Technical Data Sheet

Silox™ 23

Silox* 23

Description

Silox 23 silane is a liquid additive that is an excellent candidate to consider for crosslinking high- and medium-density polyethylene (PEXb) for use in potable water pipes. This product is a vinyl silane and peroxide combination that can provide high grafting efficiency in a Sioplas process. In the second process step it can be used in combination with the PEarlstab Y-15760 masterbatch.

PEarlstab Y-15760 is an antioxidant and catalyst masterbatch. It is available as a solid, free flowing pellet. This masterbatch helps to provide chlorine resistance to the finished pipe in drinking water applications.

Key Features and Benefits

- Extrapolated service life of continuous and intermittent hot water pipe of 134 and 536 years (NSF 171)
- Maximum service temperature of 110°C
- Chemical resistance against solvents and oil
- Creep and stress rupture performance
- Abrasion resistance
- Impact strength for resistance against crack propagation, particularly at low temperatures
- Resistance against slow crack growth
- Chlorine resistance

Typical Physical Properties

Silox 23 Typical Physical Properties

Physical Form	Clear liquid
Appearance	Colorless
Viscosity, mPa (cP) @ 23°C	2.5
Specific Gravity, g/cm^3 @ 23°C	0.970
Flash Point, Tag Closed Cup, ASTM D56-79, °C	23

PEarlstab Y-15760 Typical Physical Properties

Physical Form	Solid free flowing pellet
Appearance	Off-white pellets
Moisture Content (ppm)	<200

Potential Applications

Potential applications for Silox 23 silane and Y-15760 masterbatch include:

- Domestic hot and cold water distribution
- Under-floor heating
- Central and district heating
- Air-conditioning systems
- Transport of gas, compressed air and fluids
- Automotive and marine applications
- Industrial pipes

Patent Status

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Product Safety, Handling and Storage

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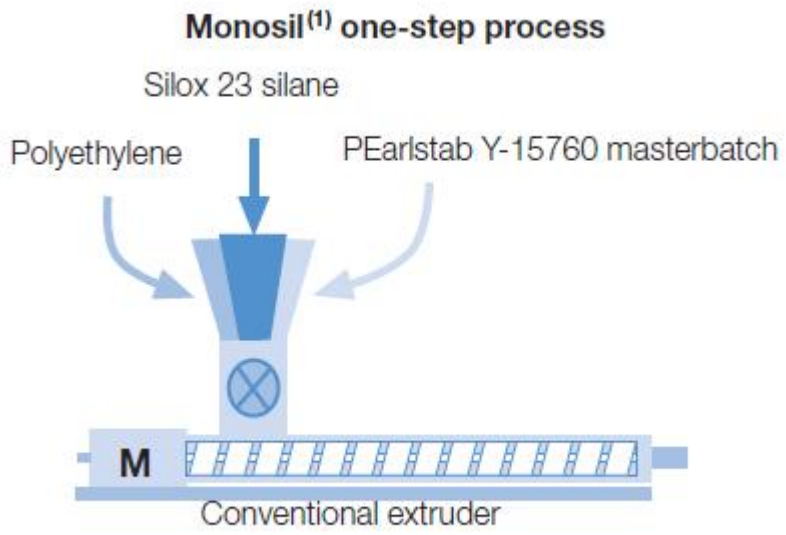
Processing Recommendations



(1) Maillefer SA and BICC Ltd.

Step One: Grafting Process

Silox 23 silane and PEarlstab Y-15760 masterbatch are extruded with high-density polyethylene resin (HDPE). Moisture content of the polyethylene base resin must be less than 200 ppm. Pre-drying the polyethylene base resin as well as the PEarlstab Y-15760 masterbatch at 70°C (158°F) by means of an air desiccator is highly recommended.

Optimum addition levels for a given application must be determined experimentally and depend on the properties (MFI and density) of the polyethylene resin used in production.

Recommended Resins Are:

Type of HDPE resin:

Melt Index (190°C/2.16 kg)	0.2 to 8g/10min.
Density	0.940 to 0.960 g/cm^3

Optimum addition level of Silox 23 silane and PEarlstab Y-15760 masterbatch must be determined experimentaiy. A starting point dose level:

Silox 23 silane	1.6 - 2.5%
PEarlstab Y-15760 masterbatch	3 - 5%
Melt temperature during the grafting	215 - 225°C

Product formulations are included as illustrative examples only. Momentive makes no representation or warranty of any kind with respect to any such formulations, including, without limitation, concerning the efficacy or safety of any product manufactured using such formulations.

Step Two: Crosslinking Process

Rate of cure is dependent upon time, temperature and thickness of the article and available moisture. Sufficient crosslinking generally can be achieved by any of the following methods:

- Immersion in water at 80-90°C (176-195°F), or
- Exposure to low pressure steam at 105°C (221°F), or
- Exposure to steam at atmospheric pressure (i.e., a sauna at 100°C (212°F)), or
- Ambient curing (only applicable to certain polymers).

Services	Test Conditions	Extrapolated Time-to-Failure (Years) ASTM F2023	Extrapolated Time-to-Failure (Years) NSF P171
Continuous Hot Water	½" SDR 9 pipe at 60°C and 80 psig	269	134
Intermittent Hot Water	½" SDR 9 pipe at 25% service at 60°C and 75% service at 23°C,80 psig	1071	536

(1) PEX-6 Pipe formulation was 93 weight percent polyethylene resin, 2 weight percent Silox 23 silane and 5 weight percent PEarlstab Y-15760 masterbatch.

Note: Test data. Actual results may vary.

Limitations

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Regulatory Compliance

Silox 23 silane status under European and national food contact regulations on plastic materials:

The silane component in Silox 23 silane is listed with ref PM nr 26320 in the EU Directive 2002/72/EC and its amendments on plastic materials and articles intended to come into contact with foodstuffs.

A European reference for the peroxide ingredients is the German BfR, Section XLVI. It allows the use of these peroxides for food contact applications in crosslinked PE. The fi nished product must contain in total no more than 0.2% conversion products from the above substances.

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