

Storage and Handling

Product Description

POLYOX™ Water-Soluble Resins (WSR) are water-soluble solids that are normally supplied as a powder in fiber drums or in Flexible Intermediate Bulk Containers (FIBCs).

POLYOX Water-Soluble Resins can be handled in common materials of construction such as steel, aluminum and stainless steel, and they are compatible with most common gasketing materials.

Explosion and fire hazard: As an organic solid, POLYOX Water-Soluble Resins will burn. In piles they burn with about the same ease as cornstarch. When the powder is dispersed in air, explosive mixtures can be formed. ASTM Standard E1226 tests show that the deflagration behavior of POLYOX Water-Soluble Resins depends markedly on their particle size and their dust hazard class can vary from St-1 to the lower boundary of St-3. A sub-200 mesh sample (particle diameter about 42 microns) yielded a K_{st} of 182 bar-m/s, while a sub-325 mesh sample (particle diameter about 29 microns) yielded a K_{st} of 303 bar-m/s. This difference in K_{st} reflects more rapid combustion of smaller particles in the sub-325 mesh powder fraction. (Typical commercial product contains about 20% sub-325 mesh powder.)

Equipment and operating procedures for handling POLYOX WSR powders should be designed to prevent the formation of explosive mixtures and/or control the effects of explosions as described in National Fire Protection Association documents NFPA 69 “Explosion Prevention Systems” and NFPA 68 “Venting of Deflagrations.” When applying deflagration rate data to process designs such as deflagration vents, the user should consider both the as-received particle size distribution and the potential for classification and accumulation of finer particles in some items of equipment.

Static electricity hazard: POLYOX WSR powders may be ignited by small energy sources such as static electricity. Static electricity may be generated and accumulate during transfer of the powders. POLYOX WSR powders have a low Minimum Ignition Energy (MIE)—sub-325 mesh powder has been measured at less than 10 mJ. Dry POLYOX WSR powders are electrically nonconductive with a typical volume resistivity in the range of 5×10^9 to 9×10^{10} ohm-m.

To minimize accumulation of static electricity, all conductive equipment, containers, piping and personnel handling the powder should be grounded as described in NFPA 77 “Static Electricity.” Pipes and metallic flexible hoses should normally have a resistance to ground of 10 ohms or less from every point, although up to 1 megohm is acceptable. Non-metallic items such as plastic vacuum hoses should be conductive and have a resistance to ground from any point of 100 megohm (10^8 ohm) or less. If the powder is pneumatically conveyed, nitrogen inerting should be considered. Additional precautions are required if a flammable vapor is present.

When transferring POLYOX Water-Soluble Resin powders from conductive containers such as fiber drums and conductive FIBCs in the absence of flammable vapor, the operator and all conductive objects in the vicinity should be properly grounded (see NFPA 77 and equipment manufacturer's recommendations). As powders are emptied, conductive containers can accumulate a static charge. If proper grounding is not in place, this could lead to ignition of the powder cloud. Electrical equipment should have the appropriate certification (see National Electrical Code).

Static electricity is of the greatest concern when POLYOX Water-Soluble Resins are handled in the presence of flammable vapors— these vapors are usually easier to ignite than POLYOX WSR powders. Even if the flammable vapor is at a concentration less than its Lower Flammable Limit (LFL) in air (perhaps as low as 10-20% LFL), a “hybrid” mixture of the vapor and combustible powders may ignite more easily due to the increased total fuel concentration. Also, small concentrations of vapor may greatly reduce the MIE of the combustible powder.

When POLYOX Water-Soluble Resins are added to flammable liquids from fiber drums, there are several methods to minimize the likelihood of ignition. One method is to inert the receiving vessel (typically to less than 6 vol % oxygen), with special attention during the period of powder addition, and to ground the drum by bonding the metal drum chimes to the vessel during emptying. It should be ensured that direct metal-to-metal electrical contact is not impeded in any way. Since flammable vapor may be displaced from the vessel, the operator and any nearby conductive objects should be electrically grounded and all electrical equipment in the vicinity should have the appropriate certification.

In flammable vapor atmospheres, transfers from plastic bags must be avoided (even for non-combustible dusts such as alumina). Plastic bags, liners and wrappings from palletized POLYOX WSR shipments should not be removed or handled in the presence of flammable vapor or in any area containing flammable vapors.

All-plastic FIBCs cannot be grounded. However, the operator and all conductive equipment should be grounded. If a flammable vapor atmosphere is present, the use of FIBCs is not recommended without special precautions. This is because it is very difficult to maintain an inerted receiving vessel when air is entrained with the powder; also, flammable vapor may be expelled through any open port into the operating area. In no case should direct additions to flammable liquids be attempted using anything but a fully conductive, grounded FIBC. Preferred alternatives are the use intermediate inerted dump hopper with star or iris valve, and a grounded, fully conductive FIBC with controls that maintain an inert atmosphere in the vessel. Expert consultation may be needed to optimize the design and operating safeguards for such FIBC transfers.

Hand dumping of POLYOX Water-Soluble Resin powders in an air atmosphere from drums into hoppers is possible without explosion venting on the hopper or associated dust collector, providing the following conditions are met:

- 1) The dust collector is built integral with the dump hopper, and volume of the dust collector is less than 8 cubic feet capacity. The dust collector should preferably have cartridge type filters, i.e., not pulse-air bags.
- 2) The operator is grounded; and grounding is provided for metal drums or the metal chimes of fiber drums.

Good housekeeping should be used when handling POLYOX Water-Soluble Resin powders to further reduce the risk of slipping hazards. If spilled, POLYOX Water-Soluble Resins become wet, a potential for a slipping hazard is created on walking/working surfaces. If POLYOX WSR powders are spilled, as much as possible should be swept or vacuumed up before they become wet. Washing with water, solvents, or most cleaning products probably will not be effective and may increase the slipping hazard. High pressure water blasting can be used to remove buildup of material. Scrubbing with chlorine bleach, such as Clorox®, or with 10% soda ash (sodium carbonate) solution, and then rinsing thoroughly with water may help remove residual films of POLYOX Water-Soluble Resins left from cleanups.

Storage: Water and heat can cause POLYOX Water-Soluble Resins to form lumps, so the polyethylene coated fiber drums and FIBCs should be stored in a dry location at a temperature of less than 40°C (104°F). Samples stored for long periods of time (over 6 months at room temperature) should be evaluated by checking solution viscosity to confirm that they are still within the specification limits. Samples that are out of specification should be discarded.

Recommended conditions:

- **Temperature:** POLYOX WSR drums should not be stored next to steam lines or other hot surfaces. Ideal storage temperature should not exceed room temperature. Storage in a refrigerator or cold room will further extend product life.
- **Moisture:** Exposure to water can cause clumping. Drums should be stored in dry areas. POLYOX WSR drum lids should be kept sealed to prevent absorption of atmospheric moisture.
- **Air Contact:** Because exposure to oxygen causes degradation, drum lids should be sealed to limit air contact.

For more information, complete literature, and product samples, you can reach a Dow representative at the following numbers:

From the United States and Canada: call 1-800-447-4369
..... fax 1-989-832-1465

In Europe: call toll-free +800 3 694 6367[†]
..... call +32 3 450 2240
..... fax +32 3 450 2815

From Latin America and Other Global Areas: call 1-989-832-1560
..... fax 1-989-832-1465

[†]Toll free from Austria (00), Belgium (00), Denmark (00), Finland (990), France (00), Germany (00), Hungary (00), Ireland (00), Italy (00), The Netherlands (00), Norway (00), Portugal (00), Spain (00), Sweden (00), Switzerland (00), and the United Kingdom (00).

Or you can contact us on the Internet at www.polyox.com

NOTICE: No freedom from any patent owned by Seller or others is to be inferred. Because use conditions and applicable laws may differ from one location to another and may change with time, Customer is responsible for determining whether products and the information in this document are appropriate for Customer's use and for ensuring that Customer's workplace and disposal practices are in compliance with applicable laws and other governmental enactments. Seller assumes no obligation or liability for the information in this document. NO WARRANTIES ARE GIVEN; ALL IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE ARE EXPRESSLY EXCLUDED.

Published July 2004

