



Marley Geareducer[®]

INTRODUCTION

SPX Cooling Technologies is the only major cooling tower manufacturer which designs and manufactures the mechanical components (other than electric motors) used on its equipment. For more than 50 years, our program has been so successful that our Marley fans, Geareducers and driveshafts are widely used on OEM applications and as replacements on competitive water cooling towers.

The durability, smooth and efficient operation and extended service life built into Marley Geareducers stem directly from sound engineering design, carefully controlled manufacturing techniques, and rigid inspection and testing methods used in their production.

Marley Geareducers were developed to meet the special requirements of geared speed reducers in water cooling tower and similar heat exchanger fan drive applications. Improvements in design and manufacturing have been made continuously through the years. The direct result is exceptional reliability. Right angle or parallel in shaft arrangement, they are manufactured in single and double reduction gearing. Double reduction gearing is utilized when higher capacities and larger fan sizes demand larger speed reduction ratios.

WHY MARLEY GEAREDUCERS?

1. They are designed specifically for axial flow fan drive application.
2. They are designed for cooling tower application, one of the most severe operating environments in which a lubricated mechanical device can be expected to operate.
3. They are designed for continuous duty.
4. They are subjected to numerous tests in prototype form before being released for production.
5. They are given operational tests during final inspection to prove satisfactory quality level of production assemblies.
6. They are performance proven in field application.
7. Gear and bearing life are designed to exceed industry standards.



TEST PROCEDURE

Typical tests of prototypes include these four principal areas: 1—lube oil distribution, 2—heat dissipation, 3—amount of deflection and, 4—overall efficiency of the unit.

Lube Oil Distribution and Heat Dissipation

The unit is first run under “non-load” conditions at full speed; the time required for lube oil to reach all points requiring lubrication is noted. The unit is then run until lube oil temperature “levels off”, generally between 150° and 160°F. (This level has been found desirable to evaporate condensate which may form in the unit.)

Deflection Test

The unit is next run with a Prony Brake to absorb the output torque. Each critical point is then measured for deflection with dial indicators. As many as thirty points are checked at from 100% to 200% of rated torque, most important of which are the gear and pinion members at or near the mesh point. Gears, pinions and shafts are “indicated” for deflection, and in addition all shafts are indicated for end movement. Bearings and caps are also indicated at this time, as are the case proper and the cover. Since each unit is tested for both torque and simulated fan load in both forward and reverse rotation, a total of more than 360 readings may be made to complete a single deflection test! A small amount of deflection can be tolerated by gear design and cutting technique. However, this is limited, and where continuous duty long life characteristics are desired high structural adequacy is necessary.

Overall Operating Efficiency

During the above tests, no-load power is checked. The effects of no-load power and gear efficiency are then combined to give an accurate determination of overall efficiency, which is normally 95% or higher. This figure is very reliable, since it includes all of the factors affecting the overall efficiency of the unit.



SPX COOLING TECHNOLOGIES
7401 WEST 129 STREET
OVERLAND PARK, KANSAS 66213
UNITED STATES
913 664 7400
spxcooling@spx.com
spxcooling.com

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MATERIALS AND MANUFACTURING

Gears

Both spiral bevel and helical gears are used. All gearing is rated conservatively to satisfy or exceed the latest accepted trade association gear rating standards.

All gears are nickel-moly alloy steel, case carburized and hardened to Rc 58 to 63. (All spiral bevel gears are lapped in matched sets to provide best tooth bearing pattern with a minimum of break-in. After lapping, each set is match marked to ensure its being used as a pair.)

Bearings

Bearings used in Marley Geareducers are of the heavy-duty taper-roller types for minimum friction and maximum service life. They are selected for calculated bearing life which varies somewhat with Geareducer size, but is in excess of minimum requirements of the leading commercial standards. Tapered bearings are located at the bottom of the fan shaft to carry the thrust load imposed by the weight of fan and shaft.

Cases, Covers, Pinion Cages and Caps

All principal external parts are of high quality cast iron, stress relieved by heat treatment before machining. Because of the critical importance of extremely accurate and rigid shaft alignment in Marley Geareducers, all machining operations, inspection, assembly procedures, and testing are rigidly controlled.

RUN-IN AND FINAL INSPECTION

After assembly, every Marley Geareducer is run-in under a torque load. This operation allows a final check to be made on proper gear adjustment and housing dimensions by producing a visible tooth bearing pattern on the gear teeth which is examined and recorded on a serialized inspection record form along with other critical dimensional inspection records. In addition, while the unit is run-in for several minutes at full speed a rustproofing oil is being circulated through the unit and through a filter at a high rate. This provides a final cleaning operation and at the same time coats all interior surfaces with a rust preventive coating which is good for about six months storage.