








ISMATEC[®]

TUBING

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TUBING	 NEW! TYGON® LMT-55	 NEW! TYGON E-LFL	 ISMAPRENE (PHARMED®)	 TYGON 3350 SI	 SILICONE PEROXIDE
Page	4	4	5	5	6
Description	The inexpensive all-round tubing for general laboratory applications. <ul style="list-style-type: none"> • Transparent • Resistant to almost all inorganic chemicals • Smooth polished inner wall • Low gas permeability • Non-aging and non-oxidizing 	The tubing with the longest service-life of any clear Tygon tubing. <ul style="list-style-type: none"> • Transparent • Broad chemical resistance • Tasteless • Extremely low particulate spallation • Meets USP Class VI and FDA criteria • Non-aging 	The ideal tubing for pharmaceutical and medical applications, and for foodstuffs. <ul style="list-style-type: none"> • Recommended for cell cultures and tissue • Ideal for production filtration, fermentation, and bioreactor process lines • Very long service-life • Non-toxic and non-hemolytic • Impermeable to normal light and UV-radiation • Appropriate for medical products and foodstuffs • Low particulate spallation • Can be autoclaved repeatedly • Withstands repeated CIP and SIP cleaning and sterilization • Meets USP class VI, FDA, and NSF criteria 	The platinum-cured silicone tubing with an ultra-smooth inner surface for sanitary transfer of sensitive fluids. <ul style="list-style-type: none"> • Can be autoclaved with steam • Excellent biological compatibility • Ultra-smooth inner-bore reduces potential for particle entrapment • Lower level of protein binding • Entirely non-toxic, non-hemolytic and non-pyrogenic • Weather, ozone, sunlight, and radiation resistant • Resistant to fungus • Odorless 	Silicone tubing blended with organic peroxide for biological applications. <ul style="list-style-type: none"> • Can be autoclaved with steam • Excellent biological compatibility • Greater physical compression capability • Not prone to mold • Non-toxic • Waterproof and resistant to ozone, radiation, and sunlight • Resistant to fungus • Odorless
Specifications					
OD (outside diameter)	0.16–0.88" (4.0–22.3 mm)	0.19–0.75" (4.8–19.1 mm)	0.16–1.3" (4.0–33.4 mm)	0.16–1.3" (4.0–33.4 mm)	0.16–1.3" (4.0–33.4 mm)
ID (inside diameter)	0.03–0.61" (0.8–15.9 mm)	0.06–0.5" (1.6–12.7 mm)	0.03–1" (0.8–25.4 mm)	0.03–1" (0.8–25.4 mm)	0.03–1" (0.8–25.4 mm)
Operating Temp	-50 to 74 °C	-50 to 74 °C	-60 to 135 °C	-60 to +200 °C	-51 to 238 °C
Certification(s)		FDA 21 CFR 175.300; US Pharmacopoeia Class VI	FDA 21 CFR 177.2600; US Pharmacopoeia Class VI, NSF listed (Standard 51)	FDA 21 CFR, 177.2600, Also exceeds 3A sanitary standards; US Pharmacopoeia XXIII Cl.VI;	FDA 21 CFR 177.2600; US Pharmacopoeia XXIII Cl.VI
Chemical Resistance					
Acids	Good	Fair	Good	Limited	Limited
Alkaline Solutions	Good	Fair	Good	Limited	Good
Solvents	Not Recommended	Not Recommended	Not Recommended	Limited	Not Recommended
Pressure	Fair	Good	Not Recommended	Not Recommended	Not Recommended
Vacuum	Good	Good	Excellent	Good	Good
Viscous Media	Excellent	Excellent	Good	Fair	Fair
Sterile Media	Limited	Limited	Excellent	Excellent	Excellent
Gas Permeability (at 25 °C)*					
CO ₂	360	720	1200	25147	25147
H ₂	—	—	—	—	—
O ₂	80	160	200	4715	4715
N ₂	40	80	80	2284	2284

$$* \text{ Permeability Coefficient} = \frac{\text{Amount of Gas (cm}^3\text{) x tubing wall thickness (cm)}}{\text{Surface Area of tubing ID (cm}^2\text{) x time (sec) x pressure drop across tubing wall (cm Hg)}} \times 10^{-10}$$

Peristaltic Pumps & Tubing

Ismatec peristaltic pumps require peristaltic tubing to operate. Flow rate of a given fluid through a peristaltic tubing pump depends on two variables:

1. The speed of the pump, measured in revolutions per minute (rpm)
2. The volume held with the internal diameter (ID) of the selected tubing

Variable Speed Pump Flow Rates

For a variable speed pump, the flow rate of a channel can be changed by varying the pump rpm, or by using tubing with different IDs, or a combination of both.

					
TUBING	TYGON 2001	TYGON MHLL	TYGON HC F-4040-A	NORPRENE® A-60-G	FLURAN® F-5500-A
Page	6	7	7	8	8

Description	<p>The transparent, plasticizer-free tubing with superior pump-life. Especially designed for MEK and other aggressive solvents.</p> <ul style="list-style-type: none"> • Plasticizer and oil-free • Smooth inner-bore • Low sorption maintains fluid and tube integrity • Does not impart anything into the pumping medium • No release of hazardous materials when properly incinerated 	<p>Chemically resistant to Acetone, MEK and other aggressive solvents. Long life tubing.</p> <ul style="list-style-type: none"> • Plasticizer-free • Smooth inner-bore • Low sorption maintains fluid integrity • Minimal adhesion and diffusion • Suitable for MEK, Acetone and other corrosive solvents • Long life tubing 	<p>The special tubing for hydrocarbons, petroleum products and distillates.</p> <ul style="list-style-type: none"> • Specially formulated to transport hydrocarbons, petroleum products and distillates • Ideal for gasoline, kerosene, heating oils, cutting liquids and coolants based on glycols • Low gas permeability 	<p>The high performance tubing for industrial use.</p> <ul style="list-style-type: none"> • Offers longest service-life with good flow consistency • Good resistance to acids and alkaline chemicals • Superior weathering • Abrasion resistant • Non-aging and non-oxidizing • Outstanding flexural fatigue resistance • Low gas permeability versus rubber tubing • Ozone (300 pphm) and UV light resistant • Ideal for use in vacuum system 	<p>The special tubing for concentrated acids and corrosive solvents.</p> <ul style="list-style-type: none"> • High chemical resistance • Low gas permeability • Wide temperature range
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Specifications					
OD (outside diameter)	0.19–0.88" (4.8–22.3 mm)	0.09–0.18" (2.22–4.63 mm)	0.19–0.75" (4.8–19.1 mm)	0.16–0.9" (4.0–22.3 mm)	0.16–0.6" (4.0–15.9 mm)
ID (inside diameter)	0.06–0.61" (1.6–15.9 mm)	0.01–0.1" (0.38–2.79 mm)	0.06–0.5" (1.6–12.7 mm)	0.03–0.6" (0.8–15.9 mm)	0.03–0.4" (0.8–9.5 mm)
Operating Temp	-73 to 57 °C	-70 to 74 °C	-37 to 74 °C	-60 to 135 °C	-32 to 204 °C
Certification(s)	FDA 21 CFR 177.2600; FDA Approved for contact with foods	FDA 21 CFR 177.2600; US Pharmacopoeia Class VI	None	None	GMP

Chemical Resistance					
Acids	Excellent	Excellent	Limited	Excellent	Excellent
Alkaline Solutions	Excellent	Excellent	Not Recommended	Excellent	Excellent
Solvents	Good	Excellent	Not Recommended	Not Recommended	Limited
Pressure	Good	Not Recommended	Good	Not Recommended	Not Recommended
Vacuum	Good	Good	Good	Good	Good
Viscous Media	Excellent	Good	Excellent	Excellent	Good
Sterile Media	Good	Good	Limited	Not Recommended	Fair

Permeability (at 25 °C)					
CO₂	1140	3800	100	1200	38
H₂	—	—	—	—	—
O₂	76	800	22	200	14
N₂	190	320	12	80	5

Ordering your Pump & Tubing

Follow these steps to complete your Ismatec® peristaltic tubing pump order:

- Select the pump for your application based on the requirements of your fluid delivery task(s):
 - Level of accuracy
 - Fluid streams (# of channels)
 - Flow rate range(s)
 - Need for constant flow, discrete dispensing, or both
 - Need for variable speed
 - Need for automation/programmability
- Note whether the selected pump requires 2-stop, 3-stop, or standard tubing.
- Review the tubing properties tables on pages 2-3 and select the tubing material best suited for your application.
- Review the page that contains information and options for the tubing material you have selected.
- Identify the correct part number for the tubing you need, based upon two factors: a) if your pump requires tubing with stops or not, and if so how many; and b) the correct inner diameter and wall thickness for the model pump you are using.
- If required, order extension tubing that corresponds as closely as possible to the tubing material and ID of your 2-stop or 3-stop tubing.

Tygon® LMT-55 Tubing

- ▶ DEHP Free
- ▶ The Tygon blend of choice for general laboratory applications

Tygon LMT-55 offers an all-around, inexpensive option for general laboratory applications. Featuring transparent walls and low gas permeability — and with many different sizes from which to choose — this tubing material option is the option of choice for many less-critical applications. To determine the expected flow rates related to the tubing inner diameters, see the technical specifications for your pump model in your pump's operating manual.

Please Note: The low overall lifetime of this material will require tubing to be replaced more frequently. For a longer life version of Tygon LMT-55, consider Tygon S3 E-LFL.



Tygon E-LFL Tubing

- ▶ DEHP Free
- ▶ Longest service life of any clear Tygon tubing material
- ▶ Excellent choice where transparency and good chemical resistance is needed

Tygon S3 E-LFL tubing is available in a broad range of sizes for use throughout our pump product line. Its good chemical resistance coupled with its durability makes it an excellent choice in those applications where longer-life tubing is desired (i.e., where tubes are not disposed of frequently).

In many cases, this tubing can withstand system pressures that are in excess of most peristaltic pumps' abilities, providing built-in safety precautions for your system flow path.

Choose tubing without stops for use with most single-channel pumps. (Note: Ensure the wall thickness of the tubing you have selected matches the requirements for the pump you are using.) Choose the 2-stop or 3-stop tubing for use with the versions of our pumps that incorporate cassettes into the pumphead design.



SPECIFICATIONS & DETAILS

Special Properties	The inexpensive all-round tubing for general laboratory applications															
Advantages	<ul style="list-style-type: none"> • Transparent • Resistant to almost all inorganic chemicals • Tasteless • Smooth polished inner wall 	<ul style="list-style-type: none"> • Low gas permeability • Non-aging and non-oxidizing • High dielectric constant • LMT-55 will outlast R-3603 in most applications by 3 to 1 														
Limitations	• Potential leaching of plasticizers															
Physical Properties	<ul style="list-style-type: none"> • Thermoplastic • PVC-based material with phthalate-free plasticizer 	• Flexible, firm, transparent														
Service Temperature Range	-50 °C to +74 °C (-58 °F to + 165 °F)															
Applications	<table border="1"> <tr><td>Acids</td><td>Good</td></tr> <tr><td>Alkaline solutions</td><td>Good</td></tr> <tr><td>Solvents</td><td>Not recommended</td></tr> <tr><td>Pressure</td><td>Fair</td></tr> <tr><td>Vacuum</td><td>Good</td></tr> <tr><td>Viscous media</td><td>Excellent</td></tr> <tr><td>Sterile media</td><td>Limited</td></tr> </table>		Acids	Good	Alkaline solutions	Good	Solvents	Not recommended	Pressure	Fair	Vacuum	Good	Viscous media	Excellent	Sterile media	Limited
Acids	Good															
Alkaline solutions	Good															
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Pressure	Fair															
Vacuum	Good															
Viscous media	Excellent															
Sterile media	Limited															
Complies with the Following Standards																
Sterilization	Autoclavable with steam, 30 minutes at 1 bar (15 psi) and 121 °C (250 °F); tubing will appear milky. Gas sterilization with Ethylene oxide. Not recommended for sterilization with radiation.															
Permeability	<table border="1"> <tr> <td></td> <td>CO₂</td> <td>360</td> <td rowspan="3">Volume of gas [cm³] x wall thickness [mm] x 10⁻¹⁰</td> </tr> <tr> <td></td> <td>O₂</td> <td>80</td> </tr> <tr> <td></td> <td>N₂</td> <td>40</td> </tr> <tr> <td></td> <td colspan="2">Area of tubing ID [cm²] x time [sec] x pressure drop across tubing wall [cm Hg]</td> <td></td> </tr> </table>			CO ₂	360	Volume of gas [cm ³] x wall thickness [mm] x 10 ⁻¹⁰		O ₂	80		N ₂	40		Area of tubing ID [cm ²] x time [sec] x pressure drop across tubing wall [cm Hg]		
	CO ₂	360	Volume of gas [cm ³] x wall thickness [mm] x 10 ⁻¹⁰													
	O ₂	80														
	N ₂	40														
	Area of tubing ID [cm ²] x time [sec] x pressure drop across tubing wall [cm Hg]															
Odor and taste	None															
Toxicity	Non-toxic															
Tubing life	<table border="1"> <tr><td>at 0 bar</td><td>35 hrs</td></tr> <tr><td>at 0.7 bar</td><td>30 hrs</td></tr> </table>		at 0 bar	35 hrs	at 0.7 bar	30 hrs										
at 0 bar	35 hrs															
at 0.7 bar	30 hrs															

14-035, REV. C

SPECIFICATIONS & DETAILS

Special Properties	The tubing with the longest service-life of any clear Tygon tubing															
Advantages	<ul style="list-style-type: none"> • Transparent • Broad chemical resistance • Tasteless • Extremely low particulate spallation • Meets USP Class VI and FDA criteria • Non-aging 	<ul style="list-style-type: none"> • Low gas permeability • Non-aging and non-oxidizing • High dielectric constant • LMT-55 will outlast R-3603 in most applications by 3 to 1 														
Limitations	• Potential leaching of plasticizers															
Physical Properties	<ul style="list-style-type: none"> • Thermoplastic • PVC-based material with phthalate-free plasticizer • Flexible, firm, transparent 	• Flexible, firm, transparent														
Service Temperature Range	-50 °C to +74 °C (-58 °F to + 165 °F)															
Applications	<table border="1"> <tr><td>Acids</td><td>Fair</td></tr> <tr><td>Alkaline solutions</td><td>Fair</td></tr> <tr><td>Solvents</td><td>Not recommended</td></tr> <tr><td>Pressure</td><td>Good</td></tr> <tr><td>Vacuum</td><td>Good</td></tr> <tr><td>Viscous media</td><td>Excellent</td></tr> <tr><td>Sterile media</td><td>Limited</td></tr> </table>		Acids	Fair	Alkaline solutions	Fair	Solvents	Not recommended	Pressure	Good	Vacuum	Good	Viscous media	Excellent	Sterile media	Limited
Acids	Fair															
Alkaline solutions	Fair															
Solvents	Not recommended															
Pressure	Good															
Vacuum	Good															
Viscous media	Excellent															
Sterile media	Limited															
Complies with the Following Standards	FDA 21 CFR 175.300; US Pharmacopoeia Class VI															
Sterilization	Autoclavable with steam, 30 minutes at 1 bar (15 psi) and 121 °C (250 °F); tubing will appear milky. Gas sterilization with Ethylene oxide. Not recommended for sterilization with radiation.															
Permeability	<table border="1"> <tr> <td></td> <td>CO₂</td> <td>720</td> <td rowspan="3">Volume of gas [cm³] x wall thickness [mm] x 10⁻¹⁰</td> </tr> <tr> <td></td> <td>O₂</td> <td>160</td> </tr> <tr> <td></td> <td>N₂</td> <td>80</td> </tr> <tr> <td></td> <td colspan="2">Area of tubing ID [cm²] x time [sec] x pressure drop across tubing wall [cm Hg]</td> <td></td> </tr> </table>			CO ₂	720	Volume of gas [cm ³] x wall thickness [mm] x 10 ⁻¹⁰		O ₂	160		N ₂	80		Area of tubing ID [cm ²] x time [sec] x pressure drop across tubing wall [cm Hg]		
	CO ₂	720	Volume of gas [cm ³] x wall thickness [mm] x 10 ⁻¹⁰													
	O ₂	160														
	N ₂	80														
	Area of tubing ID [cm ²] x time [sec] x pressure drop across tubing wall [cm Hg]															
Odor and taste	None															
Toxicity	Non-toxic															
Tubing life	<table border="1"> <tr><td>at 0 bar</td><td>800 hrs</td></tr> <tr><td>at 0.7 bar</td><td>700 hrs</td></tr> </table>		at 0 bar	800 hrs	at 0.7 bar	700 hrs										
at 0 bar	800 hrs															
at 0.7 bar	700 hrs															

Ismaprene Tubing (PharMed®)

- ▶ Excellent chemical resistance for traditional peristaltic pump tubing
- ▶ Offers FDA and USP Class VI certification



PharMed Ismaprene tubing has long been the tubing of choice for many demanding applications where other polymer blends have been unsuitable for use.

With strong chemical resistance, excellent lifetime, and low gas permeability — coupled with industry-standard certifications — PharMed tubing is offered in options for standard pumps as well as for pumps requiring 2-stop and 3-stop tubing. Special versions are available with welded stops for applications where repeated autoclaving must take place.

Tygon® 3350 SI Tubing

- ▶ Platinum-cured silicone tubing
- ▶ Features ultra-smooth inner-bore
- ▶ Biocompatible for life science applications



Tygon 3350 SI tubing is a special silicone-based tubing that undergoes a special treatment with platinum to ensure a very smooth internal surface. This surface feature helps improve the material's use with biological applications where solid material may be present. Additionally, the material exhibits a low-level of protein-binding as well as being non-toxic, helping to make this material the top choice for many life science applications.

☐ SPECIFICATIONS & DETAILS

Special Properties	The ideal tubing for pharmaceutical and medical applications, and for foodstuffs		
Advantages	<ul style="list-style-type: none"> • Recommended for cell cultures and tissue • Ideal for production filtration, fermentation, and bioreactor process lines • Very long service-life • Non-toxic and non-hemolytic • Impermeable to normal light and UV-radiation • Appropriate for medical products and foodstuffs • Low particulate spallation • Can be autoclaved repeatedly • Withstands repeated CIP and SIP cleaning and sterilization • Meets USP Class VI, FDA, and NSF criteria 		
Limitations	<ul style="list-style-type: none"> • Potential leaching of additives (lubricants) 		
Physical Properties	<ul style="list-style-type: none"> • Thermoplastic elastomer based on polypropylene • Firm, opaque, beige color 		
Service Temperature Range	-60 °C to +135 °C (-75 °F to +275 °F)		
Applications			
	Acids	Good	
	Alkaline solutions	Good	
	Solvents	Not recommended	
	Pressure	Not recommended	
	Vacuum	Excellent	
	Viscous media	Good	
	Sterile media	Excellent	
Complies with the Following Standards	FDA 21 CFR Part 177.2600; US Pharmacopoeia Class VI, NSF listed (Standard 51)		
Sterilization	Autoclavable with steam, 30 minutes at 1 bar (15 psi) and 141 °C (250 °F) Gas sterilization with Ethylene oxide. Sterilization with radiation up to 2.5 mrad. Caution: Use special tubing version (welded stoppers) when autoclaving 2 or 3-stop color-coded tubing.		
Permeability			
	CO ₂	1200	$\frac{\text{Volume of gas [cm}^3\text{]} \times \text{wall thickness [mm]}}{\text{Area of tubing ID [cm}^2\text{]} \times \text{time [sec]} \times \text{pressure drop across tubing wall [cm Hg]}} \times 10^{-10}$
	O ₂	200	
	N ₂	80	
Odor and taste	Low		
Toxicity	Non-toxic and non-hemolytic		
Tubing life	at 0 bar	1000+ hrs	
	at 0.7 bar	1000 hrs	

☐ SPECIFICATIONS & DETAILS

Special Properties	The platinum-cured silicone tubing with an ultra-smooth inner surface for sanitary transfer of sensitive fluids		
Advantages	<ul style="list-style-type: none"> • Steam autoclavability • Excellent biological compatibility • Ultra-smooth inner-bore reduces potential for particle entrapment • Lower level of protein binding • Entirely non-toxic, non-hemolytic, and non-pyrogenic • Weather, ozone, sunlight, and radiation resistant • Resistant to fungus • Odorless 		
Limitations	<ul style="list-style-type: none"> • Not suitable for concentrated solvents, oils, acids, or diluted sodium hydroxide • Relatively high gas permeability 		
Physical Properties	<ul style="list-style-type: none"> • Thermal set rubber • Siloxane polymers and amorphous silica • Soft, translucent, clear to light amber • Excellent compression strength 		
Service Temperature Range	-60 °C to +200 °C (-75 °F to +392 °F)		
Applications			
	Acids	Limited	
	Alkaline solutions	Limited	
	Solvents	Limited	
	Pressure	Not recommended	
	Vacuum	Good	
	Viscous media	Fair	
	Sterile media	Excellent	
Complies with the Following Standards	US Pharmacopoeia XXIII Cl.VI, FDA 21 CFR, Part 177.2600. Also exceeds 3A sanitary standards.		
Sterilization	Autoclavable with steam, 30 minutes at 1 bar (15 psi) and 121 °C (250 °F) Gas sterilization with Ethylene oxide Sterilization with radiation up to 2.5 mrad.		
Permeability			
	CO ₂	25147	$\frac{\text{Volume of gas [cm}^3\text{]} \times \text{wall thickness [mm]}}{\text{Area of tubing ID [cm}^2\text{]} \times \text{time [sec]} \times \text{pressure drop across tubing wall [cm Hg]}} \times 10^{-10}$
	O ₂	4715	
	N ₂	2284	
Odor and taste	None		
Toxicity	Non-toxic		
Tubing life	at 0 bar	200 hrs	
	at 0.7 bar	100 hrs	

Silicone Peroxide Tubing

- ▶ Non-toxic material great for biological applications
- ▶ Soft and translucent for applications requiring visual checks



Tygon® 2001 Tubing for Aggressive Media

- ▶ High chemical resistance for broad application use
- ▶ Options available for single and multi-channel pump systems
- ▶ Ultra-pure tubing for peristaltic pumps



Tygon 2001 tubing features all of the benefits of most Tygon blends — including wall transparency and FDA approval. Added to this is strong chemical resistance for many solutions (excluding hydrocarbons), making Tygon 2001 a material of choice for many demanding applications where other blends may not be suitable.

Options are available in both Standard Tubing, up to 0.626" (15.9 mm) and Stopper Tubing up to 0.109" (2.79 mm).

☐ SPECIFICATIONS & DETAILS

Special Properties Silicone tubing blended with organic peroxide for biological applications

Advantages

- Steam autoclavability
- Excellent biological compatibility
- Greater physical compression capability
- Not prone to mold
- Non-toxic
- Waterproof and resistant to ozone, radiation, and sunlight
- Resistant to fungus
- Odorless

Limitations

- Not recommended for concentrated solvents, oils, acids, or diluted sodium hydroxide
- Relatively high gas permeability

Physical Properties

- Polydimethylsiloxane with silica filler and silicone oil
- Excellent resistance to compression
- Soft, translucent, clear to light amber

Service Temperature Range -51 °C to +238 °C (-60 °F to +460 °F)

Applications

Acids	Limited
Alkaline solutions	Good
Solvents	Not recommended
Pressure	Not recommended
Vacuum	Good
Viscous media	Fair
Sterile media	Excellent

Complies with the Following Standards FDA 21 CFR 177.2600; US Pharmacopoeia XXIII Cl.VI

Sterilization Autoclavable with steam, 30 minutes at 1 bar (15 psi) and 121 °C (250 °C) Radiation: Irradiate at up to 2.5 mrad
Gas: Not recommended to sterilize with ethylene oxide

Permeability	Gas	Value	Volume of gas [cm ³] x wall thickness [mm]	
			x 10 ⁻¹⁰	
	CO ₂	25147	Area of tubing ID [cm ²] x time [sec] x pressure drop across tubing wall [cm Hg]	
	O ₂	4715		
	N ₂	2284		

Odor and taste —

Toxicity —

Tubing life at 0 bar —

at 0.7 bar —

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☐ SPECIFICATIONS & DETAILS

Special Properties The transparent, plasticizer-free tubing with superior pump-life; especially designed for MEK and other aggressive solvents

Advantages

- Plasticizer and oil-free
- Smooth inner-bore
- Low sorption maintains fluid and tube integrity
- Does not impart anything into the pumping medium
- No release of hazardous materials when properly incinerated

Limitations None

Physical Properties Polyolefin

Service Temperature Range -73 °C to +57 °C (-100 °F to +135 °F)

Applications

Acids	Excellent
Alkaline solutions	Excellent
Solvents	Good / Excellent

Complies with the Following Standards FDA certification for food contact

Sterilization Autoclavable with steam, 30 minutes at 1 bar (15 psi) and 141 °C (250 °F). Gas sterilization with Ethylene oxide. Sterilization with radiation up to 2.5 mrad.

Permeability	Gas	Value	Volume of gas [cm ³] x wall thickness [mm]	
			x 10 ⁻¹⁰	
	CO ₂	1140	Area of tubing ID [cm ²] x time [sec] x pressure drop across tubing wall [cm Hg]	
	O ₂	76		
	N ₂	190		

Odor and taste No odor or taste

Toxicity —

Tubing life at 0 bar 75 hrs

at 0.7 bar —

Tygon® MHLL Tubing

- ▶ Dual-layered tubing material
- ▶ Pairs chemical resistance and long-life

Tygon MHLL is a unique tubing material, comprised of an inner layer of Tygon MH and an outer layer of PharMed®. This combination helps ensure excellent chemical resistance (except for hydrocarbons and strong ketones) as well as long service life. Available as Stopper Tubing for use with MS/CA cassettes.

Additionally, this material offers both FDA approval as well as USP Class VI approval, making it a material of choice for more demanding life-science applications.



Tygon HC F-4040-A Tubing

- ▶ Specially formulated for hydrocarbon-based applications
- ▶ Features low gas permeability and good pressure resistance

Tygon F-4040-A tubing has been specially-formulated for use in petroleum (and similar) applications where other Tygon blends cannot be used successfully. The material offers some of the lowest gas permeability rates for atmospheric gases of all the Tygon blends, making it ideal for use in those applications where sensitivity to gas permeation is high or where vacuum may be applied.

In addition to being suitable for hydrocarbon-based applications, this material can also be used successfully with low-concentration acidic solutions as well as mineral salt solutions.

Yellow-tinted, the material offers some degree of translucency, however, it is not as transparent as many other Tygon blends.



SPECIFICATIONS & DETAILS

Special Properties	<ul style="list-style-type: none"> • The tubing can be used with acetone and MEK • Long life tubing
Advantages	<ul style="list-style-type: none"> • Plasticizer-free • Smooth inner-bore • Low sorption maintains fluid integrity • Minimal adhesion and diffusion • Suitable for MEK, Acetone and other corrosive solvents • Long life tubing
Limitations	<ul style="list-style-type: none"> • Cannot be repeatedly sterilized • Only available as stopper tubing
Physical Properties	<ul style="list-style-type: none"> • Special thermoplastic of high purity • Without additives • Without plasticizer • Environmental-friendly disposal • Flexible, firm, opaque
Service Temperature Range	-70 °C to +74 °C (-94 °F to +165 °F)
Applications	
Acids	Excellent
Alkaline solutions	Excellent
Solvents	Excellent
Pressure	Not recommended
Vacuum	Good
Viscous media	Good
Sterile media	Good
Complies with the Following Standards	FDA 21 CFR, Part 177.2600; USP Pharmacopoea Class VI FDA certification for food contact
Sterilization	Autoclavable with steam, 30 minutes at 1 bar (15 psi) and 121 °C (250 °F). Gas sterilization with Ethylene oxide. Sterilization with radiation up to 2.5 mrad Caution: Can not be repeatedly sterilized.
Permeability	$\frac{\text{Volume of gas [cm}^3\text{]} \times \text{wall thickness [mm]}}{\text{Area of tubing ID [cm}^2\text{]} \times \text{time [sec]} \times \text{pressure drop across tubing wall [cm Hg]}} \times 10^{-10}$
CO ₂	—
O ₂	—
N ₂	—
Odor and taste	No odor or taste
Toxicity	—
Tubing life	at 0 bar 800+ hrs
	at 0.7 bar 800+ hrs

SPECIFICATIONS & DETAILS

Special Properties	The special tubing for hydrocarbons, petroleum products and distillates
Advantages	<ul style="list-style-type: none"> • Specially formulated to transport hydrocarbons, petroleum products, and distillates • Ideal for gasoline, kerosene, heating oils, cutting liquids, and coolants based on glycols • High dielectric constant • Low gas permeability
Limitations	<ul style="list-style-type: none"> • Not recommended for strong acids and alkalis, foodstuffs, beverages, and medicines • Potential leaching of plasticizers
Physical Properties	<ul style="list-style-type: none"> • Thermoplastic • PVC-based material with plasticizer • Flexible, firm, translucent, yellow
Service Temperature Range	-37 °C to +74 °C (-35 °F to +165 °F)
Applications	
Acids	Limited
Alkaline solutions	Not recommended
Solvents	Not recommended
Pressure	Good
Vacuum	Good
Viscous media	Excellent
Sterile media	Limited
Complies with the Following Standards	None
Sterilization	Not recommended
Permeability	$\frac{\text{Volume of gas [cm}^3\text{]} \times \text{wall thickness [mm]}}{\text{Area of tubing ID [cm}^2\text{]} \times \text{time [sec]} \times \text{pressure drop across tubing wall [cm Hg]}} \times 10^{-10}$
CO ₂	100
O ₂	22
N ₂	12
Odor and taste	Must not be used for foodstuffs, beverages, and drugs
Toxicity	Must not be used for foodstuffs, beverages, and drugs
Tubing life	at 0 bar 60 hrs
	at 0.7 bar 60 hrs

Norprene® A-60-G Tubing

- ▶ Long-life tubing with strong chemical resistance
- ▶ Excellent option for industrial applications



Norprene tubing is an excellent alternative to traditional rubber tubing in industrial applications where good chemical resistance is paired with a desire for longer service life.

This tubing material offers additional benefits, including low gas permeability and broad temperature range compatibility. Combined, this material's features help make this tubing the tubing of choice in many applications.

Fluran® F-5500-A Tubing

- ▶ Specially-formulated elastomer for use with strong acidic and basic solutions
- ▶ Very low gas permeability



Fluran tubing has been specially formulated for use in applications where strong acidic solutions or strong basic solutions are being used.

The material's very low gas permeability also makes this the choice material for applications where fluids can be transferred without being contaminated by atmospheric gases. Additionally, the low gas permeability and relative strength of this material make it a material of choice in vacuum based applications.

☐ SPECIFICATIONS & DETAILS

Special Properties	The high performance tubing for industrial use	
Advantages	<ul style="list-style-type: none"> • Offers longest service-life with good flow consistency • Good resistance to acids and alkaline chemicals • Superior weathering • Abrasion resistant • Non-aging and non-oxidizing • Outstanding flexural fatigue resistance • Low gas permeability versus rubber tubing • Ozone (300 pphm) and UV light resistant • Ideal for use in vacuum system 	
Limitations	• Potential leaching of blend material	
Physical Properties	<ul style="list-style-type: none"> • Thermoplastic elastomer based on polypropylene • Excellent tensile strength • Firm, opaque, black 	
Service Temperature Range	-60 °C to +135 °C (-75 °F to +275 °F)	
Applications	Acids	Excellent
	Alkaline solutions	Excellent
	Solvents	Not recommended
	Pressure	Not recommended
	Vacuum	Good
	Viscous media	Excellent
	Sterile media	Not recommended
Complies with the Following Standards	None	
Sterilization	Not recommended	
Permeability	Volume of gas [cm ³] x wall thickness [mm]	$\times 10^{-10}$
	CO ₂ 1200	
	O ₂ 200	
	N ₂ 80	
	Area of tubing ID [cm ²] x time [sec] x pressure drop across tubing wall [cm Hg]	
Odor and taste	Must not be used for foodstuffs, beverages and drugs	
Toxicity	Must not be used for foodstuffs, beverages and drugs	
Tubing life	at 0 bar	1000+ hrs
	at 0.7 bar	1000 hrs

14-035, REV. C

☐ SPECIFICATIONS & DETAILS

Special Properties	The special tubing for concentrated acids and corrosive solvents	
Advantages	<ul style="list-style-type: none"> • High chemical resistance • Low gas permeability • Wide temperature range 	
Limitations	• Limited service-life	
Physical Properties	<ul style="list-style-type: none"> • Fluoroelastomer • Firm, opaque, black 	
Service Temperature Range	-31 °C to +204 °C (-25 °F to +400 °F)	
Applications	Acids	Excellent
	Alkaline solutions	Excellent
	Solvents	Limited
	Pressure	Not recommended
	Vacuum	Good
	Viscous media	Good
	Sterile media	Fair
Complies with the Following Standards	None	
Sterilization	Not recommended	
Permeability	Volume of gas [cm ³] x wall thickness [mm]	$\times 10^{-10}$
	CO ₂ 38	
	O ₂ 14	
	N ₂ 5	
	Area of tubing ID [cm ²] x time [sec] x pressure drop across tubing wall [cm Hg]	
Odor and taste	—	
Toxicity	—	
Tubing life	at 0 bar	150
	at 0.7 bar	90

The next seven pages contain product numbers for ordering Standard, 2-Stop, 3-Stop, and Extension tubing in each material offered.

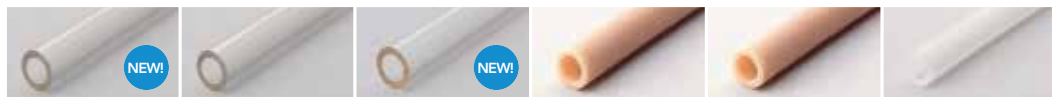
Extension Tubing



ID (mm)	TYGON® LMT-55	TYGON R3603/ R3607*	ISMAPRENE (PHARMED®)	SILICONE PEROXIDE	TYGON 2001	TYGON HC F-4040-A	FLURAN® F-5500-A
	Part No.	Part No.	Part No.	Part No.	Part No.	Part No.	Part No.
0.13	SC0226T	SC0226*					
0.19	SC0025T	SC0025*					
0.25	SC0026T	SC0026*	SC0337			SC0173	
0.38	SC0027T	SC0027*	SC0338		SC0854	SC0174	
0.44	SC0028T	SC0028*					
0.51	SC0029T	SC0029*	SC0339			SC0175	SC0550
0.57	SC0030T	SC0030*					
0.64	SC0031T	SC0031*	SC0340	SC0448	SC0856	SC0176	SC0551
0.76	SC0032T	SC0032*	SC0341	SC0449		SC0177	SC0552
0.89	SC0033T	SC0033*	SC0342	SC0450		SC0120	SC0553
0.95	SC0034T	SC0034*					
1.02	SC0035T	SC0035*	SC0343	SC0451	SC0858	SC0121	SC0554
1.09	SC0036T	SC0036*					
1.14	SC0037T	SC0037*	SC0344	SC0452		SC0122	SC0555
1.22	SC0038T	SC0038*					
1.30	SC0039T	SC0039*	SC0345	SC0453		SC0123	SC0556
1.42	SC0040T	SC0040*	SC0346	SC0454		SC0124	SC0557
1.52	SC0041T	SC0041*	SC0347	SC0455	SC0860	SC0125	SC0558
1.65	SC0042T	SC0042*	SC0348	SC0456		SC0126	SC0559
1.75	SC0043T	SC0043*					
1.85	SC0044T	SC0044*	SC0349	SC0457		SC0127	SC0560
2.06	SC0045T	SC0045*	SC0350	SC0458	SC0862	SC0128	SC0561
2.29	SC0046T	SC0046*	SC0351	SC0459		SC0129	SC0562
2.54	SC0047T	SC0047*	SC0352	SC0460		SC0130	SC0563
2.79	SC0048T	SC0048*	SC0353	SC0461	SC0864	SC0131	SC0564
3.17	SC0223T	SC0223*					
Roll Length	10 m	10 m	3 m	15 m	10 m	3 m	10 m

* The Tygon R3603/R3607 formulation is being phased out. Substituting Tygon LMT-55 is highly recommended.

2-Stop Tubing



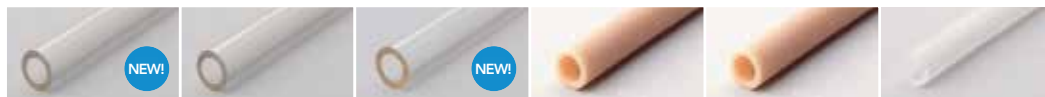
ID (mm)	COLOR CODES	TYGON® LMT-55	TYGON R3603/ R3607 *	TYGON E-LFL	ISMARENE (PHARMED®)	PHARMED BPT **	TYGON 3350 SI
		Part No.	Part No.	Part No.	Part No.	Part No.	Part No.
0.13	Orange-black	SC0188T	SC0188*				
0.19	Orange-red	SC0001T	SC0001*				
0.25	Orange-blue	SC0002T	SC0002*		SC0320	SC0740**	
0.27	Orange-blue			SCE0414			
0.38	Orange-green	SC0003T	SC0003*	SCE0415	SC0321		
0.44	Green-yellow	SC0004T	SC0004*				
0.48	Orange-yellow			SCE0416			
0.51	Orange-yellow	SC0005T	SC0005*		SC0322	SC0741**	SC0620
0.57	White-yellow	SC0006T	SC0006*				
0.64	Orange-white	SC0007T	SC0007*	SCE0417	SC0323		SC0621
0.76	Black-black	SC0008T	SC0008*	SCE0418	SC0324		SC0622
0.89	Orange-orange	SC0009T	SC0009*	SCE0419	SC0325	SC0742**	SC0623
0.95	White-black	SC0010T	SC0010*				
1.02	White-white	SC0011T	SC0011*	SCE0420	SC0326	SC0747**	SC0624
1.09	White-red	SC0012T	SC0012*				
1.14	Red-red	SC0013T	SC0013*	SCE0421	SC0327		SC0625
1.22	Red-grey	SC0014T	SC0014*				
1.25	Grey-grey			SCE0422			
1.30	Grey-grey	SC0015T	SC0015*		SC0328	SC0743**	SC0626
1.37	Yellow-yellow			SCE0423			
1.42	Yellow-yellow	SC0016T	SC0016*		SC0329		SC0627
1.52	Yellow-blue	SC0017T	SC0017*	SCE0424	SC0330	SC0744**	SC0628
1.53	Yellow-blue						
1.60	Blue-blue			SCE0425			
1.65	Blue-blue	SC0018T	SC0018*		SC0331		SC0629
1.75	Blue-green	SC0019T	SC0019*				
1.85	Green-green	SC0020T	SC0020*	SCE0426	SC0332		SC0630
2.06	Purple-purple	SC0021T	SC0021*	SCE0427	SC0333	SC0745**	SC0631
2.20	Purple-black			SCE0428			
2.29	Purple-black	SC0022T	SC0022*		SC0334		SC0632
2.54	Purple-orange	SC0023T	SC0023*		SC0335		SC0633
2.62	Purple-orange			SCE0429			
2.79	Purple-white	SC0024T	SC0024*	SCE0430	SC0336	SC0746**	SC0634
3.17	Black-white	SC0222T	SC0222*				
Tube Length		400 mm	400 mm	400 mm	400 mm	400 mm	400 mm
Pack Size		12 pieces	12 pieces	12 pieces	6 pieces	6 pieces	6 pieces

* The Tygon R3603/R3607 formulation is being phased out. Substituting Tygon LMT-55 is highly recommended.
 ** Welded stoppers for use in an autoclave.



SILICONE PEROXIDE	TYGON® 2001	TYGON MHLL	TYGON HC F-4040-A	FLURAN F-5500-A	COLOR CODES	ID (mm)
Part No.	Part No.	Part No.	Part No.	Part No.		
					Orange-black	0.13
					Orange-red	0.19
			SC0156		Orange-blue	0.25
					Orange-blue	0.27
	SC0814	SC0716	SC0157		Orange-green	0.38
					Green-yellow	0.44
					Orange-yellow	0.48
			SC0158	SC0132	Orange-yellow	0.51
					White-yellow	0.57
SC0092	SC0816		SC0159	SC0133	Orange-white	0.64
SC0093		SC0717	SC0160	SC0134	Black-black	0.76
SC0094			SC0161	SC0135	Orange-orange	0.89
					White-black	0.95
SC0095	SC0818		SC0162	SC0136	White-white	1.02
					White-red	1.09
SC0096		SC0718	SC0163	SC0137	Red-red	1.14
					Red-grey	1.22
					Grey-grey	1.25
SC0097			SC0164	SC0138	Grey-grey	1.30
					Yellow-yellow	1.37
SC0098			SC0165	SC0139	Yellow-yellow	1.42
SC0099	SC0820	SC0719	SC0166	SC0140	Yellow-blue	1.52
					Yellow-blue	1.53
					Blue-blue	1.60
SC0100			SC0167	SC0141	Blue-blue	1.65
					Blue-green	1.75
SC0101			SC0168	SC0142	Green-green	1.85
SC0102	SC0822	SC0720	SC0169	SC0143	Purple-purple	2.06
					Purple-black	2.20
SC0103			SC0170	SC0144	Purple-black	2.29
SC0104			SC0171	SC0145	Purple-orange	2.54
					Purple-orange	2.62
SC0105	SC0824	SC0721	SC0172	SC0146	Purple-white	2.79
					Black-white	3.17
400 mm	381 mm	381 mm	400 mm	180 mm		Tube Length
6 pieces	6 pieces	6 pieces	12 pieces	12 pieces		Pack Size

3-Stop Tubing



ID (mm)	COLOR CODES	TYGON® LMT-55	TYGON R3603/ R3607 *	TYGON E-LFL	ISMAPRENE (PHARMED®)	PHARMED BPT **	TYGON 3350 SI
		Part No.	Part No.	Part No.	Part No.	Part No.	Part No.
0.13	Orange-black	SC0189T	SC0189*				
0.19	Orange-red	SC0049T	SC0049*				
0.25	Orange-blue	SC0050T	SC0050*		SC0303	SC0730**	
0.27	Orange-blue			SCE0397			
0.38	Orange-green	SC0051T	SC0051*	SCE0398	SC0304		
0.44	Green-yellow	SC0052T	SC0052*				
0.48	Orange-yellow			SCE0399			
0.51	Orange-yellow	SC0053T	SC0053*		SC0305	SC0731**	SC0600
0.57	White-yellow	SC0054T	SC0054*				
0.64	Orange-white	SC0055T	SC0055*	SCE0400	SC0306		SC0601
0.76	Black-black	SC0056T	SC0056*	SCE0401	SC0307		SC0602
0.89	Orange-orange	SC0057T	SC0057*	SCE0402	SC0308	SC0732**	SC0603
0.95	White-black	SC0058T	SC0058*				
1.02	White-white	SC0059T	SC0059*	SCE0403	SC0309	SC0737**	SC0604
1.09	White-red	SC0060T	SC0060*				
1.14	Red-red	SC0061T	SC0061*	SCE0404	SC0310		SC0605
1.22	Red-grey	SC0062T	SC0062*				
1.25	Grey-grey			SCE0405			
1.30	Grey-grey	SC0063T	SC0063*		SC0311	SC0733**	SC0606
1.37	Yellow-yellow			SCE0406			
1.42	Yellow-yellow	SC0064T	SC0064*		SC0312		SC0607
1.52	Yellow-blue	SC0065T	SC0065*	SCE0407	SC0313	SC0734**	SC0608
1.53	Yellow-blue						
1.60	Blue-blue			SCE0408			
1.65	Blue-blue	SC0066T	SC0066*		SC0314		SC0609
1.75	Blue-green	SC0067T	SC0067*				
1.85	Green-green	SC0068T	SC0068*	SCE0409	SC0315		SC0610
2.06	Purple-purple	SC0069T	SC0069*		SC0316	SC0735**	SC0611
2.20	Purple-black			SCE0411			
2.29	Purple-black	SC0070T	SC0070*		SC0317		SC0612
2.54	Purple-orange	SC0071T	SC0071*		SC0318		SC0613
2.62	Purple-orange			SCE0412			
2.79	Purple-white	SC0072T	SC0072*	SCE0413	SC0319	SC0736**	SC0614
3.17	Black-white	SC0224T	SC0224*				
Tube Length		400 mm	400 mm	400 mm	400 mm	400 mm	400 mm
Pack Size		12 pieces	12 pieces	12 pieces	6 pieces	6 pieces	6 pieces

* The Tygon R3603/R3607 formulation is being phased out. Substituting Tygon LMT-55 is highly recommended.

** Welded stoppers for use in an autoclave.

*** These tubes are equipped with only 2 stoppers for use with MS/CA cassettes.



SILICONE PEROXIDE	TYGON® 2001***	TYGON MHLL***	TYGON HC F-4040-A	FLURAN F-5500-A	COLOR CODES	ID (mm)
Part No.	Part No.	Part No.	Part No.	Part No.		
					Orange-black	0.13
					Orange-red	0.19
			SC0286		Orange-blue	0.25
					Orange-blue	0.27
	SC0802***	SC0710***	SC0287		Orange-green	0.38
					Green-yellow	0.44
					Orange-yellow	0.48
			SC0288	SC0255	Orange-yellow	0.51
					White-yellow	0.57
SC0106	SC0804***		SC0289	SC0256	Orange-white	0.64
SC0107		SC0711***	SC0290	SC0257	Black-black	0.76
SC0108			SC0291	SC0258	Orange-orange	0.89
					White-black	0.95
SC0109	SC0806***		SC0292	SC0259	White-white	1.02
					White-red	1.09
SC0110		SC0712***	SC0293	SC0260	Red-red	1.14
					Red-grey	1.22
					Grey-grey	1.25
SC0111			SC0294	SC0261	Grey-grey	1.30
					Yellow-yellow	1.37
SC0112			SC0295	SC0262	Yellow-yellow	1.42
SC0113	SC0808***	SC0713***	SC0296	SC0263	Yellow-blue	1.52
					Yellow-blue	1.53
					Blue-blue	1.60
SC0114			SC0297	SC0264	Blue-blue	1.65
					Blue-green	1.75
SC0115			SC0298	SC0265	Green-green	1.85
SC0116	SC0810***	SC0714***	SC0299	SC0266	Purple-purple	2.06
					Purple-black	2.20
SC0117			SC0300	SC0267	Purple-black	2.29
SC0118			SC0301	SC0268	Purple-orange	2.54
					Purple-orange	2.62
SC0119	SC0812***	SC0715***	SC0302	SC0269	Purple-white	2.79
					Black-white	3.17
	300 mm	300 mm	400 mm	400 mm		Tube Length
	6 pieces	6 pieces	12 pieces	12 pieces		Pack Size

Standard Tubing



ID (mm)	OD (mm)	TYGON® LMT-55	TYGON R3603/ R3607 *	TYGON E-LFL	ISMAPRENE (PHARMED®)	TYGON 3350 SI	SILICONE PEROXIDE
1.6 mm wall thickness (1/16") Standard Tubing		Part No.	Part No.	Part No.	Part No.	Part No.	Part No.
0.8	4.0	SC0355T	MF0001*		MF0009	MF0291	MF0044
1.6	3.2						
1.6	4.8	SC0373T	MF0028*	SCE0389	MF0010	SC0580B	MF0035
2.4	5.6	SC0691T	SC0691*		SC1006	SC0590B	
3.2	6.4	SC0374T	MF0030*	SCE0390	MF0012	SC0581B	MF0037
4.0	7.2	SC0462T	SC0462*				
4.8	8.0	SC0379T	SC0379*	SCE0391	MF0011	SC0582B	MF0045
6.4	9.6	SC0375T	MF0031*	SC0E392	MF0013	SC0584B	MF0046
8.0	11.2	SC0376T	MF0032*	SC0E394	MF0014	SC0587B	MF0047
9.5	12.7	SC0383T	SC0383*			SC0387B	
11.1	14.3	SC0384T	SC0384*			SC0697B	
Roll Length		15 m	15 m	7.5 m	7.5 m	15 m	7.5 m
2.4 mm wall thickness (3/32")							
4.8	9.6	SC0500T	MF0029*		MF0448	SC0583B	MF0288
6.4	11.2	SC0501T	MF0033*			SC0585B	MF0040
8.0	12.8	SC0502T	SC0502*			SC0515B	
9.5	14.3	SC0503T	SC0503*			SC0516B	
11.1	15.9	SC0504T	SC0504*			SC0517B	
12.7	17.5	SC0505T	SC0505*			SC0518B	
15.9	20.7	SC0506T	SC0506*			SC0519B	
Roll Length		15 m	15 m	7.5 m	7.5 m	15 m	7.5 m
3.2 mm wall thickness (1/8")							
4.8	11.2	SC0694T	SC0694*				
6.4	12.8	SC0380T	SC0380*	SCE0393	MF0015	SC0586B	MF0314
8.0	14.4	SC0535T	SC0535*				
9.5	15.9	SC0381T	SC0381*	SCE0395	MF0016	SC0588B	MF0041
11.1	17.5	SC0534T	SC0534*				
12.7	19.1	SC0382T	SC0382*	SCE0396	MF0034	SC0589B	MF0315
15.9	22.3	SC0695T	SC0695*		SC0696	SC0532B	
Roll Length		15 m	15 m	7.5 m	7.5 m	15 m	7.5 m

* The Tygon R3603/R3607 formulation is being phased out. Substituting Tygon LMT-55 is highly recommended.



TYGON® 2001	TYGON HC F-4040-A	NORPRENE A-60-G	NORPRENE CHEMICAL	VITON®	OD (mm)	ID (mm)
Part No.	Part No.	Part No.	Part No.	Part No.	1.6 mm wall thickness (1/16") Standard Tubing	
		MF0017		MF0048	4.0	0.8
					3.2	1.6
SC0830	MF0002	SC0357		MF0049	4.8	1.6
					5.6	2.4
SC0831	MF0004	SC0358	SC1022	MF0051	6.4	3.2
					7.2	4.0
SC0832	MF0003	SC0359	SC1023	MF0322	8.0	4.8
SC0833	MF0005	SC0360	SC1024	MF0052	9.6	6.4
SC0834	MF0006	SC0361		MF0053	11.2	8.0
SC0835		SC0385	SC1025		12.7	9.5
		SC0386			14.3	11.1
15 m	15 m	15 m	15 m	7.5 m	Roll Length	
					2.4 mm wall thickness (3/32")	
	MF0476	SC0362		MF0050	9.6	4.8
	MF0007	SC0363		MF0054	11.2	6.4
		SC0511			12.8	8.0
		SC0512			14.3	9.5
					15.9	11.1
					17.5	12.7
					20.7	15.9
	15 m	15 m		7.5 m	Roll Length	
					3.2 mm wall thickness (1/8")	
					11.2	4.8
		SC0364		MF0323	12.8	6.4
					14.4	8.0
	MF0008	SC0365		MF0055	15.9	9.5
					17.5	11.1
SC0845	SC0725	SC0366	SC1026		19.1	12.7
SC0846		SC0698			22.3	15.9
15 m	15 m	15 m	15 m	7.5 m	Roll Length	

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