

Shipbuilding

TECHNICAL MANUAL

POLO-KAL NG . POLO-KAL NG VACUUM . POLO-KAL NG ASV



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General Information

The information provided in this technical manual is intended to help you select our products for your application. Text and images were compiled with utmost care. Nevertheless, errors cannot be entirely excluded. POLOPLAST does not assume legal liability or any other form of liability for erroneous information and its consequences. POLOPLAST is grateful for any suggestions or comments.

We are happy to provide further information – please contact the POLOPLAST Sales Office on +49 (0) 8342 / 70 06-0, info@poloplast.com

GENERAL INFORMATION

1.1 Scope

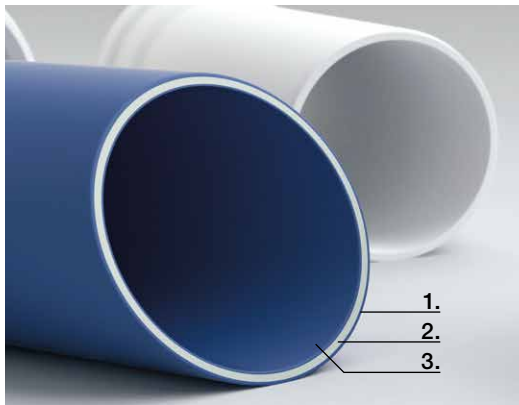
The scope of these specifications is to supply indications on the material, the design and installation of drainage systems for black and grey water using polypropylene pipes and fittings belonging to the POLO-KAL NG system manufactured by POLOPLAST GmbH & CO KG.

1.2 POLO-KAL NG System description

The POLO-KAL NG is a polypropylene multi-layer non-pressure drainage system, comprising tubes and fittings with push-fit sockets and factory-inserted lip seals made of SBR.

These pipes and fittings are commercial products with dimensions and quality according to EN 1451-1.

The pipe consists of polypropylene in the inner and outer layer. The middle layer additionally contains minerals for reinforcement. The fittings consist of polypropylene and additionally minerals for reinforcement.



1. External layer made of PP

The tough protective shell of the pipe.
Sturdy and highly impact resistant.

2. Intermediate layer made of mineral-reinforced PP

Mineral-reinforced plastic provides high stability and establishes the superior noise-insulating effect of POLO-KAL NG.

3. Internal layer made of PP

Tremendous surface smoothness and resistance to chemical agents.

The advantages of POLO-KAL NG

- **Low weight** reduces the ship's total weight and enables easy transport and assembling.
- **Long-living and non-corrosive** – optimal resistance to salt-containing air, no corrosion.
- **High secure in assembling** because established push-fit system. No risk of fire caused by sparks by cutting pipes.
- **Easy and rapid assembly** of the highly noise-insulated push-fit system POLO-KAL NG.
- **Smooth inner surface** prevents the accumulation of deposits.
- **Precision sealing system.** Precisely-shaped push-fit sockets. Rapid assembly. Durable connection.
- **25 years of multi-layer technology experience.** POLOPLAST has more than 25 years of knowledge and experience with the tried and tested 3-layer technology and 60 years of experience with above-ground drainage.

GENERAL INFORMATION

1.3 Applications

POLO-KAL NG is particularly suitable for the following applications:

- gravity drainage systems for grey and rain water including internal and external scuppers
- air vent for fresh water, ballast, grey and black water tanks
- vacuum discharge for black water (DN 40–75) with POLO-KAL NG Vacuum pipes and POLO-KAL NG fittings

1.4 Certifications

Type approvals of RINA and Lloyds Register for POLO-KAL NG are available.



Certificate No. MAC068914XG



Certificate No. 12/00016

1.5 Technical notes

1.5.1 Fields of application

The pipe system is made up of a series of diameters from 40 to 200.

Nominal size = outside diameter [mm]	Pipe minimal wall thickness	
	POLO-KAL NG for gravity discharge	POLO-KAL NG Vacuum for vacuum discharge
DN 40	1.8 mm	1.9 mm
DN 50	2.0 mm	2.3 mm
DN 75	2.6 mm	3.4 mm
DN 90	3.0 mm	-
DN 110	3.4 mm	-
DN 125	3.9 mm	-
DN 160	4.9 mm	-
DN 200	6.8 mm	-

The fittings of POLO-KAL NG can be used for gravity drainage and vacuum discharge.

GENERAL INFORMATION

1.5.2 Technical data

Material	Pipe: PP/PP-MV/PP; Fitting: PP-MV free of halogen and cadmium and free of heavy metals
Colour	Blue RAL 5014
Resistance to hot water	Long-term 60 °C 5h/day = 87.600 h/50 years Short-term 90 °C 10 min/day = 3.000 h/50 years
Pipe marking	POLO-KAL NG pipes are typically marked as follows: charge number, company name, product name, product description, indication of material, category of application, category of rigidity, dimension and wall thickness, certificates, made in Austria, EAN Code.
Chemical resistance	Chemical resistance of the POLO-KAL NG system comprises the pH range from 2 to 13. Pipes and fittings made of PP according to DIN 8078 Beiblatt 1 and ISO TR 10358. Seal material SBR or NBR according to ISO TR7620.
Connections	Push-fit sockets with factory-inserted lip seals. Seal material = SBR (from DN/OD 200 it is NBR)
Fire behaviour	according EN 13501-1: D - s2, d1 according DIN 4102: B2 (normal inflammability) Q1 (low smoke development) TR1 (no drip formation) according EN 60695-11-10/UL94: HB
Ring rigidity	The ring rigidity of the pipe has been proved according to EN ISO 9969. The rigidity is at least 6.0 kN/m ² over the entire range of dimensions DN/OD 32–160 mm. The ring rigidity of DN/OD 200 mm is at least 8.0 kN/m ² . The ring rigidity of POLO-KAL NG Vacuum DN/OD 40–75 mm is at least 18.0 kN/m ² .
Pressure	POLO-KAL NG max. 1.5 bar short-term POLO-KAL NG Vacuum max. vacuum 900 mbar short-term
E-Modulus	2400–3100 MPa according to ISO 178
Mean coefficient of elongation LAG	0.05 mm/mK (OFI test report No. 47.423)
Low-temperature impact strength	❄ -20 °C, safe transportation and laying, even at low temperatures. (Test report TGM VA KU 25000/1)
UV-Resistance	POLO-KAL NG pipes and fittings are designed to withstand outdoor storage for 2 years in Europe.

GENERAL INFORMATION

1.5.3 Linear expansion

If the working temperature is higher than the installation temperature the pipe expands. This change in length generates forces which have to be absorbed by the pipe- and fixing system.

In the case of high wastewater temperatures the linear expansion can be calculated as shown below:

Linear expansion [mm] = LAK [mm/mK] × difference in temperature [Δt] × straight pipe length [m]

Linear expansion coefficient (LAK) POLO-KAL NG: 0.05 mm/mK

Example:

A POLO-KAL NG pipe has a straight length of 15 m. Given an ambient temperature of 25 °C, wastewater is conducted at a maximum temperature of 60 °C. This results in a temperature difference of 50 Kelvin.

Linear expansion = 0.05 mm/mK × 25 K × 15 m = 18.75 mm

A linear expansion of just under 2 cm can thus be expected.

Instances of linear expansion can be compensated by drawing out the spigot ends of several push-fit connections by no more than 1 cm. Alternatively, long sleeve sockets can be used in the traditional way.

1.5.4 Use in commercial kitchens

It is recommendable to use stainless steel pipe system from sanitary object to grease separator.

POLO-KAL NG is suitable for the drainage of wastewater containing grease. In general, wastewater temperatures of up to 80 °C can be expected. When using POLO-KAL NG for conducting wastewater or exhaust air in commercial kitchens, the factory-inlaid sealing ring must be replaced with an oil- and grease resistant NBR seal. In accordance with the applicable standard, deposition equipment for wastewater containing grease must be installed and operated as close as possible to the drain point. An inclusion of electrical trace heating leading up to the point of the grease separator is optional. The surface temperature of the electrical trace heating must not exceed 60 °C. According to DIN 1986-100, waste fragmentizers for kitchen waste, which could allow the chopped debris to enter the drainage system, must not be connected to the system.

1.5.5 Use with commercial devices

In case of drainage of dish washing machines, potwashers and potwash tables, kettles, Bain Marie of distribution counters, laundry machines or similar consider the maximum temperatures according section 1.5.2.

1.5.6 Maintaining

With time, the pipework of a marine sewage system becomes progressively lined with a build-up of calcium, magnesium hard water scale and struvite deposits. There are several cleaning methods, which uses different chemicals. POLO-KAL pipe system is proved with this substances:

- Hydrochloric acid up to 42 % concentration
- Phosphoric acid up to 25 % concentration
- Sulfuric acid up to 50 % concentration
- Caustic soda

For use of other aggressive chemicals, please contact us to check the reliability for POLO-KAL NG.

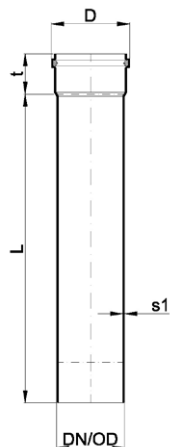
PIPE SYSTEMS

2.1 Product range

Dimensions in mm

POLO-KAL NG Socket pipe PKEM

with factory-fitted lip ring



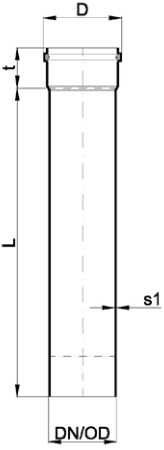
DN/OD*	Item No.	L	s1(min)	t(min)	D(max)	kg/pc.
40	02010	150	1.8	45	53	0.04
40	02011	250	1.8	45	53	0.07
40	02012	500	1.8	45	53	0.13
40	02019	750	1.8	45	53	0.20
40	02013	1000	1.8	45	53	0.26
40	02014	1500	1.8	45	53	0.39
40	02015	2000	1.8	45	53	0.52
40	02016	3000	1.8	45	53	0.78
50	02020	150	2.0	47	63	0.06
50	02021	250	2.0	47	63	0.09
50	02022	500	2.0	47	63	0.19
50	02029	750	2.0	47	63	0.28
50	02023	1000	2.0	47	63	0.37
50	02024	1500	2.0	47	63	0.56
50	02025	2000	2.0	47	63	0.74
50	02026	3000	2.0	47	63	1.12
75	02030	150	2.6	53	89	0.11
75	02031	250	2.6	53	89	0.19
75	02032	500	2.6	53	89	0.38
75	02039	750	2.6	53	89	0.56
75	02033	1000	2.6	53	89	0.75
75	02034	1500	2.6	53	89	1.13
75	02035	2000	2.6	53	89	1.51
75	02036	3000	2.6	53	89	2.26
90	02070	150	3.0	57	106	0.16
90	02071	250	3.0	57	106	0.26
90	02072	500	3.0	57	106	0.53
90	02079	750	3.0	57	106	0.79
90	02073	1000	3.0	57	106	1.06
90	02074	1500	3.0	57	106	1.58
90	02075	2000	3.0	57	106	2.11
90	02076	3000	3.0	57	106	3.17
110	02040	150	3.4	62	128	0.22
110	02041	250	3.4	62	128	0.37
110	02042	500	3.4	62	128	0.74
110	02049	750	3.4	62	128	1.11
110	02043	1000	3.4	62	128	1.49
110	02044	1500	3.4	62	128	2.23
110	02045	2000	3.4	62	128	2.97
110	02046	3000	3.4	62	128	4.46

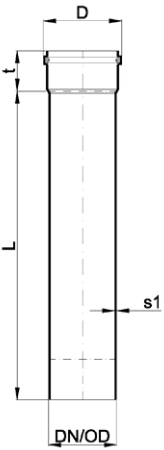
* DN/OD – according to European standardisation CEN/TC 155: Dimension Nominal / Outside Diameter

Subject to technical alterations

PIPE SYSTEMS

Dimensions in mm

POLO-KAL NG Socket pipe PKEM with factory-fitted lip ring		DN/OD	Item No.	L	s1(min)	t(min)	D(max)	kg/pc.
	125	02050	150	3.9	67	145	0.29	
	125	02051	250	3.9	67	145	0.48	
	125	02052	500	3.9	67	145	0.97	
	125	02053	1000	3.9	67	145	1.94	
	125	02054	1500	3.9	67	145	2.91	
	125	02055	2000	3.9	67	145	3.88	
	125	02056	3000	3.9	67	145	5.82	
	160	02060	150	4.9	77	184	0.47	
160	02061	250	4.9	77	184	0.79		
160	02062	500	4.9	77	184	1.58		
160	02063	1000	4.9	77	184	3.16		
160	02064	1500	4.9	77	184	4.74		
160	02065	2000	4.9	77	184	6.32		
160	02066	3000	4.9	77	184	9.47		
200	02951	1000	6.8	122	228	5.78		
200	02953	3000	6.8	122	228	17.34		

POLO-KAL NG Vacuum Socket pipe PKVEM with factory-fitted lip ring		DN/OD	Item No.	L	s1(min)	t(min)	D(max)	kg/pc.
	40	01411	250	1.9	45	53	0.09	
	40	01412	500	1.9	45	53	0.16	
	40	01413	750	1.9	45	53	0.23	
	40	01414	1000	1.9	45	53	0.30	
	40	01415	1500	1.9	45	53	0.44	
	40	01416	2000	1.9	45	53	0.58	
	40	01417	3000	1.9	45	53	0.85	
	50	01421	250	2.3	47	63	0.14	
	50	01422	500	2.3	47	63	0.25	
	50	01423	750	2.3	47	63	0.36	
	50	01424	1000	2.3	47	63	0.46	
	50	01425	1500	2.3	47	63	0.68	
	50	01426	2000	2.3	47	63	0.89	
	50	01427	3000	2.3	47	63	1.32	
75	01431	250	3.4	53	89	0.32		
75	01432	500	3.4	53	89	0.56		
75	01433	750	3.4	53	89	0.80		
75	01434	1000	3.4	53	89	1.04		
75	01435	1500	3.4	53	89	1.53		
75	01436	2000	3.4	53	89	2.01		
75	01437	3000	3.4	53	89	2.99		

Subject to technical alterations

PIPE SYSTEMS

Fittings for POLO-KAL NG and POLO-KAL NG Vacuum

Dimensions in mm

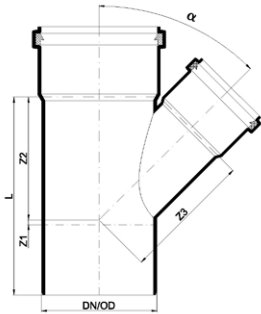
POLO-KAL NG Bend PKB with factory-fitted lip ring		DN/OD	Item No.	Z1	Z2	R	L	kg/pc.
15°		40	02110	7	8	21	51	0.04
		50	02120	7	8	27	56	0.05
		75	02130	9	10	40	64	0.12
		90	02170	13	8	47	73	0.16
		110	02140	13	13	57	80	0.26
		125	02150	12	13	90	85	0.36
		160	02160	36	16	115	121	0.72
		200	02960	13	23	120	131	1.56
30°		40	02111	10	11	21	54	0.04
		50	02121	11	12	27	60	0.06
		75	02131	15	15	40	70	0.12
		90	02171	13	19	47	72	0.17
		110	02141	21	20	58	88	0.28
		125	02151	20	22	90	93	0.39
		160	02161	25	28	115	133	0.80
		200	02962	48	37	120	144	1.70
45°		40	02112	13	14	21	57	0.04
		50	02122	15	16	27	63	0.06
		75	02132	21	21	40	75	0.15
		90	02172	26	20	47	85	0.19
		110	02142	49	29	57	116	0.36
		125	02152	50	31	90	124	0.43
		160	02162	60	41	115	145	0.78
		200	02963	66	52	120	183	1.85
87.5°		40	02114	24	25	21	68	0.05
		50	02124	29	30	27	78	0.07
		75	02134	42	42	40	97	0.15
		90	02174	50	42	47	109	0.22
		110	02144	60	60	58	128	0.37
		125	02154	64	66	90	138	0.53
		160	02164	84	87	115	169	0.98
		200	02965	106	115	125	230	2.36

Subject to technical alterations

PIPE SYSTEMS

Dimensions in mm

POLO-KAL NG Branch PKEA with factory-fitted lip ring



45°

DN/OD	Item No.	Z1	Z2	Z3	L	kg/pc.
40/40	02206	13	54	54	111	0.08
50/40	02212	8	59	61	115	0.10
50/50	02215	15	66	66	129	0.11
75/50	02218	3	80	84	138	0.20
75/75	02221	21	98	98	173	0.28
90/50	02210	-2	84	92	142	0.26
90/75	02834	14	114	117	187	0.35
90/90	02211	25	112	112	196	0.40
110/40	02204	-14	92	106	145	0.35
110/50	02224	-13	99	109	153	0.38
110/75	02227	5	117	123	189	0.48
110/90	02839	19	132	135	218	0.55
110/110	02230	47	144	144	259	0.67
125/75	02233	12	130	139	215	0.66
125/90	02843	28	161	183	262	1.02
125/110	02236	40	161	154	274	0.86
125/125	02239	50	161	160	284	0.96
160/90	02840	29	174	184	288	1.43
160/110	02242	29	174	184	287	1.26
160/125	02240	34	198	201	309	1.58
160/160	02245	59	209	209	353	1.83
200/160	02971	41	229	253	388	3.23
200/200	02973	59	240	240	423	4.00

67.5°

40/40	02207	18	35	35	97	0.08
50/40	02213	16	36	40	101	0.09
50/50	02216	22	42	42	112	0.10
75/50	02219	17	49	56	121	0.18
75/75	02222	52	88	85	193	0.29
90/50	02835	14	69	71	143	0.40
90/75	02832	100	88	84	247	0.38
90/90	02831	36	77	76	172	0.35
110/50	02225	11	57	40	136	0.36
110/75	02228	25	71	82	163	0.43
110/90	02837	46	103	107	216	0.58
110/110	02231	44	93	92	203	0.58
125/90	02844	75	104	105	248	0.79
125/110	02237	63	116	117	248	0.73
160/110	02243	53	121	135	251	1.17

GENERAL INFORMATION

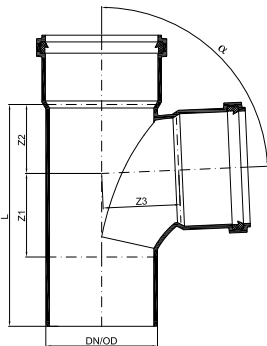
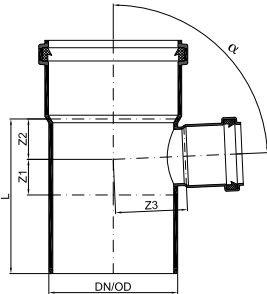
PIPE SYSTEMS

PIPE SYSTEM - LAYING
INSTRUCTIONS

PIPE SYSTEMS

Dimensions in mm

POLO-KAL NG Branch PKEA with factory-fitted lip ring

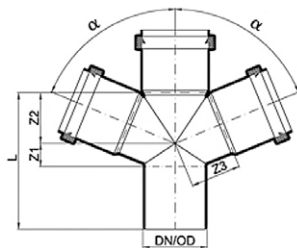


87.5°

DN/OD	Item No.	Z1	Z2	Z3	L	kg/pc.
40/40	02208	24	25	25	94	0.07
50/40	02214	24	25	30	98	0.09
50/50	02217	29	30	30	108	0.10
75/50	02220	30	32	43	117	0.18
75/75	02223	42	45	45	142	0.23
90/50	02830	29	35	52	123	0.23
90/75	02833	47	49	50	156	0.34
90/90*	02248	70	59	64	189	0.29
110/50	02226	30	34	61	132	0.34
110/75	02229	43	48	63	158	0.42
110/90	02836	19	132	135	218	0.47
110/110*	02232	82	88	76	219	0.58
125/75	02235	96	83	84	249	0.63
125/90	02845	75	65	83	214	0.86
125/110	02238	67	76	75	216	0.71
125/125	02241	65	76	75	215	0.76
160/90	02842	81	95	135	261	1.89
160/110	02244	81	95	107	261	1.21
160/125	02246	78	97	103	251	1.28
160/160	02247	115	118	118	310	1.72
200/160	02972	112	127	134	361	2.90
200/200	02974	140	127	126	388	3.80

*) swept entry branch

POLO-KAL NG Double branch PKDA with factory-fitted lip ring



45°/180°

DN/OD	Item No.	Z1	Z2	Z3	L	kg/pc.
75/50/50	02295	6	83	84	142	0.25
75/75/75	02396	23	101	100	177	0.37
110/50/50	02258	-8	97	107	156	0.42
110/110/110	02259	29	147	145	243	0.89
125/110/110	02234	32	165	158	266	1.10
160/110/110	02399	9	183	188	269	1.48

67.5°/180°

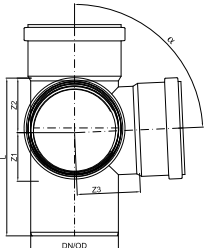
90/50/50	02848	16	59	74	144	0.33
90/90/90	02846	36	77	77	173	0.44
110/50/50	02260	14	57	78	139	0.38
110/110/110	02261	44	95	96	206	0.74
125/110/110	02262	48	101	104	218	0.88
160/110/110	02264	73	127	133	268	1.37

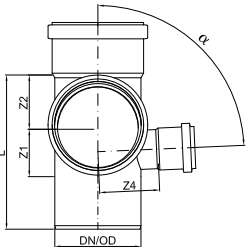
87.5°/180°

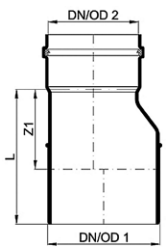
90/90/90	02847	49	59	59	168	0.44
110/50/50	02255	31	37	69	135	0.38
110/75/75	02269	44	50	66	160	0.48
110/110/110	02267	69	69	96	196	0.64
125/110/110	02272	69	78	81	216	0.86
160/110/110	02274	92	100	115	269	1.37

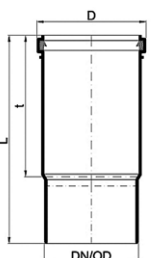
PIPE SYSTEMS

Dimensions in mm

POLO-KAL NG Double corner branch PKEDA with factory-fitted lip ring 	DN/OD	Item No.	Z1	Z2	Z3	Z4	L	kg/pc.
	87.5°/90°	90/90/90	02829	52	60	57	68	167
	110/110/110	02275	61	68	68	79	198	0.66
	110/L110/R75	02277	62	69	57	69	198	0.60
	110/L75/R110	02279	62	69	69	71	198	0.60
	125/110/110	02276	67	76	83	75	216	0.86
	160/110/110	02278	81	95	107	106	261	1.36

POLO-KAL NG Double corner branch level PKEDA with factory-fitted lip ring 	DN/OD	Item No.	Z1	Z2	Z3	Z4	L	kg/pc.
	87.5°	90/90/50	02826	70	58	64	64	189
	90/50/90	02827	70	58	64	64	189	0.41
	110/110/50	02291	83	66	67	77	217	0.61
	110/50/110	02838	83	66	67	77	217	0.61

POLO-KAL NG Reducer PKR with factory-fitted lip ring 	DN/OD1	DN/OD2	Item No.	Z1	L	kg/pc.
		50	40	02282	20	65
	75	50	02283	31	79	0.09
	90	50	02885	34	90	0.13
	90	75	02886	19	76	0.14
	110	50	02284	47	113	0.19
	110	75	02285	32	99	0.20
	110	90	02887	26	88	0.21
	125	110	02286	18	92	0.31
	160	110	02287	39	124	0.51
	160	125	02288	32	117	0.54
	200	160	02981	47	171	1.31

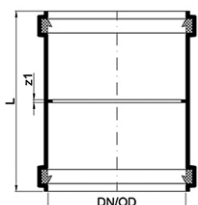
POLO-KAL NG Long sleeve PKL with factory-fitted double lip ring 	DN/OD	Item No.	L	D	t	kg/pc.
		40	02331	158	53	107
	50	02332	174	63	119	0.07
	75	02333	198	89	136	0.18
	90	02338	212	105	143	0.23
	110	02334	243	127	165	0.37
	125	02335	316	144	187	0.63
	160	02336	328	182	215	1.02
	200	02339	502	229	280	2.77

Subject to technical alterations

PIPE SYSTEMS

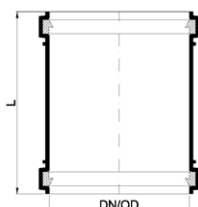
Dimensions in mm

POLO-KAL NG Double socket PKD with factory-fitted lip ring



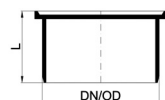
DN/OD	Item No.	L	Z1	kg/pc.
40	02301	96	2	0.07
50	02302	104	2	0.06
75	02303	118	2	0.13
90	02307	127	2	0.17
110	02304	145	3	0.28
125	02305	157	4	0.40
160	02306	180	4	0.69
200	02986	240	4	1.53

POLO-KAL NG Sleeve socket PKU with factory-fitted double lip ring



DN/OD	Item No.	L	kg/pc.
40	02311	96	0.05
50	02312	104	0.06
75	02313	118	0.13
90	02319	127	0.17
110	02314	145	0.28
125	02315	157	0.39
160	02316	180	0.68
200	02984	240	1.50

POLO-KAL NG Socket plug PKM



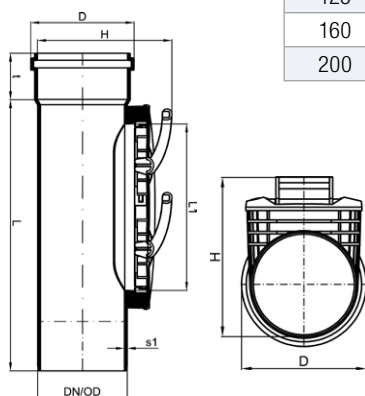
DN/OD	Item No.	L	kg/pc.
40	02321	40	0.02
50	02322	44	0.02
75	02323	51	0.06
90	02327	55	0.08
110	02324	62	0.14
125	02325	81	0.19
160	02326	92	0.36
200	02990	122	0.85

POLO-KAL NG Cleanout pipe

Branch with socket plug secured with POLO-KAL NG ASV see section 3.8.

POLO-EHP control in blue for POLO-KAL NG PKEHP

DN/OD	Item No.	L	s1(min)	t	D	H	L1	kg/pc.
110	01900	468	3.6	65	129	196	301	2.3
125	01901	474	4.0	73	146	222	301	2.5
160	01902	488	5.1	84	185	251	301	3.2
200	01903	518	7.0	120	231	295	301	4.6



Subject to technical alterations

PIPE SYSTEMS

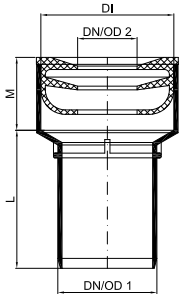
Dimensions in mm

GENERAL INFORMATION

PIPE SYSTEMS

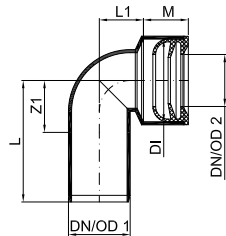
PIPE SYSTEM - LAYING INSTRUCTIONS

POLO-KAL NG Siphon fitting PKS with push-fit seal*



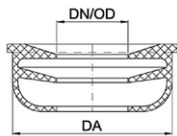
DN/OD1	DN/OD2	Item No.	L	M	DI	kg/pc.	
32	1 1/4"	32 mm	02350	56	29	54	0.06
40	1 1/4"	32 mm	02351	56	29	54	0.06
40	1 1/2"	40 mm	02352	56	29	54	0.05
50	1 1/4"	32 mm	02353	56	29	54	0.07
50	1 1/2"	40 mm	02354	56	29	54	0.06
50	2"	50 mm	02355	60	29	67	0.08

POLO-KAL NG Siphon bend PKSW with push-fit seal*



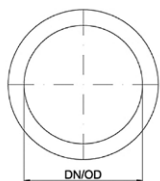
DN/OD1	DN/OD2	Item No.	L	Z1	L1	M	DI	kg/pc.	
32	1 1/4"	32 mm	02360	77	36	27	29	54	0.07
40	1 1/4"	32 mm	02361	79	34	29	29	54	0.07
40	1 1/2"	40 mm	02362	79	34	29	29	54	0.06
50	1 1/4"	32 mm	02363	88	41	30	29	54	0.08
50	1 1/2"	40 mm	02364	88	41	30	29	54	0.08
50	2"	50 mm	02365	89	42	35	29	67	0.09

POLO-KAL NG Push-fit seal PKNI



DN/OD	Item No.	DA	kg/pc.	
1 1/4"	32 mm	02378	54	0.04
1 1/2"	40 mm	02379	54	0.03
2"	50 mm	02380	67	0.04

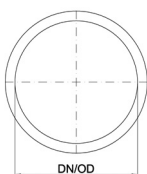
POLO-KAL NG Replacement lip ring PKLI



DN/OD	Item No.	kg/pc.
40	02931	0.01
50	02932	0.01
75	02933	0.01
90	02929	0.01
110	02934	0.02
125	02935	0.02
160	02936	0.05
200	02937	0.07

POLO-KAL NG lip ring NBR PKNL

oil and grease resistant, impervious to radon



DN/OD	Item No.	kg/pc.
50	00149	0.00
75	00150	0.01
90	00151	0.01
110	00152	0.02
125	00153	0.03
160	00154	0.05
200	00155	0.07

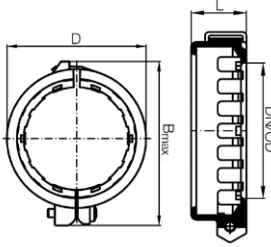
*Push-fit seal provided, unassembled

Subject to technical alterations

PIPE SYSTEMS

Dimensions in mm

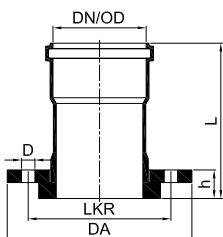
POLO-KAL NG ASV
with locknut



DN/OD	Item No.	L	D	B-max	Max. admissible extraction force in kg	Max. admissible pressure load in bar	kg/pc.
40	01561	24	61	73	100	2.5	0.04
50	01562	28	76	92	100	2.5	0.05
75	01563	30	99	116	130	2.5	0.06
90	01564	32	115	132	130	2.0	0.11
110	01565	37	138	153	180	2.0	0.15
125	01566	39	158	196	440	2.0	0.23
160	01567	43	197	234	550	2.0	0.30
200	01568	67	243	281	650	1.5	0.53

Price and delivery time on request

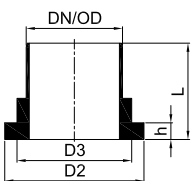
POLO-KAL NG
flange piece with socket and flange compatible to gasket acc. EN 1514-1



DN/OD	Item No.	L	LKR	DA	D	h	No. Holes	DN/OD flange	kg/pc.
PN 6									
40	01497	160	100	130	14	26	4	40	1.59
50	01498	165	110	140	14	29	4	50	1.74
75	01499	180	130	160	14	32	4	65	2.23
90	01500	185	150	190	18	35	4	80	3.36
110	01501	195	170	210	18	36	4	100	3.75
160	01502	250	225	265	18	38	8	150	5.44
PN 16									
40	01503	160	100	140	18	28	4	32	0.88
50	01504	165	110	150	18	32	4	40	0.97
75	01505	180	145	185	18	36	4	65	1.38
90	01506	185	160	200	18	39	8	80	1.62
110	01507	195	180	220	18	42	8	100	1.90
160	01508	250	240	285	22	52	8	150	4.50

Price and delivery time on request

POLO-KAL NG
flange sleeve with spigot compatible to gasket acc. EN 1514-1 compatible to flange acc. EN 1092-1, type 4



DN/OD	Item No.	D2	D3	L	h	DN/OD flange	kg/pc.
PN 6							
40	01485	79	50	90	10	40	0.13
50	01486	88	61	90	13	50	0.15
75	01487	110	91	110	16	65	0.26
90	01488	125	96	110	17	80	0.30
110	01489	145	116	125	18	100	0.38
160	01490	200	166	165	18	150	0.60
200	01482	255	224	205	32	200	1.56
PN 16							
40	01491	79	50	90	10	32	0.13
50	01492	88	61	90	13	40	0.15
75	01493	122	91	110	16	65	0.26
90	01494	139	107	110	17	80	0.30
110	01495	157	131	125	18	100	0.38
160	01496	213	175	165	18	150	0.60
200	01484	268	232	205	32	200	1.56

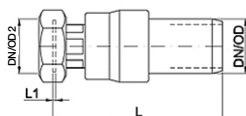
Price and delivery time on request

Subject to technical alterations

PIPE SYSTEMS

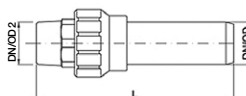
Dimensions in mm

POLO-KAL NG Adaptor union
with external screw thread, with long spigot



DN/OD	Item No.	DN/OD 2	L	kg/pc.
32	01733	1"	194	0.29
40	01735	1 1/4"	189	0.45
50	01736	1 1/2"	189	0.51

POLO-KAL NG Adaptor union
with screw nut, with long spigot



DN/OD	Item No.	DN/OD 2	L	kg/pc.
32	01732	1"	184	0.22
40	01734	1 1/4"	125	0.33
50	01737	1 1/2"	179	0.45

PIPE SYSTEM – LAYING INSTRUCTIONS

3.1 General Information

With reference to the use of this system, Res. A.753 (18) of the International Maritime Organization (I.M.O.) for the application of plastic pipes on board ships applies. The POLO-KAL NG system can be adopted under freeboard deck only if kept within the compartment and according to limitations in type approval certificates issued by classification societies. Only system components which are part of type approval have clearance for use.

Application in external areas under continuous UV radiation is not permitted.

3.1.1 Couplings

3.1.1.1 Lubricant specification

POLOPLAST lubricant is only designed for POLOPLAST products and must not be used for stainless steel or any other steel pipe connection.

3.1.1.2 Coupling PP pipes

The POLO-KAL NG is a plug-in system. It is demountable and re-usable. When setting up the plug connection make sure to always use an appropriate lubricant.

3.1.1.3 Coupling PP pipes to flanged fittings or components

Flanged couplings are used for coupling of PP with:

- Pipes of different material
- Valves or other flanged fittings
- PP pipes where needed for installation requirements.

3.1.1.4 Coupling PP pipes and threaded accessories

In some cases it is necessary to couple PP pipe elements to threaded accessories. Adapters are available in the dimension DN 40 and DN 50 with a male or a female thread.

PIPE SYSTEM – LAYING INSTRUCTIONS

3.1.2 Crossing decks and bulkheads

3.1.2.1 Decks and bulkheads without class specifications

The pipes can be implemented through the decks and bulkheads without special measures. To avoid damage to pipes due to possible contact with the deck or bulkhead ducts the minimum clearance between pipes of all diameters and the duct in the plate has to be 20 mm.

3.1.2.2 Decks and bulkheads with class specifications

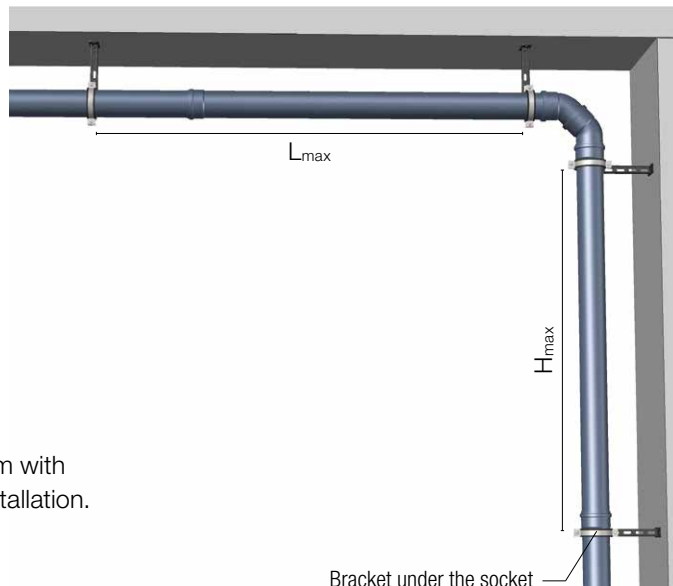
When fire compartments with fire protection class A or B are crossed by POLO-KAL NG pipes, fire retarding sealing should be made to ensure that the fire security is not affected. These fire retarding sealing, e.g. fire collar, should be consistent for fire protection certification for A or B.

3.2 Fastening

3.2.1 Maximum distance between brackets

To maintain sagging within the limits of applicable standard (EN 1451-1 and EN 1055) the following maximum distance between fastening points are recommended for POLO-KAL NG and POLO-KAL NG Vacuum.

Nominal outer diameter DN/OD	Distance between fixed brackets	
	Horizontal pipe routing L_{max}	Vertical pipe routing H_{max}
40 mm	0.60 m	1.50 m
50 mm	0.75 m	1.50 m
75 mm	1.10 m	2.00 m
90 mm	1.35 m	2.00 m
110 mm	1.65 m	2.00 m
125 mm	1.85 m	2.00 m
160 mm	2.00 m	2.00 m
200 mm	2.40 m	2.00 m



To avoid the sinking of vertical pipes fasten them with brackets under the socket immediately after installation.

3.2.2 Brackets

Customary galvanized steel brackets with rubber insert can be used. Be sure that the brackets and the cantilever can withstand any forces which may occur. All brackets are fix-brackets, so no sliding between the pipe and the bracket is allowed. It is important to not deform the pipes when tightening the brackets.

PIPE SYSTEM – LAYING INSTRUCTIONS

3.3 Installation guideline

1. Use brackets to hold the weight of the pipe. To avoid sagging of the pipe the distance between the fix-brackets must not exceed the distances which are defined in section 3.2.1.
2. To avoid pull out of the push-fit connection, the fixing system has to be designed to absorb ship hull vibrations, axial forces due to unexpected inside pressure or due axial impulse caused from vacuum discharge. Fix the push-fit system with the support of brackets to a wall or rigid elements. It is recommended to use brackets before and after each change in direction.
3. During the construction each pipe section must be checked with a pressure test (water with max. 1.5 bar) to ensure the tightness of the pipeline and the quality of the fixing system. If parts of installation can't fix by brackets, POLO-KAL NG ASV is to be used. The pressure test should be make for each deck separate.
4. To secure socket plugs against pull out POLO-KAL NG ASV collar is to be used.
5. For vacuum discharge the POLO-KAL NG ASV must be used at every push-fit connection.

3.4 Transport and storage

Take care that no damage can occur during transportation when loading pipes and fittings.

During transportation the pipes should rest on top of each other at full length (when no longer in the original packing) to avoid sagging. The sleeves have to be placed offset. Avoid sudden and abrupt stresses on pipes and fittings, especially concerning temperatures around and below 0 °C.

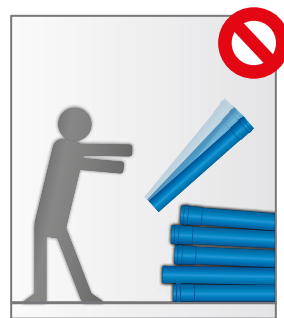
Storage temperature down to -20 °C possible
Installation temperature -5 °C to 40 °C

The outdoor storage under direct sunlight of pipes (with pre-installed gasket) has to be limited to 24 months from the date of production. Fittings must not be exposed to direct sunlight for a period greater than 6 months. Such exposure can lead to discoloration but technical performance won't be affected.

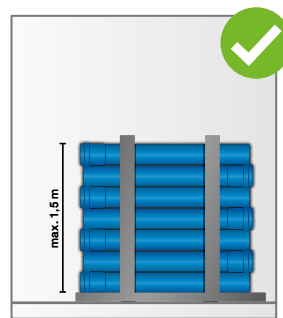
The pipes have to be stored on smooth, flat surfaces.



Loading and transportation



Unloading



PIPE SYSTEM – LAYING INSTRUCTIONS

3.5 Cutting to length and bevelling

3.5.1 Cutting to length

Pipes must be cut to length at right angles to the pipe's axis, and can be cut to the required installation length using the following tools:

- Suitable pipe cutter
- Angle grinder
- Fine-toothed saw

The cut edges must be cleanly trimmed with a pipe scraping tool or a knife.

Fittings may not be shortened!

3.5.2 Bevelling

Expert bevelling is essential for connections with double lip ring seals (e.g. when slip-on or long sleeves are used).

Bevelling of the shortened pipe is necessary when using pipes with a factory installed lip ring, in order to establish a connection quickly and safely.

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

DN	40	50	75	90	110	125	160	200
b ca. mm	4	4	4	5	6	6	7	8



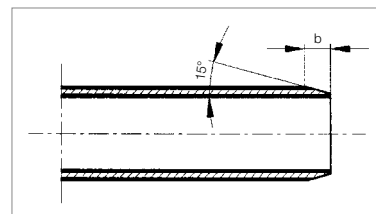
Cutting to length with a cutting and chamfering tool like this product from the company Rothenberger: ROCUT® 110/160



Cutting to length with fine-toothed saw



Bevelling with a bevelling tool

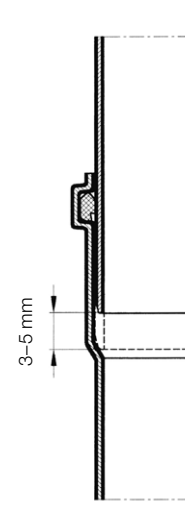


Bevelling at an angle of approx. 15°

PIPE SYSTEM – LAYING INSTRUCTIONS

3.6 Establishing the push-fit connection

- Before assembling, check the pipes, fittings and gasket for damage.
- Check the position and the 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.
- Push-in end of pipes has to be retract from the socket by 3 to 5 mm. It will be helpful to mark the pipe at the socket edge with a felt pen.
- Connections between fittings can remain fully inserted.
- If using the extraction-proof connection POLO-KAL NG ASV, also fittings have to be retracted from the push-fit connection by 5 mm.



3.7 POLO-KAL NG ASV – Extraction-proof connection

3.7.1 Fields of application

In combination with the POLO-KAL NG ASV extraction-proof connection, POLO-KAL NG, which has been approved as pressureless above ground drainage system, allows the absorption of intermittent dynamic strain, caused by excess pressure, low pressure, and/or vibration. POLO-KAL NG ASV must be used exclusively in combination with the POLO-KAL NG pipe system.

The POLO-KAL NG ASV extraction-proof connection opens up new fields of application for the POLO-KAL NG pipe system:

- **as vacuum pipe system** using POLO-KAL NG Vacuum pipes of the dimensions DN/OD 40 to DN/OD 75.
- **as pressure line for water raising systems** using POLO-KAL NG pipes and bends of the dimensions DN/OD 40 to DN/OD 90. Maximum pressure surges must be established in advance through communication with the equipment manufacturer and must be taken into consideration with regard to the maximum admissible pressure load.
- **for interior downpipes** to ensure safety conforming to standards in the case of a backwater level of up to 20 m.
- **to secure socket plugs**
Prior to the assembly of the POLO-KAL NG ASV, the plug must be pulled out of the socket by 10 mm.
- **to secure against the elements sliding apart** due to mechanical loads and vibrations.

PIPE SYSTEM – LAYING INSTRUCTIONS

3.7.2 Assembly of POLO-KAL NG ASV DN/OD 40–200 mm



Before fitting the POLO-KAL NG ASV over the socket, disassemble it.

(FIGURE 1)



Fit the half shells together over the socket connection.

(FIGURE 2)



Now tighten the screw. The maximum admissible torque is 7 Nm. Fittings in the dimensions DN/OD 40–90 must be pulled apart by 5 mm before the POLO-KAL NG ASV is installed. (FIGURE 3)



Brackets with dimensions equalling DN/OD 90 or larger are equipped with 2 screws. The maximum admissible torque is 7 Nm. (FIGURE 4)

3.8 Assembling of the cleaning pipe

The cleaning pipe consists of three parts which are delivered separately and have to be assembled locally.

- Part 1:** Single branch 45°
- Part 2:** Socket plug
- Part 3:** POLO-KAL NG ASV



Insert the socket plug into the branch and pull it 1 cm back. Mount the connection with POLO-KAL NG ASV. Ensure that the claws of the POLO-KAL NG ASV are located on the spigot but just after the top cover of the socket plug.



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