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DEPARTMENT OF COMMERCE
BUREAU OF STANDARDS
WASHINGTON

Letter
Circular
LC-360

February 27, 1933.

REREFINING USED CRANKCASE OIL

The Bureau of Standards receives numerous inquiries concerning rerefining of used crankcase oils. This letter circular has been prepared for the purpose of answering such inquiries. It contains a brief statement of the information available at the Bureau on the subject and lists a number of publications in which more detailed information is given.

The accumulation of impurities in the lubricating oil being used in an engine crankcase necessitates periodic draining of the crankcase. These impurities consist of (a) solid particles, (b) products formed by oxidation of the oil, in particular, acid compounds, (c) less volatile parts of the fuel which have worked past the piston rings and diluted the oil, and (d) water. Since a large percentage of the original constituents of the new oil still remain unchanged, adequate removal of these impurities permits the use of the oil again in the crankcase.

The process of removing the impurities so as to make oil satisfactory for replacement in the engine is called rerefining and the finished oil after this treatment is called rerefined oil. The general process of rerefining consists of the following six steps, some of which may be omitted if the nature and amounts of the impurities, or the use to which the rerefined oil is to be put, warrant it.

(1) Removal of solid particles.

Obviously all gritty material which could act as an abrasive must be removed. This may be accomplished by settling, centrifuging or filtering. Solid particles may also be precipitated by treating with alkalies, alkaline salts or washing powders which are mixtures of soap and alkaline salts.

(2) Neutralization of acid compounds.

Treatment with alkalies will neutralize acid compounds in the oil and render them non-corrosive. Among the materials which may be used are soda ash (sodium carbonate), water glass (sodium silicate), caustic soda (sodium hydroxide), and trisodium phosphate.

(3) Washing of Oil

In neutralizing the acid compounds in the oil, soaps are formed. Since both the soaps and the excess alkali are soluble in water, washing with water to remove them may be desirable.

(4) Distillation

The less volatile portions of the gasoline which have diluted the oil during use may be removed by distillation. Since cracking of the oil will occur if the temperature gets too high, the distillation may be carried out either in vacuum or by bubbling steam through the oil. The vacuum distillation method is particularly useful for the fractionation of mixtures of used oils, although it has not been commonly used for this purpose.

(5) Decolorizing Oil

The methods most commonly used for decolorizing oils after distillation are (a) percolation through bleaching clay, such as fullers earth, or (b) the contact process in which the bleaching clay is mixed with the oil and then removed by a filter press.

(6) Blending to the Desired Viscosity

If the finished rerefined oil has not the desired viscosity, it may be blended with a lighter or a heavier oil. The extent of blending required can be minimized by a control of the distillation process.

The processes outlined for rerefining oils cover only in a general way methods which have been commonly used. Many variations in the methods are possible and in some cases two or more steps may be carried out simultaneously. Further, as pointed out at the beginning, the treatment necessary to produce a satisfactory rerefined oil depends upon the quality of the crankcase drainings and the proposed use of the oil. Thus the problem faced by the person who wishes to produce for sale rerefined oil from mixtures of crankcase drainings obtained from public filling stations is much more difficult than that faced by the operator of a large fleet of cars or trucks using one make and grade of oil and who wishes to use the rerefined oil in the same cars and trucks under operating conditions with which he is familiar. For example, in the latter case, it may not be necessary to remove the diluent if present in small amounts or to restore the color.

The quality of the rerefined oil depends upon the quality of the new oil from which it was obtained and upon

the care taken in the rerefining process. No set of laboratory tests is known for predicting the behavior in service of either a new or a rerefined oil. The only satisfactory measure of the quality of a rerefined oil is its performance in the engine. The Bureau of Standards has not made any service tests on rerefined oils and is not in a position to make any statements regarding the relative performance of new and rerefined oils.

Further information on rerefining of oils may be found in the papers listed in Appendix I. Copies of these papers are not available for distribution by the Bureau of Standards, but they should be available for consultation in the larger libraries throughout the country. A list of manufacturers of apparatus for rerefining used oils may be found in Appendix II.

APPENDIX I

Bibliography

1. Winslow H. Herschel & A. H. Anderson, Reclamation of Used Petroleum Lubricating Oils, B.S. T.P. No. 223; 1922 (out of print).

2. Chas. Van Brunt & P. S. Miller, Reclamation of Automobile Crankcase Oil, Ind. & Eng. Chem., Vol. 17, pp 416, 543; 1925.

3. A. E. Flowers, F. H. McBerty & R. Reamer, Deterioration and Reclamation of Used Automobile Crankcase Oil, Ind. & Eng. Chem., Vol.17, p.481; 1915 (with bibliography).

4. C. E. Kern, Consider Disposal of Crankcase Oil, The Oil & Gas Jour., Tulsa, Okla., Vol. 27, p. 144; Nov. 8, 1928. See also The Oil & Gas Jour., Vol. 28, p. 165; November 21, 1929.

5. A. E. Flowers & M. A. Dietrich, Purification of Diesel Engine Lubricating Oil, Trans. A.S.M.E., OGP 52-12-93; 1930.

6. A. E. Flowers & M. A. Dietrich, Service Characteristics of Diesel Engine Lubricating Oil, Trans. A.S.M.E., OGP 52-2-5; 1930.

7. Winslow H. Herschel, Rerefining Crankcase Oil, Jour. S.A.E., 29 West 39th St., New York, N.Y., Vol.27, p.671; 1930.

8. Economics of Oil Reclamation, Jour. S.A.E., Vol. 31, p. 31; November 1932 and Vol. 32, p. 20; 1933.

Apparatus for Rerefining Oils

The following manufacturers have made it known that they are in a position to furnish equipment for rerefining crankcase oils. No claim is made as to the completeness of this list and the inclusion of any manufacturer does not imply that the Bureau of Standards recommends his apparatus or process.

S. W. Bowser & Company, Fort Wayne, Indiana.
De Laval Separator Co., Poughkeepsie, N. Y.
Sharples Specialty Company, Philadelphia, Pa.
Weartest Refineries, 3020 Gillham Road, Kansas City, Mo. and 111 South 40th St., Omaha, Neb.
Skinner Automotive Device Co., Detroit, Mich.
The Hilliard Corporation, Elmira, N. Y.
Arthena Building Corporation, 53 W. Jackson Blvd., Chicago, Ill.
The Johnston & Jennings Co., 877 Addison Rd., Cleveland, O.
The Wiederhold Company, Detroit, Mich.
Wm. Schwalge Co., 2510 Flourney St., Chicago, Ill.
United Refiners, Inc., 24 Garden Street, Cambridge, Mass.
Refinol Mfg. Corp., 415 W. 5th St., Kansas City, Mo.
C.I.C. Manufacturing Co., 605 N. Main St., Fort Worth, Tex.
Pratt Sales Corp., 619 Tower Bldg., Washington, D. C.
Youngstown Steel Car Corporation, Niles, Ohio.
Crucible Refining Corporation, 281 12th St., Portland, Oregon.
Smith Specialty Co., City National Bank Bldg., Wichita Falls, Texas.
Motive Parts Company of America, 2419 Indiana Ave., Chicago, Ill.
Oil Rectifying Engineers, 2575 State St., Salt Lake City, Utah.
Midget Oil Refinery Company, Clinton, Okla.
Oil Clasifier Corporation, 58 W. 45th St., New York, N.Y.
W. M. Orr, 1741 Q Street, N.W., Washington, D. C.