

VISCOPLEX® and VISCOBASE® Products Storage and Handling Guidelines

RohMax Oil Additives is a leading global supplier of high performance VISCOPLEX® lubricant additives and VISCOBASE® synthetic base fluids for use in automotive and industrial lubricants. The company also produces dewaxing aids used in refinery processing and cold flow improvers for biodiesel and forms part of the Coatings & Additives business unit of Evonik Industries, a market leader in specialty chemicals. Our broad line of viscosity index improvers (VIIs) and pour point depressants (PPDs), derived from proprietary polyalkyl methacrylate (PAMA) technology, helps formulators achieve fuel efficiency targets and cold flow optimization. Our cold flow improvers (CFIs) alter the problematic cold flow properties of biodiesel and our dewaxing aids boost process efficiency through optimized solvent dewaxing. State-of-the-art technology centers, worldwide manufacturing facilities and a global supply chain enable us to provide customized products and solutions to our customers around the world.



This document contains guidelines intended to assist RohMax customers in the storage and handling of its products. While this guidance is intended to reflect most commonly encountered conditions for storage and handling, it cannot account for all circumstances. Therefore, these guidelines should be used in conjunction with any site's regulatory compliance and safety and health programs. Always ensure employees have the proper safety equipment and training.

Availability

VISCOPLEX® products are available in bulk, in railcars, and in tank trucks/containers, ranging in capacity from 20 metric tons (~6,000 gallons) to 70 metric tons (~20,000 gallons). In addition, they are available in green, ISO-standard, "global" 1.0 mm (top), 0.9 mm (body), 1.0 mm (bottom) steel drums weighing approximately 191 kg (421 lbs) gross with a net content of 175 kg (386 lbs). VISCOBASE® products are generally available in drums. For the availability of VISCOBASE® products in

bulk, contact your local RohMax technical sales representative or customer service representative.

Storage and Shelf Life

RohMax stores some VISCOPLEX® products in steel tanks, which are well-insulated and equipped with steam heat. The recommended temperature for bulk storage for VISCOPLEX® products is 70°C (158°F), for VISCOBASE® products is 25°C (77°F). The recommended maximum storage temperature for VISCOPLEX® Series 7 and VISCOBASE® products is 80°C (176°F). The recommended maximum storage temperature for all other VISCOPLEX® products is 100°C (212°F). Most VISCOPLEX® and VISCOBASE® grades are highly viscous at ambient temperatures. It is customary to pump and blend at elevated temperature, usually in the range of 60–80°C (140–176°F). Check the Material Safety Data Sheet for other handling and exposure information. Avoid storing VISCOPLEX Series 7 and VISCOBASE products at temperatures higher than 80°C (176°F) or 100°C (212°F) for all other products for extended months.

Storage and Handling Guidelines

VISCOPLEX® and VISCOBASE® may darken gradually when stored at elevated temperatures because of oxidation of the carrier oil; however, the color change has no effect on the polymer. If the storage tanks will be inactive for long periods, steam should be turned off to retard carrier oil oxidation and conserve steam.

When applying heat to VISCOPLEX® and VISCOBASE® products, avoid high surface temperatures of heating elements (e.g., exhaust, live steam). The recommended maximum temperature for contact with heating surfaces is 130°C (266°F). Storage tanks may be heated more quickly by agitating the contents of the tank. Agitation also helps retard carrier oil oxidation by removing hot spots in the storage vessel. Agitations can be conducted by several means, including recirculation with a pump, using a mechanical stirrer or by blowing inert gas into the tank. Nitrogen or carbon dioxide are preferred versus dry air to avoid color development.

VISCOPLEX® and VISCOBASE® products, stored in sealed drums in dry ambient conditions, will have a minimum shelf life of 2 years. In hot climates, drums should be stored in the shades.

For storage and handling information on VISCOPLEX® 4-Series (eOCP) or VISCOPLEX® 14-Series (eEVA) products, please refer to the individual product data sheets and MSDS. These versions of VISCOPLEX® are unique and this handling guideline might not be all applicable. The shelf life of eEVA products is 1 year if product is kept very dry.

Health and Safety Information

RohMax maintains Material Safety Data Sheets (MSDS) on all of its products. These sheets contain important information useful for protecting the environment and your employees and customers from any known health or safety hazards associated with our products.

RohMax automatically sends MSDS with each new customer order. If an MSDS is changed, every customer who ordered up to 12 months prior to the change, will automatically receive an updated MSDS. For additional copies of our MSDS contact your local RohMax representative. We suggest that you review the MSDS before using any of our products in your facilities. We also suggest that you contact suppliers of materials recommended for use with our products for appropriate environmental, health and safety information.

VISCOPLEX® and VISCOBASE® products are typically viscous, colorless to yellow color liquids. They may cause eye and skin irritation. Material should be stored in tightly stored containers in a well ventilated area. Avoid formation of oil mists. VISCOPLEX® and VISCOBASE® can be a thermal hazard, take precautions to avoid contact with hot material. Specific instructions are in RohMax's MSDS and product labels.

Personal protective equipment (at a minimum) should include eye protection, chemical resistance gloves and protective clothing and safety shoes. Check MSDS for appropriate respiratory protection. Dispose of material in accordance with federal and state regulations.

Clean-up of Spills and Leaks

While response to spills will vary by circumstances, simple spills of product are best handled by mixing the product with an inert commercial-grade oil absorbent to form a mixture with the consistency of bread dough. Residue from this process can then be cleaned with petroleum-based solvents. Follow any site and local requirements for spill response.

In case of larger spills or leaks, we recommend to dike and contain the spill with inert material, such as sand or earth. Transfer the liquid to containers for recovery or disposal and transfer the solid diking material to separate containers. The ground may be slippery. Use care to avoid falling. Remove contaminated clothing promptly and wash affected skin areas with soap and water. Keep spills and cleaning runoffs out of municipal sewers and open bodies of water.

VISCOPEX[®] and VISCOBASE[®] Products

Bulk Handling

VISCOPEX[®] products are mixtures of polyalkyl methacrylate polymers and highly refined mineral oils. VISCOBASE[®] products are pure synthetic fluids and do not contain mineral oil. The density of VISCOPEX[®] and VISCOBASE[®] can range from 0.83 to 0.94 g/cm³ (6.9 to 7.8 lbs/gallon). The bulk viscosity can range from 3 to 2500 mm²/s (3 to 2500 cSt.) at 100 °C (212 °F). Please refer to RohMax product data sheets for product-specific physical property information and the Material Safety Data Sheets for additional handling and safety information. Because of their physical characteristics, these materials require care in handling and may require some specialized equipment.

VISCOPEX[®] and VISCOBASE[®] products are transported in railcars and tank trucks/containers. On request, bulk shipments can be delivered according to customer specified temperatures (range between 80 and 100 °C). Bulk containers can be equipped with external steam coils designed to handle pressures up to 6–10 bar (87–145 psi). Steam heat will improve product fluidity. To conserve steam, and to minimize the time required for heating, outlets on steam coils of railcars and tank trucks/containers should be equipped with steam traps during heating.

Although VISCOPEX[®] and VISCOBASE[®] products are very stable at high temperatures, oxidation can occur if the products are exposed to high temperatures over prolonged periods. We recommend that low-pressure saturated steam (2.4–3.4 bar (35–50 psi)) be used if possible. If high-pressure steam is used, we recommend that the heating process be monitored to avoid overheating and long exposure to high temperatures.

The temperature required to handle VISCOPEX[®] and VISCOBASE[®] products will depend on the particular product, viscometrics of the product and handling system used. RohMax customer service personnel are available to review your system and make appropriate recommendations.

Lines used to transfer VISCOPEX[®] and VISCOBASE[®] products should be well-insulated and traced with steam. The lines may also be traced electrically, if properly sized. Sufficient heat should be applied to achieve a product viscosity below 5000 mm²/s, which is the maximum viscosity recommended for transferring products. Optimum pumping results can be achieved when the product is heated to temperature which results in a viscosity of 1000–1200 mm²/s. The product at ambient temperatures

will become very difficult to pump and eventually cause plugging in the unloading lines. Refer to the product technical data sheet for specific information on product temperature /viscosity relationships. Pressure relief valves are highly recommended to avoid pressure build-up in heat-traced lines.

During the transfer, care should be taken to keep the product temperature below 80 °C (176 °F) for VISCOPEX[®] Series 7 products and below 107 °C (225 °F) for all other VISCOPEX[®] and VISCOBASE[®] products. However, the temperatures must be high enough to maintain optimal pumping conditions based on viscometrics. If air is used to unload the product on a cold day, the product in the railcar or tank truck/container will cool faster. In the case of using air on a cold day to unload the product, care should be taken to maintain product acceptable unloading temperatures.

Gear pumps should be used when unloading VISCOPEX[®] and VISCOBASE[®] products from railcars or tank trucks/containers. Gear pumps should be equipped with an internal or external pressure relief valve to relieve excess pressure between the suction and discharge lines

Suction lines on the unloading pumps should have a minimum diameter of 7.7 cm (3 in.). To avoid excessive pressure drop, transfer lines within the blending area should have a minimum diameter of 7.7 cm (3 in.). Should you require further information on pumping rates through various line sizes and the pressure drop involved, please contact your RohMax representative.

RohMax fills railcars and tank trucks/containers to about 98% capacity. Outage tables for railcars are available on request. Actual gross weights can be obtained from the following RohMax manufacturing plants for tank trucks/over the road containers, but will extend the shipping time:

Houston, Texas, USA

Lauterbourg, France

Morrisburg, Ontario, Canada

Weierstadt, Germany

Jurong Island, Singapore

Storage and Handling Guidelines

Unloading Tank Trucks/Containers

For maximum efficiency and safety in unloading VISCOPLEX® and VISCOBASE® products from tank trucks, use the following recommended checklist. Be sure to use proper safety equipment at all times. Personal Protection Equipment (PPE) should be used during unloading, additional fall protection when accessing the top of tank trucks. Be sure to unload tank trucks in a contained area (non pervious unloading area). Avoiding gravel or sand near the unloading area will ensure easier containment/cleaning of the product in case of a spill. If existing unloading areas have sewers, it is recommended to lock the sewers closed and/or to have mats that could be used to cover the sewers during unloading to prevent product from entering the sewers. Cleaning the sewers will be very difficult since product will cause pluggage when it cools. Follow any other local spill prevention or waste-water management procedures.

Unloading Preparations

1. Check results of laboratory testing and obtain release document.
2. If trailers are disconnected from trucks, make sure proper support is used for trailer (e.g. "A" support frames).
3. Use chock blocks for the wheels.
4. Compare contents on outlet valve tag and receiving report with instructions to unload. Inspect seal to ensure it is not tampered with. Record seal number on the unloading documents. Extra precaution (i.e. inspection of equipment and lab testing of material) might be necessary if seal is tampered with.
5. Place "Container Connected" signs (if available).
6. Attach ground wire.
7. Vent the tank truck properly. Open manhole or follow any special instructions for venting.
8. Check that transfer lines and receiving tanks are clean and free from contaminants.
9. Check for sufficient room in the receiving tank.
10. Hook unloading hoses to containers prior to any heat-up.
11. Open inlet and outlet coils. Check for leaks and product in coils.
12. Apply low-pressure steam or tempered water to the coils if necessary. Also check that coils are rated for the steam pressure that is available. Bleed the tap.
13. Set valves and lines properly. Wire quick coupling ears.
14. If air pressure is required to unload, make sure the tractor's air compressor is equipped with a pressure gauge and a relief valve.

During Unloading

1. Start the transfer.
2. Make sure the material is flowing properly.
3. Check all connections for leaks.
4. Make sure the tank truck/container is empty (by tilting it if possible). Make sure you completely empty the lines to ensure no product residue is left in the transfer hoses or unloading lines.

After Unloading

1. Stop the transfer by closing valves in the prescribed sequence and shutting off the pump.
2. Close and check that the indicator pins are in the down position on the internal valve.
3. Vent and drain coil lines before disconnecting.
4. Place coil inlet and outlet in open position.
5. Bleed off pressure in hoses before disconnecting.
6. Disconnect and drain hoses into a suitable container.
7. Close all openings on the top of the tank truck/container.
8. Remove any special fittings.
9. Remove grounding wire.
10. Remove "Container Connected" sign (if used).
11. File the checklist in the unloading department.
12. During cold conditions, make sure to drain the heating coil to avoid frost damage (unless otherwise protected by coil antifreeze fluid). If anti-freeze has to be drained, ensure proper disposal.

Ensure unloading hoses (including steam hoses, gaskets) and other unloading equipment is properly maintained according to manufacturer's recommendation.

VISCOPEX[®] and VISCOBASE[®] Products

Unloading Railcars

For maximum efficiency and safety in unloading VISCOPEX[®] and VISCOBASE[®] products from railcars, use the following recommended checklist. Use proper safety equipment at all times. Personal Protection Equipment (PPE) should be used during unloading, additional fall protection when accessing the top of railcars. Be sure to unload railcars in a contained area (non pervious unloading area). Avoiding gravel or sand near the unloading area will ensure easier containment/cleaning of the product in case of a spill. If existing unloading areas have sewers, it is recommended to lock the sewers closed and/or to have mats that could be used to cover the sewers during unloading to prevent product from entering the sewers. Cleaning the sewers will be very difficult since product will cause pluggage when it cools. Follow any other local spill prevention or wastewater management procedures.

Unloading Preparations

1. Check results of laboratory testing and obtain release document.
2. Use chock blocks for the wheels and set the railcar brake.
3. Compare contents on outlet valve tag and receiving report with instructions to unload. Inspect seal to ensure it is not tampered with. Record seal number on the unloading documents. Extra precaution (i. e. inspection of equipment and lab testing of material) might be necessary if seal is tampered with.
4. Place connection warning signs on approach end (if available).
5. Attach ground wire.
6. Vent the railcar properly. Open manhole or follow any special instructions.
7. Check that transfer lines and receiving tanks are clean and free from contaminants.
8. Check for sufficient room in the receiving tank.
9. Connect the unloading hose to the external valve and secure it properly. This should be done prior to heat-up. This is very important, as it allows the operator to check the operations of the unloading valves/belly cap while the material is at ambient temperatures.
10. Open inlet and outlet coils. Check for leaks and for product in coils.
11. Apply low-pressure steam or tempered water to the coils if necessary. Also check that coils are rated for the steam pressure that is available. Bleed the tap.
12. Set valves and lines properly. Wire quick coupling ears.
13. If air pressure is required to unload, make sure the facility's air system is equipped with a pressure gauge and a relief valve.

During Unloading

1. Start the transfer of product.
2. Make sure the material is flowing properly.
3. Check the system for leaks.
4. Make sure the railcar is empty. Make sure you completely empty the lines to ensure no product residue is left in the transfer hoses or unloading lines.

After Unloading

1. Stop the transfer by closing valves in the prescribed sequence and shutting off the pump.
2. Vent and drain coil lines before disconnecting.
3. Place coil inlet and outlet in open position.
4. Bleed off pressure in hoses before disconnecting.
5. Disconnect and drain hoses into a suitable container.
6. Close all openings on the top of the railcar.
7. Remove any special fittings.
8. Remove grounding wire.
9. Remove loading warning sign (if used).
10. File the checklist in the unloading department.

Ensure unloading hoses (including steam hoses, gaskets) and other unloading equipment is properly maintained according to manufacturer's recommendation.

Storage and Handling Guidelines

Drum Handling

Drum handling can be accomplished by following these recommended procedures as guidelines. Since the drums have to be heated, precaution must be taken when handling the hot drums. Personal Protection Equipment (PPE), e.g. eye protection, chemical resistance gloves, protective clothing and safety shoes might be necessary. Follow local safety requirements.

1. For safety considerations, four drums should be placed on a pallet. RohMax suggests the customer orders a minimum of four drums on a pallet. When handling the drums at the customer site, caution should be taken, especially if there are less than 4 drums on a pallet.
2. Drums can be emptied easily if they are well heated. Proper heating is achieved by putting them in a hot house, in drum heaters, or under steam blankets. The recommended oven temperature for drum heating is 80 °C (176 °F). Drums should not be heated above 110 °C (230 °F), respectively 80 °C (176 °C) for VISCOPLEX® Series 7 and VISCOBASE® products, to avoid spillage.
3. Be sure to crack open the larger bung before heating. This precaution will keep pressure from building up in the drum during heating.
4. Drums are best emptied by using a positive displacement pump and/or gravity draining. Other pumps do not work as well.

If a drum is found to be leaking, immediately (if feasible) empty drum or use an overpack drum. Follow local spill response or cleanup procedures. Also, please report any incidents to RohMax's customer service.

VISCOPEX[®] and VISCOBASE[®] Products

Summary Information

Table 1 provides recommended storage, handling and heating conditions for most VISCOPEX[®] and VISCOBASE[®] products. Table 2 provides minimum handling temperatures and recommended temperature when decanting drums for all VISCOPEX[®] products.

Table 1

	°C	°F
Recommended temperature for bulk storage:	70	158
Recommended maximum temperature for storage	100 (80*)	212 (176*)
Recommended maximum temperature for contact with heated surfaces	130 (110*)	266 (230*)
Recommended maximum temperature for handling	107 (80*)	225 (176*)
Recommended oven temperature for drum heating	80	176

* Applies to VISCOPEX[®] Series 7 products

Table 2

Product Bulk Viscosity @ 100 °C/212 °F		Minimum Handling Temperature for Bulk Viscosity Below 5,000 mm ² /s – °C (°F)	Recommended Temperature for Decanting Drums – °C (°F)
Minimum mm ² /s	Maximum mm ² /s		
0	150	20 (68)	35 (95)
151	200	25 (77)	40 (104)
201	250	30 (86)	40 (104)
251	300	35 (95)	45 (113)
301	400	40 (104)	50 (122)
401	500	45 (113)	55 (131)
501	625	50 (122)	60 (140)
626	800	55 (131)	65 (149)
801	1000	60 (140)	70 (158)
1001	1250	65 (149)	75 (167)
1251	1600	70 (158)	80 (176)
1601	2000	75 (167)	85 (185)
2001	2500	80 (176)	90 (194)
2501	3200	85 (185)	95 (203)

In Case of Spill, Leak, Fire, Exposure or Accident contact:

USA – CHEMTREC:		+1 800 424-9300
Canada – CANUTEC:		+1 613 996-6666
Europe/Africa/Middle East – RohMax:		+49 6151 18-4342
China (domestic sales):		+86 532 8388 9090
China (indent sales):	} Singapore emergency provider:	
HongKong:		
Japan:		+65 6542 9595
Singapore:		
South Korea:		
Other locations – COLLECT:		+1 703 527-3887

This information and all further technical advice is based on our present knowledge and experience. However, it implies no liability or other legal responsibility on our part, including with regard to existing third party intellectual property rights, especially patent rights. In particular, no warranty, whether express or implied, or guarantee of product properties in the legal sense is intended or implied. We reserve the right to make any changes according to technological progress or further developments. The customer is not released from the obligation to conduct careful inspection and testing of incoming goods. Performance of the product described herein should be verified by testing, which should be carried out only by qualified experts in the sole responsibility of a customer. Reference to trade names used by other companies is neither a recommendation, nor does it imply that similar products could not be used.

© 10/2008 Evonik RohMax Additives GmbH.
VISCOPLEX and VISCODASE are registered trademarks of Evonik RohMax Additives GmbH

Europe, Africa, Mideast:

Evonik RohMax Additives GmbH • Kirschenallee • 64293 Darmstadt • Germany • TEL: +49 6151 1809

Americas:

Evonik RohMax USA, Inc. • 723 Electronic Drive • Horsham, Pennsylvania 19044-2228 • TEL: +1 215 706 5800 • TOLL-FREE: 1 888 876 4629

Asia Pacific:

Evonik RohMax Asia Pacific Pte. Ltd. • 3 International Business Park 07-18 Nordic European Centre • Singapore 609927 • TEL: +65 6899 0080

info-rohmax@evonik.com • www.rohmax.com

