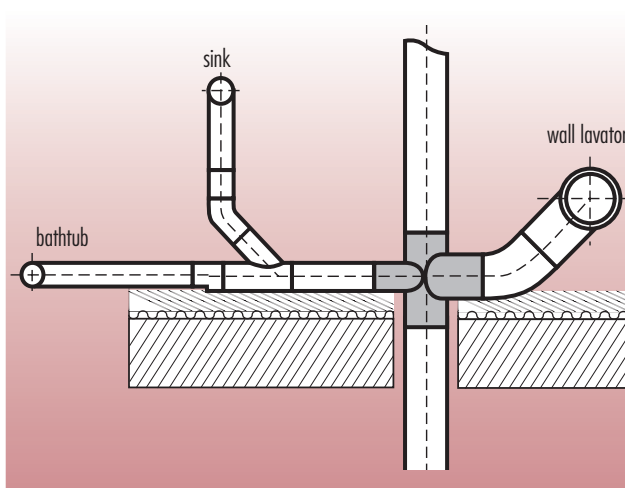
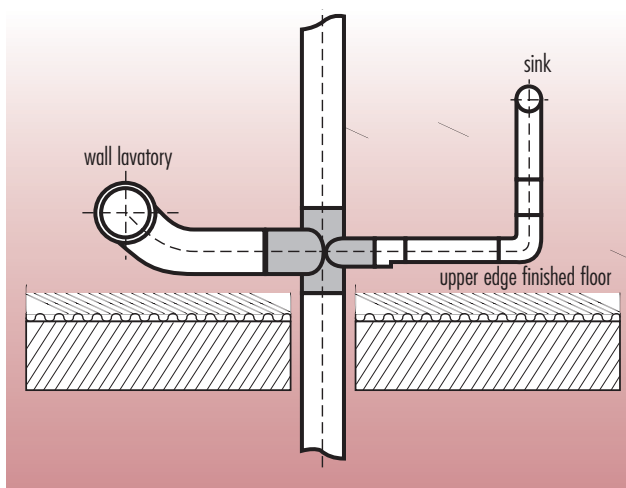
* obsolete model

The easy-flow designed double branch for space-saving waste water supplies to down pipes in pipe shafts, behind faced brick-work or in sanitary blocks allows simultaneous connection to various sanitary objects. Because of the double-sided arrangement of

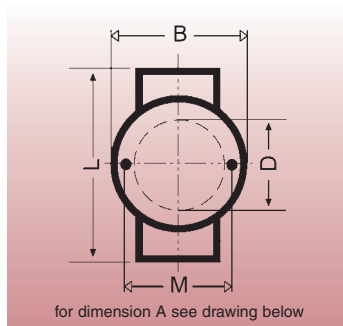
the access angles at 45°, this branch can be installed laterally reversed by vertical turning of 180°.

It allows the level connection of WC and, for example, bathtub.

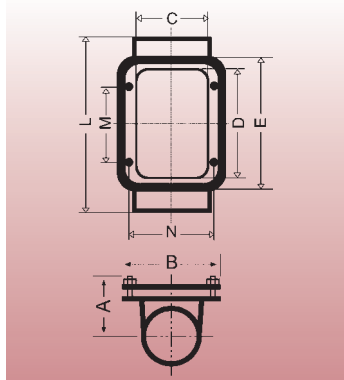
Installation examples SML combination branch



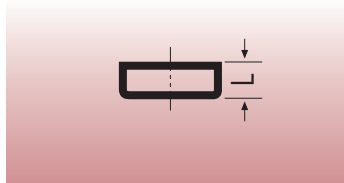
Inspection pipes for down pipes, with round opening (RRrd)



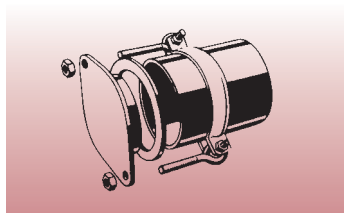
Inspection pipes for horizontal and down pipes, with rectangular opening (RRrk)



Plugs (ED)



Plugs with security collars



rubber seal in EPDM

SML-inspection pipe DIN 19522 - 100 RRrd

DN	A	B	D	L	kg	item no.
50	59	105	53	190	2,3	669580
70*	69	125	73	210	2,9	669583
80	74	135	78	220	3,1	235166
100	84	159	104	260	5,0	669586

* obsolete model

with toroidal sealing ring in EPDM as per DIN 4060

SML-inspection pipe DIN 19522 - 100 RRrk

DN	A	B	C	D	E	L	M	N	kg	item no.
100	83	160	100	200	230	340 (320)	130	130	7,6	669624
125	101	190	125	225	255	370 (355)	150	160	10,3	669627
150	112	215	150	250	280	395	170	180	14,5	669630
200	137	262	200	300	330	465	200	235	22,0	669633
250	170	330	259	350	426 (380)	570 (540)	230	300	36,5	669612
300	195	380	309	400	476 (430)	640 (610)	280	350	51,0	669615

DN 100 to DN 200 with toroidal sealing ring in EPDM. DN 250 and DN 300 with 6 hermetic

plug screws and flat sealing in EPDM.

SML-plug DIN 19522 - 100 ED

DN	L	kg	item no.
50	30	0,2	665504
70*	35	0,4	665514
80	35	0,5	235163
100	40	0,5	665524
125	45	1,1	665534
150	50	1,7	665544
200	60	3,1	665554
250	70	6,0	665564
300	80	9,5	665574

* obsolete model

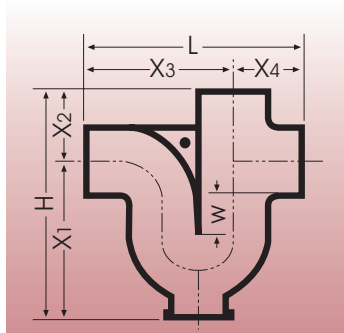
further diameters on request.

SML-plug

DN	kg	item no.
100	1,1	664804
125	1,5	664814
150	2,1	664824
200	3,3	664834

100	0,05	100700
125	0,07	100701
150	0,09	100702
200	0,11	100703

Siphons (G)



SML-siphon 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	2,8	669562
70*	265	293	200	93	172	93	60	5,0	669563
80	265	285	190	95	170	95	80	5,8	235165
100	325	392	282	110	215	110	100	8,5	669564
125	390	446	316	130	260	130	100	13,0	669565
150	470	493	348	145	325	145	100	19,5	669566
200	600	600	420	180	400	200	100	33,7	669567

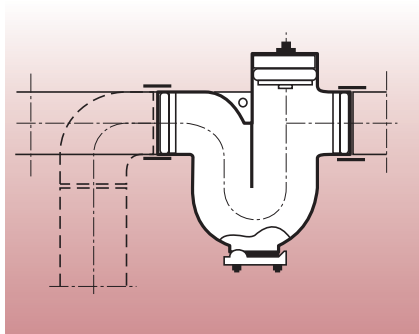
* obsolete model

Cleaning trap for DN 50 to 150 below; for DN 200 above.

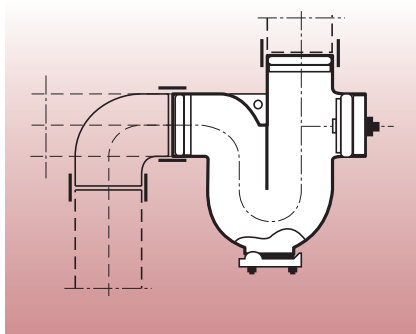
The supplying side of the SML siphons DN 50 to DN 200 may be connected either to the horizontal or the vertical pipe. Bends can guide the outlet into different direc-

tions. The supply opening not used is to be closed with a hermetic plug with press-sealing automatically supplied.

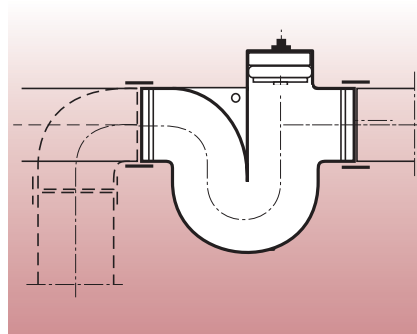
Installation examples



horizontal supply

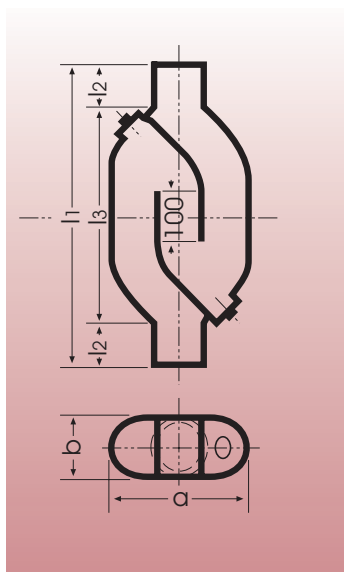


vertical supply



DN 200 version

Rain water pipe siphons (RGV)



SML-siphons DIN 19522 - 100 - RGV

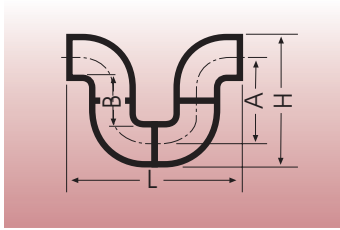
DN	a	b	l ₁	l ₂	l ₃	l ₄	kg	item no.
70*	195	90	80	312	472		9,0	669557
80	195	90	70	333	472		9,6	236357
100	276	124	90	408	588		18,5	669558
125	344	144	100	487	687		28,5	669559
150	374	179	110	522	742		38,0	669560

* obsolete model

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 connec-

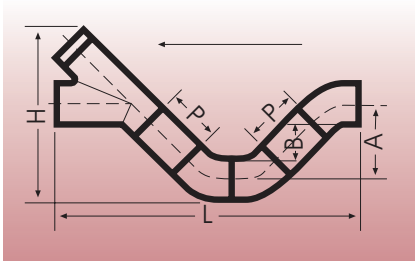
ted to the rain water pipes which join mixed water pipes. Installation must be carried out in a frost-protected area - we advise above the cleaning hole before junction of the down pipe into the base pipe.

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



Example 1:
DN 70 to 150 with 4 bends 88°

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

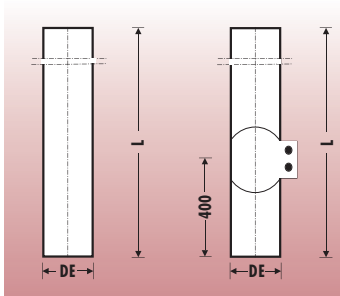


SML fittings and fitting combinations

DN	A	B	H	L
70*	185	115	263	375
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

Rain water standpipes
without socket



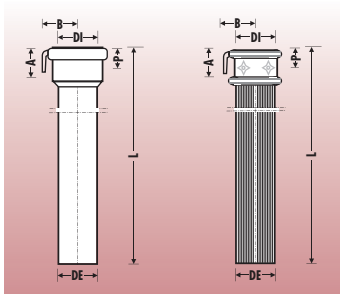
SML-rain water standpipe

Type	DN	DE	L	kg	item no.
without inspection opening	100	110	1000	8,8	660264
with inspection opening	100	110	1000	8,6	669646

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.
Inspection opening: chromium steel collar
Fixing: with normal pipe clamps

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

Rain water standpipes
with socket



SML-rain water standpipe

Type	DN	DE	DI*	L	B	A	P**	kg	item no.
round	100	110	110	1000	85	81	45	9,4	662230
antique	100	110	110	1000	88	72	50	13,5	662240

* outer diameter of connecting pipe. Standpipes can be connected to rainwater downpipes made of zinc, copper or plastics.

** Insertion length. For easier insertion we recommend to cut the pipe ends in an angle.

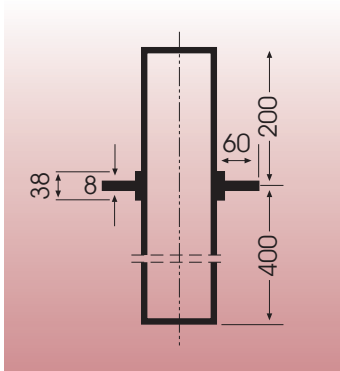
Phosphated inside and outside, coating on a PVC basis in shade RAL 7032 (grey)

Sockets with inserted EPDM sealing. Fixing with the integrated socket hook and a fixing loop (not delivered), consisting e.g. of a U profile and a bolt. The minimum distance to the wall is 20mm, wider distances can be realised through further wedges.

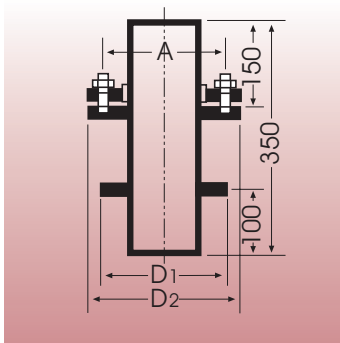
Attention: For a durable good appearance we recommend to coat rainwater standpipes after installation. Suitable paints are alkyd or acrylic varnishes with corrosion protection additive.

SML-pipe with wall flange

Pipes with wall flange for installation as wall leadthrough in water-tight concrete



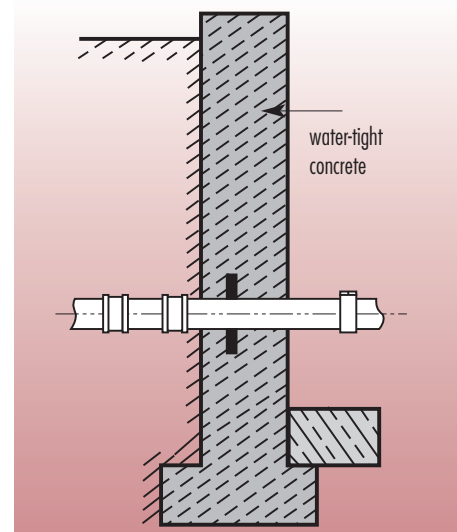
Adapters with clamp and wall flange following German DIN 18195 (sealing against non-pressing water)



with 4 locking screws M 12 x 45,
4 hexagon nuts M 12

DN	L	kg	item no.
100*	600	8,0	662224

* obsolete model



DN	A	D ₁	D ₂	kg without clamp flange	kg with clamp flange	item no. without clamp flange	item no. with clamp flange
100*	191	190	230	9,0	11,6	665874	669605

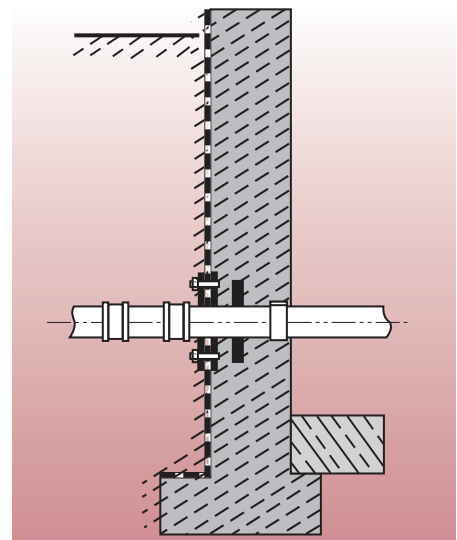
* obsolete model

The adapter with seal flange can be used for wall crossings of cast iron sewage pipes which depend upon water and gas impermeability, e.g. in

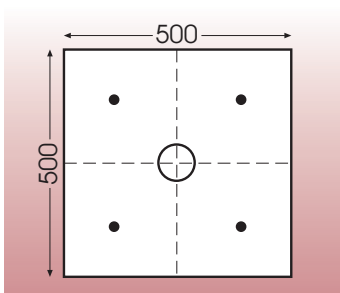
- outer walls
- floor plate
- basement waterproofing and
- reverse flat roof or similar.

These SML pipes with wall flange are classified as obsolete models, as SML pipes are not suitable for soil installation as per EN 877. These items are available as TML fittings.

The installation example shows a wall passthrough with two SVE couplings on the outer wall side so that the floor movements can be absorbed without any disadvantages to the pipelines.



Connection foils



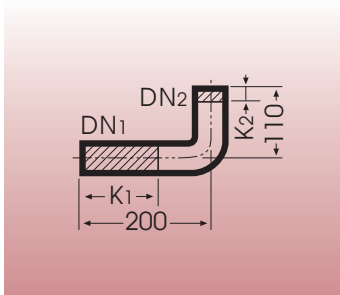
Connection foils 500 x 500 mm in EPDM. 1.5 mm thick for pasting together or jig welding with roof foils.

DN	item no.
70*	100294
100	100291
125	100292
150	100293

* obsolete model

Before pinning the connection foil, it must be glued all-over to the clamp flange.

Wash basin connecting bends 90°
for sinks and urinals (OL)



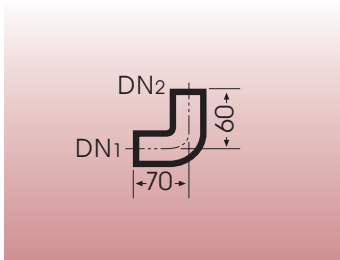
SML-wash basin connecting bend DIN 19522 - 50x40 - 90 - OL

DN		K1*	K2*	kg	item no.
1	2				
50	x 40 long	120	20	1,4	661744
50	x 50 long	120	25	1,5	661754
50	x 60 long	120	30	1,5	661764



*dimension for maximum cut-back

Wash basin connecting bends 90°
for wash basins, sinks and bidets
(OW)

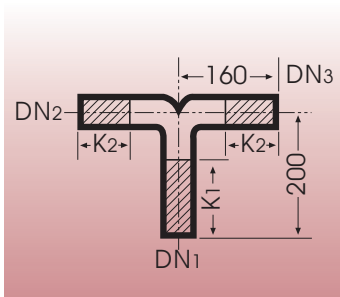


SML-wash basin connecting bend DIN 19522 - 50x40 - 90 - OW

DN		kg	item no.
1	2		
40	x 50 short	0,8	661734



Wash basin Y-joint 90° (OH)



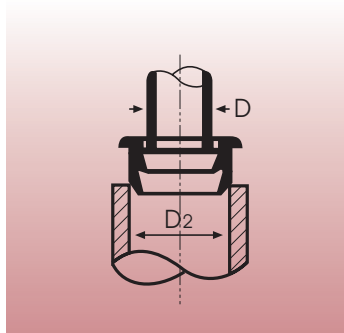
SML-wash basin connecting bend DIN 19522 - 50x50x50 - 90 - OH

DN			K1*	K2*	kg	item no.
1	2	3				
50	x 50	x 50	125	85	2,5	661794



*dimension for maximum cut-back

Rubber connections



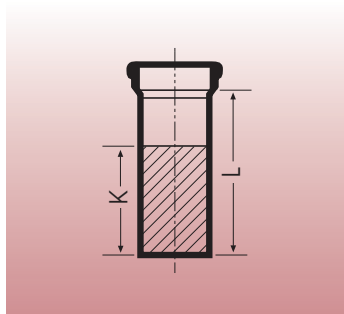
for SML bend DN	D ₂	D (connecting pipe)	marks**	item no.
50x40	40	28-34	40/30 klein (small)	100088
50x50/40x50	50	28-34	40/30 groß (large)	100125
50x50/40x50	50	38-44	40/40	100089
50x60	60	28-34	50/30	100092
50x60	60	38-44	50/40	100091
50x60	60	48-54	50/50	100090

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

Further connection possibilities for sanitary objects to SML DN 50, 70 and 80

SML fittings	connection	connecting pipe (outer diameter)
SML bends 88°, DN 50	rubber connector size 40/30 groß (large)	28-34 mm
SML branches 88° with DN 50 outlets	rubber connector size 40/40 EK-Düker-Fix connector DN 50	38-44 mm 40-56 mm
SML bends 88°, DN 70		
SML bends 88°, DN 70 with long spigot	EK-Düker-Fix connector DN 70	56-75 mm
SML branches 88° with DN 70 outlets		
SML bends 88°, DN 80	EK-Düker-Fix connector DN 80	56-75 mm / 75-90 mm
SML branches 88° with DN 80 outlets		

WC pipes DN 100



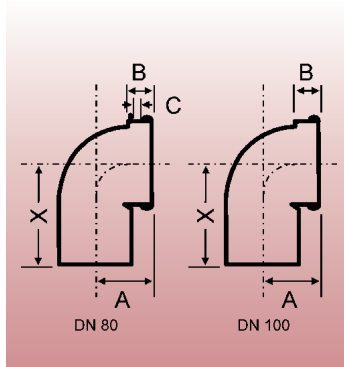
WC connections DN 100 with special sockets and rubber seals as per DIN 4060

SML-WC pipe DIN 19522 - 100 - long

DN		plastic pipe connection DN	L	K*	kg	item no.
100	long	100	225	170	4,2	663734

*dimension for maximum cut-back

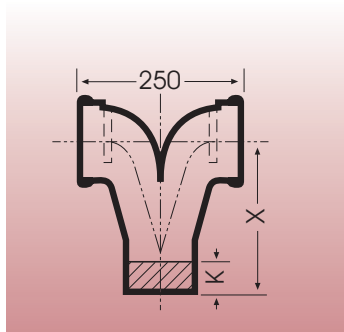
WC-Bends 90°



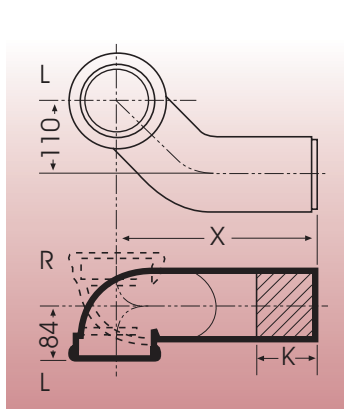
SML-WC bend DIN 19522 - 100 - 90 - short

DN		plastic pipe connection DN	X	A	B	C	kg	item no.
80	mini	90	150	98	55	15	2,2	662794
100	mini	100	150	84	44	—	3,8	662684

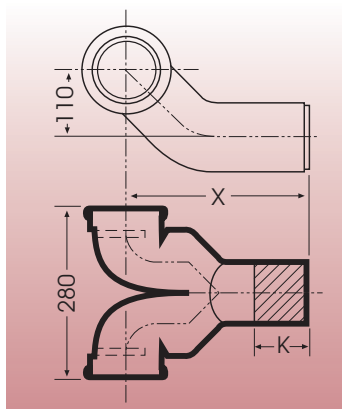
WC Y-pipe DN 100 - 90°
(for vertical installation only)



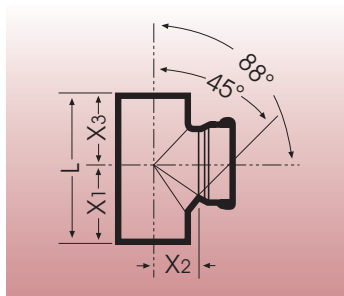
WC bends, DN 100, offset, 90°
for horizontal installation (WR) (WL)



WC Y pipe, DN 100, offset,
90° for horizontal installation(W)



WC branch DN 100 - 88°



SML-WC double socket connector DIN 19522 - 100 - 90

DN	plastic pipe connection DN	X	A	K*	kg	item no.
100	100	225	250	50	5,8	662474

*dimension for maximum cut-back

SML-WC bend DIN 19522 - 100 - 90 - WL

DN		plastic pipe connection DN	X	K*	kg	item no.
100	R = right version	100	295	90	5,6	663804
100	L = left version	100	295	90	5,6	663794

*dimension for maximum cut-back

SML-WC double socket connector DIN 19522 - 100 - 90 - W

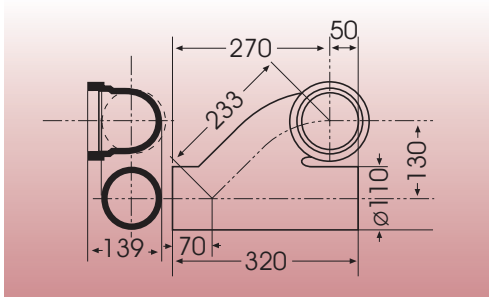
DN	plastic pipe connection DN	X	K*	kg	item no.
100	100	295	90	8,8	662994

*dimension for maximum cut-back

SML-WC branch DIN 19522 - 100 - 88

DN	plastic pipe connection DN	X ₁	X ₂	X ₃	L	kg	item no.
100x100	100	115	75	105	220	5,0	663904

WC branch DN 100 (R) (L) for
modernisation of old buildings

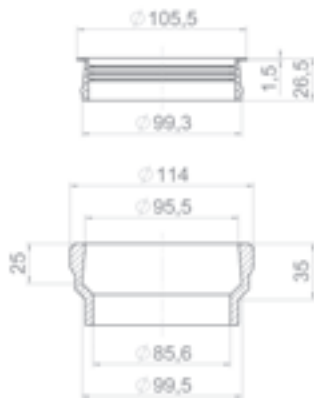


SML-WC branch DIN 19522 - 100 - 90 R

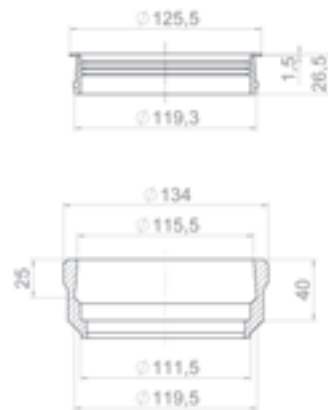
DN	Version	plastic pipe connection DN	kg	item no.
100	left	100	7,0	662164
100	right	100	7,0	662174

illustration: right version

Dimensions of special sockets and rubber joints



WC socket for plastic pipe connection DN 90



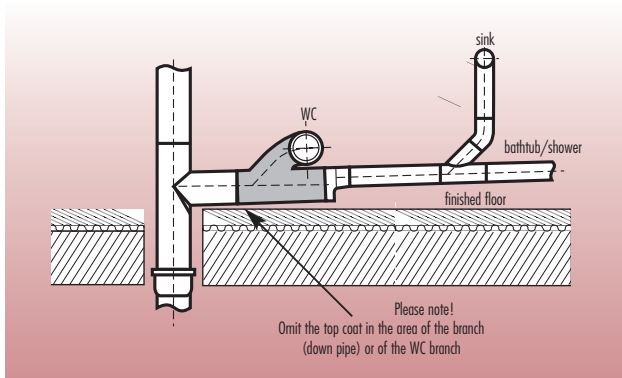
WC socket for plastic pipe connection DN 100

Installation examples

SML WC branch for modernisation of old buildings. This special branch is meant for connecting a standing WC when laying SML pipe onto an already finished floor (e.g. when modernising an old building). With use of this WC branch, it is possible to lay the collective connecting pipe onto the existing floor. The **top coat in the area of the branch (down pipe) must be**

Example 1:

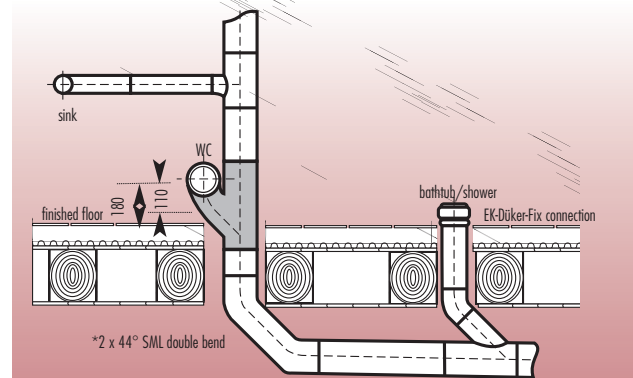
Installation of the branch into a collective connecting pipe for connection of a standing WC with horizontal outlet.



omitted. The connection height of a standing WC with horizontal outlet is generally 180 mm from the middle of the WC outlet to the upper edge of the finished floor. A customary WC connecting piece (outer dimension 110 mm, in plastic) is necessary for the connection of the WC outlet to the SML connecting socket.

Example 2:

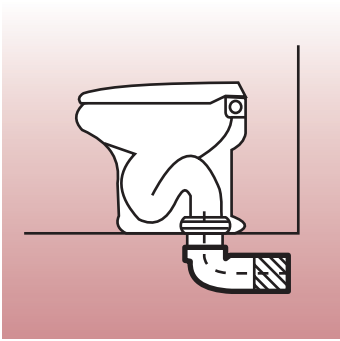
Installation of a branch into a down pipe for the connection of a standing WC with horizontal exit. **Only surface-cistern, close-coupled cistern or flushing valve possible.**



* Installation guideline for waste water down pipes as per German DIN 1986:

"Foot bends of $88^\circ \pm 2^\circ$ are permitted for down pipes which do not run through more than three storeys or which are not longer than 10 m and which pass over to horizontal pipes." However, we recommend using the 2 x 44° double bend for sound insulation reasons.

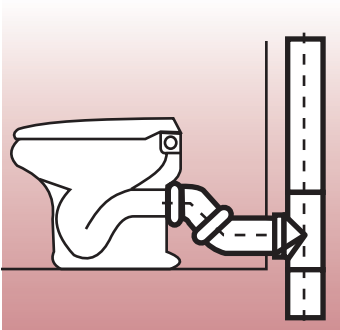
Connection examples standing WC



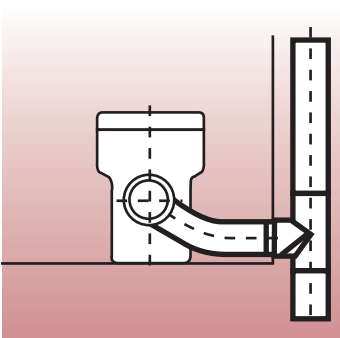
1. Standing WC with hidden vertical outlet. Connection to a cast iron WC connection bend with a plastic WC connection piece.



2. Standing WC with horizontal outlet. Connection to a cast iron WC connection bend with a plastic WC connection bend 90°.



3. Standing WC with horizontal outlet. Wall connection to a cast iron WC branch 88° in a down pipe. The difference in height of 100 mm between the water level of the WC odour trap and the base of the connecting pipe necessary in this case is achieved by putting two plastic connecting pipes 45° into one another. The normal SML branch DN 100 88° with Düker-Fix connection can be used for wall connection instead of the WC branch.



4. Standing WC with horizontal exit. Wall connection on the side with the down pipe. The necessary difference in height in the connecting pipe is achieved by a cast iron WC bend which shows an offset of 110 mm. The WC with a straight plastic WC connection piece is connected to this bend.

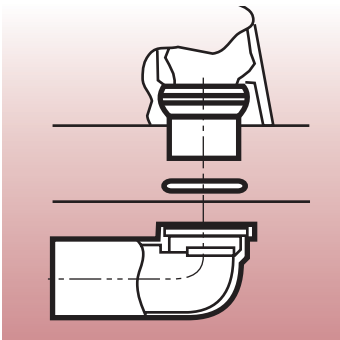
Installation notes for WC connectors

In general: When connecting WC connectors to down pipes we recommend SML branches 88° with 45° access angle which offer the best draining conditions.

WC connectors should be inserted into the down pipes so that the difference in height between the water level of the WC siphon and the base of the connecting pipe at the junction into the down pipe is at least the DN (100 mm for DN 100). Please always note this rule when connecting lavatories with horizontal outlets to the wall.

As per current state of the art, **standing WCs** are only supplied with vertical or horizontal outlet. Plastic WC connecting pieces Ø 110 mm with sealing lips or compression connections are used for joining the WC outlet to the cast iron (bend 22°, 45° and 90° as well as straight connecting pieces).

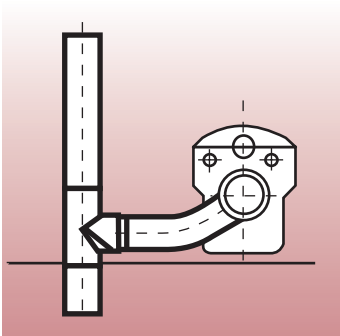
Connection examples standing WC / wall WC



5. Connection detail: Plastic WC connection piece, cast iron WC connection bend with special socket and rubber seal.

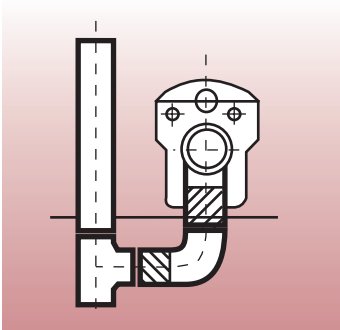
Wall WC connections are carried out by joining straight plastic WC connection pieces Ø 110 mm and sealing lips to cast iron WC connection pieces with special socket and sealing ring.

The connection may not be carried out directly to the down pipe, but only via bends or bend combinations which consider the difference in height of at least 100 mm.

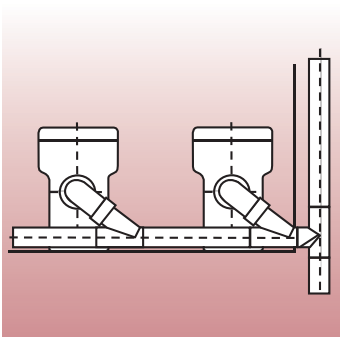


6. Wall WC connection with cast iron WC connection bend and plastic WC connection pieces.

The cast iron WC connection bends which show an offset of 110 mm and can be connected (almost) horizontally to a SML branch 88° guarantee an optimum of draining conditions. The simple WC connection bends should only be used when the given difference in height is reached due to the arrangement of the connecting pipe (refer to installation example no. 7). The simple WC double socket connector for the double-sided connection of wall WC is only intended for vertical arrangement since otherwise washing-ins from both sides would occur.

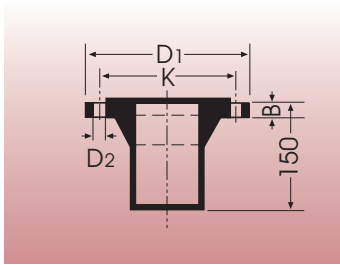


7. Wall WC connection with cast iron WC connection bend, a SML bend 88° with spigot and a plastic WC connection piece.



8. Standing WC with 4.5 or 6 l flush tank with plastic bend DN 90, EK-Düker-Fix coupling DN 80 and branch 45° DN 80. Both horizontal and down pipe are also in DN 80. **Attention:** this solution is not approved in all countries. If DN 80 cast iron pipes are not admissible for toilet drainage in your country, we recommend to connect the DN 90 plastic bend to a DN 100 cast iron branch via a transition coupling by Muecher (www.muecher.com).

Flange connecting pieces (FL)



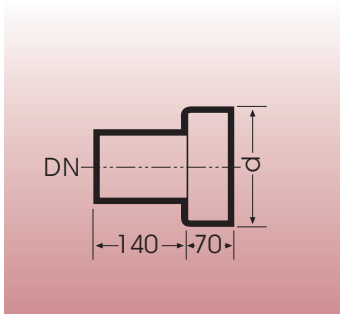
SML-flange connecting piece DIN 19522 - 150 - FL

DN	D1	D2	B	K*	screws	kg	item no.
					8 pcs		
100	220	18	24	180	M16	5,8	665934
125	250	18	26	210	M16	8,0	665944
150	285	22	26	240	M20	9,8	665954
200	340	22	26	295	M20	14,5	665964

Delivery without screws and seals

*8 holes, PN6/PN10 as per EN 1092-2

Cast iron connection pieces for stoneware (E)

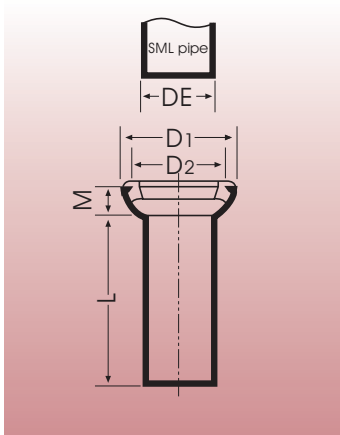


SML-connecting piece DIN 19522 - 300 - E

DN	d	kg	item no.
100	159 ± 2,0	4,9	664924
125	187 ± 3,5	6,7	664934
150	218 ± 3,5	9,7	664944
200	278 ± 3,5	13,3	664954

Connections for these: stoneware-A-ring or Tecotect-se-S seal

Connection pieces with short socket and inserted rubber profile seal



SML-connection piece

DN	D1	D2	L	M	DE	kg	item no.
100	144	125,5	250	40	110	3,3	662194
125	172	151,5	250	42,5	135	4,6	662204
150	201	178,5	250	45	160	6,1	662214

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 no. 1:

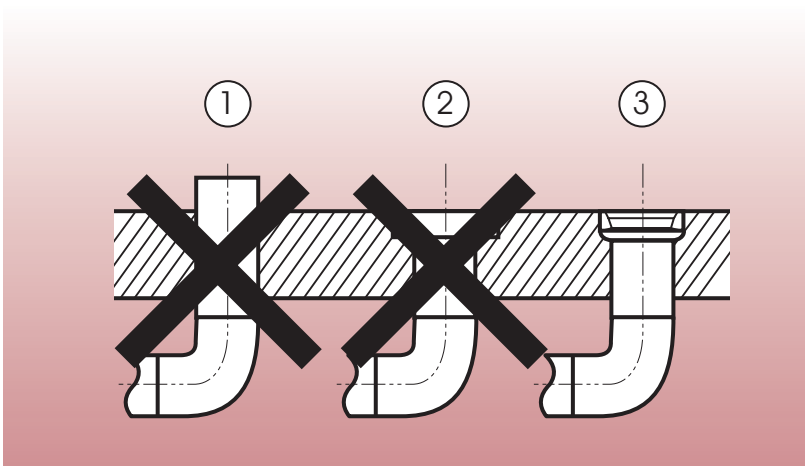
Pipe openings are easily tripped over, which can lead to injuries or damage.

Example no. 2:

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

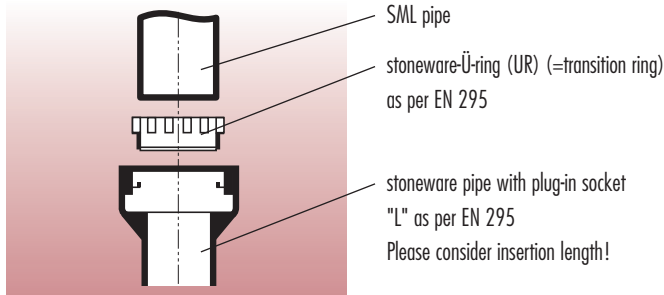
Example no. 3:

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.



Connections of SML pipes to other soil pipes

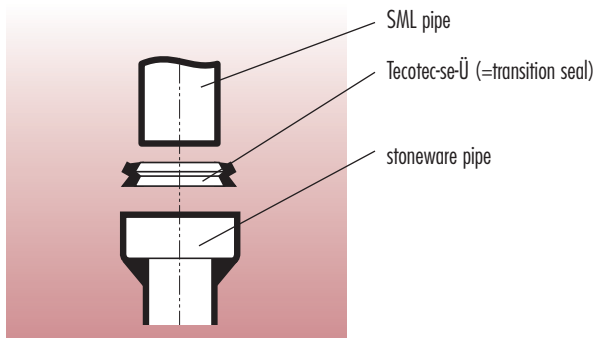
SML pipe to stoneware pipe with push-in socket "L" as per EN 295 DN 100 to 200



Stoneware transition ring "stoneware-Ü-Ring" EN 295 (UR) for connecting SML to stoneware with push-in socket "L" as per EN 295

DN	item no.
100	100295
125	100296
150	100297
200*	100298
* not for socket K	

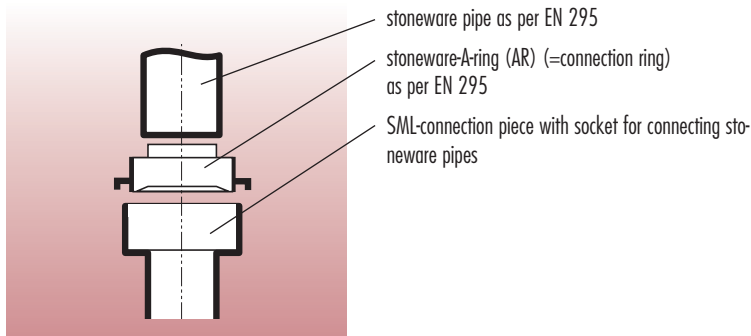
SML pipe to stoneware pipe (normal wall thickness) without pre-finished seal DN 100 to 300



Tecotect-se-Ü-seal for connecting SML to stoneware without pre-finished seal

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

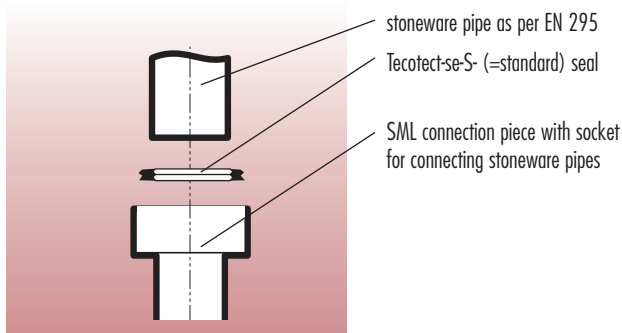
Stoneware pipe (normal wall thickness) to SML pipe DN 100 to 200



Stoneware-A-Ring EN 295 (AR) for SML connection piece stoneware to cast iron

DN	item no.
100	100312
125	100313
150	100314
200	100315

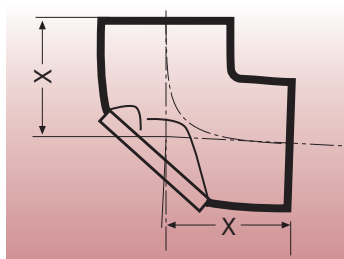
Stoneware pipe (normal wall thickness) to SML pipe DN 250 and 300



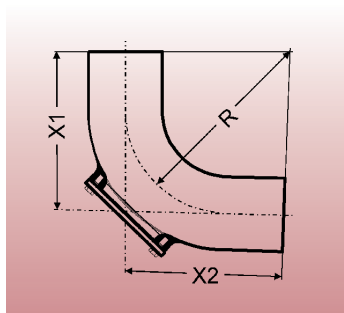
Tecotect-se-S-seal for stoneware SML connection piece to cast iron

DN	item no.
100	102567
125	102568
150	102569
200	102570

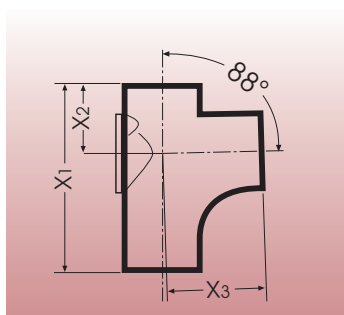
For larger diameter seals, please contact company Mücher, www.muecher.com

**SML short radius access bend - 88°**

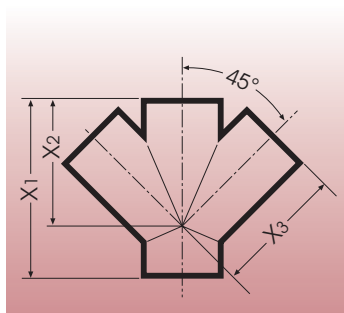
DN	X	kg	item no.
100	110	3,3	100268
150	145	6,1	232741

**SML long radius bend - 88° - with/without access**

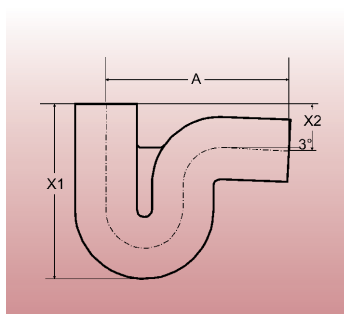
DN	X1	X2	R	kg with access	kg without access	item no. with access	item no. without access
100	230	230	150	5,5	5,1	100262	235125
150	245	245	150	-	7,8	-	235126

**SML swept entry access branch - 88°**

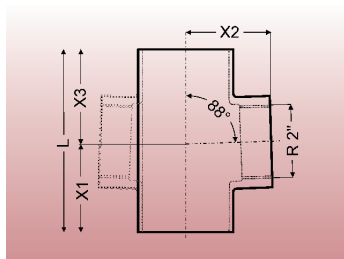
DN	X1	X2	X3	kg	item no.
100x100	270	102	150	4,3	100269

**SML double branch - 45°**

DN	X1	X2	X3	kg	item no.
100x100	260	190	190	4,0	100260
150x100	280	225	225	8,4	661444
125x100	280	220	220	6,5	237737

**SML plain trap**

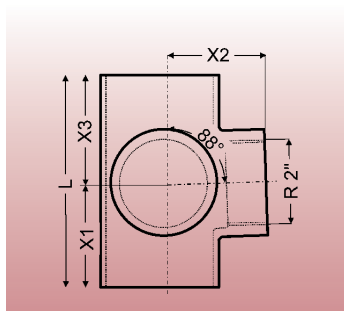
DN	A	X1	X2	kg	item no.
100	310	300	80	8,0	100261



SML boss pipe - single/double

DN	X1	X2	X3	L	kg single	kg double	item no. single	item no. double
100	77,5	80	77,5	155	2,1	2,2	100267	100266*
150	87,7	104	87,5	175	3,8	3,8	232746	237738

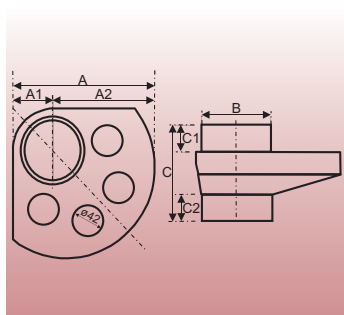
* upon request



SML double boss pipe - with bosses at 90°

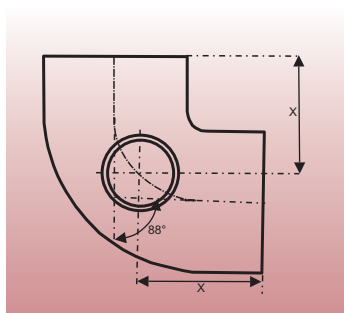
DN	X1	X2	X3	L	kg	item no.
100	75	80	75	150	2,9	100318*

* upon request



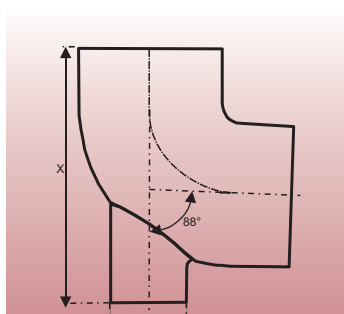
SML manifold connector

DN	A	A1	A2	B	C	C1, C2	kg	item no.
100	233,7	65	168,7	110	145	40	1,8	214089



SML bend 88° with vent

DN	X	kg	item no.
100x50	91	2,2	232445

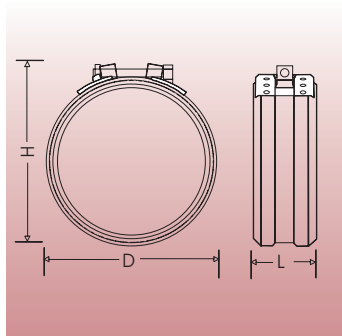


SML bend 88° with high heel

DN	X1	A	kg	item no.
100x50	195	58	2,4	235529

02 COUPLINGS DELIVERY PROGRAMME





**OUR RECOM-
MENDATION !**

Dükorapid® coupling

DN	D≈	H≈	L	item no.
maximum dimensions after installation				
40	60	72	41	659623
50	71	83	45	218592
70*	91	103	45	218593
80	96	115	45	235494
100	123	135	45	214405
125	152	164	52	218594
150	177	189	52	218595
200	227	244	70	659556

all dimensions in mm

One screw coupling

German Approval no.:

DN 50-150: ABP Nr. P-110002488-01/01

DN 40 and 200: ABP Nr. P-110002011

Material metal collar:

W2, stabilised stainless steel, 1.4510/11 as per EN 10088

Material locking parts:

lock 1.4301 or 1.4510/11

DN 50-150: screw and square nut steel with zinc lamellae coating, washer A2 as per DIN 125

DN 40 and 200: screw, washer and square nut galvanised, yellow-chromated

Material sealing:

EPDM

Axial restraint:

up to 0.5 bar

Screw size:

DN 40: M5; DN 50-150: M8; DN 200: M10

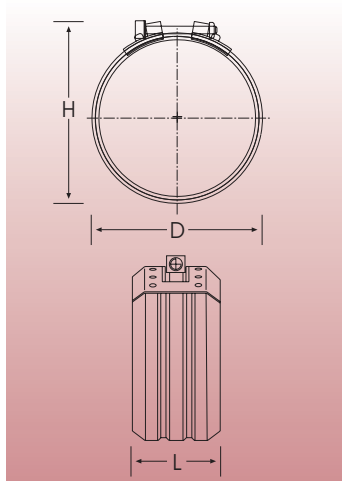
Torque:

DN 50-150: 10-20 Nm

DN 40 and 200: until both locks come together

* obsolete model

Installation instructions see page 57



MLetec® Rapid

DN	D≈	H≈	L≈	item no.
100	123	137	54	235487
125	150	164	63	235488
150	175	189	63	235489

≈ maximum dimensions after installation

One screw coupling with elevated axial restraint

German Approval no.:

ABP Nr. 110002089

Material metal collar:

W2, stabilised stainless steel, 1.4510/11 as per EN 10088

Material locking parts:

lock austenitic steel 1.4301, screw, washer, square nut galvanised, yellow-chromated

Material sealing:

EPDM silicon-free. NBR on request for waste water containing oil, animal grease, solvents or petrol

Axial restraint:

up to 1 bar

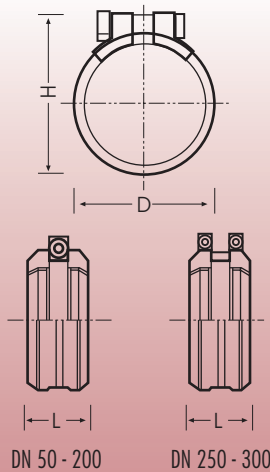
Screw size:

M8 screw with 8.8 hexagon socket

Torque:

15-25 Nm

Installation instructions see page 57



OUR RECOMMENDATION !

for installation underground and outside of buildings

Rapid Inox coupling

DN	D \approx	H \approx	L \approx	item no.
maximum dimensions after installation \approx				
40	60	72	41	235493
50	70	80	39,5	234826
70*	90	100	39,5	234827
80	95	105	39,5	235472
100	125	135	45,4	234828
125	147	162	54,5	234829
150	172	187	54,5	234830
200	227	244	70,0	234831
250	292	305	115	234832
300	344	358	115	234833

One screw coupling (DN 250 and 300: two screws) 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)

German Approval no.: Ü DIN EN 877

Material metal collar: W5, austenitic stainless steel, 1.4571 as per EN 10088

Material locking parts: austenitic stainless steel 1.4571 as per EN 10088; screw, washer and square nut A4

Material sealing: EPDM. NBR on request for waste water containing oil, animal grease, solvents or petrol

Axial restraint: DN 40 - 200: up to 0.5 bar; DN 250 - 300: up to 0.3 bar

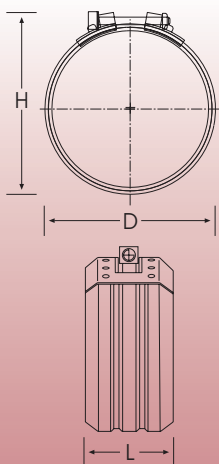
Screw size: hexagon socket screw; DN 40: M 5; DN 50 - 150: M 8; DN 200: M 10

Torque: until both fastening heads come together

Marking: Marking W5 on the metal collar

* obsolete model

Installation instructions see page 57



MLetec® Rapid Inox

DN	D \approx	H \approx	L \approx	item no.
100	123	137	54	235777
125	150	164	63	235778
150	175	189	63	235779

\approx maximum dimensions after installation

One screw coupling for soil installation and for installation outside of buildings

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

German Approval no.: Ü DIN EN 877

Material metal collar: W5, austenitic stainless steel, 1.4571 as per EN 10088

Material locking parts: austenitic stainless steel 1.4571 as per EN 10088; screw, washer and square nut A4

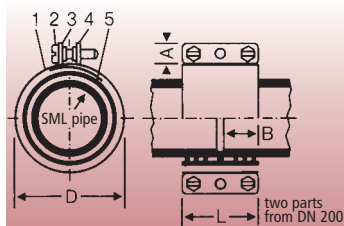
Material sealing: EPDM silicon-free. NBR on request for waste water containing oil, animal grease, solvents or petrol

Axial restraint: up to 1 bar

Screw size: M8 screw with 8.8 hexagon socket

Torque: 15-25 Nm

Installation instructions see page 57



- 1 metal collar
- 2 slit hexagonal screws (DN 50 and 70 M6, DN 100 up to 300 M8)
- 3 guiding plate
- 4 threaded plate
- 5 sealing collar

CV coupling

DN	A	B	D \approx	L	item no.
50*	14	22,5	65	48	659436
70*	14	22,5	85	48	659437
80*	14	22,5	88	48	235859
100*	18	25,5	115	54	659438
125*	18	31	140	65	659439
150*	18	31	170	65	659440
200*	18	37	220	78	659441
250*	18	37	286	78	659442
300*	18	37	338	78	659443

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 passthroughs with fire protection function (unless installed with Düker fire protection coupling).

Material metal collar: stabilised stainless steel, material no. 1.4510/11 as per EN 10088

Material locking parts: galvanised steel

Material sealing: EPDM

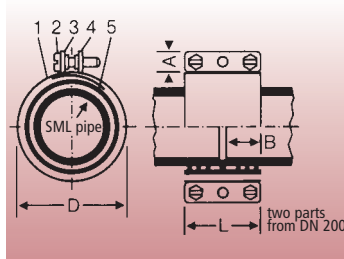
Axial restraint: -

Screw size: slotted hexagonal screws; DN 50 - 80: M 6; DN 100 - 300: M 8

Torque: hand tight

* obsolete model

Installation instructions see page 58

**CE coupling**

DN	A	B	D \approx	L	item no.
50*	14	22,5	65	48	100240
70*	14	22,5	85	48	100236
100*	18	25,5	115	54	100185
125*	18	31	140	65	100237
150*	18	31	170	65	100241
200*	18	37	220	78	100186
250*	18	37	286	78	100187
300*	18	37	338	78	100188

Double screw coupling for soil installation (only with additional corrosion protection)

German Approval no.: Ü DIN EN 877

Material metal collar: W4, austenitic stainless steel, 1.4301 as per EN 10088

Material locking parts: austenitic stainless steel, 1.4301/1.4541 as per EN 10088

Material sealing: EPDM. NBR on request for waste water containing oil, animal grease, solvents or petrol

Axial restraint: -

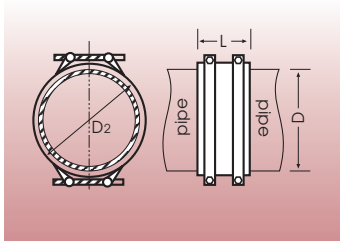
Screw size: hexagonal screws (slit on DN 50-100); DN 50 - 70: M 6; DN 100 - 300: M 8

Torque: alternately, uniformly hand tight

Marks: CE, W4

* obsolete model

Installation instructions see page 58

**Düker CE dual ring coupling**

DN	D	D ₂	L	item no.
400	431	445	110	100307

Double screw coupling for soil installation (only with additional corrosion protection) or for installation outside of buildings

German Approval no.: Ü DIN EN 877

Material metal collar: W4, austenitic stainless steel 1.4301 as per EN 10088

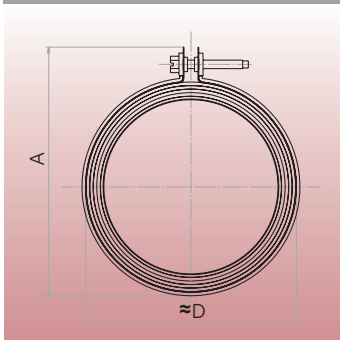
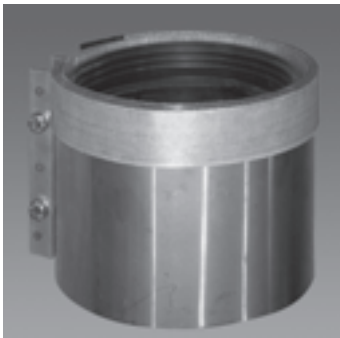
Material locking parts: austenitic stainless steel, 1.4301 as per EN 10088

Material sealing: EPDM

Axial restraint: up to 0.5 bar

Screw size: hexagonal screws M8

Torque: 35 - 40 Nm

**Düker Fire protection coupling BSV 90**

DN	A	B	D _≈	L	item no.
80*	125	22,5	98	130	237693
100*	152	25,5	127	135	237694
125*	180	31	152	150	237695
150*	202	31	177	150	237696

Two-screw coupling for installation in ceiling passthroughs with fire protection functions

German Approval no.: pending

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

Material intumescence material: expandable graphite on glass fibre fabric, intumescent at approx. 150°C

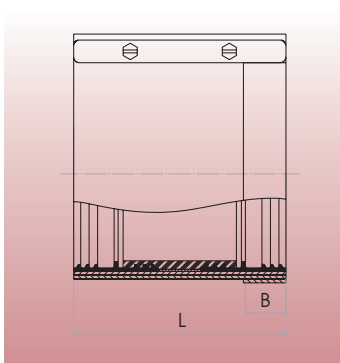
Axial restraint: –

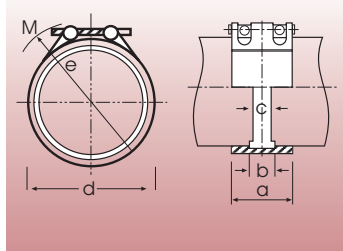
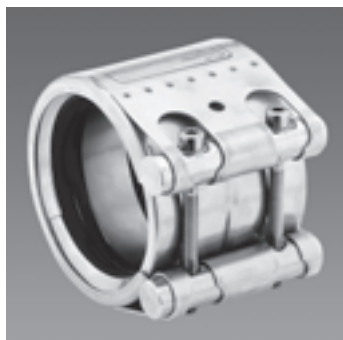
Screw size: M8

Torque: hand tight

Installation of the coupling similar to Rapid couplings (see page 57). Fasten the screws alternately and evenly. The upper third with the intumescence material strip must be placed in the ceiling; the lower two thirds must protrude below the ceiling (see page 12). Any pipes and fittings placed in a straight line below the Düker fire protection coupling must be made of cast iron.

* available after awarding of approval



**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

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: austenitic stainless steel, 1.4571 as per EN 10088

Material locking parts: bolts 1.4401, screws 1.4404 as per EN 10088

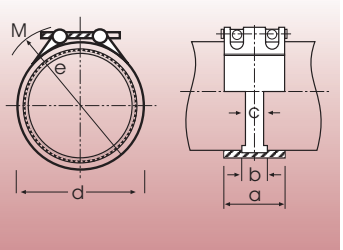
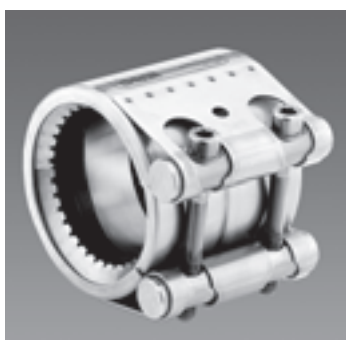
Material sealing: EPDM. NBR on request for waste water containing oil, animal grease, solvents or petrol

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 59

**Connect-G Inox coupling**

DN	a	b	c	≈d	≈e	item no.
50	78	29	17	85	105	234843
70*	98	40	25	100	120	234844
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

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: casing austenitic stainless steel 1.4571, claw ring 1.4310 as per EN 10088

Material locking parts: bolts 1.4401, screws 1.4404 as per EN 10088

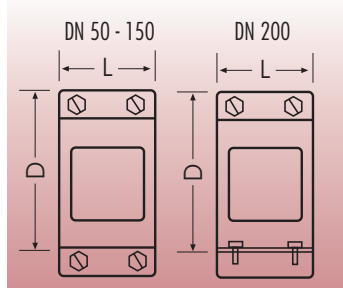
Material sealing: EPDM. NBR on request for waste water containing oil, animal grease, solvents or petrol

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 70 - 100: M 10; DN 125 - 150: M 12; DN 200 - 600: M 16

Torque: as stated on the coupling

* obsolete model
Installation instructions see page 59



D = outer diameter of the closed grip collar

**OUR RECOM-
MENDATION !**

for increased inside pressure

Dürer Kombi-grip collar EK

DN	D	L	item no.
40**	100	77	235473
50	124	72	235360
70*	144	72	235361
80	149	72	235498
100	180	87	235280
125	210	98	235315
150	230	98	235316
200	275	111	235281

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

German Approval no.: ABP Nr. P-110002089

Material metal collar: galvanised steel

Material locking parts: galvanised steel, yellow chromated 8 µ 8.8

Material sealing: -

Axial restraint: DN 40-100: up to 10 bar; DN 125-150: up to 5 bar; DN 200: up to 3 bar

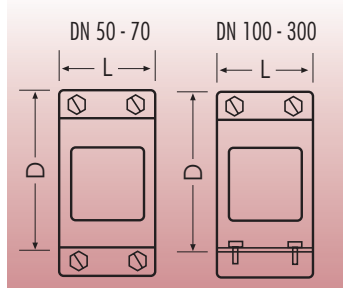
Screw size: DN 40-70: round head screws with hexagon socket with washers M 8 x 30; DN 100-150: round head screws with hexagon socket with washers M 10 x 35; DN 200: hexagonal screw with washers and self-locking nut galvanised M 10 x 30

Torque: DN 40-70: 23-25 Nm; DN 80: 25-28 Nm; DN 100: 25-30 Nm; DN 125-150: 40-60 Nm; DN 200: 50-65 Nm

Installation instructions see page 60

* obsolete model

** DN 40 in planning



CV grip collar

DN	A	D	L	item no.
50*	23	74	71	659485
70*	23	94	71	659486
100*	23	126	87	659487
125*	23	151	98	659488
150*	23	179	98	659489
200*	23	229	111	659490

Security collar with axial restraint for CV/CE couplings

German Approval no.: ABP Nr. P-110002011

Material metal collar: galvanised steel with hardened claw insert

Material locking parts: galvanised steel

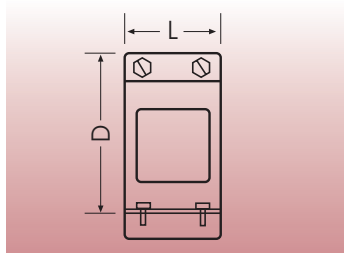
Axial restraint: up to 3 bar

Screw size: DN 50 - 70: M 8; DN 100 - 200: M 10; DN 250 - 300: M 12

Torque: DN 50 - 70: 10-12 Nm; DN 100 - 150: 18-20 Nm; DN 200: 25-30 Nm, DN 250 - 300: 55-60 Nm

* obsolete model

Installation instructions see page 60

**Düker grip collar**

DN	A	D	L	item no.
250	30	305	125	216888
300	30	350	125	100304
400	30	460	160	100305

Security collar with axial restraint for CV/CE couplings

Material metal collar: galvanised steel

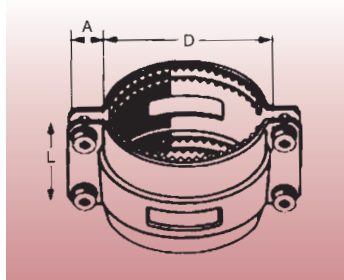
Material locking parts: galvanised steel

Axial restraint: up to 1 bar

Screw size: hexagonal screw with washers and self-locking nut galvanised
M 12 x 40 5.6

Torque: DN 250: 55-60 Nm; DN 300: 60-65 Nm; DN 400: 65-70 Nm

Installation instructions see page 60

**Rekord grip collar**

DN	A	D	L	item no.
40*	21	65	66	232413
50*	23	75	69	659550
70*	23	95	69	659551
100*	25	135	87	659552
125*	25	160	95	659553
150*	25	185	95	659554
200*	30	235	111	659555

Security collar with axial restraint for Rapid couplings

German Approval no.: ABP Nr. P-110002011

Material metal collar: galvanised steel with hardened claw insert

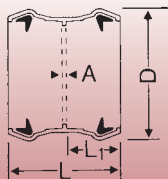
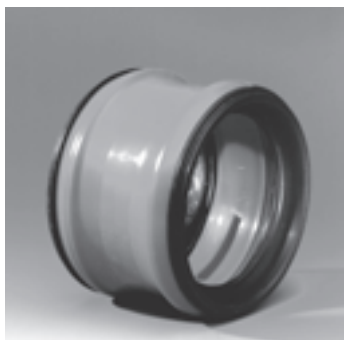
Material locking parts: guiding plates and threaded plates and screws galvanised steel,
yellow-chromated

Axial restraint: DN 40 - 100: up to 10 bar; DN 125 - 150: up to 5 bar; DN 200:
up to 3 bar

Screw size: DN 40 - 70: M 8; DN 100-150: M 10; DN 200: M 12

Torque: DN 40 - 70: 12-15 Nm; DN 100: 25-30 Nm; DN 125-150:
30-35 Nm; DN 200: 60-65 Nm

* obsolete model
Installation instructions see page 60

**SVE coupling**

DN	D	L	L ₁	A	item no.
50	77	60	29	2	659468
80	103,5	65,5	32	2	235483
100	134	82	39,5	3	659478
125	161	103	50	3	659479
150	186	103	50	3	659480
200	238	114	55,5	3	659481

Plug connector for soil installation

German Approval no.: Z-42.5-273

Material metal collar: Polypropylene-CO

Material locking parts: -

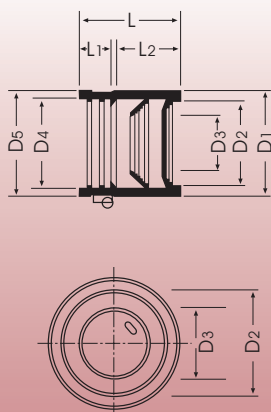
Material sealing: sealing lips NR-SBR

Axial restraint: -

Screw size: -

Torque: -

Installation instructions see page 61

**EK Düker 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	67,5	63	19	40	40-56	100270
70*	92	75	41	77	86,5	77	19	52,5	56-75	100271
80	108	75	41	81	91	83	20	52,5	56-75	236756
80**	108	90	57	81	91	83	20	55	75-90	235346
100	128	110	78	108	118	95	21	65	104-110	100272
125	145	125	90	132	145	103	26	72	125	100273

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

German Approval no.: Z-42.5-299

Material: EPDM

Material locking parts: worm thread clamp stainless steel 1.4016, screw chromated steel Cq15.

Axial restraint: -

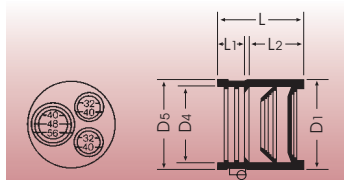
Screw size: cross-slit screw, width 7

Torque: ca. 2 Nm

Insertion lengths: DN 50: 42 mm; DN 70: 55 mm; DN 80: 55-60 mm;
DN 100: 65 mm; DN 125: 75 mm

* obsolete model Installation instructions see page 62

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

**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

German Approval no.: Z-42.5-240

Material: EPDM

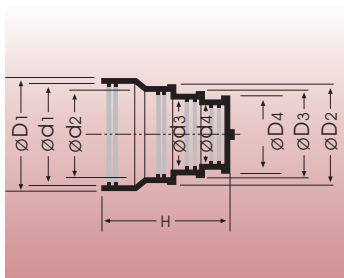
Material locking parts: worm thread clamp stainless steel 1.4016, screw galvanised steel

Axial restraint: -

Screw size: worm thread screw SW7

Torque: 5.0 + 0.5 Nm

Installation instructions see page 62

**Multiquick coupling**

DN	ØD ₁	ØD ₂	ØD ₃	ØD ₄	Ød ₁	Ød ₂	Ød ₃	Ød ₄	H	item no.
100x 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.

German Approval no.: Z-42.5-240

Material: EPDM

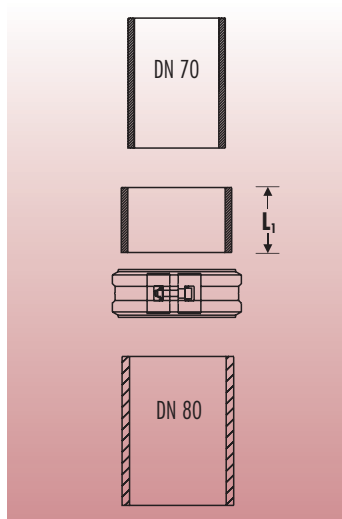
Material locking parts: worm thread clamps stainless steel 1.406, screw galvanised steel

Axial restraint: -

Screw size: worm thread screw SW7

Torque: 5.0 + 0.5 Nm

Installation instructions see page 63

**Transition coupling**

DN	D _≈	H _≈	L	L ₁	item no.
80	96	115	45	30	235347

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

Material metal collar: W2, stabilised stainless steel, 14510/11 as per EN 10088

Material locking parts: lock 1.4301, screw, washer, square nut galvanised, yellow-chromated

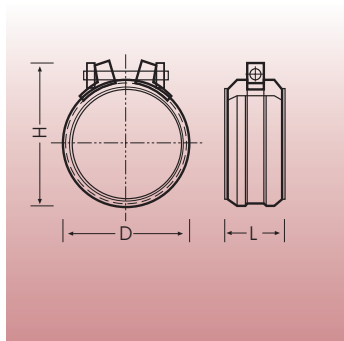
Material sealing: EPDM

Axial restraint: -

Screw size: M-8-screw with 6 mm hexagon socket

Torque: 10-20 Nm

Installation instructions see page 64

**Ductile cast iron coupling**

DN	H	D	L1	L2	kg	item no.
50*	79	111	50	68	0,6	235880
70*	89	132	50	68	0,7	235881
100*	134	168	60	78	1,1	235882
150*	184	230	71	89	1,9	235883
200*	231	278	82	100	3,5	235884

Ductile iron coupling with integrated electrical continuity screws

Material metal collar: ductile cast iron EN-GJS-400-15 (GGG 40)

Material locking parts: nuts and bolts galvanised

Material sealing: EPDM

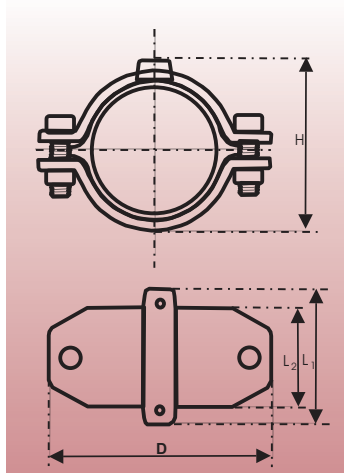
Axial restraint: -

Screw size: cylinder screw M8 with hexagonal socket 8.8

Torque: ca. 20 Nm

*upon request

Installation instructions see page 58



SML couplings - range of application for waste water, rain water, mixed water, ventilation ducts										
		axial restraint up to ... bar		in the building	in concrete	in the soil	outside of buildings	flat roof drainage (siphonic system)	connection to plastic roof drain	connection to plastic pipes
		DN								
1.	Dükorapid® coupling	40 - 200*	0,5							
2.	MLetec® coupling	100 - 150	1							
3.	Rapid-Inox coupling CrNi steel	50 - 200* / 250 - 300	0,5 / 0,3							
4.	MLetec® Rapid Inox coupling	100 - 150	1							
5.	Düker CV coupling	50 - 200	–			*				
6.	CE coupling CrNi steel	50 - 300	–			*				
7.	Düker CE dual ring coupling	400	–							
8.	Connect-F Inox coupling	100 - 600	–							
9.	Connect-G Inox coupling	50 - 400 / 500 / 600	10 / 6 / 4							
10.	SVE coupling	50 -200	–							
11.	EK Düker Fix coupling EPDM	50 -125	–							
12.	Multiquick coupling	50 -100	–			*				
13.	Kombi grip	50 - 100 / 125 - 150 / 200	10 / 5 / 3							
14.	Rekord grip* for Rapid coupling	40 - 100 / 125 - 150 / 200	10 / 5 / 3			*				
15.	CV grip* for CV and CD coupling	50 - 200 / 250 - 300	3 / 1			*				
16.	Düker grip für CE dual ring coupling	250 - 400	1			*				

* DN200: grip collars
at changes of direction

* with corrosion protec-
tion, e.g. tar wrapping

* DN200: grip collars
at changes of direction

* with corrosion protec-
tion, e.g. tar wrapping

DEUTSCHES INSTITUT FÜR BAUTECHNIK

Anstalt des öffentlichen Rechts

10629 Berlin, 8. Juli 1999
 Kolonnenstraße 30 L
 Telefon: (0 30) 7 87 30 - 276
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 Geschäft: (0 30) 7 87 30 - 230

Allgemeine bauaufsichtliche Zulassung

Zulassungsnummer:

Z-42.5-291

Antragsteller:

Eisenwerke Friedr. Wilh. Dörner
 GmbH & Co.
 Wittenburger Straße 10
 97753 Kalschach/Mün.

Zulassungsgegenstand:

Spannbänder mit der Bezeichnung "Dübelapex" in den
 Nennweiten DN 50 bis DN 150 für die Hausinstallation

Dauerdauer bis:

30. Juni 2004

Der oben genannte Zulassungsgegenstand wird hiermit allgemein bauaufsichtlich zugelassen.
 Diese allgemeine bauaufsichtliche Zulassung enthält sechs Seiten und sieben Anlagen.



Prüfamt für Grundstücksentwässerungsgegenstände
 beim Landes-Bauverordnungsamt für neue Bauteile und Bauteile
 Bauteile beim Bauamt für Bau- und Wohnungswesen Berlin

1 Berlin 30, den 30. 11. 1997
 Potsdamer Straße 580/582
 Telefon 87 05 91 App. 6129

DIN 1041 5.1 - 2102 - 67

Prüfbescheid

Prüfzeichen:

PA4
 1559

Gummimuffe

Spannbänder

Firma Friedr. Wilh. Dörner GmbH & Co.

Berlin, den 3.2. NOV. 1997
 Der Vorsitzende



W. Lange
 Bauleiter

Mounting and Installation instructions for Düker couplings

Requirements as per EN 12056

Waste water and ventilation pipelines are on principle sloping pipelines without interior pressure. However it is not impossible for pressure to develop in the pipelines under certain circumstances. Regarding pressure tightness, EN 12056 says generally:

EN 12056-1, Jan. 01, pt. 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.

Furthermore EN 12056-5, pt. 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.

EN 877 – requirements on the product

Today requirements as to the tightness of a system are fixed in the product standards. For Düker cast iron drainage pipe systems the relevant standard is EN 877. For pipelines up to DN 200 inside of buildings, the test requirement is water tightness up to 5 bar. However, this does not mean that all couplings can be used for pressures up to 5 bar. The reason is that the tests are carried out in a fixed test arrangement, without axial forces acting on the coupling.

For the application it is important to know up to what pressure the coupling is thrust-resistant (resistant to axial forces) or what measures can be taken to compensate for axial forces, e.g. fixings, grip collars, abutments etc.

The table on page 53 gives you the necessary data.

Installation instructions and admissible pressure loads on Düker SML couplings

Safe fixing or thrust-resistant couplings are particularly important for wastewater pipelines that can be subject to a higher interior pressure than 0.5 bar, e.g.

1. pipes in back water areas,
2. rain water pipes within buildings,
3. waste water pipes which run through more than one basement without further outlet,
4. pressure pipelines at waste water pumps.

Particularly on pipelines below the back water level there can be pressures during use, e.g. a backflow from the canal, which can make the pipe couplings slip. Therefore pipelines below the back water level must be treated as follows:

Waste water up to 0.5 bar in the back water area

- no additional measures on Düker Rapid couplings DN 100 to DN 150
- securing changes of direction on Düker Rapid couplings DN 200 with corresponding Düker grip collars

Waste water above 0.5 bar in the back water area

- all Düker couplings are to be secured with corresponding grip collars
- waste water pipelines connected to a mixed water sewer must also be secured with grip collars

Gravity drainage rain water pipelines

EN 12056-3, pt. 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.

Resistance to a possible obstruction of a rain water, collective or down pipe and therefore pressure loads corresponding to the height of the building is a new requirement. A backflow up to the upper building edge is still an exception. According to our experience it is sufficient to secure pipelines below the back water level with grip collars.

Down pipes above the back water area normally do not need securing with grip collars. In vertical rain water pipes that are open above, the water column cannot exert axial forces as long as the pipes are secured against a possible sideways movement. However, changes of direction must be secured with grip collars.

Collection and connection pipelines below the roof need not be secured with grip collars.

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

Pressure pipelines at waste water pumps

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

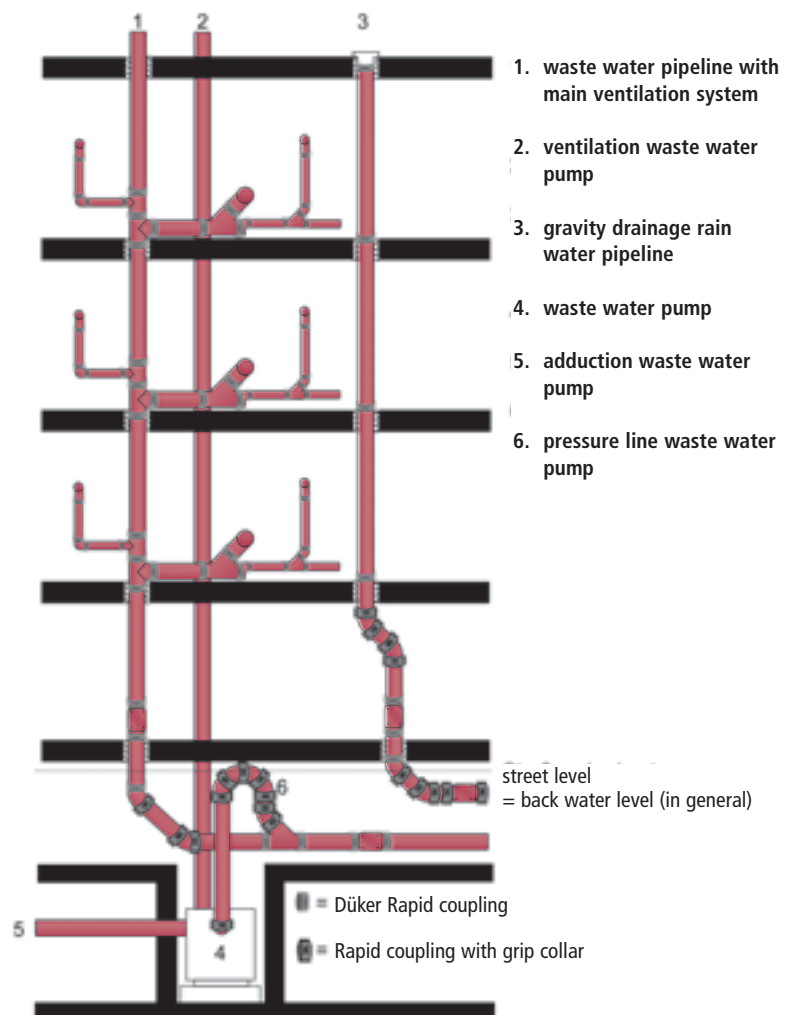
bar pressure load is that when the pump is switched off, there are often pressure peaks that can be much higher than the normal pump pressure.

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.

The installation of pipelines must be in accordance with the Düker fixing and installation guidelines.



Dükorapid® coupling / Rapid Inox coupling / MLetec® Rapid / MLetec® Rapid Inox

Dükorapid® Rapid Inox



Installation instructions



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



MLetec® Rapid MLetec® Rapid Inox



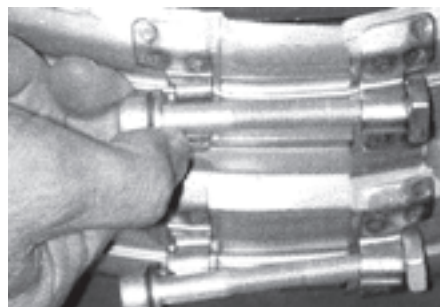
2. Push the next pipe or fitting into the other end of the coupling.



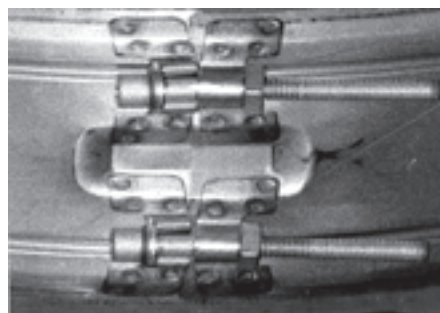
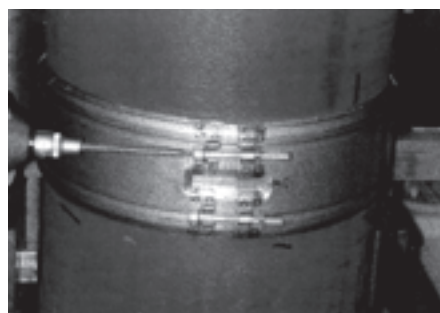
3. Tighten the hexagon socket screw with a screw wrench, ratchet or a customary powered screw driver.
Dükorapid® DN 50-150: 10 – 20 Nm
Dükorapid® DN 40 and 200, Rapid Inox: until both fastening heads come together
MLetec Rapid®: 15 – 25 Nm

Rapid Inox DN 250-300

1. Install sealing collar as shown in 1-3 of the installation instruction CV/CE (see next page)



2. Insert screw heads with the attached washer rings into the fastening heads



3. Tighten the two hexagon socket screws with a screw wrench, ratchet or a powered impact screw driver alternately and evenly until the two fastening heads come together.

CV coupling / CE coupling / Ductile iron coupling

Installation Instructions



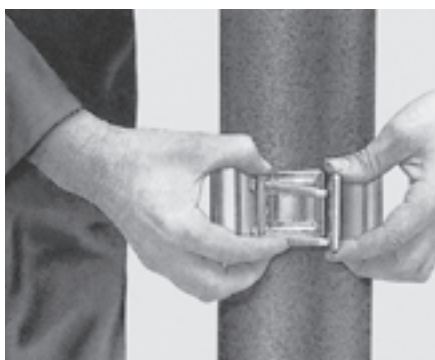
1 First of all, push the sealing collar onto the lower pipe end so that the inner sealing ring rests on top of the cut edge of the pipe.



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 **CV/CE coupling:** Wrap the metal sleeve around the sealing collar and alternately tighten both bolts so that they are even and handtight. The plates must push together parallel in order to avoid deformation.



4 **Ductile iron coupling:** Place the metal halves around the sealing collar. Watch out that the electrical continuity screws are loosened and drawn back and that the notch in the top half fits over the corresponding rubber lip. Alternately tighten the bolts.



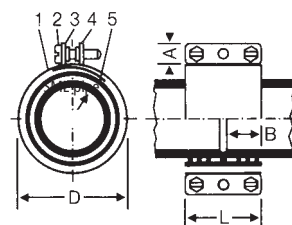
5 **Ductile iron coupling:** If necessary tighten the electrical continuity screws on both sides handtight.

CV/CE coupling



Metal collar in stabilised chromium steel, material no 1.4510/11 as per EN 10088. Galvanised fastening parts. Sealing collar in EPDM.

Special version:
CE coupling. Metal collar and fastening parts in chromium nickel steel X-5 CrNi 18 9, material no. 1.4301 as per EN 10088.



- 1 metal collar
- 2 slit hexagon screw
(DN 50-80 M6, DN 100-300 M8)
- 3 guiding plate
- 4 threaded plate
- 5 sealing collar

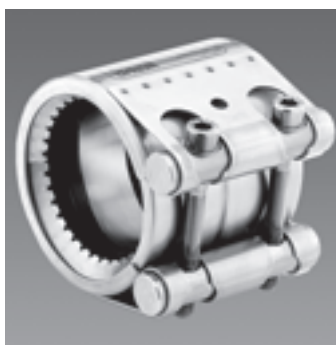
The coupling consists of two parts:
the elastic sealing collar in EPDM and a chromium steel metal collar.

This coupling is resistant to ageing, boiling water, corrosion, it is expansion-safe, and sound-absorbing. It allows installation in the smallest of areas – even where there is no more working with push-in couplings.

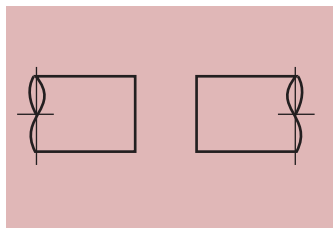
Connect-F Inox/Connect-G Inox



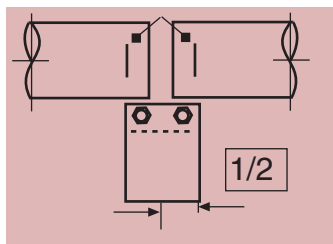
Connect-F: not resistant to axial forces; pressure-resistant up to 10 bar if the axial forces are absorbed by anchorage.



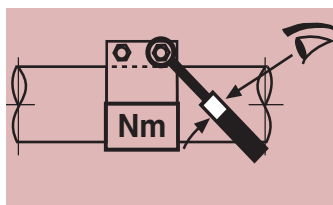
Connect-G: resistant to axial forces up to 10 bar



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



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



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).

Düker Kombi grip collar EK / CV grip collar / Düker grip collar / Rekord grip collar


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



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



Rekord grip collar
Security collar with axial restraint for Rapid 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 separation due to internal pressure without need of a special fastening to the solidium at the connections. If pressures up to 0.5 bar are to be expected, it is sufficient to protect the coupling at changes of direction, e.g. with a grip collar, or to use Rapid couplings.

If pressures of more than 0.5 bar are to be expected, all Rapid, CV and CE couplings in the pressure-stressed areas are to be secured with grip collars unless the pipe components are otherwise secured axially force-locked.

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 in the table for each screw, even if the fastening parts already touch at inferior torques.

item	DN	axial restraint up to ... bar	no. of segments	screws	screw dimension	torque Nm
Düker Kombi grip collar EK	40-70	10	2	round head screws	M 8x30	23-25
	80	10	2	with hexagon socket	M 8x30	25-28
	100	10	2	with washers*	M 10x35	35-40
	125-150	5	2		M 10x35	40-60
	200	3	3	hexagonal screw with washers* and self-locking nut	M 10x30	50-65
CV grip collar	50-70	3	2	hexagonal screws and nuts with washers*	M 8	10-12
	100-150	3	3		M 10	18-20
	200	3	3		M 10	25-30
	250-300	3	3		M 12	55-60
Düker grip collar	250	3	3	hexagonal screw with washers* and self-locking nut	M 12	55-60
	300	3	3		M 12	60-65
	400	3	4		M 12	65-70
Rekord grip collar	40-70	10	2	hexagon socket screws	M 8	12-15
	100	10	2		M 10	25-30
	125-150	5	2		M 10	30-35
	200	3	2		M 12	60-65

* important: do not forget to insert the washers under the screw heads and nuts!

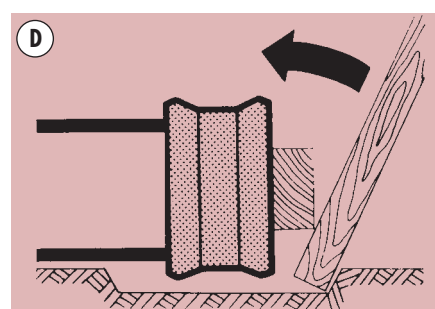
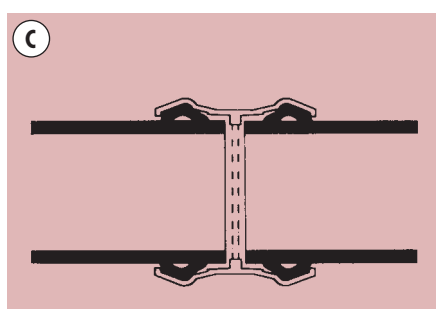
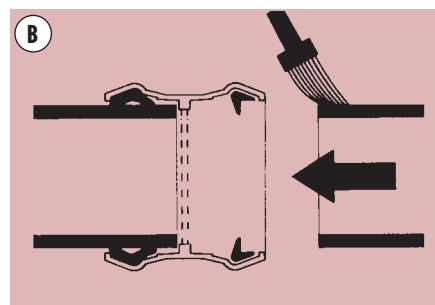
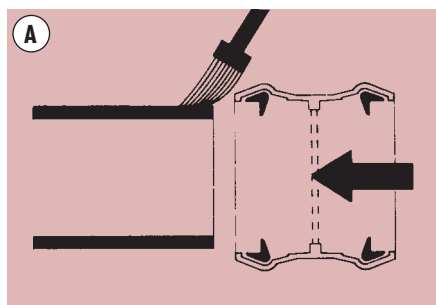
SVE coupling



Push-in coupling for underground pipes. Double socket in brown-coloured polypropylene-CO with two sealing lips in NR-SBR.

Installation instruction

- 1** Make sure that the sealing rings completely lie in the bead evenly
- 2** Clean pipes and fittings at the connection areas
- 3** Paint the ends of the pipes with a lubricant for elastomere seals (soap solution and dishwashing detergents but no oil or grease)
- 4** Place the push-in coupling onto the cut edge of the pipe and push on the pipe against the stop by jerks and jolts and gentle tilting.
- 5** Also paint the connecting pipe with a lubricant and push against the stop in the same way as described above.
- 6** A spade may be of help as a lever for installation in a pipe trench. A squared timber laid across the pipe outlet strengthens the transverse load in axial direction.
- 7** The fittings may be equipped with the necessary couplings before installation. This makes final installation easier and faster.

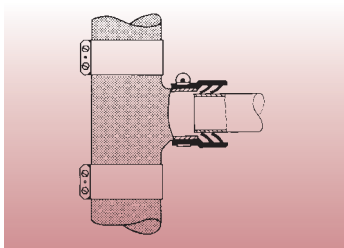


Attention!

Straight pipelines must be covered with soil in order to prevent lateral movement. At changes of direction and branches, concrete anchorage is required to withstand internal pressure (during pressure testing and normal operation).

Beware to choose the correct cast iron pipe material for underground installation: a zinc-coated pipe system (TML, MLB or MLK), as EN 877 only allows pipes with adequate outside coating to be installed in the soil.

ED Düker Fix coupling / Konfix Multi coupling



EK Düker Fix coupling in EPDM; worm thread clamp in chromium steel 1.4016; for connecting pipes in other materials to SML.

SML pipe DN	connecting pipe outside Ø	insertion depth
50	40–56 mm	42
70	56–75 mm	55
80	56–75 mm	55
80	75–90 mm	60
100	104–110 mm	65
125	125 mm	75

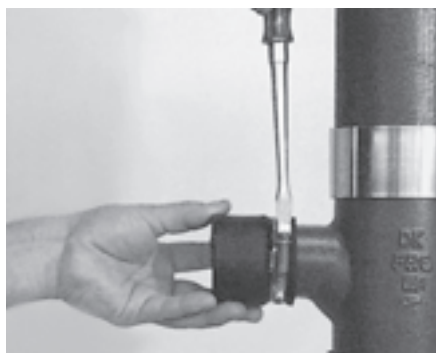


Konfix Multi coupling

With the EK Düker 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 EK Düker Fix couplings DN 100 and DN 125 are especially suited for connecting plastic roof drains.

Installation instructions



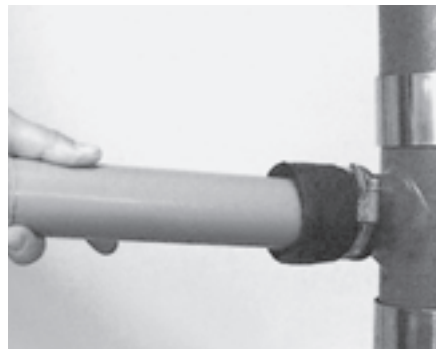
1 Push the EK Düker Fix coupling with opened clamp onto the SML pipe against the stop, then secure to the pipe with the clamp.



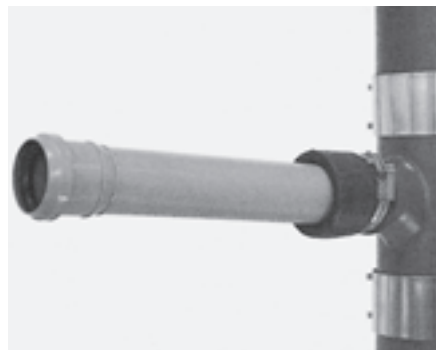
2 Grip the projecting rubber neck with a pair of tongs and carefully pull it out so that the opening is set free.

(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)



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



4 The plastic pipe used only illustrates the installation process. Any other material without special adapting pieces can be connected to the SML pipe system with the EK Düker Fix coupling. Attention: Please observe the table of acceptable outside diameters of pipes.

Attention!

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

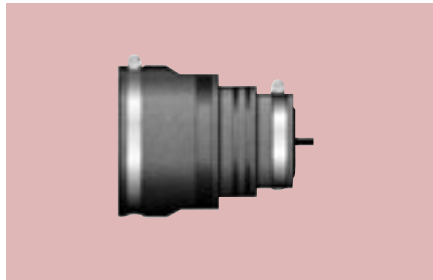
Multiquick coupling



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.

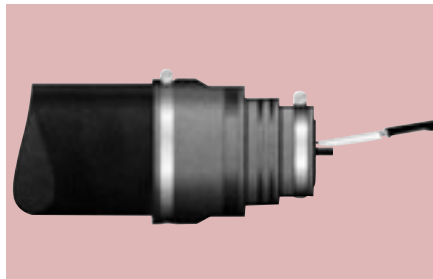


Push the open end of the Multiquick coupling over the cast iron pipe end and position the worm thread clamp in the groove intended for it. Then tighten the worm thread clamp without displacing it. Use a knife to cut open the closed side or to cut the coupling back according to the outer diameter of the connecting pipe. Cut the coupling in front of the step to the required diameter.

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!

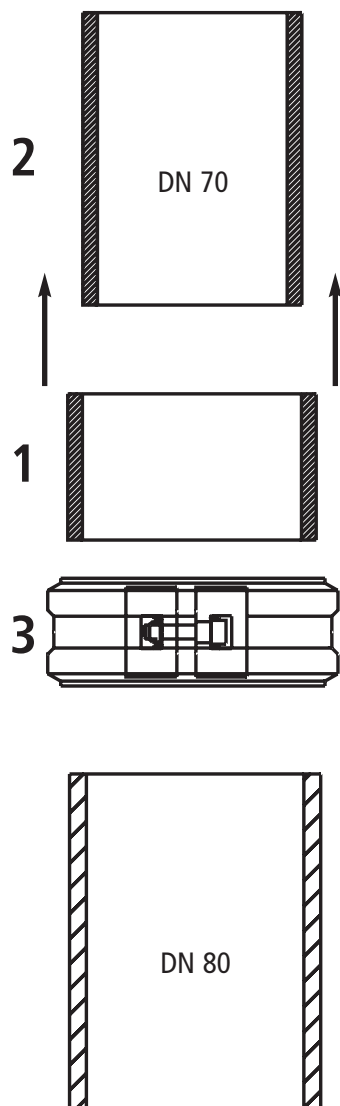
The connecting pipe must be fixed in order to avoid slipping due to internal pressure.



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.



Transition coupling DN 70 – DN 80



- 1** Push the Dükorapid® coupling
■ DN 80 onto the SML pipe or fitting
DN 80



- 3** Push SML pipe DN 70 with the hose
■ into the coupling DN 80



- 2** Push hose 74/79 onto the SML pipe
■ or fitting DN 70



- 4** Tighten the screw on the Dükorapid®
■ coupling (10 – 20 Nm)

Cutting pipes

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

1. Belt saw

Portable belt saws cut pipes perfectly



2. Powered disc cutter

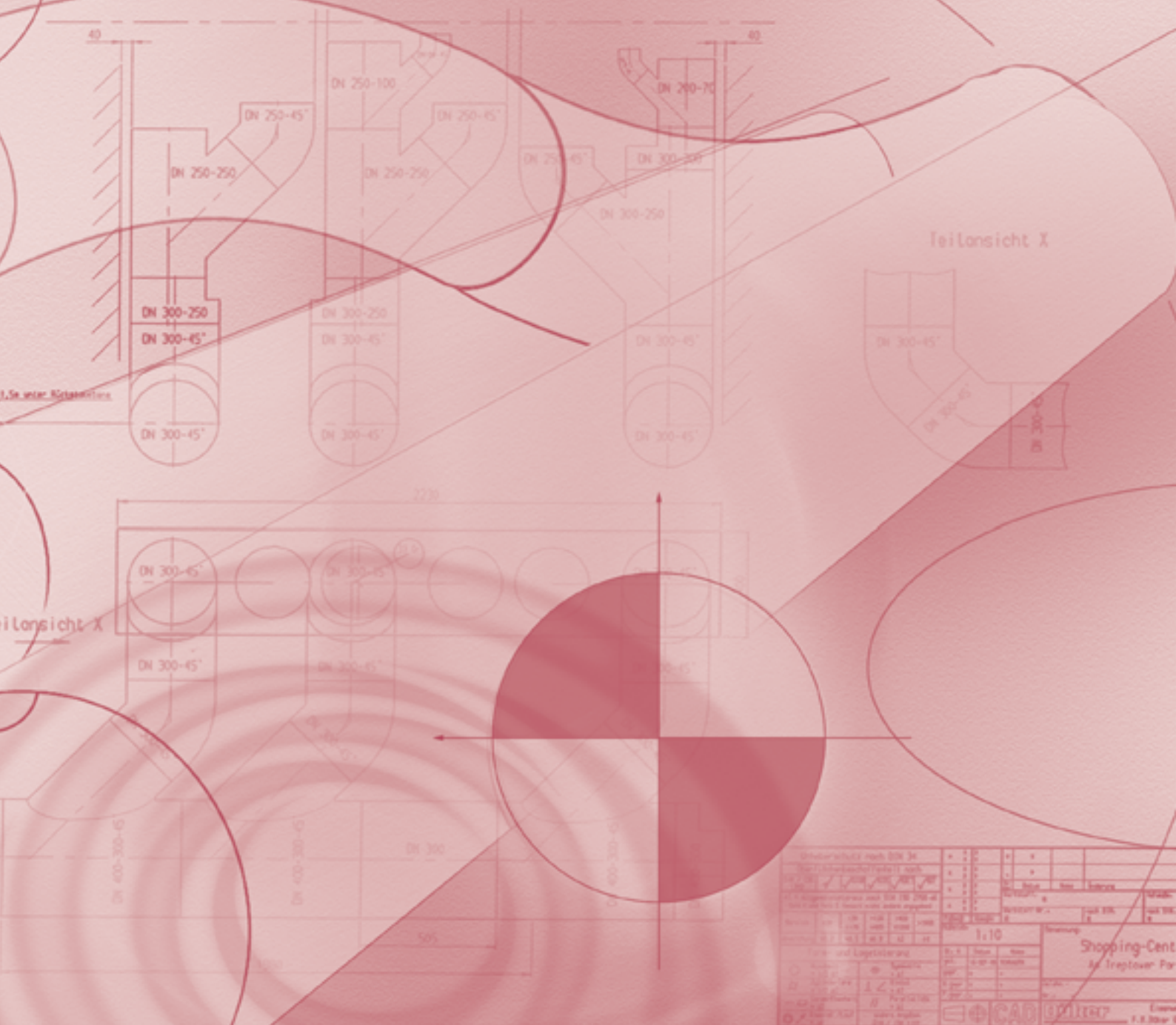
The best results with a powered disc cutter can be achieved with a disc appropriate for cast iron and a guidance as shown



3. Wheel cutter

For use without electricity





Imbedding cast iron pipes in concrete

On principle, cast iron drainage pipes can be imbedded in concrete. The cast iron expansion coefficient practically corresponds to that of concrete. As concrete passivates iron, no special protection against corrosion is necessary for SML pipelines as well as couplings. The standard single screw or twin screw couplings can be used. The pipes must be surrounded by 5 cm concrete all around. When imbedding the pipeline in concrete and during prior pressure testing of the pipeline, considerable forces may occur. In addition, when imbedding in base plates usually only little declivity is available and therefore the pipeline must be perfectly adjusted. The arising forces (which would be the weight including the water filling) should be taken in with brackets and transferred to the lower concrete, soil or the intended reinforcement. Use of threaded rods simplifies the arrangement of the usually short descent. The pipeline will tend to float to the surface when pouring in concrete. Therefore it must be secured with brackets. We recommend to fill the pipeline with water before imbedding it in concrete. If SML pipelines are imbedded in waterproof concrete bottoms, it is usually expected that the concrete must surround the pipe all around with 20 cm. If many fittings are strung together and therefore bracket fastening is not possible, then grip collars will have to be used.

Imbedding SML main pipelines in the concrete bottom is recommended for:

1. high groundwater level.

Advantage:

- leading pipes through waterproof floor plates is reduced.
- the pipeline itself is protected against any possibly aggressive groundwater.

2. non-bearing ground.

Advantage:

- not having to carry out the necessary floor exchange or floor improvement and saving costly constructions for fastening of the pipelines below the floor plate.

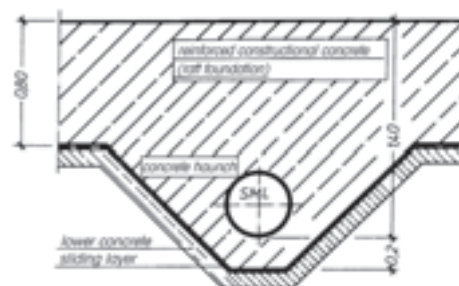
If the thickness of the concrete slab is insufficient for installing the pipeline, the concrete slab must be reinforced at this point with a concrete haunch.

Expansion gap

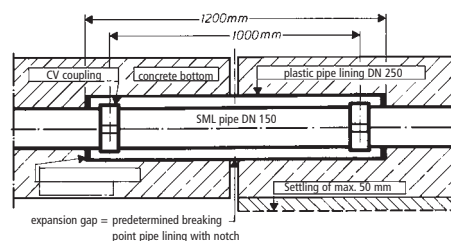
In order to avoid differences in settling, joints made up of pipe cuttings (0.5 - 1.0 m) are arranged at the expansion gaps. These pipe cuttings are placed movable with help of a pipe lining or a polystyrene casing.

According to EN 877, the permitted angling of SML couplings for the nominal widths is approximately:
up to DN 200 3 cm/m
DN 250 - 500 1.5 cm/m overall length.

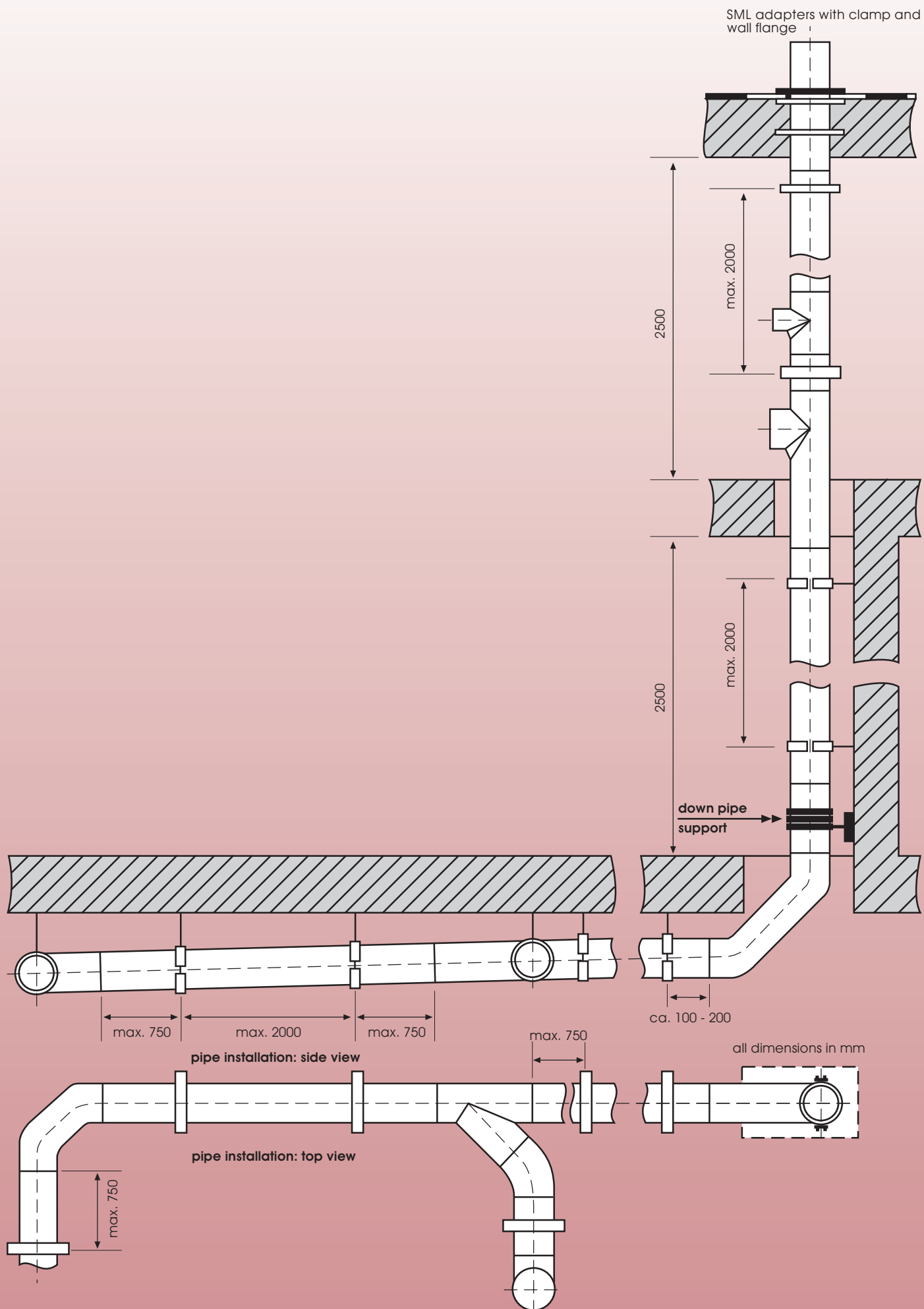
A predetermined breaking point (notched or cut through) is to be added to the pipe lining where the expansion gap is. Trickling of concrete into the cut-through pipe lining should be avoided by sealing with adhesive tape. It should also be sufficiently fastened in order to avoid slipping.



Haunch in a concrete slab



Expansion gap



Fixing SML pipes

General rules:

The distances of the fixings should be even and should 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 eventually 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.

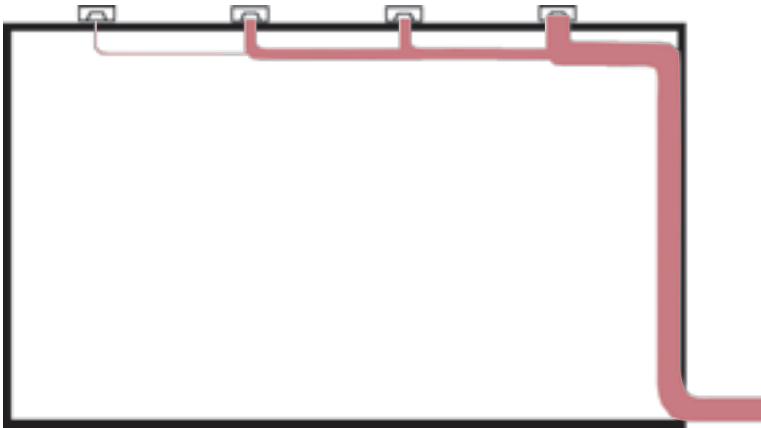
SML down pipe supports should be fastened as close to the wall as possible in order to avoid large bending moment to the brackets. Adequate supports with brackets should be used for larger wall distances.

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.

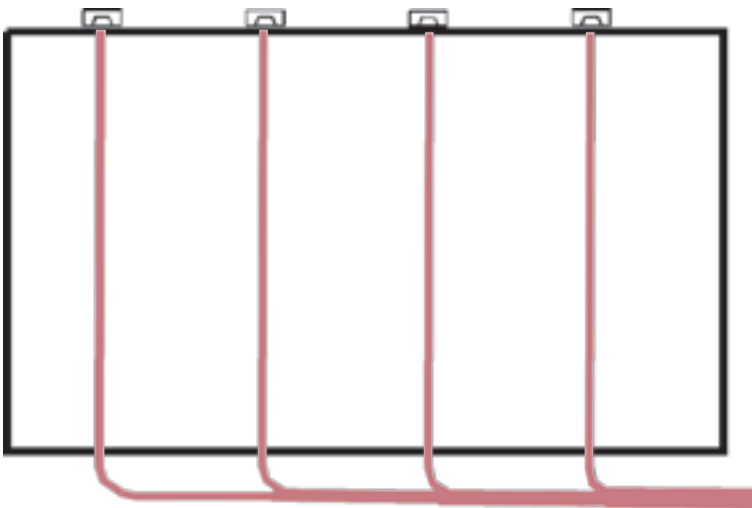
In general we recommend to install a down pipe support in down pipes of DN 100 or larger above the basement ceiling, and further down pipe supports in intervals of 5 storeys.

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 53).

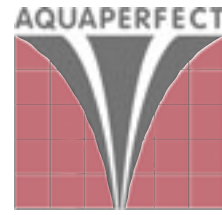
Aquaperfect® Siphonic flat roof drainage



Aquaperfect® siphonic system



Gravity drainage



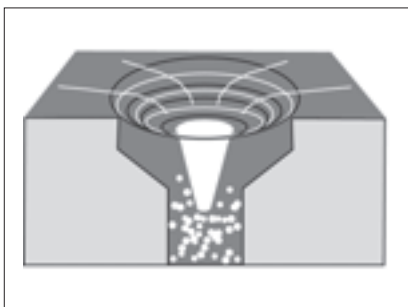
Differences to gravity drainage

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.

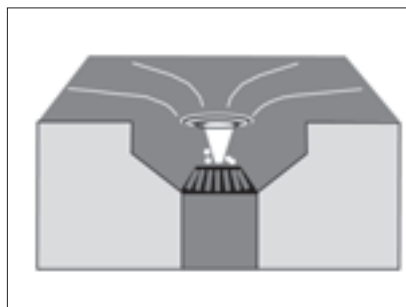
In the Aquaperfect® siphonic system, starting at a certain rain water quantity (calculation rainfall quantity), the pipeline works without air and with negative pressure. The intake of air is avoided by an air sieve in the roof drain, which prevents the forming of a vortex (Coriolis force).

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 self-cleaning effect. Smaller nominal widths, inferior material requirements and the avoidance of pipe trenches and base pipelines save cost and installation time.



Normal roof drain



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

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)
- **VDI 3806** (German regulation for siphonic roof drainage)
- **EN 1253** (roof drains)

Functioning

The pressure height corresponds to the difference in height between the roof surface and 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 0.7 m/s, whereas it may not surpass 2.5 m/s in the relaxation area.

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 two 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.

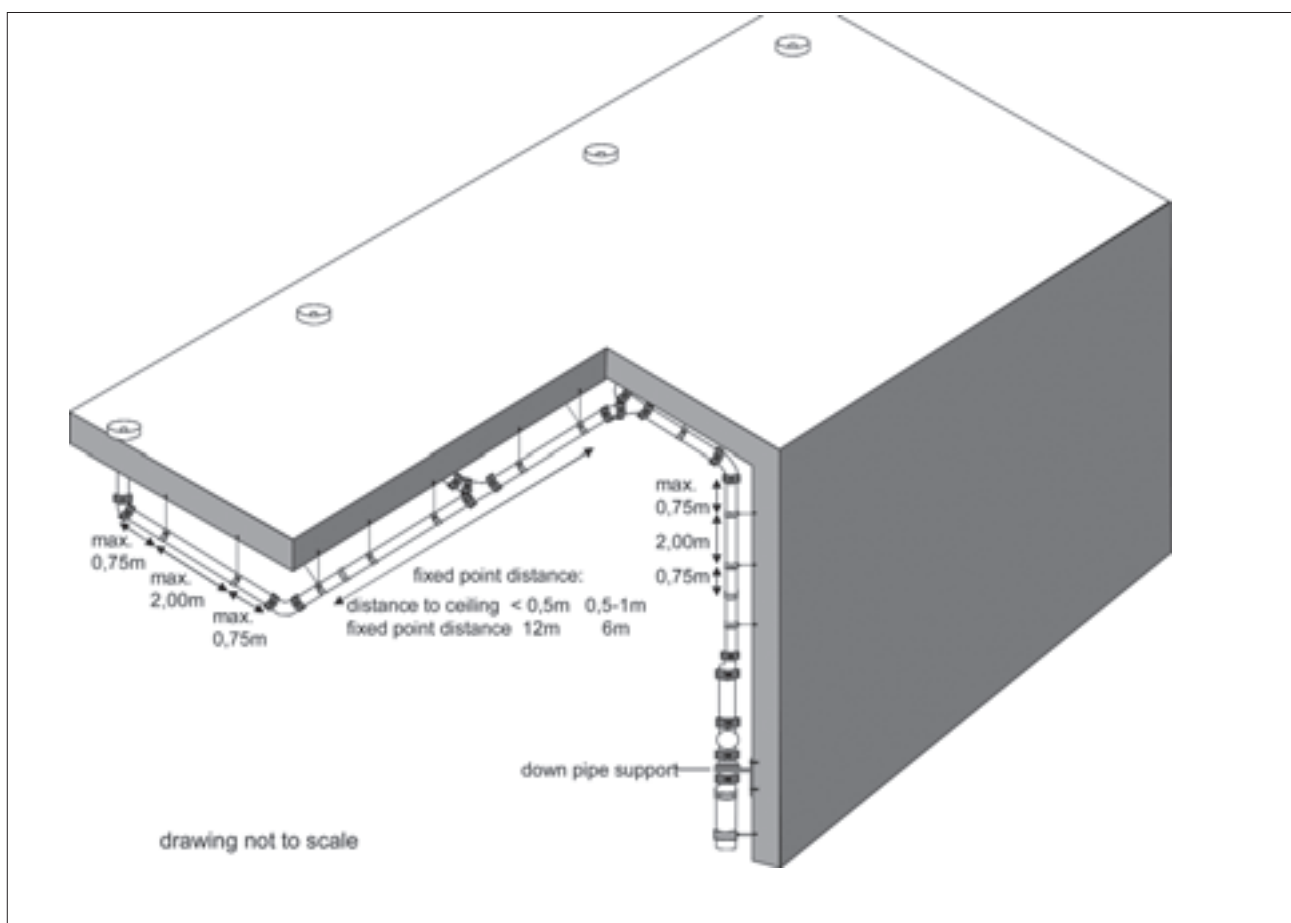
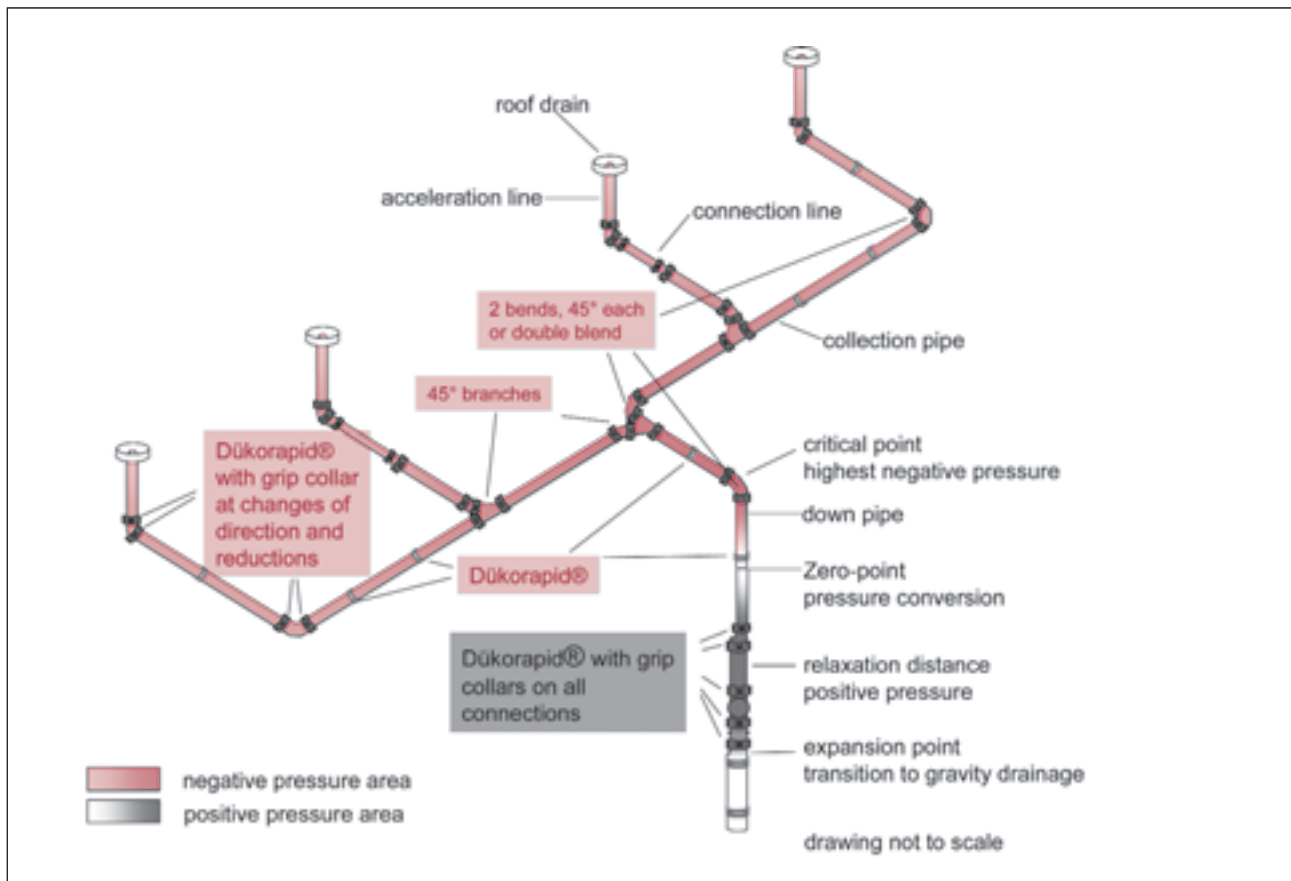
Larger building projects practically have to be planned with an appropriate computer software. The Aquaperfect® partners – Düker and Aco Passavant – offer you the service of planning and calculating siphonic systems for specific building projects. The specifier receives:

- pipeline section table and complete hydraulic calculation
- list of materials
- pipeline drawing
- specifying text

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, section 9.2. 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 or bends with steadying distance. Only at the end of the acceleration line (below the roof drain), 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 68/69 are to be observed. Fixed-point devices are to be installed with an inbetween 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. We recommend using the preinsulated compound pipe system VML.

Start-off and maintenance

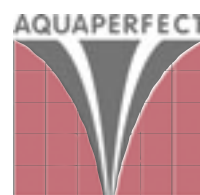
After installation the roof surface is to be cleaned thoroughly.

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.

Contact

For the calculation of Aquaperfect® siphonic systems and in case of technical questions please contact our hotline at +49 9353 791-280.



FLOW CAPACITIES

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

SML	DN 70 d _i = 71		DN 80 d _i = 75		DN 100 d _i = 103		DN 125 d _i = 127		DN 150 d _i = 152		DN 200 d _i = 200		DN 250 d _i = 263		DN 300 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	0,8	0,4	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	0,9	0,4	1,0	0,4	0,6	0,6	4,1	0,6	6,6	0,7	13,7	0,9	28,3	1,0	45,3	1,2
0,7	0,9	0,5	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	1,0	0,5	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	1,1	0,5	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	1,1	0,6	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	1,2	0,6	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	1,2	0,6	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	1,3	0,6	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	1,3	0,7	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	1,4	0,7	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	1,4	0,7	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	1,5	0,7	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	1,5	0,8	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	1,5	0,8	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	1,6	0,8	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	1,8	0,9	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	1,9	1,0	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 70 d _i = 71		DN 80 d _i = 75		DN 100 d _i = 103		DN 125 d _i = 127		DN 150 d _i = 152		DN 200 d _i = 200		DN 250 d _i = 263		DN 300 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	1,3	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	1,4	0,5	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	1,6	0,5	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	1,7	0,6	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	1,8	0,6	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	1,9	0,6	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	2,0	0,7	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	2,0	0,7	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	2,1	0,7	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	2,2	0,7	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	2,3	0,8	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	2,4	0,8	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	2,4	0,8	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	2,5	0,8	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	2,6	0,9	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	2,7	0,9	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	3,0	1,0	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	3,3	1,1	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 70 d _i = 71		DN 80 d _i = 75		DN 100 d _i = 103		DN 125 d _i = 127		DN 150 d _i = 152		DN 200 d _i = 200		DN 250 d _i = 263		DN 300 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	1,6	0,4	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	1,7	0,4	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	1,9	0,5	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	2,0	0,5	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	2,1	0,5	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	2,2	0,6	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	2,3	0,6	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	2,4	0,6	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	2,5	0,6	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	2,6	0,7	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	2,7	0,7	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	2,8	0,7	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	2,9	0,7	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	3,0	0,8	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	3,1	0,8	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	3,2	0,8	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	3,5	0,9	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	3,9	1,0	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

Selection of project references for Düker Cast Iron Drainage Pipe Systems

Project Name	Town	Country
Festspielhaus Theatre	St. Pölten	Austria
Millennium Tower	Vienna	Austria
Hilton Hotel	Sofia	Bulgaria
Four Seasons Hotel	Prague	Czech Republic
Hypo Vereins Bank	Prague	Czech Republic
Marriot Hotel	Prague	Czech Republic
Fisketorvet Center	Copenhagen	Denmark
Opera House	Helsinki	Finland
Scandic Marski Hotel	Helsinki	Finland
BMW	Dingolfing	Germany
Multi function stadium	Duesseldorf	Germany
Commerzbank	Frankfurt	Germany
Dorint Hotel Riem Arcaden	Munich	Germany
Audi	Neckarsulm	Germany
Allianz HVU	Unterfoehring	Germany
Volkswagen Shed 55	Wolfsburg	Germany
Spada Airport	Athens	Greece
Kowloon station	Hong Kong	Hong Kong
Sham Mong Road Housing Project	Hong Kong	Hong Kong
Shangri-La Hotel	Jakarta	Indonesia
King Hussein Centre	Amman	Jordan
Rijks Hospital	Amsterdam	Netherlands
Gardermoen Airport	Oslo	Norway
University	Tromsø	Norway
Galeria Domenikanska	Breslaw	Poland
Polski Telekom Building	Warsaw	Poland
Westin Hotel	Warsaw	Poland
Benfica Stadium of Light	Lisbon	Portugal
Ponte 25 de Abril	Lisbon	Portugal
World Trade Center	Shenzen	Republic China
Baltyskaja Hotel	St. Petersburg	Russia
German Center	Singapore	Singapore
Novena Square	Singapore	Singapore
El Corte Inglés	Linares	Spain
Växjö Hospital	Växjö	Sweden
Yuan's General Hospital	Kaohsiung	Taiwan
Taichung Tower	Taichung	Taiwan
Sheraton Voyager Hotel	Antalya	Turkey
Tower No. 1 Accommodation Block	Dubai	UAE
Birmingham Airport	Birmingham	UK
Children's Hospital	Bristol	UK
Millennium Stadium	Cardiff	UK
Houses of Parliament	London	UK



German centre, Singapore



Millennium Stadium, Cardiff, UK



Scandic Marski Hotel, Helsinki, Finland



Westin Hotel, Warsaw, Poland



Tower No. 1, Dubai, UAE



Commerzbank Frankfurt, Germany



Ponte 25 de Abril, Lisbon, Portugal



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