

# Best Practice for Blending and Handling Lubricant Products

(Approved by ILMA Board of Directors 04/01/2006)

**Purpose of Guidelines** These Best Practice Guidelines are provided to identify minimum recommended procedures and processes that should be in place for an ILMA member company to manufacture and supply quality lubricant products to their customers. Adoption of such guidelines will reduce risk of liability claims, equipment damage, and misapplication of products.

Refer to API Recommended Practice 1525 (First Edition, June 1997), "Bulk Oil Testing, Handling, and Storage Guidelines" for more detailed bulk oil handling guidelines.

**Equipment Calibration** A well-defined calibration program is recommended to validate the accuracy of meters, gauges and laboratory equipment. The written program should include a complete list of all equipment to be calibrated, the frequency of calibration and a log documenting calibration records. Calibrations should be traceable to NIST standards.

**Product Blending** The procedure used for the manufacture (blending) of lubricating oil products should be well documented. The procedure should address the following aspects: (1) blend vessel inspection, (2) instructions for cleaning vessel, pumps and lines between products, (3) process for weighing or metering ingredients into the vessel, (4) documented formulation information that includes ingredient quantities and lot traceability for all base oils and additives used in the batch, (5) order of ingredient addition, (6) mixing time and temperature, and (7) product disposition (where to be stored or packaged).

**Product Testing** Each product should have a set of specifications that (1) identifies quantities of each ingredient and (2) provides a slate of tests required to validate the product has been blended properly and meets intended performance level. Specifications and lot acceptance test requirements should be identified for each base oil and additive. Each batch of blended product should be tested after manufacture and after product transfer, loading and /or packaging to ensure absence of adulteration during handling. Records must be maintained to relate test results with product name/grade, batch number and date of manufacture.

**Lot Traceability** Each batch of product manufactured should be assigned an identifying batch number that can be associated with (1) the identity and quantity of the components used in the batch, (2) the test results obtained on the batch, and (3) the batch retain sample. A

new batch number (and new retain sample) should be assigned to the product blend after multiple batches of the same product are commingled in a storage tank.

**Sample Retains** It is recommended that (1) at least one pint from each batch of finished product be retained for a minimum of six months (12 months is recommended) and (2) retain samples be collected early in the loading or packaging process to confirm absence of contamination. A sample (8 oz) of bulk product should also be obtained at the time of custody transfer (i.e., when product is pumped into the customer tank). Both the supplier and the customer should secure and retain a sample of the product being delivered. Retain samples should be identified with the product name/grade, product code number, batch number and date/time of manufacture (or filling and delivery). Samples should be stored in an environment that prevents deterioration and contamination of the retain sample.

**Storage Tanks** All bulk storage tanks should be clearly labeled to identify products stored therein. This practice applies to base oil tanks, additive tanks and intermediate/finished product tanks. Tanks should be equipped with devices to measure temperature so proper storage conditions can be monitored. Written storage conditions (minimum/maximum bulk temperature/maximum skin temperature etc) should be maintained for all blended products and ingredients. Ingredient storage conditions should conform to supplier recommendations. It is recommended that all tanks be monitored on a routine basis –daily is desirable. Storage records should be maintained to document temperature and product movement in and out of the tank. Tanks that have a flat bottom should have a water draw at the lowest possible point within the tank. Tanks should be equipped with a connection suitable for taking samples of the material stored in the tank.

**Lines, Pumps, Meters and Hoses** All lines and hoses should be clearly identified with product (family) name near the valve closest to the tank discharge or receiving point. While it is desirable to have dedicated lines, pumps and meters, it is often not practical. In situations where a totally dedicated system is not possible, it is acceptable to use common lines, pumps and meters within each product group. **Common lines should not be used for oils in different product groups.**

The recommended volume for line flush is as follows:

<b>Oil Product Group</b>	<b>Recommended Flush Volume (% of common line, meter and pump volume)</b>
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(Note: 100% Flush is 0.16gal/ft for 2 inch pipe, 0.37 gal/ft for 3 inch pipe and 0.65gal/ft for 4 inch pipe.)

Motor Oils	100% when changing grades within product family / 200% of when changing from PCMO to HD and vice versa.
Hydraulic Oils	100% when changing grades within product group
Gear Oils	100% when changing grades within product group
ATF	300% when following any dyed product or until no dye color can be seen in flush
Turbine Oils	100% when changing grades

**Note: Facilities that utilize “pigged lines” and “lines that can be blown clear” will be able to use less line flush. Some testing may be required to identify minimum flush volumes in these circumstances.**

**Bulk Vessel Inspection** Tank trucks and rail cars should be visually inspected prior to loading to ensure that the unit is clean and dry. It is imperative that manifolds and bottom valves be opened to verify the absence of foreign materials- especially water. Any indication of contamination should be corrected prior to proceeding with the loading operation. Special care should be exercised with tank trucks that could have been previously loaded with gasoline or other low flash hydrocarbon. Likewise after loading, the tank truck or rail car should be inspected to verify that all valves and dome lids have been properly closed, there are no leaks, proper placards have been installed and chocks have been removed. The use of a checklist before and after loading and unloading would help ensure consistent compliance.

**Bulk Product Loading** It is important to confirm the correct product is being loaded and that lines, pumps and meters are flushed per above before beginning the loading process. It is recommended that lubricants be filtered prior to and during loading. The use of a written loading schedule and loading log is recommended to document the loading process. It is especially critical that special care be taken to avoid product mix ups when loading trucks with multiple compartments. Information that should be documented includes product name, grade and batch number, truck compartment number,

storage tank, tank truck name and number, date/time of loading, product temperature, meter readings and/or stick measurements. Such records should be signed and dated by the operator and retained.

**Package Material Inspection** All types of packaging containers (IBCs-totes, drums, pails, gallon cans and other smaller containers) need to be at least randomly inspected to verify the absence of corrosion and contaminants. Reconditioned containers may require 100% inspection. Containers should be inspected with a light that will illuminate the bottom of the container (preferably a drop light). If contamination or corrosion is observed, the incident should be documented, investigated to identify the source and corrective action taken to prevent recurrence. It is recommended that empty plastic containers be periodically weighted to verify resin content.

**Package Product Fill** It is important to confirm that the correct product is being filled into appropriate packages and that lines, pumps and meters are flushed per above before beginning the filling process. Written filling orders should include source (tank number) of product, product name/grade and batch number to be filled, and quantity of containers to be filled. Operating instructions should include fill quantities per container and container labeling guidelines for traceability purposes. A log should be maintained to document the filling process and should include storage tank ID, product/name grade filled, batch number, number and size/type of containers filled, temperature of product at time of packaging and date/time of filling operation. Such records should be signed and retained.

Note: It is important to accurately measure and document fill quantities to comply with weights and measure regulations. Random weighing of filled containers is recommended to verify compliance.

**Shipping Documents** Certificates of Analysis and other documents (provided to the customer at time of delivery) should contain product code number, product name and grade, and batch number. This practice helps ensure delivery of the correct product to the customer and provides a mechanism for tracing the delivery back to the manufacturing process, test results and retain sample.

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