

The background of the entire page is a dark blue grid with faint, light-colored technical drawings. In the top right corner, there is a circular technical drawing with various lines and symbols. In the bottom left corner, there is a large technical drawing of a gear or a similar mechanical part, showing concentric circles and radial lines. The main title 'PEXGOL' is centered in the upper half of the page.

# PEXGOL

## Engineering Guide



**Golan Plastic Products**, manufacturer and distributor of PEXGOL, is a world leader in providing comprehensive solutions for the transportation of every type of hot, corrosive or abrasive liquid materials of every kind. Golan Plastic Products is the only worldwide manufacturer that specializes in large diameter, cross-linked polyethylene pipe systems, providing industrial and mining sectors throughout the world with the most cost-effective, long term solutions available.

Established in 1964, GPP today is a global company listed on the Tel-Aviv stock exchange. Our global reputation and reliable brand name is based on accredited international standards in more than 40 nations, along with a decades-long proven track record with established clients in dozens of countries around the world.

For more information about our company, products and projects, please visit our website: **[www.pexgol.com](http://www.pexgol.com)**

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## INTRODUCTION

PEXGOL pipes are produced by Golan Plastic Products, an industrial enterprise owned by Kibbutz Shaar Hagolan. Golan Plastic Products was established in 1964 as an extrusion plant and today it is one of the biggest plastic products producers for the building sector in Israel.

In 1975 Golan Plastic Products began manufacturing hot water pipes made of crosslinked polyethylene using the peroxide high pressure process. These pipes, sold under the name of PEXGOL, are now well-known for their quality and reliability in Israel and in the international market.

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Whereas the products shown in this catalogue illustrate and describe the current state of their development, Golan reserves the right at all times to make such technical alterations as it shall see fit to its products. Although every care has been taken in the preparation of the information, specifications and other data included in this catalog, we cannot rule out inadvertent errors or omissions.

Purchasers should take into account possible deviations or variations which will not substantially diminish the functionality or performance of the products and in many cases, are designed to improve the same.

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Table No 1.1: **Properties**

| Test  | Standard                  | Required   | Nominal   | Frequency              |
|---|---------------------------|--|---|------------------------|
| Resin   |                           |  |   |                        |
| MFR   | ASTM D1238<br>ISO 1133    | 1.7 – 2.3  | 1.9   | Every batch            |
| Density   | ASTM D1505<br>ISO 1183    | 926 Kg/m <sup>3</sup>  | 55 Kg/m <sup>3</sup>  | Every batch            |
| Water content   | ASTM D6869<br>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 53455                 | 938 kg/m <sup>3</sup>  | 938 kg/m <sup>3</sup>   |                        |
| Cross linking degree  | ISO 10147                 | 70%  | 80%   | At least twice a batch |
| Elongation at break   | ISO 6259-1,<br>ISO 6259-3 | 350%   | >400%   | Every batch            |
| Tensile strength (at 20°C)                                    | DIN 53455                 | 19 N/mm <sup>2</sup>   | >19 N/mm <sup>2</sup>   | At least twice yearly  |
| % Carbon black  | ISO 6964                  | -  | Special<br>Formulation  |                        |
| Resistance to weathering                                      | ISO 14531-1,<br>Annex C   | a) Thermal stability<br>b) 95°C hydrostatic strength<br>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<br>ISO TR 10837    | >20 minutes at 200°C   | >40 minutes at<br>200°C   | Every batch            |
| Oven aging 160°   | ATEC                      | After 100 hours, at least 50%<br>elongation compare to virgin<br>material      | After 100 hours,<br>90% elongation<br>compare to virgin<br>material | Twice weekly           |
| Thermal stability at 110°C                                    | AS2492<br>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<br>(Pre cooling at - 50°C)  | >1000 h   | Type test              |
| RCP   | ISO 14531                 | lc/dn ≤ 4,7;<br>at -50°C   | lc/dn =0.2<br>at -50°C  | Type test              |
| Impact strength (at 20°C)                                     | DIN 53453                 | No failure   | No failure  | Type test              |
| Moisture absorption (at 20°C)                                 |                           | 0.01 mg/4d   | < 0.01 mg/4d  | Type test              |
| Oxygen permeability (at 80°C) for<br>pipe with oxygen barrier | DIN 4726                  | < 0.1 gm/m <sup>3</sup> x day  | 0.02  | Annually               |

Table No 1.2: **Thermal Properties**

|  | Value                 | Unit                           | Tested for standard |
|--|-----------------------|--------------------------------|---------------------|
| Service temperature range                  | -80+120               | °C                             |                     |
| Coefficient of linear expansion (at 20°C)  | 1.4x10 <sup>-4</sup>  | $\frac{m}{m \cdot ^\circ C}$   | DIN53752            |
| Coefficient of linear expansion (at 100°C) | 2.05x10 <sup>-4</sup> | $\frac{m}{m \cdot ^\circ C}$   |                     |
| Softening temperature                      | +133                  | °C                             |                     |
| Specific heat                              | 2.3                   | $\frac{kJ}{kg \cdot ^\circ C}$ | DIN53765            |
| Coefficient of thermal conductivity        | 0.35                  | $\frac{W}{m \cdot ^\circ C}$   | DIN 4725            |

Table No 1.3: **Electronic Properties**

|  | Value              | Unit  | Tested for standard |
|--|--------------------|-------|---------------------|
| Specific internal resistance (at 20°C) | 10 <sup>15</sup>   | Ω.m   |                     |
| Dielectric constant (at 20°C)          | 2. <sup>3</sup>    | -     |                     |
| Dielectric loss factor (at 20°C/50Hz)  | 1x10 <sup>-3</sup> | -     | DIN53483            |
| Rupture voltage (at 20°C)              | 60-90              | kV/mm |                     |

## International approvals

To view the certificates please see our website:  
[www.pexgol.com/about-us/international-certificates](http://www.pexgol.com/about-us/international-certificates)

|   |   |  |   |
|---|---|--|---|
|  | Deutscher Verein des Gas-und Wasserfaches e.V (incl. drinking water approval) |  | International certification network   |
|  | Israeli Standard Institute Standard Mark Approval                             |   | International ISO 9001 Approval   |
|  | Poland Standard Institute Approval  |   | Süddeutsches Kunststoff-Zentrum<br>Amtlich anerkannte Prüfanstalt für Kunststoffe GERMANY |
|  | Center SEPRO Heating System<br>Ukraine Standard Institute Approval            |   | Russian Standard Institute Approval   |
|  | Australian Standard Institute (incl. Gas & drinking water approval)           |   | NSF INTERNATIONAL<br>America Standard Food Approval<br>Drinking Water                     |
|   |   |   | South Africa Standard Institute Approvals   |

**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.**

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

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

P = Maximum working pressure (kg/cm<sup>2</sup>)

σ = Long term strength at the design temperature (kg/cm<sup>2</sup>)

D = Outside diameter (mm)

t = Wall thickness (mm)

S = ISO 4065 series

SDR (Standard Dimensions Ratio) =  $\frac{D}{t} = 2s + 1$



Pressure testing:

All pipes undergo strict quality pressure testing

**Table No 3.1: The values of σ change with the temperature as follows:**

| Temp. (°C) | σ (kg/cm <sup>2</sup> ) |
|------------|-------------------------|
| 10         | 85                      |
| 20         | 76                      |
| 30         | 66.5                    |
| 40         | 59                      |
| 50         | 52.5                    |
| 60         | 48                      |
| 70         | 42.5                    |
| 80         | 37.5                    |
| 90         | 33.5                    |
| 95         | 32                      |
| 110        | 18.75                   |

Notes:

The design stress σ is calculated with a safety factor of 1.25. The stress values and the working pressures in the following table were calculated according to DIN 16893-2000.

These values are relevant for water.

### Allowable working pressures

The working temperatures in Table 4&5 are the fluid temperature.

In case of chemicals and corrosive agents, the working pressures might have to be derated according to the data in the chemical resistance tables.

*Please consult us!*

**Table No 3.2: Allowable working pressures (bar) for conveying water in PEXGOL pipes, with a safety factor C = 1,25**  
(see full table - in supplements, page 91)

| Temperature in °C | Years of service | Class 10                       | Class 12 | Class 15 | Class 19 | Class 24 | Class 30 |
|-------------------|------------------|--------------------------------|----------|----------|----------|----------|----------|
|                   |                  | Pipe series (S)                |          |          |          |          |          |
|                   |                  | 7.6                            | 6.3      | 5        | 4        | 3.2      | 2.5      |
|                   |                  | Standard dimension ratio (SDR) |          |          |          |          |          |
|                   |                  | 16.2                           | 13.6     | 11       | 9        | 7.4      | 6        |
| 10                | 100              | 11.20                          | 13.50    | 17.00    | 21.40    | 26.90    | 33.89    |
| 20                | 100              | 9.90                           | 11.90    | 15.00    | 18.90    | 23.80    | 29.99    |
| 30                | 100              | 8.80                           | 10.60    | 13.30    | 16.80    | 21.10    | 26.59    |
| 40                | 100              | 7.80                           | 9.40     | 11.80    | 14.90    | 18.70    | 23.56    |
| 50                | 100              | 7.00                           | 8.30     | 10.50    | 13.20    | 16.70    | 21.04    |
| 60                | 50               | 6.30                           | 7.50     | 9.50     | 11.90    | 15.00    | 18.90    |
| 70                | 50               | 5.60                           | 6.70     | 8.50     | 10.70    | 13.40    | 16.88    |
| 80                | 50               | 5.10                           | 6.10     | 7.50     | 9.50     | 12.00    | 15.12    |
| 90                | 50               | 4.50                           | 5.40     | 6.80     | 8.60     | 10.90    | 13.73    |
| 95                | 50               | 4.10                           | 4.90     | 6.40     | 8.10     | 10.30    | 12.98    |
| 110               | 50               | 2.40                           | 2.90     | 3.80     | 4.70     | 5.90     | 7.43     |



**Table No 4.1: PEXGOL PIPE CLASS "10" (SDR 16.2 S7.6)**  
Working pressures: 10 bar at 20°C, 4 bar at 95°C, 6 bar for gas

| Cat No         | O.D. (mm) | Wall thickness (mm) | I.D. (mm) | Weight (kg/m) |
|----------------|-----------|---------------------|-----------|---------------|
| 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-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         |

All pipe dimensions, including pipes with larger wall thickness, can be supplied by special order.

**Table No 4.2: PEXGOL PIPE CLASS "12" (SDR 13.6 S6.3)**  
Working pressures: 12 bar at 20°C, 5 bar at 95°C, 7.5 bar for gas

| Cat No         | 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-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         |

**Table No 4.3: PEXGOL PIPE CLASS "15" (SDR 11 S5)**  
Working pressures: 15 bar at 20°C, 6 bar at 95°C, 9 bar for gas

| Cat No         | 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-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-45050 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        |

All pipe dimensions, including pipes with thicker wall measurements, can be supplied by special order.

**Table No 4.4: PEXGOL PIPE CLASS "19" (SDR 9 S4)**

Working pressures: 19 bar at 20°C, 9.5 bar at 95°C, 11.5 bar for gas

| Cat No         | .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-20022.4 BLK | 200       | 22.4                | 155.2     | 12.40         |
| PA-22525.0 BLK | 225       | 25.0                | 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         |

**Table No 4.6: PEXGOL PIPE CLASS "30" (SDR 6 S2.5)**

Working pressures: 30 bar at 20°C, 12.5bar at 95°C, 19 bar for gas

| Cat No          | 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-16026.6BLK   | 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         |

**Table No 4.5: PEXGOL PIPE CLASS "24" (SDR 7.4 S3.2)**

Working pressures: 24 bar at 20°C, 10 bar at 95°C, 15 bar for gas

| Cat No         | 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-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-71097.3 BLK | 710       | 97.3                | 515       | 185.4         |

All pipe dimensions, including pipes with thicker wall measurements, can be supplied by special order.



## Transportation of PEXGOL pipes

An outstanding feature of the PEXGOL pipe is flexibility, which enables the pipe to return to its original diameter after transportation on relatively small drums or in coils. As a result, we are able to supply longer lengths of pipe, compared to other types.

### Coils

From diameter 25 mm to 160 mm, PEXGOL pipes are available in standard coils of 50m or 100 meters.

Longer pipe lengths are available in coils according to customer's specifications.

### Straight sections

PEXGOL pipes in larger diameters up to 630 mm with plain ends can be ordered in a maximum length of 11.8m (to fit into standard 40ft containers).

### Pipes with Flared Ends

Pipes with a diameter of up to 160 mm with one or two flared ends are available in coils in lengths according to the table. PEXGOL pipes in larger diameters up to 630 mm with or without flared ends can be ordered in a maximum length of 11.8m (to fit into standard 40ft containers).

**See coiling options and drums&straight sections tables in Supplements.**

## Comparison with other plastic pipes

PEXGOL pipes are produced from a special type of polyethylene. This is a high density polyethylene (HDPE) with a very high molecular weight. During production the raw material is extruded under high pressures and temperatures in the presence of a special catalyst. While the pipes are being extruded the material crosslinks, resulting in an unbreakable (chemical) cross-connection between the adjacent long molecules of the polyethylene. As a result of the crosslinking, a 3-dimensional network is formed and the pipe is considered as one enormous molecule.

The combination of a special raw material of very high molecular weight and the crosslinking process result in a special pipe having several important qualities:

- Corrosion resistance
- Excellent mechanical resistance
- Unique chemical resistance
- Very low friction coefficient-  
C=155 in Hazen-Williams Formula
- Excellent abrasion resistance
- Very good resistance to heat
- Excellent longevity
- No longitudinal crack formation or other stress cracks
- Low creep
- No stone sediments due to pipe smoothness

**These properties provide important advantages compared to normal pipes which are not crosslinked:**

1. High working pressures.
2. High working temperature - up to 110°C and above.
3. Excellent durability in harsh corrosive conditions:
  - Industrial pipelines
  - Slurry lines
  - Tailing lines
  - Dewatering lines
  - Corrosive ground
4. Immunity against improper pipe laying procedures
5. Low head losses enabling considerable savings in cost

Regular polyethylene pipes are limited to a working temperature of up to 40°C according to ISO Standard 4427. They are also very sensitive to scratches resulting from careless handling during transportation and laying of the pipes. In non-crosslinked pipes (such as PE, PP or PB), cracks may appear after a few years.

These stress cracks occur as a result of the internal pressure or external stresses such as pipe bending or stone impregnations as a result of poor sand bedding. This phenomenon is also known as slow crack growth (SCG). The sensitivity to stress cracking is a material property, common for non-crosslinked pipe materials. SCG does not appear in crosslinked PE pipes due to the 3-dimensional crosslinked structure of PEXGOL pipes, which totally blocks the growth of these cracks. The excellent resistance of PEXGOL pipes to SCG makes it an ideal choice for industrial piping, gas transportation, chemical and regular sewage transportation. Because of this high-level resistance, it is possible to lay PEXGOL pipes in trenches without sand bedding!

## Industrial applications

The PEXGOL pipes with their excellent abrasion resistance to chemical and abrasions are ideal conduit for a wide range of industrial applications where conventional pipes would be unsatisfactory due to the abrasiveness of conveying slurries or because of vulnerability to chemical damage by solutions and acids - PEXGOL pipes present a successful and cost-effective solution.

The industrial applications of PEXGOL pipes include transporting:

- Slurries (gypsum; sand; salt; phosphates; silts; potash, and more.
- Various chemicals.
- Industrial wastes.

A list of projects is available from our sales department or on our website [www.pexgol.com](http://www.pexgol.com)

## PEXGOL pipe & fittings for process pipeline

### 1. Pipe class Selection according to:

- 1.1 Design temperature.
- 1.2 Working pressures –according to the required flow rates and specific gravity of the fluid
- 1.3 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 us
  - 1.5 for Air supply lines

### 2. Design temperature definition rules:

- 2.1 Buried pipes: according to the temperature of the liquid flowing through the pipe.
- 2.2 Exposed pipes: Design temperature should be calculated by adding 20°C to the maximum ambient temperature (e.g. a design temperature of 60°C for max. ambient temperature of 40°C).
- 2.3 Alternatively according to the temperature of the liquid flowing through the pipe (if it is higher than 60°C).

### 3. Pipes under vacuum conditions:

Minimum pipe class: class 15.

### 4. Selection of fittings for PEXGOL Pipes

- 4.1 Only fittings approved by PEXGOL pipes Service Dept. may be used.
- 4.2 The installation instructions published by PEXGOL pipes Service Dept. state service limitations (if existing) for each type of fitting.
- 4.3 Special fixpoint clamps should be used as before and after the fittings.
- 4.4 For questions, please contact PEXGOL Pipes Service Department.

### 5. PEXGOL Pipes with flared ends

- 5.1 PEXGOL pipes up to 160 mm, in lengths according to the table "PEXGOL pipes in coils", can be ordered with flared end and metal flanges.
- 5.2 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.
- 5.3 Flared ends can connect two PEXGOL pipes or a PEXGOL pipe to a fitting.
- 5.4 There is no need for an additional gasket.
- 5.5 The flanges are supplied according to the industrial standard ASA 150. Other flanges are available on special orders.
- 5.6 A flared end connection is used throughout the range of allowable working temperatures and pressures.
- 5.7 Prefabricated PEXGOL elbows with flared ends are also available.
- 5.8 Special fixpoint clamps should be used before and after the flared ends.

### 6. Pre-fabricated PEXGOL Elbows

- 6.1 Order prefabricated elbows with diameters up to 630 mm of 630 mm.
- 6.2 The standard bending radius is approximately  $R = 3D$  OR  $R = 1.5D$  for 45° or 90° elbows.
- 6.3 Order elbows with plain ends, for either flanged couplings or electrofusion fittings.
- 6.4 Order elbows with flared ends.
- 6.5 A flared end connection can be used throughout the range of allowable working temperatures and pressures.
- 6.6 Special fixpoint clamps should be used before and after the flared ends.

### 7. PEXGOL Spigot Reducers

- 7.1 PEXGOL Spigot reducers of all sizes can be ordered on request (see the product page for more details).
- 7.2 The Spigot reducers are supplied with flared ends with or without flanges.
- 7.3 Special Fixpoint clamps should be used before and after the flared ends.

### 8. PEXGOL spacers

- 8.1 PEXGOL spacers of all sizes can be ordered upon request (see the product page for more details).
- 8.2 The spacers are supplied with flared ends with or without flanges.
- 8.3 Special Fixpoint clamps should be used before and after the flared ends.

### 9. PEXGOL instrument tees

- 9.1 PEXGOL instrument tees of all sizes can be ordered upon request (see the product page for more details).
- 9.2 The Inlet is made of metal (stainless steel or other corrosive resistant metal can be specified).

### 10. PEX lined steel fittings

- 10.1 PEX lined steel fittings offer a complementary solution in the following cases:
  - 10.1.1 There is a need for a fitting which is not available as an all-PEXGOL fitting.
  - 10.1.2 The all-PEXGOL fitting is too long.
  - 10.1.3 A special shape is required.
- 10.2 The PEX lined steel fittings are supplied practically in any size and shape (see the product page for more details).
- 10.3 All the PEX-lined steel fittings can be connected to the flared ends of the PEXGOL pipes without an additional gasket.
- 10.4 All the PEX-lined steel fittings should be fully supported when installed on pipe bridges.

### 11. Pex2Pex electrofusion couplers

- 11.1 Pex2Pex electrofusion couplers can be used for the same pressure rating as PEXGOL pipes SDR 11.

### 12. Special high temperature electrofusion couplers

- 12.1 Special high temperature electrofusion couplers of all sizes can be specified on request.

## 13. G.P Flanged Couplings

- 13.1 Available from 63 mm (with 2" flange) to 500 mm (with 20" flange).
- 13.2 All couplings comply with ASA 150 flange standard.
- 13.3 Flanged couplings may be used throughout all the range of allowable working temperatures and pressures for PEXGOL Pipes.
- 13.4 Special fixpoint clamps should be used before and after the fittings.

## 14. Stainless Steel Saddles

- 14.1 Available for PEXGOL Pipes from 110 mm up to 500 mm.
- 14.2 Flanged or threaded outlets (internal thread).
- 14.3 Maximum outlet diameter - up to half of the pipe's outside diameter.
- 14.4 In case of corrosive liquids for which stainless steel is not resistant, the saddles may be ordered with a special rubber coating over the flange and neck.
- 14.5 Stainless steel saddles may be used throughout all the range of allowable working temperatures and pressures for PEXGOL pipes.

## 15. Influence of Temperature changes on PEXGOL Pipes

- 15.1 PEXGOL Pipes placed above the ground or over bridges tend to get longer when temperature rises (snaking phenomenon) and will get shorter as the temperature goes down.
- 15.2 Fixpoints or guiding clamps may be used for restraining the elongation of the pipe (mainly due to aesthetic considerations).
- 15.3 There is no need to protect the pipe itself against thermal stresses, as they are absorbed by the pipe.
- 15.4 No need for installation of "expansion points" or omegas.
- 15.5 Special fixpoint clamps should be used before and after the fittings.

## 16. PEXGOL pipes above the ground

- 16.1 PEXGOL pipes can be placed directly on ground that is free from rocks or sharp stones.
- 16.2 There is no need for special bedding!

### Designing guide lines

For each application, we ask you to fill out the application questionnaire and return it to us, so that we can decide which pipe class to use and recommend the complete solution (PEXGOL pipes & fittings) for your application. We aim to establish direct contact between our technical support and the client's designers.

For each pipeline section, the designers should design the following items and in the following order:

#### 1. PEXGOL elbows - See our PEXGOL natural Bending Radius in PEXGOL pipes.

Wherever possible use our straight pipes with a "natural bend". PEXGOL pipes come in straight sections in maximum length of 11.8 meters. They can come 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 choose the length of the two sections so that the electrofusion coupler is not in the exact location of the bend (See enclosed drawings).

There are objects in the line which are not straight pipes or elbows (meaning – Steel Tees, Laterals, etc.) they will be supplied in the same shape as common steel fittings but with a Pex lining.

You can choose Standard items from our Catalog.

However, if you see later that you need to make a non-standard item with a slightly longer or shorter legs, you can do so and ask us for approval.

These items must always come with flanges at all ends.

The standard items come with fixed flanges. For each end you can choose if the flange will be a fixed flange or a loose flange.

#### 2. Expansion joints & Omegas loops:

You do not need such an item in a PEXGOL system. If they exist – cancel them!

#### 3. Where do we need a flange?

3.1 We need a flange if we have a valve in the line.

3.2 We need a flange if we have a flanged object (for example - Tees , Laterals etc. ) in the line.

#### 4. If you cannot use the straight pipe sections with the "natural bend", use our 3XD or 1.5x D elbows.

4.1. Please note that our 1.5x D elbows are significantly longer than the Regular 1.5x D elbows.

4.1.1 Therefore please use the dimensions in our table "Prefabricated Elbows"

4.2 The 3XD elbows should be preferred to the 1.5 XD (if you can accommodate them) since they reduce head losses and abrasion rate.

4.3 If you cannot "install" the 3XD elbows in 45° or 90° degrees, try to "install" the 1.5 XD PEXGOL elbows.

4.4 You can specify other non-standard angles in special order.

4.5 If you do not have enough space for PEXGOL elbows, you can specify PEX-lined steel elbows.

#### 5. In addition to straight pipe sections and elbows ,the following items may be supplied from a PEXGOL material: Concentric or Eccentric Reducers and Instrumentation Tees. However, they should be discussed in details regarding the length, etc.

5.1 Alternatively they may be supplied a steel-lined items.

#### 6. The influence of temperature changes on pipeline length:

6.1 The length of PEXGOL pipes can increase by 0.3% for a temperature increase of 20°C.

6.2 This means 3 mm for every 1 meter.

6.3 This means that if you want to install a straight PEXGOL pipe section between two steel flanges, you have to specify the length of the PEXGOL pipe section shorter by few mm than the length between two steel flanges (so that you can install it easily) and take advantage of the thermal expansion of the PEXGOL pipe.

#### 7. "Field welding":

7.1 Please also allow "Field welding" in order to compensate the deviation of the actual length of the pipe during the installation from the designed length. In most cases these "Field welds" will be done with Electrofusion Couplers so you do not have to provide other means.

7.2 If you are using only mechanical connectors, you should design some of them so that the final pipe length can be shortened on site.

#### 8. Fixpoints

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

8.2 The designers should make themselves well acquainted with our engineering guide.

## 9. Specifying the length of the PEXGOL straight sections and elbows as separate items :

- 9.1 This will be done after all the design has been completed and approved by the designers and by Golan.
- 9.2 It is a good practice to specify a longer section in order to allow for the measuring inaccuracies and other sources of mistakes.

Please note that you can use the field welds to compensate.

### **Lifetime calculations for Slurry pipeline**

PEXGOL is a very resistant material for abrasion. However, we usually do not have information regarding the expected annual abrasion rate YR (expressed in mm per year) and this value can be obtained usually by an appropriate testing facility who deals with slurry transportation.

#### **Please note:**

During the N years of service the stand-alone PEXGOL pipe is anticipated to lose up to 30% from the wall thickness due to abrasion .

The liner is anticipated to lose all the wall thickness.

## 1. The following information is needed for the calculation:

- 1.1 The expected annual abrasion rate YR
- 1.2 The critical velocity: The critical velocity VC has to be determined, usually also by an appropriate testing facility (probably the same one).
- 1.3 The required flow rate Q to be run through the pipe.
- 1.4 The designed lifetime N (expressed in years) of the pipeline.

## 2. Calculations

- 2.1 Calculate the pipe's ID according to the flow rate Q and the critical velocity VC. The pipe's ID is actually the Maximum allowable ID in the pipe after N years of service with the influence of abrasion.
- 2.2 Calculate IN-ID (the initial ID of the pipe) according to:  $IN-ID = ID - 2 \times N \times YR$
- 2.3 Calculate the inlet pressure in the line based on the ID
- 2.4 For a stand-alone PEXGOL pipe, calculate the OD of the pipe taking into account the relevant working temperature of the pipeline.
- 2.5 Calculate the upstream parts of the line which can be designed with the same ID and a smaller OD in order to make a cost effective design with a reduced working pressure.



Chart 9.1: Class 10 (SDR 16.2)

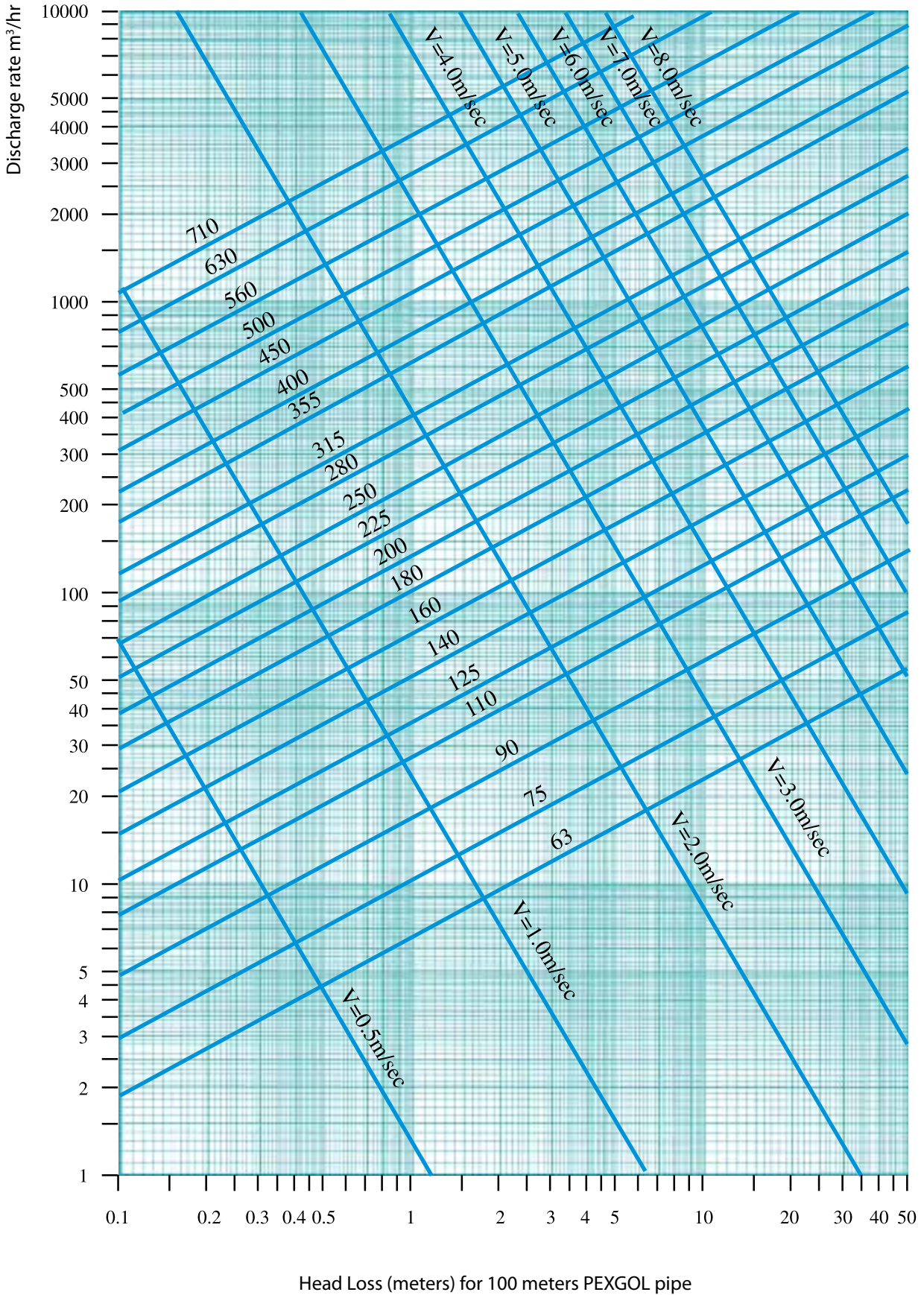




Chart 9.2: Class 12 (SDR 13.6)

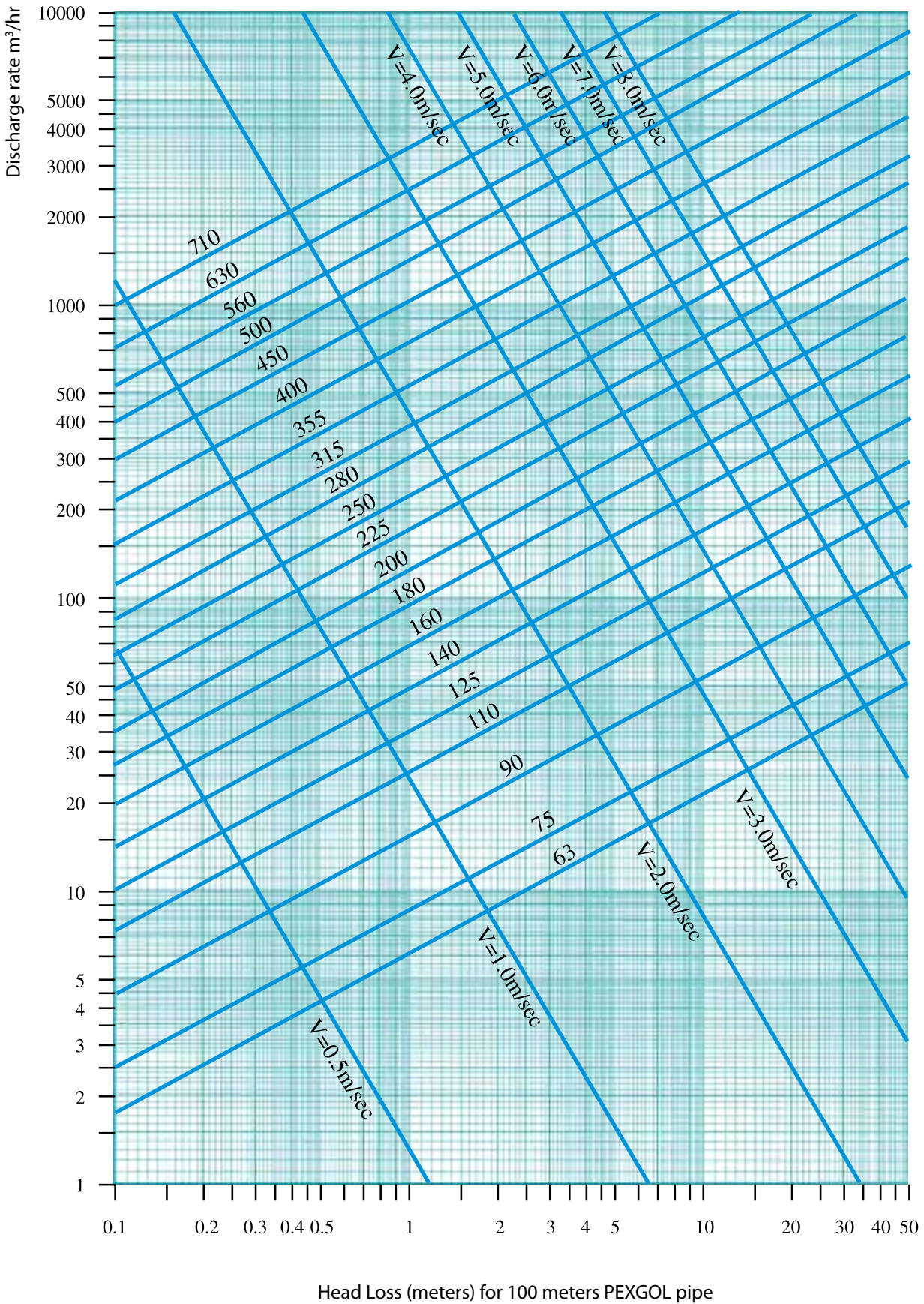




Chart 9.3: Class 15 (SDR 11)

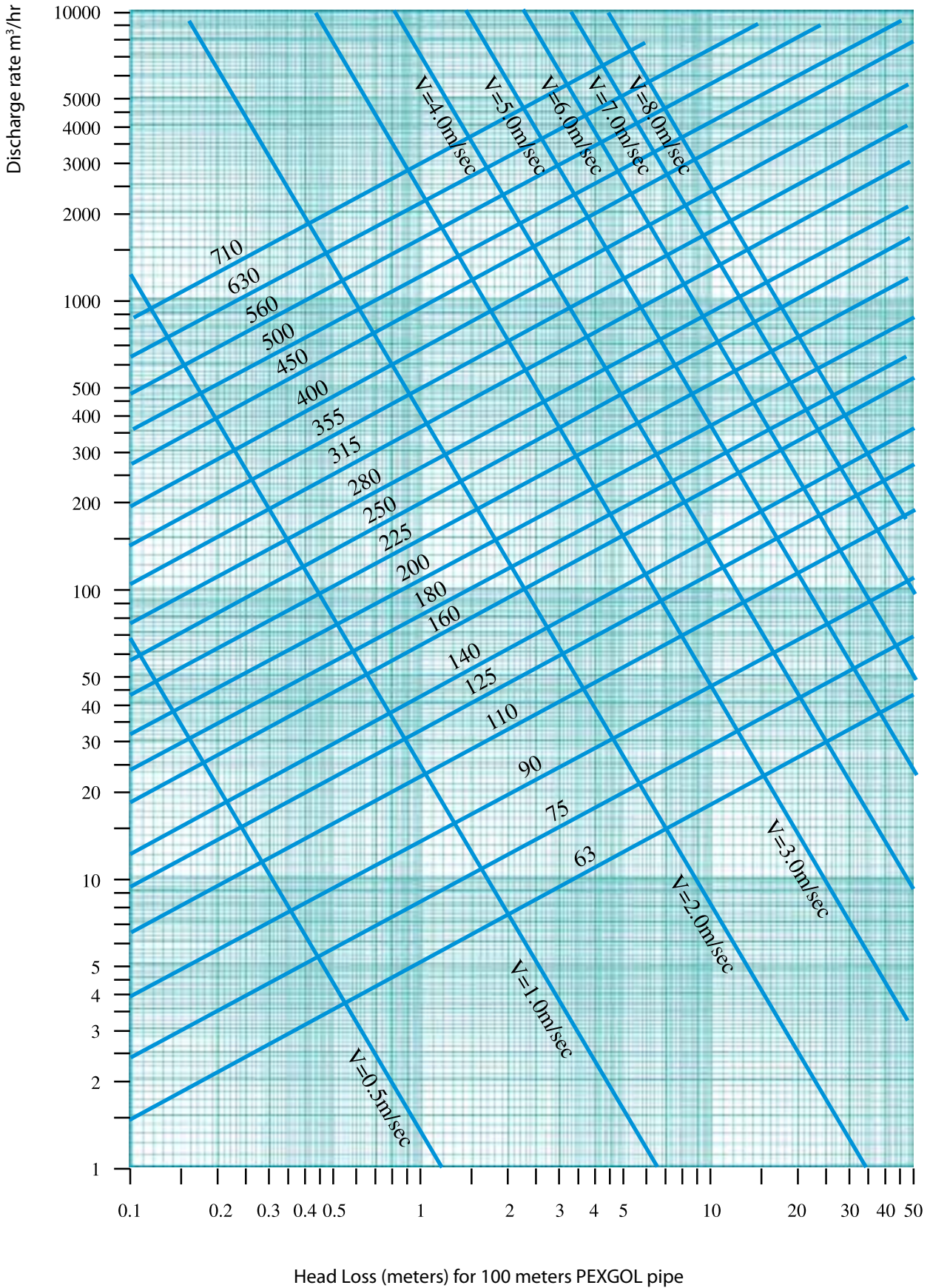




Chart 9.4: Class 19 (SDR 9)

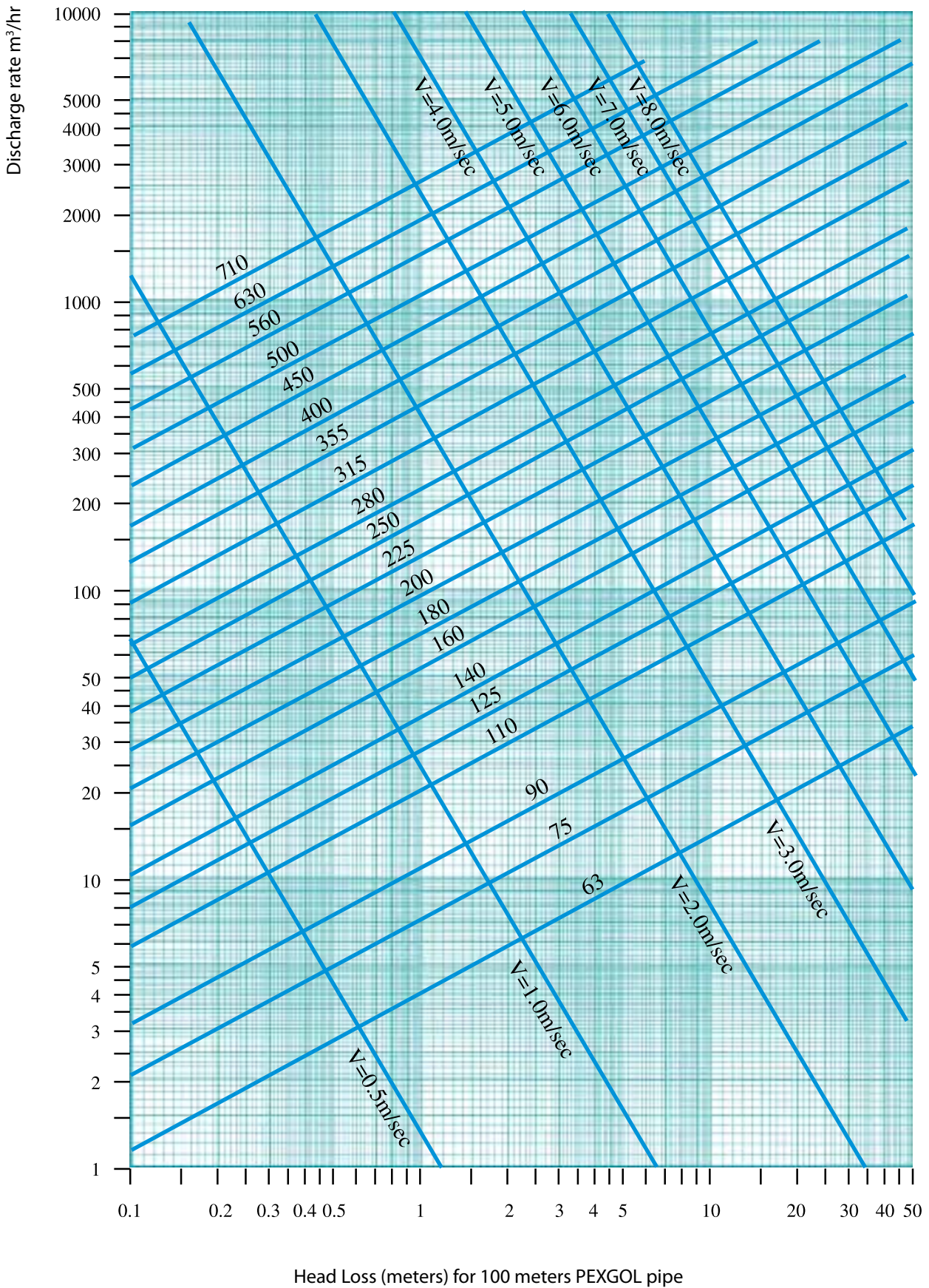




Chart 9.5: Class 24 (SDR 7.4)

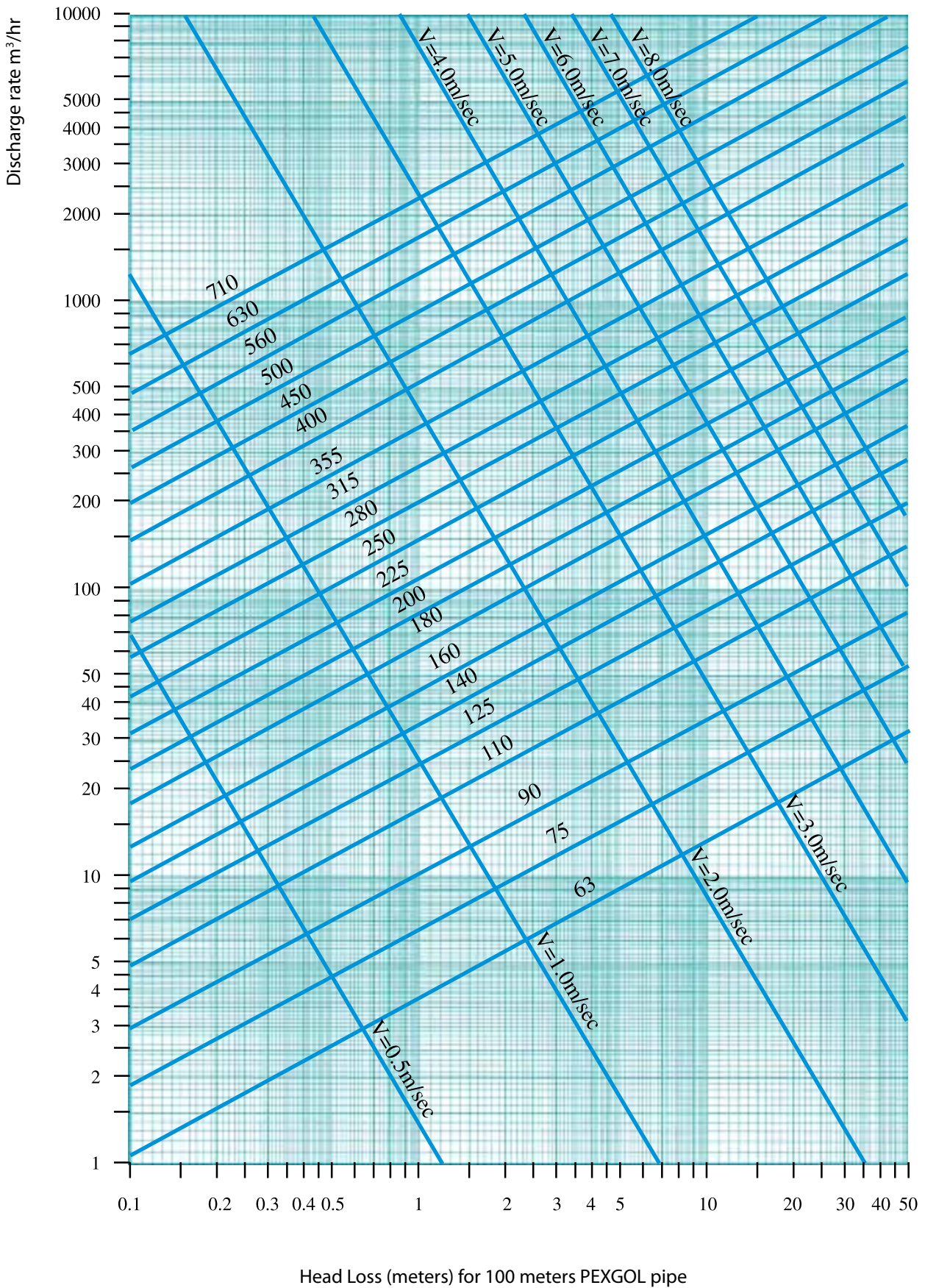




Chart 9.6: Class 24 (SDR 7.4) and Class 15 (SDR 11)

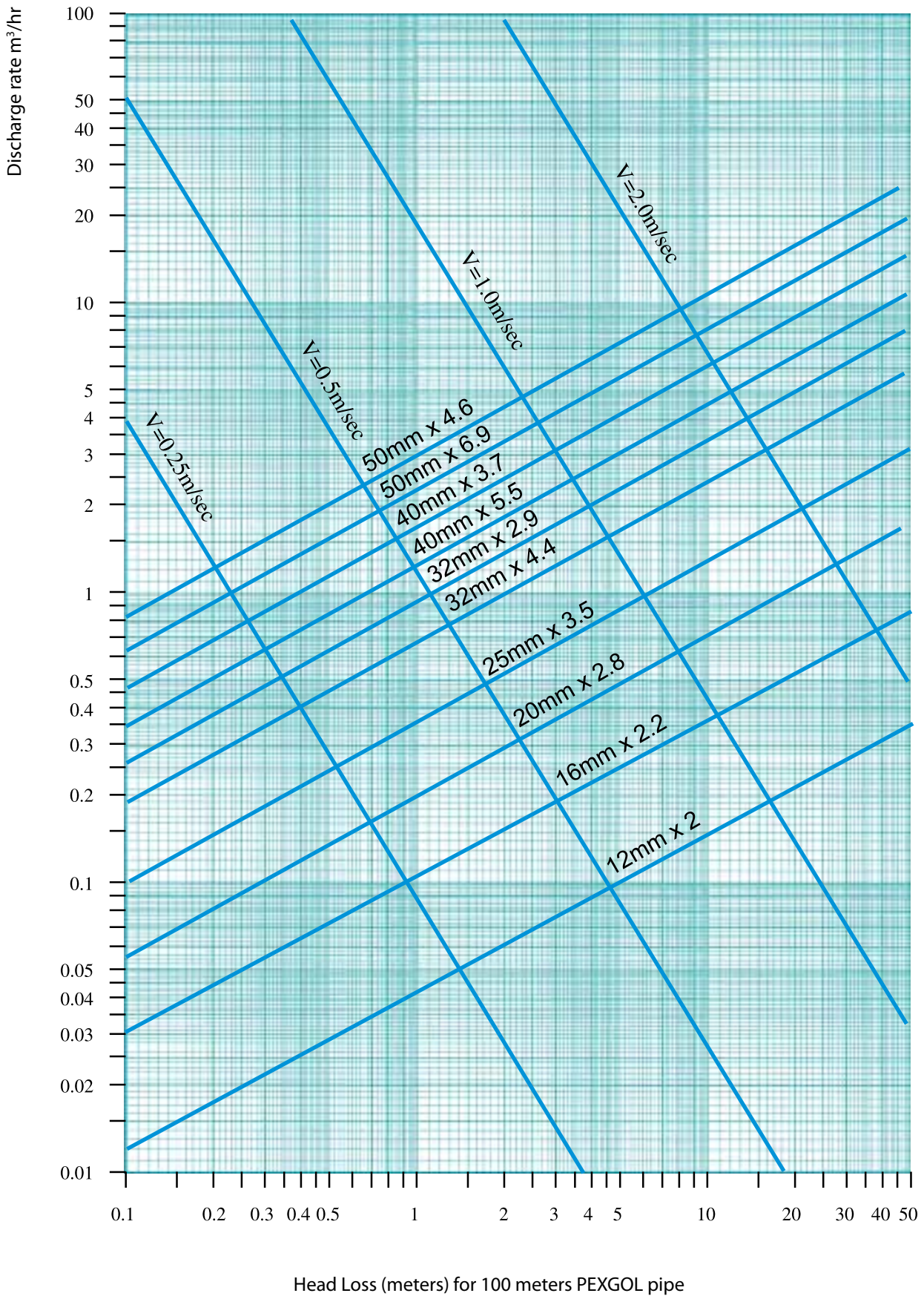
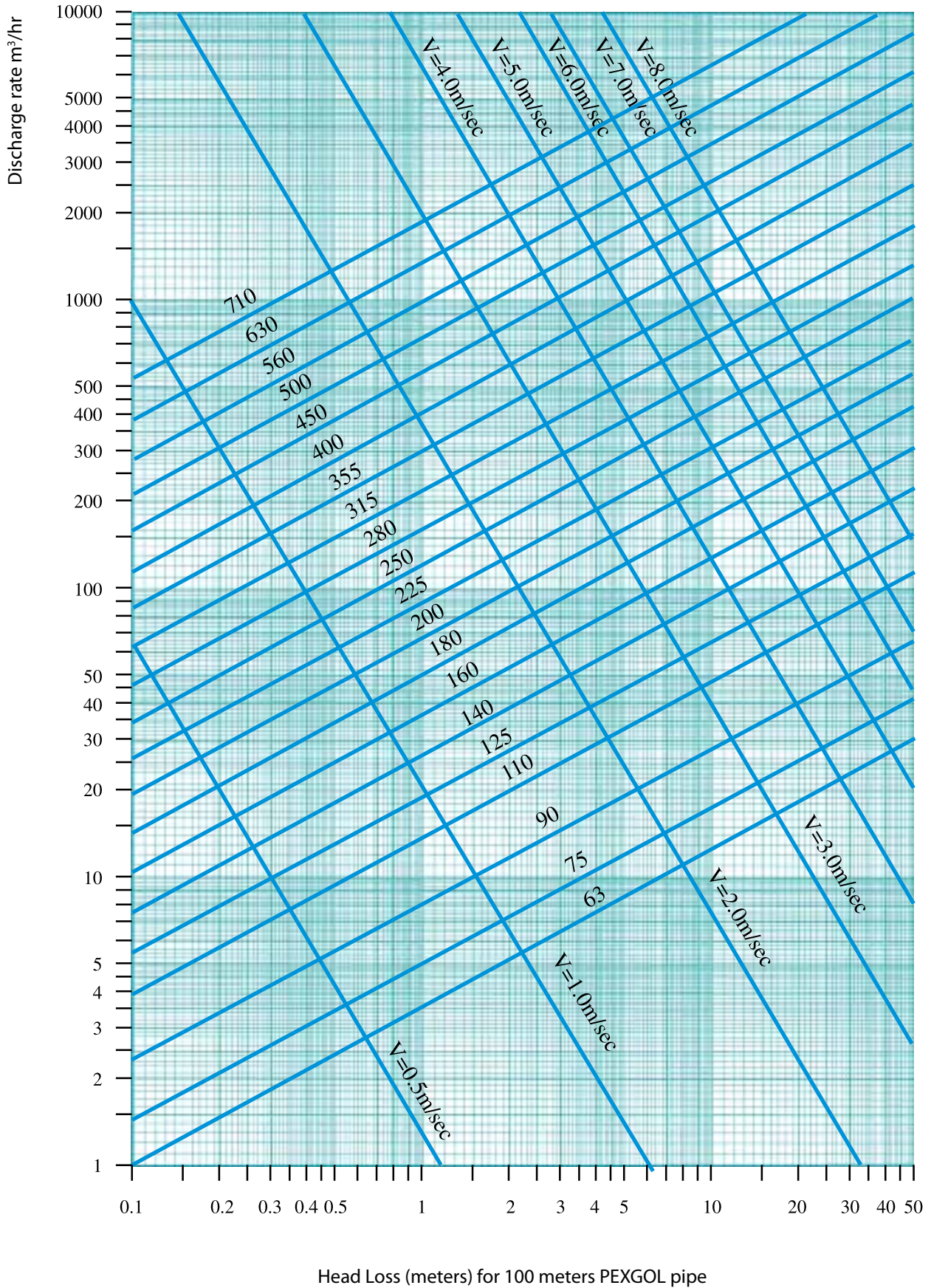




Chart 9.7: Class 30 (SDR 6)





## **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  $C=155$

## **Reduction factors for higher temperatures**

The values of the Head losses in the charts are correct for 20 °C  
For different temperatures you can use 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 Dewatering pipelines or Boreholes**

PEXGOL pipes can be used as Riser pipes for Dewatering pipelines or Boreholes .

For energy-saving reasons we recommend choosing a PEXGOL pipe with Head losses which does not exceed  $J=5\%$  and preferably lower.

However, please note that designing these pipes is not straightforward due to the complex three-dimensional stress regime in these applications.

Golan's Technical Department will calculate the pipes for you upon receiving the filled-up Borehole questionnaire (see supplement on page 78)

## 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 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:

$$a = \frac{1440}{\sqrt{1 + 2.11 \times 10^8 \frac{D}{Ee}}}$$

where:

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

d = Inside diameter of pipe (m)

e = Thickness of pipe wall (m)

E = Modulus of elasticity of pipe material (kg/m<sup>2</sup>)

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

$$p = \frac{1000 \times aV}{g}$$

Where:

p = Surge pressure (kg/m<sup>2</sup>)

a = Velocity of pressure wave (m/sec)

V = Velocity of water stopped (m/sec)

g = Acceleration caused by gravity (9.81 m/sec<sup>2</sup>)

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 can surge to the range of 10%-20% of the surge caused by closure in a time equal to or less than 2L/a.

Because of the flexibility and resilience of PEXGOL pipes, the surge pressures caused by the water hammer are reduced. A PEXGOL pipe can withstand an occasional pressure (surge pressure + working pressure) up to 2.5 times the design pressure in the relevant temperature.

The value of E the modulus of elasticity of PEXGOL pipes is much lower than the value of E for steel pipes, concrete pipes or asbestos-cement pipes. Since the velocity of the pressure wave is related to -E, the velocity decreases as the value of E is lower.

The following examples show the pressure surges caused by the water hammer for various pipes. In all following examples, the velocity of water is 1.5 m/sec:

a) Steel pipe 6" dia. 4.76 mm wall thickness:

(E = 2.1 x 10<sup>10</sup> kg/m<sup>2</sup>)

$$a = \frac{1440}{\sqrt{1 + 2.11 \times 10^8 \times \frac{0.158}{2.1 \times 10^{10} \times 4.76 \times 10^{-3}}}} = 1416 \text{ m/sec}$$

$$P = \frac{1000 \times 1416 \times 1.5}{9.81} = 216513 \text{ kg/m}^2 = 21.65 \text{ kg/cm}^2$$

b) Asbestos Cement pipe 150 mm dia. class "24"

(E = 2.5 x 10<sup>9</sup> kg/m<sup>2</sup>)

$$a = \frac{1440}{\sqrt{1 + 2.11 \times 10^8 \times \frac{0.15}{2.5 \times 10^9 \times 15 \times 10^{-3}}}} = 1060 \text{ m/sec}$$

$$P = \frac{1000 \times 1060 \times 1.5}{9.81} = 16,2000 \text{ kg/m}^2 = 16.2 \text{ kg/cm}^2$$

c) PEXGOL pipe 160 mm dia. class "24"

(E = 0.9 x 10<sup>8</sup> kg/m<sup>2</sup> at 20°C)

$$a = \frac{1440}{\sqrt{1 + 2.11 \times 10^8 \times \frac{0.116}{0.9 \times 10^8 \times 21.9 \times 10^{-3}}}} = 393 \text{ m/sec}$$

$$P = \frac{1000 \times 393 \times 1.5}{9.81} = 60,090 \text{ kg/m}^2 = 6 \text{ kg/cm}^2$$

In this case, the maximum pressure caused by the water hammer in steel pipes is three times higher than the maximum pressure in PEXGOL pipes.

Table No. 10.1: **Surge pressures in PEXGOL pipes**

| Pipe Class | SDR  | a   | Surge pressure p |
|------------|------|-----|------------------|
| 10         | 16.2 | 246 | 3.7 bar          |
| 12         | 13.6 | 272 | 4.1 bar          |
| 15         | 11.0 | 306 | 4.6 bar          |
| 19         | 9.0  | 345 | 5.2 bar          |
| 24         | 7.4  | 389 | 5.8 bar          |
| 30         | 6.0  | 447 | 6.7 bar          |

V = 1.5 m/sec

## Vacuum / suction pipelines

Under-pressure (vacuum) can 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.

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 9 shows maximum rates of vacuum supported by PEXGOL pipes of different classes:

Maximum rates of vacuum values recommended for PEXGOL pipes laid above ground:

Table No. 11.1: **Service under full vacuum**

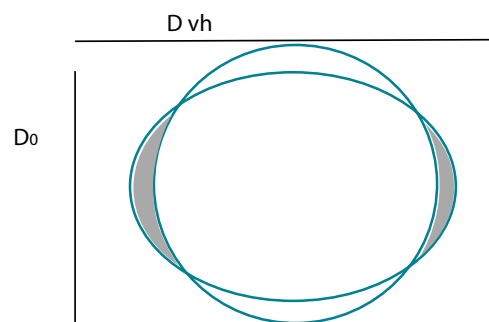
| Service Duration                  |        |         |       | Temp. | Pipe Rating          |
|-----------------------------------|--------|---------|-------|-------|----------------------|
| Year 50                           | Year 1 | Month 1 | Day 1 |       |                      |
| Tested for full vacuum conditions |        |         |       | 20°C  | Class 24<br>SDR 7    |
|                                   |        |         |       | 80°C  | Class 15<br>SDR 11   |
| 0.8                               | 0.9    |         |       | 20°C  | Class 12<br>SDR 13.6 |
| 0.8                               |        |         |       | 60°C  |                      |
| 0.6                               | 0.65   | 0.75    |       | 20°C  | Class 10<br>SDR 16.2 |
|                                   |        |         |       | 60°C  |                      |

## PEXGOL pipe class 10 is not recommended for use under full vacuum conditions.

If a PEXGOL pipe collapses it shows an oval deformation which increases progressively.

We emphasize that when a PEXGOL pipe collapses due to vacuum it can be returned to its original round shape by applying a brief internal pressure at high temperature. The following drawing shows a above-ground situation schematic of PEXGOL pipe under vacuum.

The pipes cross-section is slightly flattened because of the vacuum inside the pipe.



## PEXGOL pipe laying on the ground in a vacuum condition

### Above ground PEXGOL pipe under vacuum

When selecting PEXGOL pipes for vacuum conditions above the ground, it is recommended to use the following criterion: When  $D_vH/D_o$  is below 1.2, a PEXGOL pipe laid above ground is considered safe against vacuum failure.

### Underground PEXGOL Pipe

Vacuum, which is a negative pressure, 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 vacuum PEXGOL pipe 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, ensure 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.

### Abrasion resistance

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

Abrasion is the result of removal of material by flowing media from the inner surface of 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

Abrasion resistance is one of the most important characteristics of PEXGOL pipes.

PEXGOLs' excellent abrasion resistance is a 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 extraordinary 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.

PEXGOL pipes were installed at the Dead Sea Works instead of steel pipes, which had to be replaced every year. PEXGOL pipes have been at work since 1985, and it has not yet been necessary to replace them.

In South African gold mines, PEXGOL pipes were installed in backfillines, 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 1990. 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.

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

## Instructions for underground installation of PEXGOL pipes

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

Table No. 13.1: **Trench width**

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

The width can be increased to allow more comfortable work in the trench.

The minimum recommendation depth of the trench is 60cm (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 Bending radius in PEXGOL pipes, page 31.

## Sand bedding of the trench and backfilling

The unique properties of PEXGOL pipes allow considerable saving in costs related to sand bedding, compacting and backfilling:

**Excellent scratch resistance** – enables laying the pipes in trenches with no sand bedding; if sand bedding is required, the trench should be filled with sand 10 cm above the pipe.

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

**High ring stiffness** – no need to compact the soil to improve the pipe's pressure rating.

**Installation below a road or a pavement** with no need for a protective sleeve; in this case, use controlled compacting of the soil/ground, according to the designer's instructions, when covering the pipe to prevent the ground sinking.

In order to reduce energy losses it is recommended to insulate the pipe when underground PEXGOL pipes, for hot water transportation are buried underground.



## **Above ground Installation**

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

- If Slurry lines are frequently relocated.
- Installation through marshes or areas which are difficult to access.
- Quick installation of temporary pipe lines.

It is recommended that expansion and contraction, due to temperature variations, should be considered in the design and installation of PEXGOL pipes above the ground. The coefficient of expansion of PEXGOL pipes is high compared to steel pipes, but the forces generated by thermal stresses are much lower for PEXGOL pipes.

The reason for this is mainly 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 since 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**

PEXGOL pipes laid above the ground should be installed in a slightly curved configuration and not in a straight line to avoid thermal stresses, which helps prevent the pipe from pulling out of its fittings when the temperature drops and the pipe tends to contract.

## **Maintaining PEXGOL pipeline in a straight line**

If a straight pipeline is required, then anchoring 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 fixpoints, the smaller the theoretic increase in pipe length. As a result lateral deflections will decrease and the pipeline will be straight.

## **PEXGOL horizontally supported pipelines**

Horizontally supported pipes are subject to vertical deflections between supports due to the weight of the pipe and the transported materials, and also due to thermal deflection. Golan recommends minimizing the deflection in order to avoid high stress values inside the pipe wall. Choosing proper distance between supports helps to minimize thermal deflections.

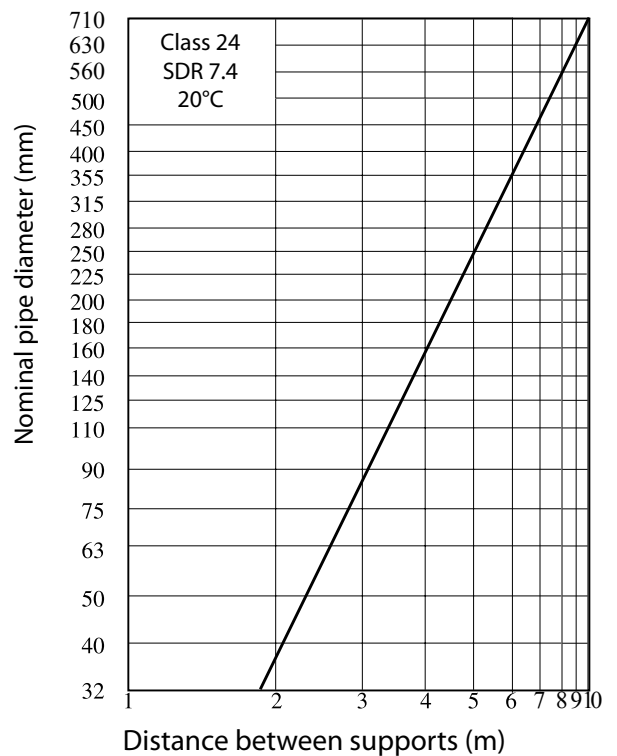
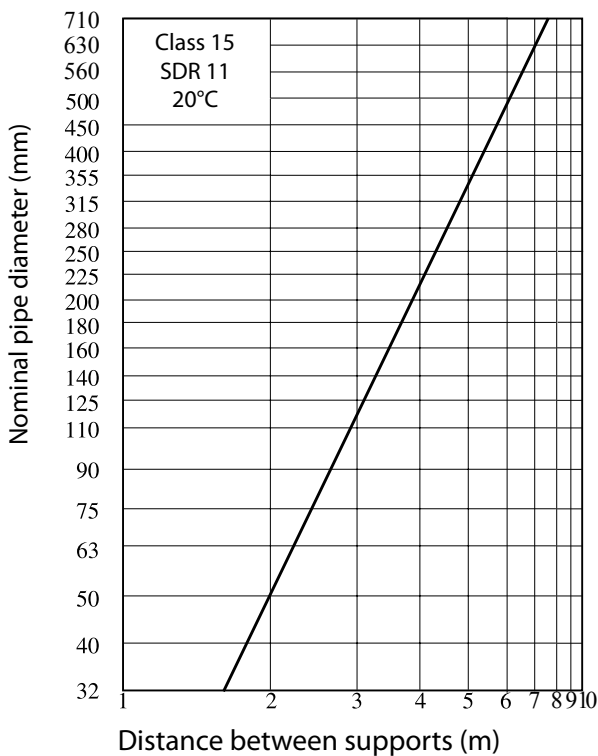
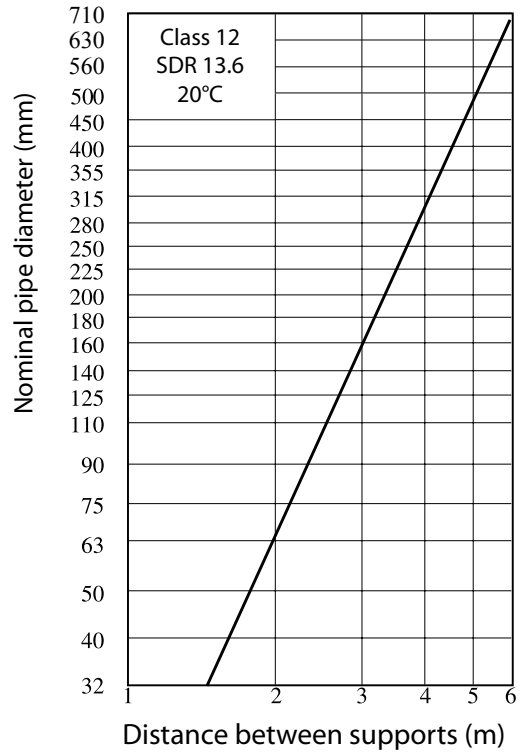
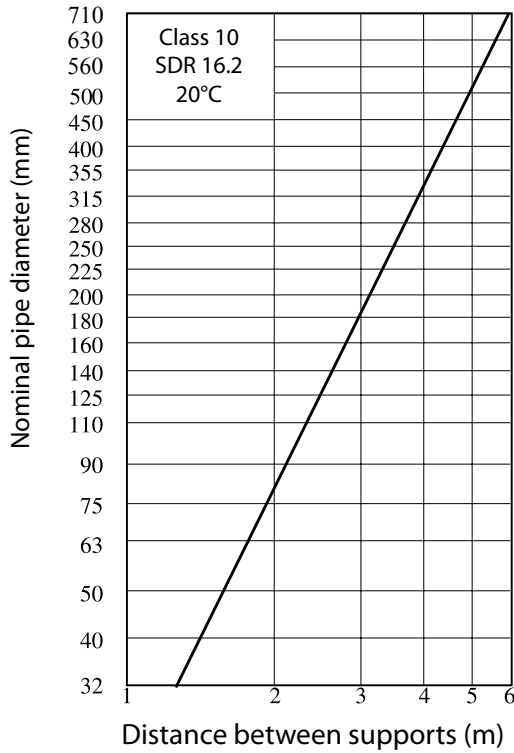
## Pipe supports

The following figures give the recommended distance between supports for various SDRs and pipe diameters, at 20°C.

For higher temperatures shorter distances are recommended and the values shown in the figures should be multiplied by the following values:

For 60°C : 0.91; For 80°C: 0.83.

Chart 17.1: **Class 24 (SDR 7.4) and Class 15 (SDR 11)**



### PEXGOL pipe behaviour 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 rising temperature the elastic modulus of the pipe decreases and so the developing stress is not high. When placing the 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 pipes 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

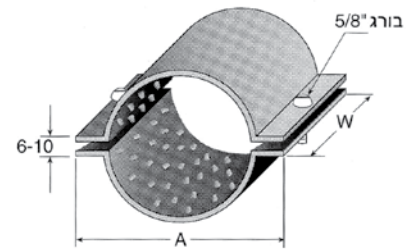
The distance between adjacent clamps may be calculated according to the following formula:  $L = 63.5 \times D$ , where L is the distance (in mm) between the clamps. D = outside pipe diameter (in mm). The formula was written taking into consideration the increase of ambient temperature from 20°C to 40°C, causing warming up of the pipe to 60°C because of its black color. The formula allows for a maximum sideward deflection of 50 mm between one Fixpoint and the other. In case the supports are not continuous, the calculated distance can be rounded off so that it will fit to the bridge. See "Horizontally Supported Pipelines".

### Fixpoint Clamps

If the pipe is to be fixed at a Fixpoint, then a Fixpoint Clamp (FPC) should be used. The FPC is made of steel with internal gripping teeth made of 316L stainless steel. The FPC is painted with a base paint that you can weld on. The lower part of the clamp can be welded to the bridge (before installing the pipe) or connected by screws. The distance between one adjacent pipe to the other is determined according to the width of the FPCs; (see table)

Table No. 18.1: Dimension Table of FIXPOINT Clamps

| Cat. No. | 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        |
| 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       |



### Max. force at the Fixpoint clamps

The max. force at the Fixpoint clamp depends on the pipe's O.D. and wall thickness.

The value of the force in kg can be calculated according to the following formula:

$$F = 24.5 \times W$$

where W is the weight of the pipe (kg/m) taken from tables 4.1-4.6 on pages 7-8.

### Side Deflection

Large side deflection might be expected large 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 Clamps for PEXGOL Pipes

The PEXGOL pipe's tendency to "snake" can be reduced by putting bars on both sides of the pipe in order 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 sideways.

### Protecting end couplings and other fittings

To ensure the pull-out resistance of curtain fittings, lay the pipe not perfectly straight, but 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 may be difficult to leave slack in the pipe), there should be a fixpoint before and after every fitting.

This applies to some of the fittings (see designing guide lines). It is not necessary to have fixpoints before and after electrofusion fittings.

If the pipe is installed in a vertical position and common fixpoint clamps cannot be used, the fitting should be protected by a fixpoint bridge. (See table no. 19.1).

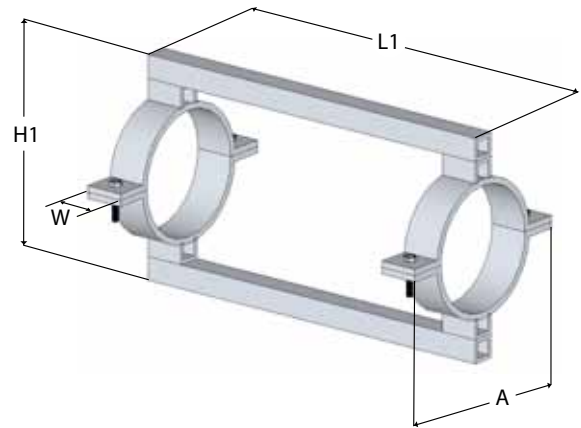


Table No. 19.1: Fixpoint bridge for PEXGOL pipes

| Cat. no. | Pipe Dia. (mm) | Clamp width W | Clamp size A | Bolt size | Total length L1 | Height H1 | Weight |
|----------|----------------|---------------|--------------|-----------|-----------------|-----------|--------|
| 301063   | 63             | 40            | 185          | " ½       | 260             | 290       | 6.14   |
| 301075   | 75             | 40            | 195          | " ½       | 270             | 300       | 6.32   |
| 301090   | 90             | 40            | 210          | " ½       | 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  |
| 301200   | 200            | 60            | 320          | "3/4      | 420             | 450       | 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  |

### Natural bending radius in PEXGOL pipes

In order to create turns with PEXGOL pipes laid inside trenches, above the ground or over pipe bridges, the pipe may be bent according to table 20.1.

This kind of pipeline design, which takes advantage of the natural flexibility of the pipe can reduce the number of connections and lower head losses.

### Designing of PEXGOL Pipes with "natural" bends

When designing such a line it is recommended to consult with our field service personal. Please keep in mind that for bending the pipe on site, suitable facilities are required and for inserting the pipe into the construction, enough space is required as well as a possibility to exert bending moments of the pipe.

Table 20.1 states the minimum recommended bending radii for PEXGOL pipe of class 10.

If possible, design with larger radii in order to facilitate pipe bending on site by decreasing the forces required for bending of the pipe.

### Bending the Pipes

The pipes should be bent by means of a suitable device, e.g. a winch or a lever. You should not forget that the pipe is quite rigid and considerable force is required for bending and fixing it.

For example: 2 tons for 110 pipe and 5 tons for 280 pipe. Please exercise caution!

Bending should be done carefully in order to avoid "knuckles". For best results it is recommended to prepare a continuous support for the pipe (having the radii of the pipe to be bent) and then to bend the pipe against it.

### 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 stated in table 20.1.

### "NATURAL" elbows on pipe bridges

The pipe should be fixed with Fixpoint clamps before and after each elbow.

For pipe diameters of 280 and higher, the elbow should be supported in the centre in addition to the two aforementioned Fixpoints.

For class 15 and class 24 pipes, smaller bending radii are possible.

For additional details please contact the PEXGOL Pipes Service Dept.

Table No. 20.1: Natural bending Radius

| Pipe OD | Natural bending Radius |
|---------|------------------------|
| 110     | 8D                     |
| 125     | 10D                    |
| 140     | 10D                    |
| 160     | 10D                    |
| 225     | 10D                    |
| 250     | 12D                    |
| 280     | 12D                    |
| 315     | 16D                    |
| 355     | 16D                    |
| 400     | 20D                    |
| 450     | 20D                    |
| 500     | 24D                    |
| 630     | 28D                    |

### Installing a Natural- bended PEXGOL pipes

When designing and installing Pexgol pipes in natural bends ,special care should be exercised in order to prevent excessive bending moments from being exerted upon the end-connectors due to forced installation. This is relevant for both mechanical and Electrofusion fittings.

The installation is complicated since it is difficult to calculate in advance the exact length of the pipe and therefore it is necessary to perform On-site adaptation (Field –weld).

The proper installation procedure is:

1. The longer arm of the Natural bend is more flexible than the shorter arm and therefore always choose it as the pipe-end whose length should be 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 you have to wait three (3x) cooling times before making the next step.
5. Make the adjustment of 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 you should perform the welding when the flared end is free (not connected to the counter-flange). You can connect the flared end & flange to the counter-flange only after three (3x) cooling times has passed.
  - 6.2 If the fitting is an Electrofusion fitting which connects the longer arm to another Pexgol or PE pipe ,you should install a Temporary Fixpoint bridge before the welding in order to protect the Electrofusion fitting during welding.
 

You can dismantle the Temporary Fixpoint bridge only after three (3x) cooling times has passed.

## Prefabricated Elbows

Prefabricated elbows are produced from PEXGOL pipes of all classes according to a proprietary process. Standard elbows are available in the following configurations and the corresponding Cat. Numbers:

- 90° R=3XD- Cat. No. 9119030
- 45° R=3XD- Cat. No. 9114530
- 90° R=1.5XD- Cat. No. 9119015
- 45° R=1.5XD- Cat. No. 9114515

PEXGOL with flared-ends can be ordered in any length between the minimum and maximum values listed in table 21.1, dim.A. Prefabricated elbows with plain-ends can be ordered in minimum lengths according to dim.B. Each 'leg' can be ordered with plain ends or with flared ends with or without flanges. The length of each 'leg' can be different.

To order the PEXGOL elbows see the order form on our website: [www.pexgol.com/support](http://www.pexgol.com/support)

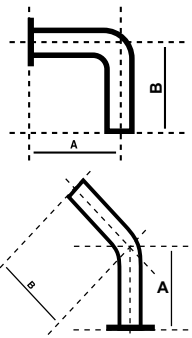
The weight of the elbow is calculated by adding the A or B values of the legs, dividing them by 1,000 (in order to get the total length of the elbow in meters) and then multiplying by the weight per meter of the pipe according to the pipe dimensions tables.

Table No. 21.1: **Dimensions of PEXGOL Elbows**

| Pipe OD (mm) | R=1.5D     |            |            |            |            |            | R=3D       |            |            |            |            |            |
|--------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
|              | 90° Elbow  |            | 45° Elbow  |            | 90° Elbow  |            | 45° Elbow  |            | 90° Elbow  |            | 45° Elbow  |            |
|              | dim.A (mm) | dim.B (mm) | dim.A (mm) | dim.B (mm) | dim.A (mm) | dim.B (mm) | dim.A (mm) | dim.B (mm) | dim.A (mm) | dim.B (mm) | dim.A (mm) | dim.B (mm) |
|              | Min        | Max        | Min        | Min        | Max        | Min        | Min        | Max        | Min        | Min        | Max        | Min        |
| 50           | 255        | 500        | 150        | 210        | 400        | 100        | 330        | 600        | 230        | 240        | 500        | 140        |
| 63           | 280        | 500        | 180        | 225        | 450        | 120        | 380        | 650        | 280        | 260        | 500        | 160        |
| 75           | 310        | 600        | 210        | 235        | 450        | 130        | 420        | 700        | 320        | 280        | 500        | 180        |
| 90           | 330        | 600        | 240        | 250        | 350        | 155        | 465        | 700        | 375        | 305        | 500        | 215        |
| 110          | 385        | 700        | 300        | 270        | 350        | 190        | 530        | 750        | 445        | 335        | 500        | 235        |
| 125          | 400        | 600        | 320        | 280        | 400        | 200        | 575        | 800        | 500        | 350        | 450        | 270        |
| 140          | 430        | 700        | 350        | 295        | 400        | 210        | 625        | 900        | 545        | 375        | 500        | 295        |
| 160          | 450        | 750        | 370        | 300        | 400        | 225        | 690        | 920        | 620        | 410        | 600        | 335        |
| 200          | 500        | 800        | 500        | 350        | 550        | 350        | 800        | 1100       | 800        | 450        | 620        | 450        |
| 225          | 600        | 800        | 600        | 400        | 600        | 400        | 900        | 1250       | 900        | 500        | 800        | 500        |
| 250          | 650        | 850        | 650        | 450        | 700        | 450        | 1000       | 1200       | 1000       | 550        | 800        | 550        |
| 280          | 750        | 950        | 750        | 480        | 700        | 480        | 1100       | 1330       | 1100       | 650        | 950        | 650        |
| 315          | 850        | 1000       | 850        | 550        | 800        | 550        | 1250       | 1500       | 1250       | 700        | 1100       | 700        |
| 355          | 1000       | 1200       | 1000       | 650        | 900        | 650        | 1400       | 1600       | 1400       | 800        | 1100       | 800        |
| 400          | 1080       | 1300       | 1080       | 700        | 1000       | 700        | 1600       | 1800       | 1600       | 900        | 1100       | 900        |
| 450          | 1200       | 1400       | 1200       | 800        | 1100       | 800        | 1900       | 1900       | 1900       | 1000       | 1150       | 1000       |
| 500          | 1350       | 1500       | 1350       | 850        | 1200       | 850        | 2000       | 2000       | 2000       | 1100       | 1100       | 1100       |
| 630          | 1650       | 1900       | 1650       | 1100       | 1300       | 1100       | 2400       | 2500       | 2400       | 1450       | 1700       | 1450       |

### Notes:

1. Length of Elbow includes also a straight section which makes connection to the elbow easier.
2. The dim.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 dim.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 may be specially ordered.
6. Elbows with angles which are not according to standard may be requested 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.

The loose flange is usually mounted over the pipe before the flaring process. Alternatively, split flanges that can be mounted later, can be supplied. Plastic coated flanges are available on request.

The pipes can be ordered in lengths according to customers specifications or in standard lengths that may fit into 20 or 40 ft containers.

For the minimum length (L) of PEXGOL stub-ends see table 22.1

To order the PEXGOL flared ends see the order form on our website: [www.pexgol.com/support](http://www.pexgol.com/support)

Table No.22.1: **Minimum length (L) for PEXGOL stub-end**

| PIPE DIA. | L   |
|-----------|-----|
| 32        | 85  |
| 40        | 85  |
| 50        | 104 |
| 63        | 120 |
| 75        | 130 |
| 90        | 140 |
| 110       | 160 |
| 125       | 182 |
| 140       | 180 |
| 160       | 180 |
| 180       | 198 |
| 200       | 200 |
| 225       | 200 |
| 250       | 215 |
| 280       | 228 |
| 315       | 238 |
| 355       | 255 |
| 400       | 285 |
| 450       | 320 |
| 500       | 350 |
| 560       | 380 |
| 630       | 400 |





## Connecting PEXGOL pipes with flared ends

When connecting two flared ends together or connecting a pipe with a flared end to a Flanged fitting, no gasket is needed! No retorquing is necessary in the flared ends of PEXGOL pipes!

The flared-end connection is suitable for both hot and cold media.

Special Fixpoint clamps should be used as before and after the flared ends, see table 18.1.

In case of sub zero temperatures, special care should be exercised to prevent pulling-out of the flared end from the flanges.

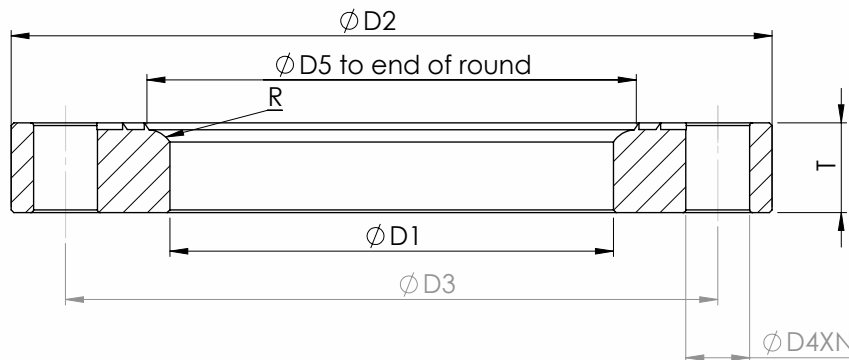


Table No.22.2: Dimensions of Flanges according to ASA 150

| Cat. No. | Pipe diameter (mm) | Flange dimension (inch) | Bolt circle diameter (mm) | O.D | Wall thickness | End of radius | Radius (mm) | Inside diameter (mm) | Bolt hole diameter | No. of bolts | bolt size (in) | Weight (kg) |
|----------|--------------------|-------------------------|---------------------------|-----|----------------|---------------|-------------|----------------------|--------------------|--------------|----------------|-------------|
|          |                    |                         | D3                        | D2  | T              | D5            | R           | D1                   | D4                 | N            |                |             |
| 64805015 | 50                 | 1.5                     | 98                        | 127 | 17             | 62            | 6           | 52                   | 16                 | 4            | 5/8            | 1.4         |
| 64806302 | 63                 | 2                       | 118                       | 152 | 19             | 77            | 7           | 65                   | 22                 | 4            | 5/8            | 2.3         |
| 64807525 | 75                 | 2.5                     | 140                       | 178 | 22             | 91            | 8           | 78                   | 19                 | 4            | 5/8            | 3.5         |
| 64809003 | 90                 | 3                       | 150                       | 190 | 24             | 106           | 8           | 93                   | 22                 | 4            | 5/8            | 4.1         |
| 64811004 | 110                | 4                       | 190                       | 228 | 24             | 130           | 10          | 116                  | 19                 | 8            | 5/8            | 5.8         |
| 64812505 | 125                | 5                       | 216                       | 254 | 24             | 145           | 10          | 131                  | 23.5               | 8            | 3/4            | 7.1         |
| 64814006 | 140                | 6                       | 240                       | 279 | 25             | 160           | 10          | 146                  | 23.5               | 8            | 3/4            | 8.9         |
| 64816006 | 160                | 6                       | 240                       | 279 | 25             | 180           | 10          | 167                  | 23.5               | 8            | 3/4            | 7.8         |
| 64820008 | 200                | 8                       | 297.5                     | 343 | 28             | 230           | 15          | 210                  | 23.5               | 8            | 3/4            | 12.9        |
| 64822508 | 225                | 8                       | 297.5                     | 343 | 28             | 255           | 15          | 236                  | 23.5               | 8            | 3/4            | 10.9        |
| 64825010 | 250                | 10                      | 362                       | 406 | 30             | 284           | 17          | 262                  | 25                 | 12           | 7/8            | 18.2        |
| 64828010 | 280                | 10                      | 362                       | 406 | 30             | 314           | 17          | 293                  | 25                 | 12           | 7/8            | 14.9        |
| 64831512 | 315                | 12                      | 432                       | 482 | 32             | 355           | 20          | 331                  | 25                 | 12           | 7/8            | 24.7        |
| 64835514 | 355                | 14                      | 475                       | 533 | 35             | 395           | 20          | 371                  | 30                 | 12           | 1              | 32.2        |
| 64840016 | 400                | 16                      | 540                       | 597 | 36             | 444           | 22          | 417                  | 30                 | 16           | 1              | 41.3        |
| 64845018 | 450                | 18                      | 577.6                     | 635 | 40             | 494           | 22          | 467                  | 32                 | 16           | 1 1/8          | 46.5        |
| 64850020 | 500                | 20                      | 635                       | 698 | 43             | 550           | 25          | 518                  | 32                 | 20           | 1 1/8          | 59.1        |
| 64863024 | 630                | 24                      | 749                       | 813 | 48             | 690           | 30          | 652                  | 35                 | 20           | 1 1/4          | 71.1        |

## PEXGOL short sections with 2 flared ends

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

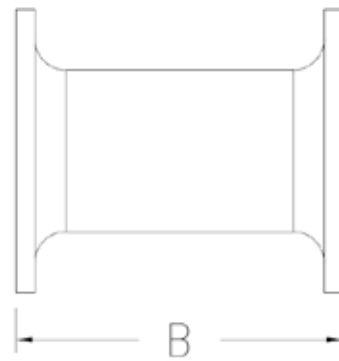
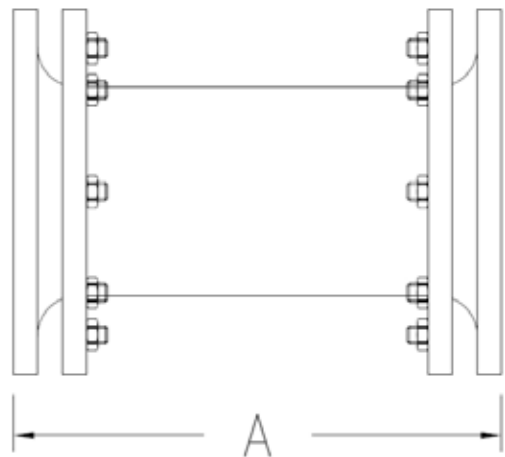
The A length is relevant for fitting which are supplied with regular flanges.

The shorter B length is applicable for fitting which are supplied with split flanges which that can be mounted after the fitting is produced.

To order the PEXGOL short sections see the order form on our website: [www.pexgol.com/support](http://www.pexgol.com/support)

Table No. 23.1: 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  |
| 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         | 440  | 350  |
| 630         | --   | 380  |



## Extra-thin PEXGOL spacers

PEXGOL spacers can be supplied in any width up to 50 mm.  
 Spacers without drilled holes are currently available for flanges up to 14".  
 Spacers with drilled holes are currently available for flanges up to 12".  
 Larger sizes for flanges up to 24" upon request.

To order the extra-thin PEXGOL spacers see the order form on our website: [www.pexgol.com/support](http://www.pexgol.com/support)



Cat No. 65900035

## PEXGOL spigot reducers

Table No.24 shows the dimensions of standard spigot reducers .

The sizes in the table are only a partial list and other sizes can be ordered on request.

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

To order the PEXGOL spigot reducers see the order form on our website: [www.peggol.com/support](http://www.peggol.com/support)

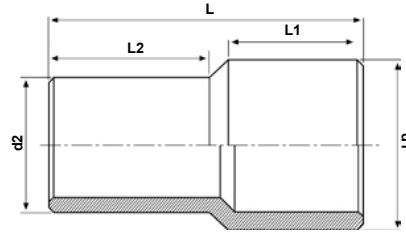


Table No. 24: **Dimensions of PEXGOL spigot reducers**

| Cat.No.    | Size d1 x d2 | Size L | Size L1 | Size L2 | Weight (kg) |          |          |
|------------|--------------|--------|---------|---------|-------------|----------|----------|
|            |              |        |         |         | Class 10    | Class 15 | Class 24 |
| RED75x63   | 75x63        | 208    | 102     | 93      | 0.21        | 0.30     | 0.43     |
| RED90x75   | 90x75        | 232    | 114     | 102     | 0.34        | 0.49     | 0.70     |
| RED90x63   | 90x63        | 236    | 114     | 93      | 0.35        | 0.49     | 0.71     |
| RED110x90  | 110x90       | 253    | 117     | 114     | 0.55        | 0.79     | 1.14     |
| RED110x75  | 110x75       | 257    | 117     | 102     | 0.56        | 0.80     | 1.16     |
| RED110x63  | 110x63       | 261    | 117     | 93      | 0.57        | 0.81     | 1.17     |
| RED125x110 | 125x110      | 260    | 127     | 117     | 0.73        | 1.04     | 1.48     |
| RED125x90  | 125x90       | 279    | 127     | 114     | 0.78        | 1.12     | 1.59     |
| RED140x125 | 140x125      | 275    | 132     | 127     | 0.98        | 1.38     | 1.98     |
| RED140x110 | 140x110      | 281    | 132     | 117     | 1.00        | 1.41     | 2.03     |
| RED160x140 | 160x140      | 286    | 132     | 132     | 1.32        | 1.88     | 2.68     |
| RED160x125 | 160x125      | 303    | 138     | 127     | 1.40        | 2.00     | 2.85     |
| RED160x110 | 160x110      | 309    | 138     | 117     | 1.43        | 2.04     | 2.90     |
| RED200x160 | 200x160      | 338    | 157     | 138     | 2.45        | 3.46     | 4.97     |
| RED200x110 | 200x110      | 371    | 157     | 117     | 2.68        | 3.80     | 5.46     |
| RED225x200 | 225x200      | 354    | 170     | 157     | 3.23        | 4.60     | 6.58     |
| RED225x160 | 225x160      | 378    | 170     | 138     | 3.45        | 4.92     | 7.03     |
| RED250x225 | 250x225      | 376    | 179     | 170     | 4.25        | 6.02     | 8.74     |
| RED250x200 | 250x200      | 390    | 179     | 157     | 4.41        | 6.24     | 9.07     |
| RED250x160 | 250x160      | 414    | 179     | 138     | 4.68        | 6.63     | 9.63     |
| RED280x250 | 280x250      | 405    | 194     | 179     | 5.72        | 8.15     | 15.57    |
| RED280x225 | 280x225      | 423    | 194     | 170     | 5.98        | 8.51     | 16.26    |
| RED315x280 | 315x280      | 437    | 205     | 194     | 7.82        | 11.14    | 18.87    |
| RED315x250 | 315x250      | 454    | 205     | 179     | 8.13        | 11.58    | 19.62    |
| RED355x315 | 355x315      | 472    | 224     | 205     | 10.70       | 15.25    | 23.00    |
| RED355x280 | 355x280      | 499    | 224     | 194     | 11.31       | 16.12    | 24.30    |
| RED400x355 | 400x355      | 522    | 249     | 224     | 15.02       | 21.44    | 28.58    |
| RED400x315 | 400x315      | 546    | 249     | 205     | 15.72       | 22.43    | 29.91    |
| RED450x400 | 450x400      | 578    | 275     | 249     | 21.10       | 30.17    | 36.76    |
| RED450x355 | 450x355      | 602    | 275     | 224     | 21.96       | 31.40    | 38.26    |
| RED500x450 | 500x450      | 631    | 302     | 275     | 28.40       | 40.70    | 43.22    |
| RED500x400 | 500x400      | 659    | 302     | 249     | 29.66       | 42.51    | 45.14    |
| RED630x500 | 630x500      | 782    | 340     | 302     | 55.94       | 79.49    | 67.52    |
| RED630x450 | 630x450      | 809    | 340     | 275     | 57.87       | 82.24    | 69.85    |

## **PEXGOL Spigot reducers with flared ends and Flanges**

PEXGOL Spigot 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.

## **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 construction materials.
- Adaptors for PEXGOL pipes with the same ID and different OD

To order the PEXGOL special reducers/adaptors see the order form on our website: [www.pexgol.com/support](http://www.pexgol.com/support)

## **PEXGOL instrument tees**

PEXGOL Instrument tees of all sizes can be ordered as custom-made items.

The inlet is made of metal stainless steel or other corrosive resistant metal can be specified on request.

The inlet is available as 3/4" or 1/2" female thread.

The inlet is available as 1", 3/4" or 1/2" male thread.

To order the PEXGOL instrument tees see the order form on our website: [www.pexgol.com/support](http://www.pexgol.com/support)



Cat No. 65900040



Cat No. 65900045

## PLASSON Pex2Pex Electrofusion Fittings

### Electrofusion fittings for high temperature working conditions:

In addition to the mechanical fittings, the PEXGOL system offers also a welding solution.

The 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.

### Special high temperature Electrofusion couplers:

When higher working pressures or pipe dimensions are needed, for which PLASSON Pex2Pex couplers are not available, Golan offers special high temperature electrofusion couplers. Please consult us.

### Electrofusion fittings for low temperature working conditions:

See PEXGOL Infrastructure manual.

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

Table No. 26.1: PLASSON Pex2Pex Coupler

| Cat. No.  | 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        |

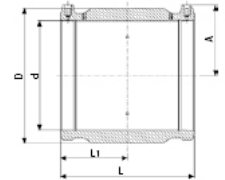


Table No. 26.2: PLASSON Pex2Pex 90° Elbow

| Cat. No.  | Pipe d | 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        |

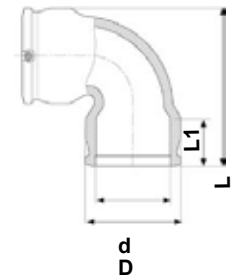


Table No. 26.3: PLASSON Pex2Pex tee's

| Cat. No.  | 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       |
| 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       |

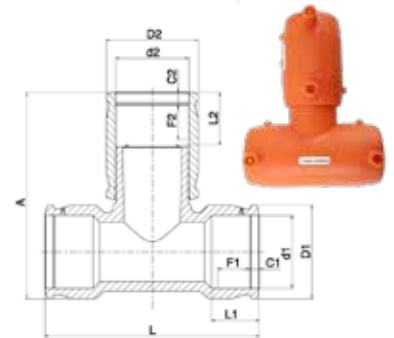
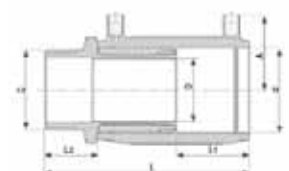


Table No. 26.4: PLASSON Pex2Pex Brass Connector

| Cat. No.     | 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         |



## Pex lined fittings



This specification covers materials, manufacturing, testing, inspection and packaging standards for standard and custom made Pex-lined fitting system.

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 (Tee, elbow, reducer etc. as ). Non-standard items can be specified as well ,subject to approval by Golan's technical department.

### Materials of construction

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

### Pex lining

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

The lining shall be made from virgin resin meeting the requirements of ASTM D1998-04.

When tested in accordance with ASTM D638, the minimum tensile strength shall be 23 N/mm<sup>2</sup> and the minimum elongation shall be 300%.

### Fittings

Fabricated fittings shall be manufactured from the materials stated above.

Cast fittings shall be 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 shall be forged steel to ASTM A105 N.

Slip on welding collars shall be 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 shall be 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 shall be visually examined and assessed in accordance with ASME B31.3 or relevant code.

### Dimensional standards

Flanged cast steel fittings shall be in accordance with ANSI B16.5 Class 150.

Flanged Ductile Iron fittings shall be in accordance with ANSI B16.42 Class 150.

Fabricated fittings shall be in accordance with the dimensions shown in Engiplas manual.

Pipe diameters and wall thicknesses shall be in accordance with the dimensions on tables 4.1-4.6 on pages 7-8.

Flanges for pipe and fittings shall be in accordance with ANSI B16.5 Class 150.

Flanges shall be slip on welding, socket welding or welding neck types.

Loose backing flanges shall be suitable for use with welding collars.

All relevant dimensions and tolerances shall be in accordance with ANSI B16.5 Class 150.

Threaded bolt holes are not permitted except for reducing flanges. Threaded bolt holes in reducing flanges shall be UNC unless specified otherwise.

Welding collars for use with loose backing flanges shall be slip on welding, socket welding or welding neck type.



The diameters and thicknesses shall be as given in dimension table 26.  
 The outside diameters shall be as given in dimension table 26.  
 The outside diameter of instrument tee bodies shall be the same as lined space  
 The lining on the faces of flanges shall have uniform thickness and shall not be less than 80% of the actual wall thickness.

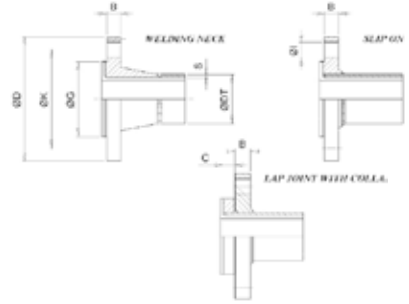


Table No. 27.1: **Dimension table**

| Nom    | DT    | D      | G     | I       | B    | C  | S    |
|--------|-------|--------|-------|---------|------|----|------|
| Size   | Mm    | mm     | mm    | n X i   | mm   | mm | mm   |
| 1"     | 33,5  | 108    | 50,8  | 4X15,7  | 14,2 | 12 | 3.38 |
| 1 1/4" | 42,2  | 117,3  | 63,5  | 4X15,7  | 15,7 | 12 | 3.56 |
| 1 1/2" | 48,3  | 127    | 73,2  | 4X19,1  | 17,5 | 12 | 3.68 |
| 2"     | 60,5  | 152,4  | 91,9  | 4X19,1  | 19,1 | 14 | 3.91 |
| 2 1/2" | 73,2  | 177,85 | 104,6 | 4X19,1  | 22,4 | 14 | 5.16 |
| 3"     | 88,9  | 190,5  | 127,0 | 4X19,1  | 23,9 | 16 | 5.49 |
| 3 1/2" | 101,6 | 215,9  | 139,7 | 8X19,1  | 23,9 | 16 | 5.74 |
| 4"     | 114,3 | 228,6  | 157,2 | 8X22,4  | 23,9 | 16 | 6.02 |
| 5"     | 141,3 | 254    | 185,7 | 8X22,4  | 23,9 | 18 | 6.55 |
| 6"     | 168,4 | 279,4  | 215,9 | 8X22,4  | 25,4 | 18 | 7.11 |
| 8"     | 219,2 | 342,9  | 269,7 | 8X22,4  | 28,4 | 20 | 8.18 |
| 10"    | 273,1 | 406,4  | 323,9 | 12X25,4 | 30,2 | 22 | 9.27 |
| 12"    | 323,9 | 482,6  | 381,0 | 12X25,4 | 31,8 | 22 | 9.53 |
| 14"    | 355,6 | 533,4  | 412,8 | 12X25,4 | 35,1 | 25 | 9.53 |
| 16"    | 406,4 | 596,9  | 469,9 | 12X28,4 | 36,6 | 25 | 9.53 |
| 18"    | 457,2 | 635    | 533,4 | 16X31,8 | 39,6 | 25 | 9.53 |
| 20"    | 508   | 698,5  | 584,2 | 20X31,8 | 42,9 | 25 | 9.53 |
| 24"    | 609,6 | 812,8  | 269,2 | 20X35,1 | 47,8 | 25 | 9.53 |

### Construction of Flanged fittings

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

Loose flanges are available on request.

### Attachment of flanges and collars

The attachment of flanges and collars shall be by both back fillet and bore welds.  
 The transition from the bore to the flanged face shall incorporate a radius to prevent undue stressing of the liner.

### Fabrication dimensional tolerances

Tolerances for flanges and fittings shall be in accordance with the relevant standards.

### Fabricated pipework shall be in accordance with the following tolerances:

- **Squareness of flanges.** Square to the axis of the pipe or fitting to within 0.05mm per 25mm measured across the face.
- **Flange faces.** Faces shall not be uneven or concave. Convexity from the bore to the periphery shall not exceed 0.4mm per 25mm width of face.
- **Flange drilling.** PCD +/- 1.5mm. c/c of bolt holes +/- 0.8mm. Eccentricity between PCD and RFD up to 2-1/2" +/- 0.8mm, 3" and greater +/- 1.5mm.
- **Bolt holes.** Bolt holes shall be off centers and equally spaced about the centerline to an accuracy of 1.5mm.
- **Linear and angular dimensions.** Linear dimensions +/- 1.5mm Angular dimensions +/- 0.25 Degrees.

### **Internal finish of housings**

The interior surfaces and flange faces shall be 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 shall ensure that the lining is capable of withstanding the temperature, pressure and vacuum ratings of the system. All interference fit linings in straight pipes shall be normalized prior to flaring.

Completed linings shall show no evidence of pinholes, porosity, cracks or bad workmanship. Sealing surfaces shall be free of surface defects that could impair sealing effectiveness. Scratches, dents, nicks or tool marks on the sealing face shall not be deeper than 0.15mm. Any of these defect types less than 0.15mm but extending across the face shall cause the product to be rejected. Blind flanges shall have linings firmly attached.

### **Production testing**

For each batch, at least one representative sample of each nominal size of fittings shall be selected and tests 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 shall have samples cut from each end and the samples shall be subjected to the same tests.

Any sample not meeting the specified requirements shall lead to rejection of the whole tube.

The outside diameter and wall thickness shall be measured. Tubes not complying with the standard shall be rejected.

Cracks found at the ends of tubes shall be cut off along with at least 50mm of adjacent material.

When specified, each liner tube shall be subjected to a flattening test. Each length of tube shall be passed through a pre-set gap between two powered rollers. The gap shall be set at 50% of the outside diameter of the tube. The tube shall then be rotated about the longitudinal axis through 90° and then passed back through the roller gap.

The tube shall be examined for cracks and any cracks along with at least 50mm of adjacent material shall be cut out.

### **Hydrostatic pressure test**

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

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

**Final examination.** Each item shall be examined visually. Following satisfactory completion, the outside edge of the flange shall be stamped with a letter "I" to indicate compliance.

### **External finish**

The outside surface of all pipe and fittings shall be finished as follows.

Shotblast SA 2-1/2 and coat with one coat zinc phosphate, zinc epoxy or zinc silicate primer. After painting, bolt holes and vents which become blocked shall be cleared. Marking and identification: The following information shall be marked permanently on each pipe and fitting either by casting into the body or by hard stamping the flange edge in letters at least 6mm high:

- Manufacturer's sign
- Lining material

### **Packaging**

All flanges shall be fitted with protective covers. These covers shall only be removed just prior to installation.

Fittings shall be fitted with medium density fiberboard blanks as above or alternatively, snap on proprietary plastic blanks may be used.

### **Performance**

All lined fittings shall be capable of meeting the temperature, pressure, and vacuum ratings stated in the Lined fittings manual.

### **Service limitations**

For positive and negative pressure limitations versus temperature, see tables 27.2 and 27.3.

Service temperature limits, subject to compatibility with the fluid being handled are:

- Pex - minus 20° to +85°C

When Lined fittings are exposed to very low temperatures (less than minus 20°C) consideration must be given as to the suitability of the material used for the housings. See section below for further information.

Table No. 27.2: **Pressure / temp. rating**

| Temperature | Pressure  |           |     |      |
|-------------|-----------|-----------|-----|------|
|             | 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 |

- Table 27.2 - 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.

Table No. 27.3: **Vacum / temp. rating**

| Liner | Temp  | 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 | Full |
|       | 50° C | Full     | Full | Full | Full | Full | Full | Full |      |      |      |      |      |
|       | 80° C | Full     | Full | Full | Full | Full |      |      |      |      |      |      |      |

### System design and supports

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

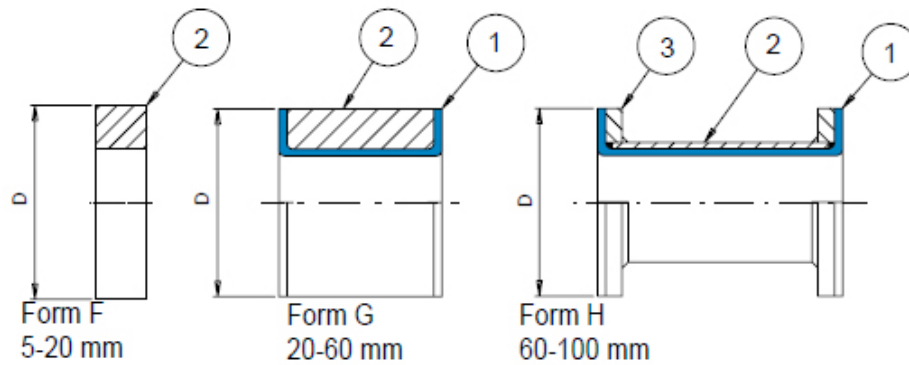
Butterfly valves are usually designed for straight metallic or thermoplastic systems, with the diameter of the vane being defined as a function of the inner diameter of the pipe system in question. The inner diameter of lined steel pipe is considerably smaller than the actual steel pipe, and inner diameters of thermoplastic pipes tend to be considerably smaller due to their heavy wall thickness. For these reasons some interference between the inner liner of a lined pipe and the valve vane may 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 since this will damage the lining.
- The material should also be handled with due care and attention, avoiding all mechanical shocks.
- All flanges are covered to protect them from damage during shipment, storage and handling on site. Should covers be removed for inspection purposes prior to installation, they should be replaced immediately after the inspection of each item is completed.
- When jointing PEX lined pipe and lined fittings together it is generally unnecessary to use gaskets between the sealing faces.
- Under normal conditions, covers should only be removed immediately prior to installation. As gaskets are often not required, utmost attention should be made to avoid scratching or otherwise damaging the lining on flange faces.
- In case of leakage sealing faces of both components should be inspected for groves or chips. Groves or nicks not deeper than approximately 15% of the flare thickness can be removed with a fine grade abrasive paper.

## Solid And Lined Spacers



## Materials

- 1 - Lining Pex ASTM D1998-04
- 2 - St 37.0 - DIN 1629
- 3 - Body St 37.0 - DIN 1629

Table No. 27.4: ANSI B16.5 - Class 150#

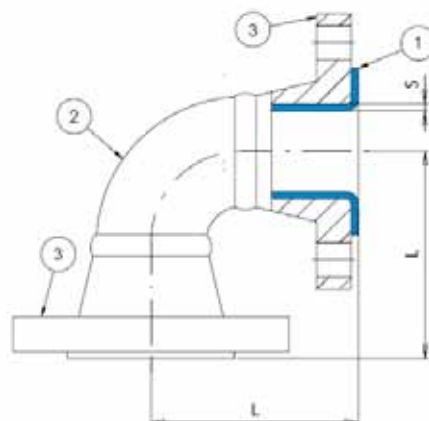
| Cat No.        | DN<br>Inch | L<br>mm |
|----------------|------------|---------|
| Pex-SPC-15025  | 1"         | 55      |
| Pex-SPC-15032  | 1 1/4"     | 68      |
| Pex-SPC-15038  | 1 1/2"     | 75      |
| Pex-SPC-15050  | 2"         | 95      |
| Pex-SPC-15062  | 2 1/2"     | 108     |
| Pex-SPC-15080  | 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     |

Standard Version: Two fixed flanges available on request:

- One or Two loosed flanges
- ANSI B16.5 Class 300 flanges
- Stainless steel body and flanges 304/316
- Different Lengths (L)



## Lined Elbows 90°



### Materials

- 1 - Lining Pex ASTM D1998-04
- 2 - St 37.0 - DIN 1629
- 3 - Body St 37.0 - DIN 1629

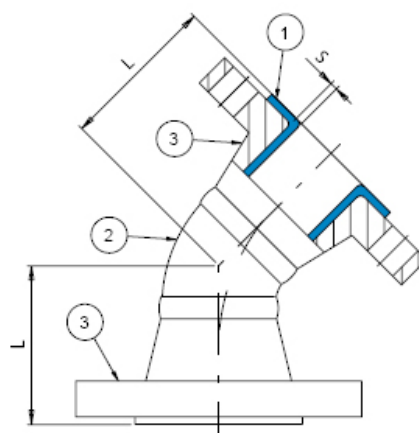
Table No. 27.5: ANSI B16.5 - Class 150#

| Cat No.         | DN<br>Inch | L<br>mm | Pex Lining<br>Thickness | Weight |
|-----------------|------------|---------|-------------------------|--------|
| Pex-LE90-15025  | 1"         | 89      | 3.0                     | 3.1    |
| Pex-LE90-15032  | 1 1/4"     | 95      | 3.0                     | 4.0    |
| Pex-LE90-15038  | 1 1/2"     | 102     | 3.0                     | 4.5    |
| Pex-LE90-15050  | 2"         | 114     | 3.5                     | 6.5    |
| Pex-LE90-15063  | 2 1/2"     | 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  |

Standard Version: Two fixed flanges available on request:

- One or Two loosed flanges
- ANSI B16.5 Class 300 flanges
- Stainless steel body and flanges 304/316
- Different Lengths (L)

## Lined Elbows 45°



## Materials

1 - Lining Pex ASTM D1998-04

2 - St 37.0 - DIN 1629

3 - Body St 37.0 - DIN 1629

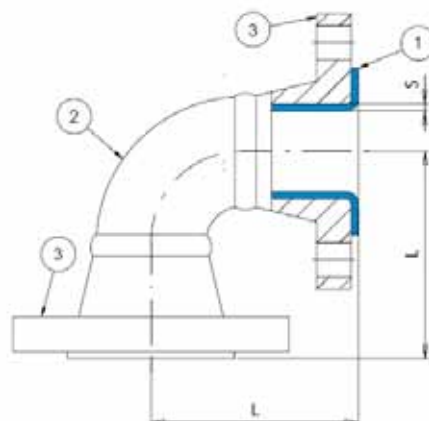
Table No. 27.6: ANSI B16.5 - Class 150#

| Cat No.         | DN<br>Inch | L<br>mm | Pex Lining<br>Thickness | Weight |
|-----------------|------------|---------|-------------------------|--------|
| Pex-LE45-15025  | 1"         | 45      | 3.0                     | 3.0    |
| Pex-LE45-15032  | 1 1/4"     | 51      | 3.0                     | 4.0    |
| Pex-LE45-15038  | 1 1/2"     | 57      | 3.0                     | 6.0    |
| Pex-LE45-15050  | 2"         | 64      | 3.5                     | 9.0    |
| Pex-LE45-15063  | 2 1/2"     | 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  |

Standard Version: Two fixed flanges available on request:

- One or Two loosed flanges
- ANSI B16.5 Class 300 flanges
- Stainless steel body and flanges 304/316
- Different Lengths (L)

## Lined Elbows 60°



### Materials

- 1 - Lining Pex ASTM D1998-04
- 2 - St 37.0 - DIN 1629
- 3 - Body St 37.0 - DIN 1629

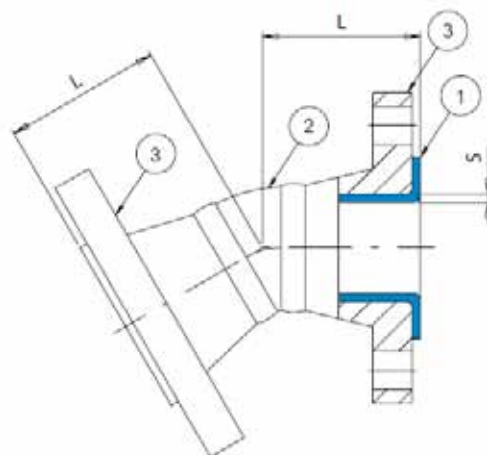
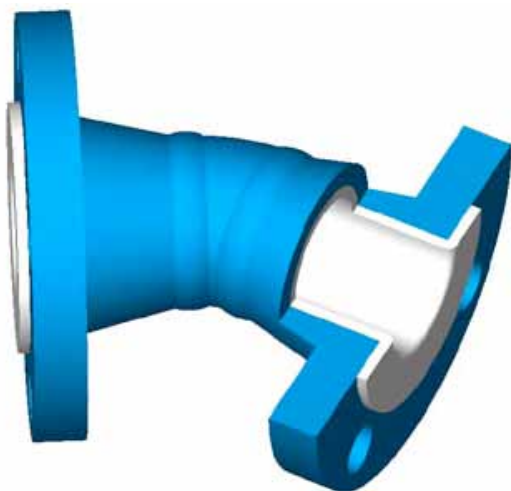
Table No. 27.7: **ANSI B16.5 - Class 150#**

| Cat No.         | DN<br>Inch | L<br>mm | Pex Lining<br>Thickness | Weight |
|-----------------|------------|---------|-------------------------|--------|
| Pex-LE60-15025  | 1"         | 45      | 3.0                     | 2.7    |
| Pex-LE60-15032  | 1 1/4"     | 51      | 3.0                     | 3.6    |
| Pex-LE60-15038  | 1 1/2"     | 57      | 3.0                     | 5.4    |
| Pex-LE60-15050  | 2"         | 64      | 3.5                     | 8.1    |
| Pex-LE60-15063  | 2 1/2"     | 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  |

Standard Version: Two fixed flanges available on request:

- One or Two loosed flanges
- ANSI B16.5 Class 300 flanges
- Stainless steel body and flanges 304/316
- Different Lengths (L)

## Lined Elbows 30°



## Materials

1 - Lining Pex ASTM D1998-04

2 - St 37.0 - DIN 1629

3 - Body St 37.0 - DIN 1629

Table No. 27.8: ANSI B16.5 - Class 150#

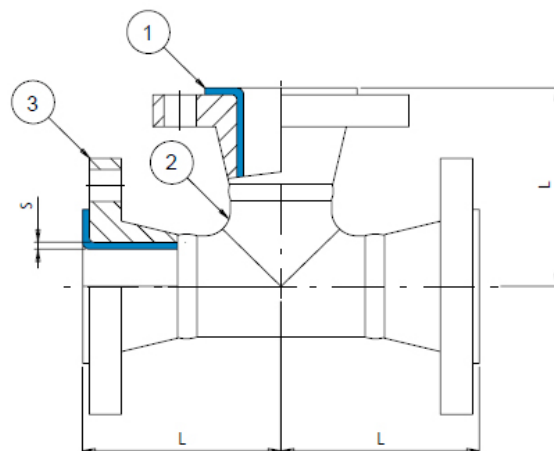
| Cat No.         | DN<br>Inch | L<br>mm | Pex Lining<br>Thickness | Weight |
|-----------------|------------|---------|-------------------------|--------|
| Pex-LE30-15025  | 1"         | 45      | 3.0                     | 2.7    |
| Pex-LE30-15032  | 1 1/4"     | 51      | 3.0                     | 3.6    |
| Pex-LE30-15038  | 1 1/2"     | 57      | 3.0                     | 5.4    |
| Pex-LE30-15050  | 2"         | 64      | 3.5                     | 8.1    |
| Pex-LE30-15063  | 2 1/2"     | 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  |

Standard Version: Two fixed flanges available on request:

- One or Two loosed flanges
- ANSI B16.5 Class 300 flanges
- Stainless steel body and flanges 304/316
- Different Lengths (L)



## Lined Equal Tee



### Materials

- 1 - Lining Pex ASTM D1998-04
- 2 - St 37.0 - DIN 1629
- 3 - Body St 37.0 - DIN 1629

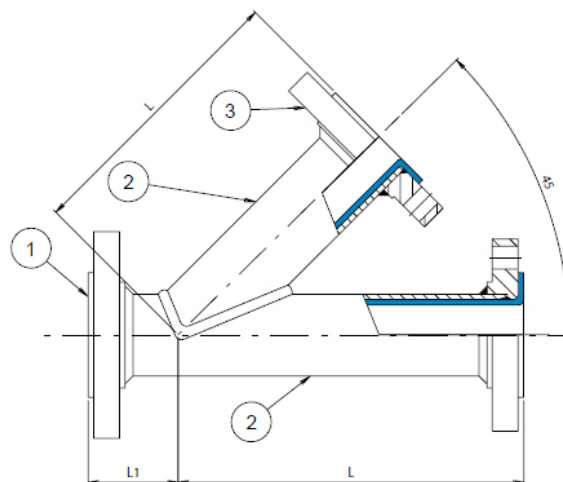
Table No. 27.9: ANSI B16.5 - Class 150#

| Cat No.        | DN<br>Inch | L<br>mm | Pex Lining<br>Thickness | Weight |
|----------------|------------|---------|-------------------------|--------|
| 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  |

Standard Version: Two fixed flanges available on request:

- One or Two loosed flanges
- ANSI B16.5 Class 300 flanges
- Stainless steel body and flanges 304/316
- Different Lengths (L)

## Lined Lateral Tee



## Materials

1 - Lining Pex ASTM D1998-04

2 - St 37.0 - DIN 1629

3 - Body St 37.0 - DIN 1629

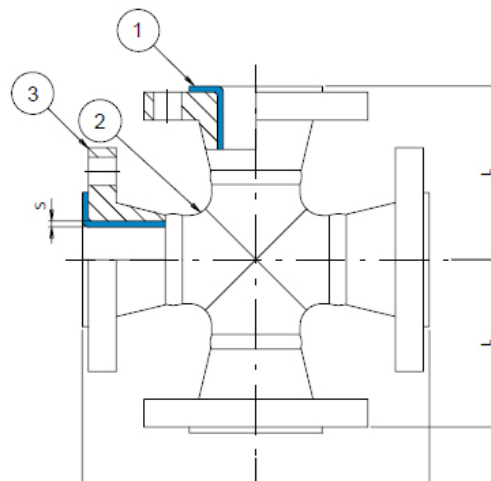
Table No. 27.10: ANSI B16.5 - Class 150#

| Cat No.        | DN<br>Inch | L<br>mm | L1<br>mm | Pex Lining<br>Thickness<br>mm | Weight<br>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         |

Standard Version: Two fixed flanges available on request:

- One or Two loosed flanges
- ANSI B16.5 Class 300 flanges
- Stainless steel body and flanges 304/316
- Different Lengths (L)

## Lined Equal Cross



### Materials

- 1 - Lining Pex ASTM D1998-04
- 2 - St 37.0 - DIN 1629
- 3 - Body St 37.0 - DIN 1629

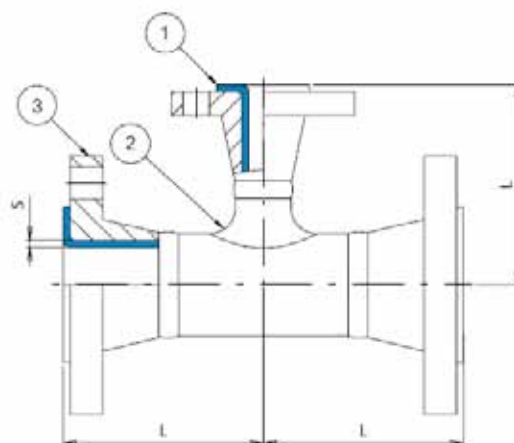
Table No. 27.11: **ANSI B16.5 - Class 150#**

| Cat No.       | DN<br>Inch | L<br>mm | Pex Lining<br>Thickness | Weight |
|---------------|------------|---------|-------------------------|--------|
| 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  |

Standard Version: Two fixed flanges available on request:

- One or Two loosed flanges
- ANSI B16.5 Class 300 flanges
- Stainless steel body and flanges 304/316
- Different Lengths (L)

## Lined Reducing Tee



## Materials

1 - Lining Pex ASTM D1998-04

2 - St 37.0 - DIN 1629

3 - Body St 37.0 - DIN 1629

Table No. 27.12: ANSI B16.5 - Class 150#

| Cat No.           | DN<br>Inch | DN2<br>Inch | L<br>mm | Pex Lining<br>Thickness | Weight |
|-------------------|------------|-------------|---------|-------------------------|--------|
| Pex-LRT-15032-19  | 1 1/4"     | 3/4"        | 95      | x                       | 5.3    |
| Pex-LRT-15032-25  |            | 1"          |         | 3.0                     | 5.5    |
| Pex-LRT-15062-19  | 2 1/2"     | 3/4"        | 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 |            | 1.5"        |         |                         | 19.8   |
| Pex-LRT-150100-50 |            | 2"          |         |                         | 21.5   |
| Pex-LRT-150100-80 |            | 3"          |         |                         | 23.5   |
| Pex-LRT-15038-19  | 1 1/2"     | 3/4"        | 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  |            | 1.5"        |         |                         | 9.4    |

Standard Version: Two fixed flanges available on request:

- One or Two loosed flanges
- ANSI B16.5 Class 300 flanges
- Stainless steel body and flanges 304/316
- Different Lengths (L)



## Lined Reducing Tee

| Cat No.            | DN<br>Inch | DN2<br>Inch | L<br>mm | Pex Lining<br>Thickness | Weight |
|--------------------|------------|-------------|---------|-------------------------|--------|
| Pex-LRT-15080-25   | 3"         | 1"          | 140     | 4.0 / 3                 | 13.8   |
| Pex-LRT-15080-38   |            | 1 1/2"      |         |                         | 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 1/2"      |         |                         | 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 1/2"      |         |                         | 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 1/2"      |         |                         | 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"          |         | 63.0                    |        |
| Pex-LRT-150250-25  | 10"        | 1"          | 280     | 6.0 / 3                 | 64.6   |
| Pex-LRT-150250-38  |            | 1 1/2"      |         |                         | 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"          |         | 83.0                    |        |
| Pex-LRT-150250-200 |            | 8"          |         | 94.0                    |        |
| Pex-LRT-150300-25  |            | 12"         |         | 1"                      | 305    |
| Pex-LRT-150300-38  | 1 1/2"     |             | 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"         |             | 165.0   |                         |        |
| Pex-LRT-150300-200 | 8"         |             | 219.0   |                         |        |
| Pex-LRT-150300-250 | 10"        |             | 223.0   |                         |        |
|                    |            |             |         |                         |        |

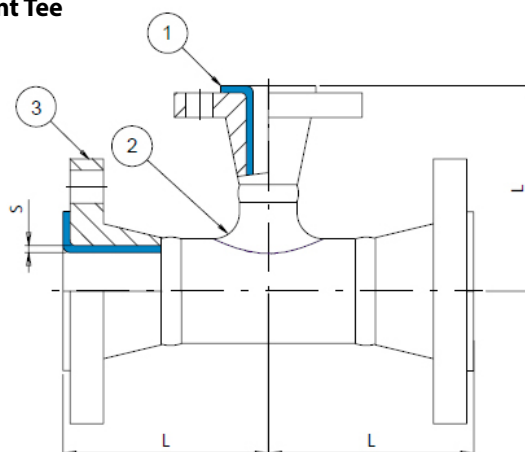
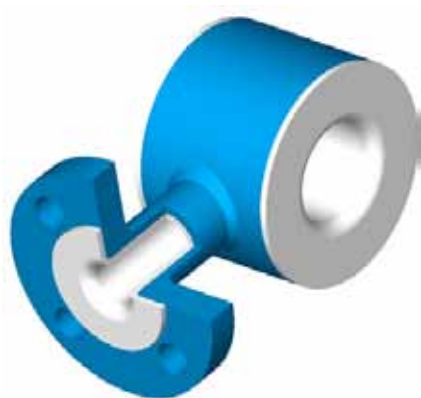
## Lined Reducing Tee

| Cat No.            | DN<br>Inch | DN2<br>Inch | L<br>mm | Pex Lining<br>Thickness | Weight |
|--------------------|------------|-------------|---------|-------------------------|--------|
| Pex-LRT-150350-25  | 14"        | 1"          | 356     | 6.0 / 3                 | 169.0  |
| Pex-LRT-150350-38  |            | 1 1/2"      |         |                         | 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"          |         | 204.0                   |        |
| Pex-LRT-150350-150 |            | 8"          |         | 293.0                   |        |
| Pex-LRT-150350-200 |            | 10"         |         | 299.0                   |        |
| Pex-LRT-150350-300 |            | 12"         |         | 307.0                   |        |
| Pex-LRT-150400-25  |            | 16"         |         | 1"                      | 305    |
| Pex-LRT-150400-38  | 1 1/2"     |             | 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"         |             | 263.0   |                         |        |
| Pex-LRT-150400-200 | 8"         |             | 291.0   |                         |        |
| Pex-LRT-150400-250 | 10"        |             | 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 1/2"      |         |                         | 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"          |         | 338.0                   |        |
| Pex-LRT-150450-200 |            | 8"          |         | 372.0                   |        |
| Pex-LRT-150450-250 |            | 10"         |         | 443.0                   |        |
| Pex-LRT-150450-300 |            | 12"         |         | 455.0                   |        |
| Pex-LRT-150450-350 |            | 14"         |         | 465.0                   |        |
| Pex-LRT-150450-400 | 16"        | 473.0       |         |                         |        |

## Lined Reducing Tee

| Cat No.            | DN<br>Inch | DN2<br>Inch | L<br>mm | Pex Lining<br>Thickness | Weight |     |         |       |
|--------------------|------------|-------------|---------|-------------------------|--------|-----|---------|-------|
| Pex-LRT-150500-25  | 20"        | 1"          | 457     | 6.0 / 3                 | 279.0  |     |         |       |
| Pex-LRT-150500-38  |            | 1 1/2"      |         |                         | 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"          |         | 6.0                     | 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 1/2" |     |         | 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"         |             | 6.0     | 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



## Materials

1 - Lining Pex ASTM D1998-04

2 - St 37.0 - DIN 1629

3 - Body St 37.0 - DIN 1629

Table No. 27.19: ANSI B16.5 - Class 150#

| Cat No.          | DN 1 Inch | DN 2 Inch | L mm | Pex Lining Thickness | Weight |
|------------------|-----------|-----------|------|----------------------|--------|
| Pex-LIT-15025-25 | 1"        | 1"        | 50   | 4.0                  | 2.2    |
| Pex-LIT-15032-25 | 1 1/4"    | 1"        | 50   | 4.0                  | 2.5    |
| Pex-LIT-15038-12 | 1 1/2"    | 1/2"      | 50   | 4.0                  | 2.4    |
| Pex-LIT-15038-19 |           | 3/4"      |      |                      | 2.6    |
| Pex-LIT-15038-25 |           | 1"        |      |                      | 2.8    |
| Pex-LIT-15038-38 |           | 1 1/2"    | 75   |                      | 4.4    |
| Pex-LIT-15050-25 | 2"        | 1"        | 50   | 4.0                  | 3.6    |
| Pex-LIT-15050-38 |           | 1 1/2"    | 75   |                      | 6.2    |
| Pex-LIT-15050-50 |           | 2"        | 90   |                      | 8.1    |
| Pex-LIT-15062-25 | 2 1/2"    | 1"        | 50   | 4.0                  | 3.9    |
| Pex-LIT-15062-38 |           | 1 1/2"    | 75   |                      | 7.2    |
| Pex-LIT-15062-50 |           | 2"        | 90   |                      | 9.8    |

Standard Version: Two fixed flanges available on request:

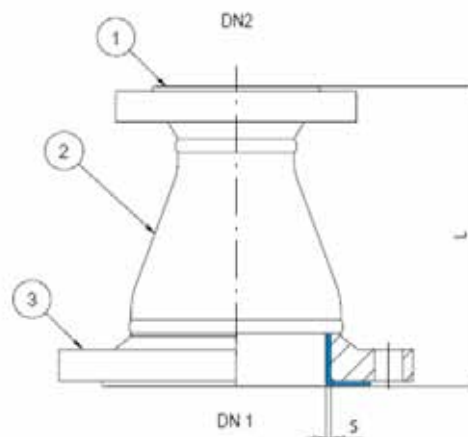
- One or Two loosed flanges
- ANSI B16.5 Class 300 flanges
- Stainless steel body and flanges 304/316
- Different Lengths (L)



## Lined Instrument Tee

| Cat No.           | DN 1 Inch | DN 2 Inch | L mm | Pex Lining Thickness | Weight |
|-------------------|-----------|-----------|------|----------------------|--------|
| Pex-LIT-15080-25  | 3"        | 1"        | 50   | 4.0                  | 4.7    |
| Pex-LIT-15080-38  |           | 1 1/2"    | 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 1/2"    | 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 1/2"    | 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 1/2"    | 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 1/2"    | 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 1/2"    | 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 1/2"    | 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 1/2"    | 110  |                      | 74.0   |
| Pex-LIT-150100-50 |           | 2"        | 120  |                      | 83.0   |
| Pex-LIT-150100-80 |           | 3"        | 160  |                      | 116.7  |
| Pex-LIT-150100-25 | 18"       | 1"        | 90   | 4.0                  | 68.5   |
| Pex-LIT-150100-38 |           | 1 1/2"    | 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 1/2"    | 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 1/2"    | 110  |                      | 94.5   |
| Pex-LIT-150100-50 |           | 2"        | 120  |                      | 107.5  |
| Pex-LIT-150100-80 |           | 3"        | 160  |                      | 150.0  |

## Lined Concentric Reducer



## Materials

- 1 - Lining Pex ASTM D1998-04
- 2 - St 37.0 - DIN 1629
- 3 - Body St 37.0 - DIN 1629

Table No. 27.24: ANSI B16.5 - Class 150#

| Cat No.           | DN 1<br>Inch | DN 2<br>Inch | L<br>mm | Pex Lining<br>Thickness | Weight |
|-------------------|--------------|--------------|---------|-------------------------|--------|
| Pex-LCR-15032-25  | 1 1/4"       | 1"           | 114     | 3.0                     | 3.0    |
| Pex-LCR-15038-19  | 1 1/2"       |              | 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 1/2"       |         |                         | 4.8    |
| Pex-LCR-15062-25  | 2 1/2"       | 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 1/2"       |         |                         | 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 1/2"       |         |                         | 9.3    |
| Pex-LCR-150100-50 |              | 2"           |         |                         | 9.8    |
| Pex-LCR-150100-80 |              | 3"           |         |                         | 12.4   |

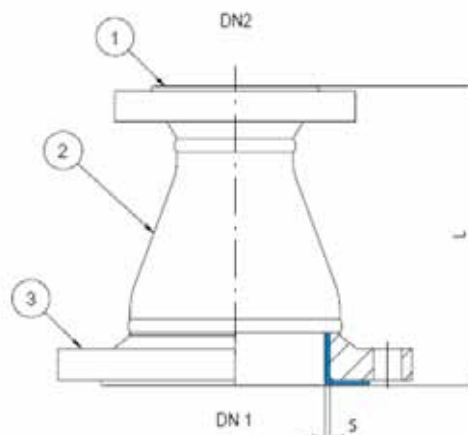
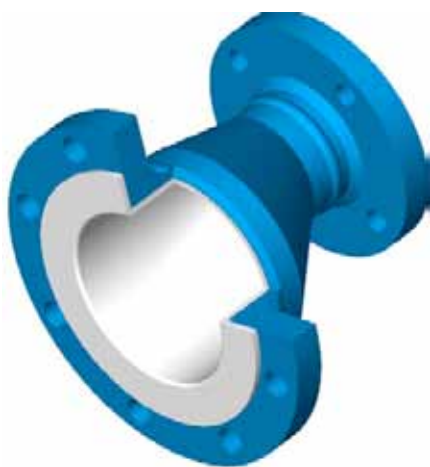
Standard Version: Two fixed flanges available on request:

- One or Two loosed flanges
- ANSI B16.5 Class 300 flanges
- Stainless steel body and flanges 304/316
- Different Lengths (L)

## Lined Concentric Reducer

| Cat No.            | DN 1<br>Inch | DN 2<br>Inch | L<br>mm | Pex Lining<br>Thickness | Weight |
|--------------------|--------------|--------------|---------|-------------------------|--------|
| Pex-LCR-150125-50  | 5"           | 2"           | 203     | 4.5 / 3.5               | 10.5   |
| Pex-LCR-150125-80  |              | 3"           |         |                         | 12.7   |
| Pex-LCR-150125-100 |              | 4"           |         |                         | 15.0   |
| Pex-LCR-150150-25  | 6"           | 1"           | 229     | 4.5 / 3.0<br>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 Excentric Reducer



## Materials

- 1 - Lining Pex ASTM D1998-04
- 2 - St 37.0 - DIN 1629
- 3 - Body St 37.0 - DIN 1629

Table No. 27.27: ANSI B16.5 - Class 150#

| Pex-Cat No.         | DN 1 Inch | DN 2 Inch | L mm | Pex Lining Thickness | Weight |
|---------------------|-----------|-----------|------|----------------------|--------|
| Pex-LECR-15038-25   | 1 1/2"    | 1"        | 114  | 3.0                  | 3.0    |
| Pex-LECR-15050-25   | 2"        | 1"        | 127  | 3.0                  | 4.0    |
| Pex-LECR-15050-38   |           | 1 1/2"    |      |                      | 4.3    |
| Pex-LECR-15080-25   | 3"        | 1"        | 152  | 4.0 / 3              | 6.7    |
| Pex-LECR-15080-38   |           | 1 1/2"    |      |                      | 6.2    |
| Pex-LECR-15080-50   |           | 2"        |      |                      | 6.9    |
| Pex-LECR-150100-38  | 4"        | 1 1/2"    | 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   |

Standard Version: Two fixed flanges available on request:

- One or Two loosed flanges
- ANSI B16.5 Class 300 flanges
- Stainless steel body and flanges 304/316
- Different Lengths (L)



## Lined Excentric Reducer

| Pex-Cat No.         | DN 1 Inch | DN 2 Inch | L mm | Pex Lining Thickness | Weight |
|---------------------|-----------|-----------|------|----------------------|--------|
| 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  |

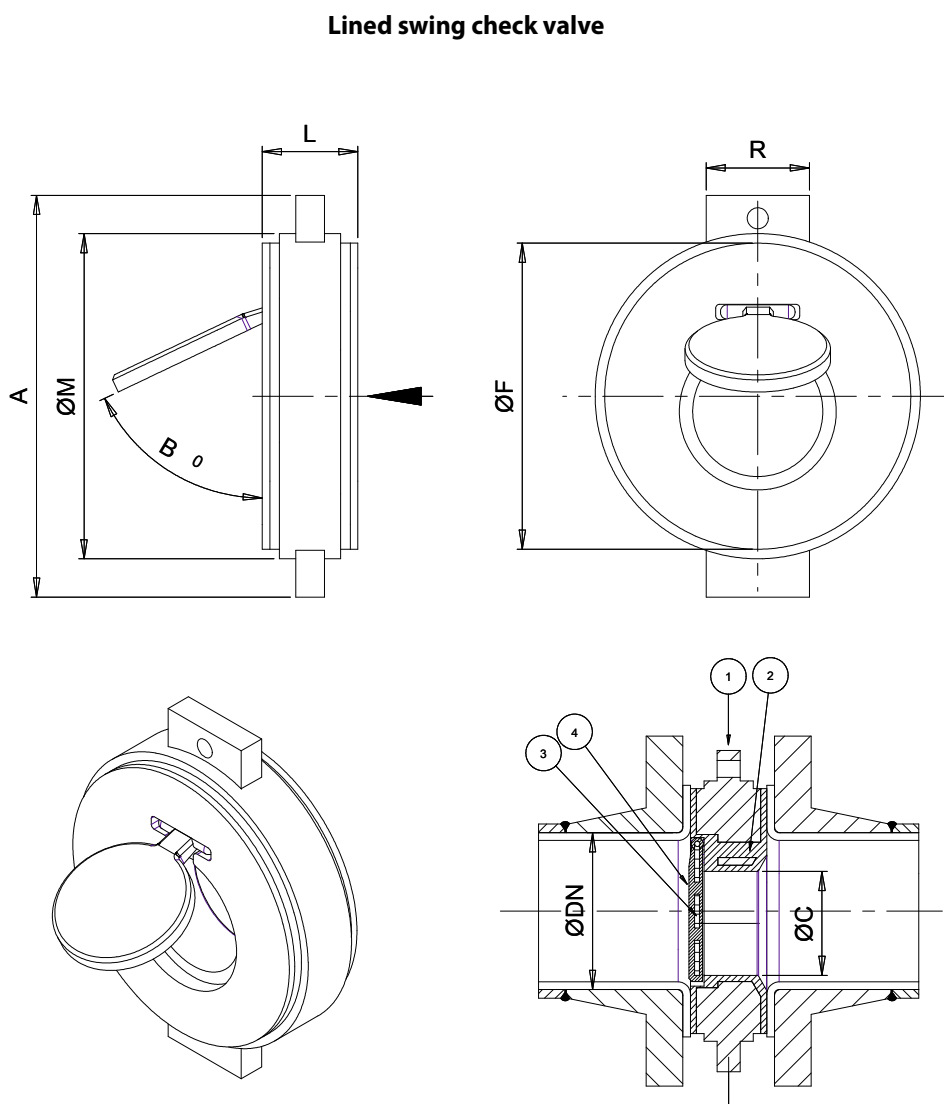


Table No. 27.30

| DN  | L   | C   | A   | M   | B  | R  |
|-----|-----|-----|-----|-----|----|----|
| 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 |

In order to adjust the ID of the Swing Check Valve to the ID of the PEXGOL pipe, you can order the PEXGOL special reducers/adaptors cat.no.65900040 (see page 38) in Custom-made dimensions. Please consult.

## Flanged Coupler for PEXGOL pipes

Available sizes from diameters 63mm to 630mm.

The couplers can be used for the full range of temperatures and pressures, same as the 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 cast iron GGG40 (ASTM A-536).

Installing the coupler is easy!

The coupler is placed around the pipe and fastened by screws. The inner surface of the coupler has special stainless steel teeth.

These teeth penetrate into the pipe wall during tightening of the coupler and provide good anchoring onto the pipe, preventing the pipe from pulling out from the fitting.

Before final torquing of the nuts, turn the coupler around the pipe until it is aligned with the opposite flange.

The sealing 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 can be supplied according to special order.

The flange has oval holes designed to fit most International standards; see table.



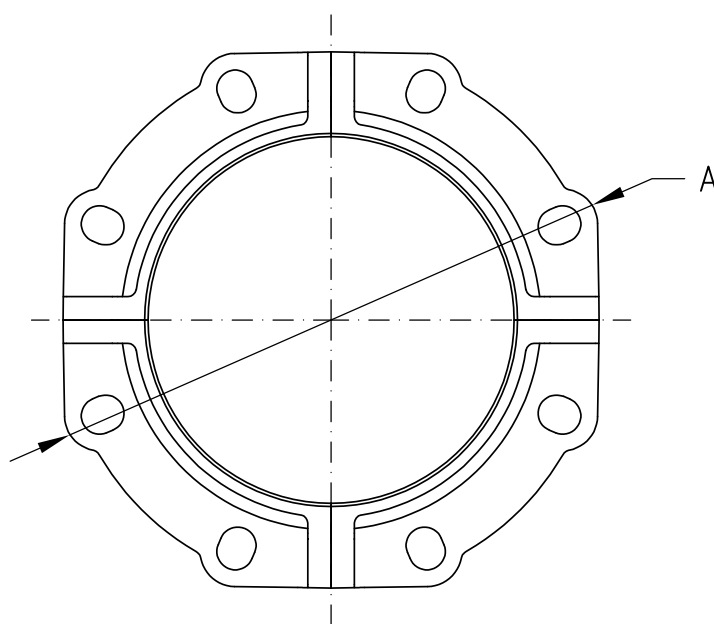
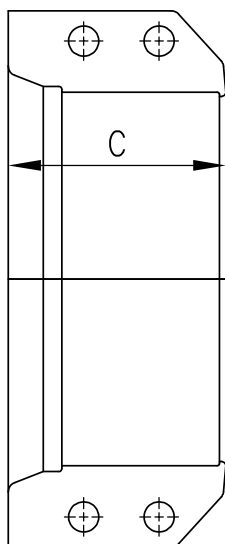
Table No. 28.1: **Compatibility with International Flange Standards**

| Cat. No. | pipe OD (mm) | Nominal diameter |       | DIN  |      |      | ANSI |     |     | BSTD |
|----------|--------------|------------------|-------|------|------|------|------|-----|-----|------|
|          |              | DN (mm)          | Inch  | 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    |
| 50816060 | 160          | 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          | 630              | 24    | -    | -    | -    | V    | V   | -   | -    |

Table No. 28.2: General Dimensions of flanged couplers

| Cat. No. | outside diameter of pipe (mm) | Nominal diameter |       | A   | C   | Bolt size (in) | Bolt length (mm)* | No. of bolts | Weight No. |
|----------|-------------------------------|------------------|-------|-----|-----|----------------|-------------------|--------------|------------|
|          |                               | DN               | Inch  |     |     |                |                   |              |            |
| 50806320 | 63                            | 50               | 2     | 165 | 70  | 5/8            | 50                | 4            | 2.7        |
| 50807525 | 75                            | 65               | 2 1/2 | 185 | 80  | 5/8            | 50                | 4            | 2.5        |
| 50809030 | 90                            | 80               | 3     | 208 | 96  | 5/8            | 50                | 4            | 4.0        |
| 50811040 | 110                           | 100              | 4     | 242 | 110 | 5/8            | 50                | 8            | 6.5        |
| 50816060 | 160                           | 150              | 6     | 285 | 120 | 3/4            | 60                | 8            | 11.2       |
| 50820080 | 200                           | 200              | 8     | 348 | 130 | 3/4            | 60                | 8            | 13.0       |
| 50822580 | 225                           | 200              | 8     | 344 | 130 | 3/4            | 60                | 8            | 12.4       |
| 50825010 | 250                           | 250              | 10    | 410 | 150 | 7/8            | 70                | 12           | 17.0       |
| 50928010 | 280 ASA                       |                  | 10    | 405 | 160 | 7/8            | 70                | 12           | 20.0       |
| 50828010 | 280 BS                        | 250              |       | 405 | 160 | 7/8            | 70                | 8            | 20.0       |
| 50831512 | 315                           | 300              | 12    | 475 | 180 | 7/8            | 70                | 12           | 27.7       |
| 50835514 | 355                           | 350              | 14    | 535 | 200 | 1              | 75                | 12           | 40.0       |
| 50840016 | 400                           | 400              | 16    | 600 | 215 | 1              | 75                | 16           | 55.0       |
| 50845018 | 450                           | 450              | 18    | 635 | 235 | 1 1/8          | 100               | 16           | 65.0       |
| 50850020 | 500                           | 500              | 20    | 715 | 280 | 1 1/8          | 100               | 20           | 75.0       |
| 50863024 | 630                           | 630              | 24    | 840 | 280 | 1 1/4          | 100               | 20           | 75.0       |

\* For connecting to flanged couplers



## 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.

PEXGOL pipes can be used with plastic saddles such as PLASSON 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 32mm up to 160mm diameter (see the instructions page for the installation of saddles).

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

All metal saddles are suitable for use in piping that conveys 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.

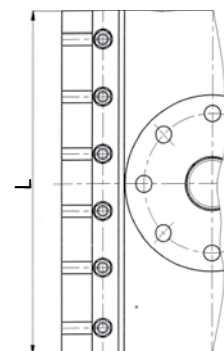
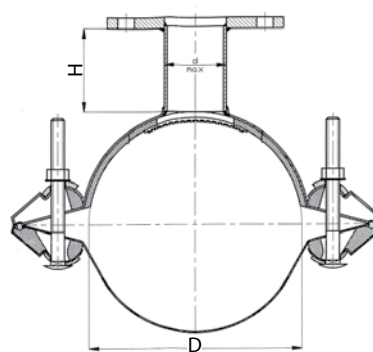




Table No. 29.1: Dimensions of PEXGOL Stainless Steel  
Branch - Off Saddles ASA 150 Flanged Outlet

| Cat No.   | OD [D] and flange | H (mm) | L (mm) | Weight (kg) |
|-----------|-------------------|--------|--------|-------------|
| 46811002  | 110*2"            | 120    | 225    | 5.5         |
| 46811003  | 110*3"            | 120    | 225    | 6.3         |
| 468916002 | 160*2"            | 120    | 300    | 7.0         |
| 46816003  | 160*3"            | 120    | 300    | 9.0         |
| 46816004  | 160*4"            | 120    | 300    | 9.5         |
| 46820002  | 200*2"            | 120    | 375    | 14.0        |
| 46820003  | 200*3"            | 120    | 375    | 15.0        |
| 46820004  | 200*4"            | 120    | 375    | 15.0        |
| 46822502  | 225*2"            | 120    | 375    | 15.0        |
| 46822503  | 225*3"            | 120    | 375    | 15.6        |
| 46822504  | 225*4"            | 120    | 375    | 16.0        |
| 46822506  | 225*6"            | 150    | 375    | 19.0        |
| 46825002  | 250*2"            | 120    | 450    | 16.0        |
| 46825003  | 250*3"            | 120    | 450    | 17.0        |
| 46825004  | 250*4"            | 120    | 450    | 18.0        |
| 46825006  | 250*6"            | 150    | 450    | 20.0        |
| 46928002  | 280*2"            | 120    | 450    | 17.0        |
| 46928003  | 280*3"            | 120    | 450    | 18.0        |
| 46928004  | 280*4"            | 120    | 450    | 20.0        |
| 46828006  | 280*6"            | 150    | 450    | 23.0        |
| 46831502  | 315*2"            | 120    | 450    | 18.0        |
| 46831503  | 315*3"            | 120    | 450    | 20.0        |
| 46831504  | 315*4"            | 120    | 450    | 21.0        |
| 46831506  | 315*6"            | 150    | 450    | 23.0        |
| 46831508  | 315*8"            | 150    | 450    | 28.0        |
| 46835502  | 355*2"            | 120    | 450    | 19.0        |
| 46835503  | 355*3"            | 120    | 450    | 21.0        |
| 46835504  | 355*4"            | 120    | 450    | 22.0        |
| 46835506  | 355*6"            | 150    | 450    | 25.0        |
| 46835508  | 355*8"            | 150    | 450    | 29.0        |
| 46840003  | 400*3"            | 120    | 525    | 23.0        |
| 46840004  | 400*4"            | 120    | 525    | 23.0        |
| 46840006  | 400*6"            | 150    | 525    | 26.0        |
| 46840008  | 400*8"            | 150    | 525    | 30.0        |
| 46845003  | 450*3"            | 120    | 525    | 24.0        |
| 46845004  | "450x4            | 120    | 525    | 24.0        |
| 46845006  | "450x6            | 150    | 525    | 27.0        |
| 46845008  | "450x8            | 150    | 525    | 31.0        |
| 46850003  | "500x3            | 120    | 525    | 26.0        |
| 46850004  | "500x4            | 120    | 525    | 26.0        |
| 46850006  | "500x6            | 150    | 525    | 28.0        |
| 46850008  | "500x8            | 150    | 525    | 32.0        |
| 46863003  | "630x3            | 120    | 525    | 29.0        |
| 46863004  | "630x4            | 120    | 525    | 30.0        |
| 46863006  | "630x6            | 150    | 525    | 32.0        |
| 46863008  | "630x8            | 150    | 525    | 36.0        |

### Performing pressure tests in PEXGOL water supply lines

1. Test purpose: Final check for pipe and fittings to ensure there are no leakages.
2. Test procedure:
  - 2.1 On the day before the test, the pipeline can be filled up with water at the maximum working pressure of the pipeline.
  - 2.2 On the day of the test, check the pipeline visually, especially around the fittings.
3. Attention!
  - 3.1 Metal fittings (flanged couplings, branch-off saddles) should be temporarily covered, to prevent excessive heat buildup due to exposure to sunlight.
  - 3.2 For installation above the ground, lower test pressures (according to the table) must be used, as the pipe may be heat up due to exposure to sunlight.
  - 3.3 Changes in the pipeline topography (which could create higher local pressure due to a water column) should be considered and the test pressure should be reduced accordingly.
4. Pressure testing:
  - 4.1 Bring up the pressure to the test pressure (see table) and then close the feeding line.
  - 4.2 As the pipe is flexible and tends to increase its diameter under pressure, the line pressure decreases to 10-20% of the test pressure.
  - 4.3 The line pressure should be increased again, up to the test pressure.
  - 4.4 With each cycle of pressure reduction and repressurization the pressure is expected to decrease less.
5. After 3-4 cycles, the pressure should be rapidly lowered to 75% of the working pressure by letting water out of the line.
- 6.1 After closing the valve, the pressure should increase as the result of the tendency of the pipe to decrease its volume.
- 6.2 If the pressure decreases instead of increases investigate for the reason for pressure loss, for example, leakages at the fittings.

Table No. 30.1: **Test pressures**

| Pipe class | Test pressure |              |
|------------|---------------|--------------|
|            | Underground   | Above ground |
| 10         | 12            | 7            |
| 12         | 14            | 8.5          |
| 15         | 18            | 11           |
| 24         | 29            | 17           |

### Repair Instructions of PEXGOL pipe in water lines. Diameters: 63mm to 500mm

PEXGOL pipes may be damaged as a result of uncaredful digging.

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 ensure no scratches extend beyond the repair area.
  - 1.3 Use a repair fitting, supplied by Golan or a branch-off saddle.
2. Large hole need
  - 2.1 Uncover the pipe, 3 meters along the pipe, 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 replace does not exceed 1 meter in length.
  - 2.4 The new section will be connected by:
    - 2.4.1 Two electrofusion repair couplers.
    - 2.4.2 Four golan flanged couplers.
    - 2.4.3 Two PLASSON mechanical couplers (for pipes up to 160mm).
3. Only technicians trained by Golan's field service personnel are authorized to perform the repair.
4. Stop water flow using of common squeeze-off techniques.

## 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

1. The following procedure is an initial test for the chemical resistance of PEXGOL pipes.
  - 1.1. 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.
2. The tested items are DUMBBELLS (also called "dogbones" or "coupons") made from PEXGOL pipes.
3.
  - 3.1. The dumbbells are immersed in the same material transported through the pipeline (same chemical composition and same temperature) for a period of 4 weeks.
  - 3.2. After 2 weeks, 10 dumbbells are removed and stored.
  - 3.3 After an additional 2 weeks, the other 10 dumbbells are removed.
  - 3.4. The two groups of dumbbells are packed separately and the packages are marked appropriately to identify the removal and storage conditions.
  - 3.5. The packages are to be sent to Golan for tensile testing.

## Classification

- A. Resistant. Can be used within the working pressures.
- B. Conditionally resistant. Restrictions must be made as regards pressures.
- 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. Not recommended.

| 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 Dichloro-ethylene |      |      |       |
| Acid mixture H2SO4-HNO3-H2O    | U                     |      |      |       |
| Acid mixture H2SO4-H3PO4-H2O   |                       | B    |      |       |
| Acrylic emulsions              | A                     |      |      |       |
| Acroline dispersion            | A                     |      |      |       |
| Acroline solution              | B                     |      |      |       |
| Acronal                        | C                     |      |      |       |
| Acrylonitrile                  | 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    | U     |
| 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    |       |
| 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    |       |

| Compound                     | Chemical Resistance |      |      |       |
|------------------------------|---------------------|------|------|-------|
|                              | 40°C                | 60°C | 80°C | 100°C |
| 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                   | A    |      |       |
| Amyl Methyl Carbinol         | B                   | A    | A    |       |
| Amyl Naphthaline             | B                   | C    |      |       |
| Amyl Phthalate               | A                   | B    | A    |       |
| Aniline Hydrochloride        | D                   |      |      |       |
| Aniline Sulphate             | U                   |      |      |       |
| Aniline, coloured            | see Aniline         | A    | A    |       |
| Aniline, pure                | A                   | A    |      |       |
| Aniline, water soluble       | B                   | A    | A    | U     |
| Animal Fats                  | A                   | A    | A    |       |
| Animal Oils                  | B                   | B    | B    |       |
| Anis Oil                     | B                   | U    |      |       |
| Aniseed Oil                  | C                   | U    | A    | B     |
| Anisole                      | see Cyclohexanone   | A    | A    |       |
| Antifreeze solution          | A                   | A    | A    |       |
| Antimony Pentachloride       | A                   | A    | A    |       |
| Antimony Trichloride         | A                   | A    | A    |       |
| Anthraquinone Sulphonic Acid | A                   | A    |      |       |
| Aqua regia                   | U                   | A    | A    |       |
| Aromatic Acids               | A                   | A    | A    |       |
| Aromatic Hydrocarbons        | U                   | A    | z    |       |
| Arsenic                      | B                   | B    | A    | A     |
| Arsenic Acid 80%             | A                   | A    | A    |       |

| Compound                       | Chemical Resistance        |      |      |       |
|--------------------------------|----------------------------|------|------|-------|
|                                | 40°C                       | 60°C | 80°C | 100°C |
| Arsenic Acid Anhydride         | A                          | A    | A    |       |
| Arsenic Salts                  | A                          | A    |      | B     |
| Arsenic Trichloride            | U                          |      |      |       |
| Ascorbic Acid                  | A                          | A    | 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                          | 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    | B    |       |
| Beater Glues                   | A                          | A    | 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    | A    |       |
| Benzene Carbonic Acid          | see Bensoic Acid           | A    |      |       |
| Benzene Dicarboxic Acid        | see Phthalic Acid          | A    | A    |       |
| Benzene Sulphonic Acid         | A                          |      | B    |       |
| Benzoic Acid                   | A                          | A    | B    |       |
| Benzole Carbon Acid            | see Bensoic Acid           | A    |      |       |
| Benzole Dicarboxic Acid        | see Phthalic Acid          |      |      |       |
| Benzole Sulphonic Acid         | U                          | A    | A    |       |
| Benzyl Acetate                 | B                          | C    |      |       |
| Benzyl Alcohol                 | A                          | A    | B    |       |
| Benzyl Benzoate                |                            | B    |      |       |
| Benzyl Chloride                | A                          |      |      |       |
| Bichromate Sulfuric Acid       | B                          | U    |      |       |
| Bismuth Carbonate              | A                          | A    | A    | B     |
| Bisulfite                      | see Sodium Bisulfite       | A    | A    |       |
| Bitumen                        | A                          | C    | A    |       |
| Black Liquor                   | B                          | B    | A    |       |
| Bleach                         | D                          | U    | A    |       |
| Bleach Lye 10%                 | B                          | B    |      |       |
| Bloodstream Salt, red          | see Potassium Ferricyanide | A    | A    |       |
| Bloodstream Salt, yellow       | see Potassium Ferricyanid  | A    | A    |       |
| Bone Oil                       | A                          | A    | A    |       |
| Bonewax                        | A                          |      | U    | A     |
| Borax                          | see Sodium Tetraborate     | A    | A    |       |
| 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    |      |       |
| Brom Oil                       | A                          |      | B    |       |
| Bromate Solution               | A                          | A    |      |       |

| Compound                       | Chemical Resistance |      |      |   |
|--------------------------------|---------------------|------|------|---|
|                                | 40°C                | 60°C | 80°C |   |
| Bromoethane                    | U                   | A    | A    |   |
| Bromic Acid                    | A                   | A    | A    | B |
| Bromine Vapours, low conc.     | B                   |      |      |   |
| Bromine Water                  | U                   | A    | A    |   |
| Bromine, Liquid                | U                   | C    |      |   |
| Bromochloromethane             | U                   | A    | A    |   |
| Butadiene 50%                  | A                   | A    | A    |   |
| Butadiene 100%                 |                     | B    | A    |   |
| Butane (gas)                   | U                   | A    |      |   |
| Butanediol up to 10%           | A                   | A    | A    |   |
| Butanediol up to 100%          | B                   | A    | A    |   |
| Butanetriol                    | A                   | A    |      |   |
| Butanol 100%                   | A                   | A    | A    |   |
| Butanone                       | A                   | U    |      |   |
| Butene                         | U                   | A    | A    |   |
| Butoxyl                        | A                   | C    | A    |   |
| Butter                         | A                   |      | B    |   |
| Butter Acid                    | C                   | A    | A    |   |
| Butter Acid in water, conc.    | C                   | A    | A    |   |
| Butter Acid in water, sol. 20% | C                   |      |      |   |
| Butyl Acetate                  | A                   | B    | C    |   |
| Butyl Acrylate                 | A                   | B    | C    |   |
| Butyl Alcohol                  | see Butanol         | C    |      |   |
| Butyl Aldehyde                 | A                   |      | B    |   |
| Butyl Benzyl Phthalate         | A                   | A    |      |   |
| Butyl Carbinol                 |                     |      | B    |   |
| Butyl Cellulose solution       | U                   | A    |      |   |
| Butyl Phenol                   | U                   | A    | A    |   |
| Butyl Stearate                 | A                   | A    | A    |   |
| Butylene                       | see Butene          | A    | B    |   |
| Butylene Glycol                | see Butanediol      | A    |      |   |
| Butyric Acid                   | C                   | D    |      |   |
| Cadmium Salts                  | A                   | A    | 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                   | A    | A    | B |
| Calcium Carbide                | A                   | A    | A    |   |
| Calcium Carbonate (Soda)       | A                   | A    | A    |   |
| Calcium Chlorate               | A                   | A    | A    |   |
| Calcium Chloride               | A                   | A    | A    | B |
| Calcium Hydrosulphite          | B                   | B    |      |   |
| containing SO2                 | A                   | A    | A    |   |
| Calcium Hydroxide              | A                   | A    | A    |   |
| Calcium Hypochlorite           | A                   | A    | A    |   |
| Calcium Nitrate                | A                   | A    | A    | A |
| Calcium Oxide                  | A                   | A    | A    |   |
| Calcium Phosphate              | A                   | A    | A    |   |
| Calcium Sulphate               | A                   | A    | A    |   |
| Calcium Sulphide               |                     |      | B    |   |
| Calcium Water                  | A                   |      |      |   |
| Camphor                        | C                   |      |      |   |
| Cane Sugar                     | A                   | A    | A    |   |
| Cane Sugar Juice               | A                   | A    | A    |   |
| Carbamide 33%                  | A                   | A    | A    |   |
| Carbazole                      | A                   | A    | B    |   |
| Carbolic Acid                  | A                   | B    |      |   |



| Compound                        | Chemical Resistance                   |      |      |       |
|---------------------------------|---------------------------------------|------|------|-------|
|                                 | 40°C                                  | 60°C | 80°C | 100°C |
| Carbolic Acid (Phenol)          | A                                     | A    |      |       |
| Carbolineum                     | A                                     | C    |      |       |
| Carbon Bisulfide                | U                                     |      |      |       |
| Carbon Dioxide                  | A                                     | A    | A    |       |
| Carbon Dioxide damp             | A                                     | A    | A    | U     |
| 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             | aa Ethylene Glycol<br>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-<br>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                                     |      |      |       |
| 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                                     |      |      | U     |
| Chloroacetic Acid 100%          |                                       | B    |      |       |
| 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%           |                                       |      | B    |       |

| Compound                    | Chemical Resistance       |      |      |       |
|-----------------------------|---------------------------|------|------|-------|
|                             | 40°C                      | 60°C | 80°C | 100°C |
| Chromium Trioxide 80%       | A                         |      |      |       |
| Chromo Sulfuric Acid        | A                         | U    |      |       |
| Cider                       | A                         | B    |      |       |
| Cinnamon                    | B                         | C    |      |       |
| Cinnamon Oil                | D                         |      |      |       |
| Cis - Oxime                 | see Benzaldehyde<br>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    |      |       |
| 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 Seed 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                | A                         |      |      |       |
| Cuprous Chloride, saturated | B                         | B    |      |       |
| Cuprous 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    |      |       |
| Denatured Spirit            | see Methyl Alcohol        |      |      |       |
| Deodorants                  | A                         | A    |      |       |
| Detergents                  | A                         | B    |      |       |
| Dextrine                    | A                         | A    | A    |       |
| Dextrose                    | A                         | A    | A    | A     |

| Compound                            | Chemical Resistance   |      |      |       |
|-------------------------------------|-----------------------|------|------|-------|
|                                     | 40°C                  | 60°C | 80°C | 100°C |
| 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    |       |
| Dichloroacetic Acid                 | A                     | A    | A    |       |
| Dichloroacetic Acid Methylene Ester | A                     | A    | A    |       |
| Dichlorobenzene                     | C                     | U    |      |       |
| Dichloroethane                      | see Ethyl Chloride    |      |      |       |
| Dichloroethylene                    | U                     |      |      |       |
| Dichloromethane                     | see Methyl Chloride   |      |      |       |
| Dicyclohexamine                     |                       |      | B    |       |
| Diesel Fuel                         | A                     |      |      |       |
| Diesel Oil                          | A                     | B    | C    |       |
| Diethylene 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           |      |      |       |
| Dimethyl Phthalate                  | A                     | A    | A    |       |
| Dimethyl Sulphoxide                 | A                     | A    |      |       |
| Diocetyl Phthalate                  | B                     | C    |      |       |
| Diocetyl 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    |       |

| Compound   | Chemical Resistance  |      |      |       |
|--|----------------------|------|------|-------|
|  | 40°C                 | 60°C | 80°C | 100°C |
| 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 plus Acetic Acid, quality use | A                    |      |      |       |
| Ethyl Benzene  | D                    | U    |      |       |
| Ethyl Benzoate   | B                    |      |      |       |
| 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    | U     |
| 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 all conc.          | A                         | A    | A    | A     |
| Chlorine all conc.             | A                         | A    | A    | B     |
| Fluorine traces                | A                         | A    | A    | U     |
| Gases, containing              |                           |      |      |       |
| Nitrius Oxide traces           | A                         | A    | A    | U     |
| Oleum, low conc.               | U                         |      |      |       |
| Sulphur Dioxide 50%            | A                         | A    |      |       |
| Sulphur Dioxide, low conc.     | A                         | A    | A    | B     |
| Sulphuric Acid, all conc.      | A                         | A    | A    |       |
| Gases                          | See "Waste Gases with..." |      |      |       |
| 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 10%                     | A                         | A    |      |       |

| Compound                     | Chemical Resistance   |      |      |       |
|------------------------------|-----------------------|------|------|-------|
|                              | 40°C                  | 60°C | 80°C | 100°C |
| Glycol Dichloride            | see Ethylene Chloride |      |      |       |
| Glycol Ester                 | A                     | A    | A    |       |
| Glycolic Acid 37%            | A                     | B    |      |       |
| Glycolic Acid Butyl Ester    | A                     | A    |      |       |
| Glystantin(                  | 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    |      |       |
| Hydrobromic Acid 20%         | A                     | A    |      |       |
| Hydrobromic Acid 50%         | A                     | A    |      |       |
| Hydrochloric Acid 10%        | A                     | A    | A    | U     |
| Hydrochloric Acid 20%        | A                     | A    | B    | U     |
| Hydrochloric Acid 30%        | A                     | A    | A    | U     |
| Hydrochloric Acid 30%        | A                     |      | B    | U     |
| 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                     | U    |      |       |
| Hydrogen Phosphide           | A                     |      |      |       |
| Hydrogen Sulphide, H2S       | A                     |      |      |       |
| Hydrogen Sulphide (Aq. Sol.) | A                     | A    |      |       |
| Hydrogen Sulphide, dry       | A                     | A    | A    |       |
| Hydroquinone                 | A                     | A    |      |       |
| Hydrosulphite                | A                     | A    |      |       |
| Hydroxylamine Sulphate       | A                     | A    |      |       |
| Hypochlorous Acid            | A                     | A    |      |       |
| Hydraulic Fluids             | A                     | B    |      |       |
| Hyrazine Hydrate             | A                     | A    |      |       |

| Compound                    | Chemical Resistance |      |      |       |
|-----------------------------|---------------------|------|------|-------|
|                             | 40°C                | 60°C | 80°C | 100°C |
| Igepal                      | A                   | A    | A    |       |
| Ink                         | A                   | A    | A    |       |
| Iodine                      | A                   |      | U    |       |
| Iodine, alcoholic sol.      | B                   |      |      |       |
| Iodine ink                  | A                   |      |      |       |
| Iodine-Potassium Iodide, 3% | A                   | A    |      |       |
| Iodine Solution             | U                   |      |      |       |
| 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    |      |       |
| Linseed 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    |       |
| 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    |      |       |

| Compound                        | Chemical Resistance |      |      |       |
|---------------------------------|---------------------|------|------|-------|
|                                 | 40°C                | 60°C | 80°C | 100°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    |       |
| 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    |       |

| Compound                      | Chemical Resistance   |      |      |       |
|-------------------------------|-----------------------|------|------|-------|
|                               | 40°C                  | 60°C | 80°C | 100°C |
| Monochloro Benzene            | D                     |      |      |       |
| Monoethanolamine              | A                     |      |      |       |
| Monoethyl Ether               | A                     | A    | A    |       |
| Monomethyl Aniline            | A                     | A    | A    |       |
| Morpholine                    | A                     | A    |      |       |
| Motor Oil                     |                       |      | C    |       |
| Mowith                        | A                     | A    |      |       |
| Mustard                       | A                     | B    |      |       |
| Nafta                         | B                     | U    |      |       |
| Naphthalene, Naphthaline      | A                     | C    |      |       |
| Natural gas                   | A                     | A    |      |       |
| Nickel                        | A                     |      |      |       |
| Nickel Chloride               | A                     | B    |      |       |
| 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            |      |      |       |
| Ozone                         | C                     |      | U    |       |
| Painting Turpentine           | see Thinner           |      |      |       |
| Palm Kernal Oil               | A                     | A    |      |       |
| Palm Oil                      | B                     | B    |      |       |

| Compound                         | Chemical Resistance |      |      |       |
|----------------------------------|---------------------|------|------|-------|
|                                  | 40°C                | 60°C | 80°C | 100°C |
| 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 Chlora        |                     |      |      |       |
| Amide 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    |       |
| 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    |      |       |



| Compound                           | Chemical Resistance      |      |      |       |
|------------------------------------|--------------------------|------|------|-------|
|                                    | 40°C                     | 60°C | 80°C | 100°C |
| 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 Bisulphate               | A                        | A    |      |       |
| Potassium Borate 1%                | A                        | A    | A    |       |
| Potassium Bromate                  | A                        | A    | A    |       |
| Potassium Bromide                  | A                        | A    | A    |       |
| Potassium Carbonate                | A                        | A    | A    |       |
| Potassium Chlorate                 | A                        | A    | A    |       |
| Potassium Chloride                 | 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    | U     |
| 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 Phosphate                | 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    | U     |
| Potassium Tetracyano Cuprate       | A                        | A    |      |       |
| Potassium Thiosulphate             | A                        | A    |      |       |
| Propargyl Alcohol                  | A                        |      |      |       |
| Propane Acid                       | see Propionic Acid       |      |      |       |
| Propane Diol                       | see Propylene Glycol     |      |      |       |
| Propane Triol                      | see Glycerine            |      |      |       |

| Compound                     | Chemical Resistance  |      |      |       |
|------------------------------|----------------------|------|------|-------|
|                              | 40°C                 | 60°C | 80°C | 100°C |
| Propane, gas                 | A                    | B    |      |       |
| Propane, liquid              | B                    |      |      |       |
| 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 Dichloride         | 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    |      |       |
| 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    |       |
| 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                    |      |      |       |
| Sodium Chlorite and Bleach   | A                    |      | B    |       |
| Sodium Chlorite and Water    | A                    |      |      |       |
| Sodium Chromate              | A                    | A    |      |       |

| Compound  | Chemical Resistance |      |      |       |
|---|---------------------|------|------|-------|
|   | 40°C                | 60°C | 80°C | 100°C |
| 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.<br>(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    |      |       |
| 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<br>Carbon Disulphide 0.01% | A                   | A    |      |       |
| Spinning-Bath Oil containing<br>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    |       |
| Starch Syrup  | A                   | 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    |      |       |
| Sulfuric Acid 98%                                       | U                   |      |      |       |
| Sulphates   | A                   | A    |      |       |

| Compound                                   | Chemical Resistance            |      |      |       |
|--|--------------------------------|------|------|-------|
|  | 40°C                           | 60°C | 80°C | 100°C |
| 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 Y50%                        | A                              | A    | A    |       |
| Sulphuric Acid 70%                         | A                              |      | C    |       |
| Sulphuric Acid 80-90%                      | A                              | C    |      |       |
| Sulphuric Acid 96%                         |                                |      |      | C     |
| Sulphuric Acid 98%                         | U                              |      |      |       |
| Sulphuric Ether                            | B                              | C    |      |       |
| Sulphurous Acid                            | A                              | A    |      |       |
| Sulphuryl Chloride                         | B                              |      |      |       |
| Superchloric Acid                          | see Perchloric Acid            |      |      |       |
| Synthetic Washing Powder,<br>home quality  | A                              | A    | A    |       |
| Tallow                                     | A                              | B    |      |       |
| Tannic Acid                                | A                              | A    |      |       |
| Tannin                                     | see Ascorbic Acid              |      |      |       |
| Tar  | U                              |      |      |       |
| Tartaric Acid (Dihydroxy<br>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 Naph-<br>talene |      |      |       |
| 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    |       |
| Tri  | see Trichloro Ethylene         |      |      |       |
| Tributyle 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                         | U                              |      |      |       |
| Trichloro Methane                          | see Chloroform                 |      |      |       |
| Tricresyl Phosphate                        | A                              | A    |      |       |
| Triethanolamine                            | A                              | B    |      |       |
| Triethylene Glycol                         | A                              | A    |      |       |
| Trilom, trade quality                      | A                              | A    | A    |       |
| Trimethyl Borate                           | U                              |      |      |       |
| Trimethylbenzene                           | see Pseudocumol                |      |      |       |
| Trimethylol Propane                        | A                              | A    |      |       |

| Compound   | Chemical Resistance |      |      |       |
|--|---------------------|------|------|-------|
|  | 40°C                | 60°C | 80°C | 100°C |
| 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    |      |       |
| 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   |      |      |       |

| Compound                          | Chemical Resistance     |      |      |       |
|-----------------------------------|-------------------------|------|------|-------|
|                                   | 40°C                    | 60°C | 80°C | 100°C |
| 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    |       |

# Supplements

Table No 33.1: Allowable working pressures for conveying water in Pexgol pipes, with a safety factor C = 1,25

| Temperature.<br>In °C | Years<br>of service | Pipe series (S)                  |       |       |       |       |       |
|-----------------------|---------------------|----------------------------------|-------|-------|-------|-------|-------|
|                       |                     | 7.6                              | 6.3   | 5     | 4     | 3.2   | 2.5   |
|                       |                     | Standard dimension ratio (SDR)   |       |       |       |       |       |
|                       |                     | 16.2                             | 13.6  | 11    | 9     | 7.4   | 6     |
|                       |                     | Allowable working pressure (bar) |       |       |       |       |       |
| 10                    | 1                   | 11.80                            | 14.20 | 17.90 | 22.50 | 28.30 | 35.66 |
|                       | 5                   | 11.60                            | 13.90 | 17.50 | 22.10 | 27.80 | 35.03 |
|                       | 10                  | 11.50                            | 13.80 | 17.40 | 21.90 | 27.60 | 34.78 |
|                       | 25                  | 11.40                            | 13.70 | 17.20 | 21.70 | 27.30 | 34.40 |
|                       | 50                  | 11.30                            | 13.60 | 17.10 | 21.50 | 27.10 | 34.15 |
|                       | 100                 | 11.20                            | 13.50 | 17.00 | 21.40 | 26.90 | 33.89 |
| 20                    | 1                   | 10.50                            | 12.60 | 15.80 | 19.90 | 25.10 | 31.63 |
|                       | 5                   | 10.30                            | 12.30 | 15.50 | 19.60 | 24.60 | 31.00 |
|                       | 10                  | 10.20                            | 12.20 | 15.40 | 19.40 | 24.40 | 30.74 |
|                       | 25                  | 10.10                            | 12.10 | 15.20 | 19.20 | 24.20 | 30.49 |
|                       | 50                  | 10.00                            | 12.00 | 15.10 | 19.10 | 24.00 | 30.24 |
|                       | 100                 | 9.90                             | 11.90 | 15.00 | 18.90 | 23.80 | 29.99 |
| 30                    | 1                   | 9.30                             | 11.10 | 14.00 | 17.70 | 22.30 | 28.10 |
|                       | 5                   | 9.15                             | 10.90 | 13.80 | 17.30 | 21.90 | 27.59 |
|                       | 10                  | 9.05                             | 10.80 | 13.70 | 17.20 | 21.70 | 27.34 |
|                       | 25                  | 8.95                             | 10.70 | 13.50 | 17.00 | 21.40 | 26.96 |
|                       | 50                  | 8.90                             | 10.60 | 13.40 | 16.90 | 21.30 | 26.84 |
|                       | 100                 | 8.80                             | 10.60 | 13.30 | 16.80 | 21.10 | 26.59 |
| 40                    | 1                   | 8.30                             | 9.90  | 12.50 | 15.70 | 19.80 | 24.95 |
|                       | 5                   | 8.10                             | 9.70  | 12.20 | 15.40 | 19.40 | 24.44 |
|                       | 10                  | 8.05                             | 9.60  | 12.10 | 15.30 | 19.30 | 24.32 |
|                       | 25                  | 8.00                             | 9.50  | 12.00 | 15.10 | 19.10 | 24.07 |
|                       | 50                  | 7.90                             | 9.40  | 11.90 | 15.00 | 18.90 | 23.81 |
|                       | 100                 | 7.80                             | 9.40  | 11.80 | 14.90 | 18.70 | 23.56 |
| 50                    | 1                   | 7.40                             | 8.80  | 11.10 | 14.00 | 17.70 | 22.30 |
|                       | 5                   | 7.25                             | 8.70  | 10.90 | 13.70 | 17.30 | 21.80 |
|                       | 10                  | 7.20                             | 8.60  | 10.80 | 13.60 | 17.20 | 21.67 |
|                       | 25                  | 7.10                             | 8.50  | 10.70 | 13.50 | 17.00 | 21.42 |
|                       | 50                  | 7.00                             | 8.40  | 10.60 | 13.40 | 16.80 | 21.17 |
|                       | 100                 | 7.00                             | 8.30  | 10.50 | 13.20 | 16.70 | 21.04 |
| 60                    | 1                   | 6.60                             | 7.90  | 9.90  | 12.50 | 15.80 | 19.91 |
|                       | 5                   | 6.45                             | 7.70  | 9.70  | 12.30 | 15.50 | 19.53 |
|                       | 10                  | 6.40                             | 7.70  | 9.70  | 12.20 | 15.30 | 19.28 |
|                       | 25                  | 6.35                             | 7.60  | 9.50  | 12.00 | 15.20 | 19.15 |
|                       | 50                  | 6.30                             | 7.50  | 9.50  | 11.90 | 15.00 | 18.90 |
|                       | 70                  | 1                                | 5.90  | 7.10  | 8.90  | 11.20 | 14.10 |
| 5                     |                     | 5.80                             | 6.90  | 8.70  | 11.00 | 13.80 | 17.39 |
| 10                    |                     | 5.75                             | 6.80  | 8.60  | 10.90 | 13.70 | 17.26 |
| 25                    |                     | 5.65                             | 6.80  | 8.50  | 10.80 | 13.60 | 17.14 |
| 50                    |                     | 5.60                             | 6.70  | 8.50  | 10.70 | 13.40 | 16.88 |
| 80                    |                     | 1                                | 5.30  | 6.30  | 8.00  | 10.00 | 12.70 |
|                       | 5                   | 5.20                             | 6.20  | 7.80  | 9.80  | 12.40 | 15.62 |
|                       | 10                  | 5.15                             | 6.10  | 7.70  | 9.80  | 12.30 | 15.50 |
|                       | 25                  | 5.10                             | 6.10  | 7.60  | 9.60  | 12.10 | 15.25 |
|                       | 50                  | 5.10                             | 6.10  | 7.50  | 9.50  | 12.00 | 15.12 |
|                       | 90                  | 1                                | 4.80  | 5.70  | 7.20  | 9.00  | 11.40 |
| 5                     |                     | 4.65                             | 5.60  | 7.00  | 8.80  | 11.10 | 13.99 |
| 10                    |                     | 4.60                             | 5.50  | 6.90  | 8.80  | 11.00 | 13.86 |
| 25                    |                     | 4.60                             | 5.50  | 6.90  | 8.70  | 11.00 | 13.86 |
| 50                    |                     | 4.50                             | 5.40  | 6.80  | 8.60  | 10.90 | 13.73 |
| 95                    |                     | 1                                | 4.50  | 5.40  | 6.80  | 8.60  | 10.80 |
|                       | 5                   | 4.40                             | 5.30  | 6.60  | 8.40  | 10.60 | 13.36 |
|                       | 10                  | 4.40                             | 5.20  | 6.60  | 8.30  | 10.50 | 13.23 |
|                       | 25                  | 4.20                             | 5.00  | 6.50  | 8.20  | 10.40 | 13.10 |
|                       | 50                  | 4.10                             | 4.90  | 6.40  | 8.10  | 10.30 | 12.98 |
|                       | 110                 | 1                                | 4.00  | 4.80  | 6.30  | 8.00  | 10.20 |
| 5                     |                     | 2.60                             | 3.15  | 4.00  | 5.00  | 6.25  | 7.88  |
| 10                    |                     | 2.50                             | 3.00  | 3.90  | 4.90  | 6.15  | 7.75  |
| 25                    |                     | 2.50                             | 3.00  | 3.85  | 4.80  | 6.00  | 7.56  |
| 50                    |                     | 2.40                             | 2.90  | 3.80  | 4.70  | 5.90  | 7.43  |



**Application design questioner for Newtonians fluids in Horizontal installations**

**Company Name:** \_\_\_\_\_

| <i>Please answer the following questions to the best of your knowledge</i> |  |
|--|--|
| Type of transported material   |  |
| Chemical composition   |  |
| Concentration (%)  |  |
| Specific gravity (gr/cm <sup>3</sup> )                                     |  |
| Fluid temperature (deg.C)  |  |
| Ambient temperature (deg.C)  |  |
| Abrasive problems (Y/N)  |  |
| Required flow rate (m <sup>3</sup> / hr)                                   |  |
| Line length (m)  |  |
| Existing pipe outside diameter (mm)  |  |
| Existing pipe inside diameter (mm)   |  |
| Altitude differences in the line (m)                                       |  |
| Pump pressure (bar)  |  |
| Slurry minimum critical velocity (m/sec)                                   |  |

**Application questionnaire for boreholes and dewatering**

| <i>Please answer the following questions to the best of your knowledge</i> |  |
|--|--|
| Minimum dynamic water level (m)  |  |
| Depth of installation (m)  |  |
| Required flow rate (cubic meters per hour)                                 |  |
| Outlet pressure (bar)  |  |
| Water temperature (deg.C)  |  |
| Pump pressure at closed valve (bar)  |  |
| Weight of pump (kg)  |  |
| Weight of cables (kg per meter)  |  |
| Pump weight suspended on the pipe (Y/N)                                    |  |

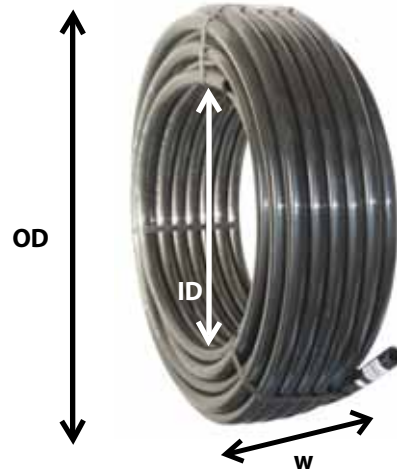


Table No. 33.2: Transportation in coils

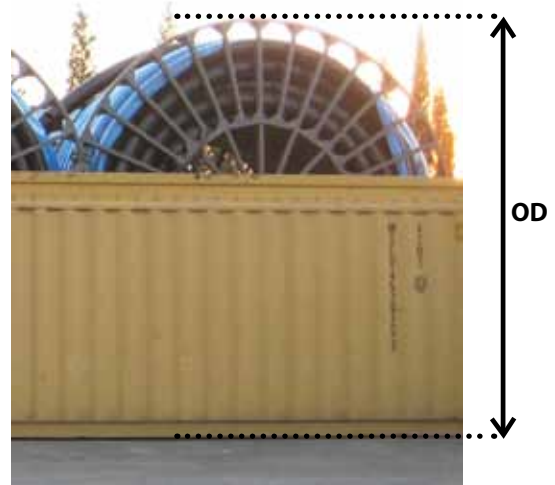
| Pipe |       | Standard Coil (20' and 40' container) |        |         |       |              | Tall Coil (40' High Cube Container) |         |         |       |              | Total Length Per Container type |        |        |
|------|-------|---------------------------------------|--------|---------|-------|--------------|-------------------------------------|---------|---------|-------|--------------|---------------------------------|--------|--------|
| OD   | Class | Length [m]                            | ID[mm] | OD [mm] | W[mm] | Weight [ Kg] | Length [m]                          | ID [mm] | OD [mm] | W[mm] | Weight [ Kg] | 20'                             | 40'    | 40'HC  |
| 40   | 10    | 1,500                                 | 1,250  | 2,150   | 950   | 442          | 2,000                               | 1,200   | 2,400   | 1,000 | 590          | 9,000                           | 18,000 | 20,000 |
| 40   | 12    | 1,500                                 | 1,250  | 2,150   | 950   | 325          | 2,000                               | 1,200   | 2,400   | 1,000 | 734          | 9,000                           | 18,000 | 20,000 |
| 40   | 15    | 1,800                                 | 1,050  | 2,200   | 1,050 | 756          | 2,100                               | 1,200   | 2,400   | 1,050 | 882          | 9,000                           | 19,800 | 21,000 |
| 40   | 19    | 1,800                                 | 1,050  | 2,200   | 1,050 | 755          | 2,100                               | 1,200   | 2,400   | 1,050 | 1,056        | 9,000                           | 19,800 | 21,000 |
| 40   | 24    | 1,800                                 | 1,050  | 2,200   | 1,050 | 1,062        | 2,100                               | 1,200   | 2,400   | 1,050 | 1,239        | 9,000                           | 19,800 | 21,000 |
| 40   | 30    | 1,800                                 | 1,050  | 2,200   | 1,050 | 1,265        | 2,100                               | 1,200   | 2,400   | 1,050 | 1,475        | 9,000                           | 19,800 | 21,000 |
| 50   | 10    | 1,000                                 | 1,000  | 2,250   | 1,200 | 458          | 1,200                               | 1,250   | 2,400   | 1,000 | 550          | 5,000                           | 11,000 | 12,000 |
| 50   | 12    | 1,200                                 | 1,050  | 2,200   | 1,050 | 648          | 1,400                               | 1,050   | 2,400   | 1,050 | 755          | 6,000                           | 13,200 | 14,000 |
| 50   | 15    | 1,200                                 | 1,050  | 2,200   | 1,050 | 780          | 1,400                               | 1,050   | 2,400   | 1,050 | 910          | 6,000                           | 13,200 | 14,000 |
| 50   | 19    | 1,200                                 | 1,050  | 2,200   | 1,050 | 940          | 1,400                               | 1,050   | 2,400   | 1,050 | 1,096        | 6,000                           | 13,200 | 14,000 |
| 50   | 24    | 1,200                                 | 1,050  | 2,200   | 1,050 | 1,104        | 1,400                               | 1,050   | 2,400   | 1,050 | 1,288        | 6,000                           | 13,200 | 14,000 |
| 50   | 30    | 1,200                                 | 1,050  | 2,200   | 1,050 | 1,308        | 1,400                               | 1,050   | 2,400   | 1,050 | 1,526        | 6,000                           | 13,200 | 14,000 |
| 63   | 10    | 600                                   | 1,200  | 2,200   | 1,050 | 618          | 800                                 | 1,200   | 2,400   | 1,050 | 824          | 3,000                           | 6,600  | 8,000  |
| 63   | 12    | 600                                   | 1,200  | 2,200   | 1,050 | 510          | 800                                 | 1,200   | 2,400   | 1,050 | 680          | 3,000                           | 6,600  | 8,000  |
| 63   | 15    | 700                                   | 1,100  | 2,200   | 1,050 | 756          | 800                                 | 1,100   | 2,400   | 1,050 | 824          | 3,500                           | 7,700  | 8,000  |
| 63   | 19    | 700                                   | 1,100  | 2,200   | 1,050 | 875          | 800                                 | 1,100   | 2,400   | 1,050 | 1,000        | 3,500                           | 7,700  | 8,000  |
| 63   | 24    | 700                                   | 1,100  | 2,200   | 1,050 | 1,015        | 800                                 | 1,100   | 2,400   | 1,050 | 1,160        | 3,500                           | 7,700  | 8,000  |
| 63   | 30    | 700                                   | 1,100  | 2,200   | 1,050 | 1,400        | 800                                 | 1,100   | 2,400   | 1,050 | 1,600        | 3,500                           | 7,700  | 8,000  |
| 75   | 10    | 300                                   | 1,450  | 2,200   | 1,000 | 309          | 450                                 | 1,450   | 2,400   | 1,000 | 464          | 1,500                           | 3,300  | 4,500  |
| 75   | 12    | 450                                   | 1,200  | 2,200   | 1,050 | 545          | 500                                 | 1,200   | 2,400   | 1,050 | 605          | 2,250                           | 4,950  | 5,000  |
| 75   | 15    | 500                                   | 1,050  | 2,200   | 1,050 | 720          | 500                                 | 1,100   | 2,400   | 1,050 | 720          | 2,500                           | 5,500  | 5,000  |
| 75   | 19    | 500                                   | 1,050  | 2,200   | 1,050 | 875          | 500                                 | 1,100   | 2,400   | 1,050 | 875          | 2,500                           | 5,500  | 5,000  |
| 75   | 24    | 500                                   | 1,050  | 2,200   | 1,050 | 1,035        | 500                                 | 1,100   | 2,400   | 1,050 | 1,035        | 2,500                           | 5,500  | 5,000  |
| 75   | 30    | 500                                   | 1,050  | 2,200   | 1,050 | 1,000        | 500                                 | 1,100   | 2,400   | 1,050 | 1,000        | 2,500                           | 5,500  | 5,000  |
| 90   | 10    | 200                                   | 1,550  | 2,200   | 1,000 | 294          | 300                                 | 1,550   | 2,450   | 1,000 | 441          | 1,000                           | 2,200  | 2,400  |
| 90   | 12    | 250                                   | 1,300  | 2,200   | 1,000 | 433          | 350                                 | 1,300   | 2,500   | 1,000 | 606          | 1,250                           | 2,750  | 2,800  |
| 90   | 15    | 300                                   | 1,150  | 2,200   | 1,050 | 627          | 400                                 | 1,300   | 2,500   | 1,000 | 836          | 1,500                           | 3,300  | 3,200  |
| 90   | 19    | 300                                   | 1,150  | 2,200   | 1,050 | 750          | 400                                 | 1,300   | 2,500   | 1,000 | 1,000        | 1,500                           | 3,300  | 3,200  |
| 90   | 24    | 300                                   | 1,150  | 2,200   | 1,050 | 891          | 400                                 | 1,300   | 2,500   | 1,000 | 1,188        | 1,500                           | 3,300  | 3,200  |
| 90   | 30    | 300                                   | 1,150  | 2,200   | 1,050 | 1,200        | 400                                 | 1,300   | 2,500   | 1,000 | 1,600        | 1,500                           | 3,300  | 3,200  |

Table No. 33.2: **Transportation in coils**

| Pipe |       | Short Coil (20' and 40' container) |        |         |       |              | Tall Coil (40' High Cube Container) |         |         |       |              | Total Length Per Container type |       |       |
|------|-------|------------------------------------|--------|---------|-------|--------------|-------------------------------------|---------|---------|-------|--------------|---------------------------------|-------|-------|
| OD   | Class | Length [m]                         | ID[mm] | OD [mm] | W[mm] | Weight [ Kg] | Length [m]                          | ID [mm] | OD [mm] | W[mm] | Weight [ Kg] | 20'                             | 40'   | 40'HC |
| 110  | 10    | N/A                                | N/A    | N/A     | N/A   | N/A          | N/A                                 | N/A     | N/A     | N/A   | N/A          | N/A                             | N/A   | N/A   |
| 110  | 12    | 130                                | 1,650  | 2,250   | 1,000 | 334          | 210                                 | 1,700   | 2,550   | 1,000 | 540          | 650                             | 1,430 | 1,680 |
| 110  | 15    | 250                                | 1,150  | 2,250   | 1,000 | 778          | 300                                 | 1,100   | 2,500   | 1,000 | 933          | 1,250                           | 2,750 | 2,400 |
| 110  | 19    | 250                                | 1,150  | 2,250   | 1,000 | 938          | 300                                 | 1,100   | 2,500   | 1,000 | 1,125        | 1,250                           | 2,750 | 2,400 |
| 110  | 24    | 250                                | 1,150  | 2,250   | 1,000 | 1,113        | 300                                 | 1,100   | 2,500   | 1,000 | 1,335        | 1,250                           | 2,750 | 2,400 |
| 125  | 10    | N/A                                | N/A    | N/A     | N/A   | N/A          | N/A                                 | N/A     | N/A     | N/A   | N/A          | N/A                             | N/A   | N/A   |
| 125  | 12    | 75                                 | 1,800  | 2,250   | 1,000 | 248          | 120                                 | 1,800   | 2,500   | 1,000 | 397          | 375                             | 825   | 960   |
| 125  | 15    | 150                                | 1,250  | 2,250   | 1,050 | 605          | 200                                 | 1,250   | 2,450   | 1,050 | 622          | 750                             | 1,650 | 1,600 |
| 125  | 19    | 150                                | 1,250  | 2,250   | 1,050 | 735          | 200                                 | 1,250   | 2,450   | 1,050 | 750          | 750                             | 1,650 | 1,600 |
| 125  | 24    | 150                                | 1,250  | 2,250   | 1,050 | 860          | 200                                 | 1,250   | 2,450   | 1,050 | 1,146        | 750                             | 1,650 | 1,600 |
| 125  | 30    | 150                                | 1,250  | 2,250   | 1,050 | 1,050        | 200                                 | 1,250   | 2,450   | 1,050 | 1,400        | 750                             | 1,650 | 1,600 |
| 140  | 10    | N/A                                | N/A    | N/A     | N/A   | N/A          | N/A                                 | N/A     | N/A     | N/A   | N/A          | N/A                             | N/A   | N/A   |
| 140  | 12    | N/A                                | N/A    | N/A     | N/A   | N/A          | 70                                  | 1,900   | 2,400   | 1,000 | 291          | N/A                             | N/A   | 700   |
| 140  | 15    | 75                                 | 1,650  | 2,200   | 1,000 | 377          | 120                                 | 1,650   | 2,450   | 1,000 | 606          | 375                             | 825   | 960   |
| 140  | 19    | 100                                | 1,300  | 2,150   | 1,000 | 610          | 140                                 | 1,300   | 2,400   | 1,000 | 854          | 500                             | 1,100 | 1,400 |
| 140  | 24    | 100                                | 1,300  | 2,150   | 1,000 | 721          | 140                                 | 1,300   | 2,400   | 1,000 | 1,009        | 500                             | 1,100 | 1,400 |
| 140  | 30    | 100                                | 1,300  | 2,150   | 1,000 | 900          | 140                                 | 1,300   | 2,400   | 1,000 | 1,260        | 500                             | 1,100 | 1,400 |
| 160  | 10    | N/A                                | N/A    | N/A     | N/A   | N/A          | N/A                                 | N/A     | N/A     | N/A   | N/A          | N/A                             | N/A   | N/A   |
| 160  | 12    | N/A                                | N/A    | N/A     | N/A   | N/A          | N/A                                 | N/A     | N/A     | N/A   | N/A          | N/A                             | N/A   | N/A   |
| 160  | 15    | N/A                                | N/A    | N/A     | N/A   | N/A          | 70                                  | 1,850   | 2,450   | 1,000 | 462          | N/A                             | N/A   | 560   |
| 160  | 19    | 70                                 | 1,560  | 2,200   | 1,250 | 553          | 115                                 | 1,560   | 2,450   | 1,250 | 909          | 280                             | 630   | 920   |
| 160  | 24    | 70                                 | 1,560  | 2,200   | 1,250 | 505          | 115                                 | 1,560   | 2,450   | 1,250 | 1,081        | 280                             | 630   | 920   |
| 160  | 30    | 70                                 | 1,560  | 2,200   | 1,250 | 770          | 115                                 | 1,560   | 2,450   | 1,250 | 1,265        | 280                             | 630   | 920   |

Table No. 33.3: Length of pipes on drums & Straight sections

| Pipe |      | Class | Weight (kg/mt) | Meters on drum | BARS in 40 ft container |                      |
|------|------|-------|----------------|----------------|-------------------------|----------------------|
| OD   | W.T. |       |                |                | 11.8 mt bars in 40- ft  | meters bars in 40 ft |
| 160  | 9.9  | 10    | 4.62           | 400            | 175                     | 2065                 |
| 200  | 12.4 | 10    | 7.23           | 165            | 116                     | 1369                 |
| 225  | 13.9 | 10    | 9.12           | 81             | 86                      | 1015                 |
| 250  | 15.5 | 10    | N/A            | N/A            | 77                      | 909                  |
| 280  | 17.3 | 10    | N/A            | N/A            | 60                      | 708                  |
| 315  | 19.5 | 10    | N/A            | N/A            | 46                      | 543                  |
| 355  | 21.9 | 10    | N/A            | N/A            | 33                      | 389                  |
| 400  | 24.7 | 10    | N/A            | N/A            | 23                      | 271                  |
| 450  | 27.8 | 10    | N/A            | N/A            | 23                      | 271                  |
| 500  | 30.9 | 10    | N/A            | N/A            | 20                      | 236                  |
| 630  | 38.9 | 10    | N/A            | N/A            | 9                       | 105                  |
| 90   | 6.7  | 12    | 1.73           | 1700           | 588                     | 6938                 |
| 110  | 8.1  | 12    | 2.57           | 1200           | 431                     | 5086                 |
| 160  | 11.8 | 12    | 3.31           | 500            | 175                     | 2065                 |
| 200  | 14.7 | 12    | 4.15           | 250            | 116                     | 1369                 |
| 225  | 16.6 | 12    | 10.75          | 136            | 86                      | 1015                 |
| 250  | 18.4 | 12    | 13.42          | 66             | 77                      | 909                  |
| 280  | 20.6 | 12    | N/A            | N/A            | 60                      | 708                  |
| 315  | 23.2 | 12    | N/A            | N/A            | 46                      | 542.8                |
| 355  | 32.2 | 12    | N/A            | N/A            | 33                      | 389                  |
| 400  | 29.4 | 12    | N/A            | N/A            | 23                      | 271                  |
| 450  | 33.1 | 12    | N/A            | N/A            | 23                      | 271                  |
| 500  | 36.7 | 12    | N/A            | N/A            | 20                      | 236                  |
| 90   | 8.2  | 15    | 2.09           | 2000           | 588                     | 6938                 |
| 110  | 10   | 15    | 3.11           | 1200           | 431                     | 5086                 |
| 140  | 12.7 | 15    | 5.02           | 780            | 248                     | 2926                 |
| 160  | 14.6 | 15    | 6.6            | 600            | 175                     | 2065                 |
| 200  | 18.1 | 15    | 10.23          | 286            | 116                     | 1369                 |
| 225  | 20.4 | 15    | 12.97          | 200            | 86                      | 1015                 |
| 250  | 22.7 | 15    | 16.05          | 105            | 77                      | 909                  |
| 280  | 25.4 | 15    | 20.1           | 67             | 60                      | 708                  |
| 315  | 28.6 | 15    | 25.46          | 56             | 46                      | 543                  |
| 355  | 32.2 | 15    | N/A            | N/A            | 33                      | 389                  |
| 200  | 22.4 | 19    | 12.4           | 385            | 116                     | 1369                 |
| 225  | 25   | 19    | 15.55          | 200            | 86                      | 1015                 |
| 315  | 35.2 | 19    | 30.65          | 100            | 46                      | 543                  |
| 450  | 50.3 | 19    | N/A            | N/A            | 23                      | 271                  |
| 90   | 12.3 | 24    | 2.97           | 2000           | 588                     | 6938                 |
| 110  | 15.1 | 24    | 4.45           | 1300           | 431                     | 5086                 |
| 160  | 21.9 | 24    | 9.4            | 600            | 175                     | 2065                 |
| 200  | 27.4 | 24    | 14.65          | 385            | 116                     | 1369                 |
| 225  | 30.8 | 24    | 18.59          | 260            | 86                      | 1015                 |
| 160  | 27.3 | 30    | 11             | 600            | 175                     | 2065                 |
| 200  | 34   | 30    | 17             | 385            | 116                     | 1369                 |



### Drum Dimentions

OD [mm] 3950

W [mm] 2100

Drum weight [Kg] 2000

### Transportation:

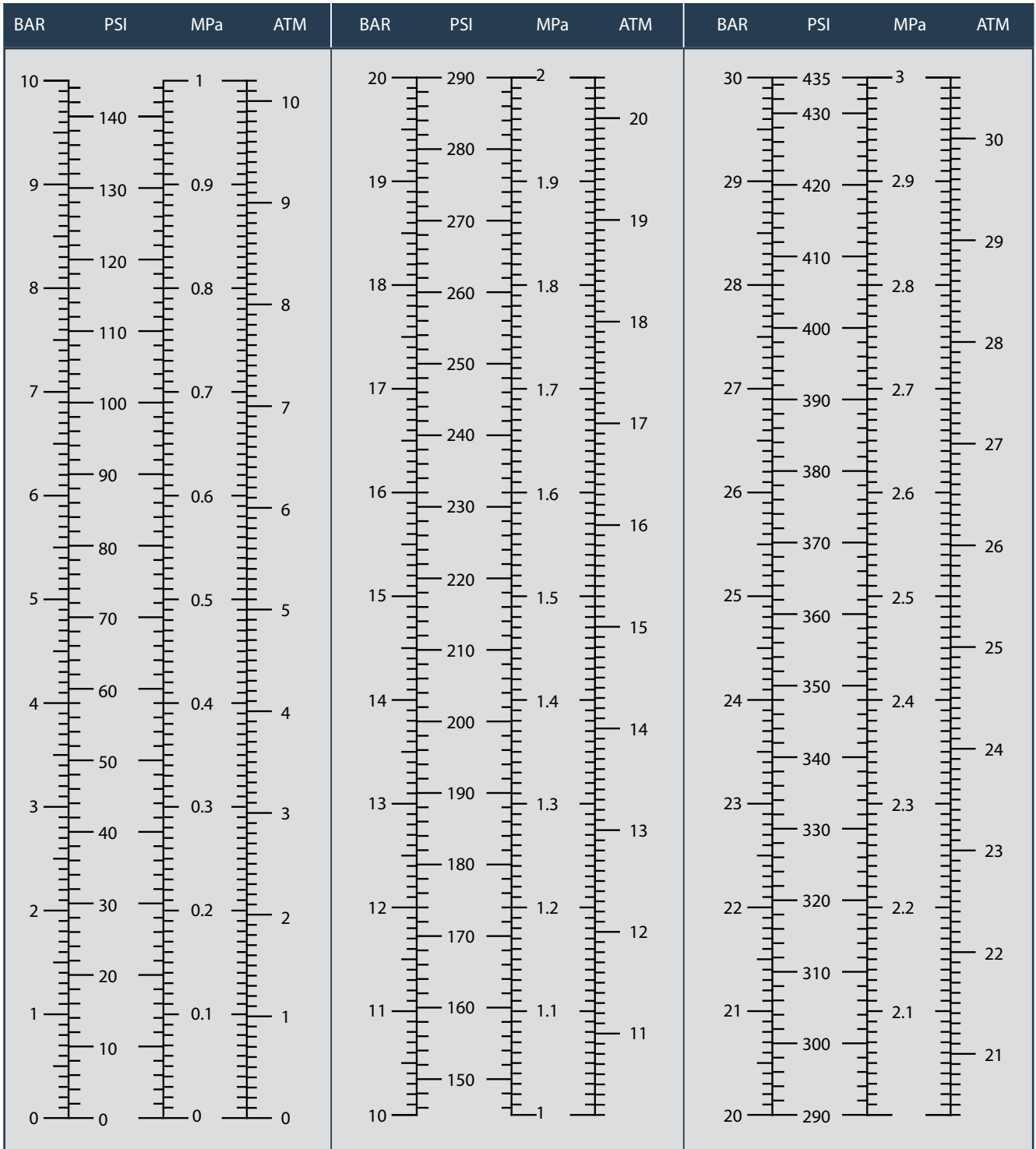
Drums: Open Top container.

3 drums per container.

Bars: 40' High Cube container

Table No. 33.5: **Conversion tables**

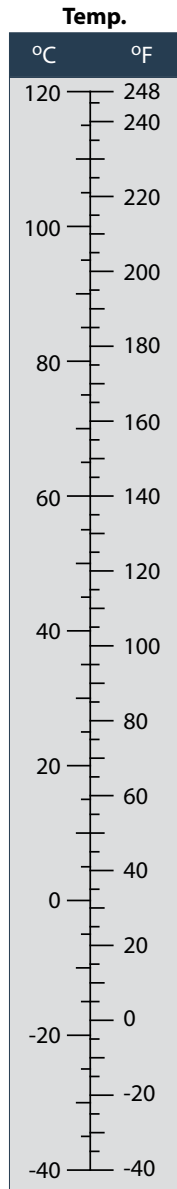
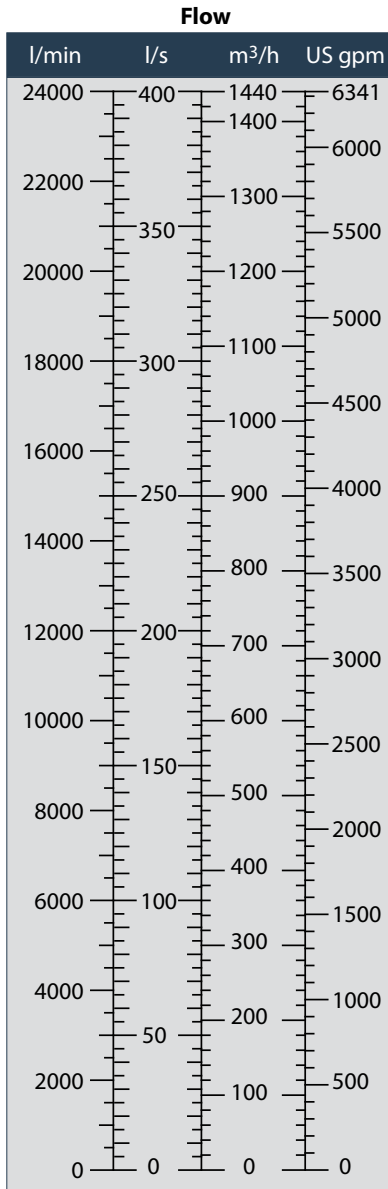
**Pressure**



| Unit             | Inch   | 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   | 1609x10 <sup>3</sup> | 1,609.34 |
| millimeters [mm] | 0.039  | 0.47    | 1                    | 1000     |
| meters [m]       | 39.37  | 3.28084 | 0.001                | 1        |



# Engineering Guide



| Quantity    | SI (Metric) Unit  | Equal US Customary Unit                          |
|-------------|---|--|
| Length      | meter (m)   | 3.281 feet (ft)                                  |
|             | meter (m)   | 39.37 inches (in)                                |
|             | millimeter (mm)   | 0.03937 inches (in)                              |
| Area        | square meter (m <sup>2</sup> )  | 10.76 ft <sup>2</sup>                            |
|             | square meter (m <sup>2</sup> )  | 1550 in <sup>2</sup>                             |
|             | square millimeter (mm <sup>2</sup> )  | 0.001550 in <sup>2</sup>                         |
| Volume      | cubic meter (m <sup>3</sup> )   | 35.31 ft <sup>3</sup>                            |
|             | cubic meter (m <sup>3</sup> )   | 264.2 gallons (gal)                              |
|             | liter   | 0.03531 ft <sup>3</sup>                          |
|             | liter   | 61.02 in <sup>3</sup>                            |
|             | liter   | 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 <sup>2</sup> )  | 1.450x10 <sup>-4</sup> lbf/in <sup>2</sup> (psi) |
|             | MegaPascal (MPa) or N/mm <sup>2</sup>   | 1.450x10 <sup>2</sup> lbf/in <sup>2</sup> (psi)  |
|             | bar   | 14.504 lbf/in <sup>2</sup> (psi)                 |
|             | kilopascal (kPa) or (kN/m <sup>2</sup> )  |  |
|             | kilogram-force/square centimeter (kgf/cm <sup>2</sup> ) or kilopond (kp/cm <sup>2</sup> ) | 0.1450 lbf/in <sup>2</sup> (psi)                 |
|             |   | 14.223 lbf/in <sup>2</sup> (psi)                 |
| Enthalpy    | Joule/gram (j/g)  | 0.4299 Btu/lbm                                   |
| Temperature | Kelvin (k)  | 1.800° Rankine (°R)                              |
|             | Kelvin (k)  | 1.8K-459.67=°Fahrenheit (°F)                     |
|             | °Celsius (°c)   | 1.8°C + 32 = °F                                  |

# MINING



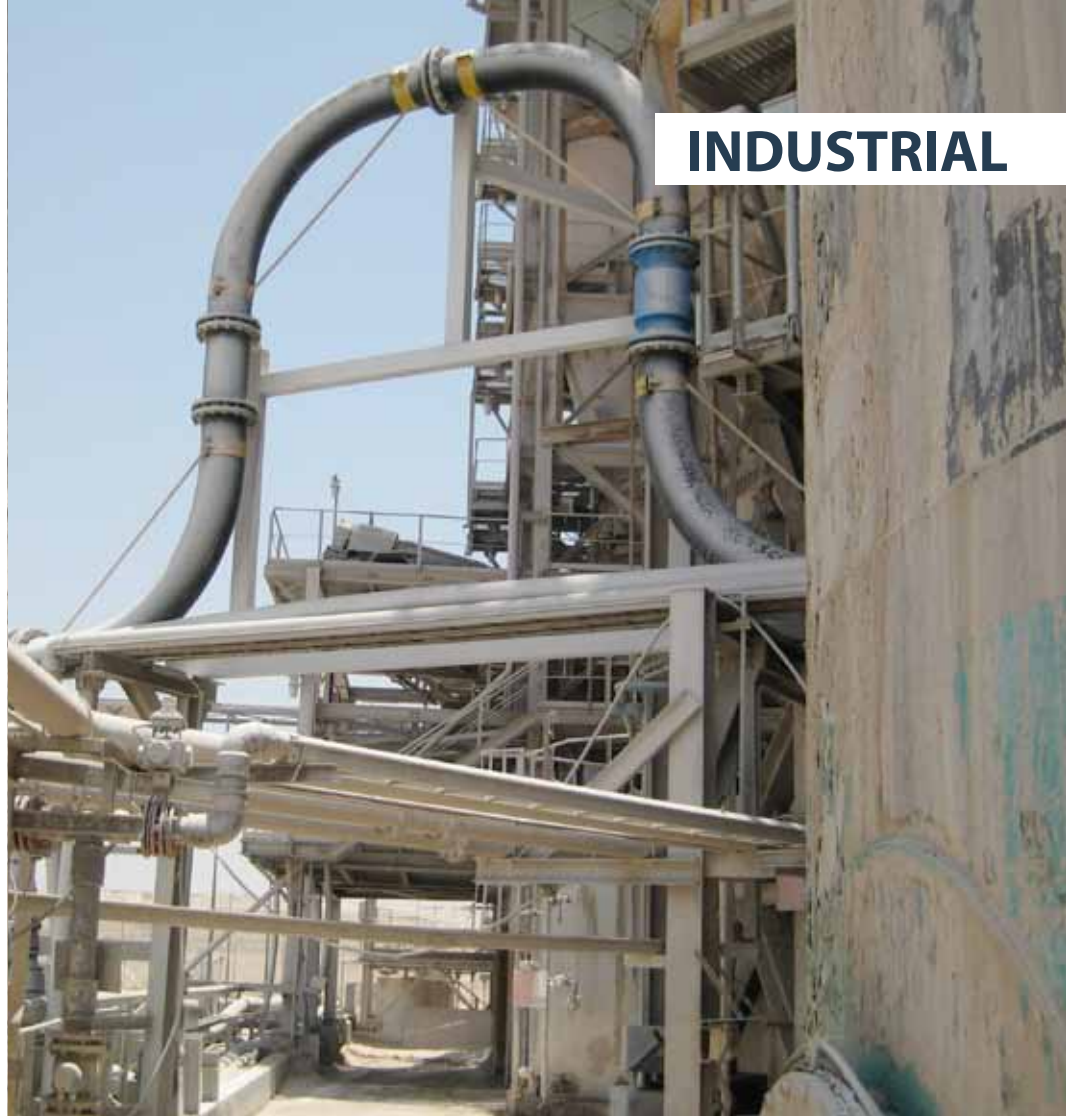
# TAILING



# INDUSTRIAL







**INDUSTRIAL**



**BOREHOLES**

# PEXGOL™

by GOLAN PLASTIC PRODUCTS Ltd.

