

Gage Wear

Courtesy Van Keuren

The best general purpose material for gage use is a high quality tool steel such as 52100. This steel has several attributes which make it particularly useful for plug gages.

The high chrome content of the steel results in a corrosion resistant gage and also helps to reduce friction between the gage and the product, thus decreasing wear and providing a longer gage life.

Such steel, when through hardened and properly treated, becomes highly stable. 52100 steel should be hardened to an optimum of 60-62 Rockwell C scale. Hardness in excess of this range will produce an overly brittle and less easily stabilized steel. A softer steel will of course not have good wear resistant qualities. Gages made without the proper temperature conditioning may not be fully stable and may change in size without the user's knowledge. Such changes could lead to errors.

Since a majority of the parts being gaged are of steel, the matching thermal expansion of rate of 52100 steel contributes to accurate gaging. 52100's rate of 6.3 millionths of an inch per inch per degree Fahrenheit is closely matched by that of all steels and well within tolerance applications.

The method of manufacture also affects gage life. Gages produced by grinding will have a surface consisting of peaks and valleys. When such gages are inserted they will be subject to rapid wear due to the ease with which the peaks are abraded. This wear may immediately eliminate the entire tolerance of the gage and make it undersize.

A very smooth surface not subject to rapid wear is obtained by lapping the gage. Lapping removes the peaks and produces a smooth wear resistant surface and a long gaging life.

For some applications chrome plating of the gage will produce a harder and more resistant surface and may be more useful in gaging highly abrasive materials such as magnesium or aluminum. Under proper conditions a chrome plated gage may last up to five times longer than a tool steel gage. Under humid or corrosive atmospheric conditions, chrome plating will provide an advantage over tool steel while retaining the thermal characteristics of steel. The extra cost of chrome plating may be justified in particular applications by this more wear resistant surface.

Tungsten carbide is recommended for extreme wear resistance in plug gages. Tungsten carbide gages have a wear life of fifty times that of tool steel and can be extremely useful especially where the component tolerance is very small and a steel gage might quickly wear beyond limits.

Tungsten carbide will take a better finish than tool steel. In addition it is somewhat corrosion resistant, nearly non-magnetic, and will not burr. It should be noted, however, that carbide has a coefficient of expansion of only three millionths of an inch per inch per degree Fahrenheit and that therefore when gaging steel products more stringent temperature control in fine tolerance gaging will be necessary.

In GO and NOGO gaging it is not uncommon to specify chrome plated or carbide GO members to be used in conjunction with a steel NOGO. The GO member must be resistant to wear. The NOGO member will not usually enter the hole and is therefore not so subject to wear.