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10422

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Petroleum and natural gas industries – Threading, gauging, and thread inspection of casing, tubing and line pipe threads – Specification

*Industries du pétrole et du gaz naturel – Filetage, calibrage et inspection des
filetages des tubes de cuvelage, des tubes de production et de conduites –
Spécifications*
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ISO 10422:1993

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Reference number
ISO 10422:1993(E)

Foreword

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Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 10422 was prepared by the American Petroleum Institute (API) (as STD 5B, 13th ed.) and was adopted, under a special "fast-track procedure", by Technical Committee ISO/TC 67, *Materials and equipment for petroleum and natural gas industries*, in parallel with its approval by the ISO member bodies.

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Introduction

International Standard ISO 10422:1993 reproduces the content of API STD 5B, 13th edition, 1988. ISO, in endorsing this API document, recognizes that in certain respects the latter does not comply with all current ISO rules on the presentation and content of an International Standard. Therefore, the relevant technical body, within ISO/TC 67, will review ISO 10422:1993 and reissue it, when practicable, in a form complying with these rules.

This International Standard is not intended to obviate the need for sound engineering judgement as to when and where this International Standard should be utilized and users should be aware that additional or differing requirements may be needed to meet the needs for the particular service intended.

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Standards referenced herein may be replaced by other international or national standards that can be shown to meet or exceed the requirements of the referenced standards.

Appendix A to this document should not be considered as requirements. It is included only as guidelines.
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Petroleum and natural gas industries – Threading, gauging, and thread inspection of casing, tubing and line pipe threads – Specification

1 Scope

This International Standard specifies dimensional requirements on thread and thread gauges, and covers the instruments and methods for the inspection of threads for line pipe, casing and tubing,

2 Requirements

Requirements are specified in:

“API Specification STD 5B (STD 5B), Thirteenth Edition, May 31, 1988, *Specification for Threading, Gaging, and Thread Inspection of Casing, Tubing and Line Pipe Threads*”,

which is adopted as ISO 10422.

For the purposes of international standardization, however, modifications shall apply to specific clauses and paragraphs of API STD 5B. These modifications are outlined below.

NOTE – A wavy line in the margin indicates the location of a modification to the text of the API publication.

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TABLE OF CONTENTS

Delete Appendix C.

Page 3

Information given in the POLICY statement is relevant to the API publication only.

Page 4

Information given in the FOREWORD is relevant to the API publication only.

Page 5

Subclause 1.6 Metric conversions

The factors used for converting the pound (lb) and the pound per square inch (psi) shall be replaced as follows:

1 pound (lb) = 0,453 529 37 kg (exactly)

1 pound per square inch (lb/in²) = 0,070 37 kg/cm²

Subclause 1.7 Referenced standards, item c

This part is information which is relevant to the API publication only.

TABLE 1.0, REFERENCED STANDARDS

The equivalent International Standard to API RP 5C1 is ISO 10405:1993, *Petroleum and natural gas industries – Care and use of casing and tubing*.

The provisions of API Spec Q1 (Quality program) do not apply in the framework of this International Standard.

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SECTION 2, THREAD DIMENSIONS AND TOLERANCES

Subclause 2.3

First paragraph, last three lines shall read:

“... of ISO 10405:1993, *Petroleum and natural gas industries – Care and use of casing and tubing*.”

Second paragraph, first sentence: Introduce the metric values as follows:

"A 3/8 in (9,5 mm) high equilateral triangle die stamp shall be placed at a distance of $L_4 + 1/16$ in [L_4 (mm) + 1,6 mm] from each end of 16 in (406,4 mm), 18 5/8 in (473,075 mm) and 20 in (508 mm) 8-round thread casing in grades H40, J55 and K55."

Subclause 2.4, NOTE

Add "(mm)" in the definition of t_0 and D , after "in inches".

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Subclause 2.5

1st line shall read: "The angle 65° of the outside chamfer..."

Subclause 2.6

9th line shall read: "The threads in steel couplings for line pipe nominal diameter 2 in (50,8 mm) and larger...";

13th line: Replace "which will minimize" by "so as to minimize";

4th line from bottom: The number in parentheses shall be "(0,152 mm)".

Subclause 2.8

2nd line: Add "(25,4 mm)" after "inch".

In the NOTE, the first two lines shall read:

"For line pipe threads finer than 11 1/2 threads per in (11 1/2 threads per 25,4 mm or 0,453 threads/mm), [pipe size smaller than 1 in (25,4 mm) nominal diameter], only..."

Subclause 2.9

5th line shall read: "pipe couplings nominal diameter 6 in (152,4 mm) and larger..."

7th line: The number in parentheses shall read: "(19 mm per 6 100 mm)".

9th to 11th line: Delete the sentence starting "Maximum misalignment" and ending "difficulties".

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Subclause 2.11

Add the following sentence:

"The criteria for rejection by the purchaser shall be some demonstration that axial misalignment exceeds 0,031 in (0,79 mm), or the angular misalignment exceeds 3/4 in per 20 ft (19 mm per 6 100 mm) of projected axis, or by a check of whether the minimum length of full crest threads (L_c) is present."

Subclause 2.13

Add the following subclause:

"2.13 A hand tight connection is defined as a threaded connection that has been made up by hand without the aid of excessive force. Hand tight standoff "A" is the maximum theoretical make up position of two nominal parts which can be achieved without incurring interference."

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Subclause 3.1

Replace the existing subclause with the following text:

"All threads covered by this section shall comply with the gauging practice requirements specified herein. Accordingly, any manufacturer who produces products utilizing any of the threads covered by this specification shall have access to master gauges for each size and type of thread produced. Master gauges consist of a plug and mating ring conforming to the requirements of Section 4, and certified as required in Section 5."

NOTE 2

Add the following to the end of the NOTE:

"Good care is as indicated in paragraph 3.2 and paragraph 5.4."

NOTE 3

Delete this note.

NOTE 4

Renumber as NOTE 3.

2nd line: Add "(340 mm)" after "13 3/8 in".

6th line: Add "(406 mm)" after "16 in".

Subclause 3.2

Replace the existing clause with the following text:

"The manufacturer of product threads shall also provide working gauges conforming to the requirements of paragraph 4.2 for use in gauging the product threads, and shall maintain all working gauges in such condition as to ensure that product threads, gauged as required herein, are acceptable under this specification. The manufacturer shall establish and document a frequency for determining interchange standoff of working gauges with master gauges, and for inspecting product threads with working gauges based on his control of the manufacturing process."

Subclause 3.4

Renumber the present NOTE as "NOTE 1:".

Add a new NOTE 2 as follows:

"NOTE 2: *"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 one inch (25,4 mm) by the number of threads per inch (threads per mm) as indicated in Tables 2.1 through 2.7 to three significant figures.*"

Subclause 3.5

Delete the last four lines from the bottom: "The API monogram... have been met."

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Subclause 3.6, item a

6th line: The text in parentheses shall read: "(per inch or per 25,4 mm)".

9th line onwards shall read:

"pipe nominal diameter 8 in (203,2 mm) and smaller, and 1/5 thread turn for 8-thread gauges for line pipe nominal diameter 10 in (254 mm) and larger."

Subclause 3.6, item b

7th line onwards shall read:

"for sizes 8 5/8 in (219,1 mm) and smaller, 1/5 thread turn for sizes 9 5/8 in (244,5 mm) and larger, and 1/5 thread turn for all 10-thread gauges."

Subclause 3.6, item c

Last two lines shall read:

"turn for sizes 8 5/8 in (219,1 mm) and smaller, and 1/8 thread turn for sizes 9 5/8 in (244,5 mm) and larger."

Subclause 3.9

9th line: Replace the sentence starting "Other gage dimension..." up to "... reference plane." with the following text:

"Other gauge dimensions which affect *how the gauges may be used* were not changed; therefore, gauges made prior to 1940 may be used, provided proper adjustment in standoff values are made for the shift in reference plane."

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Right-hand column

2nd line: Delete the period after "mm" in the parentheses and add "(340 mm)" after "13 3/8".

3rd line: Add "(406,4 mm)" after "16 in".

4th and 5th lines: The numbers in parentheses shall be "(E₇ - 0,083 3 L₇ + 1,57 mm)."

Item b, 3rd line from bottom onwards shall read:

"D for sizes 13 3/8 in (340 mm) and smaller, and is equal to the nominal pipe diameter for sizes 16 in (406,4 mm) and larger."

Item e, 3rd and 4th lines shall read:

"13 3/8 in (340 mm) and smaller; for 16 in (406,4 mm) and larger, g is 1.488 in (37,8 mm)."

Item g, 3rd and 4th lines shall read:

"plus 0.016 in (0,41 mm) for sizes 13 3/8 in (340 mm) and smaller; for 16 in (406,4 mm) and larger D₄ is equal to..."

Item j, second line shall read:

"for sizes 13 3/8 in (340 mm) and smaller; crests and roots"

Item j, 3rd line: Add "(406,4 mm)" after "16 in".

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Subclause 4.8

4th line from bottom: Delete the words "and a gaging notch"; add a period after "gages".

Last two lines: Delete the sentence: "The overall... L₄ - S."

Subclause 4.9

Third and fifth lines: Add "(219 mm)" after "8 5/8".

Item a (table): Metric dimensions shall be introduced as follows:

Size		Plate diameter		Bolt circle	
in	mm	in	mm	in	mm
9 5/8	244,5	9 5/8	244,5	7 1/4	184,2
10	254				
10 3/4	273	10 3/4	273	9 3/8	244,5
11 3/4	298,5				
12	304,8				
13 3/8	340	13 3/8	340	10 3/4	273
14	355,6				
16	406,4	16	406,4	12 3/8	314,3
18	457,2	18	457,2	16	406,4
18 5/8	473				
20	508	20	508	17 3/8	441,3

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Subclause 4.9

Item b (table): Metric dimensions shall be introduced as follows:

Size		Plate diameter		Bolt circle	
in	mm	in	mm	in	mm
5	127	7	177,8	4	101,6
5 1/2	139,7				
6 5/8	168,3	8	203,2	5 1/4	133,1
7	177,8				
7 1/2	190,5				
8 5/8	215,9				
9 5/8	244,5	9 1/2	241,3	7 1/2	190,5
10 3/4	273				

Subclause 4.11

Delete the last sentence starting: "Unless otherwise stated..."

Item a, **Spec 5B***: Delete this item, then rename existing items "b" to "e" as "a" to "d".

Footnote shall be deleted.

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Figures 4.6 to 4.7

Metric dimensions shall be added as follows:

5/8" (16 mm) Holes, 4 places

1/2" (12,7 mm)

6" (152,4 mm)

2" (51 mm)

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Moreover, the two tables containing the dimensions of the plate diameter (A) and of the bolt circle (B), in relation to the size in inches, may be completed with the metric dimensions given in subclause 4.9.

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Table 4.10

PLUG GAGE: Change the tolerance concerning "Crest truncation" as follows:

Crest truncation + 0.0040
- 0.0000

RING GAGE: Change the tolerance concerning "Crest truncation" as follows:

Crest truncation + 0.0040
- 0.0000

Table 4.11PLUG GAGE: Major Diameter D_o : Add "Specified size" before

5 1/2 thru 7 in

7 5/8 thru 13 3/8 in

16 in and larger

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Subclause 5.1

5th line: Delete the symbol "†".

After the 3rd address "Rome, Italy", add the following agency:

"National Institute of Metrology,
Beijing, People's Republic of China."

Replace "National Bureau of Standards" by:

"National Institute of Standards and Technology,
Gaithersburg, Maryland, USA."

Replace "National Research Laboratory" by:

"National Research Metrology Laboratory,
Ibaraki, Japan."

4th line from bottom: Add: "(219,1 mm)" after $8 \frac{5}{8}$ in

2nd line from bottom: Add before "Physikalisch-...":

"Oil Country Tubular Goods Inspection Laboratory,
China National Oil and Gas Exploration & Development Corporation,
People's Republic of China."

Subclause 5.2

12th line and 17th line: Delete the words "with copy to the API Dallas office".

End of subclause: Add the following text:

"Master gauges and certificates of compliance may be transferred. If a certificate is not available, the gauges shall be recertified and a new certificate issued by an agency listed in par. 5.1."

Subclause 5.3

NOTE: Add "(406,4 mm)" after "16 in".

Delete the footnote identified with †.

Subclause 5.5

Item d to be deleted.

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Subclause 6.4

9th line: Add "(12,7 mm)" after "1/2 in"

10th line: Add "(219,1 mm)" after " $8 \frac{5}{8}$ in".

11th line: Add "(273 mm)" after " $10 \frac{3}{4}$ in" and "(25,4 mm)" after "1 in".

18th line: Add "11 1/2 threads per 25,4 mm or 0,453 threads/mm)".

First NOTE, 3rd and 4th lines: The sentence shall read:

"Thus, the phrase "number of turns per inch (per mm)" means per inch of thread axis."

Second NOTE, 3rd and 4th lines: Add "(15,9 mm)" after "0.625 inches", and "(12,7 mm)" after "0.500 inches".

The first NOTE shall be numbered "NOTE 1" and the second "NOTE 2".

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Figure 6.3

2nd and 3rd lines of the caption shall read:

"THREADS IN SIZES 4 in (101,4 mm) NOMINAL DIAMETER
[4 1/2 in (114,3 mm) – OD] AND LARGER"

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Subheading above subclause

This shall be modified to:

"Internal Threads in Sizes 4 in (101,6 mm) Nominal Diameter [4 1/2 in (114,3 mm) – OD] and Larger"

Subclause 6.10

2nd line: Make the same changes as above.

Subclause 6.11, right-hand column

5th line shall read: "is the fourth crest on sizes 5 in (127 mm) through 7 5/8 in (155 mm), and..."

7th line: Add "(219 mm)" after "8 5/8 in".

8th line: Add "(273 mm)" after "10 3/4 in".

16th line: Add "(127 mm)" after "5 in", and "(155 mm)" after "7 5/8 in".

18th line: Add "(219 mm)" after "8 5/8 in", and "(273 mm)" after "10 3/4 in".

Subheading above subclause 6.12

This shall be modified to:

"Internal Threads in Sizes Smaller than 4 in (101,6 mm) Nominal Diameter [4 1/2 in (114,3 mm) – OD]"

Subclause 6.12

2nd line shall read: "sizes smaller than nominal diameter 4 in (101,6 mm) [4 1/2 in (114,3 mm) – OD] shall..."

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Subclause 6.14

6th line: Add "(406,4 mm)" after "16 in".

Subclause 6.15

3rd line shall read: "make up triangle $A_1 + 0.375$ in ($A_1 + 9,5$ mm). The thread must be a..."

Last line shall read: "dial reads + 0.005 in (+ 0,13 mm) or less..."

Subclause 6.16

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8th line: The value in parentheses shall read "(25,4 mm)".

Table following subclause 6.17

Heading of first column: Add "(25,4 mm)" after "per inch".

Fourth column, values in mm: The decimal marker shall be a comma.

Figure 6.6, Detail A

The caption shall read: "... internal threads in sizes 4 in (101,6 mm) nominal diameter [4 1/2 in (114,3 mm) – OD] and larger"

Figure 6.6, Detail B

The caption shall read: "... than 4 in (101,6 mm) nominal diameter [4 1/2 in (114,3 mm) – OD]"

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Subclause 6.18

2nd line shall read: "and of internal threads in sizes 4 in (101,6 mm) nominal diameter [4 1/2 in (114,3 mm) – OD]"

5th and 6th lines shall read: "... smaller than 4 in (101,6 mm) nominal diameter [4 1/2 in (114,3 mm) – OD]"

3rd line from bottom: The text in parentheses shall read: "(± 0,003 mm)".

Last line: The text in parentheses shall read: "(± 0,005 mm)".

Figure 6.7, Detail A

The caption shall read:

"... THREADS IN SIZES 3 in (76,2 mm) NOMINAL DIAMETER [3 1/2 in (89 mm) – OD] AND LARGER"

Figure 6.7, Detail B

Add to the caption: "(406,4 mm)" after "16 in".

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Figure 6.8

The caption shall read:

"... 3 in (76,2 mm) NOMINAL DIAMETER [3 1/2 in (89 mm) – OD]"

Subclause 6.22

2nd line: Add "(127 mm)" after "5 in" and "(193,7 mm)" after "7 5/8 in".

5th line: Add "(219 mm)" after "8 5/8 in" and "(273 mm)" after "10 3/4 in".

8th line: Add at end "(2,29 mm)" after "0.090 in".

Subclause 6.23 (left-hand column)

7th line: Add "(406,4 mm)" after "16 in".

Last line (before the table) shall read: "within a tolerance of $\pm 0.000 2$ in ($\pm 0,005$ mm)."

27th and 28th lines: The same correction applies.

Last line of first table: Add "(340 mm)" after "13 3/8 in".

5th line from bottom: Add "(406,4 mm)" after "16 in".

Right-hand column

4th line shall read: "Sizes 5 in (127 mm) to 7 5/8 in (193,7 mm)".

13th line shall read: "Sizes 8 5/8 in (219 mm) through 10 3/4 in (273 mm)".

Subclause 6.24

14th line shall read: "tolerance of ± 0.0005 in ($\pm 0,013$ mm). ..."

18th line shall read: "than 3 in (76,2 mm) nominal diameter. ..."

22nd line: Add "(340 mm)" after "13 3/8 in".

29th line and 32nd lines: Add "(406,4 mm)" after "16 in".

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Subclause 6.25

First two lines shall read:

"External Threads and Internal Threads in Sizes 3 in (76,2 mm) Nominal Diameter [3 1/2 in (89 mm) – OD] and Larger."

5th line shall read: "in sizes 3 in (76,2 mm) nominal diameter and larger. The tip of the".

Subclause 6.26

First two lines shall read:

Internal Threads in Sizes Smaller than 3 in (76,2 mm) Nominal Diameter [3 1/2 in (89 mm) – OD]. The gauge illustrated".

4th line shall read: "... smaller than 3 in (76,2 mm) nominal diameter."

Subclause 6.28

8th line shall read: "0.100 in (2,54 mm)".

9th line: The number in parentheses shall read "(0,762 mm)".

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Subclause 6.30, item b

11th line shall read: "(101,6 mm) nominal diameter [4 1/2 in (114,3 mm) – OD] and larger, and at least..."

13th line: Insert "(101,6 mm)" after "4 in".

14th line shall read: "[4 1/2 in (114,3 mm) – OD]."

Subclause 6.30, item c

13th line shall read: "in the range from 260 °F to 266 °F (127 °C to 130 °C) and".

Subclause 6.30, item d

4th line: Delete the dot after the symbol "g" for gram (28,3 g). Substitute "cm³" for "c.c." (28,6 cm³ or 0,028 6 l)

6th line: Delete the dot after the symbol "g" for gram (40 g).

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Subclause 6.34

3rd line from top: The number in the first parentheses shall be "(2,21 mm)". The number in the second parentheses shall be "(0,584 mm)".

Subclause 6.35

8th line: The number in parentheses shall be "(> 0,08 mm)".

11th line: The number in parentheses shall be "(± 0,03 mm)".

Subclause 6.35, right-hand column

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The first six lines shall read:

"number two and three dials, sizes 7/8 in (193,7 mm) and smaller, $\pm 0,003$ in ($\pm 0,08$ mm), sizes over 7/8 in, $-0,005$ in ($-0,13$ mm). When using the gauge "C" illustrated in figure 6.13, the tolerances from zero setting are $-0,003$ in ($-0,08$ mm) for sizes 7/8 in and smaller, and $-0,005$ ($-0,13$ mm) for sizes over 7/8 in."

Subclause 6.36

8th line: The number in parentheses shall be "(> 0,08 mm)".

10th line: The sentence shall read:

"The tolerances from zero setting are, number or dial, $\pm 0,001$ in ($\pm 0,03$ mm), number two and three dials, from $-0,001$ in ($-0,03$ mm) to $-0,004$ in ($-0,10$ mm)."

Last two lines shall read: "... from zero setting are $-0,001$ in ($-0,03$ mm) to $-0,004$ in ($-0,10$ mm) for all sizes."

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Subclause 6.38, right-hand column

4th line: The number in parentheses shall be "(2,54 mm)".

5th line: The number in parentheses shall be "(0,762 mm)".

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Figure 6.18

The caption shall read:

"... IN SIZES 4 in (101,6 mm) NOMINAL DIAMETER [4 1/2 in (114,3 mm) – OD] AND LARGER"

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Figure 6.19

The caption shall read:

"... THAN 4 in (101,6 mm) NOMINAL DIAMETER [4 1/2 in (114,3 mm) – OD]"

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Figure 6.20

The caption shall read:

"... THREADS IN SIZES 4 in (101,6 mm) NOMINAL DIAMETER [4 1/2 in (114,3 mm) – OD] AND LARGER"

Figure 6.21

The caption shall read:

"... SMALLER THAN 4 in (101,6 mm) NOMINAL DIAMETER [4 1/2 in (114,3 mm) – OD]"

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Figure 6.22

The caption shall read:

"... THREADS IN SIZES 3 in (76,2 mm) NOMINAL DIAMETER [3 1/2 in (89 mm) – OD] AND LARGER"

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Figure 6.23

The caption shall read:

"... SMALLER THAN 3 in (76,2 mm) NOMINAL DIAMETER [3 1/2 in (89 mm) – OD]"

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Subclause 7.6

2nd line: Delete the reference to "API".

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Table 7.3, left-hand column

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9th line shall read: "Sizes 5 in (127 mm) through 7 5/8 in (193,7 mm)".

15th line shall read: "Sizes 8 5/8 in (219 mm) through 10 3/4 in (273 mm)".

Table 7.3, right-hand column

4th line of NOTE: The number in parentheses shall be "(± 0,03 mm)".

Paragraph entitled "Seal", 3rd line: The number in parentheses shall be (± 5,21 mm per metre).

6th line: The number in parentheses shall be "(292,1 mm ± 6,35 mm)".

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Subclause 7.7

4th line: Delete the reference to "API".

Subclause 7.9

7th line: The number in parentheses shall be "(± 0,038 mm)".

9th line: The number in parentheses shall be "(± 0,05 mm)".

Right-hand column

Delete the last sentence of 7.9 starting from "The API monogram" up to and including "have been met."

Subclause 7.10

8th line: The number in parentheses shall be "(– 0,30 mm)".

9th line: The number in parentheses shall be "(– 0,25 mm)".

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Subclause 7.11

Replace the existing text with the following:

“Grand Master Plug Gauges. The grand master plug gauges comply with the same limitations and tolerances as prescribed herein for the reference master plug gauges. Grand master plug gauges for all sizes of extreme-line casing are deposited with the National Institute of Standards and Technology (NIST), Gaithersburg, Maryland 20899, USA.”

Subclause 7.12, item j

The last two lines shall read: “1.000 in (25,4 mm). See detail B: $m = b - 1.000$ in ($b - 25,4$ mm).”

Subclause 7.15

13th line: The number in parentheses shall be “(± 0,03 mm)”.

EXAMPLE, 2nd line: Add “(139,7 mm)” after “5 1/2 in”.

5th line from bottom: The number in parentheses shall be “(- 0,008 mm)”.

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Subclause 7.15, paragraph (a)

4th line from top: The number in parentheses shall be “(- 0,008 mm)”.

8th line: The number in parentheses shall be “(- 0,028 mm)”.

10th line: Delete “or” in the parentheses “(8,143 mm)”.

16th line: The numbers in parentheses shall be “(8,151 mm ± 0,038 mm)”.

Last but one line: The numbers in parentheses shall be “(8,171 mm ± 0,038 mm)”.

Subclause 7.15, paragraph (b)

7th line: The number in parentheses shall be “(± 0,046 mm)”.

9th line: Delete “or” in the parentheses

12th line: The number in parentheses shall be “(38,1 mm)”.

15th line: The number in parentheses shall be “(± 0,046 mm)”.

19th line: The number in parentheses shall be “(± 0,015 mm)”.

21st and 22nd lines: Delete “or” in the parentheses.

25th line: The number in parentheses shall be “(63,5 mm)”.

27th line: The numbers in parentheses shall be “(63,515 mm ± 0,051 mm)”.

Last line: The numbers in parentheses shall be “(3,653 mm ± 0,051 mm)”.

Subclause 7.21, item a

Delete this item, then rename items “b” to “f” as “a” to “e”.

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Figure 7.8

Caption shall read:

“GAUGE DETAILS – SIZES 5 in (127 mm) THROUGH 7 5/8 in (193,7 mm)”

Last line below the caption: Add “(193,7 mm)” after “7 5/8 in”.

Figure 7.9

Caption shall read:

“GAUGE DETAILS – SIZES 8 5/8 in (219 mm) THROUGH 10 3/4 in (273 mm)”