

AERONAUTICAL MATERIAL SPECIFICATION

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STUDS, STEEL ALLOY Heat Treated - Roll Threaded

1. **ACKNOWLEDGMENT:** A vendor shall mention this specification number in all quotations and when acknowledging purchase orders.
2. **APPLICATION:** Studs made from AMS 6320, AMS 6322 or AMS 6327 steel.
3. **FABRICATION:** Stud blanks shall be machined from bar stock and shall be machined sufficiently to remove surface defects and decarburization except as permitted in 4.5. The smaller diameter or nut end of blanks for stepped studs may be reduced as necessary but the larger diameter or stud end shall not be upset. Threads shall be formed by rolling.
4. **TECHNICAL REQUIREMENTS:**
 - 4.1 **Heat Treatment:** Machined blanks, unless machined from heat treated stock, shall, before finishing the shank and rolling the threads, be heat treated as follows:
 - 4.1.1 **Heating Equipment:** Furnaces may be any type ensuring uniform temperature throughout the parts being heated and shall be equipped with, and operated by, automatic temperature controllers. The heating medium or atmosphere shall cause neither surface hardening nor decarburization other than that permitted by 4.4 and 4.5.
 - 4.1.2 **Hardening:** Blanks shall be heated uniformly to 1500-1550 F, held at that temperature for 15-30 minutes and quenched in oil.
 - 4.1.3 **Tempering:** Hardened blanks shall be tempered by heating uniformly to the temperature necessary to produce the specified hardness, holding at that temperature for not less than 1 hr and cooling.
 - 4.2 **Threads:** Screw Thread Standards for Federal Services 1944 (National Bureau of Standards Handbook H28) shall be a part of this specification and shall be the basis of all screw thread requirements. Tolerances for pitch diameter of the stud end shall be as shown on the drawing. Tolerances for lead and thread form, and accuracy of thread angle, of the stud end shall be in accordance with Class 4 Fit screw threads in the above referenced Handbook H28; any error in lead shall be in the same relative direction on the lead thread of the stud end as on the full thread of the stud end. (See figure 10).
 - 4.2.1 Threads shall be produced on the heat treated and finished blanks by a single rolling for each end. Flow lines at threads shall be continuous, shall follow the general thread contour, and shall be of maximum density at root of thread (see Figure 2).

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4.2.2 Threads shall have no multiple or single laps at the root or on the sides (see Figures 3, 4, and 5), except that slight laps are permissible at the crest, on the non-pressure side inside the pitch diameter, and on the sides outside the pitch diameter (see Figures 6, 7, and 8). Slight deviation from thread contour is permissible at the crest of the thread as shown in Figure 9; the incomplete thread at each end of the thread may also deviate slightly from contour.

4.2.3 The pitch diameter of all full threads on the stud end, Figure 10, shall not taper more than 0.0005 inch per inch and, if tapered, the smaller diameter shall be at the entering end of the stud. Taper variations shall fall within pitch diameter tolerances specified on the drawing.

4.2.4 The pitch diameter of the lead threads on the stud end shall originate from the stud pitch diameter and continue, decreasing for a distance B specified in the following Table I and illustrated in Figure 1.

TABLE I

Pitch	20	18	16	14	13	12	11	10
B, Inch, max	0.15	0.17	0.19	0.21	0.23	0.25	0.27	0.30

4.2.5 Circularity (out-of-roundness) of the pitch diameter of the stud end shall not exceed 0.0005 inch full indicator reading. Circularity shall fall within pitch diameter tolerances specified on the drawing.

4.2.6 The minimum lead thread length on the stud end is controlled by the number of threads that the stud will enter a lead thread ring gage or gage of equivalent accuracy made to the maximum pitch diameter of the lead threads specified on the drawing; the number of such threads shall be one or two.

4.2.7 Studs without necks that are made in accordance with this specification will have a minimum full thread length shown on the drawing. A maximum full thread length will also be shown and this will include the imperfect threads due to the lead. Beyond the maximum thread length shown studs shall not be cut or mutilated in any way by the threading operation, unless so indicated on the drawing.

4.2.8 The general "break edge" note on drawings does not apply to the crest of the thread, since sharp edges (without burrs and feather edges) at this location are permissible. Any operation to remove burrs from the thread should not break the edge more than approximately 0.003 inch radius.

4.2.9 Threads on the nut end and the lead threads on the stud end may be 0.001 inch under the specified limits before plating but shall conform to the gage requirements after plating.

4.3 Structure: Parts shall have microstructure of tempered martensite.