

# DuPont™ Liveo™ Pharma 80 Tubing and DuPont™ Liveo™ Overmolded Assemblies for high-pressure biopharma processing applications

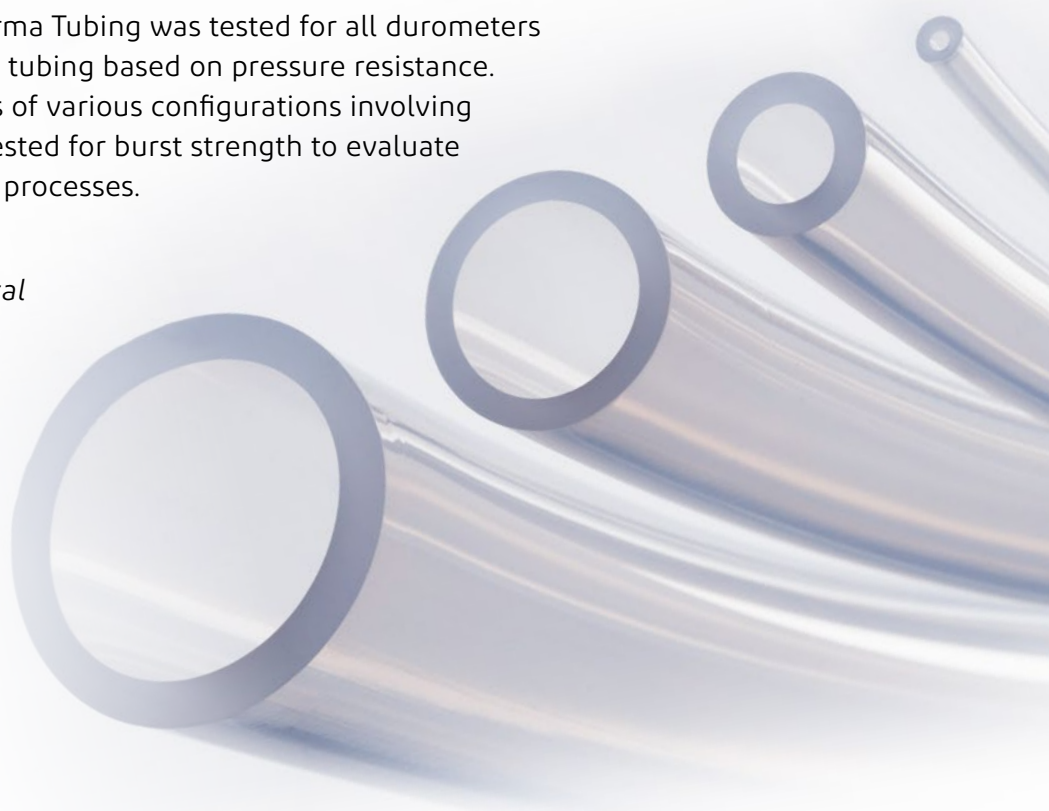
## Introduction

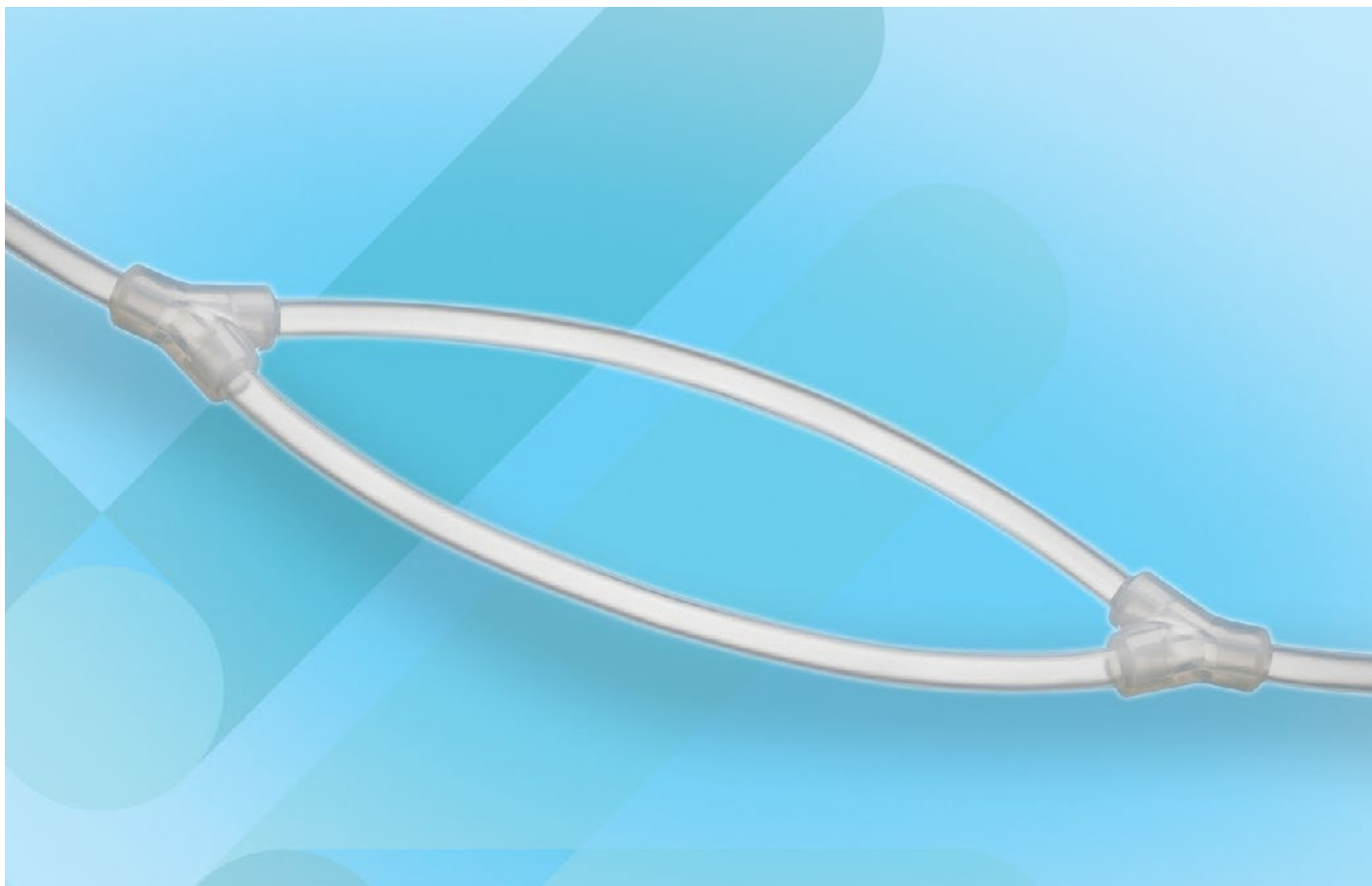
Liveo™ Pharma Overmolded Assemblies are produced according to customer-specified design and requirements using platinum-cured tubing of the highest purity (Liveo™ Pharma Tubing) and Liveo™ Biomedical Grade Liquid Silicone Rubber (LSR). These overmolded assemblies (OMAs) are designed to improve process efficiency and changeover while reducing the risk of contamination and leaks, therefore preserving the integrity of the critical fluid, drug solution or product.

The Liveo™ Pharma Tubing product range is made from tear-resistant high-consistency silicone rubber and is available in 50, 65 and 80 Shore A durometers to meet broad processing requirements. While customers tend to select braided tubing when it comes to high-pressure processes, the 80 Shore A durometer tubing offered by DuPont presents high resistance to kinking and pressure that is worth considering.

The burst strength of Liveo™ Pharma Tubing was tested for all durometers to help customers select the best tubing based on pressure resistance. Similarly, overmolded assemblies of various configurations involving Liveo™ Pharma 80 Tubing were tested for burst strength to evaluate their suitability for high-pressure processes.

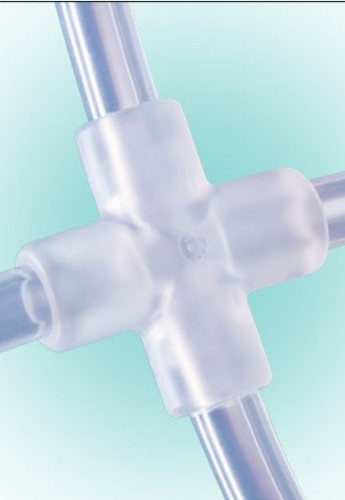



*Burst resistance values in this document are provided as a typical performance characteristic only and are not intended to be used in preparing product specifications.*





### DuPont™ Liveo™ materials tested

Liveo™ Pharma 80 Tubing of various internal diameter (I.D.) and outside diameter (O.D.) sizes – ¼" x ½", ⅜" x ⅝", ½" x ¾", ¾" x 1", and ¾" x 1⅝" – were used with overmolded connections made of Liveo™ Biomedical Grade LSR of various configurations to evaluate burst resistance in high-pressure applications:

Cross	Tri-clamp (per ASME/BPE) ¾" (mini) or 1½" sanitary flange	Tee	Wye
			

## Test methods and experimental setup

DuPont does not complete these tests for batch release, and the data presented are provided as typical performance characteristics and are not intended to be used in preparing product specifications.

### DuPont™ Liveo™ Pharma Tubing burst strength

Burst strength testing on the aforementioned most-common sizes of untreated Liveo™ Pharma Tubing were measured based on ASTM D380-94 (Standard Test Methods for Rubber Hose) and ISO 1402 (Rubber and Plastic Hoses and Hose Assemblies-Hydrostatic Testing). A sample of cut tubing (18" to 24" in length) was secured between barbed fittings in a closed polycarbonate chamber. A digital gauge located in-line and just before the outlet valve captured maximum pressure readings. The test subject was filled with lab water void of air bubble entrapment. Water flow was blocked off at one end of the tubing by closing the outlet valve, and pressure was increased in a uniform rate via a hydrostatic pump until failure occurred. The gauge recorded the maximum pressure encountered.

### DuPont™ Liveo™ Pharma Overmolded Assembly burst measurement

Using the same procedure used to test the Liveo™ Pharma Tubing, the assemblies were secured between two and sometimes three barbed fittings in the polycarbonate burst chamber.

### Burst results of Liveo™ Pharma 80 Tubing and Liveo™ Pharma Overmolded Assemblies

Size dimensions	Burst pressure, psi (bar)								
	Liveo™ Pharma Advanced Pump Tubing <sup>(1)</sup>	Liveo™ Pharma 50 Tubing <sup>(1)</sup>	Liveo™ Pharma 65 Tubing <sup>(1)</sup>	Liveo™ Pharma 80 Tubing <sup>(1)</sup>	Overmolded tee assembly with Liveo™ Pharma 80 Tubing <sup>(2)</sup>	Overmolded cross assembly with Liveo™ Pharma 80 Tubing <sup>(2)</sup>	Overmolded wye assembly with Liveo™ Pharma 80 Tubing <sup>(2)</sup>	Overmolded flange assembly with Liveo™ Pharma 80 Tubing <sup>(2)</sup> (mini, ¾" TC)	Overmolded flange assembly with Liveo™ Pharma 80 Tubing <sup>(2)</sup> (1½" TC)
¼" x ½"	75 (5.2)	85 (5.9)	147 (10.1)	254 (17.5)	132 (9)	135 (9.3)	137 (9.4)	156 (10.8)	203 (14)
⅜" x ⅝"	50 (3.4)	59 (4)	112 (7.7)	192 (13.2)	110 (7.6)	94 (6.5)	131 (9.0)	189 (13)	173 (11.9)
½" x ¾"	37 (2.5)	48 (3.3)	90 (6.2)	147 (10.1)	96 (6.6)	94 (6.5)	123 (8.5)	137 (9.4)	140 (9.7)
¾" x 1"	24 (1.6)	33 (2.3)	63 (4.3)	107 (7.4)	79 (5.5)	82 (5.7)	83 (5.7)	N/A	102 (7)
¾" x 1⅝"	41 (2.8)	50 (3.4)	91 (6.3)	154 (10.6)	74 (5.1)	N/A	N/A	N/A	150 (10.3)

Burst strength test based on ASTM D380-94 Standard Test Methods for Rubber Hose (reapproved in 2012; American Society of Testing and Materials; W. Conshohocken, PA 19428-2959) and ISO 1402 Rubber and Plastic hoses and hose assemblies-Hydrostatic testing.

<sup>(1)</sup>Tubing burst pressure measured.

<sup>(2)</sup>OMA burst pressure measured at failure at the connection.

Note: Liveo™ Pharma 50 Tubing, Liveo™ Pharma 65 Tubing and Liveo™ Pharma Advanced Pump Tubing are included in the above table for reference.

N/A: Not yet available. Entries for overmolded assemblies listed as "Not yet available" can be obtained if customer process requires size category.

**It is the responsibility of the end user to apply a safety factor for burst when using the above products in end use applications, as each end use material is unique.**



## Summary and conclusions

DuPont™ Liveo™ Pharma Tubing is available in 50, 65 and 80 Shore A durometers to meet broad processing requirements such as filtration, process intensification, continuous manufacturing and more. The results show the product with the highest durometer (hardness), Liveo™ Pharma 80 Tubing, exhibits high burst strength and therefore can be a cost-effective solution for transportation of critical fluids in biopharmaceutical processes where high pressure is involved. As such, it is a suitable alternative to reinforced (braided) tubing for moderate to high pressures or vacuum applications, depending on end-use system and pressure requirements.

Liveo™ Pharma Overmolded Assemblies produced with Liveo™ Pharma Tubing and Liveo™ Biomedical Grade LSR serve high-purity fluid transfer applications in biopharmaceutical and pharmaceutical manufacturing processes and help improve process efficiencies and flexibility, which also assists in reducing cross-contamination risk and cleaning costs.

High-pressure-resistant Liveo™ Pharma 80 Tubing was used to construct overmolded assemblies in tee, cross, wye and tri-clamp designs, which were tested for burst strength. While, based on the results, it is expected that the overmolded assemblies have a reduced overall pressure resistance when directly compared to the corresponding Liveo™ Pharma 80 Tubing, the overall effectiveness will assist the customer in defining which range of pressure can be used in their process when applying a safety factor to meet their unique material process requirements.

## For more information about Liveo™ Biopharmaceutical Processing Solutions

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