



ISO 9001- AS9100 B REGISTERED

2230 Pennsylvania Avenue
Bensalem, PA 19020-0928

Workmanship Standards Manual

Initial Release - February 28 2012

Approvals - Revision

Quality Assurance - Tony Arjona - Date: 4-22-25

Engineering - Frank Richards Jr - Date: 4-22-25

INDEX

- 1.0 Manufacturing Quality Requirements
- 2.0 Machining Appearance Requirements
- 3.0 Packaging
- 4.0 Plating
- 5.0 Painting

1.0 Manufacturing Quality Requirements

1.1 MACHINING - GENERAL

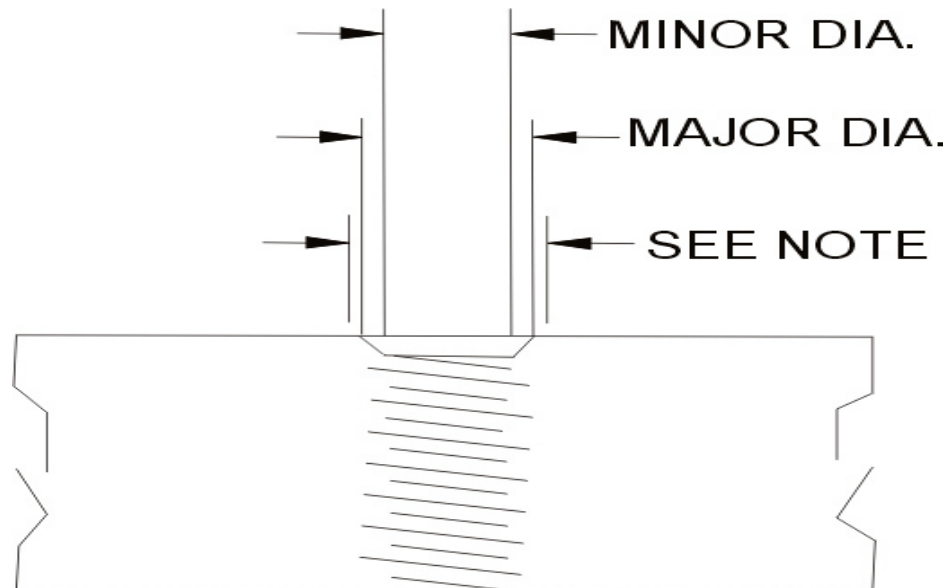
This section of the manual covers the workmanship standards for fabrication of machined parts and assemblies.

1.1.1 Finish of Machined Surfaces

Unless otherwise specified, all machined surfaces shall have a surface finish of 63 or better.

1.1.2 Countersinking

NOTE: All tapped holes in flat workpieces shall be countersunk to a depth that causes the greatest diameter of the countersinking operation to be at least as large as the major thread diameter and not larger than the difference between the major and minor thread diameters beyond the major thread diameter.

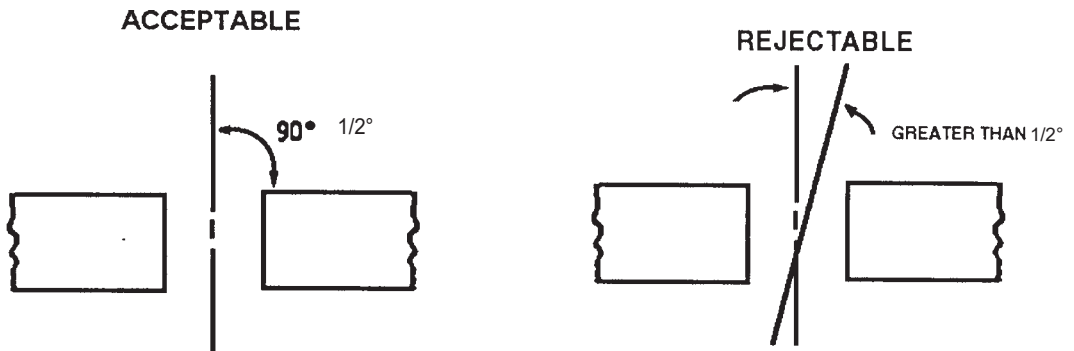


On drilled holes in flat workpieces, minimum material required to break sharp edge and deburr only, shall be removed. Deburr edges .005 Max.

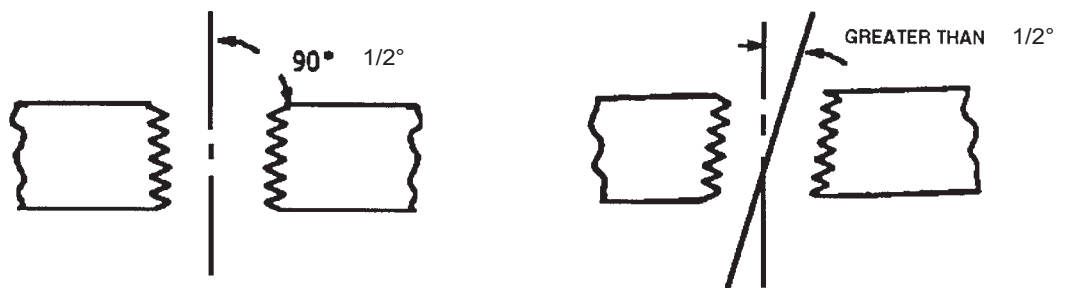
Tapped or drilled holes in shafts or irregular surfaces shall be free of burrs.

1.1.3 Perpendicularity

For holes drilled into materials over .125" deep or drilled through material over .125" thick, the hole shall be within $1/2^\circ$ of being perpendicular.



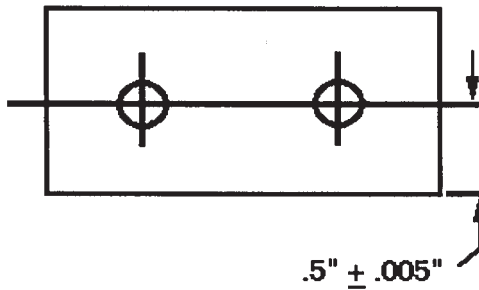
For tapped holes into materials over .125" deep or tapped through material over .125" thick, the tapped hole shall be within 1.5° of being perpendicular.



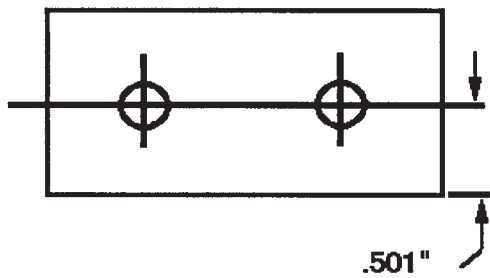
1.1.4 Hole Location on Center Line

Deviation of holes from their true location shall not exceed $\frac{1}{2}$ of total tolerance ($\frac{1}{2}$ of $.010'' = .005''$) away from center line. (Machined parts only).

AS SHOWN ON DRAWING

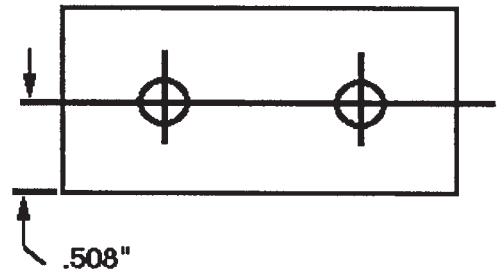


ACCEPTABLE



WITHIN $\frac{1}{2}$ OF TOTAL TOLERANCE

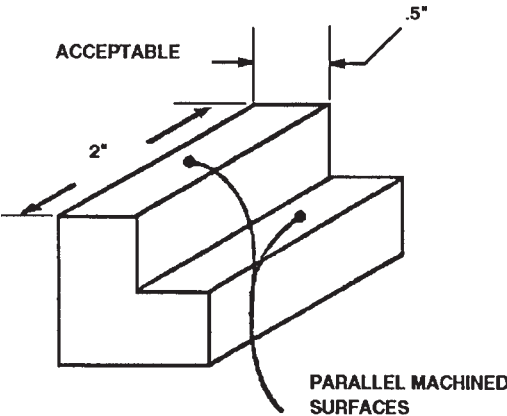
REJECTABLE



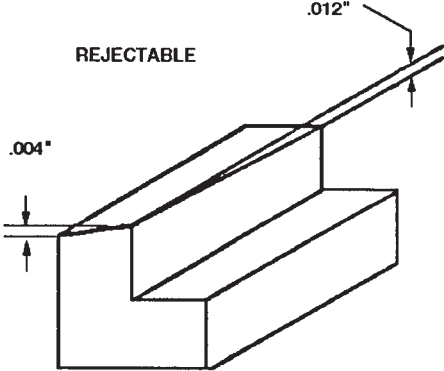
BEYOND $\frac{1}{2}$ OF TOTAL TOLERANCE

1.1.5 Parallelism & Perpendicularity

Parallel machined surfaces shall be parallel within a rate of .005" per 1".
Machined surfaces shall be perpendicular 90° within .005" per 1".



SURFACES ARE PARALLEL AND SQUARE TO WITHIN LIMITS



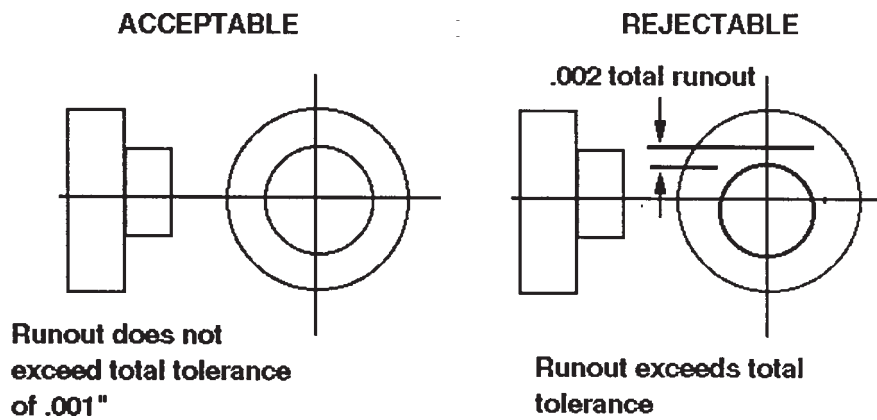
SURFACES EXCEED TOTAL TOLERANCES.

1.1.6 Runout on Diameters

The true indicated runout on any diameter with respect to any other diameter with the same center axis shall not exceed twice the smallest runout tolerance for either diameter.

Minimum tolerance of diameter = $\pm .0005$ "

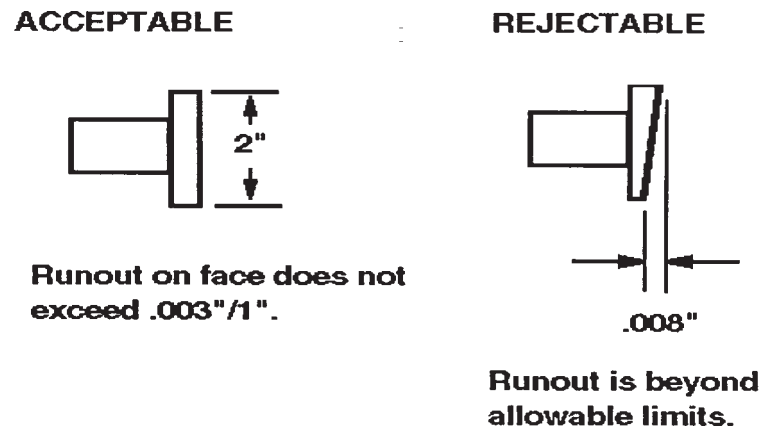
Total tolerance = $2 \times .0005$ " = $.001$ "



1.1.7 Runout on Face

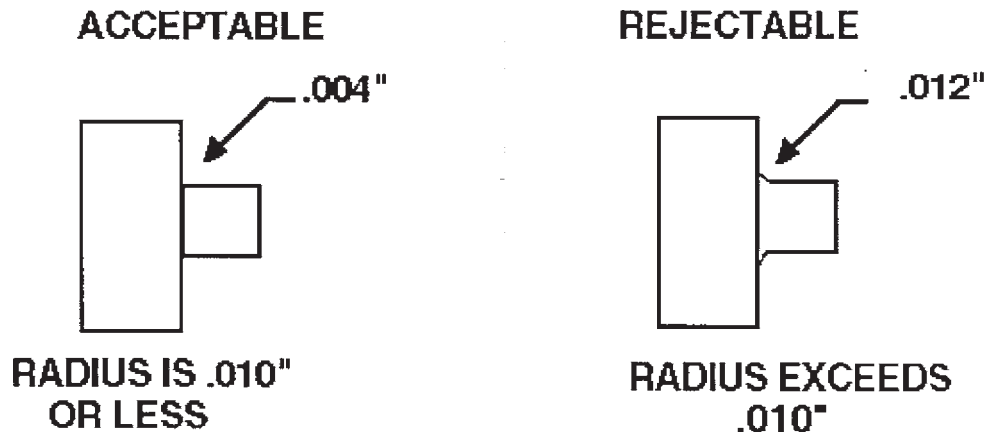
Runout on any face, with respect to axis or outside diameter, shall not exceed $.003$ " per 1 " of face diameter.

Allowable tolerance = $2 \times .003$ " = $.006$ "



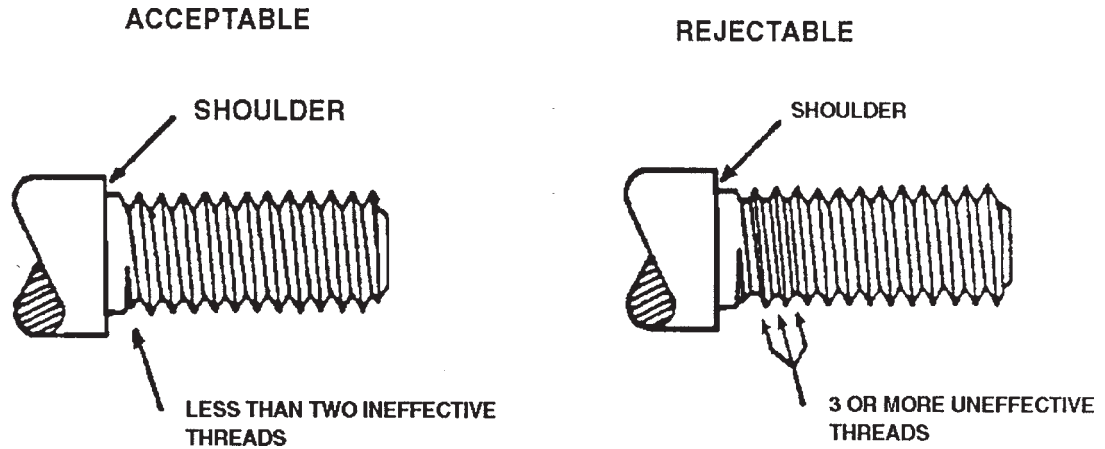
1.1.8 Maximum Allowable Inside Radius For Turned Parts

The inside corner radius of turned parts shall not exceed .010" unless otherwise specified on drawing.

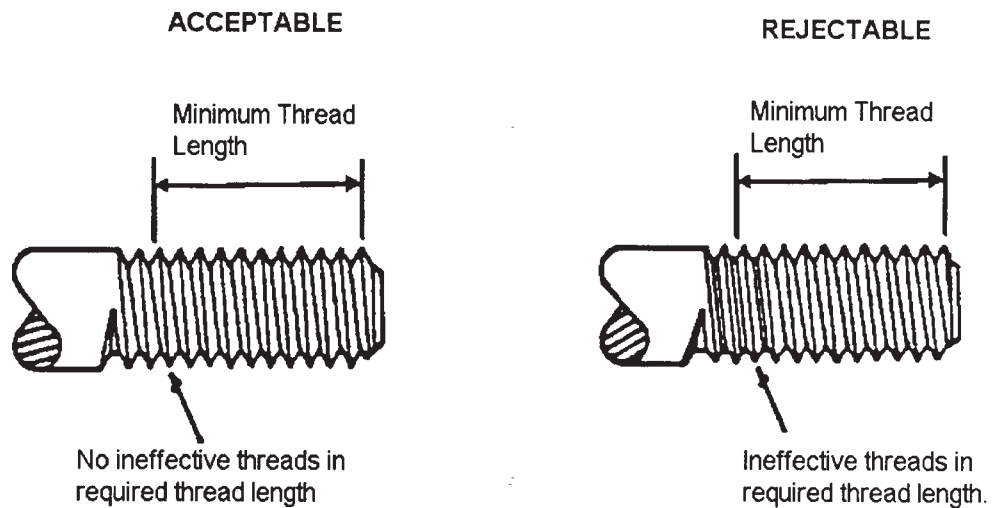


1.1.9 External Threads Up To Shoulder

Complete and effective threads shall extend to within two threads of the shoulder.



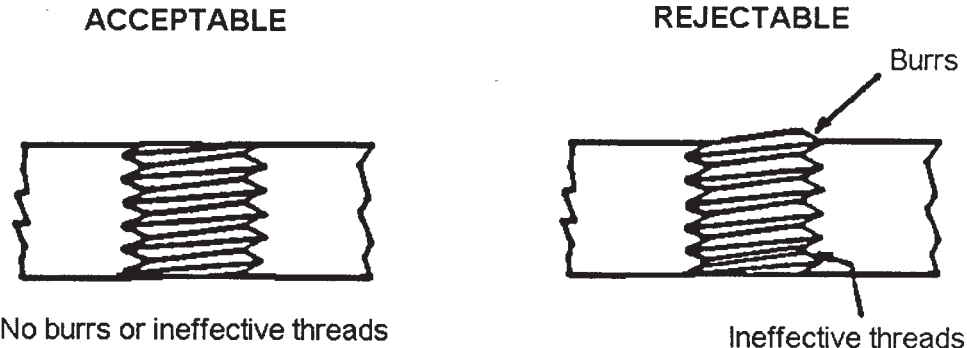
1.1.10 External Threads Up To Shaft



No ineffective threads within required minimum thread length. Maximum of two incomplete threads for tool runout.

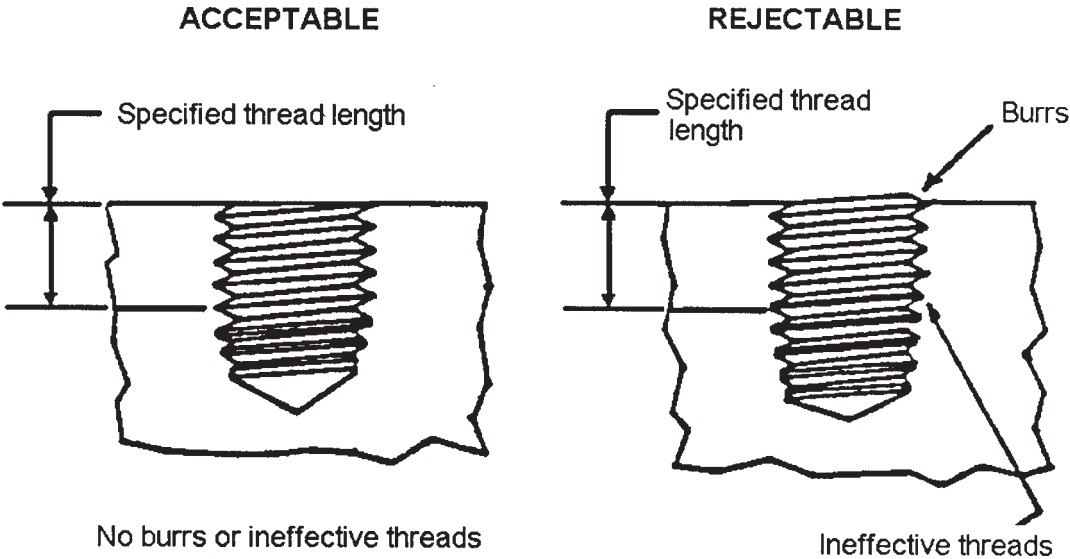
1.1.11 Internal Threads, Threaded Through Hole

Complete and effective threads shall extend through the total depth of the hole. No burrs, visual imperfections or damaged threads are allowed.



1.1.12 Internal Threads, Threaded Into a Blind Hole

No incomplete or ineffective threads in the specified thread length. No burrs, visual imperfections or damaged threads are allowed.



2.0 Machining Appearance Requirements

2.1 Machined Surfaces

- 2.1.1 All parts must have a quality cosmetic appearance. No gouges, nicks or dents permitted. Surface finish of 63 or better required.
- 2.1.2 All edges to be burr free with a maximum edge break of .010.
- 2.1.3 All surfaces to be free of burrs, chips, dirt and oil etc.
- 2.1.4 All threaded & blind holes shall be free of burrs, chips, dirt and oil etc.
- 2.1.5 All threaded holes to have a .010 minimum to .030 maximum chamfer lead.
- 2.1.6 All parts to be free of all solvents.
- 2.1.7 If indicated on drawing or purchase order all parts to be fine grained for appearance - 180 grit minimum.

3.0 Packaging

- 3.1.1 Good commercial packaging shall apply to insure arrival of the finished material in a clean, undamaged and ready to use condition.
- 3.1.2 Proper banding and securing of material to skids where required shall be performed to eliminate load shifts during transit.

4.0 Plating

- 4.1.1 Plated surfaces shall be smooth, adherent, and free from blisters, bleeding, pits nodules, peeling, corrosion, excessive edge buildup, or indications of burning.

5.0 Painting

- 5.1.1 Painted surfaces shall be proper color, gloss, thickness, uniform in appearance, continuous, adherent, free from scratches, cuts, abrasions, burns, blisters, orange peel, fish eye, foreign debris, excessive buildup, etc. Paint adhesion testing to be in accordance with NE standard QPM 110 & QPM 114.