

Industrial - Bearings

ISO 4406 Cleanliness Specification Recommendation of New Lubricants

Always follow Chevron's ISOCLEAN® Certified Lubricant Product Guidelines.



OEM	Component Type	Oil Cleanliness Specification ISO D 4406 Maximum Allowed Cleanliness Code	Notes:
<p>Note Bearing OEMs generally rate expected bearing life (assuming the bearing is correctly aligned and operated within its load rating) with a figure called the L₁₀ Life. This means that 10% of the bearings may fail at this life and and 90% are still operating satisfactorily. However this expected life can be modified by a Lubrication Factor η_L and Contamination Factor η_C. These value of these two factors range between 0 and 1. If both were to be 0.5 then a revised life expectancy of $L_{10} * \eta_L * \eta_C$ would be L₁₀ Revised = L₁₀ . 0.5 * 0.5 or 0.25 of nominal L₁₀. As can be seen, both these factors reduce bearing life expectancy. In an ideal world both of these factors would = 1 where the lubrication was perfect and the contamination was zero. This would provide a true L₁₀ Life as indicated by the OEM because revised $L_{10} = L_{10} * 1 * 1 = \text{OEM } L_{10}$. However even if the lubrication is perfect, contamination is always present, reducing the expected life. By removing the factor of lubrication by assuming the lubrication is perfect, (so Lubrication Factor $\eta_L = 1$) the expected life L₁₀ is multiplied the Contamination Factor only. In this way we are studying only the effect of oil contamination levels on bearing life. Bearing life studies of bearings running with oil contaminated at XX/13/10 to XX/14/11 show an Contamination Factor η_C of between 0.8 and 1.0, indicating only a small amount of bearing life reduction. When the oil cleanliness is reduced to a range of XX/15/12 to XX/16/13, the Contamination Factor η_C increases to 0.3 to 0.5, showing life reduction of 30% to 50%. Further when the oil cleanliness is reduced even further to XX/17/14 to XX/19/15 the Contamination Factor η_C is between 0.01 and 0.3. This shows dramatic reduction of bearing life. This background will explain the data below and is from the papers "Lubrication and the Effects of Contamination" and "Method for Estimating Contamination Factor η_C based on lubricant cleanliness" published by SKF published in 2010.</p>			
SKF	Rolling Element bearings	A very high oil cleanliness level from XX/13/10 to xx/14/11 will enable rolling element bearings to achieve an L₁₀ life of 80% to 100% of the OEM L₁₀ spec	From the research papers "Lubrication and the Effects of Contamination" and "Method for Estimating Contamination Factor η_C based on lubricant cleanliness" by SKF published in 2010.
SKF	Rolling Element bearings	Oil cleanliness levels of XX/15/12 to XX/16/13 provide a bearing L₁₀ life of 30% to 50% of the OEM L₁₀ spec.	From the research papers "Lubrication and the Effects of Contamination" and "Method for Estimating Contamination Factor η_C based on lubricant cleanliness" by SKF published in 2010.
SKF	Rolling Element bearings	Oil cleanliness levels of xx/17/14 to xx/19/15 provide a bearing L₁₀ life of only 1% to 30% of the OEM L₁₀ spec.	From the research papers "Lubrication and the Effects of Contamination" and "Method for Estimating Contamination Factor η_C based on lubricant cleanliness" by SKF published in 2010.
Kaydon and Cooper (SKF Companies)	Thin Section and Slewing Ring bearings	No published OEM spec. These bearings are grease lubricated. For correct product, check with machinery OEM. Chevron Multifak EP 1 is noted on the approved greases list for Slewing Ring bearings.	These bearings are widely used in heavy construction and mining equipment, wind turbines and oil and gas machinery.
Vickers (now part of Eaton Corp)	Rolling Element Ball Bearings	15/13/11	From Eaton Guide to Systemic Guide to Contamination Control Doc #561 October 2002
Vickers (now part of Eaton Corp)	Rolling Element Roller Bearings	16/14/12	Refer to Eaton Guide from above
Vickers (now part of Eaton Corp)	Journal Bearings > 400 rpm	17/15/13	Refer to Eaton Guide from above
Vickers (now part of Eaton Corp)	Journal Bearings < 400 rpm	18/16/14	Refer to Eaton Guide from above
INA & FAG divisions of Schaeffler Technologies, Germany	Rolling Element Bearings	Recognizes that contaminants severely reduce bearing life. No specific ISO codes recommended, but fine filtration recommended with a minimum β Ratio of 200.	From "Lubrication of Rolling Bearings" dated 3.2013

