

Starrett Webber Material Properties Comparison for Gage Blocks

Material Properties	Steel	Croblox (Chrome-Carbide)	Ceramic
Corrosion resistance	Poor	Excellent	Excellent
Thermal expansion	Excellent 6.4ppm/°F	Good 4.7ppm/°F	Very Good 5.5ppm/°F
Wear resistance	Fair to Poor	Very Good	Very Good
Scratch resistance	Fair to Poor	Very Good	Excellent
Burr resistance	Fair to Poor	Good	Very Good
Chip resistance	Very Good	Fair	Good
Stability – long term	Fair to Poor	Excellent	Data Unavailable
Thermal conductivity	Very Good	Good 1.2x long than of Steel	Poor 2.2x longer than steel
Surface finish	Fair to Good 0.7µin AA	Excellent 0.3µin AA	Very Good 0.5µin AA
Wrung-ability	Fair to Good	Excellent	Excellent

Steel recommended if one or more of the following applies:

- Initial cost is very important. Other materials may provide lower cost over the long term, but steel definitely provides the lowest initial cost.
- Replacement costs are important. If blocks are to be used on the "shop floor", and management expects that they will not be well cared for, then the lower cost of steel can be significant for items considered to be expendable.
- The environment is not well controlled. Steel is quickest to acclimate to the changing environmental conditions of all the available materials. Its thermal expansion characteristics is also most likely to match any micrometer or calipers being used on the shop floor. This will give more consistent measurements.
- Larger measurements need to be made. Temperature becomes very important for larger measurements. As steel is a common material for manufactured parts, the thermal expansion of steel gage blocks is most likely to match those parts being produced, as well as the measuring instruments (micrometers and calipers) used to control the manufacturing process. For parts being made from aluminum or plastic, at least the thermal expansion of steel is well known, and is more likely to be handled correctly than for other materials.

Steel blocks are available in Webber Grade A1 (B89.1.9 Grade 0) only, except for selected sizes 5 inches (125mm) and longer in length which are also available in Webber Grade AA (B89.1.9 Grade 00) accuracy.

Croblox recommended if one or more of the following applies:

- The set is going to be used as a reference standard. Croblox is the most stable of all gage block materials. The unique combination of hardness, superior surface finish, and stability makes sets of chrome-carbide (Croblox) an ideal choice for laboratory reference standards. Greater accuracy is required than is available from steel gage blocks (Grade 2 blocks).

Croblox gage blocks are available in 2 accuracy grades:

- Webber Grade A1 (B89.1.9 Grade 0) and Webber Grade AA (B89.1.9 Grade 00) Where the lowest uncertainty of measurement is required, Webber Grade AA Croblox gage blocks may be calibrated using our Laboratory Calibration procedures. Starrett Webber Laboratory Calibration procedures are restricted to rectangular style blocks only.

Croblox and ceramic recommended if one or more of the following applies:

- The blocks are being used in an abrasive environment. In grinding shops where there is a lot of grit in the air, the grit can land on the gage surface. This grit can scratch the blocks during use and can quickly destroy their wringing ability and accuracy. Croblox and ceramic gage blocks are 10 to 30 times more resistant to scratching than are steel blocks. The useful life of the block in this kind of environment will more than offset the greater initial cost over steel.
- The blocks are used in a humid or corrosive environment. Steel blocks rust. Croblox and ceramic blocks do not. The average life of a steel gage block is 3 years, and is most likely to be scrapped because of corrosion on its gage surfaces. Rust can happen very quickly, and it only takes one brief lapse of care for a steel block to be ruined. Ceramic and Croblox gage blocks never have to be oiled. They positively will not corrode under any normal conditions.
- The blocks will often be wrung together in combinations. Croblox and ceramic gage blocks have superior surface finishes which mean they will wring together more easily and accurately. Also, since Croblox and ceramic blocks are more scratch resistant than steel, they will maintain their ability to wring together far longer than steel blocks.

Webber Grade AA (B89.1.9 Grade 00) Croblox gage blocks are available in the inch system in both rectangular and square styles, and in the metric system only in rectangular style.

Webber Grade AA (B89.1.9 Grade 00) ceramic gages are available only in rectangular style. (Both inch & metric)

Webber Grade AA (B89.1.9 Grade 00) steel blocks are only available in square style , sizes 5 inches or 125mm and longer in length.