OBSOLETE - SEND: PYDRAUL A C
MONSANTO FLUIDS FOR SPECIALIZED ENGINEERING
(Green Brochure)
AD-215-086 c-53

MONSANTO CHEMICALS

AROCLOR

Incombustible Lubricants Used in High-Pressure Compressors

Monsanto Technical Bulletin No. P-128 April 15, 1948

Monsanto Chemical Company, St. Louis, 4 Mo.

CORRECTION COPY

* * * *

Selected AROCLORS*, chlorinated biphenyl, are effective incombustible lubricants used in high-pressure compressors.

Particularly Aroclor 1254 and also Aroclor 1248 are suggested for this purpose.

1. Aroclors eliminate explosion hazard.
2. Tests indicate that Aroclors withstand considerably higher bearing loads than mineral oils used in high-pressure compressors.
3. Wear-rate characteristics of Aroclors are superior to those of mineral oils.

This bulletin describes the commercial use of Aroclor in high-pressure compressors as related by R. W. Andrews and E. M. Kipp of the Aluminum Company of America.

* * * *

*Registered in U.S. Patent Office.

The information in this bulletin is based on our experience, represents our best judgment in the matter, and is intended to be helpful; but we cannot assume responsibility for any loss or accident that may result from its use.

AROCLOR - Incombustible Lubricants Used in High-Pressure Compressors { Monsanto Tech. Bul. No. P-128, April 15, 1948

0408471

TOWOLDMON0031518

INCOMBUSTIBLE LUBRICANT USED IN HIGH-PRESSURE COMPRESSORS

By

Raynal W. Andrews, Aluminum Company of America,

and

E. M. Kipp, Aluminum Research Laboratories

(Published in the September 28, 1944, American Machinists Magazine)

"LOCALIZED OVERHEATING of compressors in operation for long continuous periods presented an explosion hazard which has been eliminated through investigations made by the Aluminum Company of America.

"Increased leakage of air through the valves and past the pistons causes the localized overheating, which often reached temperatures in excess of the flash and fire points of the best mineral oils. The presence of oil, oil vapor, or a mixture of oil fractions in the discharge lines and receivers combined with oxygen to support combustion need only be ignited by a small particle of hot carbon to create a serious explosion.

"The possibility of replacing air with an inert gas, such as nitrogen, was abandoned as too costly and difficult from the angle of supply.

"Analysis indicated that removal of all combustible material, such as air compressor oil, would solve the problem. Intensive study of organic compounds having a high boiling point led to the tentative selection of a group of biphenyl compounds containing a wide range of substituted chlorine in the biphenyl group. Known as Aroclors, these products vary in character from thin, combustible oil substance to an incombustible plastic solid.

"One of the group known as Aroclor 1254 has neither flash nor fire point and is a liquid at room temperature. Its physical data include:

Form	Yellow-tinted viscous oil
Flash Point	None (Cleveland open cup)
Fire Point	None (Cleveland open cup)
Pour Point	46 to 54 F. (ASTM)
Viscosity	210 F., 43.5-48.5
(Saybolt Universal	130 F., 280-400
Seconds)	100 F., 1,800-3,800

"Lubricating characteristics of the material were compared with those of a number of standard-type mineral oils widely used as air compressor lubricants. Tests indicated that the material could withstand considerably higher applied bearing loads than the mineral oils before failure of the test-bearing piece occurred. Wear-rate characteristics of the material, with a variety of loads and running times, were superior to those of the mineral oils. Oxidation stability and gum-forming characteristics were determined by heating samples to temperatures of 100, 210, 350 and 500 F., in conjunction with steel, copper, brass and aluminum.

"The samples, in contact with the different metals, were held at high temperatures for periods of from six to twelve hours during which a current of air, saturated with moisture, was bubbled through the liquid. No evidence of the formation of hydrochloric acid was found except at temperatures of 350 and 500 F. No sludge was found in the material itself, although at temperatures of 350 and 500 F. some black, gummy sludge formed on the surface of each of the metals. At 350 and 500 F., the amount of oxidation and gas formation was far less than was evident when mineral oils were used under parallel conditions.

0408472

TOWOLDMON0031519

"The field tests indicated the necessity of procuring a special lubricator, and thermostatically controlled strip heaters for the lubrication suction tank to insure flow of the material through the inlet ports of the lubricator pumping units. More than 15 high-pressure compressors of various types have been equipped for lubrication with this material and they have given satisfactory service. Experience indicates that the material should be used sparingly. Rate of feed should be comparable with the best practice for mineral oil lubrication.

"The material's viscosity characteristic introduces an operating problem in cases where room temperature falls appreciably below 70 F., although a properly selected lubricator should pump the material in the more viscous state as long as the suction tank is heated to insure the filling of the lubricator cylinders. Dilution with lighter liquids should be reserved as a last resort, as it adversely affects the non-combustible properties of the resultant mixture.

"While explosions of air-hydraulic accumulators have been few in number, they have been devastating in effect. The fact that air compressed to 4,500 lb. per sq. in. weighs approximately 23.5 lb. per cu. ft. indicates a concentration of oxygen sufficient to support the combustion of a substantial quantity of ordinary compressor oil. Test results have produced a lubricant without flash or fire points to eliminate the threat of explosions."

★ ★ ★ ★

MONSANTO CHEMICAL COMPANY
Saint Louis 4, Missouri
New York · Chicago · Boston · Birmingham · Charlotte · Cincinnati · Cleveland
Philadelphia · Detroit · Los Angeles · San Francisco · Montreal · Toronto

PGB-rh 1M-8D

0408473

TOWOLDMON0031520