

HP In Reliability

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Oil mist proven for motor lubrication

Since the mid-1970s, oil mist has demonstrated its superiority for lubrication and preserving electric motor bearings. By then, petrochemical plants in the U.S. Gulf Coast area, the Caribbean and South America had converted in excess of 1,000 electric motors to dry-sump oil-mist lubrication. In 1986, there were more than 4,000 electric motors on oil-mist lube in the



U.S. Gulf coast area alone.

However, universal acceptance did not come overnight. And to this day, we hear occasional questions relating to such issues as oil intrusion and explosion hazard.

Today's epoxy motor winding materials will not deteriorate in an oil-mist atmosphere. This has been conclusively proven in tests by several manufacturers. Windings coated with epoxy varnish were placed in beakers with various types of mineral oils and synthetic lubricants. Next, they were oven-aged at 170°C (338°F) for several weeks, and then cooled and inspected.

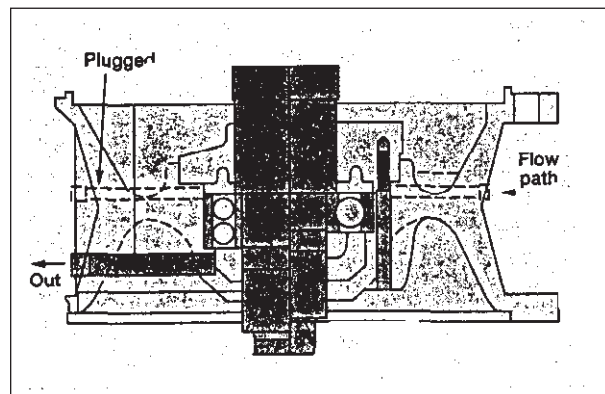
Final proof was obtained during inadvertent periods of severe lube oil intrusion. In one such case, a conventional oil-lubricated, 3,000 hp, (~2,200 kW), 13.8 kV motor ran well even after oil was literally drained from its interior. The incident caused some increase in dirt collection, but did not adversely affect winding quality.

Regarding explosion hazards with oil mist in plant-wide systems, the potential for such occurrences was investigated and obtained that the oil/air mixture was substantially below the sustainable burning point. Experiments had shown the concentration of oil mist in the main manifold ranging from 0.005 to as little as 0.001 of the concentration generally considered. The explosion hazard of oil-mist lubricated motors is thus not different from that of NEMA-II motors. No signs of overheating were found, and winding resistance readings conformed fully to the initial as-installed values.

Converting from grease lube to oil-mist lube. Conversion to dry-sump oil-mist lubrication does not necessarily require that the motor

be removed and sent to the shop. Motors with regreasable bearings are easiest to convert because they generally don't incorporate oil rings or bearing shields. Most oil-lubricated bearings can be a candidate for dry-sump lubrication by adding only the piped oil-mist inlet, vent and drain passages. Oil rings must be removed because there is, of course, no longer an oil sump from which oil is to be fed to the bearing. Our illustration shows the bearing shields removed to establish unimpeded passage from the oil mist inlet pipe through the bearing rotation elements and the vent pipe to atmosphere. However, ample experience shows that the inboard bearing shield need not be removed to ensure a successful installation.

Our reference¹ describes a petrochemical plant area with a series of vertical motors. One such motor, rated 125 hp/3,560 rpm, experienced frequent thrust bearing failures with conventional oil lubrication. Installing dry-sump oil mist solved the chronic lubrication problem. Bearing housing temperatures were lowered from 160°F (71°C) to 110°F (43°C) after conversion to dry-sump lubrication.



Vertical electric motor bearings with both shields removed to promote unimpeded passage from the oil-mist inlet pipe through the rotating elements to vent pipe and atmosphere.

A properly installed and maintained oil-mist lubrication system will result in a high percentage reduction in bearing failures. It must be noted, however that such bearing failure reductions will not be achieved if the basic bearing fail

ure problem is not lubrication related. Oil mist cannot eliminate problems caused by defective bearings, incorrect bearing installation, excessive misalignment or incorrect mounting clearances.

Nevertheless, oil mist excels as a preservative and protective "blanket," preventing ingress of atmospheric contaminants into standby equipment. Bearing friction losses are kept low, and with through-flow oil-mist lubrication,¹ electric motor bearings tend to run considerably cooler than with grease or oil ring lubrication.

LITERATURE CITED

¹Bloch, H.P., "Oil mist lubrication handbook," Gulf Publishing Co., Houston, Texas, 1987.

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