



POLO-KAL NG  
POLO-KAL 35  
POLO-CLIP HS/POLO-CLIP  
POLO-BSM / TOPFOX



# DOMESTIC WASTE DISPOSAL

TECHNICAL PRODUCT INFORMATION



**poloplast**   
PIPE SYSTEMS

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## GENERAL NOTES

The information contained in this brochure is to help you make your selection from our product range. We have listed the texts and figures with the utmost care. Nevertheless, we cannot fully exclude errors. POLOPLAST can neither bear legal responsibility nor give whatsoever warranty for inaccurate data and their consequences. POLOPLAST would appreciate any suggestions for improvement.



POLOPLAST offers a comprehensive system solution and has proven its competence in the domestic waste disposal sector: The sound-insulated domestic waste disposal programmes POLO-KAL NG and POLO-KAL 3S are combined with the highly-noise insulated pipe bracket POLO-CLIP HS and the fire protection collar POLO-BSM to form an innovative problem solution.

### I.I.1 POLO-KAL NG – SOUND-INSULATED DOMESTIC WASTE DISPOSAL POLO-KAL 3S – HIGHLY SOUND-INSULATED DOMESTIC WASTE DISPOSAL



(Diagramme 1)  
POLO-KAL NG and POLO-KAL 3S

The solutions “POLO-KAL NG” (sound-insulated) and “POLO-KAL 3S” (highly sound-insulated) are presented in an innovative triple layer technology: three layers which match with each other perfectly are combined to provide an excellent profile of properties:

#### POLO-KAL NG – SOUND-INSULATED

- (1) The **outer PP layer** forms the protective cover of the pipe and shows outstanding impact strength, sturdiness and excellent weathering resistance. Its even surface is the unique blue colour of the POLO-KAL NG pipe system.
- (2) The mineral component reinforced **middle PP-MV layer** is decisive for the excellent sound insulation of POLO-KAL NG. It is due this supporting layer that the pipe becomes highly rigid, solid and safe.
- (3) The smooth **inner PP layer** rounds off the excellent features of POLO-KAL NG through its high hot-water and chemical resistance, as well as abrasion resistance and low tendency to form incrustations.

#### POLO-KAL 3S – HIGHLY SOUND-INSULATED

- (1) The **outer PP layer** is the protective cover of the medium transferring pipe and the intermediary layer and provides high stability, rigidity and impact strength. It is the typical white colour of the POLO-KAL 3S.
- (2) The unique elastoplastic **middle porolene layer** developed by POLOPLAST is decisive for the outstanding noise insulation results of POLO-KAL 3S. It dampens impacts and vibration, absorbs airborne and impact sound waves and in this way minimises the discharge noise.
- (3) The **inner PP layer** surfaces are absolutely smooth. Excellent hydraulic properties and high chemical resistance prevent any incrustation or corrosion.

The excellent property profile of POLO-KAL NG and POLO-KAL 3S demonstrates a number of convincing advantages:

- > The innovative triple-layer technology meets the highest requirements concerning pipe quality, sound insulation and stability.
- > POLO-KAL NG, noise-insulated, provides a high degree of sound insulation in traditional house building and guarantees high living comfort.
- > POLO-KAL 3S, highly sound-insulated, meets the increased requirements for rooms needing noise protection and provides maximum possible damping of vibration.
- > High pipe rigidity and dimensional stability prevent the piping from sagging.

- > High impact strength and cold impact strength make it possible to lay the pipes even at temperatures below freezing.
- > Tightness due to the exactly shaped connecting socket and sealing groove preventing the packing ring from sliding away.
- > A simple system of push-fit connecting sockets guarantees time and cost saving laying.
- > Extensive range of fittings for tailor-made solutions.

### 1.1.2 POLO-CLIP HS PIPE FASTENING SYSTEM HIGHLY SOUND-INSULATED

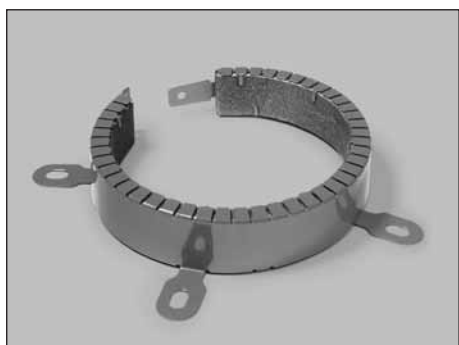


(Diagramme 2)  
POLO-CLIP HS bracket

Due to its shape and the combination of materials used the POLO-CLIP HS pipe bracket provides considerable benefits in sound insulation, strength and handling:

- > The combination of a hard and a soft component in one injection moulding compound allows the material to be optimally chosen in order to provide high sound insulation.
- > The ribs of the soft component are adjusted to the acoustic behaviour of the POLOPLAST POLO-KAL NG and POLO-KAL 3S domestic waste disposal programmes. The air cushion surrounded by the ribs provides sound neutralization.
- > The slanted ribs prevent sound waves from being transmitted.
- > A special locking mechanism provides secure hold and prevents the occurrence of uncontrolled pressing.
- > The bracket base is designed to guarantee high strength and sound insulation at the same time.
- > POLO-CLIP HS can be easily mounted on the pipe without any tools.
- > Available in three nominal widths (110/90/75) and with an M8 and M10 nut.

### 1.1.3 POLO-BSM FIRE PROTECTION COLLAR



(Diagramme 3)  
POLO-BSM

The POLO-BSM fire protection collar together with the domestic waste disposal programmes POLO-KAL NG and POLO-KAL 3S form a perfectly matching system solution with optimum fire protection features. From the point of view of safety requirements the features of the collar ideally supplement the properties of both pipe systems.

- > Highest reliability due to its resistance to atmospheric influences (frost, heat, humidity, light, as well as industrial climate).
- > Reliable effectiveness due to high resistance to diluted acids, caustic solutions, paints, binding agents etc.
- > Fire- and hot-gas proof lock between fire lobbies prevents flames and smoke from spreading through apertures in the pipes.
- > Simple mounting and unproblematic retrofitting.
- > Maintenance-free and of unlimited storage duration.

**I.2.1. POLO-KAL NG AND POLO-KAL 35****EN 1451 PART 1-6**

(following)

- > Plastic piping systems for discharging waste water (at low and high temperatures) within a building.

**Polypropylene (PP)****EN 12056 PART 1-5**

- > Gravity discharge systems within buildings

**ÖNORM B 2501**

- > Draining systems for buildings and plots of land  
Supplementary directives on planning, performance and testing

Remaining standard to EN 12056

**DIN 1986 PART 100**

- > Draining systems for buildings and plots of land, Part 100 "Additional regulations to DIN EN 752 and DIN EN 12056"

**I.2.2. POLO-BSM****ÖNORM B 3800 PART 2-4**

- > Behaviour of building materials and structural elements in fire

**ÖNORM B 3836**

- > Behaviour of building materials in fire -  
sealing of cable bushings

**I.2.3. TOPFOX****DIN 4102-II**

- > Behaviour of building materials and structural elements in fire; pipe casings, pipe sealing, installation pits and ducts, as well as the locks of their inspection apertures  
Terms, requirements and tests

# I\_GENERAL INFORMATION

## I.3\_CERTIFICATIONS



### POLO-KAL NG:

Certification no. Z-42.1-241

### POLO KAL 3S:

Certification no. Z-42.1-341



### POLO-KAL NG:

Certification no. 117/6221/2000

### POLO-KAL 3S:

Certification no. 265/6221/2001



### POLO-KAL NG:

Certification no. NPS 0396

### POLO KAL 3S:

Pipes certification no. PS 0697

Fittings certification no. PS 0702



### POLO-KAL NG:

Certification no. 0704/99

### POLO-KAL 3S:

Certification no. 0990/99



### POLO-KAL NG:

Certification no. 02 0056 V/AO

### POLO KAL 3S:

Certification no. 01 0557 V/AO



### POLO-KAL NG:

Certification no. 0901A/02/0016/1/C/C06

**I.4.1. POLO-KAL NG  
TGM-VA KU 20080/I**

- > resistance to external impact, tested in stepped tests at -10°C

**SIEGEN IB-WEG 2003.4**

- > charging tests of ventilating pipes

**ING.BERNHARD HAMMER  
OCTOBER 2001**

- > work and time comparison  
“fitting and welding of domestic waste disposal systems”

**SIEGEN  
G02-I46/2**

- > assessment and comparison of loss of pressure for plastic pipe sections and fittings

**OFI 47.423**

- > coefficient of linear expansion of plastic pipe sections

**ÖKI 33.044**

- > resistance to low pressure

**OFI 301.499**

- > emission measuring on the inner pipe layer following VDA 278

**OFI 304.324**

- > emission measuring on POLO-KAL NG fittings and seals following VDA 278

**INTERNAL TEST**

- > food safe

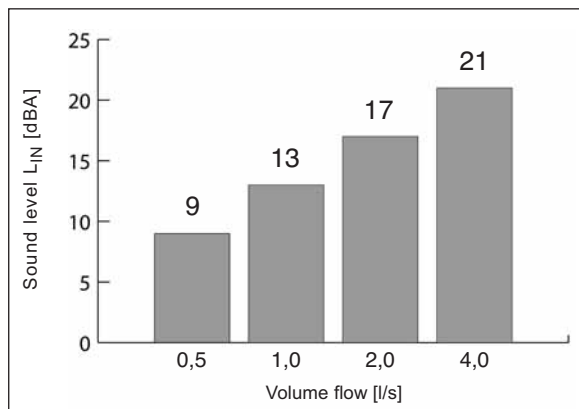
**I.4.2 POLO KAL 35  
OFI 47.423**

- > coefficient of linear expansion of plastic pipe sections

The results of a sound-level test carried out at the FRAUNHOFER INSTITUTE STUTTGART prove the high sound-insulation competence of the POLO-KAL NG and POLO-KAL 3S three-layer pipe systems together with POLO-CLIP HS.

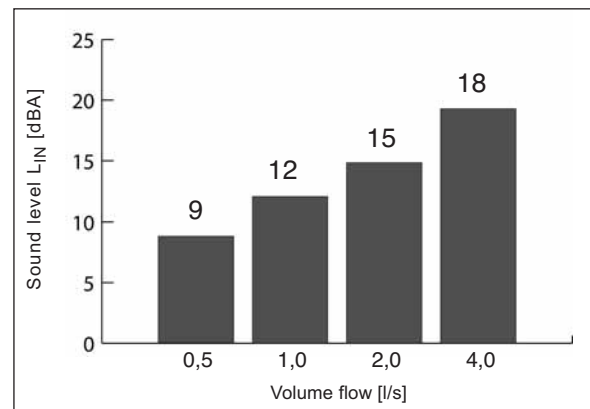
#### Measurement results of the Fraunhofer Institute Stuttgart:

(EN 14366 "Laboratory measurement of noise from waste water installations")



(Diagramme 4)

POLO-KAL NG with POLO-CLIP HS



(Diagramme 5)

POLO-KAL 3S with POLO-CLIP HS

(location of measurement: rear basement)

Volume flow [l/s]	0,5	1,0	2,0	4,0	
Sound level at the moment of installation $L_{IN}$ [dBA]					Test No.:
<b>POLO-KAL 3S with POLO-CLIP HS*</b>	9	12	15	18	P-BA 164/2006
<b>POLO-KAL NG with POLO-CLIP HS*</b>	9	13	17	21	P-BA 165/2006
<b>POLO-KAL NG with Bismat 1000**</b>	7	9	12	17	P-BA 162/2006

\*) The values might deteriorate by 2 – 3 dB, if a conventional steel clip with rubber lining is used.

\*\*) In practice, sound-protection values depend on the laying quality and could deviate from laboratory values.



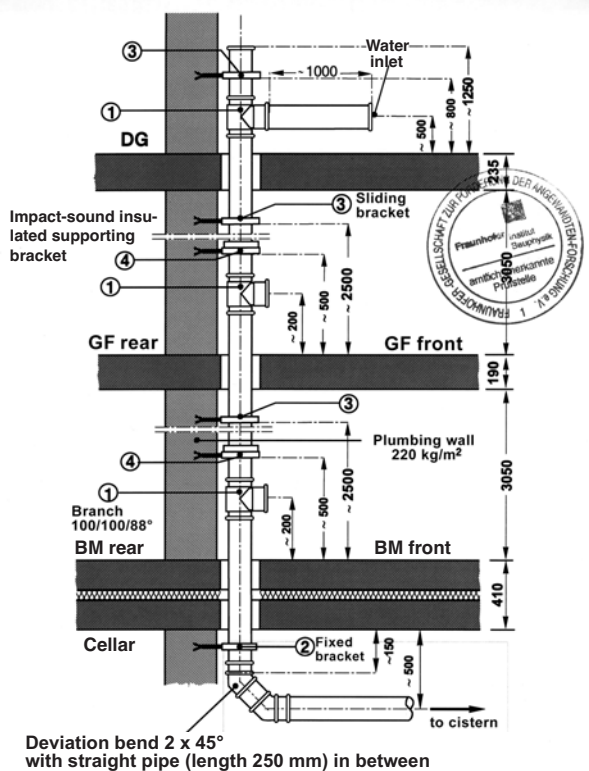
Sound insulation properties of domestic waste disposal pipes are measured according to the currently valid EN 14366 "Laboratory measurement of noise from waste water installations". They show the following significant changes, as compared to former measurements:

- > Measurements are carried out only in the basement
- > The following two measurements are taken:

$L_{IN}$  corresponds to the sound level at the moment of installation of the pipe system measured in basement;

$L_{SC, A}$  corresponds to the characteristic impact sound, which is determined by calculation after measurement with open clips. This value, as any measurements with open clips, is not representative for a system's practical sound insulation capacity.

The waste water system installation plan is represented in the following drawings:



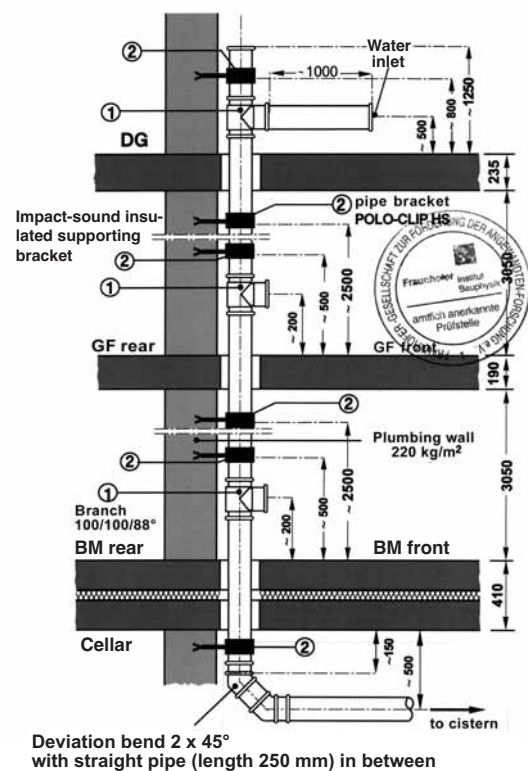
(Diagramme 6)

Test configuration with Bismat 1000

- ① Branch DN/OD 110/87°
- ② Fixed bracket: steel bracket with rubber lining
- ③ Sliding bracket: Bismat 1000
- ④ Impact-sound insulated supporting bracket: Bismat 1000

- > Basement rear: Measuring room, receiving room
- > Basement front: Transmitting room
- > Plumbing wall: 115 mm thick sand-lime brick, rendered on both sides
- > Mass per unit area of plumbing wall: 220 kg/m²
- > Water discharge:
 

$Q = 0,5 \text{ l/s}$ ( $Q = 30 \text{ l/min}$ )	$Q = 2,0 \text{ l/s}$ ( $Q = 120 \text{ l/min}$ )
$Q = 1,0 \text{ l/s}$ ( $Q = 60 \text{ l/min}$ )	$Q = 4,0 \text{ l/s}$ ( $Q = 240 \text{ l/min}$ )



(Diagramme 7)

Test configuration with POLO-CLIP HS

- ① Branch DN/OD 110/87°
- ② Highly noise-insulated pipe bracket POLO-CLIP HS

**Material** > Pipe: PP-C / PP-TV / PP-C  
> Fitting: PP-C-KV

**Colour** > Blue RAL 5014 (free of halogen and cadmium)

**Hot water resistance** > Short intervals up to 97°C  
> Long intervals up to 95°C

**Pipe identification** > Household waste water pipes with the name POLO-KAL NG carry the following identification: batch number, year and week of manufacture, company name, dimension application class, stiffness class, test mark and material details.

**Chemical resistance** > According to the chemical resistance list.

**Connections** > Push-fit socket with factory-installed lip ring.  
> Sealing material = SBR  
> Sealing material for AGT = FPM-LILA

**Fire protection** > The pipe and fitting range complies with

Fire classification B2 inflammable (normal),  
Smoke formation class Q1 slight smoking,  
Drip formation class TR1 non-drip,

in accordance with Austrian Standard B 3800 or DIN 4102, part 2.

**Stability and Impermeability** > **Pipe ring stiffness** was proven in accordance with ISO/DIS 9969. Stiffness amounts to at least 4,0 kN/m<sup>2</sup> over the total dimensional area (ÖKI test report no. 33.870 dated 30.11.1995).  
> **Tightness** was proven according to EN 1277/B and C and DIN 19560 under pressure, bending and deformation of the socket area (ÖKI test number 31.309 dated 30.5.1994).

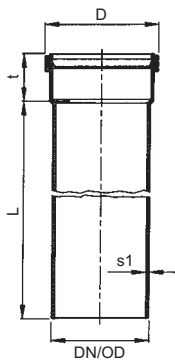
**Standards** > The pipe system was tested following the Product Standard ON EN 1451-1 (Discharge pipes and fittings of PP).

**Tests** > POLO-KAL NG pipes and fittings are supervised by the external Authorized Research Institute for Plastics (VAK) and TGM.

### Physical standard values

Item	Unit	Value	Standard
Medium density	kg/dm <sup>3</sup>	1,0 – 1,2	ISO 3477
Melt-flow index area	g/10 min.	0,5 – 1,5	ISO 1133
Apparent yielding point	MPa	> 26	ISO/DIS 6259
Elastic modulus	MPa	> 2600	ISO 178
Impact toughness	KJ/m <sup>2</sup>	> 22	ISO R 179
Ductile yield	%	> 200	ISO/DIS 6259
Vicat	°C	> 143/73	ISO 306

measures in mm

**POLO-KAL NG****Socket pipe**with factory-fitted  
lip ring

DN/OD*	Art. No.	L	s1-min	t-min.	D-max.		kg/pc.
32	2000	150	1,8	39,2	41		0,040
32	2001	250	1,8	39,2	41		0,058
32	2002	500	1,8	39,2	41		0,106
32	2003	1000	1,8	39,2	41		0,200
32	2004	1500	1,8	39,2	41		0,294
32	2005	2000	1,8	39,2	41		0,388
40	2010	150	1,8	43,4	55		0,053
40	2011	250	1,8	43,4	55		0,077
40	2012	500	1,8	43,4	55		0,136
40	2013	1000	1,8	43,4	55		0,255
40	2014	1500	1,8	43,4	55		0,375
40	2015	2000	1,8	43,4	55		0,494
50	2020	150	2,0	45,4	63		0,076
50	2021	250	2,0	45,4	63		0,109
50	2022	500	2,0	45,4	63		0,192
50	2023	1000	2,0	45,4	63		0,359
50	2024	1500	2,0	45,4	63		0,525
50	2025	2000	2,0	45,4	63		0,692
50	2026	3000	2,0	45,4	63		1,025
75	2030	150	2,6	50,6	89		0,154
75	2031	250	2,6	50,6	89		0,221
75	2032	500	2,6	50,6	89		0,391
75	2033	1000	2,6	50,6	89		0,730
75	2034	1500	2,6	50,6	89		1,069
75	2035	2000	2,6	50,6	89		1,408
75	2036	3000	2,6	50,6	89		2,138
90	2071	250	3,0	56,6	106		0,340
90	2072	500	3,0	56,6	106		0,595
90	2073	1000	3,0	56,6	106		1,103
90	2075	2000	3,0	56,6	106		2,120
90	2076	3000	3,0	56,6	106		3,137
110	2040	150	3,4	61,9	128		0,316
110	2041	250	3,4	61,9	128		0,446
110	2042	500	3,4	61,9	128		0,770
110	2043	1000	3,4	61,9	128		1,418
110	2044	1500	3,4	61,9	128		2,066
110	2045	2000	3,4	61,9	128		2,714
110	2046	3000	3,4	61,9	128		4,010
125	2050	150	3,9	66,7	145		0,426
125	2051	250	3,9	66,7	145		0,597
125	2052	500	3,9	66,7	145		1,024
125	2053	1000	3,9	66,7	145		1,879
125	2054	1500	3,9	66,7	145		2,734
125	2055	2000	3,9	66,7	145		3,589
125	2056	3000	3,9	66,7	145		5,299
160	2060	150	4,9	73	183,5		0,710
160	2061	250	4,9	73	183,5		0,984
160	2062	500	4,9	73	183,5		1,669
160	2063	1000	4,9	73	183,5		3,040
160	2064	1500	4,9	73	183,5		4,410
160	2065	2000	4,9	73	183,5		5,781
160	2066	3000	4,9	73	183,5		8,522

\* DN/OD - according to European standardization CEN/TC 155 Dimension Nominal / Outside Diameter

Subject to technical alterations (without prior notice)

**POLO-KAL NG**

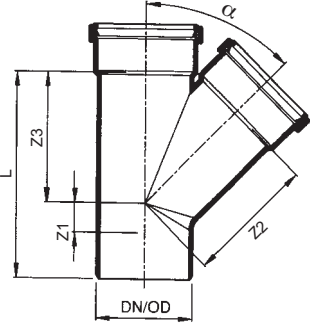
# POLO-KAL 35

## PIPE BRACKET

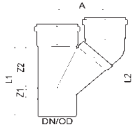
**FIRE PROTECTION  
COLLAR**

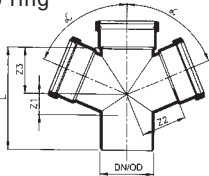
LAYING  
INSTRUCTIONSINVITATION FOR  
TENDERS TEXT

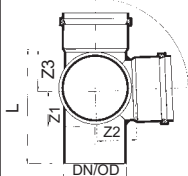
measures in mm

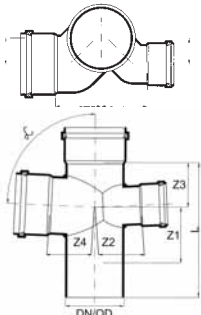
POLO-KAL NG		DN/OD	Art. No.	Z1	Z2	Z3		L	kg/pc.
Branch with factory-fitted lip ring	45°	32/32	2200	13	47	47		85	0,039
		40/32	2203	8	53	52		85	0,048
		40/40	2206	9	56,1	54		112	0,070
		50/32	2209	5	60	53		98	0,069
		50/40	2212	4	63,2	59		116	0,085
		50/50	2215	11	68,2	66		130	0,085
		75/50	2218	2	86,5	79		137	0,177
		75/75	2221	16	100,6	96		172	0,224
		90/50	2210	2	96	88		145	0,257
		90/90	2211	29	116	116		174	0,391
		110/50	2224	19	111,8	97		152	0,412
		110/75	2227	1	126,5	116		188	0,475
		110/110	2230	23	147,8	143		240	0,835
		125/75	2233	7	153	159		238	0,523
		125/110	2236	29	151	148		249	0,561
		125/125	2239	42	160	160		274	0,692
		160/110	2242	15	177	167		268	0,898
		160/160	2245	53	203	203		342	1,256
		200/160	2971	23	245	210		233	3,197
		200/200	2973	75	291	291		484	4,630
	67,5°	250/160	2975	170	306	288		457	6,020
		250/250	2979	200	351	352		585	9,290
		40/40	2207	14	34	34		97	0,064
		50/40	2213	13	40	36		101	0,077
		50/50	2216	18	42	42		113	0,086
		75/50	2219	13	56	48		120	0,167
		110/50	2225	6	76	56		135	0,374
		110/75	2228	19	82	71		163	0,424
		110/110	2231	38	57	92		203	0,596
		125/110	2237	50	97	95		217	0,491
	87,5°	160/110	2243	50	116	100		236	0,808
		40/40	2208	20	25	25		94	0,061
		50/40	2214	21	30	25		98	0,078
		50/50	2217	26	30	30		108	0,082
		75/50	2220	25	43	32		117	0,165
		75/75	2223	38	44	44		141	0,198
		90/90	2248	53	55	55		165	0,316
		110/50	2226	25	61	33		131	0,374
		110/75	2229	37	63	46		157	0,408
		110/110	2232	55	66	66		194	0,524
		125/75	2235	50	86	61		183	0,382
		125/110	2238	60	73	66		198	0,456
		125/125	2241	72	73	73		217	0,510
		160/110	2244	70	110	70		226	0,803
		160/160	2247	124	124	95		305	1,111
		200/160	2972	152	129	112		382	2,814
		200/200	2974	132	132	132		382	3,516
		250/160	2976	118	154	118		388	4,804
		250/250	2980	153	163	163		468	7,033

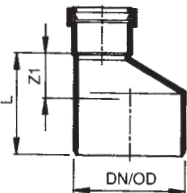
measures in mm

<b>POLO-KAL NG</b> <b>Parallel branch</b> with factory-fitted lip ring 	DN/OD	Art. No.	Z1	Z2	L1	L2	L	kg/pc.
	110/110	2294	24	150	231	252	139	0,812

<b>POLO-KAL NG</b> <b>Double branch</b> with factory-fitted lip ring 	67,5°/180°	DN/OD	Art. No.	Z1	Z2	Z3	L	kg/pc.
		110/50	2260	6	75	56	135	0,600
		110/110	2261	38	92	92	206	0,696
		125/110	2262	49	115	113	234	0,618
		160/110	2264	44	140	127	257	1,095

<b>POLO-KAL NG</b> <b>Double corner branch</b> with factory-fitted lip ring 	87,5°/90°	DN/OD	Art. No.	Z1	Z2	Z3	L	kg/pc.
		110/110/110	2275	60	70	70	195	0,657
		110/110/75	2277	60	65	70	195	0,567
		110/75/110	2279	60	65	70	195	0,567

<b>POLO-KAL NG</b> <b>Double branch (bent)</b> with factory-fitted lip ring 	87,5°/180°	DN/OD	Art. No.	Z1	Z2	Z3	Z4	L	kg/pc.
		110/110/75	2268	175	70	80	85	250	0,718
		110/75/110	2273	175	70	80	85	250	0,718

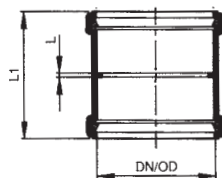
<b>POLO-KAL NG</b> <b>Reducer</b> with factory-fitted lip ring 	DN/OD	Art. No.	Z1				L	kg/pc.
	40/32	2280	10				45	0,022
	50/32	2281	18				58	0,032
	50/40	2282	12				64	0,038
	75/50	2283	20				88	0,074
	90/75	2289		34	15		22	0,106
	110/50	2284	39				110	0,188
	110/75	2285	26				97	0,218
	110/90	2290		37	19		25	0,150
	125/110	2286	22				94	0,200
	160/110	2287	53				149	0,323
	160/125	2288	42				128	0,378
	200/160	2981	122				240	1,110
	250/200	2983	128				280	2,220



measures in mm

**POLO-KAL NG****Double socket**

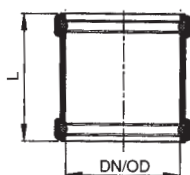
with factory-fitted lip ring



DN/OD	Art. No.	L1					L	kg/pc.
32	2300	78					2,8	0,017
40	2301	95,5					1,2	0,028
50	2302	103,5					1,2	0,046
75	2303	117,5					1,8	0,101
110	2304	144,8					2,3	0,225
125	2305	164					4,4	0,278
160	2306	225					4,8	0,517
200	2986	240					4,0	1,485
250	2987	356					4,0	3,160

**POLO-KAL NG****Sleeve socket**

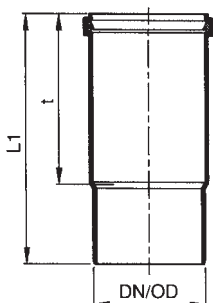
with factory-fitted O-ring



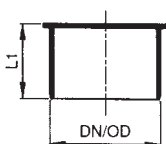
DN/OD	Art. No.						L	kg/pc.
40	2311						96	0,028
50	2312						104	0,046
75	2313						118	0,101
90	2319						127	0,175
110	2314						145	0,225
125	2315						165	0,263
160	2316						224	0,527
200	2984						240	1,465

**POLO-KAL NG****Long sleeve**

with factory-fitted lip ring

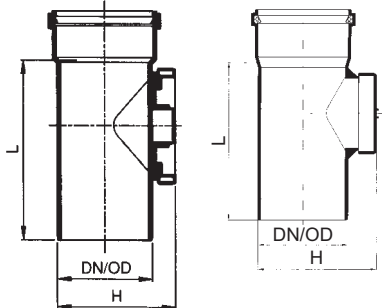


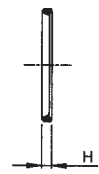
DN/OD	Art. No.	L1	t					kg/pc.
40	2331	156	107					0,045
50	2332	172	119					0,053
75	2333	195	134					0,148
110	2334	241	166					0,347
125	2335	306	205					0,380
160	2336	370	260					0,743

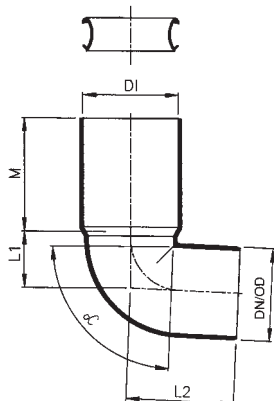
**POLO-KAL NG****Socket plug**

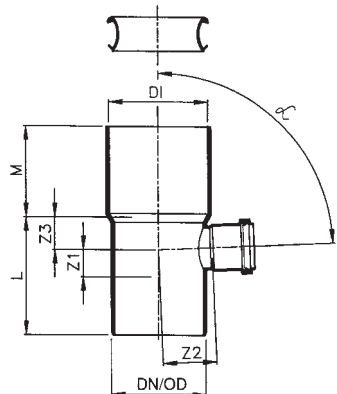
DN/OD	Art. No.	L1						kg/pc.
40	2321	46						0,017
50	2322	50						0,021
75	2323	56						0,061
110	2324	69						0,168
125	2325	71						0,155
160	2326	90						0,379
200	0771	228						0,83
250	0772	287						1,18

measures in mm

<b>POLO-KAL NG</b> <b>Clean out pipe</b> with factory-fitted lip ring DN/OD 50/75 and 110    DN/OD 125 and 160		DN/OD	Art. No.	H				L	kg/pc.
		50	2342	62,5				138	0,086
		75	2343	93,8				165	0,212
		110	2344	137,5				204	0,551
		125	2345	156,3				279	0,503
		160	2346	200				310	0,905

<b>POLO-KAL NG</b> <b>Replacement lip ring</b>		DN/OD	Art. No.	H					kg/pc.
		32	2930	6					0,002
		40	2931	7,8					0,005
		50	2932	7,8					0,006
		75	2933	8,1					0,008
		90	2929	9,2					0,015
		110	2934	11,2					0,017
		125	2935	10					0,024
		160	2936	11					0,038

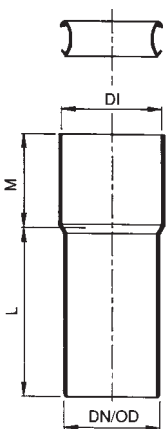
<b>POLO-KAL NG</b> <b>WC-bend</b> with seal		DN/OD	Art. No.	L1	L2	M	DI		kg/pc.
		110	2372	64	130	137	115		0,411

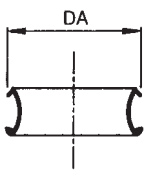
<b>POLO-KAL NG</b> <b>WC-branch</b> with seal		DN/OD	Art. No.	Z1	Z2	Z3	M	L	kg/pc.
		110/50	2373	25	62	35	107	132	0,380

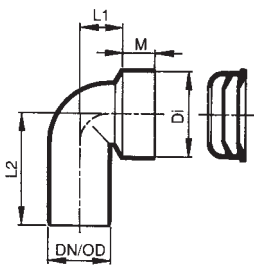


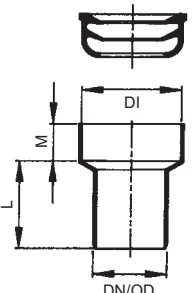


measures in mm

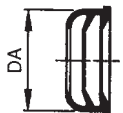
<b>POLO-KAL NG</b> <b>WC-connection</b> with seal 	DN/OD	Art. No.	M	DI			L	kg/pc.
	110	2371	105	115			185	0,410

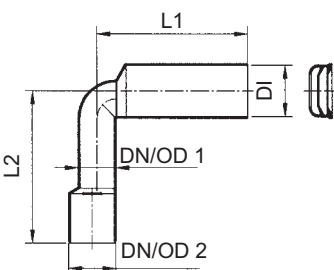
<b>POLO-KAL NG</b> <b>WC-seal</b> 	DN/OD	Art. No.						kg/pc.
	110	2376						0,127

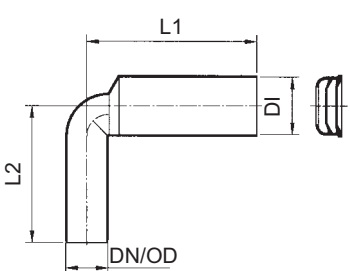
<b>POLO-KAL NG</b> <b>Siphon-bend</b> with push-fit seal 	DN/OD	Inch	Art. No.	L1	L2	M	DI	kg/pc.
	32	1 1/4"	2360	30	61	26	53,7	0,028
	40	1 1/4"	2361	28	78	26	53,7	0,044
	40	1 1/2"	2362	28	78	26	53,7	0,044
	50	1 1/4"	2363	30	88	26	53,7	0,044
	50	1 1/2"	2364	30	88	26	53,7	0,044
	50	2"	2365	32	70	26	67,2	0,057

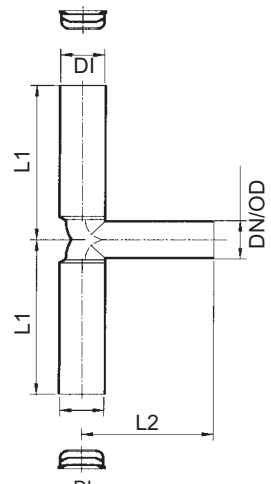
<b>POLO-KAL NG</b> <b>Siphon-fitting</b> with push-fit seal 	DN/OD	Inch	Art. No.	L1	M	DI		kg/pc.
	32	1 1/4"	2350	72	26	53,7		0,022
	40	1 1/4"	2351	56	26	53,7		0,034
	40	1 1/2"	2352	56	26	53,7		0,034
	50	1 1/4"	2353	56	26	53,7		0,028
	50	1 1/2"	2354	56	26	53,7		0,028
	50	2"	2355	78	26	67,2		0,041

measures in mm

<b>POLO-KAL NG</b> <b>Push-fit seal</b> 	DN/OD	Inch	Art. No.					kg/pc.
	53,7	1 1/4"	2378					0,050
	53,7	1 1/2"	2379					0,030
	67,2	2"	2380					0,050

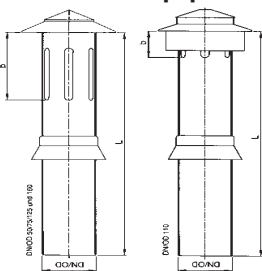
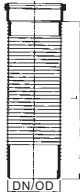
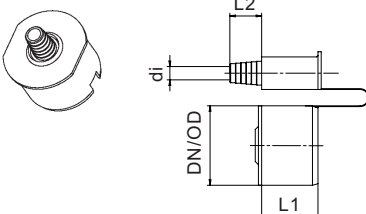
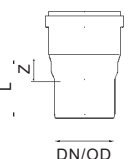
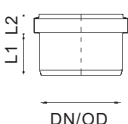

<b>POLO-KAL NG</b> <b>Siphon-bend long reduced</b> with push-fit seal 	DN/OD	Inch	Art. No.	L1	L2	DI		kg/pc.
	40/50	1 1/4"	2250	160	160	53,7		0,113
	40/50	1 1/2"	2251	160	160	53,7		0,113

<b>POLO-KAL NG</b> <b>Siphon-bend long</b> with push-fit seal 	DN/OD	Inch	Art. No.	L1	L2	DI		kg/pc.
	50	2"	2252	200	160	67,2		0,181

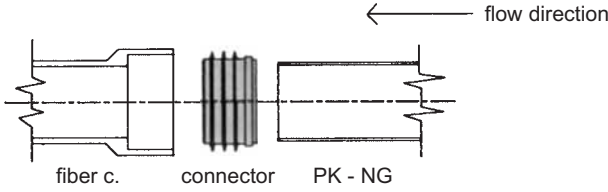
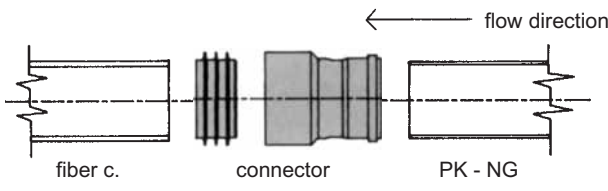
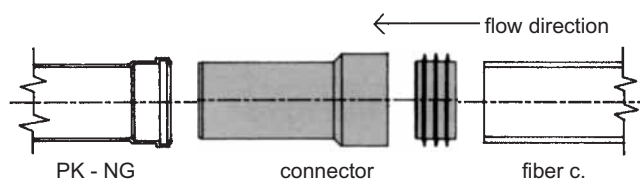
<b>POLO-KAL NG</b> <b>Double siphon-bend long</b> with two push-fit seals 	DN/OD	Inch	Art. No.	L1	L2	DI		kg/pc.
	50	1 1/4"	2253	200	160	53,7		0,187
	50	1 1/2"	2254	200	160	53,7		0,187



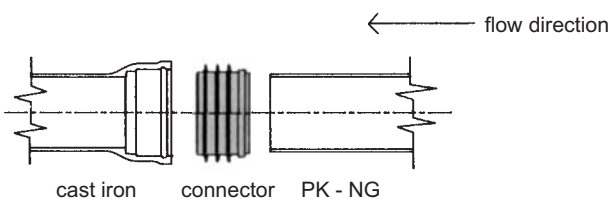
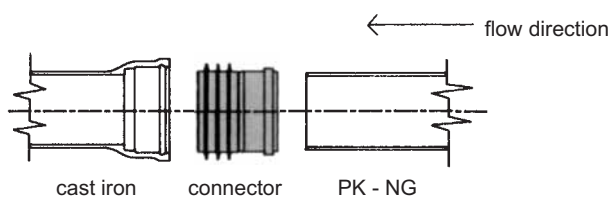
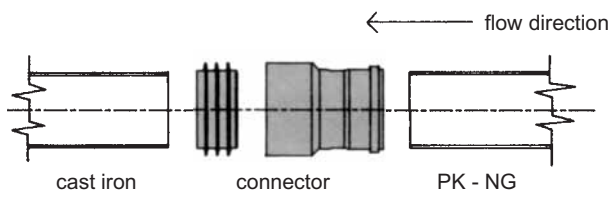
measures in mm

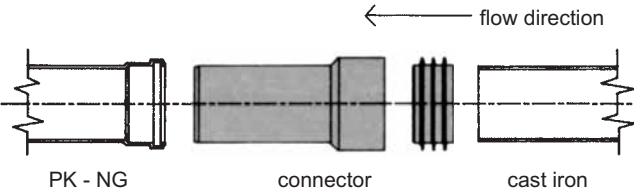
GENERAL INFORMATION	<b>POLO-KAL NG</b> Ventilation pipe 	DN/OD	Art. Nr.	b				L	kg/pc.
		110	2384	177				751	1,350
		125	2385	200				1038	1,332
		160	2386	246				1143	2,374
POLO-KAL NG	<b>POLO-KAL NG</b> Flexible connection for ventilation pipe with factory-fitted lip ring 	DN/OD	Art. Nr.					L	kg/pc.
		110	2390					500	0,650
POLO-KAL NG	<b>POLO-KAL NG</b> Connection for flexible hoses 	DN/OD	Art. Nr.	L1	L2	di			kg/pc.
		40	2357	35,5	20	8,4			0,034
		50	2358	35,5	20	8,4			0,038
PIPE BRACKET	<b>POLO-KAL NG</b> Reduction 	DN/OD	Art. Nr.	Z	L				kg/pc.
		80/90	2883	28	80				0,148
FIRE PROTECTION COLLAR	<b>POLO-KAL NG</b> Reduction 	DN/OD	Art. Nr.	L1	L2				kg/pc.
		75/80	2882	40	19				0,048
LAYING INSTRUCTIONS	<b>POLO-KAL NG</b> Viton-lipring 	DN/OD	Art. Nr.	H					kg/pc.
		75	0171	7,8					0,017
		90	0172	8,2					0,028
		110	0173	8,9					0,043
INVITATION FOR TENDERS TEXT		125	0174	10,2					0,051
		160	0175	11,5					0,083

## 2.3.1 CONNECTION TO FIBER CEMENT PIPES

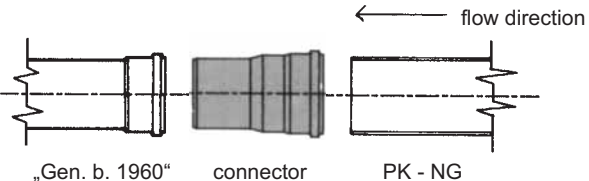
 <p>fiber c. connector PK - NG</p> <p>← flow direction</p> <p>Connection from <b>POLO-KAL NG spigot end</b> to <b>fiber cement socket</b></p>	DN/OD	Art. No.
	50	2860
	75	2861
	110	2862
	125	2863
	160	2864
 <p>fiber c. connector PK - NG</p> <p>← flow direction</p> <p>Connection from <b>POLO-KAL NG spigot end</b> to <b>fiber cement spigot end</b></p>	DN/OD	Art. No.
	50	2870
	75	2871
	110	2872
	125	2873
	160	2874
 <p>PK - NG connector fiber c.</p> <p>← flow direction</p> <p>Connection with long spigot end from <b>fc-spigot end</b> to <b>POLO-KAL NG socket</b></p>	DN/OD	Art. No.
	50	2850
	75	2851
	110	2852
	125	2853
	160	2854

## 2.3.2 CONNECTION TO CAST IRON SOCKET PIPES


 <p>cast iron connector PK - NG</p> <p>← flow direction</p> <p>Connection from <b>POLO-KAL NG spigot end</b> to <b>cast iron socket</b></p>	DN/OD	Art. No.
	50	2860
	75	2861
	110	—
	125	—
	160	—
 <p>cast iron connector PK - NG</p> <p>← flow direction</p> <p>Connection from <b>POLO-KAL NG spigot end</b> to <b>cast iron socket</b></p>	DN/OD	Art. No.
	50	—
	75	—
	110	2865
	125	2866
	160	2867
 <p>cast iron connector PK - NG</p> <p>← flow direction</p> <p>Connection from <b>POLO-KAL NG spigot end</b> to <b>cast iron spigot end</b></p>	DN/OD	Art. No.
	50	2870
	75	2871
	110	2872
	125	2873
	160	2874

		DN/OD	Art. No.
 <p>PK - NG                      connector                      cast iron</p> <p>← flow direction</p> <p>Connection with long spigot end from <b>cast iron spigot end to POLO-KAL NG socket</b></p>		50	2850
		75	2851
		110	2852
		125	2853
		160	2854

### 2.3.3 CONNECTION TO POLO-KAL PIPES „GENERATION BEFORE 1960“

		DN/OD	Art. No.
 <p>„Gen. b. 1960“                      connector                      PK - NG</p> <p>← flow direction</p> <p>Connection from <b>POLO-KAL NG spigot end to PK-socket „Generation before 1960“</b></p>		50	2880
		75	–
		110	2881
		125	–
		160	–

### 2.3.4 REPLACEMENT - SEALS

		DN/OD	Art. No.
 <p>Seal for connection to fibre cement or cast iron pipes <b>colour: black</b></p>		50	2890
		75	2891
		110	2892
		125	2893
		160	2894

- > For connection of POLO-KAL NG pipes to pipe pieces made of other materials, the especially developed renovation-adaption fittings are to be used.
- > For synthetic push-fit programmes made of
  - \_PE - hard
  - \_PP
  - \_ABS and
  - \_PVC – U
 adaptor fittings are not necessary, as the outside diameter of these pipes is standardized.

**Sealing area of the seal for spigot ends made of poured cement or asbestos cement pipes:**

DN/OD	50	from	58 - 67 mm
DN/OD	75	from	78 - 86 mm
DN/OD	110	from	110 - 116 mm
DN/OD	125	from	135 - 142 mm
DN/OD	160	from	160 - 172 mm

**Note:** Make sure to fit the pipe free from distortion. The sealing ring should be evenly pressed. When laid free from distortion the connecting fittings are leakproof up to 0.3 bar.

**Material** > Pipe: PP-H / PP-MV / PP-C  
> Fitting: PP-C-MV

**Colour** > Light grey RAL 7035 (free of halogen and cadmium)

**Hot water resistance** > Short intervals up to 97°  
> Long intervals up to 95°

**Pipe identification** > Household waste water pipes with the name POLO-KAL 3S carry the following identification: batch number, year and week of manufacture, company name, dimension and mark of conformity.

**Chemical resistance** > According to the chemical resistance list.

**Connections** > Push-fit socket with factory-fitted lip ring.  
> Sealing material = SBR

**Fire protection** > The pipe and fitting range complies with

Fire classification B2 inflammable (normal),  
Smoke formation class Q2 slightly smoking,  
Drip formation class TR1 non-drip,

in accordance with Austrian Standard B 3800 or DIN 4102, part 1.

**Stability and impermeability** > **Ring stiffness** of POLO-KAL 3S pipes is over 4 KN/m<sup>2</sup>.

**Standards** > The pipe system was tested for application capability according to Product Standard ON EN 1451-1 (Discharge pipes and fittings of PP).

**Tests** > POLO-KAL 3S pipes and fittings are supervised by the external Authorized Research Institute for Plastics OFI.

#### Physical standard values

Item	Unit	Value	Standard
Medium density	kg/dm <sup>3</sup>	1,2 – 1,5	ISO 3477
Melt-flow index area	g/10 min.	0,5 – 1,5	ISO 1133
Apparent yielding point	MPa	> 27	ISO/DIS 6259
Elastic modulus	MPa	> 1000	ISO 178
Impact toughness	KJ/m <sup>2</sup>	> 28	ISO R 179
Ductile yield	%	> 500	ISO/DIS 6259
Vicat VSTA	°C	> 143/73	ISO 306

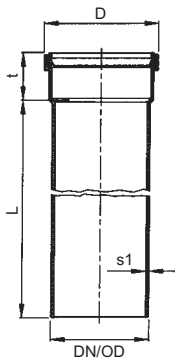
measures in mm

GENERAL  
INFORMATION

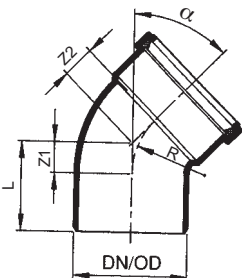
POLO-KAL NG

POLO-KAL 3S

PIPE BRACKET

FIRE PROTECTION  
COLLARLAYING  
INSTRUCTIONSINVITATION FOR  
TENDERS TEXT**POLO-KAL 3S****Socket pipe**with factory-fitted  
lip ring

DN/OD*	Art. No.	L	s1-min	t-min.	D-max.		kg/pc.
75	2420	150	3,8	47	90		0,257
75	2421	250	3,8	47	90		0,376
75	2422	500	3,8	47	90		0,673
75	2423	1000	3,8	47	90		1,266
75	2424	1500	3,8	47	90		1,860
75	2425	2000	3,8	47	90		2,454
75	2426	3000	3,8	47	90		3,720
110	2430	150	4,8	57	130		0,502
110	2431	250	4,8	57	130		0,727
110	2432	500	4,8	57	130		1,291
110	2433	1000	4,8	57	130		2,418
110	2434	1500	4,8	57	130		3,545
110	2435	2000	4,8	57	130		4,672
110	2436	3000	4,8	57	130		6,926
125	2470	150	5,3	60	150		0,707
125	2471	250	5,3	60	150		1,004
125	2472	500	5,3	60	150		1,746
125	2473	1000	5,3	60	150		3,231
125	2474	1500	5,3	60	150		4,715
125	2475	2000	5,3	60	150		6,200
125	2476	3000	5,3	60	150		9,169
160	2450	150	7,5	69	190		1,177
160	2451	250	7,5	69	190		1,683
160	2452	500	7,5	69	190		2,949
160	2453	1000	7,5	69	190		5,480
160	2454	1500	7,5	69	190		8,011
160	2455	2000	7,5	69	190		10,543
160	2456	3000	7,5	69	190		15,605

**POLO-KAL 3S****Bend**with factory-fitted  
lip ring

15°

30°

45°

67,5°

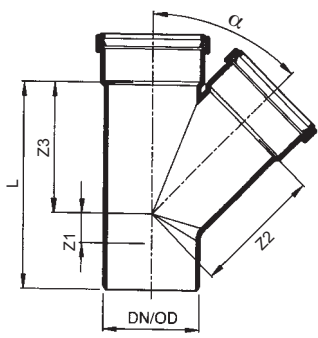
87,5°

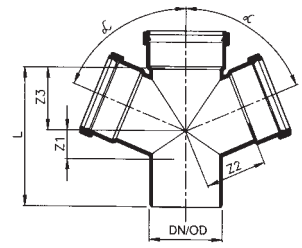
DN/OD	Art. No.	Z1	Z2	R		L	kg/pc.
75	2520	6	12	46		56	0,236
110	2530	9	9	57		65	0,436
125	2560	9	9	90		89	0,461
160	2550	11	11	115		106	0,833
75	2521	19	12	46		62	0,257
110	2531	15	15	57		72	0,465
125	2561	18	18	90		98	0,509
160	2551	23	23	115		118	0,907
75	2522	19	25	46		69	0,277
110	2532	24	24	57		81	0,520
125	2562	28	28	90		108	0,549
160	2552	35	35	115		130	1,002
75	2523	30	37	46		80	0,312
110	2533	38	38	57		95	0,529
75	2525	50	43	46		93	0,355
110	2535	55	55	57		112	0,656
125	2565	64	64	90		144	0,668
160	2555	81	81	115		176	1,257

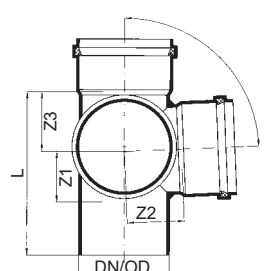
\* DN/OD - according to European standardization CEN/TC 155 Dimension Nominal / Outside Diameter

Subject to technical alterations (without prior notice)

measures in mm

<b>POLO-KAL 3S</b>		<b>DN/OD</b>	<b>Art. No.</b>	<b>Z1</b>	<b>Z2</b>	<b>Z3</b>		<b>L</b>	<b>kg/pc.</b>
<b>Branch</b> with factory-fitted lip ring 	45°	75/50	2643	6	91	89		145	0,500
		75/75	2606	19	106	106		175	0,622
		110/50	2646	1	110	97		161	0,963
		110/75	2649	8	129	126		191	0,939
		110/110	2609	24	150	150		231	1,267
		125/110	2568	29	151	148		249	1,084
	67,5°	125/125	2566	42	160	160		274	1,224
		160/110	2657	2	168	159		248	1,800
		160/160	2615	36	194	194		317	2,200
	87,5°	110/50	2647	24	75	52		139	0,843
		110/75	2650	31	85	77		165	0,795
		110/110	2610	38	94	94		189	1,036
		75/50	2645	33	46	37		120	0,406
		75/75	2608	43	49	49		142	0,487
		110/50	2648	47	61	27		137	0,803
		110/75	2651	53	71	53		163	0,775
		110/110	2611	55	66	66		178	0,938
		125/110	2569	60	73	66		198	0,842
		125/125	2567	72	73	73		217	0,945
		160/110	2659	70	110	110		250	1,942
		160/160	2660	100	120	120		300	2,700

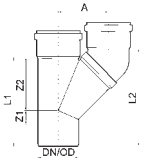
<b>POLO-KAL 3S</b>		<b>DN/OD</b>	<b>Art. No.</b>	<b>Z1</b>	<b>Z2</b>	<b>Z3</b>		<b>L</b>	<b>kg/pc.</b>
<b>Double branch</b> with factory-fitted lip ring 	67,5°/180°	110/110	2513	38	94	94		189	1,303

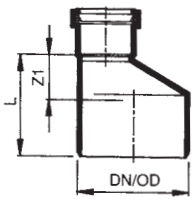
<b>POLO-KAL 3S</b>		<b>DN/OD</b>	<b>Art. No.</b>	<b>Z1</b>	<b>Z2</b>	<b>Z3</b>		<b>L</b>	<b>kg/pc.</b>
<b>Corner branch</b> with factory-fitted lip ring 	87,5°/90°	110/110	2674	55	66	66		178	1,419

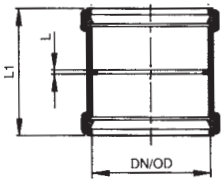


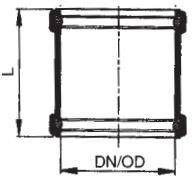


measures in mm

<b>POLO-KAL 3S</b> <b>Parallel branch</b> with factory-fitted lip ring 	DN/OD	Art. No.	Z1	Z2	L1	L2	A	kg/pc.
	110/110	2684	23	143	240	261	139	1,232

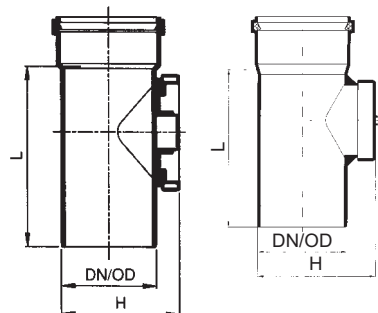
<b>POLO-KAL 3S</b> <b>Reducer</b> with factory-fitted lip ring 	DN/OD	Art. No.	Z1				L	kg/pc.
	75/50	2738	26				76	0,213
	110/50	2742	44				101	0,344
	110/75	2743	30				87	0,353
	125/110	2570	22				94	0,401
	160/110	2745	53				149	0,649
	160/125	2747	42				128	0,686

<b>POLO-KAL 3S</b> <b>Double socket</b> with factory-fitted lip ring 	DN/OD	Art. No.	L1				L	kg/pc.
	75	2722	109				3	0,255
	110	2723	117				4	0,441

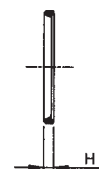
<b>POLO-KAL 3S</b> <b>Sleeve socket</b> with factory-fitted O-ring 	DN/OD	Art. No.					L	kg/pc.
	75	2712					109	0,251
	110	2713					117	0,430
	125	2571					165	0,491
	160	2715					224	0,844

measures in mm

<b>POLO-KAL 3S</b> <b>Clean out pipe</b> with factory-fitted lip ring DN/OD 50/75 and 110    DN/OD 125 and 160		DN/OD	Art. No.	H				L	kg/pc.
		75	2766	90				155	0,241
		110	2773	140				195	1,129
		125	2559	155				300	1,310
		160	2782	190				345	3,520



<b>POLO-KAL 3S</b> <b>Replacement lip ring</b>		DN/OD	Art. No.	H					kg/pc.
		50	2932	8,3					0,009
		75	2933	9,2					0,012
		110	2934	11,2					0,022
		125	2935	12,0					0,024
		160	2936	11,0					0,038



GENERAL  
INFORMATION

POLO-KAL NG

POLO-KAL 3S

PIPE BRACKET

FIRE PROTECTION  
COLLAR

LAYING  
INSTRUCTIONS

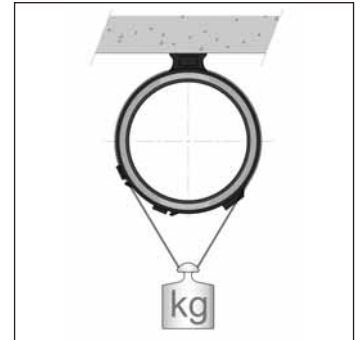
INVITATION FOR  
TENDERS TEXT



#### 4.1.1 DETERMINATION OF BREAKING LOAD IN CASE OF FLOOR MOUNTING

The breaking load of the POLO-CLIP HS bracket in case of floor mounting indicates the load which leads to a failure of the POLO-CLIP HS bracket, when the load direction is vertical to the pipe axis. The breaking load was determined during a tensile test at a test speed of 20 mm/min (refer to diag. 8).

Nominal widths for DN/OD	Bracket breaking load kg
75	270
90	270
110	270



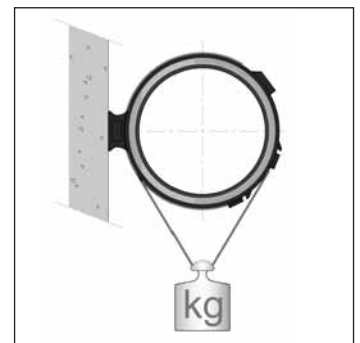
(Diagramme 8)  
Floor load determination

#### 4.1.2 DETERMINATION OF BREAKING LOAD IN CASE OF CROSS MOUNTING

In case of cross mounting the breaking load of the POLO-CLIP HS bracket indicates the admissible load existing, when the load direction is horizontal to the pipe axis.

##### TEST SET-UP FOR CROSS LOAD DETERMINATION FOR HORIZONTAL DISCHARGE PIPES

Nominal widths for DN/OD	Bracket breaking load kg
75	140
90	140
110	140



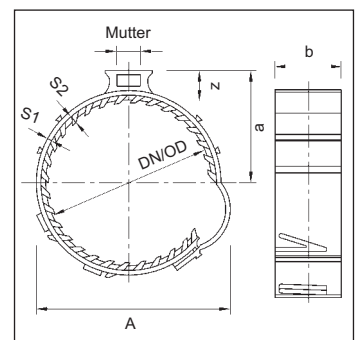
(Diagramme 9)  
Cross load determination

#### 4.1.3 POLO-CLIP HS BRACKET - TABLE OF DIMENSIONS

Material: polypropylene (PP)

measures in mm

DN/OD	Art-No.		b	S1	S2	a	Z	A	kg/pc.
	M8	M10							
75	1851	1854	50	2,4	4,5	60,5	23	97,5	0,098
90	1851	1854	50	2,4	4,5	68	23	108,95	0,110
110	1851	1854	50	2,4	4,5	78	23	126,75	0,126



(Diagramme 10)  
Dimensioning

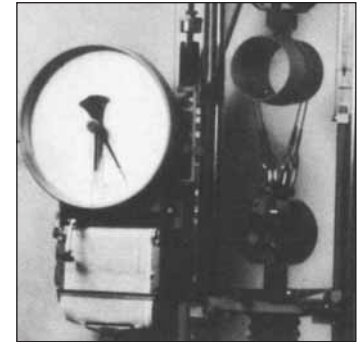
#### 4.2.1 DETERMINATION OF BREAKING LOAD IN CASE OF FLOOR MOUNTING

The breaking load of the POLO-CLIP bracket in case of floor mounting indicates the load which leads to a failure of the POLO-CLIP bracket, when the load direction is vertical to the pipe axis. The breaking load was determined during a tensile test at a test speed of 20 mm/min (refer to diag. 11).

**FOR MANY SPECIMEN THE LOWEST DETERMINED BREAKING LOAD VALUE WAS STATED**  
(minimum safety factor 6)

Nominal widths for DN/OD	Max. pipe weight*		Bracket breaking load
	kg / 10 d	kg / m	kg / 10 d
32	0,26	0,81	40
40	0,51	1,28	45
50	0,98	1,96	50
75	3,32	4,42	85
110	10,45	9,50	90
125	15,34	12,27	180
160	32,18	20,11	190

\* static load on the pipe, 100 % filled with water, referring to a pipe length  
POLO-KAL NG of 10 d or 1 metre.



(Diagramme 11)  
Tensile Test Device

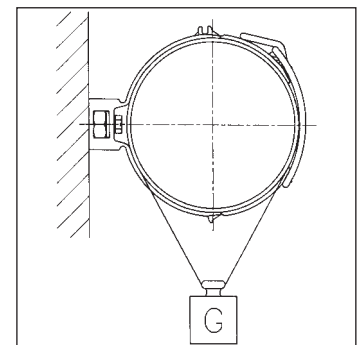
#### 4.2.2 DETERMINATION OF BREAKING LOAD IN CASE OF CROSS MOUNTING

In case of cross mounting the breaking load of the POLO-CLIP bracket indicates the admissible load existing, when the load direction is horizontal to the pipe axis.

#### TEST SET-UP FOR CROSS LOAD DETERMINATION FOR HORIZONTAL DISCHARGE PIPES

Nominal widths for DN/OD	Max. pipe weight*		Bracket breaking load
	kg / 10 d		kg / 10 d
32	0,26		30
40	0,51		30
50	0,98		30
75	3,32		70
110	10,45		90
125	15,34		150
160	32,18		150

As can be seen in the table, the minimum safety factor is 4 compared to the pipe weight. It is recommended to observe a bracket distance of 10 d.



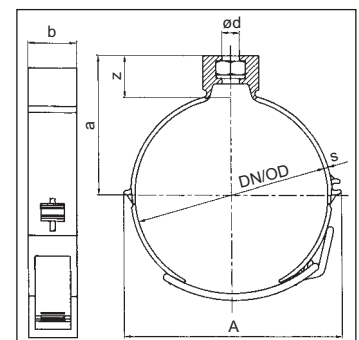
(Diagramme 12)  
Cross load determination

#### 4.2.3 POLO-CLIP BRACKET - TABLE OF DIMENSIONS

Material: polypropylene (PP)

measures in mm

DN/OD	Art. No.	b	s	a	z	Ø d	nut	A	kg/pc.
32	1810	25	1,1	35	19	11	M 10	35	0,012
40	1810	25	1,1	40	20	11	M 10	45	0,013
50	1810	25	1,1	45	20	11	M 10	56	0,014
75	1815	25	2,5	61	23	10,6	M 10	80	0,035
110	1815	25	2,5	79	24	10,6	M 10	125	0,041
125	1819	25	4,0	86	24	10,6	M 10	134	0,062
160	1819	25	4,0	105	25	10,6	M 10	173	0,072



(Diagramme 13)  
Dimensioning

## 5.1.1 FIELD OF APPLICATION

The POLO-BSM fire protection collar system Intumex RS 10/30 or RS 10/60, tested according to Austrian Standard B 3800 for the fire resistance period of 90 minutes (F90), can be used for following waste-water discharge pipes of plastics:

## &gt; Domestic waste disposal

\_POLO-KAL NG of DN/OD 50 - 250 mm

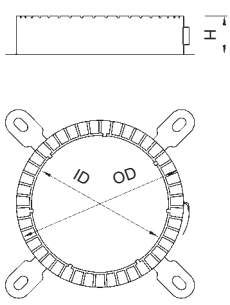
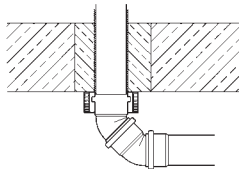
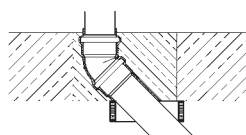
\_POLO-KAL 3S of DN/OD 50 - 160 mm

\_PP-HT and PE of DN/OD 50 - 160 mm

## &gt; Sewage

\_PVC of DN/OD 110 - 200 mm

## 5.1.2 TECHNICAL DATA

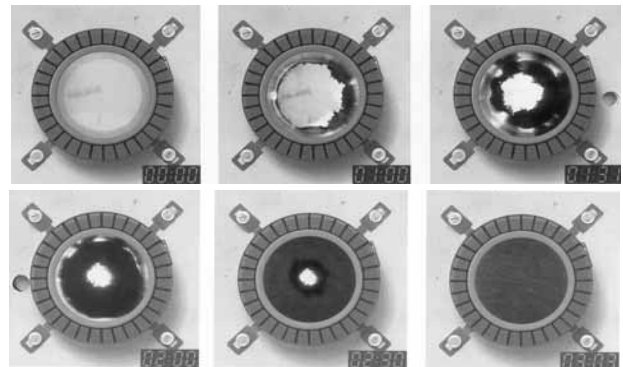
	DN/OD	Art. No.	straps	ID	OD	H	kg/pc.
	32	2813	2	40	52	30	0,043
	40	2814	3	48	65	30	0,071
	50	2815	3	58	74	30	0,081
	75	2818	3	85	107	30	0,132
	90	2819	4	100	120	30	0,193
	110	2820	4	120	142	30	0,236
	125	2821	4	135	157	30	0,252
	160	2822	5	170	200	30	0,403
	200	2823	5	210	240	60	0,926
	250	2824	6	262	320	60	1,350
	50	2802	3	71	88	60	0,191
	75	2807	4	100	120	60	0,364
	90	2808	4	120	142	60	0,424
	110	2809	4	135	157	60	0,474
	125	2810	5	170	200	60	0,760
	160	2823	5	210	240	60	0,926
	50	2806	3	85	107	60	0,270
	75	2808	4	120	142	60	0,424
	90	2809	4	135	157	60	0,474
	110	2811	5	146	175	60	0,640
	125	2810	5	170	200	60	0,760

### 5.1.2 DESCRIPTION

In case of fire and heat the plastic-pipe becomes soft and deforms. At a temperature of approx. 130°C the fire obstruction laminate „INTUMEX L“ expands to ten times its volume, provided that it is not restricted through construction.

Where expansion possibilities are limited, an expansion pressure of up to 10 bar results and ensures a reliable seal against fire and hot gas between the fire zones.

Within a few minutes the fire obstruction laminate squeezes the plastic pipe together and closes it completely. This makes it impossible for flames and smoke to spread over the pipe profile.



(Diagramme 14)  
Fire test

### 5.1.3 TESTS

The fact of tests of the POLO-BSM fire protection collar is documented in the test certificates of the Authorized State Test and Research Centre IBS (test report BV number 313791 dated 15/2/1991).

5.2.1 FIELD OF APPLICATION


The TOPFOX fire protective collar, which has been tested according to DIN 4102-11 and meets the requirements of the fire resistance class R 90, can be used with the following thermo-plastic pipes according to fire classification B2.

- > Domestic waste disposal
- \_POLO-KAL NG

 between DN/OD 40 - 160 mm
- \_POLO-KAL 3S

 between DN/OD 75 and 160 mm

measures in mm

	DN/OD	Art. No.	Height	Depth
	40	T0040	62	35
	50	T0050	72	35
	75	T0075	108	50
	110	T0110	140	50
	125	T0125	175	50
	160	T0160	199	50

5.2.2 DESCRIPTION

Fire and heat soften the plastic pipe and lead to its deformation. Starting at temperatures of 180°C the special fire protective laminate expands up to fourteen times its volume, if not obstructed by the structure.

The fire protective laminate generates an expansion pressure of 6 bar. It closes and reliably seals the plastic pipe within a few minutes.

Flames and smoke can no longer propagate via the pipe. Thus, the fire lobbies are separated reliably and fire and hot gas cannot penetrate.

5.2.3 TESTS

The TOPFOX fire protective collars have been tested by the German Institute of Structural Engineering (Deutsches Institut für Bautechnik) and have been awarded general approval by the construction supervision authority (approval number Z-19.17-1364 dated 20th November, 2000).

### 6.1.1 LOADING AND TRANSPORTING

When loading pipes and fittings take care that no damage can occur during transportation.

Where possible during transportation the pipes should rest in their entire length on top of each other (when no longer in the original packing) so that sagging can be avoided. To do this the sleeves are to be placed offset. Avoid sudden and abrupt stresses on pipes and fittings, especially with temperatures in the frost range.

**INCORRECT**



**CORRECT**



(Diagramme 15)  
Loading and transportation

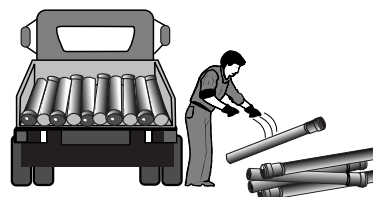
### 6.1.2 UNLOADING AND STORING

Unloading is to be carried out with appropriate care. Do not drop pipes and fittings or slide them over the ground. Furthermore, make sure that the pipes are not pulled over sharp edges (e.g. tailgate).

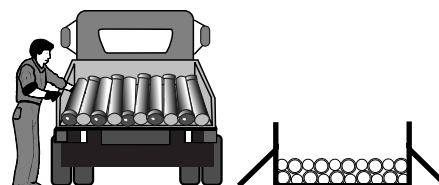
Permanent sagging or damage must not be caused through storage. Unpalletized pipes should not be stacked higher than 1.5 m. By placing the sleeves offset, the individual pipe racks can be almost completely supported. Pipe stacks are to be secured against rolling apart.

Short lengths of 150, 250 and 500 mm as well as fittings are packed in practice-proven cartons. Protect carton-packed pipes and fittings from moisture.

**INCORRECT**



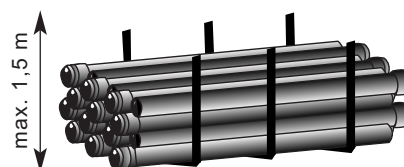
**CORRECT**



(Diagramme 16)  
Unloading

### 6.1.3 OUTDOOR EXPOSURE

POLO-KAL 3S and POLO-KAL NG pipe systems are designed to withstand outdoor storage for 1 year. Longer outdoor storage periods and intense insolation might lead to discolouration which, however, is only an optical defect and in no way influences the quality of the pipe system.



(Diagramme 17)  
Storing

When laying pipes outside buildings (e. g., rain water downpipes) they must be protected from mechanical impact.

The sealing material is designed to withstand outdoor storage for three years, after this period the seals have to be replaced. This only applies to seals which are directly exposed to weathering; when inserted (spigot-end sleeves) their service life is the same as that of seals fitted within.



### 6.2.1 CUTTING TO LENGTH

Cut pipes to length at right angles to the pipe's axis.

Cutting the pipe to length is to be carried out with a cutting and deburring tool for synthetic pipes as required.

Cutting and deburring is effected in one action and guarantees safety when installing.

### FITTINGS MAY NOT BE SHORTENED.

Pipes can also be cut to the required length using a fine-toothed saw or any other suitable parting-off tool.

In order to obtain the required right-angled cut for a clean fit, it is recommended that a cutting box is used.

Debur the cut edges inside and outside with a knife or a scraper.

### 6.2.2 BEVELLING

Bevelling is necessary for connections with O-ring sealings (e.g. with sleeves).

Bevelling is not necessary when using pipes with a factory installed lip ring, but is recommended for easier fitting in special installation situations.

When not using a cutting and deburring tool for a plastic pipe, bevelling the pipe ends can be effected using a suitable deburring tool or a coarse-cut file at an angle under approx. 15° according to the following table.

DN/OD	32	40	50	75	90	110	125	160	200	250
w ca. mm	4	4	4	4	5	6	6	7	8	10



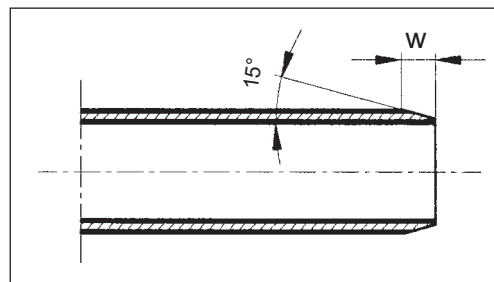
(Diagramme 18)  
Cutting to length with a cutting and chamfering tool



(Diagramme 19)  
Cutting to length with a fine-toothed saw



(Diagramme 20)  
Bevelling with a bevelling tool



(Diagramme 21)  
Bevelling at an angle under approx. 15°

**THE CONVENTIONAL PIPE CUTTER FOR PE - HD PIPES IS NOT SUITABLE FOR CUTTING POLO-KAL NG AND POLO-KAL 35 PIPES.**

## 6.3\_INFORMATION ON PUSH-FIT CONNECTION

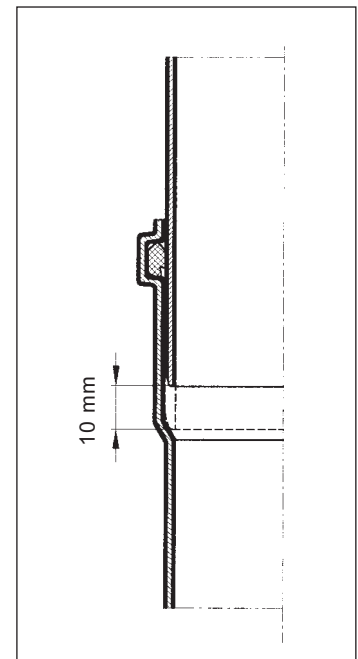
Push-fit connections between pipes and fittings, the face-to-face dimension of the pipe being 2 metres, have to take up a change in length of maximum 10 mm dependent on thermal processes.

Therefore, after the push-fit connection has been established, the pipes have to be retracted in the push-fit socket by 10 mm (see diag. 22).

It is not necessary to make allowances for changes in length to push-fit connections between fittings, they can remain fully inserted.

### THE POLO-KAL NG PUSH-FIT CONNECTIONS ARE MADE AS FOLLOWS:

- > Check the position and intactness of the lip ring in the socket flange. Clean lip ring seal if necessary.
- > Clean the push-in ends of the pipe and fitting.
- > Apply a thin, even coat of POLOPLAST lubricant over the push-in ends.
- > Slide push-in end in turning slightly until sleeve base is reached.
- > Mark the pipe with a felt pen in this position at the socket edge.
- > If necessary, retract the push-fit connection by 10 mm in the socket.



(Diagramme 22)  
Push-fit connection

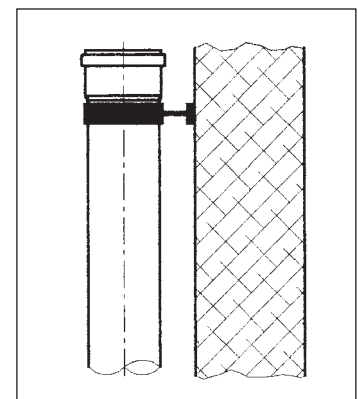
### DO NOT USE OIL OR GREASE.

Where pipes are vertically arranged, the individual lengths must be fastened with brackets immediately after installation to avoid sinking (see diag. 23).

#### Length expansion coefficient:

\_POLO-KAL NG 0,05 mm/m°K

\_POLO-KAL 3S 0,09 mm/m°K



(Diagramme 23)  
Fastening of the bracket

### 6.4.1 SOUND INSULATION

If in areas where the site supervisory regulations concerning „Sound Insulation in Building Construction“ are to be observed and the noise level (e.g. 25 or 30 dB (A)) stemming from the installed pipes must not be exceeded, the established restrictions concerning coordination of pipe arrangement to the respective ground plan lay-outs in the technical building regulations for individual domestic projects are to be taken into account.

Waste water pipes may not be openly arranged in spaces to be insulated against sound and must be separated from solid walls by impact sound insulation.

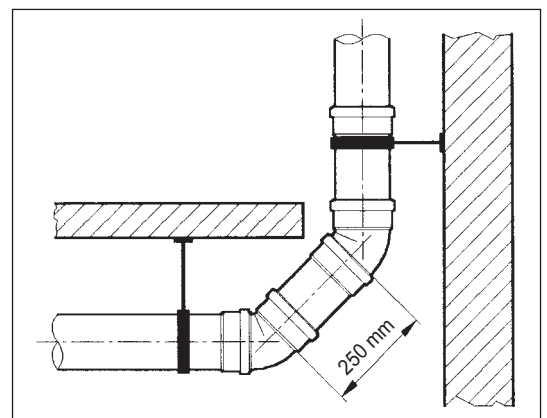
When fastening without impact sound insulation, the mass surface density of the wall must be at least 350 kg/m<sup>2</sup>.

### 6.4.2 QUIETENING SECTION

Because the pipe arrangement has an important influence not only on the origin of sound but also on the reduction, appropriate measures must be taken which reduce the flow and impact sounds in turn areas, e.g. with distortions of vertical down-pipes in the intermediate ceiling area.

For hydraulic and acoustic reasons every 90° turn, in which the down pipe changes to a horizontal pipe, must be fitted with a quietening section consisting of two 45° bends and a piece of pipe 250 mm long.

**87.5° BENDS MAY NOT BE FITTED INTO THE AREA OF TURN FROM A VERTICAL TO A HORIZONTAL ARRANGEMENT.**



(Diagramme 24)  
Turn with quietening section

### 6.4.3 INSTALLING PIPES IN CONCRETE

POLO-KAL pipes and fittings can be directly set into concrete. The change in pipe length, which has been already described (see chapter 6\_3 Information on Push-fit Connection) – is to be taken into account.

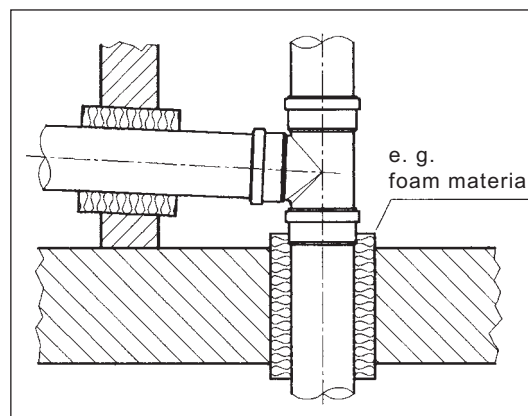
The pipe components are to be fastened in such a way that their position in the concrete cannot change. Pipe ends are to be closed and sleeve socket apertures are to be sealed with adhesive tape or foil to prevent cement slurry from seeping in during cementation and setting.

For larger concrete covers or possibly occurring line load in longitudinal direction (wall) a static proof has to be established. For soundproofing it is sensible to sheathe the entire piping in insulating material (with diffusion-tight outer skin).

#### 6.4.4 WALL AND CEILING INSTALLATIONS

Wall and ceiling installations are to be made moisture tight and sound absorbing.

If a flooring substitute is to be applied, then the exposed pipe components are to be secured in protecting tubes or encased in soft materials (e.g. foam material).



(Diagramme 25)  
Wall and ceiling installations

#### 6.4.5 INSTALLING PIPES IN BRICKWORK (CHASES)

Chases and kervings are only allowed when they do not cause a reduction in the stability and bearing capacity of supporting walls. Wall kervings are to be arranged so that the piping can be installed stress-free.

If the pipes are to be plastered immediately, i.e. without using a base or a facing, then the pipes and fittings must be completely wrapped beforehand in a flexible material like foam or something similar (Impact sound bridge).

When pipes are laid in outside walls, the residual thickness of the wall in the area of the chase must correspond to the thermal insulation regulations. This can be achieved by inserting insulating strips.

#### SPACE REQUIRED FOR POLO-KAL DISCHARGE PIPES IN CHASES

measures in mm

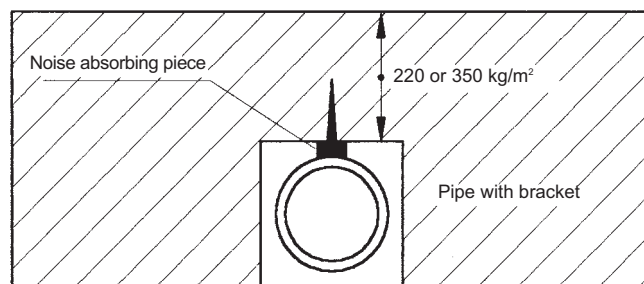
Pipe diameter DN/OD	Chase depths without insulation	Chase depths with insulation (e.g. 20 mm)
75	140 x 140	180 x 180
90	160 x 160	200 x 200
110	180 x 180	220 x 220
125	190 x 190	230 x 230
160	230 x 230	270 x 270
200	270 x 270	310 x 310
250	320 x 320	360 x 360

**DETAILS ON CHASE DEPTHS DO NOT INCLUDE PIPE CROSSINGS.**

#### 6.4.6 EXAMPLE OF INSTALLATION IN A GAP

The installation of waste water pipes in chases and gaps is very problematic.

Principle waste water pipes can only be installed in chases when on the side facing the room needing protection a minimum wall weight of  $220 \text{ kg/m}^2$  – bzw.  $350 \text{ kg/m}^2$  remains, when fixing without a noise-insulation piece (see diag. 26).

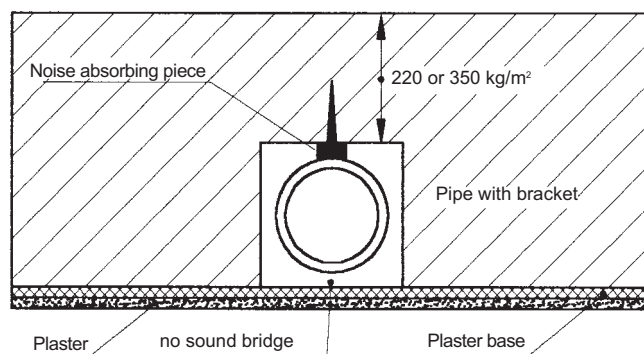


(Diagramme 26) Room needing protection  
Fastening without sound insulation element

Chases can be faced using a plaster base (plaster base tiles or wire lattice) and a coat of plaster.

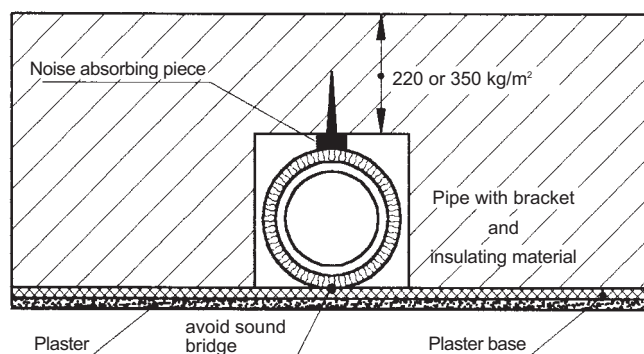
Coating can also be carried out with gypsen plaster board or asbestos cement covering plates (see diag. 27).

Between discharge pipe and plaster base no connecting paths (=sound bridges) may develop.



(Diagramme 27) Room needing protection  
Traditional laying method

To guard against sound bridges between the pipe wall and building, discharge pipes can be encased in insulation materials (see diag. 28).



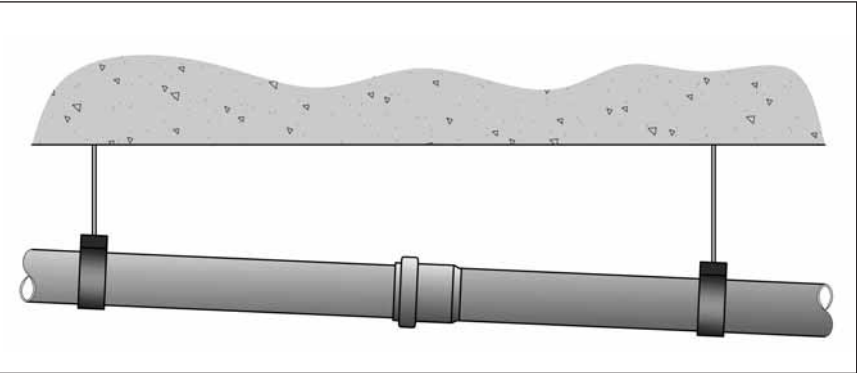
(Diagramme 28) Room needing protection  
Avoiding impact sound bridges

**THE WORKS MANAGEMENT SHOULD CHECK AND CONFIRM INSTALLATION IMPLEMENTATION BEFORE THE CHASES ARE CLOSED.**

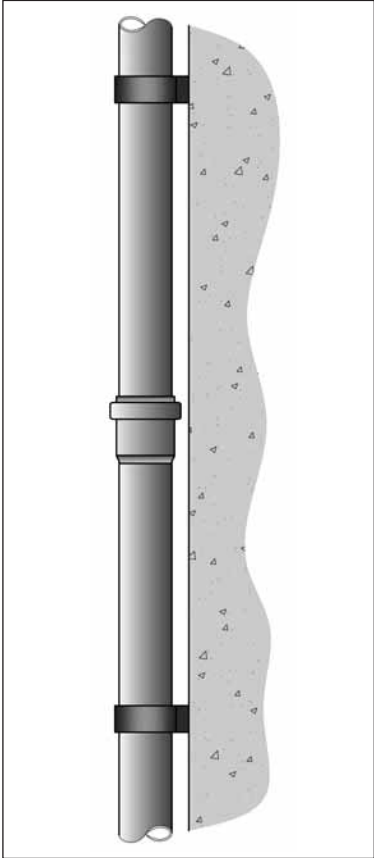
6.4.7 MAXIMUM SPANS

nominal outside diameter DN/OD mm	span	
	horizontal piping* D max., in m	vertical piping** D max., in m
32	0,5	1,50
40	0,6	1,50
50	0,75	1,50
75	1,10	2,00
90	1,35	2,00
110	1,65	2,00
125	1,85	2,00
160	2,40	2,00
200	3,00	2,00
250	3,75	2,00

- \* The piping must be secured against lateral yielding.  
\*\* On each storey a fixed and a movable clip should be fitted.  
The fixed clip must be installed under a sleeve.



(Diagramme 29)  
Horizontal piping



(Diagramme 30)  
Vertical piping

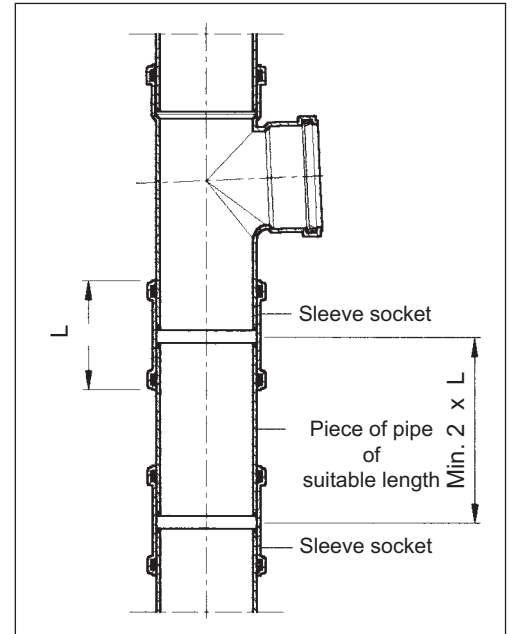
## 6.5.1 SUBSEQUENT INSTALLATION OF FITTINGS

## INSTALLATION OF A JUNCTION USING TWO SLEEVES

When using two sleeve sockets, a piece of pipe of suitable length (the length of the fitting plus twice the outside diameter of the pipe) is cut out, the pipe ends deburred and bevelled and the junction installed.

A sleeve socket is slid onto both the remaining pipe piece and the piece of pipe.

The piece of pipe is set into the gap in the pipe and closed off by sliding both sleeve sockets back (see diag. 31).



(Diagramme 31)

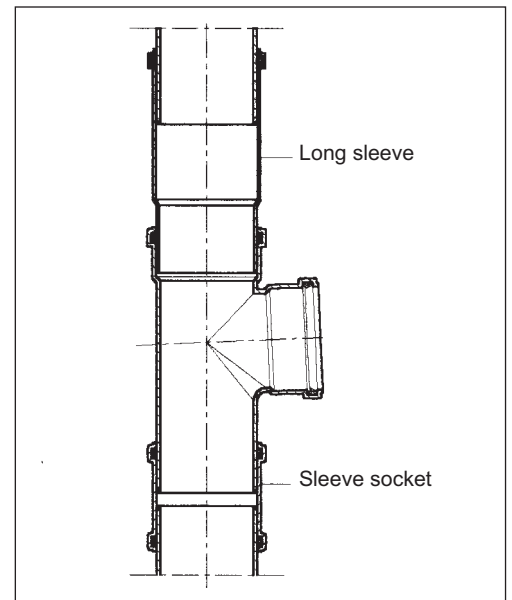
Installation of a junction with 2 sleeve sockets

## INSTALLATION OF A JUNCTION USING A LONG SLEEVE AND SLEEVE SOCKET

If long sleeves are to be used, a piece of pipe is cut out the length of which corresponds to that of the fitting plus push-in depth, the pipe ends are deburred and bevelled and the long sleeve pushed in until it stops.

Push the sleeve over the tapered end of the junction and insert into the pipe.

Then push the tapered end of the long sleeve into the socket of the fitting (see diag. 32).



(Diagramme 32)

Installation of a junction with long sleeve and sleeve socket

**SLEEVE SOCKETS AND LONG SLEEVES ARE FITTED WITH O-RING SEALS, MAKING IT EASIER TO PUSH BACK WHEN RETROFITTING THEM.**

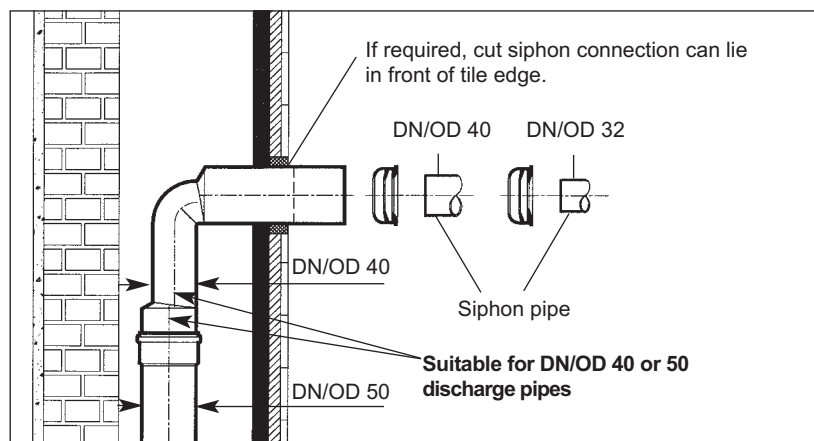
## 6.5.2 INSTALLATION OF LONG SIPHON-BENDS

The **long siphon-bends** can be used on plumbing walls, lightweight facings or conventional types of installations.

### SIPHON-BEND LONG DN/OD 40/50 OUTLET REDUCED

measures in mm

Areas of use	Siphon pipe Ø
Washstands	32
Bidets	32
Sink basins	40
Small sinks	40



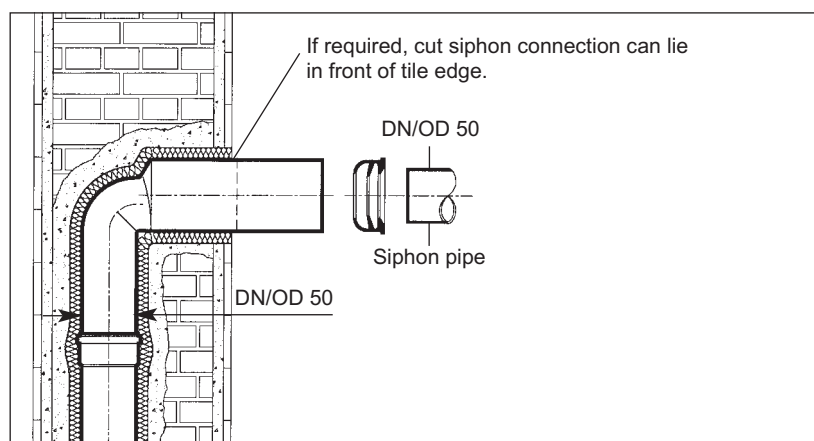
(Diagramme 33)

Example of plumbing wall installation

### SIPHON-BEND LONG DN/OD 50

measures in mm

Areas of use	Siphon pipe Ø
Urinals	50
Large sinks	50
Washing machines	50
Bathtubs	50



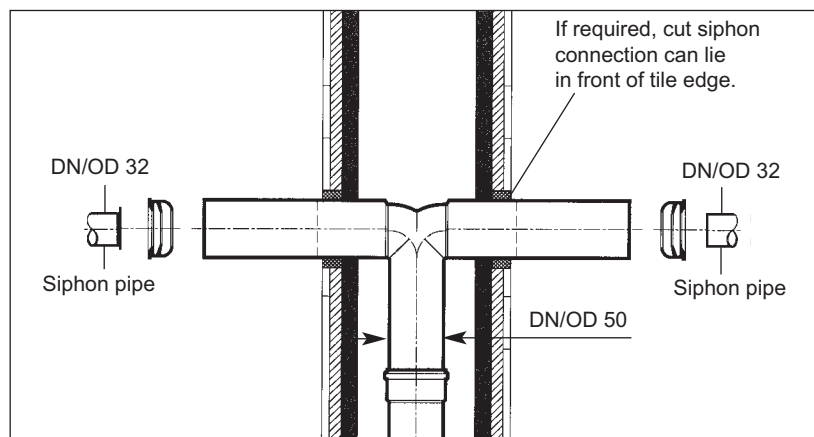
(Diagramme 34)

Example of a conventional installation (fixed onto or into a wall)

### DOUBLE SIPHON-BEND LONG DN/OD 50

measures in mm

Areas of use	Siphon pipe Ø
Washstands Long line facility	32



(Diagramme 35)

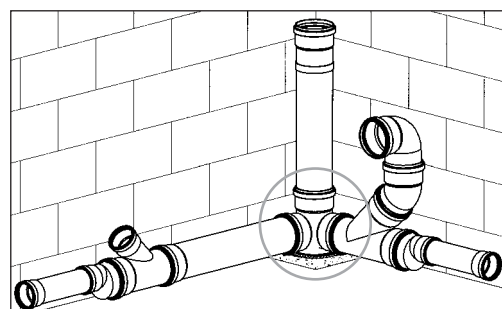
Example of lightweight facings



## 6.5.3 INSTALLATION OF SPECIAL FITTINGS

### DOUBLE CORNER BRANCH

Double corner branches are used for installation in corner areas. The space-saving cross section allows several sanitary objects to be connected at the same time and is ideal for installations in corner areas, in pipe pits, behind plumbing walls or in sanitary cells.

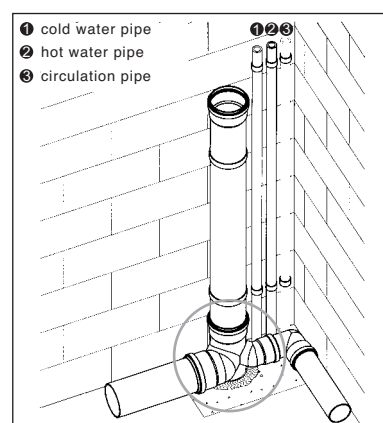


(Diagramme 36)

Example of installation of a double corner branch

### DOUBLE BRANCH (BENT)

Bent double branches are used as by-passes, e. g., in the area of household plumbing. The cross section with its form favourable to flow allows several sanitary objects to be connected at the same time. The space-saving waste water discharge connection is ideal for installation in pipe pits, behind plumbing walls or in sanitary cells.

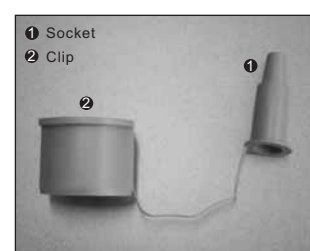


(Diagramme 37)

Example of installation of a bent double branch

### CONNECTION FOR FLEXIBLE HOSES

The POLO-KAL NG connection for flexible hoses serves as a connection to ventilation, condensing value and air conditioning devices. It is a PP part consisting of socket and clip and stands out against traditional connections for flexible hoses due to its following advantages: low amount of assembly work involved, no need for tools, compactness.



(Diagramme 38)

POLO-KAL NG  
Connection for flexible hoses



(Diagramme 39)

Insert the hose into the clip



(Diagramme 40)

Insert the socket into the  
hose end



(Diagramme 41)

Push the clip on the  
socket and clamp the  
hose (the connecting wire  
may be separated any  
time)



(Diagramme 42)

Fit the connection for fle-  
xible hoses in the pipe

**6.6.1 CENTRALISED VACUUM CLEANING UNIT**

POLO-KAL NG household discharge pipes are excellently suited for centralised vacuum cleaner installations.

**THE PERIOD WHEN THE SHELL OF A BUILDING IS ERECTED IS THE TIME TO INSTALL VACUUM CLEANER PIPING.**



**(Diagramme 43)**

Schematic representation of a centralised vacuum cleaning unit

**THE SOLUTION FOR CLEAN AIR WITHOUT UNNECESSARY NOISE**

- > **Centralised cleaning units with radio ON/OFF control (e.g. Thomas).**
- > **Easy and effortless hoovering** due to the use of long suction hoses.
- > **No house dust contamination.** The exhaust air is directly led out to the open.
- > **Flexible use** due to portable central vacuum cleaning units.
- > **Simple mounting** due to the use of **tested POLO-KAL NG pipes and fittings.**

## 6.6.2 HINTS ON THE LAYOUT OF SUCTION AND EXHAUST PIPES

### LAYING OF SUCTION PIPES

Connect the pipes in accordance with the POLOPLAST laying directives. Form angles and branches, if possible, with 45° fittings, as 90° connections cause increased losses through friction.

**Our hint:** either install a rising pipeline from floor to floor, the connecting pipes to the air sockets being led through the floor, or lay a circular pipe on the lowest floor connecting it to the air sockets by side-cuts.

### LAYING OF THE EXHAUST PIPE

The exhaust pipe should be as short as possible and led outside at a level of no more than 2 m above the central cleaning unit.

### SOCKET ADAPTER

The dimensions of „Thomas“ socket adapters match with the POLO-KAL NG siphon fittings (siphon fittings of other brands may have different dimensions - Caution: compatibility).

Siphon fittings have to be sealed in the wall flush with the plaster.

### AIR SOCKETS

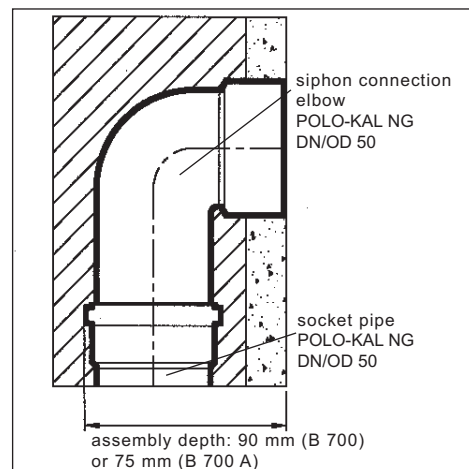
The maximum reach of the suction hose and the suction pipes is approximately 9 m. Press the air socket into the siphon fitting and dowel it into the wall with the help of the screws supplied.

### CENTRALISED VACUUM CLEANING DEVICE

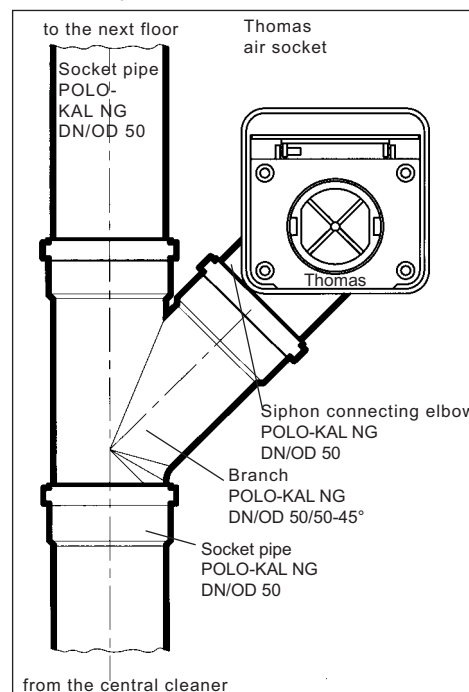
The centralized vacuum cleaners may be arranged in the cellar or a side room.

### VACUUM TIGHTNESS

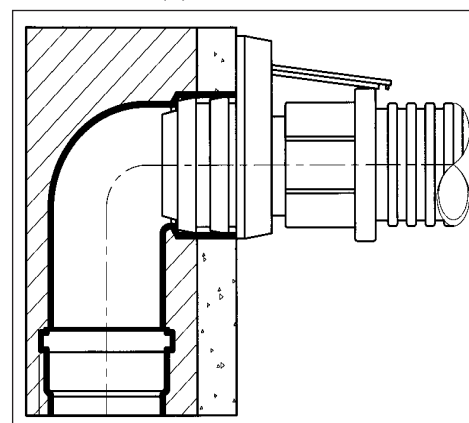
Maximum vacuum = 0.7 bar  
Permanent vacuum load = 0.5 bar



(Diagramme 44)  
Suction Pipe



(Diagramme 45)  
AIR SOCKET (1)



(Diagramme 46)  
AIR SOCKET (2)

## 6.6.3 EXHAUST GAS SYSTEM

### FIELD OF APPLICATION

The following chapter refers to the POLOPLAST exhaust gas system with POLO-KAL NG pipes. The POLO-KAL NG AGT system has been approved for use in exhaust gas piping in connection with oil and gas condensing boilers with temperatures up to 120°C (B class) – approval number Z-13.1.5-05-6242.

In addition, the POLO-KAL NG AGT system meets high requirements:

- > air-tightness (high and low pressure)
- > resistance to condensate
- > resistance to acids contained in the condensate

POLO-KAL NG AGT systems can be used in new buildings as well as for reconstruction purposes and are designed to be fitted with single-walled, indoor-air dependent systems.

### BENEFITS

- |                                  |   |
|----------------------------------|---|
| > non-corroding                  | permanently resistant to condensate acids |
| > low weight                     | easy to lay                               |
| > shaped push-fit sleeves        | quick laying                              |
| > resistant seals                | permanently leakproof                     |
| > practical face-to-face lengths | fast and easy laying                      |

### DIMENSIONS (INDOOR-AIR DEPENDENT SYSTEMS)

da 75, da 90, da 110, da 125, da 160

### CONDENSING SYSTEMS

Without further measures traditional house chimneys are not suitable for use as exhaust gas ducts of condensing devices, as their lifting force is insufficient and condensation occurs due to residual moisture. A well-tryed solution for this problem are specially tested plastic exhaust pipes.

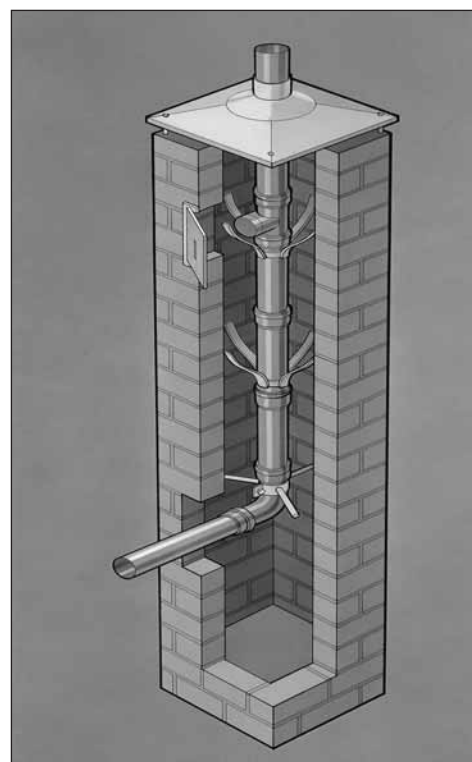
### MATERIALS

#### PIPES AND FITTINGS

Boiler condensates contain acids. This type of condensation makes high demands on the chemical resistance of exhaust gas pipes. Furthermore the exhaust gas pipe has to be reliably leakproof and resistant to corrosion at temperatures up to 120°C.

#### SEALS

A special Viton seal guarantees permanent and trouble-free operation of the exhaust pipe of gas and oil condensing boilers even in its bead area and the area of the seal itself. The seals have to be replaced on site, i. e., our standard seals have to be exchanged for special acid-proof seals.



(Diagramme 47)  
Exhaust gas system

## PLANNING AND DESIGN

### STANDARDS AND DIRECTIVES

#### ÖNORM H 5152 DATED 2003-II-01

- > Condensing appliances for furnace installations
- Planning rules

#### ÖVGW GUIDELINE GI

- > Technical guidelines on installing, modifying, operating and maintaining low-pressure gas furnaces in buildings (ÖVGW TR-Gas)

part 1 dated October 1996

terms and definitions

part 2 dated July 2003

pipings

part 3 dated October 1996

mounting, connecting and operating gas systems

part 4 dated October 1996

exhaust gas ducts of gas furnaces

part 5 dated October 1996

tables, illustrations, examples

#### ÖVGW GUIDELINE G4 DATED NOVEMBER 1997

- > installation of gas furnaces of more than 50kW
- special conditions for the installation of gas furnaces for heating and water heating purposes with an overall rated heat load > 50 kW (combustion chambers)

#### ÖVGW GUIDELINE G4I DATED APRIL 1991

- > gas condensing furnaces;
- installation and connection of gas condensing furnaces

### SUITABLE STRUCTURAL ELEMENTS OF THE CORRESPONDING FIRE PROTECTION CLASS

according to ÖNORM B 3800-4 (Behaviour of building materials and components in fire - Components: Classification of fire resistance, issue 2000-05-01). The type of building material and the respective minimum thickness can be seen in the tables of ÖNORM B 3800-4 stated below (see annex 1).

### THESE STANDARDS AND GUIDELINES HAVE TO BE ADHERED TO FOR PLANNING AND DESIGN

#### CONDENSATE DISCHARGE

A condensate discharging facility is already provided in most condensing boilers. For more information please consult the manufacturer of the equipment.

#### MEASUREMENT OPENING FOR INDOOR-AIR DEPENDENT SYSTEMS

A measuring device is already provided in most condensing boilers. For more information please consult the manufacturer of the equipment.

In case no measuring device has been provided in the condensing boiler, an aperture of 12 mm diameter can be bored into the pipe which then has to be closed with an acid-proof rubber piece. For inspection remove this rubber piece.

## CLEANING OPENINGS

Depending on the length of the pipe a certain number of cleaning openings must be provided which allow the free cross section to be inspected

## MOUNTING INSTRUCTIONS (INDOOR-AIR DEPENDENT SYSTEMS)

### PREPARATORY WORK

Clarify open questions with the chimney sweeper. If necessary, have the chimney swept and checked for free cross section. Determine the exhaust pipe cross section (observe the minimum cross section of the exhaust-gas shaft).

### SHAFT REAR VENTILATION

Clarify whether the required back ventilation of the exhaust-gas shaft will be guaranteed by a grid and determine the necessary free grid surface.

### SHAFT FASTENING

Provide a shaft inlet (coming from the furnace). The leading-in bend has to be fastened to the shaft wall with a clip. Then mount the pipe in the middle of the shaft, for this purpose use a spacer. At the end of the pipe use a plain-end piece. Move the chimney cap to cover the plain end piece of the pipe and fasten it to the shaft with wing nuts (disassembly without tools).

### CONNECTION TO THE BOILER

Use a connecting duct to provide leakproof connection to the boiler.

### HORIZONTAL PIPING

The connection between boiler and chimney shaft is a horizontal pipe which has to be laid with a slope of at least 3% towards the boiler.



### 6.7.1 DESCRIPTION OF THE POLO-CLIP HS BRACKET SYSTEM

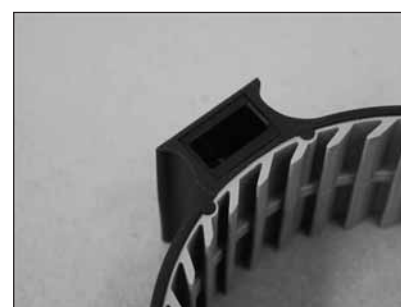
The POLO-CLIP HS bracket is a fastening system for three nominal pipe diameters, DN/OD 110, 90 and 75, which provides a high level of sound insulation. The bracket base, its ribs (of TPE material) and the lock are of special shape.



(Diagramme 53)  
POLO-CLIP HS bracket

#### BRACKET BASE

An M8 or alternatively an M10 nut is inserted in the bracket base. This is to allow work to be carried out in two dimensions with a threaded rod as well as with a screw with woodwork and metric thread.



(Diagramme 54)  
Bracket base

#### TPE RIBS

Due to their slanted position and the air cushion in between the ribs are optimally adjusted to the acoustic behaviour of the POLOPLAST domestic waste disposal systems POLO-KAL NG and POLO-KAL 3S.



(Diagramme 55)  
TPE ribbing

#### LOCKING

The special V-shaped locking mechanism securely holds the bracket in its position on the pipe and at the same time prevents uncontrolled pressing.



(Diagramme 56)  
Closure

### 6.7.2 HANDLING OF THE POLO-CLIP HS BRACKET

POLO-CLIP HS is easy to mount. The DN/OD 110 nominal width can be immediately used without modifying the bracket body.

POLO-CLIP HS is fitted on the wall or the ceiling with the help of a screw with woodwork and metric thread or a threaded rod and a two-hole base plate. Make sure that the pipe, when ceiling-fitted with the help of longer threaded rods, be additionally secured from lateral yielding.

After fitting the bracket, the pipe is inserted (see figure 57). If the pipe is laid in a vertical direction and the bracket has to serve as a fixed point, it always must be installed below a sleeve.

The bracket engages when the lock is pressed into the latching point, afterwards the lock in the latching point has to be shifted until the bracket body is flush with the surface (see figure 58). This frictional connection offers double security (see figure 59).



(Diagramme 57)  
Mounting of the POLO-CLIP HS bracket



(Diagramme 58)  
Fixing the locking



(Diagramme 59)  
Mounted bracket

### 6.7.3 MODIFICATION OF THE BRACKET FOR USE WITH OTHER NOMINAL PIPE DIAMETERS

The basic bracket has to be cut to length for use with pipes of DN/OD 90 and DN/OD 75 diameters. Use a cutting tool, e. g., snips, to cut the bracket body marked by notches to the required pipe dimension. The shortened bracket can be used immediately.



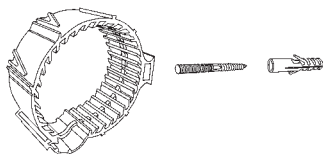
(Diagramme 60)  
Cutting the bracket body



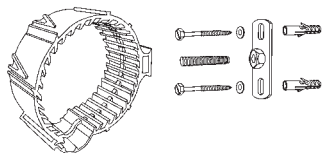
## 6.7.4 MOUNTING PIPES WITH THE POLO-CLIP HS BRACKET

### MOUNTING THE BRACKET ON THE WALL

- (1) mounting the POLO-CLIP HS bracket on the wall with the help of a screw with woodwork and metric thread

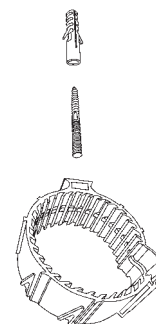


- (2) mounting the POLO-CLIP HS bracket on the wall with the help of a threaded rod and a two-hole base plate

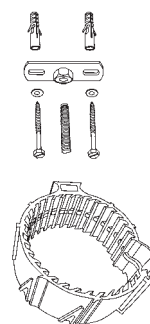


### MOUNTING THE BRACKET ON THE CEILING

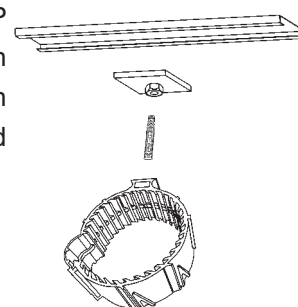
- (1) mounting the POLO-CLIP HS bracket on the ceiling with the help of a screw with woodwork and metric thread



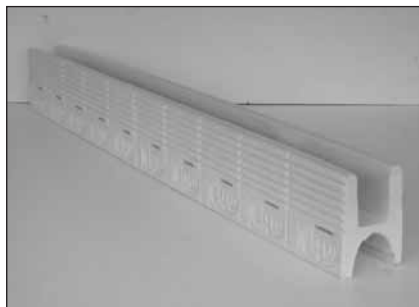
- (2) mounting the POLO-CLIP HS bracket on the ceiling with the help of a threaded rod and a two-hole base plate



- (3) mounting the POLO-CLIP HS bracket on a bar with the help of a screw with woodwork and metric thread



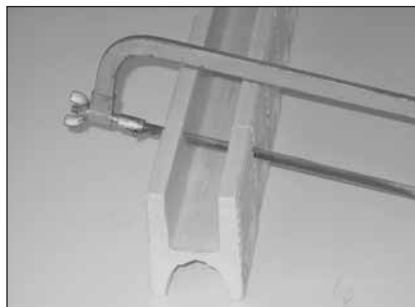
**NOTE: IF A LONGER THREADED ROD IS USED FOR FITTING THE BRACKET, THE PIPE HAS TO BE SECURED AGAINST LATERAL YIELDING.**

**(Diagramme 61)**

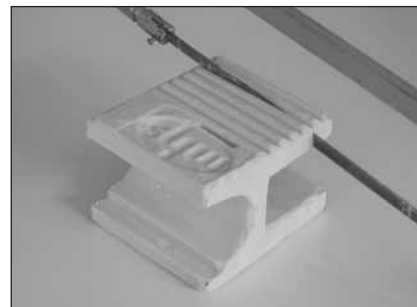
Insulation body for squeezing 50 mm discharge pipes without sound interaction  
Length: 100 cm

For all-over use: a 1% slope is provided in the form

(Important: note direction of the arrow)

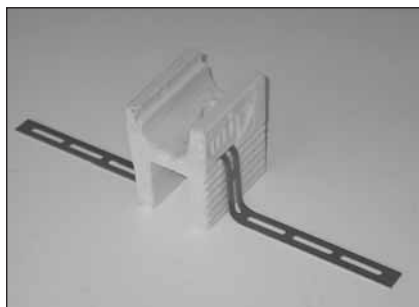
**(Diagramme 62)**

Can be sawn into sections where marked

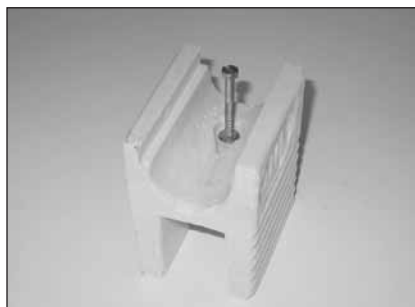
**(Diagramme 63)**

Height adjustment:  
separation markings every 10 mm

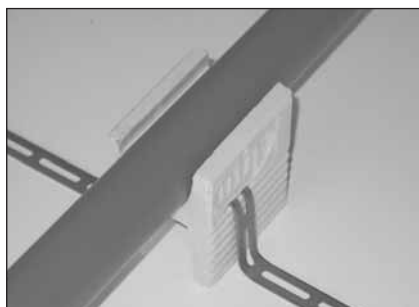
## TYPES OF FASTENING, NOT DEPENDING ON THE PIPE:

**(Diagramme 64)**

(a) Perforated tape pulled through the fixing slot in the foam element

**(Diagramme 65)**

(b) With screw and washer – through the insulation element

**(Diagramme 66)**

Perfect discharge piping with requirements to:

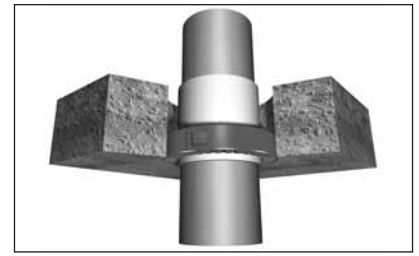
large-surface pipe support (no pressure marks or deformation), pipe laying independent of the floor fastening, fast and easy to modify, the pipe may be dismantled and re-assembled at any time, saving assembly time, saving time for preparatory works, corresponding with standards.

**(Diagramme 67)**

Perfect solution also for wall and ceiling mounting

**(1) STANDARD CEILING FITTING**

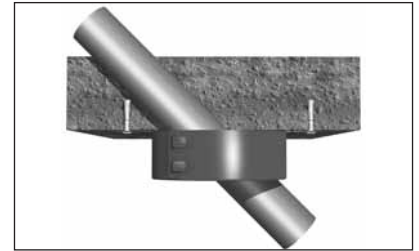
Here the collar is mounted in the ceiling aperture (see diagramme 68) or fastened to the lower ceiling edge.



**(Diagramme 68)**  
Standard ceiling fitting

**(2) SPECIAL CEILING FITTING - AT AN ANGLE OF 45°**

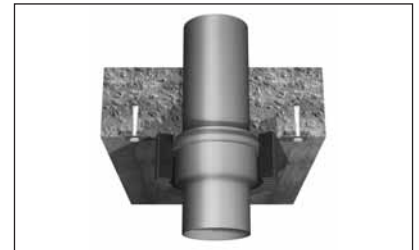
Here the collar is fastened to the lower ceiling edge (see diagramme 69).



**(Diagramme 69)**  
Special ceiling fitting "at an angle of 45°"

**(3) SPECIAL CEILING FITTING - "FITTING ABOVE A BRACKET"**

Here the collar is fastened to the lower ceiling edge (see diagramme 70).



**(Diagramme 70)**  
Special ceiling fitting  
"fitting above bracket"

**(4) WALL FITTING**

Here collars are fitted on both sides of the wall or in the wall (see diagramme 71).



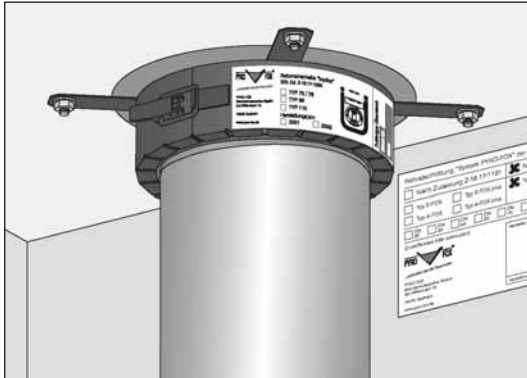
**(Diagramme 71)**  
Wall fitting

When mounting the fire protection collar **IN** the wall or ceiling aperture, the fastening brackets may be bent back. The fire protection collar is installed **ON** the wall or ceiling by means of the fastening elements supplied (note – use the steel dowels supplied).

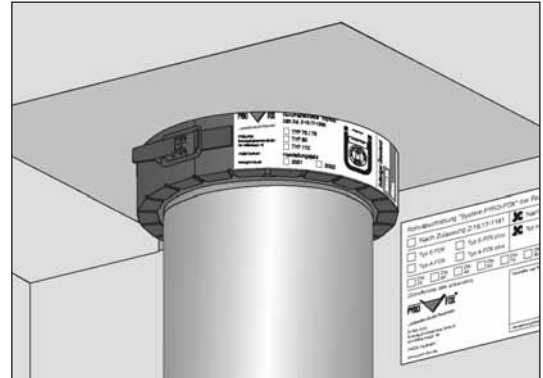
For the installation of domestic waste disposal pipes with the fire-classification B1 and B2 the following fire protective requirements are necessary:

- > Break-through and openings should be as small as possible.
- > Remaining openings should be filled and closed completely with not combustable material.
- > If coverings for the plastic-pipes (like heat-, cold- or noise protection) are necessary, mineral-fibre-wool or cellular-foam-hoses (min. B2) have to be used.

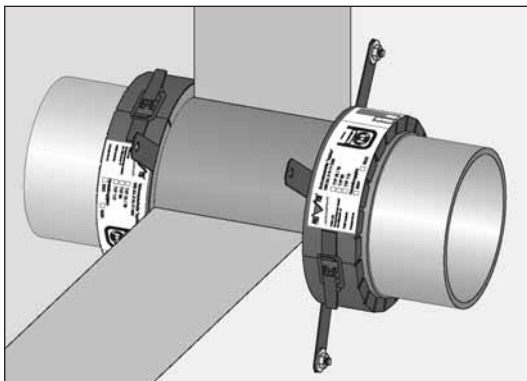
DIBT (GERMAN INSTITUTE OF STRUCTURAL ENGINEERING APPROVAL)  
Z-19.17-1364 R 90 ACCORDING TO DIN 4102



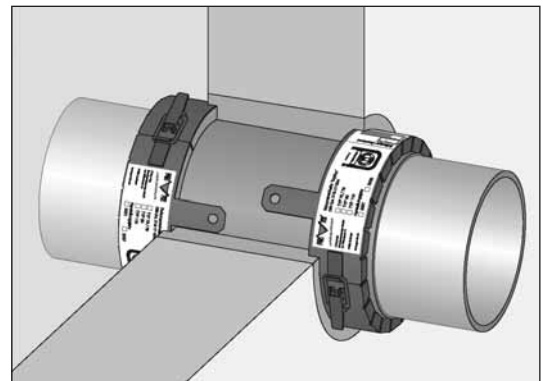
(Diagramme 72)  
solid ceiling – dowelled



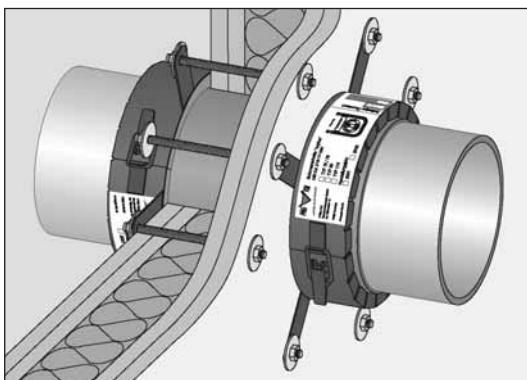
(Diagramme 73)  
solid ceiling – bedded in mortar



(Diagramme 74)  
solid wall – dowelled



(Diagramme 75)  
solid wall – bedded in mortar



(Diagramme 76)  
light dividing wall – screwed down

#### > Installation in walls:

As opposed to ceilings, two fire protective collars have to be used for wall ducts.

The installation procedure is the same.

#### > Light wall boards:

Threaded bolts have to be used for the installation in light walls. It is recommended to turn the collars towards one another by 45°.

**6.II.1 RANGE OF APPLICATION**

The repair welding device is used to repair PP domestic waste disposal pipes which have been unintentionally bored through. The repair welding device is delivered as a set and consists of:

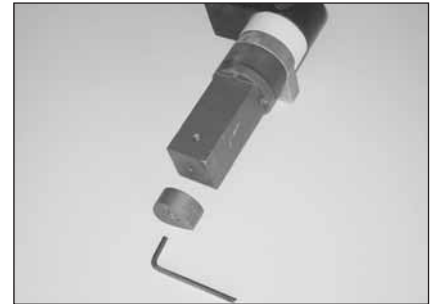
- > Welding case, weight approximately 5 kg.
- > Heating device 220 V, 600 W.
- > Saddle heating elements for DN/OD 50 – 150.
- > Pressing wood for PP welding plugs.
- > Fastening screw and hexagon socket screw key.



(Diagramme 77)  
Welding Case

**6.II.2 PROCESSING**

- > According to the pipe diameter a weld element is fastened at the front or side.
- > Switch on the device and set it to 225 - 230°C (POLO-KAL NG and POLO-KAL 3S pipes). The temperature is reached, when the pilot lamp on the handle is extinguished.



(Diagramme 78)

- > Burr the bore hole and clean it (the place to be repaired must be dry and free of oil).
- > Put the PP welding plug on the welding device and let it warm up for about 60 seconds.
- > Afterwards slightly press the welding device together with the weld-on element to the place of repair and let it warm up for about 90 seconds.



(Diagramme 79)

- > Take off the repair welding device and the PP welding plug with the pressing wood.
- > Press the pressing wood (side of the radius) with the PP welding plug slightly towards the place of repair, then hold it for about 10 seconds.
- > After the weld has cooled down (approximately 10 minutes) the repaired place may work under full load.
- > Cut off the protruding end (peg).



(Diagramme 80)

## 7.1. INVITATION FOR TENDERS TEXT FOR POLO-KAL NG HOUSEHOLD DISCHARGE PROGRAMME

### SOCKET PIPE

A 3 – layer combination pipe made of halogen-free PP – C synthetic material reinforced with mineral aggregate, with a radial rigidity minimum of 4 KN/m<sup>2</sup>, a reinforced pipe wall and integrated push-fit sleeve as well as a factory-fitted lip ring, tested and monitored following the Production Standards ON EN 1451-1 and DIN 19560 consisting of:

#### > Internal Layer

Of PP–C, hot water resistant to 97°C tested in accordance to ON EN 1451-1 and DIN 19560, good heat and corrosion ageing stability as well as a high chemical resistance and a smooth pipe inner-surface.

Colour: blue (free of halogen and cadmium)

#### > Intermediate Layer

Of PP–MV compound reinforced with mineral aggregate, which guarantees greater stiffness and stability.

Colour: grey

#### > External Layer

Of PP–C, with high impact resistance and good weathering resistance. Outside diameters meet the ON EN 1451-1 and are compatible with commercially available household discharge programmes.

Colour: blue (free of halogen and cadmium)

### FITTING

Single-layered fitting reinforced with mineral aggregate, made of halogen-free PP – C – KV synthetic materials, a reinforced wall and factory-fitted lip ring, hot water resistant to 95°C in accordance to ON EN 1451-1.

Colour: blue (free of halogen and cadmium)

## 7.2. INVITATION FOR TENDERS TEXT FOR POLO-KAL 35 DOMESTIC WASTE DISPOSAL

### SOCKET PIPE

A 3 – layer combination pipe made of halogen-free synthetics, fulfilling the requirements of DIN 4109 and Austrian Standard B 8115 (Sound Insulation in High Building Construction), with an integrated push-fit sleeve and factory-fitted lip ring, tested and monitored following the Production Standard ON EN 1451-1, consisting of:

#### > Internal Layer

Of PP–C, hot water resistant to 95°C in accordance to ON EN 1451-1, high heat and corrosion ageing stability as well as high chemical resistance and a smooth pipe inner-surface.

colour: light grey / white

**> Sound absorbing intermediate layer**

Made of „POROLEN“, an elastoplastic, compact and vibration deadening material, for the reduction of sound transfer from the internal to the external layer.

Colour: blue / grey

**> External layer**

Of PP-H, guaranteed high rigidity, stability and impact resistance. Outside diameters meet the ON EN 1451-1 and are compatible with conventional household discharge programmes.

colour: light grey / white

**> Fitting**

Single-layered reinforced, halogen-free fitting (PP-C-MV) with factory-fitted lip ring, hot water resistant to 95°C in accordance to ON EN 1451-1.

Colour: light grey / white

**7.3. INVITATION FOR TENDERS TEXT FOR POLO-CLIP HS BRACKET**

Highly sound insulating 2-component PP clip with oblique TPE slats for high sound insulation, with pressed-in M8 nut or, alternatively, M10 nut, suitable to be used with sound-insulating and highly sound-insulating plastic pipes.

**7.4. INVITATION FOR TENDERS TEXT FOR POLO-BSM**

POLO-BSM system Intumex RS 10/30 or RS 10/60 fire protection collar, tested according to the Austrian Standard B 3800, for F90 in round, space-saving design, for mounting “in” walls or ceilings according to the processing directives of the manufacturer.

Suitable for use with all plastic waste disposal piping systems made of PP, PE, ABS, PVC up to DN/OD 160, as well as composite pipes (three-layer pipes), such as POLO-KAL 3S and POLO-KAL NG within the dimensional range of DN/OD 32 – 250, and special POLO-KAL NG and POLO-KAL 3S applications (slanted ducts up to a max. of 45° and above a bracket).

Collar body made of stainless steel sheet, beginning from 130°C - expansion up to the tenfold of its volume, with an expansion pressure up to 10 bar.

## 7.5. INVITATION FOR TENDERS TEXT "TOPFOX" "DIBT" APPROVAL Z-19.17-1364

..... Fire protective collar, "Topfox" type ("DIBT" approval Z-19.17-1364).  
Fire protective collar for wall and ceiling ducts, to be dowelled or embedded in mortar.  
Also suitable for light wall boards.  
When dowelling is applied, the fixing straps have to be bent by 90°. Steel dowels or M6 tie bolts (with general approval by the construction supervision authority) have to be used.  
For wall feedthroughs one fire protective collar has to be mounted on each side of the wall. When mounted on light dividing walls the fire protective collars have to be screwed down by M6 threaded rods, plain washers and nuts.  
The seals have to be marked.

Pipe diameter DN: ..... mm

Number: ..... pieces    Unit price:..... €    Total price: ..... €



# NOTES



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