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COMPRESSOR SHORT CYCLING AN UNRECOGNIZED PROBLEM

A frequent cause of compressor failure that is seldom recognized or understood is short cycling. If a compressor failure results, it will either be a motor burn or a lubrication failure, and in both cases it is a near certainty that the cause of failure will be misdiagnosed.

Each time a compressor starts, there is a quick reduction in the suction pressure and therefore the crankcase pressure. The pressure drop causes a reduction in the saturation temperature, resulting in the oil-refrigerant mixture flashing into foam and vapor with the frequent result that a large percentage of the crankcase oil is pumped out of the compressor. If the compressor operates for sufficient time to stabilize the system, the oil will return to the compressor, but if the running period is very short, the oil may still be trapped in the system when the compressor cycles off.

If this cycle is repeated, the compressor will progressively pump oil from the crankcase, and the entire oil charge can be lost from the crankcase. If the running cycle is short, an oil pressure safety control may not be actuated since it requires at least two minutes run time to trip the heat actuated safety element. Under such conditions the compressor can operate without lubrication to the bearings, with the obvious potential for damage.

On any system, air conditioning or commercial refrigeration, where the compressor is controlled by a close differential control, short cycling can be a problem. There really is no magic answer as to an acceptable cycling rate. An adequate run time to stabilize the operating conditions and insure oil return is more important than a long off cycle. The probability is that cycles at three minute intervals will not cause a temperature problem in either the compressor or the contactor.

But the tremendous number of cycles over a period of time that accumulate from short cycling must shorten the life expectancy of both the contactor and the motor, and the benefits of close differential control versus short compressor life must be evaluated on a judgment basis.

The design of the compressor to considerable extent affects its cycle life expectancy. Copelaweld air conditioning and heat pump compressors are spring mounted, with relatively soft mounts for good noise suppression. Spring life of 200,000 cycles would normally be adequate for a 10 year heat pump life. Commercial applications undoubtedly would see more frequent cycling, and 300,000 cycles would be a typical design goal for spring life on commercial welded compressors.

In Copelametic compressors the mounting is external to the compressor, and cycle life would be related to the motor. 500,000 to 1,000,000 cycles might be a typical average life span, with longer life for smaller lower horsepower motors and shorter life for larger horsepower equipment.