

Gage blocks are measuring tools of the highest order. They must be used with great care, and if properly handled, will give long, useful service. However, gage blocks are primary standards of length, and when used as working gages they must be handled in a manner that will conserve the original accuracy and fine finish of the gage surfaces. When these blocks were delivered to you, the box was sealed with tape and enclosed in a vacuum sealed bag. This is your assurance that these gages have not been tampered with since their inspection and packing at our plant.

### CLEAN GAGE BLOCKS BEFORE AND AFTER EACH USE

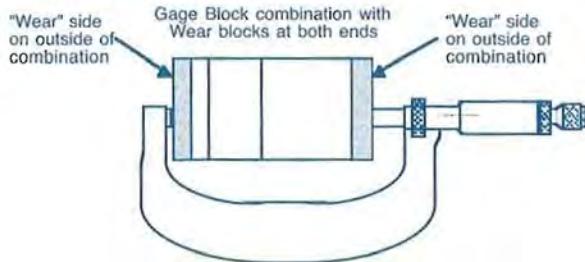
- ◊ When using the gages, the blocks should be wiped off with a soft cloth dampened lightly with mineral spirits to remove any corrosion resisting oil or other oils, grease, or dirt that may be on the gage. Do not use chlorinated solvents to remove grease from the blocks or to clean the slots of the case.
- ◊ Whenever the gages are used around grinding equipment or in any place where there is dirt, always keep the lid of the case closed.
- ◊ After using steel gages, wipe them with a chamois dampened with a rust preventative oil such as Starrett M-1, holding the block in such a manner that your fingers never touch the block. (Finger oils may contain acids which may corrode steel blocks.) Place the block back into its case using the chamois to shield the gage from your fingers and hand.
- ◊ Croblox® and ceramic gage blocks should be wiped off with a clean chamois before placing back in the case.

### WRINGING GAGE BLOCKS

- ◊ When wringing gages together to build up a desired combination, first wipe the gage with a soft cloth which has been prepared with a few drops of light machinery oil. Then, using a second soft cloth, wipe off any excess oil. Then, carefully slide the blocks together while exerting pressure to force out any air that may be between the blocks. The blocks should then take hold and adhere to each other very tightly. (For further information, see Wringing Gage Blocks at [www.starrett-webber.com](http://www.starrett-webber.com) )

### USE OF WEAR BLOCKS

- ◊ Wear blocks are "throw away" blocks whose purpose is to prevent wear on other gage blocks.



- ◊ Wear blocks are used at both ends of combinations and are meant to take the brunt of the contact with other measuring instruments such as micrometers. The desired length of the combination must include the wear blocks. One side of the wear block is marked "wear". This side should always be on the outside of the combination. Inspect the non-wear side of the block before using it in a combination. The non-wear side to be wrung to the other gages should not itself scratch any of the blocks it is supposed to protect. When wear blocks become worn or scratched, they may be discarded and replaced.

- ◊ "Wear" blocks are made from croblox® material to give longer life and make them more resistant to scratches.

### STONING GAGE BLOCKS

- ◊ After gage blocks have been used, you may find a block which will not wring together with another block. The trouble is the block has become nicked or scratched during use. If you examine the block carefully with a magnifying glass, you may discover a small burr, usually at the edge of the block. This burr must be carefully removed to restore the block to usefulness. This may be done by stoning.

- ◊ Blocks may be stoned with Webber gage block stones to remove light nicks and scratches. Light stoning will not alter the size of the gage block. (For further information, see Stoning Gage Blocks at [www.starrett-webber.com](http://www.starrett-webber.com) )

- ◊ Blocks that are severely damaged will probably not be repaired by stoning. They should be replaced.

### TEMPERATURE AND GAGE BLOCKS

- ◊ Gage blocks and most other materials and objects such as micrometers and calipers expand or become larger as the temperature increases. This change is given by the formula:

$$\text{CHANGE} = \text{length of block} \times (\text{Temperature of block} - 68) \times \text{Expansion Coefficient}$$

For a 4-inch steel block at 76°F with an expansion coefficient of .0000064, the block grows by  $4 \times (76-68) \times .0000064$  or .000205 inches.

an insulator and does not conduct heat very well.)

- ◊ When building a combination of gage blocks the heat absorbed from your hands will cause the gage blocks to expand. The gage blocks must be allowed to acclimate to the same temperature as the measuring gage and work piece. (Placing them on a steel or aluminum soaking plate will reduce the acclimation time. Granite plates are not recommended as granite is

- ◊ Parts made from nonferrous materials such as aluminum or brass will have different expansion coefficients than steel. If accurate measurements are required, then careful calculations must be made for the different expansions of the part and measuring gages if they are not being used at 68°F. Consult an engineering or machinist handbook for tables of expansion coefficients for various alloys. Webber lists the coefficients of our gage blocks on the back side of our Calibration Certificates.

- ◊ In practical use, if the gage blocks and the work piece and micrometer or caliper are all made from steel, their expansions will be similar.

**1) IS AUTHORIZATION NEEDED TO SEND IN GAGES FOR CALIBRATION?**

No. But we do ask that you either include a copy of your purchase order with the shipment or reference your purchase order number on the packing list. This will speed up processing of your order.

**2) HOW OFTEN SHOULD GAGE BLOCKS BE CALIBRATED?**

Industry consensus is that gage blocks be calibrated every 1 to 3 years. Calibration intervals may be shortened or lengthened as needed. The frequency of calibration is determined by the user with consideration given to usage, care, and desired accuracy.

**3) WHEN IS A USED BLOCK RECOMMENDED FOR REPLACEMENT?**

You, the user of the blocks can specify your own replacement tolerances according to your needs. These requirements should be stated on our purchase order.

If you specify a grade on your Purchase Order:

- a. For blocks calibrated to the old GGG-G-15C specification, we will add our uncertainty of measurement, both plus and minus, to the tolerance before marking a block out of tolerance. This is in accordance with procedures written in the GGG specification for used gage blocks.
- b. For blocks calibrated to the new B89.1.9 standard, we will mark out of tolerance any block that is measured beyond the published tolerance UNLESS instructed by you, the user, to add our uncertainty of measurement, both plus and minus, to the tolerance. (The B89.1.9 standard does not specify tolerances for used gage blocks.) NOTE: If calibration to a grade is required, it is our recommendation to only replace blocks that exceed published tolerances plus the uncertainty of measurement.

You may specify your own replacement tolerances on your purchase order. The old 10 to 1 Tool Maker's rule is a very useful guide. For example, if you are using the gage blocks to calibrate micrometers with a resolution of .0001 inches, then having your gage blocks calibrated to a tolerance tighter than .000010 inches (10 microinches) is probably not necessary.

If you use your gage blocks in combinations by wringing blocks together, then we recommend replacing any block that has lost its wringability.

**4) MY OLD SET WAS MANUFACTURED TO THE OLD TOLERANCES CONTAINED IN GGG-G-15C. ARE REPLACEMENT BLOCKS AVAILABLE?**

Yes. But, this may require us to do a little searching through our inventory for blocks to meet the tighter GGG tolerances. Thus, there is a 10% surcharge for gage blocks ordered to the GGG-G-15C specification.

**5) DOES WEBBER CHECK BLOCKS FOR WRINGABILITY DURING CALIBRATION?**

Wringability is NOT checked for every block unless requested. There is an additional charge for this service as both sides of the blocks are wrung either to a test block or to an optical flat. However, even if the additional test is not performed, if a block is obviously damaged, it will be noted on the Certificate of Calibration.

Wringability may be checked by you, the user of the blocks. This check does not require an accredited laboratory. Upon request, we will provide you with procedures to check for wringability.

**6) DOES A WEBBER CALIBRATION INCLUDE A CHECK FOR PARALLELISM (VARIATION IN LENGTH) AND FLATNESS?**

All Webber calibrations check for parallelism (Variation in Length). Flatness is NOT usually checked except as an additional test using an optical flat and/or a flatness interferometer at extra cost. As a rule, we do not usually recommend a separate flatness calibration. It is our experience that if a block is within its parallelism tolerance, it is also within its flatness tolerance.

**7) CAN A LOWER GRADE SET BE CALIBRATED TO A MORE ACCURATE GRADE?**

No. The grade of the blocks cannot be upgraded by calibration. The grade of a block is dependent on its geometry (flatness and parallelism) that cannot be changed by inspection.

**8) CAN OUT OF TOLERANCE GAGE BLOCKS BE REWORKED OR RECONDITIONED?**

It is usually not economical to recondition used gage blocks because the material cost in a gage block is a small percentage of its list price. In production runs, the volume of gages produced keeps labor costs per piece to a minimum. The labor required to make a single good block from a used bad one would far exceed the price of a new block. AN EXCEPTION may be for longer gage blocks, 5 inches (125mm) and above in length, provided they are not undersized or severely tapered.

FOR MORE INFORMATION ABOUT OUR CALIBRATION SERVICES, PLEASE VISIT OUR WEBSITE: [www.starrett-webber.com](http://www.starrett-webber.com)