

Starrett

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Granite Surface Plates

Granite Surface Plates Ensure Precise Flatness Accuracy When Properly Maintained

Manufacturers worldwide still rely on flatness accuracy to varying degrees, and so must properly select, install and maintain their granite surface plates. Yet, even with the advances in calibration equipment technology over the past 60 years, the basic plate has remained unchanged.

Of interest, the granite surface plate was first fashioned because of a desperate situation during the Second World War. An owner of a monument and metal working shop in Dayton, Ohio, Mr. Wallace Herman, required a flat table for checking parts, but the military was using all the metal for artillery. Thankfully, Herman deduced that granite could be used, just like metal, for a flat surface and he manufactured the first granite plate from a piece of black stone. The original stone worked, and the technologies have evolved and improved to the very precise granite surface plates that are available today.

Granite Selection

All granite is not the same, and depending on the type, have different wear characteristics. There is Black, Pink or Starrett Crystal Pink.

The Black Granite or Diabase is harder than the other granites. The modulus of elasticity is 9.5×10 to 6th power comparing to the Crystal Pink which is 3.8×10 to the 6th power. However, due to the quartz content of 32% in the Crystal Pink it will outlast the Black 5 to 1. The quartz content is the determining factor in the wearability of granite. Black granite is used primarily for its load bearing capabilities. With any specific weight the Black will be thinner than the "Crystal Pink" because it is literally just a piece of "rock" with no particular mineral content. Whereas, the quartz content of the Crystal Pink permits the instruments to slide much easier without any risk of wearing the plate. In general, Crystal Pink does not carry the load of the black, but its thickness can be compensated to carry the same load.

Installation, Care and Maintenance

The granite surface plate is a precision piece of equipment and must be properly installed and maintained. Before use, be sure the granite surface plate is always used on the support system furnished with the plate.

This will normally be a hard rubber pad attached to the bottom of the plate forming a non-distortable 3-point support system. The pads are installed during manufacturing and the plate rests on them throughout lapping, inspection and shipping. They are a critical factor in surface plate accuracy and must not be removed. Plates up to and including 6' wide x 12' long are furnished with this non-distortable 3-point support system.



When mounting the plate on a stand, be sure only the pads are resting the stand. Never support the plate by the ledges or under its four corners as this will completely void the guarantee of accuracy.

Plates larger than 6' wide x 12' long are supported on multiple support points (6 or more points) consisting of granite pedestals and leveling wedges. The number of support points and positioning is determined by the size of the plate. The height of the granite pedestals, or even if they are used, is determined by the thickness of the plate and overall working height desired.

Nylon slings are highly suggested when lifting the granite. If you must use a forklift to move the granite surface plate, always have protective padding between the metal forks and the granite.

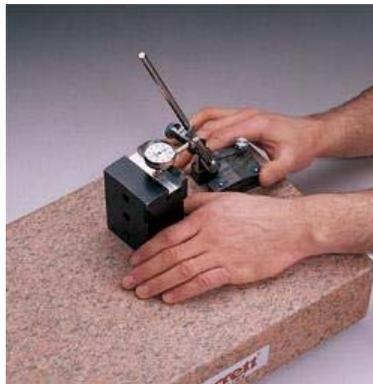
Once set-up, plates do not require extensive care and maintenance. However, it is important to follow some basic rules. Primarily, keeping the surface clean and free from buildup of dust, dirt, grease, grime and other foreign particles will maintain accurate tool readings and extend the life of the plate. Environment and usage have much to do with the frequency of cleaning; however, as a rule, you should clean a plate daily if it is used each day. Consult your supplier for a good surface plate cleaner and if the plate is not used for an extended period of time, it should be covered with a surface plate cover.

Usage

Because a surface plate is a standard or "0" reference point, there are many uses for surface plates. Whether alongside manufacturing or in final inspection, granite surface plates are vital for quality control.

When using a height gage on the plate you must "0" that gage anywhere on the plate with a gage block. Remove the gage block and you can check any of your parts to see if they are flat. Large automotive manufacturers plates to check for warpage of chassis' or crankshafts, as does the aircraft industry etc. Usage for granite are virtually unlimited.

Do not use granite surface plates as workbenches or lunch tables. Dropping wrenches or hammers on plates can chip and nick the surface, and spilling coffee or drinks on granite can cause permanent stains. Grease from food particles will do the same.



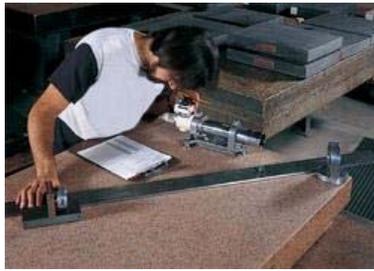
Be sure to set your work piece to be measured down gently on the plate, as a sudden jolt or blow to the plate with a heavy metal object can chip or nick the surface. Also, when inspecting work pieces, especially small parts, try to used different areas of the surface plate because using the same spot over and over, year after year, will wear a "hole" in the plate.

When using threaded inserts in a granite surface plate, use the minimum torque required on hold down bolts, but do not exceed the limits noted on the caution label attached to the plate which came with the threaded insert.

Inspection

Surface plates should be checked on a regular basis for wear using a repeat reading gage with a manual indicator. Generally, long before a surface plate has worn beyond specifications for overall flatness, it will show worn or wavy spots, which will produce measurement errors. The reading gage will readily detect these error-causing areas.

Simply set the gage on the plate and zero it at any point on the table. Move the gage over the plate and if there are hand movements in the indicator more than .000025" for a "AA" plate, .000050" for an "A" plate or .000100" for a "B" grade plate then you have indication that the plate may have some high and low spots and be out of tolerance. Specifically, the tolerance must repeat from side to side within the specified tolerance range in order to be an accurate plate.



Also note that actual calibration of overall flatness traceable to N.I.S.T. can be performed periodically using an autocollimator.

When inspection indicates that the overall accuracy of a surface plate is out of tolerance, the plate should be relapped to restore it to its original accuracy. Even with normal use a plate should be calibrated on an established cycle, whether it be 1, 2 or 3 years, depending on frequency of use.

The granite surface plate was invaluable for ensuring flatness accuracy in the 1950's and provides the same benefit today. Following the simple rules for maintaining your plates will provide you with precise measurement readings in your manufacturing process.

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