DRAINAGE TECHNOLOGY

TML Specifier's Manual

Düker cast iron drainage pipe system
for building and site drainage
in underground applications

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TML cast iron drainage pipe system

The manufacture of cast iron drainage pipes, fittings and corresponding couplings is based primarily on the European standard EN 877. Apart from the building drainage, they are also used for site drainage and the connection to the public sewage system. For these systems, which are often laid underground, EN 877 contains specific regulations for the outside coating of pipes and fittings and for the metal collars of couplings. The Düker TML drainage pipe systems fulfils all of these requirements.

TML coating

The material as well as the inside coating of TML pipes correspond to those of the well-known Düker SML pipes:

- material: gray cast iron with flake graphite type at least EN-GJL-150 as per EN 1561
- inside coating: fully cross-linked two-components epoxy coating with resistance that surpasses the requirements of EN 877 by far

The outside coating of TML pipes corresponds to EN 877:

- thermal spray zinc coating, surface density at least 130 g/m²
- finishing paint compatible with zinc, brown colour

TML fittings receive a high-quality epoxy powder coating in brown colour inside and out.

Planning and installation

Planning and installation of TML pipelines follow the technical regulations and stipulations of

- EN 12056 Gravity drainage systems inside buildings
- EN 752 Drain and sewer systems outside buildings
- EN 1610 Construction and testing of drains and sewers

and other European, national or local standards and regulations.

CE conformity

In 2008, the relevant product standard EN 877 for cast iron drainage pipe systems became a so-called harmonized standard. This means that it now contains an annex ZA with details about the product characteristics and testing required for CE marking.

The manufacturers are now required to apply the CE marking to their products as per EN 877 in order to confirm the product's suitability for the free trade inside the EU. The CE marking replaces certain national marks such as the German "Ü" conformity mark.

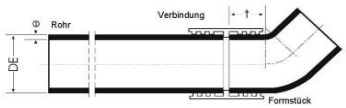
The application of the CE marking must be based on a Declaration of Performance issued by the manufacturer. This Declaration of Performance (DOP) is based on the European Construction Products Regulation (CPR). The Düker DOPs can be downloaded at www.dueker.de/dop.

However, and unlike former "Ü" mark, the CE marking on cast iron drainage pipe products is not based on any third-party quality tests. All tests (with the exception of a fire test for the European classification "non-combustible") are carried out and confirmed only by the manufacturer himself. For this product, the CE marking is not an effective statement about product quality.

GEG quality association cast iron drainage technology

In order 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 a number of tests defined in the RAL GEG quality directives.

Those awarded with the RAL GEG quality label are subject to an initial test as well as regular third-party surveillance by an authorized institute. The requirements for this label are considerably higher than those of EN 877, particularly regarding the resistance of the inside coating. Unlike the CE marking, this quality label guarantees users a permanently high product quality.



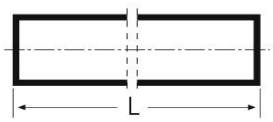
TML -Pipes and Fittings (DIN EN 877 and 19 522)

nominal diameter	exterior Ø		wall thickness pipes and fittings		admissible interior pressure		insertion lengths (sealing zone)	pipe weight empty	surface ca m²
			nomi-	mini-	pipes up	fittings*			
DN	DE	tolerance	nal	mum	to	up to	t	ca.kg/m	per m
100	110	+2/-1	3,5	3,0	10 bar	10 bar	40	8,5	0,35
125	135	+2/-2	4,0	3,5	10 bar	10 bar	45	11,7	0,42
150	160	+2/-2	4,0	3,5	10 bar	5 bar	50	14,3	0,50
200	210	+2,5/-2,5	5,0	4,0	10 bar	5 bar	60	23,8	0,65

* except inspection pipes and connection piedes

All dimensions in mm

Pipes

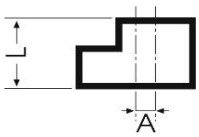


TML -pipe DIN 19522 - DN 100x3000

L= 3000mm

DN	kg	item no.
100	25,6	232055
125	35,0	232056
150	42,8	232057
200	71,5	232058

Reducers (R) (adapters)



TML -reducer DIN 19522 - 125 x 100 R

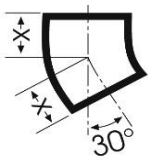
DN	A	L	kg	item no.
125x100	12,5	95	1,5	232071
150x100	25	105	2,2	232072
150x125	12,5	110	2,2	232073
200x100	50	115	4,1	232074
200x125	37,5	120	4,1	232075
200x150	25	125	4,3	232076

Bend 45°

TML -bend DIN 19522-100-45

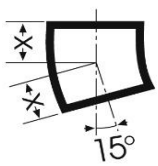
DN	X	kg	item no.
100	70	1,5	232061
125	80	2,3	232064
150	90	3,5	232067
200	110	5,5	232070

Bends 30°



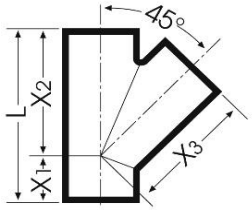
DN	X	kg	item no.
100	60	1,3	232060
125	70	2,0	232063
150	80	3,1	232066
200	95	5,2	232069

Bends 15°



DN	X	kg	item no.
100	50	1,0	232059
125	60	1,7	232062
150	65	2,5	232065
200	80	4,6	232068

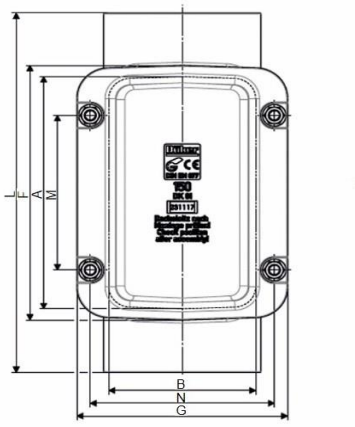
branches 45°

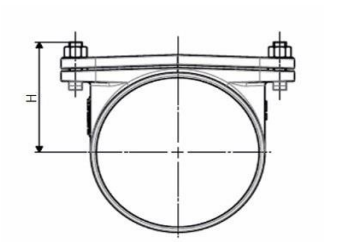


The introduction of the German standard DIN 19522:200-01 (supplement to EN 877) led to dimensional changes on some fittings such as branches 45°. Such fittings of older manufacture may therefore deviate from the dimensions stated in this document.

TML -branch DIN 19522-70x50-45						
DN	**X1**	**X2**	**X3**	**L**	**kg**	**item no.**
100 x 100	70	205	205	275	4,2	232077
125 x 100	60	220	220	280	5,2	232078
125 x 125	80	240	240	320	6,4	232079
150 x 100	55	240	240	295	6,4	232080
150 x 125	70	255	255	325	8,3	232081
150 x 150	90	265	265	355	9,2	232082
200x 100	40	265	265	305	10,0	232083
200 x 125	55	280	280	335	11,9	232084
200 x 150	75	300	300	375	12,4	232085
200 x 200	115	340	340	455	17,2	232086

Inspection pipes
with rectangular opening (RRrk)





TML -inspection pipe rectancular DIN 19522 - *100* RRrk										
DN	**H**	**G**	**F**	**B**	**A**	**L**	**N**	**M**	**kg**	**item no.**
100	82	160	230	100	200	340	136	130	6,0	232096
125	99	190	255	125	225	370	163	150	8,2	232098
150	111	215	280	150	250	395	188	170	12,0	232099
200	136	265	330	200	300	465	238	216	19,0	232101

with toroidal sealing ring in EPDM

Note: the cover shape, cover seat on the body, sealing and bolts are being modified step by step from manufacturing date autumn 2018. The table states the new dimensions. Dimensions G and L remain unchanged.

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

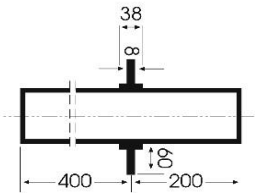
Cover old version
cover with smooth surface

Cover new version
outside surface recessed

Plugs (ED)

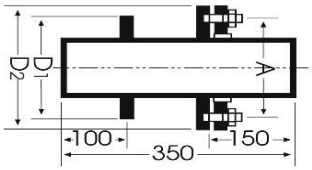
TML -plug DIN 19522 - 100 ED			
DN	**L**	**kg**	**item no.**
100	40	0,5	232091
125	45	1,1	232092
150	50	1,7	232093
200	60	3,1	232094

Pipes with wall flange



TML	-pipe with wall flange		
DN	**L**	**kg**	**item no.**
100	600	8,8	235820

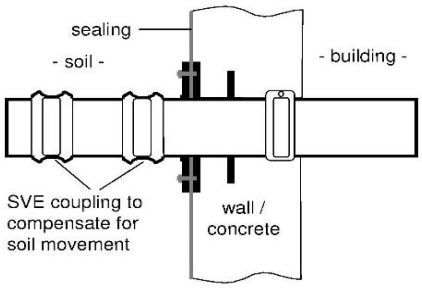
Adapters with clamp and wall flange



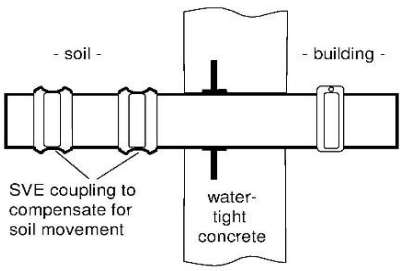
TML	-adapter with clamp and wall flange				
DN	**A**	**D1**	**D2**	**kg**	**item no.**
100	191	190	230	11,6	235811

Installation examples

SML adapters with clamp and wall flange

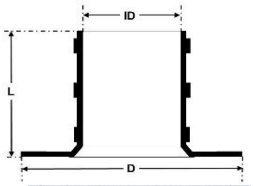


SML pipe with wall flange



Pipes with wall flange and adapters with clamp and wall flange can be used for wall penetrations of drainage pipes which require water and gas impermeability, e.g. in outer walls, floor plate, basement waterproofing.

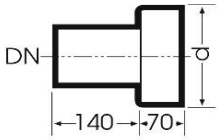
Düker Sealing Flange
water and gas-proof sealing for wall and roof penetrations



Düker sealing flange, resistance to pressurised water, tested up to 2.5 bar							
DN	**for outside diameter**	**D**	**L**	**designation sealing flange**	**kg**	**item no.** black	**item no.** transparent
100	111-125	320	150	ID 128	1,2	326827	326831
125	135-160	320	150	ID 163	1,3	326828	326832
150	135-160	320	150	ID 163	1,3	326828	326832

Suitable for penetrations through water-tight concrete or in combination with waterproofing sheeting or coating.
The installation of the Düker sealing flange is very easy and fast, even on a finished pipe installation. For wall penetrations there is a transparent version "T", for roof penetrations a UV-resistant black version "S". Delivered as an installation set inlcuding sealing glue and bonding agent.

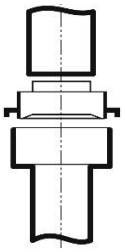
Cast iron connection pieces for clay pipe (E)



TML -connection DIN 19522 - 300 - E			
DN	**d**	**kg**	**item no.**
100	159 ± 2,0	4,9	232087
125	187 ± 3,5	6,7	232088
150	218 ± 3,5	9,7	232089
200	278 ± 3,5	13,3	232090

Connections for these: clay pipe A-ring

Vitrified clay pipe (normal wall thickness) to TML pipe DN 100 to 200

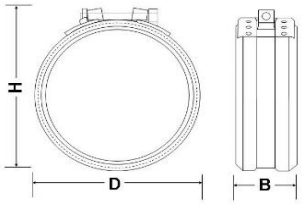


clay pipe as per EN 295

clay pipe A-ring (AR) (=connection ring) as per DIN EN 295
TML-connection piece with socket for connecting stoneware pipes

Clay pipe A-Ring DIN EN 295 (AR)
for TML connection piece clay pipe to cast iron

DN	**kg**	**item no.**
100	0,4	100312
125	0,6	100313
150	0,7	100314
200	1,0	100315

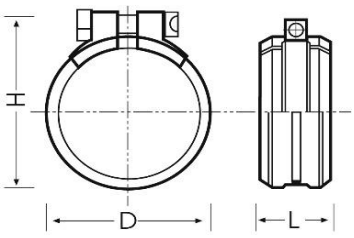


Dükorapid® Inox coupling				
DN	D≈	H≈	L≈	item no.
	maximum dimensions after installation			
100	123	135	47,0	240615
125	152	164	54,0	240616
150	177	189	54,0	240617
200	230	240	62,0	240618

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

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

Material metal collar:	stainless steel, austenitic chromium nickel steel, 1.4404 as per EN 10088-2 locks 1.404 as per EN 10088-2
Material locking parts:	bolt, washer, square nut steel A4
Material sealing:	EPDM
Axial restraint:	up to 0.5 bar
Screw size:	cylinder head bolt with hexagon socket; DN 500-150: M 8, DN 200: M 10
Torque:	DN 100-150: 18 Nm; DN 200: 28 Nm if the locks should touch do not tighten any more

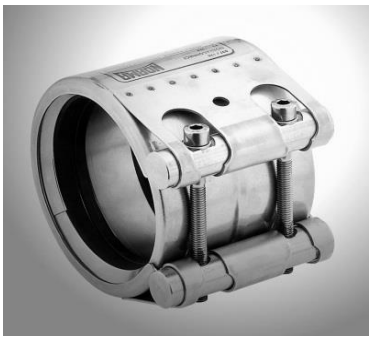


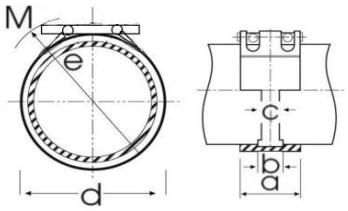
Rapid Inox coupling				
DN	D≈	H≈	L≈	item no.
	maximum dimensions after installation			
100	125	135	45,4	234828
125	147	162	54,5	234829
150	172	187	54,5	234830
200	227	244	70,0	234831

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

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

Material metal collar:	stainless steel, austenitic chromium nickel steel, 1.4571/1.4401 as per EN 10088-2 locks 1.4571/14401 as per EN 10088-2
Material locking parts:	screw, washer, square nut: A4
Material sealing:	EPDM. NBR on request for waste water containing oil, animal grease, solvents or petrol
Axial restraint:	DN 100 - 200: up to 0.5 bar
Screw size:	hexagon socket screw; DN 100 - 150: M 8; DN 200: M 10
Torque:	until both fastening heads come together
Marking:	marking W5 on the metal collar



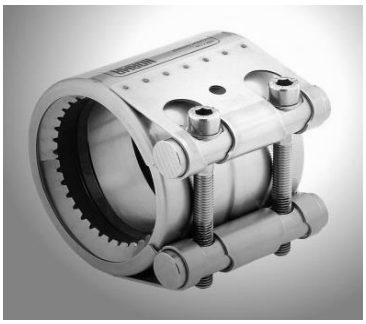


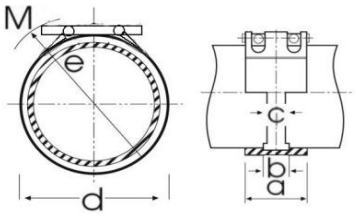
Connect-F Inox coupling						
DN	a	b	c	≈d	≈e	item no.
100	98	40	25	133	148	234834
125	113	50	35	166	194	234835
150	113	50	35	186	210	234836
200	138	74	35	240	270	234837

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:	stainless steel 1.4571
Material locking parts:	stainless steel, bolts 1.4401, screws 1.4404
Material sealing:	EPDM
Axial restraint:	-
Screw size:	DN 100: M 8; DN 125 - 150: M 10; DN 200: M 12
Torque:	as stated on the coupling



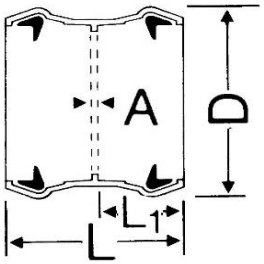


Connect-G Inox coupling						
DN	a	b	c	≈d	≈e	item no.
100	98	40	25	130	150	234845
125	115	50	35	165	195	234846
150	115	50	35	185	215	234847
200	140	67	35	240	270	234848

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:	stainless steel, casing 1.4571, claw ring 1.4310
Material locking parts:	stainless steel, bolts 1.4401, screws 1.4404
Material sealing:	EPDM
Axial restraint:	up to 10 bar
Screw size:	DN 100: M 10; DN 125 - 150: M 12; DN 200: M 16
Torque:	as stated on the coupling



SVE coupling					
DN	D	L	L_1	A	item no.
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.:

Material metal collar:	Polypropylene-CO
Material locking parts:	-
Material sealing:	sealing lips EPDM
Axial restraint:	-
Screw size:	-
Torque:	-

* obsolete model

For further coupling models please refer to the SML specifier's manual.
Attention: all coupling models not listed here require further on-site corrosion protection in underground installation, e.g. tar wrapping.

For the coupling installation instructions please see the SML specifier's manual.

Selection of Material

The product standard EN 877, paragraph 4.8.3.2, contains detailed specifications for the required outside coating on cast iron drainage pipe systems installed underground:

"Pipes shall have an outside coating comprising a layer of metallic zinc covered by a finishing paint compatible with zinc. (…) When measured, the mean mass of zinc per unit area shall not be less than 130 g/m². (…)

Paragraph 4.8.3.3 says:

"Fittings and accessories shall have a coating (…) of a quality at least equivalent to that of the pipes e.g. (…) epoxy resin based coatings."

The Düker pipe systems TML, MLK-protec and MLB satisfy these requirements. SML, however, is not suitable for underground installation.

In paragraph 4.8.4.1, there are specifications for the materials of couplings in underground installation:

"All parts of couplings or clamping components shall be made of cast iron and coated in accordance with 4.8.3.3, or from austenitic stainless steel in accordance with EN 10088-1, EN 10088-2 and EN 10088-3 with at least 16.5% chrome and 8.5% nickel or equivalent, or from material of comparable resistance".

The stainless steel collars and clampings of all "Inox" couplings correspond to these requirements (Rapid-Inox, Connect-F-Inox, Connect-G-Inox). The SVE coupling can be considered a "material of comparable resistance". Due to their ease of installation however we recommend to use Rapid couplings.

Attention: CE couplings, which used to be common practice in underground installation, do not consist of a material that is up to the requirements of paragraph 4.8.4.1 of EN 877.

Should any components be installed that do not correspond to paragraph 4.8 of EN 877, these items must be given an on-site corrosion protection e.g. a bituminous wrapping of the manufacturer Denso.

Soil Conditions

The soil aggressiveness is to be determined on the basis of many factors, such as soil type, state, water content, pH value, content in sulphide, sulphate and chloride.

Düker TML, MLK-protec and MLB as well as "Inox" couplings are appropriate for the following soil grades as per German DVGW worksheet GW9:

- Ia (practically not aggressive)
- Ib (slightly aggressive)
- II (aggressive)

In case of very aggressive soils (soil grade III), an additional corrosion protection such as Denso must be applied to the complete pipeline. The same applies to laying in ground water.

Pipe Bedding

Planning and execution of pipe bedding are to be carried out as per EN 1610 paragraph 7; the German DWA worksheet A139 "Installation and inspection of waste water pipelines and canals", or corresponding local regulations are also to be recommended.

The thickness of the lower bedding layer of compressible material is at least 100 mm; this value should be increased by one tenth of the pipe diameter. In case of very hard soil, the value is at least 150 mm and should be increased by one fifth of the pipe diameter.

The thickness of the upper bedding layer is to be determined by the specifier.

For couplings, if necessary holes should be provided for in the bedding so the pipeline does not rest on the connections.

Static Calculation

The static calculation follows German DWA worksheet A127 "Guidelines for the static calculation of waste water pipelines and canals", or local regulations.

Compression of Trench Filling Material

The compression is to be carried out according to EN 1610, paragraph 11 as well as German ATV-DVWK worksheet A139 "Installation and inspection of waste water pipelines and canals" or corresponding local regulations.

Bearing Load

The bearing capacity of cast iron drainage pipes can be determined on the basis of EN 877, annex C.2.

Due to the superior material stability, TML, MLK-protec and MLB can be used for all cover heights including traffic and surface loads common in site drainage praxis.

In case of correct and expert installation, a cover height of 0.8 to 6 m and a simultaneous traffic load of SLW 60 can be assumed as a guideline.

Leak Test

The water tightness of underground waste water pipelines must be proven as per EN 1610. The test is prescribed after filling the pipe trench; an additional test before filling is however recommendable, together with a thorough visual inspection of the pipeline.

The leak test can on principle be carried out with air or with water. Should a test with air fail, a test with water can be done instead. However, we recommend to test with water from the start.

Leak test with air

The leak test with air is to be carried out according to table 3 of EN 1610. The German plumbers' association ZVSHK recommends the test method LC with a test pressure of 100 mbar, and admissible pressure loss of 15 mbar, and a test duration of 3 to 8 minutes depending on the pipeline diameter.

At first, the pressure is kept up by adding air. This period serves to compensate for temperature differences in the air added. After that, no more air is added and the pressure loss after a defined period of time is measured.

For measuring, electronic devises or the U-pipe-manometer have proved themselves.

Leak test with water

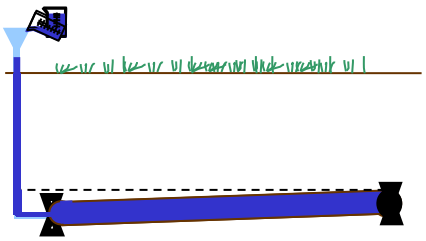
The test can be carried out on the complete pipeline or on defined pipeline sections.

At first, the length of the pipeline must be determined, in order to calculate the inner surface and the admissible quantity of water to be added.

The test pressure is to be calculated as per the pressure of a water column from the pipe crest of the section to be tested up to the ground level, e.g. 2.5 m = 25 kPa (250 mbar). The test pressure is minimum 10 kPa, maximum 50 kPa.

The pipeline is slowly filled with water from the lowest point so the air contained in it is expelled at the highest point. Upon reaching the test pressure, the pipeline must remain completely filled for one hour in order to compensate for temperature differences.

After that begins the test period of 30 minutes. The pressure is to be kept permanently on the level of the predefined test pressure within a tolerance of 1kPa, by refilling water to compensate for any water leakage. The height of the water column above ground level must not surpass 10 cm in order to prevent increasing the pressure by more than 1 kPa.



The quantity of refilled water is to be reported. Within the test period it may not surpass:

- 0.15 l/m² interior surface for pipelines
- 0.20 l/m² for pipelines including shafts
- 0.40 l/m² for shafts and inspection openings

The values only for pipelines are for example:

DN	inside surface per m pipe in m² approx.	max. water qty per m pipeline in l approx.
80	0.24	0.036
100	0.32	0.048
125	0.40	0.060
150	0.48	0.072
200	0.63	0.095

Securing against Slipping

During the recommended leak test in the open trench, the connections must be secured against slipping.

As the test is carried out at a maximum of 0.5 bar, we recommend using couplings such as Rapid Inox, which are axially restrained up to 0.5 bar.

Should higher pressures occur, it is possible to use Connect-G-Inox. Grip collars (e.g. Kombi grip collar) can also be combined with metallic couplings; however these grip collars must either be removed before filling the trench of they must be given an additional corrosion protection.

Connections can also be secured with abutments, particularly at changes of direction, such as poles driven into the ground, concrete abutments, cones of filled-on material etc.

no.	qty.	item	unit price	amount
		Title: Drainage pipe system – Düker – TML system		
		Socketless cast iron drainage pipes and fittings, approved and manufactured as per EN 877, dimensions as per DIN 19 522, with CE marking and Declaration of Performance as per CPR		
		Short name: Düker- TML –pipes and fittings		
		Pipes inside with a fully cross-linked two-component epoxy coating, outside with a metal spray zinc-coating, 130 g/m² and a brown two-component lacquer, fittings inside and outside with a fully cross-linked epoxy coating.		
		Range of products DN 100 – 200 as per the latest price-list.		
		Installation: As per Düker installation instructions and in accordance with the technical regulations of EN 12056 / DIN 1986 part 100 / EN 752, EN 1610		
		Couplings: Rapid Inox, Connect-F Inox coupling, Connect-G Inox coupling, SVE coupling. The securing of pipelines with the risk of internal pressure and axial restraint require grip collars or Connect couplings. Couplings and grip collars are paid for separately.		
1		mtrs. **Düker – TML pipes** in trade lengths of 3000 mm, **DN .....**, including cutting to length, supply and installation material: wages:		
		Fittings*		
2		pcs. **Düker TML bends** all angles (15°,30°,45°), **DN .....**, supply and installation material: wages:		
		pcs. **Düker TML branches 45°**, **DN ..... x .....**, supply and installation material: wages:		
3		pcs. **Düker TML reducers**, **DN ..... x .....**, supply and installation material: wages:		
4		pcs. **Düker TML plugs**, **DN .....**, supply and installation. material: wages:		

no.	qty.	item	unit price	amount
5		pcs. **Düker TML inspection pipes** with rectangular opening, for horizontal pipes, **DN .....**, supply and installation material: wages:		
6		pcs. **Düker TML connection pipes E** for connecting stoneware pipes to TML, **DN .....**, supply and installation material: wages:		
7		pcs. **Dükorapid® Inox couplings**, lock with only one screw,metal collar and locks made of material no. 1.4404 as per EN 10088-2, bolts and nuts A4, sealing collar made of EPDM, **DN** ....., supply and installation. material: wages:		
8		pcs. **Connect-F-Inox couplings**, metal collar made of material no. 1.4571, locking parts made of material no. 1.4401, screws made of material no. 1.4404, sealing collar made of EPDM, **DN .....**, supply and installation. material: wages:		
9		pcs. **Connect-G-Inox couplings**, coupling with axial restraint, metal collar made of material no. 1.4571, locking parts made of material no. 1.4401, screws made of material no. 1.4404, claw ring made of material no. 1.4310, sealing collar made of EPDM, **DN .....**, supply and installation. material: wages:		
10		pcs. **SVE couplings** made of Polypropylene-CO with integrated sealing lips EPDM, for underground installation, **DN .....**,supply and installation. material: wages:		
11		pcs. **Kombi grip collars****, securing grip collar with axial restraint for Rapid-Inox couplings on pipelines subject to inside pressure, **DN .....**, supply and installation. material: wages:		
12		pcs. **Düker sealing flange** transparent, two-part sealing attachment made of high-performance plastic against pressurised (tested 2.5 bar) and non-pressurised water as per DIN 18533 for waterproofing of pipe penetrations underground or at the facade, for pipes **DN .....,** supply and installation. material: wages: ** this coupling must be equipped with an additional corrosion protection in case of soil installation.		

DRAINAGE TECHNOLOGY

JOBBING FOUNDRY

FITTINGS AND VALVES

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