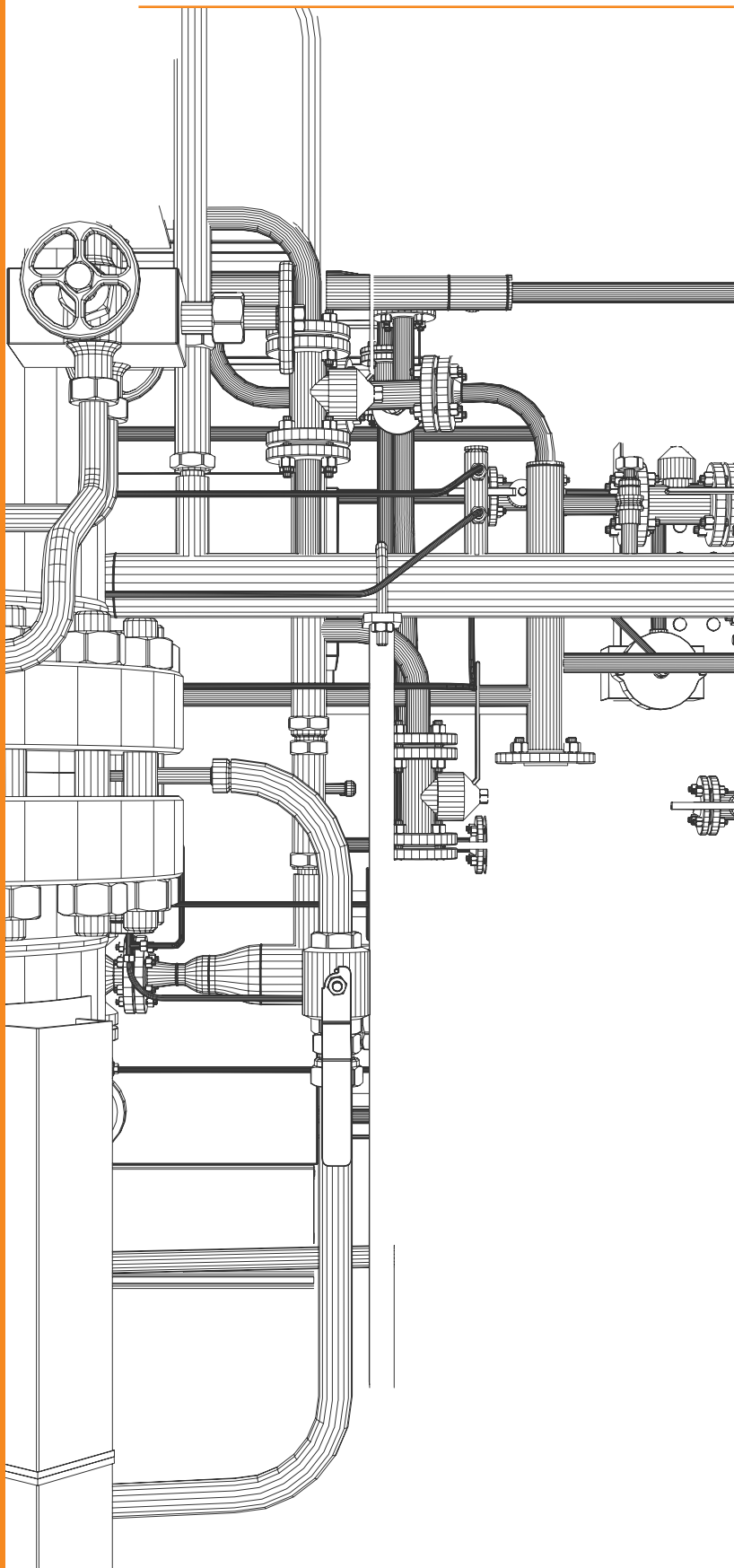
Technical Information

PEXGOL
X-LINKED PIPING SOLUTIONS

Golan Plastic Products, manufacturer and distributor of Pexgol, is a world leader in providing comprehensive solutions for the transportation of all types of hot, corrosive or abrasive liquid materials. It is the only manufacturer on an international scale with factories in Israel, Argentina, Chile and Mexico, specialising in large diameter, cross-linked polyethylene pipe systems, the most cost-effective, long-term solutions available to infrastructure, industrial, oil & gas and mining sectors throughout the world.
Established in 1964, **Golan Plastic Products** 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 infrastructure & industrial piping systems



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

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 pipes are determined by the following equation:

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

P = Maximum working pressure (kg/cm²)
σ = Long term strength at the design temperature (kg/cm²) (10.1)
D = Outside diameter (mm)
t = Wall thickness (mm)
S = ISO 4065 series
SDR (Standard Dimensions Ratio) = $\frac{D}{t} = 2s + 1$

Table 8.1: Changes of Design Stress Values σ with Temperature

Temperature (°C)	σ (kg/cm2)
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

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 since 1985 at the Dead Sea Hot Leach Crystallisation Facility carrying hot sylvinite at 114°C and are still working today.
The design stresses σ in tables 8.1 and the working pressures in tables 9.1 & 9.2 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.

Allowable Working Pressures

Table 9.1: Allowable working pressures [bar] for conveying water in Pexgol pipes, with a safety factor C = 1.25

Design Temperature	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 9.2: Allowable working pressures [psi] for conveying water in Pexgol pipes, with a design factor DF = 0.8; safety factor C = 1.25

Design Temperature		Class 6	Class 8	Class 10	Class 12	Class 15	Class 19	Class 24	Class 30
		12.5	10	7.6	6.3	5	4	3.2	2.5
°C	°F	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

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

Catalogue Number	Outside Diameter (mm)	Wall thickness (mm)	Inside Diameter (mm)	Weight (kg/m)
PA-903.5 BLK	90	3.5	83	0.9
PA-1104.2 BLK	110	4.2	101.6	1.4
PA-1254.8 BLK	125	4.8	115.4	1.8
PA-1405.4 BLK	140	5.4	129.2	2.3
PA-1606.2 BLK	160	6.2	147.6	3
PA-1806.9 BLK	180	6.9	166.2	3.7
PA-2007.7 BLK	200	7.7	184.6	4.6
PA-2258.6 BLK	225	8.6	207.8	5.8
PA-2509.6 BLK	250	9.6	230.8	7.2
PA-28010.7 BLK*	280	10.7	258.6	9
PA-31512.1 BLK*	315	12.1	290.8	11.4
PA-35513.6 BLK	355	13.6	327.8	14.4
PA-40015.3 BLK*	400	15.3	369.4	18.3
PA-45017.2 BLK	450	17.2	415.6	23.2
PA-50019.1 BLK*	500	19.1	461.8	28.6
PA-56021.4 BLK**	560	21.4	517.2	35.8
PA-63024.1 BLK*	630	24.1	581.8	45,4
PA-71027.2 BLK**	710	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

Catalogue Number	Outside Diameter (mm)	Wall thickness (mm)	Inside Diameter (mm)	Weight (kg/m)
PA-753.6BLK	75	3.6	67.8	0.8
PA-904.3BLK	90	4.3	81.4	1.1
PA-1105.3BLK	110	5.3	99.4	1.7
PA-1256.0BLK	125	6	113	2.2
PA-1406.7BLK	140	6.7	126.6	2.8
PA-1607.7BLK	160	7.7	144.6	3.6
PA-1808.6BLK	180	8.6	162.8	4.6
PA-2009.6BLK	200	9.6	180.8	5.7
PA-22510.8BLK	225	10.8	203.4	7.2
PA-25011.9BLK	250	11.9	226.2	8.8
PA-28013.4BLK*	280	13.4	253.2	11.1
PA-31515.0BLK*	315	15	285	14
PA-35516.9BLK	355	16.9	321.2	17.8
PA-40019.1BLK*	400	19.1	361.8	22.6
PA-45021.5BLK*	450	21.5	407	28.7
PA-50023.9BLK	500	23.9	452.2	35.4
PA-56026.7BLK**	560	26.7	506.6	44.3
PA-63030.0BLK*	630	30	570	56
PA-71033.8BLK**	710	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

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

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

Catalogue Number	Outside Diameter (mm)	Wall thickness (mm)	Inside Diameter (mm)	Weight (kg/m)
PA-162BLK	16	2.0	13	0.09
PA-202BLK	20	2.0	16.2	0.11
PA-252.3BLK	25	2.3	20.4	0.16
PA-322.9BLK	32	2.9	26.2	0.26
PA-403.7BLK	40	3.7	32.6	0.42
PA-504.6BLK	50	4.6	40.8	0.65
PA-635.8BLK	63	5.8	51.4	1.03
PA-756.8BLK	75	6.8	61.4	1.44
PA-908.2BLK	90	8.2	73.6	2.09
PA-11010BLK	110	10.0	90	3.11
PA-12511.4BLK	125	11.4	102.2	4.03
PA-14012.7BLK	140	12.7	114.6	5.02
PA-16014.6BLK	160	14.6	130.8	6.60
PA-18016.4BLK	180	16.4	147.2	8.34
PA-20018.1BLK	200	18.1	163.8	10.23
PA-22520.4BLK	225	20.4	184.2	12.97
PA-25022.7BLK	250	22.7	204.6	16.05
PA-28025.4BLK	280	25.4	229.2	20.10
PA-31528.6BLK	315	28.6	257.8	25.46
PA-35532.2BLK	355	32.2	290.6	32.30
PA-40036.3BLK*	400	36.3	327.4	41.5
PA-45040.9BLK*	450	40.9	368.2	52
PA-50045.4BLK	500	45.4	409.2	65
PA-56050.9BLK**	560	50.9	458.4	82
PA-63057.3BLK	630	57.3	515.6	103
PA-71064.5BLK**	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

Catalogue Number	Outside Diameter (mm)	Wall thickness (mm)	Inside Diameter (mm)	Weight (kg/m)
PA-637.1BLK	63	7.1	48.8	1.25
PA-758.4BLK	75	8.4	58.2	1.75
PA-9010.1BLK	90	10.1	69.8	2.50
PA-11012.3BLK	110	12.3	85.4	3.75
PA-12514.1BLK	125	14.1	97	4.90
PA-14015.7BLK	140	15.7	108.6	6.10
PA-16017.9BLK	160	17.9	124.2	7.90
PA-18020.1BLK	180	20.1	139.8	9.9
PA-20022.4BLK	200	22.4	155.2	12.40
PA-22525.0BLK	225	25.2	175	15.55
PA-25027.9BLK	250	27.9	194.2	19.30
PA-28031.3BLK*	280	31.3	217.4	24.20
PA-31535.2BLK	315	35.2	244.6	30.65
PA-35539.7BLK	355	39.7	275.6	39
PA-40044.7BLK*	400	44.7	310.6	49.40
PA-45050.3BLK	450	50.3	349.4	62.50
PA-50055.8BLK*	500	55.8	388.4	77
PA-56062.5BLK**	560	62.5	435	96.70
PA-63070.0BLK*	630	70.0	489.4	122
PA-71078.9BLK**	710	78.9	552.2	154.9

** Minimum quantity required ** By special order*

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

Catalogue Number	Outside Diameter (mm)	Wall thickness (mm)	Inside Diameter (mm)	Weight (kg/m)
PA-122N	12	2.0	8	0.06
PA-162.2BLK	16	2.2	11.6	0.09
PA-202.8BLK	20	2.8	14.4	0.15
PA-253.5BLK	25	3.5	18	0.23
PA-324.4BLK	32	4.4	23.2	0.38
PA-405.5BLK	40	5.5	29	0.59
PA-506.9BLK	50	6.9	38.2	0.92
PA-638.6BLK	63	8.6	45.8	1.45
PA-7510.3BLK	75	10.3	54.4	2.07
PA-9012.3BLK	90	12.3	65.4	2.97
PA-11015.1BLK	110	15.1	79.8	4.45
PA-12517.1BLK	125	17.1	90.8	5.73
PA-14019.2BLK	140	19.2	101.6	7.21
PA-16021.9BLK	160	21.9	116.2	9.40
PA-18024.6BLK	180	24.6	130.8	11.88
PA-20027.4BLK	200	27.3	145.2	14.65
PA-22530.7BLK	225	30.8	163.4	18.59
PA-25034.2BLK	250	34.2	181.6	23
PA-28038.3BLK	280	38.3	203.4	29
PA-31543.1BLK*	315	43.1	228.8	37
PA-35548.5BLK	355	48.5	258	47
PA-40054.7BLK*	400	54.7	290.6	59
PA-45061.5BLK*	450	61.5	327	75
PA-50068.5BLK*	500	68.5	363	93
PA-56076.7BLK**	560	76.7	406.5	117
PA-63086.3BLK*	630	86.3	457	148
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

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

** Minimum quantity required ** By special order*

GOLAN PLASTIC PRODUCTS Ltd.

PEXGOL C - black 18x2.0 coated pipe- Data Sheet (Sept.2020)

Quality control

- The pipes comply with the requirements of DIN 4726, ISO 17455, DIN 16892/3,
- ISO 15875, SKZ HR 3.2, UNE EN ISO 15875.
- Raw material – tests on every shipment.
- 100% online dimension control.
- Cross linking degree test on every batch.
- Internal pressure tests – comply with the requirements of the above standards.
- Resistance of the adhesive layer -peeling test.
- Final quality tests on every coil.
- **GOLAN** is annually supervised by the following institutes:
  DVGW, SKZ, NSF, ICC, DTI, AENOR, CSTB, Global Mark, Israeli Standards Institute (SII).

PEXGOL C for Heating

Standard	Value	Material Properties
DIN 16892/3	60% at minimum	Cross linking
DIN 53479	0.94 g/cm^3	Density
DIN 53455	> 400%	Elongation
DIN 4726, ISO 17455	< 0.1 g/(m3d)	Oxygen permeability
DIN 52328	1.4 x 10-4	Coefficient of linear expansion
DIN 52612	0.38 w/m0c	Thermal conductivity at 200°C

PEXGOL pipes are made of high density polyethylene (HDPE) high molecular weight (HMW) resins. The high density polyethylene raw material is mixed with additives of the highest quality which gives the pipe its excellent durability to extreme temperatures. The pipe has a proven life expectancy of 50 years.

Technical Data		
Material	PE-HD	Class and Pressure
Size (SDR 9)	18x2.0	Class 4 – Heating (60^0c) 10 Bar Class 2 – Sanitary (70^0c) 8 Bar
Max temperature	95°C	

Positive properties

- Small bending radius
- Max Working Temp. 95°C.
- High durability to combination of pressure and temperature.
- Low pressure loss.
- Smooth surface.

Chart 19.1 Class 15 (SDR 11)

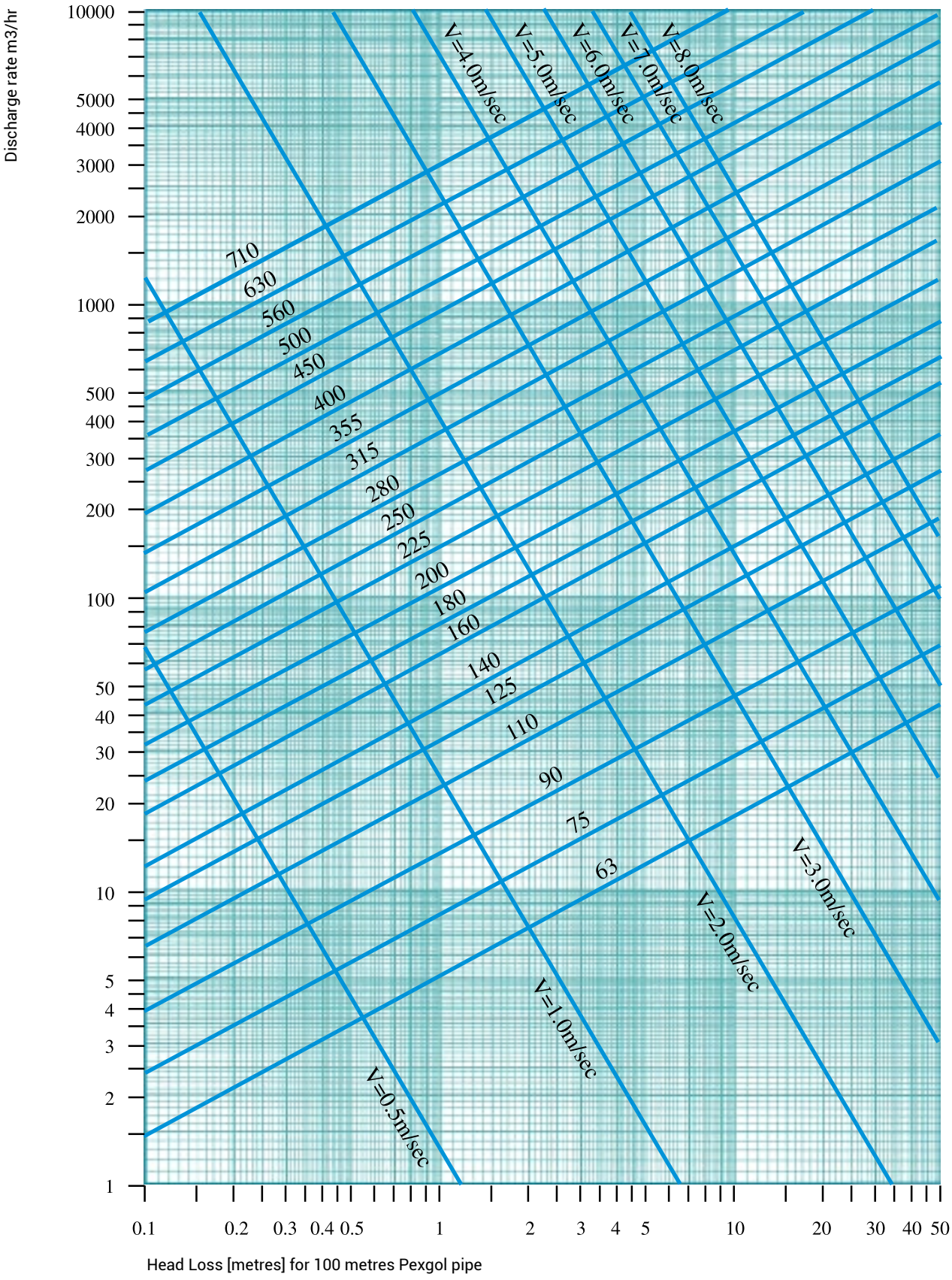


Chart 21.1 Class 24 (SDR 7.4)

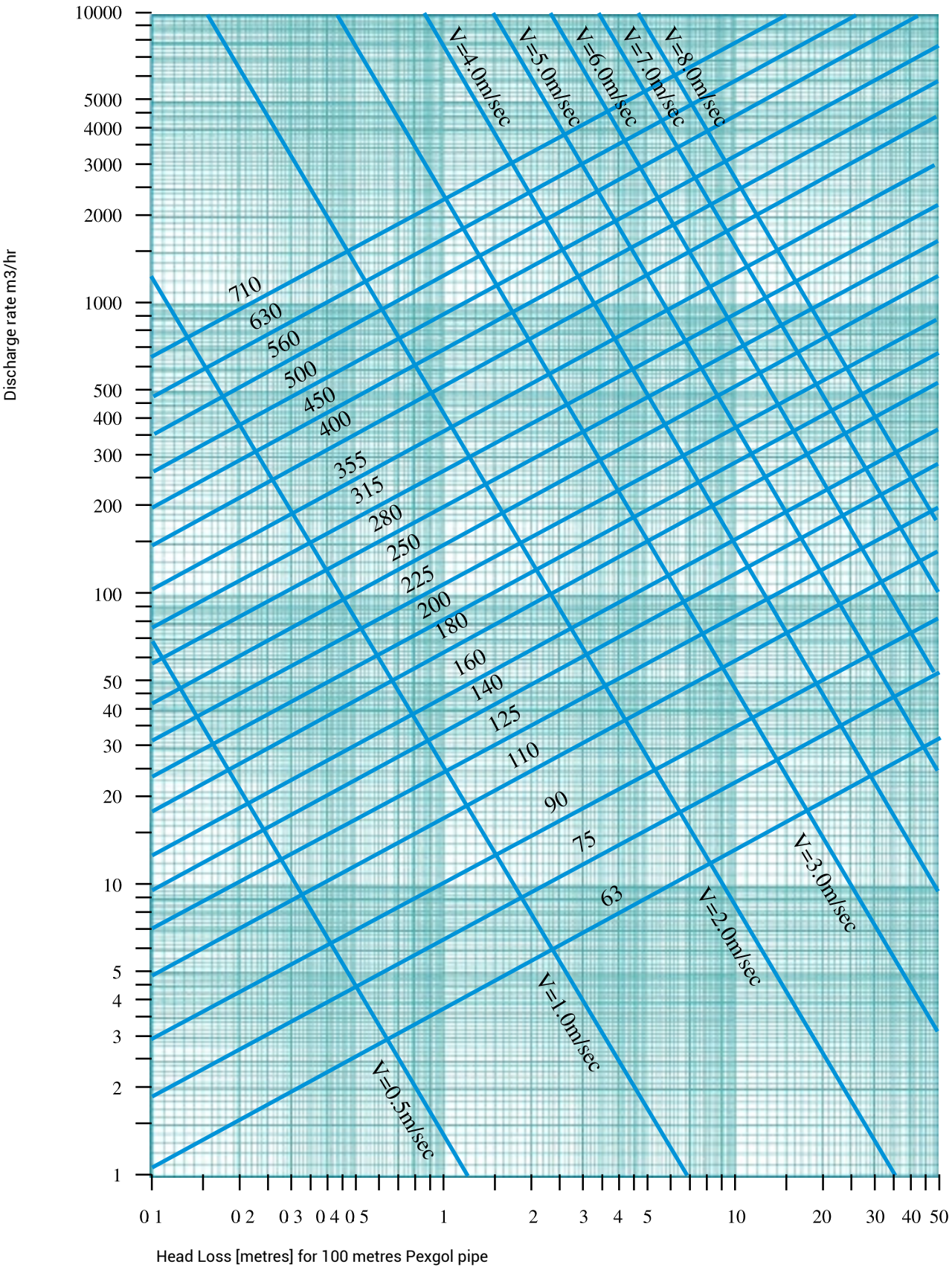
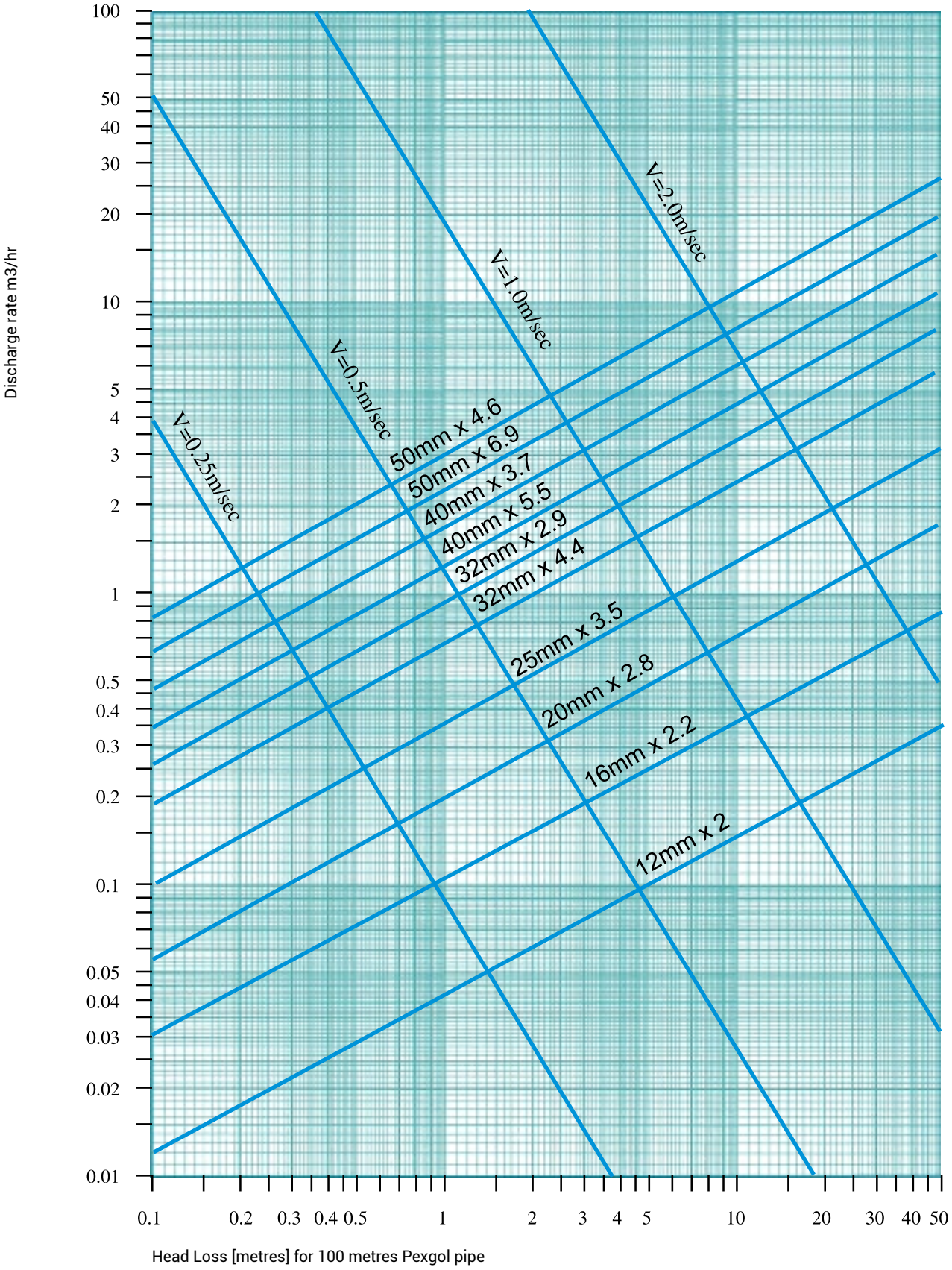


Chart 23.1 Class 24 (SDR 7.4) & Class 15 (SDR 11)



Coefficients of Friction

Absolute Surface Roughness

0.0005 mm – 0.0007 mm

The Values of the 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 98).

Pexgol Properties

Test / Resina	Standard	Required	Nominal	Frequency
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
Every 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	ISO 1183	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 6259-1, ISO 6259-3	350%	>400%	Every Batch
Tensile strength (at 20°C and at 100°C)	ISO 6259-1 ISO 6259-3	19 N/mm^2 19 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
Stabilisers Migration	NCh2086	At least 50% of a virgin sample	>50%	Annually
Oxidative Induction Time (OIT)	EN 728 ISO TR 10837	>20 min at 200°C	>40 min at 200°C	Every Batch
Oven aging 160°C	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	EN15632	15,000 h	>25,000	Type Test
Pent Test	ASTM F876	100 hs	>100 hs	Once per year
Squeeze-off	ISO 14531	1.000 hs (Pre cooling at -50°C)	>1.000 hs	Type Test
RCP	ISO 14531	lc/dn ≤ 4.7; a -50°C	lc/dn = 0.2 a -50°C	Type Test
Impact strength at 20 °C	DIN 53453	No failure	No failure	Type Test
Impact strength, at -140 °C Surface Energy Moisture absorption at 20 °C		No failure 34x10-3 N/m 0.01 mg/4d	No failure 34 x 10 - 3 N/m < 0.01 mg/4d	Type Test
Oxygen permeability (at 80°C) for pipe with oxygen barrier acc. To EN 15632	ISO 17455	≤3.60 mg O2/(m²/d)	≤2.0 mg O2/(m²/d)	Type Test

Table 25.1: 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 25.2: 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 x 10-3	-	DIN53483
Rupture voltage at 20°C	100	kV/mm	

International Approvals Standard and Guidelines

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