

# 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  $11\frac{1}{2}$  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.