Threading, Gauging, and Inspection of Casing, Tubing, and Line Pipe Threads

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Threading, Gauging, and Inspection of Casing, Tubing, and Line Pipe Threads

1 Scope

1.1 Coverage—Threading and Gauging

This specification covers dimensions, tolerances, and marking requirements for API threads and the gauges that control the acceptance criteria for the threads. Thread element gauges, instruments, and requirements for the inspection of threads for line pipe, round thread casing, round thread tubing, and buttress casing connections are included. Thread dimensions shown without specifications (or shown as NA) are not subject to inspection of diameter, ovality, and addendum. Thread dimensions shown without tolerances are related to the basis for connection design and are not subject to measurement to determine acceptance of product.

1.2 Coverage—Inspection

Thread inspection applies at the point of manufacture prior to shipment, to inspection at some intermediate point, to inspection subsequent to delivery at destination, and to inspection by inspectors representing the purchaser or the manufacturer. The manufacturer may, at his or her option, use other instruments or methods to control manufacturing operations; but acceptance and rejection of the product is determined by the results of inspection made in accordance with the requirements of this specification.

Thread inspection is performed using instruments designed to measure either the functional relationship of multiple thread elements or measure an individual thread element. The inspection requirements include measurements of standoff, diameter, ovality, addendum, taper, lead, height, and angle of thread that are applicable to threads having $11^{1}/_{2}$ or less turns per inch (0.45 or less turns per mm). Ring and plug gauges are designed to measure the functional size of an internal or external thread. Individual thread elements listed are measured with one or more specific instruments.

See API 5B1 for additional inspection procedures.

1.3 Application of the API Monogram

If product (master gauges only) is manufactured at a facility licensed by API and it is intended to be supplied bearing the API Monogram, the requirements of Annex A apply.

1.4 Other Applications

By agreement between the purchaser and manufacturer, the supplemental requirements for *Enhanced Leak Resistance LTC* in API 5TRSR22 and Annex B apply.

Information on the shipping of Master Gauges can be found in Annex C.

2 Normative References

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any addenda or errata) applies.

API Recommended Practice 5A3, *Thread Compounds for Casing, Tubing, Line Pipe, and Drill Stem Elements*

API Specification 5L, *Line Pipe Specifications*, 6th Edition

API Specification Q1, *Quality Management System Requirements for Manufacturing Organizations for the Petroleum and Natural Gas Industry*

ASME B1.3M, *Screw Thread Gaging Systems for Acceptability: Inch and Metric Screw Threads (UN, UNR, UNJ, M, and MJ)*

3 Terms, Definitions, and Abbreviations

3.1 Terms and Definitions

For the purposes of this specification, the following terms and definitions apply.

3.1.1
addendum
The distance from the crest cone to the pitch cone.

NOTE The opposite of addendum is dedendum (see 3.1.12).

3.1.2
angular misalignment
The measured angular deviation of one or both coupling-thread cones to the centerline thread cone axis.

3.1.3
basic size
The theoretical size from which variations are measured.

3.1.4
black-crested threads
Threads that are not fully crested because the original mill surface has not been removed.

NOTE 1 They have historically been and continue to be referred to as “black-crested threads”.

NOTE 2 There can be non-full-crested threads that are not black-crested.

3.1.5
burr
A localized point of roughness or a thin ridge or protrusion produced by mechanical damage or machining.

3.1.6
chamfer
The beveled surface, beginning at the end of the pipe or coupling, where the thread form starts.

3.1.7
concentricity
The measured concentric deviation from the centerline thread cone axis by one or both coupling-thread cones.

3.1.8
continuity of thread
A thread that meets the thread form and angle requirements throughout the perfect thread length.

3.1.9
crest
The top of the thread.

3.1.10
crest diameter
The major diameter of an external thread or the minor diameter of an internal thread.

3.1.11
crest truncation
The distance between the theoretical sharp crest (crest apex) and the finished crest.

3.1.12
dedendum
The distance between the pitch cone and root cone.

NOTE The opposite of dedendum is addendum (see 3.1.1).

3.1.13
defect
Imperfection of sufficient magnitude to warrant rejection of the thread based on specification requirements.

3.1.14
effective thread length
The dimension designated as L_2 for line pipe and round thread tubing and casing.

NOTE This is the theoretical point at which the vanish cone angle begins.

3.1.15
external thread
A thread on the external surface of a pipe.

3.1.16
first perfect thread
The first completely machined thread.

3.1.17
flank
(side)
The surface of the thread which connects the crest with the root.

3.1.18
flank angle
The angle between the individual flanks and a line perpendicular to the axis of the thread measured in an axial plane.

NOTE A flank angle of a symmetrical thread is commonly termed the half-angle of the thread.

3.1.19
hand-tight
Threaded connection that has been made up by hand without the aid of tongs or other mechanical devices.

3.1.20
hand-tight mating standoff
The length at hand-tight engagement from the face of the coupling to the vanish point of the threads for casing and tubing round threads and line pipe threads; and to the base of the triangle for buttress threads.

3.1.21
height
The distance between the crest and root, normal to the axis of the thread.

3.1.22
imperfect thread length
The buttress threads located beyond the L_7 plane (away from the pipe ends).

3.1.23
imperfection
Discontinuity or irregularity in the product.

3.1.24
included angle
The angle between the flanks of the threads measured in an axial plane.

3.1.25
internal thread
Thread on the internal surface of a coupling or pipe.

3.1.26
last scratch
(vanish point)
The last visible evidence of the continuous machined root as it stops or runs out.

3.1.27
lead
The distance parallel to the thread axis from a point on a thread turn and the corresponding point on the next turn (i.e. the axial displacement of a point following a helix, one turn around the thread axis).

3.1.28
leading flank
(front or stab flank)
The flank of the pipe thread facing the nearest open end of pipe.

NOTE The flank of the coupling thread facing the open end of the coupling.

3.1.29
length of full-crest thread length
The length measured parallel to the thread axis from the end of the pipe to the first non-full-crested thread.

NOTE The partial threads in the chamfer are considered to be within the full-crest thread length.

3.1.30
load flank
(pressure flank)
The flank of the pipe thread facing away from the open end of the pipe.

NOTE The flank of the coupling or box thread facing away from the open end of the coupling; the 3-degree flank on buttress thread.

3.1.31
major cone
An imaginary cone which would bound the crest of an external taper thread or the roots of an internal taper thread.

3.1.32
major diameter
The crest diameter of the external thread and the root diameter of the internal thread.

3.1.33
mill end
The end of the pipe to which the coupling is applied at the mill.

NOTE Referred to as the box end of the integral joint pipe.

3.1.34
minor cone
An imaginary cone which passes over the root of the external thread and crest of internal thread.

3.1.35
minor diameter
The root diameter of the external thread and the crest diameter of the internal thread.

3.1.36
ovality
The difference between the maximum and minimum thread diameter measurements.

3.1.37
qualified gauge surface
A surface on a gauge defined by qualified surface requirements used to simulate product dimensions.

3.1.38
perfect
Within the specification limits.

3.1.39
perfect thread length
The last perfect thread location on external threads shall be $L_4 - \mathrm{g}$ for tubing and line pipe, L_7 for buttress, and last scratch (last thread groove) – 0.625 in. for casing round threads; the last perfect thread location on internal threads is $J + 1\mathrm{p}$ measured from the physical center of the coupling or from the small end of the box for integral joint tubing.

3.1.40
pin
(pin end)
The externally threaded end of pipe without a coupling applied.

3.1.41
pitch
Axial distance between corresponding points on successive threads which in a single start thread is equivalent to lead.

3.1.42
pitch cone
(pitch line)
An imaginary cone of such apex angle and location of its vertex and axis that its surface would pass through a taper thread in such a manner as to make the axially measured widths of the thread ridge and thread groove are equal.

NOTE It is located equidistant between the sharp major and minor cones of a given thread; on a theoretically perfect taper thread, these widths are equal to half of the basic pitch.

3.1.43
pitch diameter
On a taper thread, the pitch diameter at a given position on the thread axis is the diameter of the pitch cone at that position; on buttress threads, the pitch diameter is midway between the major and minor diameter.

3.1.44
power-tight
A threaded connection that has been fully made up by mechanical means using power tongs or a screw-on machine.

3.1.45
recess
The counter-bored section at the end of line pipe, casing, and tubing round thread coupling that facilitates stabbing the threads.

3.1.46
right-hand thread
A thread that advances in a clockwise receding direction when viewed axially.

3.1.47
root
The bottom of the thread.

3.1.48
root truncation
The distance between the theoretical sharp root (root apex) and the finished root.

3.1.49
run-out
(buttress threads)
Intersection of the thread root and the pipe outside surface.

3.1.50
standoff
Distance between faces of gauges or gauges and product reference planes when mated.

3.1.51
taper
For round threads and line pipe threads, taper is defined as the increase in the pitch diameter of the thread, in “inch per inch of thread” (“millimeter per millimeter of thread”); for buttress threads, taper is defined as the change in diameter along the minor cone of the external threads and the major cone of the internal threads.

3.2 Abbreviations

BC buttress casing thread

LC long threaded casing connection

LP line pipe

Rd thread form on round threaded connections

SC short threaded casing connection

TECL thread element control length

MOW mic over wire

4 Thread Dimensions and Tolerances—Line Pipe, Round Thread Casing and Tubing, and Buttress Thread Casing

4.1 Thread Measurement

4.1.1 Thread length shall be measured parallel to the thread axis; thread crest diameter, ovality, addendum (round threads), height and taper diameter shall be measured approximately normal to the thread axis.

4.1.2 Lead of line pipe and round threads shall be measured parallel to the axis along the pitch cone, and for buttress threads, parallel to the thread axis, approximately along the pitch cone for both the external and the internal thread.

4.1.3 On line pipe and round threads, the included taper shall be measured on the diameter along the pitch cone, and for buttress threads, on the diameter along the minor cone for the external thread, and the major cone for the internal thread. For gauging procedures, see Sections 5 and 6, and API 5B1.

4.2 Visual Inspection

Threads shall be free from visible tears, cuts, grinds, shoulders or other imperfections which break the continuity of the threads within the minimum length of full crest threads from the end of pipe (L_c), and within the interval from the recess or counterbore to a plane located at distance $J + 1$ thread turn from the center of the coupling or from the small end of the thread in the box of integral-joint tubing. Superficial scratches, minor dings and surface irregularities that do not affect the continuity of thread surfaces are occasionally encountered and may not necessarily be detrimental. Due to the difficulty in defining superficial scratches, minor dings and surface irregularities, and the degree to which they affect thread performance, no blanket waiver of such imperfections can be established.

As a guide to acceptance, the most critical consideration is to ensure that there are no detectable protrusions on the threads that can peel off the protective coating on the coupling threads or score mating surfaces. Cosmetic repair of thread surfaces by hand is permitted. Imperfections between the length, L_c, and vanish point are permissible providing their depth does not extend below the root cone of the thread; or extend beyond $12^1/_2$ % of specified pipe wall thickness (measured from the projected pipe surface), whichever is greater. Grinding to probe imperfections or to eliminate defects is also permitted in this area, with the depth of grind having the same limits as imperfections in this area. Imperfections include such other discontinuities as seams, laps, pits, tool marks, dents, handling damage, and so forth. Minor pitting and thread discoloration may also be encountered in any part of the threaded area and may not necessarily be detrimental. Due to the difficulty to define pitting and discoloration, and the degree to which they affect thread performance, no blanket waiver of such imperfections can be established.

As a guide to acceptance, the most critical considerations are that corrosion products protruding above the surface of the threads be removed and that no leak path exists. Filing or grinding to remove pits is not permitted.

Imperfections within the above described permissible limits shall be permitted under the following conditions:

a) If imperfections are detected at the mill, the pipe end with imperfections shall be the end with the exposed pipe threads. No imperfections detected at the mill are permitted on the coupling end of the pipe, except as otherwise provided in 4.2, item c.

b) Imperfections within the above limits are acceptable on the end with the exposed pipe threads. Imperfections running under the coupling, which are detected after shipment from the mill, are not acceptable unless it can be demonstrated that the imperfection is within the above described permissible limit. If the imperfection is within the permissible limits the coupling may be reapplied and the length of pipe is an acceptable product. If the imperfection exceeds permissible limits, it shall be considered a defect and the length of pipe is rejectable, or it may be reconditioned by cutting the threads off, rethreading and reapplying the coupling.

c) Imperfections that would run under the coupling shall be removed by grinding prior to threading, provided the grind is well contoured with the circumference of the pipe and displays a high degree of workmanship. Such grinding shall not be considered an imperfection. Because of the difficulty in defining acceptable contours and a high degree of workmanship, user discretion shall govern.

NOTE User discretion applies only to the contour of the grind.

4.3 Thread Precision

Threads shall be cut with such precision of form and dimensions and with such finish as to make a tight connection when properly made up power-tight using a high-grade thread compound. On casing and tubing, the thread compound shall meet or exceed the performance requirements of API 5A3. For tubing, the connection shall be capable of being made up power-tight and unscrewed four times without injury to the threads by galling. It should not be expected that threaded connections will gauge properly after being made up power-tight. Subsequent use of tubing is reviewed in API 5C1 (i.e. content applicable to threads).

A $^3/_8$ in. (9.52 mm) high equilateral triangle die stamp shall be placed at a distance of $L_4 + {}^1/_{16}$ in. (1.59 mm) from each end of size 16 in. (406.4 mm), $18^5/_8$ in. (474.34 mm), and 20 in. (505 mm) 8-round thread casing in Grades H40, J55, and K55. However, the position of the coupling with respect to the base of the triangle shall not be a basis for acceptance or rejection. For buttress casing, a triangle stamp shall be applied as indicated in Figure 1 and shall be used as a means of make-up acceptance or rejection. Unless otherwise specified on the purchase order, the triangle mark may be replaced with a transverse white paint band $^3/_8$ in. (9.52 mm) wide by 3 in. (75 mm) long.

NOTE A tight connection is when a properly made up power-tight using a high-grade thread compound, shows no leaks at ambient temperature at pressures up to and including the specified hydrostatic test pressure.

4.4 Thread Design

Threads shall be right-hand and shall conform to the dimensions and tolerances specified herein.

In the design of round thread casing connections, values for total thread length L_4 are derived from calculations based on providing a theoretical wall thickness at the root of the thread at the end of the pipe as determined by 0.090 in. (2.29 mm) or the following formula, whichever is greater:

$$t_o = 0.009D + 0.040 \text{ in. } (0.009D + 1.02 \text{ mm}) \quad (1)$$

where

t_o basic wall thickness at the root of the thread at the end of the pipe in inches (mm), and

D specified outside diameter of casing, in inches (mm).

The theoretical wall thickness t_o is related to a basis of connection design only and is not a specification value. It is not subject to measurement or application of tolerances.

"p" is defined as the distance from a point on a nominal thread form to a corresponding point on the next thread, measured parallel to the axis. This value can be calculated by dividing 1 in. (25.4 mm) by the number of threads per 1 in. (25.4 mm).

4.5 Chamfer

The angle (60 degrees) of the outside chamfer at the end of the pipe shall be as shown in Figure 1, Figure 4, Figure 5, and Figure 8, and shall extend 360 degrees around the face of the pipe. The diameter of the chamfer shall be such that the thread root shall run out on the chamfer and not on the face of the pipe and shall not produce a feather edge.

4.6 Internal Thread

The root of the coupling thread shall start within the area of the ID chamfer and extend to the center of the coupling. The length of thread in the box end of integral-joint tubing shall not be less than $L_4 + J$ from the face of the box. The internal threads within the interval from the recess or counterbore to a place located at distance $J + 1$ thread turn from the center of the coupling, or from the small end of the thread in the box of integral-joint tubing, shall conform to the requirements of Section 4.

4.7 Thread Finish

The threads in steel coupling for line pipe nominal sizes 2 in. (50.8 mm) and larger, and in each size of casing and tubing, shall be zinc, tin, or copper electroplated or phosphated, or another appropriate coating or process method to minimize galling and develop the maximum leak resistance characteristics of the connection. Either the box or the pipe male end of accessories and integral-joint tubing shall be zinc or tin electroplated or phosphated or processed by some other acceptable method which will minimize galling and develop the maximum leak resistance characteristics of the connection. Where tin, copper or other ductile coating in excess of 0.001 in. (0.03 mm) are used, the thread tolerance, standoff, and thread diameter apply only to the uncoated threads.

In some instances, coatings in excess of 0.001 in. (0.03 mm) thickness are being used and accurate gauging is impractical. The maximum thickness of electroplated tin coatings shall not exceed 0.006 in. (0.15 mm). Taper, standoff, thread diameter (accomplished by measurement of the thread crest diameter and addendum), and OD dimensions may be affected by power-tight make-up. Deviations from the specified tolerance for these dimensions may be expected after power-tight make-up.

4.8 Thread Control

All threads shall be controlled in accordance with gauging practice requirements in Section 6.

4.9 Thread Elements

Thread elements for all threads, except line pipe threads finer than $11^1/_2$ threads per inch ($11^1/_2$ threads per 25.4 mm), shall be subject to inspection in accordance with Sections 5 and 6.

NOTE With respect to thread elements, line pipe threads finer than $11^1/_2$ threads per inch ($11^1/_2$ threads per 25.4 mm), nominal pipe sizes smaller than 1 in., only the requirements on thread length and stand-off are subject to inspection.

4.10 Misalignment

The maximum misalignment of the axis of coupling threads measured in the plane of the coupling face shall not exceed 0.031 in. (0.79 mm) for casing and tubing couplings. The maximum angular misalignment in line pipe couplings nominal size 6 in. and larger and in each size of couplings for casing and tubing shall not exceed $^3/_4$ in. per 20 ft (31.25 mm per 10 m) of projected axis. Concentricity and alignment tests may be made in accordance with the requirements in Section 5 or other method giving an equal degree of accuracy may be used.

4.11 Misalignment Tests (Options)

If requested by the purchaser, either of the methods of misalignment tests as defined in Section 5 shall be made on one coupling from each lot of 100 couplings or less of each size. If a coupling fails, two additional couplings from the same lot may be tested, both of which shall conform to the specified requirements; otherwise, the lot shall be rejected. The manufacturer may elect to test each coupling in the rejected lot. The term lot as used in this paragraph is defined as 100 consecutive pieces manufactured on the same piece of equipment.

4.12 Misalignment Rejects (Purchaser Option)

The purchaser shall have the right to reject pipe on which he considers the pin threads to be out of alignment to a degree which would adversely affect the performance of the pipe. The criteria for rejection shall demonstrate that axial misalignment exceeds 0.031 in. (0.79 mm) or the angular misalignment exceeds $^3/_4$ in. per 20 ft (31.25 mm per 10 m) of projected axis or by a check of whether the minimum length of full crest threads, L_c, is present.

4.13 Full Crested Thread Length

The required minimum length of full crest threads is defined by L_c in Table 1 and Tables 3–9.

Black-crested threads within the L_c shall not be made to appear full crested either mechanically or by hand.

4.14 Rounded Nose

In lieu of the conventional corner breaks on the ends of threaded tubing, the “Round” or “Bullet-nose” profile specified in Table 10 (and depicted in Figure 9) may be supplied at the manufacturer’s option or may be specified by the purchaser. The modified profile shall be rounded to provide for coatable service and the radius transition shall be smooth with no sharp corners, burrs, or slivers on the ID or OD chamfer surfaces. The dimensions listed in Table 10 are recommended values but are not subject to measurement to determine acceptance or rejection of the product.

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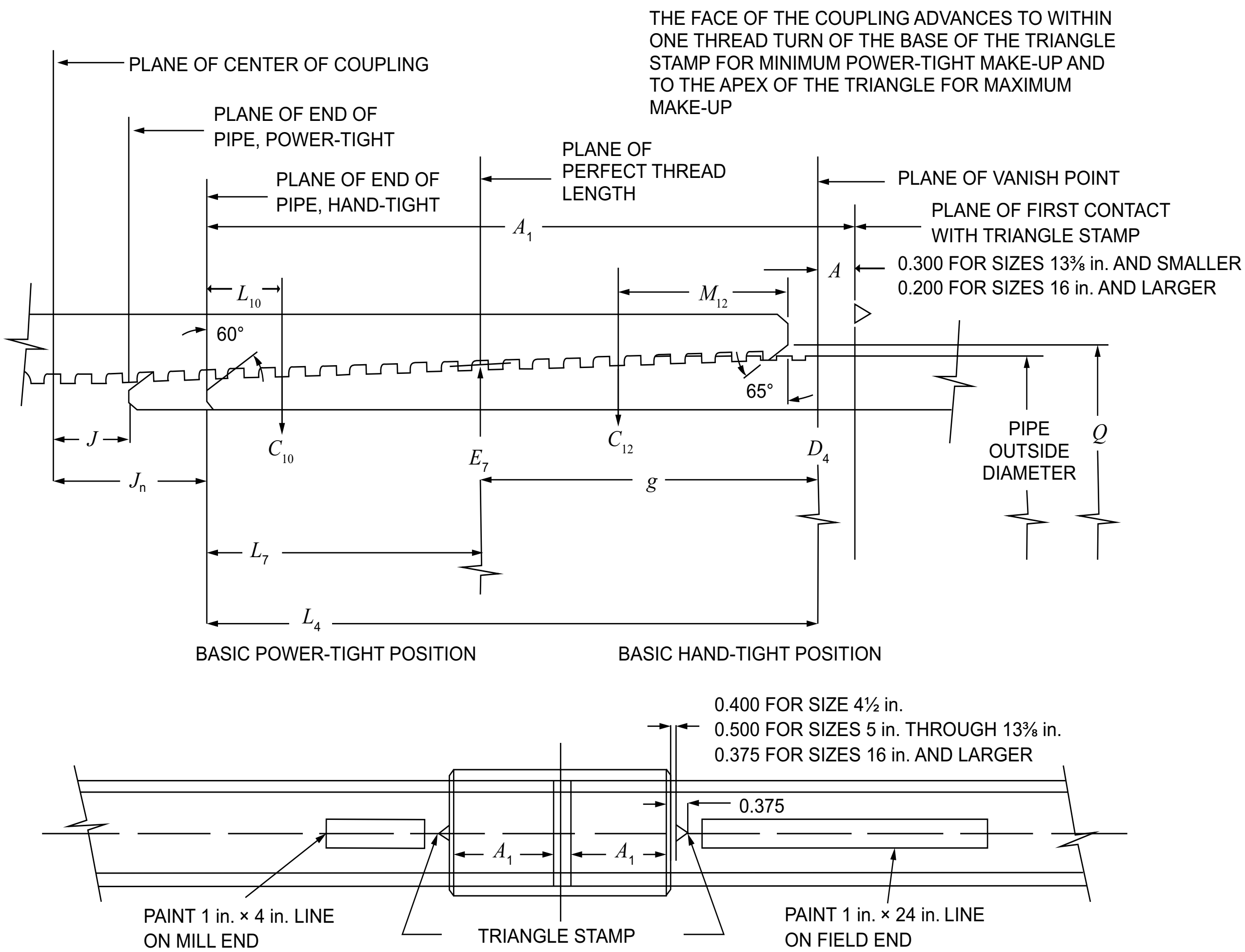
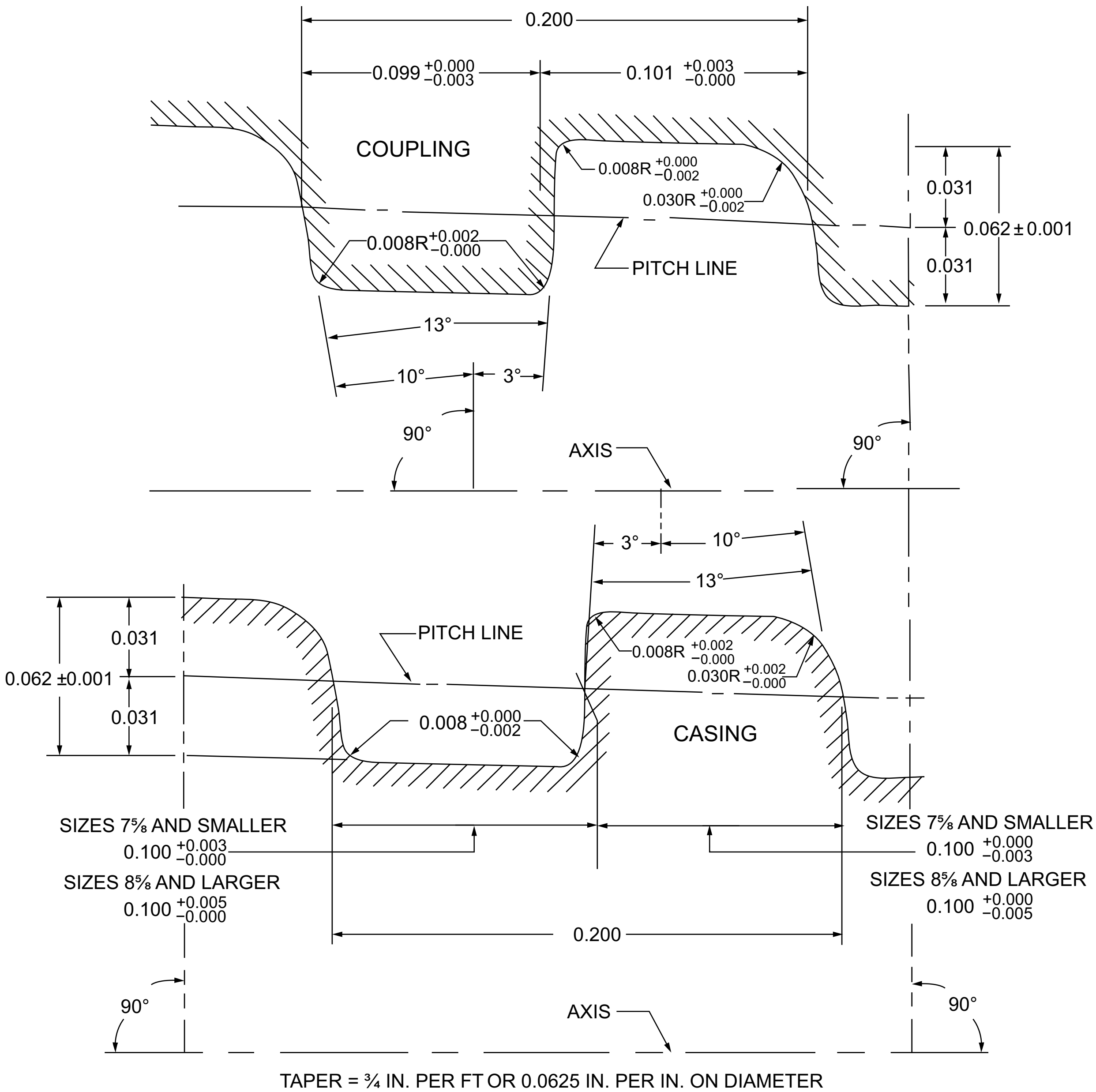


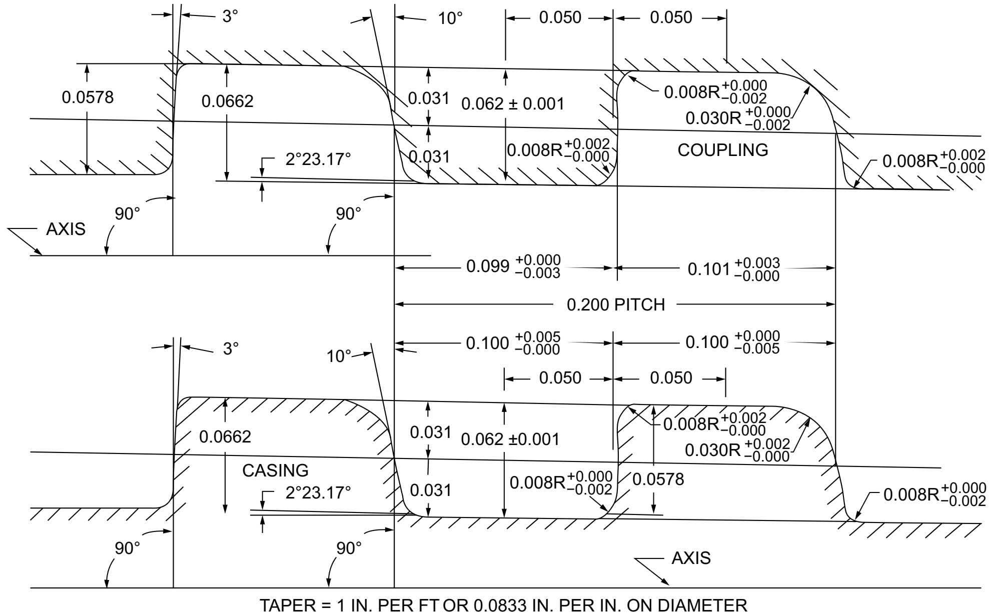
NOTE See Figure 2 and Figure 3 for detail of thread form and dimensions.

Figure 1—Basic Dimensions of Buttress Threads Hand-tight Make-up



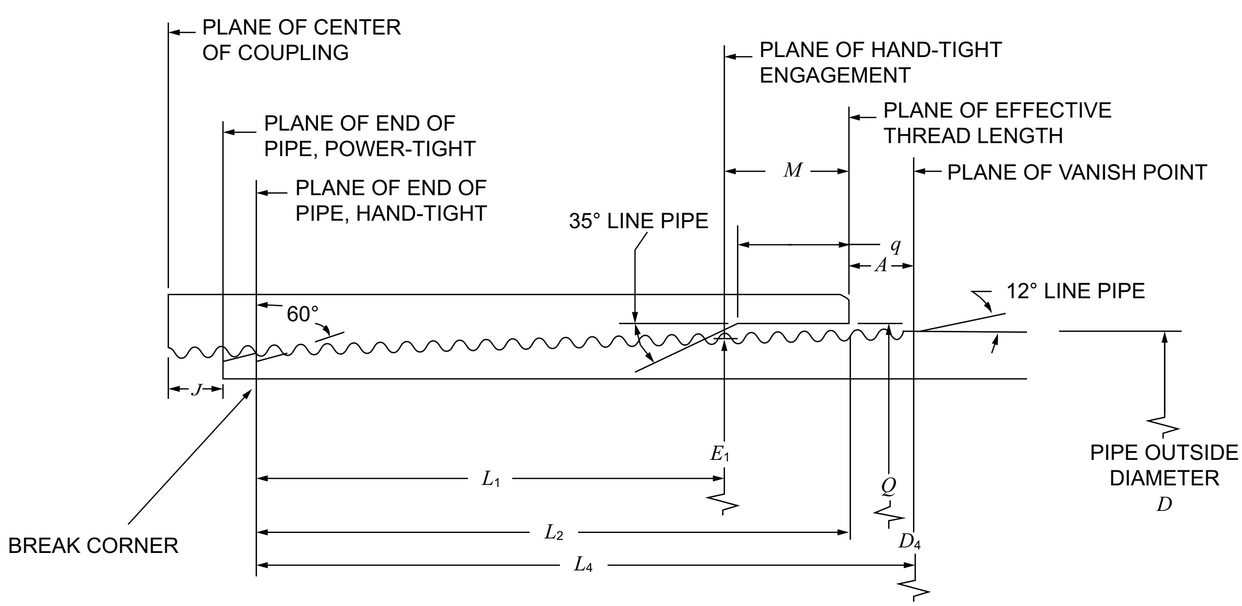
NOTE 1 Thread crests and roots are parallel to cone.
NOTE 2 Casing sizes 4 1/2 in. through 13 3/8 in.

Figure 2—Buttress Casing Thread Form and Dimensions



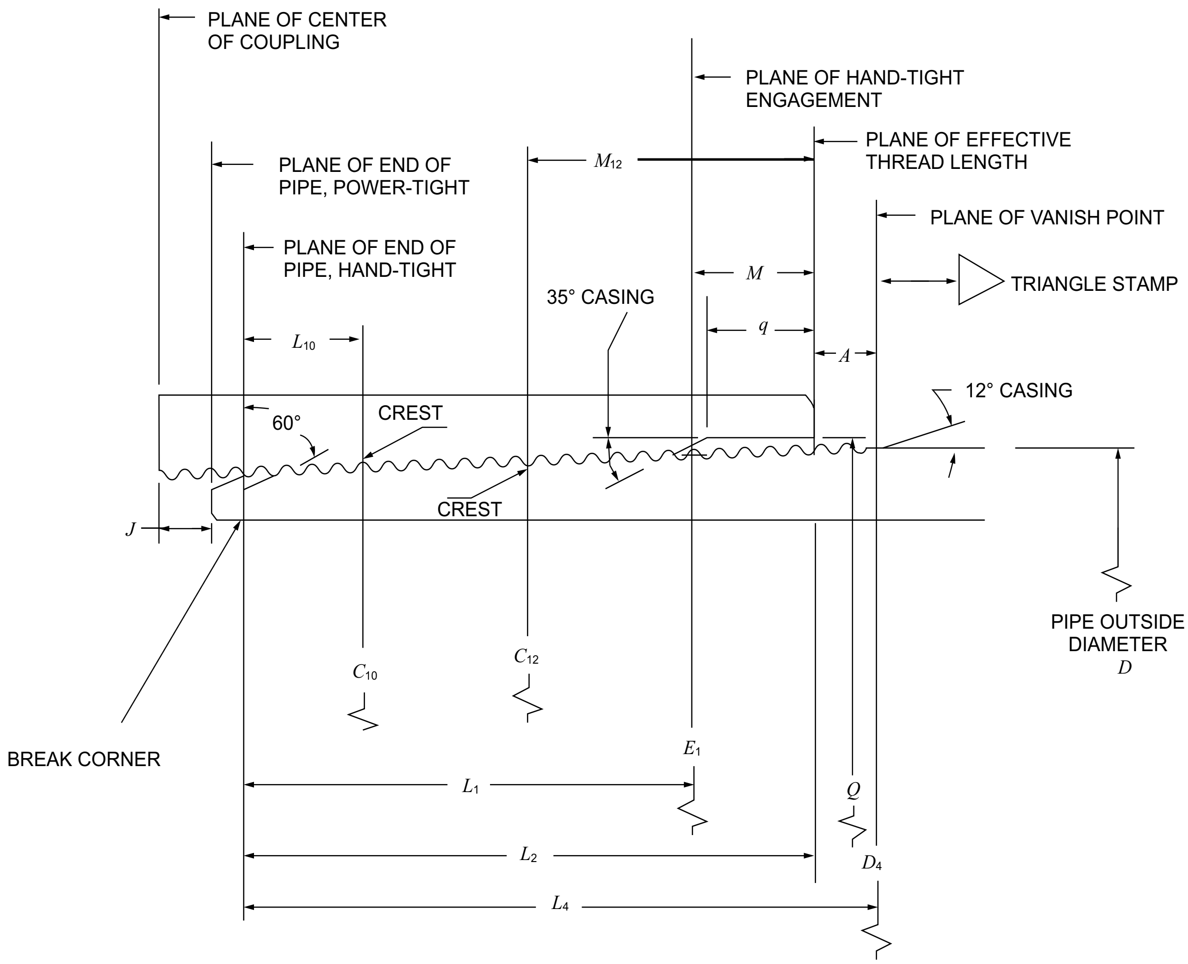
NOTE 1 Thread crests and roots are parallel to thread axis.
NOTE 2 Casing sizes 16 in. and larger.

Figure 3—Buttress Casing Thread Form and Dimensions



NOTE 1 For basic power tight make-up, the face of the coupling or box advances to plane of vanish point.
NOTE 2 The vanishing cone angle applies to the roots of the incomplete threads produced by either multiple points or single point tools.

Figure 4—Basic Dimensions of Line Pipe Hand-tight Make-up



NOTE 1 See Figure 6 and Figure 7 for detail of thread form and dimensions.

NOTE 2 The vanish cone angle is optional for round threads on downhole tools.

NOTE 3 For basic power-tight make-up, the face of coupling or box advances to plane of vanish point.

NOTE 4 The vanish cone angle applies to the roots of the incomplete threads produced by either multiple point or single point tools.

NOTE 5 TECL (thread element control length) is a measured dimension (actual total thread length—0.500 in.), therefore, not a basic design measurement.

Figure 5—Basic Dimensions of Casing Round Threads Hand-tight Make-up

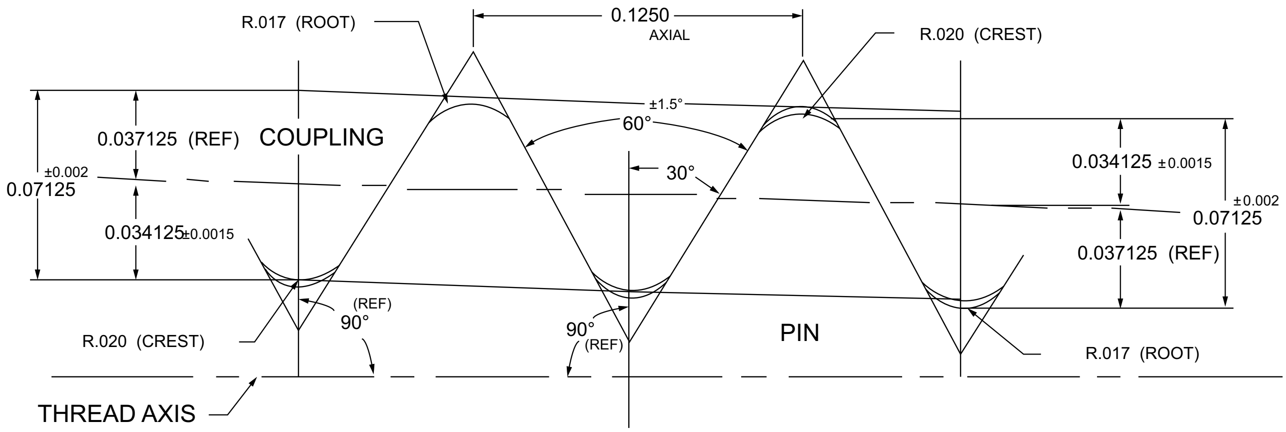
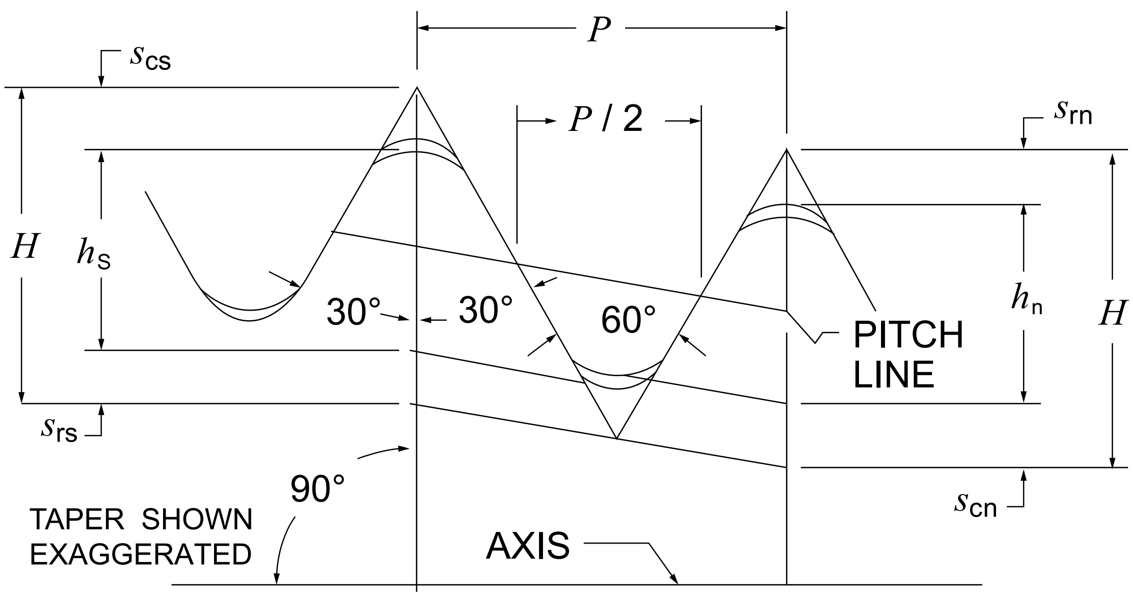


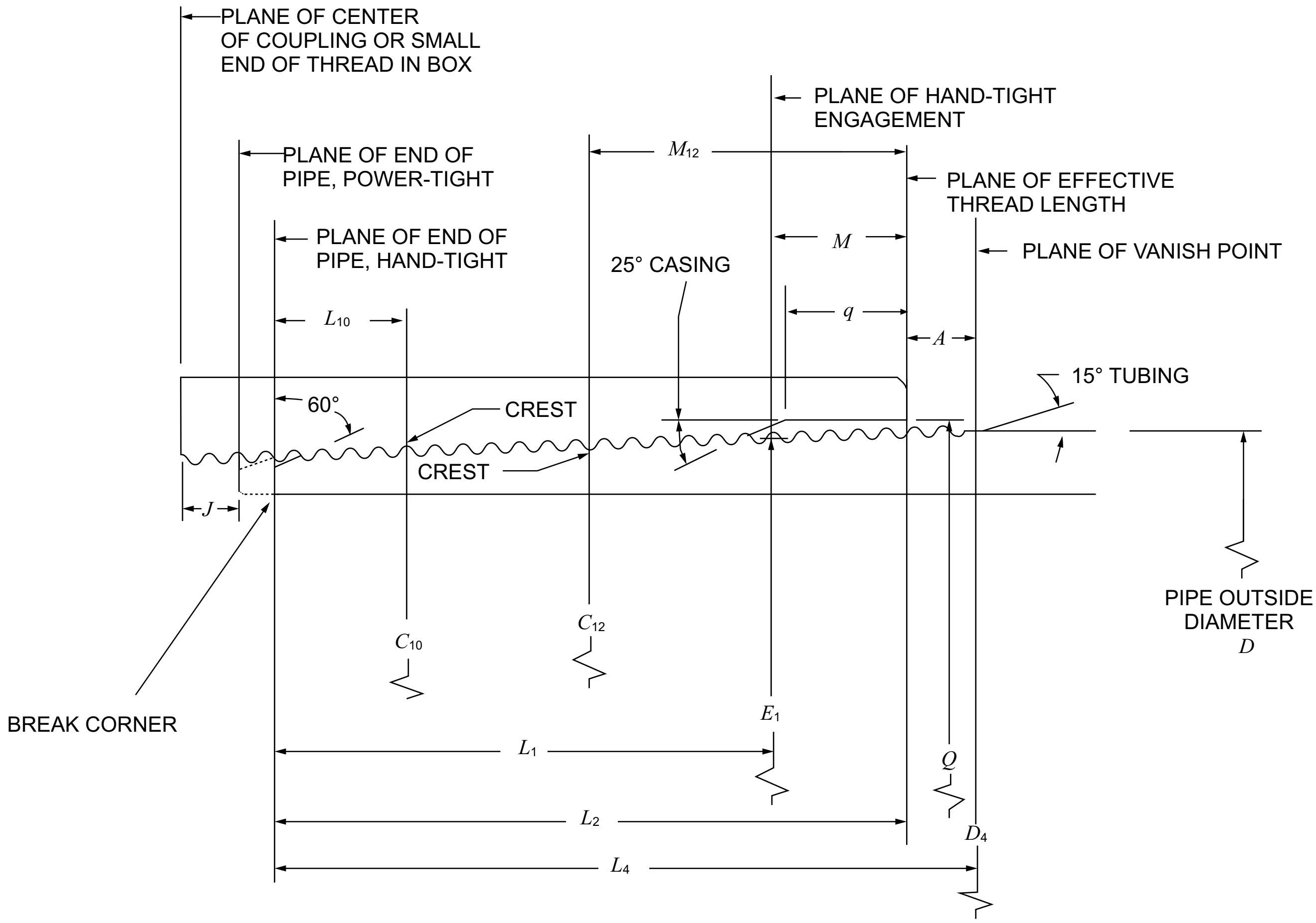
Figure 6—Casing Round Thread Dimensions



Taper = $^3/_4$ in. per ft or 0.025 in. per in. on diameter

NOTE See Table 11 and Table 12 for dimensions and tolerances.

Figure 7—Casing Round Thread Form



NOTE 1 The vanish cone angle is optional for round threads on downhole tools.
NOTE 2 The vanish cone angle applies to the roots of the incomplete threads produced by either multiple point or single point tools.
NOTE 3 For basic power-tight make-up, the face of coupling or box advances to plane of vanish point.

Figure 8—Basic Dimensions of Tubing Round Threads Hand-tight Make-up

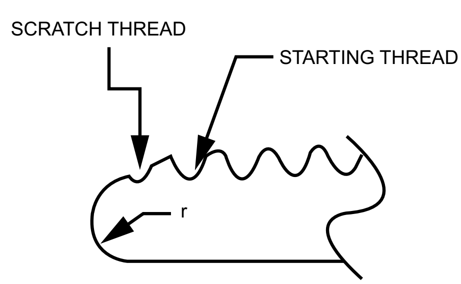
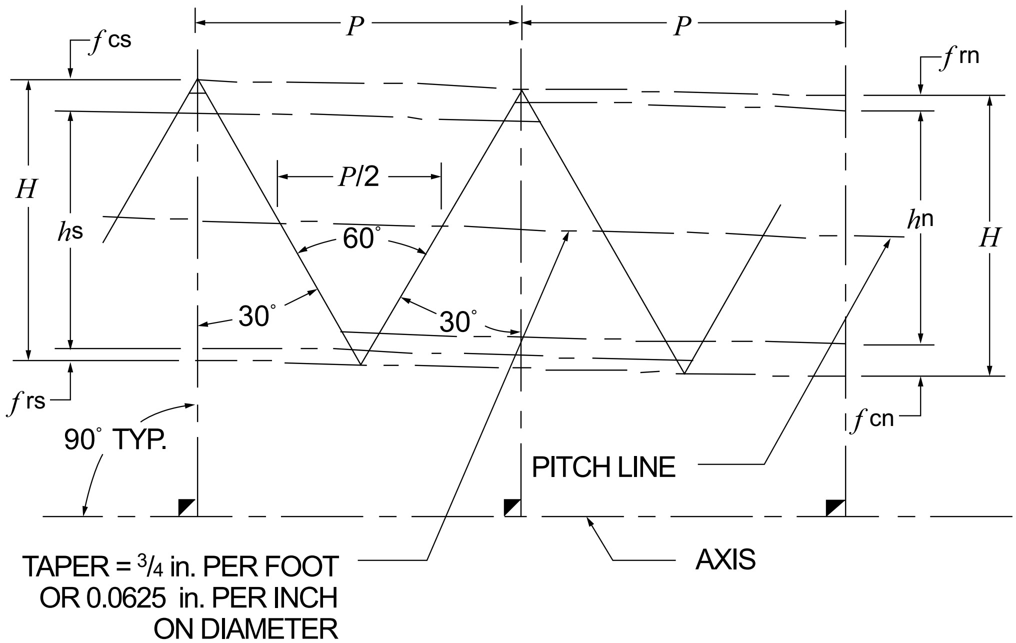
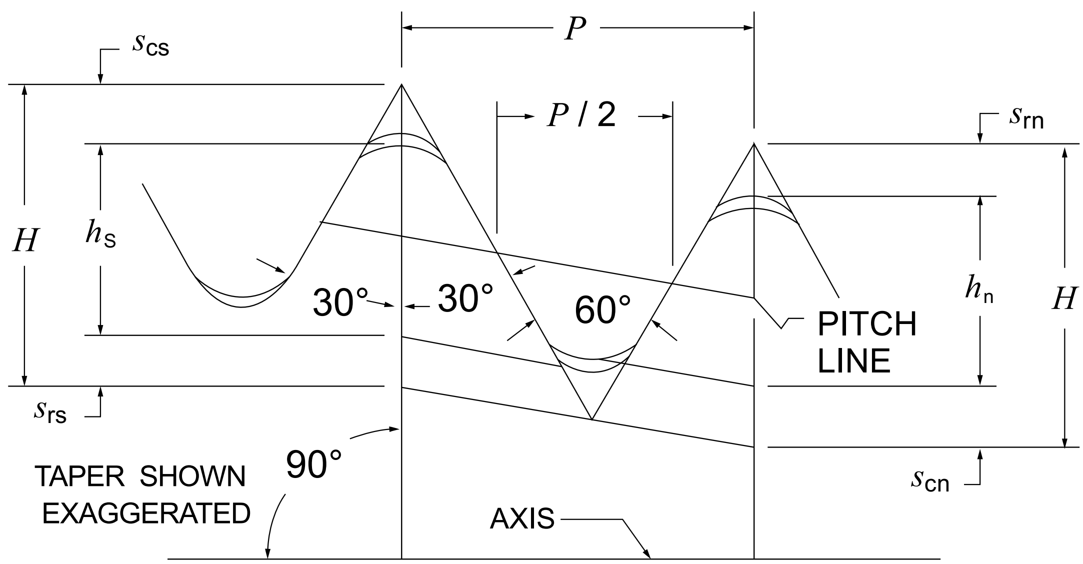


Figure 9—Round Nose Ends



NOTE See Table 13 and 14 for dimensions and tolerances.

Figure 10—Line Pipe Thread Form



Taper = $^3/_4$ in. per ft or 0.0625 in. per in. on diameter

NOTE See Table 15 and 16 for dimensions and tolerances.

Figure 11—Tubing Round Thread Form

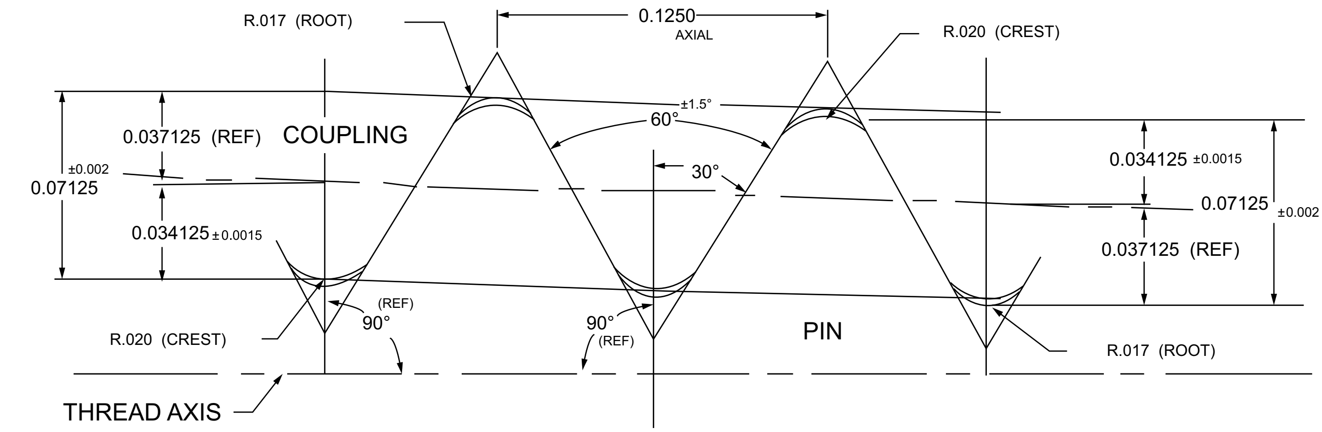


Figure 12—8 Round Tubing Thread Dimensions

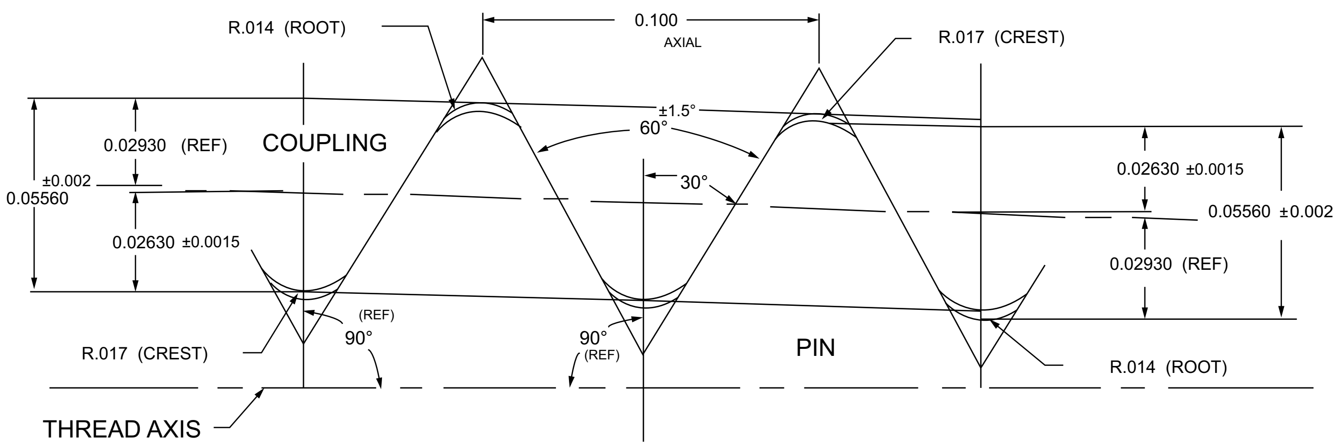


Figure 13—10 Round Tubing Thread Dimensions

Table 1—Casing Short-thread Dimensions

Size Designation	Major Diameter	Nominal Weight Thread and Coupling lb per ft	No. of Threads Per in.	Length: End of Pipe to Hand-tight Plane	Length: Effective Threads	Total Length: End of Pipe to Vanish Point	Pitch Diameter at Hand-Tight Plane	End of Pipe to Center of Coupling, Power-tight Make-up	Length: Face of Coupling to Hand-tight Plane	Diameter of Coupling Recess	Depth of Coupling Recess	Hand-tight Standoff, Thread Turns	Minimum Length, Full Crest Threads from End of Pipe	Thread Crest Diameter at Face of Coupling	Thread Crest Diameter at End of Pin	Length End of Pipe to Gauge Plane	Pin Thread Crest Diameter at L_{10}	Length: Face of Coupling to Gauge Plane	Box Thread Crest Diameter at M_{12}
D	D_4			L_1	L_2	L_4	E_1	J	M	Q	q	A	L_c[a]	C_{11}	C_9	L_{10}	C_{10}	M_{12}	C_{12}
4 1/2	4.500	9.50	8	0.921	1.715	2.000	4.40337	1.125	0.704	4 19/32	0.500	3	0.875	4.3791	4.4141	0.5625	4.4493	1.2045	4.3038
4 1/2	4.500	Others	8	1.546	2.340	2.625	4.40337	0.500	0.704	4 19/32	0.500	3	1.500	4.3791	4.3750	1.1875	4.4492	1.2045	4.3038
5	5.000	11.50	8	1.421	2.215	2.500	4.90337	0.750	0.704	5 3/32	0.500	3	1.375	4.8791	4.8828	1.0625	4.4492	1.2045	4.3038
5	5.000	Others	8	1.671	2.465	2.750	4.90337	0.500	0.704	5 3/32	0.500	3	1.625	4.8791	4.8672	1.3125	4.4492	1.2045	4.3038
5 1/2	5.500	All	8	1.796	2.590	2.875	5.40337	0.500	0.704	5 3/32	0.500	3	1.750	5.3791	5.3594	1.4375	5.4492	1.2045	5.3038
6 5/8	6.625	All	8	2.046	2.840	3.125	6.52837	0.500	0.704	6 23/32	0.500	3	2.000	6.5041	6.4687	1.6875	6.5742	1.2045	6.4288
7	7.000	17.00	8	1.296	2.090	2.375	6.90337	1.250	0.704	7 3/32	0.500	3	1.250	6.8791	6.8906	0.9375	6.9492	1.2045	6.8038
7	7.000	Others	8	2.046	2.840	3.125	6.90337	0.500	0.704	7 3/32	0.500	3	2.000	6.8791	6.8437	1.6875	6.9492	1.2045	6.8038
7 5/8	7.625	All	8	2.104	2.965	3.250	7.52418	0.500	0.709	7 25/32	0.433	3 1/2	2.125	7.5002	7.4609	1.8125	7.5742	1.2095	7.4246
8 5/8	8.625	24.00	8	1.854	2.715	3.000	8.52418	0.875	0.709	8 25/32	0.433	3 1/2	1.875	8.5002	8.4766	1.5625	8.5743	1.2095	8.4246
8 5/8	8.625	Others	8	2.229	3.090	3.375	8.52418	0.500	0.709	8 25/32	0.433	3 1/2	2.250	8.5002	8.4531	1.9375	8.5742	1.2095	8.4246
9 5/8[b]	9.625	All	8	2.229	3.090	3.375	9.52418	0.500	0.709	9 25/32	0.433	3 1/2	2.250	9.5002	9.4531	1.9375	9.5742	1.2095	9.4246
9 5/8[c]	9.625	All	8	2.162	3.090	3.375	9.51999	0.500	0.713	9 25/32	0.433	3 1/2	2.250	9.4963	9.4531	1.9375	9.5742	1.2095	9.4207
10 3/4[b]	10.750	32.75	8	1.604	2.465	2.750	10.64918	1.250	0.709	10 29/32	0.433	4	1.625	10.6252	10.6172	1.3125	10.6992	1.2095	10.5496
10 3/4[b]	10.750	Others	8	2.354	3.215	3.500	10.64918	0.500	0.709	10 29/32	0.433	3 1/2	2.375	10.6252	10.5703	2.0625	10.6992	1.2095	10.5496
10 3/4[c]	10.750	Others	8	2.287	3.215	3.500	10.64499	0.500	0.713	10 29/32	0.433	3 1/2	2.375	10.6213	10.5703	2.0625	10.6992	1.2095	10.5457

Table 1—Casing Short-thread Dimensions (Continued)

Size Designation	Major Diameter	Nominal Weight Thread and Coupling lb per ft	No. of Threads Per in.	Length: End of Pipe to Hand-tight Plane	Length: Effective Threads	Total Length: End of Pipe to Vanish Point	Pitch Diameter at Hand-Tight Plane	End of Pipe to Center of Coupling, Power-tight Make-up	Length: Face of Coupling to Hand-tight Plane	Diameter of Coupling Recess	Depth of Coupling Recess	Hand-tight Standoff, Thread Turns	Minimum Length, Full Crest Threads from End of Pipe	Thread Crest Diameter at Face of Coupling	Thread Crest Diameter at End of Pin	Length End of Pipe to Gauge Plane	Pin Thread Crest Diameter at L_{10}	Length: Face of Coupling to Gauge Plane	Box Thread Crest Diameter at M_{12}
D	D_4			L_1	L_2	L_4	E_1	J	M	Q	q	A	Lc[a]	C_{11}	C_9	L_{10}	C_{10}	M_{12}	C_{12}
11 3/4[b]	11.750	All	8	2.354	3.215	3.500	11.64918	0.500	0.709	11 29/32	0.433	4	2.375	11.6252	11.5703	2.0625	11.6992	1.2095	11.5496
11 3/4[c]	11.750	All	8	2.287	3.215	3.500	11.64499	0.500	0.713	11 29/32	0.433	3 1/2	2.375	11.6213	11.5703	2.0625	11.6992	1.2095	11.5457
13 3/8[b]	13.375	All	8	2.354	3.215	3.500	13.27418	0.500	0.709	13 1/32	0.433	4	2.375	13.2502	13.1953	2.0625	13.3242	1.2095	13.1746
13 3/8[c]	13.375	All	8	2.287	3.215	3.500	13.26999	0.500	0.713	13 1/32	0.433	3 1/2	2.375	13.2463	13.1953	2.0625	13.3242	1.2095	13.1707
16	16.000	All	8	2.854	3.715	4.000	15.89918	0.500	0.709	16 7/32	0.366	4	2.875	15.8752	15.7891	2.5625	15.9493	1.2095	15.7996
18 5/8	18.625	All	8	2.854	3.715	4.000	18.52418	0.500	0.709	18 27/32	0.366	3 1/2	2.875	18.5002	18.4141	2.5625	18.5743	1.2095	18.4246
20[d]	20.000	87.50	8	2.854	3.715	4.000	19.89918	0.500	0.709	20 7/32	0.366	3 1/2	2.875	19.8752	19.7891	2.5625	19.9493	1.2095	19.7996
20[e]	20.000	All	8	2.787	3.715	4.000	19.89499	0.500	0.713	20 7/32	0.366	4	2.875	19.8713	19.7891	2.5625	19.9493	1.2095	19.7957

NOTE 1 All dimensions in inches, except as indicated. See Figure 5. For thread crest details, see Figures 6 and 7.

NOTE 2 Included taper on diameter (all sizes) of 0.0625 in. per inch.

NOTE 3 Hand-tight standoff "A" is the basic allowance for basic power make-up of the joint as shown in Figure 5.

NOTE 4 See 6.1.3 for additional information on crest diameter locations; these locations may be different from traditional diameters and locations, and new standards may be required.

[a] L_c = L4 – 1.125 in. for 8 round thread casing.

[b] Applicable to coupling grades lower than P110.

[c] Applicable to coupling grades P110 and higher.

[d] Applicable to coupling grades lower than J55 and K55.

[e] Applicable to coupling grades J55 and K55 and higher.

Table 2—Tolerances on Buttress Casing Thread Dimensions

Element		Tolerances
Taper		
	coupling	0.750 or 1.000 in. per ft on diameter ... +0.054 in. –0.030 in.
		0.0625 or 0.0833 in. per in. on diameter ... +0.0045 in. –0.0025 in.
	pipe (perfect thread length)	0.750 or 1.000 in. per ft on diameter ... +0.042 in. –0.018 in.
		0.0625 or 0.0833 in. per in. on diameter ... +0.0035 in. –0.0015 in.
	pipe (imperfect thread length)[a]	0.750 or 1.000 in. per ft on diameter ... +0.054 in. –0.018 in.
		0.0625 or 0.0833 in. per ft on diameter ... +0.0045 in. –0.0015 in.
Lead[b]	per in.	13 $^3/_8$ and smaller ... +0.002 in. 16 and larger ... +0.003 in.
	cumulative	+0.004 in.
Thread height		+0.062 ± 0.001 in.
Angle, included		± 1 degree
Length, L_4 (external thread)		
tolerance not specified because of type of thread		
Length, A_1		± $^1/_{32}$ in.
Chamfer		
	60 deg on outside end of threaded pipe	±5 deg
	65 deg on inside end of threaded coupling	+5 deg, –0 deg
Average thread crest diameter[d]	4 $^1/_2$ through 13 $^3/_8$ in. (external)	+0.0060 in. –0.0020 in.
	4 $^1/_2$ through 13 $^3/_8$ in. (internal)	+0.0080 in. –0.0000 in.
	16 in. and larger (external)	+0.0085 in. –0.0020 in.

Table 2—Tolerances on Buttress Casing Thread Dimensions (Continued)

Element	Tolerances
16 in. and larger (internal)	+0.0100 in. –0.0000 in.
Single Dial Buttress Thread Form Gauge Tolerancee,[h]	
external threads	
< 8 $^5/_8$ in. OD	+0 in. (0.0 mm) –0.003 in. (0.08 mm)
≤ 8 $^5/_8$ in. OD	+0 in. (0.0 mm) –0.005 in. (0.13 mm)
internal threads	
all sizes	+0.001 in. (0.03 mm) –0.004 in. (0.10 mm)
Ovality[d]	
thread crest diameter, D/t < 20	0.003D[g,f]
thread crest diameter, D/t ≤ 20	0.004D[g,f]
Standoff, A[g]	see 6.1.10

[a] Taper of the thread root (or “minor”) cone should not increase over the max tolerance at the point of intersection with the pipe OD.

[b] The lead tolerance per in. is the maximum allowable error in any inch within the perfect thread length; The cumulative tolerance is the maximum allowable error over the full perfect thread length; The perfect thread length for (external and internal) threads is defined by 5.2.1.

[c] Tolerances apply to both external and internal threads except where otherwise indicated.

[d] Ovality shall be measured while part is outside of machine; See 6.1.6 for details.

[e] See 5.7.2 for details.

[f] D = nominal pipe body OD.

[g] The presence of ovality may require adjustments to standoff requirements; For standoff adjustments due to ovality; see 6.1.8.

[h] These tolerances apply to the basic 0.100 thread tooth width as measured with the single dial buttress thread form gauge and do not correspond to the tolerances shown in Figure 2 and Figure 3.