



New Requirements from API 5B (16th Edition)

Overview

The verbal forms used to express the provisions ("Foreword"):

1. — the term "shall" denotes a minimum requirement in order to conform to the standard;
2. — the term "should" denotes a recommendation or that which is advised but not required in order to conform to the standard;
3. — the term "may" is used to express permission or a provision that is optional; and
4. — the term "can" is used to express possibility or capability.

4.9 "Thread Elements" points out: "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."

In this document we have compiled & listed the new inspection items required by new API 5B which are mandatory.

Thread Addendum

**Per API 5B 5.5.2, Thread addendum *shall* be measured on round thread.
Thread addendum is now a required, mandatory element to be inspected.**

Why is it required?

API tubing, casing, and line pipe threads are governed by the Specification 5B. The Sixteenth Edition has made some major changes, including mandating the inspection of thread addendum. 5B 1.2 lists out the new inspection requirements including addendum. 5B 4.8 states that all threads **shall** be controlled in accordance with gauging practice requirements in Section 6. Further, 5.5.2 explicitly states that "addendum **shall** be measured on round thread." The foreword points out that "the term 'shall' denotes a minimum requirement in order to conform to the standard", or more simply, you must do this or be in violation of your license.

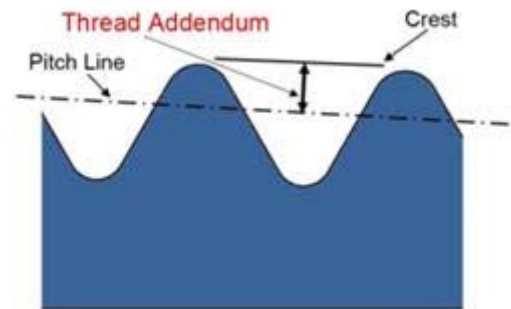


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What is Thread Addendum?

Per 3.1.1, addendum is defined as “the distance from the crest cone to the pitch cone.”



What is required to be inspected?

All casing and tubing (API 5B 60° V threads: 8 Round & 10 Round) falling under the 5B specification manufactured by an API licensee.

All casing threads need to be inspected. Non-upset tubing (NUE), regular thread external-upset tubing (EUE), and integral joint tubing must all be inspected. For casing and tubing, the inspection tolerance is ± 0.0015 in for both the coupling and pin.

How do I inspect it?



TA-3002 Thread Addendum Gage Inspecting a Part

Inspection should be done with an indicator style gage with contact points, like our TA-3002 Thread Addendum Gage. Choose a contact point based on the Threads Per Inch (TPI). In Table 20, 5B provides the options for you:



Threads Per Inch (TPI)	Contact Point Diameter	Gagemaker Model Number
8	0.072"/1.83mm	T072
10	0.057"/1.45mm	T057

Note: Tolerance is 0.002 in/ 0.05mm

Set the gage with the proper standard. For both 8 and 10 Round threads, Gagemaker separately offers the TAS-1014 addendum standard for use with any of its addendum gages.



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Recommended Gages (Gagemaker):

TA-3002	External Thread Addendum Gage For 8 & 10 Round API
TAS-1014	Thread Addendum Standard for 8 & 10 Round

Tooth Thickness or Groove Width Inspection

API 5B 5.6 & 5.7 REQUIRE BUTTRESS FORM INSPECTION

Per API 5B 5.6, Buttress Thread Form "*shall* conform to ... the requirements of tooth thickness or groove width".

Tooth thickness is now a required, mandatory element to be inspected.



TW-6001 Thread Groove Width Gage Inspecting a Part

Why is it required?

API buttress threads are governed by the Specification 5B. The Sixteenth Edition has made some major changes, including mandating the inspection of tooth thickness. 5.6 and 5.7 describe the inspection requirements and procedures. Figures 2 and 3 provide the Buttress



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Casing Thread Form and Dimensions. Table 2 provides the tolerances for buttress dimensions. Also see Table 2 note h , which states "These tolerances apply to the basic 0.100 thread tooth width as measured with the single dial buttress thread form gauge [.]"

5.6.4 "For buttress threads, the thread form shall conform to the basic dimensions ... including the requirements of thread height, included flank angles, tooth thickness, or groove width."

5.6.4 "The following are examples of acceptable methods of measuring tooth thickness: single dial gauge, optical comparator, contour measuring machine, or cast molds."

What is Tooth Thickness vs. Groove Width?

A single pitch is the combination of tooth thickness (sometimes also called "tooth width") and groove width.

The tooth thickness is the physical helical ridge constructed by the stab flank, load flank, and the crest on a thread screw.

The groove width is the physical helical valley constructed by the stab flank, load flank, and the root of a thread screw.

The tooth thickness and groove width have an inverse relationship with each other. If the tooth thickness is narrow, the groove width will be wide, and vice versa.

5.6.4 "For buttress threads, the thread form shall conform to the basic dimensions within the tolerances of Figure 2 and 3 including the requirements of thread height, included flank angles, tooth thickness, or groove width."

How do I inspect it?

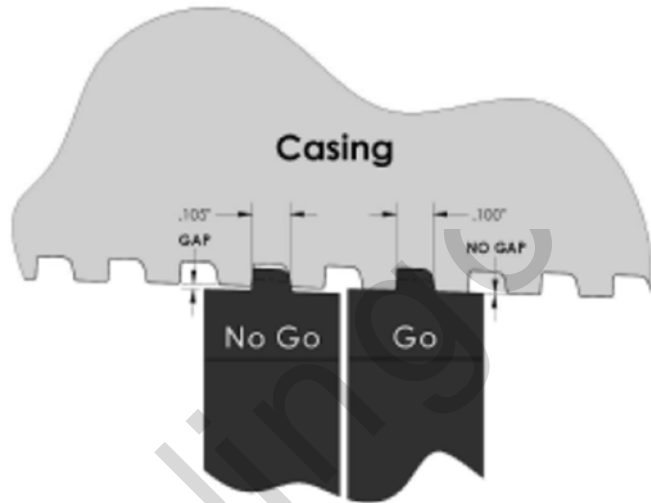
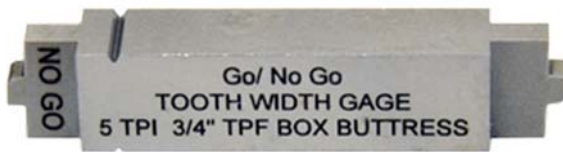
5.6.4 allows for the inspection via a single dial gauge. 5.7 describes the type of gauge and procedure to be used. The gage inspects "actual tooth thickness of both external and internal buttress casing threads near the pitch line."





How to inspect Groove Width?

Use Groove Width GO/NO GO Gages.



Recommended Gages (Gagemaker)

TW-6001	Tooth width gage
TWS-5B-750	Tooth width Standard API 5B buttress, 0.750" TPF
TWS-5B-1	Tooth width Standard API 5B buttress, 1.00" TPF
GW-1001	Groove Width Go/Nogo Pin 5 TPI.750 TPF API Buttress <8.625
GW-1002	Groove Width Go/Nogo Pin 5 TPI.750 TPF API Buttress >8.625
GW-1003	Groove Width Go/Nogo Box 5 TPI.750 TPF API Buttress
GW-1004	Groove Width Go/Nogo Pin 1.0" TPF API Buttress
GW-1005	Groove Width Go/Nogo Box 1.0" TPF API Buttress



Angle and Thread Form Measurement

Per 5.6.2, "Thread form shall be assessed with an Optical Comparator/Profile Projector or equivalent form assessment device. A thread form master overlay, physical or digital, of known accuracy is required. Thread angles shall be measured with an Optical Comparator/Profile Projector or equivalent precision angle measuring device."

5.6.4 points out: "Angular, as well as linear assessments of the defects shall be determined by comparing the thread profile image with that of a toleranced thread overlay (Figures 45 and 46) or by direct measurement."

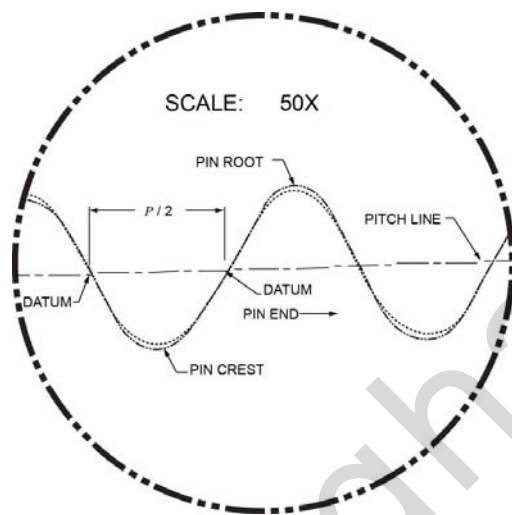


Figure 45 – External Thread Form Overlays for 8 Round Threads

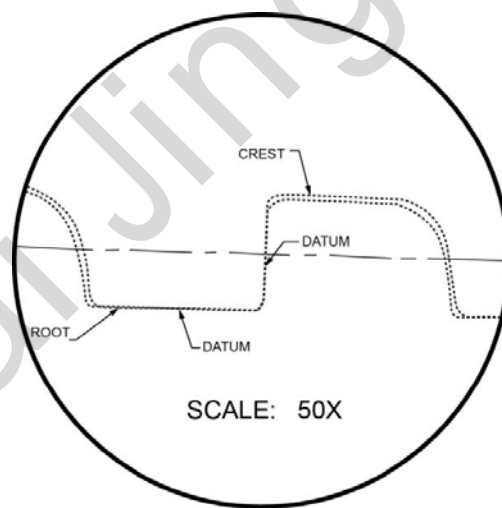


Figure 46 – External Thread Form Overlays for Buttress Threads

Gagemaker supply the overlays required by this section.

OLTP-11-1/2V	Overlay of Thread Profile TP-11-1/2V
OLTP-RTC-10R	Overlay of Thread Profile TP-RTC-10R
OLTP-RTC-8R	Overlay of Thread Profile TP-RTC-8R,
OLTP-5BTC75-EXT	Overlay of Thread Profile TP-5BTC75-EXT
OLTP-5BTC75-INT	Overlay of Thread Profile TP-5BTC75-INT
OLTP-5BTC1-EXT	Overlay of Thread Profile



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	TP-5BTC1-EXT
OLTP-5BTC1-INT	Overlay of Thread Profile TP-5BTC1-INT
OLPR-RTC-10R	Product Overlay with Tolerance 10 TPI 3/4 TPF 10R
OLPR-RTC-8R	Overlay with Tolerance 8 TPI, 3/4" TPF, 8-Round
OLPR-5BTC75-EXT	Product Overlay with Tolerances 5 TPI 3/4 TPF BUTTRESS PIN
OLPR-5BTC75-INT	Product Overlay with tolerances 5 TPI 3/4 TPF BUTTRESS BOX
OLPR-5BTC1-EXT	Product Overlay with Tolerance 5 TPI 1 TPF BUTTRESS PIN
OLPR-5BTC1-INT	Product Overlay with Tolernace 5 TPI 1 TPF BUTTRESS BOX

Crest Diameter & Ovality

API 5B 6.1.1 CREST DIAMETER SETTING STANDARD REQUIREMENTS

Per 6.1.1, "a manufacturer who produces products using the threads covered by this Specification shall have access to setting standards for thread diameter gauges[...] for each size and type of thread produced." Traditional standards need replacing.



MRP Crest Diameter and Ovality Gauge Inspecting a Part

Why do I need new setting standards?

API tubing, casing, and line pipe threads are governed by the Specification 5B. The Sixteenth Edition has made some major changes, including a new mandate requiring crest diameter inspection. API not only requires this new inspection but has mandated the inspection procedure. 5B 4.8 states, "All threads shall be controlled in accordance with gauging practice requirements in Section 6." Next, 4.9 Thread Elements states, "Thread elements for all threads [...] shall be subject to inspection in accordance with Sections 5 and 6."



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Section 6 mandates the inspection of crest diameter and ovality (6.1.1, 6.1.2 and 6.1.7). Gage requirements are governed by 6.1.4 in combination with Section 7 and Section 8. Crest diameter inspection under Section 6 has now been well defined. Inspections will be taken at predetermined locations based on thread type and size (6.1.3). Table 7's Note 4 points out that the new crest diameter locations "may be different from traditional diameters and locations, and new standards may be required." These specific locations create new gage setting dimensions that invalidate existing gage setting standards. Basically, historical setting standards do not meet the new API 5B dimensional and marking requirements.

Difference between new and old rod standards

The new rod standards measure the crest diameter at locations as published in the respective Tables, at the L10 AND C10 dimensions per 6.1.3. They also meet the new accuracy and marking requirements of section 7.1.11. (historical rod standards DO NOT meet these requirements).



Crest Diameter Setting Standards

The locations were determined by the API Task Group on threading, gauging, and thread compounds to be located closer to the face of the pin and stay well within the Lc. This avoids measuring crest diameters in-topped threads.

Recommended Gages (Gagemaker)

MRP-1000	INTERNAL/EXTERNAL CREST DIAMETER GAGE INTERNAL RANGE 1 1/2" - 4 1/2", EXTERNAL RANGE 1 1/2" - 4 1/2"
MRP-1001	Ext Crest Diameter Gage, 4 1/2" reach 1 1/2" - 4 1/2" dia.
MRP-2001	Ext Crest Diameter Gage, 4 1/4" reach, 2-3/8"-20"
MRP-2002	Int Crest Diameter Gage, 4 1/4" reach, 2-3/8"-20"
MRP-2003	Int/Ext Crest Diameter Gage, 4 1/4" reach, 2 3/8"-20"



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New Product Recommendation

Crest Diameter and Ovality Gages – MRP® AIR Carbon Fiber

A Stronger, Lighter, and More Accurate MRP® Crest Diameter Gage



MRP-AIR-2001	External Crest Diameter Gage 4-1/2" Reach, 2-3/8" to 20" Range
MRP-AIR-2002	Internal Crest Diameter Gage 4-1/4" Reach, 2-3/8"- 20" Range
MRP-AIR-2003	Int/Ext Crest Diameter Gage 4-1/4" Reach, 2 3/8-20" Range

Comments originally provided by Gagemaker.

Compiled & edited by Shanghai Jingoo.

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