

POLYTETRAFLON®
TUBING MADE FROM
PTFE - PFA - FEP
ECTFE - ETFE - PVDF

PLASTICS
WITHOUT
LIMITATIONS
MADE IN GERMANY



POLYTETRA



POLYTETRAFLON® TUBING MADE FROM PTFE - PFA - FEP ECTFE - ETFE - PVDF

Plastics and fluoroplastics in particular have been our field of activity for 30 years now. We are considered as reliable partners in the industry because of our experience, creativity and the extensive consultation services provided by us.

We not only offer a complete range of products, but focus also on comprehensive consultation services in the technically challenging field of thermoplastics. We will offer you our support in finding solutions to your application. Just let us know your demands, so that you can benefit from our long-term experience in this area.

► Products and industries

Polytetra GmbH supplies a range of tubing that is produced according to varying application criteria. Speak to us about your requirements - we embrace every challenge!

Just some of the industrial applications of our products around the world:

Electrical industry, mechanical and plant engineering, electroplating, semiconductor industry, foodstuffs industry, medical technology, car industry, coating and fluid technology.

► Materials and production

POLYTETRAFLON® fluoropolymer tubing features almost universal chemical resistance, excellent anti-adhesion and electrical properties, very high temperature resistance and physiological harmlessness. Fluoropolymer tubes are divided into two classic production processes.

Paste extrusion:
This covers all PTFE tubing.

Screw extrusion:
Covers PFA, FEP, ECTFE, ETFE and PVDF.



In paste extrusion PTFE paste is formed by adding a lubricant in a cartridge and this is then pressed into a blank mould and then into a die. This involves an external sintering process over a relatively long section. The lubricant here volatilises at 100%.

There is currently a variety of PTFE pastes on the market, which all have different characteristics. For this reason Polytetra offers so-called industrial quality and pressure hose quality. Various paste materials can be used for the industrial quality.

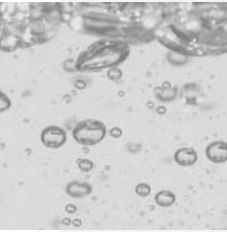
The testing process is limited to production and batch testing. POLYTETRAFLON® pressure hose quality tubing is exclusively made from replicable paste materials, which are also subjected to single coil testing. Here the customer is guaranteed to get the same material when reordering as was supplied in the first order.

Screw extrusion has the advantage that it can be produced continuously in almost unlimited lengths. Screw extrudates also feature greater material homogeneity.

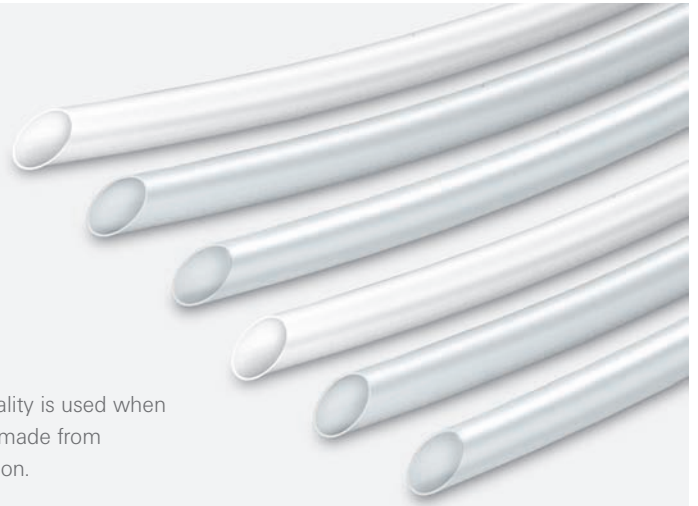
▶ For additional information on the Internet, see:

www.polytetra.com

Do you have any queries?
For consultation:
+ 49 (0)2166 / 95 90 - 0
Email: sales@polytetra.com



**POLYTETRAFLON®
PTFE TUBES
INDUSTRIAL QUALITY /
PRESSURE TUBE QUALITY**



POLYTETRAFLON® PTFE tubes are produced in two qualities. Our industrial quality is used when there are no special requirements. POLYTETRAFLON® industrial tubing can be made from various standard pastes. Industrial tubing is only tested per batch after production.

Do you need PTFE tubes for use under increased pressure or with aggressive media? POLYTETRAFLON® pressure tube quality PTFE tubes are produced from the highest quality and also replicable paste types. This ensures that users get the same quality on request if they need to reorder. You will get a test report 2.2. in accordance with EN 10204, on request also an inspection certificate.

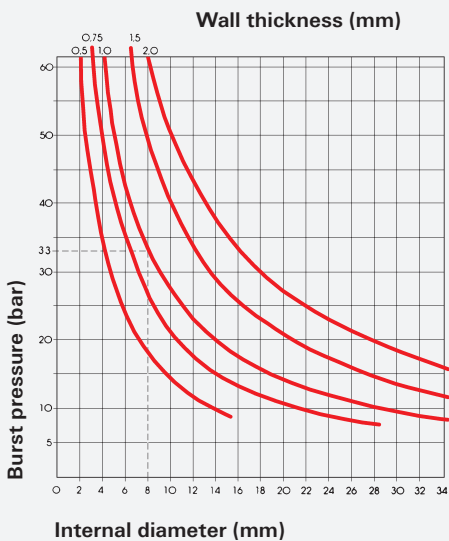
► **TOLERANCES FOR INDUSTRIAL AND PRESSURE TUBE QUALITY PTFE TUBING ACCORDING TO THE GKV STANDARD**

| Internal-Ø mm | Tolerance mm | Wall thickness mm | Tolerance |
|---------------|--------------|-------------------|-----------|
| 3 - 5 | ± 0.20 | 0.10 - 0.30 | ± 0.05 |
| > 5 - 7 | ± 0.25 | > 0.30 - 0.60 | ± 0.10 |
| > 7 - 10 | ± 0.30 | > 0.60 - 1.00 | ± 0.15 |
| > 10 - 15 | ± 0.35 | > 1.00 - 2.00 | ± 0.20 |
| > 15 - 20 | ± 0.40 | > 2.00 - 4.00 | ± 0.40 |
| > 20 - 30 | ± 0.50 | > 4.00 - 6.00 | ± 0.50 |
| > 30 - 40 | ± 0.60 | | |
| > 40 | on request | | |

Special tolerances on request

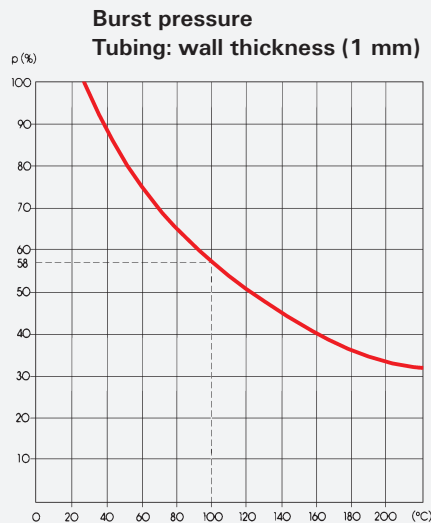
POLYTETRAFLON® PTFE tubing is available in wall thicknesses of 0.50 mm, 1.00 mm and 1.50 mm and internal diameters of approx. 1 mm to 65 mm. Special wall thicknesses or special diameters are available on request. Our Technical Sales Department will be glad to advise you.

► **BURST PRESSURE AT ROOM TEMPERATURE**



Identifying the operating pressure at room temperature.
Example: I-Ø 8 mm, wall 1 mm. Value from burst pressure curve = 33 bar. Safety factor = 3 = division by 3 = 33:3 = 11 bar operating pressure at RT

► **TEMPERATURE CORRECTION CURVE**



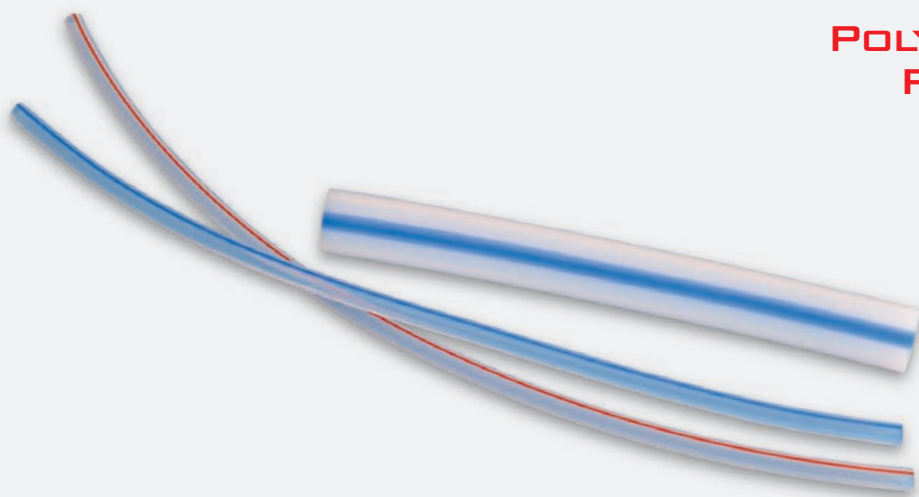
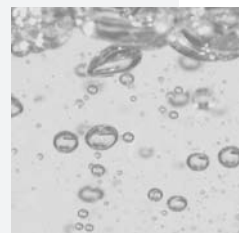
Example: I-Ø 8 mm, wall 1 mm at 100°C. Operating pressure at RT = 11 bar, value from temperature curve = 58 %, 58 % of 11 bar = 6.4 bar max. operating pressure at 100°C

► For additional information on the Internet, see:

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**POLYTETRAFLON®
PTFE TUBING**



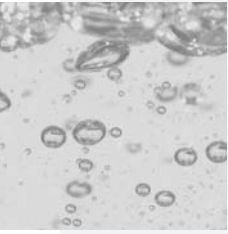
► **POLYTETRAFLON® PTFE TUBING
AWG SIZES (AMERICAN WIRE GAUGE)**

Production is possible in 10 different basic colours / colour strips, but not to RAL or HKS. Please be aware that the chemical resistance also changes in coloured tubing. We shall be glad to advise you. Specification to FDA or USP class VI (if nec. also customer specification) must be notified at the enquiry stage, but at the latest when the order is placed. Retrospective specification is no longer possible.

| AWG no. | Internal diameter in mm | | | Wall thickness in mm | | |
|---------|-------------------------|--------|--------|----------------------|-------------|-----------------|
| | Nominal Ø | min. Ø | max. Ø | thick-walled | thin-walled | standard-walled |
| 30 | 0.30 | 0.25 | 0.38 | 0.23 | 0.15 | 0.23 |
| 28 | 0.40 | 0.33 | 0.48 | 0.23±0.05 | 0.15±0.05 | 0.23±0.05 |
| 26 | 0.50 | 0.41 | 0.56 | 0.23 | 0.15 | 0.23 |
| 24 | 0.60 | 0.51 | 0.69 | 0.30 | 0.15 | 0.25 |
| 23 | 0.65 | 0.58 | 0.76 | 0.30±0.075 | 0.15±0.05 | 0.25±0.075 |
| 22 | 0.70 | 0.65 | 0.81 | 0.30 | 0.15 | 0.25 |
| 20 | 0.90 | 0.81 | 1.02 | 0.40 | 0.15 | 0.30 |
| 19 | 1.00 | 0.91 | 1.12 | 0.40±0.075 | 0.15±0.05 | 0.30±0.075 |
| 18 | 1.10 | 1.01 | 1.24 | 0.40 | 0.15 | 0.30 |
| 17 | 1.20 | 1.14 | 1.37 | 0.40 | 0.15 | 0.30 |
| 16 | 1.40 | 1.29 | 1.55 | 0.40±0.075 | 0.15±0.05 | 0.30±0.075 |
| 15 | 1.50 | 1.45 | 1.70 | 0.40 | 0.15 | 0.30 |
| 14 | 1.70 | 1.63 | 1.88 | 0.40 | 0.20 | 0.30 |
| 13 | 1.90 | 1.83 | 2.08 | 0.40±0.075 | 0.20±0.05 | 0.30±0.075 |
| 12 | 2.20 | 2.06 | 2.31 | 0.40 | 0.20 | 0.30 |
| 11 | 2.40 | 2.31 | 2.57 | 0.40 | 0.20 | 0.30 |
| 10 | 2.70 | 2.59 | 2.84 | 0.40±0.075 | 0.20±0.075 | 0.30±0.075 |
| 9 | 3.00 | 2.89 | 3.15 | 0.51±0.100 | 0.20 | 0.38 |
| 8 | 3.40 | 3.28 | 3.58 | 0.51 | 0.20 | 0.38 |
| 7 | 3.80 | 3.66 | 4.01 | 0.51±0.100 | 0.20±0.05 | 0.38±0.075 |
| 6 | 4.20 | 4.11 | 4.52 | 0.51 | 0.25±0.075 | 0.38 |
| 5 | 4.70 | 4.62 | 5.03 | 0.51 | 0.25 | 0.38 |
| 4 | 5.30 | 5.18 | 5.69 | 0.51±0.100 | 0.25±0.075 | 0.38±0.075 |
| 3 | 6.00 | 5.82 | 6.32 | 0.51 | 0.25 | 0.38 |
| 2 | 6.70 | 6.55 | 7.06 | 0.51 | 0.25 | 0.38 |
| 1 | 7.50 | 7.34 | 7.90 | 0.51±0.100 | 0.25±0.075 | 0.38±0.075 |
| 0 | 8.40 | 8.26 | 8.81 | 0.51 | 0.25 | 0.38 |

Materials: PTFE-Standard

PFA - FEP - ECTFE - ETFE - PVDF on request



**POLYTETRAFLON®
TUBING MADE FROM
PFA FEP CoEX®
ECTFE ETFE PVDF**



POLYTETRAFLON® PFA tubing

has almost the same chemical and thermal characteristics as PTFE tubing, but has much higher bending fatigue strength and is much less sensitive to buckling.

POLYTETRAFLON® FEP tubing

is less resistant against aggressive chemical media than PTFE tubing, but does have a clear advantage: it is far more transparent and is used where liquids inside the tube need to be monitored.

POLYTETRAFLON® CoEX® tubing

is unique because two plastic materials can be processed into one tube in one operation. This means users can exploit the positive characteristics of two materials. We shall be glad to advise you.

Possible combinations:

PFA/PFA – PFA/FEP – FEP/PFA
PFA/MFA – MFA/FEP – PVDF/PVDF
PVDF/ECTFE – ECTFE/PVDF

POLYTETRAFLON® ECTFE tubing

has excellent electrical isolation properties and is resistant to numerous chemicals, including strong acids, chlorine and sodium hydroxide.

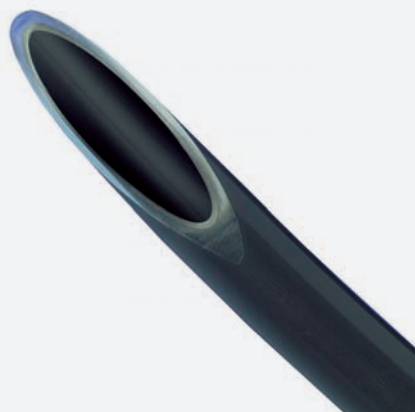
POLYTETRAFLON® ETFE tubing

has much higher pressure resistance than PTFE tubing for example. With regard to mechanical characteristics, ETFE offers excellent abrasion resistance and stiffness.

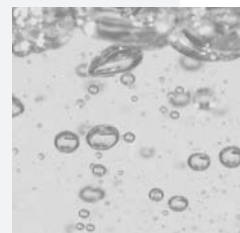
POLYTETRAFLON® PVDF tubing

has a good price-performance ratio. PVDF also has higher stiffness and pressure resistance than PTFE.

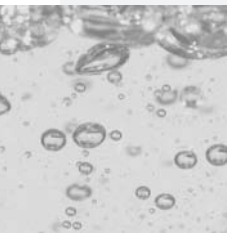
POLYTETRAFLON® tubing made from the above materials is produced with metric and imperial dimensions. Our Technical Sales Department will be glad to advise you.



**PROPERTIES
OF FLUOROPLASTICS**



| Feature | Standard | Unit | PTFE | PFA | FEP | ETFE | PCTFE | PVDF | ECTFE | |
|---------------------|---|-----------|-----------------------------------|-------------------|-------------------|-------------------|--------------------|-------------------|--------------------|--------------------|
| general | Density | ISO 1183 | g/cm ³ | 2.14 - 2.19 | 2.12 - 2.17 | 2.12 - 2.17 | 1.71-1.78 | 2.10-2.16 | 1.75-1.78 | 1.67-1.70 |
| | Upper service temperature, without load | | °C | 250-260 | 250-260 | 200-205 | 150-180 | 150-180 | 150-170 | 150-180 |
| | Combustibility | | | non-combustible | non-combustible | non-combustible | self-extinguishing | non-combustible | self-extinguishing | self-extinguishing |
| | Water absorption at 23 °C Saturation | | % | >0.05 | >0.05 | >0.05 | >0.05 | >0.05 | >0.05 | >0.05 |
| thermal | Melting temperature | ASTM 2116 | °C | 327 | 300-310 | 253-282 | 265-275 | 185-210 | 165-178 | 240-247 |
| | Lin. thermal expansion coefficient | DIN 52612 | 10 ⁻⁵ ·K ⁻¹ | 10-16 | 10-16 | 10-14 | 8-12 | 4-8 | 8-18 | 4-8 |
| | Heat conductivity at 23 °C | | W/K·m | 0.23 | 0.22 | 0.20 | 0.23 | 0.19 | 0,17 | 0.15 |
| | Specific heat at 23 ° | | kJ/kg·K | 1.01 | 1.09 | 1.17 | 1.95 | 0.92 | 1.38 | |
| | Oxygen index | | % | >95 | >95 | >95 | 30 | >95 | 43 | 60 |
| mechanical | Tensile strength at 150 °C | ISO 527 | N/mm ² | 29-39 14-20 | 27-32 15-21 | 19-25 4-6 | 36-48 8-12 | 31-42 1-2 | 38-50 7.5-10.5 | 41-54 3.5-4.5 |
| | Elastic limit at 23 °C | ISO 527 | N/mm ² | 10 | 14 | 12 | 24 | 40 | 46 | 34 |
| | Ultimate elongation at 23 °C | ISO 527 | % | 200-500 | 300 | 250-350 | 200-500 | 80-250 | 20-250 | 200-300 |
| | Tensile E-Modulus | ISO 527 | N/mm ² | 400-800 | 650 | 350-700 | 500-1200 | 1000-1200 | 1800-1800 | 1200-1800 |
| | Limiting bending stress at 23 °C | ISO 178 | N/mm ² | 18-20 | 15 | | 25-30 | 52-63 | 55 | 50 |
| | Bending E-Modulus | ISO 527 | N/mm ² | 600-800 | 650-700 | 660-680 | 1000-1500 | 1200-1500 | 1200-1400 | 1700 |
| | Ball indentation hardness | ISO 2039 | | 25-30 | 25-30 | 23-29 | 34-40 | 55-70 | 62-68 | 55-65 |
| | Rockwell hardness R | ISO 2039 | | 20-30 | 25-35 | 20-30 | 45-55 | 103-118 | 100-115 | 85-95 |
| electrical | Shore hardness D | DIN 53505 | | 55-72 | 60-65 | 55-60 | 63-75 | 70-90 | 73-85 | 70-80 |
| | Friction coefficient | | | 0.05-0.2 | 0.2-0.3 | 0.3-0.35 | 0.3-0.5 | 0.3-0.4 | 0.2-0.4 | 0.65 |
| | Dielectric constant at 100Hz | IEC 60250 | | <2.1 | <2.1 | <2.1 | 2,6 | 2.3-2.8 | | 2.3-2.6 |
| | at 10 ⁶ | | | <2.1 | <2.1 | <2.1 | 2,6 | 2.3-2.4 | | |
| | Dielectric loss factor at 100Hz | | *10 ⁻⁴ | 0.5-0.7 | 0.5-0.7 | 0.5-0.7 | 5-6 | | | 10-15 |
| | Specific flow resistance | IEC 60093 | Ω·cm | >10 ¹⁸ | >10 ¹⁸ | >10 ¹⁸ | >10 ¹⁶ | >10 ¹⁸ | >10 ¹⁵ | >10 ¹⁵ |
| | Surface resistance | DIN 53482 | Ω | >10 ¹⁶ | >10 ¹⁶ | >10 ¹⁶ | >10 ¹⁴ | >10 ¹⁶ | >10 ¹³ | >10 ¹² |
| | Creep resistance | IEC 60112 | | KA3c | | KA3c | | KA3c | | |
| Dielectric strength | IEC 60243-2 | kV/mm | >40 | >50 | >50 | >40 | >40 | >40 | >40 | |



POLYTETRAFLON®
CORRUGATED TUBING MADE FROM
PTFE PFA FEP MFA



POLYTETRAFLON® corrugated tubing offers a wide range of usage possibilities and is used wherever greater flexibility is required. Production from conductive PTFE is also possible depending on the application.

We differentiate between:

► **SERIES W-501 MATERIAL PTFE**

We have a range of corrugated tubing that is oriented to the DIN standard in its dimensions, nominal widths and possible connections to the conventional dimensions for plastic piping.

| DN | Inches | ID mm | ID tol. mm | Wall mm | Wall tol. mm | OD | OD tol. |
|----|--------|-------|------------|---------|--------------|-------|----------|
| 6 | 1/4" | 6.70 | +/- 0.30 | 0.65 | +/- 0.10 | 10.00 | +/- 0.30 |
| 8 | 5/16" | 8.50 | +/- 0.40 | 0.65 | +/- 0.10 | 12.70 | +/- 0.30 |
| 10 | 3/8" | 9.60 | +/- 0.40 | 0.65 | +/- 0.10 | 15.00 | +/- 0.30 |
| 12 | 1/2" | 13.60 | +/- 0.40 | 0.70 | +/- 0.15 | 18.20 | +/- 0.40 |
| 15 | 5/8" | 16.20 | +/- 0.40 | 0.70 | +/- 0.15 | 21.20 | +/- 0.40 |
| 20 | 3/4" | 20.00 | +/- 0.50 | 0.70 | +/- 0.15 | 26.00 | +/- 0.50 |
| 22 | 7/8" | 23.00 | +/- 0.50 | 0.80 | +/- 0.15 | 28.70 | +/- 0.75 |
| 25 | 1" | 25.00 | +/- 0.50 | 0.80 | +/- 0.15 | 32.40 | +/- 0.50 |
| 32 | 1 1/4" | 32.30 | +/- 0.75 | 0.90 | +/- 0.15 | 39.00 | +/- 0.75 |

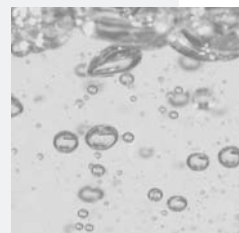
Supplied in coiled bundles in production lengths.

► For additional information on the Internet, see:

www.polytetra.com

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Email: sales@polytetra.com

**POLYTETRAFLON®
CORRUGATED TUBING MADE FROM
PTFE PFA FEP MFA**



► **SERIES W-503 MATERIAL PTFE**

| DN Ø d ₁ mm | Flow Ød ₂ mm | Wall thickness s mm | Smallest bend radius mm | Standard length mm | Maximum available length mm | Flanged tangent Ød ₂ mm | Pressure (abs.) at | |
|------------------------------|-------------------------------|---------------------------|-------------------------------|--------------------------|-----------------------------------|--|--------------------|--------------|
| | | | | | | | 20°C bar | 100°C bar |
| 15 | 10 | 1.0 | 35 | 3000 | 10000 | 25 | approx. 6.0 | approx. 1.5 |
| 20 | 13 | 1.0 | 45 | 3000 | 10000 | 32 | approx. 5.5 | approx. 1.5 |
| 25 | 17 | 1.0 | 50 | 3000 | 10000 | 40 | approx. 5.0 | approx. 1.5 |
| 32 | 21 | 1.0 | 60 | 3000 | 8000 | 52 | approx. 4.5 | approx. 1.5 |
| 40 | 28 | 1.5 | 75 | 3000 | 5000 | 70 | approx. 3.5 | approx. 1.5 |
| 50 | 35 | 1.5 | 90 | 3000 | 5000 | 90 | approx. 2.5 | approx. 1.5 |

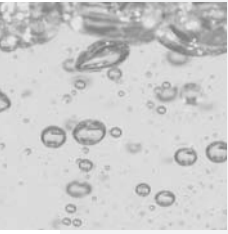
Available in standard lengths and maximum lengths as shown in the table

Type 503-1 = with 2 collar fittings

Type 503-2 = with 1 collar and 1 flange

Type 503-3 = with 2 flanges

At customer request we also produce the so-called combination corrugated tubing to drawings or specific dimensions, which consists of some smooth and some corrugated sections. Designs in antistatic black or made from PFA, FEP or MFA are also possible. Please do not hesitate to contact us.



POLYTETRAFLON® APPLICATION EXAMPLES



Customer-specific tubing made from
PTFE - PFA or PVDF

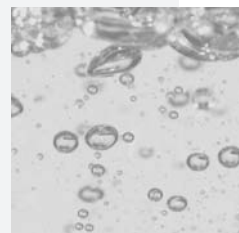


Temperature sensor with PFA coating,
end liquid tightly welded, additionally
welded seal to flange DN 50.



PTFE tube lengths, warm formed

**POLYTETRAFLON®
SPECIAL PRODUCTS**



Would you like to pre-treat fluoropolymer tubing for gluing?

Tetra-Etch® - the clean and easy method of preparing fluoropolymer surfaces for gluing by etching. Tetra-Etch® can be used on PTFE, PFA or FEP and wears away the fluor atoms on the material surface. Additional use of our special two-component glue makes the listed materials adherent.

Request our Special Brochure or get advice from our Technical Sales Department.



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**MORE CATALOGUES ON
HEATSHRINKABLE TUBING / ROLLCOVERS:**



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