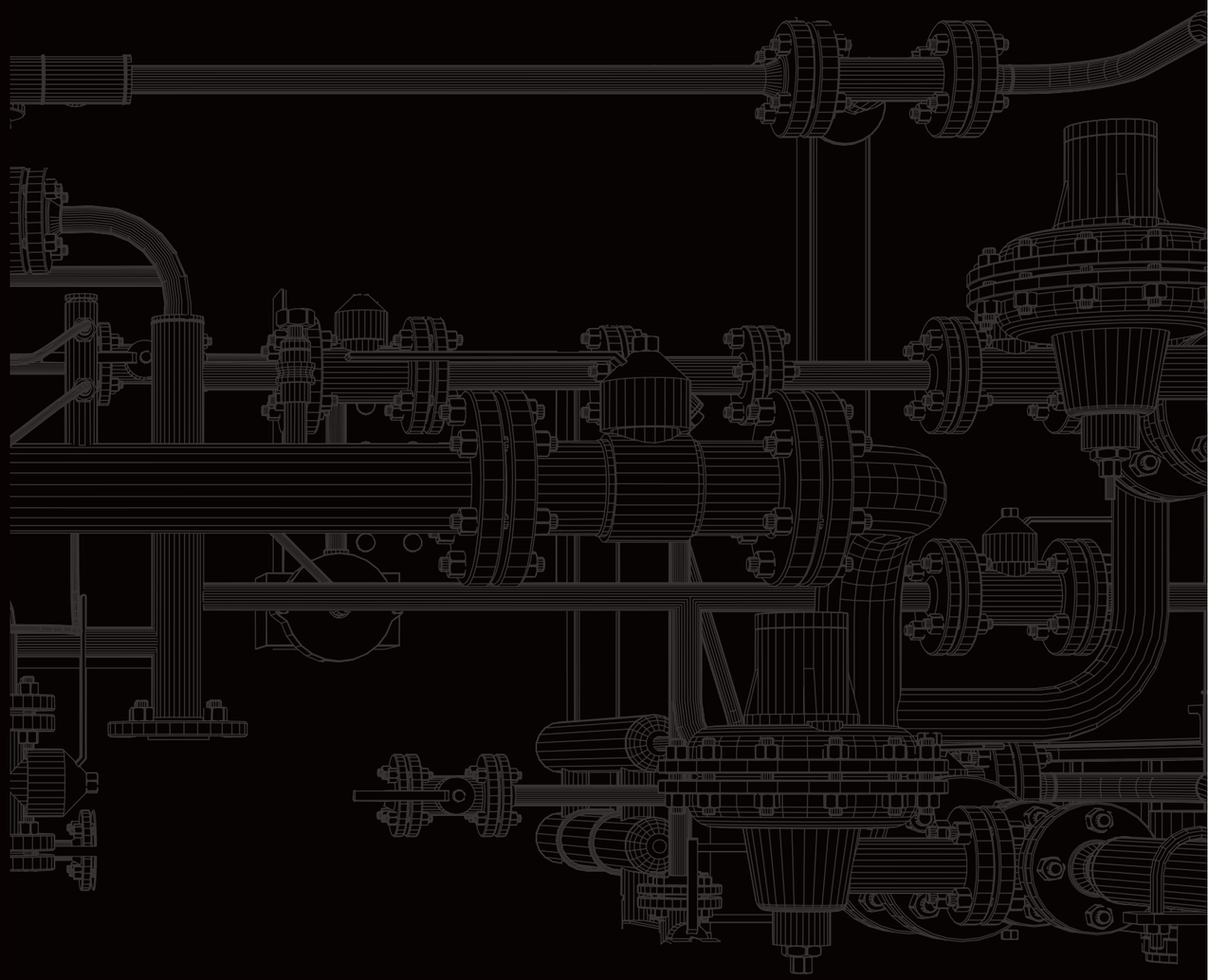
pexgol
X-LINKED PIPING SOLUTIONS

DESIGN & INSTALLATION ENGINEERING GUIDE



About Pexgol

Pexgol, a division of Golan Plastic Products, is the only worldwide manufacturer that specializes in large diameter, cross-linked polyethylene pipe systems, providing them to industrial and mining sectors throughout the world.

Pexgol material results

Pexgol material results in a chemically unbreakable cross-connection between these polyethylene chains.

The result of this chemical reaction is the creation of a material which has extremely high structural integrity, combined with resistance to a wide variety of corrosives and weather conditions.

GOLAN PLASTIC PRODUCTS

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FOR INFRASTRUCTURE AND INDUSTRIAL PIPE SYSTEMS

Welcome to Pexgol Engineering Guide

This Guide contains the following main sections:

- Pexgol system solutions
- Dimensions and pressure rating of Pexgol pipes
- Pipes and fittings
- Design considerations and installation instructions
- Fittings catalog

Golan Plastic Products, manufacturer and distributor of Pexgol, is a world leader in providing comprehensive solutions for the transportation all types of hot, corrosive or abrasive liquid materials.

Golan Plastic Products is the only manufacturer on an international scale specializing in large diameter, cross-linked polyethylene pipe systems, the most cost-effective, long term solutions available to infrastructure, industrial and mining sectors throughout the world. Established in 1964, GPP today is a global company listed on the Tel Aviv stock exchange.

Pexgol's global reputation and reliable brand name are based on accredited international standards in more than 40 countries, along with a decades-long proven track record with established clients around the world.

For more information, products and projects, please visit our website www.pexgol.com.

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Pexgol Engineering Applications Guide

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PEXGOL SYSTEM SOLUTIONS

Industry

Dewatering Lines

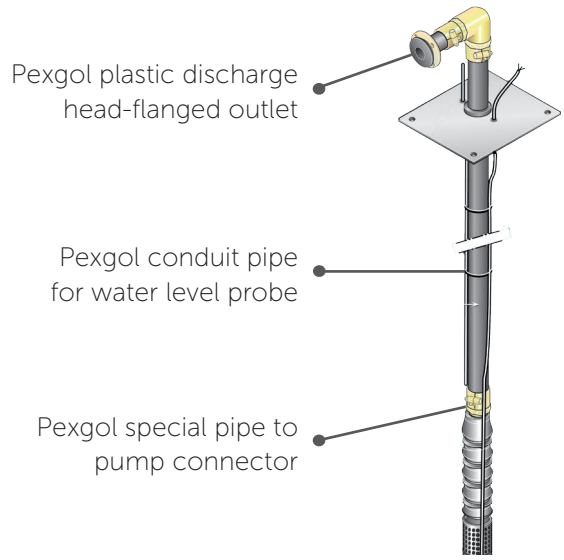
Pegxol pipes are a good solution for dewatering lines. They can be supplied in any required pressure class in long continuous lengths and can be dragged on the ground to the final location. Pexgol pipes are easily installed as they do not require anchoring along the line, since the pump is not suspended on the pipe and the weight of the pump and water column are not carried by the pipe. The end fittings should be protected by a pullout prevention technique such as fixpoints. Fittings along the line should be protected by a floating fixpoint device such as our fixpoint bridge (see pages 58 and 75).

For dewatering design considerations see "Inclined and Dewatering pipes" on pages 82 to 85.

Riser Mains for Boreholes

Pexgol pipes are used for pumping water in boreholes up to 300 meters dynamic water level.

The pipes are supplied with special borehole fittings.



Pexgol for Boreholes

Pexgol Solutions for Industrial Applications

Pexgol pipes with their excellent resistance to temperature extremes, chemicals and abrasion are ideal conduits for a wide range of industrial applications (see Chemical Resistance).

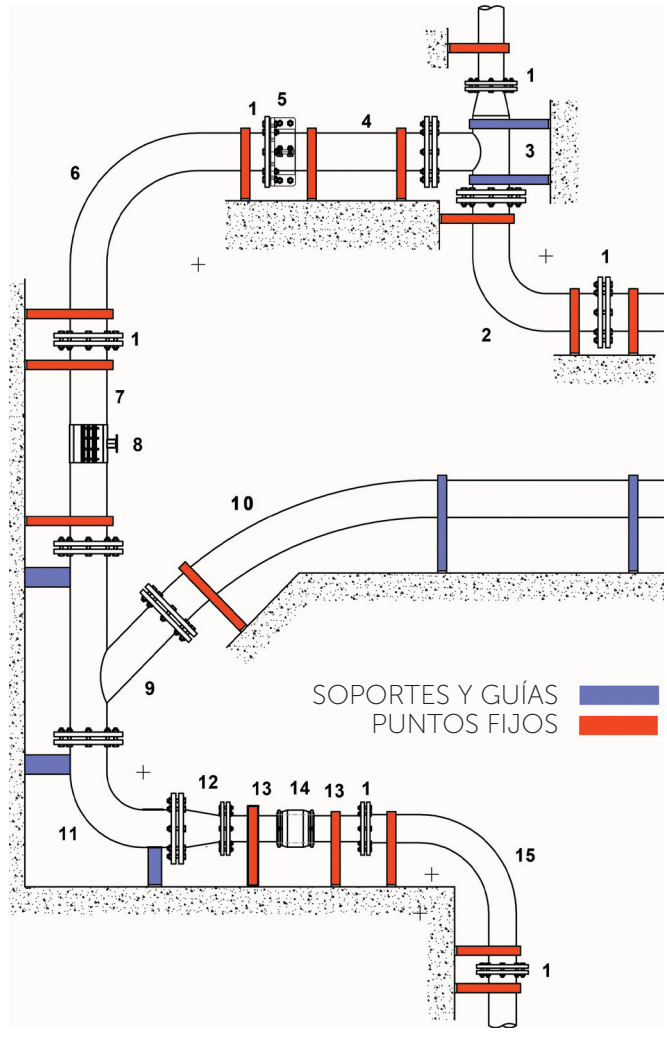
Pexgol pipes offer a successful, cost-effective solution where conventional pipes would be unsatisfactory for conveying slurries due to their poor abrasion resistance or because of vulnerability to chemicals.

Industrial applications of Pexgol pipes include transporting slurries; gypsum, sand, salt, phosphates, silts, potash, and various chemicals and industrial wastes.

A list of projects is available from our sales department or on our website, www.pexgol.com.

Industrial installation example

1. Flared end connector with a loose flange
2. 90-1.5D elbow with two flared ends and two loose flanges
3. Special Pex-lined fitting (equal Tee with a reducer)
4. Pipe spool with one flared end & a loose flange
5. Flanged coupling (used for "field welding" adjustment)
6. 90-3 D elbow with two flared ends and two loose flanges
7. Pipe spool with two flared ends & two loose flanges
8. Stainless steel branch-off saddle with 2" flanged outlet
9. Standard Pex-lined lateral Tee
10. Long spool with a natural bend & a flared end connector with a loose flange
11. Standard Pex-lined 1.5D elbow
12. Standard Pex-lined concentric reducer
13. Pipe spool with one flared end & a loose flange
14. Electrofusion coupling
15. 90-3 D elbow with two flared ends and two loose flanges



Infrastructure

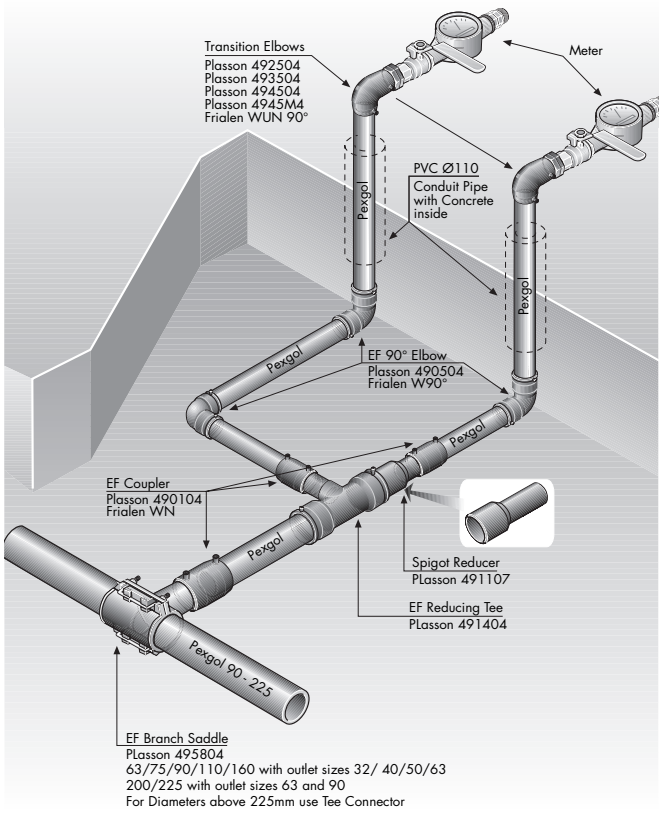
Pexgol Solutions for Infrastructure Applications

Infrastructure applications

Golan Plastic supplies complete pipe systems for municipal services and industrial use. Contractor training is provided by Golan.

Pexgol cold water supply Installation guide

Complete water supply systems and industrial pipelines can be created by combining Pexgol pipes and electrofusion fittings. The Installation guide and the electrofusion welding instructions can be downloaded from our site.



Pexgol lines for very low ambient temperatures

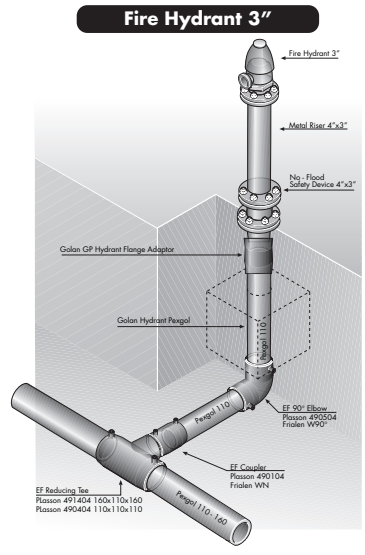
Specially designed pre-insulated Pexgol pipes can be installed above ground in very low ambient temperatures. Pexgol pre-insulated pipes are suitable for industrial and infrastructure applications.

Pexgol fire extinguishing lines

Golan Plastic provides a complete solution with electrofusion fittings and it's own special hydrant outlets. The pipes are UL approved.

Hydrant outlets

Catalog Number	Size
85511004	110 mm



Natural gas pipes

Pexgol natural gas pipelines can be designed based on ISO14531 Pex pipes for gaseous fluids or the Australian standard: AS 2492.

The main advantages of Pexgol pipes for this application:

- Maximum service temperature: 60°C
- Minimum service temperature: -50°C
- No sand bedding is needed

Pexgol natural gas pipes are usually connected by electrofusion fittings.

Air supply pressure lines

Pexgol pipes must be designed with the correct design temperature. Recommended safety factor is 1.5.
All fittings types can be used, including brass.

Pexgol Pre-insulated Pipes for District Heating & Industrial Applications

The following table describes some of the Pexgol pre-insulated pipes that Golan supplies. The inner pipe is made of Pex-a natural material. The pipe can be EVOH coated in red, yellow, or other colors. Alternatively, it is supplied as a black pipe (UV resistant). The inner pipe can be single, a double-pipe combination, or a four-pipe combination (up to 63 mm), according to requirements. The external corrugated layer is made of UV resistant black material. In cases of above-ground installation in extremely low ambient temperatures, the external corrugated layer can be made of Pex material.

The pipes are supplied with a heat–tracing element on special request.

Table No. 34.1: Pre-insulated pipes

Catalog Number	Description	Insulation WT (mm)	Outside diameter (mm)	Bending radius (m)
90000-M9032C	THERMO-Pexgol a natural coated yellow single pipe 32 x 2.9 - 100 m	26	90	0.25
90000-M12540C	THERMO-Pexgol a natural coated red single pipe 40 x 3.7 - 100 m	40	90	0.30
90000-M12540S-1	THERMO-Pexgol a black single pipe 40 x 5.5-100 m	40	90	0.30
90000-M12550C	THERMO-Pexgol a natural coated yellow single pipe 50 x 4.6 - 100 m	53	125	0.40
90000-M16050S	THERMO-Pexgol a black single pipe 50 x 6.9 100 m	53	125	0.40
90000-M16063C	THERMO-Pexgol a natural coated yellow single pipe 63 x 5.8 - 100 m	45	125	0.50
90000-M16075C	THERMO-Pexgol a natural coated yellow single pipe 75 x 6.8 - 100 m	42	160	0.75
90000-M16075S	THERMO-Pexgol a black single 75 x 10.3 - 100 m	42	160	0.75
90000-M20090C	THERMO-Pexgol a natural coated red single pipe 90 x 8.2 - 100 m	48	160	1.00
90000-M20090S	THERMO-Pexgol a natural coated natural single pipe 90 x 12.3 - 100 m	48	160	1.00
90000-M200110C	THERMO-Pexgol a natural coated red single pipe 110 x 10 - 100 m	42	200	1.20

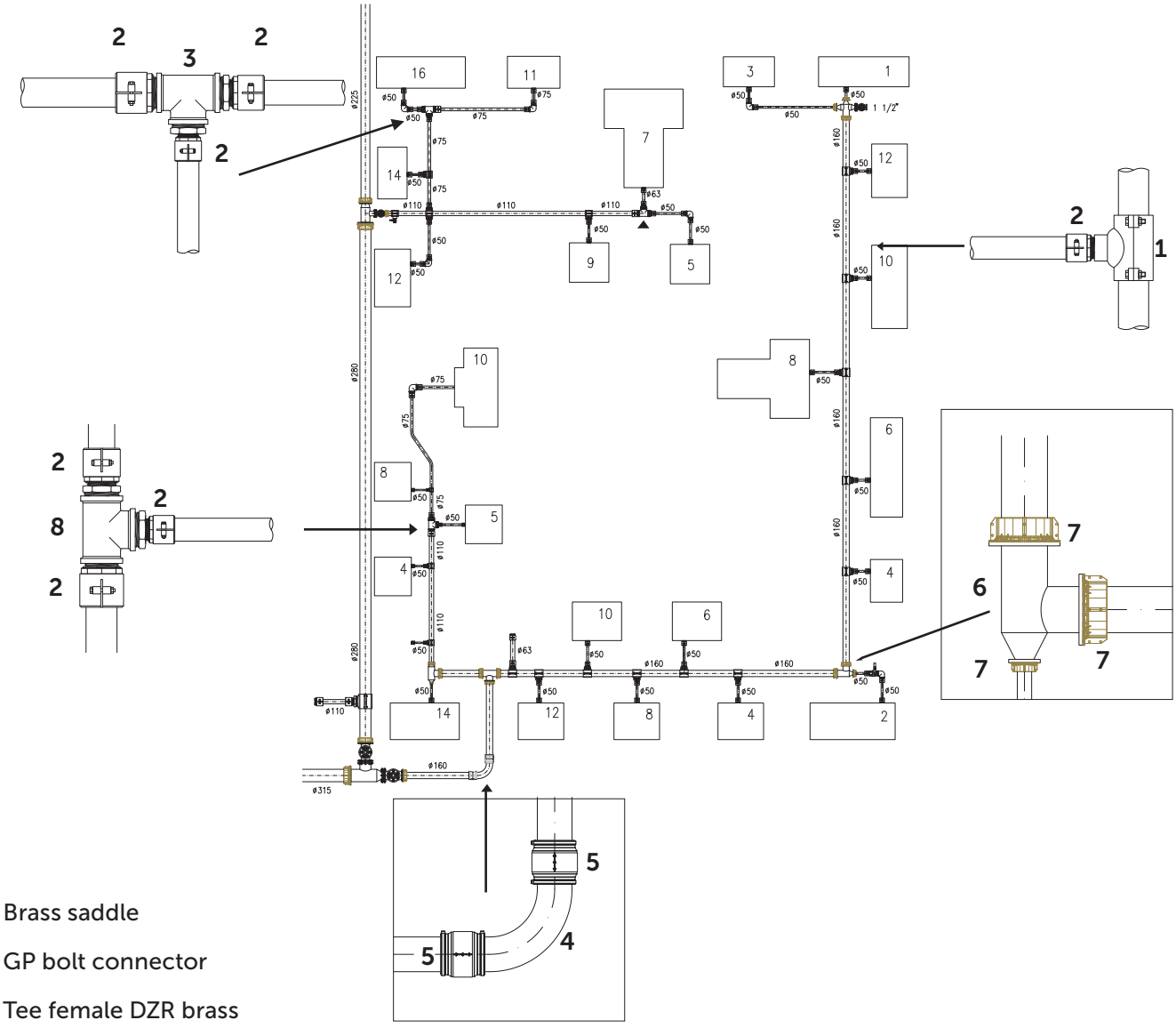
Note: Other sizes are available on request.

Residential

Pexgol Solutions for Hot and Cold Water

Golan supplies regular and pre-insulated pipe systems for district heating: transporting hot and cold water from central systems to buildings. The pre-insulated pipes maintain the heat even under extremely cold ground conditions and transport hot and cold water in long, continuous pipelines. Company engineers are available to assist in system design (pipes and fittings).

Infrastructure hot water installation example

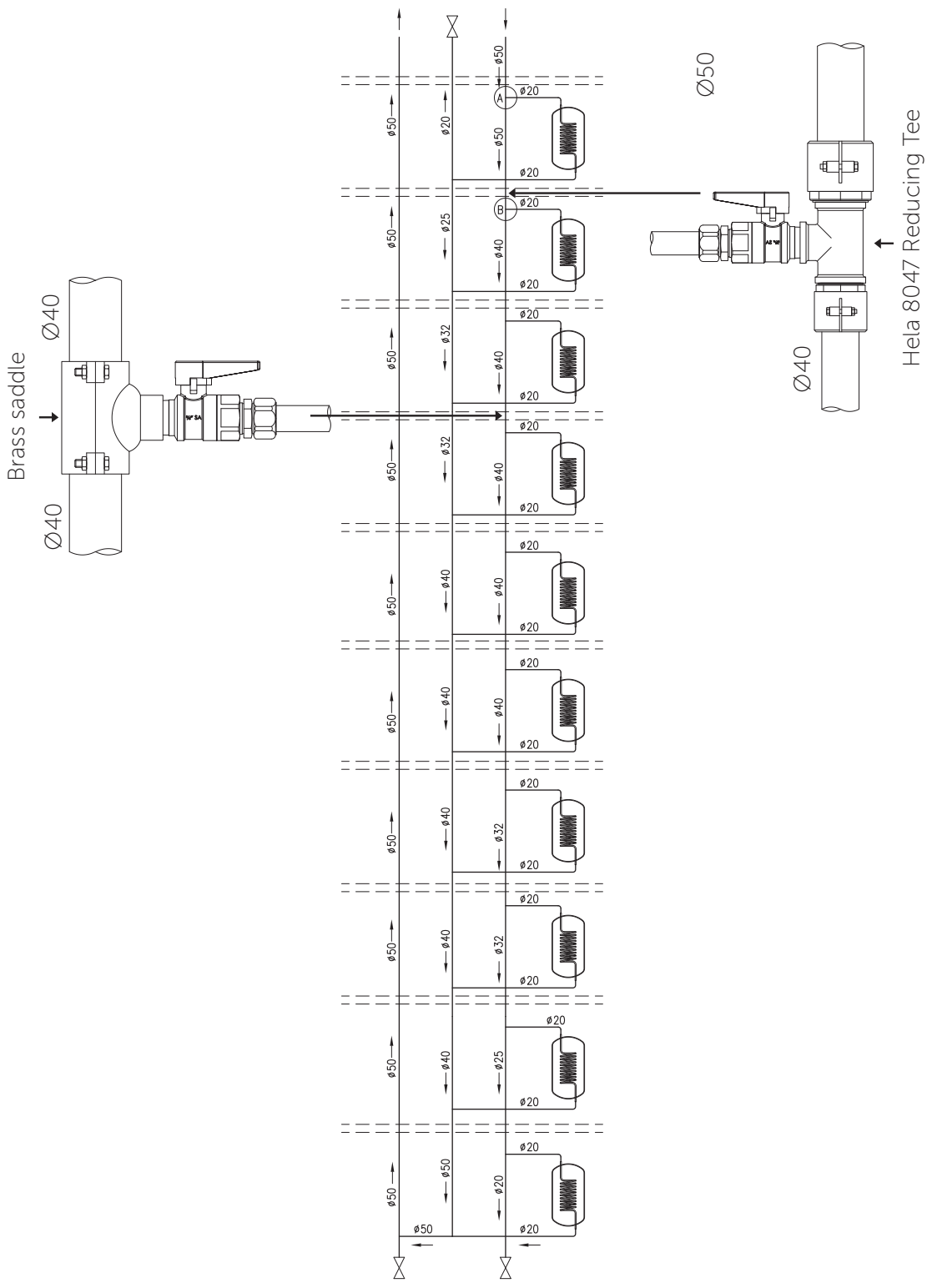


1. Brass saddle
2. GP bolt connector
3. Tee female DZR brass
4. 90 1.5 D Pexgol elbow
5. Reinforced electrofusion coupler
6. Special Pex-lined steel fitting
7. GP flanged coupling
8. Hela 8047 reducing tee

Hot Water Risers

Pexgol pipes are used for closed-loop and open-loop risers. The pipes are supplied in coils with all the required brass fittings including branch-off saddles, HELA 8047 reducing tees, and more.

Risers system installation example



TECHNICAL INFORMATION

Design Stresses of Pexgol Pipes

Pexgol pipes are produced according to the DIN Standards 16892/16893 and the Israeli standard 1519 Part 1. These standards show the working pressures of Pexgol pipes at various temperatures.

Pipes according to other standards (IPS according to ASTM 2788, for example), are available by special order.

The working pressures for Pexgol pipe are determined by the following equation:

$$P = \frac{2\sigma t}{D\text{-}t} \quad \text{or} \quad P = \frac{2\sigma}{SDR\text{-}1} \quad \text{or} \quad \frac{\sigma}{S}$$

P = Maximum working pressure (kg/cm^2)
σ = Long term strength at the design temperature (kg/cm^2) (10.1)
D = Outside diameter (mm)
t = Wall thickness (mm)
S = ISO 4065 series
SDR (Standard Dimensions Ratio) = $\frac{D}{t} = 2s + 1$

Allowable working pressures

The working pressures of Pexgol pipes are based on DIN 16893-2000 and the accumulated experience of Pexgol pipes in Infrastructure and Industry including pipes that were installed 30 years ago at the Dead Sea Hot Leach Crystallization Facility carrying hot sylvinite at 114°C and are still working today.
The design stresses σ in tables 14.1 and the working pressures in tables 15.1 & 15.2 were calculated with a safety factor of 1.25 According to DIN 16893-2000 these values are for water.
In case of chemicals and corrosive agents, the working pressures might have to be de-rated according to the data in the chemical resistance tables.

Table No. 14.1: Changes of design stress values σ with temperature:

Temperature (°C)	σ (kg/cm^2)
10°C	85
20°C	76
30°C	66.5
40°C	59
50°C	52.5
60°C	48
70°C	42.5
80°C	37.5
90°C	33.5
95°C	32
100°C	27.5
105°C	22.5
110°C	18.75

Table No 15.1: Allowable working pressures [bar] for conveying water in Pexgol pipes, with a safety factor C = 1.25

Temperature °C	Class 6	Class 8	Class 10	Class 12	Class 15	Class 19	Class 24	Class 30
	Pipe series (S)							
	12.5	10	7.6	6.3	5	4	3.2	2.5
	Standard dimension ratio (SDR)							
	26	21	16.2	13.6	11	9	7.4	6
10°	6.8	8.5	11.20	13.50	17.00	21.40	26.90	33.89
20°	6.0	7.6	9.90	11.90	15.00	18.90	23.80	29.99
30°	5.3	6.7	8.80	10.60	13.30	16.80	21.10	26.59
40°	4.7	5.9	7.80	9.40	11.80	14.90	18.70	23.56
50°	4.1	5.2	7.00	8.30	10.50	13.20	16.70	21.04
60°	3.8	4.8	6.30	7.50	9.50	11.90	15.00	18.90
70°	3.4	4.3	5.60	6.70	8.50	10.70	13.40	16.88
80°	3.0	3.8	5.10	6.10	7.50	9.50	12.00	15.12
90°	2.7	3.4	4.50	5.40	6.80	8.60	10.90	13.73
95°	2.6	3.2	4.10	4.90	6.40	8.10	10.30	12.98
100°	2.1	2.7	3.5	4.2	5.5	7.0	9.0	11.2
105°	1.8	2.2	2.8	3.4	4.5	5.5	7.0	8.7
110°	1.5	1.9	2.40	2.90	3.80	4.70	5.90	7.43

Table No 15.2: Allowable working pressures [psi] for conveying water in Pexgol pipes, with a design factor DF = 0.8; safety factor C = 1.25

Temperature		Class 6	Class 8	Class 10	Class 12	Class 15	Class 19	Class 24	Class 30
		Pipe series (S)							
°C	°F	12.5	10	7.6	6.3	5	4	3.2	2.5
		Dimension ratio (DR)							
		26	21	16.2	13.6	11	9	7.4	6
10	50	99	123	162	196	247	310	390	491
21	70	83	105	137	164	207	261	329	414
32	90	72	91	120	144	181	228	287	361
38	100	72	90	119	143	180	227	285	360
49	120	61	77	104	123	155	195	247	311
60	140	55	70	91	109	138	173	218	274
71	160	49	61	80	96	122	153	192	241
82	180	42	54	72	86	106	134	170	214
88	190	40	50	67	80	101	128	162	204
93	200	39	47	61	73	95	120	153	192
99	210	31	40	51	62	81	103	132	164
104.5	220	26	32	41	50	66	81	102	127
110	230	22	28	35	42	55	68	86	108

Pexgol Pipes - Dimensions & Pressure Rating

Pexgol pipes are transported in coils, coils with cores and straight sections. See "Transportation" section.

Pexgol Pipe class 6 (SDR 26 S12.5)
Working pressures: 6 bar at 20°C, Initial ring stiffness 5 KN/m²

Catalog Number	O.D. mm	Wall thickness mm	I.D. mm	Weight kg/m
PA-903.5 BLK	90.0	3.5	83.0	0.9
PA-1104.2 BLK	110.0	4.2	101.6	1.4
PA-1254.8 BLK	125.0	4.8	115.4	1.8
PA-1405.4 BLK	140.0	5.4	129.2	2.3
PA-1606.2 BLK	160.0	6.2	147.6	3.0
PA-1806.9 BLK	180.0	6.9	166.2	3.7
PA-2007.7 BLK	200.0	7.7	184.6	4.6
PA-2258.6 BLK	225.0	8.6	207.8	5.8
PA-2509.6 BLK	250.0	9.6	230.8	7.2
PA-28010.7 BLK *	280.0	10.7	258.6	9.0
PA-31512.1 BLK *	315.0	12.1	290.8	11.4
PA-35513.6 BLK	355.0	13.6	327.8	14.4
PA-40015.3 BLK *	400.0	15.3	369.4	18.3
PA-45017.2 BLK	450.0	17.2	415.6	23.2
PA-50019.1 BLK *	500.0	19.1	461.8	28.6
PA-56021.4 BLK **	560.0	21.4	517.2	35.8
PA-63024.1 BLK *	630.0	24.1	581.8	45.4
PA-71027.2 BLK **	710.0	27.2	655.6	57.8

Pexgol Pipe class 8 (SDR 21 S10)
Working pressures: 7.6 bar at 20°C, Initial ring stiffness 10 KN/m²

Catalog Number	O.D. mm	Wall thickness mm	I.D. mm	Weight kg/m
PA-753.6 BLK	75.0	3.6	67.8	0.8
PA-904.3 BLK	90.0	4.3	81.4	1.1
PA-1105.3 BLK	110.0	5.3	99.4	1.7
PA-1256.0 BLK	125.0	6.0	113.0	2.2
PA-1406.7 BLK	140.0	6.7	126.6	2.8
PA-1607.7 BLK	160.0	7.7	144.6	3.6
PA-1808.6 BLK	180.0	8.6	162.8	4.6
PA-2009.6 BLK	200.0	9.6	180.8	5.7
PA-22510.8 BLK	225.0	10.8	203.4	7.2
PA-25011.9 BLK	250.0	11.9	226.2	8.8
PA-28013.4 BLK *	280.0	13.4	253.2	11.1
PA-31515.0 BLK *	315.0	15.0	285.0	14.0
PA-35516.9 BLK	355.0	16.9	321.2	17.8
PA-40019.1 BLK *	400.0	19.1	361.8	22.6
PA-45021.5 BLK *	450.0	21.5	407.0	28.7
PA-50023.9 BLK	500.0	23.9	452.2	35.4
PA-56026.7 BLK **	560.0	26.7	506.6	44.3
PA-63030.0 BLK *	630.0	30.0	570.0	56.0
PA-71033.8 BLK **	710.0	33.8	642.4	71.1

* Minimum quantity required ** By special order

Pexgol Pipe class 10 (SDR 16.2 S7.6)

Working pressures: 10 bar at 20°C, 6 bar for natural gas | Initial ring stiffness 23 KN/m²

Catalog Number	O.D. mm	Wall thickness mm	I.D. mm	Weight kg/m
PA-633.9 BLK	63	3.9	55.2	0.72
PA-754.7 BLK	75	4.7	65.8	1.03
PA-905.6 BLK	90	5.6	78.8	1.47
PA-1106.8 BLK	110	6.8	96.4	2.18
PA-1257.7 BLK	125	7.7	109.6	2.81
PA-1408.7 BLK	140	8.7	122.6	3.55
PA-1609.9 BLK	160	9.9	140.2	4.62
PA-18011.1 BLK	180	11.1	157.8	5.83
PA-20012.4 BLK	200	12.4	175.2	7.23
PA-22513.9 BLK	225	13.9	197.2	9.12
PA-25015.5 BLK	250	15.5	219	11.30
PA-28017.3 BLK	280	17.3	245.4	14.12
PA-31519.5 BLK	315	19.5	276	17.91
PA-35521.9 BLK	355	21.9	311.2	22.67
PA-40024.7 BLK	400	24.7	350.6	28.81
PA-45027.8 BLK	450	27.8	394.4	36.48
PA-50030.9 BLK	500	30.9	438.2	45.05
PA-56034.6 BLK **	560	34.6	490.8	53.6
PA-63038.9 BLK	630	38.9	552.2	71.50
PA-71043.8 BLK **	710	43.8	622.4	90.75

Pexgol Pipe class 12 (SDR 13.6 S6.3)

Working pressures: 12 bar at 20°C, 7.5 bar for natural gas | Initial ring stiffness 40 KN/m²

Catalog Number	O.D. mm	Wall thickness mm	I.D. mm	Weight kg/m
PA-634.7 BLK	63	4.7	53.6	0.85
PA-755.6 BLK	75	5.6	63.8	1.21
PA-906.7 BLK	90	6.7	76.6	1.73
PA-1108.1 BLK	110	8.1	93.8	2.57
PA-1259.2 BLK	125	9.2	106.6	3.31
PA-14010.3 BLK	140	10.3	119.4	4.15
PA-16011.8 BLK	160	11.8	136.4	5.43
PA-18013.3 BLK	180	13.3	153.4	6.8
PA-20014.7 BLK	200	14.7	170.6	8.47
PA-22516.6 BLK	225	16.6	191.8	10.75
PA-25018.4 BLK	250	18.4	213.2	13.42
PA-28020.6 BLK	280	20.6	238.8	16.60
PA-31523.2 BLK	315	23.2	268.6	21.04
PA-35526.1 BLK	355	26.1	302.8	26.68
PA-40029.4 BLK	400	29.4	341.2	33.86
PA-45033.1 BLK	450	33.1	383.8	42.89
PA-50036.7 BLK	500	36.7	426.4	52.85
PA-56041.2 BLK **	560	41.2	477.6	66.50
PA-63046.6 BLK *	630	46.6	537.4	84.60
PA-71052.2 BLK **	710	52.2	605.6	106.8

* Minimum quantity required ** By special order

Pexgol Pipe class 15 (SDR 11 S5)

Working pressures: 15 bar at 20°C, 9 bar for natural gas | Initial ring stiffness 80 KN/m²

Catalog Number	O.D. mm	Wall thickness mm	I.D. mm	Weight kg/m
PA-162 BLK	16	2.0	13	0.09
PA-202 BLK	20	2.0	16.2	0.11
PA-252.3 BLK	25	2.3	20.4	0.16
PA-322.9 BLK	32	2.9	26.2	0.26
PA-403.7 BLK	40	3.7	32.6	0.42
PA-504.6 BLK	50	4.6	40.8	0.65
PA-635.8 BLK	63	5.8	51.4	1.03
PA-756.8 BLK	75	6.8	61.4	1.44
PA-908.2 BLK	90	8.2	73.6	2.09
PA-11010 BLK	110	10.0	90	3.11
PA-12511.4 BLK	125	11.4	102.2	4.03
PA-14012.7 BLK	140	12.7	114.6	5.02
PA-16014.6 BLK	160	14.6	130.8	6.60
PA-18016.4 BLK	180	16.4	147.2	8.34
PA-20018.1 BLK	200	18.1	163.8	10.23
PA-22520.4 BLK	225	20.4	184.2	12.97
PA-25022.7 BLK	250	22.7	204.6	16.05
PA-28025.4 BLK	280	25.4	229.2	20.10
PA-31528.6 BLK	315	28.6	257.8	25.46
PA-35532.2 BLK	355	32.2	290.6	32.30
PA-40036.3 BLK *	400	36.3	327.4	41.5
PA-45040.9 BLK *	450	40.9	368.2	52
PA-50045.4 BLK	500	45.4	409.2	65.00
PA-56050.9 BLK **	560	50.9	458.4	82.00
PA-63057.3 BLK	630	57.3	515.6	103.00
PA-71064.5 BLK **	710	64.5	581	129.50

Pexgol Pipe class 19 (SDR 9 S4)

Working pressures: 19 bar at 20°C, 11.5 bar for natural gas | Initial ring stiffness 150 KN/m²

Catalog Number	O.D. mm	Wall thickness mm	I.D. mm	Weight kg/m
PA-637.1 BLK	63	7.1	48.8	1.25
PA-758.4 BLK	75	8.4	58.2	1.75
PA-9010.1 BLK	90	10.1	69.8	2.50
PA-11012.3 BLK	110	12.3	85.4	3.75
PA-12514.1 BLK	125	14.1	97	4.90
PA-14015.7 BLK	140	15.7	108.6	6.10
PA-16017.9 BLK	160	17.9	124.2	7.90
PA-18020.1 BLK	180	20.1	139.8	9.9
PA-20022.4 BLK	200	22.4	155.2	12.40
PA-22525.0 BLK	225	25.2	175	15.55
PA-25027.9 BLK	250	27.9	194.2	19.30
PA-28031.3BLK *	280	31.3	217.4	24.20
PA-31535.2 BLK	315	35.2	244.6	30.65
PA-35539.7 BLK	355	39.7	275.6	39.00
PA-40044.7 BLK *	400	44.7	310.6	49.40
PA-45050.3 BLK	450	50.3	349.4	62.50
PA-50055.8 BLK *	500	55.8	388.4	77.00
PA-56062.5 BLK **	560	62.5	435	96.70
PA-63070.0 BLK *	630	70.0	489.4	122.00
PA-71078.9 BLK **	710	78.9	552.2	154.9

* Minimum quantity required ** By special order Smaller sizes available on request

Pexgol Pipe class 24 (SDR 7.4 S3.2)

Working pressures: 24 bar at 20°C, 15 bar for natural gas | Initial ring stiffness 300 KN/m²

Catalog Number	O.D. mm	Wall thickness mm	I.D. mm	Weight kg/m
PA-122 N	12	2.0	8	0.06
PA-162.2 BLK	16	2.2	11.6	0.09
PA-202.8 BLK	20	2.8	14.4	0.15
PA-253.5 BLK	25	3.5	18	0.23
PA-324.4 BLK	32	4.4	23.2	0.38
PA-405.5 BLK	40	5.5	29	0.59
PA-506.9 BLK	50	6.9	38.2	0.92
PA-638.6 BLK	63	8.6	45.8	1.45
PA-7510.3 BLK	75	10.3	54.4	2.07
PA-9012.3 BLK	90	12.3	65.4	2.97
PA-11015.1 BLK	110	15.1	79.8	4.45
PA-12517.1 BLK	125	17.1	90.8	5.73
PA-14019.2 BLK	140	19.2	101.6	7.21
PA-16021.9 BLK	160	21.9	116.2	9.40
PA-18024.6 BLK	180	24.6	130.8	11.88
PA-20027.4 BLK	200	27.3	145.2	14.65
PA-22530.7 BLK	225	30.8	163.4	18.59
PA-25034.2BLK	250	34.2	181.6	23.00
PA-28038.3 BLK	280	38.3	203.4	29.00
PA-31543.1 BLK *	315	43.1	228.8	37.00
PA-35548.5 BLK	355	48.5	258	47.00
PA-40054.7 BLK *	400	54.7	290.6	59.00
PA-45061.5 BLK *	450	61.5	327	75.00
PA-50068.5 BLK *	500	68.5	363	93.00
PA-56076.7 BLK **	560	76.7	406.5	117.00
PA-63086.3 BLK *	630	86.3	457	148.00
PA-71097.3BLK **	710	97.3	515	185.4

Pexgol Pipe class 30 (SDR 6 S2.5)

Working pressures: 30 bar at 20°C, 12.5 bar at 95°C, 19 bar for natural gas | Initial ring stiffness 640 KN/m²

Catalog Number	O.D. mm	Wall thickness mm	I.D. mm	Weight kg/m
PA-6310.5BLK	63	10.5	42	1.7
PA-7512.5 BLK	75	12.5	50	2.4
PA-9015 BLK	90	15	60	3.5
PA-11018.3 BLK	110	18.3	73	5.2
PA-12520.8 BLK	125	20.8	83.4	6.8
PA-14023.3 BLK	140	23.3	93	8.5
PA-16026.6 BLK	160	26.6	106.8	11
PA-18029.9 BLK	180	29.9	120	14
PA-20033.2 BLK	200	33.2	133.5	17.2
PA-22537.4 BLK	225	37.4	150	22
PA-25041.5 BLK	250	41.5	167	27
PA-28046.5 BLK *	280	46.5	187	34
PA-31552.3 BLK *	315	52.3	210	43
PA-35559 BLK *	355	59	237	55
PA-40066.7 BLK *	400	66.7	266.5	70
PA-45075 BLK *	450	75	300	89
PA-50083.4 BLK *	500	83.5	333	108.5
PA-56093.4BLK **	560	93.5	373	135.5
PA-630105 BLK *	630	105	420	171.5
PA-710118.3 BLK **	710	118.3	473	217.7

* Minimum quantity required ** By special order Smaller sizes available on request

Abrasion Resistance

Transporting solid materials by fluids (in the form of a slurry) is common in industry, mining, and in many piping systems. In most cases, the flow is kept turbulent to avoid sedimentation.

Abrasion is the result of the inner surface of the pipe wall being removed or degraded by flowing media in the pipe. The rate of abrasion for various slurries is determined by many factors such as:

- Flow rate
- Density of the particles
- Size distribution of the particles
- Hardness and angularity of the particles
- Temperature viscosity of the liquid
- Incorrect installation

Abrasion resistance is one of the most important advantages of Pexgol pipes. Pexgol's excellent abrasion resistance is result of the unique structure of crosslinked polyethylene, making the pipe material especially tough and resilient, and generally able to resist abrasion better than metal pipes.

The ability of the pipe material to absorb the kinetic energy of the hard particles inside the slurry and its resistance to deformation make Pexgol pipes extra-ordinary abrasion resistant conduits.

Unavoidable scratches in Pexgol pipes cause no damage.

Results of tests performed on pipes after being subjected to scratches as deep as 20% of the pipe wall show that no damage is caused to the pipe during intensive pressure tests. The crosslinked molecular structure accounts for the insensitivity of Pexgol pipes to scratches as well as their resistance to slow-crack growth. The restraining action of the adjacent molecular chains of the crosslinked network absorb the energy of the "tearing" forces.

Pexgol pipes abrasion resistance was tested and approved in laboratory tests as well as in on-site conditions.

In South African gold mines, Pexgol pipes were installed in backfill lines, working at a very high line velocity, transferring highly abrasive material for many years without failure.

In Israel's Dead Sea Works, 450 mm Pexgol pipes have been installed since 1985, instead of steel pipes, which had to be replaced every year. These pipes are connected to dredgers which "harvest" the salt particles. Non-crosslinked PE pipes , which were installed in these lines, failed after a few months.

Pexgol pipes have been at work since 1985, and it has not yet been necessary to replace them.

Technical test reports concerning abrasion resistance of Pexgol pipes are available on request.

Abrasion allowance:

Pexgol pipes have an "abrasion allowance" of 20% of the nominal wall thickness of the pipe. This means that the pipe can withstand the design working pressure until the remaining wall thickness of the pipe is reduced to 80% of the nominal value. The real lifetime of the pipe depends on the actual abrasion rate in the line. The 80% rule applies for all working pressures and all temperatures in all classes.

Flow Chart for Full Flow Conditions

Chart 21.1: Class 6 (SDR 26)

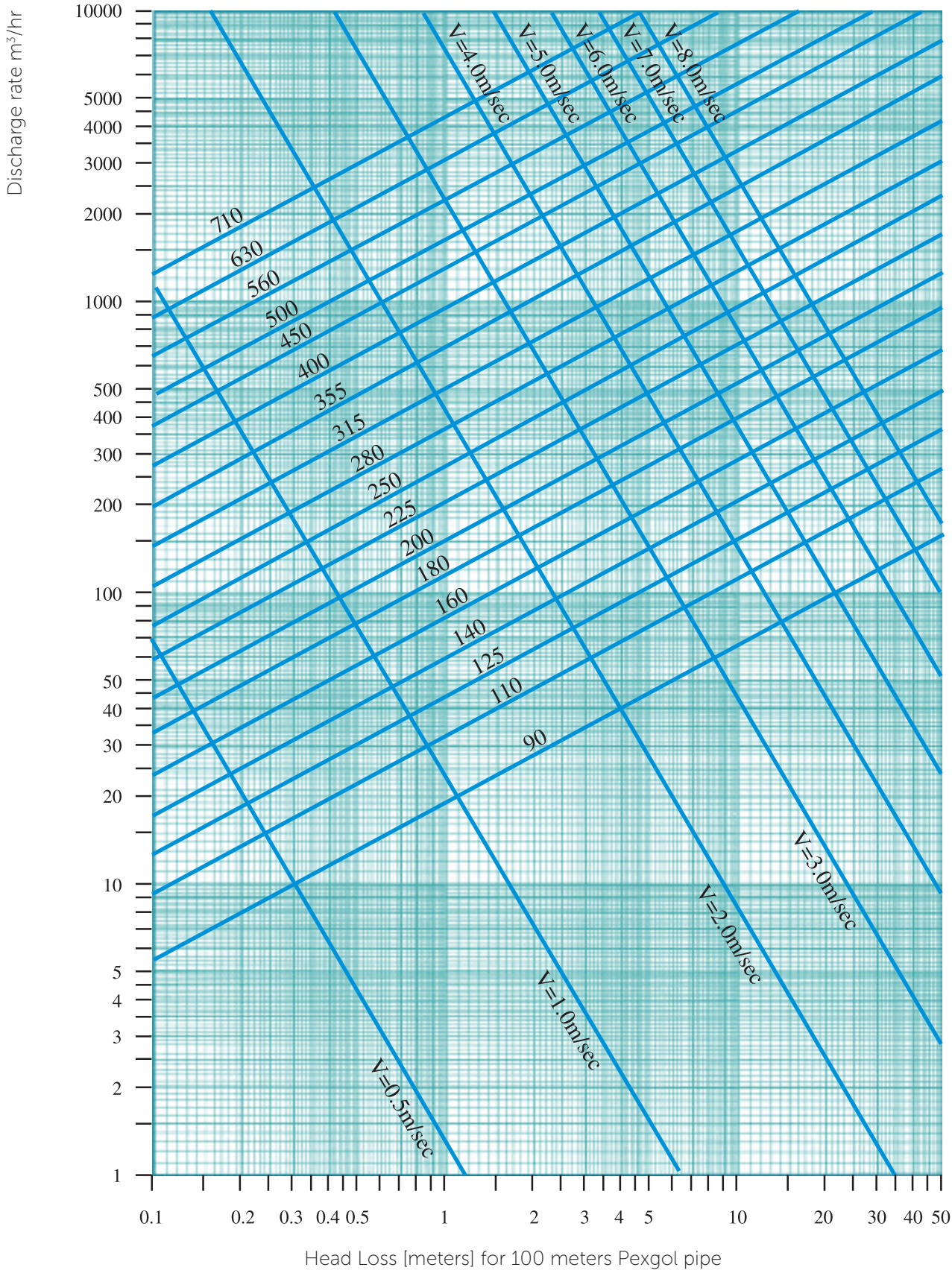


Chart 22.1: Class 8 (SDR 21)

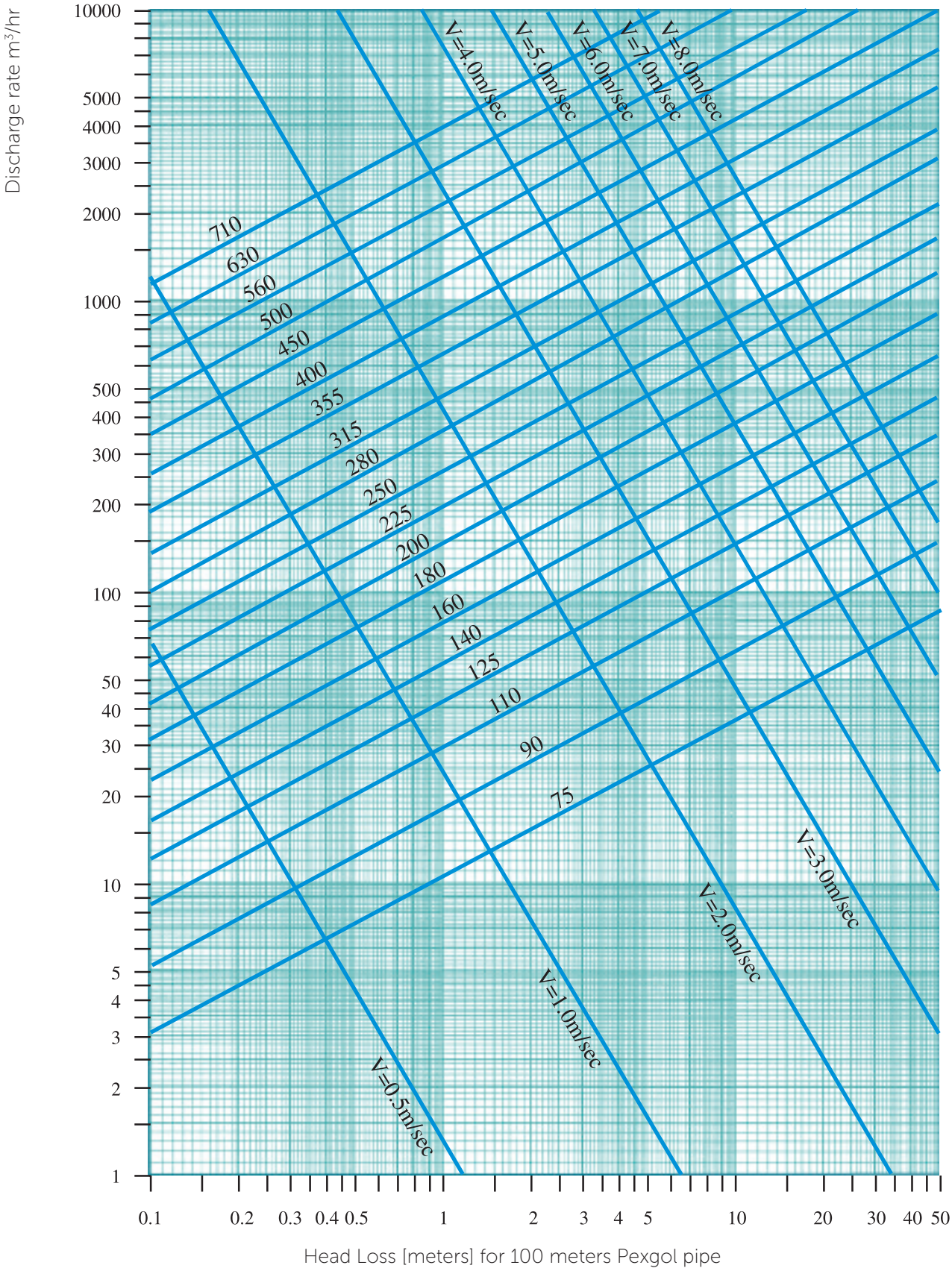


Chart 23.1: Class 10 (SDR 16.2)

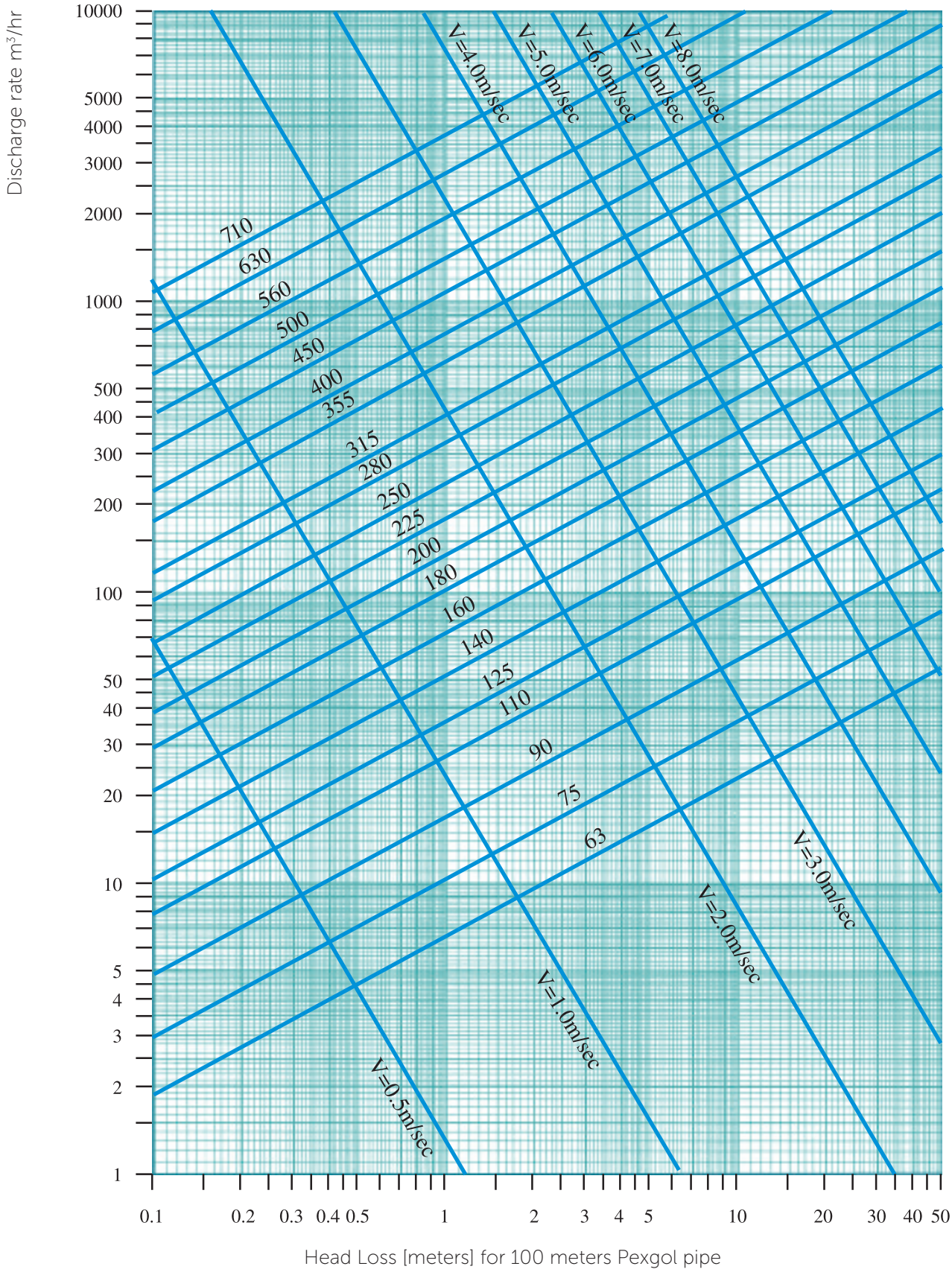


Chart 24.1: Class 12 (SDR 13.6)

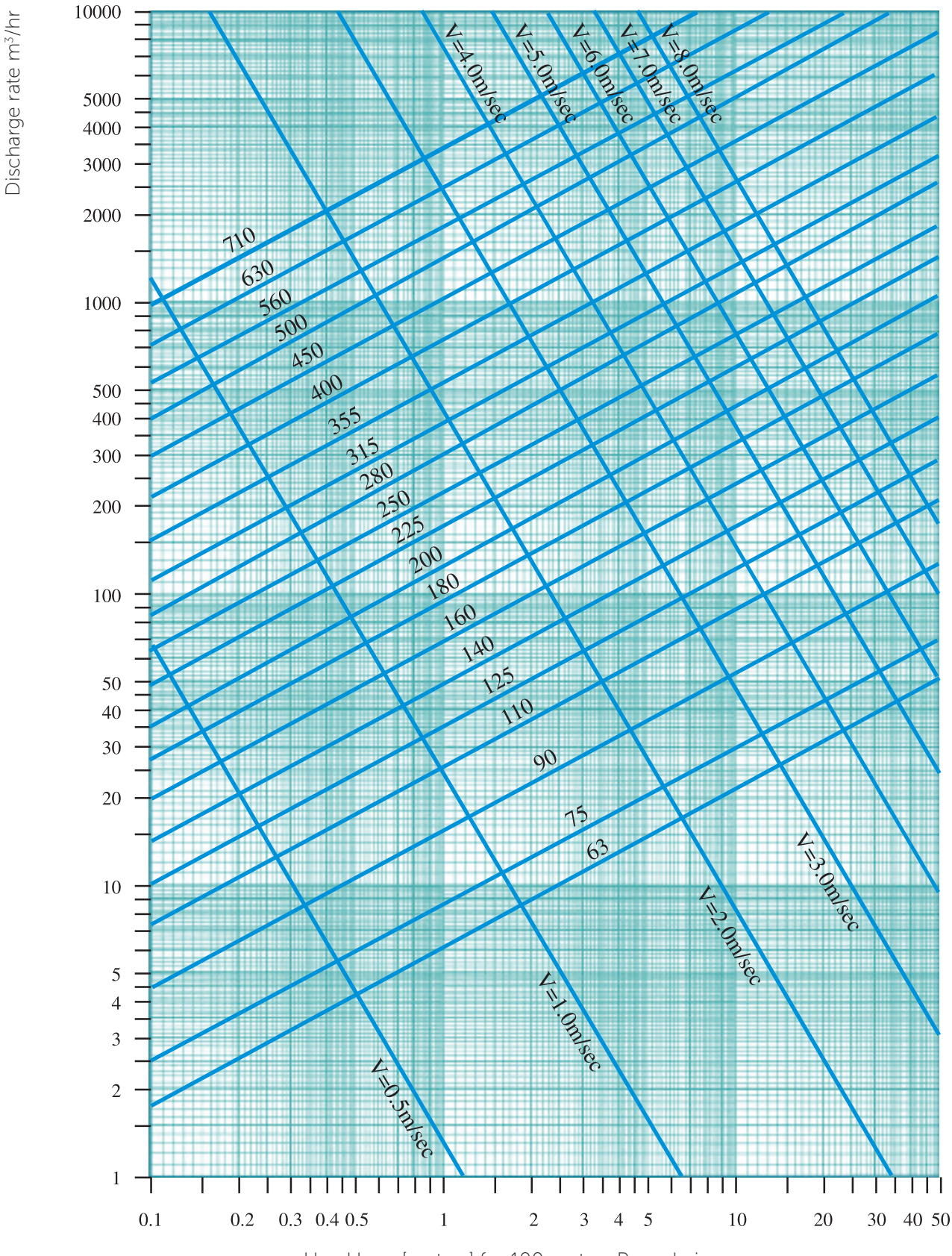


Chart 25.1: Class 15 (SDR 11)

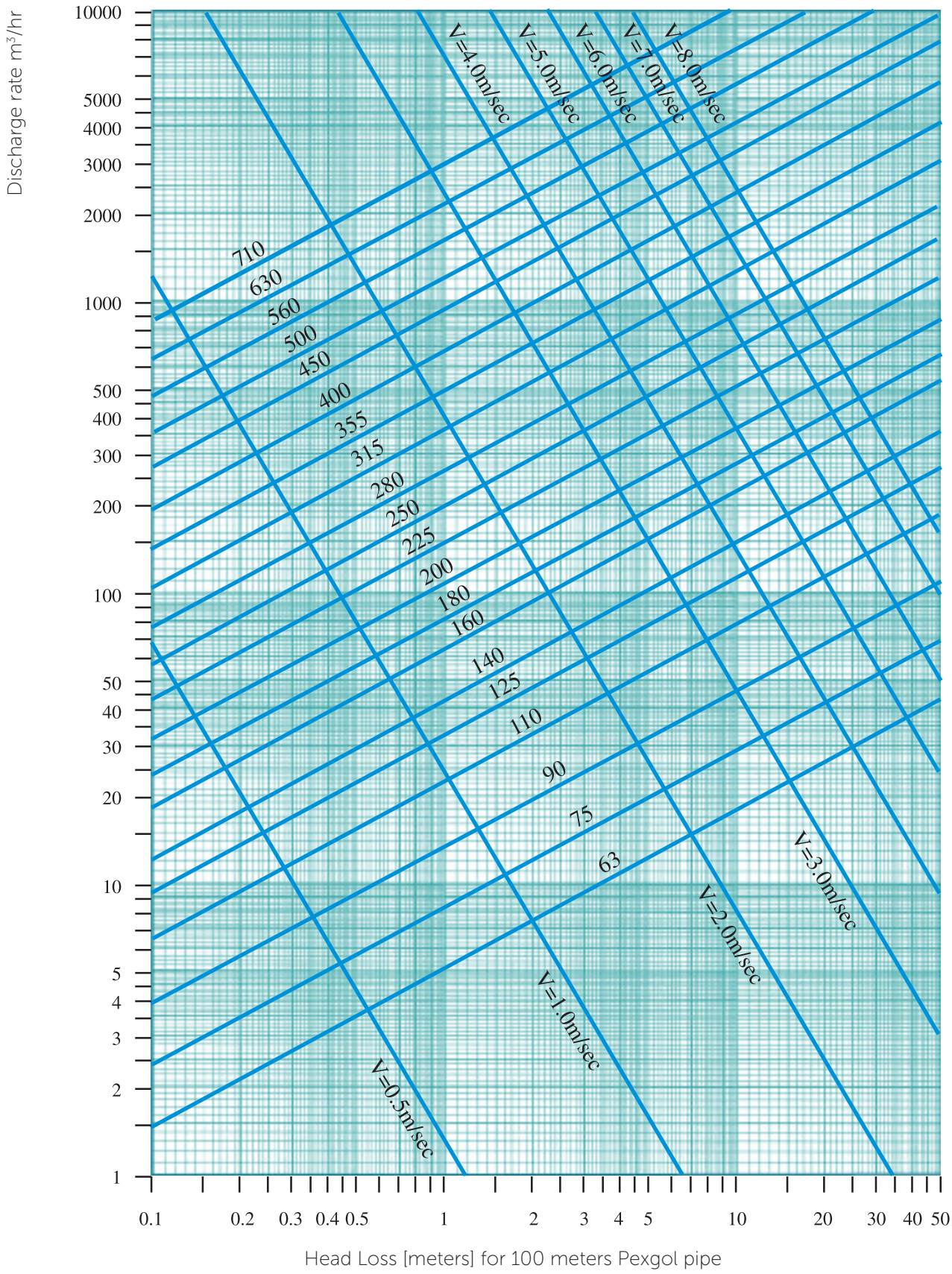


Chart 26.1: Class 19 (SDR 9)

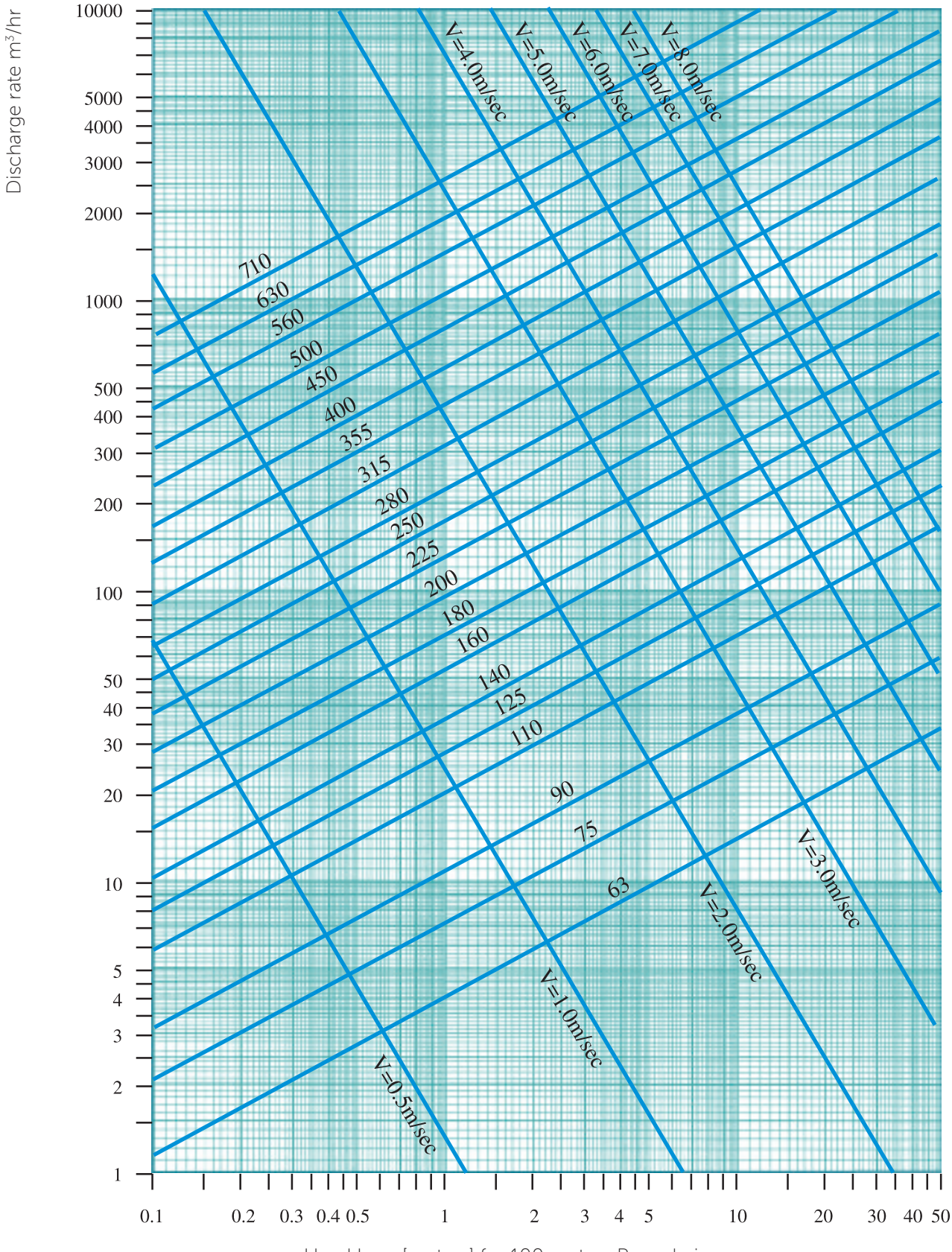


Chart 27.1: Class 24 (SDR 7.4)

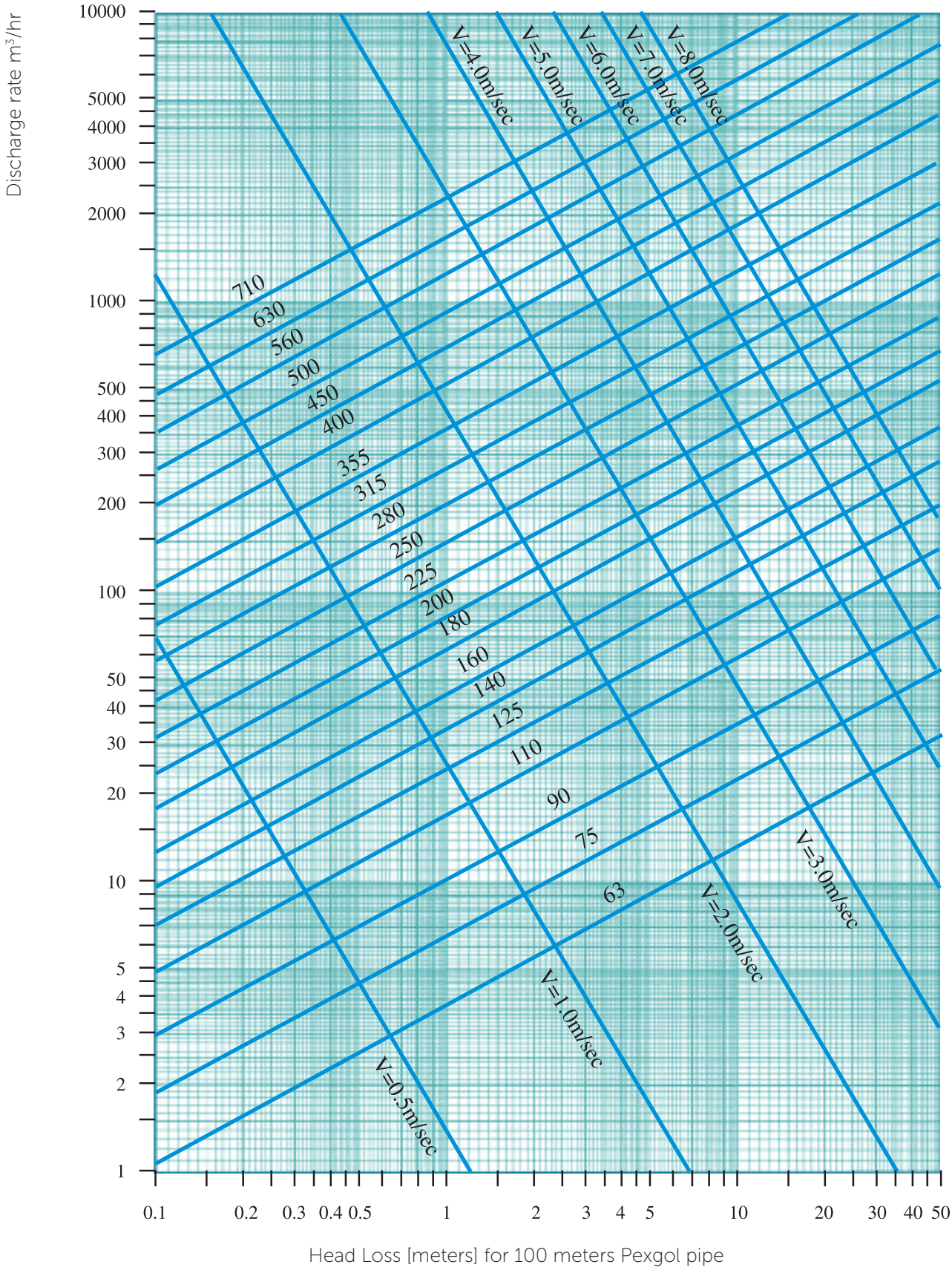


Chart 28.1: Class 30 (SDR 6)

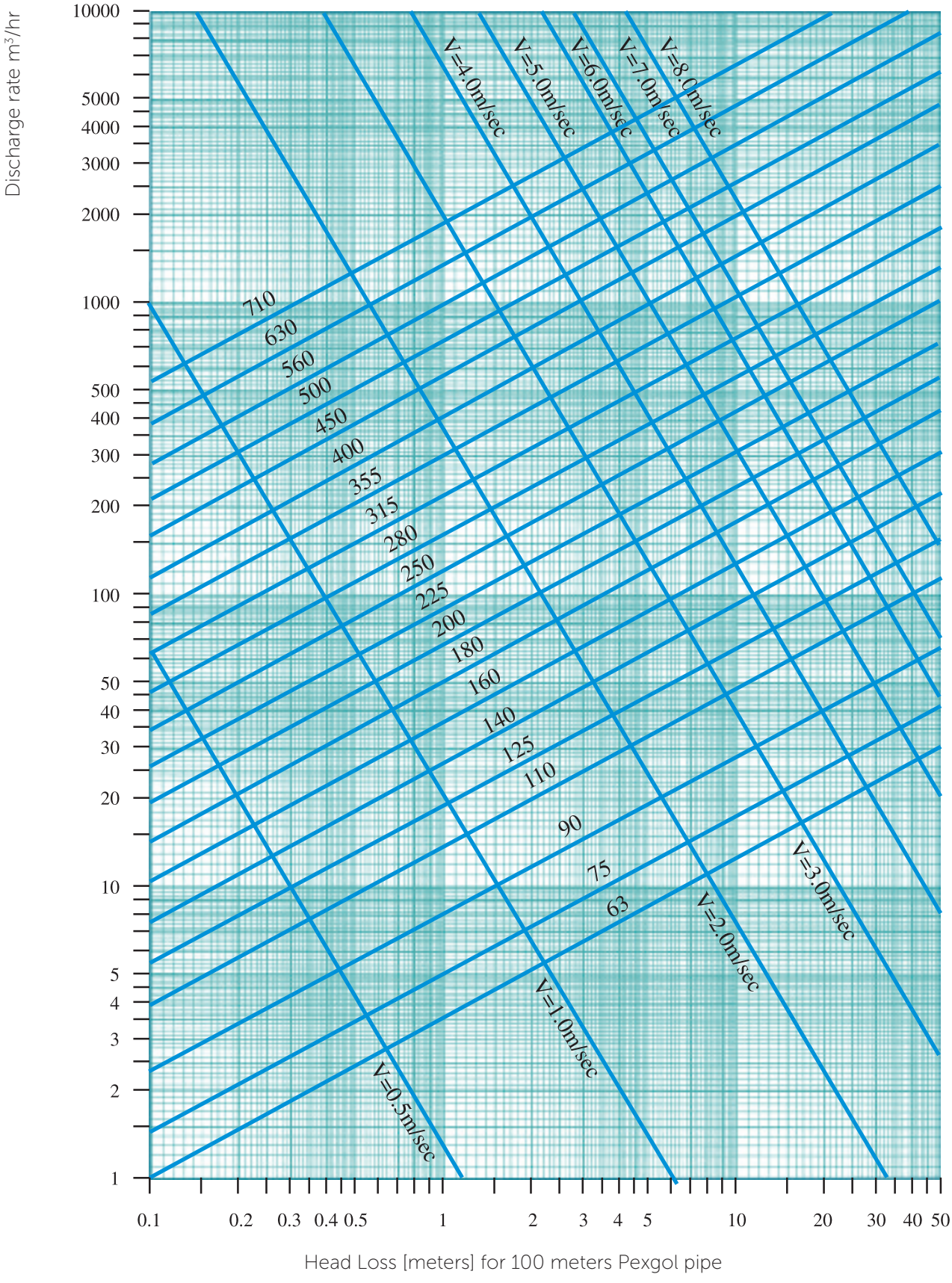
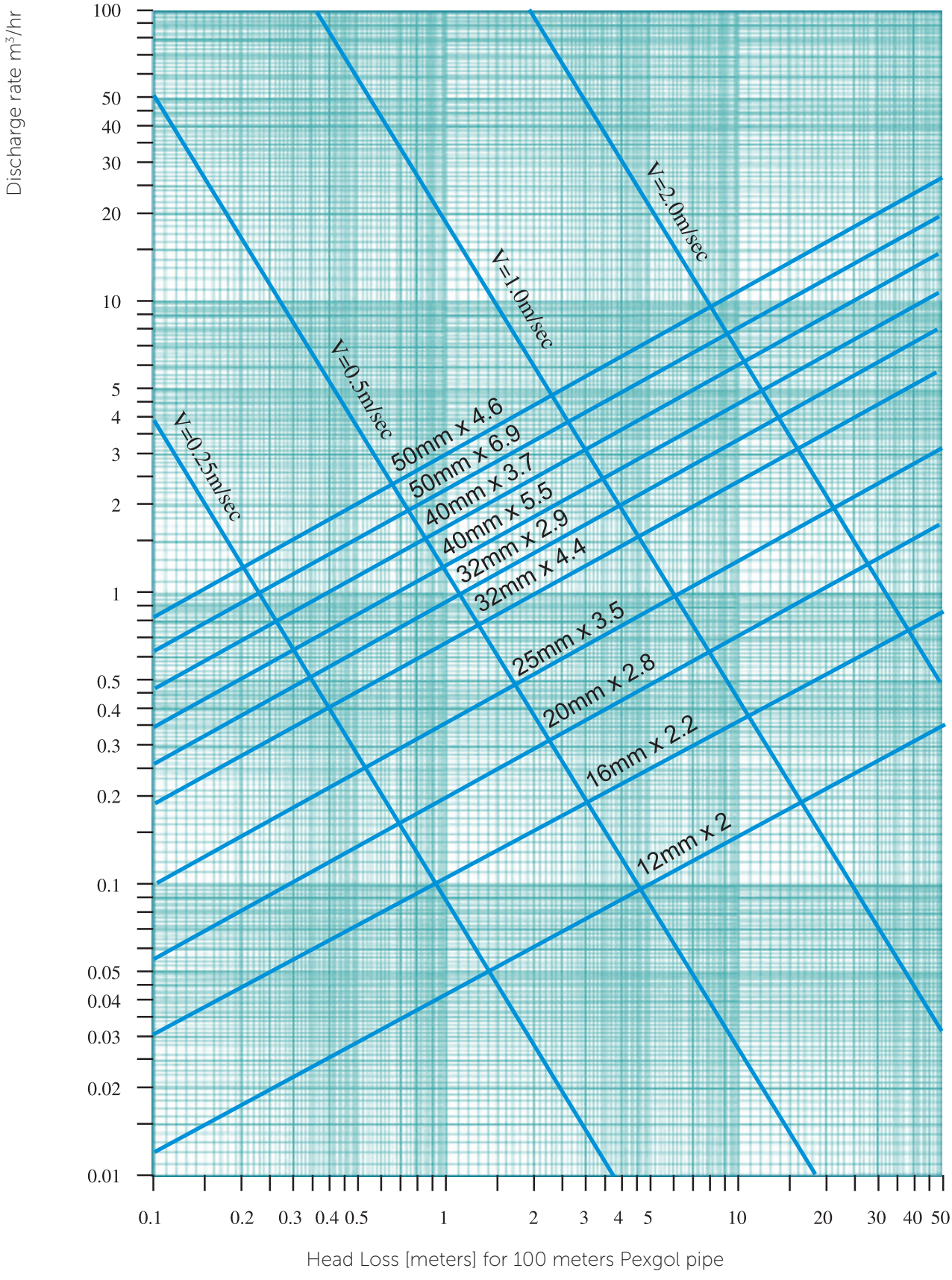


Chart 29.1: Class 24 (SDR 7.4) and Class 15 (SDR 11)



Coefficients of Friction

Absolute surface roughness

0.0005 mm – 0.0007 mm

The values of Hazen-Williams coefficient

The values of the head losses in the charts were calculated using the Hazen-Williams formula with Hazen-Williams coefficient C = 155

Manning coefficient:

n = 0.005 - 0.007

Reduction factors for higher temperatures

The values of the head losses J in the charts are correct for 20°C. At higher temperatures the head losses are lower. For different temperatures, multiply the value of J by the following reduction factors:

10°C – 1.03
20°C – 1.00
30°C – 0.98
40°C – 0.93
50°C – 0.91
60°C – 0.88
70°C – 0.85
80°C – 0.83
90°C – 0.81

Calculating Pexgol pipes for boreholes

Pexgol pipes can be used as riser pipes for boreholes.

For energy-saving reasons, we recommend choosing a Pexgol pipe with head losses that do not exceed J = 5%, and preferably lower. However, please note that designing these pipes is complicated, due to the complex three-dimensional stress regime in these applications.

Golan's Technical Department will calculate the pipe design for you after receiving the completed borehole questionnaire (page 112).

Water Hammer

Water hammer is a series of pressure pulsations, of varying magnitude, above and below the normal pressure of the liquid in the pipe. The amplitude and periodicity depends on the extinguished velocity of the liquid, as well as the size, length and material of the pipeline. Shock results from these pulsations when any liquid, flowing with a certain velocity, is stopped in a short period of time. The pressure increase, when flow is stopped, is independent of the working pressure of the system. The surge pressure in any pipeline occurs when the total discharge is stopped in a period of time, equal to or less than the time required for the induced pressure wave to travel from the point of valve closure to the inlet end of the line and return. This time is:

$$t = \frac{2L}{a}$$

Where:

t = Time for pressure wave to travel the length of the pipe and return (sec.)

L = Length of pipe line (m)

a = Velocity of pressure wave (m/sec)

When the liquid in the pipe is water, the velocity of the pressure wave "a" is determined by the following equation:

$$a = \frac{1440}{\sqrt{1 + 2{,}070 \times \frac{d}{Ee}}}$$

Where:

a = Velocity of pressure wave (m/sec).

Kbulk = Bulk modulus of fluid (for example: 2,070 MPa for water at 20°C)

d = Inside diameter of pipe (mm)

e = Thickness of pipe wall (mm)

E = Instantaneous (short term) modulus of elasticity (MPa) for the pipe material (obtained from Tensile tests)

The surge pressure caused by water hammer is determined by the following equation:

$$P = 0.1 \times \rho \times a \times \frac{V}{g}$$

Where:

P = Surge pressure (bar)

ρ = Fluid density (for example: 1 gr/cm^3 for water at 20°C)

a = Velocity of pressure wave (m/sec)

V = Velocity of water stopped = line velocity (m/sec)

g = Acceleration caused by gravity (9.81 m/sec^2)

Pressure caused by water hammer can be minimized by increasing closure times of valves to a value greater than 2L/a. For example, when the closure time is 10 times 2L/a, the pressure surge can be 10%–20% of the surge caused by closure in a time equal to or less than 2L/a.

The value of the short-term modulus of elasticity E for Pexgol pipes is much lower than the value of E for steel pipes, concrete pipes or HDPE pipes. Since the velocity a of the pressure wave is related to the short-term modulus of elasticity E, the velocity a decreases when the value of E is lower.

In order to determine the resistance of the pipe material to the water hammer phenomenon, the total occurring pressure (surge pressure + working pressure) should be calculated and compared to the maximum allowable total occurring pressure in each pipe material. The resistance of HDPE pipes depends on the nature of the water hammer. In case of recurring water hammer shock waves, HDPE pipes are limited to a maximum total occasional pressure of only 1.5 times the working pressure. Because of the flexibility and resilience of Pexgol pipes, the surge pressures caused by the water hammer are much reduced. Furthermore, because of the cross-linked structure, the Pexgol pipe can withstand a total transient pressure (recurring or occasional surge pressure + working pressure) at least 2.5 times the design pressure in the relevant temperature.

Comparison culculations for other pipe materials:

The following examples show the pressure surges caused by the water hammer for various pipes, which are considered for the same application. In all following examples:

- The line is horizontal; line length is 2,200 m.
- The flow rate is 150 cubic meters per hour, head losses are 5%.
- The line is designed for a pump pressure of 11 bar.

The pipes calculated for this application are as follows:

1. Steel pipe 6" schedule 40, buried pipeline or above-ground installation.
2. PE 3408 6" DR 11, buried pipeline.
3. PEX 160 mm SDR 13.6 Class 12, buried pipeline.
4. PE 4710 6" DR 13.5, buried pipeline.
5. PEX 180 mm SDR 11 Class 15, Above ground installation, ambient temperature 20°C, design temperature is 40°C.
6. PEX 180 mm SDR 9 Class 19, Above ground installation, ambient temperature 40°C, design temperature is 60°C.

1. Steel pipe 6" sch. 40

Buried pipeline or above ground installation.

OD 6.625" (168.3 mm), w.t. 7.11 mm, d = 154 mm , V = 2.2 m/sec, E = 210,000 MPa

$$a = \frac{1440}{\sqrt{1 + 2{,}070 \times \frac{154}{7.11 \times 2.1 \times 10^5}}}$$

a = 1307 m/sec t = 2L/a = 2 x 2200/1307 = 3 sec

$$P = 0.1 \times 1307 \times \frac{2.2}{9.81} = 29 \text{ bar}$$

Surge pressure result: 29 bar.

Total transient pressure: surge pressure (29 bar) + pump pressure in the line (11 bar) is 40 bar.

2. PE 3408 6" DR 11

Buried pipeline:

Maximum allowable working pressure of the pipe is 11 bar (160 psi) at 20°C.

Maximum allowable total transient pressure: 16.5 bar (240 psi).

OD 6.625" (168.3 mm), w.t. 0.602" (15.3 mm), d = 137.7 mm, V = 2.8 m/sec

E = 827 MPa at 20°C

$$a = \frac{1440}{\sqrt{1 + 2070 \times \frac{137.7}{15.3 \times 827}}}$$

a = 297 m/sec t = 2 L/a = 2 x 2200/297 = 15 sec

$$P = 0.1 \times 297 \times \frac{2.8}{9.81} = 8.5 \text{ bar}$$

Surge pressure result: 8.5 bar, total transient pressure: 11 + 8.5 = 19.5 bar.

The total transient pressure exceeds the maximum allowable total transient pressure for this pipe material.

3. Pexgol 160 mm SDR 13.6 Class 12

Buried pipeline:

Maximum allowable working pressure of the pipe is 12 bar at 20°C.

Max. allowable total transient pressure: 30 bar.

OD 160 mm, w.t. 11.8 mm, d = 136.4 mm, V = 3m/sec

E = 465 MPa at 20°C

$$a = \frac{1440}{\sqrt{1 + 2070 \times \frac{136.4}{11.8 \times 465}}}$$

a = 199 m/sec t = 2L/a = 2 x 2200/199 = 22sec

$$P = 0.1 \times 199 \times \frac{3}{9.81} = 6 \text{ bar}$$

Surge pressure result: surge pressure: 6 bar, total transient pressure: 12+6=18 bar

The total transient pressure is much lower than the maximum allowable total transient pressure (30 bar).

4. PE 4710 6" DR 13.6

Buried pipeline:

Maximum allowable working pressure of the pipe is 11 bar (160 psi) at 20°C.

Allowable total pressure during recurring surge is 16.5 bar.

OD 6.625" (168.3 mm), w.t. 0.491" (12.5 mm), d = 143.4 mm, V = 2.6 m/sec

E = 827 MPa at 20°C

$$a = \frac{1440}{\sqrt{1 + 2070 \times \frac{143.4}{12.5 \times 827}}}$$

a = 264 m/sec t= 2L/a = 2 x 2,200/264 = 17 sec

$$P = 0.1 \times 264 \times \frac{2.6}{9.81} = 7 \text{ bar}$$

Surge pressure result: 7 bar, total transient pressure: 11 + 7 = 18 bar.

The total transient pressure exceeds the maximum allowable total transient pressure for this pipe material.

5. Pexgol 180mm SDR 11 Class 15

Above ground installation: ambient temperature is 20°C, design temperature is 40°C.

Maximum allowable working pressure of the pipe is 12 bar at 40°C.

Maximum allowable total transient pressure: 30 bar.

OD 180 mm, w.t. 16.4 mm, d = 147.2 mm, V = 2.5 m/sec

E = 228 MPa at 40°C

$$a = \frac{1440}{\sqrt{1 + 2070 \times \frac{147.2}{16.4 \times 228}}}$$

a = 159 m/sec t = 2L/ a = 2 x 2,200/159 = 28 sec

$$P = 0.1 \times 159 \times \frac{2.5}{9.81} = 4 \text{ bar}$$

Surge pressure results: 4 bar, total transient pressure: 12 +4 = 16 bar

The total transient pressure is much lower than the maximum allowable total transient pressure (30 bar).

6. Pexgol 180 mm SDR 9 Class 19

Above ground installation: ambient temperature is 40°C, design temperature is 60°C.

Maximum allowable working pressure of the pipe is 12 bar at 60°C.

Maximum allowable total transient pressure: 30 bar.

OD 180 mm, w.t. 20 mm, d = 140 mm, V = 2.7 m/sec.

E = 136 MPa at 60°C

$$a = \frac{1440}{\sqrt{1 + 2070 \times \frac{140}{20 \times 136}}}$$

a = 139 m/sec t = 2L/a = 2 x 2,200/139 =3 2 sec

$$P = 0.1 \times 139 \times \frac{2.7}{9.81} = 4 \text{ bar}$$

Surge pressure results: 4 bar, total transient pressure: 11 + 4 = 15 bar

The total transient pressure is much lower than the maximum allowable total transient pressure (30 bar).

Conclusions:

1. The surge pressure caused by the water hammer in steel pipes is at least three times higher than the surge pressure in Pexgol pipes.
2. The surge pressure caused by the water hammer in HDPE pipes could sometimes be too high.
3. Pexgol pipes have a high margin for surge pressures in all temperature range and pipe classes.

The expression for a = the velocity of pressure wave is a function of the short term Modulus E and the dimension ratio d/e, which is the same for each pipe class: d/e = (D-2xe)/e = (D/e) - 2 = SDR-2

It is possible to calculate the values for a for each pipe class.

In the following table (32.1), the values of the pressure velocity a were calculated for the following design temperatures:

20°C – for buried pipes

40°C – for above ground pipes at ambient temperature of 20°C

60°C – for above ground pipes at ambient temperature of 40°C

The values of P were calculated for line velocity of 1.0 m/sec.

Table 32.1 shows the low surge pressures expected in Pexgol pipes.

Table No. 35.1: Surge pressures in Pexgol pipes

Pipe class	SDR	E = 465MPa		E = 228MPa		E = 136MPa	
		20°C		40°C		60°C	
		a [m/sec]	Surge pressure p	a [m/sec]	Surge pressure p	a [m/sec]	Surge pressure p
6	26	139	1.4 bar	97	1 bar	75	0.8 bar
8	21	156	1.6 bar	109	1.1 bar	85	0.9 bar
10	16.2	180	1.8 bar	126	1.3 bar	98	1 bar
12	13.6	198	2 bar	140	1.4 bar	108	1.1 bar
15	11	225	2.3 bar	158	1.6 bar	123	1.2 bar
19	9	254	2.6 bar	179	1.8 bar	139	1.4 bar
24	7.4	288	2.9 bar	204	2.1 bar	158	1.6 bar
30	6	332	3.4 bar	236	2.4 bar	183	1.9 bar

The value of a = Velocity of pressure wave was calculated using the instantaneous Modulus of Elasticity.

Please note the surge pressure P is in direct linear relation to the value of the line velocity V.

Therefore, values for different surge pressures for the same pipe class can be calculated by changing the values of the Line velocity V.

For example: calculating the surge pressure in paragraph 4.

Pexgol 180 mm SDR 9 Class 19/Above ground installation

Ambient temperature is 40°C.

Design temperature is 60°C.

Design pressure of the pipe is 12 bar at 60°C.

Maximum allowable total transient pressure is 30 bar.

OD 180 mm, w.t. 20.1 mm, d = 139.8 mm = 0.1398 m, V = 2.7m/sec.

From table 35.1, the surge pressure for class 19, velocity of 1 m/sec and design temperature of 60°C is 1.6 bar.

For the *Pexgol* 180 mm class 19 which has a velocity of 2.7 m/sec, the surge pressure will be: 1.6 x 2.7/1 = 4.3 bar

For water density higher than 1.0, divide the value of the Velocity of the pressure wave a (taken from Table 35.1) by the square root of the actual water density.

Vacuum/Suction Pipelines

Under-pressure (vacuum) might develop in the following cases:

1. When a pipe is installed in vacuum-feeding pipelines.
2. When a pipe is installed in a steep inclination, causing rapid free flow.
3. Extreme temperature changes of the transported liquid.

If a Pexgol pipe collapses, it results in an oval deformation. Note that when a Pexgol pipe collapses due to vacuum, it can be returned to its original round shape by applying internal pressure.

The amount of vacuum that a Pexgol pipe can withstand depends on the pipe's SDR. A pipe with sufficient wall thickness must be selected in order to resist the collapsing forces generated by the vacuum.

Table 36.1 shows maximum rates of vacuum supported by Pexgol pipes of different classes and different design temperatures. These are values empirical values.

Table No. 36.1: Service under vacuum

Pipe Class	SDR	Temperature	1 Year	50 Years
30	SDR 6	up to 80°C	Full vacuum *	
24	SDR 7.4	up to 80°C	Full vacuum *	
15	SDR 11	up to 80°C	Full vacuum *	
12	SDR 13.6	20°C	Full vacuum *	
12	SDR 13.6	60°C	-0.9	-0.8
10	SDR 16.2	60°C	-0.65	-0.6
8	SDR 21	60°C	-0.52	-0.5
6	SDR 26	60°C	-0.45	-0.4

* Tested under full vacuum conditions: -1 bar (g) 0 bar (a)

The values in the table are in bar (g) (Bar gauge). For example:
-0.8 bar (g) is equal to 0.2 bar (a) or Bar absolute.
Pexgol pipe class 10 is not recommend for use under full vacuum conditions.

Allowable external pressure:

For pipe of uniform cross-section, applying a safety factor of 1.5 which includes the influence of pipe ovality, the maximum allowable external pressure Pc in bar can calculated from the following equation:

Pc = 2618/(SDR-1) 3

For Pexgol class 10 SDR 13.6 Pc = 0.75 bar
For Pexgol class 12 SDR 13.6 Pc = 1.0 bar
For Pexgol class 15 SDR 11.0 Pc = 2.5 bar
For Pexgol class 19 SDR 9.0 Pc = 5.0 bar
For Pexgol class 24 SDR 7.3 Pc = 10.0 bar
For Pexgol class 30 SDR 6.0 Pc = 21.0 bar

Underground Pexgol pipe under vacuum or external pressures

Vacuum, or external pressures, creates hoop stresses in the pipe wall which are combined with the external pressures of the soil. In extreme cases, these stresses can cause the pipe to collapse. Therefore, when a Pexgol vacuum pipeline is installed underground, the vacuum stresses have to be added to the total static and dynamic loads exerted by the soil and all the stresses must be considered. In this case, make sure that the soil around the pipe is compacted. When designing a vacuum pipeline at recommended vacuum conditions, please contact our engineer for consultation regarding installation of vacuum breakers.

Properties of Pexgol Pipes

Test	Standard	Required	Nominal	Frequency
Resin				
MFR	ASTM D1238 ISO 1133	1.7 – 2.3	1.9	Every batch
Density	ASTM D1505 ISO 1183	926 kg/m^3	955 kg/m^3	Every batch
Water content	ASTM D6869 ISO 15512	<0.1%	<0.1%	Every batch
Master Batch				
Melt Flow Rate (MFR)	ASTM D1238	1.0 – 3.0	1.61	Every batch
Carbon Black Content CBC	ASTM D4218	2.0 – 2.6	2.4	Every batch
Pipe				
Density	DIN 53479	938 kg/m^3	938 kg/m^3	
Cross linking degree	ISO 10147	70%	80%	At least twice a batch
Elongation at break (at 20°C)	ISO 527	350%	> 400%	Every batch
Tensile strength (at 20°C) (at 100°C)	DIN 53455 -	19 N/mm^2 9 - 13 N/mm^2	> 19 N/mm^2	At least twice yearly
UV Resistance	ISO 14531-1, Annex C Resistance to weathering	a) Thermal stability b) 95°C hydrostatic strength c) Elongation at break	Comply	Type test
Longitudinal reversion	ISO 2505	< 3%	< 2.5%	Every Batch
Stabilizers migration	NCh2086	At least 50% of a virgin sample	> 50%	Annually
Oxidative Induction Time (OIT)	EN 728 ISO TR 10837	> 20 minutes at 200°C	> 40 minutes at 200°C	Every batch
Oven aging 160°	ATEC	After 100 hours, at least 50% elongation compared to virgin material	After 100 hours, 90% elongation compared to virgin material	Twice weekly
Thermal stability at 110°C	AS2492 DIN 16892	8760 h	> 10,000	Once per year
Pent test	ASTM F876	100 h	> 100 h	Once per year
Squeeze off	ISO 14531	1000 h (Pre cooling at -50°C)	> 1000 h	Type test
RCP	ISO 14531	lc/dn ≤ 4,7; at -50°C	lc/dn = 0.2 at - 50°C	Type test
Impact strength (at 20°C)	ISO 179	No failure	No failure	Type test
Impact strength (at -140°C) Surface energy Moisture absorption (at 20°C)		No faliure 34 x 10 - 3 N/m 0.01 mg/4d	No faliure 34 x 10 - 3 N/m < 0.01 mg/4d	Type test Type test
Oxygen permeability (at 80°C) for pipe with oxygen barrier O^2	DIN 4726	< 0.1 gr/m^3 x day	0.02	Annually

Table No. 38.1: Thermal properties

	Value	Unit	Tested for standard
Service temperature range	- 50 up to + 115	°C	
Coefficient of linear expansion (at 20°C)	1.4 x 10-4	m/m*°C	DIN53752
Coefficient of linear expansion (at 100°C)	2.05 x 10-4	m/m*°C	
Softening temperature	+ 133	°C	
Specific heat	2.3	kj/kg*°C	DIN53765
Coefficient of thermal conductivity	0.35	watt/m*°C	DIN 4725

Table No. 38.2: Electronic properties

	Value	Unit	Tested for standard
Specific internal resistance at 20°C	10^{15}	Ω. m	
Dielectric constant at 20°C	2.3	-	
Dielectric loss factor at 20°C/50Hz	1×10^{-3}	-	DIN53483
Rupture voltage at 20°C	100	kV/mm	

International approvals

To view complete certification list, please visit our website:
www.pexgol.com

Chemical Resistance

The Pexgol Chemical Resistance List is based on information included in the professional literature. The list is only intended as a guide.

Changes in the composition of the medium or special working conditions could lead to deviations. Consult the experts of Golan Plastic Products in each specific case.

Chemical resistance test for Pexgol pipes

The following procedure is an initial test for the chemical resistance of Pexgol pipes.

- Each combination of service conditions (service temperature, chemical concentration) constitutes a different case. However, for the same pipeline, the worst case is usually the highest temperature and the highest concentration.

The tested items are 20 "dumbbells" (also called dogbones or "coupons") made from Pexgol pipes.

Immersion test

- The dumbbells are immersed in the same material transported through the pipeline (same chemical composition and same temperature) for a period of 4 weeks.
- After 2 weeks, 10 dumbbells are removed and stored.
- After an additional 2 weeks, the other 10 dumbbells are removed.
- The two groups of dumbbells are packed separately and the packages are marked appropriately to identify the removal and storage conditions.
- The packages are sent to Golan for tensile testing.

Classification

A. Resistant: can be used within the working pressures, according to table 11.2 or 12.1 (safety factor of 1.25).

B. Conditionally resistant: restrictions of 70% to 90% must be made regarding the working pressures according to table 11.2 or 12.1.

C. Conditionally resistant: can be used within pressures up to 60% of the working pressures.

D. Conditionally resistant: can be used within pressures up to 20% of the working pressures.

U. Unknown, not recommended.

In case of dangerous liquids (strong acids and bases) the safety factor should be increased to 1.5 or 2.0.
In case of doubt please consult us.

Compound	Chemical resistance			
	40°C	60°C	80°C	100°C
Accumulator Acid	A	A	A	
Acetaldehyde 40%	A	A		B
Acetaldehyde 100%	U			
Acetamide	A	A	A	
Acetic Acid 05%	A	A		
Acetic Acid 10%	A	A		
Acetic Acid 20%	A	A		
Acetic Acid 50%	A	A		
Acetic Acid 60%	A	A		
Acetic Acid 80%	A	A		
Acetic Acid Ethyl Ester	A	A		
Acetic Anhydride	A	D		
Acetoacetic Acid	A			
Acetone	C			
Acetophenone			B	
Acetyl Bromide	U			
Acetyl Chloride			B	
Acetylene	A	A	A	
Acetylene Dichloride	see Dichloroethylene			
Acid mixture H2SO4-HNO3-H2O	U			
Acid mixture H2SO4-H3PO4-H2O		B		
Acrylic emulsions	A			
Acroline dispersion	A			
Acroline solution	B			
Acronal	C			
AcryloNitritle	A	A	A	
Acrylic Acid	A	A		
Adipic Acid	A	A	A	
Air	A	A	A	
Aktivin	A	A		
Alcohol	see Ethylalcohol			
Aliphatic Esters	A	A	A	
Allyl Acetate	A	C		
Allyl Alcohol 7%	A	A	A	
Allyl Alcohol 95%	A			
Allyl Aldehyde	see Acroline			
Allyl Chloride	C	U		
Alum	A	A	A	B
Aluminium Acetate	A	A	A	
Aluminium Chloride	A	A	A	
Aluminium Fluoride	A	A	A	

Compound	Chemical resistance			
	40°C	60°C	80°C	100°C
Aluminium Hydroxide	A	A	A	
Aluminium Metaphosphate	A	A		
Aluminium Nitrate sol.	A	A	A	
Aluminium Phosphate	A	A	A	
Aluminium Potassium Phosphate	A	A	A	
Aluminium Potassium Sulphate	A	A	A	A
Aluminium Sodium Sulphate sol.	A	A	A	
Aluminium Sulphate	A	A	A	
Amino Acids	A	A		B
Aminoacetic Acid	B	B		
Ammonia Aqueous	A	A	A	
Ammonia, dry gas	A	A	A	
Ammoniacal Liquor	A	A		
Ammonium Acetate	A	A	A	
Ammonium Aluminium Sulphate	A	A		
Ammonium Bromide	B	B		
Ammonium Carbonate	A	A	A	
Ammonium Chloride	A	A	A	
Ammonium Fluoride 20%	A	A	A	
Ammonium Hydrogen Carbonate	A	A	A	
Ammonium Hydrogen Sulphide	A	A	A	
Ammonium Hydroxide	A	A	A	
Ammonium Metaphosphate	A	A	A	
Ammonium Molybdate	A		B	
Ammonium Nitrate	A	A	A	
Ammonium Persulphate	A	A	A	
Ammonium Phosphate	A	A	A	
Ammonium Sulfide	A	A	A	
Ammonium Sulphate	A	A	A	
Ammonium Sulphocyanide	A			
Ammonium Thiocyanate	A	A	A	
Amyl Acetate	A	A		
Amyl Alcohol	A	A	A	
Amyl Chloride	U			
Amyl Methyl Carbinol	B			
Amyl Naphthaline	B			
Amyl Phthalate	A	B		
Aniline Hydrochloride	D			
Aniline Sulphate	U			
Aniline, coloured	see Aniline			
Aniline, pure	A	A		

Compound	Chemical resistance			
	40°C	60°C	80°C	100°C
Aniline, water soluble	B			
Animal Fats	A	A	A	
Animal Oils	B	B	B	
Anis Oil	B			
Aniseed Oil	C	U		
Anisole	see Cyclohexanone			
Antifreeze solution	A	A	A	
Antimony Pentachloride	A	A	A	
Antimony Trichloride	A	A	A	
Antrhoquinone Sulphonic Acid	A	A		
Aqua regia	U			
Aromatic Acids	A	A	A	
Aromatic Hydrocarbons	U			
Arsenic	B	B		
Arsenic Acid 80%	A	A	A	
Arsenic Acid Anhydride	A	A		
Arsenic Salts	A			
Arsenic Trichloride	U			
Ascorbic Acid	A			
Asphalt	A	C		
ASTM Oil no. 1	A	A	A	
ASTM Oil no. 2	A	A	A	
ASTM Oil no. 3	A	A	A	
Atropine Sulphate	A			
Barium Carbonate	A	A	A	
Barium Chloride	A	A	A	
Barium Hydrosulphide, Bone Oil			B	
Barium Hydroxide	A	A	A	
Barium Salts	A	A		
Barium Sulphate	A	A	A	
Barium Sulphide	A	A	A	
Battery Acid	A	B		
Beater Glues	A			
Beer Colours	A	A	A	
Beer, trading quality	A			
Beet Juice	A	A		
Benzaldehyde 0.1%			C	
Benzaldehyde 100%	A	C		
Benzaldehyde Oxime 2%	A			
Benzaldoxime	see Benzaldehyde Oxime			
Benzene (Benzole)	D	U		

Compound	Chemical resistance			
	40°C	60°C	80°C	100°C
Benzene Carbonic Acid	see Bensoic Acid			
Benzene Dicarbonic Acid	see Phthalic Acid			
Bezene Sulphonic Acid	A		B	
Benzoic Acid	A	A	B	
Benzole Carbon Acid	see Bensoic Acid			
Benzole Dicarbon Acid	see Phthalic Acid			
Benzole Sulphonic Acid	U			
Benzyl Acetate	B			
Benzyl Alcohol	A	A	B	
Benzyl Benzoate		B		
Benzyl Chloride	A			
Bichromate Sulfuric Acid	B	U		
Bismuth Carbonate	A	A	A	
Bisulfite	see Sodium Bisulfite			
Bitumen	A	C		
Black Liquor	B	B		
Bleach	D	U		
Bleach Lye 10%	B	B		
Bloodstream Salt, red	see Potassium Ferricyanide			
Bloodstream Salt, yellow	see Potassium Ferricyanid			
Bone Oil	A	A		
Bonewax	A		U	
Borax	see Sodium Tetraborate			
Boric Acid	A	A	A	
Boric Acid Methyl Ester	B	U		
Boric Copper Sulphate	A			
Boric Trifluoride	A			
BoronTrifluoride	A	D		
Brake Fluids	A	A	A	
Brandy	A			
Brines, saturated	A	A	A	A
Brom Oil	A		B	
Bromate Solution	A	A		
Bromoethane	U			
Bromic Acid	A	A	A	
Bromine Vapours, low conc.	B			
Bromine Water	U			
Bromine, Liquid	U			
Bromochloromethane	U			
Butadiene 50%	A	A	A	
Butadiene 100%		B		

Compound	Chemical resistance			
	40°C	60°C	80°C	100°C
Butane (gas)	U			
Butanediol up to 10%	A	A	A	
Butanediol up to 100%	B			
Butanetriol	A	A		
Butanol 100%	A	A	A	
Butanone	A	U		
Butene	U			
Butoxyl	A	C		
Butter	A		B	
Butter Acid	C			
Butter Acid in water, conc.	C			
Butter Acid in water, sol. 20%	C			
Butyl Acetate	A	B	C	
Butyl Acrylate	A	B		
Butyl Alcohol	see Butanol			
Butyl Aldehyde	A		B	
Butyl Benzyl Phtalate	A	A		
Butyl Carbinol			B	
Butyl Cellulose solution	U			
Butyl Phenol	U			
Butyl Stearate	A	A	A	
Butylene	see Butene			
Butylene Glycol	see Butanediol			
Butyric Acid	C	D		
Cadmium Salts	A			
Caffeine Citrate	B	B		
Calcium Acetate	A	A	A	
Calcium Bisulphide	A	B		
Calcium Bisulphite	A	A	A	
Calcium Bromide 50%	A	A		
Calcium Bromide 80%	A			
Calcium Carbide	A	A		
Calcium Carbonate (Soda)	A	A	A	
Calcium Chlorate	A	A	A	
Calcium Chloride	A	A	A	B
Calcium Hydrosulphite containing SO2	B	B		
Calcium Hydroxide	A	A	A	
Calcium Hypochlorite	A	A	A	
Calcium Nitrate	A	A	A	
Calcium Oxide	A			

Compound	Chemical resistance			
	40°C	60°C	80°C	100°C
Calcium Phosphate	A			
Calcium Sulphate	A	A	A	
Calcium Sulphide			B	
Calcium Water	A			
Camphor	C			
Cane Sugar	A			
Cane Sugar Juice	A	A	A	
Carbamide 33%	A	A	A	
Carbazole	A	A		
Carbolic Acid	A	B		
Carbolic Acid (Phenol)	A	A		
Carbolineum	A	C		
Carbon Bisulfide	U			
Carbon Dioxide	A	A	A	
Carbon Dioxide damp	A	A	A	
Carbon Dioxide dry	A	A	A	A
Carbon Disulphide		D	U	
Carbon Monoxide - lamp gas	A	A	A	
Carbon Tetrachloride		D	U	
Carbonic Acid H2CO3	A	A		
Carnbevox	A			
Carrot Juice	A	A		
Castor Oil	A	B		
Caustic Potash	A	A		
Caustic Soda	see Sodium Hydroxide			
Cedar Leaf Oil	D			
Cedar Wood Oil	D			
Cellulose dissolver	see Ethylene Glycol Monoethyl Ether			
Cetyl Alcohol	A	A	B	
Chalk	A	A	A	
Cheese Enzyme	A	A	A	
Chloral Hydrate	A	A	A	
Chloramine	A	A	A	
Chloramine T	see Paratoulene Sulpho Chlor			
Chloride Acid	see Hydrochloric Acid			
Chlorine water 10 PPM	A	A		
Chlorine water sturated	A		B	
Chlorine, damp gas	C	U		
Chlorine, dry gas	B		U	
Chlorine, liquid	U			

Compound	Chemical resistance			
	40°C	60°C	80°C	100°C
Chloro Acetic Acid Ethyl Ester	A	A		
Chloro Acetic Acid Methyl Ester	A	A		
Chloro Carbonic Acid	A	C		
Chloroacetic Acid 85%	B	B		
Chloroacetic Acid 98%	B			
Chloroacetic Acid 100%		B		U
Chlorobenzene	D	U		
Chlorocalcium (in H2O)	A	A	A	
Chloroethane	see Ethyl Chloride			
Chloroethanol	A	A	A	
Chloroethyl Alcohol	see Chloroethanol			
Chloroethyl Phosphate	A	A		
Chloroform	D	U		
Chloromethane	see Methyl Chloride			
Chloropicrin	U			
Chloropropane	see Glycerine Chlorhydrin			
Chlorosulfonic Acid	U			
Chrome Alum	A	A	A	
Chrome Anode Mud	A	A		
Chrome Mercury	B			
Chromic Acid 50%	A	A	A	
Chromic Acid 80%	A		B	
Chromic Acid Anhydride	see Chromium Trioxide			
Chromium Oxide	see Chromium Trioxide			
Chromium Salts	A			
Chromium Trioxide 20%	A	A	A	
Chromium Trioxide 50%	A		B	
Chromium Trioxide 80%				
Chromo Sulfuric Acid	A	U		
Cider	A	B		
Cinnamon	B	C		
Cinnamon Oil	D			
Cis - Oxime	see Benzaldehyde Oxime			
Citric Acid	A			
Citronella	B	D		
Citrus Juices	A	A		
Cloves	C	C		
Coal Tar	D	U		
Cobalt Chloride	A	A	A	
Coca Cola	A	A		
Coca Cola Syrup	A	B		

Compound	Chemical resistance			
	40°C	60°C	80°C	100°C
Cocanut Oil Alcohols	B	C		
Cocoa Fat	A	A	A	
Cocoa Fat Alcohol	A	A	A	
Coconut Oil	A	B		
Cod Liver Oil	B	C		
Coffee	A			
Cognac	A			
Colanut, concentrated	A	A	A	
Cooking Salt	see Sodium Chloride			
Copper Acetate			B	
Copper Chloride (cupric)	A	A	A	
Copper Chloride (cuprous)	A	A	A	
Copper Cyanide	A	A	A	
Copper Fluoride	A	A	A	
Copper Nitrate	A	A	A	
Copper Salts	A	A		
Copper Sulphate	A	A	A	
Corn Oil	A	A	A	
Corn Syrup	A	A		
Cotton d Oil	A	B	C	
Coumarone Resins	A	A		
Cranberry Sauce	B	B		
Creosote	A	B		
Cresol 100%	A	C		
Cresol diluted	A	C		
Crop Protection Agent	A	A		
Croton Aldehyde	A	C		
Crude Oil	A	B	C	D
Cupric Salts Cuprous Chloride	A			
Saturated	B	B		
Cupprous Oxide	B	B		
Cyanides	A	A	A	
Cyclanone	A	A		
Cyclohexane	C	D		
Cyclohexanol	A			
Cyclohexanone	D	U		
Cyclohexyl Alcohol	A	B		
DDT	A	A		
Decahydro Naphthalene	B	C		
Decalin	A	C		
Defoamer	A	C		

Compound	Chemical resistance			
	40°C	60°C	80°C	100°C
Denatured Spirit	see Methyl Alcohol			
Deodorants	A	A		
Detergents	A	B		
Dextrine	A	A	A	
Dextrose	A	A	A	A
Diacetone	A	A	A	
Diacetone Alcohol	A			
Diammonium Salts	A	A	A	
Diazo Salts	A	A		
Dibenzyl Ether			B	
Dibromoethane	D	U		
Dibutyl Ether	B	D		
Dibutyl Phthalate	B	C		
Dibutyl Sebacate	A	B	B	
Dichloracetic Acid	A	A	A	
Dichloracetic Acid Methylester	A	A	A	
Dichlorobenzene	C	U		
Dichloroethane	see Ethyl Chloride			
Dichloroethylene	U			
Dichloromethane	see Methyl Chloride			
Dicyclohexamine			B	
Diesel Fuel	A	U		
Diesel Oil	A	U		
Diethlene Glycol Monobutylene	A			
Diethyl Benzene				B
Diethyl Ether	see Ethyl Ether			
Diethyl Ketone	B	C		
Diethyl Phthalate	A			
Diethylamine			B	
Diethylene Dioxide	see Dioxane			
Diethylene Glycol	A	A		
Diglycolic Acid	A	A	A	
Dihexyl Phthalate	A	A	A	
Diisobutylene			B	
Diisopropyl Ether	B	U		
Diisopropyl Ketone	A	A	A	
Dimethyl Amine	C	U		
Dimethyl Aniline			B	
Dimethyl Benzole	see Xylol			
Dimethyl Formamide	A	B		
Dimethyl Ketone	see Acetone			

Compound	Chemical resistance			
	40°C	60°C	80°C	100°C
Dimethyl Phthalate	A	A	A	
Dimethyl Sulphoxide	A	A		
Dioctyl Phthalate	B	C		
Dioctyl Sebacate			B	
Dioxalane			B	
Dioxane	A	B	C	
Dioxyethyl Ether	see Diethylene Glycol			
Diphenyl			B	
Diphenyl Amine	A	C		
Diphenyl Oxide	B	C		
Dishwash Detergents	A	A	B	
Disodium Phosphate	A	A		
Disodium Sulphate	A	A		
Dispersions	A			
Dodecylbenzene Sulfonic Acid	A	C		
Dop (Diethylhexyl Phthalate)	A	C		
Edible Oil	A			
Electrolyte 10%	A	A	A	
Elementine normal conc.	A	A	A	A
Emulsions, Photographic	A	A	A	
Engine Oils	A	C		
Ephetin	A	A		
Epichlorohydrin	A	A	B	
Epoxy Ethane	see Ethylene Oxide			
Epsom Salts	A	A		
Essential Oils	C	U		
Esteric Oils	B	B	B	
Ethanal	see Acetaldehyde			
Ethandiol	see Ethylene Glycol			
Ethane	A	A		
Ethane Diamine	see Ethylene Diamine			
Ethanol	see Ethyl Alcohol			
Ethanolamine	A	A	B	
Ethers	C	D	U	
Ethoxyethane	see Ethyl Ether			
Ethyl Acetate	A	B	C	
Ethyl Alcohol	A	A	A	B
Denaturated with 2% Toluol	A			
plus Acetic Acid, quality use	A			
Ethyl Benzene	D	U		
Ethyl Benzoate	B			

Compound	Chemical resistance			
	40°C	60°C	80°C	100°C
Ethyl Carbitol			B	
Ethyl Cellulose			B	
Ethyl Chloride	C	U		
Ethyl Dibromide	C	U		
Ethyl Ether	C	D	U	
Ethyl Formate			B	
Ethyl Glycol			B	
Ethyl Methyl Ketone	see Butanone			
Ethyl Oxalate	A	A	A	
Ethyl Pentachloro Benzene	U			
Ethyl Salicylate	B			
Ethyl Silicate	A	A	A	
Ethyl Valeriate	A			
Ethylamine	A	A	A	
Ethylene	A	B		
Ethylene Chlorhydrin	U			
Ethylene Chloride	U			
Ethylene Diamine	A	A		
Ethylene Diamine Tetraacetic Acid	A	A		
Ethylene Dichloride	D	U		
Ethylene Glycol 100% trading quality	A	A	A	B
Ethylene Glycol \Monoethyl Ether	A			
Ethylene Oxide, gaseous	A	A		
Ethylene Oxide, liquid	U			
Ethylene Trichloride	D			
Ethylhexyl Alcohol	A	B		
"Eugenol"	B			
Euron B	B	B		
Euron G	A	A		
Fatty Acid	A	B	C	
Fatty Acid Amides	A	C		
Fatty Alcohols	A	C		
Fatty Oils	A	C		
Ferric Chloride	see Iron Chloride			
Ferric Nitrate	see Iron Nitrate			
Ferrous Ammonium Citrate	A	B		
Ferrous Chloride	A	B		
Ferrous Sulphate Fe SO4	A	A		
Fertilizer Salts	A	A	A	B
Fir Wool Oil	A	C		

Compound	Chemical resistance			
	40°C	60°C	80°C	100°C
Fish Oil	A	A	A	
Fish Solubles	B			
Fluoboric Acid	A	B		
Fluorbenzene	U			
Fluorides	A	A	A	
Fluorine, liquid	C			
Fluorine (solution)	U			
Fluosilicic Acid 25%	A	C		
Formaldehyde 40%	A	A		
Formaldehyde, diluted	A	A	A	
Formamide	A	A	A	
Formic Acid	A	A	B	
Freon 12	C	U		
Freon 13	A	A	A	
Freon 21	U			
Freon 22	A	A	A	
Freon 113	A			
Freon 114	A	A	A	
Frigen	C	U		
Fructose	A	A		
Fruit Juice	A	A	A	
Fruit Mass (fruit pulp)	A	A	A	
Fruit Sugar	A			
Fuel Oils	A	D		
Fuming Sulphuric Acid	see Oleum			
Furan	D			
Furfural	A	C	U	
Furfural Alcohol	A	B		
Gallic Acid	A	A		
Gas Liquor	A	A		
Gas, Natural	see Natural Gas			
Gases, containing Carbon Dioxide, Carbon Acid	A	A	A	A
Gases containing Chlorine	A	A	A	B
Gases, containin Fluorine traces	A	A	A	
Gases, containin Nitrious Oxide traces	A	A	A	
Gases, containin Oleum, low conc.	U			
Gases, containin Sulphur Dioxide 50%	A	A		
Gases, containin Sulphur Dioxide, low conc.	A	A	A	B
Gases, containin Sulphuric Acid	A	A	A	

Compound	Chemical resistance			
	40°C	60°C	80°C	100°C
Gasoline-Benzene mixture 80/20	B		C	
Gasoline, Leaded	A			
Gasoline, pure, 100 Octane	B	C		
Gasoline, Sour	A			
Gasoline, Unleaded	A			
Gelatine	A	A	A	
Genantin	A	A		
Gin	A	A		
Glaubers Salt	A	A		
Glucose	see Dextrose			
Glycerine Chlorhydrin	A	A	A	
Glycerine, Glycerol	A	A	A	
Glycerol Chloro Hydrin	A	A		
Glycine	see Glycol			
Glycois	A	A		
Glycol	A	A		
Glycol Dichloride	see Ethylene Chloride			
Glycol Ester	A	A	A	
Glycolic Acid 37%	A	B		
Glycolic Acid Butyl Ester	A	A		
Glysantin	A	A		
Grape Juice	A	A		
Grape Sugar	A	A		
Grapefruit Juice	A	A		
Grease	A			
Grisiron 8302	B	B		
Grisiron 8702	A	A		
Hair Oil/Tonic Oil	A	A		
Halothane	C	D		
Hand Lotions	A	A		
Heating Oil, Barrel Oil	A			
Heavy Emulsion	see Barium Carbonate			
Heavy Oil			B	
Heptane	B	D		
Hexachlorobenzene	A	B		
Hexadecylalcohol	A	A		
Hexane	C	D		
Hexane Triol	A	A		
Hexyl Alcohol	D			
Honey	A			
Household Cleaners	A	B		

Compound	Chemical resistance			
	40°C	60°C	80°C	100°C
Hydrobromic Acid 20%	A	A		
Hydrobromic Acid 50%	A	A		
Hydrochloric Acid 10%	A	A	A	
Hydrochloric Acid 20%	A	A	A	
Hydrochloric Acid < 30%	A	A	A	
Hydrochloric Acid ≥ 30%	A	A	B	
Hydrochloric dry gas	A			
Hydrocyanic Acid	see Hydrogen Cyanide			
Hydrocyanic Acid 10%	A	C		
Hydrofluoric Acid 20%	A	C		
Hydrofluoric Acid 50%	A	C		
Hydrofluoric Acid 75%, HF	A	C		
Hydrofluosilicic Acid	A	A		
Hydrogen	A	A	A	
Hydrogen Bromide	A	A	A	
Hydrogen Chloride gas dry and moist	A	A	A	
Hydrogen Cyanide	A	A	A	
Hydrogen Fluoride 40%	A	A		
Hydrogen Fluoride 70%	A			
Hydrogen Peroxide 30%	A	A	A	
Hydrogen Peroxide 50%	B			
Hydrogen Peroxide 90%	C			
Hydrogen Peroxide 100%	A			
Hydrogen Phosphide	A			
Hydrogen Sulphide, H2S	A	A	A	B
Hydrogen Sulphide (Aq. Sol.)	A	A	A	B
Hydrogen Sulphide, dry	A	A	A	
Hydroquinone	A	A		
Hydrosulphite	A	A		
Hydroxylamine Sulphate	A	A		
Hypochlorous Acid	A	A		
Hyraulic Fluids	A	B		
Hyrazine Hydrate	A	A		
Igepal	A	A	A	
Ink	A	A	A	
Iodine	A			
Iodine, alcoholic sol.	B			
Iodine ink	A			
Iodine-Potassium Iodide, 3%	A	A		
Iodine Solution	U			

Compound	Chemical resistance			
	40°C	60°C	80°C	100°C
Iodine, Tincture of	A	C		
Iron (II) Chloride	A	A	A	
Iron (II) Sulphate	A	A	A	
Iron (III) Chloride	A	A	A	A
Iron (III) Nitrate	A	A	A	
Iron (III) Sulphate	A	A	A	
Isobutyl Alcohol	A	A		
Isooctane	A	B		
Isopropanol	A	A		
Isopropyl Acetate	A	C		
Isopropyl Ether	D	U		
Jams	A	A		
Kerosene	B	C		
Kerosine	B	C		
Ketones	B	D		
Labarraques Solution	D	U		
Lacquer	U			
Lactic Acid 90%	A	A	A	
Lactose	A	A		
Lanolin	A	A	A	
Latex	A			
Lauryl Alcohol	B			
Lavender Oil			B	
Lead Acetate	A	A	A	B
Lead Arsenate	A			
Lead Nitrate	A	A	A	
Lead Sulphamate	A	A	A	
Lemon Juice	A	A		
Lemon Oil	B	U		
Lime	A	A		
Lime Chloride	A	A		
Lime Juice	B	B		
Lime Water	A	A		
Lind Oil	A	B	C	
Liquor, Trading Quality	C	U		
Lithium Bromide	A	A		
LPG	A	A		
Lubricating Oils	A	C		
Machine Oils	A	B		
Magnesium Carbonate	A	A	A	
Magnesium Chloride	A	A	A	

Compound	Chemical resistance			
	40°C	60°C	80°C	100°C
Magnesium Fluosilicate	A	A		
Magnesium Hydroxide	A	A	A	
Magnesium Iodine	A	A		
Magnesium Nitrate	A	A	A	
Magnesium Salts	A	A		
Magnesium Sulphate	A	A	A	A
Maleic Acid	A	A	A	A
Malic Acid	A	A		
Manganese Sulphate	A	A	A	
Manure, liquid	A	A		
Margarine	B	C		
Marmelade	A	A	A	
Masa	A	A		
Mascara	A	A	A	
Mash	A	A		
Mayonnaise	A			
Melase spices, industrial conc.	A	A	A	
Melase, industrial conc.	A	A	A	A
Menthanol	see Menthol			
Menthol	A	C		
Mercuric Chloride	A	B		
Mercuric Cyanide	B	B		
Mercurochrome	A	A		
Mercurous Nitrate	B	B		
Mercury	A	A	A	
Mercury Salts	A	A	A	
Mesityl Oxide				B
Metallic Mordants	A	A		
Methacrylate	A	A		
Methacrylic Acid	A	A		
Methane			B	
Methane Amide	see Formamide			
Methanol	see Methyl Alcohol			
Methoxy Butanol	A	A	A	
Methoxybutyl Alcohol	A	B		
Methyl-2-Pentanone (4-)	A	A		
Methyl Acetate			B	
Methyl Alcohol	A	A	A	
Methyl Amine, 32%	A			
Methyl Bromide	see Bromethane			
Methyl Butyl Ketone	A	A	A	

Compound	Chemical resistance			
	40°C	60°C	80°C	100°C
Methyl Cellulose Solvent	A			
Methyl Chloride	D	U		
Methyl Ethyl Ketone	B	D		
Methyl Formate			B	
Methyl Glycol	A	A	A	
Methyl Isobutyl Ketone	A	C		
Methyl Methacrylate	A	A	B	
Methyl n-Propyl Ketone	A	B		
Methyl Oleate	A	A	A	
Methyl Phenol	see Cresol			
Methyl Pyrrolidone	A	A		
Methyl Salicate	B			
Methyl Salicylate	A	B		
Methyl Sulphate	A	A		
Methyl Sulphuric Acid up to 50%	B	B		
Methylbenzene	D	U		
Methylcyclohexane	C	D		
Methylene Chloride	C	U		
Milk	A	A	A	
Mineral Oils	B	U		
Mineral Spirits	A	C		
Mineral Water	A	A	A	
Molasses	A	A		
Mold Release	A	A		
Monochloride Acetic Acid	A	A	A	
Monochloride Acetic Acid Ethylester	A	A	A	
Monochloride Acetic Acid Methylester	A	A	A	
Monochloro Benzene	D			
Monoethanolamine	A			
Monoethyl Ether	A	A	A	
Monomethyl Aniline	A	A	A	
Morpholine	A	A		
Motor Oil			C	
Mowilth	A	A		
Mustard	A	B		
Nafta	B	U		
Naphthalene, Naphthaline	A	C		
Natural gas	A	A		
Nickel	A			
Nickel Chloride	A	B		

Compound	Chemical resistance			
	40°C	60°C	80°C	100°C
Nickel Nitrate	A	B		
Nickel Salts	A	A		
Nickel Sulphate	A	B		
Nicotine	A	A		
Nicotine Acid	B	B		
Nitric Acid ¥30%	A	A		
Nitric Acid 30-50%	B	C		
Nitric Acid 40%	B			
Nitric Acid 70%	C			
Nitric Acid 98%			U	
Nitrobenzene (Oil of Mirbane)	C	U		
Nitrocellulose	A			
Nitroethane	A		U	
Nitrogen	A	A	A	
Nitroglycerin	B	D		
Nitromethane	A		U	
Nitrotoluene	A	B		
Nitrous gases, conc.	A		U	
Nonyl Alcohol	A	A		
Octane	A	B		
Octyl Alcohol	A		B	
Octyl Cresol	B	U		
Oil	C	C		
Oil Acid			C	
Oleic Acid	A	C		
Oleic Acid (Red Oil)	U			
Oleum	U			
Oleum vapeur (SO3)	B			
Olive Oil	A	A	A	
Optical Brighteners	A	A		
Orange Extract	A	A		
Ortho-Boric Acid	see Boric Acid			
Oxalic Acid	A	B		
Oxyacetic Acid	see Glycolic Acid			
Oxybensole	see Phenol			
Oxydiethanole	see Diethylene Glycol			
Oxygen	A	A		
Oxypropionic Acid	see Lactic Acid			
Oxyrane	see Ethylene Oxide			
l-Oxytoluol	see Benzyl Alcohol			
m-Oxytoluol	see Cresol			

Compound	Chemical resistance			
	40°C	60°C	80°C	100°C
Ozone	C		U	
Painting Turpentine	see Thinner			
Palm Kernal Oil	A	A		
Palm Oil	B	B		
Palmatic Acid	A	A	B	
Palmityl Alcohol	A	A		
Palmolive Oil	A			
Paraffin	A	B	C	
Paraffin emulsion, trading qual.		B		
Paraffin Oil	A	A	A	
Paraformaldehyde	A	A		
Paratoluene Sulpho Chloramide Sodium 1%	A			
Peanut Butter	B	B		
Pentanol	see Amyl Alcohol			
Pentanol Acetate	see Amyl Acetate			
Pepper	B	B		
Peppermint Oil	B	D		
Perchloric Acid 10%	A	A		
Perchloric Acid 20%	A	A	A	
Perchloric Acid 50%	A	B	C	
Perchloric Acid 70%	A	D		
Perchloro Ethylene	U			
Perfumes	C	U		
Petroleum	A	B	C	
Petroleum Ether	A	D		
Petroleum Jelly	B	B		
Petroleum Spirits	C	D		
Phenol up to 90%	A	A		U
Phenolic Resins	A	A		
Phenols 100% (Carbolic Acid)	D			
Phenyl Alcohol	see Benzyl Alcohol			
Phenyl Ethane	see Ethyl Benzene			
Phenyl Ethyl Alcohol	A	A		
Phenyl Hydrazine	C	D		
Phenyl Hydrazine Hydrochloride	A	U		
Phenyl Methane	see Toluol			
Phenyl Methyl Ether	see Cyclohexanone			
Phenyl Sulfonate	A	A		
Phosgene, gas	U			
Phosphates	A	A	A	

Compound	Chemical resistance			
	40°C	60°C	80°C	100°C
Phosphoric Acid 80%	A	A	A	A
Phosphoric Acid 90%	A	A	A	A
Phosphoric Acid 95%	A	A		
Phosphorus Oxychloride	A	B	B	
Phosphorus Pentoxide	A	A	A	
Phosphorus Trichloride	A	B		
Phosphorus Yellow	A			
Photographic Developer	A	A		
Photographic solution, Fixer	A	A	A	
Phthalic Acid 50%	A	A	A	
Phtalic Acid Ester	A	C		
Phtalic Anhydride	B	B		
Pickling Baths	B	C		
Picric Acid 1%	A		B	
Pine Oil	B	D		
Pineapple Juice	A	A		
Pinene			B	
Plasticizers of Polyester	A	B		
Plating Solutions, Brass	A	B		
Plating Solutions, Cadmium	A	B		
Plating Solutions, Copper	A	B		
Plating Solutions, Gold	A	B		
Plating Solutions, Indium	A	B		
Plating Solutions, Iron	A	B		
Plating Solutions, Lead	A	B		
Plating Solutions, Nickel	A	B		
Plating Solutions, Rhodium	A	B		
Plating Solutions, Silver	A	B		
Plating Solutions, Tin	A	B		
Plating Solutions, Zinc	A	B		
Polyesters (Resins)	C	U		
Polyglycols	A	A		
Polysolvan O	A	A		
Potash Alum	A	A		
Potassium Acetate			B	
Potassium Bicarbonate	A	B		
Potassium Bichromate 40%	see Potassium Dichromate			
Potassium Bisolphate	A	A		
Potassium Borate 1%	A	A	A	
Potassium Bromate	A	A	A	
Potassium Bromide	A	A	A	

Compound	Chemical resistance			
	40°C	60°C	80°C	100°C
Potassium Carbonate	A	A	A	
Potassium Chlorate	A	A	A	
Potassium Chloride	A	A	A	A
Potassium Chromate	A	A	A	
Potassium Chromium Sulphate	A	A	A	B
Potassium Cupro Cyanide	A	A	A	
Potassium Cyanide	A	A	A	
Potassium Dichromate 40%	A	A	A	
Potassium Ferricyanide	A	A	A	B
Potassium Ferrocyanide	A	B		
Potassium Fluoride	A	A	A	
Potassium Hydrogen Carbonate	A	A	A	
Potassium Hydrogen Sulphate	A	A	A	
Potassium Hydrogen Sulphite solution	A	A	A	
Potassium Hydroxide 50%	A	A	A	
Potassium Hydroxide 60%	A	A	B	
Potassium Hypochlorite, solution	A		B	
Potassium Iodide, cold saturated	A	A	A	
Potassium Nitrate	A	A	A	
Potassium Orthophosphate	A	A	A	
Potassium Perborate	A	A	A	
Potassium Perchlorate 1%	A	A	A	A
Potassium Perchlorate 10%	A			
Potassium Permanganate 18%	A	A	A	
Potassium Persulfate	A			
Potassium Phophate	A	A	A	
Potassium Salts	A			
Potassium Sulphate	A	A	A	
Potassium Sulphate, cold saturated	A	A	A	
Potassium Sulphide	A	A	A	
Potassium Sulphite	A	A		
Potassium Supersulphate	A	A	A	
Potassium Tetracyao Cuprate	A	A		
Potassium Thiosulphate	A	A		
Propargyl Alcohol	A			
Propane Acid	see Propionic Acid			
Propane Diol	see Propylene Glycol			
Propane Triol	see Glycerine			
Propane, gas	A	B		
Propane, liquid	B			

Compound	Chemical resistance			
	40°C	60°C	80°C	100°C
Propanol	A	A	A	
Propanone	see Acetone			
Propargyl Alcohol	A	B		
Propene	A	A	A	
Propionic Acid	A	A	A	
Propyl Acetate			B	
Propyl Alcohol	see Propanol			
Propylene Dichloriole	U			
Propylene Glycol	A	A	A	
Propylene Oxide	A	A		
Prune Juice	A			
Pseudo Cumol/Pseudo Cumene	B	B		
Pyridine	A	B	C	
Pyrol			B	
Quinine	A	A		
Rayon Coagulating Bath	A	B		
Resorcinol	A	B		
Ricine Oil	A		B	
Rinser Loosener	A	A	A	
Road Tar	U			
Roasting Gases	A	A		
Rouge	A	A		
Rubbers Dispersions/Latex	A	A		
Sagrotan	A	B		
Salicylic Acid	A	A	A	
Salicylic Acid Methyl Ester	A	B		
Sauerkraut	A	A		
Sea Water	A	A	A	A
Selenic Acid	A	A		
Shampoos, Shaving Lotion	A	A		
Shortening	A	B		
Silicic Acid	A	A		
Silicone Fats	A	A	A	
Silicone Oils	A	A	A	
Silver Nitrate≤80%	A	A	A	B
Silver Salts, cold saturated	A	A	A	
Soap	A	A	A	
Soap Loosener	A	A	A	
Soap Solution	A	A	A	
Soda	see Sodium Carbonate			
Sodium Acetate	A	A	A	

Compound	Chemical resistance			
	40°C	60°C	80°C	100°C
Sodium Aluminate	A	A	A	
Sodium Aluminium Sulphate	A	A	A	
Sodium Benzoate	A	A	A	
Sodium Benzoate to 36%	A	A	A	
Sodium Bicarbonate	A	A	A	
Sodium Bisulphate	A	A	A	
Sodium Bisulphite	A	A	A	A
Sodium Borate	A	A	A	
Sodium Bromide	A	A	A	
Sodium Carbonate	A	A	A	
Sodium Chlorate	A	A	A	
Sodium Chloride	A	A	A	A
Sodium Chlorite 50%	A	A	A	A
Sodium Chlorite and Bleach	A		B	
Sodium Chlorite and Water	A	A	A	A
Sodium Chromate	A	A		
Sodium Cyanide	A	A	A	
Sodium Dichromate	A	A		
Sodium Dodecylbenzene Sulfonate	A	A		
Sodium Ferricyanide	A	A	A	
Sodium Ferrocyanide	A	A	A	
Sodium Fluoride	A	A	A	
Sodium Hexacyano Ferrate	A	A		
Sodium Hexametaphosphate	A			
Sodium Hydrogen Carbonate	A	A	A	
Sodium Hydrogen Phosphate	A	A	A	
Sodium Hydrogen Sulphite sol.	A	A	A	
Sodium Hydrosulphite 10%	A	A	A	
Sodium Hydroxide 15%	A	A		
Sodium Hydroxide 20%	A	A		
Sodium Hydroxide 30%	A	A		
Sodium Hydroxide 50%	A	A		
Sodium Hydroxide 70%	A	A		
Sodium Hydroxide Conc. (Caustic Soda)	A	A		
Sodium Hypochlorite 12%	B	D		
Sodium Hypochlorite Solution	B			
Sodium Metaphosphate	A	A	A	
Sodium Nitrate	A	A	A	
Sodium Nitrite	A	A	A	
Sodium Perborate	A	C		

Compound	Chemical resistance			
	40°C	60°C	80°C	100°C
Sodium Perchlorate	A	A		
Sodium Peroxide 10%	A	A	A	
Sodium Phosphate	A	A	A	
Sodium Polyacrylate (GR 894)	A	A	A	
Sodium Silicate	A	A	A	
Sodium Sulphate	A	A	A	
Sodium Sulphide	A	A	A	
Sodium Sulphite	A	A	A	
Sodium Tetraborate	A	A	A	
Sodium Thiosulphate	A	A	A	
Soya Oil	A	B		
Spermaceti	A	B		
Spindle Oil	C	D		
Spinning Oil	A		B	
Spinning-Bath Oil containing Carbon Disulphide 0.01%	A	A		
Spinning-Bath Oil containing Carbon Disulphide 0.07%	A	A		
Spot Solvents	A	A	A	
Stain Removers	C	D		
Stannic Chloride	A	A		
Stannic Salts	A			
Stannous Chloride	A	A		
Starch	A	A	A	A
Starch Syrup	A	A	A	
Steam	A	A	A	
Stearic Acid	A	A	B	
Styrene	C	U		
Succinic Acid	A	A		
Sucrose Solution	A	A	A	
Sugar	A	A		
Sulphates	A	A		
Sulphur	A	A	A	
Sulphur Dioxid, dry	A	A	A	B
wet, in water solution	A	A	A	
Sulphur Solution	A			
Sulphur Trioxide	U			
Sulphuric Acid 20%	A	A	A	A
Sulphuric Acid lower than 50%	A	A	A	B
Sulphuric Acid 70%	A		C	
Sulphuric Acid 80-90%	B	C		
Sulphuric Acid 96%	A			U

Compound	Chemical resistance			
	40°C	60°C	80°C	100°C
Sulphuric Acid 98%	U			
Sulphuric Ether	B	C		
Sulphurous Acid	A	A		
Sulphuryl Chloride	B			
Superchloric Acid	see Perchloric Acid			
Synthetic Washing Powder, home quality	A	A	A	
Tallow	A	B		
Tannic Acid	A	A		
Tannin	see Ascorbic Acid			
Tar	U			
Tartaric Acid (Dihydrxy Succinic Acid)	A	A		
Tea	B	B		
Tertiary Butyl Alcohol	A	A	A	
Tetrabromo Ethane	D	U		
Tetrachloro Ethane	D	U		
Tetraethyl Lead	A			
Tetrahydro Furane	U			
Tetrahydro Furfuryl Alcohol	A			
Tetrahydro Naphtalene	B	U		
Tetraline	see Tetrahydro Naphtalene			
Tetramethylene Oxide	see Tetrahydro Furane			
Tin Chloride	A	A		
Tin Salts	A	A	A	
Thinner	D			
Thioglycolic Acid	A	A		
Thionyl Chloride	D	U		
Thiophene	D	U		
Titanium Tetrachloride	U			
Toluene	D	U		
Tomato Juice	A	A		
Transformer Oils	A	C	D	
Tributile Phosphate	A	A		
Tributro Ethyl Phosphate			B	
Trichloro Acetic Acid	A		B	
Trichloro Acetic Acid 50%	A	C		
Trichloro Benzene	U			
Trichloro Ethane	C		U	
Trichloro Ethylene (Tri)	U			
Trichloro Methane	see Chloroform			
Tricresyl Phosphate	A	A		

Compound	Chemical resistance			
	40°C	60°C	80°C	100°C
Triethanolamine	A	B		
Triethylene Glycol	A	A		
Trifluoroacetic acid (TFA)	A			
Trilom, trade quality	A	A	A	
Trimethyl Borate	U			
Trimethylbenzene	see Pseudocumol			
Trimethylol Propane	A	A		
Trinitro Phenol	see Picric Acid			
Trinitro Toluene	U			
Trioctyl Phosphate	A	B		
Trisodium Phosphate	A	B	C	
Trybutyl Phosphate	A	A	A	
Turbine Oil			B	
Turpentine	D	U		
Tutogen U	A	A		
Tween 20	B	U		
Tween 80	B	U		
Urea	A	B		
Uric Acid	A	A		
Uric Compounds	see Carbamide			
Urine	A	A		
Urine, normal conc.	A	A	A	
Vanille Extract	A	B		
Vaseline	A	B	C	
Vaseline Oil	A		B	
Vegetable Dyes	A	A		
Vegetable Oils	B	B	B	
Vinegar	A	A	A	
Vinegar Acid Anhydride	A	A	B	U
Vinegar Acid Butyl Ester	see Butyl Acetate			
Vinegar Acid Ethyl Ester	see Ethyl Acetate			
Vinegar Ester	see Ethyl Acetate			
Vinegar, trading quality	A	A	A	
Vinyl Acetate	A	A		
Vinyl Chloride	A	A	A	
Vinyl Cyanide	see AcryloNitrile			
Viscose Spinning Solution	A	A		
Vitamine C	A	A		
Walnut Oil	A	B		
Wastegases with Acid	A	A		

Compound	Chemical resistance			
	40°C	60°C	80°C	100°C
Wastegases with Carbon Monoxide	A	A		
Wastegases with HCL	A	A		
Wastegases with H2SO4	A	A		
Wastegases with low sodium Dioxide	A	A		
Wastegases with traces of Hydrogen Fluoride	A	A		
Wastegases with traces of Nitrosyl Sulfuric Acid	A	A		
Water	A	A	A	A
Water Acid Mine	A			
Water Deionized	A			
Water Distilled	A			
Waterglass	A			
Waxes	A	C		
Wetting Agents	A	B		
Whey	A	A		
Whisky	see Ethyl Alcohol			
Whitener	see Sodium Hypochlorite			
Wine Vinegar	see Vinegar			
Wine, red and white	A	A	A	
Wohlstone Acid	A	A	A	
Wood Glue, type Polyvinyl Acetate	B			
Wood Stains	A	C		
Wool Fat	see Lanolin			
Xylol	C		U	
Yeast	A	A	A	
Zinc Bromide	A	A		
Zinc (II) Chloride	A	A	A	B
Zinc Carbonate	A	A	A	
Zinc Hydrate	A	A	A	
Zinc Oxide	A	A	A	
Zinc Salts	A			
Zinc Sludge	A	A		
Zinc Stearate	A	A		
Zinc Sulphate	A	A	A	

Classification

A. Resistant: can be used within the working pressures, according to table 11.2 or 12.1 (safety factor of 1.25).

B. Conditionally resistant: restrictions of 70% to 90% must be made regarding the working pressures according to table 11.2 or 12.1.

C. Conditionally resistant: can be used within pressures up to 60% of the working pressures.

D. Conditionally resistant: can be used within pressures up to 20% of the working pressures.

U. Unknown, not recommended.

In case of dangerous liquids (strong acids and bases) the safety factor should be increased to 1.5 or 2.0.
In case of doubt please consult us.

FITTINGS

Non-Restrained Fittings and Pullout Prevention Techniques

Buried Pexgol pipes and their approved fittings are self-restrained and require no thrust blocking.

Thrust blocks are used to support fire hydrants. Concrete pads are used under metal valves to reduce settlement. Anchor blocks are used when a Pexgol pipe is to be connected to other pipe materials that use bell and spigot connections unless these connections are themselves restrained to prevent pullout.

Generally, it is necessary to anchor the ends of a Pexgol pipeline that transitions into an unrestrained joint pipe system.

Design of wall anchors and thrust blocks

A typical anchoring technique is installing a fixpoint clamp or a GP flanged coupling on the pipe close to the wall, and pouring concrete around it.

Non-restrained fittings

A different situation occurs in certain applications where axial forces which are present in the pipe may pull out the pipe from non-restrained joints.

The axial forces may be a result of the following:

- Thermal deflection (contraction) due to temperature variations.
- Ground movement and earthquakes.
- Hoop expansion: The internal pressure hoop expands the diameter (ever so slightly) and tends to contract the pipe length in proportion to Poisson's Ratio.

In dewatering or borehole applications, additional longitudinal forces might be present due to the weight of the pipeline, the weight of the water column, or pump weight. These axial forces could result in pulling out the pipe from a gasket joint or a complete pulling out of the Pexgol pipe from the fitting.

Buried applications

All Pexgol's fittings that are approved for buried applications are considered as restrained connections and they do not require any pull-out prevention method in buried applications.

Above ground applications

For the applications of horizontal pipelines and inclined pipelines (including dewatering lines) with a slope of up to 40°, the following fittings are restrained by the ground and therefore are considered as restrained connections and do not require any pull-out prevention method:

- Electrofusion fittings
- Hela bolt connectors
- Branch-off saddles

The following fittings are considered as unrestrained connections for above ground applications, and they require a pullout prevention technique:

- Flanged couplers
- Pexgol flared end connectors
- Victaulic PE couplers
- Aquafast couplers

For dewatering applications and inclined pipeline with slope over 40°, all Pexgol fittings are considered as unrestrained connections, and they require a pull-out prevention technique.

Borehole applications

This is a special application requiring special constrained fittings and consulting.

Pullout prevention methods and devices

1. Fixpoints

Unrestrained fitting should be protected from pull-out by creating a fixpoint before and after each fitting using our fixpoint clamps (see pages 57 & 58).

2. Floating fixpoint device

In some applications (like dewatering or inclined pipelines) it might be costly or problematic to install fixpoints in the line.

In that case, if you have of a non-restrained fitting which requires a pullout prevention device, it might be easier to replace the two fixpoints by a floating fixpoint device.

A floating fixpoint device is actually two restraining fittings that are installed before and after the non-restrained fitting. Restraining a non-restrained fitting is achieved by connecting two restraining fitting so that the axial forces can be transfered through the device while bypassing the non-restrained fitting.

The pictures on page 58 show a few arrangements for a floating fixpoint device, including our fixpoint bridge (see pagess 58 & 75).

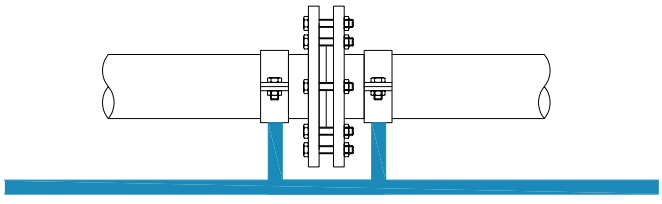
In cases of industrial installation over pipe supports, it is usually feasible to use the fixpoint clamps as pull-out prevention devices. However, in cases where the Pexgol pipe is connected to a steel pipe by a non-restrained fitting, it might be convenient to use the fixpoint bridge and install one clamp directly on the steel pipe. Alternatively, a combination of a back-flange and a fixpoint clamp can be used together with the existing steel flange(see drawing on page 58).

Fixpoint clamp

The fixpoint clamp is a standard item from Golan. It is available for all pipe diameters from 63 mm. For more details (see page 73).

Fixpoint clamp

The drawings show a double flared-ends connection or a double flanged coupling connection protected from pull-out by two fixpoint clamps. The solid blue lines represent a part of the construction that is not supplied by Golan.



Double flared-ends connection with two fixpoint clamps

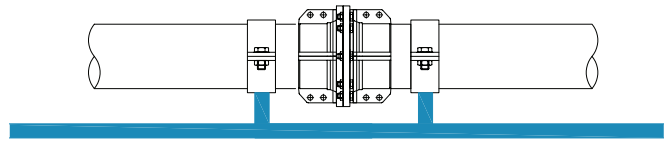


Figure 57.1: Double flanged coupling with two fixpoint clamps

Anchoring the pipeline along the line (for example, in case of sea outfall lines) is achieved by casting concrete on a fixpoint clamp.

A Flex Restraint electrofusion fitting by Plasson can be used to replace the fixpoint clamp.

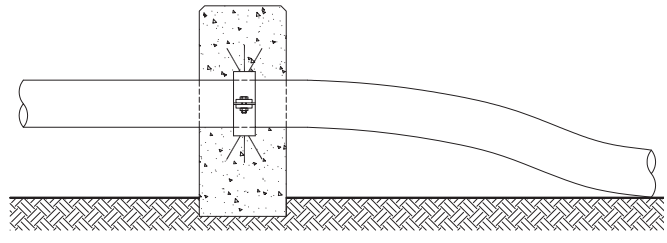


Figure 57.2: Anchoring block using a fixpoint clamp

Anchoring the end of an inclined pipeline (for example, in the case of dewatering lines) is necessary for restraining the weight of the inclined pipeline.

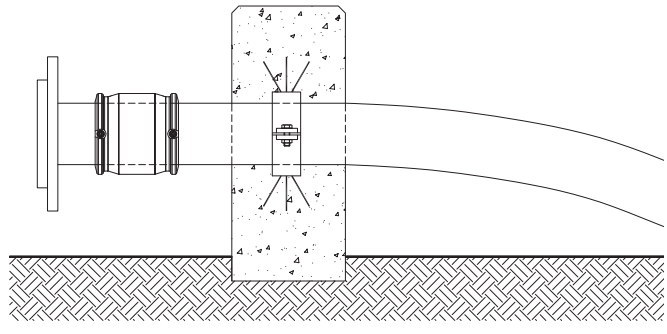


Figure 57.3: Anchoring the pipe end

Floating fixpoint devices

The central mechanical fitting is protected from pull-out by two external fittings operating in tandem with two loose flanges. Before connecting the central fitting, a loose flange is mounted over the pipe and then the external fitting is mounted over the pipe, far enough from the pipe end to allow the central fitting to be mounted later.

The axial forces are transmitted from one flange to the other flange through the threaded bars. The central fitting as well as the external fittings in the picture are Victaulic connectors but they can be replaced by flanged couplers or any other type of mechanical connectors approved for Pexgol pipes.

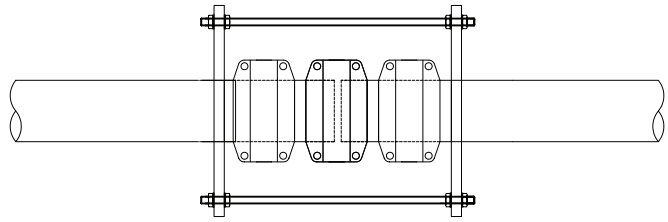


Figure 58.1: Floating fixpoint devices using two mechanical fitting

The central mechanical fitting is protected from pull-out by two external electrofusion fittings operating in tandem with two loose flanges. Before connecting the central fitting, a loose flange is mounted over the pipe and then the external electrofusion fitting is mounted over the pipe, far enough from the pipe end to allow the central fitting to be mounted later.

The axial forces are transmitted from one flange to the other flange through the threaded bars. The central fitting in the picture is a flared end connector, but it could be a flanged coupling or any other mechanical connector.

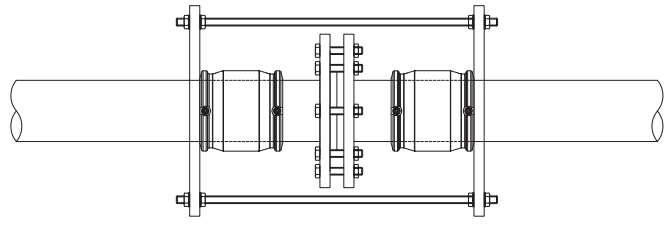


Figure 58.2: Floating fixpoint devices using two loose flanges and two electrofusion couplers

The floating fixpoint device in this picture is called a fixpoint bridge. It has two fixpoint clamps that replace the two external fittings and the two loose flanges in the previous pictures.

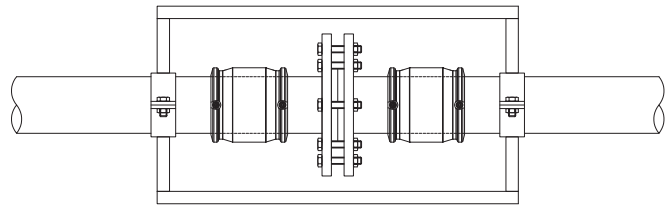


Figure 58.3: Floating fixpoint devices using a fixpoint bridge and two electrofusion fitting

The two fixpoint clamps are connected by a steel frame that replaces the threaded bars in the previous pictures. For more details (see page 75). The fixpoint bridge is a standard item available by ordering from Pexgol's fittings catalog (see page 117).

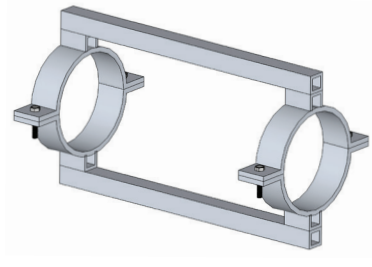


Figure 58.4: GP fixpoint bridge

PE100 electrofusion fittings

Electrofusion fittings are used to connect Pexgol cross-linked polyethylene pipes (for example, ISO 14531). The pipes and fitting are joined by electrofusion welding, creating a leak-proof seal. During the electrofusion process, a current is transported through a heating wire. The surrounding material (around the wire) is melted, welding the pipe to the fitting.

Service temperature for the PE 100 electrofusion fittings is limited to 40°C. For higher temperatures Pex2Pex electrofusion couplers can be used.

Golan approves and supplies the following fittings systems and installation tools: **Plasson, Friatec, GF/Wavin.**

www.plasson.com
www.friatec.com
www.gfps.com

	Group	Range
	Couplers	20 to 710 mm
	Branch saddles	63 to 710 mm
	Elbows 22.5°, 45°, 90°	20 to 250 mm
	Tees & Reducing tees	20 to 250 mm
	Reducing couplers	20 to 180 mm
	End cups	20 to 315 mm
	Flange adaptors	20 to 400 mm
	PP coated flanged backing ring	20 to 400 mm
	Transition couplers	20 to 110 mm
	Tapping saddles	40 to 250 mm
	Electrofusion control boxes & Installation tools	
	Non-standard & custom-made items	

Plasson Pex2Pex Electrofusion Fittings

Electrofusion fittings for high temperature working conditions

In addition to the mechanical fittings, the Pexgol system offers also a high temperature welding system. The items with the brand name Plasson Pex2Pex, are suitable for Pexgol pipes class 15 SDR11 in the temperature range from -50° to +110° and the full pressure ranges of this pipe class. The couplers are not UV resistant and should be protected from UV light.

Special high temperature electrofusion couplers

When higher working pressures or pipe dimensions are required, for which Plasson Pex2Pex couplers are not available, Golan offers special high temperature electrofusion couplers. Please consult Golan's application engineer.

Prior to using Plasson Pex2Pex fittings for the first time, please consult Golan regarding local training.

Table No. 60.1: Plasson Pex2Pex Coupler

Catalog Number	Pipe Diameter	D	L	L1	Weight (kg)
480100050	50	68	100	48.5	0.143
480100063	63	82	118	57	0.22
480100075	75	97	125	61	0.33
480100090	90	115	145	70.7	0.53
480100110	110	139	161	79	0.82
480100125	125	155	169	83	1.00
480100160	160	196	192	94.7	1.77

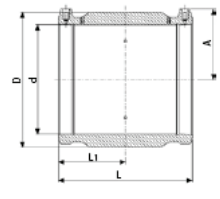


Table No. 60.2: Plasson Pex2Pex 90° Elbow

Catalog Number	Pipe Diameter	D	L	L1	Weight (kg)
480500075	75	96	149.5	60.7	0.50
480500090	90	110.5	201.5	70	0.84
480500110	110	140	234	71	1.52
480500125	125	163.1	271	81	2.33

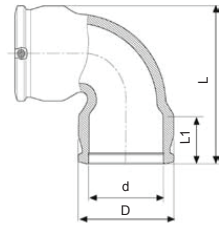


Table No. 60.3: Plasson Pex2Pex tees

Catalog Number	Nominal Diameter	D1	D2	L	L1	L2	A	Weight (kg)
480400050	50	68	68	139	48.5	48.5	155	0.374
480400063	63	82	82	166	57.5	57.3	188	0.598
480400075	75	97	96	195	58.5	61.0	232	0.997
480400090	90	112	115	292	70.5	70.7	252	1.700
480400110	110	142.5	138.5	327.5	71.5	79	296	2.386
480400125	125	163	154.5	380	85	83	326	3.838

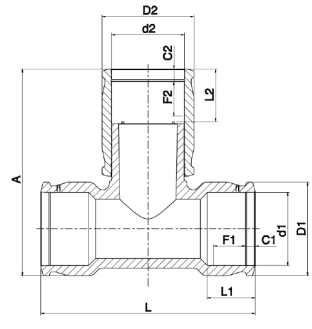
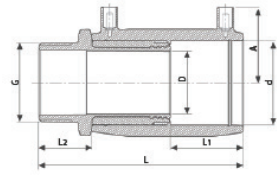


Table No. 60.4: Plasson Pex2Pex Brass Connector

Catalog Number	Pipe Diameter	G	D	L	L1	Weight (kg)
482100050015	50	1 ½"	38	136	48.5	0.53
482100063020	63	2"	48	160	57	0.9
482100075020	75	2"	59	166	61	1.3
482100075025	75	2 ½"	59	171	61	1.5



Pex-lined Fittings

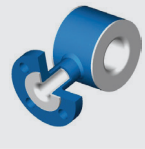
Pex-lined steel fittings consist of a steel flanged fitting lined with thick black Pex coating which extends over the full face of the flanges. This type of fitting can be used as a standard fitting such as a Tee, an elbow, or a reducer. The fittings are supplied with an external epoxy coating. Standard fittings are supplied with wall thickness of Pex layer: 3 – 5 mm for corrosion resistance and up to 10 mm for abrasion resistance.

The fittings are usually supplied with weld-neck flanges. Loose flanges are supplied on request. Shorter fittings (with slip-on flanges instead of weld-neck flanges) are supplied on request.

The elbows in the fittings catalog (page 142) are 1.5XD elbows. Long-radius (3XD) elbows or elbows with a larger radius can be supplied upon request. The minimum length of each fitting is indicated in the fitting catalogue pages 117 to 146. This length can be reduced after consulting Golan.

It is possible to order a non-standard fitting, which is a combination of standard fittings, or a standard fitting with longer legs. For maximum allowable length, consult the application engineer.

Golan supplies straight sections of steel Pex-lined pipes as well, between Pex-lined fittings, in order maintain the same ID on the line. Alternatively, Golan supplies Pexgol pipes with the same or similar ID, or Pexgol reducers to match the ID.

Lined equal tee range 1" - 24"	
Lined equal cross range 1" - 24"	
Lined elbows 90° and 60° range 1" - 24"	
Lined reducer range 1" - 24"	
Lined instrument tee range 1" - 24"	
Lined reducing tee range 1" - 24"	
Lined lateral tee range 1"-24"	

For full details, see Pexgol Fittings Catalog, pages 117 to 146.

Brass Fittings for Pexgol Pipes Class 15 & 24

Notes:

- It is recommended to install brass fittings above the ground.
  If you must install them, make sure they are protected from corrosion.
- Do not connect brass fittings to steel or galvanized steel pipes or fittings.
- All thread outlets are BSPT.
- NTP threads are available upon request.

Branch-off saddles: male & female thread range 32 - 160 mm	
GP bolt connectors: DZR brass male & female BSPT thread range 32 - 160 mm	
Hela 8010 Pex double bolt connectors DZR brass class 15/24 range 32 - 160 mm	
HELA 8045 Pex equal Tee bolt connectors DZR brass class 24 range 40 - 63 mm	
HELA 8047 reducing Tee bolt connectors DZR brass class 24 range 25 - 50 mm	
Various brass elbows, Tees, nipples and bushings in sizes of up to 4"	

For full details, see Pexgol Fittings Catalog pages 117 to 146.

Branch-Off Saddles

Branch-off saddles are designed for side outlets of a maximum diameter equaling half of the main pipe's diameter. They are made from plastic or metal. Plastics saddles may be installed below ground. If you must install metal saddles below ground, make sure the ground is not corrosive for brass or stainless steel saddles. Do not connect brass fittings to steel or galvanized steel pipes or fittings.

Pexgol pipes can be used with plastic saddles such as Plasson mechanical saddles or electrofusion saddles, with restrictions regarding the allowable temperature and pressure range, according to Golan's recommendations for Pexgol pipe connections.

Golan's metal saddles are suitable for the full temperature and pressure ranges of Pexgol pipes. Brass saddles with threaded outlets are used for pipes from 32 mm to 160 mm diameter; see the next page for the installation of saddles.

For diameters bigger than 110 mm, stainless steel saddles with threaded or flanged outlets (according to standard requirements) are available.

All metal saddles are suitable for pipes transporting drinking water.

Saddles with internal rubber lining at the flange outlet are available for corrosive materials that might damage the stainless steel saddles. Golan supplies these saddles on special request.

Branch-off saddles - male & female thread range 32 - 160 mm *	
Pexgol stainless steel branch-off saddles threaded outlet *	
Branch saddles 63 - 710 mm **	

* For full details, see Pexgol Fittings Catalog.
** For full details, see Plasson, Friatec and GF/Wavin catalogs.

Prefabricated Pexgol Elbows

Prefabricated elbows are produced from Pexgol pipes of all classes according to a proprietary process.

Prefabricated elbows with flared-ends are available in any length between the minimum and maximum values, dimension A. Prefabricated elbows with plain ends are available in minimum lengths according to dim.B.

The length of each leg of a Pexgol elbows is specified according to dimension A or dimension B in table 64.1

Each leg can be ordered with plain ends or with flared ends with or without flanges. The length of each leg can be different.

The elbows are produced with a tolerance of up to +5 degrees and +/-10 mm in length.

For full details see Fittings Catalog (page 117) where the full range of products is available.

When ordering, please specify length A or B, and describe the pipe ends. For example:

ELB16014.6-453D one leg 550 mm with flared end and flange ASA 150, the other leg 420 mm plain end.

The weight of the elbow is calculated by adding the A or B values of the legs, dividing them by 1,000 (to get the total length of the elbow in meters) and then multiplying by the weight per meter of the pipe according to the pipe dimensions tables.

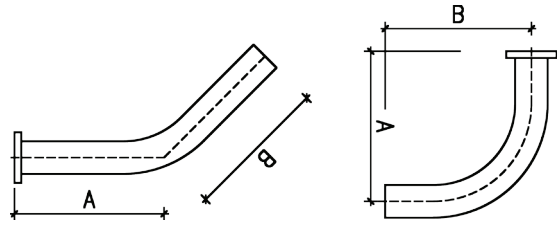
Table No. 64.1: Dimensions of Pexgol elbows

OD	1.5D						3D					
	45°			90°			45°			90°		
	A [mm]		B [mm]	A [mm]		B [mm]	A [mm]		B [mm]	A [mm]		B [mm]
	Min	Max	Min	Min	Max	Min	Min	Max	Min	Min	Max	Min
50	210	400	100	260	600	130	240	500	140	330	600	230
63	225	450	120	320	600	180	260	500	160	380	650	280
75	235	450	130	310	600	210	280	500	180	420	700	320
90	250	350	155	380	600	240	305	500	215	465	700	375
110	270	350	190	420	700	280	335	500	235	530	750	445
125	280	400	200	400	600	320	350	500	270	575	800	500
140	295	400	210	430	700	350	375	500	295	625	900	545
160	300	400	225	450	750	320	410	600	335	690	1000	620
180	300	400	225	450	750	370	430	610	360	720	950	650
200	350	550	350	635	900	450	450	620	450	800	1100	800
225	400	600	400	700	1000	500	500	800	500	900	1250	900
250	450	700	450	720	1000	500	550	800	550	1000	1250	1000
280	480	700	480	820	1000	600	650	950	650	1100	1330	1100
315	550	800	550	900	1100	700	700	1100	700	1250	1500	1250
355	650	900	650	1000	1200	1000	800	1100	800	1400	1600	1400
400	700	1000	700	1080	1300	1080	900	1100	900	1500	2400	1500
450	800	1100	800	1200	1400	1200	1000	1150	1000	1900	1900	1900
500	850	1200	850	1350	1500	1350	1100	1100	1100	2000	200	2000
560	*	*	*	*	*	*	*	*	*	*	*	*
630	1100	1300	1100	1650	1900	1650	1450	1700	1450	2400	2500	2400
710	*	*	*	*	*	*	*	*	*	*	*	*

* Available upon request

Notes:

- Elbow length also includes a straight section to make connection to the elbow easier.
- The dim.A is the length of the elbow with a flared end & flange.
- Elbows with a plain end (for electrofusion or mechanical connector) are available with a shorter length according to dim.B.
- Elbows with longer dimensions A or B are available by special order (after coordination with Golan Plastic Products).
- Larger or smaller radius elbows are available by special order. Elbows with angles not according to standard are available by special order.



Flared End Connectors

The ends of the Pexgol pipe are heated and then flared by a proprietary process, performed at Golan Plastic Products. The final pipe end is similar to a stub end. Flared ends can be also be made at the ends of Pexgol elbows, reducers, etc.

The loose flange is usually mounted over the pipe at Golan during the flaring process. Alternatively, split flanges can be supplied and mounted later. The flanges are available according to table 72.1 Flanges that conform to different standards are available by special request. Detailed drawings of flanges are supplied on request. Plastic coated flanges are available on request.

Pexgol flared end pipes are available in lengths according to customer specifications. They are also available in lengths of 5.80 m to fit into 20 ft containers or in lengths of 11.80 m to fit into 40 ft containers. The elbows with flared ends are available from our catalog according to specified length. Pexgol flared end pipes are available in minimum lengths according to table No. 65.1.

Table No. 65.1: Length (L) for Pexgol stub end

Catalog Number	Pipe dia.	Standard length	Minimum length L
FLA322.9	32	500	85
FLA403.7	40	500	85
FLA6504.6	50	500	104
FLA635.8	63	500	120
FLA756.8	75	500	130
FLA908.2	90	500	140
FLA11010	110	500	160
FLA12511.4	125	500	182
FLA14012.7	140	500	180
FLA16014.6	160	500	180
FLA18016.3	180	500	198
FLA20018.1	200	500	200
FLA22520.4	225	500	200
FLA25022.7	250	500	215
FLA28025.4	280	500	228
FLA31528.6	315	500	238
FLA35532.2	355	500	255
FLA40036.3	400	500	285
FLA45040.9	450	500	320
FLA50045.4	500	500	350
FLA56050.8	560	500	380
FLA63057.2	630	500	400
FLA71064.5	710	500	450

The straight sections with flared ends are produced with a tolerance of +/- 10 mm in length. The elbows with flared ends are produced with a tolerance of up to +5 degrees and +/- 10 mm in length

The catalog number in table No. 65.1 represents a Pexgol stub-end that is a Pexgol pipe class 15 spool with a standard length of 500mm and with a flared end on one side. For example – *FLA16014.6 means pipe section 160 mm, wall thickness 14.6 mm, and length 500 mm. For sections shorter than 500 mm, use the length L in the table.*

If a different wall thickness is required or a longer section is required, or flared end on both sides, or the section should be supplied with loose flanges, please specify according to the following example:

For a pipe section 160 mm, wall thickness 14.6 mm, length 2500 mm with one flared end & flange – FLA16014.6 2500 mm with flaring and flange ASA 150 on one side.

Please refer to our fitting catalog where the full range of fittings is available.

Pexgol Short Sections with two Flared Ends

The following table lists the lengths of short flared ends Pexgol sections.

The A length is relevant for short sections which are supplied with regular flanges.

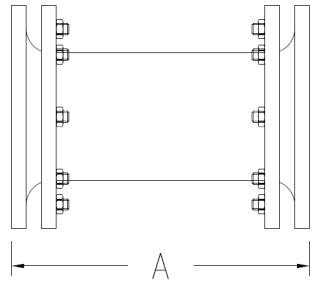
The shorter B length is applicable for short sections which are supplied with split flanges that can be mounted after the short section is flared.

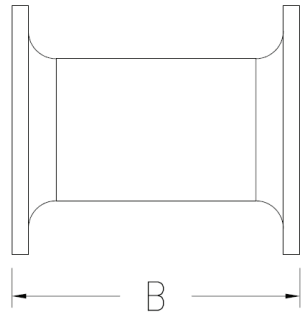
The short sections with flared ends are produced with a tolerance of +/- 10 mm in length.

Table No. 66.1: Dimensions of Pexgol spacers

Pexgol O.D.	Minimum length of a flanged Pexgol pipe with full S.O. flanges	Minimum length of a Pexgol pipe with split S.O. flange
	A	B
90	210	165
110	215	165
160	225	175
180	240	200
200	290	230
225	290	230
250	355	290
280	340	280
315	380	320
355	355	285
400	395	320
450	410	330
500	550	350
630	--	380

Catalog Number 65900035





Extra-thin Pexgol Spacers

Pexgol spacers are supplied in any width up to 50 mm.

Pexgol Spigot Reducers

Pexgol concentric spigot reducers are available according to the following table. Other sizes are available by special order. The working pressures and temperatures of the Pexgol spigot reducers are the same as for the d1 side of the reducer. Table 67.1 lists the dimensions of standard spigot reducers. The sizes in the table are a partial list only, and other sizes are available on request.

When using the Spigot reducers to connect them with electrofusion couplers, the end user can shorten lengths L1 or L2.

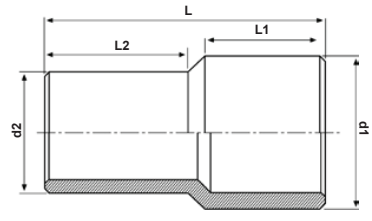


Table No. 67.1: Dimensions of Pexgol spigot reducers

Catalog Number	Size d1 x d2	Size L	Size L1	Size L2	Weight (kg) class 10	Weight (kg) class 15	Weight (kg) class 24
RED75 x 63	75 x 63	405	205	175	0.20	0.3	0.43
RED90 x 75	90 x 75	420	215	180	0.34	0.49	0.7
RED90 x 63	90 x 63	420	215	175	0.35	0.49	0.71
RED110 x 90	110 x 90	580	280	270	0.55	0.79	1.14
RED110 x 75	110 x 75	580	280	255	0.56	0.8	1.16
RED110 x 63	110 x 63	580	280	240	0.57	0.81	1.17
RED125 x 110	125 x 110	620	280	280	0.73	1.04	1.48
RED125 x 90	125 x 90	620	280	270	0.78	1.12	1.59
RED140 x 125	140 x 125	700	360	290	0.98	1.38	1.98
RED140 x 110	140 x 110	700	360	280	1	1.41	2.03
RED160 x 140	160 x 140	720	355	360	1.32	1.88	2.68
RED160 x 125	160 x 125	720	355	350	1.4	2	2.85
RED160 x 110	160 x 110	720	355	340	1.43	2.04	2.9
RED180 x 160	180 x 160	580	260	255	2.1	3	4.2
RED180 x 140	180 x 140	580	260	245	1.5	2.2	3.1
RED180 x 125	180 x 125	580	260	235	1.6	2.3	3.3
RED200 x 160	200 x 160	580	260	255	2.45	3.46	4.97
RED200 x 110	200 x 110	580	260	255	2.68	3.8	5.46
RED225 x 200	225 x 200	590	250	270	3.23	4.6	6.58
RED225 x 180	225 x 180	590	260	260	3.1	4.35	6.2
RED225 x 160	225 x 160	590	260	260	3.45	4.92	7.03
RED250 x 225	250 x 225	680	330	320	4.25	6.02	8.74
RED250 x 200	250 x 200	680	330	320	4.41	6.24	9.07
RED250 x 160	250 x 160	680	330	320	4.68	6.63	9.63
RED280 x 250	280 x 250	700	340	330	5.72	8.15	15.57
RED280 x 225	280 x 225	700	300	320	5.98	8.51	16.26
RED315 x 280	315 x 280	770	340	330	7.82	11.14	18.87
RED315 x 250	315 x 250	770	340	330	8.13	11.58	19.62
RED355 x 315	355 x 315	795	350	340	10.7	15.25	23
RED355 x 280	355 x 280	795	350	340	11.31	16.12	24.3
RED400 x 355	400 x 355	815	355	350	15.02	21.44	28.58
RED400 x 315	400 x 315	815	355	350	15.72	22.43	29.91
RED450 x 400	450 x 400	865	275	355	21.1	30.17	36.76
RED450 x 355	450 x 355	865	400	355	21.96	31.4	38.26
RED500 x 450	500 x 450	631	302	275	28.4	40.7	43.22
RED500 x 400	500 x 400	659	302	249	29.66	42.51	45.14
RED630 x 500	630 x 500	782	340	302	55.94	79.49	67.52
RED630 x 450	630 x 450	809	340	275	57.87	82.24	69.85

Pexgol Reducers with Flared Ends and Flanges

The working pressures and temperatures of the Pexgol spigot reducers are the same as for the d1 side of the reducer. Pexgol reducers are supplied with flared ends, with or without flanges. If supplied without flanges, use split flanges that can be installed later by the end user.

The split flanges can be supplied by Golan or by the end user.

The maximum length of each flared end is specified as L1 or L2 according to table 65.1 or any length down to the minimum length L in table 67.1.

The reducers with flared ends are produced with a tolerance of +/- 10 mm in.

Pexgol Special Reducers/Adaptors

Golan supplies special reducers for individual projects.

For example:

- Reducers to match the inside diameter of Pexgol pipes to steel pipes or pipes made from other materials.
- Adaptors for Pexgol pipes with the same ID and different OD.

To order the Pexgol special reducers/adaptors, please consult Golan's application engineer.

Spacers which are installed between Pexgol pipes and butterfly valves to allow the opening of the valve.

Catalog Number 65900040

Pexgol Instrument tees & Water Flushing Ports

Pexgol Instrument tees & Water flushing ports for all Pexgol pipe sizes are available.

They are installed between two adjacent flanges.

The inlet is made of 316 stainless steel. Other corrosive resistant materials can be specified on request.

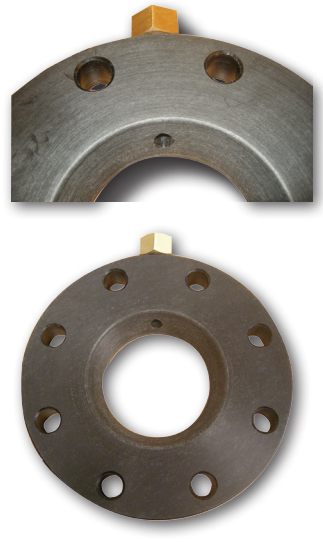
The inlet is available as ¾" or ½" female thread.

The inlet is available as 1", ¾" or ½" male thread.

To order Pexgol special reducers/adaptors, please consult Golan's application engineer.

Pexgol Single/Double Sided Orifice

Golan supplies this accessory according to the client design with one or two connecting points.



Catalog Number 65900045

Flanged Couplers for Pexgol Pipes

Available in sizes from diameter 63 mm to 710 mm.

The couplers can be used for the full range of temperatures and pressures, the same as Pexgol pipes. Pexgol flanged couplers consist of either two halves or four quarters depending on the pipe size. The body of the coupling is made of Spheroidal cast iron GGG40 (ASTM A-536). The inner surface of the coupling has special stainless steel teeth.

These teeth penetrate into the pipe wall during tightening of the coupling and provide good anchoring onto the pipe, preventing the pipe from pulling out from the fitting. The flanged couplers are supplied with an integral gasket and bolts for connecting the two halves or four quarters.

The gasket seals between the coupler and the pipe, and also between the coupler and the opposite flange.

The gasket is designed so that the coupler does not come into contact with the liquid flowing through the pipe.

The standard gasket is made of EPDM; other materials are applied according to special order. The flange has oval holes designed to fit most international standards; see table 69.1.

Installing the coupler is simple and easy:

- Place the gasket on the pipe.
- Open the screws and apply anti seize lube.
- Place the coupler around the pipe and tighten the screws equally. Recommended: use of electric rattle guns
- For connecting two flanged couplers use Table 71.1 if needed.

A complete installation manual is available upon request.

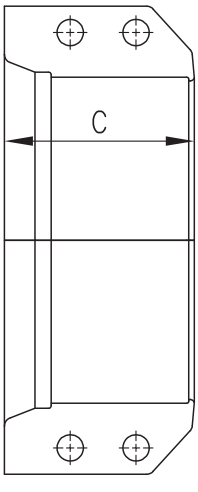
Table No. 69.1: Compatibility with international flange standards

Catalog Number	Pipe OD (mm)	Nominal Flange size		DIN			ANSI			BSTD
		DN (mm)	In.	2632	2633	2634	125	150	300	
				10	16	25				
50806320	63	50	2"	V	V	V	V	V	V	-
50807525	75	65	2 1/2"	V	V	-	V	V	-	-
50809030	90	80	3"	V	V	V	V	V	V	-
50811040	110	100	4"	V	V	V	V	V	V	V
50812540	125	100	4"	V	V	V	V	V	V	V
50814060	140	150	6"	V	V	-	V	V	-	V
50816060	160	150	6"	V	V	-	V	V	-	V
50818060	180	150	6"	V	V	-	V	V	-	V
50820080	200	200	8"	V	-	-	V	V	-	V
50822580	225	200	8"	V	V	-	V	V	-	V
50825010	250	250	10"	V	V	-	V	V	-	-
50928010	280 ASA	-	10"	-	V	-	V	V	-	-
50828010	280 BS	250		-	-	-	-	-	-	V
50831512	315	300	12"	-	V	-	V	V	-	V
50835514	355	350	14"	-	-	-	V	V	-	V
50840016	400	400	16"	-	-	-	V	V	-	-
50845018	450	450	18"	-	-	-	V	V	-	-
50850020	500	500	20"	V	V	-	V	V	-	-
50863024	630	-	24"	-	-	-	V	V	-	-
50871028	710	-	28"	-	-	-	V	V	-	-

Flanged Coupler for Pexgol Pipes - Continued

Table No. 70.1: General dimensions of flanged couplers and bolts for connecting 2 quarters of coupler

Catalog Number	Outside diameter of pipe (mm)	Nominal Flange size		A	C	Bolt size (in.)	Bolt length (mm)*	No.of bolts	Weight (kg)
		DN	in.						
50806320	63	50	2	165	70	3/8"	40	4	2.7
50807525	75	65	2 1/2"	185	80	1/2"	45	4	2.5
50809030	90	80	3	208	96	1/2"	45	4	4.0
50811040	110	100	4	242	110	5/8"	45	8	6.5
50812540	125	100	4	242	110	5/8"	45	8	8
50814060	140	150	6	285	120	5/8"	50	8	10
50816060	160	150	6	285	120	5/8"	50	8	11.2
50818006	180	150	6	285	119	5/8"	50	8	12.1
50820080	200	200	8	348	130	5/8"	50	8	13.0
50822580	225	200	8	344	130	5/8"	50	8	12.4
50825010	250	250	10	410	150	5/8"	60	8	17.0
50928010	280 ASA		10	405	160	5/8"	60	8	20.0
50828010	280 BS	250		405	160	5/8"	60	8	20.0
50831512	315	300	12	475	180	3/4"	70	8	27.7
50835514	355	350	14	535	200	3/4"	70	8	40.0
50840016	400	400	16	600	215	3/4"	70	8	55.0
50845018	450	450	18	635	235	3/4"	70	8	65.0
50850020	500	500	20	715	280	3/4"	80	8	68.0
50863024	630		24	840	280	3/4"	80	8	86.0
50871028	710		28	930	320	3/4"	80	8	135.0



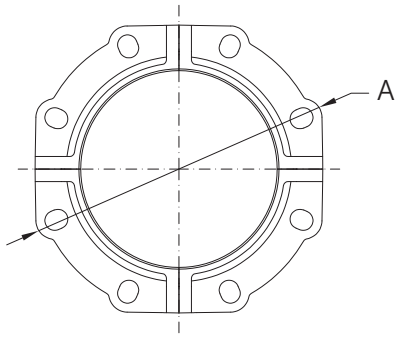


Table No. 71.1: Bolts for connecting 2 flanged couplings

Pexgol Pipe dia.	Flange size	Bolt size**	Bolt length (mm)**	No.of bolts	Torque N x m		Torque ft x lbs	
					Min	Max	Min	Max
63	2"	5/8" 16 mm	50	4	33	49	24	36
75	2 ½"	5/8" 16 mm	50	4	33	49	24	36
90	3"	5/8" 16 mm	50	4	33	49	24	36
110	4"	5/8" 16 mm	50	8	33	49	24	36
125	4"	5/8" 16 mm	50	8	33	49	24	36
140	6"	3/4" 20 mm	60	8	46	69	34	50
160	6"	3/4" 20 mm	60	8	46	69	34	50
180	6"	3/4" 20 mm	60	8	46	69	34	50
200	8"	3/4" 20 mm	60	8	64	99	47	73
225	8"	3/4" 20 mm	60	8	64	99	47	73
250	10"	7/8" 22 mm	70	12	64	99	47	73
280	10"	7/8" 22 mm	70	12	64	99	47	73
315	12"	7/8" 22 mm	70	12	93	140	68	103
355	14"	1" 25 mm	70	12	130	180	95	132
400	16"	1" 25 mm	75	12	130	180	95	132
450	18"	1 1/8" 28 mm	75	16	130	180	95	132
500	20"	1 1/8" 28 mm	100	16	125	185	92	136
560	22"	1 1/8" 28 mm	100	20	170	200	125	147
630	24"	1 1/4" 28 mm	110	20	170	200	125	147
710	28"	1 1/4" 28 mm	110	28	170	200	125	147

Compatibility of Pexgol Flanges

Table 72.1 describes the compatibility of each flange. Useful dimensions are also presented in the table. The flanges were designed to be compatible with most existing flange standards. Therefore, most of the bolt holes are oval and slightly oversized.

Complete drawing of flanges according to any required standard are prepared on request. Flanges according to other flange standards can be supplied by special order. Split flanges of all flange standards are supplied by special order.

Table No. 72.1: Compatibility of Pexgol flanges

Catalog Number	Pipe diameter	ISOR 2084 B.S. 4504		ANSI B 16.5 ASA 150	AS 2129 B.S. 10 : 1962		W.T.	No. of bolts	O.D	Weight (kg)
		DIN 2632	DIN 2633		Table D	Table E				
		ISO PN 10	ISO PN 16		PN 10	PN 16	T	N	D2	
65003201	32	DN25	DN25	1"	DN25-1"	DN25-1"	14	4	108	0.9
65004012	40	DN32	DN32	1.25"	DN32-1.25"	DN32-1.25"	16	4	118	1.2
65005015	50	DN40	DN40	1.5"	DN40-1.5"	DN40-1.5"	17	4	150	2.0
65006302	63	DN50	DN50	2"	DN50-2"	DN50-2"	19	4	152	2.2
65007525	75	DN65	DN65	2.5"	DN65-2.5"	DN65-2.5"	22	4	178	3.4
65009003	90	DN80	DN80	3"	DN80-3"	DN80-3"	24	4	190	4.0
65011004	110	DN100	DN100	4"	DN100-4"	DN100-4"	24	8	228	5.7
65012504	125	DN100	DN100	4"	DN100-4"	DN100-4"	24	8	228	5.1
65014006	140	DN150	DN150	6"	DN150-6"	DN150-6"	25	8	279	8.7
65016006	160	DN150	DN150	6"	DN150-6"	DN150-6"	25	8	279	7.6
65018006	180	DN150	DN150	6"	DN150-6"	DN150-6"	25	8	279	6.6
65020008	200	DN200	X	8"	DN200-8"	DN200-8"	28	8	343	12.6
65022508	225	DN200	X	8"	DN200-8"	DN200-8"	28	8	343	10.6
64825010	250	DN250	DN250	10"	X	DN250-10"	30	12	406	17.8
64925010	250	X	X	X	DN250-10"	X	22	8	406	13.0
64828010	280	DN250	DN250	10"	X	DN250-10"	30	12	406	14.5
64928010	280	X	X	X	DN250-10"	X	22	8	406	10.6
65031512	315	DN300	DN300	12"	DN300-12"	DN300-12"	32	12	482	24.1
65035514	355	DN350	DN350	14"	DN350-14"	DN350-14"	35	12	533	31.4
64840016	400	DN400	DN400	16"	X	X	36	16	597	40.2
64940016	400	X	X	X	DN400-16"	DN400-16"	36	12	578	35.3
64845018	450	X	X	18"	X	DN450-18"	40	16	635	45.3
64945018	450	X	X	X	DN450-18"	X	40	12	641	47.2
64850020	500	DN500	DN500	20"	X	X	43	20	698	57.6
64950020	500	X	X	X	DN500-20"	DN500-20"	43	16	705	60.2
64863024	630	X	DN600	24"	X	X	48	20	813	69.3
64963024	630	X	X	X	DN600-24"	DN600-24"	48	16	825	75.1

Fixpoint clamps

The fixpoint clamp (FPC) is made of steel with internal gripping teeth made of 316L stainless steel. The FPC is painted with a base paint that withstands welding.

The lower part of the clamp can be welded to the construction bridge (before installing the pipe) or it can be connected by screws. The distance between one adjacent pipe to the other is determined according to the width of the FPCs; see table 73.1.

Affix natural pipe bends with fixpoint clamps before and after each elbow. For pipe diameters of 280 mm and larger, support the natural pipe bends in the centre in addition to the two fix points noted.

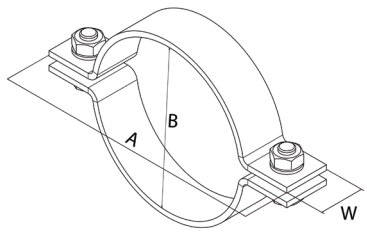


Table No. 73.1: Dimension table of fixpoint clamps

Catalog Number	Pipe Diameter (mm)	Length W (mm)	Width A (mm)	Weight (kg)
66206302	63	40	185	1.11
66207525	75	40	195	1.17
66209003	90	40	210	1.25
66211004	110	50	230	1.67
66212505	125	50	250	1.86
66214006	140	50	260	1.94
66216006	160	50	280	2.05
66218006	180	55	700	2.5
66220008	200	60	320	3.61
66222508	225	80	350	5.12
66225010	250	80	370	5.46
66228010	280	80	400	5.97
66231512	315	80	435	6.46
66235514	355	100	475	8.84
66240016	400	100	520	9.79
66245018	450	100	570	10.80
66250020	500	100	620	11.85
66263024	630	100	754	14.45

Pexgol pipe behavior at high temperature

Pexgol pipes have a tendency to elongate considerably when exposed to sunlight due to a high thermal expansion coefficient which is typical for plastic pipes. With increasing temperatures, the elastic modulus of the pipe decreases so the developing stress is not high.

When placing Pexgol pipe over pipe bridges, the thermal expansion is reduced by the use of suitable fixtures so that the pipe will develop internal stresses which do not cause any damage. There is no need to use expansion joints!

Pexgol pipe behavior at low temperature

When the ambient temperature drops below 20°C, the tendency to axial contraction could create axial stresses in the pipe. These stresses are absorbed by the pipe without causing damage (stress relaxation).

Minimum service temperature is -50°C.

Determining the maximum distance between two guiding clamps (see page 102 & table 102.1)

Max. force at the fixpoint clamps

Determining the maximum force at the fixpoint clamp

Pipes in Above-ground installations are subjected to temperature variations which induce axial thermal movements: contraction or elongation.

These axial thermal movements are partially balanced by external friction between the pipe and the construction.

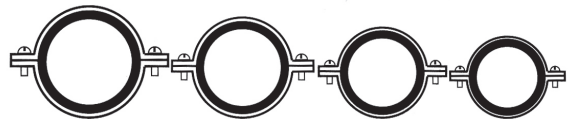
If a pipe is restrained with fixpoints, they will tend to restrain these thermal movements. As a result, these fixpoints will be subjected to axial forces which are balanced by axial thermal stresses inside the pipe's wall.

The axial thermal stresses can be calculated by the following formula:

- Sigma = E x A x ΔT where:
- E is the relevant (short term or long term) Modulus of Elasticity.
- A is the coefficient of Thermal expansion or contraction

ΔT is the temperature difference.

The values of the Modulus of Elasticity and the values of the coefficient of Thermal expansion or contraction are temperature dependent and so are the values of the axial thermal stresses.



The highest values of the thermal stresses occur during the relatively short stage of temperature changes and therefore they involve the short term Modulus of Elasticity. These initial Short term thermal stresses in the pipe decrease with time due to Stress relaxation.

Theses Long term stresses are usually low and therefore they are of no concern for the Pexgol pipe itself.

However, the initial high forces are transmitted through the fixpoints to the metal construction and they can damage it.

Since the axial forces in the fixpoints and the metal construction are equal to the axial thermal forces in the pipe, it is easier to calculate directly the axial thermal forces in the pipe.

The axial thermal forces in the pipe can be calculated by multiplying the thermal stresses by the pipe cross section. It is recommended to design the metal construction based on the max. theoretical axial forces.

The values of max. theoretical axial forces are calculated assuming that the friction forces between the pipe and the construction are negligible.

The worst case scenario is when the pipe is installed in a certain ambient temperature T1 and then the temperature is going down to a lower temperature T2.

As the temperature is going down, the tendency of the pipe to contract is balanced by tensile forces in the fixpoints.

The following Table 73.1 presents the values of the initial Short term thermal stresses as a function of the design temperature.

Table No. 74.1: Initial short term thermal stresses vs design temperature

Design temperature		Thermal stress [MPa]
Ti [C°]	Tf [C°]	
100	110	0.25
90	100	0.26
80	90	0.28
70	80	0.29
60	70	0.31
50	60	0.36
40	50	0.41
30	40	0.53
20	30	0.65
10	20	0.66
0	10	0.88
-10	0	1.01
-20	-10	1.30
-30	-20	1.61
-40	-30	2.72
-50	-40	1.11

These values are valid for a temperature difference of 10°C.

The following calculation example illustrates the way to calculate the Axial forces in the fixpoints.

A Pexgol pipe OD 280mm Wall thickness 25.4 mm SDR 11 was installed in an ambient temperature of 40°C.

The design temperature in this case is 40 + 20 = 60°C

In winter the temperature drops down to -30°C.
The design temperature in this case is -30°C

The axial forces in the fixpoints are calculated by adding the values of the thermal stresses for the temperature range between + 60°C to -30°C, and then multiply them by the cross section of the pipe.

The sum of the values of the thermal stresses from Table 74.1 is 7.72 MPa:

Ti [C°]	Tf [C°]	Thermal Stress [MPa]
60	70	0.31
50	60	0.36
40	50	0.41
30	40	0.53
20	30	0.65
10	20	0.66
0	10	0.88
-10	0	1.01
-20	-10	1.30
-30	-20	1.61

Sum of the values: 7.72

The cross section of the pipe can be easily calculated from the Formula: A = 3.14 x (D-T) x T

For OD 280 mm Wall thickness 25.4 mm the pipe cross section is 3.14 x 254.6 x 25.4 = 20,306 mm^2

The axial forces in the fixpoints:

20,306 x 7.72 = 156762 N = 15.67 ton

Side deflection

Large side deflection might be expected in the event of a malfunction, but there is no risk of possible damage due to one pipe "leaning" on its neighbor or rubbing against it.

Guiding camps for Pexgol pipes

The Pexgol pipe's tendency to "snake" is reduced by putting bars on both sides of the pipe to limit sideward deflection. Alternatively, using guiding clamps (GC), which are conventional clamps (FPC) without the internal gripping teeth, is recommended. The pipe can freely slide through in the axial direction but not sidewards.

Fixpoint bridge

Pullout protection of end couplings and other fittings

To ensure the pull-out resistance of certain fittings, do not lay the pipe perfectly straight, but rather with some surplus length (slack). In case of short pipes (up to about 10 meters), or in case of installations on pipe bridges (where it might be difficult to leave slack in the pipe), there should be a pull-out protection device such as a fixpoint clamp before and after every fitting.

This applies to some of the fittings; depending on the application design guidelines. If the pipe is installed in a an inclined or a vertical position (for example – in dewatering applications) and common fixpoint clamps cannot be used, the fitting should be protected by a floating fixpoint device such as a fixpoint bridge.

See table 75.1 and pages 58 & 85.

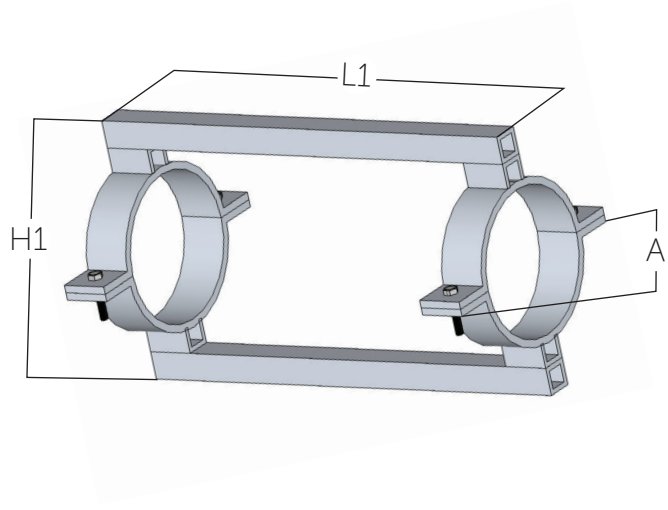


Table No. 75.1: Fixpoint bridge dimensions

Catalog Number	Pipe diameter (mm)	Clamp width W	Clamp size A	Bolt size	Total length L1	Height H1	Weight
301063	63	40	185	1/2"	260	290	6.14
301075	75	40	195	1/2"	270	300	6.32
301090	90	40	210	1/2"	320	350	7.31
301110	110	50	230	5/8"	360	380	8.86
301125	125	50	250	5/8"	360	380	8.83
301140	140	50	260	5/8"	380	480	10.14
301160	160	50	280	5/8"	380	480	10.11
301180	180	60	300	3/4"	400	480	11.5
301200	200	60	320	3/4"	420	480	13.09
301225	225	80	350	3/4"	460	500	19.20
301250	250	80	370	3/4"	510	560	18.25
301280	280	80	400	3/4"	520	560	19.01
301315	315	80	435	3/4"	580	650	21.14
301355	355	100	475	1"	650	700	26.64
301400	400	100	520	1"	750	750	29.47
301450	450	100	570	1"	750	800	31.48
301500	500	100	620	1"	800	850	34.03
301630	630	100	754	1"	800	950	38.87

DESIGN CONSIDERATIONS

Design Considerations

Natural Bend Radius in Pexgol Pipes

To create turns with Pexgol pipes laid inside trenches, above the ground or over pipe bridges, the pipe can be bent according to table 78.1.

The values in table 78.1. are relevant for installations at all ambient temperatures from low subzero temperatures and up to 40°C.

For pipe diameters lower than 110 mm use the values of the 110 mm pipes at all pressure classes.

Field bending involves excavating the trench to the appropriate bend radius, then sweeping or pulling the pipe string into the required bend and placing it in the trench.

This kind of pipeline design, which takes advantage of the natural flexibility of the pipe, reduces the number of connections and lowers head losses.

Observe appropriate safety precautions during field bending. Considerable force might be required to field bend the pipe, and the pipe could spring back forcibly if the restraints slip or are inadvertently released while bending.

Designing Pexgol pipes with natural bends

When designing Pexgol pipes with natural bends, it is recommended to consult with our field service personnel. Take into consideration that to bend the pipe on site, suitable facilities are required. Take into consideration the space required to insert the pipe into the construction, as well as the possibility to exert bending moment of the pipe.

"NATURAL" bends of Pexgol pipes

Table 78.1 shows bending radii for Pexgol pipes. If possible, design the pipeline with larger bending radii to facilitate pipe bending on site.

The pipe bends must be fixed with fixpoint clamps before and after each elbow. For pipe diameters of 280 mm and larger, the pipe bends must be supported in the centre in addition to the two fix points noted. For additional details please contact the Golan's application engineer.

Route change of Pexgol pipes inside trenches

For a route change in buried pipes, it is recommended to dig the trench with the minimum natural bending radius listed in table 78.1.

Table No. 78.1: Natural bending radius

Pipe OD	Class 6	Class 8	Class 10	Class 12	Class 15	Class 19	Class 24	Class 30
110	13.5D	10.5D	8.0D	6.5D	5.0D	4.5D	3.5D	3.0D
125	16.5D	13.5D	10.0D	8.5D	6.5D	5.5D	4.5D	3.5D
140	16.5D	13.5D	10.0D	8.5D	6.5D	5.5D	4.5D	3.5D
160	16.5D	13.5D	10.0D	8.5D	6.5D	5.5D	4.5D	3.5D
180	16.5D	13.5D	10.0D	8.5D	6.5D	5.5D	4.5D	3.5D
200	16.5D	13.5D	10.0D	8.5D	6.5D	5.5D	4.5D	3.5D
225	16.5D	13.5D	10.0D	8.5D	6.5D	5.5D	4.5D	3.5D
250	20.0D	16.0D	12.0D	10.0D	8.0D	6.5D	5.0D	4.0D
280	20.0D	16.0D	12.0D	10.0D	8.0D	6.5D	5.0D	4.0D
315	27.0D	21.5D	16.0D	13.5D	11.0D	8.5D	7.0D	5.5D
355	27.0D	21.5D	16.0D	13.5D	11.0D	8.5D	7.0D	5.5D
400	34.0D	27.0D	20.0D	17.0D	13.0D	10.5D	8.5D	7.0D
450	34.0D	27.0D	20.0D	17.0D	13.0D	10.5D	8.5D	7.0D
500	40.0D	32.0D	24.0D	20.0D	16.0D	13.0D	10.0D	8.0D
560	43.0D	34.5D	26.0D	22.0D	17.0D	13.5D	11.0D	9.0D
630	47.0D	37.0D	28.0D	23.5D	19.0D	14.5D	12.0D	9.5D
710	50.0D	40.0D	30.0D	25.0D	20.0D	16.0D	13.0D	10.0D

Natural Bends in Pexgol Pipes

When designing and installing Pexgol pipes in natural bends, high bending moments might be exerted upon the end-connectors. In case of self- restrained fittings no special care should be taken. In case of non-restrained fittings to special care should be taken to prevent excessive bending moment on the end-connectors due to forced installation.

See page 56 (Non-Restrained Fittings and Pullout Prevention Techniques).

Bending the Pipes

Use a suitable device, such as a winch or a lever, to bend the pipes. Remember that the pipe is rigid and considerable force is required for bending and fixing it – for example, 2 tons for a 110 mm pipe and 5 tons for a 280 mm pipe. Please exercise caution!

Bend the pipe carefully to avoid kinking. For best results, it is recommended to prepare a continuous support (with the radius of the pipe to be bent) for the pipe. Then bend the pipe against it.

The installation is complicated since it is difficult to calculate in advance the exact length of the pipe. As a result, on-site adaptation (field welding) is necessary.

Proper installation procedure:

1. The longer arm of the natural bend is more flexible than the shorter arm; therefore, always choose the longer arm as the pipe end whose length is adjusted.
2. Install the fitting onto the end of the shorter arm.
3. Connect the shorter arm to the existing counter-flange.
4. If necessary, install a fixpoint clamp before the fitting to protect it during bending.
   - 4.1 If the fitting is an electrofusion fitting, wait three cooling times (3x) before continuing with the next step.
5. Adjust the length of the longer arm.
6. Cut the length and install the fitting.
   - 6.1 If the fitting is an electrofusion fitting with a stub-end (flared end) connection, perform the welding when the flared end is free (not connected to the counter-flange). Connect the flared end & flange to the counter-flange only after waiting three cooling times (3x).
   - 6.2 If the fitting is an electrofusion fitting which connects the longer arm to another Pexgol or PE pipe, install a temporary fixpoint bridge before welding in order to protect the electrofusion fitting during welding. Disassemble the temporary fixpoint bridge only after waiting three cooling times (3x).
   - 6.3 See Non-restrained fittings page 56.

Pexgol Pipes: Design Considerations

1. Defining the design temperature

The design temperature of the Pexgol pipe is chosen according to data from the RFI questionnaire.

1.1 Buried pipes: according to the temperature of the liquid flowing through the pipe.

1.2 Exposed pipes: design temperature calculated by adding 20°C to the maximum ambient temperature (for example, a design temperature of 60°C for maximum ambient temperature of 40°C).

1.3 Alternatively, according to the temperature of the liquid flowing through the pipe (if higher than 60°C).

2. Water and Newtonian fluids

2.1 The pipe class is selected according to the following data from the RFI questionnaire:

2.2 Pressure head losses in the line expressed in bars (taking into account the specific gravity of the transported material).

2.3 Design temperature (see first paragraph above).

2.4 Basic safety factor (design coefficient):

- 1.25 for water and fluids with the classification A in the chemical resistance list.
- For materials with classification B, C, D in the chemical resistance list, please consult Golan.
- 1.5 for air supply lines.

2.5 Static pressure according to the altitude difference in the line and the specific gravity of the transported material.

2.6 If the pipeline is horizontal and the static pressure is low, select class 6 and verify its suitability.

2.7 Choose a higher class with the same OD in order in to increase the transportable section lengths.

2.8 The hydraulic calculation usually results in the same OD.

2.9 If the altitude difference in the line is significant, select a Pexgol pipe class that has in the design temperature higher pressure rating than the static pressure. The additional pressure margin is used for the pressure head losses; this will determine the ID of the pipe.

2.10 The OD is determined by the Pexgol pipe class the customer chooses and the availability of this specific pipe diameter.

3. Replacing waterline steel pipes

When replacing steel pipes (Hazen - Williams C = 110) with Pexgol pipes (Hazen - Williams C = 155) with the same pressure head losses, the ID of the Pexgol pipe can be 88% of the ID of the existing steel pipe.

When replacing steel pipes with Pexgol pipes with the same ID, the head losses are expected to be lower by 50%.

4. Influence of temperature changes on Pexgol pipes

4.1 Pexgol pipes placed above the ground or over bridges tend to get longer (to expand) when temperature rises (snaking phenomenon) or to get shorter (contract) as the temperature decreases. Expansion or contraction does not affect the Pexgol pipe, even in extremely low temperatures.

4.2 There is no need to protect the pipe against thermal stresses, as they are absorbed by the pipe.

4.3 Fixpoints or guiding clamps are used for restraining the elongation of the pipe (mainly for aesthetic considerations).

4.4 There is no need for installation of "expansion joints" or omegas.

4.5 Special fixpoint clamps should be used before and after the fittings (as recommended) to prevent the pipe from pulling out.

5. Pexgol pipes above ground

Pexgol pipes withstand exposure to sunlight for unlimited periods—that is, the lifetime of the pipe.

- Pexgol pipes can be placed directly on ground.
- Special bedding is not required.
- For further information see: Above ground installation guidelines.

6. Pipes under full vacuum conditions

Its recommended to use a minimum pipe class 15. For more information see page 36 "Vacuum/Suction Pipelines".

7. Pexgol pipes at low temperatures

Pexgol pipes are used at temperatures as low as -50°C and even lower. Since the Pexgol material does not become fragile at these temperatures, it tolerates bending and dragging at low temperatures during installation. Pexgol pipes tolerate complete "homogeneous" freezing of the transported liquid. Homogeneous freezing takes place if the pipe is evenly exposed to low temperatures along the pipeline.

However, if freezing starts at localized freezing points, the pressure of the fluid which is trapped between two adjacent freezing points increases until the pipe bursts. This happens to any pipe material. Localized freezing points might be metal fittings (including Pex-lined steel fittings), fixpoint clamps or any point where the metal touches the pipe. Consequently, localized freezing points should be avoided or properly insulated.

Please note that this applies to both above-ground or shallow underground installations.

Slurry Design Considerations

1. The pipe class is determined based on the following data from the RFI Application Questionnaire:
   - Working pressure
   - Design temperature
   - Chemical resistance of the pipe material to the slurry
2. The pipe diameter is chosen based on the ID of existing steel pipe or on the value of the minimum critical slurry velocity.
3. Replacing carbon steel slurry pipes with Pexgol pipes with the same ID: A slurry pipeline is designed according to the minimum critical velocity of the slurry material. Carbon steel slurry pipes can be replaced with Pexgol pipes of the same or slightly smaller nominal ID, maintaining the same slurry velocity. Table 81.1 can be used as guidelines for choosing the suitable Pexgol pipes for replacing carbon steel slurry pipes according to the ID and flanges of existing steel pipe. The values of the ID of the Pexgol pipes in Table 81.1 are nominal ID values which were calculated based on the value of the nominal wall thickness of the pipe. The Pexgol pipes were chosen assuming that the working conditions of the existing steel pipes are appropriate for the Pexgol pipe classes listed here. Pexgol special reducers should be used for matching ID of Pexgol pipes to existing steel pipes.
4. **Abrasion allowance:**

Pexgol pipes have an "abrasion allowance" of 20% of the nominal wall thickness of the pipe. This means that the pipe can withstand the design working pressure until the remaining wall thickness of the pipe is reduced to 80% of the nominal value. The real lifetime of the pipe depends on the actual abrasion rate in the line. The 80% rule applies for all working pressures and all temperatures in all classes.

5. Increasing the ID of the Pexgol pipes due to abrasion results in decreasing the velocity of the slurry. In order to make sure that the value of the minimum critical slurry velocity is maintained after 20% abrasion, the ID of the Pexgol pipe can be calculated by multiplying the Nominal Pexgol pipe ID by the correction factors in Table 91.2.

Table No. 81.1:
Replacing Carbon steel slurry pipes with Pexgol pipes

Sch. 40 Carbon steel pipe		Pipe	Loose flanges	Pipe	Loose flanges
Size	ID				
3"	78	90 class 15	3"	110 class 24	4"
31/2"	90	110 class 15	4"	125 class 24	4"
4"	102	125 class 15	4"	140 class 24	5" or 6"
5"	128	160 class 15	6"	180 class 24	6"
6"	154	180 class 15	6"	200 class 24	8"
8"	202	250 class 15	10"	280 class 24	10"
10"	254	315 class 15	12"	355 class 24	14"
12"	303	355 class 12	14"	-	-
14"	333	400 class 15	16"	450 class 24	18"
16"	381	450 class 12	18"	-	-
18"	428	500 class 12	20"	-	-

Table No. 81.2: Correction factors for abrasion

Class	Correction Factor
6	1.016
8	1.021
10	1.028
12	1.0345
15	1.044
19	1.057
24	1.074
30	1.1

Inclined and Dewatering Pipes, High - Gradient Supply Lines

Design considerations

- All these type of pipes should be axially restrained at the top and bottom of the line.
- The pump rests on the ground. The weight of the pump and water column is not supported by the pipe.

Defining the design temperature

The design temperature of the Pexgol pipe is chosen according to data from the RFI questionnaire.

- Buried pipes: according to the temperature of the liquid flowing through the pipe.
- Exposed pipes: design temperature calculated by adding 20°C to the maximum occurring ambient temperature (e.g. a design temperature of 60°C for an ambient temperature of up to 40°C).

Selecting the Pexgol pipe for dewatering/uphill pipes

Design example:
Required flow rate – 150 cubic meters per hour
Pipeline goes from an altitude of 2100 m to an altitude of 2235 m.
Line length – 500 m ambient temperature 40°C

The pipe can be installed above ground or covered by 0.9 m of soil.

- Calculate the line pressure by grade line calculation or according to any other applicable method.
- Calculate the static pressure at the lowest point of the pipeline taking into account the fluid density. For water, divide the altitude difference (in meters) in the line by 10. The result is in bar. Please note that the lowest point is not necessarily at the bottom of the pipeline! In this example: *2235 - 1100 = 135 / m = 13.5 bar*
- Choose the appropriate Pexgol pipe class from table 11.2 by looking at the design temperature. Select the Pexgol pipe class which has a higher working pressure than the calculated value in section 3.1. The additional pressure margin will be used for the head losses.
- Design temp for above ground installation is *40 + 20 = 60°C.*
- Selected pipe class for buried pipes installation: *Class 19. Working pressure - 14.9 bar at 40°C.*

  Selected pipe class for above ground installation:

  A. Class 24: Working pressure -15 bar at 60°C.

  B. Alternative pipe - class 30. Working pressure – 18.9 bar at 60°C. Design temperature for buried pipes is 40°C.

Design example with alternative pipe class 24. Working pressure 18.7

- Calculate the pressure margin and the allowable Head losses coefficient J;
- Pressure margin for above ground installation is *15 - 13.5 = 1.5 bar = 15 m/J = 15 x 100/500 = 3%*
- Pressure margin for the alternative pipe for above ground installation is: *18.9-13.5 = 5.4 bar = 54 m/J = 54 x 100/500 = 10.8%*
- Pressure margin for buried pipes installation *14.9 - 13.5 = 1.4 bar = 14 m/J = 14 x 100/500 = 2.8%*
- Pressure margin for the alternative pipe for buried pipes installation: *18.7 - 13.5 = 5.2 bar = 52 m/J = 52 x 100/500 = 10.4%*
- Select the pipe diameter according to the calculated J and the flow rate.
  The selected pipe diameter for above ground installation is 200 class 24.
  The alternative pipe diameter for above ground installation is 180 class 30.
  The selected pipe diameter for buried pipe installation is 200 class 19.
  The alternative pipe diameter for buried pipe installation is 160 class 24.
  Advantages of the alternative pipes:
- Smaller diameter – allows transportation of longer pipe sections = cheaper transportation.
  Cheaper pipe per meter length.
- Disadvantage: higher head losses.
- The line designer should include in the line the all the required accessories including air relief valves and drain valves.
- If the overall altitude difference in the line is much higher that the max. allowable altitude difference H of the highest Pexgol class available, the line should be designed using booster pumps.
- Selecting the Pexgol pipe for a downhill pipeline using a full cross-section flow design. In a full cross-section flow design the pipe has to support the full static pressure (liquid column) of the line.

  Design example:

  The Pipeline pipeline goes down a slope from an altitude of 2250 m to an altitude of 2100 m.

  Required flow rate – 150 cubic meters per hour Line length – 1500 m Ambient temperature 40°C.

The pipe can be installed above ground or covered by 0.9 m of soil.

- Calculate the line pressure by grade line calculation or according to any other method. Calculate the static pressure at the lowest point of the pipeline taking into account the fluid density. For water – divide the altitude difference (in meters) in the line by 10. The result is in bar. Please note that the lowest point is not necessarily at the bottom of the pipeline.In this example the lowest point in the line is located at the end of the line: *2250 - 1100 = 150 m = 15.0 bar.*
- Choose the suitable Pexgol pipe class from table 11.2 by looking at the design temperature. Select the Pexgol pipe class which has the same or slightly higher working pressure than the calculated value in section.
- Design temp for above ground installation is 40 + 20 = 60°C. Selected pipe class for above ground installation:
- For a full cross-section flow design the pipe should be Pexgol Class 24 in order to allow a working pressure of 15 bar at 60°C.
- Calculate the allowable head losses coefficient J based on the altitude difference in the line and the line length: *Altitude difference is: 150 m J = 150 x 100/1500 = 10%*
- For a full cross-section flow design, select the suitable pipe that can transport the required flow with the calculated value of J. Selected pipe class for above ground installation is 160 class 24. Selected pipe class for buried pipe installation is 160 class 19.
- Check the value of the expected surge pressure (water hammer) against the maximum permissible. Total occasional pressure, which is 2.5 the working pressure in the design temperature.
  For the 160 class 24, the Line velocity V = 4 m/sec.
  According to the table 32.1 the surge pressure for class 24 is 3 bar for V = 1 m/sec. for V = 4 m/sec. the surge pressure value will be 4 x 3 = 12 bar.
  The total occasional pressure will be 15 + 12 = 27 bar.
  The maximum permissible total occasional pressure in Class 24 at 60°C is 15 x 2.5 = 37.5 bar.
  Conclusion – the 160 class 24 is O.K. or the 160 class 19, the line velocity V = 3.44 m/sec.
  According to the table 32.1, the surge pressure for class 24 is 3.2 bar for V = 1 m/sec so for V = 3.44 m/sec the surge pressure value will be 3.44 x 3.2 = 11 bar.
  The total occasional pressure will be 15 + 11 = 26 bar.
  The maximum permissible total occasional pressure in Class 19 at 40°C is 14.9 x 2.5 = 37.25 bar.
  Conclusion – the 160 class 19 is O.K.

Air relief valves

- Air relief valves are required in any pipeline material including Pexgol.
- The line designer should include in the line the all the required accessories including air relief valves and drain valves.
- As a service to our customers, Pexgol application engineers can perform the analysis of the line in cooperation with A.R.I. Israel and supply a drawing with the location of the air relief valves. Golan supplies the air relief valves and the saddles/fittings required for connecting the line accessories to the Pexgol pipes.
- The following data is required for the analysis:

  A. List of key points along the line in Excel file or PDF/ DWG drawing of the line with the following details:
  - Name of the point.
  - Location of the point – distance from the beginning of the line and height above a reference point.
  - Type and functionality of each fitting: drain, cut-off valve, pressure reducer, outlet connection to consumer (indicate flow rate), etc.

  B. Working conditions:
  - Flow direction
  - Discharge rate
  - Inlet/outlet pressures

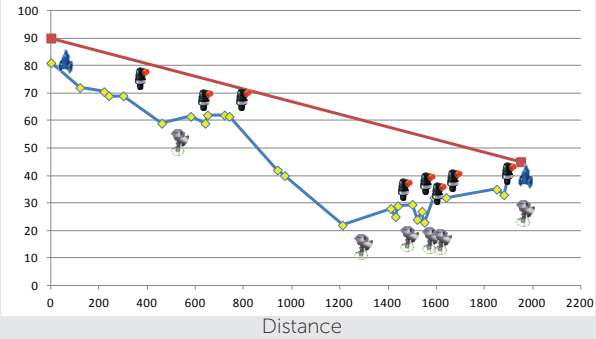
Inclined and Dewatering Pipes, High-Gradient Supply Lines - Continued

Selecting the Pexgol pipe for downhill single slope pipeline using a partially filled cross-section flow design.

- Please note that this type of design requires a skilled designer so the following information should be considered as guidelines only.
- In case of a partially filled cross-section flow design, the pipe is to be designed so that it will be in a low pressure (close to an atmospheric pressure) in all or most of its length. This design allows the use of a lower pipe class of with a larger OD and this might be problematic for transportation.
- Calculate the allowable head losses coefficient J based on the altitude difference in the line and the line length.
- Calculate the ID of the pipeline (according to Hazen – Williams C = 155 or any other formula).

Air Relief Valve Analysis example (Courtesy of ARI)

Elevation



Isolating valve Drainage valve Air relief valve

Section Diameter: 164 ,Pipe Material: 150 ,Maximum Negative Pressure: 4			
0+000	0.00	80.94	Reservoir / Water tower Flowrate: 170.00, Water level: 90.00 Isolating valve Diameter: 200.00, Head loss: 0.70 D-040 Selected diameter: 2
0+290	290.00	69.20	D-040 Selected diameter: 2
0+470 Drainage Valve	470.00	58.80	Drainage valve Diameter: 50.00, Head loss: 0.60
0+570	580.00	61.50	D-040 Selected diameter: 2
0+720	720.00	61.93	D-040 Selected diameter: 2
1+210 Drainage Valve	1,210.00	22.60	Drainage valve Diameter: 50.00, Head loss: 0.60
1+410	1,410.00	27.70	D-040 Selected diameter: 2
1+430 Drainage Valve	1,430.00	25.50	Drainage valve Diameter: 50.00, Head loss: 0.60
1+500	1,500.00	29.41	D-040 Selected diameter: 2
1+520 Drainage Valve	1,520.00	24.60	Drainage valve Diameter: 50.00, Head loss: 0.60
1+540	1,540.00	27.65	D-040 Selected diameter: 2
1+550 Drainage Valve	1,550.00	24.09	Drainage valve Diameter: 50.00, Head loss: 0.60
1+590	1,590.00	31.65	D-040 Selected diameter: 2
1+850	1,850.00	34.59	D-040 Selected diameter: 2
1+880 Drainage Valve	1,880.00	32.57	Drainage valve Diameter: 50.00, Head loss: 0.60
1+900	1,900.00	40.47	D-040 Selected diameter: 2

- In order to make sure that flow regime will be a partially filled cross-section, the selected actual ID of the line should be at least 25% higher than the calculated pipe ID according to previous design example.
- Selecting the Pexgol pipe class: It is a good practice to design Class 15 in order to allow full vacuum resistance and possibility of transporting long pipe sections. Lower pipe classes should be avoided in this case. Higher pipe classes can be designed for transporting longer sections while maintaining the required minimum ID for the partially filled crosssection low design.

Pexgol pipe for downhill single slope pipeline can be designed using a partially filled cross-section flow design.

- Each top point in the line should be vented so that the pressure there is atmospheric pressure.
- Each valley is actually a siphon so that the height of the fluid column above the bottom of the valley is calculated from the previous top point in the line.
- In some cases, the pipe class might have to be higher than class 15, depending on the local static pressure.

Installing the Pexgol pipe

- Pexgol pipes can be towed upwards from the bottom of the line or it is possible to slide the pipe down from a high point.
- Empty pexgol pipes can be towed up to the top of the line in very long sections. Table 84.1 presents the maximum allowable length of an empty Pexgolpipe that is allowed to be towed or slid to its final location, depending on the design temperature.
- The maximum allowable length is the same for all Pexgol pipe classes.
- The required towing force can be calculated by multiplying the weight of the pipe by the friction coefficient of 0.5.
- If the pipe consissts of more than one sections, the sections can be connected temporarily during towing.

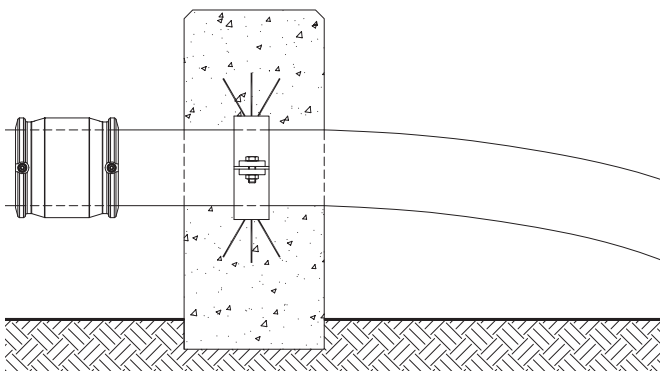
Table No. 84.1: Towing of empty Pexgol pipe - maximum allowable length (meters)

Pipe	0°C	10°C	20°C	30°C	40°C	50°C	60°C
All classes	1150 m	1100 m	1000 m	850 m	750 m	650 m	600 m

- If the pipe sections are already connected by fittings, they should be secured and protected by fixpoint bridges.

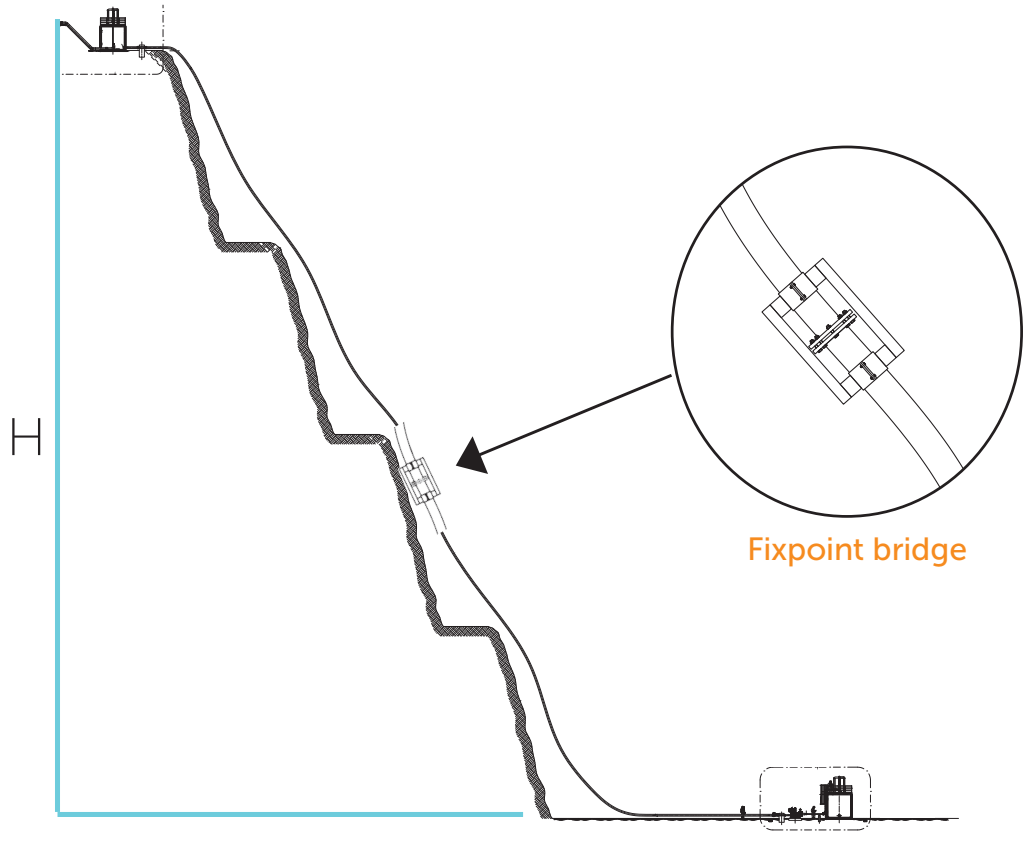
Securing inclined Pexgol pipes

- The top and bottom ends of the Pexgol pipeline should be anchored by a fixpoint. see drawing.
- The Pexgol pipeline can be laid uphill or downhill in a long continuous section, without any fixpoint between the top and bottom ends.
- There is no limitation on the total pipe length.
- It is recommended to design the pipe with an additional 1 - 2% slack in order to reduce potential axial contraction forces.
- The weight of the pipe might increase due to accumulation of soil or snow on top of it. This additional weight will be balanced by the increasing friction between the pipe and the ground.



Restraining of fittings along the pipeline

- In slopes of less than 40°, all mechanical couplers (flared ends, flanged couplers etc.) should be restrained by floating fixpoint devices like Golan's fixpoint bridge (page 75). Electrofusion couplers can be installed without a floating fixpoint device.
- In slopes above 40°, all type of fittings (including electrofusion couplers) should be restrained by floating fixpoint devices.
- When installing a repair fitting, the pipe can be secured by a fixpoint bridge prior to cutting the pipe (page 75).



Design Guidelines for Complete Systems * See design example on page 7

Designing a complete solution by Golan:

For every application received from a customer, we must have the Application RFI Questionnaire and the relevant assembly drawings of the pipeline. We design the pipe class and recommend the complete solution.

The detailed assembly drawing of the proposed solution is sent to the client for approval. We transform the approved version into parts drawings and prepare a price quotation.

1. Elbows

1.1 If possible, use Pexgol straight pipes with a natural bend. (see page 75). Pexgol pipes come in straight sections in maximum length of 11.8 meters. They are available with one or two flared ends and flanges. If you have to bend a pipe with a longer length, order two sections and make a longer pipe by connecting it with a reinforced electrofusion coupler. Always select the length of the two sections so that the electrofusion coupler is not in the exact location of the bend.

1.2 When straight pipe sections with the natural bend is not an option, use Prefabricated Pexgol elbows 3 x D or 1.5 x D.

1.3 Please note that our 1.5 x D elbows are significantly longer than the carbon steel 1.5 x D elbows.

1.4 3 x D elbows are recommended rather than 1.5 x D since 3 x D elbows reduce head losses and abrasion rate.

1.5 Other non-standard angles are available by special order.

1.6 Elbows and natural pipe bends must be fixed with fixpoint clamps before andafter each elbow. For pipe diameters of 280 mm and larger, thenatural pipe bends should be supported in the centre, in additionto the two fixpoints.

1.7 If there is not enough space for Pexgol elbows, you can specify Pex-lined steel elbows, (Pex-lined fittings, see page 61).

2. Other fittings

2.1 The following items, in addition to straight pipe sections and elbows, can be supplied from Pexgol material: concentric or eccentric reducers and instrumentation Tees.

3. Pex-lined steel fittings

3.1 Components in the line which are not straight pipes or elbows including steel Tees, laterals, and others can be designed as Pex-lined steel fittings. Choose standard items from our Fittings Catalog, page 137.

3.2 However, if you find that you need to make a non-standard item with longer or shorter legs, make your selection and ask Golan for approval.

3.3 The maximum length of any item is approx 2000 mm x 2000 mm.

3.4 The standard items come with fixed flanges.

3.5 When Pex-lined steel fittings are connected to Pexgol pipes or elbows, the ID of the Pex-lined steel fittings can be larger than the ID of the Pexgol pipe with the same flange size .In order to match up their ID , smaller –size fittings with the same flange sizes as the flanges of the pipes can be used. Please consult us.

4. Expansion joints & Omega loops:

4.1 Expansion joints and Omega loops are not necessary in a Pexgol system. However, expansion joints might be needed when connecting a few Pex-lined steel fittings.

5. Influence of temperature changes on pipeline length

5.1 The length of Pexgol pipes can be changed by 0.3% due to a temperature change of 20°C, meaning 3 mm for every 1 meter.

5.2 When installing a straight Pexgol pipe section between two steel flanges, take into consideration the thermal expansion of the Pexgol pipe.

6. Field welding

6.1 The actual length of the pipe can be different than the designed length due to production tolerances and temperature changes.

6.2 Field welds" should be included in the design in order to compensate for the deviation of the actual length of the pipe during the installation from the designed length.

6.3 This is very important in case of pipes and elbows with flared ends . It is a good practice to design some pipe ends with mechanical couplers.

6.4 When using only mechanical connectors, design some of them so that the final pipe length can be adjusted on site.

7. Protecting the fittings

7.1 When designing Pexgol pipes and fittings, the designer can utilize the flexibility of the Pexgol pipes & elbows. However, electrofusion and mechanical fittings should be regarded as rigid items.

7.2 Special care should be exercised in order to prevent excessive bending moment from being exerted on the fittings due to forced installation

8. Fixpoints

8.1 Fixpoints must be designed before and after each fitting (for example, flared end connection) as specified in our engineering guide.

9. Specifying the length of the Pexgol straight sections and elbows as separate items is acceptable after the design has been completed and approved by the designers and by Golan.

9.1 It is a good practice to specify a longer section to allow for measuring inaccuracies other possible errors.

Design Considerations for Pexgol Fittings

1. General considerations

1.1 Use only fittings approved by Pexgol and listed in the Engineering Guide.

1.2 Service limitations (as relevant) for each type of fitting are specified in the Engineering Guide. When designing Pexgol pipes and fittings, the designer can utilize the flexibility of the Pexgol pipes & elbows. However, electrofusion and mechanical fittings should be regarded as rigid items.

1.3 Special care should be exercised in order to prevent excessive bending moment from being exerted on the fittings due to forced installation.

1.4 Use special fixpoint clamps before and after the fittings where required (see Non-restrained fittings).

1.5 Mechanical fittings might cause local reduction of the inner diameter at pipe ends.

1.6 Drawings of the fittings are supplied on request.

1.7 For further questions, please consult Golan's application engineer.

2. Pre-fabricated Pexgol elbows

2.1 Prefabricated elbows are available in all pipe classes with diameters up to 630 mm.

2.2 The standard bending radius of the elbows is approximately R = 3D or R = 1.5D for 450 or 900 elbows.

2.3 The working pressures and temperatures are the same as the Pexgol pipe class from which the elbow is made.

2.4 Order elbows with plain ends for either flanged couplings or electrofusion fittings.

2.5 Elbows with flared ends with or without flanges are available.

2.6 Flared end connectors can be used throughout the entire range of allowable working temperatures and pressures.

2.7 Install special fixpoint clamps before and after each flared end.

3. Pexgol spigot reducers

3.1 Pexgol spigot reducers of all sizes and all pipe classes are available on request; (see page 60 for more details).

3.2 The working pressures and temperatures are the same as for the Pexgol pipe class.

3.3 The Pexgol reducers are supplied with flared ends, with or without flanges.

3.4 Use special fixpoint clamps before and after each flared end.

4. Pexgol spacers and special reducers

4.1 Pexgol spacers of all sizes and are available on request; (see page 68).

4.2 Use special fixpoint clamps before and after the flared ends; (see page 73).

5. Pexgol instrument tees

5.1 Pexgol instrument tees of all sizes are available on request; (see page 68 for more details).

5.2 The inlet is made of 316 stainless steel. Other corrosive resistant metals can be specified.

6. PEX-lined steel fittings

6.1 Pex-lined steel fittings can be used as a part of any Pexgol pipe system. Their working pressures and temperatures are usually higher than working pressures and temperatures of the Pexgol pipes.

6.2 The Pex-lined steel fittings are available in nearly any size and shape; see product page 61 for more details.

6.3 The minimum length of each fitting is indicated in the Fittings Catalog, pages 137, 146 & 61. This length can be reduced after consulting Golan Plastic Products.

6.4 It is possible to order a non-standard fitting which is a combination of standard fittings, or a standard fitting with longer legs.

6.5 The maximum allowable length for any such fitting is 2200 mm x 2200 mm.

6.6 Pex-lined steel fittings can be used in the following cases:

- A fitting that is not available as an all-Pexgol fitting is required.
- The all-Pexgol fitting is too long.
- A special shape is required.

6.7 All the Pex-lined steel fittings can be connected to the flared ends of the Pexgol pipes without an additional gasket.

6.8 All the Pex-lined steel fittings must be fully supported when installed on pipe bridges.

7. Pexgol Pipes with flared ends

7.1 Pexgol pipes up to 160 mm, in lengths according to the tables for transportation in coils in Transportation, are available with flared end and metal flanges.

7.2 Larger diameter Pexgol pipes (up to 630 mm) can be ordered in any length up to 11.5 meters

(to fit into 40 ft. containers) with one or two flared ends.

7.3 Flared ends connect two Pexgol pipes or a Pexgol pipe to a fitting.

7.4 The sections with flared ends are produced with a tolerance of +/- 10 mm in length.

7.5 No additional gaskets are needed.

7.6 Tightening the flanges of the flared end connectors does not require specific torque values. Simply tighten the bolts evenly around the flange until all bolts are tight.

7.7 The flanges are supplied according to industrial standard ASA 150. Other flanges are available by special order.

7.8 A flared end connection can be used throughout the range of allowable working temperatures and pressures.

7.9 Prefabricated Pexgol elbows with flared ends are also available.

7.10 Use special fixpoint clamps before and after the flared.

8. PE100 electrofusion fittings

- PE100 couplers can be used up to 45°-50°C. Regarding working pressures and temperature of PN16 and PN25 couplers, please refer to the recommendations of the approved manufacturers.
- The PE100 electrofusion fittings must be protected in the following cases:
- Above ground installations in extremely low temperatures.
- Underground installations without sand embedding.

9. Pex2Pex electrofusion couplers

9.1 Pex2Pex electrofusion couplers are used for the same pressure rating as Pexgol pipes SDR 11 up to 60°C. For 70°C the maximum allowable pressure is 6 bar for 50 years.

9.2 The couplers are not UV resistant and must be protected from UV light.

10. Special high temperature electrofusion couplers

10.1 Special high temperature and pressure couplers for all pipe sizes can be specified on request. Please consult Golan's application engineer.

11. Brass fittings

- GP bolt connectors are self-restraint type fittings.
- For full details, see Fittings Catalog, page 132.
- It is recommended to install brass fittings above the ground. If you must install them anyway, make sure they are protected from corrosion.
- Do not connect brass fittings to steel or galvanized pipes or fittings.

12. GP flanged couplings

12.1 Available from 63 mm (with 2" flange) to 630 mm (with 24" flange).

12.2 All couplings comply with ASA 150 flange standard and some of them comply with other international standards; see table 69.1.

12.3 GP flanged couplings are suitable for the full range of allowable working temperatures and pressures of Pexgol pipes.

12.4 In above ground applications, use special fixpoint clamps before and after the fittings

12.5 In some cases, the ID of the Pexgol pipes might be reduced locally by the GP flanged coupling.

13. Brass saddles

13.1 Available for Pexgol pipes from 32 mm to 160 mm.

13.2 British Standard Pipe Tapered Threaded (BSPT) threaded outlets.

13.3 Suitable for the full temperature and pressure ranges of Pexgol pipes.

13.4 See the instruction for the installation of saddles (page 98).

14. Stainless Steel Saddles

14.1 Available for Pexgol pipes from 110 mm to 630 mm.

14.2 Flanged or threaded outlets (internal thread).

14.3 Maximum outlet diameter – up to half of the pipe's outer diameter.

14.4 The saddles are available with a special rubber coating over the flange and neck to protect from corrosive liquids to which stainless steel is not resistant.

14.5 Stainless steel saddles can be used throughout the range of allowable working temperatures and pressures for Pexgol pipes.

14.6 In above ground applications, use special fixpoint clamps before and after the fittings.

14.7 Stainless steel saddles working pressure it up to 150 psi (10.3 bar).

15. Victaulic, Bruno and Aquafast fittings for HDPE pipes

are approved for use with Pexgol pipe classes 10 and higher pressure classes.

15.1 In above ground applications, use special fixpoint clamps before and after the fittings.

INSTALLATION INSTRUCTIONS

Performing Pressure Tests in Pexgol Water Supply Lines and Dewatering

Test purpose: final check to make sure there are no leakages in the fittings.

Considerations:

1.1 Make sure the underground pipes are already covered, leaving only the fittings uncovered It is recommended to fill up the pipeline with water at the maximum working pressure on the day before the test

1.2 On the day of the test, inspect the pipeline visually,especially around the fittings.

1.3 Temporarily cover metal fittings (flanged couplings, branch-off saddles) to prevent excessive heat buildup due to exposure to sunlight.

1.4 For installation above the ground, test pressures in the table 92.1. Take into consideration that the pipe might be heated due to exposure to sunlight.

1.5 Take into consideration changes in the pipeline topography (which could create higher local pressure due to a water column); reduce the test pressure accordingly.

Test puPressure testing:

1.1 Bring the pressure to the level of the test pressure (see table 92.1) and then close the feeding line.

1.2 As the pipe is flexible and tends to expand its diameter under pressure, the line pressure is expected to decrease.

1.3 Increase the line pressure again, up to the test pressure.

1.4 With each cycle of pressure reduction and increase, the pressure is expected to decrease less.

After 3-4 cycles, open the valve and close it immediately, rapidly lowering the pressure to approx. 75% of the test pressure by letting water out of the line.

1.1 After closing the valve, the pressure is expected to increase as a result of the tendency of the pipe to decrease its volume.

1.2 If the pressure decreases instead of increasing, investigate the reason for pressure loss, for example, leakages at the fittings.

Table No. 92.1: Pressure test

Pipe class	Test pressure - bar					
	Underground inst.			Above ground inst.		
	Fluid temperature			Ambient temperature		
	20⁰	30⁰	40⁰	20⁰	30⁰	40⁰
6	7.0	6.0	5.5	5.5	5.0	4.0
8	9.0	7.5	7.0	7.0	6.0	5.5
10	12.0	10.0	9.0	9.0	8.0	7.0
12	14.0	12.5	11.0	11.0	10.0	8.5
15	18.0	15.5	14.0	14.0	12.5	11.0
19	22.0	20.0	17.5	17.5	15.5	14.0
24	29.0	25.0	22.0	22.0	20.0	17.0
30	35.0	31.5	28.0	28.0	25.0	22.0

Instructions for Welding Electrofusion Fittings

Electrofusion fittings can be used to connect Pexgol cross-linked polyethylene pipes.

The pipes and fitting are connected by means of fusion welding creating a leak-proof seal.

A sealing ring is not needed.

During the electrofusion process a current is transported through a heating wire.

- The surrounding material around the wire is melted and welds the pipe to the fitting.
- Electrofusion system is one of Pexgol's connector systems, providing all connection technologies for Pexgol pipes.
- Electrofusion fittings are the main means of connection in municipal water and industrial distribution systems.
- Fittings are tested and have a lifetime of 50 years, according to the European standards a working pressures of 16 atm in water networks.
- Lightweight and small volume welding connectors.
- Economical use especially for big diameters in water transportation.
- Connectors are offered in diameters ranging from 20mm to 630 mm as well as in a wide variety: couplers, elbows, end plugs, Tees, saddles, tapping saddles (for connecting new outlets to "live line").

The entire electrofusion process is executed and fully monitored by the computerized control box ensuring safe, reliable connections.

Installation instructions for electrofusion fittings: Installation performed only by trained workers who have received a valid certificate showing that they have been trained by a person authorized by Pexgol.

Type of electrofusion fittings: Use only electrofusion fittings approved for fusion with Pexgol cross-linked polyethylene pipes.

Wall thickness defined as follows:

25 – 75 mm pipes, minimum S.D.R. 11

90 – 355 mm pipes, minimum S.D.R. 16.2

Pressures:

PN 16 electrofusion fittings are suitable for working together with Pexgol pipes which are rated up to pressures of P.N. 15 in water or 10 bars in gas (only PE spigot connectors are produced in two levels, P.N. 10 and P.N. 16).

Rounding the pipe

For a quality fusion and for easy insertion, rounding the pipe is compulsory. This is achieved by using rounding tools which are placed on the pipe end. The tools maintain a rounded pipe during the welding process.

Support of the fitting during the welding process:

When welding pipes in diameters 90 mm and higher, the pipe should be inserted into the fitting by means of spanners (come-alongs) which allow controlled insertion and ensure the coupler does not move during the welding process.

Cooling time

Please note the cooling time that appears on a sticker on each fitting.

Do not disassemble spanners and rounding devices until the cooling time has elapsed.

When the fusion process is completed, note the hour and add the cooling time. The result is the disassemble time. Mark this time on the fitting and do not disassemble it earlier than this time!

Pexgol electrofusion fittings are allowed for use at the following temperatures: In case of higher pressures please consult the Pexgol Field Service.

Working instructions:

1. Preparing the fittings for welding: Preparation and welding can be conducted at ambient temperature. If the weather is windy (with dust) or rain or other sources of humidity, the welding area should be protected by a cover or welding should be halted until the weather conditions are suitable.
2. Preparation (cleaning and scrubbing) must be done close to the welding time. Do not prepare pipes and fittings for welding if you plan to weld at a later stage.
3. Scraping and peeling of the pipe: universal or hand scraper must be in perfect working condition with a sharp blade. The blade in the universal scraper should be replaced when no longer sharp. The blade of the hand scraper should be sharpened from time to time using a fine iron file.

   The thickness of the scraped layer should be as follows:

   - Diameter: 20 - 25 mm, 0.15 - 0.20 mm
   - Diameter: 32 - 75 mm, 0.15 - 0.25 mm
   - Diameter: 90 - 355 mm, 0.20 - 0.30 mm

Electrofusion Welding

A. Marking the pipe for cutting

The pipe must be free of dirt and dust.

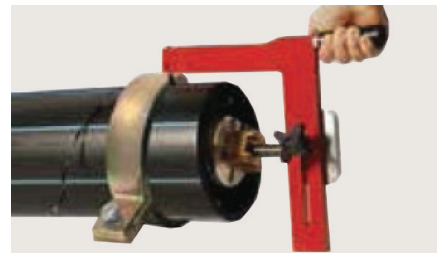
1. Use a plastic marking tape long enough to go around the pipe circumference.
2. Mark the welding location around the pipe with a marker.

B. Cutting the pipe

1. Use a cutting tool for plastic pipes up to diameter 160 mm. From diameter 180 mm and higher use a JigSaw cutter, with a suitable plastic saw.

C. Rounding of the pipe and scraping the oxidized layer

1. Round the pipe prior to scraping it.
2. Place the rounding device on the pipe so that the distance from the pipe to the rounder is equal to the depth insertion of the pipe into the fitting plus 4 centimeters.
   Note: To ensure perfect, symmetric roundness of the pipe, make sure that the rounding device is placed in such a way that the screws will be on the flattened sides of the pipe (on the narrow axis of the oval) and fasten them until perfect roundness of the pipe is reached.
3. Use the universal rotational scraper according to the instructions.

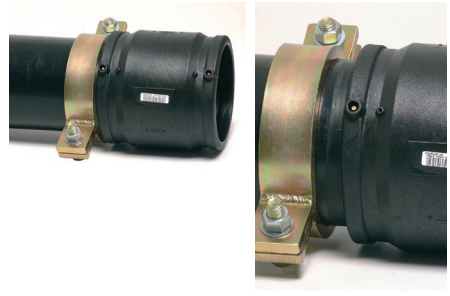


D. Pipe Preparation

1. The pipe must be marked to prepare insertion of the fitting.
2. Move the rounding device until the marking of the full insertion.
3. It is absolutely necessary to clean entire welding surface. This is performed with a special cleaning solution of 95% ethanol (or equivalent) and new clean paper wipers to ensure that no fibers are left on the surface.

E. Installing the fitting onto the pipe

1. Remove the fitting from its original packaging, only when you are ready to start the welding process. Clean the inner side of the fitting with the special cleaning solution. Clean the pipe surface again.
2. Install the fitting onto the prepared pipe and make sure that the pipe is fully inserted into the fitting up to the end. The fitting should fit easily into the pipe.



F. Preparation of the oppsite pipe end for insertion

1. Clean, mark and place the rounding device as described.
2. Pull the pipe into the fitting by means of 2 spanners from each side until the rounder and the coupler meet.
3. Make sure to insert the pipe straight and precisely along the axis of the fitting by guiding both spanners. Make sure that there are no "angles" between the pipe's axis and the fitting's axis.

G. Welding

Please follow carefully installation instructions for the electrofusion control box.

1. Connect the terminals from the control box to the fitting. Make sure to connect "black to black" and "red to red", and make sure that the electric cable is loose, not pulled tight.
2. Operate the control box and start the welding process.

H. Cooling time

At the end of the fusion carefully remove the black and red terminals from the fitting.

1. The correct cooling time is shown on the barcode label on each fitting. Mark on the coupler the exact hour when the coupler can be removed (adding the correct cooling time to the exact hour when the fusion was completed).
2. Dismantle the clamps and rounding equipment only at the end of the cooling time.

Note:

Since pressure testing requires lower temperatures of the joint, we recommend waiting twice the cooling time after fusion before pressurizing the pipe and waiting 3 times the cooling time after fusion before beginning pressure testing.

Welding of Saddles

A. Pipe must be marked

The pipe must be free of dirt and dust.

1. Place the lower part of the saddle on the place intended for fusion, mark the location of the outlet by marking a line all around the pipe. Use the lower part of the saddle for marking in order to avoid dirtying the upper part prior to welding.
2. Mark 3 lines on each side of the line at a distance of 30 mm from each other.
3. Remove the lower part and scrape the marked area with a manual scraper until all lines are scraped (except for the center line).

Note: The manual scraper should be very sharp! Sharpen it by rotating the knife from time to time (4 positions) and by sharpening it with a fine iron file.
Use a manual scraper and scrape using two hands to achieve best results.

B. Pipe preparation and mounting of the saddle

1. Clean the pipe with a special cleaning solution for PE cleaning (ethanol) as any other fluid may damage the joint. To apply the solution, use clean wipes.
2. Clean the inner side of the upper saddle and install it to the pipe.
3. Close the saddle screws so that the upper and lower parts meet.
4. Fasten the screws.

Note: The hole should be drilled only after the welding is completed.

C. Welding

Please follow carefully installation instructions of the welding device.

1. Connect the terminals from the generator to the saddle "red to red", "black to black".
2. Operate the generator and start welding process.

D. Cooling time and drilling of hole

Cooling time:

1. At the end of the fusion carefully remove the black and red terminals from the fitting.
2. Mark on the coupler the exact hour when the coupler can be removed (adding the correct cooling time to the exact hour when the fusion was completed).
3. Dismantle the clamps and rerounding equipment only at the end ofthe cooling time. After cooling, drill the outlet hole using a hole saw tool.

Installation Instructions for Saddles

Note: the following data for installing Golan brass saddles, electrofusion saddles and Krausz stainless steel saddles to Pexgol pipes.

Install all saddles onto the pipe prior to drilling the outlet hole.

Table No. 98.1: Dimensions of drills for outlet hole in brass saddles

Dimensions of drills for outlet hole in brass saddles		
Brass saddles dimensions	Thread	Diameter and drill type
32 x ¾"	Female	13 mm drill
32 x ½"	Male	13 mm drill
40 x ¾"	Female	13 mm drill
40 x ½"	Male	13 mm drill
50 x ¾"	Male	22 mm hole saw tooth
63 x ¾"	Male	19 mm hole saw tooth
63 x 1"	Male	24 mm hole saw tooth
63 x 2"	Female	45 mm hole saw tooth
75 x 1 ½"	Male	35 mm hole saw tooth
75 x 2"	Female	45 mm hole saw tooth
90 x 1 ½"	Male	33 mm hole saw tooth
90 x 2"	Female	45 mm hole saw tooth
110 x 2"	Female	45 mm hole saw tooth
160 x 2"	Female	45 mm hole saw tooth

Notes:

- Saddles up to 63 mm – 11 mm wrench
- Saddles 75 mm and 90 mm – 14 mm wrench
- Tighten the saddles until the two halves meet.

Table No. 98.2: Dimensions of drills for outlet hole in stainless steel saddles

Dimensions of drills for outlet hole in stainless steel saddles			
Outlet type	Outlet size	Drill type	Drill diameter
Female outlet thread	1 ½"	Hole saw tooth	40
Female outlet thread	2"	Hole saw tooth	51
Flanged outlet	2"	Hole saw tooth	40
Flanged outlet	3"	Hole saw tooth	70
Flanged outlet	4"	Hole saw tooth	92
Flanged outlet	6"	Hole saw tooth	140

Install electrofusion saddles of all manufacturers (Plasson, Friatec, GF/Wavin) and Plasson mechanical saddles according to the manufacturer's instructions.

Connecting Pexgol Pipes with Flared Ends

The flared-end connection is suitable for both hot and cold media. Special fixpoint clamps should be used before and after the flared ends (see pages 57 & 73). Flange material is carbon steel A37. Other carbon steel or stainless steel grades can be ordered.

In case of sub zero temperatures, special restraining techniques should be employed to prevent pulling out of the flared end from the flanges.

No gasket is needed when connecting two Pexgol pipes with flared ends and flanges or when connecting a Pexgol pipe with a flared end to a flanged fitting.

Tighten the bolts evenly around the flange until all the bolts are all tight.

If torque wrenches are applied , use the recommended values in the following table. Tighten the bolts evenly using 75% of the recommended torque values and then tighten to the final value.

No retorquing is necessary in the flared ends of Pexgol pipes.

Table No. 99.1: Tightening torque values for Pexgol flared ends

Pexgol pipe dia.	Flange size	Bolt diameter	Torque N x m		Torque ft x lbs	
			Min.	Max.	Min.	Max.
63	2"	⅝" 16 mm	34	48	25	35
75	2 ½"	⅝" 16 mm	34	48	25	35
90	3"	⅝" 16 mm	48	68	35	50
110	4"	⅝" 16 mm	48	68	35	50
125	4"	⅝" 16 mm	61	88	45	65
140	6"	¾" 20 mm	68	100	50	75
160	6"	¾" 20 mm	68	100	50	75
180	6"	¾" 20 mm	68	100	50	75
200	8"	¾" 20 mm	108	163	80	120
225	8"	¾" 20 mm	108	163	80	120
250	10"	⅞" 22 mm	108	163	80	120
280	10"	⅞" 22 mm	108	163	80	120
315	12"	⅞" 22 mm	142	217	105	160
355	14"	1" 25 mm	244	370	180	270
400	16"	1" 25 mm	244	370	180	270
450	18"	1 ⅛" 28 mm	270	405	200	300
500	20"	1 ⅛" 28 mm	270	405	200	300
560	22"	1 ⅛" 28 mm	352	530	260	390
630	24"	1 ⅛" 28 mm	395	590	290	435

Repair Instructions for Pexgol Pipe

1. **Small hole (up to 5 cm diameter)**
   - 1.1 Uncover the pipe, 2 meters along the pipe and 0.5 meter below the pipe.
   - 1.2 Carefully clean the soil from the pipe and make sure no scratches extend beyond the repair area.
   - 1.3 Use a repair fitting, supplied by Golan or use a branch-off saddle.
   - 1.4 In case of vertical installation (dewatering line), the fitting must be protected by a fixpoint bridge.

2. **Large hole requiring (replacing a pipe section)**
   - 2.1 Uncover the pipe, 3 meters along the pipe and 0.5 meters below the pipe.
   - 2.2 Cut out the section of the pipe with the hole and replace with a new section.
   - 2.3 In most cases, the maximum length of the section to be replaced does not exceed 1 meter in length.
   - 2.4 The new section will be connected by:
     - Two electrofusion repair couplers
     - Four Golan flanged couplings
     - Two Plasson mechanical couplers (for pipes up to 160 mm)

Notes:

- Only technicians trained by Golan's field service personnel are authorized to perform the repair.
- If necessary, can stop water flow using common squeeze-off techniques.
- In case of a vertical installation (dewatering line), the pipe must be secured by a fixpoint bridge prior o cutting the pipe.
- Follow the instructions according to the size of the hole in the pipe.

Repair Mechanical Fitting

Repair EF Fitting

Instructions for Underground Installation of Pexgol Pipes

For all Pexgol pipe classes, the minimum recommended depth of the trench is 60 cm, to prevent mechanical damage to the pipe. If the pipe is to be covered only to prevent solar heating, the designer may reduce this depth.

In cold areas the installation depth may be increased by the designer to prevent freezing of the transported fluids.

For the maximum allowed installation depth for each pipe class, please contact the application engineer.

If required, the width can be increased to allow more comfortable work in the trench. The minimum recommendation depth of the trench is 60 cm, to prevent mechanical damage of the pipe.

For a route change, for example a 90° angle, it is recommended to dig the trench with a suitable radius.

See Natural bending radius in page 78.

The following table shows the minimum required trench width for Pexgol pipes.

Table No. 101.1: Trench width

Outside pipe diameter	Minimum trench width (mm)
90	250
110	250
125	265
140	280
160	300
180	350
200	400
225	400
280	450
315	550
355	650
450	750
500	850
630	1000

Backfilling of the Trench

The excellent scratch resistance of the Pexgol pipes enables laying the pipes in trenches with no sand bedding; if sand bedding is required by the pipe designer, fill the trench with sand 10 cm above the pipe.

Backfilling the trench using the earth originally removed from the trench is allowed (in accordance with ISO 14531, Part 4); if corrosive soil is used to cover Pexgol pipes that are connected with metal fittings, cover the fittings with sand, not with the corrosive soil.

No compacting is required for any class of Pexgol pipes regardless of the depth of the trench.

Installation below a road or a pavement can be done without any protective sleeves. In this case, controlled compacting of the soil/ground, according to the designer's instructions, should be applied when covering the pipe to prevent the ground sinking.

It is recommended to insulate hot water underground Pexgol pipes to reduce energy losses.

Above-Ground Installation Guidelines

Above-ground installation of Pexgol pipes is advantageous in the following cases:

- Slurry lines which are frequently relocated.
- Installation through marshes or areas with difficult access.
- Quick installation of temporary pipelines.

Pexgol pipes withstand exposure to sunlight for pipe lifetime.

The coefficient of expansion of Pexgol pipes is high compared to steel pipes, but the forces generated by thermal stresses are much lower. The reason is the low modulus of elasticity and the fact that the Pexgol pipes feature stress relaxation.

Pexgol pipes installed above ground might increase in length as a result of temperature increases and tend to undergo "snaking". Longitudinal elongation and contraction of the pipe is not uniform due to the coefficient of friction between the pipe and the ground varies. However, the toughness and the exceptional abrasion resistance of Pexgol pipes enable the pipes to move across the soil without affecting strength or service life.

Above ground installation instructions for Pexgol pipes laid on the ground

when the design temperature is lower than the installation temperature. The pipe tends to contract. The contraction creates axial stresses in the pipes which tend to pullout the pipes from the fittings.

Installing Pexgol pipes above the ground with a calculated slack rather than in a straight line, is a way to reduce thermal stresses.

This procedure reduces the tendency of the pipe to pull out of its fittings.

The slack (calculated according to the Pexgol coefficient of thermal contraction) is 0.2% or 2 mm for every meter per 10°C.

The actual value depends on the temperature difference between the installation temperature and the lowest temperature.

The slack can be maintained by pushing the mid span of the pipe slightly sidewise during the installation.

Axially unrestrained fittings should be secured and protected from pull out, (see page 56).

Maintaining Pexgol pipeline in a straight line, on the ground or on pipe racks

If a straight pipeline is required, guiding the pipeline at intervals is a good method of limiting and controlling thermal expansion and contraction of the pipeline.

The smaller the distance between the guides, the smaller the theoretic increase in pipe length. As a result, lateral deflections decrease and the pipeline remains straight.

Determining the maximum distance between two guides

The distance between two adjacent guides is calculated according to the following formula:

L = F x D where:

L is the distance (in m) between the guides.

D = outside pipe diameter (in mm).

F is a coefficient which depends on the temperature increase ΔT between the installation temperature and the design temperature (See table 70.1)

The formula allows for a maximum sidewise deflection of 50 mm between two adjacent guides.

Example: Pipe diameter 200 mm, installation temperature 20°C, maximum ambient temperature 40°C, design temperature is 20 + 40 = 60°C.
ΔT = 60° - 20° = 40° I F = 0.064 I L = 0.064 x 200 = 12.8 m

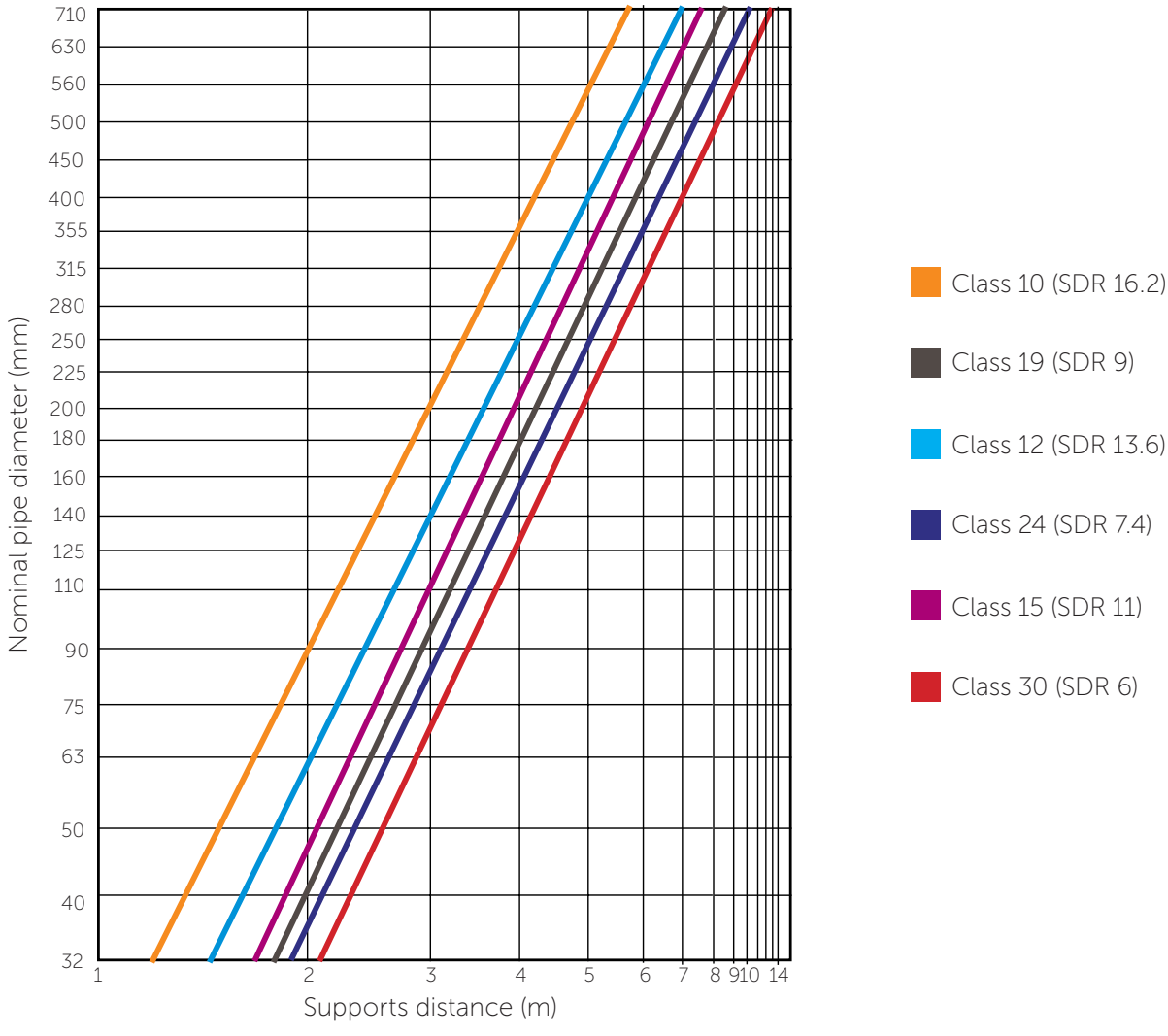
Table No. 102.1: Coefficients F

ΔT	Coefficient F
10^0	0.25
20^0	0.125
30^0	0.085
40^0	0.064
50^0	0.05
60^0	0.04
70^0	0.036
80^0	0.03

Pexgol Horizontally Supported Pipeline

The distance between two adjacent supports can be found in the following table:

Figure 103.1: Maximum supports distance



The values shown in Figure 103.1 must be multiplied by the following correction factors in Table 103.2.

Table No. 103.2: Correction factors for figure 103.1

Design temperature	Correction factor
0^0	1.15
10^0	1.11
20^0	1.07
30^0	1.03
40^0	0.99
50^0	0.95
60^0	0.91
70^0	0.87
80^0	0.83
90^0	0.79
100^0	0.75

PEXGOL PIPES TRANSPORTATION

Transportation of Pexgol Pipes

An outstanding feature of the Pexgol pipe is its flexibility, due to the cross-linked structure. This structure enables the pipe to return to its original diameter after de-coiling. As a result, Golan is able to supply longer lengths of pipe, compared to other suppliers and types of pipes. Pexgol pipes can be shipped in coils, coils with cores and straight sections.

These tables provide the maximum lengths which can be shipped in various containers. More details can be found next pages.

1. Transportation of Pexgol pipes in coils

Pexgol pipes of diameters from 40 to 280 mm are available in coils for shipping in coils. From **40 mm to 160 mm** can be fitted on 20' and 40', 20' and 40' OT, and 40'HC containers. From diameters of 180 up to 280 mm, on containers of 20' and 40' OT.

Table No. 106.1:
Transportation in coils for pipes of 40 mm to 160 mm

Pipe		20', 40' and containers			40'HC containers		20' and 40'OT containers		
OD	Class	Max. Lenght per coil [m]	20' N° of coils allowed	40' N° of coils allowed	Max. Lenght per coil [m]	40'HC N° of coils allowed	Max. Lenght per coil [m]	20'OT N° of coils allowed	40'OT N° of coils allowed
40	15	1800	5	11	2100	10	N/A	N/A	N/A
40	19	1800	5	11	2100	10	N/A	N/A	N/A
40	24	1800	5	11	2100	10	N/A	N/A	N/A
40	30	1800	5	11	2100	10	N/A	N/A	N/A
50	15	1200	5	11	1400	10	N/A	N/A	N/A
50	19	1200	5	11	1400	10	N/A	N/A	N/A
50	24	1200	5	11	1400	10	N/A	N/A	N/A
50	30	1200	5	11	1400	10	N/A	N/A	N/A
63	10	600	5	11	800	10	N/A	N/A	N/A
63	12	600	5	11	800	10	4500	1	3
63	15	700	5	11	800	10	4500	1	3
63	19	700	5	11	800	10	4500	1	3
63	24	700	5	11	800	10	4500	1	3
63	30	700	5	11	800	10	4500	1	3
75	10	300	5	11	450	10	N/A	N/A	N/A
75	12	450	5	11	500	10	3300	1	3
75	15	500	5	10	500	10	3300	1	3
75	19	500	5	10	500	10	3300	1	3
75	24	500	5	10	500	10	3300	1	3
75	30	500	5	10	500	10	3300	1	3
90	10	200	5	11	300	8	N/A	N/A	N/A
90	12	250	5	11	350	8	2000	1	3
90	15	300	5	10	400	8	2000	1	3
90	19	300	5	10	400	8	2000	1	3
90	24	300	5	10	400	8	2000	1	3
90	30	300	5	10	400	8	2000	1	3
110	12	130	5	11	210	8	1300	1	3
110	15	250	5	9	300	8	1300	1	3
110	19	250	5	9	300	8	1300	1	3
110	24	250	5	9	300	8	1300	1	3
110	30	250	5	9	300	8	1300	1	3

Table No. 106.1: (continued)
Transportation in coils for pipes of 40 mm to 160 mm

Pipe		20', 40' and Containers			40'HC Containers		20' and 40'OT Containers		
OD	Class	Max. Lenght per coil [m]	20' N° of coils allowed	40' N° of coils allowed	Max. Lenght per coil [m]	40'HC N° of coils allowed	Max. Lenght per coil [m]	20'OT N° of coils allowed	40'OT N° of coils allowed
125	12	75	5	11	120	8	1000	1	3
125	15	150	5	10	200	8	1150	1	3
125	19	150	5	10	200	8	1150	1	3
125	24	150	5	10	200	8	1150	1	3
125	30	150	5	10	200	8	1150	1	3
140	12	N/A	N/A	N/A	70	10	760	1	3
140	15	75	5	11	120	8	800	1	3
140	19	75	5	11	120	8	870	1	3
140	24	75	5	11	120	8	870	1	3
140	30	75	5	11	120	8	870	1	3
160	12	N/A	N/A	N/A	N/A	N/A	500	1	3
160	15	N/A	N/A	N/A	70	8	600	1	3
160	19	N/A	N/A	N/A	140	8	600	1	3
160	24	N/A	N/A	N/A	140	8	600	1	3
160	30	N/A	N/A	N/A	140	8	600	1	3

OT - Open Top Container / HC - High Cube

Table No. 107.1:
Transportation in coils for pipes of 180 mm to 280 mm

Pipe		Max. lenght per coil [m]	N° coils allowed	
OD	Class		20' OT	40' OT
180	12	380	1	3
180	15	450	1	3
180	19	500	1	3
180	24	500	1	3
180	30	500	1	3
200	12	270	1	3
200	15	300	1	3
200	24	300	1	3
200	30	300	1	3
225	12	142	1	3
225	15	230	1	3
225	19	280	1	3
225	24	280	1	3
225	30	280	1	3
250	15	135	1	3
250	19	230	1	3
250	24	230	1	3
250	30	230	1	3
280	15	108	1	3
280	19	150	1	3
280	24	160	1	3
280	30	185	1	3

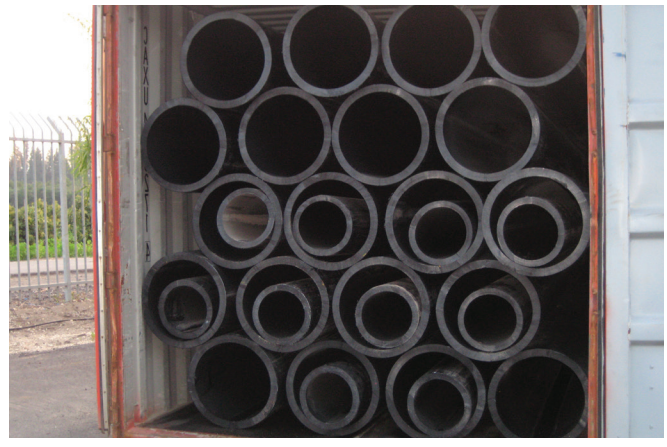


Table No. 108.1:
Coils dimensions for transporting

Pipe		Standard coil (20' and 40' container)				Tall coil (40' high cube container)			
OD	Class	Length [m]	ID [mm]	OD [mm]	W [mm]	Length [m]	ID [mm]	OD [mm]	W [mm]
40	10	1,500	1,250	2,150	950	2,000	1,200	2,400	1,000
40	15	1,800	1,050	2,200	1,050	2,100	1,200	2,400	1,050
40	19	1,800	1,050	2,200	1,050	2,100	1,200	2,400	1,050
40	24	1,800	1,050	2,200	1,050	2,100	1,200	2,400	1,050
40	30	1,800	1,050	2,200	1,050	2,100	1,200	2,400	1,050
50	15	1,200	1,050	2,200	1,050	1,400	1,050	2,400	1,050
50	19	1,200	1,050	2,200	1,050	1,400	1,050	2,400	1,050
50	24	1,200	1,050	2,200	1,050	1,400	1,050	2,400	1,050
50	30	1,200	1,050	2,200	1,050	1,400	1,050	2,400	1,050
63	10	600	1,200	2,200	1,050	800	1,200	2,400	1,050
63	12	600	1,200	2,200	1,050	800	1,200	2,400	1,050
63	15	700	1,100	2,200	1,050	800	1,100	2,400	1,050
63	19	700	1,100	2,200	1,050	800	1,100	2,400	1,050
63	24	700	1,100	2,200	1,050	800	1,100	2,400	1,050
63	30	700	1,100	2,200	1,050	800	1,100	2,400	1,050
75	10	300	1,450	2,200	1,000	450	1,450	2,400	1,050
75	12	450	1,200	2,200	1,050	500	1,200	2,400	1,050
75	15	500	1,050	2,200	1,050	500	1,100	2,400	1,050
75	19	500	1,050	2,200	1,050	500	1,100	2,400	1,050
75	24	500	1,050	2,200	1,050	500	1,100	2,400	1,050
75	30	500	1,050	2,200	1,050	500	1,100	2,400	1,050
90	10	200	1,550	2,200	1,000	300	1,550	2,450	1,000
90	12	250	1,300	2,200	1,000	350	1,300	2,500	1,000
90	15	300	1,150	2,200	1,050	400	1,300	2,500	1,000
90	19	300	1,050	2,200	1,050	400	1,300	2,500	1,000
90	24	300	1,050	2,200	1,050	400	1,300	2,500	1,000
90	30	300	1,050	2,200	1,050	400	1,300	2,500	1,000
110	12	130	1,650	2,250	1,000	210	1,700	2,550	1,000
110	15	250	1,150	2,250	1,000	300	1,100	2,550	1,000
110	19	250	1,150	2,250	1,000	300	1,100	2,550	1,000
110	24	250	1,150	2,250	1,000	300	1,100	2,550	1,000
110	30	250	1,150	2,250	1,000	300	1,100	2,550	1,000
125	12	75	1,800	2,250	1,000	120	1,800	2,550	1,000
125	15	150	1,250	2,250	1,050	200	1,250	2,450	1,050
125	19	150	1,250	2,250	1,050	200	1,250	2,450	1,050
125	24	150	1,250	2,250	1,050	200	1,250	2,450	1,050
125	30	150	1,250	2,250	1,050	200	1,250	2,450	1,050
140	12	N/A	N/A	N/A	N/A	70	1,900	2,450	1,000
140	15	75	1,650	2,200	1,000	120	1,650	2,450	1,000
140	19	75	1,650	2,200	1,000	120	1,650	2,450	1,000
140	24	75	1,650	2,200	1,000	120	1,650	2,450	1,000
140	30	75	1,650	2,200	1,000	120	1,650	2,450	1,000
160	15	N/A	N/A	N/A	N/A	70	1,850	2,450	1,000
160	19	N/A	N/A	N/A	N/A	140	1,850	2,500	2,000
160	24	N/A	N/A	N/A	N/A	140	1,850	2,500	2,000
160	30	N/A	N/A	N/A	N/A	140	1,850	2,500	2,000

* Open Top Container.

2. Transportation of Pexgol pipes with coils with cores

Pexgol pipes of **diameters 315** mm are available in special coils with cores up to 120 meters depending on the class.

Pipe		Max. length per coil [m]	N° coils allowed	
OD	Class		20' OT container	40' OT container
315	15	50	1	3
315	19	90	1	3
315	24	120	1	3

3. Transportation of Pexgol pipe in straight Sections

Pexgol pipes in larger **diameters from 315 mm up to 710 mm** with plain ends can be ordered in straight bars a maximum length of 11.8 m each (to fit into standard 40 ft containers).

Table No. 109.1: Pipes in straight sections on 40' OT and 40' HC containers

Pipe	Bars in 40' OT container	
OD	Units 11.8 [m]	Total [m]
63	1,385	16343
75	944	11139
90	588	6938
110	431	5086
125	298	3516
140	248	2926
160	175	2065
180	150	1770
200	116	1369
225	86	1015
250	77	906
280	60	708
315	46	543
355	33	389
400	27	319
450	23	271
500	20	236
630	9	106
710	9	106

Pipe	Bars in 40' OT container	
OD	Units 11.8 [m]	Total [m]
63	1,385	16343
75	944	11139
90	614	7245
110	408	4814
125	312	3682
140	250	2950
160	186	2195
180	151	1782
200	118	1392
225	93	1097
250	77	909
280	60	708
315	47	555
355	39	460
400	30	354
450	24	283
500	20	236
630	12	141
710	9	106

4. Transportation with drums

Pexgol pipes of diameters from **280 mm to 450 mm** are available in drums. This transportation method it's only available on special circumstances and from Golan Plastic factory in Chile. Please consult us.

Pipe		Total Length Per Container type (m)	
OD	Class	20'OT	40'OT
280	19	150	450
280	24	185	555
280	30	185	*
315	15	55	165
315	19	90	270
315	24	90	270
315	30	90	*
355	19	50	150
355	24	50	150
355	30	50	150
400	19	40	120
400	24	40	120
400	30	40	120
450	24	34	102
450	30	34	102

* Weight limitations dictate using less than 3 full drums.

QUESTIONNAIRE

Application Questionnaire (RFI)

Golan Plastic Products is keen to find the right solution for any application. The solution is always a combination of the right pipe class and the right choice of fitting.

To select the right solution for you application, we ask you to please complete the relevant Application Questionnaire and send it to us. Please answer the following questions to the best of your knowledge and select the proper measurement units.

Newtonian fluids

Please answer the following questions to the best of your knowledge/Select the proper units	
Type of transported material	
Chemical composition	
Concentration (%)	
Specific gravity (gr/cm^3) (lb/ft^3)	
Fluid temperature (°C) (°F)	
Maximum environmental temperature (°C) (°F)	
Is the pipe exposed above the ground?	Yes No
Is the fluid abrasive?	Yes No
Required flow rate (m^3/h) (gpm)	
Pump pressure (bar) (psi)	
Line length (m) (ft)	
Current pipe material	
Current pipe outside diameter (mm) (in)	
Current pipe inside diameter (mm) (in)	
Altitude difference on the pipe (m) (ft)	
Line going up Line going down	
Final discharge pressure of the pipe system (bar) (psi)	
Minimum critical speed of the slurry (m/s) (ft/s)	

Note: Please attach any additional information such as layout sketches, field outline, pump brand and model (if it's already selected), specifications page, etc.

Notes:

Boreholes and dewatering

Please answer the following questions to the best of your knowledge/Select the proper units	
Minimum dynamic water level (m) (ft)	
Depth of installation (pipe length) (m) (ft)	
Required flow rate (m^3/h) (gpm)	
Discharge pressure(*) (bar) (psi)	
Water temperature (°C) (°F)	
Pump pressure at closed valve (bar) (psi)	
Pump weight (kg) (lb)	
Weight of wiring (kg/m) (lb/ft)	
Pump connection size Flange Thread	
Pump construction material	
Interior coating dimension (ID) (mm) (in)	

* Required pressure at the borehole outlet.

Note: If you already selected the pump, please send brand and model.

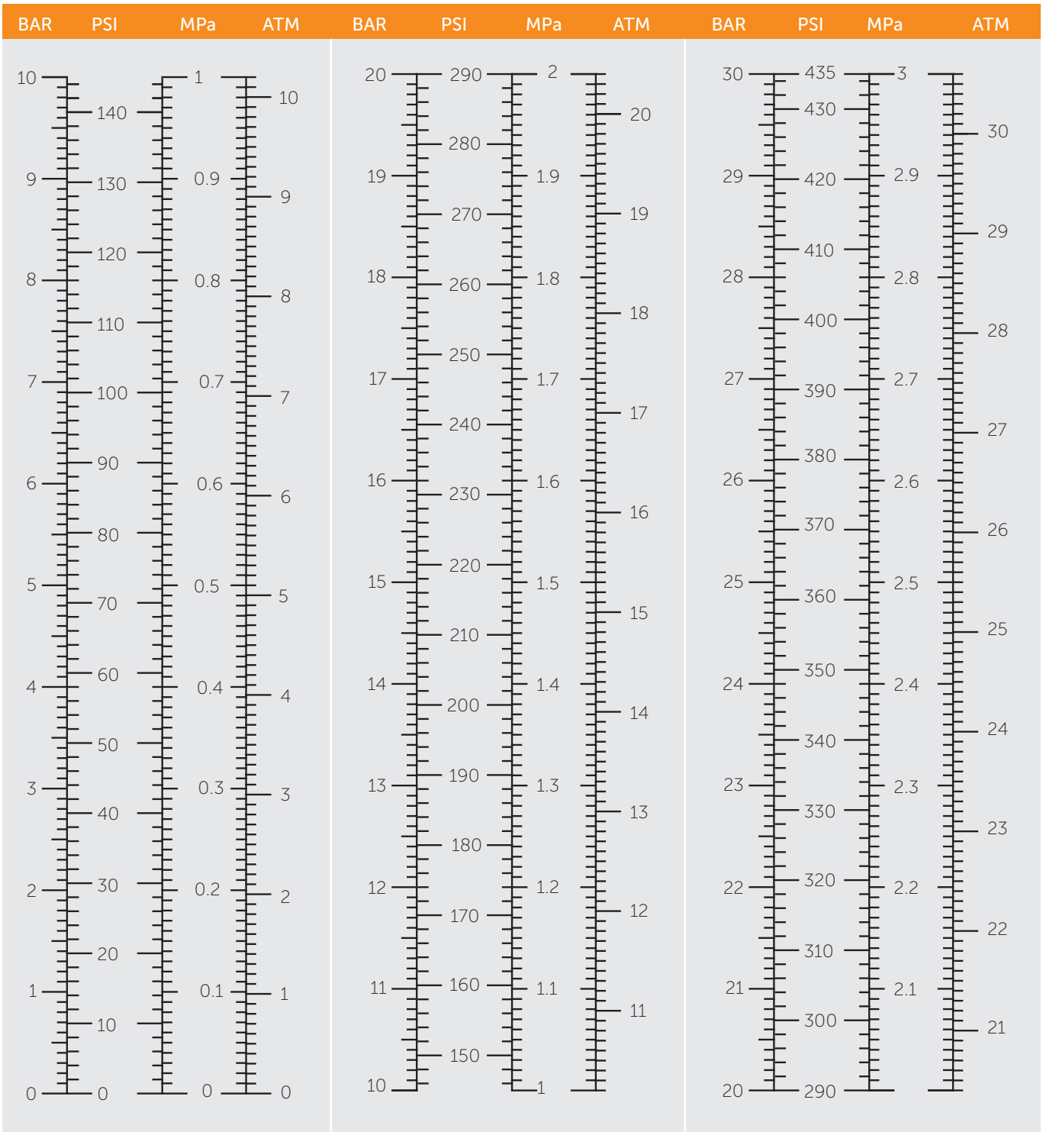
Slurry

Please answer the following questions to the best of your knowledge/Select the proper units				
Slurry to transport				
Flow		m^3/h		gpm
Chemical composition				
pH				
Specific solids gravity	S			
Concentration	(%)			
Fluid temperature		°C		°F
Slurry density		kg/m^3		g/cm^3
Dynamic viscosity		Pa·s		Pa·s
Yield stress (TO)		Pa		
d.50		mm		µm
d.85		mm		µm
Critical velocity		m/s		ft/s
Is the pipe exposed above the ground?	Yes		No	
Maximum environmental temperature		°C		°F
Altitude difference on the pipe		m		ft
Line length		m		ft
There's a selected pump?	Yes		No	
Current pump pressure		bar		psi
There's a current working pipe?	Yes		No	
Current pipe material				
Current pipe outside diameter		mm		in
Current pipe inside diameter		mm		in
Expected service life			Years	

Note: Please attach any additional information such as layout sketches, field outline, pump brand and model (if it's already selected), specifications page, etc.

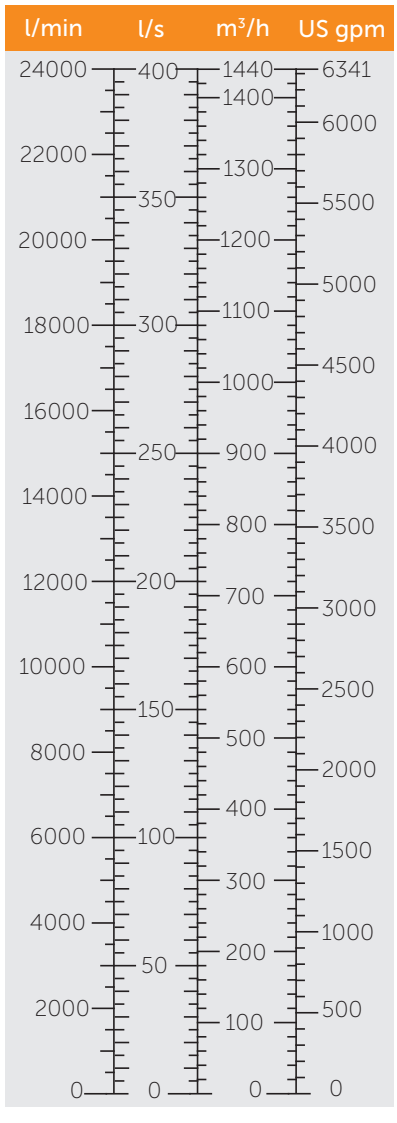
Notes:

Conversion tables

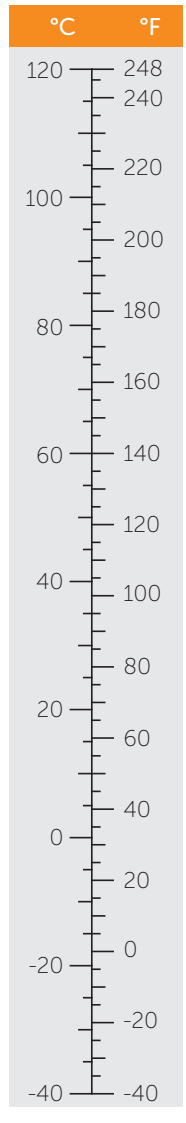


Unit	In.	Feet	Millimeters	Meters
inch [in.]	1	0.08	25.4	0.0254
foot [ft]	12	1	304.8	0.3048
yard [yd]	36	3	914.4	0.9144
mile [mi]	63,360	5,280	1609×10^3	1,609.34
millimeters [mm]	0.039	0.47	1	1000
meters [m]	39.37	3.28084	0.001	1

Flow



Temperature



Quantity	SI (Metric) Unit	Equal US Customary Unit
Length	meter (m) meter (m) millimeter (mm)	3.281 feet (ft) 39.37 inches (in.) 0.03937 inches (in.)
Area	square meter (m^2) square meter (m^2) square millimeter (mm^2)	10.76 ft^2 1550 $in.^2$ 0.001550 $in.^2$
Volume	cubic meter (m^3) cubic meter (m^3) liter liter liter	35.31 ft^3 264.2 gallons (gal) 0.03531 ft^3 61.02 in^3 0.2642 gal
Mass	kilogram (kgm)	2.205 pounds mass (lbm)
Force	Newton (N)	0.2248 pounds force (lbf)
Pressure	Pascal (PA) or (N/M^2) MegaPascal (MPa) or N/mm^2 bar kilopascal (kPa) or (kN/m^2) kilogram-force/square centimeter (kgf/cm^2) or kilopond (kp/cm^2)	1.450x10-4 lbf/in^2 (psi) 1.450x102 lbf/in^2 (psi) 14.504 lbf/in^2 (psi) 0.1450 lbf/in^2 (psi) 14.223 lbf/in^2 (psi)
Enthalpy	Joule/gram (j/g)	0.4299 Btu/lbm
Temperature	Kelvin (k) Kelvin (k) °Celsius (°C)	1.800° Rankine (°R) 1.8K - 459.67=°Fahrenheit (°F) 1.8°C + 32 = °F

FITTINGS CATALOG

Flared End Connectors (Stub Ends)

The ends of the Pexgol pipe are heated and flared by a proprietary process, performed at Golan Plastic Products. The final pipe end is similar to a stub end.

The loose flange is usually mounted over the pipe during the flaring process. Alternatively, split flanges can be supplied to be mounted later. Golan prepares flanges conforming to different standards. Detailed drawings of flanges are supplied as requested. Plastic coated flanges are also available on request.

The pipes can be ordered in lengths according to customer specifications. Alternatively, they are available in lengths of 5.80 m to fit into 20ft containers or in lengths of 11.80 m to fit into 40 ft containers Pipes in lengths of 12-13 meters can be supplied upon a special order in 4 5ft containers. The catalog numbers in the table on the next page represent Pexgol pipe sections of standard length 500 mm with a flared end on one side.

Please specify according to the following example if:

- A longer section is required, or
- Flared ends on both sides are required, or
- Loose flanges are required for the pipe section

Example:

For a pipe section 160 mm, wall thickness 14.6mm, length 2500 mm with one flared end & flange:

FLA16014.6 2500 mm with flared end and flange ASA 150 on one side.

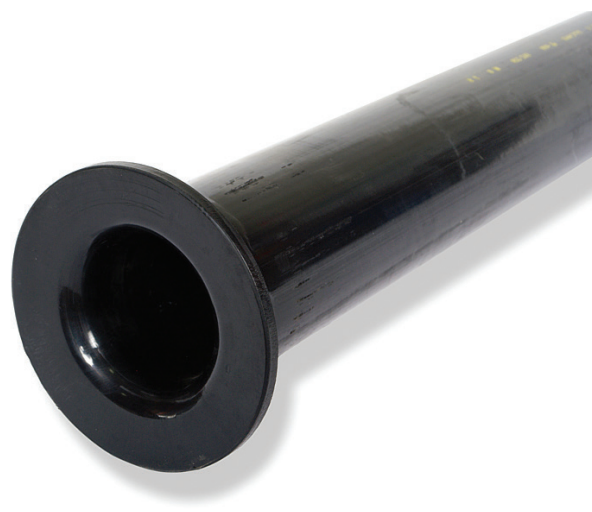
The catalog number represents only the flared end and not the flange, which is ordered separately.

Length of Flared End Connectors (stub-ends)

OD	Std length	Catalog Number
63	500.0	85.0
75	500.0	85.0
90	500.0	104.0
110	500.0	120.0
125	500.0	130.0
140	500.0	140.0
160	500.0	160.0
180	500.0	182.0
200	500.0	180.0
225	500.0	180.0
250	500.0	198.0
280	500.0	200.0
315	500.0	200.0
355	500.0	215.0
400	500.0	228.0
450	500.0	238.0
500	500.0	255.0
560	500.0	285.0
630	500.0	320.0
710	500.0	350.0

Flared Ends Catalog Numbers

OD	Class 10	Class 12	Class 15	Class 19	Class 24	Class 30
63	FLA633.9	FLA634.7	FLA635.8	FLA-637.1	FLA638.6	FLA-6310.5
75	FLA754.7	FLA755.6	FLA756.8	FLA758.4	FLA7510.3	FLA7512.5
90	FLA905.6	FLA906.7	FLA908.2	FLA9010.1	FLA9012.3	FLA9015
110	FLA1106.8	FLA1108.1	FLA11010	FLA11012.3	FLA11015.1	FLA11018.3
125	FLA1257.7	FLA1259.2	FLA12511.4	FLA12514.1	FLA12517.1	FLA12520.8
140	FLA1408.7	FLA14010.3	FLA14012.7	FLA14015.7	FLA14019.2	FLA14023.3
160	FLA1609.9	FLA16011.8	FLA16014.6	FLA16017.9	FLA16021.9	FLA16027.3
180	FLA18011.1	FLA18013.3	FLA18016.3	FLA18020.1	FLA18024.6	FLA18029.9
200	FLA20012.4	FLA20014.7	FLA20018.1	FLA20022.4	FLA20027.4	FLA20033.2
225	FLA22513.9	FLA22516.6	FLA22520.4	FLA22525.0	FLA22530.8	FLA22537.4
250	FLA25015.2	FLA22516.6	FLA25022.7	FLA25027.9	FLA25034.2	FLA25041.5
280	FLA28017.3	FLA28020.6	FLA28025.4	FLA28031.3	FLA28037.7	FLA-28046.5
315	FLA31519.5	FLA31523.2	FLA31528.6	FLA31535.2	FLA31543.1	FLA31552.3
355	FLA35521.9	FLA35526.1	FLA35532.2	FLA35539.7	FLA35548.5	FLA35559
400	FLA40024.7	FLA40029.4	FLA40036.3	FLA440044.7	FLA40054.7	FLA40066.7
450	FLA45027.8	FLA45033.1	FLA45040.9	FLA45050.3	FLA45061.5	FLA45075
500	FLA50030.9	FLA50036.7	FLA50045.4	FLA50055.8	FLA50068.5	FLA50083.4
560	FLA56034.6	FLA56041.2	FLA56050.8	FLA56062.5	FLA56076.7	FLA56093.4
630	FLA63038.9	FLA63046.6	FLA63057.2	FLA63070.0	FLA63086.3	FLA630105
710	FLA71043.8	FLA71052.2	FLA71064.5	FLA71078.9	FLA71097.3	FLA710118.3



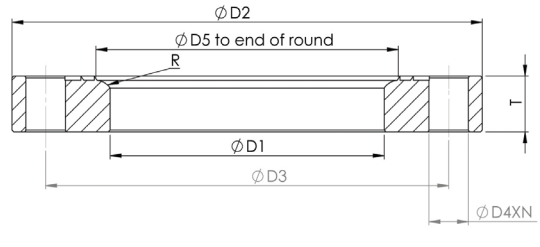
Loose Flanges for Flared End Connectors

The following table lists dimensions of flanges for Pexgol flared ends according to ASA 150 or B.S. table 10D. Flanges according to other flange standards are available by special order. Split flanges of all flange standards are also supplied by special order.

Catalog Number	Standard	Pipe diameter (mm)	Flange dim. (in.)	O.D	Wall thickness	Radius (mm)	Inside diameter (mm)	No. of Bolts	Weight (kg)
				D2	T	R	D1	N	
65003201	ASA/BSTD	32	1	108	14	1	34	4	0.9
65004012	ASA/BSTD	40	1.25	118	16	1	42	4	1.2
65005015	ASA/BSTD	50	1.5	127	17	6	52	4	1.4
65006302	ASA/BSTD	63	2	152	19	7	65	4	2.3
65007525	ASA/BSTD	75	2.5	178	22	8	78	4	3.5
65009003	ASA/BSTD	90	3	190	24	8	93	4	4.1
65011004	ASA/BSTD	110	4	228	24	10	116	8	5.8
65012504	ASA/BSTD	125	4	228	24	10	131	8	5.3
65014006	ASA/BSTD	140	6	279	25	10	146	8	8.9
65016006	ASA/BSTD	160	6	279	25	10	167	8	7.9
65018006	ASA/BSTD	180	6	279	25	10	187	8	6.7
65020008	ASA/BSTD	200	8	343	28	15	210	8	12.9
65022508	ASA/BSTD	225	8	343	28	15	236	8	10.9
64825010	ASA	250	10	406	30	17	262	12	18.2
64925010	BSTD	250	10	406	30	17	262	8	18.2
64828010	ASA	280	10	406	30	17	293	12	14.9
64928010	BSTD	280	10	406	30	17	293	8	14.9
65031512	ASA/BSTD	315	12	482	32	20	331	12	24.7
65035514	ASA/BSTD	355	14	533	35	20	371	12	32.2
64840016	ASA	400	16	597	36	22	417	16	41.3
64940016	BSTD	400	16	578	36	22	417	12	36.5
64845018	ASA	450	18	635	40	22	467	16	46.5
64945018	BSTD	450	18	641	40	22	467	12	48.5
64850020	ASA	500	20	698	43	25	518	20	59.1
64950020	BSTD	500	20	705	43	25	518	16	61.8
64863024	ASA	630	24	813	48	30	652	20	71.1
64963024	BSTD	630	24	826	48	30	652	16	78.0

Carbon Flange BSTD

Carbon Flange ASA150



Prefabricated Pexgol Elbows

Prefabricated elbows are produced from Pexgol pipes of all classes according to a proprietary process. The length of each leg of a Pexgol elbows is specified according to dimension A or dimension B in the table below. Prefabricated elbows with flared-ends are available in any length between the minimum and maximum values, dimension A. Prefabricated elbows with plain ends are available in minimum lengths according to dimension B.

Each leg can be supplied with plain ends or with flared ends with or without flanges. and in varying length for each leg.

For ordering please write the length A or B and describe the pipe ends.

For example:

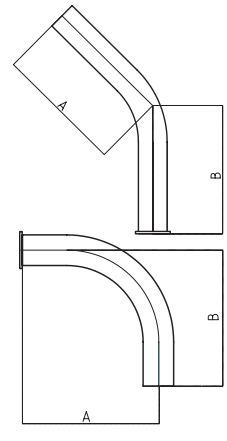
ELB16014.6 - 453D one leg 550 mm with flared end and flange ASA 150, other leg 420 mm plain end.

The weight of the elbow is calculated by adding the A or B values of the legs, dividing them by 1,000 (to get the total length of the elbow in meters) and then multiplying by the weight of the pipe per meter according to the pipe dimensions tables.

Dimensions of Pexgol Elbows

OD	1.5D						3D					
	45°			90°			45°			90°		
	A [mm]		B [mm]	A [mm]		B [mm]	A [mm]		B [mm]	A [mm]		B [mm]
	Min	Max	Min	Min	Max	Min	Min	Max	Min	Min	Max	Min
50	210	400	100	260	600	130	240	500	140	330	600	230
63	225	450	120	320	600	180	260	500	160	380	650	280
75	235	450	130	310	600	210	280	500	180	420	700	320
90	250	350	155	380	600	240	305	500	215	465	700	375
110	270	350	190	420	700	280	335	500	235	530	750	445
125	280	400	200	400	600	320	350	500	270	575	800	500
140	295	400	210	430	700	350	375	500	295	625	900	545
160	300	400	225	450	750	320	410	600	335	690	1000	620
180	300	400	225	450	750	400	430	610	360	720	950	650
200	350	550	350	635	900	450	450	620	450	800	1100	800
225	400	600	400	700	1000	500	500	800	500	900	1250	900
250	450	700	450	720	1000	500	550	800	550	1000	1250	100
280	480	700	480	820	1000	600	650	950	650	1100	1330	1100
315	550	800	550	900	1100	700	700	1100	700	1250	1500	1250
355	650	900	650	1000	1200	1000	800	1100	800	1400	1600	1400
400	700	1000	700	1080	1300	1080	900	1100	900	1500	2400	1500
450	800	1100	800	1200	1400	1200	1000	1150	1000	1900	1900	1900
500	850	1200	850	1350	1500	1350	1100	1100	1100	2000	200	2000
560	*	*	*	*	*	*	*	*	*	*	*	*
630	1100	1300	1100	1650	1900	1650	1450	1700	1450	2400	2500	2400
710	*	*	*	*	*	*	*	*	*	*	*	*

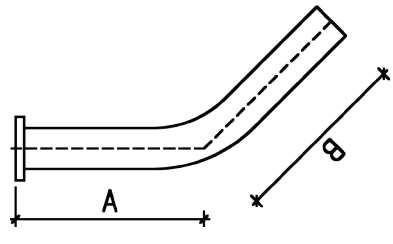
* Available on request

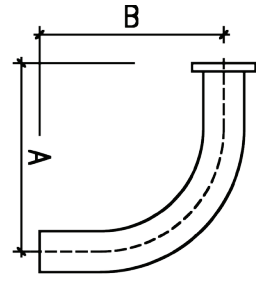


Notes:

1. Length of ebow also includes a straight section to makes connection to the elbow easier.
2. The dimension A is the length of the elbow with a flared end & flange.
3. Elbows with a plain end (for electrofusion or mechanical connector) can be ordered with a shorter length according to dimension B.
4. Elbows with longer dimensions A or B can be specially ordered (after coordination with Golan Plastic Products).
5. Larger or smaller radii elbows are available by special order.
6. Elbows with angles not according to standard are supplied by special order.

OD	Class	1.5D		3D	
		45°	90°	45°	90°
		Catalog Number	Catalog Number	Catalog Number	Catalog Number
50	15	ELB504.6-451.5D	ELB504.6-901.5D	ELB504.6-453D	ELB504.6-903D
50	19	ELB505.6-451.5D	ELB505.6-451.5D	ELB505.6-453D	ELB505.6-453D
50	24	ELB506.9-451.5D	ELB506.9-901.5D	ELB506.9-453D	ELB506.9-903D
50	30	ELB508.3-451.5D	ELB508.3-451.5D	ELB508.3-453D	ELB508.3-453D
63	10	ELB633.9-451.5D	ELB633.9-901.5D	ELB633.9-453D	ELB633.9-903D
63	12	ELB634.7-451.5D	ELB634.7-451.5D	ELB634.7-453D	ELB634.7-453D
63	15	ELB635.8-451.5D	ELB635.8-901.5D	ELB635.8-453D	ELB635.8-903D
63	19	ELB637.1-451.5D	ELB637.1-901.5D	ELB637.1-453D	ELB637.1-903D
63	24	ELB638.6-451.5D	ELB638.6-901.5D	ELB638.6-453D	ELB638.6-903D
63	30	ELB6310.5-451.5D	ELB6310.5-901.5D	ELB6310.5-453D	ELB6310.5-903D
75	10	ELB754.6-451.5D	ELB754.6-901.5D	ELB754.6-453D	ELB754.6-903D
75	12	ELB755.6-451.5D	ELB755.6-451.5D	ELB755.6-453D	ELB755.6-453D
75	15	ELB756.8-451.5D	ELB756.8-901.5D	ELB756.8-453D	ELB756.8-903D
75	19	ELB758.4-451.5D	ELB758.4-901.5D	ELB758.4-453D	ELB758.4-903D
75	24	ELB7510.3-451.5D	ELB7510.3-901.5D	ELB7510.3-453D	ELB7510.3-903D
75	30	ELB7512.5-451.5D	ELB7512.5-901.5D	ELB7512.5-453D	ELB7512.5-903D
90	10	ELB905.6-451.5D	ELB905.6-901.5D	ELB905.6-453D	ELB905.6-903D
90	12	ELB906.7-451.5D	ELB906.7-451.5D	ELB906.7-453D	ELB906.7-453D
90	15	ELB908.2-451.5D	ELB908.2-901.5D	ELB908.2-453D	ELB908.2-903D
90	19	ELB9010.1-451.5D	ELB9010.1-901.5D	ELB9010.1-453D	ELB9010.1-903D
90	24	ELB9012.3-451.5D	ELB9012.3-901.5D	ELB9012.3-453D	ELB9012.3-903D
90	30	ELB9015.0-451.5D	ELB9015.0-901.5D	ELB9015.0-453D	ELB9015.0-903D
110	10	ELB1106.8-451.5D	ELB1106.8-901.5D	ELB1106.8-453D	ELB1106.8-903D
110	12	ELB1108.1-451.5D	ELB1108.1-451.5D	ELB1108.1-453D	ELB1108.1-453D
110	15	ELB11010-451.5D	ELB11010-901.5D	ELB11010-453D	ELB11010-903D
110	19	ELB11012.3-451.5D	ELB11012.3-901.5D	ELB11012.3-453D	ELB11012.3-903D
110	24	ELB11015.1-451.5D	ELB11015.1-901.5D	ELB11015.1-453D	ELB11015.1-903D
110	30	ELB11018.3-451.5D	ELB11018.3-901.5D	ELB11018.3-453D	ELB11018.3-903D
125	10	ELB1257.7-451.5D	ELB1257.7-901.5D	ELB1257.7-453D	ELB1257.7-903D
125	12	ELB1259.2-451.5D	ELB1259.2-451.5D	ELB1259.2-453D	ELB1259.2-453D
125	15	ELB12511.4-451.5D	ELB12511.4-901.5D	ELB12511.4-453D	ELB12511.4-903D
125	19	ELB12514.1-451.5D	ELB12514.1-901.5D	ELB12514.1-453D	ELB12514.1-903D
125	24	ELB12517.1-451.5D	ELB12517.1-901.5D	ELB12517.1-453D	ELB12517.1-903D
125	30	ELB12520.8-451.5D	ELB12520.8-901.5D	ELB12520.8-453D	ELB12520.8-903D





OD	Class	1.5D		3D	
		45°	90°	45°	90°
		Catalog Number	Catalog Number	Catalog Number	Catalog Number
140	10	ELB1408.7-451.5D	ELB1408.7-901.5D	ELB1408.7-453D	ELB1408.7-903D
140	12	ELB14010.3-451.5D	ELB14010.3-451.5D	ELB14010.3-453D	ELB14010.3-453D
140	15	ELB14012.7-451.5D	ELB14012.7-901.5D	ELB14012.7-453D	ELB14012.7-903D
140	19	ELB14015.7-451.5D	ELB14015.7-901.5D	ELB14015.7-453D	ELB14015.7-903D
140	24	ELB14019.2-451.5D	ELB14019.2-901.5D	ELB14019.2-453D	ELB14019.2-903D
140	30	ELB14023.3-451.5D	ELB14023.3-901.5D	ELB14023.3-453D	ELB14023.3-903D
160	10	ELB1609.9-451.5D	ELB1609.9-901.5D	ELB1609.9-453D	ELB1609.9-903D
160	12	ELB16011.8-451.5D	ELB16011.8-451.5D	ELB16011.8-453D	ELB16011.8-453D
160	15	ELB16014.6-451.5D	ELB16014.6-901.5D	ELB16014.6-453D	ELB16014.6-903D
160	19	ELB16017.9-451.5D	ELB16017.9-901.5D	ELB16017.9-453D	ELB16017.9-903D
160	24	ELB16021.9-451.5D	ELB16021.9-901.5D	ELB16021.9-453D	ELB16021.9-903D
160	30	ELB16026.6-451.5D	ELB16026.6-901.5D	ELB16026.6-453D	ELB16026.6-903D
180	10	ELB18011.1-451.5D	ELB18011.1-901.5D	ELB18011.1-453D	ELB18011.1-903D
180	12	ELB18013.3-451.5D	ELB18013.3-451.5D	ELB18013.3-453D	ELB18013.3-453D
180	15	ELB18016.3-451.5D	ELB18016.3-901.5D	ELB18016.3-453D	ELB18016.3-903D
180	19	ELB18020.1-451.5D	ELB18020.1-901.5D	ELB18020.1-453D	ELB18020.1-903D
180	24	ELB18024.6-451.5D	ELB18024.6-901.5D	ELB18024.6-453D	ELB18024.6-903D
180	30	ELB18029.9-451.5D	ELB18029.9-901.5D	ELB18029.9-453D	ELB18029.9-903D
200	10	ELB20012.4-451.5D	ELB20012.4-901.5D	ELB20012.4-453D	ELB20012.4-903D
200	12	ELB20014.7-451.5D	ELB20014.7-453D	ELB20014.7-453D	ELB20014.7-453D
200	15	ELB20018.1-451.5D	ELB20018.1-901.5D	ELB20018.1-453D	ELB20018.1-903D
200	19	ELB20022.4-451.5D	ELB20022.4-901.5D	ELB20022.4-453D	ELB20022.4-903D
200	24	ELB20027.4-451.5D	ELB20027.4-901.5D	ELB20027.4-453D	ELB20027.4-903D
200	30	ELB20033.2-451.5D	ELB20033.2-901.5D	ELB20033.2-453D	ELB20033.2-903D
225	10	ELB22513.9-451.5D	ELB22513.9-901.5D	ELB22513.9-453D	ELB22513.9-903D
225	12	ELB22516.6-451.5D	ELB22516.6-451.5D	ELB22516.6-453D	ELB22516.6-453D
225	15	ELB22520.4-451.5D	ELB22520.4-901.5D	ELB22520.4-453D	ELB22520.4-903D
225	19	ELB22525.0-451.5D	ELB22525.0-901.5D	ELB22525.0-453D	ELB22525.0-903D
225	24	ELB22530.8-451.5D	ELB22530.8-901.5D	ELB22530.8-453D	ELB22530.8-903D
225	30	ELB22537.4-451.5D	ELB22537.4-901.5D	ELB22537.4-453D	ELB22537.4-903D
250	10	ELB25015.5-451.5D	ELB25015.5-901.5D	ELB25015.5-453D	ELB25015.5-903D
250	12	ELB25018.4-451.5D	ELB25018.4-901.5D	ELB25018.4-453D	ELB25018.4-903D
250	15	ELB25022.7-451.5D	ELB25022.7-901.5D	ELB25022.7-453D	ELB25022.7-903D
250	19	ELB25027.9-451.5D	ELB25027.9-901.5D	ELB25027.9-453D	ELB25027.9-903D
250	24	ELB25034.2-451.5D	ELB25034.2-901.5D	ELB25034.2-453D	ELB25034.2-903D
250	30	ELB25041.5-451.5D	ELB25041.5-901.5D	ELB25041.5-453D	ELB25041.5-903D
280	10	ELB28017.3-451.5D	ELB28017.3-901.5D	ELB28017.3-453D	ELB28017.3-903D
280	12	ELB28020.6-451.5D	ELB28020.6-901.5D	ELB28020.6-453D	ELB28020.6-903D
280	15	ELB28025.4-451.5D	ELB28025.4-901.5D	ELB28025.4-453D	ELB28025.4-903D
280	19*	ELB28031.3-451.5D	ELB28031.3-901.5D	ELB28031.3-453D	ELB28031.3-903D
280	24	ELB28038.3-451.5D	ELB28038.3-901.5D	ELB28038.3-453D	ELB28038.3-903D
280	30*	ELB28046.5-451.5D	ELB28046.5-901.5D	ELB28046.5-453D	ELB28046.5-903D

* Minimum quantity required.

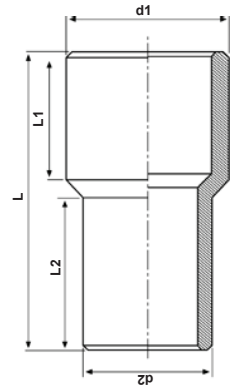
OD	Class	1.5D		3D	
		45°	90°	45°	90°
		Catalog Number	Catalog Number	Catalog Number	Catalog Number
315	10	ELB31519.5-451.5D	ELB31519.5-901.5D	ELB31519.5-453D	ELB31519.5-903D
315	12	ELB31523.2-451.5D	ELB31523.2-901.5D	ELB31523.2-453D	ELB31523.2-903D
315	15	ELB31528.6-451.5D	ELB31528.6-901.5D	ELB31528.6-453D	ELB31528.6-903D
315	19	ELB31535.2-451.5D	ELB31535.2-901.5D	ELB31535.2-453D	ELB31535.2-903D
315	24*	ELB31543.1-451.5D	ELB31543.1-901.5D	ELB31543.1-453D	ELB31543.1-903D
315	30*	ELB31552.3-451.5D	ELB31552.3-901.5D	ELB31552.3-453D	ELB31552.3-903D
355	10	ELB35521.9-451.5D	ELB35521.9-901.5D	ELB35521.9-453D	ELB35521.9-903D
355	12	ELB35526.1-451.5D	ELB35526.1-901.5D	ELB35526.1-453D	ELB35526.1-903D
355	15	ELB35532.2-451.5D	ELB35532.2-901.5D	ELB35532.2-453D	ELB35532.2-903D
355	19	ELB35539.7-451.5D	ELB35539.7-901.5D	ELB35539.7-453D	ELB35539.7-903D
355	24	ELB35548.5-451.5D	ELB35548.5-901.5D	ELB35548.5-453D	ELB35548.5-903D
355	30*	ELB35559.0-451.5D	ELB35559.0-901.5D	ELB35559.0-453D	ELB35559.0-903D
400	10	ELB40024.7-451.5D	ELB40024.7-901.5D	ELB40024.7-453D	ELB40024.7-903D
400	12	ELB40029.4-451.5D	ELB40029.4-901.5D	ELB40029.4-453D	ELB40029.4-903D
400	15*	ELB40036.3-451.5D	ELB40036.3-901.5D	ELB40036.3-453D	ELB40036.3-903D
400	19*	ELB40044.7-451.5D	ELB40044.7-901.5D	ELB40044.7-453D	ELB40044.7-903D
400	24*	ELB40054.7-451.5D	ELB40054.7-901.5D	ELB40054.7-453D	ELB40054.7-903D
400	30*	ELB40066.7-451.5D	ELB40066.7-901.5D	ELB40066.7-453D	ELB40066.7-903D
450	10	ELB45027.8-451.5D	ELB45027.8-901.5D	ELB45027.8-453D	ELB45027.8-903D
450	12	ELB45033.1-451.5D	ELB45033.1-901.5D	ELB45033.1-453D	ELB45033.1-903D
450	15*	ELB45040.9-451.5D	ELB45040.9-901.5D	ELB45040.9-453D	ELB45040.9-903D
450	19	ELB45050.3-451.5D	ELB45050.3-901.5D	ELB45050.3-453D	ELB45050.3-903D
450	24*	ELB45061.5-451.5D	ELB45061.5-901.5D	ELB45061.5-453D	ELB45061.5-903D
450	30*	ELB45075.0-451.5D	ELB45075.0-901.5D	ELB45075.0-453D	ELB45075.0-903D
500	10	ELB50030.9-451.5D	ELB50030.9-901.5D	ELB50030.9-453D	ELB50030.9-903D
500	12	ELB50036.7-451.5D	ELB50036.7-901.5D	ELB50036.7-453D	ELB50036.7-903D
500	15	ELB50045.4-451.5D	ELB50045.4-901.5D	ELB50045.4-453D	ELB50045.4-903D
500	19*	ELB50055.8-451.5D	ELB50055.8-901.5D	ELB50055.8-453D	ELB50055.8-903D
500	24*	ELB50068.5-451.5D	ELB50068.5-901.5D	ELB50068.5-453D	ELB50068.5-903D
500	30*	ELB500 83.5-451.5D	ELB500 83.5-901.5D	ELB500 83.5-453D	ELB500 83.5-903D
560	10**	ELB56034.6-451.5D	ELB56034.6-901.5D	ELB56034.6-453D	ELB56034.6-903D
560	12**	ELB56041.2-451.5D	ELB56041.2-901.5D	ELB56041.2-453D	ELB56041.2-903D
560	15**	ELB56050.8-451.5D	ELB56050.8-901.5D	ELB56050.8-453D	ELB56050.8-903D
560	19**	ELB56062.5-451.5D	ELB56062.5-901.5D	ELB56062.5-453D	ELB56062.5-903D
560	24**	ELB56076.7-451.5D	ELB56076.7-901.5D	ELB56076.7-453D	ELB56076.7-903D
560	30**	ELB56093.5-451.5D	ELB56093.5-901.5D	ELB56093.5-453D	ELB56093.5-903D
630	10	ELB63038.9-451.5D	ELB63068.9-901.5D	ELB63038.9-453D	ELB63068.9-903D
630	12*	ELB63046.6-451.5D	ELB63046.6-901.5D	ELB63046.6-453D	ELB63046.6-903D
630	15*	ELB63057.2-451.5D	ELB63057.2-901.5D	ELB63057.2-453D	ELB63057.2-903D
630	19*	ELB63070.0-451.5D	ELB63070.0-901.5D	ELB63070.0-453D	ELB63070.0-903D
630	24*	ELB63086.3-451.5D	ELB63086.3-901.5D	ELB63086.3-453D	ELB63086.3-903D
630	30*	ELB630105-451.5D	ELB630105-901.5D	ELB630105-453D	ELB630105-903D
710	10	ELB71043.8-451.5D	ELB71043.8-901.5D	ELB71043.8-453D	ELB71043.8-903D
710	12**	ELB71052.2-451.5D	ELB71052.2-901.5D	ELB71052.2-453D	ELB71052.2-903D
710	15**	ELB71064.5-451.5D	ELB71064.5-901.5D	ELB71064.5-453D	ELB71064.5-903D
710	19**	ELB71078.9-451.5D	ELB71078.9-901.5D	ELB71078.9-453D	ELB71078.9-903D
710	24**	ELB71097.3-453D	ELB71097.3-901.5D	ELB71097.3-453D	ELB71097.3-903D
710	30**	ELB710118.3-453D	ELB710118.3-901.5D	ELB710118.3-453D	ELB710118.3-903D

* Minimum quantity required. ** By special order.

Spigot Reducers

The sizes in the table are only a partial list and other sizes are available on request.

When using spigot reducers to connect with electrofusion couplers, the end user can reduce the L1 or L2 dimensions.



Dimensions of Spigot Reducers

Catalog Number	Size d1 x d2	Size L	Size L1	Size L2	Weight (kg) class 10	Weight (kg) class 15	Weight (kg) class 24
RED75 x 63	75 x 63	405	205	175	0.20	0.3	0.43
RED90 x 75	90 x 75	420	215	180	0.34	0.49	0.7
RED90 x 63	90 x 63	420	215	175	0.35	0.49	0.71
RED110 x 90	110 x 90	580	280	270	0.55	0.79	1.14
RED110 x 75	110 x 75	580	280	255	0.56	0.8	1.16
RED110 x 63	110 x 63	580	280	240	0.57	0.81	1.17
RED125 x 110	125 x 110	620	280	280	0.73	1.04	1.48
RED125 x 90	125 x 90	620	280	270	0.78	1.12	1.59
RED140 x 125	140 x 125	700	360	290	0.98	1.38	1.98
RED140 x 110	140 x 110	700	360	280	1	1.41	2.03
RED160 x 140	160 x 140	720	355	360	1.32	1.88	2.68
RED160 x 125	160 x 125	720	355	350	1.4	2	2.85
RED160 x 110	160 x 110	720	355	340	1.43	2.04	2.9
RED180 x 160	180 x 160	580	260	255	2.1	3	4.2
RED180 x 140	180 x 140	580	260	245	1.5	2.2	3.1
RED180 x 125	180 x 125	580	260	235	1.6	2.3	3.3
RED200 x 160	200 x 160	580	260	255	2.45	3.46	4.97
RED200 x 110	200 x 110	580	260	255	2.68	3.8	5.46
RED225 x 200	225 x 200	590	250	270	3.23	4.6	6.58
RED225 x 180	225 x 180	590	260	260	3.1	4.35	6.2
RED225 x 160	225 x 160	590	260	260	3.45	4.92	7.03
RED250 x 225	250 x 225	680	330	320	4.25	6.02	8.74
RED250 x 200	250 x 200	680	330	320	4.41	6.24	9.07
RED250 x 160	250 x 160	680	330	320	4.68	6.63	9.63
RED280 x 250	280 x 250	700	340	330	5.72	8.15	15.57
RED280 x 225	280 x 225	700	300	320	5.98	8.51	16.26
RED315 x 280	315 x 280	770	340	330	7.82	11.14	18.87
RED315 x 250	315 x 250	770	340	330	8.13	11.58	19.62
RED355 x 315	355 x 315	795	350	340	10.7	15.25	23
RED355 x 280	355 x 280	795	350	340	11.31	16.12	24.3
RED400 x 355	400 x 355	815	355	350	15.02	21.44	28.58
RED400 x 315	400 x 315	815	355	350	15.72	22.43	29.91
RED450 x 400	450 x 400	865	275	355	21.1	30.17	36.76
RED450 x 355	450 x 355	865	400	355	21.96	31.4	38.26
RED500 x 450	500 x 450	631	302	275	28.4	40.7	43.22
RED500 x 400	500 x 400	659	302	249	29.66	42.51	45.14
RED630 x 500	630 x 500	782	340	302	55.94	79.49	67.52
RED630 x 450	630 x 450	809	340	275	57.87	82.24	69.85

Pex2Pex Fittings

Pex2Pex electrofusion fittings for high temperature working conditions:

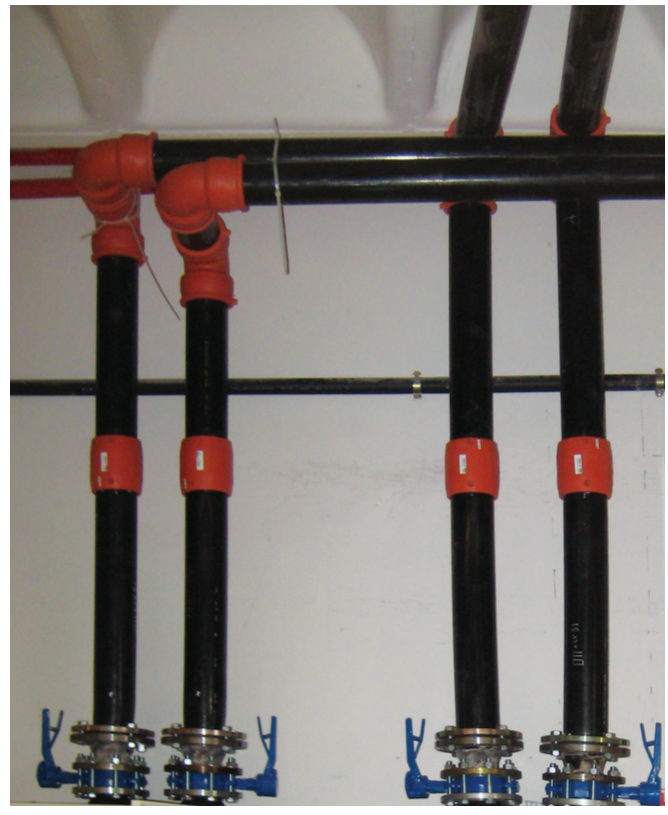
In addition to mechanical fittings, the Pexgol system also offers a welding solution. Items with the brand name Plasson Pex2Pex, are suitable for Pexgol pipes class 15 SDR11 in all the temperature and pressure ranges of this pipe class.

The couplers are not UV resistant and must be protected from UV light.

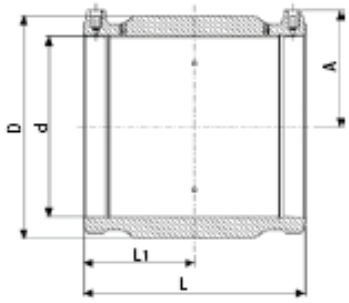
Special high temperature electrofusion couplers:

Golan offers special high temperature electrofusion couplers for conditions requiring higher working pressures or pipe dimensions for which Pex2Pex couplers are not available. Please consult Golan's application engineer.

Prior to using Pex2Pex fittings for the first time, please consult Golan regarding on site training.

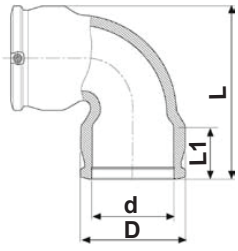


Pex2Pex Coupler



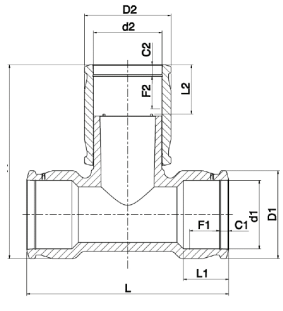
Catalog Number	Pipe	D	L	L1	Weight (kg)
480100050	50	68	100	48.5	0.143
480100063	63	82	118	57	0.22
480100075	75	97	125	61	0.33
480100090	90	115	145	70.7	0.53
480100110	110	139	161	79	0.82
480100125	125	155	169	83	1.00
480100160	160	196	192	94.7	1.77

Pex2Pex 90° Elbow



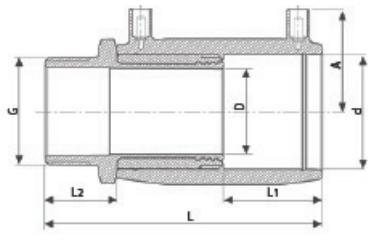
Catalog Number	Pipe	D	L	L1	Weight (kg)
480500075	75	96	149.5	60.7	0.50
480500090	90	110.5	201.5	70	0.84
480500110	110	140	234	71	1.52
480500125	125	163.1	271	81	2.33

Pex2Pex Tees



Catalog Number	Nominal dia	D1	D2	L	L1	L2	A	Weight (kg)
480400050	50	68	68	139	48.5	48.5	155	0.374
480400063	63	82	82	166	57.5	57.3	188	0.598
480400075	75	97	96	195	58.5	61	232	0.997
480400090	90	112	115	292	70.5	70.7	252	1.7
480400110	110	142.5	138.5	327.5	71.5	79	296	2.386
480400125	125	163	154.5	380	85	83	326	3.838

Pex2Pex Brass Connector



Catalog Number	Pipe d	G	D	L	L1	Weight (kg)
482100050015	50	1.5"	38	136	48.5	0.53
482100063020	63	2"	48	160	57	0.9
482100075020	75	2"	59	166	61	1.3
482100075025	75	2 1/2"	59	171	61	1.5

Flanged Coupler for Pexgol Pipes

Available sizes from diameters 63 mm to 710 mm.

The flange has oval holes designed to fit most international standards. See table 69.1.

The couplers can be used for the full range of temperatures and pressures, the same as Pexgol pipes. Pexgol flanged couplers consist of either two halves or four quarters, depending on the pipe size.

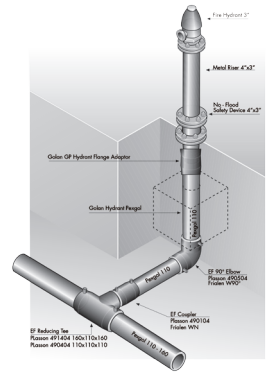
The body of the coupler is made of spheroidal (ductile) cast iron GGG40 (ASTM A-536). The standard gaskes are made of EPDM. Bolts to connect the two halves or four quarters are included.

Catalog Number	Pipe OD (mm)
50806320	63
50807525	75
50809030	90
50811040	110
50812540	125
50814060	140
50816060	160
50818060	180
50820080	200
50822580	225
50825010	250
50928010	280 ASA
50828010	280 BS
50831512	315
50835514	355
50840016	400
50845018	450
50850020	500
50863024	630
50871028	710

For additional details and dimensions, please our Engineering & Applications Guide.

Hydrant Connector

Catalog Number	Size
85511004	110 mm



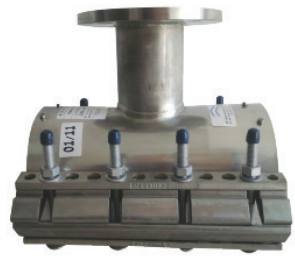
Branch-off Saddles

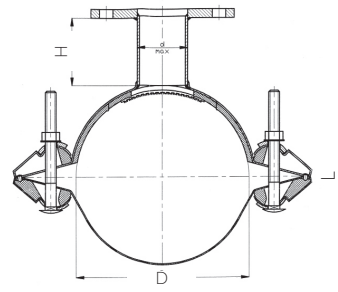
Branch-off saddles are designed for side outlets with a maximum diameter equal to half of the main pipe's diameter. Threaded or flanged outlets (according to ASA 150, BSTD or other standard requirements) are available.

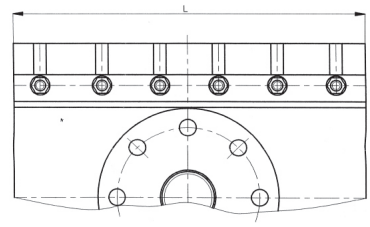
Golan's stainless steel saddles are supplied for diameters from 110 mm to 710 mm. They can be used for the full temperature and pressure ranges of Pexgol pipes.

For the installation of saddles, see instructions at:

www.pexgol.com







All stainless steel saddles are suitable for transporting drinking water. Saddles with internal rubber lining at the flange outlet are available for corrosive materials that might damage the stainless steel saddles. Golan supplies these saddles by special request.

Stainless Steel Branch-off Saddles/ASA 150 Flanged Outlet

Catalog Number	OD [D] and flange size	H (mm)	L (mm)	Weight (kg)
46811002	110 x 2"	120	225	5.5
46811003	110 x 3"	120	225	6.3
46812502	125 x 2"	120	225	7.0
46812503	125 x 3"	120	225	7.0
46814002	140 x 2"	120	300	7.0
46814003	140 x 3"	120	300	7.0
468916002	160 x 2"	120	300	7.0
46816003	160 x 3"	120	300	9.0
46816004	160 x 4"	120	300	9.5
468918002	180 x 2"	120	300	7.0
46818003	180 x 3"	120	300	9.0
46818004	180 x 4"	120	300	9.5
46820002	200 x 2"	120	375	14.0
46820003	200 x 3"	120	375	15.0
46820004	200 x 4"	120	375	15.0
46822502	225 x 2"	120	375	15.0
46822503	225 x 3"	120	375	15.6
46822504	225 x 4"	120	375	16.0
46822506	225 x 6"	150	375	19.0
46825002	250 x 2"	120	450	16.0
46825003	250 x 3"	120	450	17.0
46825004	250 x 4"	120	450	18.0
46825006	250 x 6"	150	450	20.0
46928002	280 x 2"	120	450	17.0
46928003	280 x 3"	120	450	18.0
46928004	280 x 4"	120	450	20.0
46828006	280 x 6"	150	450	23.0

Stainless Steel Branch-off Saddles/ASA150 Flanged Outlet

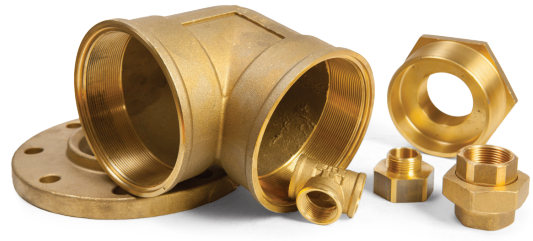
Catalog Number	OD [D] and flange size	H (mm)	L (mm)	Weight (kg)
46831502	315 x 2"	120	450	18.0
46831503	315 x 3"	120	450	20.0
46831504	315 x 4"	120	450	21.0
46831506	315 x 6"	150	450	23.0
46831508	315 x 8"	150	450	28.0
46835502	355 x 2"	120	450	19.0
46835503	355 x 3"	120	450	21.0
46835504	355 x 4"	120	450	22.0
46835506	355 x 6"	150	450	25.0
46835508	355 x 8"	150	450	29.0
46840003	400 x 3"	120	525	23.0
46840004	400 x 4"	120	525	23.0
46840006	400 x 6"	150	525	26.0
46840008	400 x 8"	150	525	30.0
46845003	450 x 3"	120	525	24.0
46845004	450 x 4"	120	525	24.0
46845006	450 x 6"	150	525	27.0
46845008	450 x 8"	150	525	31.0
46850003	500 x 3"	120	525	26.0
46850004	500 x 4"	120	525	26.0
46850006	500 x 6"	150	525	28.0
46850008	500 x 8"	150	525	32.0
46863003	630 x 3"	120	525	29.0
46863004	630 x 4"	120	525	30.0
46863006	630 x 6"	150	525	32.0
46863008	630 x 8"	150	525	36.0

Stainless Steel Branch-off Saddles/Female Thread Outlet

Catalog Number	OD [D] and flange size	H (mm)	L (mm)	Weight (kg)
47011020	110 x 2"	120	225	5.5
47011030	110 x 3"	120	225	6.3
47016020	160 x 2"	120	300	7.0
47016030	160 x 3"	120	300	9.0
47018020	180 x 2"	120	300	7.0
47018030	180 x 3"	120	300	9.0
47020020	200 x 2"	120	375	14.0
47020030	200 x 3"	120	375	15.0
47022520	225 x 2"	120	375	15.0
47022530	225 x 3"	120	375	15.6
47025020	250 x 2"	120	450	16.0
47025030	250 x 3"	120	450	17.0
47028020	280 x 2"	120	450	17.0
47028030	280 x 3"	120	450	18.0
47031520	315 x 2"	120	450	18.0
47031530	315 x 3"	120	450	20.0
47035520	355 x 2"	120	450	19.0
47035530	355 x 3"	120	450	21.0
47040030	400 x 3"	120	525	23.0
47045030	450 x 3"	120	525	24.0
47050030	500 x 3"	120	525	26.0
47063030	630 x 3"	120	525	29.0

Brass Fittings

Golan's brass fittings can be used for the full temperature and pressure ranges of Pexgol pipes. Brass saddles with threaded outlets are used for pipes with diameters from 32 mm to 160 mm.

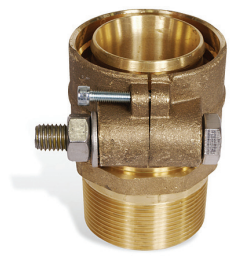


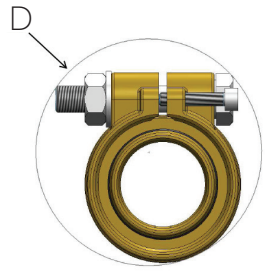
Branch-Off Saddles - Male/Female Thread

Brass	DZR Brass	Thread
44203205	-	32 x 1/2" F
44403207	-	32 x 3/4" M
44204005	-	40 x 1/2" F
44404007	-	40 x 3/4" M
44205007	-	50 x 3/4" F
44405007	-	50 x 1" M
44206307	-	63 x 3/4" M
44206310	-	63 x 1" F
-	44506315	63 x 1 1/4" M
-	44506302	63 x 2" F
44207515	-	75 x 1 1/2"
-	44507502	75 x 2" F
-	44509002	90 x 2" F
-	44511002	110 x 2" F
-	44516002	160 x 2" F

Gp Bolt Connectors - Dzr Brass - Male/Female Bspt Thread

Catalog Number	Pipe	Class	Male Thread	D
29423210	32 x 2.9	15	1"	55
30473210	32 x 4.4	24	1"	55
29424012	40 x 3.7	15	1 1/4"	77
30474012	40 x 5.5	24	1 1/4"	77
29425015	50 x 4.6	15	1 1/2"	85
30475015	50 x 6.9	24	1 1/2"	85
29426320	63 x 5.8	15	2"	105
30476320	63 x 8.7	24	2"	105
29427525	75 x 6.8	15	2 1/2"	115
30477525	75 x 10.3	24	2 1/2"	115
29429030	90 x 8.2	15	3"	140
30479030	90 x 12.3	24	3"	140
29421104	110 x 10.0	15	4"	160
30471104	110 x 15.1	24	4"	160
294212504	125 x 11.4	15	4"	200
304712504	125 x 17.1	24	4"	200
294214005	140 x 12.7	15	5"	-
304714005	140 x 19.2	24	5"	-
29421606	160 x 14.6	15	6"	230
30471606	160 x 21.9	24	6"	230





Hela 8010 Pex Double Bolt Connector Class 15/24

Catalog Number	Pipe	Class
91032001	32 x 2.9	15
91032002	32 x 4.4	24
91040001	40 x 3.7	15
91040002	40 x 5.5	24
91050001	50 x 4.6	15
91050002	50 x 6.9	24
91063001	63 x 5.8	15
91063002	63 x 8.7	24
91075001	75 x 6.8	15
91075002	75 x 10.3	24
91090001	90 x 8.2	15
91090002	90 x 12.3	24
91011001	110 x 10.0	15
91011002	110 x 15.1	24
91012501	125 x 11.4	15
91012502	125 x 17.1	24
91016001	160 x 14.6	15
91016002	160 x 21.9	24
91016000	160 x 14.6 stainless steel	15

Hela 8045 Pex Double Connector with Side Outlet Class 24

Catalog Number	Pipe	Class	Thread
42405405	40 x 5.5	24	1"
42506506	50 x 6.9	24	1 1/4"
42638638	63 x 8.7	24	1 1/4"

Hela 8047 Reducing Connector with Side Outlet Class 24

Catalog Number	Pipe	Class	Thread
42325323	25 x 3.5/32 x 4.4	24	3/4"
42332403	32 x 4.4/40 x 5.5	24	3/4"
42340501	40 x 5.5/50 x 6.9	24	1"
42350631	50 x 6.9/63 x 8.7	24	1 1/4"

TEE Female DZR Brass

Catalog Number	Catalog Number DZR Brass	Thread (in.)
42250511	-	0.50
42250711	-	0.75
-	42251011	1.00
-	42231211	1.25
-	42231511	1.50
-	42232011	2.00
-	42232511	2.50
-	42233011	3.00
-	42234011	4.00

Bushing DZR Brass

Catalog Number	Catalog Number DZR Brass	Thread (in.)
53320507		$^{3}/_{4}$" x $^{1}/_{2}$"
-	53320510	1" x $^{1}/_{2}$"
-	53320710	1" x $^{3}/_{4}$"
-	53310712	1 $^{1}/_{4}$" x $^{3}/_{4}$"
-	53310715	1 $^{1}/_{2}$" x $^{3}/_{4}$"
-	53331012	1 $^{1}/_{4}$" x 1"
-	53331015	1 $^{1}/_{2}$" x 1"
-	53331215	1 $^{1}/_{2}$" x 1 $^{1}/_{4}$"
-	53330720	2" x $^{3}/_{4}$"
-	53331020	2" x 1"
-	53331220	2" x 1 $^{1}/_{4}$"
-	53331520	2" x 1 $^{1}/_{2}$"
-	53332512	2 $^{1}/_{2}$" x 1 $^{1}/_{4}$"
-	53331525	2 $^{1}/_{2}$" x 1 $^{1}/_{2}$"
-	53332025	2 $^{1}/_{2}$" x 2"
-	53332030	3" x 2"
-	53333025	3" x 2 $^{1}/_{2}$"
-	53334020	4" x 2"
-	53334025	4" x 2 $^{1}/_{2}$"
-	53334030	4" x 3"

Female Coupler DZR Brass

Catalog Number	Catalog Number DZR Brass	Thread (in.)
57220511	-	0.50
57220711	-	0.75
-	57221011	1.00
-	57231211	1.25
-	57231511	1.50
-	57232011	2.00
-	57232015	2.50
-	57233011	3.00
-	57234011	4.00

Nipple DZR Brass

Catalog Number	Catalog Number DZR brass	Thread (in.)
55410511	-	1/2"
55410711	-	3/4"
-	55431011	1"
-	55431211	1 1/4"
-	55431511	1 1/2"
-	55432011	2"
-	55432511	2 1/2"
-	55433011	3"
-	55434011	4"

Reducing Nipple DZR Brass

Catalog Number	Catalog Number DZR brass	Thread (in.)
27420705	-	3/4" x 1/2"
-	27420710	1" x 3/4"
-	27411215	1 1/2" x 1 1/4"
-	27431220	2" x 1 1/4"
-	27431520	2" x 1 1/2"
-	27431525	2 1/2" x 1 1/2"
-	27432025	2 1/2" x 2"
-	27433020	3" x 2"
-	27434030	4" x 3"

Male/Female Elbow 90° (Material Brass CuZn40Pb2/DZR Brass)

Catalog Number Stand. brass	Catalog Number Dzr brass	Size
-	32310511	1/2"
-	32310711	3/4"
-	32331011	1"
-	32331211	1 1/4"
-	32331511	1 1/2"
-	32332011	2"
-	32332511	2 1/2"
-	32333011	3"

Female Elbow 90°

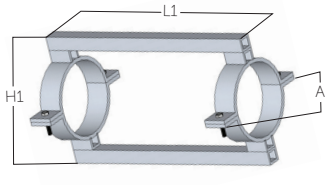
Catalog Number Stand. brass	Catalog Number Dzr brass	Size
32230511	-	1/2"
32230711	-	3/4"
-	32231011	1"
-	32231211	1 1/3"
-	32231511	1 1/2"
-	32232011	2"
-	32232511	2 1/2"
-	32233011	3"
-	32234011	4"

Fixpoint Clamps

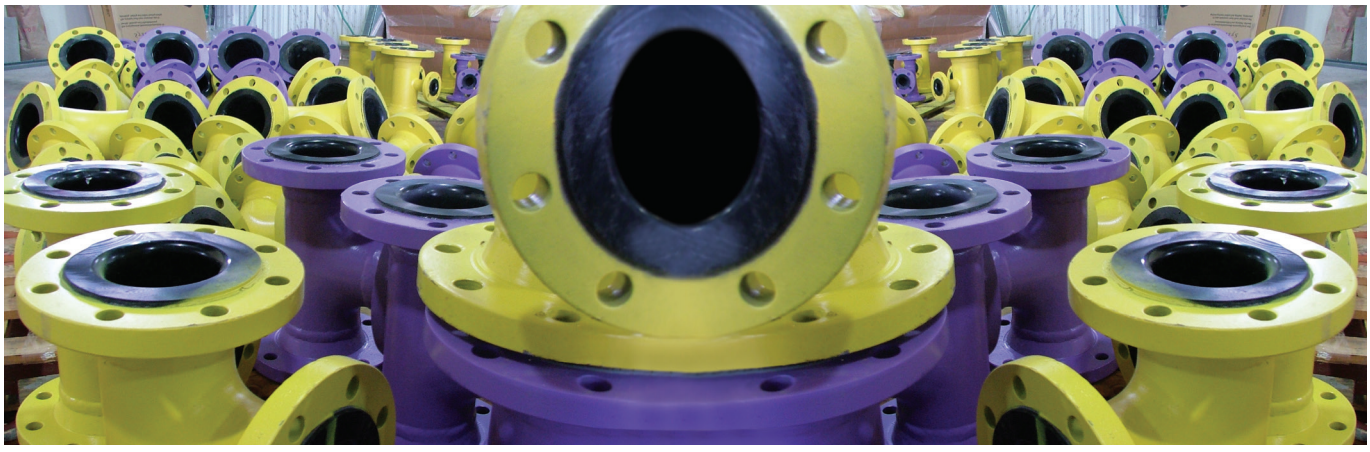
Catalog Number	Pipe diameter (mm)	Length W (mm)	Width A (mm)	Weight (kg)
66206302	63	40	185	1.11
66207525	75	40	195	1.17
66209003	90	40	210	1.25
66211004	110	50	230	1.67
66212505	125	50	250	1.86
66214006	140	50	260	1.94
66216006	160	50	280	2.05
66218006	180	55	700	2.5
66220008	200	60	320	3.61
66222508	225	80	350	5.12
66225010	250	80	370	5.46
66228010	280	80	400	5.97
66231512	315	80	435	6.46
66235514	355	100	475	8.84
66240016	400	100	520	9.79
66245018	450	100	570	10.80
66250020	500	100	620	11.85
66263024	630	100	754	14.45

Fixpoint Bridge for Pexgol pipes

Catalog Number	Pipe diameter (mm)	Clamp width W	Clamp size A	Bolt size	Total length L1	Height H1	Weight (kg)
301063	63	40	185	1/2"	260	290	6.14
301075	75	40	195	1/2"	270	300	6.32
301090	90	40	210	1/2"	320	350	7.31
301110	110	50	230	5/8"	360	380	8.86
301125	125	50	250	5/8"	360	380	8.83
301140	140	50	260	5/8"	380	480	10.14
301160	160	50	280	5/8"	380	480	10.11
301180	180	60	300	3/4"	400	480	11.5
301200	200	60	320	3/4"	420	480	13.09
301225	225	80	350	3/4"	460	500	19.20
301250	250	80	370	3/4"	510	560	18.25
301280	280	80	400	3/4"	520	560	19.01
301315	315	80	435	3/4"	580	650	21.14
301355	355	100	475	1"	650	700	26.64
301400	400	100	520	1"	750	750	29.47
301450	450	100	570	1"	750	800	31.48
301500	500	100	620	1"	800	850	34.03
301630	630	100	754	1"	800	950	38.87



Pex-Lined Fittings



These specifications cover materials, manufacturing, testing, inspection and packaging standards for standard and custom made Pex-lined fittings.

Pex-lined steel fittings consist of a steel flanged fitting lined with thick black Pex coating which extends over the full face of the flanges. This type of fitting is used as a standard fitting (Tee, elbow, reducer, etc.). Non-standard items can also be supplied, subject to approval by Golan's technical department.

Manufacturing materials

All materials used are traceable to origin and records are maintained for a minimum of three years. When specified, material and/or test certificates is supplied.

Pex lining

Pex lining is made from resin conforming to the requirements of materials as defined in ASTM specification D1998-04.

The lining is made from virgin resin, meeting the requirements of ASTM D1998-04.

When tested in accordance with ASTM D638, the minimum tensile strength is 23 N/mm^2 and the minimum elongation is 300%.

Fittings

Fabricated fittings are manufactured from the materials stated above.

Cast fittings are manufactured from the following:

- Ductile iron – ASTM A395, BS2789 grade 420/12 or DIN 1693 Part 1 GGG40.
- Cast steel – ASTM A216 WCB or equivalent.
- Flanges and welding – neck collars are forged steel to ASTM A105 N.

Slip on welding collars are steel plate to BS1501-161-430A, DIN 17100 grades RSt 37-2 or NF A 35-501 grade E24, EN 10025 or equivalent.

Fabrication standards

Qualification of welding procedures, welders and welding operators are in accordance with section

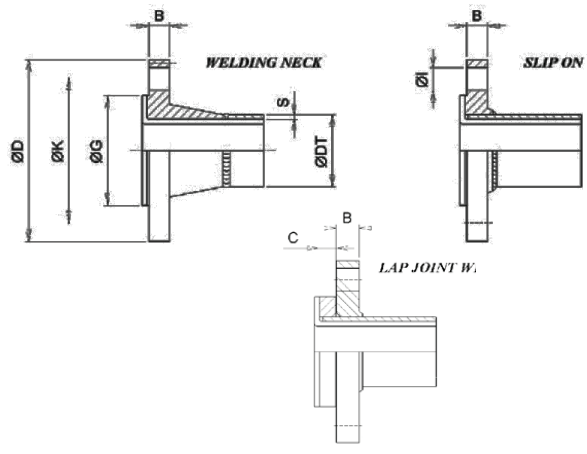
IX of the ASME Boiler and Pressure Vessel Code or BS 4870: Part 1 and BS 4871: Part 1, DIN 8560 or EN-288-3.

All welds are visually examined and assessed in accordance with ASME B31.3 or relevant code.

Dimensional standards

- Flanged cast steel fittings are in accordance with ANSI B16.5 Class 150.
- Flanged ductile Iron fittings are in accordance with ANSI B16.42 Class 150.
- Fabricated fittings are in accordance with the dimensions shown in the following Tables.
- Pipe diameters and wall thicknesses are in accordance with the dimensions in the following tables.
- Flanges for pipe and fittings are in accordance with ANSI B16.5 Class 150.
- Flanges are slip on welding, socket welding or welding neck types.
- Loose backing flanges are suitable for use with welding collars.
- All relevant dimensions and tolerances are in accordance with ANSI B16.5 Class 150.
- Threaded bolt holes are not permitted except for reducing flanges. Threaded bolt holes in reducing flanges are UNC unless specified otherwise.
- Welding collars for use with loose backing flanges are slip on welding, socket welding or welding neck type.

- The diameters and thicknesses are given in the following dimension table.
- The dimension table lists the outside diameters. The outside diameter of the instrument Tee bodies are the same as the lined space. The lining on the faces of flanges have uniform thickness, not less than 80% of the actual wall thickness.
- The Pexgol lining thickness in the following table is the standard. Higher thicknesses are available on request.



Dimension Table

Nom	DT	D	G	I	B	C	S	Pex Lining thick.
Size	mm	mm	mm	n x i	mm	mm	mm	mm
1"	33.5	108	50.8	4 x 15.7	14.2	12	3.38	3.0
1 ¼"	42.2	117.3	63.5	4 x 15.7	15.7	12	3.56	3.0
1 ½"	48.3	127	73.2	4 x 19.1	17.5	12	3.68	3.0
2"	60.5	152.4	91.9	4 x 19.1	19.1	14	3.91	3.5
2 ½"	73.2	177.85	104.6	4 x 19.1	22.4	14	5.16	3.5
3"	88.9	190.5	127.0	4 x 19.1	23.9	16	5.49	4.0
3 ½"	101.6	215.9	139.7	8 x 19.1	23.9	16	5.74	4.0
4"	114.3	228.6	157.2	8 x 22.4	23.9	16	6.02	4.5
5"	141.3	254	185.7	8 x 22.4	23.9	18	6.55	4.5
6"	168.4	279.4	215.9	8 x 22.4	25.4	18	7.11	6.0
8"	219.2	342.9	269.7	8 x 22.4	28.4	20	8.18	6.0
10"	273.1	406.4	323.9	12 x 25.4	30.2	22	9.27	6.0
12"	323.9	482.6	381.0	12 x 25.4	31.8	22	9.53	7.0
14"	355.6	533.4	412.8	12 x 25.4	35.1	25	9.53	7.0
16"	406.4	596.9	469.9	12 x 28.4	36.6	25	9.53	7.0
18"	457.2	635	533.4	16 x 31.8	39.6	25	9.53	7.0
20"	508	698.5	584.2	20 x 31.8	42.9	25	9.53	7.0
24"	609.6	812.8	269.2	20 x 35.1	47.8	25	9.53	7.0

Construction of flanged fittings

Completed fittings are one piece construction. Flanges are fixed. The preparation and assembly of welded branch connections are in accordance with BS 2633 or ASME B31.3.

Attachment of flanges and collars

Attachment of flanges and collars are done by both back fillet and bore welds.
Transition from the bore to the flanged face must incorporate a radius to prevent undue stressing of the liner.

Fabrication dimensional tolerances

Tolerances for flanges and fittings is in accordance with the relevant standards.
Fabricated pipework are in accordance with the following tolerances:

- **Squareness of flanges** – Square to the axis of the pipe or fitting to within 0.05 mm per 25 mm measured across the face.
- **Flange faces** – Faces should not be uneven or concave. Convexity from the bore to the periphery must not exceed 0.4 mm per 25 mm width of face.
- **Flange drilling** – PCD +/- 1.5 mm. c/c of bolt holes +/- 0.8mm. Eccentricity between PCD and RFD up to 2-½" +/- 0.8 mm, 3" and greater +/- 1.5 mm.
- **Bolt holes** – Bolt holes are off center and equally spaced about the center line to an accuracy of 1.5 mm.
- **Linear and angular dimensions** – Linear dimensions +/- 1.5 mm; angular dimensions +/- 0.25 degrees.

Internal finish of housings

The interior surfaces and flange faces are clean and free of sharp corners, burrs, rust, scale, weld spatter or other protrusions that could adversely affect the lining.

Lining

The method of lining and the fit of the lining ensures that the lining is capable of withstanding the temperature, pressure and vacuum ratings of the system.
All interference fit linings in straight pipes are normalized prior to flaring.
Completed linings show no evidence of pinholes, porosity, cracks or bad workmanship. Sealing surfaces are free of surface defects that could impair sealing effectiveness. Scratches, dents, nicks or tool marks on the sealing face are not deeper than 0.15 mm.
Any of these defect types less than 0.15mm but extending across the face cause the product to be rejected.
Blind flanges have linings firmly attached linings.

Production testing

For each batch, at least one representative sample of each nominal size of fittings is selected; tests are carried out to determine mechanical properties and SG.
Where samples do not comply with the requirements stated in this specification, each tube in the batch must have samples cut from each end and the samples are subjected to the same tests.
Any sample not meeting the specified requirements leads to rejection of the whole tube.
The outside diameter and wall thickness are measured.
Tubes not complying with the standard are rejected.
Cracks found at the ends of tubes are cut off along with at least 50mm of adjacent material.
When specified, each liner tube is subjected to a flattening test. Each length of tube is passed through a pre-set gap between two powered rollers. The gap is set at 50% of the outside diameter of the tube. The tube is rotated about the longitudinal axis through 90° and then passed back through the roller gap.
The tube is examined for cracks. A crack, if found, is cut out along with at least 50mm of adjacent material.

Hydrostatic pressure test

Hydrostatic pressure test is carried out at 16 Barg water in air. Any evidence of leakage are cause for rejection.

Electrostatic test

Electrostatic testing is carried out at a minimum voltage of 20,000V. The full surface of every lining is tested. Any pinholes are cause for rejection.

Final Examination

Each item is examined visually. Following satisfactory completion, the outside edge of the flange is stamped with a letter "I" to indicate compliance.

External finish

The outside surface of all pipe and fittings are finished as follows.
Shot blast SA 2-½ and coated with one coat zinc phosphate, zinc epoxy or zinc silicate primer. After painting, blocked bolt holes and vents are cleared.
Marking and identification: The following information is marked permanently on each fitting by casting into the body or by hard stamping the flange edge in letters at least 6 mm high:

- Manufacturer's marking
- Lining material

Packaging

All flanges are fitted with protective covers. These covers are removed just prior to installation.
Fittings are fitted with medium density fiberboard blanks or alternatively snap-on proprietary plastic blanks could be used.

Performance

All lined fittings meet the temperature, pressure, and vacuum ratings stated in the Lined Fittings manual.

Service limitations

For positive and negative pressure limitations versus temperature, see table next page.
Service temperature limits, subject to compatibility with the fluid being handled are:
Pex: -50° to +115°C
When lined fittings are exposed to very low temperatures (below -50°C) consideration must be given as to the suitability of the material used for the housings. See section below for further information.

Pressure/Temperature Rating

	Pressure			
Temperature	ANSI # 150		ANSI # 300	
	PSI	BAR	PSI	BAR
20°C	250	17.2	450	31.0
50°C	244	17	425	29.3
100°C	235	16	390	26.9

The pressure ratings for ANSI 150# and PN16 dimensioned fittings are based on ratings in ANSI B 16.5.
The pressure ratings for ANSI 300# dimensioned fittings are based on the rating in ANSI B 16.5 300#, down rated to compensate for the decrease in mechanical properties at elevated temperatures of the lining materials.

Vacuum/Temperature Rating

Liner	Temperature	Diameter										
		25	40	50	80	100	150	200	250	300	350	400
Pex	20°C	Full	Full	Full	Full	Full	Full	Full	Full	Full	Full	Full
	50°C	Full	Full	Full	Full	Full	Full	Full	-	-	-	-
	80°C	Full	Full	Full	Full	Full	-	-	-	-	-	-

System design and supports

Pipe systems must be adequately supported to avoid excessive deflection of flanged joints, and supports should be installed close to flanges. The requirement for adequate support is critical in areas of high levels of concentration of valves and fittings.

Butterfly valves are usually designed for straight metallic or thermoplastic systems, with the diameter of the vane being defined as a function of the inner diameter of the pipe system under consideration. The inner diameter of lined steel pipe is considerably smaller than the actual steel pipe. Inner diameters of thermoplastic pipes tend to be considerably smaller due to their heavy wall thickness. Consequently, some interference between the inner liner of a lined pipe and the valve vane might be experienced.

The designer should consider this possibility early in the selection process for pipe systems and valves, and if required, incorporate adequate conical spacers between the flanges of plastic fittings and the valve.

Installation and maintenance instructions for lined fittings

- Lined products must not be welded, brazed or torch cut to prevent damaging the lining.
- Handle the material with due care and attention, avoiding all mechanical shocks.
- All flanges are covered to protect them from damage during shipment, storage and handling onsite. If covers are removed for inspection purposes prior to installation, replace them immediately after inspection of each item is completed.
- When joining a Pexgol pipe and lined fittings together, the use of gaskets between the sealing faces is usually not necessary.
- Under normal conditions, remove covers only immediately prior to installation. As gaskets are often not required, utmost attention is required to avoid scratching or otherwise damaging the lining on flange faces.
- In case of leakage, inspect the sealing faces of each component for grooves or chips. Grooves or nicks not deeper than approximately 15% of the flare thickness can be removed with a fine-grade abrasive paper.

Lined Fittings

Materials:

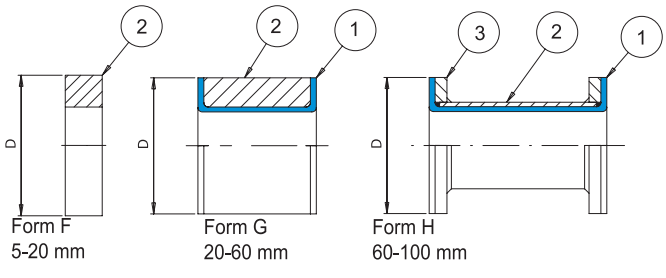
- Lining Pex ASTM D1998-04
- St 37.0 - DIN 1629
- Body St 37.0 - DIN 1629

Standard Version – two fixed flanges

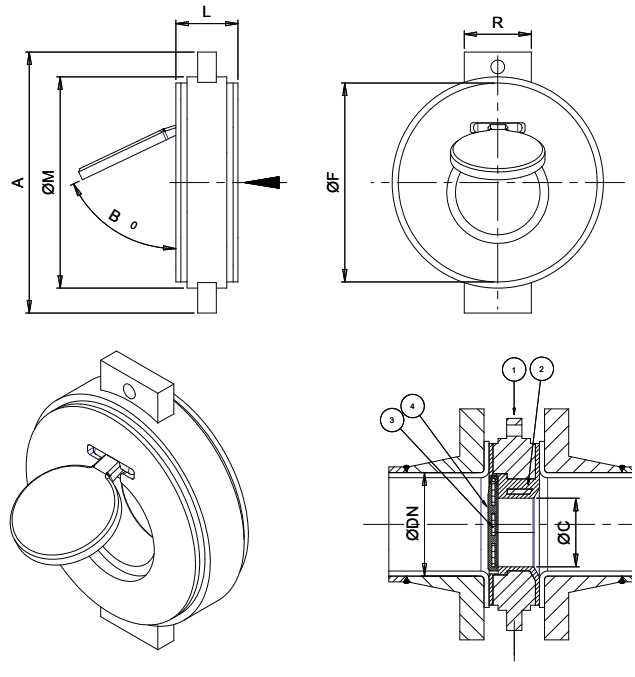
Available on request:

- One or two loose flanges
- ANSI B16.5 Class 300 flanges
- Stainless steel body and flanges 304/316
- Different lengths (L)

Solid and Lined Spacers



Lined Swing Check Valve



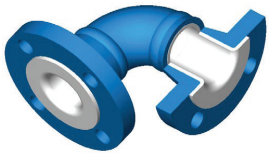
ANSI B16.5 - Class 150#

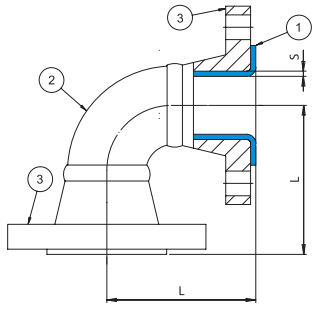
Catalog Number	DN In.	L mm
Pex-SPC-15025	1"	55
Pex-SPC-15032	1 1/4"	68
Pex-SPC-15038	1 1/2"	75
Pex-SPC-15050	2"	95
Pex-SPC-15062	2 1/2"	108
Pex-SPC-15080	3"	130
Pex-SPC-150100	4"	162
Pex-SPC-150125	5"	190
Pex-SPC-150150	6"	218
Pex-SPC-150200	8"	273
Pex-SPC-150250	10"	336
Pex-SPC-150300	12"	406
Pex-SPC-150350	14"	447
Pex-SPC-150400	16"	511
Pex-SPC-150450	18"	546
Pex-SPC-150500	20"	603
Pex-SPC-150600	24"	714

R	B	M	A	C	L	DN
50	43	26	140	100	62	65
80	46	45	170	135	65	85
100	52	65	208	170	65	55
150	56	104	270	220	65	70
200	60	145	320	275	65	90
250	68	185	400	335	65	70
300	78	230	470	405	65	95
350	78	252	510	445	65	95
400	102	300	575	510	65	95

To adjust the the Swing Check Valve to the ID of the Pexgol pipe, order the Pexgol special reducers/adaptors Catalog Number 65900040 (38) in custom-made dimensions. Please consult Golan's Application Engineer.

Lined Elbows





Lined Elbows 90° ANSI B16.5 - Class 150#

Catalog Number	DN (In.)	L (mm)	Pex lining thickness	Weight (kg)
Pex-LE90-15025	1"	89	3.0	3.1
Pex-LE90-15032	1 ¼"	95	3.0	4.0
Pex-LE90-15038	1 ½"	102	3.0	4.5
Pex-LE90-15050	2"	114	3.5	6.5
Pex-LE90-15063	2 ½"	127	3.5	9.0
Pex-LE90-15080	3"	140	4.0	12.0
Pex-LE90-150100	4"	165	4.0	19.0
Pex-LE90-150125	5"	190	4.0	22.0
Pex-LE90-150150	6"	203	6.0	34.0
Pex-LE90-150200	8"	229	6.0	57.0
Pex-LE90-150250	10"	279	6.0	82.0
Pex-LE90-150300	12"	305	7.0	115.0
Pex-LE90-150350	14"	546	7.0	150.0
Pex-LE90-150400	16"	610	7.0	192.0
Pex-LE90-150450	18"	673	7.0	225.0
Pex-LE90-150500	20"	737	7.0	280.0
Pex-LE90-150600	24"	864	7.0	395.0

Lined Elbows 45° ANSI B16.5 - Class 150#

Catalog Number	DN (In.)	L (mm)	Pex lining thickness	Weight (kg)
Pex-LE45-15025	1"	45	3.0	3.0
Pex-LE45-15032	1 ¼"	51	3.0	4.0
Pex-LE45-15038	1 ½"	57	3.0	6.0
Pex-LE45-15050	2"	64	3.5	9.0
Pex-LE45-15063	2 ½"	76	3.5	13.0
Pex-LE45-15080	3"	76	4.0	15.0
Pex-LE45-150100	4"	102	4.0	20.0
Pex-LE45-150125	5"	114	4.0	26.0
Pex-LE45-150150	6"	127	6.0	33.0
Pex-LE45-150200	8"	140	6.0	54.0
Pex-LE45-150250	10"	165	6.0	75.0
Pex-LE45-150300	12"	190	7.0	110.0
Pex-LE45-150350	14"	190	7.0	117.0
Pex-LE45-150400	16"	203	7.0	145.0
Pex-LE45-150450	18"	216	7.0	165.0
Pex-LE45-150500	20"	241	7.0	210.0
Pex-LE45-150600	24"	279	7.0	290.0

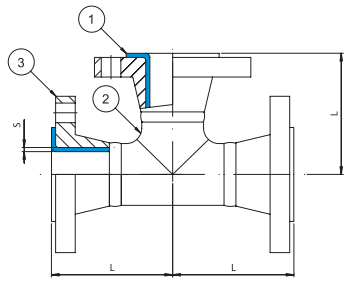
Lined Elbows 60° ANSI B16.5 - Class 150#

Catalog Number	DN (In.)	L (mm)	Pex lining thickness	Weight (kg)
Pex-LE60-15025	1"	45	3.0	2.7
Pex-LE60-15032	1 ¼"	51	3.0	3.6
Pex-LE60-15038	1 ½"	57	3.0	5.4
Pex-LE60-15050	2"	64	3.5	8.1
Pex-LE60-15063	2 ½"	76	3.5	11.7
Pex-LE60-15080	3"	76	4.0	13.5
Pex-LE60-150100	4"	102	4.0	18.0
Pex-LE60-150125	5"	114	4.0	20.5
Pex-LE60-150150	6"	127	6.0	26.1
Pex-LE60-150200	8"	140	6.0	42.7
Pex-LE60-150250	10"	165	6.0	59.3
Pex-LE60-150300	12"	190	7.0	86.9
Pex-LE60-150350	14"	190	7.0	92.4
Pex-LE60-150400	16"	203	7.0	114.6
Pex-LE60-150450	18"	216	7.0	130.4
Pex-LE60-150500	20"	241	7.0	165.9
Pex-LE60-150600	24"	279	7.0	229.1

Lined Elbows 30° ANSI B16.5 - Class 150#

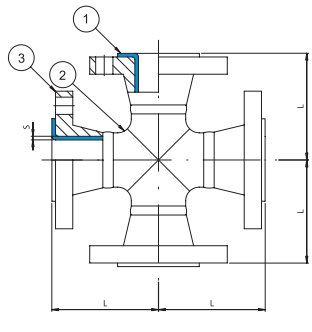
Catalog Number	DN (In.)	L (mm)	Pex lining thickness	Weight (kg)
Pex-LE30-15025	1"	45	3.0	2.7
Pex-LE30-15032	1 ¼"	51	3.0	3.6
Pex-LE30-15038	1 ½"	57	3.0	5.4
Pex-LE30-15050	2"	64	3.5	8.1
Pex-LE30-15063	2 ½"	76	3.5	11.7
Pex-LE30-15080	3"	76	4.0	13.5
Pex-LE30-150100	4"	102	4.0	16.0
Pex-LE30-150125	5"	114	4.0	20.8
Pex-LE30-150150	6"	127	6.0	26.4
Pex-LE30-150200	8"	140	6.0	43.2
Pex-LE30-150250	10"	165	6.0	56.3
Pex-LE30-150300	12"	190	7.0	82.5
Pex-LE30-150350	14"	190	7.0	87.8
Pex-LE30-150400	16"	203	7.0	108.8
Pex-LE30-150450	18"	216	7.0	123.8
Pex-LE30-150500	20"	241	7.0	157.5
Pex-LE30-150600	24"	279	7.0	217.5

Lined Equal Tee
ANSI B16.5 - Class 150#



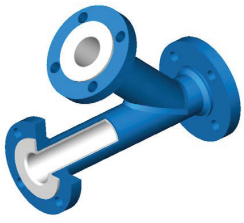
Catalog Number	DN In.	L mm	Pex lining thickness	Weight (kg)
Pex-LET-15025	1"	89	3.0	3.5
Pex-LET-15032	1 1/4"	95	3.0	4.6
Pex-LET-15038	1 1/2"	102	3.0	6.5
Pex-LET-15050	2"	114	3.5	10.0
Pex-LET-15063	2 1/2"	127	3.5	13.7
Pex-LET-15080	3"	140	4.0	21.0
Pex-LET-150100	4"	165	4.5	36.0
Pex-LET-150125	5"	190	4.5	43.0
Pex-LET-150150	6"	203	6.0	49.0
Pex-LET-150200	8"	229	6.0	75.0
Pex-LET-150250	10"	279	6.0	113.0
Pex-LET-150300	12"	305	7.0	153.0
Pex-LET-150350	14"	356	7.0	197.0
Pex-LET-150400	16"	381	7.0	263.0
Pex-LET-150450	18"	419	7.0	303.0
LET-150500	20"	457	7.0	330.0
LET-150600	24"	559	7.0	397.0

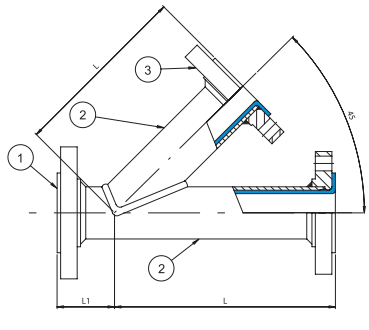
Lined Equal Cross
ANSI B16.5 - Class 150#



Catalog Number	DN In.	L mm	Pex lining thickness	Weight (kg)
Pex-LC-15025	1"	89	3.0	5.5
Pex-LC-15032	1 1/4"	95	3.0	6.5
Pex-LC-15038	1 1/2"	102	3.0	8.2
Pex-LC-15050	2"	114	3.5	13.6
Pex-LC-15063	2 1/2"	127	3.5	16.5
Pex-LC-15080	3"	140	4.0	23.6
Pex-LC-150100	4"	165	4.5	33.0
Pex-LC-150125	5"	190	4.5	43.0
Pex-LC-150150	6"	203	6.0	52.3
Pex-LC-150200	8"	229	6.0	86.3
Pex-LC-150250	10"	279	6.0	124.0
Pex-LC-150300	12"	305	7.0	169.0
Pex-LC-150350	14"	356	7.0	300.0
Pex-LC-150400	16"	381	7.0	372.0
Pex-LC-150450	18"	419	7.0	427.0
Pex-LC-150500	20"	457	7.0	547.0
Pex-LC-150600	24"	559	7.0	713.0

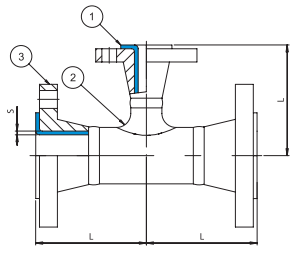
Lined Lateral Tee
ANSI B16.5 - Class 150#





Catalog Number	DN In.	L mm	L1 mm	Pex lining thickness	Weight (kg)
Pex-LLT-15025	1"	146	45	3.0	4.0 7.0
Pex-LLT-15038	1 1/2"	178	51	3.0	9.0
Pex-LLT-15050	2"	203	64	3.5	19.5
Pex-LLT-15080	3"	254	76	4.0	36.0
Pex-LLT-150100	4"	305	76	4.5	53.0
Pex-LLT-150150	6"	368	89	6.0	80.0
Pex-LLT-150200	8"	445	115	6.0	13.0

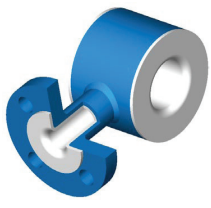
Lined Reducing Tee
ANSI B16.5 - Class 150#

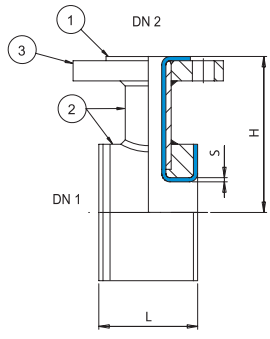


Catalog Number	DN In.	DN2 In.	L mm	Pex lining thickness	Weight (kg)
Pex-LRT-15032-19	1 ¼"	¾"	95	x	5.3
Pex-LRT-15032-25		1"		3.0	5.5
Pex-LRT-15062-19	2 ½"	¾"	127	x	5.3
Pex-LRT-15062-25		1"		3.0	5.5
Pex-LRT-150100-25	5"	1"	190	4.5/3	19.0
Pex-LRT-150100-38		1 ½"			19.8
Pex-LRT-150100-50		2"			21.5
Pex-LRT-150100-80		3"			23.5
Pex-LRT-15038-19	1 ½"	¾"	102	x	5.3
Pex-LRT-15038-25		1"		3.0	5.5
Pex-LRT-15050-25	2"	1"	114	3.0	7.9
Pex-LRT-15050-38		1 ½"			9.4
Pex-LRT-15080-25	3"	1"	140	4.0/3	13.8
Pex-LRT-15080-38		1 ½"			14.0
Pex-LRT-15080-50		2"			15.0
Pex-LRT-150100-25	4"	1"	165	4.5/3	19.0
Pex-LRT-150100-38		1 ½"			19.8
Pex-LRT-150100-50		2"			21.5
Pex-LRT-150100-80		3"			23.5
Pex-LRT-150150-25	6"	1"	203	4.5/3	28.2
Pex-LRT-150150-38		1 ½"			30.7
Pex-LRT-150150-50		2"			32.0
Pex-LRT-150150-80		3"			35.2
Pex-LRT-150150-100		4"			37.0
Pex-LRT-150200-25	8"	1"	229	6.0/3	42.5
Pex-LRT-150200-38		1 ½"			45.6
Pex-LRT-150200-50		2"			47.0
Pex-LRT-150200-80		3"			54.0
Pex-LRT-150200-100		4"			57.0
Pex-LRT-150200-150		6"		6.0	63.0
Pex-LRT-150250-25	10"	1"	280	6.0/3	64.6
Pex-LRT-150250-38		1 ½"			66.3
Pex-LRT-150250-50		2"			68.3
Pex-LRT-150250-80		3"			75.3
Pex-LRT-150250-100		4"			79.3
Pex-LRT-150250-150		6"		6.0	83.0
Pex-LRT-150250-200		8"			94.0
Pex-LRT-150300-25	12"	1"	305	6.0/3	127.0
Pex-LRT-150300-38		1 ½"			133.0
Pex-LRT-150300-50		2"			136.0
Pex-LRT-150300-80		3"			146.0
Pex-LRT-150300-100		4"			152.0
Pex-LRT-150300-150		6"		6.0	165.0
Pex-LRT-150300-200		8"			219.0
Pex-LRT-150300-250		10"		7.0	223.0

Catalog Number	DN In.	DN2 In.	L mm	Pex lining thickness	Weight (kg)
Pex-LRT-150350-25	14"	1"	356	6.0/3	169.0
Pex-LRT-150350-38		1 ½"			173.0
Pex-LRT-150350-38		2"			175.0
Pex-LRT-150350-50		3"			186.0
Pex-LRT-150350-80		4"			191.0
Pex-LRT-150350-100		6"		6.0	204.0
Pex-LRT-150350-150		8"			293.0
Pex-LRT-150350-200		10"		7.0	299.0
Pex-LRT-150350-300		12"			307.0
Pex-LRT-150400-25	16"	1"	305	6.0/3	227.0
Pex-LRT-150400-38		1 ½"			231.0
Pex-LRT-150400-50		2"			233.0
Pex-LRT-150400-80		3"			244.0
Pex-LRT-150400-100		4"			250.0
Pex-LRT-150400-150		6"		6.0	263.0
Pex-LRT-150400-200		8"			291.0
Pex-LRT-150400-250		10"		7.0	355.0
Pex-LRT-150400-300		12"			359.0
Pex-LRT-150400-350		14"			373.0
Pex-LRT-150450-25	18"	1"	419	6.0 / 3	303.0
Pex-LRT-150450-38		1 ½"			307.0
Pex-LRT-150450-50		2"			309.0
Pex-LRT-150450-80		3"			319.0
Pex-LRT-150450-100		4"			323.0
Pex-LRT-150450-150		6"		6.0	338.0
Pex-LRT-150450-200		8"			372.0
Pex-LRT-150450-250		10"		7.0	443.0
Pex-LRT-150450-300		12"			455.0
Pex-LRT-150450-350		14"			465.0
Pex-LRT-150450-400		16"			473.0
Pex-LRT-150500-25	20"	1"	457	6.0/3	279.0
Pex-LRT-150500-38		1 ½"			283.0
Pex-LRT-150500-50		2"			286.0
Pex-LRT-150500-80		3"			294.0
Pex-LRT-150500-100		4"			299.0
Pex-LRT-150500-150		6"		6.0	313.0
Pex-LRT-150500-200		8"			343.0
Pex-LRT-150500-250		10"		7.0	413.0
Pex-LRT-150500-300		12"			421.0
Pex-LRT-150500-350		14"			429.0
Pex-LRT-150500-400		16"			439.0
Pex-LRT-150500-450		18"			447.0
Pex-LRT-150600-25	24"	1"	500	6.0/3	363.0
Pex-LRT-150600-38		1 ½"			367.0
Pex-LRT-150600-500		2"			370.0
Pex-LRT-150600-80		3"			377.0
Pex-LRT-150600-100		4"			383.0
Pex-LRT-150600-150		6"		6.0	396.0
Pex-LRT-150600-200		8"			427.0
Pex-LRT-150600-250		10"		7.0	533.0
Pex-LRT-150600-300		12"			543.0
Pex-LRT-150600-350		14"			553.0
Pex-LRT-150600-400		16"			567.0
Pex-LRT-150600-450		18"			577.0
Pex-LRT-150600-500		20"			589.0

Lined Instrument Tee
ANSI B16.5 Class 150#

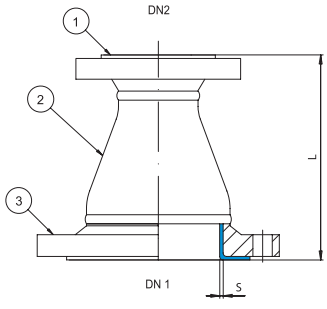




Catalog Number	DN 1 In.	DN 2 In.	L mm	Pex lining thickness	Weight (kg)
Pex-LIT-15025-25	1"	1"	50	4.0	2.2
Pex-LIT-15038-25	1 ½"	1"			2.8
Pex-LIT-15038-38		1 ½"			4.4
Pex-LIT-15050-25	2"	1"	50	4.0	3.6
Pex-LIT-15050-38		1 ½"	75		6.2
Pex-LIT-15050-50		2"	90		8.1
Pex-LIT-15062-25	2 ½"	1"	50	4.0	3.9
Pex-LIT-15062-38		1 ½"	75		7.2
Pex-LIT-15062-50		2"	90		9.8
Pex-LIT-15080-25	3"	1"	50	4.0	4.7
Pex-LIT-15080-38		1 ½"	75		8.3
Pex-LIT-15080-50		2"	90		12.6
Pex-LIT-150100-25	4"	1"	50	4.0	5.9
Pex-LIT-150100-38		1 ½"	75		8.9
Pex-LIT-150100-50		2"	90		16.0
Pex-LIT-150100-80		3"	130		24.5
Pex-LIT-150150-25	6"	1"	50	4.0	8.2
Pex-LIT-150150-38		1 ½"	75		14.7
Pex-LIT-150150-50		2"	90		21.8
Pex-LIT-150150-80		3"	130		30.1
Pex-LIT-150200-25	8"	1"	50	4.0	10.5
Pex-LIT-150200-38		1 ½"	75		17.8
Pex-LIT-150200-50		2"	90		23.3
Pex-LIT-150200-80		3"	130		33.3
Pex-LIT-150100-25	10"	1"	50	4.0	13.7
Pex-LIT-150100-38		1 ½"	75		23.3
Pex-LIT-150100-50		2"	90		26.0
Pex-LIT-150100-80		3"	160		36.7
Pex-LIT-150100-25	12"	1"	50	4.0	43.0
Pex-LIT-150100-38		1 ½"	75		55.5
Pex-LIT-150100-50		2"	90		62.0
Pex-LIT-150100-80		3"	160		69.0
Pex-LIT-150100-25	14"	1"	50	4.0	53.1
Pex-LIT-150100-38		1 ½"	75		66.5
Pex-LIT-150100-50		2"	90		73.7
Pex-LIT-150100-80		3"	160		103.0
Pex-LIT-150100-25	16"	1"	90	4.0	59.0
Pex-LIT-150100-38		1 ½"	110		74.0
Pex-LIT-150100-50		2"	120		83.0
Pex-LIT-150100-80		3"	160		116.7

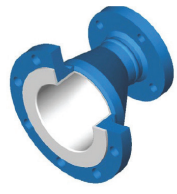
Catalog Number	DN 1 In.	DN 2 In.	L mm	Pex lining thickness	Weight (kg)
Pex-LIT-150100-25	18"	1"	90	4.0	68.5
Pex-LIT-150100-38		1 ½"	110		90.5
Pex-LIT-150100-50		2"	120		93.7
Pex-LIT-150100-80		3"	160		129.7
Pex-LIT-150100-19	20"		90	4.0	X
Pex-LIT-150100-25		1"			72.0
Pex-LIT-150100-38		1 ½"	110		89.7
Pex-LIT-150100-50		2"	120		100.0
Pex-LIT-150100-80		3"	160		137.0
Pex-LIT-150100-25	24"	1"	90	4.0	79.1
Pex-LIT-150100-38		1 ½"	110		94.5
Pex-LIT-150100-50		2"	120		107.5
Pex-LIT-150100-80		3"	160		150.0

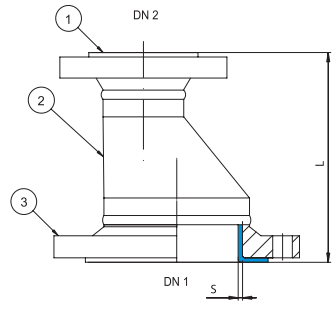
Lined Concentric Reducer ANSI B16.5 - Class 150#



Catalog Number	DN 1 In.	DN 2 In.	L mm	Pex lining thickness	Weight (kg)
Pex-LCR-15032-25	1 ¼"	1"	114	3.0	3.0
Pex-LCR-15038-19	1 ½"	¾"	114	X	3.1
Pex-LCR-15038-25		1"		3.0	3.3
Pex-LCR-15050-25	2"	1"	127	3.0	4.1
Pex-LCR-15050-38		1 ½"			4.8
Pex-LCR-15062-25	2 ½"	1"	140	3.0	5.8
Pex-LCR-15062-50		2"			6.9
Pex-LCR-15080-25	3"	1"	152	4.0/3	6.7
Pex-LCR-15080-38		1 ½"			6.2
Pex-LCR-15080-50		2"			6.9
Pex-LCR-150100-25	4"	1"	178	4.0/3	9.9
Pex-LCR-150100-38		1 ½"			9.3
Pex-LCR-150100-50		2"			9.8
Pex-LCR-150100-80		3"			12.4
Pex-LCR-150125-80	5"	3"	203	4.5/3.5	12.7
Pex-LCR-150125-100		4"			15.0
Pex-LCR-150150-25	6"	1"	229	4.5/3.0 5.0/4.0	18.9
Pex-LCR-150150-50		2"			19.9
Pex-LCR-150150-80		3"			17.4
Pex-LCR-150150-100		4"			18.3
Pex-LCR-150200-100	8"	4"	279	6.0	22.0
Pex-LCR-150200-150		6"			25.3
Pex-LCR-150250-100	10"	4"	305	6.0	33.0
Pex-LCR-150250-150		6"			37.5
Pex-LCR-150250-200		8"			44.7
Pex-LCR-150300-150	12"	6"	356	7.0	45.9
Pex-LCR-150300-200		8"			47.8
Pex-LCR-150300-250		10"			52.5
Pex-LCR-150350-200	14"	8"	406	7.0	69.0
Pex-LCR-150350-250		10"			73.5
Pex-LCR-150350-300		12"			80.0
Pex-LCR-150400-250	16"	10"	457	7.0	98.0
Pex-LCR-150400-300		12"			105.0
Pex-LCR-150400-350		14"			115.0
Pex-LCR-150450-300	18"	12"	483	7.0	135.0
Pex-LCR-150450-350		14"			148.0
Pex-LCR-150450-400		16"			157.0
Pex-LCR-150500-300	20"	12"	508	7.0	185.0
Pex-LCR-150500-350		14"			198.0
Pex-LCR-150500-400		16"			210.0
Pex-LCR-150500-450		18"			218.0
Pex-LCR-150600-400	24"	16"	610	7.0	272.0
Pex-LCR-150600-450		18"			282.0
Pex-LCR-150600-500		20"			291.0

Lined Eccentric Reducer ANSI B16.5 - Class 150#





Catalog Number	DN 1 In.	DN 2 In.	L mm	Pex lining thickness	Weight (kg)
Pex-LECR-15038-25	1 ½"	1"	114	3.0	3.0
Pex-LECR-15050-25	2"	1"	127	3.0	4.0
Pex-LECR-15050-38		1 ½"			4.3
Pex-LECR-15080-25	3"	1"	152	4.0 / 3	6.7
Pex-LECR-15080-38		1 ½"			6.2
Pex-LECR-15080-50		2"			6.9
Pex-LECR-150100-38	4"	1 ½"	178	4.5 / 3.5	9.3
Pex-LECR-150100-50		2"			9.8
Pex-LECR-150100-80		3"			12.4
Pex-LECR-150150-50	6"	2"	229	5.0 / 4.0	15.6
Pex-LECR-150150-80		3"			17.0
Pex-LECR-150150-100		4"			18.7
Pex-LECR-150200-100	8"	4"	279	6.0	22.0
Pex-LECR-150200-150		6"			28.0
Pex-LECR-150250-100	10"	4"	305	6.0	33.0
Pex-LECR-150250-150		6"			37.5
Pex-LECR-150250-200		8"			44.7
Pex-LECR-150300-150	12"	6"	356	7.0	45.9
Pex-LECR-150300-200		8"			47.8
Pex-LECR-150300-250		10"			52.5
Pex-LECR-150350-200	14"	8"	406	7.0	69.0
Pex-LECR-150350-250		10"			73.5
Pex-LECR-150350-300		12"			80.0
Pex-LECR-150400-250	16"	10"	457	7.0	98.0
Pex-LECR-150400-300		12"			105.0
Pex-LECR-150400-350		14"			115.0
Pex-LECR-150450-300	18"	12"	483	7.0	135.0
Pex-LECR-150450-350		14"			148.0
Pex-LECR-150450-400		16"			157.0
Pex-LECR-150500-300	20"	12"	508	7.0	185.0
Pex-LECR-150500-350		14"			198.0
Pex-LECR-150500-400		16"			210.0
Pex-LECR-150500-450		18"			218.0
Pex-LECR-150600-500	24"	20"	610	7.0	291.0

pexgol

X-LINKED PIPING SOLUTIONS