

Dodge® mounted bearings: Timken OK load lubrication testing procedure

Certain greases have extreme pressure additives (EP). These additives for lubricants have a role to decrease wear to parts that are exposed to high pressure. The method of measuring the EP additives in grease is called the Timken Method. This paper will describe the Timken Method of testing and how the results are found.

The Timken Method (ASTM D2509) is one of a number of different tests to evaluate the load carrying capability of lubricants. This particular test uses a machine consisting of a tapered roller bearing cup rotating against a stationary steel block, made of case carburized steel (see **Figure 1**). The cup is brought into contact with the steel block under load while the contact area is flooded with a lubricant that is being tested. The test is normally run at about 800 rpm and for 10 minutes at a given load. Lubrication is applied at a rate of 45 grams per minute. If there are no indications of weld marks on the test block, new blocks are tested at increasing load until weld marks appear. The weld marks, as defined by the Timken Method, are any irregular scars or scoring marks on the test block (see **Figure 2**). The results that are reported are considered the OK load, which is the load in pounds measured just prior to the scars appearing on the test block.



Figure 1. Timken Method Test Machine



Figure 2. Sample of Scarring on Test Block

The Timken OK Load can be seen on grease data sheets. Typically the range of load prior to the scarring of the test block is between 30 to 55 pounds.

Typical Properties

Mobilgrease XHP	005	220	221	222
NLGI Grade	00	0	1	2
Thickener Type	Li-Complex	Li-Complex	Li-Complex	Li-Complex
Color, Visual	Dark Blue	Dark Blue	Dark Blue	Dark Blue
Penetration, Worked, 25° C, ASTM D 217	415	370	325	280
Dropping Point, °C, ASTM D 2265	-----	270	280	280
Viscosity of Oil, ASTM D 445				
cSt @ 40° C	220	220	220	220
4-Ball Wear Test, ASTM D 2266, scar, mm	0.50	0.50	0.5	0.5
4-Ball Weld Load, ASTM D 2596, kg	315	315	315	315
Timken OK Load, ASTM D 2509, lb	40	40	40	40
Bomb Oxidation, ASTM D 942, Pressure drop at 100 hrs, kPa (psig)	35 (5)	35 (5)	35 (5)	35 (5)
Corrosion Prevention, ASTM D 1743	Pass	Pass	Pass	Pass
Rust Protection, IP 220-mod., Distilled Water Washout	0,0	0,0	0,0	0,0
Copper Strip Corrosion, ASTM D 4048	1B	1B	1B	1B

The Timken OK load test is a method to determine the effect EP additives have on lubrication performance. Lubrication manufacturers will also use this test to determine what levels of EP additives are in a grease. Typically only those greases that are known to have EP additives added in their manufacturing process are tested. However, the results of the test are not a good indication on how well the EP additives will perform in actual field service.

