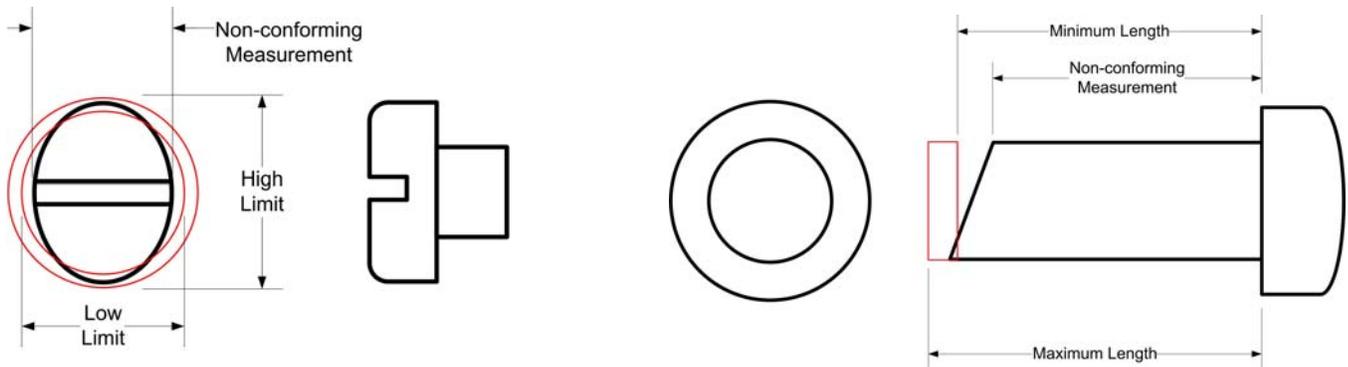




## Interpreting Dimensional Conformance in Terms of Published Limits



When do measurements conform to the standard and when do they not? This seems rather straight-forward and obvious, but according to some the interpretation is not clear.

Standards and specifications can define requirement limits by tabulating the upper and lower values in a chart, or limits can be defined by listing the nominal size and then designating a plus tolerance, minus tolerance, or a plus and minus tolerance. In some cases requirements can be specified as only a minimum or a maximum value. Any of these methods are equally valid and establish the limits within which the parts must fall.

One thing to know about specified requirements is that when a value is designated as a “reference” that requirement is NOT required to be evaluated and is NOT supposed to be used to determine product acceptability. If a specification indicates a particular part characteristic as “1/8 in. ref.” it is a SUGGESTION only and NOT a REQUIREMENT. Even if the specified characteristic measured 1/2 in., the part IS still CONFORMING for that characteristic.

Where the misunderstanding sometimes occurs in interpreting measurements, regarding their conformance to limit requirements is whether the limits apply to the measurement regardless of part orientation or not. Some feel that if a characteristic is within the limits in only one orientation, but is over or under the limits in another orientation the part should be considered conforming for that characteristic. This is a faulty interpretation of the applicability of characteristic limits.

When a standard or specification defines the upper and lower limits of a particular part characteristic then ALL of the measurements of that part characteristic must be within those specified limits to be considered conforming. Any measurement outside of the



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specified limits is an indication that the part is non-conforming. One important caution in this regard is that the part must be measured with the appropriate gage or equipment for evaluating the characteristic. As an example, to determine the conformance of the protrusion height of flat head screws the protrusion must be measured using a protrusion gaging plate and not an optical comparator.

I think it is important to distinguish between FUNCTIONAL parts and CONFORMING part characteristics. The standards and specifications setting bodies attempt to set requirement limits that can be practically met using current manufacturing technology. They also expect the established limits to fall within a size range that will reasonably assure the parts will function as intended.

When a part characteristic is measured with the appropriate equipment and provides a value outside the published limits, it does mean the parts are NON-CONFORMING to the standard or specification, but non-conforming measurements do not necessarily mean the parts are not FUNCTIONAL. Only the end user knows where and how they will use the parts and whether or not the parts having a particular non-conforming characteristic are functional or not.

When characteristics are found outside their specified limits, the purchaser has every right to reject the lot of fasteners having that non-conformity. The supplier has the right to ask the purchaser to consider the end-use of the parts and to request the end-user to determine if they will accept the parts if that particular non-conformity does not adversely affect the functionality of the fasteners.

Once a non-conformity is discovered and acknowledged the purchaser has the discretion to accept the parts or not. It is my suggestion that purchasers only employ this discretion regarding dimensional non-conformities and not for performance non-conformities such as tensile strength, torsional strength, and ductility performance.

If the purchaser will not accept the parts due to the non-conformity, the supplier has the right to scrap the parts, sort the parts for the non-conformity, and re-work the parts to correct the non-conformity. If the supplier decides to sort or rework the parts, they should inspect the lot prior to re-submitting the parts to the purchaser to make certain their efforts have effectively removed the non-conformity from that particular lot of fasteners.

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