

Corrosion protection

One of the fundamental grease properties is to protect (prevent corrosive attack). When considering the term corrosion, as applied to lubricants, corrosion includes the deterioration of metal surfaces by chemical attack. This may be caused by some ingredient in the lubricant or by external factors. One form of chemical attack, commonly called rusting, is caused when iron or steel is exposed to water and air. If the water contains salts or acid, rusting is more rapid and more serious. When a grease lubricated bearing surface comes into contact with water that surface may become stained and then rusted. Rusting in a grease can be controlled, and even prevented, by incorporation of suitable additives into the grease. Corrosion of ferrous metal is measured using the SKF Emcor corrosion test. A rating of rust detected on the test specimen after exposure is reported in duplicate using the following system.

Emcor Rating	Degree of rusting
0	No rust
1	Not more than 3 small spots, each just sufficient to be visible to the naked eye & less than 1 mm in diameter
2	Small areas of corrosion covering < 1% of the surface
3	Areas of corrosion covering >1% - < 5% of the surface
4	Areas of corrosion covering >5% - < 10% of the surface
5	Areas of corrosion cover more than 10% of the surface Tests are run in duplicate both results are reported hence results appear as 0-0 (no rust in duplicate)

Greases not affording this minimum protection, 0 - 0, should be avoided. For example an Emcor rating of 1 - 1, or higher, indicates that the grease is not suitable where water contamination is possible.

SKF used to have the following a, b, c and d ratings for the Emcor test	
a rating:	Corrosion after the standard test with distilled water
b rating:	No corrosion after the standard test with distilled water
c rating:	No corrosion after wash-out test with distilled water
d rating:	Maximum corrosion degree of 2 - 2 after salt wash-out test
a rating:	> 0 - 0 after distilled water test
b rating:	0 - 0 after distilled water test
c rating:	0 - 0 after water wash-out test
d rating:	< 2 - 2 after salt water wash-out test

The SKF Emcor standard procedure is often modified for special grease applications. These modifications show increased corrosion protection for applications such as paper processing industry. Standard modifications include: water washout (corrosion protection in extremely wet conditions), Salt water protection (for marine environment), Pulp water corrosion (for paper industry where aggressive processing liquid is used).

Other grease corrosion tests, e.g. ASTM D1743, do exist, none have been demonstrated to fulfill all requirements of grease application and testing.

Note: typical corrosion protection additives are: phosphates, metal salts, sulphated waxes.

