MILITARY SPECIFICATION

SCREW THREADS, INTERNAL COLD FORMED, GENERAL SPECIFICATION FOR

This specification is approved for use within the US Army Armament, Munitions and Chemical Command, Department of the Army, and is available for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers screw threads, internal cold formed and the acceptance practice used to determine conformance to the requirements.

1.2 Classification. Screw threads shall be Unified form and series and shall be of the following classes:

Class 2B - Medium tolerance
Class 3B - Close tolerance

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document, should be addressed to: Commander, U.S. Army ARDEC, ATTN: SMCAR-ESC-S, Picatinny Arsenal, New Jersey 07806-5000 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications and standards. The following specifications and standards form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of these documents shall be those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation.

SPECIFICATION

MILITARY

MIL-I-6868 - Inspection Process, Magnetic Particle

STANDARDS

FEDERAL

FED-STD-H28/1 - Nomenclature, Definitions and Letter Symbols for Screw Threads.
FED-STD-H28/2 - Unified Inch Screw Threads-UN and UNR Thread Forms.
FED-STD-H28/6 - Gages and Gaging for Unified Screw Threads- UN and UNR Thread Forms.
FED-STD-H28/20 - Inspecection Methods for Acceptability of UN, UNR, UNJ, M and MJ Screw Threads.

MILITARY

MIL-STD-6866 -Inspection, Liquid Penetrant

(Copies of specifications, standards, handbooks, drawings, publications and other Government documents required by contractors in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting activity.)

2.2 Other publications. The following document forms a part of this specification to the extent specified herein. Unless otherwise specified, the issues of the documents which are DOD adopted shall be those listed in the issue of the DODISS specified in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS shall be the issue of the non-government documents which is current on the date of the solicitation.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI Y14.5M -Dimensioning and Tolerancing

(Application for copies should be addressed to the American Society of Mechanical Engineers, 345 East 47th Street, New York, NY 10017, or the American National Standards Institute, 1430 Broadway, New York, NY 10018.)

2.3 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein (except for associated detail specifications, specification sheets or MS standards), the text of this specification shall take precedence. Nothing in this specification, however, shall supersede applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Basic data. The form of thread, dimensions, thread classes and thread series shall be in accordance with FED-STD-H28/2. Thread roots shall be rounded (see 4.2).

3.1.1 Gaging system. Gaging system for acceptability shall be selected and specified in accordance with FED-STD-H28/20.

3.1.2 Coated thread allowance. Unless otherwise specified, when internally threaded parts are to be coated, the threads may be overcut to allow for the coating thickness. Unless otherwise specified on the drawing, the amount of overcut shall be as follows: Increase the tabulated minimum pitch diameter by an amount equal to four times the maximum coating thickness. Increase the tabulated minimum major diameter and the minimum minor diameter by an amount equal to two times the maximum coating thickness. Increase the tabulated maximum pitch diameter and the maximum minor diameter by an amount equal to two times the minimum coating thickness. All thread elements shall be within tolerance, as modified above, before coating and shall conform to the tabulated material limits for standard Unified threads after coating.

Note: The above procedure will reduce the pitch diameter tolerance available for the tapping process. Modified limits must be considered in the design of cold forming taps.

3.1.3 Thread allowance for dry film lubricant. Internal threads to be coated with dry film lubricant may have the maximum pitch diameter increased by not more than 0.001 inch. The increase in pitch diameter to accommodate dry film lubricant is not in addition to that specified if another coating is applied before the dry film lubrication. The dry film lubrication may be removed for gaging. If the parts are to be returned to stock they shall be recoated with dry film lubricant.

3.1.4 Definitions. Nomenclature, definitions and symbols for screw threads are in accordance with FED-STD-H28/1 and as specified in applicable documents.

3.1.5 Lead and flank angle. Equivalent change in functional diameter due to variations in lead (including helix) or flank angle shall not exceed one-half the total pitch diameter tolerance for each element individually. These maximum variations and the pitch diameter tolerance cannot be applied simultaneously.

3.1.6 Circularity (roundness). Circularity is defined in ANSI Y14.5M. Screw thread pitch diameter shall be circular within a tolerance zone of one-half the pitch diameter tolerance where pitch diameter tolerance is less than 0.004 inch. Where pitch diameter tolerance is 0.004 inch or larger tolerance zone is 0.002 inch. When circularity is checked using pitch diameter indicating gage segments or rolls, circularity is equal to one-half the difference between maximum and minimum pitch diameter readings. Threads 1.5000 inches and larger with 16 threads per inch or less may exceed the tolerance by 0.002 inch over a maximum arc of 15°, in the direction of minimum material (oversize thread) in this area, provided that this overcut does not result in raised material on the thread flanks or roots.

3.1.7 Taper. Taper of the pitch diameter over the length of engagement shall be within but not exceed one-half the pitch diameter tolerance. Unless otherwise specified, length of engagement used shall be considered equal to the basic major diameter for the UNC, UNF and 8 UN series and 9 pitches for all other thread series.

3.1.8 Runout. The circular runout of the minor diameter cylinder with the pitch diameter cylinder shall not exceed twice the pitch diameter tolerance. Circular runout is defined in ANSI Y14.5M.

3.2 Grain flow . The grain flow in the threads shall be continuous and shall follow the general contour with the maximum density at the bottom of the root as shown in Figure 1 (see 4.3).

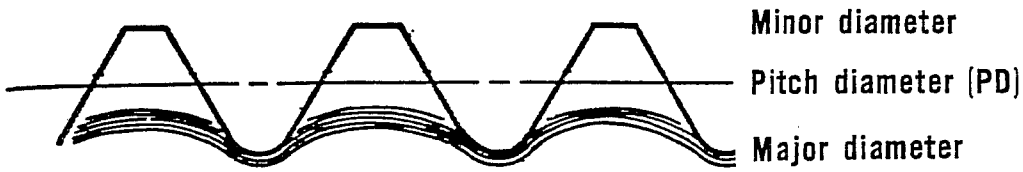


FIGURE 1. Thread grain flow .

3.3 Discontinuities in threads. Permissible and nonpermissible thread defeats are defined in 3.3.1, 3.3.2 and 3.3.3 (see 4.4).

3.3.1 Root defects. Root defects such as laps, seams, notches, slivers, folds, roughness, and oxide scale are not permissible (see figure 2).

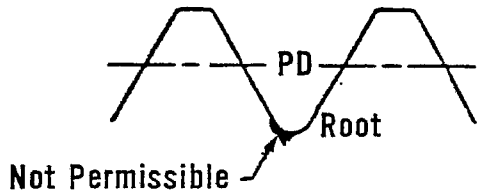


FIGURE 2. Root defects .

3.3.2 Flank defects.

3.3.2.1 Multiple laps. Multiple laps on the flanks of a thread are not permissible regardless of location.

3.3.2.2 Single laps. Laps on thread flanks which extend toward the root are not permissible (see figure 3). There shall be no laps along the flank of the thread below the pitch diameter (see figure 4). A single lap is permissible along the flank of the thread above the pitch diameter on either the pressure or non-pressure flank (one lap at any cross-section through the thread) provided it extends toward the crest and generally parallel to the flank (see figure 5).

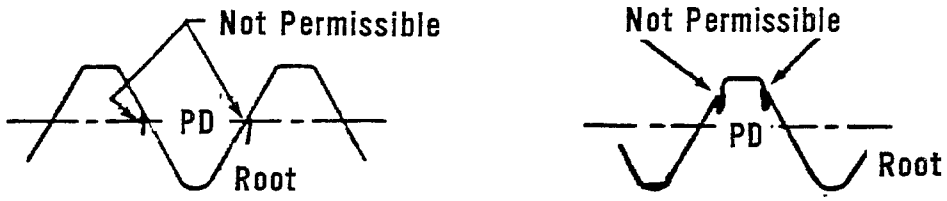


FIGURE 3. Single flank laps extending toward roots.

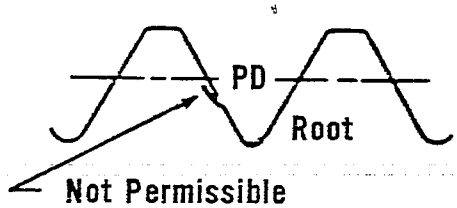


FIGURE 4. Flank lap below pitch diameter.

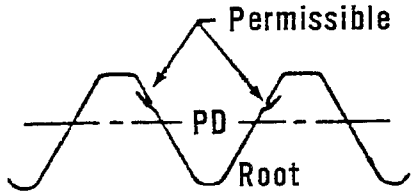
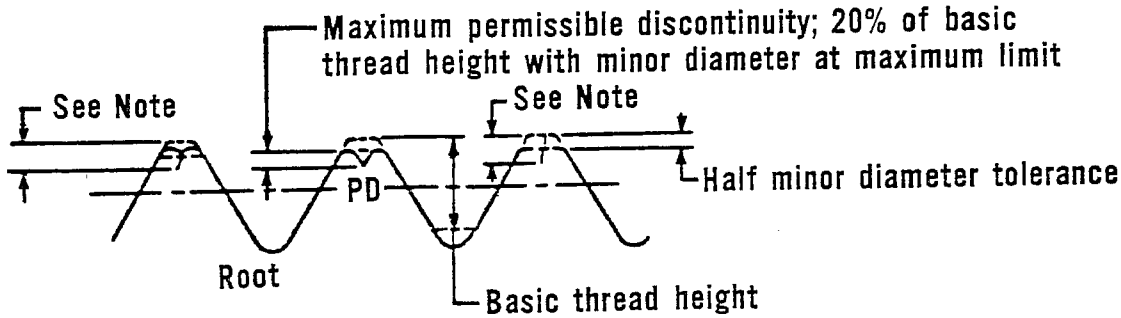


FIGURE 5. Permissible flank laps .

3.3.3 Crest imperfections. Crest craters, crest laps, or a crest lap in combination with a crest crater are permissible provided that the imperfections do not extend deeper than 20% of the basic thread height (see Table I) as measured from the thread crest when the thread minor diameter is at maximum size (see figure 6). The minor diameter of the thread shall be measured prior to sectioning. As the minor diameter of the thread approaches minimum size, values for depth of crest crater and crest lap imperfections listed in Table I may be increased by one-half of the difference between the maximum minor diameter and the actual minor diameter as measured on the part.



NOTE: Depth of discontinuity equals 20% of basic thread height plus half the difference between actual minor diameter and maximum minor diameter.

FIGURE 6. Crest imperfections.

TABLE I. Permissible depth of crest discontunuity.

Threads per inch	Basic thread height, h 0.54127P	Permissible depth 20% h	Threads per inch	Basic thread height, h 0.54127P	Permissible depth 20% h
	inch	inch		inch	inch
80	0.0068	0.0014	16	0.0338	0.0068
72	0.0075	0.0015	14	0.0387	0.0077
64	0.0085	0.0017	13	0.0416	0.0083
56	0.0097	0.0019	12	0.0451	0.0090
48	0.0113	0.0023	11 1/2	0.0471	0.0094
44	0.0123	0.0025	11	0.0492	0.0098
40	0.0135	0.0027	10	0.0541	0.0108
36	0.0150	0.0030	9	0.0601	0.0120
32	0.0169	0.0034	8	0.0677	0.0135
28	0.0193	0.0039	7	0.0773	0.0155
27	0.0200	0.0040	6	0.0902	0.0180
24	0.0226	0.0045	5	0.1082	0.0216
20	0.0271	0.0054	4 1/2	0.1203	0.0241
18	0.0301	0.0060	4	0.1353	0.0271

4. QUALITY ASSURANCE PROVISIONS

4.1 Quality assurance. Quality assurance applicable to screw threads shall be governed by the quality assurance provisions, including sampling plans, of the product procurement document and by 4.2, 4.3 and 4.4 below.

4.2 Thread form and dimensions. Product thread form and dimensions shall be accepted in accordance with FED-STD-H28/20 for the gaging system specified. Thread gages and gaging shall be in accordance with FED-STD-H28/6 (see 3.1)

4.3 Grain flow. Grain flow shall be determined by microexamination using a suitable etchant and magnification to reveal the microstructure (see 3.2).

4.4 Discontinuities. Discontinuities in the threads shall be determined during product discontinuity inspection by magnetic particle method, MIL-I-6868, liquid penetrant method, MIL-STD-6866, or other surface inspection method specified in the product procurement document. For thread sizes smaller than 1/4 inch, cutting of the threaded product may be necessary to permit examination. Acceptance or rejection shall be based upon location, position and depth of discontinuities using visual inspection and microexamination (see 3.3).

5. PACKAGING

Not applicable

6. NOTES:

6.1 Intended use. These cold formed internal screw threads are used where clipless tapping is required and where increased thread strength at the root is desired. Materials such as aluminum, brass, copper, low carbon steels and some corrosion resistant steels are most suitable for cold formed threads. Wrought low-alloy steel with hardness up to HRC 32 has been tested successfully.

6.2 Design information. Due to minor diameter craters permitted in 3.3.3, effective bearing area on the mating external thread could be reduced. This would reduce the shear area of the external thread.

Custodian:
Army-AR

Preparing activity:
Army-AR

Agent:
DLA-IS

(Project THDS-A002)