

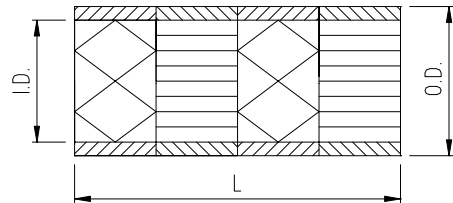
## Static Mixer Melt Blenders for Extrusion Blow Molding of Bottles Made of Polyolefines



Mixing Element LMXR  
(Licensee of BAYER AG)



Mixing of epoxy resin/hardener in an empty pipe and in a static mixer



Sketch of a Static Mixer Melt Blender for Extrusion Blow Molding (standard 4-element design)

### Application

- Homogenizing the polymer melt in the die just before blowing-up the tube to form the bottle.
- Producing a polymer melt of uniform temperature and uniform viscosity. This allows the production of bottles having a uniform wall thickness
- Improving colorant distribution and thus eliminating color streaks in the end product

### Characteristics of the Mixer

The StaMixCo Static Mixer Melt Blender for extrusion blow molding contains in the standard design 4 (four) very efficient mixing elements (picture top left and top right), which homogenize the polymer melt just before it is formed into tube(s). As the polymer melt flows through the static mixer grid, it is divided into many thin layers that are continuously moved in radial direction and rearranged (picture top center). By this process, differences in temperature and concentration (e.g. colorant pigments), are reduced by a factor of approximately 3. Differences in temperature are reduced further inside the formed tube due to the effect of thermal conductivity and thus temperature differences are practically eliminated. Due to the uniform colorant distribution, colorant streaks in the end product disappear.

The mixing elements including the ring are cast as one piece where the outside surfaces are machined to final dimensions. There are no welds and no gaps between the mixing grid bars and the surrounding sleeve. All the mixer grids are joined to each other and to the ring via a single molten metal pour. All inlet and outlet edges of the mixing elements have a flow efficient roof design (picture top left) where there are no flat areas exposed perpendicular to the flow direction or large weld spots where polymer can hang-up and degrade. Due to the monolithic cast construction and the use of special strong stainless steel 17-4 PH (= DIN 1.4542 or A 630), the thickness of the bars of the mixer grid can be reduced which increases the cross-section available for the polymer melt flow with the result of a lower pressure drop created by the flowing polymer.

### Selection of the Mixer Size

The mixer size is a function of the flow-rate, the physical properties of the polymer melt and the operating conditions. The mixer size recommended for HDPE can be selected using the table on the back side of this sheet.

### Availability of Mixers

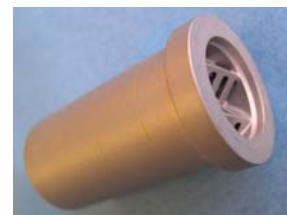
Static mixers for blow molding are available in standard designs. They are also available in special designs made on request of our clients.



Standard design with 4 (four) single elements (the most cost effective solution)



Mixing elements brazed into a rod (brazed with a nickel braze in a vacuum oven)



Mixing elements brazed to a rod with support ring (brazed with a nickel braze in a vacuum oven)

**Dimension, Throughput, Pressure Drop**

Dimension for : Standard design → **Available from stock** ←  
 Pressure drop for: HDPE  
 MFI: 0.4 g/10 min (190°C/2.16 kg)  
 Operating temperature: 190 °C  
 Melt blender: Static mixer with 4 mixing elements LMXR

Melt Blender Type	I.D. mm	O.D. mm	L mm	Pressure drop = 20 bar		Pressure drop = 40 bar		Pressure drop = 60 bar	
				Mass flow kg/h	Shear-rate s-1	Mass flow kg/h	Shear-rate s-1	Mass flow kg/h	Shear-rate s-1
<b>SMN-12-4</b>	12	18	32.0	0.17	3.9	0.6	13.6	1.3	29.5
<b>SMN-15-4</b>	15	22	38.0	0.45	4.4	1.7	16.6	3.7	36.2
<b>SMN-18-4</b>	18	26	45.0	0.9	4.6	3.4	18	7.4	39
<b>SMN-22-4</b>	22	30	54.0	1.6	4.6	6.3	18	13.5	39
<b>SMN-27-4</b>	27	35	66.0	3.0	4.6	11.5	18	25	39
<b>SMN-33-4</b>	33	42	80.0	5.4	4.6	21	18	45.5	39
<b>SMN-40-4</b>	40	50	96.0	9.6	4.6	37.5	18	81.2	39
<b>SMB-R52-4</b>	52	60	120.0	27.5	5.3	106	20.5	235	45.4
<b>SMB-R75-4</b>	66	75	150.0	61.0	5.5	233	21	522	47

Tolerances: - I.D.: as cast; - O.D.: f7; - L = 0/-0.4

Table 1: Dimensions and mass flow rate for melt blenders for extrusion blow molding plants with different pressure drops

**Special designs**

For an optimum installation of the mixers into the die heads, we are able to supply mixers where the outside dimensions are specially adapted to the requirements of the die head design of clients.

The following parameters can be adjusted within certain limits:

- Number of mixing elements of a mixer (→ will have an influence on the homogenizing efficiency as well as on the pressure drop of the mixer.)
- Installation length L
- Outer diameter O.D.
- Mixing elements can be brazed to a rod (using a nickel braze and a vacuum oven). After the brazing operation the mixer is machined to the final required shape and dimensions regarding:
  - outer diameter O.D., with or without support ring
  - length L

The inside diameter I.D. of a specific mixer size cannot be changed, because the mixer is a cast part, where the ring/sleeve is an integral part of the mixing elements LMXR (monolithic part).

→ Please contact us, if you need a mixer with special dimension which is adjusted precisely to your requirements.

→ For our evaluation, please submit your drawing or sketch with the critical dimension of the installation dimensions for the static mixer.

Please fill in our specification sheet “Extrusion Melt Blender SMB” (see our website [www.stamixco.com](http://www.stamixco.com) under “Downloads”) with the data of your application and send to us. We will perform the calculations necessary to recommend a static mixer including the calculated pressure drop.