

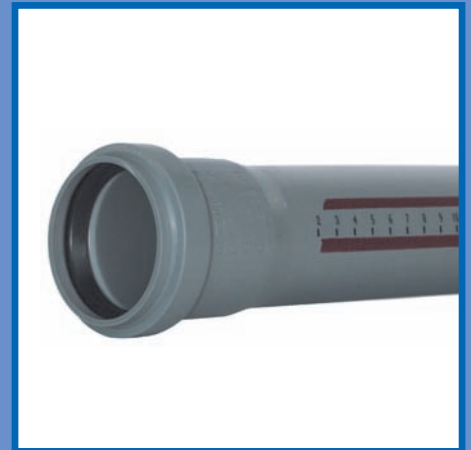
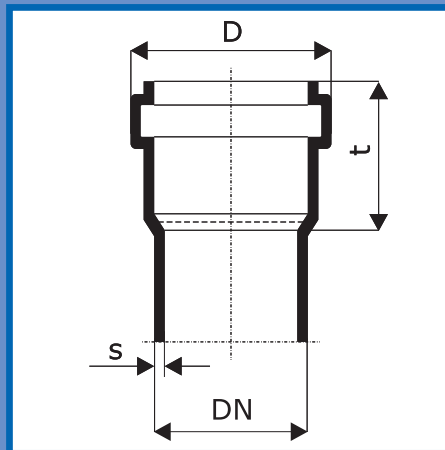
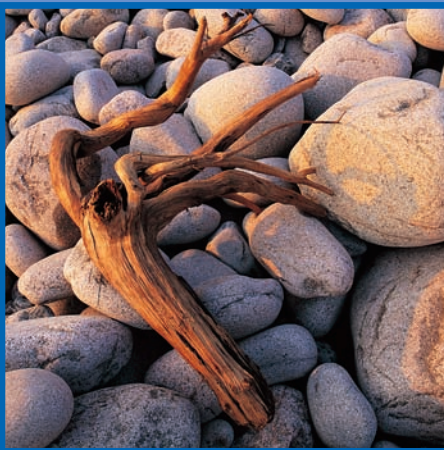


## HT-System (PPs)

Discharge pipes and fittings

### HT-System (PPs)

The modified house discharge system from Ostendorf. It unites all the requirements of a modern house discharge system from sound insulation/fire protection to easy centimeter-marking installation. Of course, all the established properties such as low inflammability, chemical resistance and hot water resistance have been taken on. What has come about is a qualitatively high-grade house discharge pipe system with a maximum degree of compliance to all the requirements.





Benefits and  
Advantages of  
the System

Material Properties

### Just trust what you hear

Those wishing to live comfortably today want to avoid disturbing noises. This is where the Ostendorf HT easy-to-install, corrosion-resistant house discharge pipe system helps to raise the quality of living.

- CAN BE USED IN ALL FIELDS OF BUILDING CONSTRUCTION
- EXCELLENT MECHANICAL AND ACOUSTIC PROPERTIES

### How sound arises in the waste water pipe

Impact and flow noises result in airborne and structure-borne sounds at the piping walls. For instance, the impacting of water waste, which can reach relatively high speeds, induces noise at many points such as bends, branches and collecting lines. With Ostendorf HT, the sanitary specialist has a soundproof house discharge pipe system which sets new standards.

- AIRBORNE NOISE
- STRUCTURE-BORNE NOISE

### Ostendorf HT avoids noise

The modified basic material formula in the HT house discharge pipe system provides reliable sound insulation. It is a hot water-resistant pipe system suitable for pressureless discharge of waste water, according to DIN EN 12056 and DIN 1986-100.

- SOUNDPROOF
- STOPS SOUND TRANSFER

### Don't give noise a chance

A DIN EN 14366 sound insulation test carried out by the Fraunhofer Institut für Bauphysik in Stuttgart on the new Ostendorf HT system came up with acoustic figures of 26 dB(A). Usual steel clamps with inlaid rubber and a 4 l/s flow rate were used in testing.

- 26 DB(A) ACCORDING TO DIN EN 14366

### Strength and stability

Ostendorf HT is corrosion-resistant, resistant to aggressive waste water and has a permanent low Inflammability as per DIN 4102 B1. There are no incrustations due to the smooth surface. Ostendorf HT is available from DN 32 to DN 160. The reliable push-fit connection makes the system easy to install and fulfils all expectations.

- CORROSION RESISTANT
- EASY-TO-INSTALL
- B1 FLAME RESISTANT

### Quality guarantee

Our HT pipes and fittings are quality labeled and are subject to constant quality checks. We run a certificated quality management system based on DIN EN ISO 9001 DQS, Reg. No. 289722-QM.

- DIN EN ISO 9001
- CONSTANT QUALITY CHECKS

### Quality of living

Particularly in the matter of raised requirements in housing, Ostendorf HT satisfies all ecological and economical expectations and contributes decisively to raising the quality of living – and thus the value of the property.

- RAISES THE PROPERTY VALUE
- MEETS BOTH ECONOMICAL AND ECOLOGICAL CRITERIA



## HT-System (PPs) Discharge pipes and fittings

### Description

Polypropylene (PP), produced according to DIN EN 1451-1 respectively DIN 19560-10, resistant to hot water, permanent low inflammability as per DIN 4102 B1.

### Application

Building drainage as

- Waste water pipe
- Rainwater pipe
- Ventilation pipe

(also see areas of use: DIN 1986-4).

### Colour

Dusty grey RAL 7037, halogen and cadmium-free.

### Seal

Factory inlaid lip seal.

### Chemical resistance

Discharge of aggressive media in the range of pH 2 to pH 12 – see supplementary sheet no. 1 on DIN 8078.

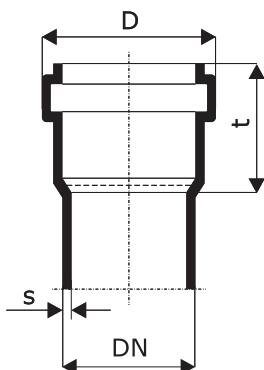
### Commercial name

Ostendorf HT-Abflussrohr (Ostendorf High-Temperature Discharge Pipe)

### Marking

#### Pipes and fittings

Permanent marking with manufacturer label, nominal diameter, DIN standard (DIN EN 1451-1), date of manufacture, (fittings also marked with details).



### Seals

Company label of the sealing ring manufacturer, nominal diameter, DIN standard (DIN EN 681), date of manufacture, number of the mould and mould cavity.

### Central vacuum cleaning system

Test certificate from the Staatliche Material Prüfungsanstalt Darmstadt: "K 08 1177" and "K 04 1525"

### Associated documents

- a) Laying instruction of KRV e.V. Bonn
- b) List of the mechanical and thermal properties

MECHANICAL AND THERMAL PROPERTIES				
Property	Measuring method		SYMBOL	VALUE
Density (g/cm <sup>3</sup> )	ISO R 1183	DIN 53479	$\rho$	0,95
Notch impact resistance* as per Charpy (kJ/m <sup>2</sup> )	ISO R 179 Test bar as per Fig. 2	DIN 53453 Standard small bar	$a_k$	6,86
Limit bending stress (N/mm <sup>2</sup> )		DIN 53452 Standard small bar	$\sigma_{bG}$	43,14
Yield stress (N/mm <sup>2</sup> )	ISO R 527 Test speed C Test bar as per Fig. 2	DIN 53452 Test speed V Test bar 4	$\sigma_s$	30,39
Tear resistance (N/mm <sup>2</sup> )			$\sigma_r$	39,22
Elongation at tear (%)			$\epsilon_R$	800
Modulus of elasticity (N/mm <sup>2</sup> )		DIN 53457 Section 2.3	E	1275
Vicat softening point (°C)	ISO R 306-1 kp	DIN 53460 Method A Silicone oil	VSP/A	158–164**
Thermal conductivity (W/Km)		DIN 52162	$\lambda$	0,22
Linear coefficient of thermal expansion (°C <sup>-1</sup> )		VDE 0304 Teil 1.4	$\alpha$	1,2 · 10 <sup>-4</sup>

\* measured at 20°C

\*\* applies to base material

DN(OD)	s [mm]	D [mm]	t [mm]	kg/m
32	1,8	44	40	0,19
40	1,8	53	55	0,24
50	1,8	63	56	0,31
75	1,9	88	61	0,48
90	2,2	105	58	0,66
110	2,7	125	76	0,98
125	3,1	143	82	1,25
160	3,9	181	90	2,05



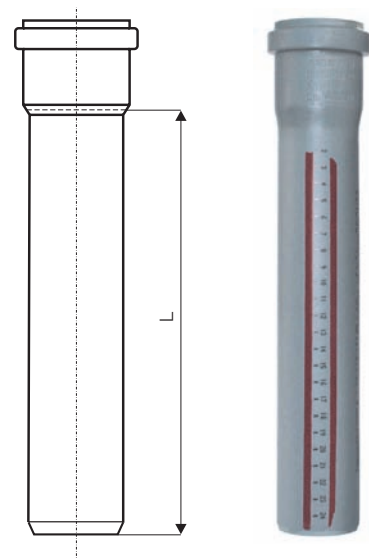


Product range  
HT-System (PPs)

## HTEM – Single socket pipe (push-fit)

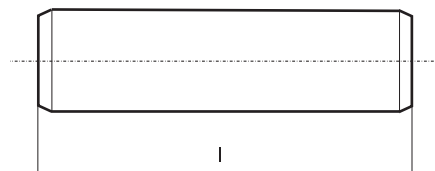
No.	DN	L [mm]	m [kg]	Unit
10005	32	150	0,042	20/960
10015	32	250	0,061	20/800
10025	32	500	0,106	20/320
10045	32	1000	0,198	10/300
10065	32	2000	0,382	10/300
10000	40	150	0,060	20/960
10010	40	250	0,083	20/960
10020	40	500	0,141	20/320
10030	40	750	0,198	10/280
10040	40	1000	0,256	10/260
10050	40	1500	0,371	10/260
10060	40	2000	0,486	10/260
10100	50	150	0,073	20/720
10110	50	250	0,103	20/720
10120	50	500	0,177	20/320
10130	50	750	0,252	10/200
10140	50	1000	0,326	10/200
10150	50	1500	0,475	10/200
10160	50	2000	0,623	10/200
10200	75	150	0,110	20/480
10210	75	250	0,157	20/320
10220	75	500	0,277	20/160
10230	75	750	0,396	6/120
10240	75	1000	0,515	6/120
10250	75	1500	0,735	6/120
10260	75	2000	0,992	6/120
10900	90	150	0,154	20/320
10910	90	250	0,217	20/240
10920	90	500	0,373	10/120
10930	90	750	0,530	4/96
10940	90	1000	0,686	4/96
10950	90	1500	0,999	4/96
10960	90	2000	1,312	4/96
10300	110	150	0,248	20/160
10310	110	250	0,343	20/160
10320	110	500	0,578	10/80
10330	110	750	0,813	4/60
10340	110	1000	1,048	4/60
10350	110	1500	1,519	4/60
10360	110	2000	1,989	4/60
10400	125	150	0,320	10/120
10410	125	250	0,443	10/120
10420	125	500	0,749	5/60
10430	125	750	1,055	1/54
10440	125	1000	1,361	1/54
10450	125	1500	1,973	1/54
10460	125	2000	2,585	1/54
10500	160	150	0,544	1/84
10510	160	250	0,741	1/70
10520	160	500	1,231	1/35
10530	160	750	1,722	1/35
10540	160	1000	2,213	1/35
10550	160	1500	3,195	1/35
10560	160	2000	4,176	1/35

## HT – Pipe



## HTGL – Plain ended pipe

No.	DN	L [mm]	m [kg]	Unit
10085	32	5000	0,918	1/300
10080	40	5000	1,152	1/260
10180	50	5000	1,486	1/200
10280	75	5000	2,384	1/120
10980	90	5000	3,191	1/96
10380	110	5000	4,705	1/60
10480	125	5000	6,121	1/54
10580	160	5000	9,816	1/35





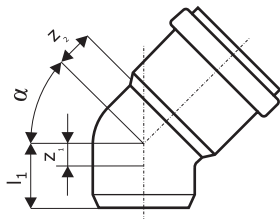
## HT – Fitting

## HTB – Bend 15°

No.	DN	$\alpha$	$z_1$	$z_2$	$l_1$	m [kg]	Unit
11005	32	15°	3	8	45	0,024	20/1400
11000	40	15°	4	8	66	0,033	20/960
11100	50	15°	5	8	67,5	0,043	20/960
11200	75	15°	7	10	73	0,064	20/480
11900	90	15°	6	12	60	0,099	20/480
11300	110	15°	9	13	85	0,169	20/240
11400	125	15°	10	14	92	0,215	20/160
11500	160	15°	12	18	113	0,477	10/80

## HTB – Bend 30°

No.	DN	$\alpha$	$z_1$	$z_2$	$l_1$	m [kg]	Unit
11015	32	30°	6	10	48	0,025	20/1400
11010	40	30°	7	10	69	0,034	20/960
11110	50	30°	8	11	70,5	0,046	20/960
11210	75	30°	12	15	78	0,078	20/480
11910	90	30°	13	18	67	0,106	20/480
11310	110	30°	16	20	92	0,186	20/240
11410	125	30°	18	22	100	0,234	20/160
11510	160	30°	23	29	123	0,521	10/80



## HTB – Bend 45°

No.	DN	$\alpha$	$z_1$	$z_2$	$l_1$	m [kg]	Unit
11025	32	45°	9	12	51	0,025	20/1400
11020	40	45°	10	13	72	0,035	20/960
11120	50	45°	12	15	74,5	0,047	20/960
11220	75	45°	17	20	83	0,081	20/480
11920	90	45°	20	25	74	0,114	20/480
11320	110	45°	25	28	101	0,203	20/240
11420	125	45°	28	32	110	0,271	20/160
11520	160	45°	36	42	136	0,546	5/60



## HTB – Bend 67°

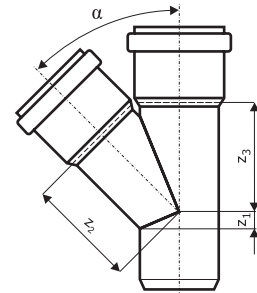
No.	DN	$\alpha$	$z_1$	$z_2$	$l_1$	m [kg]	Unit
11035	32	67°	14	17	58	0,027	20/1400
11030	40	67°	16	19	78,0	0,037	20/960
11130	50	67°	19	22	81,5	0,052	20/960
11230	75	67°	27	31	93	0,092	20/480
11930	90	67°	32	36	86	0,110	20/240
11330	110	67°	40	43	116	0,229	20/160

## HTB – Bend 87°

No.	DN	$\alpha$	$z_1$	$z_2$	$l_1$	m [kg]	Unit
11055	32	87°	19	23	61	0,028	20/1400
11050	40	87°	23	26	85	0,040	20/960
11150	50	87°	27	31	89,5	0,054	20/960
11250	75	87°	39	43	105	0,099	20/480
11950	90	87°	46	49	100	0,137	20/240
11350	110	87°	57	61	133	0,246	20/160
11450	125	87°	65	69	147	0,329	10/120
11550	160	87°	83	89	183	0,609	5/60

**HTEA – Branch 45°**

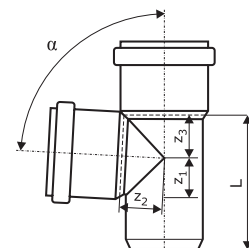
No.	DN	$\alpha$	$z_1$	$z_2$	$z_3$	L [mm]	m [kg]	Unit
12005	32/32	45°	9	40	40	92	0,046	20/960
12000	40/40	45°	10	49	49	115	0,068	20/960
12010	50/40	45°	5	56	54	116	0,060	20/480
12110	50/50	45°	12	61	61	130	0,091	20/480
12120	75/50	45°	1	79	74	134	0,115	20/480
12220	75/75	45°	17	91	91	168	0,171	20/240
12190	90/50	45°	9	90	82	127	0,164	20/240
12290	90/75	45°	9	103	100	163	0,197	20/240
12990	90/90	45°	20	110	110	184	0,243	20/160
12130	110/50	45°	17	101	90	135	0,245	20/240
12230	110/75	45°	0	116	109	175	0,307	20/160
12330	110/110	45°	25	133	133	226	0,430	10/80
12340	125/110	45°	18	143	141	243	0,459	5/60
12440	125/125	45°	28	152	152	266	0,612	5/60
12350	160/110	45°	2	166	158	265	0,735	5/40
12550	160/160	45°	36	197	313	305	1,138	5/30

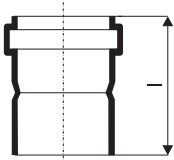

**HTEA – Branch 67°**

No.	DN	$\alpha$	$z_1$	$z_2$	$z_3$	L [mm]	m [kg]	Unit
13005	32/32	67°	14	27	27	85	0,044	20/960
13000	40/40	67°	16	32	32	105	0,063	20/960
13010	50/40	67°	14	38	35	105	0,078	20/480
13110	50/50	67°	19	40	40	116	0,086	20/480
13120	75/50	67°	14	53	45	120	0,123	20/480
13220	75/75	67°	27	59	59	146	0,154	20/240
13130	110/50	67°	8	71	51	130	0,229	20/240
13230	110/75	67°	21	77	66	150	0,262	20/160
13330	110/110	67°	40	85	85	196	0,370	10/120


**HTEA – Branch 87°**

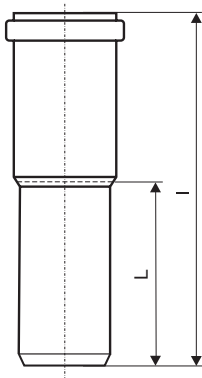
No.	DN	$\alpha$	$z_1$	$z_2$	$z_3$	L [mm]	m [kg]	Unit
14005	32/32	87°	19	21	21	85	0,043	20/960
14000	40/40	87°	23	24	24	105	0,050	20/960
14010	50/40	87°	22	29	24	105	0,069	20/480
14110	50/50	87°	27	29	29	114	0,080	20/480
14120	75/50	87°	27	42	30	118	0,115	20/480
14220	75/75	87°	39	43	43	142	0,142	20/240
14190	90/50	87°	26	50	31	111	0,147	20/240
14290	90/75	87°	39	51	44	137	0,173	20/240
14990	90/90	87°	56	70	51	161	0,244	20/160
14130	110/50	87°	40	60	44	152	0,256	20/240
14230	110/75	87°	40	60	44	152	0,244	20/160
14330	110/110	87°	57	61	61	185	0,350	10/120
14340	125/110	87°	57	68	62	204	0,440	5/60
14440	125/125	87°	28	120	152	266	0,490	5/60
14350	160/110	87°	59	83	63	237	0,714	5/60
14550	160/160	87°	36	162	313	251	0,900	4/48





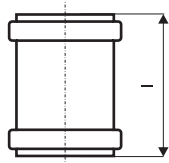
#### HTAM – Single socket

No.	DN	L [mm]	m [kg]	Unit
17130	50	113	0,045	20/480
17230	75	117	0,072	20/480
17330	110	130	0,155	20/240



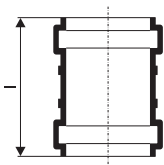
#### HTL – Long socket

No.	DN	L [mm]	L [mm]	m [kg]	Unit
17010	40	239	174	0,045	20/960
17110	50	239	174	0,071	20/480
17210	75	254	183	0,117	20/480
17910	90	150	86	0,111	20/480
17310	110	255	185	0,276	20/160



#### HTU – Coupler

No.	DN	L [mm]	m [kg]	Unit
18005	32	93	0,027	20/1400
18000	40	111	0,042	20/960
18100	50	112	0,054	20/960
18200	75	118	0,081	20/480
18900	90	105	0,101	20/480
18300	110	140	0,192	20/240
18400	125	177	0,213	20/160
18500	160	196	0,444	15/120



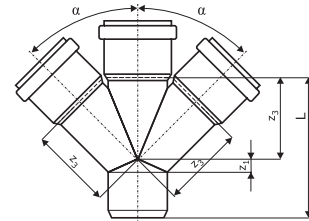
#### HTMM – Double socket

No.	DN	L [mm]	m [kg]	Unit
17005	32	93	0,028	20/1400
17000	40	111	0,041	20/960
17100	50	112	0,054	20/960
17200	75	118	0,082	20/480
17900	90	105	0,097	20/480
17300	110	140	0,192	20/240
17400	125	177	0,245	20/160
17500	160	196	0,453	15/120

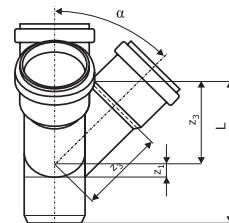
**HTDA – Double branch**

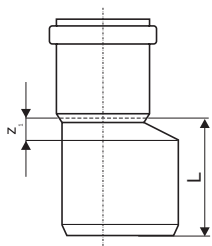
No.	DN	$\alpha$	$z_1$	$z_2$	$z_3$	L [mm]	m [kg]	Unit
16110	50/50/50	67°	20	41	41	124	0,104	20/480
16220	75/75/75	67°	28	59	59	153	0,182	20/240
16130	110/50/50	67°	8	73	54	135	0,227	10/120
16330	110/110/110	67°	40	86	86	201	0,462	5/60

16990	90/90/90	87°	46	51	51	151	0,242	20/160
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**HTED – Double corner branch**

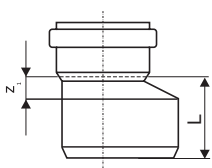
No.	DN	$\alpha$	$z_1$	$z_2$	$z_3$	L [mm]	m [kg]	Unit
17340	110/110/110	67°	40	86	86	202	0,461	10/80





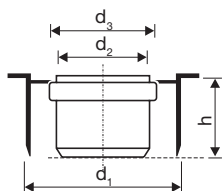
#### HTR – Reducer, eccentric

No.	DN	$z_1$	L [mm]	m [kg]	Unit
15015	50/32	17	68	0,034	20/960
15010	50/40	11	66	0,033	20/960
15120	75/50	20	78	0,060	20/480
15290	90/50	29	83	0,077	20/480
15295	90/75	17	73	0,090	20/480
15130	110/50	39	105	0,117	20/480
15230	110/75	25	91	0,125	20/480
15930	110/90	17	75	0,122	20/240
15340	125/110	14	101	0,173	20/240
15350	160/110	33	137	0,299	20/160
15450	160/125	26	130	0,290	20/160



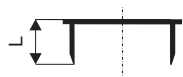
#### HTR – Reducer, eccentric, short

No.	DN	$z_1$	L [mm]	m [kg]	Unit
15005	40/32	15	52	0,022	20/1400
15125	75/50	13	40	0,056	20/480
15135	110/50	18	40	0,101	20/480
15235	110/75	20	52	0,134	20/480



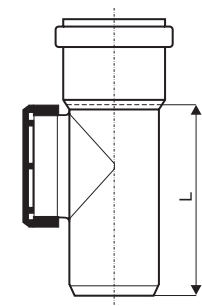
#### HT – Inner reducer

No.	DN	$d_1$	$d_2$	$d_3$	h	m [kg]	Unit
15530	110/50	90	50,8	60,3	44	0,121	20/480
15540	110/75	90	75,9	85,1	44	0,115	20/480



#### HTM – Plug

No.	DN	L [mm]	m [kg]	Unit
17015	32	39	0,020	100/7000
17020	40	39	0,010	20/2880
17120	50	39	0,015	20/2880
17220	75	39	0,024	20/2880
17/920	90	39	0,041	20/960
17320	110	46	0,067	20/960
17420	125	50	0,089	20/480
17520	160	58	0,178	20/480



#### HTRE – Inspection pipe

No.	DN	L [mm]	m [kg]	Unit
18110	50	115	0,092	20/480
18210	75	142	0,161	20/480
18910	90	171	0,244	20/240
18310	110	185	0,333	20/160
18410	125	214	0,438	5/60
18510	160	266	0,712	5/60

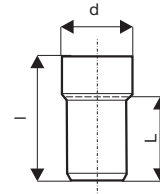
## HT – Replacement cover for inspection pipe

No.	DN	m [kg]	Unit
19100	50	0,025	-
19200	75	0,042	-
19900	90	0,063	-
19300	110	0,063	-



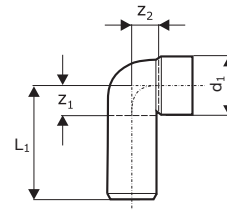
## HTS – Connection piece to iron pipes

No.	DN	d [mm]	L [mm]	L [mm]	m [kg]	Unit
18130	40/40	50	88	58	0,022	20/2880
18230	50/40	50	104	84	0,024	20/2880
18330	50/50	60	118	72	0,027	20/1400



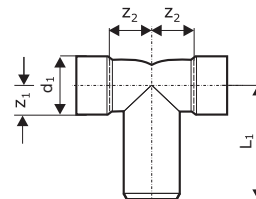
## HTSW – Siphon bend

No.	DN	d <sub>1</sub>	z <sub>1</sub>	z <sub>2</sub>	L <sub>1</sub>	m [kg]	Unit
18050	40/30	40	27,0	20	89,0	0,028	20/960
18150	40/40	50	25,5	20	88,5	0,032	20/960
18250	50/40	50	30,5	25	93,5	0,039	20/960
18350	50/50	60	30,5	25	93,5	0,040	20/960



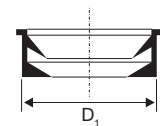
## HTDSW – Double siphon bend 90°

No.	DN	d <sub>1</sub>	z <sub>1</sub>	z <sub>2</sub>	L <sub>1</sub>	m [kg]	Unit
18360	40/50/40	50	27	39	90	0,049	20/480



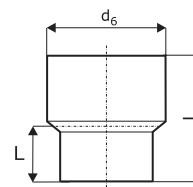
## HTGM – Gasket

No.	DN	D <sub>1</sub>	D <sub>2</sub>	for siphon bend	m [kg]	Unit
19030	40/30 A	40	28-34	DN 40/30	0,013	-
19130	40/30 B	50	28-34	DN 40/40, 50/40	0,029	-
19230	40/40 C	50	38-44	DN 40/40, 50/40	0,015	-
19330	50/30 D	60	28-34	DN 50/50	0,053	-
19430	50/40 E	60	38-44	DN 50/50	0,038	-
19530	50/50 F	60	48-54	DN 50/50	0,019	-
19630	50 B				0,020	-

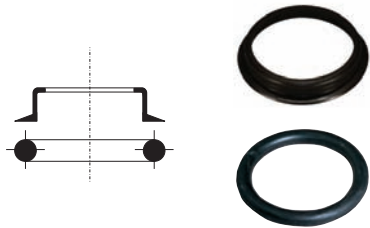


## HTUG – Connection piece to cast-iron pipe

No.	DN	d <sub>6</sub>	l [mm]	L [mm]	m [kg]	Unit
18120	50	72	140	70	0,048	20/960
18220	75	92	114	56	0,069	20/480
18320	110	124	129	67	0,136	20/480



## HT – Accessories



## HT – GA set gasket

No.	DN	m [kg]	Unit
19140	50	0,038	10/0
19240	75	0,043	10/0
19340	110	0,067	10/0



## HT – Lip seal

No.	DN	m [kg]	Unit
19000	32	0,003	-
19020	40	0,006	-
19120	50	0,007	-
19220	75	0,010	-
19920	90	0,014	-
19320	110	0,022	-
19420	125	0,029	-
19520	160	0,046	-

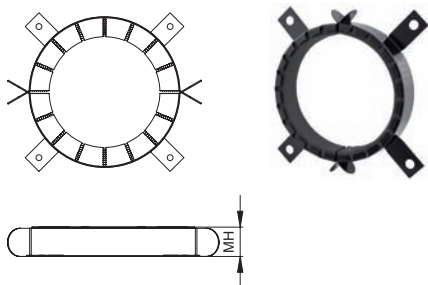
## HT – NBR gasket (oil and fat resistant)

No.	DN	m [kg]	Unit
19025	40	0,006	-
19125	50	0,007	-
19225	75	0,010	-
19925	90	0,014	-
19325	110	0,022	-
19425	125	0,029	-
19535	160	0,046	-



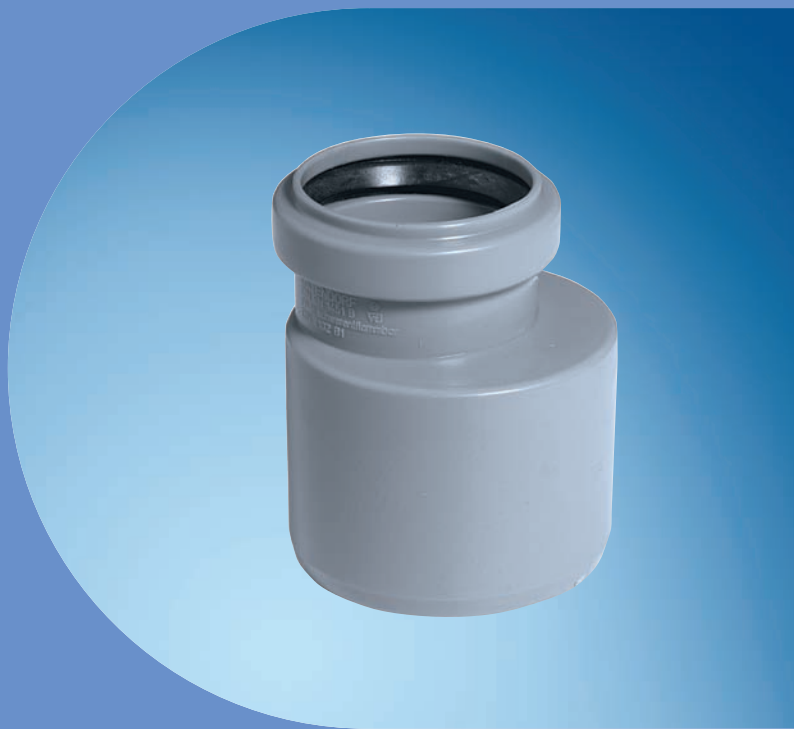
## HT – Lubricant

No.	m [kg]	Unit
19010	0,150	50/1750
19110	0,250	50/1800
19210	0,500	24/864



## HT – Fire protection sleeve

No.	Sleeve size	m [kg]	Unit
19170	25-50	0,103	1
19270	32-63	0,200	1
19370	40-75	0,225	1
19970	50-90	0,383	1
19470	63-110	0,486	1
19570	75-125	0,780	1
19670	90-140	1,120	1
19770	110-160	1,175	1













## Fire Protection

## HT System (PPs) in association with the BIS Pacifyre® AWM II fire sleeve

The new Ostendorf fire protection set provides practical and reasonably priced solutions for fire protection in buildings. The new BIS Pacifyre® AWM II fire sleeve generation features not only reduced dimensions but also the fire retarding of many special solutions, such as socket seal-off in the fire sleeve. The BIS Pacifyre® AWM II fire sleeve can seal off all Ostendorf house drainage pipe systems. This and other outstanding features provide for considerable flexibility in the implementation of your building projects. The BIS Pacifyre® AWM II fire sleeve is designed and approved especially for soundproof pipe systems (Z-19.17-1194). The fact that the fire

sleeve consists of two half shells also makes it possible for installation to be done at a later stage. "Zero spacing" – the gap between adjoining fire sleeves can be 0 mm – ensures maximum flexibility in planning.

The Ostendorf fire protection set as delivered includes the fastening set, an identification plate and a 4 mm thick protective hose for decoupling the structure-borne sounds of the ceiling or wall penetration. By turning over the retaining tabs, the BIS Pacifyre® AWM II fire sleeve can be both bed in mortar and plugged.

OVERVIEW OF THE BUILDING CATEGORIES AND REQUIREMENTS PLACED ON PIPES PENETRATING WALLS AND CEILINGS ACC. TO MBO 2002							
BUILDING CHARACTERISTICS		GK 1 (a + b)	GK 2	GK 3	GK 4	GK 5	Special Buildings
	Illustration						
	MBO	§2 (3) <sup>1)</sup>	§2 (3) <sup>1)</sup>	§2 (3) <sup>1)</sup>	§2 (3) <sup>1)</sup>	§2 (3) <sup>1)</sup>	§2 (4) <sup>2)</sup>
	Statement (OKFFB = Top edge of finished floor of day rooms to top edge of earth)	<b>Detached building ≤ 7m OKFFB</b> - max. 2 useable floor units - total ≤ 400m <sup>2</sup> or detached agricultural or forestry utilized building	<b>Building ≤ 7m OKFFB</b> - max. 2 useable floor units - total ≤ 400m <sup>2</sup>	<b>Other buildings ≤ 7m OKFFB</b>	<b>Other buildings ≤ 13m OKFFB</b> - Useable floor units each under 400m <sup>2</sup>	<b>Other buildings ≤ 22m OKFFB</b>	e.g. - Hotels - Kindergartens - Schools - Sports centres and halls - Hospitals of any height and high-rise buildings
Comment	Detached house, Small office buildings	Semi-detached house, Row of houses	Apartment blocks, Office buildings	Apartment blocks, Office buildings	Apartment blocks, Office buildings	---	
STRUCTURAL COMPONENT PROPERTY	Structural components of basement ceilings MBO §31(2)	<b>F 30</b> (No requirements placed on fire protection; observe sound and thermal insulation aspects!)	<b>F 30</b> (No requirements placed on fire protection; observe sound and thermal insulation aspects!)	<b>F 90<sup>4)</sup></b>	<b>F 90</b>	<b>F 90</b>	<b>F90 / F 120<sup>3)</sup></b>
	Upper storey ceiling structural components MBO §31(1) <sup>2)</sup>	<b>No requirements placed</b>	<b>F 30<sup>2)</sup></b> (No requirements placed on fire protection; observe sound and thermal insulation aspects!)	<b>F 30<sup>2)</sup></b>	<b>F 60* / F 90<sup>2)</sup></b>	<b>F 90<sup>2)</sup></b>	<b>F 90<sup>2)</sup></b>
	Space-enclosing partition walls in upper storeys (e.g. apartment partition wall)	<b>No requirements placed</b>	<b>F 30</b>	<b>F 30</b>	<b>F 60* / F 90</b>	<b>F 90</b>	<b>F 90<sup>3)</sup></b>
	Walls of required corridors and exits to the outside MBO §36(4)	<b>No requirements placed</b>	<b>No requirements placed</b>	<b>Upper storey: F 30 Basement: F 30</b>	<b>Upper storey: F 30 Basement: F 90</b>	<b>Upper storey: F 30 Basement: F 90</b>	<b>Upper storey: F 30 Basement: F 90</b>
	Walls of required staircases MBO § 35(4)	<b>No requirements placed</b>	<b>F 30-A</b>	<b>F 30-A</b>	<b>F 60-A* / F 90-A</b>	<b>F 30-A</b>	<b>F 30-A<sup>3)</sup></b>
	Fire walls/building partition walls MBO § 30(3)	<b>No requirements placed</b>	<b>F 60-AB* / F 90-AB</b>	<b>F 60-AB* / F 90-AB</b>	<b>F 60-AB* / F 90-AB</b>	<b>F 90-A</b>	<b>F 30-A<sup>3)</sup></b>

<sup>1)</sup> In acc. with §40 no requirements are placed on the sealing of pipe systems, installation shafts and channels within flats/apartments and useable floor units not exceeding 400 m<sup>2</sup> in not more than 2 useable floor units.

<sup>2)</sup> Given that there is no day room in the loft, then no particular requirements are placed on ceilings in lofts and for flat roofs.

<sup>3)</sup> Particular requirements apply to special-purpose buildings. These can be taken from the special purpose building directives and/or respective specific fire protection concept as an integral part of building approval.

<sup>4)</sup> F30 requirements for supporting structural parts (walls and ceilings) in basements hold good in Bavarian, Hesse and Hamburg.

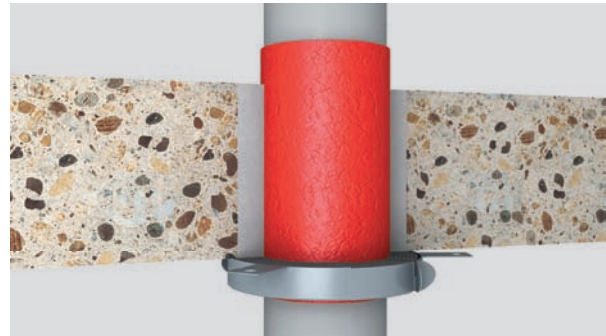
\* Sealings for F 60 structural components are not currently available on the market. For this reason sealings for F 90 structural components are to be used to ensure that the protection goal requirements can be met!

Introduction of the 2002 Model Building Regulation (MBO) and the 2005 Model Pipe Line System Provision (MLAR) have both defined the goal of preventing fires in buildings. Their implementation has considerably eased the work of the technical planner. DIN 4102 (fire protection) and DIN 4109 (sound insulation) also apply.

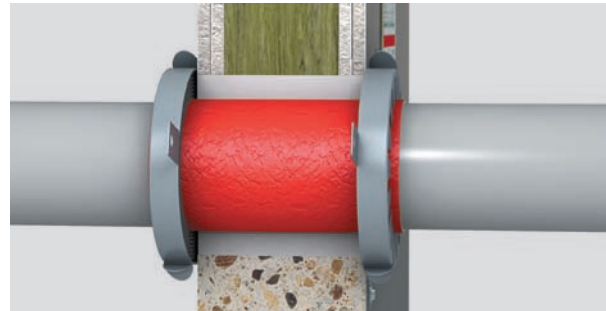
The compressed explanations here are to help the interested user in avoiding any planning and implementation errors. To this end, Table 1 charts the MBO 2002 building categories and requirements placed on the structural parts of these buildings. Pipes which, for instance, penetrate these structural parts in the course of equipping the building must have a proper fire stop to shut off any fire or smoke. These pipe seals can be achieved in R 90 quality with the new "Ostendorf BIS Pacifyre AWM II fire protection set". Since the BIS Pacifyre AWM II fire sleeve has been tested and approved for practically all fitting situations, such as inclined fittings and socket installation at the sleeve, It offers maximum flexibility.

If you would like more information on the new "Ostendorf Fire Protection Set" contact us under +49(0)4441-874-10.

## Installation

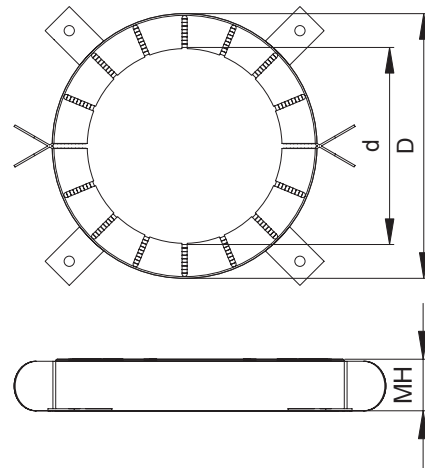


Installation in ceilings  $\geq 150$  mm



Installation in wall (lightweight partition wall or solid wall)  $\geq 100$  mm

## Technical drawings



## Application table

No.	Pipe outside $\varnothing$ mm	Sleeve		Sleeve height mm	No. Fastening brackets
		inside $\varnothing$ mm d	outside- $\varnothing$ mm D		
19170	25 – 50	54	68	26	2
19270	32 – 63	67	94	26	4
19370	40 – 75	79	106	26	4
19970	50 – 90	94	132	26	4
19470	63 – 110	114	155	26	4
19570	75 – 125	129	172	40	4
19670	90 – 140	144	200	40	6
19770	110 – 160	164	200	40	6

## Installation Instructions



Install pipe (and possibly the sound insulation hose included in the supply)



Close remaining or ring gap in a flue gas-tight manner



Select sleeve size



If necessary, mark and set up the fixing points



Plugging the retaining tab with the jointly supplied fixing set (as an option the tabs can also be bent through 90° and bedded in mortar!)

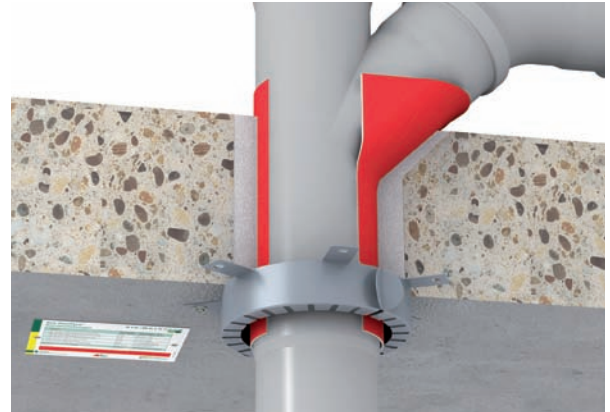


Fill in the identification plate as supplied and attach next to the fire-retarding seal.

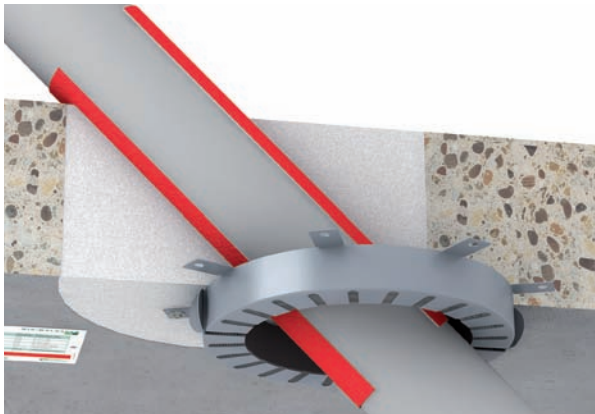
## Special applications



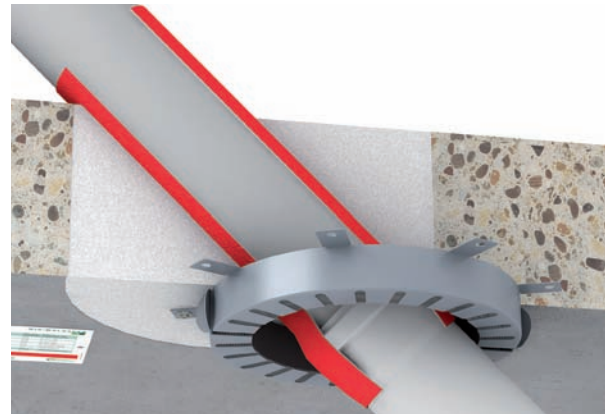
Straight pipe bushing (possibly with sound insulation hose  $\leq 4\text{mm}$ )



Straight pipe bushing with socket at the sleeve



Inclined bushing



Inclined bushing with socket



Knees or branches



Zero spacing one under the other

## Seal-offs in existing ceilings (Special-purpose ceilings)

Special-purpose ceilings differ from a solid one as defined in the Usability Certificate (ABP/ABZ) for pipe and/or cable fire stops. These ceilings must have a lining at the fire protection stop.

The fire stops are only to be fitted inside the structurally non-supporting surfaces of "special-purpose ceilings". At all events, it is recommended consulting a structural analyst.

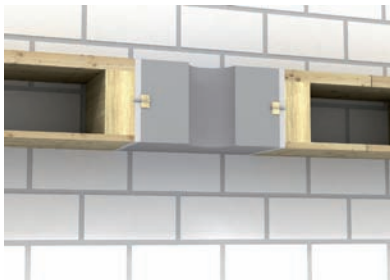
As detailed in ABP/ABZ, the planned pipe or cable fire stop is fitted inside the lining with a concrete or mortar casting. The minimum component thickness as per usability certificate must be adhered to. The component rebate could jut out should the minimum component thickness for the fire stop vary from that of the structural part.

The regulatory building fire stop fitting as against solid ceilings must be agreed to beforehand with the project manager responsible, architects and/or the fire protection

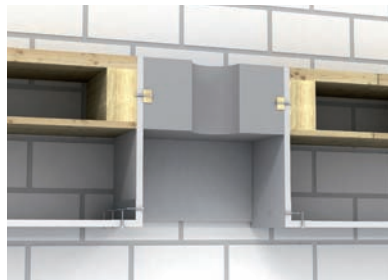
specialist monitoring the work. The following documents should be available:

- Planning and fire-stop
- Detailed diagram and description of the structural fitting
- Expert opinion involving project-specific classification of the deviation (major or minor deviation)
- Application by the house builder or his representative for approval of deviation from the "Eingeführten Technischen Baubestimmungen (ETBs)" at the secondary building authority.

Given that classification represents a major deviation from the Usability Certificate (ABP/ABZ), the house builder or his representative must apply for approval from the principal building authority.



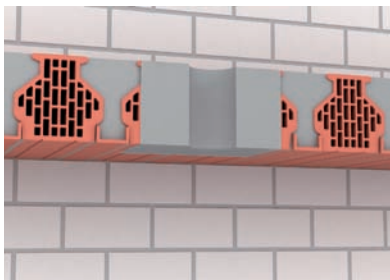
Wooden beam ceiling without ceiling substructure



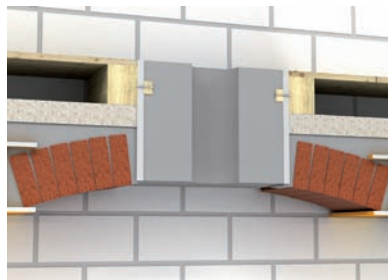
Wooden beam ceiling with classified ceiling substructure



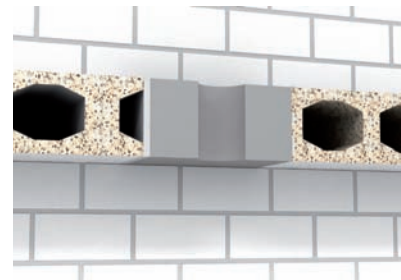
Porous concrete ceiling (possibly with cavities)



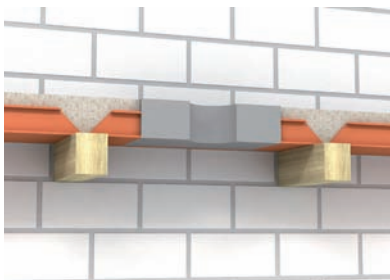
Ribbed or brick element ceiling



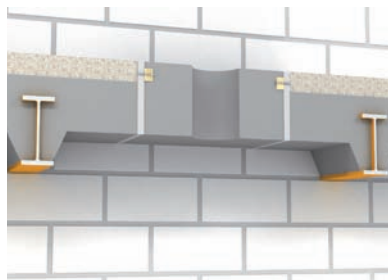
Cap ceiling



Cavity ceiling



Beamed ceiling



Steel support composite ceiling



# Installation Instructions

### 1. FIELD OF APPLICATION

The following instruction describes how the HT pipes and fittings - for discharging media in foul water, rainwater and ventilation pipes inside buildings - are to be handled, stored and mounted.

Orders for laying the detailed waste water piping systems are only to be placed with companies with a pool of trained operating personnel. The instruction is only for installing genuine pipes and fittings involving the use of the genuine sealing elements and lubricants.

### 2. TRANSPORT, HANDLING AND STORAGE

Unpalletized pipes should be laid completely flat along their entire length during transport. Heavy shocks – especially in freezing temperatures – must be avoided. For loading and unloading wide canvass lifting harnesses must be used.

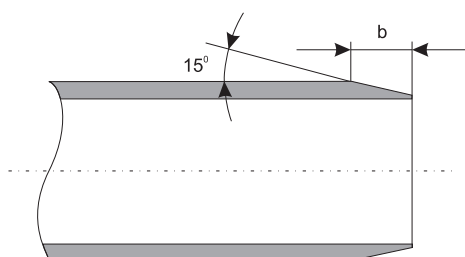
Pipes and fittings may be stored outdoors; pre-installed sealing elements should not be stored longer than three years. The following points must be observed when laying pipes:

- Pipes must be stored in a stable position so that no deformation or sagging can take place.
- The pipe sockets must be free, both in the vertical and horizontal directions.
- A stacking height of 1.5 meters should not be exceeded.

### 3. CUTTING TO LENGTH AND BEVELING

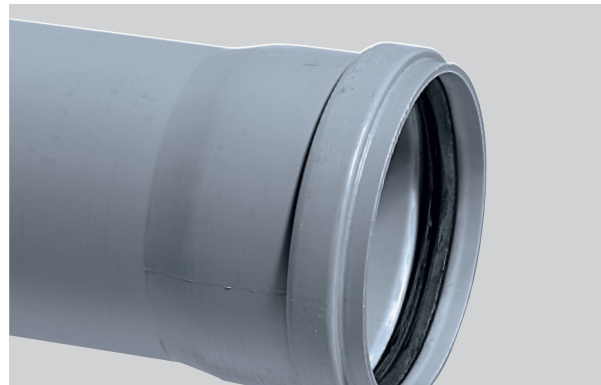
Cutting pipes to length is done at right angles by using a pipe cutter or a fine-toothed saw. The cut edges must be deburred. The pipe end is then beveled with a beveling tool or by using a coarse file at an angle of approx. 15° as shown in the following figure.

BEVELING DIMENSIONS								
DN	32	40	50	75	90	110	125	160
b[mm]	3,5	3,5	3,5	3,5	4,5	4,5	5,0	6,0



### 4. CONNECTING PIPES AND FITTINGS

- Clean the pipe spigot end and clean the socket.



- Check the condition and quality of the factory pre-installed sealing element.

- Apply factory supplied lubricant lightly and evenly on the bevelled surface only of the spigot end.



When inserting, the ring seal must be free of lubricant. Center up the spigot end of the pipe and push until the pipe end reaches the end of the socket.

- Length changes between pipes and fittings as well as between pipes within the spigot and socket connection are possible.



It is required that the pipe be pulled back a maximum of 10 mm. For normal HT pipes, that means a maximum length of 2 meters.

The spigot ends of fittings may remain fully pushed into the socket.

Pipes must be secured with pipe clamps to prevent slippage during subsequent installation work. This is done after taking into account the necessary measures concerning length changes.

## 5. PIPE CLAMPS

In general, plastic waste water pipe systems must be installed so that they are not under mechanical stresses and are allowed to undergo natural length changes. As a rule, securing pipes is done with pipe clamps that have an inner lining and that are appropriate for the given outer diameter and which completely circumvent the pipe. If no inner lining is used inside the clamp, then the inside edge of the clamp must be rounded off and the inside surface must be smooth. Only an inner lining that is recommended by the pipe manufacturer can be used. Inner linings made of PVC or pipe hooks must not be used!

### 5.1 FIXED CLAMPS

Fixed points are achieved by completely tightening the pipe clamps in a piping system. They must be positioned so that each pipe length is prevented from slipping. The fixed clamps must be positioned directly behind the socket for pipe with sockets.

Fittings or groups of fittings must always be laid out as fixed points.

### 5.2 LOOSE CLAMPS

Pipe clamps which are not completely tightened (loose clamps) must allow unimpaired longitudinal movement of the pipeline after installation. For this reason the inside diameter of the clamp must be slightly bigger than the outside diameter of the pipe when installed.

### 5.3 Distance between Pipe Clamps

RECOMMENDED PIPE CLAMP INTERVALS		
DN	Horizontal [m]	Vertical [m]
32	0,50	1,2
40	0,50	1,2
50	0,50	1,5
75	0,80	2,0
90	0,90	2,0
110	1,10	2,0
125	1,25	2,0
160	1,60	2,0

## 6. LAYING PIPE LINES IN MASONRY STRUCTURES

Slots in masonry must be made to allow stress and tension free pipe installation.

If the pipes must be embedded in mortar without the use of mortar carriers or enclosures, then the pipes and fittings must be completely wrapped in flexible material, such as cardboard, mineral or glass wool.

At areas where high temperatures can occur, appropriate measures must be taken to protect the pipes (insulation of heat carrying lines e.g. heating lines).

In addition, the ZVSHK guidelines "Vorwandinstallation" and the ZVSHK instruction manual "Entwässerungsleitungen" must be referred to.

Horizontally laid pipelines (connecting or collecting lines) which, for example, serve as a connection for multiple wall fixture elements should have a wrapping along the entire length. Linear expansion of the pipes and fixtures must not be hindered.

## 7. PIPE INSTALLATION IN CEILINGS AND FLOORS

Laying pipes in ceilings must be done so that they are moisture proof and sound proof. The appropriate wrapping material must be used. In case of floors using poured asphalt, the pipeline parts must be protected by using protective pipes or by wrapping with heat insulating materials.

If fire protection requirements are placed on ceilings, then the appropriate fire protection steps are to be observed.

## 8. INSTALLING PIPE SYSTEMS IN CONCRETE

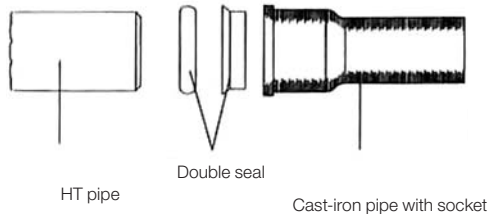
House waste water pipes and fittings may be embedded in concrete. Length changes of the pipes from thermal expansion must be considered as previously described.

The parts of the pipe system must be fastened so that movement and expansion is prevented during concrete pouring. To prevent penetration of concrete fluid into the gaps of connections, an adhesive tape strip must be used to seal the socket joint. All pipe openings must be closed off.

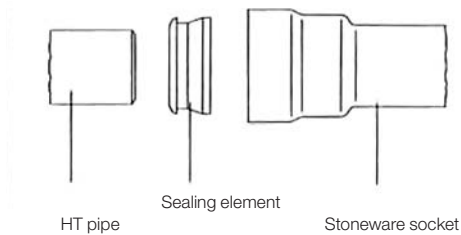
### 9. CONNECTION TO PIPES OF OTHER MATERIALS AND PIPE CUTTINGS

To connect HT pipes to other pipe system parts made of some other material, the appropriate fittings and sealing materials from the manufacturer must be used.

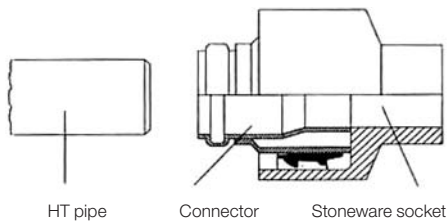
#### Connection to cast-iron pipe socket



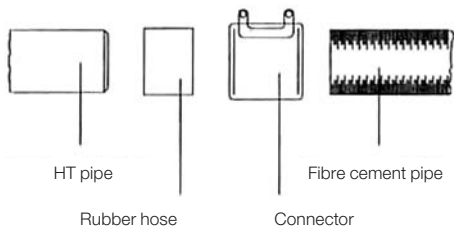
#### Connection to steel pipe socket



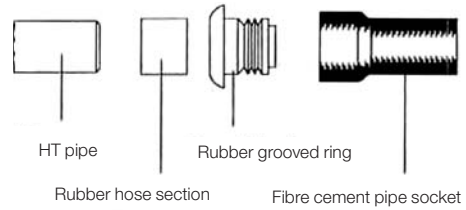
#### Connection to stoneware pipe socket



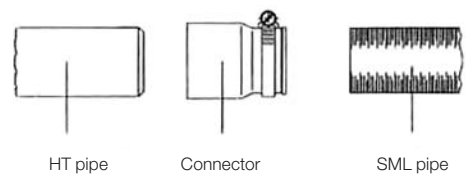
#### Connection to fibre cement pipe spigot end



#### Connection to fibre cement pipe socket



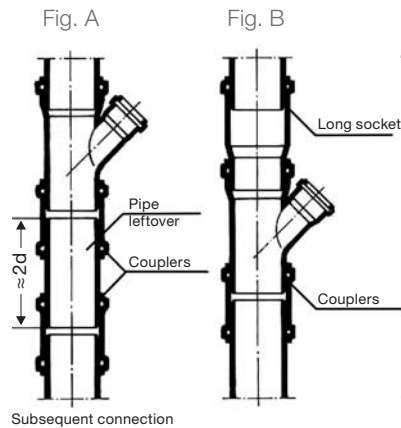
#### Connection to SML pipe



### 10. SUBSEQUENT CONNECTION OF PIPES AND FITTINGS

If a connection must be done to an existing line, then fittings and components made by the manufacturer must be used.

a) When using couplers a sufficiently long pipe length (length of the fitting 2d) is cut out, the ends of the pipe are then to beveled and the branch connector is then installed. The remaining space in the line is closed off by inserting an appropriately long pipe length and two couplers (Fig A.).



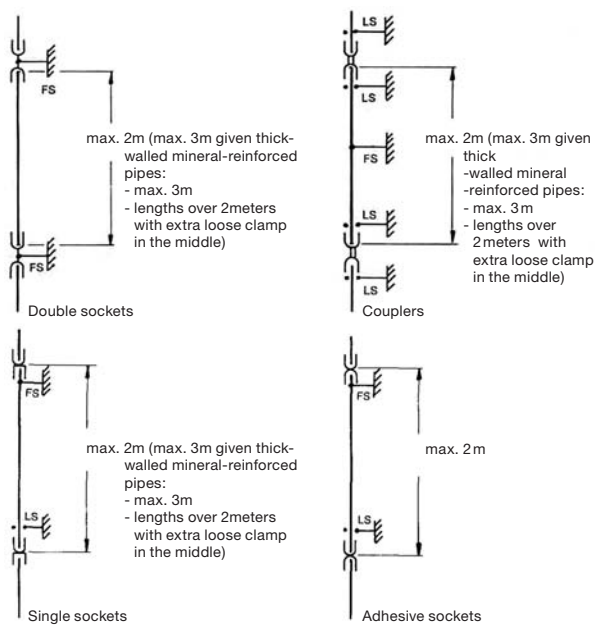
b) If long sockets are used, then a length of pipe that equals the length of the fitting plus the insert depth is cut out. The long socket is then inserted all the way to the end and the fitting is installed by using a coupler. Afterwards the spigot end of the long socket is to be inserted in the other socket end of the fitting (Fig B).

## 11. PREPARING AND USING SMOOTH PIPES AND LEFTOVER PIECES

Cutting, using and preparing leftover pieces (pipes with plain ends) can be done by using double sockets, couplers and single sockets.

When using these connectors, a maximum length of 2 meters should not be exceeded when laying pipes with plain ends. They must be laid in accordance with the following installation regulation. It must be adhered to ensure compensation for expansion (see linear expansion).

The instructions of the pipe manufacturer in question are to be observed when using thick-walled, mineral-reinforced pipe systems and setting up welded joints. Decisive in horizontal installation are the pipe clamp intervals for horizontal pipe lines.



Chemical  
Resistance



## Chemical Resistance of Polypropylene – HT System (PPs)

Chemicals	Concentrate [%]	Temp. [°C]		
		20	60	100
Acetone <sup>1</sup>	100	+	°	
Ammonia, gaseous	100	+	+	
Ammonia, aq.	conc.	+	+	
Ammonia, aq.	10	+	+	
Amyl alcohol, pure		+	+	
Acetic anhydride	100	+		
Aniline	100	+		+*
Benzaldehyde	100	+		
Benzaldehyde, aq.	sat.	+		
Petrol	(see Industrial liquids)			
Benzene	100	-*	-	
Bromine, liquid	100	-		
Bromine vapours	high	-	-	
Bromine vapours	dil.	°	-	
Bromine water	sat.	-	-	
Butane, liquid	100	+		
Butane, gaseous	100	+	+	
Butyl acetate	100	+	°	
Cyclohexane	100	+		
Cyclohexanol	100	+	+	
Cyclohexanone	100	+	-	
Dibutyl phthalate	(see Industrial liquids)			
Diethyl ether	100	°		
Potassium dichromate, aq.	sat.	+	+	+
Dimethylformamide	100	+		
1,4-Dioxan	100	+	°	-
Ammonium nitrate, aq.	any.	+	+	+
Potassium nitrate, aq.	sat.	+	+	
Sodium nitrate, aq.	sat.	+	+	
Calcium nitrate, aq.	sat.	+	+	+
Ethyl acetate	100	°	°	
Ethyl alcohol	100	+		
Ethyl alcohol, aq.	96	+	+	
Ethyl alcohol, aq.	50	+	+	
Ethyl alcohol, aq.	10	+	+	
Ethyl benzene	100	°	-	
Ethylene chloride	100	°	-*	
2-Ethyl hexanol	100	+		
Ethyl chloride	100	-		
Ether - see diethyl ether				
Phenol	sat.	+	+	
Formaldehyde, aq.	40	+	+	
Formaldehyde, aq.	30	+	+	
Formaldehydw, aq.	10	+	+	
Ammonium phosphate, aq.	any	+	+	+
Sodium phosphate, aq.	sat.	+	+	+
Glycerol	100	+	+	
Glycerol, aq.	high	+	-	-
Glycerol, aq.	verdünnt	+	-	-
Glycol	100	+	+	
Glycol, aq.	high	+	+	
Glycol, aq.	dil.	+	+	+
Heptane	100	+	°	
Hexane	100	+	°	
Aluminium salts	any	+	+	+
Sodium disulphide, aq.	sat.	+	+	
Sodium hydrog. carbonate, aq.	sat.	+	+	+

Chemicals	Concentrate [%]	Temp. [°C]		
		20	60	100
Potassium hydroxide	50	+	+	
Potassium hydroxide	25	+	+	
Potassium hydroxide	10	+	+	
Potassium hydroxide	100	+	+	
Chlorine liquid	100	-		
Chlorine, gaseous, dry	100	-	-	-
Chlorine, gaseous, damp	10	°	-	-
Chlorobenzene	100			
Sodium chlorate, aq.	5	+		
Ammonium chloride, aq.	any	+	+	+
Tin chloride	sat.	+	+	
Potassium chloride, aq.	sat.	+	+	+
Sodium chloride, aq.	sat.	+	+	+
Calcium chloride, aq.	sat.	+	+	+
Sodium perchlorate, aq.	5	+	+	
Potassium hypochlorite, aq.	sat.	+	+	
Sodium hypochlorite, aq.	25	+	+	
Chloroform	100	-*	-	
Chlorine water	sat.	°	-	
Hydrogen chloride, gaseous	high	+	+	
Isocotane	100	+	°	
Isopropyl alcohol	100	+	+	
Potassium iodide, aq.	sat.	+	+	
Cresol	100	+	°	
Cresol, aq.	sat.	+	°	
Benzoic acid	100	+	+	
Benzoic acid, aq.	sat.	+	+	+
Boric acid	100	+	+	
Boric acid, aq.	sat.	+	+	
Citric acid, aq.	sat.	+	+	+
Nitric acid	50	°	-	
Nitric acid	25	+	+	
Nitric acid	10	+	+	
Hydrofluoric acid	40	+	+	
Phosphoric acid	sat.	+	°	
Phosphoric acid	50	+	+	
Phosphoric acid	10	+	+	+
Hydrochloric acid	sat.	+	+	
Chlorosulphonic acid	100	-	-	
Chromic acid	sat.	+	-	
Chromic acid	20	+	°	
Succinic acid, aq.	sat.	+	+	
Lactic acid, aq.	90	+	+	
Lactic acid, aq.	50	+	+	
Lactic acid, aq.	10	+	+	+
Formic acid	98	+	°	
Formic acid	90	+		
Formic acid	50	+	+	
Formic acid	10	+	+	+
Glacial acetic acid	100	+	°	-
Acetic acid, aq.	50	+	+	
Acetic acid, aq.	10	+	+	+
Oleic acid	100	+		
Sulphuric acid	96	+	°	
Sulphuric acid	50	+	+	
Sulphuric acid	25	+	+	
Sulphuric acid	10	+	+	+
Stearolic acid	100	+		
Oxalic acid, aq.	sat.	+	+	+
Acidity of wine, aq.	sat.	+	+	

Chemicals	Concentrate [%]	Temp. [°C]		
		20	60	100
Hyper manganese, aq.	sat.	+	+	
Methanol	100	+	+	
Methanol, aq.	50	+	+	
Methyl ethyl keton	100	+	°	
Methyl chloride	100	°		
Mineral oils	(see Industrial liquids)			
Urea, aq.	sat.	+	+	
Naphthalene	100	+		
Naphthalene	100	-*	-	-
Soda lime	50	+	+	
Soda lime	25	+	+	
Soda lime	10	+	+	+
n-Butanol	100	+	+	
Nitrobenzene	100	+*	°	
Ammonium acetate, aq.	any	+	+	+
Acetate see isocotane				
Phosphorous pentoxide	100	+		
Sulphur dioxide	dil.	+	+	
Ozone < 0.5 ppm		+*	-*	
Hydrogen peroxide, aq.	90			
Hydrogen peroxide, aq.	30	+	°	
Hydrogen peroxide, aq.	10	+	+	
Hydrogen peroxide, aq.	3	+	+	+
Potassium persulphate, aq.	sat.	+		
Propane, liquid	100	+		
Propane, gaseous	100	+	+	
Pyridine	100	+	°	
Mercury	100	+	+	
Sulphur	100	+	+	+
Ammonium sulphate	any	+	+	+
Potassium sulphate, aq.	sat.	+	+	+
Sodium sulphate, aq.	sat.	+	+	+
Carbon disulphide	100	°		
Hydrocarbon	dil.	+	+	
Sodium sulphite, aq.	sat.	+	+	
Barium salts	any	+	+	+
Magnesium salts, aq.	sat.	+	+	+
Chromium salts 2+, 3+	sat.	+	+	
Copper salts	sat.	+	+	+
Nickel salts	sat.	+	+	
Mercury salts, aq.	sat.	+	+	
Silver salts	sat.	+	+	
Zinc salts, aq.	sat.	+	+	
Iron salts, aq.	sat.	+	+	+
Sodium sulphide, aq.	sat.	+	+	
Trisodium tetraborate, aq.	sat.	+	+	+
Tetrahydrofuran	100	°	-	
Tetrahydronaphtalene	100	°	-	
Tetrachlorothane	100	°	-	
Tetrachloromethane	100	°	-	
Thiophene	100	°	-	
Sodium thiosulphate, aq.	sat.	+	+	
Toluene	100	°	-	
Trichloroethane	100	°	-*	
Ammonium carbonate	any	+	+	+
Potassium carbonate (potash)	sat.	+	+	
Sodium carbonate (soda)	sat.	+	+	
Sodium carbonate (soda)	10	+	+	+
Water	100	+	+	+
Xylene	100	°	-	

Chemicals	Concentrate [%]	Temp. [°C]		
		20	60	100
<b>Industrial liquids</b>				
Battery acid		+	+	
Asphalt		+	°	
Petrol, pure		+	°	
Petrol, natural		+	°	
Petrol, special		+	°	
Petrol, super		+	°	
Bleaching lye (12.5 % Cl)		°	°	
Borax, aq.	sat.	+	+	
Wood turpentine		+	+	
Brake fluid		+	+	
Tar		+	°	
Formalin®		+	+	
Photographic developer	stand.	+	+	
Fridex®		+	+	
Chlorinated lime		+	+	
Chrome tanning bath		+	+	
Chromic-sulphuric acid mixture		-	-	
Alum saturated		+	+	
Shoe polish		+	°	
Kresolum Saponatum®		+		
Moth balls		+		
Lanolin®		+	°	
LITEX®		+	+	
Linseed oil		+	+	
Lysol®		+	°	
Mineral oils (free from aromatics)		+	°	-
Engine oils		+	°	-
Diesel oil		+	°	
Synthetic grease removal agent	stand.	+	+	+
Oil for two-stroke engines		°	°	
Oil for typewriters		+	+	
Transformer oil		+	°	
Oleum	any	-	-	
Paraffin	100	+	+	-
Paraffin oil	100	+	°	-
Pectin saturated		+	+	
Petroleum ether	100	+	°	
Furniture polish		+	°	-
Detergent		+	+	
Sagrotan®		+	°	
Surfactants for dishes		+	+	+
Silicone oil		+	+	
Pine essence		+	+	
Soda	see sodium carbonate			
Solvina		+	+	
Turpentine		°	-	
Heating oil		+	°	
China ink		+	+	
Fixing bath	10	+	+	
Sea water		+	+	+
Water glass		+	+	
Parquet wax		+	°	
Plasticizers – dibutyl phthalate		+	°	
Plasticizers – dibutyl sebacate		+		
Plasticizers – dihexyl phthalate		+		
Plasticizers – dinonyl adipate		+		

Chemicals	Concentrate [%]	Temp. [°C]		
		20	60	100
Plasticizers – dioctyl adipate		+		
Plasticizers – dioctyl phthalate		+		
Plasticizers – tricresyl phosphate		+		
Plasticizers – trioctyl phosphate		+		

Pharmaceuticals and cosmetics				
Aspirin®		+		
Quinine		+		
Tincture of iodine		+		
Camphor		+		
Nail polish		+		
Menthol		+		
Soap and soap flakes		+		
Soap solution	sat.	+	+	+
Soap solution	10	+	+	+
Nail polish remover		+	°	
Perfume		+		
Hair shampoo		+	+	
Vaseline		+	°	
Toothpaste		+	+	

Foodstuffs and luxury items				
Potato salad		+		
Coca-Cola®		+		
Sugar dry		+	+	+
Tea – leaves		+	+	+
Tea – ready to drink		+	+	
Lemon puree and peel		+	+	+
Apple puree		+		
Orange puree and peel		+	+	+
Ether oils		+		
Gin		+	°	
Mustard	40	+		
Cocoa – ready to drink		+		
Cocoa – powder		+	+	+
Coffee (beans and ground)		+		
Coffee – ready to drink		+		
Ketchup		+	+	+
Cognac		+	+	
Spices		+		
Fish, pickled		+		
Sauerkraut (pickled cabbage)		+	+	+
Liquor	any	+	+	+
Lemonade		+	+	
Beef suet		+		
Mayonnaise		+	+	
Margarine		+	+	+
Marmalade		+	+	
Butter		+	+	
Honey		+	+	+
Milk-based foods		+	+	+
Milk		+		
Flour		+	+	
Vinegar	stand.	+		
Lemon peel oil		+	+	
Coconut oil		+		
Mint oil		+	+	
Olive oil		+	+	
Palm oil		+	°	
Orange peel oil		+		

Chemicals	Concentrate [%]	Temp. [°C]		
		20	60	100
Vegetable oil		+	°	
Soya bean oil		+	°	
Maize oil		+	°	
Groundnut oil		+	+	+
Animal fat		+	°	
Fruit salad		+		
Pastries		+	+	+
Beer		+		
Buttermilk		+		
Pudding		+	+	+
Rum	40	+	+	
Cod-liver oil		+		
Pork lard		+	°	
Salami		+	+	
Turnip syrup	any	+	+	+
Salted herrings		+		
Soda water		+		
Salt water		+	+	+
Cooking salt	see sodium chloride			
Cheese		+		
Starch solution	any	+	+	
Whipped cream		+		
Pineapple juice		+	+	
Lemon juice		+	+	
Grapefruit juice		+	+	
Apple juice		+	+	
Fruit juice		+	+	
Orange juice		+	+	
Tomato juice		+	+	
Baking juice		+	+	+
Lemon essence		+		
Almond essence		+		
Vinegar essence	stand.	+	+	
Rum essence		+		
Vanilla essence		+	+	
Curd		+		
Raw and boiled egg		+	+	+
Wine		+	+	
Whisky	40	+		
Vegetables		+	+	+
Gelatine		+	+	+

### Key

+	resistant
+	partially resistant
°	resistant to a certain degree
-*	of low resistance
-	not resistant
no details	not tested
any	any concentration
conc.	concentrated solution
low	low concentration
stand.	standard concentration
serv.	service concentration
dil.	diluted solution
aq.	aqueous solution
sat.	cold saturated solution
hot sat.	hot saturated solution
trac.	traces

<sup>1</sup> Boiling point 56.3 °C

<sup>2</sup> Boiling point 34.6 °C

<sup>3</sup> Boiling point 13.1 °C

<sup>4</sup> Discolouring with lead stabilisers

<sup>5</sup> Resistance depends on composition

<sup>6</sup> Free of solvents, plasticizers and other additives