

SECTION 4. NUTS

7-63. GENERAL. Aircraft nuts are available in a variety of shapes, sizes, and material strengths. The types of nuts used in aircraft structures include castle nuts, shear nuts, plain nuts, light hex nuts, checknuts, wingnuts, and sheet spring nuts. Many are available in either self-locking or nonself-locking style. Typical nut types are shown in table 7-13. Refer to the aircraft manufacturer's structural repair manual, the manufacturer's engineering department, or the FAA, before replacing any nut with any other type.

7-64. SELF-LOCKING NUTS. These nuts are acceptable for use on certificated aircraft subject to the aircraft manufacturer's recommended practice sheets or specifications. Two types of self-locking nuts are currently in use, the all-metal type, and the fiber or nylon type.

a. DO NOT use self-locking nuts on parts subject to rotation.

b. Self-locking castellated nuts with cotter pins or lockwire may be used in any system.

c. Self-locking nuts should not be used with bolts or screws on turbine engine airplanes in locations where the loose nut, bolt, washer, or screw could fall or be drawn into the engine air intake scoop.

d. Self-locking nuts should not be used with bolts, screws, or studs to attach access panels or doors, or to assemble any parts that are routinely disassembled before, or after each flight. They may be used with anti-friction bearings and control pulleys, provided the inner race of the bearing is secured to the supporting structure by the nut and bolt.

e. Metal locknuts are constructed with either the threads in the locking insert, out-of-round with the load-carrying section, or with a saw-cut insert with a pinched-in thread in the locking section. The locking action of the all-metal nut depends upon the resiliency of the metal when the locking section and load-carrying section are engaged by screw threads. Metal locknuts are primarily used in high temperature areas.

f. Fiber or nylon locknuts are constructed with an unthreaded fiber or nylon locking insert held securely in place. The fiber or nylon insert provides the locking action because it has a smaller diameter than the nut. Fiber or nylon self-locking nuts are not installed in areas where temperatures exceed 250 °F. After the nut has been tightened, make sure the bolt or stud has at least one thread showing past the nut. **DO NOT** reuse a fiber or nylon locknut, if the nut cannot meet the minimum prevailing torque values. (See table 7-2.)

g. Self-locking nut plates are produced in a variety of forms and materials for riveting or welding to aircraft structures or parts. Certain applications require the installation of self-locking nuts in channel arrangement permitting the attachment of many nuts in a row with only a few rivets.

7-65. NUT IDENTIFICATION FINISHES. Several types of finishes are used on self-locking nuts. The particular type of finish is dependent on the application and temperature requirement. The most commonly used finishes are described briefly as follows.

TABLE 7-2. Minimum prevailing torque values for re-used self-locking nuts.

FINE THREAD SERIES	
THREAD SIZE	MINIMUM PREVAILING TORQUE
7/16 - 20	8 inch-pounds
1/2 - 20	10 inch-pounds
9/16 - 18	13 inch-pounds
5/8 - 18	18 inch-pounds
3/4 - 16	27 inch-pounds
7/8 - 14	40 inch-pounds
1 - 14	55 inch-pounds
1-1/8 - 12	73 inch-pounds
1-1/4 - 12	94 inch-pounds
COARSE THREAD SERIES	
THREAD SIZE	MINIMUM PREVAILING TORQUE
7/16 - 14	8 inch-pounds
1/2 - 13	10 inch-pounds
9/16 - 12	14 inch-pounds
5/8 - 11	20 inch-pounds
3/4 - 10	27 inch-pounds
7/8 - 9	40 inch-pounds
1 - 8	51 inch-pounds
1-1/8 - 8	68 inch-pounds
1-1/4 - 8	88 inch-pounds

a. Cadmium-Plating. This is an electrolytically deposited silver-gray plating which provides exceptionally good protection against corrosion, particularly in salty atmosphere, but is not recommended in applications where the temperature exceeds 450 °F. The following additional finishes or refinements to the basic cadmium can be applied.

(1) **Chromic Clear Dip.** Cadmium surfaces are passivated, and cyanide from the plating solution is neutralized. The protective film formed gives a bright, shiny appearance, and resists staining and finger marks.

(2) **Olive Drab Dichromate.** Cadmium-plated work is dipped in a solution of chromic acid, nitric acid, acetic acid, and a dye which produces corrosion resistance.

(3) **Iridescent Dichromate.** Cadmium-plated work is dipped in a solution of sodium dichromate and takes on a surface film of basic chromium chromate which resists corrosion. Finish is yellow to brown in color.

NOTE: Cadmium-plated nuts are restricted for use in temperatures not to exceed 450 °F. When used in temperatures in excess of 450 °F, the cadmium will diffuse into the base material causing it to become very brittle and subject to early failure.

b. Silver plating. Silver plating is applied to locknuts for use at higher temperatures. Important advantages are its resistance to extreme heat (1,400 °F) and its excellent lubricating characteristics. Silver resists galling and seizing of mating parts when subjected to heat or heavy pressure.

c. Anodizing for Aluminum. An inorganic oxide coating is formed on the metal by connecting the metals and anodes in a suitable electrolyte. The coating offers excellent corrosion resistance and can be dyed in a number of colors.

d. Solid Lubricant Coating. Locknuts are also furnished with molybdenum disulfide for lubrication purposes. It provides a clean, dry, permanently-bonded coating to prevent seizing and galling of threads. Molybdenum disulfide is applied to both cadmium and silver-plated parts. Other types of finishes are available, but the finishes described in this chapter are the most widely used.

7-66. CASTLE NUT (AN310). The castle nut is used with drilled shank hex head bolts, clevis bolts, drilled head bolts, or studs that are subjected to tension loads. The nut has slots or castellations cut to accommodate a cotter pin or safety wire as a means of safetying.

7-67. CASTELLATED SHEAR NUT (AN320). The castellated shear nut is designed for use with hardware subjected to shear stress only.

7-68. PLAIN NUT (AN315 AND AN335). The plain nut is capable of withstanding large tension loads; however, it requires an auxiliary locking device, such as a checknut or safety wire. Use of this type on aircraft structures is limited.

7-69. LIGHT HEX NUTS (AN340 AND AN345). These nuts are used in nonstructural applications requiring light tension. Like the AN315 and AN335, they require a locking device to secure them.

7-70. CHECKNUT (AN316). The checknut is used as a locking device for plain nuts, screws, threaded rod ends, and other devices.

7-71. WINGNUTS (AN350). The wingnut is used where the desired torque is obtained by use of the fingers or handtools. Wingnuts are normally drilled to allow safetying with safety wire.

7-72. SHEET SPRING NUTS (AN365). Sheet spring nuts are commonly called speed nuts. They are used with standard and sheet metal self-tapping screws in nonstructural applications. They are used to support line and conduit clamps, access doors, etc. Their use should be limited to applications where they were originally used in assembly of the aircraft.

7-73.—7-84. RESERVED.

