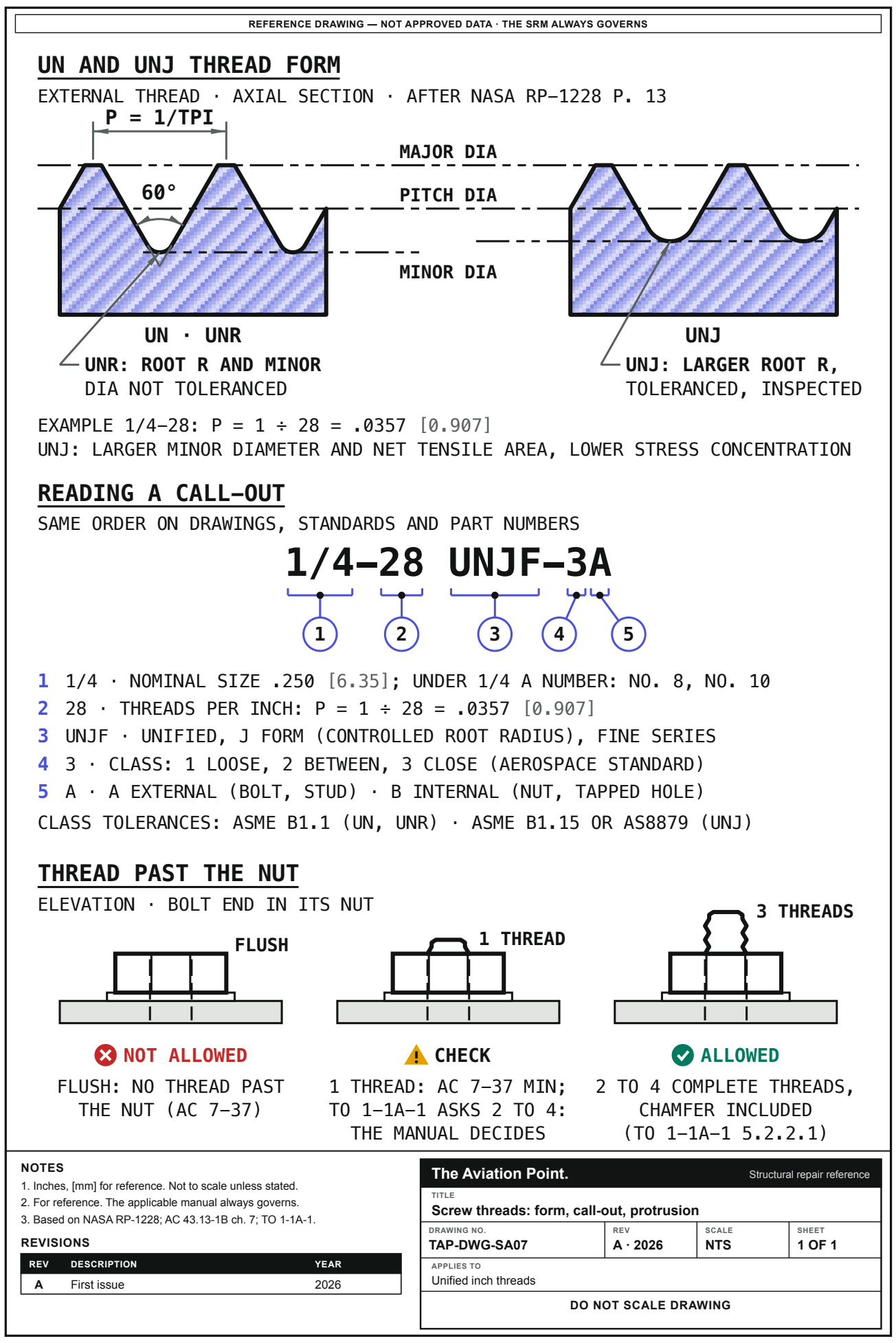
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The Aviation Point

Screw Threads: Series, Classes, Checks and Repair

UNC · UNF · UNJ · classes 2A/3A · thread protrusion · inserts and threaded bushings

1 Identification



Form after NASA RP-1228 pp. 12-13; call-out after AC 43.13-1B Table 7-1; protrusion after AC 43.13-1B par. 7-37 and TO 1-1A-1 par. 5.2.2.1.

Thread series used on aircraft

Series	What sets it apart	Where it is used	Source
`UNC (coarse)`	Deeper thread; larger tolerances, room for plating; starts without cross-threading and comes off more easily when corroded. Can be bought in class 3	General-purpose fasteners	NASA RP-1228 p. 12
`UNF (fine)`	Larger minor diameter than UNC: slightly more load and better torque-locking; tighter tolerances; smaller lead angle for finer adjustment	The most widely used thread in aerospace	NASA RP-1228 p. 12; AC 43.13-1B Table 7-1
`UNEF (extra fine)`	Finer than UNF	Tapped holes in hard material, thin threaded walls, thin material	NASA RP-1228 p. 12
`UNJC, UNJF`	External and internal forms. The external thread has a much larger root radius, mandatory and inspected; the minor diameter grows, so the net tensile area is larger and the stress concentration smaller	High-strength bolts: above 180 ksi (1,241 MPa) they usually have J threads	NASA RP-1228 p. 13
`UNR`	A rolled UN external thread with a rounded root; root radius and minor diameter not checked or toleranced. No internal UNR	Nearly all rolled external threads	NASA RP-1228 p. 13
`UNK`	As UNR, but root radius and minor diameter are toleranced and inspected. No internal UNK	External threads only	NASA RP-1228 p. 13
`Constant pitch (8, 12, 16 UN)`	One pitch across a range of diameters	Bolts of 1 in (25.4 mm) and over; 8, 12 or 16 threads per inch most common	NASA RP-1228 p. 13

Educational reference only, not approved data. Always consult the applicable SRM, AMM, or AC 43.13-1B and your certifying authority.

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2 Allowable damage

What the public documents accept and reject

Case	Rule	Source
Bolt through a nut, FAA practice	At least one thread of the bolt protruding through a self-locking or plain nut	AC 43.13-1B par. 7-37
Bolt through a nut, military practice	A minimum of two and a maximum of four complete threads, chamfer included, protrude through the nut; a slightly longer grip is allowed with a washer under the nut or head	TO 1-1A-1 par. 5.2.2.1
Fiber or nylon locknut	At least one thread showing past the nut; not used above 250 °F (121 °C); not reused if it cannot meet the minimum prevailing torque (Table 7-2)	AC 43.13-1B par. 7-64f
Self-locking bolt (nylon pellet or strip)	Do not reuse	TO 1-1A-1 par. 5.2.2.12
Overtorque	Overstresses the threaded areas and can fail the bolt or the nut	AC 43.13-1B par. 7-40
Torque basis	Threads clean and dry unless the manufacturer specifies otherwise; Table 7-1 values are derived from oil-free cadmium-plated threads	AC 43.13-1B par. 7-40b, Table 7-1
Weak, worn or stripped tapped thread	Repaired, not reused: insert, or threaded bushing when an insert cannot be used	TO 1-1A-1 par. 3.10a(1); NASA RP-1228 p. 10
Substitution	Standard hex bolts are not substituted for internal wrenching or 12-point external wrenching bolts	TO 1-1A-1 pars. 5.2.2.6, 5.2.2.7
Nicks, galling, cross-threading on a bolt or stud	—	The aircraft SRM, the AMM or the part's CMM; no generic public limit
UN and UNJ parts mixed	—	The drawing or the fastener standard decides

3 Repair

Threaded bushing: minimum wall after drilling and tapping

Bolt, stud, plug or fitting OD up to	In aluminum, magnesium or brass	In steel
1/2 in (12.7 mm)	3/32 in, 0.0937 in (2.38 mm)	1/10 in, 0.100 in (2.54 mm)
3/4 in (19.05 mm)	1/8 in, 0.125 in (3.18 mm)	2/10 in, 0.200 in (5.08 mm)
1-1/4 in (31.75 mm)	3/16 in, 0.1875 in (4.76 mm)	21/64 in, 0.3281 in (8.33 mm)
2 in (50.8 mm)	1/2 in, 0.500 in (12.7 mm)	13/32 in, 0.4062 in (10.32 mm)

1. Identify size, TPI, series, class.
2. Get the SRM or drawing authority.
3. Insert, key-lock or bushing.
4. Check the wall left.
5. Drill, tap, install, lock.
6. Gauge, torque, record.

Key points

- **Class 3** is the aerospace fit; screws run looser.
- **UNJ:** mandatory, inspected root radius on high-strength bolts.
- **Protrusion:** AC at least 1 thread; TO 1-1A-1 two to four.
- **Clean, dry threads** unless the manufacturer says otherwise.

MAIN SOURCES · AC 43.13-1B CHG 1, Acceptable Methods, Techniques, and Practices: Aircraft Inspection and Repair · NASA Reference Publication 1228, Fastener Design Manual, R. T. Barrett, March 1990 · TO 1-1A-1 / NAVAIR 01-1A-1, General Manual for Structural Repair · FAA-H-8083-30B, Aviation Maintenance Technician Handbook: General, chapter 11 · Thread and insert standards named by number

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