

# Industrial - Gearbox OE

## ISO 4406 - Iso Cleanliness Specification Recommendation of New Lubricants

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



OEM	Component Type	Oil Cleanliness Specification ISO 4406 Maximum Allowed Cleanliness Code	Notes:
<p><b>Note:</b> Some Industrial Gear OEMs do recommend Oil Cleanliness Levels per ISO 4406 of fresh lubricants introduced to their gearsets or have a maximum level for in-service lubricant. Other OEMs design their gearsets to reach an accepted life expectancy anticipating "slight contamination" of the lubricant per ISO 281. Gearset bearings are the components that are most affected by lubricant contamination and thus the OEMs utilize ISO 281 to determine gearset life. These OEMs do recognize cleaner lubricants will provide extended gear set life, but have not established oil cleanliness recommendations. Per ISO 281, in oil lubricated gear sets without filtration or with off-line filters, the "slight contamination" factor (<math>\eta_c</math> 0.3 to 0.5) indicates acceptable ISO 4406 codes of: —/15/12, —/14/12, —/16/12, —/16/13. These codes are consistent with a "clean" gear oil at 18/16/13 or below and would provide acceptable component life with the recommended ISO viscosity grade for the gear set and operating temperature.</p>			
Altra Motion	Gear Motors, Helical and Worm Gear	No cleanliness specifications. An ISO 4406 cleanliness code of <b>18/16/13</b> , or cleaner, will provide acceptable component life with the recommended ISO Viscosity Grade for the gear set and operating temperature.	Brands under Altra Motion: Ameridrives, Bauer Gear Motor, Bibby Turboflex, Boston Gear, Delroyd Worm Gear, Formsprag Clutch, Guardian Couplings, Huco, Industrial Clutch, Inertia Dynamics, Jacobs Vehicle Systems, Kilian, Kollmorgen, Lamiflex Couplings, Marland Clutch, Matrix, Nuttal Gear, Portescap, Stieber, Stromag, Svendborg Brakes, TB Wood's, Thomson, Twiflex, Warner Electric, Wichita Clutch
Amarillo Gear Company	Generation II, "A" Series Cooling Tower Drives, Right Angle Drives, Model 20 - Model 150 and P3, P5, P6, & P8	Target for industrial gearboxes <b>17/15/12</b>	Used oil analysis limits: TAN less than 2.0, Fe<300 ppm, Pb<75 ppm, Cu<275 ppm, Chromium<30 ppm, Al<40 ppm, Sn>30 ppm, Ag<30 ppm, Si<60 ppm. Contamination factor RE: ISO 281, design for e/c 0.3 to 0.5. Target ISO Level of Contamination at 'slight contamination'.
Boston Gear (Div. of Altra Motion)	Helical and Worm Gear	No cleanliness specifications. An ISO 4406 cleanliness code of <b>18/16/13</b> , or cleaner, will provide acceptable component life with the recommended ISO Viscosity Grade for the gear set and operating temperature.	Boston Gear's primary recommendation is Klubersynth UH1 460 (PAG)
Chemineer Rotating Mixers (brand of NOV Inc.)	Mixer Gear sets	No specific cleanliness level recommendation from Chemineer Rotating Mixers. However, NOV Inc. have a general cleanliness level recommendation of <b>XX/17/14</b>	

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<b>Cincinnati Gearing</b>	Enclosed Industrial gear drives; Spur, Herringbone & Bevel	No specific recommendations from Cincinnati, suggests use guidelines from ISO 281 based on the bearing life rating. An ISO 4406 cleanliness code of <b>18/16/13</b> , or cleaner, will provide acceptable component life with the recommended ISO Viscosity Grade for the gear set and operating temperature.	Chief Engineer, Tom Miller, Cincinnati Gearing, Nov. 2014
<b>Cone Drive</b>	Double Enveloping Worm Speed Reducers & Gearsets	No cleanliness specifications. An ISO 4406 cleanliness code of <b>18/16/13</b> , or cleaner, will provide acceptable component life with the recommended ISO Viscosity Grade for the gear set and operating temperature.	Per Cone Drive Approved-List-of-Lubricants-23169-Jun2018, "It is necessary that the oil be clean and free from sludge at all times to obtain long life from the gear unit."
<b>Delroyd Worm Gear Div., Transamerica Delaval (Division of Altra Motion)</b>	Worm Gear Drives	No cleanliness specifications. An ISO 4406 cleanliness code of <b>18/16/13</b> , or cleaner, will provide acceptable component life with the recommended ISO Viscosity Grade for the gear set and operating temperature.	Delroyd joined Nuttal in mid-90s, then joined Altra Motion mid-2010's.
<b>Dodge (division of Baldor Electric Co., which is owned by ABB)</b>	Shaft Mounted Drives	Shaft Mounted drives no published particle count specs	Shaft mounted drives are widely used in the aggregate industry to drive conveyors. This is the Dodge flagship product.  Discussion with Chief Engineer, M Konruff in Greenville, SC, Dec. 2014
	Worm Gear Drives	Worm Gear Drives are "Filled for Life" with a PAG synthetic fluid, no published particle count specifications	
	High Horsepower & Large Specialty gear drives with oil circulating systems	No officially published spec, but suggests <b>18/16/14</b>	
	Industrial Speed Reducers	<b>17/16/13</b>	
<b>Falk - Subsidiary of Rexnord</b>	Most types of Industrial Gear Drives	<b>25/22/18</b> Maximum in service	See excerpts from Rexnord Lubrication Bulletin #128-010. The complete bulletin is on the internet here <a href="https://www.rexnord.com/contentitems/techlibrary/documents/128-010_manual">https://www.rexnord.com/contentitems/techlibrary/documents/128-010_manual</a>
<b>GE Off Highway electric wheel motors (Now Wabtec)</b>	GE OHV D50E35 GE Off Highway electric wheel motors	ISO 4406 new oil <b>-/15/12</b> and max <b>-/18/13</b>	Cleanliness lever requirement per John Curtin on 10Aug'22. Wabtec purchased the GE motor, railroad, plus a few other GE divisions in 2019.
<b>Hansen Industrial Gear (Sumitomo Drive Technologies)</b>	All Enclosed Gear Sets	Initial Fill - <b>/15/12</b> or better, Filter $\beta_{10} = 200$ minimum	Per Hansen Industrial Gear Sumitomo Drive MM_405_002_EN
<b>Hansen Transmission Div (Sumitomo)</b>	Gear Drive Type P4	Initial Fill - <b>/15/12</b> or better, Filter $\beta_{10} = 200$ minimum In service maximum 20/18/14 US field guideline	Per Hansen Maintenance Manual Manufacturing Number Generic / Standardized Gear Units MM_GENERIC_011_EN

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Lightnin (brand of SPX FLOW inc.)	Mixer Gear sets	No cleanliness specifications. An ISO 4406 cleanliness code of <b>18/16/13</b> , or cleaner, will provide acceptable component life with the recommended ISO Viscosity Grade for the gear set and operating temperature.	
Lufkin (now division of GE Oil and Gas)	Enclosed Industrial gear drives Spur, Herringbone & Bevel	<b>-17/14</b>	Engineering Manager at Lufkin, Lisa Ford
NOV (National Oilwell Varco)	Gear oil is EP with viscosity from ISO 100 to ISO 460 depending on ambient temperature.	<b>XX/17/14</b>	XX indicates no >4 micron requirement. NOV Oil Recommendations are in Chevron's Data base. NOV has a general cleanliness code recommendation of XX/17/14 Cliff Swiontek, Engineer, Cliff.Swiontek@NOV.com  BRNDS: AmClyde, Ameron, Anson, APL, APPCO, Artex, ASEP, Axelson Surface Safety Products, Belco, BLM, Bowen, BRANDT, Chemineer Rotating Mixers, CTES, Dreco, DynaWinch, Elmar, Enerflow, Grant Prideco, Greerco High Shear Mixers, Guardian, GustoMSC, Hercules, Hitec, Hydra Rig, Hydralift, Kenics Static Mixers and Heat Exchangers, M/D Totco, MISSION, MoldeCrane, Mono and Moyno, MSI Pipe Protection Technologies, Prochem Belt Driven Mixers, Procon, Quality Tubing, ReedHycalog, Remacut, Rolligon, Seabox, Sentry, Shaffer, Texas Oil Tools, Tolteq, Tuboscope, Varco, Varco BJ, Wellstream Processing, Wilco, Yale
Nuttall Gear (Div of Altra Motion)	All Enclosed Gear Sets	No cleanliness specifications. An ISO 4406 cleanliness code of <b>18/16/13</b> , or cleaner, will provide acceptable component life with the recommended ISO Viscosity Grade for the gear set and operating temperature.	Delroyd joined Nuttall in mid-90s, then joined Altra Motion mid-2010's.
Philadelphia Gear Corp - Div of Timken	All Enclosed Gear Sets	Philadelphia Gear has not cleanliness specifications but does agree a CVX Recommended <b>18/16/13</b> per ISO 4406 cleanliness level.	Per phone and email communications with George Lankford
RegalRexnord	All Enclosed Gear Sets	Rxnord Falk recommends oil change when "Solid particle contamination code exceeds <b>25/22/18</b> for particle sizes $\geq 4/\geq 6/\geq 14$ microns"	regalrexnord.com (Brands: Browning, Falk, Curst, Foote-Jones, Gove Gear, Hub City, Milwaukee Gear, Morse, Rexnord)
Rexnord	Most types of Industrial Gear Drives	<b>25/22/18</b> Maximum in service	See excerpts from Rexnord Lubrication Bulletin #128-010. The complete bulletin is on the internet here <a href="https://www.rexnord.com/contentitems/techlibrary/documents/128-010_manual">https://www.rexnord.com/contentitems/techlibrary/documents/128-010_manual</a>
Siemens Flenders	Helical & bevel gear drives, planetary gears and geared motors	<b>XX/20/15</b> in service	Siemens-Flenders bulletin # BA 7300, Sept. 2012
	Worm gear drives	<b>XX/20/15</b> in service	Siemens-Flenders bulletin # BA 7303, Sept. 2012
	Marine Gearboxes	<b>XX/20/15</b> in service	Siemens-Flenders bulletin # BA 7301, Sept. 2012

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5/4/2023

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SPX FLOW Inc	All Enclosed Gear Sets		Brands: ANHYDRO, APV, BOLTING SYSTEMS, BRAN+LUEBBE, DELAIR, DELTECH, GERSTENBERG SCHRÖDER, HANKISON, HYTEC, JEMACO, JOHNSON PUMP, JOHNSON PUMP MARINE, LIGHTNIN, PHILADELPHIA, PLENTY, PNEUMATIC PRODUCTS, POWER TEAM, SEITAL SEPARATION, SPX RAIL SYSTEMS, STELZER, STONE, TIGERHOLM, UUTECHNIC, WAUKESHA CHERRY-BURRELL SPX FLOW Inc., 135 Mt. Read Blvd, Rochester, NY 14611 Application Engineer, Margaret Daugherty 585-436-5550
Sumitomo	Gear Drives - all types	≤ 20/18/14 for In Service Gear Drives No standard for Fill Oils in Sumitomo approved list	Sumitomo engineering staff, Chesapeake, VA, Dec. 2014
Sumitomo - Hansen Transmission Div	Gear Drive Type P4	Initial Fill - /15/12 or better, Filter β <sub>10</sub> = 200 minimum In service maximum 20/18/14 US field guideline	Per Hansen Maintenance Manual Manufacturing Number Generic / Standardized Gear Units MM_GENERIC_011_EN
Twin Disc, Inc	All Enclosed Gear Sets	only old ISO spec data available xx/16/13 Fill; xx/18/15 in service	Original specification is dated March 2003 and is currently being updated
Wabtec (GE Off Highway electric wheel motors)	GE OHV D50E35 GE Off Highway electric wheel motors	ISO 4406 new oil -/15/12 and max -/18/13	Cleanliness lever requirement per John Curtin on 10Aug'22. Wabtec purchased the GE motor, railroad, plus a few other GE divisions in 2019.