

Tygon® F-4040-A

High Performance Fuel and Lubricant Tubing for Small Engines

Designed to Resist Hydrocarbons

Specifically designed to handle most fuels and industrial lubricants, Tygon® Fuel and Lubricant Tubing resists the swelling and hardening caused by hydrocarbon-based fluids. This significantly reduces the risk of failure due to cracking and leakage. Its minimum extractability safeguards the liquid or vapor being transferred against adulteration.

Because it is extremely flexible, Tygon® Fuel and Lubricant Tubing simplifies installation, even in tight places. It is translucent yellow for positive identification and to allow easy flow monitoring. It is routinely used to handle gasoline, kerosene, heating oils, cutting compounds and glycol-based coolants.

Routinely Specified in Fuel and Lubricant Applications

A consistent performer lot after lot, Tygon® Fuel and Lubricant Tubing is the most requested fuel and lubricant tubing for a variety of applications - from small engine fuel lines to coolant transfer.

Other Tygon® formulations are available to meet new permeation standards.



Features and Benefits

- Resists embrittlement
- Compatible with most hydrocarbons
- Resistant to swelling
- Highly flexible, easy to install
- Specifically developed for fuels and lubricants
- Ozone and UV light resistant

Typical Applications

- Small engine fuel lines
- General automotive
- Recreational vehicles
- Lawn and garden equipment
- Coolant transfer
- Heating fuels
- Cutting compounds
- Polishing equipment
- Lubrication lines

Tygon® F-4040-A

Part Number	ID	OD	Wall Thickness	Length	Min. Bend Radius	Max. Working Pressure	Vacuum Rating
	(in.)	(in.)	(in.)	(ft.)	(in.)	73°F (psi*)	inHg at 73°F
AAG00700	2/25	7/50	3/100	50	1/4	40	29.9
AAG00165	3/32	3/16	3/64	50	1/4	50	29.9
AAG00007	1/8	1/4	1/16	50	3/8	50	29.9
AAG00012	3/16	5/16	1/16	50	5/8	35	29.9
AAG00017	1/4	3/8	1/16	50	1	30	22.0
AAG00022	5/16	7/16	1/16	50	1-3/8	25	14.0
AAG00027	3/8	1/2	1/16	50	1-7/8	20	10.0
AAG00029	3/8	5/8	1/8	50	1-1/8	35	29.9
AAG00032	7/16	9/16	1/16	50	2-3/8	15	7.0
AAG00036	1/2	5/8	1/16	50	2-7/8	15	5.0
AAG00038	1/2	3/4	1/8	50	1-3/4	30	22.0
AAG00046	5/8	7/8	1/8	50	2-1/2	25	14.0
AAG00053	3/4	1	1/8	50	3-1/4	20	10.0

*Working pressures are calculated at a 1:5 ratio relative to burst pressure using ASTM D1599.

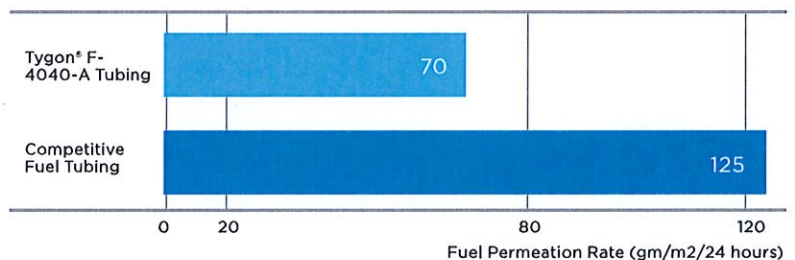
Typical Physical Properties

Property	ASTM Method	Value or Rating
Durometer Hardness, Shore A, 15s	D2240	57
Tensile Strength, psi (MPa)	D412	1,820 (12.5)
Ultimate Elongation, %	D412	310
Tear Resistance, lb-f/in (kN/m)	D1004	167 (29.0)
Specific Gravity	D792	1.26
Water Absorption, % at 73°F (23°C) for 24 hrs.	D570	0.49
Compression Set Constant Deflection, % at 158°F (70°C) for 22 hrs.	D395 Method B	65
Maximum Recommended Operating Temp., °F (°C)	—	165 (74)
Tensile Modulus, at 100% Elongation, psi (MPa)	D412	910 (6.3)
Tensile Set, at 75% Elongation	D412	50
Color	—	Yellow
Brittleness by Impact Temp., °F (°C)	D746	-35 (-37)
Dielectric Strength, v/mil (kV/mm)	D149	403 (15.8)

Unless otherwise noted, all tests were conducted at room temperature 73°F. Values shown were determined on 0.075" thick extruded strip, 0.075" thick molded ASTM plaques or molded ASTM durometer buttons.

Comparative Fuel Permeation Rate of Tubing

The table below summarizes the results of an in-house study conducted on permeation of unleaded, alcohol-free 87 octane gasoline in 1/4" ID x 3/8" OD tubing. Testing was conducted in accordance with SAE J1527.



The performance of tubing in peristaltic pumping applications is affected by the conditions of use and equipment utilized, along with size and wall thickness of the tubing tested. The data above is presented for information only and should not be utilized for specification purposes.

The values listed for working and burst pressures are derived from tests conducted under controlled laboratory conditions. Many factors will reduce the tubing's ability to withstand pressures, including temperature, chemical attack, stress, pulsation and the attachment to fittings. It is imperative that the user conduct tests simulating the conditions of the application prior to specifying the tubing for use.



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NOTE: The data and details given in this document are correct and up to date. This document is intended to provide information about the product and possible applications. This document is not the product specification and does not provide specific features, nor does it guarantee product performance in specific applications. Saint-Gobain cannot anticipate or control the conditions of the field and for this reason strongly recommends that practical tests are conducted to ensure that the product meets the requirements of a specific application.

Tygon® is a registered trademark.

Versilic[®] silicone Tubing



Versilic[®] Silicone Tubing

Versilic[®] 60 shore tubing is biologically inert and does not inhibit cell culture. It stays flexible down to -50°C and maintains its chemical, mechanical and electrical performance up to +200°C.

Versilic[®] meets the European Pharmacopoeia requirements for silicone elastomer for closures and tubing, USP Class VI biological tests and ISO 10993 biocompatibility (systemic toxicity, irritation, sensitization, cytotoxicity, hemocompatibility and Ames test). Tubing Compliant with FDA regulations CFR 177.2600.

Versilic[®] Silikon Schläuche

Versilic[®] – Schläuche mit dem Härtegrad Shore 60 sind biologisch inert und besitzen keine hemmenden Zellkulturen. Sie bleiben bis zu -50°C biegsam und bewahren ihre chemische, mechanische und elektrischen Eigenschaften bis zu +200°C.

Sie erfüllen die chemischen Testanforderungen der Europäischen Pharmacopoe, die biologischen Tests der US – Pharmacopia Klasse VI und die Biokompatibilitätserfordernisse der Norm ISO 10993 (Allgemeine Toxizität, Reizung, Sensibilisierung, Zytotoxizität, Hämokompatibilität, sowie den Ames Test). Erfüllt die FDA-Vorschriften CFR 177.2600.

Tube Silicone Versilic[®]

D'une dureté Shore de 60, le tube silicone Versilic[®] est biologiquement inerte et favorise la culture de cellules. Il reste flexible jusqu'à -50°C et conserve ses performances chimiques, mécaniques et électriques jusqu'à +200°C.

Le Versilic[®] est conforme aux tests de la pharmacopée européenne, aux tests biologiques de l'USP classe VI et aux exigences de biocompatibilité la norme ISO 10993 (toxicité, systémique, irritation, sensibilisation, cytotoxicité, hémolyse et tests d'Ames). Ce tube est conforme aux règlements de la FDA CFR 177.2600.

BIOPHARMACEUTICAL PRODUCTS

For biopharmaceutical applications

Für Biopharmazeutische Anwendungen

Pour applications biopharmaceutiques et sanitaires

Features and Benefits

- Peroxide-cured silicone
- Biological neutrality
- FDA
- US and European Pharmacopoeia
- Temperature resistance -50°C / +200°C

Eigenschaften und Nutzen

- Mit peroxid vernetztes Silikon
- Biologisch neutral
- FDA
- US und Europäische Pharmacopoe
- Temperaturbeständigkeit -50°C / +200°C

Caractéristiques et avantages

- Silicone peroxyde
- Neutralité biologique
- FDA
- Conforme aux Pharmacopées américaines et Européennes
- Résiste à des températures comprises entre -50°C / +200°C

Versilic® Silicone Tubing

General Characteristics/Allgemeine Eigenschaften/Caractéristiques Générales

Basic Composition/Grundstoffe/Formulation de base

Basic elastomer/Basiselastomer/Elastomère de base	Silicone/Silikon
Catalyst/Katalysator/Catalyseur	Peroxide/Peroxid/Peroxyde
Fillers/Füllstoff/Charges	Mineral fillers/Mineralfüllstoff/Charges minérales

Typical Physical Properties/Physikalische Eigenschaften/Propriétés physiques

Color/Farbe/Couleur	Translucent/Transparent
Specific gravity/Spezifisches Gewicht/Densité	1,15+ / -0,03
Hardness/Härte/Dureté (Shore A; 15s)	62+ / -5
Tensile Strength/Reissfestigkeit/Résistance à la rupture (MPa)	≥ 7,5
Ultimate Elongation/Reissdehnung/Allongement à la rupture (%)	≥ 270
300 Modulus/Modul 300/Module 300 (MPa)	7,7+ / -1,5

Temp. Resistance/Temperaturbeständigkeit/Tenue Température: -50°C /+200°C

Up to/Kurzfristig bis/Pointes possibles	230°C
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Pharmacopoea/Pharmakopoe/Pharmacopée

European Pharmacopoea/Europäische Pharmakopoe/Pharmacopée Européenne	Compliant/Zugelassen/Conforme
USP (Class VI)/U.S. Pharmacopoe (Class VI)/Pharmacopée américaine (Class VI)	Compliant/Zugelassen/Conforme

Food Grade Certifications/Lebensmittelzertifizierung/Alimentarité

USA (FDA; 21CFR part 177-2600)	Compliant/Zugelassen/Conforme
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Usage/Anwendungen/Applications

Tubing for biopharmaceutical and medical applications/Schlauch für paramedizinische Anwendungen/Tube pour applications biopharmaceutiques et médicales.

Sterilization/Stérilisation

Steam/Dampf/Vapeur d'eau (134°C @ 18 mn)	Appropriate/Geeignet/Approprié
Ethylene oxide/Ethylenoxyd/Oxyde d' éthylène	Appropriate/Geeignet/Approprié
Irradiation/Bestrahlung/Irradiation	Appropriate/Geeignet/Approprié

BIOPHARMACEUTICAL PRODUCTS

Come through clean.™

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Versilic® is a registered trademark.

IMPORTANT: It is the user's responsibility to ensure the suitability and safety of Saint-Gobain Performance Plastics tubing for all intended uses. Laboratory and clinical tests must be conducted in accordance with applicable regulatory requirements in order to determine the safety and effectiveness for use of tubing in any particular application.

For a period of 6 months from the date of first sale, Saint-Gobain Performance Plastics Corporation warrants this product to be free from defects in materials and workmanship. Our only obligation will be to replace any portion proving defective, or at our option, to refund the purchase price thereof. User assumes all other risk, if any, including the risk of injury, loss or damage, direct or consequential, arising out of the use, misuse, or inability to use, this product. THIS WARRANTY IS IN LIEU OF THE WARRANTIES OF MERCHANTABILITY, FITNESS FOR PARTICULAR PURPOSE, AND ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED. No deviation is authorized.

Saint-Gobain Performance Plastics Corporation assumes no obligations or liability for any advice furnished by it, or for results obtained with respect to those products. All such advice is given and accepted at the buyer's risk.

Versilic® Silicone Tubing

Standard Sizes/Standard Durchmesser/Tailles Standard

I.D.	w.th.	O.D.	50 meters	25 meters	10 meters
I.D.	W.st.	A.D.	50 meter	25 mètres	10 mètres
D.I.	ep.	D.E.	50 mètres	25 mètres	10 mètres
0,5	1,0	2,5	760010	—	—
1,0	1,0	3,0	760070	—	—
1,5	0,75	3,0	760110	—	—
2,0	1,0	4,0	760160	—	—
2,0	1,75	5,5	760170	—	—
2,0	2,0	6,0	760180	—	—
3,0	1,0	5,0	760210	—	760210-10
3,0	1,25	5,5	760220	—	—
3,0	1,5	6,0	760230	—	760230-10
3,0	2,0	7,0	760250	—	—
4,0	1,0	6,0	760320	—	760320-10
4,0	1,5	7,0	—	760330	—
4,0	2,0	8,0	—	760350	760350-10
4,0	3,0	10,0	—	760360	—
5,0	1,0	7,0	—	760410	—
5,0	1,5	8,0	—	760420	760420-10
5,0	2,0	9,0	—	760430	—
5,0	2,5	10,0	—	760440	—
6,0	1,0	8,0	—	760490	—
6,0	1,5	9,0	—	760500	760500-10
6,0	2,0	10,0	—	760510	760510-10
6,0	3,0	12,0	—	760520	760520-10
7,0	1,5	10,0	—	760570	760570-10
7,0	2,0	11,0	—	760580	—
7,0	2,5	12,0	—	760581	760581-10
7,0	3,0	13,0	—	760590	—
8,0	1,5	11,0	—	760630	—
8,0	2,0	12,0	—	760650	760650-10
8,0	3,0	14,0	—	760670	760670-10
8,0	4,0	16,0	—	760690	760690-10
8,5	1,75	12,0	—	760720	—
9,0	2,0	13,0	—	760730	—
10,0	2,0	14,0	—	760770	760770-10
10,0	3,0	16,0	—	760800	760800-10
10,0	4,0	18,0	—	760810	760810-10
10,0	6,5	23,0	—	760820	—
12,0	1,75	15,5	—	760870	—
12,0	2,5	17,0	—	760880	—
15,0	3,0	21,0	—	761050	—
18,0	3,0	24,0	—	—	761080
20,0	3,5	27,0	—	—	761100
25,0	5,0	35,0	—	—	761150
30,0	5,0	40,0	—	—	761170
40,0	5,0	50,0	—	—	761190
50,0	5,0	60,0	—	—	761270

Special grades and sizes are available upon request.
Sondergrade und Durchmesser nach Anfrage.
Grades et dimensions spéciales disponibles sur demande.

VERSILIC® SILICONE TUBING IS NOT INTENDED FOR USE AS AN IMPLANT MATERIAL



Saint-Gobain
Life Sciences –
Bioprocess Solutions



PharMed® BPT

Biocompatible Peristaltic Pump Tubing

High Performance Peristaltic Pump Tubing

PharMed® BPT tubing has been formulated to withstand the rigors of peristaltic pumping action while providing the biocompatible fluid surface required in sensitive bioprocess applications. With its superior flex life characteristics, PharMed BPT tubing simplifies biopharmaceutical manufacturing processes by reducing production downtime due to pump tubing failure.

Simplifies Cleaning and Sterilization

PharMed® BPT tubing is ideal for use in clean-in-place and steam-in-place cleaning and sterilization systems. It is compatible with virtually all commercial cleaners and sanitizers and can be repeatedly autoclaved up to five cycles without affecting overall service life. PharMed BPT also withstands 50kGy of gamma radiation with minimal effect on physical properties.

Superior Barrier Properties

PharMed® BPT tubing is less permeable to gases and vapors than silicone tubing. It is ideal for protecting sensitive fluids in a variety of biopharmaceutical operations including media mixing, cell culture, harvest, and purification. PharMed BPT tubing has very good general chemical resistance and excellent acid, alkali and oxidation resistance. Opaque to visible and UV light, PharMed BPT tubing will help to protect light-sensitive fluids.

Fully Characterized and Biocompatible

PharMed® BPT tubing comes complete with biocompatibility, physiochemical and extractable testing which can be found in the [Validation Guide Summary](#) on the Saint-Gobain Bioprocess Solutions website.

Features/Benefits

- Outlasts silicone tubing in peristaltic pumps
- Withstands repeated autoclaving
- Withstands repeated CIP and SIP cleaning and sterilization
- Documented Biocompatibility
- Multiple Manufacturing sites

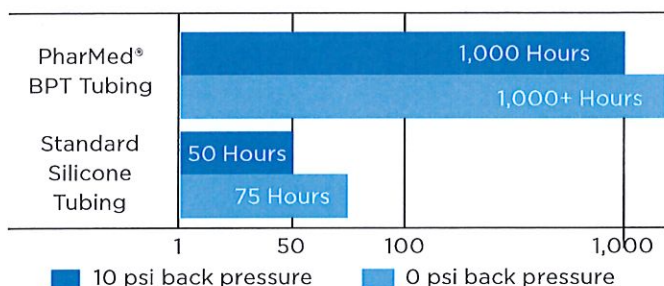
Typical Pump Applications

- Cell harvest and media process systems
- Bioreactor process lines
- Production filtration and fermentation
- Aseptic filling
- Shear-sensitive fluid transfer
- Diagnostics and laboratory testing



Comparative Peristaltic Pump Tubing Life

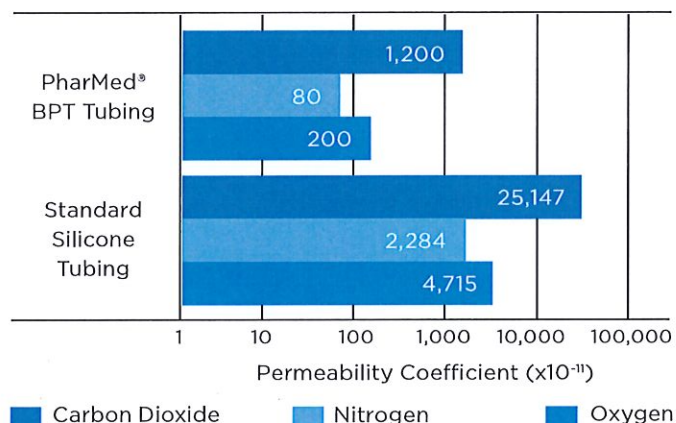
The table below depicts hours until tubing rupture of 1/4" (6.4mm) ID x 3/8" (9.5mm) OD tubing. In each case, a 3-roller pump head was utilized operating at 600 rpm at room temperature 73°F (23°C).



The performance of tubing in peristaltic pumping applications is affected by the conditions of use and equipment utilized, along with size and wall thickness of the tubing tested. The data above is presented for information only and should not be utilized for specification purposes.

Permeability Coefficient Comparison

$$\text{Permeability Coefficient} = \frac{\text{amount of gas (cm}^3\text{) x tubing wall thickness (cm)}}{\text{surface area of tubing ID (cm}^2\text{) x time (sec) x pressure drop across tubing wall (cm Hg)}}$$



Typical Physical Properties of PharMed® BPT Tubing

Property	ASTM Method	Value or Rating
Appearance	—	Opaque Cream
Durometer Hardness Shore A, 15 Sec	D2240	64
Maximum Service Temperature, °F (°C)	—	275 (135)
Low Temperature Embrittlement, °F (°C)	D746	-75 (-59)
Water Absorption, % 24 hrs. @ 23°C	D570	0.30

Unless otherwise noted, all tests were conducted at room temperature (73°F). Values shown were determined on 0.075" thick extruded strip or 0.075" thick molded ASTM plaques or molded ASTM durometer buttons.

Sterilization Methods

Autoclavable	30 min at 121°C
Gas (Ethylene Oxide)	Yes
Gamma	50kGy

PharMed® BPT Standard Sizes

Part Numbers	I.D. inches (mm)	O.D. inches (mm)	Wall thickness inches (mm)	Length feet (mm)	Minimum bend radius inches (mm)	Max Working Pressure		Vacuum Rating in Hg (mm Hg)	
						at 73°F psi* (bar)	at 180°F psi* (bar)	73°F (23°C)	180°F (82°C)
AY242605	.020 (0.5)	.145 (3.7)	1/16 (1.6)	25 (7.6)	1/8 (3.2)	115 (7.9)	72 (5.0)	29.9 (760)	29.9 (760)
AY242606	1/32 (0.8)	5/32 (4.0)	1/16 (1.6)	25 (7.6)	1/8 (3.2)	78 (5.4)	49 (3.4)	29.9 (760)	29.9 (760)
AY242002	1/16 (1.6)	1/8 (3.2)	1/32 (0.79)	25 (7.6)	1/4 (6.4)	24 (1.7)	14 (1.0)	29.9 (760)	29.9 (760)
AY242003	1/16 (1.6)	3/16 (4.76)	1/16 (1.6)	25 (7.6)	1/8 (3.2)	43 (3.0)	27 (1.9)	29.9 (760)	29.9 (760)
AY242005	3/32 (2.4)	7/32 (5.6)	1/16 (1.6)	25 (7.6)	1/4 (6.4)	30 (2.1)	19 (1.3)	29.9 (760)	29.9 (760)
AY242006	1/8 (3.2)	3/16 (4.8)	1/32 (0.8)	25 (7.6)	1/2 (12.7)	13 (0.9)	8 (0.6)	25 (635)	15 (381)
AY242007	1/8 (3.2)	1/4 (6.4)	1/16 (1.6)	25 (7.6)	1/2 (12.7)	24 (1.7)	15 (1.0)	29.9 (760)	29.9 (760)
AY242012	3/16 (4.8)	5/16 (7.9)	1/16 (1.6)	25 (7.6)	5/8 (15.8)	17 (1.2)	10 (0.7)	29.9 (760)	27 (686)
AY242017	1/4 (6.4)	3/8 (9.5)	1/16 (1.6)	25 (7.6)	7/8 (22.2)	13 (0.9)	8 (0.6)	25 (635)	15 (381)
AY242019	1/4 (6.4)	1/2 (12.7)	1/8 (3.2)	25 (7.6)	3/4 (19.0)	24 (1.7)	15 (1.0)	29.9 (760)	29.9 (760)
AY242022	5/16 (7.9)	7/16 (11.1)	1/16 (1.6)	25 (7.6)	1-1/4 (31.7)	11 (0.8)	6 (0.4)	15 (381)	9 (229)
AY242027	3/8 (9.5)	1/2 (12.7)	1/16 (1.6)	25 (7.6)	1-3/8 (34.9)	9 (0.6)	5 (0.3)	10 (254)	6 (152)
AY242029	3/8 (9.5)	5/8 (15.8)	1/8 (3.2)	25 (7.6)	1-1/8 (28.5)	17 (1.2)	10 (0.7)	29.9 (760)	27 (686)
AY242038	1/2 (12.7)	3/4 (19.0)	1/8 (3.2)	25 (7.6)	1-1/8 (28.5)	10 (0.7)	8 (0.6)	25 (635)	15 (381)
AY242046	5/8 (15.9)	7/8 (22.2)	1/8 (3.2)	25 (7.6)	2-3/4 (69.8)	11 (0.8)	6 (0.4)	15 (381)	9 (229)
AY242053	3/4 (19.0)	1 (25.4)	1/8 (3.2)	25 (7.6)	3-1/2 (88.9)	9 (0.6)	5 (0.3)	10 (254)	6 (152)

*Working pressures are calculated at a 1:5 ratio relative to burst pressure using ASTM D1599.

The values listed for working and burst pressures are derived from tests conducted under controlled laboratory conditions. Many factors will reduce the tubing's ability to withstand pressures, including temperature, chemical attack, stress, pulsation and the attachment to fittings. It is imperative that the user conduct tests simulating the conditions of the application prior to specifying the tubing for use.



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Saint-Gobain Performance Plastics' manufacturing facilities have the ability to create a variety of sizes or coil lengths for your particular application needs. Contact us for a quote to meet your specific requirements.

PharMed® is a registered trademark

Contact us today for:

[Consultations](#) • [Samples](#) • [Quotes](#) • [Orders](#)

For registered access to Saint-Gobain Product Validation Summaries, [CLICK HERE](#)

IMPORTANT: It is the user's responsibility to ensure the suitability and safety of Saint-Gobain Performance Plastics products for all intended uses and that the materials to be used comply with all applicable medical regulatory requirements. Saint-Gobain Performance Plastics assumes no responsibility for any product failures that occur due to misuse of the materials it provides arising out of the design, fabrication or application of the products into which the materials are incorporated.

WARRANTY: For a period of 12 months from the date of first sale, Saint-Gobain Performance Plastics warrants this product to be free of defects in materials and workmanship. Our only obligation will be to replace any portion proving defective, or at our option, to refund the purchase price thereof.

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