

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

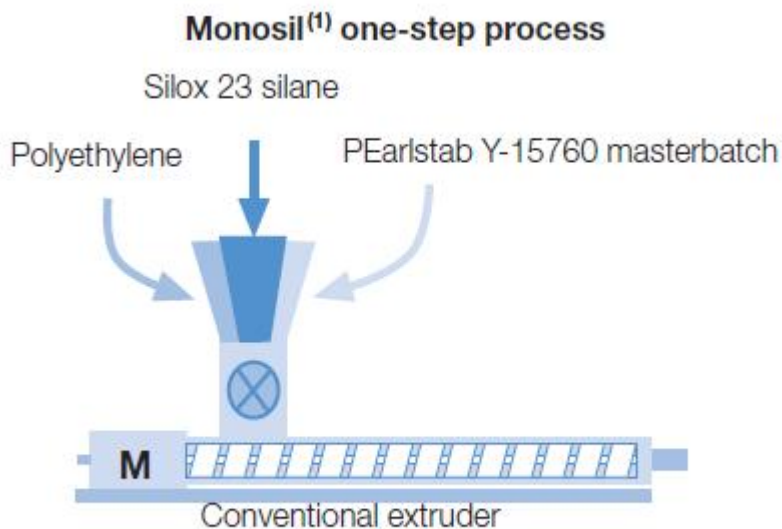
Patent Status

Standard copy to come

Product Safety, Handling and Storage

Standard copy to come

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 experimentally. 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

Standard copy to come

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 finished product must contain in total no more than 0.2% conversion products from the above substances.

Contact Information

Email

commercial.services@momentive.com

Telephone

| Americas | Latin America | EMEAI- Europe, Middle East, Africa & India | ASIA PACIFIC |
|--------------------------------|----------------------|---|---------------------|
| +1 800 295 2392 | Brazil | Europe | China |
| Toll free* | +55 11 4534 9650 | +390510924300 | 800 820 0202 |
| +704 805 6946 | Direct Number | Direct number | Toll free |
| Direct Number | | | +86 21 3860 4892 |
| | | | Direct number |
| *All American countries | Mexico | India, Middle East & Africa | Japan |
| | +52 55 2169 7670 | + 91 44 71212207 | +81 3 5544 3111 |
| | Direct Number | Direct number* | Direct number |
| | | *All Middle Eastern countries, Africa, India, | Korea |
| | | | +82 2 6201 4600 |

For literature and technical assistance, visit our website at: www.momentive.com

DISCLAIMER:

THE MATERIALS, PRODUCTS AND SERVICES OF MOMENTIVE PERFORMANCE

MATERIALS INC. AND ITS SUBSIDIARIES AND AFFILIATES (COLLECTIVELY “SUPPLIER”), ARE SOLD SUBJECT TO SUPPLIER’S STANDARD CONDITIONS OF SALE, WHICH ARE INCLUDED IN THE APPLICABLE DISTRIBUTOR OR OTHER SALES AGREEMENT, PRINTED ON THE BACK OF ORDER ACKNOWLEDGMENTS AND INVOICES, AND AVAILABLE UPON REQUEST. ALTHOUGH ANY INFORMATION, RECOMMENDATIONS, OR ADVICE CONTAINED HEREIN IS GIVEN IN GOOD FAITH, SUPPLIER MAKES NO WARRANTY OR GUARANTEE, EXPRESS OR IMPLIED, (i) THAT THE RESULTS DESCRIBED HEREIN WILL BE OBTAINED UNDER END-USE CONDITIONS, OR (ii) AS TO THE EFFECTIVENESS OR SAFETY OF ANY DESIGN INCORPORATING ITS PRODUCTS, MATERIALS, SERVICES, RECOMMENDATIONS OR ADVICE. EXCEPT AS PROVIDED IN SUPPLIER’S STANDARD CONDITIONS OF SALE, SUPPLIER AND ITS REPRESENTATIVES SHALL IN NO EVENT BE RESPONSIBLE FOR ANY LOSS RESULTING FROM ANY USE OF ITS MATERIALS, PRODUCTS OR SERVICES DESCRIBED HEREIN. Each user bears full responsibility for making its own determination as to the suitability of Supplier’s materials, services, recommendations, or advice for its own particular use. Each user must identify and perform all tests and analyses necessary to assure that its finished parts incorporating Supplier’s products, materials, or services will be safe and suitable for use under end-use conditions. Nothing in this or any other document, nor any oral recommendation or advice, shall be deemed to alter, vary, supersede, or waive any provision of Supplier’s standard Conditions of Sale or this Disclaimer, unless any such modification is specifically agreed to in a writing signed by Supplier. No statement contained herein concerning a possible or suggested use of any material, product, service or design is intended, or should be construed, to grant any license under any patent or other intellectual property right of Supplier covering such use or design, or as a recommendation for the use of such material, product, service or design in the infringement of any patent or other intellectual property right.

*Silox™ is a trademark of Momenive Performance Materials Inc.

The use of the “™” symbol designates registered or unregistered trademarks of Momenive Performance Materials Inc. or its affiliated companies. Momenive and the Momenive logo are trademarks of Momenive Performance Materials Inc.