How to Convert Polyamide Tubing to Polyurethane Tubing



Context

As many of you may already be aware, the worldwide demand for Polyamide 12 has been escalating. This means that we, along with all other suppliers, are faced with a period of shortage for the key components used for manufacturing these materials.
Meanwhile, in order to limit the risk of tubing shortage in Polyamide 12, we propose an alternative solution using polyester or polyether polyurethane tubing. This recommendation guide is designed to help you check the tubing compatibility with your application.

Proposal

- Improve service level to customer
- Optimize lower bend radius
- Maintain Tubepack packaging benefits
- Enable easier fluid identification of circuits thanks to crystal tubing
- Allow food compatibility with polyurethane polyether tubing

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ENGINEERING YOUR SUCCESS.

Comparative Product Advantages: Polyamide vs. Polyurethane Tubing

Semi-Rigid Polyamide 12

Legris polyamide tubing provides optimum mechanical properties, has good chemical resistance and conforms to the NF E49-100* standard. Shore hardness of semi-rigid tubing is 60D; that of rigid tubing is 65D.

Advantages of Legris polyamide tubing

- large range of working temperatures and pressures
- good chemical resistance
- good humidity resistance
- constant rigidity, good ageing
- good absorption of vibrations
- strong abrasion resistance
- silicone-free
- tube length marked every metre

Polyurethane

The excellent flexibility of Legris flexible polyurethane tubing allows compact cabling where a small bend radius is required. Legris flexible polyurethane tubing has a shore hardness of 52D and conforms to the NF E49-101* standard. The Legris range comprises 2 versions:

- **polyester polyurethane tubing**, for superior **chemical resistance** and improved **ageing**,
- **polyether polyurethane** tubing, for excellent **resistance to humidity** and **bacteriological aggressions.**

Advantages of Legris polyurethane tubing

- high flexibility and small bend radius
- good chemical resistance
- constant rigidity, good ageing
- good absorption of vibrations
- UV-resistant
- fluid identification (crystal version)
- excellent resistance to abrasion
- silicone-free
- tube length marked every metre

* Both norms for technical design are based on equivalent specifications (dimensions, test protocoles, tolerances etc...)

Connections

LF 3000®, LF 3600, LF 3800 / LF 3900 **push-in fittings**



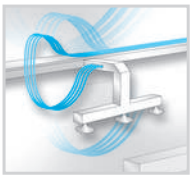
brass and stainless steel **compression fittings** (ferrules are necessary)



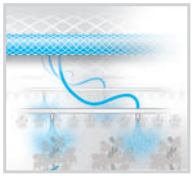
adaptors



Applications



pneumatic systems



suitable for use with industrial fluids

Connections

LF 3000®, LF 3600, LF 3800 / LF 3900 **push-in fittings**



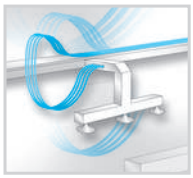
brass and stainless steel **compression fittings** (ferrules are necessary)



adaptors



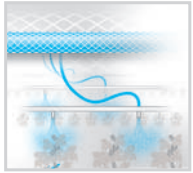
Applications



pneumatic systems



food and industrial applications



suitable for use with food and industrial fluids

The vacuum capability of Legris semi-rigid polyamide and polyurethane tubing is 755 mm Hg (99 % vacuum). Connected with LF 3000® push-in fittings, it offers excellent vacuum performance.

Technical Characteristics – Conversion Checklist

Suitable Fluids

	Polyurethane polyester tubing	Polyurethane polyether tubing
Compressed air	X	X
Vacuum	X	X
Liquids and water		X
Gas	X	X
Chemical agents		X

You will find the comprehensive Chemical Compatibility Chart at the back of this brochure. In case of doubt, we recommend you continue using Polyamide 12 tubing.

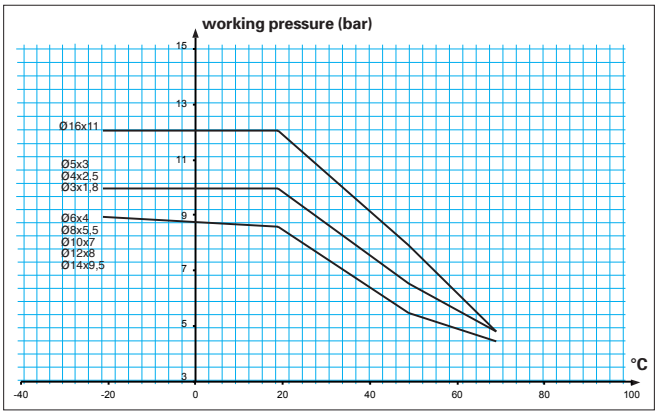
Working Pressure

For standard applications, up to 8 bar at 20°C, there is no risk in switching to polyurethane tubing.
For pressures higher than 8 bar, please refer to the graphs below.

Working Temperature

For standard applications, from -15°C to +70°C, there is no risk in switching to polyurethane tubing.

Polyurethane Tubing



To calculate **burst pressure**, the values in the above graph should be multiplied x 3.

Semi-Rigid Polyamide Tubing



To calculate **burst pressure**, the values in the above graph should be multiplied x 3.

Cross References - Polyamide to Polyurethane Tubing

Reels up to 1000m long

Semi-rigid polyamide 500m and 1000m reels

o.d. tube (mm)	i.d. tube (mm)	length of tube (m)	minimum bend radius at 20°C (mm)	Neutral						
4	2,7	1000	30	2010P04 00 27	2010P04 01 27	2010P04 02 27	2010P04 03 27	2010P04 04 27	2010P04 05 27	2010P04 06 27
6	4	1000	35	2010P06 00	2010P06 01	2010P06 02	2010P06 03	2010P06 04	2010P06 05	2010P06 06
8	6	500	55	2005P08 00	2005P08 01	2005P08 02	2005P08 03	2005P08 04	2005P08 05	2005P08 06
10	8	500	90	2005P10 00	2005P10 01	2005P10 02	2005P10 03	2005P10 04	2005P10 05	2005P10 06

Polyester polyurethane tubing, 300m, 500m and 1000m rolls

o.d. tube (mm)	i.d. tube (mm)	length of tube (m)	minimum bend radius at 20°C (mm)						
4	2,5	1000	10	2010U04 01	2010U04 02	2010U04 03	2010U04 04	2010U04 05	2010U04 06
6	4	1000	15	2010U06 01	2010U06 02	2010U06 03	2010U06 04	2010U06 05	2010U06 06
8	5,5	500	20	2005U08 01	2005U08 02	2005U08 03	2005U08 04	2005U08 05	2005U08 06
10	7	300	30	2003U10 01	2003U10 02	2003U10 03	2003U10 04	2005U10 05	2003U10 06

Polyether polyurethane tubing, 300m, 500m and 1000m reels

o.d. tube (mm)	i.d. tube (mm)	length of tube (m)	minimum bend radius at 20°C (mm)	CRYSTAL		
4	2,5	1000	10	2010U04R08	2010U04R04	2010U04R01
6	4	1000	20	2010U06R08	2010U06R04	2010U06R01
8	5,5	500	25	2005U08R08	2005U08R04	2005U08R01
10	7	300	35	2003U10R08	2003U10R04	2003U10R01



Drum, up to 1000m long

- for optimized handling
- upon request



Tube length marked every metre

- marking every metre
- time saved when cutting specific length
- immediate identification of remaining quantity

Cross References - Polyamide to Polyurethane Tubing

Tubepack® Packaging

1025P Close tolerance semi-rigid polyamide tubing, 25 m rolls

o.d. tube mm	i.d. tube mm	minimum bend radius for tube at ambient temp. in mm	CLEAR							kg for 25 m
3	1,8	8	1025P03 00 18	*	*	*	1025P03 04 18	*	*	0,020
4	2	25	1025P04 00	1025P04 01	1025P04 02	1025P04 03	1025P04 04	1025P04 05	1025P04 06	0,318
4	2,7	30	1025P04 00 27	1025P04 01 27	1025P04 02 27	1025P04 03 27	1025P04 04 27	1025P04 05 27	1025P04 06 27	0,254
5	3,3	25	1025P05 00 33	1025P05 01 33	*	*	1025P05 04 33	*	*	0,420
6	4	35	1025P06 00	1025P06 01	1025P06 02	1025P06 03	1025P06 04	1025P06 05	1025P06 06	0,535
8	6	55	1025P08 00	1025P08 01	1025P08 02	1025P08 03	1025P08 04	1025P08 05	1025P08 06	0,748
10	7,5	75	1025P10 00 75	1025P10 01 75	*	*	1025P10 04 75	*	*	1,135
10	8	90	1025P10 00	1025P10 01	1025P10 02	1025P10 03	1025P10 04	1025P10 05	1025P10 06	0,989
12	9	75	1025P12 00 09	1025P12 01 09	*	*	1025P12 04 09	*	*	1,769
12	10	90	1025P12 00	1025P12 01	*	*	1025P12 04	*	*	1,345
14	11	100	1025P14 00 11	1025P14 01 11	*	*	1025P14 04 11	*	*	2,226
14	12	120	1025P14 00	1025P14 01	*	*	1025P14 04	*	*	1,734
16	13	120	1025P16 00 13	*	*	*	*	*	*	2,500

1025U Flexible polyester polyurethane tubing, 25 m rolls

o.d. tube mm	i.d. tube mm	minimum bend radius for tube at ambient tempera-ture in mm	flexible polyester polyurethane tubing, in 25 m rolls						kg for 25 m
3	1,8	8	1025U03 01 18	*	*	*	*	*	0,020
4	2,5	10	1025U04 01	1025U04 02	1025U04 03	1025U04 04	1025U04 05	1025U04 06	0,310
5	3	13	1025U05 01	*	*	1025U05 04	*	*	0,522
6	4	15	1025U06 01	1025U06 02	1025U06 03	1025U06 04	1025U06 05	1025U06 06	0,591
8	5,5	20	1025U08 01	1025U08 02	1025U08 03	1025U08 04	1025U08 05	1025U08 06	0,971
10	7	25	1025U10 01	1025U10 02	*	1025U10 04	1025U10 05	1025U10 06	1,467
12	8	35	1025U12 01	1025U12 02	*	1025U12 04	1025U12 05	1025U12 06	2,406
14	9,5	45	1025U14 01 95	*	*	1025U14 04 95	*	*	2,815

1025U..R Close tolerance flexible polyether polyurethane tubing, 25 m rolls

o.d. tube mm	i.d. tube mm	minimum bend radius for tube at ambient tempera-ture in mm	close tolerance flexible polyether polyurethane tubing, in 25 m rolls		CRYSTAL	CRYSTAL	CRYSTAL	CRYSTAL	CRYSTAL	kg for 25 m
4	2,5	10	1025U04R01	1025U04R04	1025U04R08	1025U04R14	1025U04R13	1025U04R12	1025U04R17	0,310
5	3	15	*	*	1025U05R08	*	*	*	*	0,522
6	4	20	1025U06R01	1025U06R04	1025U06R08	1025U06R14	1025U06R13	1025U06R12	1025U06R17	0,591
8	5,5	25	1025U08R01	1025U08R04	1025U08R08	1025U08R14	1025U08R13	1025U08R12	1025U08R17	0,971
10	7	35	1025U10R01	1025U10R04	1025U10R08	1025U10R14	*	*	*	1,467
12	8	40	1025U12R01	1025U12R04	1025U12R08	1025U12R14	*	*	*	2,406
14	9,5	50	*	1025U14R04 95	1025U14R08 95	*	*	*	*	2,815

***Available upon request**



Tubepack® Standard

- 25 m and 100 m long
- rationalization of tube storage plus:
  - immediate identification of the tube type
  - easy unreeling and efficient storage

Cross References - Polyamide to Polyurethane Tubing

Tubepack® Packaging

1100P Close tolerance semi-rigid polyamide tubing, 100 m rolls

o.d. tube mm	i.d. tube mm	minimum bend radius for tube at ambient temp. in mm	CLEAR							kg for 100 m
4	2	25	1100P04 00	1100P04 01	1100P04 02	1100P04 03	1100P04 04	1100P04 05	1100P04 06	1,152
4	2,7	30	1100P04 00 27	1100P04 01 27	1100P04 02 27	1100P04 03 27	1100P04 04 27	1100P04 05 27	1100P04 06 27	0,893
5	3,3	25	1100P05 00 33	1100P05 01 33	*	*	1100P05 04 33	*	*	1,274
6	4	35	1100P06 00	1100P06 01	1100P06 02	1100P06 03	1100P06 04	1100P06 05	1100P06 06	1,799
8	6	55	1100P08 00	1100P08 01	1100P08 02	1100P08 03	1100P08 04	1100P08 05	1100P08 06	2,898
10	7,5	75	1100P10 00 75	1100P10 01 75	*	*	1100P10 04 75	*	*	4,400
10	8	90	1100P10 00	1100P10 01	1100P 10 02	1100P10 03	1100P10 04	1100P10 05	*	3,667
12	9	75	1100P12 00 09	1100P12 01 09	*	*	1100P12 04 09	*	*	5,600
12	10	90	1100P12 00	1100P12 01	*	*	1100P12 04	*	*	5,052
14	11	100	1100P14 00 11	1100P14 01 11	*	*	1100P14 04 11	*	*	5,200
14	12	120	1100P14 00	1100P14 01	*	*	1100P14 04	*	*	4,800
16	13	120	1100P16 00 13	*	*	*	*	*	*	7,800

1100U Flexible polyester polyurethane tubing, 100 m rolls

o.d. tube mm	i.d. tube mm	minimum bend radius for tube at ambient tempera-ture in mm	flexible polyester polyurethane tubing, in 100 m rolls						kg for 100 m
4	2,5	10	1100U04 01	1100U04 02	1100U04 03	1100U04 04	1100U04 05	1100U04 06	1,092
5	3	13	1100U05 01	*	*	1100U05 04	*	*	1,605
6	4	15	1100U06 01	1100U06 02	1100U06 03	1100U06 04	1100U06 05	1100U06 06	2,064
8	5,5	20	1100U08 01	1100U08 02	1100U08 03	1100U08 04	1100U08 05	1100U08 06	3,610
10	7	25	1100U10 01	*	*	1100U10 04	*	*	6,105
12	8	35	1100U12 01	*	*	1100U12 04	*	*	8,610
14	9,5	45	1100U14 01 95	*	*	1100U14 04 95	*	*	11,215

1100U..R Close tolerance flexible polyether polyurethane tubing, 100 m rolls

o.d. tube mm	i.d. tube mm	minimum bend radius for tube at ambient tempera-ture in mm	close tolerance flexible polyether polyurethane tubing, in 100 m rolls							kg for 100 m
4	2,5	10	1100U04R01	1100U04R04	1100U04R08	1100U04R14	1100U04R13	1100U04R12	1100U04R17	1,092
6	4	20	1100U06R01	1100U06R04	1100U06R08	1100U06R14	1100U06R13	1100U06R12	1100U06R17	2,064
8	5,5	25	1100U08R01	1100U08R04	1100U08R08	1100U08R14	1100U08R13	1100U08R12	1100U08R17	3,610
10	7	35	*	*	1100U10R08	1100U10R14	*	*	*	6,109
12	8	40	*	*	1100U12R08	1100U12R14	*	*	*	8,610
14	9,5	50	*	*	1100U14R08 95	*	*	*	*	11,215

***Available upon request**

Chemical Compatibility Chart

1	Recommended
2	Satisfactory
3	Not recommended

Please contact us for complementary information.

Substances	PA	PU ether	PU ester
Acetaldehyde	1	1	3
Acetone	1	3	1
Acetylene	1	-	-
Acid, acetic	-	1	3
Acid, hydrochloric up to 10%	1	1	3
Acid, citric	1	1	1
Acid, chromic up to 10%	3	3	3
Acid, nitric	1	1	3
Acid, sulphuric up to 10%	1	1	1
Ammonia and gaseous	1	1	3
Ammonioum chloride up to 10%	-	1	1
Benzene	1	3	3
Bromine	3	-	-
Butane	1	1	1
Butyl acetate	1	3	2
Butylic and Butyl alcohol	1	3	2
Calcium choride	1	-	-
Carbon tetrachloride (sodium hypochlorite)	3	2	2
Chloroform	-	3	3
Copper sulphate	1	-	-
Compressed air	1	1	1
Cyclohexanone	1	3	3
Ethanol	-	2	2
Ethyl acetate	1	2	2
Ethyl alcohol	1	-	-
Ethylen oxide	1	-	-
Freon 12-22	1	2	2
Formalin (formaldehyde)	2	1	2
Glucose	1	1	2
Glycol (without H2O)	-	1	1
Glycol (methyl)	-	3	3
Hexachloride	-	2	1
Hydrogen	1	1	2
Hydrogen peroxide (perydrol)	2	2	2
Kerosene	1	1	2
Magnesium chloride (up to 30%)		1	2
Methane	1	1	1
Methanol	-	1	1
Methyl acetate	1	2	2
Methyl alcohol (pure)	1	1	1

Substances	PA	PU ether	PU ester
Methyl bromide	1	-	-
Methyl chloride	1	-	-
Methyl ethyl ketone	1	3	3
Methyl isobutyl ketone	1	3	3
Oils (cutting)	1	1	1
Oils (ASTM class A)	1	2	1
Oils (ASTM class B)	1	2	1
Oils (ASTM class C)	1	2	1
Oils (ASTM class 1)	1	1	1
Oils (ASTM class 2)	1	1	1
Oils (ASTM class 3)	1	1	1
Oils, engine	1	2	2
Oils, paraffin	1	1	2
Oxygen	2	1	1
Ozone	3	2	2
Perchlorate ethylene	2	3	3
Phenols	3	3	3
Phospohoric acid 50%	3	3	3
Potash	1	2	3
Potassium chloride up to 40%	1	1	2
Potassium manganate 5%	-	3	2
Potassium sulphate	1	-	-
Propane	1	1	1
Soda 50%	1	1	3
Sodium carbonate	1	-	-
Sodium chloride	1	1	2
Sodium hydroxide (caustic soda)	2	1	2
Sodium hypochlorite(bleach)	1	1	3
Sulphurous anhydride	2	-	-
Petrol with up to 40% aromatic	1	3	2
Petrol with more than 40% aromatic	1	3	3
Tetrachloroethylene	1	2	2
Toluene	1	2	2
Tributylphosphate	1	-	-
Trichlorethylene	1	3	3
Water (drinking, food)	3	1	3
Water (Industrial)	1	1	3
Water (distilled)	1	1	3
Water (sea)	2	1	3
Xylem	1	2	2
Zinc chloride	1	1	1

PA = Polyamide
PU = Polyurethane

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