API Specification

5CT

9th Edition, June 2011

Specification for Casing and Tubing

ISO 11960:2011 Petroleum and natural gas industries — Steel pipes for use as casing or tubing for wells

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1.0 Product

Specification 5CT includes the following requirements for product ordered and may be applicable in addition to any product-specific requirements listed in other sections identified herein

1.1 PRODUCTS

1.1.1 API Specification 5CT – 4.1.35

- short round thread casing (SC);
- long round thread casing (LC);
- buttress thread casing (BC);
- non-upset tubing (NU);
- external upset tubing (EU);
- integral tubing connections (IJ).

1.1.2 API Specification 5CT – 4.1.35
Pipe, coupling, coupling stock, coupling material, coupling blank or accessory material, either individually or collectively as applicable.

1.1.3 API Specification 5CT – Introduction
This Standard is not intended to inhibit a vendor from offering, or the purchaser from accepting, alternative equipment or engineering solutions for the individual application.

1.1.4 API Specification 5CT – 1.1
By agreement between the purchaser and manufacturer, this Standard can also be applied to other plain-end pipe sizes and wall thicknesses.

1.1.5 API Specification 5CT – Annex F.1
The use of the Monogram on products constitutes a representation and warranty by the Licensee to purchasers of the products that, on the date indicated, the products were produced in accordance with a verified quality management system and in accordance with an API product specification.

1.1.6 API Specification 5CT – Annex H.1

This annex describes Product Specification Level (PSL) requirements for PSL-2 and PSL-3, for all Grades except H-40, L-80 9Cr and C110, that may be specified by the purchaser. Higher PSL requirements may be furnished at the option of the manufacturer.

1.1.7 API Specification 5CT – 2.2

In this Standard, data are expressed in both the International System (SI) of units and the United States Customary (USC) system of units. For a specific order item, it is intended that only one system of units be used, without combining data expressed in the other system.

Products manufactured to specifications expressed in either of these unit systems shall be considered equivalent and totally interchangeable. Consequently, compliance with the requirements of this Standard as expressed in one system provides compliance with requirements expressed in the other system.

For data expressed in the SI, a comma is used as the decimal separator and a space as the thousands separator. For data expressed in the USC system, a dot (on the line) is used as the decimal separator and a space as the thousands separator.
In the text, data in SI units are followed by data in USC units in parentheses.

Separate tables for data expressed in SI units and USC units are given in Annex C and Annex E respectively.

Figures are contained in Annex D and express data in both SI and USC units.

1.2 CASING

API Specification 5CT – 4.1.5

Pipe run from the surface and intended to line the walls of a drilled well.

1.3 COUPLING

API Specification 5CT – 4.1.8
Internally threaded cylinder for joining two lengths of threaded pipe.

1.4 PUP JOINT

API Specification 5CT – 4.1.37
Casing or tubing of length shorter than Range 1, see Table C.27 or Table E.27.

1.5 THREAD PROTECTOR

API Specification 5CT – 4.1.45
Cap or insert used to protect threads and seals during handling, transportation and storage.

1.6 TUBING

API Specification 5CT – 4.1.46
Pipe placed in a well to produce or inject fluids.

2.0 PURCHASER'S RIGHTS

2.1 INSPECTION

2.1.1 API Specification 5CT – Annex B.2

The inspector representing the purchaser shall have unrestricted access, at all times while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works which will concern the manufacturer of the pipe or couplings ordered. The manufacturer shall afford the inspector all reasonable facilities to satisfy the inspector that the pipe is being manufactured in accordance with this Standard. All inspections should be made prior to shipment at the place of manufacture or processing, unless otherwise specified on the purchase agreement, and shall be so conducted as not to interfere unnecessarily with the operation of the works.

2.1.2 API Specification 5CT – Annex B.3

The manufacturer is responsible for complying with all of the provisions of this Standard. The purchaser may make any investigation necessary to ensure compliance by the manufacturer and may reject any material that does not comply with this Standard.

3.0 PURCHASER'S RESPONSIBILITY

3.1 PURCHASER

3.1.1 API Specification 5CT – 4.1.39
Party responsible for both the definition of requirements for a product order and for payment for that order.

3.1.2 API Specification 5CT – 7.14.1
The purchaser should refer to ISO 15156-2 or ANSI-NACE MR0175/ISO 15156-2 for guidance on the usage of Grades C90, T95 and C110. Particular attention should be given to the application of Grade C110 in ISO 15156-2 or ANSI-NACE MR0175/ISO 15156-2 SSC Regions 2 or 3, as this material is not suitable for all sour (hydrogen sulfide-containing) service applications

4.0 DESIGN REQUIREMENTS

4.1 DESIGN REQUIREMENTS

4.1.1 API Specification 5CT – 1.3
Casing sizes larger than Label 1 4-1/2 but smaller than Label 1 10-3/4 can be specified by the purchaser to be used in tubing service, see Tables C.1, C.23, C.27 and C.28 or Tables E.1, E.23, E.27 and E.28.

4.1.2 API Specification 5CT – 6.1
Accessory material for casing and tubing shall be seamless unless otherwise specified on the purchase agreement.

4.1.3 API Specification 5CT – 7.3.1
If the minimum shear area is less than 75 % or if the requirements of b) are not met, then either the material shall be rejected or a transition curve shall be made to demonstrate that the product is on the upper shelf at the specified test temperature (either the standard test temperature or a reduced test temperature specified by the purchaser).

4.1.4 API Specification 5CT – 7.3.2
For coupling stock, coupling materials and accessory materials where the critical thickness is not specified in the purchaser agreement, the critical thickness shall be the specified wall thickness.

4.1.5 API Specification 5CT – 7.6.6
If not specified on the purchase agreement,

a) the critical thickness for determining the impact energy requirements shall be based on the thickness of the cross-section of the accessory that has the lowest t/D ratio, where D is the specified outside diameter and t is the calculated wall thickness at that section.

b) for an accessory with API internal threads, the critical thickness for these API threads is shown in Table C.7 or Table E.7, and D is

the specified outside diameter of the connection as specified in 9.4 and 9.6.

c) for special end-finish connections, the critical thickness for externally threaded members is the specified pipe body thickness, while for internally threaded members it is the calculated thickness of the internally threaded member at the plane of the small end of the pin (when the connection is made up power-tight).

4.1.6 API Specification 5CT – 7.7.1

a) Grades M65, L80 all types, C90, T95 and C110 – Through-wall hardness

The hardness numbers and/or mean hardness numbers obtained shall comply with the requirements in Table C.5 or Table E.5.

b) Grades C90, T95 and C110 — Surface hardness (only if required in accordance with 10.6)

For Grades C90 and T95, if the Brinell or Rockwell C-scale hardness number does not exceed 255 HBW or 25,4 HRC respectively, then the length or piece is acceptable. If any of the hardness numbers are over 255 HBW or 25,4 HRC two additional indentations may be made in the immediate area. If either of the second test hardness numbers exceeds 255 HBW or 25,4 HRC the length or piece shall be rejected.

For Grade C110 upset product and individually heat treated coupling blanks, pup joints or accessory material, if the Brinell or Rockwell C-scale hardness number does not exceed 286 HBW or 30 HRC respectively then the piece is acceptable. If any of the hardness numbers are over 286 HBW or 30 HRC two additional indentations may be made in the immediate area. If either of the second test hardness numbers exceeds 286 HBW or 30 HRC the piece shall be rejected.

c) Grades C90, T95 and C110 — Through-wall hardness

For Grades C90 and T95, any mean hardness number not exceeding 25,4 HRC is acceptable. If any hardness number from a single indentation exceeds 27,0 HRC, the length or piece shall be

rejected. Products with mean hardness numbers between 25,4 HRC and 27,0 HRC shall be retested.

For Grade C110, any mean hardness number not exceeding 30 HRC is acceptable. If any hardness number from a single indentation exceeds 32 HRC the length or piece shall be rejected. Products with mean hardness numbers between 30 HRC and 32 HRC shall be retested.

d) Grades C90 and T95 — Alternative maximum hardness requirements

By agreement between the purchaser and manufacturer, the maximum mean hardness numbers may be altered from those stated above, based on sulfide stress corrosion cracking tests specified in 7.14.

4.1.7 API Specification 5CT – 7.10.2
For pipe, coupling blanks, coupling material and coupling stock with a wall thickness of 30 mm (1.181 in) or larger, an alternative requirement may be used by agreement between manufacturer and purchaser.

4.1.8 API Specification 5CT – 8.2
Pipe shall be furnished in the sizes, wall thicknesses and masses (as shown in Tables C.23to C.26 inclusive or Tables E.23 to E.26 inclusive) as specified on the purchase agreement. Other plain-end pipe sizes and wall thicknesses may be furnished by agreement between purchaser and manufacturer. Coupling stock, coupling material and accessory material shall be furnished in dimensions specified on the purchase agreement or, in the case of coupling material, the dimensions shall be specified in the manufacturer's internal requirements.

4.1.9 API Specification 5CT – 8.2
Casing sizes larger than Label 1 4-1/2 but smaller than Label 1 10-3/4 may be specified by the purchaser to be used in tubing service, see Tables C.1, C.23, C.27 and C.28 or Tables E.1, E.23, E.27 and E.28.

4.1.10 API Specification 5CT – 8.3.2

The outside diameter shall be within the tolerances specified in 8.11.1. For pipe furnished non-upset and plain-end and which is specified on the purchase agreement for the manufacture of pup joints, the non-upset plain-end tolerances shall apply to the full length.

4.1.11 API Specification 5CT – 8.3.2
For coupling stock, coupling material and accessory material outside diameter tolerances shall be specified on the purchase agreement or, in the case of coupling material and accessory material, the outside diameter tolerances shall be specified in the manufacturer's internal requirements.

4.1.12 API Specification 5CT – 8.4
For coupling stock, coupling material and accessory material the wall thickness tolerance shall be specified on the purchase agreement or, in the case of coupling material and accessory material, the wall thickness shall be specified in the manufacturer's internal requirements.

4.1.13 API Specification 5CT – 8.5
The masses determined as described in 10.13.7 shall conform to the calculated masses as specified herein (or adjusted calculated masses for martensitic chromium grades L80 Type 9Cr or L80 Type 13Cr) for the end-finish specified on the purchase agreement, within the tolerances stipulated in 8.11.3.

4.1.14 API Specification 5CT – 8.6
Casing, tubing and pup joints shall be furnished in lengths conforming to Table C.27 or Table E.27. The length of API couplings shall be as specified in Tables C.32 to C.35 or Tables E.32 to E.35 as applicable. The length of coupling stock, coupling material and accessory material shall be as specified on the purchase agreement or, in the case of coupling material and accessory material, the length shall be specified in the manufacturer's internal requirements.

4.1.15 API Specification 5CT – 8.7

If so specified on the purchase agreement, for round thread casing only, jointers (two pieces coupled to make a standard length) may be furnished to a maximum of 5 % of the order; but no length used in making a jointer shall be less than 1,52 m (5.0 ft).

4.1.16 API Specification 5CT – 8.9.2
Straightness requirements shall be as agreed between the purchaser and manufacturer or, in the case of coupling material and accessory material, the straightness shall be specified in the manufacturer's internal requirements.

4.1.17 API Specification 5CT – 8.11.6
External upset tubing may be ordered with extended length upsets (Lel) as agreed between purchaser and manufacturer. A minimum of 95 % of the number of lengths (both ends) shall meet the Lel with the remaining balance meeting Leu requirements, unless otherwise agreed between purchaser and manufacturer.

4.1.18 API Specification 5CT – 8.12.2
Product shall be furnished with one of the end finishes specified in Tables C.1 and C.2 or Tables E.1 and E.2 as specified on the purchase agreement.

Additionally, seal ring configuration in accordance with A.8 SR13 may be ordered.

Some items of Grades H40, J55, K55 or M65 casing are available in either short or long thread forms (see Table C.1 or Table E.1). If long thread is desired on these items, the purchaser shall so specify on the purchase agreement. Otherwise short-thread casing in accordance with Table C.23 or Table E.23 shall be furnished.

4.1.19 API Specification 5CT – 8.12.3
In lieu of the conventional corner breaks on the threaded ends of external upset tubing, the "round" or "bullet-nose" end may be supplied at the manufacturer's option or may be specified by the purchaser.

4.1.20 API Specification 5CT – 8.12.6

Pipe with end-finish not specified in this Standard may be furnished if so specified in the purchase agreement. This pipe shall have the body of the pipe manufactured in accordance with the requirements of this Standard. When threaded by the pipe mill or processor, the pipe shall be marked as specified in 11.5.2.

4.1.21 API Specification 5CT – 8.12.6
Couplings and accessories with end-finish not specified in this Standard may be furnished if so specified in the purchase agreement. These items shall be manufactured in accordance with the requirements of this Standard, except for end-finish and dimensions, and shall be marked as specified in 11.5.2.

4.1.22 API Specification 5CT – 9.2.4
Grade J55 EU tubing shall be furnished with Grade L80 Type 1 special clearance couplings when specified on the purchase agreement.

4.1.23 API Specification 5CT – 9.2.5
Grades J55 and K55 buttress casing shall be furnished with Grade L80 Type 1 couplings when specified on the purchase agreement.

4.1.24 API Specification 5CT – 9.2.9
Grades N80 Type 1 and N80Q EUE tubing shall be furnished with Grade P110 special clearance couplings when specified on the purchase agreement.

4.1.25 API Specification 5CT – 9.2.10
Grades N80 Type 1 and N80Q buttress casing shall be furnished with Grade P110 couplings when specified on the purchase agreement.

4.1.26 API Specification 5CT – 9.2.11
Grade P110 buttress casing shall be furnished with Grade Q125 couplings when specified on the purchase agreement.

4.1.27 API Specification 5CT – 9.4.1

Couplings shall conform to the dimensions and tolerances shown in Tables C.32 to C.35 or Tables E.32 to E.35. Unless otherwise specified on the purchase agreement, threaded and coupled casing and tubing shall be furnished with regular couplings.

4.1.28 API Specification 5CT – 9.4.2
Couplings may be machined on the complete outside surface in addition to the inside surface. Dimensions shall be as specified on the purchase agreement unless couplings with standard API threads are ordered, in which case the dimensions shall be as shown in Tables C.32 and C.33 or Tables E.32 and E.33.

4.1.29 API Specification 5CT – 9.6
When specified in the purchase agreement, special-clearance (reduced outside diameter Wc) couplings for buttress casing and external upset tubing shall be furnished. Unless otherwise specified, special-clearance external upset tubing couplings shall have a special bevel on both ends as specified in 9.10 and shown on Figure D.5.

4.1.30 API Specification 5CT – 9.6
When specified in the purchase agreement, special-clearance buttress thread casing couplings shall have a special bevel on both ends as shown on Figure D.3. The inside and outside edges of the bearing face shall be rounded or broken as shown on Figures D.3 and D.5.

4.1.31 API Specification 5CT – 9.7
Combination couplings with different types of thread of the same specified size shall be furnished when specified on the purchase agreement. The minimum length and minimum outside diameter of combination couplings shall be sufficient to accommodate the specified size and type of threads.

4.1.32 API Specification 5CT – 9.8
Reducing couplings are used to connect two pipes of different diameter with the same or different types of thread on the two ends, and shall be furnished when specified on the purchase agreement. The minimum length and minimum diameter of reducing couplings shall be sufficient to accommodate the specified size and type of threads.

4.1.33 API Specification 5CT – 9.9
Seal-ring couplings conforming to the requirements of A.8 SR13 shall be furnished when specified on the purchase agreement.

4.1.34 API Specification 5CT – 9.10
When specified in the purchase agreement, special-bevel tubing regular couplings conforming to the requirements of Tables C.34 and C.35 or Tables E.34 and E.35 shall be furnished for non-upset and external-upset tubing. Unless otherwise specified, special bevel tubing regular couplings shall be bevelled on both ends as shown on Figures D.4 and D.5. The inside and outside edges of the bearing face shall be rounded or broken as shown on Figures D.4 and D.5. The root faces of the couplings shall be faced at right angles to the axis.

4.1.35 API Specification 5CT – 9.11.2
Casing couplings shall be furnished with one of the end finishes specified in Tables C.1 and C.2 or Tables E.1 and E.2 as specified on the purchase agreement.

4.1.36 API Specification 5CT – 9.11.2
Tubing couplings shall be furnished with one of the end-finishes specified in Table C.2 or Table E.2 as specified on the purchase agreement.

4.1.37 API Specification 5CT – 10.6.11
Hardness conversions shall be made in accordance with an appropriate conversion table selected by the manufacturer, unless otherwise specified on the purchase agreement.

4.1.38 API Specification 5CT – 10.13.6

For plain-end pipe, and for other products if specified on the purchase agreement, the length shall be measured from end to end.

For threaded and coupled pipe
- when measured with the coupling installed the length shall be measured from the end of the pin to the outer face of the coupling
- when measured without coupling the length shall be measured from pin end to pin end and proper allowance for the length of the coupling shall be added.

For integral-joint tubing the length shall be measured from the pin end to the outer face of the box end.

For pup joints and accessories the length shall be measured from end to end.

4.1.39 API Specification 5CT – Annex A.4.1
Coupling blank dimensions shall be adequate to yield a fully machined cylinder with uniform wall thickness with an outside diameter, inside diameter and length as specified on the purchase agreement. The coupling blanks shall be provided fully machined by the manufacturer only when specified on the purchase agreement.

4.1.40 API Specification 5CT – Annex A.4.2
For fully machined coupling blanks, the tolerance on outside diameter shall be $^{+2,38}_{0}$ mm ($^{+3/32}_{0}$ in) and the tolerance on the inside diameter shall be $^{0}_{+2,38}$ mm ($^{0}_{+3/32}$ in), unless otherwise agreed upon between purchaser and manufacturer.

Coupling blanks ordered with as-rolled outside diameter surface shall have an outside diameter tolerance of 1 %, but not greater than ( )."

4.1.41 API Specification 5CT – Annex A.5.1

Grade Q125 casing shall be provided with upset end(s). Dimensions of the upset shall be specified on the purchase agreement.

4.1.42 API Specification 5CT – Annex A.7.2
By agreement between purchaser and manufacturer, a factor F of 3,090 may be used in lieu of the values given in Table C.51 (SR12.1) or Table E.51 (SR12.1) provided the standard deviation of the new lot of material is consistent with past experience.

4.1.43 API Specification 5CT – Annex A.11.1
By agreement between purchaser and manufacturer, the Supplementary Requirements for enhanced leak resistance LC in SR22 shall apply. It should be noted that the SR22 product is fully interchangeable with standard API LC connections. However, the SR22 design criteria concerning leak resistance shall not apply for such mixed product.

4.1.44 API Specification 5CT – Annex H.7.2
The mean hardness numbers obtained as specified in 7.10.1 shall equal or exceed the hardness corresponding to a minimum of 95 % martensite as determined by Equation H.2

$$HRC_{min} = 59 \times (\%\ carbon) + 29 \qquad (H.2)$$

For product with a wall thickness of 30 mm (1.181 in) or larger, an alternative requirement may be used by agreement between manufacturer and purchaser.

4.1.45 API Specification 5CT – Annex H.18.4.2
Coupling stock containing defects shall either be given disposition in accordance with 10.15.18, or the section of coupling stock containing the defect shall be cut off within the limits of the requirements on length specified on the coupling stock purchase agreement.

4.2 DESIGN DATA TABLES – SI UNITS

API Specification 5CT – Annex C

Table C.1 — ISO/API casing list
Sizes, masses, wall thickness, grade and applicable end-finish

Labels [a]		Outside diameter	Nominal linear mass [b, c] T&C	Wall thickness	Type of end-finish [d]								
1	2	*D* mm	kg/m	*t* mm	H40	J55 K55	M65	L80 R95	N80 Type 1, Q	C90 T95	C110	P110	Q125
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*
4-1/2	9.50	114,30	14,14	5,21	PS	PS	PS	—	—	—	—	—	—
4-1/2	10.50	114,30	15,63	5,69	—	PSB	PSB	—	—	—	—	—	—
4-1/2	11.60	114,30	17,26	6,35	—	PSLB	PLB	PLB	PLB	PLB	P	PLB	—
4-1/2	13.50	114,30	20,09	7,37	—	—	PLB	PLB	PLB	PLB	P	PLB	—
4-1/2	15.10	114,30	22,47	8,56	—	—	—	—	—	—	—	PLB	PLB
5	11.50	127,00	17,11	5,59	—	PS	PS	—	—	—	—	—	—
5	13.00	127,00	19,35	6,43	—	PSLB	PSLB	—	—	—	—	—	—
5	15.00	127,00	22,32	7,52	—	PSLB	PLB	PLB	PLB	PLB	P	PLB	—
5	18.00	127,00	26,79	9,19	—	—	PLB	PLB	PLB	PLB	P	PLB	PLB
5	21.40	127,00	31,85	11,10	—	—	PLB	PLB	PLB	PLB	P	PLB	PLB
5	23.20	127,00	34,53	12,14	—	—	—	PLB	PLB	PLB	P	PLB	PLB
5	24.10	127,00	35,86	12,70	—	—	—	PLB	PLB	PLB	P	PLB	PLB
5-1/2	14.00	139,70	20,83	6,20	PS	PS	PS	—	—	—	—	—	—
5-1/2	15.50	139,70	23,07	6,98	—	PSLB	PSLB	—	—	—	—	—	—
5-1/2	17.00	139,70	25,30	7,72	—	PSLB	PLB	PLB	PLB	PLB	P	PLB	—
5-1/2	20.00	139,70	29,76	9,17	—	—	PLB	PLB	PLB	PLB	P	PLB	—
5-1/2	23.00	139,70	34,23	10,54	—	—	PLB	PLB	PLB	PLB	P	PLB	—
5-1/2	26.80	139,70	39,88	12,70	—	—	—	—	—	P	P	—	PLB
5-1/2	29.70	139,70	44,20	14,27	—	—	—	—	—	P	P	—	—
5-1/2	32.60	139,70	48,51	15,88	—	—	—	—	—	P	P	—	—
5-1/2	35.30	139,70	52,53	17,45	—	—	—	—	—	P	P	—	—
5-1/2	38.00	139,70	56,55	19,05	—	—	—	—	—	P	P	—	—
5-1/2	40.50	139,70	60,27	20,62	—	—	—	—	—	P	P	—	—
5-1/2	43.10	139,70	64,14	22,22	—	—	—	—	—	P	P	—	—
6-5/8	20.00	168,28	29,76	7,32	PS	PSLB	PSLB	—	—	—	—	—	—
6-5/8	24.00	168,28	35,72	8,94	—	PSLB	PLB	PLB	PLB	PLB	P	PLB	—
6-5/8	28.00	168,28	41,67	10,59	—	—	PLB	PLB	PLB	PLB	P	PLB	—
6-5/8	32.00	168,28	47,62	12,06	—	—	—	PLB	PLB	PLB	P	PLB	PLB
7	17.00	177,80	25,30	5,87	PS	—	—	—	—	—	—	—	—
7	20.00	177,80	29,76	6,91	PS	PS	PS	—	—	—	—	—	—
7	23.00	177,80	34,23	8,05	—	PSLB	PLB	PLB	PLB	PLB	P	—	—
7	26.00	177,80	38,69	9,19	—	PSLB	PLB	PLB	PLB	PLB	P	PLB	—
7	29.00	177,80	43,16	10,36	—	—	PLB	PLB	PLB	PLB	P	PLB	—
7	32.00	177,80	47,62	11,51	—	—	PLB	PLB	PLB	PLB	P	PLB	—
7	35.00	177,80	52,09	12,65	—	—	—	PLB	PLB	PLB	P	PLB	PLB
7	38.00	177,80	56,55	13,72	—	—	—	PLB	PLB	PLB	P	PLB	PLB
7	42.70	177,80	63,54	15,88	—	—	—	—	—	P	P	—	—
7	46.40	177,80	69,05	17,45	—	—	—	—	—	P	P	—	—
7	50.10	177,80	74,56	19,05	—	—	—	—	—	P	P	—	—
7	53.60	177,80	79,77	20,62	—	—	—	—	—	P	P	—	—
7	57.10	177,80	84,97	22,22	—	—	—	—	—	P	P	—	—

See notes at end of table.

Table C.1 (*continued*)

Labels[a]		Outside diameter	Nominal linear mass[b, c] T&C	Wall thickness	Type of end-finish [d]								
1	2	*D* mm	kg/m	*t* mm	H40	J55 K55	M65	L80 R95	N80 Type 1, Q	C90 T95	C110	P110	Q125
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*
7-5/8	24.00	193,68	35,72	7,62	PS	—	—	—	—	—	—	—	—
7-5/8	26.40	193,68	39,29	8,33	—	PSLB	PSLB	PLB	PLB	PLB	P	—	—
7-5/8	29.70	193,68	44,20	9,52	—	—	PLB	PLB	PLB	PLB	P	PLB	—
7-5/8	33.70	193,68	50,15	10,92	—	—	PLB	PLB	PLB	PLB	P	PLB	—
7-5/8	39.00	193,68	58,04	12,70	—	—	—	PLB	PLB	PLB	P	PLB	PLB
7-5/8	42.80	193,68	63,69	14,27	—	—	—	PLB	PLB	PLB	P	PLB	PLB
7-5/8	45.30	193,68	67,41	15,11	—	—	—	PLB	PLB	PLB	P	PLB	PLB
7-5/8	47.10	193,68	70,09	15,88	—	—	—	PLB	PLB	PLB	P	PLB	PLB
7-5/8	51.20	193,68	76,19	17,45	—	—	—	—	—	P	P	—	—
7-5/8	55.30	193,68	82,30	19,05	—	—	—	—	—	P	P	—	—
7-3/4	46.10	196,85	68,60	15,11	—	—	—	P	P	P	P	P	P
8-5/8	24.00	219,08	35,72	6,71	—	PS	PS	—	—	—	—	—	—
8-5/8	28.00	219,08	41,67	7,72	PS	—	PS	—	—	—	—	—	—
8-5/8	32.00	219,08	47,62	8,94	PS	PSLB	PSLB	—	—	—	—	—	—
8-5/8	36.00	219,08	53,57	10,16	—	PSLB	PSLB	PLB	PLB	PLB	P	—	—
8-5/8	40.00	219,08	59,53	11,43	—	—	PLB	PLB	PLB	PLB	P	PLB	—
8-5/8	44.00	219,08	65,48	12,70	—	—	—	PLB	PLB	PLB	P	PLB	—
8-5/8	49.00	219,08	72,92	14,15	—	—	—	PLB	PLB	PLB	P	PLB	PLB
9-5/8	32.30	244,48	48,07	7,92	PS	—	—	—	—	—	—	—	—
9-5/8	36.00	244,48	53,57	8,94	PS	PSLB	PSLB	—	—	—	—	—	—
9-5/8	40.00	244,48	59,53	10,03	—	PSLB	PSLB	PLB	PLB	PLB	P	—	—
9-5/8	43.50	244,48	64,73	11,05	—	—	PLB	PLB	PLB	PLB	P	PLB	—
9-5/8	47.00	244,48	69,94	11,99	—	—	PLB	PLB	PLB	PLB	P	PLB	PLB
9-5/8	53.50	244,48	79,62	13,84	—	—	—	PLB	PLB	PLB	P	PLB	PLB
9-5/8	58.40	244,48	86,91	15,11	—	—	—	PLB	PLB	PLB	P	PLB	PLB
9-5/8	59.40	244,48	88,40	15,47	—	—	—	—	—	P	P	—	—
9-5/8	64.90	244,48	96,58	17,07	—	—	—	—	—	P	P	—	—
9-5/8	70.30	244,48	104,62	18,64	—	—	—	—	—	P	P	—	—
9-5/8	75.60	244,48	112,50	20,24	—	—	—	—	—	P	P	—	—
10-3/4	32.75	273,05	48,74	7,09	PS	—	—	—	—	—	—	—	—
10-3/4	40.50	273,05	60,27	8,89	PS	PSB	PSB	—	—	—	—	—	—
10-3/4	45.50	273,05	67,71	10,16	—	PSB	PSB	—	—	—	—	—	—
10-3/4	51.00	273,05	75,90	11,43	—	PSB	PSB	PSB	PSB	PSB	P	PSB	—
10-3/4	55.50	273,05	82,59	12,57	—	—	PSB	PSB	PSB	PSB	P	PSB	—
10-3/4	60.70	273,05	90,33	13,84	—	—	—	—	—	PSB	P	PSB	PSB
10-3/4	65.70	273,05	97,77	15,11	—	—	—	—	—	PSB	P	PSB	PSB
10-3/4	73.20	273,05	108,93	17,07	—	—	—	—	—	P	P	—	—
10-3/4	79.20	273,05	117,86	18,64	—	—	—	—	—	P	P	—	—
10-3/4	85.30	273,05	126,94	20,24	—	—	—	—	—	P	P	—	—
11-3/4	42.00	298,45	62,50	8,46	PS	—	—	—	—	—	—	—	—
11-3/4	47.00	298,45	69,94	9,53	—	PSB	PSB	—	—	—	—	—	—
11-3/4	54.00	298,45	80,36	11,05	—	PSB	PSB	—	—	—	—	—	—
11-3/4	60.00	298,45	89,29	12,42	—	PSB	PSB	PSB	PSB	PSB	P	PSB	PSB
11-3/4	65.00	298,45	96,73	13,56	—	—	—	P	P	P	P	P	P
11-3/4	71.00	298,45	105,66	14,78	—	—	—	P	P	P	P	P	P
13-3/8	48.00	339,72	71,43	8,38	PS	—	—	—	—	—	—	—	—
13-3/8	54.50	339,72	81,10	9,65	—	PSB	PSB	—	—	—	—	—	—
13-3/8	61.00	339,72	90,78	10,92	—	PSB	PSB	—	—	—	—	—	—
13-3/8	68.00	339,72	101,19	12,19	—	PSB	PSB	PSB	PSB	PSB	P	PSB	—
13-3/8	72.00	339,72	107,15	13,06	—	—	—	PSB	PSB	PSB	P	PSB	PSB

See notes at end of table.

Table C.1 (*continued*)

Labels [a]		Outside diameter	Nominal linear mass [b, c] T&C	Wall thickness	Type of end-finish [d]								
1	2	*D* mm	kg/m	*t* mm	H40	J55 K55	M65	L80 R95	N80 Type 1, Q	C90 T95	C110	P110	Q125
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*
16	65.00	406,40	96,73	9,53	PS	—	—	—	—	—	—	—	—
16	75.00	406,40	111,61	11,13	—	PSB	PSB	—	—	—	—	—	—
16	84.00	406,40	125,01	12,57	—	PSB	PSB	—	—	—	—	—	—
16	109.00	406,40	162,21	16,66	—	P	—	P	P	—	—	P	P
18-5/8	87.50	473,08	130,21	11,05	PS	PSB	PSB	—	—	—	—	—	—
20	94.00	508,00	139,89	11,13	PSL	PSLB	PSLB	—	—	—	—	—	—
20	106.50	508,00	158,49	12,70	—	PSLB	PSLB	—	—	—	—	—	—
20	133.00	508,00	197,93	16,13	—	PSLB	—	—	—	—	—	—	—

P = Plain-end, S = Short round thread, L = Long round thread, B = Buttress thread.

[a] Labels are for information and assistance in ordering.

[b] Nominal linear masses (col. 4) are shown for information only.

[c] The densities of martensitic chromium steels (L80 Types 9Cr and 13Cr) are different from carbon steels. The masses shown are therefore not accurate for martensitic chromium steels. A mass correction factor of 0,989 may be used.

[d] Buttress casing is available with regular, special clearance couplings or special clearance couplings with special bevel.

Table C.2 — ISO/API tubing list
Sizes, masses, wall thickness, grade and applicable end-finish

Labels				Outside diameter	Nominal linear masses [a, b]			Wall thick-ness	Type of end finish [11]						
1	2				Non-upset T&C	Ext. upset T&C	Integ. joint								
	NU T&C	EU T&C	IJ	D mm	kg/m	kg/m	kg/m	t mm	H40	J55	L80 R95	N80 Type 1,Q	C90	T95	P110
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1.050	1.14	1.20	—	26,67	1,70	1,79	—	2,87	PNU	PNU	PNU	PNU	PNU	PNU	—
1.050	1.48	1.54	—	26,67	2,20	2,29	—	3,91	PU	PU	PU	PU	PU	PU	PU
1.315	1.70	1.80	1.72	33,40	2,53	2,68	2,56	3,38	PNUI	PNUI	PNUI	PNUI	PNUI	PNUI	—
1.315	2.19	2.24	—	33,40	3,26	3,33	—	4,55	PU	PU	PU	PU	PU	PU	PU
1.660	2.09	—	2.10	42,16	—	—	3,13	3,18	PI	PI	—	—	—	—	—
1.660	2.30	2.40	2.33	42,16	3,42	3,57	3,47	3,56	PNUI	PNUI	PNUI	PNUI	PNUI	PNUI	—
1.660	3.03	3.07	—	42,16	4,51	4,57	—	4,85	PU	PU	PU	PU	PU	PU	PU
1.900	2.40	—	2.40	48,26	—	—	3,57	3,18	PI	PI	—	—	—	—	—
1.900	2.75	2.90	2.76	48,26	4,09	4,32	4,11	3,68	PNUI	PNUI	PNUI	PNUI	PNUI	PNUI	—
1.900	3.65	3.73	—	48,26	5,43	5,55	—	5,08	PU	PU	PU	PU	PU	PU	PU
1.900	4.42	—	—	48,26	6,58	—	—	6,35	—	—	P	—	P	P	—
1.900	5.15	—	—	48,26	7,66	—	—	7,62	—	—	P	—	P	P	—
2.063	3.24	—	3.25	52,40	—	—	4,84	3,96	PI	PI	PI	PI	PI	PI	—
2.063	4.50	—	—	52,40	—	—	—	5,72	P	P	P	P	P	P	P
2-3/8	4.00	—	—	60,32	5,95	—	—	4,24	PN	PN	PN	PN	PN	PN	—
2-3/8	4.60	4.70	—	60,32	6,85	6,99	—	4,83	PNU	PNU	PNU	PNU	PNU	PNU	PNU
2-3/8	5.80	5.95	—	60,32	8,63	8,85	—	6,45	—	—	PNU	PNU	PNU	PNU	PNU
2-3/8	6.60	—	—	60,32	9,82	—	—	7,49	—	—	P	—	P	P	—
2-3/8	7.35	7.45	—	60,32	10,94	11,09	—	8,53	—	—	PU	—	PU	PU	—
2-7/8	6.40	6.50	—	73,02	9,52	9,67	—	5,51	PNU	PNU	PNU	PNU	PNU	PNU	PNU
2-7/8	7.80	7.90	—	73,02	11,61	11,76	—	7,01	—	—	PNU	PNU	PNU	PNU	PNU
2-7/8	8.60	8.70	—	73,02	12,80	12,95	—	7,82	—	—	PNU	PNU	PNU	PNU	PNU
2-7/8	9.35	9.45	—	73,02	13,91	14,06	—	8,64	—	—	PU	—	PU	PU	—
2-7/8	10.50	—	—	73,02	15,63	—	—	9,96	—	—	P	—	P	P	—
2-7/8	11.50	—	—	73,02	17,11	—	—	11,18	—	—	P	—	P	P	—
3-1/2	7.70	—	—	88,90	11,46	—	—	5,49	PN	PN	PN	PN	PN	PN	—
3-1/2	9.20	9.30	—	88,90	13,69	13,84	—	6,45	PNU	PNU	PNU	PNU	PNU	PNU	PNU
3-1/2	10.20	—	—	88,90	15,18	—	—	7,34	PN	PN	PN	PN	PN	PN	—
3-1/2	12.70	12.95	—	88,90	18,90	19,27	—	9,52	—	—	PNU	PNU	PNU	PNU	PNU
3-1/2	14.30	—	—	88,90	21,28	—	—	10,92	—	—	P	—	P	P	—
3-1/2	15.50	—	—	88,90	23,07	—	—	12,09	—	—	P	—	P	P	—
3-1/2	17.00	—	—	88,90	25,30	—	—	13,46	—	—	P	—	P	P	—
4	9.50	—	—	101,60	14,14	—	—	5,74	PN	PN	PN	PN	PN	PN	—
4	10.70	11.00	—	101,60	—	16,37	—	6,65	PU	PU	PU	PU	PU	PU	—
4	13.20	—	—	101,60	19,64	—	—	8,38	—	—	P	—	P	P	—
4	16.10	—	—	101,60	23,96	—	—	10,54	—	—	P	—	P	P	—
4	18.90	—	—	101,60	28,13	—	—	12,70	—	—	P	—	P	P	—
4	22.20	—	—	101,60	33,04	—	—	15,49	—	—	P	—	P	P	—
4-1/2	12.60	12.75	—	114,30	18,75	18,97	—	6,88	PNU	PNU	PNU	PNU	PNU	PNU	—
4-1/2	15.20	—	—	114,30	22,62	—	—	8,56	—	—	P	—	P	P	—
4-1/2	17.00	—	—	114,30	25,30	—	—	9,65	—	—	P	—	P	P	—
4-1/2	18.90	—	—	114,30	28,13	—	—	10,92	—	—	P	—	P	P	—
4-1/2	21.50	—	—	114,30	32,00	—	—	12,70	—	—	P	—	P	P	—
4-1/2	23.70	—	—	114,30	35,27	—	—	14,22	—	—	P	—	P	P	—
4-1/2	26.10	—	—	114,30	38,84	—	—	16,00	—	—	P	—	P	P	—

P = Plain-end, N = Non-upset threaded and coupled, U = External upset threaded and coupled, I = Integral joint.

[a] Nominal linear masses (col. 6, 7, 8) are shown for information only.

Table C.3 — Process of manufacture and heat treatment

Group	Grade	Type	Manufacturing process [a]	Heat treatment	Tempering temperature °C min
1	2	3	4	5	6
1	H40	—	S or EW	—	—
	J55	—	S or EW	— [b]	—
	K55	—	S or EW	— [b]	—
	N80	1	S or EW	[c]	

Table C.5 — Tensile and hardness requirements

Group	Grade	Type	Total elongation under load	Yield strength MPa		Tensile strength min.	Hardness [a] max.		Specified wall thickness	Allowable hardness variation [b]
			%	min.	max.	MPa	HRC	HBW	mm	HRC
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*
1	H40	—	0,5	276	552	414	—	—	—	—
	J55	—	0,5	379	552	517	—	—	—	—
	K55	—	0,5	379	552	655	—	—	—	—
	N80	1	0,5	552	758	689	—	—	—	—
	N80	Q	0,5	552	758	689	—	—	—	—
	R95	—	0,5	655	758	724	—	—	—	—
2	M65	—	0,5	448	586	586	22	235	—	—
	L80	1	0,5	552	655	655	23	241	—	—
	L80	9Cr	0,5	552	655	655	23	241	—	—
	L80	13Cr	0,5	552	655	655	23	241	—	—
	C90	1	0,5	621	724	689	25,4	255	≤ 12,70	3,0
									12,71 to 19,04	4,0
									19,05 to 25,39	5,0
									≥ 25,40	6,0
	T95	1	0,5	655	758	724	25,4	255	≤ 12,70	3,0
									12,71 to 19,04	4,0
									19,05 to 25,39	5,0
									≥ 25,40	6,0
	C110	—	0,7	758	828	793	30	286	≤ 12,70	3,0
									12,71 to 19,04	4,0
									19,05 to 25,39	5,0
									≥ 25,40	6,0
3	P110	—	0,6	758	965	862	—	—	—	—
4	Q125	1	0,65	862	1034	931	[b]	—	≤ 12,70	3,0
									12,71 to 19,04	4,0
									≥ 19,05	5,0

[a] In case of dispute, laboratory Rockwell C hardness testing shall be used as the referee method.

[b] No hardness limits are specified, but the maximum variation is restricted as a manufabrbcturing control in accordance with 7.8 and 7.9.

Table C.7 — Critical thickness for couplings with API threads

Dimensions in millimetres

Label 1	Critical thickness for couplings						
	NU	EU	Special clearance		BC	LC	SC
			EU	BC			
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*
1.050	4,29	5,36	—	—	—	—	—
1.315	5,36	6,55					

Table C.23 — Dimensions and masses for standard casing and for casing threaded with API round thread and buttress thread

Labels [a]		Outside diameter	Nominal linear mass T&C [b, c]	Wall thick-ness	Inside diam-eter	Drift diam-eter	Calculated mass [c]				
							Plain-end	ε_m, mass gain or loss due to end finishing [d] kg			
								Round thread		Buttress thread	
1	2	D mm	kg/m	t mm	d mm	mm	w_{pe} kg/m	Short	Long	RC	SCC
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*
4-1/2	9.50	114.30	14.14	5.21	103.88	100.70	14.02	1.91	—	—	—

Table C.23 (*continued*)

Labels [a]		Outside diameter	Nominal linear mass T&C [b, c]	Wall thick-ness	Inside diam-eter	Drift diam-eter	Calculated mass [c]				
							Plain-end	$\varepsilon_{m\,f}$, mass gain or loss due to end finishing [d] kg			
								Round thread		Buttress thread	
1	2	D mm	kg/m	t mm	d mm	mm	w_{pe} kg/m	Short	Long	RC	SCC
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*
7-5/8	24.00	193,68	35,72	7,62	178,44	175,26	34,96	7,17	—	—	—
7-5/8	26.40	193,68	39,29	8,33	177,02	173,84	38,08	6,89	8,62	9,34	2,82
7-5/8	29.70	193,68	44,20	9,52	174,64	171,46	43,24	—	7,89	8,53	2,00
7-5/8	33.70	193,68	50,15	10,92	171,84	168,66	49,22	—	7,17	7,71	1,18
7-5/8	39.00	193,68	58,04	12,70	168,28	165,10	56,68	—	6,17	6,62	0,10
7-5/8	42.80	193,68	63,69	14,27	165,14	161,96	63,14	—	5,45	5,17	−1,37
7-5/8	45.30	193,68	67,41	15,11	163,46	160,28	66,54	—	5,01	5,01	−1,52
7-5/8	47.10	193,68	70,09	15,88	161,92	158,74	69,63	—	4,61	4,19	−2,35
7-5/8	51.20	193,68	76,19	17,45	158,78	155,60	75,84	—	—	—	—
7-5/8	55.30	193,68	82,30	19,05	155,58	152,40	82,04	—	—	—	—
7-3/4	46.10	196,85	68,60	15,11	166,63	165,10 [e]	67,72	—	—	—	—
7-3/4	46.10	196,85	68,60	15,11	166,63	163,45	67,72	—	—	—	—
8-5/8	24.00	219,08	35,72	6,71	205,66	202,48	35,14	10,70	—	—	—
8-5/8	28.00	219,08	41,67	7,72	203,64	200,46	40,24	10,07	—	—	—
8-5/8	32.00	219,08	47,62	8,94	201,20	200,02 [e]	46,33	9,43	12,52	12,79	2,74
8-5/8	32.00	219,08	47,62	8,94	201,20	198,02	46,33	9,43	12,52	12,79	2,74
8-5/8	36.00	219,08	53,57	10,16	198,76	195,58	52,35	8,80	11,61	11,88	1,83
8-5/8	40.00	219,08	59,53	11,43	196,22	193,68 [e]	58,53	—	10,80	10,98	0,92
8-5/8	40.00	219,08	59,53	11,43	196,22	193,04	58,53	—	10,80	10,98	0,92
8-5/8	44.00	219,08	65,48	12,70	193,68	190,50	64,64	—	9,89	10,07	0,01
8-5/8	49.00	219,08	72,92	14,15	190,78	187,60	71,51	—	8,89	8,98	−1,08
9-5/8	32.30	244,48	48,07	7,92	228,60	224,66	46,20	11,07	—	—	—
9-5/8	36.00	244,48	53,57	8,94	226,60	222,63	51,93	10,43	14,51	14,06	2,94
9-5/8	40.00	244,48	59,53	10,03	224,40	222,25 [e]	57,99	9,71	13,61	13,15	2,03
9-5/8	40.00	244,48	59,53	10,03	224,40	220,45	57,99	9,71	13,61	13,15	2,03
9-5/8	43.50	244,48	64,74	11,05	222,40	218,41	63,61	—	12,79	12,34	1,22
9-5/8	47.00	244,48	69,94	11,99	220,50	216,54	68,75	—	12,07	11,61	0,49
9-5/8	53.50	244,48	79,62	13,84	216,80	215,90 [e]	78,72	—	10,61	10,16	−0,96
9-5/8	53.50	244,48	79,62	13,84	216,80	212,83	78,72	—	10,61	10,16	−0,96
9-5/8	58.40	244,48	86,91	15,11	214,25	212,72 [e]	85,47	—	9,75	9,13	−2,00
9-5/8	58.40	244,48	86.91	15,11	214,25	210,29	85,47	—	9,75	9,13	−2,00
9-5/8	59.40	244,48	88,40	15,47	213,50	209,58	87,37	—	—	—	—
9-5/8	64.90	244,48	96,58	17,07	210,30	206,38	95,73	—	—	—	—
9-5/8	70.30	244,48	104,62	18,64	207,20	203,23	103,82	—	—	—	—
9-5/8	75.60	244,48	112,51	20,24	204,00	200,02	111,93	—	—	—	—
10-3/4	32.75	273,05	48,74	7,09	258,90	254,91	46,50	13,15	—	—	—
10-3/4	40.50	273,05	60,27	8,89	255,30	251,31	57,91	11,97	—	15,60	3,27
10-3/4	45.50	273,05	67,71	10,16	252,70	250,82 [e]	65,87	11,07	—	14,42	2,09
10-3/4	45.50	273,05	67,71	10,16	252,70	248,77	65,87	11,07	—	14,42	2,09
10-3/4	51.00	273,05	75,90	11,43	250,20	246,23	73,75	10,25	—	13,34	1,00
10-3/4	55.50	273,05	82,59	12,57	247,90	244,48 [e]	80,75	9,43	—	12,25	−0,09
10-3/4	55.50	273,05	82,59	12,57	247,90	243,94	80,75	9,43	—	12,25	−0,09
10-3/4	60.70	273,05	90,33	13,84	245,40	241,40	88,47	8,53	—	11,07	—
10-3/4	65.70	273,05	97,77	15,11	242,80	238,86	96,12	7,62	—	9,98	—
10-3/4	73.20	273,05	108,93	17,07	238,90	234,95	107,76	—	—	—	—
10-3/4	79.20	273,05	117,86	18,64	235,80	231,80	116,95	—	—	—	—
10-3/4	85.30	273,05	126,94	20,24	232,60	228,60	126,19	—	—	—	—

See notes at end of table.

Table C.23 (*continued*)

Labels [a]		Outside diameter	Nominal linear mass T&C [b, c]	Wall thickness	Inside diameter	Drift diameter	Calculated mass [c]				
							Plain-end	e_m, mass gain or loss due to end finishing [d] kg			
1	2	D mm	kg/m	t mm	d mm	mm	w_{pe} kg/m	Round thread		Buttress thread	
								Short	Long	RC	SCC
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*
11-3/4	42.00	298,45	62,50	8,46	281,50	279,40 [e]	62,56	13,43	—	—	—
11-3/4	42.00	298,45	62,50	8,46	281,50	277,50	62,56	13,43	—	—	—
11-3/4	47.00	298,45	69,94	9,52	279,41	275,44	67,83	12,52	—	16,24	—
11-3/4	54.00	298,45	80,36	11,05	276,40	272,39	78,32	11,34	—	14,70	—
11-3/4	60.00	298,45	89,29	12,42	273,60	269,88 [e]	87,61	10,25	—	13,43	—
11-3/4	60.00	298,45	89,29	12,42	273,60	269,65	87,61	10,25	—	13,43	—
11-3/4	65.00	298,45	96,73	13,56	271,30	269,88 [e]	95,27	—	—	—	—
11-3/4	65.00	298,45	96,73	13,56	271,30	267,36	95,27	—	—	—	—
11-3/4	71.00	298,45	105,66	14,78	268,90	264,92	103,40	—	—	—	—
13-3/8	48.00	339,72	71,43	8,38	322,96	318,99	68,48	15,06	—	—	—
13-3/8	54.50	339,72	81,10	9,65	320,42	316,45	78,55	13,97	—	18,23	—
13-3/8	61.00	339,72	90,78	10,92	317,88	313,91	88,55	12,88	—	16,69	—
13-3/8	68.00	339,72	101,19	12,19	315,34	311,37	98,46	11,70	—	15,24	—
13-3/8	72.00	339,72	107,15	13,06	313,60	311,15 [e]	105,21	10,98	—	14,33	—
13-3/8	72.00	339,72	107,15	13,06	313,60	309,63	105,21	10,98	—	14,33	—
16	65.00	406,40	96,73	9,53	387,40	382,57	96,73	19,32	—	—	—
16	75.00	406,40	111,61	11,13	384,10	379,37	108,49	17,33	—	20,68	—
16	84.00	406,40	125,01	12,57	381,30	376,48	122,09	15,51	—	17,96	—
16	109.00	406,40	162,21	16,66	373,10	368,30	160,13	—	—	—	—
18-5/8	87.50	473,08	130,21	11,05	450,98	446,22	125,91	33,38	—	39,19	—
20	94.00	508,00	139,89	11,13	485,70	480,97	136,38	21,32	27,76	24,86	—
20	106.50	508,00	158,49	12,70	482,60	477,82	155,13	18,87	24,86	21,95	—
20	133.00	508,00	197,93	16,13	475,70	470,97	195,66	13,61	18,42	15,97	—

See also Figures D.1, D.2 and D.3.

[a] Labels are for information and assistance in ordering.

[b] Nominal linear masses, threaded and coupled (Col. 4) are shown for information only.

[c] The densities of martensitic chromium steels (L80 Types 9Cr and 13Cr) are less than those of carbon steels. The masses shown are therefore not accurate for martensitic chromium steels. A mass correction factor of 0,989 may be used.

[d] Mass gain or loss due to end finishing. See 8.5.

[e] Drift diameter for most common bit size. This drift diameter shall be specified on the purchase agreement and marked on the pipe. See 8.10 for drift requirements.

Table C.24 — Dimensions and masses for standard tubing and for tubing threaded with API non-upset, external upset and integral tubing connections

Labels [a]				Outside dia.	Nominal linear masses [b, c]			Wall thickness	Inside dia.	Calculated mass [c]				
										Plain-end	e_m, mass gain or loss due to end finishing [d] kg			
1	2				Non-upset T&C	Ext upset T&C	Integral joint				Non-upset	External upset [e]		Integral joint
	NU T&C	EU T&C	IJ	D mm	kg/m	kg/m	kg/m	t mm	d mm	w_{pe} kg/m		Regular	Special clear	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1.050	1.14	1.20	—	26,67	1,70	1,79	—	2,87	20,93	1,68	0,09	0,64	—	—
1.050	1.48	1.54	—	26,67	2,20	2,29	—	3,91	18,85	2,19	—	0,60	—	—
1.315	1.70	1.80	1.72	33,40	2,53	2,68	2,56	3,38	26,64	2,50	0,18	0,64	—	0,09
1.315	2.19	2.24	—	33,40	3,26	3,33	—	4,55	24,30	3,24	—	0,61	—	—
1.660	2.09	—	2.10	42,16	—	—	3,13	3,18	35,80	3,06	—	—	—	0,09
1.660	2.30	2.40	2.33	42,16	3,42	3,57	3,47	3,56	35,04	3,39	0,36	0,73	—	0,09
1.660	3.03	3.07	—	42,16	4,51	4,57	—	4,85	32,46	4,46	—	0,68	—	—
1.900	2.40	—	2.40	48,26	—	—	3,57	3,18	41,90	3,54,	—	—	—	0,09
1.900	2.75	2.90	2.76	48,26	4,09	4,32	4,11	3,68	40,90	4,05	0,27	0,91	—	0,09
1.900	3.65	3.73	—	48,26	5,43	5,55	—	5,08	38,10	5,41	—	0,92	—	—
1.900	4.42	—	—	48,26	6,58	—	—	6,35	35,56	6,56	—	—	—	—
1.900	5.15	—	—	48,26	7,66	—	—	7,62	33,02	7,64	—	—	—	—
2.063	3.24	—	3.25	52,40	—	—	4,84	3,96	44,48	4,73	—	—	—	0,09
2.063	4.50	—	—	52,40	—	—	—	5,72	40,96	6,58	—	—	—	—
2-3/8	4.00	—	—	60,32	5,95	—	—	4,24	51,84	5,86	0,73	—	—	—
2-3/8	4.60	4.70	—	60,32	6,85	6,99	—	4,83	50,66	6,61	0,73	1,81	1,34	—
2-3/8	5.80	5.95	—	60,32	8,63	8,85	—	6,45	47,42	8,57	0,64	1,63	1,16	—
2-3/8	6.60	—	—	60,32	9,82	—	—	7,49	45,34	9,76	—	—	—	—
2-3/8	7.35	7.45	—	60,32	10,94	11,09	—	8,53	43,26	10,89	—	—	—	—
2-7/8	6.40	6.50	—	73,02	9,52	9,67	—	5,51	62,00	9,17	1,45	2,54	1,71	—
2-7/8	7.80	7.90	—	73,02	11,61	11,76	—	7,01	59,00	11,41	1,27	2,63	1,78	—
2-7/8	8.60	8.70	—	73,02	12,80	12,95	—	7,82	57,38	12,57	1,18	2,27	1,43	—
2-7/8	9.35	9.45	—	73,02	13,91	14,06	—	8,64	54,74	13,72	—	—	—	—
2-7/8	10.50	—	—	73,02	15,63	—	—	9,96	53,10	15,49	—	—	—	—
2-7/8	11.50	—	—	73,02	17,11	—	—	11,18	50,66	17,05	—	—	—	—
3-1/2	7.70	—	—	88,90	11,46	—	—	5,49	77,92	11,29	2,45	—	—	—
3-1/2	9.20	9.30	—	88,90	13,69	13,84	—	6,45	76,00	13,12	2,27	4,17	2,45	—
3-1/2	10.20	—	—	88,90	15,18	—	—	7,34	74,22	14,76	2,18	—	—	—
3-1/2	12.70	12.95	—	88,90	18,90	19,27	—	9,52	69,86	18,64	1,81	3,72	2,00	—
3-1/2	14.30	—	—	88,90	21,28	—	—	10,92	67,06	21,00	—	—	—	—
3-1/2	15.50	—	—	88,90	23,07	—	—	12,09	64,72	22,90	—	—	—	—
3-1/2	17.00	—	—	88,90	25,30	—	—	13,46	61,98	25,04	—	—	—	—
4	9.50	—	—	101,60	14,14	—	—	5,74	90,12	13,57	2,81	—	—	—
4	10.70	11.00	—	101,60	—	16,37	—	6,65	88,30	15,57	—	4,81	—	—
4	13.20	—	—	101,60	19,64	—	—	8,38	84,84	19,27	—	—	—	—
4	16.10	—	—	101,60	23,96	—	—	10,54	80,52	23,67	—	—	—	—
4	18.90	—	—	101,60	28,13	—	—	12,70	76,20	27,84	—	—	—	—
4	22.20	—	—	101,60	33,04	—	—	15,49	70,62	32,89	—	—	—	—
4-1/2	12.60	12.75	—	114,30	18,75	18,97	—	6,88	100,54	18,23	2,72	—	—	—
4-1/2	15.20	—	—	114,30	22,62	—	—	8,56	97,18	22,32	—	—	—	—
4-1/2	17.00	—	—	114,30	25,30	—	—	9,65	95,00	24,90	—	—	—	—
4-1/2	18.90	—	—	114,30	28,13	—	—	10,92	92,46	27,84	—	—	—	—
4-1/2	21.50	—	—	114,30	32,00	—	—	12,70	88,90	31,82	—	—	—	—
4-1/2	23.70	—	—	114,30	35,27	—	—	14,22	85,86	35,10	—	—	—	—
4-1/2	26.10	—	—	114,30	38,84	—	—	16,00	82,30	38,79	—	—	—	—

See also Figures D.4, D.5 and D.7.

[a] Labels are for information and assistance in ordering.

[b] Nominal linear masses (Col. 6,7 and 8) are shown for information only.

[c] The densities of martensitic chromium (L80 Types 9Cr and 13Cr) are different from carbon steels. The masses shown are therefore not accurate for martensitic chromium steels. A mass correction factor of 0,989 may be used.

[d] Mass gain or loss due to end finishing. See 8.5.

[e] The length of the upset may alter the mass gain or loss due to end finishing.

NOTE The table for "API extreme-line casing upset end dimensions" has been deleted.

Table C.25 — External upset tubing dimensions for API connections, Groups 1, 2, and 3

Labels [a]		Outside diameter D	Nominal linear mass threaded and coupled [b]	Upset			
				Outside diameter [c] D_4	Length from end of pipe to start of taper [d, e] L_{eu}	Length from end of pipe to end of taper [e] L_a	Length from end of pipe to start of pipe body [e] L_b
1	2	mm	kg/m	mm +1,59 0	mm +0 −25,4	mm	mm max.
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*
1.050	1.20	26,67	1,79	33,40	60,32	—	—
1.050	1.54	26,67	2,29	33,40	60,32	—	—
1.315	1.80	33,40	2,68	37,31	63,50	—	—
1.315	2.24	33,40	3,33	37,31	63,50	—	—
1.660	2.40	42,16	3,57	46,02	66,68	—	—
1.660	3.07	42,16	4,57	46,02	66,68	—	—
1.900	2.90	48,26	4,32	53,19	68,26	—	—
1.900	3.73	48,26	5,55	53,19	68,26	—	—
2-3/8	4.70	60,32	6,99	65,89	101,60	152,40	254,00
2-3/8	5.95	60,32	8,85	65,89	101,60	152,40	254,00
2-3/8	7.45	60,32	11,09	65,89	101,60	152,40	254,00
2-7/8	6.50	73,02	9,67	78,59	107,95	158,75	260,35
2-7/8	7.90	73,02	11,76	78,59	107,95	158,75	260,35
2-7/8	8.70	73,02	12,95	78,59	107,95	158,75	260,35
2-7/8	9.45	73,02	14,06	78,59	107,95	158,75	260,35
3-1/2	9.30	88,90	13,84	95,25	114,30	165,10	266,70
3-1/2	12.95	88,90	19,27	95,25	114,30	165,10	266,70
4	11.00	101,60	16,37	107,95	114,30	165,10	266,70
4-1/2	12.75	114,30	18,97	120,65	120,65	171,45	273,05

See also Figures D.5 and D.6.

NOTE Nominal linear masses are shown for information only.

[a] Labels are for information and assistance in ordering.

[b] The densities of martensitic chromium steels (L80 9Cr and 13Cr) are different from carbon steels. The masses shown are therefore not accurate for chromium steels. A mass correction factor of 0,989 may be used.

[c] The minimum outside diameter of upset D_4 is limited by the minimum length of full-crest threads. See API Spec 5B.

[d] For pup joints only, the length tolerance on L_{eu} is + 101,6 mm to − 25,4 mm. The length on L_b may be 101,6 mm longer than specified.

[e] For extended-length upsets on external upset tubing, add 25,4 mm to the dimensions in columns 6, 7 and 8.

Table C.26 — Integral tubing connection dimensions for API connections, Groups 1 and 2

Labels		Outside dia. D	Nominal linear mass [a]	Upset dimensions								
				Pin				Box				
				Outside dia. [b] D_4	Inside dia. [c] d_{iu}	Length L_{iu}	Length of taper m_{iu}	Outside diameter W_b	Length L_{eu}	Length of taper m_{eu}	Diameter of recess Q	Width of face b
1	2	mm	kg/m	mm +1,59 0	mm +0,38 0	mm min.	mm min.	mm +0,13 −0,64	mm min.	mm	mm	mm min.
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*
1.315	1.72	33,40	2,56	—	24,64	34,92	6,35	39,37	44,45	25,40	35,00	0,79
1.660	2.10	42,16	3,13	—	33,05	38,10	6,35	47,75	47,62	25,40	43,76	0,79
1.660	2.33	42,16	3,47	—	33,05	38,10	6,35	47,75	47,62	25,40	43,76	0,79
1.900	2.40	48,26	3,57	—	38,89	41,28	6,35	53,59	50,80	25,40	49,86	0,79
1.900	2.76	48,26	4,11	—	38,89	41,28	6,35	53,59	50,80	25,40	49,86	0,79
2.063	3.25	52,40	4,84	53,19	42,47	42,86	6,35	59,06	53,98	25,40	54,76	0,79

See also Figure D.7.

[a] Nominal linear masses, upset and threaded, are shown for information only.

[b] The minimum outside diameter D_4 is limited by the minimum length of full-crest threads. See API Spec 5B.

[c] The minimum diameter d_{iu} is limited by the drift test.

Table C.27 — Range lengths

Dimensions in metres

	Range 1	Range 2	Range 3
CASING			
Total range length, inclusive	4,88 to 7,62	7,62 to 10,36	10,36 to 14,63
Range length for 95 % or more of carload: [a]			
Permissible variation, max.	1,83	1,52	1,83
Permissible length, min.	5,49	8,53	10,97
THREADED AND COUPLED TUBING AND CASING USED AS TUBING			
Total range length, inclusive	6,10 to 7,32 [b]	8,53 to 9,75 [c]	11,58 to 12,80 [d]
Range length for 100 % of carload: [a]			
Permissible variation, max.	0,61	0,61	0,61
INTEGRAL TUBING CONNECTIONS (including IJ/PE and IJ/SF)			
Total range length, inclusive	6,10 to 7.92 [b]	8,53 to 10,36	11,58 to 13,72
Range length for 100 % of carload: [a]			
Permissible variation, max.	0,61	0,61	0,61
PUP JOINTS	Lengths 0,61; 0,91; 1,22; 1,83; 2,44; 3,05 and 3,66 [e] Tolerance ± 0,076		

[a] Carload tolerances shall not apply to order items of less than 18 144 kg of pipe. For any carload of 18 144 kg or more of pipe that is shipped to the final destination without transfer or removal from the car, the tolerance shall apply to each car. For any order item consisting of more than 18 144 kg of pipe that is shipped from the manufacturer's facility by rail, but not to the final destination, the carload tolerance shall apply to the overall quantity of pipe shipped on the order item, but not to the individual carloads.

[b] By agreement between purchaser and manufacturer, the maximum length may be increased to 8,53 m.

[c] By agreement between purchaser and manufacturer, the maximum length may be increased to 10,36 m.

[d] By agreement between purchaser and manufacturer, the maximum length may be increased to 13,72 m.

[e] 0,61 m pup joints may be furnished up to 0,91 m long by agreement between purchaser and manufacturer, and lengths other than those listed may be furnished by agreement between purchaser and manufacturer.

Table C.28 — Standard drift size

Dimensions in millimetres

Product and Label 1	Standard drift mandrel size min.	
	Length	Diameter
Casing		
< 9-5/8	152	d – 3,18
≥ 9-5/8 to ≤ 13-3/8	305	d – 3,97
> 13-3/8	305	d – 4,76
Tubing [a, b]		
≤ 2-7/8	1 067	d – 2,38
> 2-7/8 to ≤ 8-5/8	1 067	d – 3,18
> 8-5/8 to < 10-3/4	1 067	d – 3,97

[a] Integral-joint tubing shall be tested before upsetting with a drift mandrel as shown, and shall also be drift tested at the pin end, after upsetting, with a cylindrical drift mandrel 1 067 mm in length and d_{bj} – 0,38 mm in diameter (see Table C. 26, Col. 6 for d_{bj}).

[b] Casing sizes larger than Label 1: 4-1/2 but smaller than Label 1: 10-3/4 specified by the purchaser to be used in tubing service shall be marked as specified in Clause 11.

Table C.29 — Alternative drift size

Labels		Pipe outside diameter D	Pipe linear mass	Alternative drift mandrel size mm min.	
1	2	mm	kg/m	Length	Diameter
1	*2*	*3*	*4*	*5*	*6*
7	23.00	177,80	34,23	152	158,75
7	32.00	177,80	47,62	152	152,40
7-3/4	46.10	196,85	68,60	152	165,10
8-5/8	32.00	219,08	47,62	152	200,02
8-5/8	40.00	219,08	59,53	152	193,68
9-5/8	40.00	244,48	59,53	305	222,25
9-5/8	53.50	244,48	79,62	305	215,90
9-5/8	58.40	244,48	86,91	305	212,72
10-3/4	45.50	273,05	67,71	305	250,82
10-3/4	55.50	273,05	82,59	305	244,48
11-3/4	42.00	298,45	62,50	305	279,40
11-3/4	60.00	298,45	89,29	305	269,88
11-3/4	65.00	298,45	96,73	305	269,88
13-3/8	72.00	339,72	107,15	305	311,15

Table C.32 — API round-thread casing coupling — Dimensions, tolerances and masses

Label 1	Size [a]	Outside diameter W [b, c]	Minimum length mm		Diameter of recess Q [d]	Width of bearing face b	Mass kg	
	Outside diameter D mm	mm	Short N_L	Long N_L	mm	mm	Short	Long
1	2	3	4	5	6	7	8	9
4-1/2	114,30	127,00	158,75	177,80	116,68	3,97	3,62	4,15
5	127,00	141,30	165,10	196,85	129,38	4,76	4,66	5,75
5-1/2	139,70	153,67	171,45	203,20	142,08	3,18	5,23	6,42
6-5/8	168,28	187,71	184,15	222,25	170,66	6,35	9,12	11,34
7	177,80	200,03	184,15	228,60	180,18	4,76	8,39	10,83
7-5/8	193,70	215,90	190,50	234,95	197,64	5,56	12,30	15,63
8-5/8	219,08	244,48	196,85	254,00	223,04	6,35	16,23	21,67
9-5/8	244,48	269,88	196,85	266,70	248,44	6,35	18,03	25,45
10-3/4	273,05	298,45	203,20	—	277,02	6,35	20,78	—
11-3/4	298,45	323,85	203,20	—	302,42	6,35	22,64	—
13-3/8	339,72	365,12	203,20	—	343,69	5,56	25,66	—
16	406,40	431,80	228,60	—	411,96	5,56	34,91	—
18-5/8	473,08	508,00	228,60	—	478,63	5,56	54.01	—
20	508,00	533,40	228,60	292,10	513,56	5,56	43,42	57,04

See also Figures D.1 and D.2.

[a] The size designation for the coupling is the same as the size designation for the pipe on which the coupling is used.

[b] Groups 1, 2 and 3 — Tolerance on outside diameter W: ± 1 % but not greater than ± 3,18 mm.

[c] Group 4 — Tolerance on outside diameter W: ± 1 % but not greater than $^{+3,18}_{-1,59}$ mm.

[d] Tolerance on diameter of recess, Q, for all groups: $^{+0,79}_{0}$ mm.

Table C.33 — API buttress thread casing coupling — Dimensions, tolerances and masses

Label 1	Size [a]	Outside diameter		Minimum length	Diameter of counterbore	Width of bearing face	Mass kg	
	Outside diameter D mm	Regular W [b, c] mm	Special clearance [d] W_c mm	N_L mm	Q mm	b mm	Regular	Special clearance
1	2	3	4	5	6	7	8	9
4-1/2	114,30	127,00	123,82	225,42	117,86	3,18	4,55	3,48
5	127,00	141,30	136,52	231,78	130,56	3,97	5,85	4,00
5-1/2	139,70	153,67	149,22	234,95	143,26	3,97	6,36	4,47
6-5/8	168,28	187,71	177,80	244,48	171,83	6,35	11,01	5,65
7	177,80	200,03	187,32	254,00	181,36	5,56	10,54	6,28
7-5/8	193,68	215,90	206,38	263,52	197,23	7,94	15,82	9,29
8-5/8	219,08	244,48	231,78	269,88	222,63	9,52	20,86	10,80
9-5/8	244,48	269,88	257,18	269,88	248,03	9,52	23,16	12,02
10-3/4	273,05	298,45	285,75	269,88	276,61	9,52	25,74	13,39
11-3/4	298,45	323,85	—	269,88	302,01	9,52	28,03	—
13-3/8	339,72	365,12	—	269,88	343,28	9,52	31,77	—
16	406,40	431,80	—	269,88	410,31	9,52	40,28	—
18-5/8	473,08	508,00	—	269,88	476,99	9,52	62,68	—
20	508,00	533,40	—	269,88	511,91	9,52	50,10	—

See also Figure D.3.

[a] The size designation for the coupling is the same as the size designation for the pipe on which the coupling is used.

[b] Groups 1, 2 and 3 : Tolerance on outside diameter W: ± 1 % but not greater than ± 3,18 mm.

[c] Group 4 : Tolerance on outside diameter W: ± 1 % but not greater than $^{+3,18}_{-1,59}$ mm.

[d] Groups 1, 2 and 3 — Tolerance on outside diameter W_c: $^{+0,79}_{-0,40}$ mm.

Table C.34 — API non-upset tubing coupling — Dimensions, tolerances and masses

Label 1	Size [a] Outside diameter D mm	Outside diameter W [b] mm	Minimum length N_L mm	Diameter of recess Q mm	Width of bearing face b mm	Maximum bearing face diameter, special bevel B_f mm	Mass kg
1	2	3	4	5	6	7	8
1.050	26,67	33,35	80,96	28,27	1,59	30,00	0,23
1.315	33,40	42,16	82,55	35,00	2,38	37,80	0,38
1.660	42,16	52,17	88,90	43,76	3,18	47,17	0,59
1.900	48,26	55,88	95,25	49,86	1,59	52,07	0,56
2-3/8	60,32	73,02	107,95	61,93	4,76	66,68	1,28
2-7/8	73,02	88,90	130,18	74,63	4,76	80,98	2,34
3-1/2	88,90	107,95	142,88	90,50	4,76	98,42	3,71
4	101,60	120,65	146,05	103,20	4,76	111,12	4,35
4-1/2	114,30	132,08	155,58	115,90	4,76	123,19	4,89

See also Figure D.4.

[a] The size designation for the coupling is the same as the size designation for the pipe on which the coupling is used.

[b] Tolerance on outside diameter W: ±1 %.

Table C.35 — API external-upset tubing coupling — Dimensions, tolerances and masses

Label 1	Size [a] Outside diameter D mm	Outside diameter Regular W [b] mm	Outside diameter Special clearance W_c [c] mm	Minimum length N_L mm	Diameter of recess Q mm	Width of bearing face, regular b mm	Maximum bearing face diameter B_f Regular with special bevel mm	Maximum bearing face diameter B_f Special clearance mm	Mass kg Regular	Mass kg Special clearance
1	2	3	4	5	6	7	8	9	10	11
1.050	26,67	42,16	—	82,55	35,00	2,38	37,80	—	0,38	—
1.315	33,40	48,26	—	88,90	38,89	2,38	42,77	—	0,57	—
1.660	42,16	55,88	—	95,25	47,63	3,18	50,95	—	0,68	—
1.900	48,26	63,50	—	98,42	54,76	3,18	58,34	—	0,84	—
2-3/8	60,32	77,80	73,91	123,82	67,46	3,97	71,83	69,90	1,55	1,07
2-7/8	73,02	93,17	87,88	133,35	80,16	5,56	85,88	83,24	2,40	1,55
3-1/2	88,90	114,30	106,17	146,05	96,85	6,35	104,78	100,71	4,10	2,38
4	101,60	127,00	—	152,40	109,55	6,35	117,48	—	4,82	—
4-1/2	114,30	141,30	—	158,75	122,25	6,35	130,96	—	6,05	—

See also Figure D.5.

[a] The size designation for the coupling is the same as the size designation for the pipe on which the coupling is used.

[b] Tolerance on outside diameter W: ±1 %.

[c] Tolerance on outside diameter W_c: ±0,38 mm.

4.3 DESIGN DATA TABLES – USC UNITS

API Specification 5CT – Annex E

Table E.1 — ISO/API casing list
Sizes, masses, wall thickness, grade and applicable end-finish

Labels [a]		Outside diameter	Nominal linear mass [b, c] T&C	Wall thickness	Type of end-finish [d]								
1	2	*D* in	lb/ft	*t* in	H40	J55 K55	M65	L80 R95	N80 Type 1, Q	C90 T95	C110	P110	Q125
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*
4-1/2	9.50	4.500	9.50	0.205	PS	PS	PS	—	—	—	—	—	—
4-1/2	10.50	4.500	10.50	0.224	—	PSB	PSB	—	—	—	—	—	—
4-1/2	11.60	4.500	11.60	0.250	—	PSLB	PLB	PLB	PLB	PLB	P	PLB	—
4-1/2	13.50	4.500	13.50	0.290	—	—	PLB	PLB	PLB	PLB	P	PLB	—
4-1/2	15.10	4.500	15.10	0.337	—	—	—	—	—	—	—	PLB	PLB
5	11.50	5.000	11.50	0.220	—	PS	PS	—	—	—	—	—	—
5	13.00	5.000	13.00	0.253	—	PSLB	PSLB	—	—	—	—	—	—
5	15.00	5.000	15.00	0.296	—	PSLB	PLB	PLB	PLB	PLB	P	PLB	—
5	18.00	5.000	18.00	0.362	—	—	PLB	PLB	PLB	PLB	P	PLB	PLB
5	21.40	5.000	21.40	0.437	—	—	PLB	PLB	PLB	PLB	P	PLB	PLB
5	23.20	5.000	23.20	0.478	—	—	—	PLB	PLB	PLB	P	PLB	PLB
5	24.10	5.000	24.10	0.500	—	—	—	PLB	PLB	PLB	P	PLB	PLB
5-1/2	14.00	5.500	14.00	0.244	PS	PS	PS	—	—	—	—	—	—
5-1/2	15.50	5.500	15.50	0.275	—	PSLB	PSLB	—	—	—	—	—	—
5-1/2	17.00	5.500	17.00	0.304	—	PSLB	PLB	PLB	PLB	PLB	P	PLB	—
5-1/2	20.00	5.500	20.00	0.361	—	—	PLB	PLB	PLB	PLB	P	PLB	—
5-1/2	23.00	5.500	23.00	0.415	—	—	PLB	PLB	PLB	PLB	P	PLB	PLB
5-1/2	26.80	5.500	26.80	0.500	—	—	—	—	—	P	P	—	—
5-1/2	29.70	5.500	29.70	0.562	—	—	—	—	—	P	P	—	—
5-1/2	32.60	5.500	32.60	0.625	—	—	—	—	—	P	P	—	—
5-1/2	35.30	5.500	35.30	0.687	—	—	—	—	—	P	P	—	—
5-1/2	38.00	5.500	38.00	0.750	—	—	—	—	—	P	P	—	—
5-1/2	40.50	5.500	40.50	0.812	—	—	—	—	—	P	P	—	—
5-1/2	43.10	5.500	43.10	0.875	—	—	—	—	—	P	P	—	—
6-5/8	20.00	6.625	20.00	0.288	PS	PSLB	PSLB	—	—	—	—	—	—
6-5/8	24.00	6.625	24.00	0.352	—	PSLB	PLB	PLB	PLB	PLB	P	PLB	—
6-5/8	28.00	6.625	28.00	0.417	—	—	PLB	PLB	PLB	PLB	P	PLB	—
6-5/8	32.00	6.625	32.00	0.475	—	—	—	PLB	PLB	PLB	P	PLB	PLB
7	17.00	7.000	17.00	0.231	PS	—	—	—	—	—	—	—	—
7	20.00	7.000	20.00	0.272	PS	PS	PS	—	—	—	—	—	—
7	23.00	7.000	23.00	0.317	—	PSLB	PLB	PLB	PLB	PLB	P	—	—
7	26.00	7.000	26.00	0.362	—	PSLB	PLB	PLB	PLB	PLB	P	PLB	—
7	29.00	7.000	29.00	0.408	—	—	PLB	PLB	PLB	PLB	P	PLB	—
7	32.00	7.000	32.00	0.453	—	—	PLB	PLB	PLB	PLB	P	PLB	—
7	35.00	7.000	35.00	0.498	—	—	—	PLB	PLB	PLB	P	PLB	PLB
7	38.00	7.000	38.00	0.540	—	—	—	PLB	PLB	PLB	P	PLB	PLB
7	42.70	7.000	42.70	0.625	—	—	—	—	—	P	P	—	—
7	46.40	7.000	46.40	0.687	—	—	—	—	—	P	P	—	—
7	50.10	7.000	50.10	0.750	—	—	—	—	—	P	P	—	—
7	53.60	7.000	53.60	0.812	—	—	—	—	—	P	P	—	—
7	57.10	7.000	57.10	0.875	—	—	—	—	—	P	P	—	—

See notes at end of table.

Table E.1 (*continued*)

Labels [a]		Outside diameter	Nominal linear mass [b, c] T&C	Wall thickness	Type of end-finish [d]								
1	2	*D* in	lb/ft	*t* in	H40	J55 K55	M65	L80 R95	N80 Type 1, Q	C90 T95	C110	P110	Q125
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*
7-5/8	24.00	7.625	24.00	0.300	PS	—	—	—	—	—	—	—	—
7-5/8	26.20	7.625	26.40	0.328	—	PSLB	PSLB	PLB	PLB	PLB	P	—	—
7-5/8	29.70	7.625	29.70	0.375	—	—	PLB	PLB	PLB	PLB	P	PLB	—
7-5/8	33.70	7.625	33.70	0.430	—	—	PLB	PLB	PLB	PLB	P	PLB	—
7-5/8	39.00	7.625	39.00	0.500	—	—	—	PLB	PLB	PLB	P	PLB	PLB
7-5/8	42.80	7.625	42.80	0.562	—	—	—	PLB	PLB	PLB	P	PLB	PLB
7-5/8	45.30	7.625	45.30	0.595	—	—	—	PLB	PLB	PLB	P	PLB	PLB
7-5/8	47.10	7.625	47.10	0.625	—	—	—	PLB	PLB	PLB	P	PLB	PLB
7-5/8	51.20	7.625	51.20	0.687	—	—	—	—	—	P	P	—	—
7-5/8	55.30	7.625	55.30	0.750	—	—	—	—	—	P	P	—	—
7-3/4	46.10	7.750	46.10	0.595	—	—	—	P	P	P	P	P	P
8-5/8	24.00	8.625	24.00	0.264	—	PS	PS	—	—	—	—	—	—
8-5/8	28.00	8.625	28.00	0.304	PS	—	PS	—	—	—	—	—	—
8-5/8	32.00	8.625	32.00	0.352	PS	PSLB	PSLB	—	—	—	—	—	—
8-5/8	36.00	8.625	36.00	0.400	—	PSLB	PSLB	PLB	PLB	PLB	P	—	—
8-5/8	40.00	8.625	40.00	0.450	—	—	PLB	PLB	PLB	PLB	P	PLB	—
8-5/8	44.00	8.625	44.00	0.500	—	—	—	PLB	PLB	PLB	P	PLB	—
8-5/8	49.00	8.625	49.00	0.557	—	—	—	PLB	PLB	PLB	P	PLB	PLB
9-5/8	32.30	9.625	32.30	0.312	PS	—	—	—	—	—	—	—	—
9-5/8	36.00	9.625	36.00	0.352	PS	PSLB	PSLB	—	—	—	—	—	—
9-5/8	40.00	9.625	40.00	0.395	—	PSLB	PSLB	PLB	PLB	PLB	P	—	—
9-5/8	43.50	9.625	43.50	0.435	—	—	PLB	PLB	PLB	PLB	P	PLB	—
9-5/8	47.00	9.625	47.00	0.472	—	—	PLB	PLB	PLB	PLB	P	PLB	PLB
9-5/8	53.50	9.625	53.50	0.545	—	—	—	PLB	PLB	PLB	P	PLB	PLB
9-5/8	58.40	9.625	58.40	0.595	—	—	—	PLB	PLB	PLB	P	PLB	PLB
9-5/8	59.40	9.625	59.40	0.609	—	—	—	—	—	P	P	—	—
9-5/8	64.90	9.625	64.90	0.672	—	—	—	—	—	P	P	—	—
9-5/8	70.30	9.625	70.30	0.734	—	—	—	—	—	P	P	—	—
9-5/8	75.60	9.625	75.60	0.797	—	—	—	—	—	P	P	—	—
10-3/4	32.75	10.750	32.75	0.279	PS	—	—	—	—	—	—	—	—
10-3/4	40.50	10.750	40.50	0.350	PS	PSB	PSB	—	—	—	—	—	—
10-3/4	45.50	10.750	45.50	0.400	—	PSB	PSB	—	—	—	—	—	—
10-3/4	51.00	10.750	51.00	0.450	—	PSB	PSB	PSB	PSB	PSB	P	PSB	—
10-3/4	55.50	10.750	55.50	0.495	—	—	PSB	PSB	PSB	PSB	P	PSB	—
10-3/4	60.70	10.750	60.70	0.545	—	—	—	—	—	PSB	P	PSB	PSB
10-3/4	65.70	10.750	65.70	0.595	—	—	—	—	—	PSB	P	PSB	PSB
10-3/4	73.20	10.750	73.20	0.672	—	—	—	—	—	P	P	—	—
10-3/4	79.20	10.750	79.20	0.734	—	—	—	—	—	P	P	—	—
10-3/4	85.30	10.750	85.30	0.797	—	—	—	—	—	P	P	—	—
11-3/4	42.00	11.750	42.00	0.333	PS	—	—	—	—	—	—	—	—
11-3/4	47.00	11.750	47.00	0.375	—	PSB	PSB	—	—	—	—	—	—
11-3/4	54.00	11.750	54.00	0.435	—	PSB	PSB	—	—	—	—	—	—
11-3/4	60.00	11.750	60.00	0.489	—	PSB	PSB	PSB	PSB	PSB	P	PSB	PSB
11-3/4	65.00	11.750	65.00	0.534	—	—	—	P	P	P	P	P	P
11-3/4	71.00	11.750	71.00	0.582	—	—	—	P	P	P	P	P	P
13-3/8	48.00	13.375	48.00	0.330	PS	—	—	—	—	—	—	—	—
13-3/8	54.50	13.375	54.50	0.380	—	PSB	PSB	—	—	—	—	—	—
13-3/8	61.00	13.375	61.00	0.430	—	PSB	PSB	—	—	—	—	—	—
13-3/8	68.00	13.375	68.00	0.480	—	PSB	PSB	PSB	PSB	PSB	P	PSB	—
13-3/8	72.00	13.375	72.00	0.514	—	—	—	PSB	PSB	PSB	P	PSB	PSB

See notes at end of table.

Table E.1 (*continued*)

Labels [a]		Outside diameter	Nominal linear mass [b, c] T&C	Wall thickness	Type of end-finish [d]								
1	2	*D* in	lb/ft	*t* in	H40	J55 K55	M65	L80 R95	N80 Type 1, Q	C90 T95	C110	P110	Q125
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*
16	65.00	16.000	65.00	0.375	PS	—	—	—	—	—	—	—	—
16	75.00	16.000	75.00	0.438	—	PSB	PSB	—	—	—	—	—	—
16	84.00	16.000	84.00	0.495	—	PSB	PSB	—	—	—	—	—	—
16	109.00	16.000	109.00	0.656	—	P	—	P	P	—	—	P	P
18-5/8	87.50	18.625	87.50	0.435	PS	PSB	PSB	—	—	—	—	—	—
20	94.00	20.000	94.00	0.438	PSL	PSLB	PSLB	—	—	—	—	—	—
20	106.50	20.000	106.50	0.500	—	PSLB	PSLB	—	—	—	—	—	—
20	133.00	20.000	133.00	0.635	—	PSLB	—	—	—	—	—	—	—

P = Plain-end, S = Short round thread, L = Long round thread, B = Buttress thread.

[a] Labels are for information and assistance in ordering.

[b] Nominal linear masses (col. 4) are shown for information only.

[c] The densities of martensitic chromium steels (L80 Types 9Cr and 13Cr) are different from carbon steels. The masses shown are therefore not accurate for martensitic chromium steels. A mass correction factor of 0,989 may be used.

[d] Buttress casing is available with regular, special clearance couplings or special clearance couplings with special bevel.

Table E.2 — ISO/API tubing list
Sizes, masses, wall thickness, grade and applicable end-finish

Labels				Outside diameter	Nominal linear masses [a, b]			Wall thick-ness	Type of end-finish ‖						
1	2				Non-upset T&C	Ext. upset T&C	Integ. joint								
	NU T&C	EU T&C	IJ	*D* in	lb/ft	lb/ft	lb/ft	*t* in	H40	J55	L80 R95	N80 Type1, Q	C90	T95	P110
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*
1.050	1.14	1.20	—	1.050	1.14	1.20	—	0.113	PNU	PNU	PNU	PNU	PNU	PNU	—
1.050	1.48	1.54	—	1.050	1.48	1.54	—	0.154	PU	PU	PU	PU	PU	PU	PU
1.315	1.70	1.80	1.72	1.315	1.70	1.80	1.72	0.133	PNUI	PNUI	PNUI	PNUI	PNUI	PNUI	—
1.315	2.19	2.24	—	1.315	2.19	2.24	—	0.179	PU	PU	PU	PU	PU	PU	PU
1.660	2.09	—	2.10	1.660	—	—	2.10	0.125	PI	PI	—	—	—	—	—
1.660	2.30	2.40	2.33	1.660	2.30	2.40	2.33	0.140	PNUI	PNUI	PNUI	PNUI	PNUI	PNUI	—
1.660	3.03	3.07	—	1.660	3.03	3.07	—	0.191	PU	PU	PU	PU	PU	PU	PU
1.900	2.40	—	2.40	1.900	—	—	2.40	0.125	PI	PI	—	—	—	—	—
1.900	2.75	2.90	2.76	1.900	2.75	2.90	2.76	0.145	PNUI	PNUI	PNUI	PNUI	PNU I	PNUI	—
1.900	3.65	3.73	—	1.900	3.65	3.73	—	0.200	PU	PU	PU	PU	PU	PU	PU
1.900	4.42	—	—	1.900	4.42	—	—	0.250	—	—	P	—	P	P	—
1.900	5.15	—		1.900	5.15	—	—	0.300	—	—	P	—	P	P	—
2.063	3.24	—	3.25	2.063	—	—	3.25	0.156	PI	PI	PI	PI	PI	PI	—
2.063	4.50	—	—	2.063	4.50	—	—	0.225	P	P	P	P	P	P	P
2-3/8	4.00	—	—	2.375	4.00	—	—	0.167	PN	PN	PN	PN	PN	PN	—
2-3/8	4.60	4.70	—	2.375	4.60	4.70	—	0.190	PNU	PNU	PNU	PNU	PNU	PNU	PNU
2-3/8	5.80	5.95	—	2.375	5.80	5.95	—	0.254	—	—	PNU	PNU	PNU	PNU	PNU
2-3/8	6.60	—	—	2.375	6.60	—	—	0.295	—	—	P	—	P	P	—
2-3/8	7.35	7.45	—	2.375	7.35	7.45	—	0.336	—	—	PU	—	PU	PU	—
2-7/8	6.40	6.50	—	2.875	6.40	6.50	—	0.217	PNU	PNU	PNU	PNU	PNU	PNU	PNU
2-7/8	7.80	7.90	—	2.875	7.80	7.90	—	0.276	—	—	PNU	PNU	PNU	PNU	PNU
2-7/8	8.60	8.70	—	2.875	8.60	8.70	—	0.308	—	—	PNU	PNU	PNU	PNU	PNU
2-7/8	9.35	9.45	—	2.875	9.35	9.45	—	0.340	—	—	PU	—	PU	PU	—
2-7/8	10.50	—	—	2.875	10.50	—	—	0.392	—	—	P	—	P	P	—
2-7/8	11.50	—	—	2.875	11.50	—	—	0.440	—	—	P	—	P	P	—
3-1/2	7.70	—	—	3.500	7.70	—	—	0.216	PN	PN	PN	PN	PN	PN	—
3-1/2	9.20	9.30	—	3.500	9.20	9.30	—	0.254	PNU	PNU	PNU	PNU	PNU	PNU	PNU
3-1/2	10.20	—	—	3.500	10.20	—	—	0.289	PN	PN	PN	PN	PN	PN	—
3-1/2	12.70	12.95	—	3.500	12.70	12.95	—	0.375	—	—	PNU	PNU	PNU	PNU	PNU
3-1/2	14.30	—	—	3.500	14.30	—	—	0.430	—	—	P	—	P	P	—
3-1/2	15.50	—	—	3.500	15.50	—	—	0.476	—	—	P	—	P	P	—
3-1/2	17.00	—	—	3.500	17.00	—	—	0.530	—	—	P	—	P	P	—
4	9.50	—	—	4.000	9.50	—	—	0.226	PN	PN	PN	PN	PN	PN	—
4	10.70	11.00	—	4.000	—	11.00	—	0.262	PU	PU	PU	PU	PU	PU	—
4	13.20	—	—	4.000	13.20	—	—	0.330	—	—	P	—	P	P	—
4	16.10	—	—	4.000	16.10	—	—	0.415	—	—	P	—	P	P	—
4	18.90	—	—	4.000	18.90	—	—	0.500	—	—	P	—	P	P	—
4	22.20	—	—	4.000	22.20	—	—	0.610	—	—	P	—	P	P	—
4-1/2	12.60	12.75	—	4.500	12.60	12.75	—	0.271	PNU	PNU	PNU	PNU	PNU	PNU	—
4-1/2	15.20	—	—	4.500	15.20	—	—	0.337	—	—	P	—	P	P	—
4-1/2	17.00	—	—	4.500	17.00	—	—	0.380	—	—	P	—	P	P	—
4-1/2	18.90	—	—	4.500	18.90	—	—	0.430	—	—	P	—	P	P	—
4-1/2	21.50	—	—	4.500	21.50	—	—	0.500	—	—	P	—	P	P	—
4-1/2	23.70	—	—	4.500	23.70	—	—	0.560	—	—	P	—	P	P	—
4-1/2	26.10	—	—	4.500	26.10	—	—	0.630	—	—	P	—	P	P	—

P = Plain-end, N = Non-upset threaded and coupled, U = External upset threaded and coupled, I = Integral joint.

[a] Nominal linear masses (col. 6, 7 & 8) are shown for information only.

[b] The densities of martensitic chromium steels (L80 types 9Cr and 13Cr) are different from carbon steels. The masses shown are therefore not accurate for martensitic chromium steels. A mass correction factor of 0.989 may be used.

Table E.3 — Process of manufacture and heat treatment

Group	Grade	Type	Manufacturing process [a]	Heat treatment	Tempering temperature °F min.
1	*2*	*3*	*4*	*5*	*6*
1	H40	—	S or EW	—	—
	J55	—	S or EW	— [b]	—
	K55	—	S or EW	— [b]	—
	N80	1	S or EW	[c]	—
	N80	Q	S or EW	Q	—
	R95	—	S or EW	Q [d]	1 000
2					
	M65	—	S or EW	[e]	—
	L80	1	S or EW	Q	1 050
	L80	9Cr	S	Q [f]	1 100
	L80	13Cr	S	Q [f]	1 100
	C90	1	S	Q	1 150
	T95	1	S	Q	1 200
	C110	—	S	Q	1 200
3	P110	—	S or EW [g, h]	Q	—
4	Q125	1	S or EW [h]	Q	—

[a] S = seamless process; EW = electric-welded process.

[b] Full-body, full-length normalized, normalized and tempered or quenched and tempered at the manufacturer's option or as specified on the purchase agreement.

[c] Full-body, full-length heat treament is mandatory. At the manufacturer's option, normalised or normalised and tempered.

[d] Includes the method of interrupted quenching followed by controlled cooling.

[e] Full-body, full-length heat-treatment is mandatory. At the manufacturer's option or as specified on the purchase agreement the product may be normalised (N), normalised and tempered (N&T), or quenched and tempered (Q).

[f] Types 9Cr and 13Cr may be air-quenched.

[g] Special chemical requirements for electric-welded P110 pipe are specified in Table E.4.

[h] Products shall be heat-treated full-body, full-length. Special requirements unique to electric-welded P110 and Q125 are specified in A.6 SR11.

Table E.5 — Tensile and hardness requirements

Group	Grade	Type	Total elongation under load	Yield strength ksi		Tensile strength min.	Hardness [a] max.		Specified wall thickness	Allowable hardness variation [b]
			%	min.	max.	ksi	HRC	HBW	in	HRC
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*
1	H40	—	0.5	40	80	60	—	—	—	—
	J55	—	0.5	55	80	75	—	—	—	—
	K55	—	0.5	55	80	95	—	—	—	—
	N80	1	0.5	80	110	100	—	—	—	—
	N80	Q	0.5	80	110	100	—	—	—	—
	R95	—	0.5	95	110	105	—	—	—	—
2	M65	—	0.5	65	85	85	22	235	—	—
	L80	1	0.5	80	95	95	23	241	—	—
	L80	9Cr	0.5	80	95	95	23	241	—	—
	L80	13Cr	0.5	80	95	95	23	241	—	—
	C90	1	0.5	90	105	100	25.4	255	≤ 0.500	3.0
									0.501 to 0.749	4.0
									0.750 to 0.999	5.0
									≥ 1.000	6.0
	T95	1	0.5	95	110	105	25.4	255	≤ 0.500	3.0
									0.501 to 0.749	4.0
									0.750 to 0.999	5.0
									≥ 1.000	6.0
	C110	—	0.7	110	120	115	30	286	≤ 0.500	3.0
									0.501 to 0.749	4.0
									0.750 to 0.999	5.0
									≥ 1.000	6.0
3	P110	—	0.6	110	140	125	—	—	—	—
4	Q125	1	0.65	125	150	135	[b]	—	≤ 0.500	3.0
									0.501 to 0.749	4.0
									≥ 0.750	5.0

[a] In case of dispute, laboratory Rockwell C hardness testing shall be used as the referee method.

[b] No hardness limits are specified, but the maximum variation is restricted as a manufacturing control in accordance with 7.8 and 7.9.

Table E.7 — Critical thickness for couplings with API threads

Dimensions in inches

Label 1	Critical thickness for couplings						
	NU	EU	Special-clearance		BC	LC	SC
			EU	BC			
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*
1.050	0.169	0.211	—	—	—	—	—
1.315	0.211	0.258	—	—	—	—	—
1.660	0.239	0.240	—	—	—	—	—
1.900	0.196	0.251	—	—	—	—	—
2-3/8	0.304	0.300	0.224	—	—	—	—
2-7/8	0.380	0.358	0.254	—	—	—	—
3-1/2	0.451	0.454	0.294	—	—	—	—
4	0.454	0.458	—	—	—	—	—
4-1/2	0.435	0.493	—	0.259	0.322	0.349	0.337
5	—	—	—	0.266	0.360	0.392	0.372
5-1/2	—	—	—	0.268	0.356	0.389	0.370
6-5/8	—	—	—	0.274	0.469	0.508	0.485
7	—	—	—	0.280	0.420	0.458	0.430
7-5/8	—	—	—	0.348	0.536	0.573	0.546
8-5/8	—	—	—	0.352	0.602	0.647	0.612
9-5/8	—	—	—	0.352	0.602	0.657	0.614
10-3/4	—	—	—	0.352	0.602	—	0.618
11-3/4	—	—	—	—	0.602	—	0.618
13-3/8	—	—	—	—	0.602	—	0.618
16	—	—	—	—	0.667	—	0.632
18-5/8	—	—	—	—	0.854	—	0.819
20	—	—	—	—	0.667	0.673	0.634

NOTE The coupling blank thickness is greater than indicated above, due to thread height and manufacturing allowance to avoid black crest threads.

Table E.23 — Dimensions and masses for standard casing and for casing threaded with API round thread and buttress thread

Labels [a]		Outside diameter	Nominal linear mass T&C [b, c]	Wall thick-ness	Inside diam-eter	Drift diam-eter	Calculated mass [c]		
							Plain-end	ε_m, mass gain or loss due to end finishing [d] lb	
								Round thread	Buttress thread

Table E.23 (*continued*)

Labels [a]		Outside diameter	Nominal linear mass T&C [b, c]	Wall thickness	Inside diameter	Drift diameter	Calculated mass [c]				
							Plain-end	ε_m, mass gain or loss due to end finishing [d] lb			
								Round thread		Buttress thread	
1	2	D in	lb/ft	t in	d in	in	w_{pe} lb/ft	Short	Long	RC	SCC
1	2	3	4	5	6	7	8	9	10	11	12
7-5/8	24.00	7.625	24.00	0.300	7.025	6.900	23.49	15.80	—	—	—
7-5/8	26.40	7.625	26.40	0.328	6.969	6.844	25.59	15.20	19.00	20.60	6.21
7-5/8	29.70	7.625	29.70	0.375	6.875	6.750	29.06	—	17.40	18.80	4.41
7-5/8	33.70	7.625	33.70	0.430	6.765	6.640	33.07	—	15.80	17.00	2.61
7-5/8	39.00	7.625	39.00	0.500	6.625	6.500	38.08	—	13.60	14.60	0.21
7-5/8	42.80	7.625	42.80	0.562	6.501	6.376	42.43	—	12.01	11.39	−3.01
7-5/8	45.30	7.625	45.30	0.595	6.435	6.310	44.71	—	11.04	11.04	−3.36
7-5/8	47.10	7.625	47.10	0.625	6.375	6.250	46.77	—	10.16	9.23	−5.17
7-5/8	51.20	7.625	51.20	0.687	6.251	6.126	50.95	—	—	—	—
7-5/8	55.30	7.625	55.30	0.750	6.125	6.000	55.12	—	—	—	—
7-3/4	46.10	7.750	46.10	0.595	6.560	6.500 [e]	45.51	—	—	—	—
7-3/4	46.10	7.750	46.10	0.595	6.560	6.435	45.51	—	—	—	—
8-5/8	24.00	8.625	24.00	0.264	8.097	7.972	23.60	23.60	—	—	—
8-5/8	28.00	8.625	28.00	0.304	8.017	7.892	27.04	22.20	—	—	—
8-5/8	32.00	8.625	32.00	0.352	7.921	7.875 [e]	31.13	20.80	27.60	28.30	6.03
8-5/8	32.00	8.625	32.00	0.352	7.921	7.796	31.13	20.80	27.60	28.20	6.03
8-5/8	36.00	8.625	36.00	0.400	7.825	7.700	35.17	19.40	25.60	26.20	4.03
8-5/8	40.00	8.625	40.00	0.450	7.725	7.625 [e]	39.33	—	23.80	24.20	2.03
8-5/8	40.00	8.625	40.00	0.450	7.725	7.600	39.33	—	23.80	24.20	2.03
8-5/8	44.00	8.625	44.00	0.500	7.625	7.500	43.43	—	21.80	22.20	0.03
8-5/8	49.00	8.625	49.00	0.557	7.511	7.286	48.04	—	19.60	19.80	−2.37
9-5/8	32.30	9.625	32.30	0.312	9.001	8.845	31.06	24.40	—	—	—
9-5/8	36.00	9.625	36.00	0.352	8.921	8.765	34.89	23.00	32.00	31.00	6.48
9-5/8	40.00	9.625	40.00	0.395	8.835	8.750 [e]	38.97	21.40	30.00	29.00	4.48
9-5/8	40.00	9.625	40.00	0.395	8.835	8.679	38.97	21.40	30.00	29.00	4.48
9-5/8	43.50	9.625	43.50	0.435	8.755	8.599	42.73	—	28.20	27.20	2.68
9-5/8	47.00	9.625	47.00	0.472	8.681	8.525	46.18	—	26.60	25.60	1.08
9-5/8	53.50	9.625	53.50	0.545	8.535	8.500 [e]	52.90	—	23.40	22.40	−2.12
9-5/8	53.50	9.625	53.50	0.545	8.535	8.379	52.90	—	23.40	22.40	−2.12
9-5/8	58.40	9.625	58.40	0.595	8.435	8.375 [e]	57.44	—	21.50	20.13	−4.40
9-5/8	58.40	9.625	58.40	0.595	8.435	8.279	57.44	—	21.50	20.13	−4.40
9-5/8	59.40	9.625	59.40	0.609	8.407	8.251	58.70	—	—	—	—
9-5/8	64.90	9.625	64.90	0.672	8.281	8.125	64.32	—	—	—	—
9-5/8	70.30	9.625	70.30	0.734	8.157	8.001	69.76	—	—	—	—
9-5/8	75.60	9.625	75.60	0.797	8.031	7.875	75.21	—	—	—	—
10-3/4	32.75	10.750	32.75	0.279	10.192	10.036	31.23	29.00	—	—	—
10-3/4	40.50	10.750	40.50	0.350	10.050	9.894	38.91	26.40	—	34.40	7.21
10-3/4	45.50	10.750	45.50	0.400	9.950	9.875 [e]	44.26	24.40	—	31.80	4.61
10-3/4	45.50	10.750	45.50	0.400	9.950	9.794	44.26	24.40	—	31.80	4.61
10-3/4	51.00	10.750	51.00	0.450	9.850	9.694	49.55	22.60	—	29.40	2.21
10-3/4	55.50	10.750	55.50	0.495	9.760	9.625 [e]	54.26	20.80	—	27.00	−0.19
10-3/4	55.50	10.750	55.50	0.495	9.760	9.604	54.26	20.80	—	27.00	−0.19
10-3/4	60.70	10.750	60.70	0.545	9.660	9.504	59.45	18.80	—	24.40	—
10-3/4	65.70	10.750	65.70	0.595	9.560	9.404	64.59	16.80	—	22.00	—
10-3/4	73.20	10.750	73.20	0.672	9.406	9.250	72.40	—	—	—	—
10-3/4	79.20	10.750	79.20	0.734	9.282	9.126	78.59	—	—	—	—
10-3/4	85.30	10.750	85.30	0.797	9.156	9.000	84.80	—	—	—	—

See notes at end of table.

Table E.24 — Dimensions and masses for standard tubing and for tubing threaded with API non-upset, external upset and integral tubing connections

Labels [a]				Outside dia.	Nominal linear masses [b, c]			Wall thick-ness	Inside dia.	Calculated mass [c]				
										Plain-end	e_w, mass gain or loss due to end finishing [d] lb			
1	2										Non-upset	External upset [e]		Integral joint
	NU T&C	EU T&C	IJ	D in	Non-upset T&C lb/ft	Ext. upset T&C lb/ft	Integral joint lb/ft	t in	d in	w_{pe} lb/ft		Regular	Special-clear-ance	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1.050	1.14	1.20	—	1.050	1.14	1.20	—	0.113	0.824	1.13	0.20	1.40	—	—
1.050	1.48	1.54	—	1.050	1.48	1.54	—	0.154	0.742	1.48	—	1.32	—	—
1.315	1.70	1.80	1.72	1.315	1.70	1.80	1.72	0.133	1.049	1.68	0.40	1.40	—	0.20
1.315	2.19	2.24	—	1.315	2.19	2.24	—	0.179	0.957	2.17	—	1.35	—	—
1.660	2.09	—	2.10	1.660	—	—	2.10	0.125	1.410	2.05	—	—	—	0.20
1.660	2.30	2.40	2.33	1.660	2.30	2.40	2.33	0.140	1.380	2.27	0.80	1.60	—	0.20
1.660	3.03	3.07	—	1.660	3.03	3.07	—	0.191	1.278	3.00	—	1.50	0.20	—
1.900	2.40	—	2.40	1.990	—	—	2.40	0.125	1.650	2.37	—	—	—	0.20
1.900	2.75	2.90	2.76	1.990	2.75	2.90	2.76	0.145	1.610	2.72	0.60	2.00	—	0.20
1.900	3.65	3.73	—	1.990	3.65	3.73	—	0.200	1.500	3.63	—	2.03	—	—
1.900	4.42	—	—	1.990	4.42	—	—	0.250	1.400	4.41	—	—	—	—
1.900	5.15	—	—	1.990	5.15	—	—	0.300	1.300	5.13	—	—	—	—
2.063	3.24	—	3.25	2.063	—	—	3.25	0.156	1.751	3.18	—	—	—	0.20
2.063	4.50	—	—	2.063	—	—	—	0.225	1.613	4.42	—	—	—	—
2-3/8	4.00	—	—	2.375	4.00	—	—	0.167	2.041	3.94	1.60	—	—	—
2-3/8	4.60	4.70	—	2.375	4.60	4.70	—	0.190	1.995	4.44	1.60	4.00	2.96	—
2-3/8	5.80	5.95	—	2.375	5.80	5.95	—	0.254	1.867	5.76	1.40	3.60	2.56	—
2-3/8	6.60	—	—	2.375	6.60	—	—	0.295	1.785	6.56	—	—	—	—
2-3/8	7.35	7.45	—	2.375	7.35	7.45	—	0.336	1.703	7.32	—	—	—	—
2-7/8	6.40	6.50		2.875	6.40	6.50	—	0.217	2.441	6.17	3.20	5.60	3.76	—
2-7/8	7.80	7.90	—	2.875	7.80	7.90	—	0.276	2.323	7.67	2.80	5.80	3.92	—
2-7/8	8.60	8.70	—	2.875	8.60	8.70	—	0.308	2.259	8.45	2.60	5.00	3.16	—
2-7/8	9.35	9.45	—	2.875	9.35	9.45	—	0.340	2.195	9.21	—	—	—	—
2-7/8	1.050	—	—	2.875	10.50	—	—	0.392	2.091	10.40	—	—	—	—
2-7/8	11.50	—	—	2.875	11.50	—	—	0.440	1.995	11.45	—	—	—	—
3-1/2	7.70	—	—	3.500	7.70	—	—	0.216	3.068	7.58	5.40	—	—	—
3-1/2	9.20	9.30	—	3.500	9.20	9.30	—	0.254	2.992	8.81	5.00	9.20	5.40	—
3-1/2	10.20	—	—	3.500	10.20	—	—	0.289	2.922	9.92	4.80	—	—	—
3-1/2	12.70	12.95	—	3.500	12.70	12.95	—	0.375	2.750	12.53	4.00	8.20	4.40	—
3-1/2	14.30	—	—	3.500	14.30	—	—	0.430	2.640	14.11	—	—	—	—
3-1/2	15.50	—	—	3.500	15.50	—	—	0.476	2.548	15.39	—	—	—	—
3-1/2	17.00	—	—	3.500	17.00	—	—	0.530	2.440	16.83	—	—	—	—
4	9.50	—	—	4.000	9.50	—	—	0.226	3.548	9.12	6.20	—	—	—
4	10.70	11.00	—	4.000	—	11.00	—	0.262	3.476	10.47	—	10.60	—	—
4	13.20	—	—	4.000	13.20	—	—	0.330	3.340	12.95	—	—	—	—
4	16.10	—	—	4.000	16.10	—	—	0.415	3.170	15.90	—	—	—	—
4	18.90	—	—	4.000	18.90	—	—	0.500	3.000	18.71	—	—	—	—
4	22.20	—	—	4.000	22.20	—	—	0.610	2.78o	22.11	—	—	—	—
4-1/2	12.60	12.75	—	4.500	12.60	12.75	—	0.271	3.958	12.25	6.00	13.20	—	—
4-1/2	15.20	—	—	4.500	15.20	—	—	0.337	3.826	15.00	—	—	—	—
4-1/2	17.00	—	—	4.500	17.00	—	—	0.380	3.740	16.77	—	—	—	—
4-1/2	18.90	—	—	4.500	18.90	—	—	0.430	3.640	18.71	—	—	—	—
4-1/2	21.50	—	—	4.500	21.50	—	—	0.500	3.500	21.38	—	—	—	—
4-1/2	23.70	—	—	4.500	23.70	—	—	0.560	3.380	23.59	—	—	—	—
4-1/2	26.10	—	—	4.500	26.10	—	—	0.630	3.240	26.06	—	—	—	—

See Figures D.4, D.5 and D.7.

[a] Labels are for information and assistance in ordering.

[b] Nominal linear masses (Col. 6, 7 and 8) are shown for information only.

[c] The densities of martensitic chromium (L80 Types 9Cr and 13Cr) are different from carbon steels. The masses shown are therefore not accurate for martensitic chromium steels. A mass correction factor of 0.989 may be used.

[d] Mass gain or loss due to end finishing. See 8.5.

[e] The length of the upset may alter the mass gain or loss due to end finishing.

NOTE The table "API extreme-line casing upset end dimensions" has been deleted.

Table E.25 — External upset tubing dimensions for API connections, Groups 1, 2, and 3

Labels [a]		Size Outside diameter D	Nominal linear mass, threaded and coupled [b]	Upset			
				Outside diameter [c] D_4	Length from end of pipe to start of taper [d, c] L_{eu}	Length from end of pipe to end of taper [e] L_a	Length from end of pipe to start of pipe body [e] L_b
1	2	in	lb/ft	in $^{+0.062\,5}_{0}$	in $^{0}_{-1}$	in	in max.
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*
1.050	1.20	1.050	1.20	1.315	2 3/8	—	—
1.050	1.54	1.050	1.54	1.315	2 3/8	—	—
1.315	1.80	1.315	1.80	1.469	2 ½	—	—
1.315	2.24	1.315	2.24	1.469	2 ½	—	—
1.660	2.40	1.660	2.40	1.812	2 5/8	—	—
1.660	3.07	1.660	3.07	1.812	2 5/8	—	—
1.900	2.90	1.900	2.90	2.094	2 11/16	—	—
1.900	3.73	1.900	3.73	2.094	2 11/16	—	—
2-3/8	4.70	2.375	4.70	2.594	4.00	6.00	10.00
2-3/8	5.95	2.375	5.95	2.594	4.00	6.00	10.00
2-3/8	7.45	2.375	7.45	2.594	4.00	6.00	10.00
2-7/8	6.50	2.875	6.50	3.094	4 ¼	6 ¼	10 ¼
2-7/8	7.90	2.875	7.90	3.094	4 ¼	6 ¼	10 ¼
2-7/8	8.70	2.875	8.70	3.094	4 ¼	6 ¼	10 ¼
2-7/8	9.45	2.875	9.45	3.094	4 ¼	6 ¼	10 ¼
3-1/2	9.30	3.500	9.30	3.750	4 ½	6 ½	10 ½
3-1/2	12.95	3.500	12.95	3.750	4 ½	6 ½	10 ½
4	11.00	4.000	11.00	4.250	4 ½	6 ½	10 ½
4-1/2	12.75	4.500	12.75	4.750	4 ¾	6 ¾	10 ¾

See also Figures D.5 and D.6.

NOTE Nominal linear masses are shown for information only.

[a] Labels are for information and assistance in ordering.

[b] The densities of martensitic chromium steels (L80 9Cr and 13Cr) are different from carbon steels. The masses shown are therefore not accurate for chromium steels. A mass correction factor of 0.989 may be used.

[c] The minimum outside diameter of upset D_4 is limited by the minimum length of full-crest threads. See API Spec 5B.

[d] For pup joints only, the length tolerance on L_{eu} is: $^{+4}_{-1}$ in. The length on L_b may be 4 in longer than specified.

[e] For extended length upsets on external upset tubing, add 1 in to the dimensions in columns 6, 7 and 8.

Table E.26 — Integral tubing connection dimensions for API connections, Groups 1 and 2

Labels		Outside dia. D	Nominal linear mass [a]	Upset dimensions in								
				Pin				Box				
				Outside dia. [b] D_4	Inside dia. [c] d_{iu}	Length L_{iu}	Length of taper m_{iu}	Outside diameter W_b	Length L_{eu}	Length of taper m_{eu}	Diameter of recess Q	Width of face b
1	2	in	lb/ft	+0.0625 0	+0.015 0	min.	min.	+0.005 - 0.025	min.			min.
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*
1.315	1.72	1.315	1.72	—	0.970	1 3/8	¼	1.550	1.750	1	1.378	1/32
1.660	2.10	1.660	2.10	—	1.301	1 ½	¼	1.880	1.875	1	1.723	1/32
1.660	2.33	1.660	2.33	—	1.301	1 ½	¼	1.880	1.875	1	1.723	1/32
1.900	2.40	1.900	2.40	—	1.531	1 5/8	¼	2.110	2.000	1	1.963	1/32
1.900	2.76	1.900	2.76	—	1.531	1 5/8	¼	2.110	2.000	1	1.963	1/32
2.063	3.25	2.063	3.25	2.094	1.672	1 11/16	1/4	2.325	2.125	1	2.156	1/32

See also Figure D.7.

[a] Nominal linear masses, upset and threaded, are shown for information only.

[b] The minimum outside diameter D_4 is limited by the minimum length of full-crest threads. See API Spec 5B.

[c] The minimum diameter d_{iu} is limited by the drift test.

Table E.27 — Range lengths

Dimensions in feet

	Range 1	Range 2	Range 3
CASING			
Total range length, inclusive	16.0 to 25.0	25.0 to 34.0	34.0 to 48.0
Range length for 95 % or more of carload [a]			
Permissible variation, max.	6.0	5.0	6.0
Permissible length, min.	18.0	28.0	36.0
THREADED AND COUPLED TUBING AND CASING USED AS TUBING			
Total range length, inclusive	20.0 to 24.0 [b]	28.0 to 32.0 [c]	38.0 to 42.0 [d]
Range length for 100 % of carload [a]			
Permissible variation, max.	2.0	2.0	2.0
INTEGRAL TUBING CONNECTIONS (including IJ/PE and IJ/SF)	20.0 to 26.0 [b]	28.0 to 34.0	38.0 to 45.0
Total range length, inclusive			
Range length for 100 % of carload [a]	2.0	2.0	2.0
Permissible variation, max.			
PUP JOINTS	Lengths 2; 3; 4; 6; 8; 10 and 12 [e]		
	Tolerance ± 3 in		

[a] Carload tolerances shall not apply to order items of less than 40 000 lb of pipe. For any carload of 40 000 lb or more of pipe that is shipped to the final destination without transfer or removal from the car, the tolerance shall apply to each car. For any order item consisting of more than 40 000 lb of pipe that is shipped from the manufacturer's facility by rail, but not to the final destination, the carload tolerance shall apply to the overall quantity of pipe shipped on the order item, but not to the individual carloads.

[b] By agreement between purchaser and manufacturer the maximum length may be increased to 28.0 ft.

[c] By agreement between purchaser and manufacturer the maximum length may be increased to 34.0 ft.

[d] By agreement between purchaser and manufacturer, the maximum length may be increased to 45.0 ft.

[e] 2 ft pup joints may be furnished up to 3 ft long by agreement between purchaser and manufacturer, and lengths other than those listed may be furnished by agreement between purchaser and manufacturer.

Table E.28 — Standard drift size

Dimensions in inches

Product and Label 1	Standard drift mandrel size min.	
	Length	Diameter
Casing		
< 9-5/8	6	d – 1/8
≥ 9-5/8 to ≤ 13-3/8	12	d – 5/32
> 13-3/8	12	d – 3/16
Tubing [a, b]		
≤ 2-7/8	42	d – 3/32
> 2-7/8 to ≤ 8-5/8	42	d – 1/8
> 8-5/8 to < 10-3/4	42	d – 5/32

[a] Integral-joint tubing shall be tested before upsetting with a drift mandrel as shown, and shall also be drift-tested at the pin end, after upsetting, with a cylindrical drift mandrel 42 in in length and d_{bi} – 0.015 in diameter (see Table E.26, col. 6 for d_{bi}).

[b] Casing sizes larger than Label 1: 4-1/2 but smaller than Label 1: 10-3/4 specified by the purchaser to be used in tubing service shall be marked as specified in Clause 11.

Table E.29 — Alternative drift size

Labels		Pipe outside diameter D	Pipe nominal linear mass, T&C	Alternative drift mandrel size in min.	
1	2	in	lb/ft	Length	Diameter
1	*2*	*3*	*4*	*5*	*6*
7	23.00	7.000	23.0	6	6.250
7	32.00	7.000	32.0	6	6.000
7-3/4	46.10	7.750	46.1	6	6.500
8-5/8	32.00	8.625	32.0	6	7.875
8-5/8	40.00	8.625	40.0	6	7.625
9-5/8	40.00	9.625	40.0	12	8.750
9-5/8	53.50	9.625	53.5	12	8.500
9-5/8	58.40	9.625	58.4	12	8.375
10-3/4	45.50	10.750	45.5	12	9.875
10-3/4	55.50	10.750	55.5	12	9.625
11-3/4	42.00	11.750	42.0	12	11.000
11-3/4	60.00	11.750	60.0	12	10.625
11-3/4	65.00	11.750	65.0	12	10.625
13-3/8	72.00	13.375	72.0	12	12.250

Table E.32 — API round-thread casing coupling — Dimensions, tolerances and masses

Label 1	Size [a]	Outside diameter W [b, c]	Minimum length in		Diameter of recess Q [d]	Width of bearing face b	Mass lb	
	Outside diameter D in	in	Short N_L	Long N_L	in	in	Short	Long
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
4-1/2	4.500	5.000	6 ¼	7	4 19/32	5/32	7.98	9.16
5	5.000	5.563	6 ½	7 ¾	5 3/32	3/16	10.27	12.68
5-1/2	5.500	6.050	6 ¾	8	5 19/32	1/8	11.54	14.15
6-5/8	6.625	7.390	7 ¼	8 ¾	6 23/32	¼	20.11	25.01
7	7.000	7.875	7 ¼	9	7 3/32	3/16	18.49	23.87
7-5/8	7.625	8.500	7 ½	9 ¼	7 25/32	7/32	27.11	34.46
8-5/8	8.625	9.625	7 ¾	10	8 25/32	¼	35.79	47.77
9-5/8	9.625	10.625	7 ¾	10 ½	9 25/32	¼	39.75	56.11
10-3/4	10.750	11.750	8	—	10 29/32	¼	45.81	—
11-3/4	11.750	12.750	8	—	11 29/32	¼	49.91	—
13-3/8	13.375	14.375	8	—	13 17/32	7/32	56.57	—
16	16.000	17.000	9	—	16 7/32	7/32	76.96	—
18-5/8	18.625	20.000	9	—	18 27/32	7/32	119.07	—
20	20.000	21.000	9	11 ½	20 7/32	7/32	95.73	126.87

See also Figures D.1 and D.2

[a] The size designation for the coupling is the same as the size designation for the pipe on which the coupling is used.

[b] Groups 1, 2 and 3: Tolerance on outside diameter, W: ± 1 % but not greater than ± 1/8 in.

[c] Group 4: Tolerance on outside diameter W: ± 1 % but not greater than $^{+1/8}_{-1/16}$ in.

[d] Tolerance on diameter of recess, Q, for all groups: $^{+0.031}_{0}$ in.

Table E.33 — API buttress thread casing coupling — Dimensions, tolerances and masses

Label 1	Size [a]	Outside diameter		Minimum length	Diameter of counterbore	Width of bearing face	Mass lb	
	Outside diameter D in	Regular W [b, c] in	Special-clearance W_c [d] in	N_L in	Q in	b in	Regular	Special clearance
1	2	3	4	5	6	7	8	9
4-1/2	4.500	5.000	4.875	8 7/8	4.640	1/8	10.12	7.68
5	5.000	5.563	5.375	9 1/8	5.140	5/32	13.00	8.82
5-1/2	5.500	6.050	5.875	9 ¼	5.640	5/32	14.15	9.85
6-5/8	6.625	7.390	7.000	9 5/8	6.765	¼	24.49	12.46
7	7.000	7.875	7.375	10	7.140	7/32	23.24	13.84
7-5/8	7.625	8.500	8.125	10 3/8	7.765	5/16	34.88	20.47
8-5/8	8.625	9.625	9.125	10 5/8	8.765	3/8	45.99	23.80
9-5/8	9.625	10.625	10.125	10 5/8	9.765	3/8	51.05	26.49
10-3/4	10.750	11.750	11.250	10 5/8	10.890	3/8	56.74	29.52
11-3/4	11.750	12.750	—	10 5/8	11.890	3/8	61.80	—
13-3/8	13.375	14.375	—	10 5/8	13.515	3/8	70.03	—
16	16.000	17.000	—	10 5/8	16.154	3/8	88.81	—
18-5/8	18.625	20.000	—	10 5/8	18.779	3/8	138.18	—
20	20.000	21.000	—	10 5/8	20.154	3/8	110.45	—

See also Figure D.3.

[a] The size designation for the coupling is the same as the size designation for the pipe on which the coupling is used.

[b] Groups 1, 2 and 3: Tolerance on outside diameter W: ± 1 % but not greater than ± 1/8 in.

[c] Group 4: Tolerance on outside diameter W: ± 1 % but not greater than $^{+1/8}_{-1/16}$ in.

[d] Groups 1, 2 and 3: Tolerance on outside diameter W_c: $^{-1/64}_{+1/32}$ in.

Table E.34 — API non-upset tubing coupling — Dimensions, tolerances and masses

Label 1	Size [a] Outside diameter D in	Outside diameter W [b] in	Minimum length N_L in	Diameter of recess Q in	Width of bearing face b in	Maximum bearing face diameter, special bevel B_t in	Mass lb
1	2	3	4	5	6	7	8
1.050	1.050	1.313	3 3/16	1.113	1/16	1.181	0.51
1.315	1.315	1.660	3 ¼	1.378	3/32	1.488	0.84
1.660	1.660	2.054	3 ½	1.723	1/8	1.857	1.29
1.900	1.900	2.200	3 ¾	1.963	1/16	2.050	1.23
2-3/8	2.375	2.875	4 ¼	2.438	3/16	2.625	2.82
2-7/8	2.875	3.500	5 1/8	2.938	3/16	3.188	5.15
3-1/2	3.500	4.250	5 5/8	3.563	3/16	3.875	8.17
4	4.000	4.750	5 ¾	4.063	3/16	4.375	9.58
4-1/2	4.500	5.200	6 1/8	4.563	3/16	4.850	10.77

See Figure D.4.

[a] The size designation for the coupling is the same as the size designation for the pipe on which the coupling is used.

[b] Tolerance on outside diameter W: ±1 %.

Table E.35 — API external-upset tubing coupling — Dimensions, tolerances and masses

Label 1	Size [a] Outside diameter D in	Outside diameter Regular W [b] in	Outside diameter Special clearance W_c [c] in	Minimum length N_L in	Diameter of recess Q in	Width of bearing face, regular b in	Maximum bearing face diameter B_t Regular with special bevel in	Maximum bearing face diameter B_t Special-clearance in	Mass lb Regular	Mass lb Special clearance
1	2	3	4	5	6	7	8	9	10	11
1.050	1.050	1.660	—	3 ¼	1.378	3/32	1.488	—	0.84	—
1.315	1.315	1.900	—	3 ½	1.531	3/32	1.684	—	1.26	—
1.660	1.660	2.200	—	3 ¾	1.875	1/8	2.006	—	1.49	—
1.900	1.900	2.500	—	3 7/8	2.156	1/8	2.297	—	1.85	—
2-3/8	2.375	3.063	2.910	4 7/8	2.656	5/32	2.828	2.752	3.43	2.35
2-7/8	2.875	3.668	3.460	5 ¼	3.156	7/32	3.381	3.277	5.30	3.42
3-1/2	3.500	4.500	4.180	5 ¾	3.813	¼	4.125	3.965	9.03	5.24
4	4.000	5.000	—	6	4.313	¼	4.625	—	10.63	—
4-1/2	4.500	5.563	—	6 1/4	4.813	¼	5.156	—	13.33	—

See also Figure D.5.

[a] The size designation for the coupling is the same as the size designation for the pipe on which the coupling is used.

[b] Tolerance on outside diameter W: ±1 %.

[c] Tolerance on outside diameter W_c: ±0.015 in.

Table E.48 — Marking requirements and sequence

Marking sequence		Mark or symbol [b]	Stencil and/or stamp marking requirements [a]				
			Groups 1 and 3		Groups 2 and 4		All groups
			Pipe	Couplings and accessories	Pipe	Couplings and accessories	Coupling stock
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*
1	Manufacturer's name or mark	« ... »	D or P	D or P	P	P	P
2	API Spec 5CT	5CT [c]	D or P	D or P	P	P	P
	Date of manufacture as in 11.1.8 or 11.1.9.	« ... »	D or P	D or P	P	P	P
3	Unthreaded pipe or special end finish, if applicable (place symbol after specification marking):						
	— Unthreaded pipe either upset or non-upset	PE	D or P		P		
	— Pipe with special end finish threaded by the pipe mill or processor	SF	D or P		P		
	— Couplings or accessories threaded with special end finish	SF		D or P		P	
	— Coupling stock	CS					P
4	Size designation (fill in Label 1 designation from column 1 of Table E.1 or E.2)	« ... »	P		P		
	Specified diameter for coupling stock and other products with no mass designation						P
5	Mass designation (fill in Label 2 designation from Table E.1 or E.2)	« ..... »	D or P		P		
	Specified wall thickness for coupling stock and other products with no mass designation						P
6	Grade of product:						
	— H40	H					
	— J55	J					
	— K55	K					
	— M65	M					
	— N80 Type 1	N1					
	— N80Q	NQ					
	— R95	R					
	— L80 Type 1	L					
	— L80 Type 9Cr	L9					
	— L80 Type 13Cr	L13					
	— C90 Type 1	C90-1					
	— T95 Type 1	T95-1					
	— C110	C110					
	— P110	P					
	— Q125 Type 1	Q1					
	All grade designations		D or P	D or P	P	P	P
7	Sulfide cracking test [f]						
	— C90 Type 1	A, B or D					
	— T95 Type 1	A, B or D					
	— C110	A, D or DA [g]					
	All test method designations				P	P	P

Table E.48 (*continued*)

Marking sequence		Mark or symbol [b]	Stencil and/or stamp marking requirements [a]				
			Groups 1 and 3		Groups 2 and 4		All groups
			Pipe	Couplings and accessories	Pipe	Couplings and accessories	Coupling stock
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*
8	Reduced alternative impact test temperature, if applicable. Fill in specified test temperature for full-size specimens, including ± symbol and °F	« ... »F	P	P	P	P	
9	Heat treatment, if applicable:						
	— J55, K55 or M65 normalised	Z	P	P	P	P	P
	— J55, K55 or M65 normalised & tempered	N&T	P	P	P	P	P
	— M65 quenched & tempered	Q	P	P	P	P	P
10	Process of manufacture:						
	— Seamless	S					
	— Electric-welded	E					
	All designations		D or P		P		
11	Supplementary requirements, if applicable:						
	— A.2 SR1	S1	P		P		
	— A.3 SR2	S2	P		P		
	— A.4 SR9 (fill in type)	S9Q« ... »				P	
	— A.8 SR13	S13		D or P		P	
	— A.10 SR16 (fill in minimum full-size energy absorption requirement, in foot pounds, and test temperature including ± symbol and °F)	S16« ... »F	P		P		
	— A.11 SR22	S22	P	D	P	D	
	— Annex H (PSL)	L2 or L3	P	P	P	P	P
12	Hydrostatic test pressure [e] (fill in the actual test pressure, in psi)						
	All designations	P« ... »	P		P		
13	Type of thread, if applicable	« ... »	P	P	P	P	
14	Full-length drift test, if applicable:						
	— Standard (casing or tubing)	D					
	— Alternative (casing or tubing) where « ... » is the size of the alternative drift	DA« ..... »					
	— For casing specified for tubing service and drift-tested in accordance with 8.10	DT42					
	All designations		P		P		
15	Serialization of Grades C90, T95, C110 and Q125				D [d] or P	D [d] or P	P
16	Tin plating of couplings, if applicable	T		P		P	
17	Couplings H40, J55 and K55 only visually inspected	V		P			

NOTE See 11.4 for mandatory colour code requirements.

[a] D indicates for optional (die) stamping; P indicates a requirement for (paint) stencilling. Optional marking is permitted as specified in 11.1 and 11.2.

[b] A blank space, « ..... », indicates information to be filled in.

[c] The manufacturer may include "API" before "5CT".

[d] Stamp marking shall conform to the requirements of 11.2.5.

[e] Pipe can be identified as manufactured to SI units by the marked hydro-test pressure which will be less than 100 (MPa), while the pressure marked for pipe manufactured to USC units will be over 1 000 (psi). This information is used to clearly identify the units used for CVN markings, which shall be in the same unit system as the pressure markings.

[f] "A" when tested using Method A (smooth tensile), "B" when tested using Method B, (bent beam), "D" when tested using Method D (DCB).

[g] For Grade C110 only, "DA" when tested using a test solution other than ANSI-NACE TM0177-2005 Test Solution A.

Table E.49 — Retention of records

Requirement	Sub-clause reference
Chemical properties	
Heat analysis	10.3.1
Product analysis	10.3.2
Mechanical properties	
Heat control tensile tests	10.4.2
Tensile tests on products	7.2, 10.4.7
Impact tests on products	7.4, 7.5, 7.6 , 10.7
Hardness tests	7.7, 7.8, 7.9 and 10.6
Hardenability tests (Grades C90, T95 and C110)	7.10, 10.9
Grain size (Grades C90, T95 and C110)	7.11, 10.8
Coupling tests	9.3
Hydrostatic tests	
Tester recorder charts	10.12.1
Testing	10.12.1
Manufacturer certification	
Results of all required tests (Group 4)	13.3
Sulfide stress cracking test (Grades C90, T95 and C110)	7.14, 10.10
Calibration	Various

Table E.51 — SR12.1 Inspection lot sample sizes vs. F factor

Sample size	F	Sample size	F
1	*2*	*3*	*4*
3	13.857	16	4.534
4	9.215	18	4.415
5	7.501	20	4.319
6	6.612	25	4.143
7	6.061	30	4.022
8	5.686	35	3.937
9	5.414	40	3.866
10	5.203	45	3.811
12	4.900	50	3.766
14	4.690	∞	3.090

5.0 TESTING REQUIREMENTS

5.1 DEFECTS

API Specification 5CT – 10.15.12
Coupling stock containing defects may be given further evaluation in accordance with 10.15.15, except the maximum size of the non-surface-breaking imperfection specified in 8.13.1 c) shall be reduced to 32 mm2 (0.05 in2). Coupling stock containing defects shall either be given a disposition in accordance with 10.15.18, or the section of coupling stock containing the defect shall be cut off within the limits of the requirements on length specified on the coupling stock purchase agreement.

5.2 DEPTH TESTING

API Specification 5CT – 10.15.16
For the evaluation of an indicated imperfection, the depth shall be measured by one of the following methods

a) using a mechanical measuring device (for example, pit gauge, callipers, etc.). Removal of material by grinding or other means to facilitate measurement shall not, for pipe, reduce the remaining wall thickness below 87,5 % of the specified wall thickness or, for coupling stock, reduce the remaining outside diameter or wall thickness below the minimum specified on the purchase agreement. Abrupt changes in wall thickness caused by material removal during prove-up shall be removed.

b) using an ultrasonic technique(s) (time- and/or amplitude-based), or other comparable techniques. Verification of the ultrasonic technique(s) shall be documented, and shall show capability to differentiate imperfection sizes larger and smaller than the appropriate defect size stated in 8.13.

If the purchaser and manufacturer do not agree on the evaluation test results, either party may require destructive evaluation of the material; after which disposition shall be as described in B.4

5.3 DRIFT TESTING

5.3.1 API Specification 5CT – 8.1

When specified by the purchaser as "alternative drift pipe", pipe in the sizes and masses in Table C.29 or Table E.29 shall be tested with the alternative drift mandrels as shown. Pipe which is drifted with the alternative drift mandrels shall be marked as described in Clause 11.

5.3.2 API Specification 5CT – Annex G.4.1

The SI values for standard drift diameters of pipe were calculated (not converted) using Equation G.6

$$dd_m = d_m - dc_m \quad \text{(G.6)}$$

where

dd_m is the drift diameter, expressed in millimetres;

d_m is the inside diameter, expressed in millimetres;

dc_m is the drift constant, expressed in millimetres.

The drift constants used are given below.

Product	Label 1	dc_m mm
Casing	< 9-5/8	3,18
	9-5/8 to 13-3/8	3,97
	> 13-3/8	4,76
Tubing	≤ 2-7/8	2,38
	> 2-7/8	3,18
Casing specified by the purchaser to be used in tubing service where Label 1 is larger than 4-1/2 but smaller than 10-3/4	> 4-1/2 to 8-5/8	2,38
	> 8-5/8 to 10-3/4	3,18

The calculated SI values for standard drift diameters were rounded to the nearest 0,01 mm.

5.4 FREQUENCY & RETESTING

5.4.1 API Specification 5CT – 7.14.2

a) Grades C90 and T95 for each lot, as specified by 10.2, manufacturers shall demonstrate that the product meets or exceeds the minimum SSC requirement using one of the ANSI-NACE TM0177-2005 test methods given in 7.14.5. If the purchaser requires an SSC requirement higher than the minimum, or requires a specific test method from the list below, agreement shall be reached between purchaser and manufacturer.

Additional requirements for PSL-3 products are specified in Annex H.

b) Grade C110 for each lot, as defined in 10.2, manufacturers shall demonstrate that the product meets or exceeds the minimum SSC requirement using ANSI-NACE TM0177-2005 test Method A or test Method D as given in 7.14.5. If the purchaser requires an SSC requirement higher than the minimum or requires a specific test method, agreement shall be reached between the purchaser and manufacturer.

c) For Method A full size tensile test specimens shall be used except where sub-size tensile specimens are required because of product size constraints.

d) For Method D, a full size DCB specimen shall be used except where sub-size DCB specimens are required because of product size constraints. When Method D sub-size or alternative specimens are required, acceptance criteria shall be agreed between the purchaser and manufacturer.

e) When not specified in this Standard, the details of the manufacturer's qualification, frequency of sulfide stress-cracking testing, retest procedures and testing practices should be addressed by the purchaser and manufacturer prior to placing or accepting a purchase agreement.

5.4.2 API Specification 5CT – 9.3
Couplings shall conform to the mechanical requirements specified in Clauses 7 and 10, including the frequency of testing, re-test provision, etc. A record of these tests shall be open to inspection by the purchaser.

5.5 HARDNESS TESTING

5.5.1 API Specification 5CT – 7.9
All individually heat-treated coupling blanks, pup joints or accessory material shall be surface hardness tested to verify process control. For Grades C90, T95 and C110, the surface hardness test results shall be used in the selection of the pieces for through-wall hardness testing. The process-control hardness test results need not be provided by the manufacturer or processor unless specified on the purchase agreement.

5.5.2 API Specification 5CT – 10.6.2
Additional hardness testing on the outside surface and through-wall hardness testing of pipe and upsets may be carried out as agreed between purchaser and manufacturer. Test procedures for this additional testing shall be agreed between purchaser and manufacturer.

5.5.3 API Specification 5CT – 10.6.5
For Grade C110, one through-wall hardness test in one quadrant shall be made on each length from both ends of each pipe. If the manufacturer applies a process control plan which has been demonstrated to the satisfaction of the purchaser to be sufficient to ensure that the entire length of the pipe has homogeneous hardness properties, the testing frequency may be reduced to the frequency applicable for Grades C90 and T95.

5.5.4 API Specification 5CT – 10.6.10
The use of the Rockwell B-scale on materials having a hardness below 20 HRC is at the manufacturer's option or as specified on the purchase agreement. Rockwell hardness numbers and mean hardness numbers shall be reported in Rockwell C, from actual or converted numbers, to the first or second decimal place. When

A.9 SR15 is specified on the purchase agreement, the manufacturer shall provide these data to the purchaser.

5.5.5 API Specification 5CT – 10.6.12
The testing machine shall be checked at the beginning and end of a continuous run of testing and at such times as are required to assure the operator of the equipment and the purchaser (or his representative) that the machine is satisfactory. In any event, checks should be made at least every 8 h of a continuous run of testing. Checks shall be made on standardized test blocks within the following hardness ranges

5.6 HYDROSTATIC TESTING

5.6.1 API Specification 5CT – 10.12.2
For threaded pipe, the hydrostatic test pressures shall be standard pressures calculated as described in 10.12.3, or a higher pressure as agreed upon between the purchaser and the entity performing the threading.

5.6.2 API Specification 5CT – 10.12.2
For plain-end pipe except Grade Q125, the hydrostatic test pressures shall be the pressures calculated as described in 10.12.3, or a higher pressure as agreed upon between purchaser and manufacturer. This does not preclude conducting subsequent hydrostatic tests at a fibre stress not exceeding 80 % of specified minimum yield strength, in accordance with the formula listed below. Failure to pass this hydrostatic test without leakage is basis for rejection.

5.6.3 API Specification 5CT – 10.12.3
The manufacturer shall have a documented design basis to establish the physical limitations of the hydrostatic test equipment. If the calculated test pressure (based on the outside diameter, thickness and grade) is greater than the physical capability of the hydrostatic test equipment, the manufacturer, upon agreement with the purchaser, shall use a test pressure equal to the physical capability of the test equipment. However, the hydrostatic test capability may be less than 20,5 MPa (3 000 psi) only for those

products where the calculated test pressure is less than 20,5 MPa (3 000 psi).

5.6.4 API Specification 5CT – 10.12.3
Alternative test pressures for Grades H40, J55 and K55 in sizes larger than Label 1 9-5/8 are calculated using a factor f of 0,8. For Grades C110, P110 and Q125, when the calculated test pressure exceeds 69,0 MPa (10 000 psi), the standard test pressure is limited to 69,0 MPa (10 000 psi) and the alternative test pressure is as calculated. The alternative test pressures are given in parentheses in the tables. Alternative test pressures shall be used when specified on the purchase agreement and when agreed by the purchaser and manufacturer.

5.7 IMPACT TESTING

5.7.1 API Specification 5CT – 7.5.6
For all other grades except Grades H40, J55, K55 and N80 Type 1 (which have no mandatory impact requirements for pipe), compliance with the requirements of 7.5.3 may be qualified by a documented procedure in lieu of testing, at the manufacturer's option, unless A.10 SR16 is specified on the purchase agreement, in which case testing is mandatory as specified in 10.7

5.7.2 API Specification 5CT – 10.5.5
The requirements in A.6 SR11 shall apply when EW pipe and A.6 SR11 are specified on the purchase agreement (see 6.1).

5.7.3 API Specification 5CT – Annex A.10.1
When A.10 SR16 is specified on the purchase agreement for Group 1 Grades N80Q and R95, Group 2 (except M65), and Group 3, the testing provisions of 10.7, which are optional for the manufacturer in accordance with 7.5.6, become mandatory. When A.10 SR16 is specified on the purchase agreement for Group 1 Grades H40, J55, K55 and N80 Type 1, the requirements in A.10.2 are mandatory.

5.8 NDE TESTING

API Specification 5CT – 8.13.1
When NDE (except visual) is specified by this Standard [see 10.15, A.2 SR1 and A.3 SR2] or specified on the purchase agreement, any non-surface-breaking imperfection detected that, when outlined on the outside surface, has an area greater than 260 mm2 (0.40 in2).

5.9 PRODUCT ANALYSES

5.9.1 API Specification 5CT – 10.3.2
For Groups 1, 2 (except for Grade C110) and 3, the product analyses shall be available to the purchaser on request.

5.9.2 API Specification 5CT – 10.3.2
For Grades C110 and Q125, the product analyses shall be provided to the purchaser.

5.9.3 API Specification 5CT – 10.3.4
Samples for re-check product analyses shall be taken in the same manner as specified for product analysis samples. The results of all re-check product analyses shall be provided to the purchaser when specified on the purchase agreement.

5.10 SHEAR TESTING

API Specification 5CT – Annex H.6.1
Either

a) the minimum shear area shall be 75 %, in accordance with ASTM E23; or

b) the manufacturer may use a documented procedure (taking into account, as a minimum, variations in chemistry, diameter and wall thickness) together with the impact test results to demonstrate that the upper shelf behavior is achieved

If the minimum shear area is less than 75 % or if the requirements of b) are not met, then either the material shall be rejected or a transition curve shall be made to demonstrate that the product is

on the upper shelf at the specified test temperature (either the standard test temperature or a reduced test temperature specified by the purchaser).

5.11 TEST SPECIMENS

5.11.1 API Specification 5CT – 7.14.3

For all test methods, when agreed by the purchaser, the manufacturer may use randomly selected test specimens provided prior documented validation test results or previous qualification of the manufacturing procedure (according to ISO 15156-2 or ANSI-NACE MR0175/ISO 15156-2) confirm that the manufacturing procedure results in products that meet the SSC requirements of this Standard.

5.11.2 API Specification 5CT – 10.7.3

For pipe, one set of test specimens shall be taken from each lot unless compliance with the requirements is qualified by a documented procedure, see 7.5.6. If A.10 SR16 is specified in the purchase agreement, testing is mandatory.

5.12 SUPPLEMENTARY REQUIREMENTS

5.12.1 API Specification 5CT – 1.4

Supplementary requirements that can optionally be agreed between purchaser and manufacturer for non-destructive examination, fully machined coupling blanks, upset casing, electric-welded casing, tubing and pup joints, impact testing, seal ring couplings, test certificates, tensile testing and sulfide stress cracking testing are given in Annex A.

5.12.2 API Specification 5CT – 7.2.4

By agreement between purchaser and manufacturer the supplementary requirements for statistical tensile testing of Grades C90, T95 and C110 in A.12 (SR38) shall apply.

5.12.3 API Specification 5CT – 7.3.8

By agreement between purchaser and manufacturer, the supplementary requirements for statistical impact testing in A.7 SR12 shall apply.

5.12.4 API Specification 5CT – 13.2
Where additional information is required, including the results of mechanical testing, the supplementary requirement in A.9 SR15 shall be specified in the purchase agreement.

5.13 TEMPERATURE TESTING

5.13.1 API Specification 5CT – 7.3.7
The test temperature shall be 0 °C (32 °F) for all groups except Group 1, Grades J55 and K55. Grades J55 and K55 shall be tested at 21 °C (70 °F). An alternative lower test temperature may be specified on the purchase agreement or selected by the manufacturer for any grade. The tolerance on the test temperature shall be · 3 °C (· 5 °F).

5.13.2 API Specification 5CT – Annex A.10.6.3
The test temperature for full-size test specimens shall be specified by the purchaser as

a) + 21 °C (+ 70 °F), or

b) 0 °C (+ 32 °F), or

c) – 10 °C (+ 14 °F), or

d) other temperature as specified on the purchase agreement.

The tolerance on the test temperature for full-size test specimens shall be · 3 °C (· 5 °F).
The test temperature shall be reduced as specified in A.10.6.5 SR16.5.5 for Grades H40, J55 and K55 when sub-size test specimens are required.

Additional requirements for PSL-2 and PSL-3 product are given in Annex H.

5.13.3 API Specification 5CT – Annex A.10.7
The size and orientation of the test specimen (i.e. full-size, ¾-size or ½-size), the actual test temperature (i.e. specified temperature less the test temperature reduction that may be applicable for Grades H40, J55, and K55), the results of the individual specimens (i.e. the impact energy absorption and the percentage shear), and the average absorbed energy shall be reported to the purchaser.

5.13.4 API Specification 5CT – Annex H.6.2.1
Impact testing shall be carried out in accordance with A.10 SR16. The test temperature shall be 21 °C (70 °F) for Grades J55 and K55 and 0 °C (32 °F) for all other grades, or a lower temperature by agreement between purchaser and manufacturer.

5.14 TENSILE TESTING

5.14.1 API Specification 5CT – 7.2.1
The tensile properties of upset casing and tubing, except elongation of the upset ends, shall comply with the requirements given for the pipe body. In case of dispute, the properties (except elongation) of the upset shall be determined from a tensile test specimen cut from the upset. A record of such tests shall be available to the purchaser.

5.14.2 API Specification 5CT – 10.4.5
When tensile testing of the upset is required, the purchaser and manufacturer shall agree upon the most representative type and size of test specimen to be used for the test.

5.14.3 API Specification 5CT – 10.4.6
Tensile test specimens for coupling blanks and pup joint or accessory material heat-treated in coupling blank or individual lengths shall be removed from the piece as illustrated in Figure D.9. Reduced-section strip specimens may be used by agreement between purchaser and manufacturer

5.14.4 API Specification 5CT – 10.10
For Grade C110, the level of resistance to sulfide stress cracking shall be evaluated using the tensile method (Method A), unless one of the DCB methods (Method D) in Annex A.13, SR39 is specified on the purchase agreement.

5.14.5 API Specification 5CT – Annex A.5.2
Tensile, impact and hardness properties of the pipe and upset shall comply with the requirements of Clause 7. The allowable hardness variation of the upset shall be based on the nominal wall thickness of the upset specified on the purchase agreement. The tensile test specimens for the upset shall be the largest round specimen feasible. The size to be used shall be agreed by the purchaser and manufacturer prior to testing.

5.15 WALL THICKNESS

5.15.1 API Specification 5CT – 10.13.4
For Grade C110, wall thickness shall be measured over the full length, with a minimum coverage of 100 % of the surface area covered by the automatic system. The minimum measured wall thickness for each pipe shall be reported. Traceability by pipe is only required when specified on the purchase agreement.

5.15.2 API Specification 5CT – 10.13.4
Accessory material shall have the wall thickness verified if so specified in the purchase agreement.

6.0 SHIPPING REQUIREMENTS

6.1 SHIPPING

6.1.1 API Specification 5CT – 8.14.1
All casing couplings and regular tubing couplings shall be screwed onto the pipe power-tight, except that they shall be screwed on handling-tight (see Note 1 below) or shipped separately if so specified on the purchase agreement. Special-clearance tubing couplings shall be screwed onto the pipe handling-tight, except that they shall be shipped separately if so specified on the purchase agreement.

6.1.2 API Specification 5CT – 8.14.2
The requirements for Group 4 are the same as that shown in 8.14.1, except that couplings with API threads shall be shipped separately unless power-tight make-up is specified on the purchase agreement.

6.1.2 API Specification 5CT – Annex H.20
Unless otherwise specified on the purchase agreement, seal rings for field-end box threads shall be shipped separately in a sealed package labelled with the quantity, connection , connection manufacturer, date inspected, and date packaged.

7.0 DOCUMENTATION REQUIREMENTS

7.1 DOCUMENTATION

7.1.1 API Specification 5CT – 13.1

A material test report, certificate of compliance or similar document printed from or used in electronic form from an electronic data interchange (EDI) transmission shall be regarded as having the same validity as a counterpart printed in the certifier's facility. The content of the EDI-transmitted document shall meet the requirements of this Standard and conform to any existing EDI agreement between purchaser and manufacturer.

7.1.2 API Specification 5CT – Annex A.1

This annex describes supplementary requirements that may be specified by the purchaser or agreed between purchaser and manufacturer. These requirements apply only when stated on the purchase agreement.

8.0 PURCHASE AGREEMENT

8.1 PURCHASE AGREEMENT

8.1.1 API Specification 5CT – 5.1

The purchaser should refer to ISO 15156-2 or ANSI-NACE MR0175/ISO 15156-2 for guidance on the usage of Grades C90, T95 and C110. Particular attention should be given to the application of Grade C110 in ISO 15156-2 or ANSI-NACE MR0175/ISO 15156-2 SSC Regions 2 or 3, as this material is not suitable for all sour (hydrogen sulfide-containing) service applications.

NOTE The SSC test is for quality control purposes only and does not qualify the material for any specific sour service application. It is the product user's responsibility to ensure that the product is suitable for the intended application.

8.1.2 API Specification 5CT – 5.2.1

When enquiring or placing orders for pipe manufactured in accordance with this Standard, the purchaser shall specify the following

Requirement	**Reference**
Standard	API 5CT
Quantity	
Type of pipe or couplings	
Casing	
Threaded or plain-end	8.12.1, Table C.1 or Table E.1
Type of connection SC, LC or BC or other connection	8.12.2, Table C.1 or Table E.1
With or without couplings	8.12.2, Table C.1 or Table E.1
Special clearance couplings – BC	9.6, Tables C.1, C.33 or Tables E.1, E.33
Special clearance couplings with special bevel – BC	9.6
Label 1 or specified outside diameter	Table C.1 or Table E.1
Label 2 or specified mass or wall thickness	Table C.1 or Table E.1
Grade and type where applicable	Tables C.1, C.4 or Tables E.1, E.4
Range length	8.6, Table C.27 or Table E.27
Seamless or electric-welded	6.1, Table C.3 or Table E.3
Critical thickness for special end-finish couplings, stock or blanks	7.6.6
Delivery date and shipping instructions	
Inspection by purchaser	Annex B

8.1.3 API Specification 5CT – 5.2.2

The purchaser shall also state on the purchase agreement the requirements, where applicable, concerning the following stipulations, which are at the purchaser's option

Requirement	Reference
Heat treatment	6.2, Table C.3 or Table E.3
Lower alternative impact test temperature	7.3.7
Impact testing for Group 1 Grades N80 type Q and R95, Group 2 (except M65) and Group 3	7.5.6, A.10 SR16
Impact testing for Group 1 Grades H40, J55, K55, N80 type 1	7.5.1, A.10 SR16
Casing jointers – SC and LC	8.7
Alternative drifting requirements	8.10
Casing with couplings detached	8.14
Coupling make-up (other than power-tight)	8.14
Coupling grade	9.2
Seal ring couplings	9.9, A.8 SR13
Heat and supplementary analyses	10.3
Additional markings	11
Pipe coatings	12.1
Material certification	13.2, A.9 SR15
Product Specification Level (PSL-2 or PSL-3)	Annex H
Alternative grades or heat treatments of coupling	9.2
Statistical tensile test - Grades C90, T95, C110	A.12 SR38
Combination couplings	9.7
Reducing couplings - Groups 1, 2 and 3	9.8

8.1.4 API Specification 5CT – 5.2.3

The following may be agreed between purchaser and manufacturer

Requirement	Reference
Upset – Grade C110	6.1
Cold rotary straightening - Grade Q125	6.3.6
Statistical tensile testing	7.2.4, A.12 SR38
Statistical impact testing	7.3.8, A.7 SR12
Impact of Group 1 non-heat-treated pipe	7.5.1, A.10 SR16
Sulfide stress cracking test - Grades C90 and T95	7.14
Sulfide stress cracking test and test solution – Grade C110	7.14, A.13 SR39
Thread and storage compound	8.14
Waiving NDE of Group 1 couplings in Grades H40, J55 and K55	9.12.3
Coupling thread surface treatment - Grade Q125 only	9.15
Reduced section tensile specimens – Grade Q125	10.4.6
Additional hardness testing	10.6.2
Alternative hydrostatic test pressures	10.12.3
Plain-end Grade Q125 casing hydrostatic testing	10.12.2
Non-destructive examination	10.15, A.2 SR1, A.3 SR2, A.5 SR10 and A.6 SR11
Marking requirements	11

Thread protectors	12.2
Coupling blanks – Grade Q125 only	9.4.2, A.4 SR9
Upset casing – Grade Q125 only	A.5 SR10
Electric-weld casing and pup joints – Grades P110 and Q125	A.6 SR11
Alternative *F* factor for statistical impact testing	A.7.2 SR12.2
Special end-finish for casing, couplings or pup joints	8.12.6, 9.11.2
Special size and wall thickness – plain-end pipe	8.2
Enhanced leak resistance LC connections	A.11 SR22

8.1.5 API Specification 5CT – 5.3.1

When enquiring or placing orders for pipe manufactured in accordance with this Standard, the purchaser shall specify the following

Requirement	**Reference**
Standard	API 5CT
Quantity	
Type of pipe or couplings	
Tubing	
Non-upset, external-upset or integral joint	Table C.2 or Table E.2
Threaded, plain-end, or other connection	8.12
With or without couplings	8.12
Regular couplings with special bevel – NU, EU	9.10, Tables C.24, C.34 and C.35 or Tables E.24, E.34 and E.35
Special clearance couplings – EU	9.6, Tables C.24, C.35 or Tables E.24 and E.35
Label 1 or specified outside diameter	Table C.2 or Table E.2
Label 2 or specified mass or wall thickness	Table C.2 or Table E.2
Grade and type, where applicable	Table C.2 or Table E.2, Table C.4 or Table E.4
Range length	8.6, Table C.27 or Table E.27
Seamless or electric-welded	6.1, Table C.3 or Table E.3
Critical thickness for special end-finish couplings	7.4.6
Delivery date and shipping instructions	
Inspection by purchaser	Annex B

8.1.6 API Specification 5CT – 5.3.2

The purchaser shall also state on the purchase agreement the requirements, where applicable, concerning the following stipulations, which are at the purchaser's option

Requirement	Reference
Heat treatment	6.2, Table C.3 or Table E.3
Lower alternative impact test temperature	7.3.7
Impact testing for Group 1 Grades N80 type Q and R95, Group 2 (except M65) and Group 3	7.5.6, A.10 SR16
Impact testing for Group 1 Grades H40, J55, N80 type 1	7.5.1, A.10 SR16
Alternative drift requirements	8.10
Extended length upset	8.11.6
Rounded nose for EU	8.12.3
Coupling make-up (other than power-tight)	8.14
Tubing with couplings detached	8.14
Coupling grade	9.2
Alternative grades or heat treatments of coupling	9.2
Combination couplings	9.7
Reducing couplings — Groups 1, 2 and 3	9.8
Seal ring couplings	9.9, A.8 SR13
Heat and supplementary analyses	10.3
Additional hardness testing	10.6.2
Additional markings	11
Pipe coatings	12.1
Material certification	13.2, A.9 SR15
Product Specification Level (PSL-2 or PSL-3)	Annex H

8.1.7 API Specification 5CT – 5.3.3

The following may be agreed between purchaser and manufacturer

Requirement	Reference
Statistical tensile test	7.2.4, A.12 SR38
Statistical impact testing	7.3.8, A.7 SR12
Impact testing of Group 1 non-heat-treated pipe	7.5.1, A.10 SR16
Sulfide stress cracking test — Grades C90 and T95	7.14
Extended length upsets – EU	8.11.6
Upset length – regular or extended	8.11.6
Thread and storage compound	8.14
Special end-finish for tubing, couplings or pup-joints	8.12.6, 9.11.3
Waiving NDE of Group 1 couplings in Grades H40, J55 and K55	9.12.3
Additional hardness testing	10.6.2
Alternative hydrostatic test pressures	10.12.3
Non-destructive examination	10.15, A.2 SR1, A.3 SR2, A.5 SR10 and A.6 SR11
Marking requirements	11
Thread protectors	12.2

Electric-weld tubing and pup joints — Grade P110	A.6 SR11
Special size and wall thickness	8.2
Casing used for tubing	8.2, Table C.27 or Table E.27

8.1.8 API Specification 5CT – 5.4.1

When enquiring or placing orders for coupling stock, coupling material or accessory material manufactured in accordance with this Standard, the purchaser shall specify the following

Requirement	**Reference**
Standard	API 5CT
Quantity	
Kind of product coupling stock, coupling material or accessory material	
Outside diameter and tolerances	8.2
Wall thickness and tolerances	8.2
Straightness tolerance	8.9.2
Length	8.6
Grade and type, where applicable	Tables C.3 & C.4 or Tables E.3 & E.4
Impact requirements or critical thickness	7.4
Inspection by purchaser	Annex B
Critical thickness for special end-finish accessory material	7.6.6
Wall thickness verification of special end-finish accessory material	10.13.4
Delivery date and shipping instructions	

8.1.9 API Specification 5CT – 5.4.2
The purchaser shall also state on the purchase agreement the requirements, where applicable, concerning the following stipulations, which are at the purchaser's option

Requirement	Reference
Heat treatment	6.2, Table C.3 or Table E.3
Statistical tensile testing	7.2.4, A.12 SR38
Statistical impact testing	7.3.8, A.7 SR12
Impact testing	7.5.3, A.10 SR16
Sulfide stress cracking test – Grades C90 and T95	7.14
Sulfide stress cracking test and test solution – Grade C110	7.14, A.13 SR39
Heat and supplementary analyses	10.3
Additional markings	11
Material certification	13.2, 13.3, A.9 SR15
Product Specification Level (PSL-2 or PSL-3)	Annex H

8.1.10 API Specification 5CT – 6.1
Electric-welded Grade P110 pipe and Grade Q125 casing shall be provided only when the supplementary requirement in A.6 SR11 is specified on the purchase agreement.

8.1.11 API Specification 5CT – 6.1
Grade Q125 upset casing shall be provided only when the supplementary requirement in A.5 SR10 is specified on the purchase agreement.

8.1.12 API Specification 5CT – 7.6.5
By agreement between the manufacturer and purchaser, the provisions of A.10 SR16 shall apply.

9.0 PROCESSING REQUIREMENTS

9.1 SUPPLEMENTARY REQUIREMENTS

API Specification 5CT – Annex A.9.1
The manufacturer shall provide the following data, as applicable, for each item for which this Supplementary Requirement is specified on the purchase agreement. The manufacturer's certificate shall cite this Standard, and revision date thereof, to which the product was manufactured.

a) SR15.1.1
Specified diameter, wall thickness, grade, process of manufacture and type of heat treatment.

b) SR.15.1.2
The minimum tempering temperature allowed by the documented heat treatment procedure for each lot of quenched and tempered or normalised and tempered casing and tubing (except coupling stock and coupling material).

c) SR15.1.3
Chemical analyses (heat, product, control, and re-check) showing the mass fraction, expressed as a percent, of all elements whose limits or reporting requirements are set in this Standard.

d) SR15.1.4
Test data for all tensile tests required by this Standard, including yield strength, tensile strength, elongation. The type, size and orientation of specimens shall be shown.

If elongation is recorded or reported, the record or report shall show the nominal width of the test specimen when strip specimens are used, the diameter and gauge length when round-bar specimens are used, or it shall state when full-section specimens are used.

e) SR15.1.5
Where impact testing is required by this Standard, impact test results including

• the test criteria
• the size, location and orientation of the test specimen

- the nominal test temperature (i.e. the actual test temperature, including the sub-size temperature reduction if applicable)
- the absorbed energy measured for each test specimen and
- the average absorbed energy for each test.

The percent shear area shall be reported for
- Grade C110 as specified in 7.3.1.
- PSL-2 or PSL-3 product as specified in H.6.1 or

f) SR15.1.6
Hardness test results (including Rockwell hardness numbers and mean hardness numbers, test type and criterion, and specimen location and orientation) where such testing is required.

g) SR15.1.7
The grain size and the test method used to determine the grain size.

h) SR15.1.8
For Grade C110 tested in accordance with A.13 (SR39), the certification shall include a statement specifying if the SSC testing was performed in Solution A or the actual percent H2S when performed in the solution described in A.13.3 (SR39.3).

i) SR 15.1.9
The information specified in the ANSI-NACE TM0177-2005 "NACE UNIFORM Material Testing Report Form (Part 2) Testing in Accordance with ANSI-NACE TM0177 Method – NACE Standard DCB Test" shall be provided.

j) SR15.1.10
Minimum hydrostatic test pressure and duration.

k) SR15.1.11
For welded pipe for which NDE of the weld seam is required by this Standard, the method of NDE employed (ultrasonic, electromagnetic and/or magnetic particle) and the type of reference standard.

l) SR15.1.12

For seamless product for which NDE is specified by the purchaser (either in the body of this Standard, in the Supplementary Requirements or in the purchase agreement), the method of inspection employed (ultrasonic, electromagnetic or magnetic particle) the acceptance level, the location and orientation of the reference indicator used. and the type and size of the reference standard used.

m) SR15.1.13
For electric-welded pipe, the minimum temperature for heat treatment of the weld seam. If such heat treatment is not performed, "No Seam Heat Treatment" shall be stated on the certificate.

n) SR15.1.14
Results of any supplemental testing required by the purchaser.

9.2 COATING

9.2.1 API Specification 5CT – 12.1.1
Unless otherwise specified on the purchase agreement, pipe and couplings shall be given an external coating for protection from rust while in transit. An attempt should be made to make these coatings smooth, hard to the touch and with minimum sags. The coating shall be rated to protect the pipe for at least three months.

9.2.2 API Specification 5CT – 12.1.1
Unless otherwise specified on the purchase agreement, coupling stock, coupling material and accessory material shall be supplied without external coating (bare), except for a protective coating that may be applied over the stencil.

9.2.3 API Specification 5CT – 12.1.1
The purchase agreement shall specify when bare pipe or specially coated pipe is required. For special coatings, the purchase agreement shall further specify whether the coating shall be applied to the full length or whether a certain specific distance from the end shall be left un-coated. Unless otherwise specified, such bare ends are commonly given a coating with oil for protection in transit.

9.2.4 API Specification 5CT – 12.1.2

By agreement between purchaser and manufacturer, protective coatings, internal and external, may be required for pipe for long-term storage to protect against corrosion, especially when stored in a marine environment.

The following points shall apply.

a) The protection shall be effective against corrosion in a marine environment during the long-term storage period defined by the purchaser and manufacturer; minor surface discolouration shall be acceptable.

b) There shall be no need for removal of the protective coating before the running of the tubulars.

c) Correct application of the coating is essential and the following parameters shall be assessed

- dryness of the pipe;
- cleanliness of the pipe;
- temperature at application;
- thickness of the coating film.

9.3 HEAT TREATMENT

9.3.1 API Specification 5CT – 6.2.1
Product shall be heat-treated in accordance with a documented procedure as stipulated in Table C.3 or Table E.3 for the particular grade and type specified on the purchase agreement.

9.3.2 API Specification 5CT – 6.2.2
For Grades J55 and K55 product the heat treatment (see Table C.3 or Table E.3) is at the manufacturer's option unless a specific type of treatment, consistent with Table C.3 footnote b or Table E.3 footnote b, is specified on the purchase agreement.

9.3.3 API Specification 5CT – 6.2.3
When requested by the purchaser, the manufacturer shall produce evidence to show that the tempering practice will result in the pipe attaining the minimum tempering temperature.

9.3.4 API Specification 5CT – 6.3.6
Gag-press straightening or hot rotary-straightening at 400 °C (750 °F) minimum at the end of rotary-straightening is acceptable (unless a higher minimum temperature is specified on the purchase agreement). If hot rotary-straightening is not possible, the product may be cold rotary-straightened provided it is then stress-relieved at 510 °C (950 °F) or higher. Product may be cold rotary-straightened without subsequent stress-relieving only by agreement between purchaser and manufacturer.

9.3.5 API Specification 5CT – 7.1
For Grade C110 the manufacturer shall inform the purchaser at the time of inquiry of the minimum and maximum concentrations for all elements intentionally added to each heat, regardless of the purpose of the addition.

9.3.6 API Specification 5CT – 9.2.1

When heat treatment is not stipulated on the purchase agreement, Grade H40 pipe shall be furnished with Grade H40, J55 or K55 couplings which are either as-rolled, normalised, normalised and tempered, or quenched and tempered.

9.3.7 API Specification 5CT – 9.2.2
When heat treatment is not stipulated on the purchase agreement, Grade J55 pipe shall be furnished with Grade J55 or K55 couplings which are either as-rolled, normalised, normalised and tempered, or quenched and tempered.

9.3.8 API Specification 5CT – 9.2.3
When heat treatment is not stipulated on the purchase agreement, Grade K55 pipe shall be furnished with Grade K55 couplings which are either as-rolled, normalised, normalised and tempered, or quenched and tempered.

9.3.9 API Specification 5CT – 10.3.1
For Groups 1, 2 (except Grade C110) and 3, when requested by the purchaser, the manufacturer shall furnish a report giving the heat analysis of each heat of steel used in the manufacture of product specified on the purchase agreement. In addition the purchaser, upon request, shall be furnished the results of quantitative analyses for other elements used by the manufacturer to control mechanical properties.

9.3.10 API Specification 5CT – 10.3.1
For Grades C110 and Q125, the manufacturer shall furnish a report giving the heat analysis of each heat of steel used in the manufacture of product specified on the purchase agreement. The report shall include quantitative analyses for other elements used by the manufacturer to control mechanical properties.

9.3.11 API Specification 5CT – 13.2
A record of heat control tests shall be available to the purchaser.

9.3.12 API Specification 5CT – Annex H.4

The manufacturer shall inform the purchaser at the time of inquiry of the minimum and maximum concentrations for all elements intentionally added to each heat, regardless of the purpose of the addition.

9.3.13 API Specification 5CT – Annex H.9.2
If requested by the purchaser, the manufacturer shall for each heat demonstrate that the product meets or exceeds the 80 % SMYS threshold using test Method A in accordance with ANSI-NACE TM0177-2005. The test solution shall have a pH of 3,5 and a partial pressure of H2S of 10 kPa (1.5 psi).

9.4 PROCESS CONTROL

9.4.1 API Specification 5CT – Annex H.9.1
By agreement between the purchaser and manufacturer, the number of specimens per lot required may be reduced to no less than one with a process control plan that is sufficient to ensure that the product meets or exceeds the 90 % YSmin threshold.

9.4.2 API Specification 5CT – Annex H.14.1
The manufacturer shall apply a process control plan which has been demonstrated to the satisfaction of the purchaser as sufficient to ensure that each pipe body, each upset and each coupling has mechanical properties conforming to the requirements of this Standard. If this condition is not fulfilled, each pipe body, each upset and each coupling shall be surface hardness tested. Hardness minimum and maximum values, when not specified in this Standard, shall be in accordance with the manufacturer's specifications or by agreement between the purchaser and the manufacturer.

9.5 STRAIGHTENING

API Specification 5CT – Annex H.3.2

Gag press straightening or hot rotary straightening [400 ºC (750 ºF) minimum at end of rotary straightening unless a higher minimum temperature is specified on the purchase agreement] is acceptable. If hot rotary straightening is not possible, the pipe may be cold rotary straightened provided it is then stress-relieved at 510 ºC (950 ºF) or higher.

9.6 THREADS

9.6.1 API Specification 5CT – 8.12.5

For Grade C110 the pin and box threads shall be abrasive-blasted, unless processed by any appropriate technique, including the threading process, which has been agreed between the purchaser and manufacturer to be sufficient to avoid the presence of material susceptible to detaching or causing galling during connection make-up.

9.6.2 API Specification 5CT – Annex H.10

Pin threads shall be abrasive-blasted, unless processed by any appropriate technique, including the threading process, which has been agreed between the purchaser and manufacturer to be sufficient to avoid the presence of material susceptible to detaching or causing galling during make-up.

9.6.3 API Specification 5CT – Annex H.12

Box threads shall be abrasive-blasted, unless processed by any appropriate technique, including the threading process, which has been agreed between the purchaser and manufacturer to be sufficient to avoid the presence of material susceptible to detaching or causing galling during make-up.

9.7 THREAD TREATMENT

9.7.1 API Specification 5CT – 8.14.1
A thread compound shall be applied to cover the full surface on the engaged thread of either the coupling or pipe before making up the connection. Application on both coupling and pipe may be agreed between purchaser and manufacturer. Unless otherwise specified by the purchaser, the thread compound shall conform to ISO 13678 or API RP 5A3.

9.7.2 API Specification 5CT – 9.15
Thread surface treatment shall be as specified on the purchase agreement.

9.7.3 API Specification 5CT – 12.2.1
The entity performing the threading shall apply external and internal thread protectors that meet the requirements of Annex I unless otherwise specified on the purchase agreement.

9.7.4 API Specification 5CT – 12.2.3
By agreement between purchaser and manufacturer, open-ended, driftable protectors may be supplied. Thread compound shall cover the entire thread and seal surfaces of the connection.

9.7.5 API Specification 5CT – Annex F.4.2.6
For buttress casing in all sizes and grades and for round thread casing in sizes label 1 16 and larger in grades H40, J55, K55 and M65, the make-up triangle shall be stamped on the outside of each length on both ends. By agreement between purchaser and manufacturer, the make-up triangle may be replaced with a transverse white paint band 10 mm (3/8 in) wide by 76 mm (3 in) long. To assist in locating the triangle or transverse white paint band on buttress casing, a 25 mm (1 in) wide by 610 mm (24 in) long longitudinal white paint stripe shall be placed adjacent to the triangle or transverse paint band on the field end; additionally, a 25 mm (1 in) wide by 100 mm (4 in) long longitudinal white paint stripe shall be placed adjacent to the triangle or transverse paint band on the mill end.

9.7.6 API Specification 5CT – Annex I.1.2

The thread-protector manufacturer shall document the design criteria, evaluation data and installation procedures to demonstrate compliance with these requirements. This information shall be available upon request to both the protector purchaser and/or the tubular user.

9.7.7 API Specification 5CT – Annex I.1.3
The thread-protector manufacturer shall design the protector to be used in conjunction with API and/or SF thread forms. Thread-protector design shall assist in minimizing corrosion that can result from moisture intrusion or entrapment. The protectors shall be capable of a snug-up fit with the face of the pin or coupling as applicable (no gap). The use of a gasket-type insert in the pin-end protector is acceptable by agreement between the manufacturer and purchaser.

9.8 WELDING

9.8.1 API Specification 5CT – 6.1
Pipe furnished to this Standard shall be made by the seamless or electric-weld process as shown in Table C.3 or Table E.3 and as specified on the purchase agreement.

9.8.2 API Specification 5CT – Annex A.6.1
Casing (Grades P110 and Q125) and tubing (Grade P110) may be produced by the electric-weld process only when detailed quality control provisions are jointly agreed by purchaser and manufacturer prior to the manufacture of the pipe. Tensile, impact and hardness testing shall be performed as frequently as required for seamless pipe.

10.0 MARKING REQUIREMENTS

10.1 MARKING REQUIREMENTS

10.1.1 API Specification 5CT – 6.4.2
The serial number shall be marked on products as specified below. It is the responsibility of the manufacturer to maintain the identification of material until it is received by the purchaser.

10.1.2 API Specification 5CT – 10.15.18
If a defect is not removed from coupling stock and accessory material within acceptable limits, then the area shall be marked to indicate the presence of a defect. The marking shall consist of a paint band encircling the tube body that covers the entire defect area if this area is equal to or less than 50 mm (2 in) in axial length, or bands in a cross-hatched pattern if this area is greater than 50 mm (2 in) in length. The band colour shall be as agreed between the purchaser and manufacturer.

10.1.3 API Specification 5CT – 11.1.4
Products shall be marked by stencilling, or a combination of stencilling and stamping, at the option of the manufacturer, as stipulated
— by agreement between purchaser and manufacturer, stamping can be required, in which case a combination of stamping and stencil marking shall be used;

10.1.4 API Specification 5CT – 11.1.10
Other additional markings are allowed and may be applied as desired by the manufacturer or as requested by the purchaser, but shall be applied after the markings specified in Table C.48 or Table E.48.

10.1.5 API Specification 5CT – 11.1.11
Marking for coupling material and accessory material shall be specified on the purchase agreement or, in the case of coupling material, in the manufacturer's internal marking requirements but shall be traceable to, as a minimum, this Standard, the manufacturer, the date of manufacture and the grade. When the

purchase agreement specifies marking with colour bands these bands shall be consistent with Table C.46 or Table E.46.

10.1.6 API Specification 5CT – 11.2.4
When specified on the purchase agreement, products shall be stamped by one or more of the methods in 11.2.1 at the option of the manufacturer.

10.1.7 API Specification 5CT – 11.2.5
When specified on the purchase agreement, products shall be stamped by one or more of the methods in 11.2.1 at the option of the manufacturer. In addition, the following apply

- Grade R95 and Group 2 (except Grades C90, T95 and C110) products shall be heat-treated subsequent to using method 2 in 11.2.1.
- Grades C90, T95, C110 and Q125 products shall be heat-treated subsequent to using methods 2 and 4 in 11.2.1, with the following exceptions
  -stamping of the make-up triangle;
  -when the stamp markings are removed by cropping or by grinding, machining, threading to a depth not less than twice the depth of the stamping;
  -by agreement between purchaser and manufacturer, the stamp marks may be left in the product.

10.1.8 API Specification 5CT – 11.2.6
For buttress casing in all sizes and grades and for round thread casing in sizes Label 1 16 and larger in Grades H40, J55, K55 and M65, the make-up triangle shall be stamped on the outside of each length on both ends. By agreement between purchaser and manufacturer, the make-up triangle may be replaced with a transverse white paint band 10 mm (3/8 in) wide by 76 mm (3 in) long.

10.1.9 API Specification 5CT – 11.4.1
Each product shall be colour-coded as specified in 11.4.2 to 11.4.6, unless otherwise specified on the purchase agreement.

10.1.10 API Specification 5CT – Annex F.4.1.4
Products shall be marked by stencilling, or a combination of stencilling and stamping, at the option of the manufacturer, as stipulated.

By agreement between purchaser and manufacturer, stamping can be required, in which case a combination of stamping and stencil marking shall be used

10.1.11 API Specification 5CT – Annex F.4.1.6
It is allowable to place additional markings for other compatible standards following the required marking sequence. Such markings are at the option of the manufacturer or as requested by the purchaser.

10.1.12 API Specification 5CT – Annex F.4.1.10
Other additional markings are allowed and may be applied as desired by the manufacturer or as requested by the purchaser, but shall be applied after the markings specified in Table C.61 or Table E.61.

10.1.13 API Specification 5CT – Annex F.4.2.4
When specified on the purchase agreement, products shall be stamped by one or more of the methods in F.2.1 at the option of the manufacturer.

10.1.14 API Specification 5CT – Annex F.4.2.5
When specified on the purchase agreement, products may be stamped by one or more of the methods in F.2.1 at the option of the manufacturer.

- Grade R95 and group 2 (except grades C90, T95 and C110) shall be heat-treated subsequent to using method 2 in F.2.1.

- Grades C90, T95, C110 and Q125 products shall be heat-treated subsequent to using methods 2 and 4 in F.2.1, with the following exceptions
  -the make-up triangle mark;
  -when the stamp markings are removed by grinding, machining, threading or cropping to a depth not less than twice the depth of the stamping;
  -when not removing the stamping is by agreement between purchaser and manufacturer.

10.1.15 API Specification 5CT – Annex F.4.4.1
Each product shall be colour-coded as described in F.4.2 to F.4.6, unless otherwise specified on the purchase agreement.

11.0 INSPECTION REQUIREMENTS

11.1 INSPECTION REQUIREMENTS

11.1.1 API Specification 5CT – 8.12.4
Product threads, gauging practice and thread inspection shall conform to the requirements of API Spec 5B. Product ends shall not be rounded out by hammering but may be slightly shaped to secure conformance with threading requirements. For grade C90 and higher strength grades this shaping shall only be carried out if agreed with the purchaser.

11.1.2 API Specification 5CT – 9.12.2
All couplings shall be inspected on the outside and inside surfaces after finish machining and before any inside or outside surface plating, using the wet fluorescent magnetic particle method in accordance with ISO 13665 or ASTM E709 with a circumferentially oriented magnetic field for the detection of longitudinal surface imperfections, or by other non-destructive method of equal sensitivity as demonstrated to the purchaser.

11.1.3 API Specification 5CT – 9.12.3
By agreement between purchaser and manufacturer, NDE of Grades H40, J55 and K55 couplings may be waived. However, in this case, the couplings shall be inspected visually on the outside and inside surfaces after finish machining and before plating, and shall be free from all visible seams, cracks and porosity.

11.1.4 API Specification 5CT – 10.15.1
If the provisions for purchaser inspection of pipe and/or witnessing of NDE operations are stated on the purchase agreement, they shall be in accordance with Annex B.

11.1.5 API Specification 5CT – 10.15.11
For API round thread pup joints in size designations listed in Table C.2 or Table E.2 in Group 1, Group 2 Grades L80 and Group 3, the required inspections, unless otherwise agreed upon between purchaser and manufacturer.

11.1.6 API Specification 5CT – 10.15.12

Coupling stock shall be inspected for longitudinal and transverse imperfections on the inside surface using ultrasonic shear-wave techniques to acceptance level L3 with a maximum notch length of 25 mm (1 in). By agreement between the purchaser and manufacturer, alternative NDE methods which demonstrate the capability to detect the reference indicators may be used.

11.1.7 API Specification 5CT – 10.15.13
Grade C110 pipe, with the ends treated in accordance with 10.15.13 b), shall be inspected after end finishing (and before coupling installation on threaded and coupled tubulars) using the wet magnetic particle method, or a method agreed between the purchaser and manufacturer.

11.1.8 API Specification 5CT – 13.2
The manufacturer shall, upon request by the purchaser, furnish to the purchaser a certificate of compliance stating that the material has been manufactured, sampled, tested and inspected in accordance with this Standard and has been found to meet the requirements.

Additional requirements for PSL-2 and PSL-3 product are given in Annex H.

11.1.9 API Specification 5CT – 13.4
Tests and inspections requiring retention of records in this Standard are shown in Table C.49 or Table E.49. Such records shall be retained by the manufacturer and shall be available to the purchaser on request for a period of three years after the date of purchase from the manufacturer.

11.1.10 API Specification 5CT – Annex A.4.3
Coupling blanks that will not be fully machined by either the manufacturer or the purchaser shall be inspected and meet the same requirements as finished couplings. Coupling blanks that will be fully machined by either the manufacturer or the purchaser may have imperfections on the as-rolled surface; however, the machined surface shall meet the surface inspection criteria of 9.12 and be to the specified dimensions.

11.1.11 API Specification 5CT – Annex A.6.5.5
The inspection equipment shall be adjusted to produce a well-defined indication from each reference indicator when the reference standard is scanned by the inspection system(s). Responses from the notches and hole shall meet the required system(s) sensitivity level. Outside-wall and inside-wall notches of reduced length may be used by agreement between the purchaser and manufacturer.

11.1.12 API Specification 5CT – Annex A.8.1
The inspection shall be by the wet fluorescent magnetic particle method, using a circumferentially oriented magnetic field, or by another non-destructive method of equal sensitivity as demonstrated to the purchaser. The inspection shall encompass both the inside and outside surfaces. The inspection shall exclude the dry magnetic particle method.

11.1.13 API Specification 5CT – Annex A.14.2
The inspection equipment shall be adjusted to produce a well-defined indication from each reference indicator when the reference standard is scanned by the inspection system(s). Responses from the notches and hole shall meet the required system(s) sensitivity level. Outside-wall and inside-wall notches of reduced length may be used by agreement between the purchaser and manufacturer.

11.1.14 API Specification 5CT – Annex B.1 Inspection notice
If the inspector representing the purchaser desires to inspect the product or witness a test, reasonable notice shall be given of the time at which the run is intended to be made.

11.1.15 API Specification 5CT – Annex B.4 Rejection
Unless otherwise provided, material which shows defects on inspection or subsequent to acceptance at manufacturer's works, or which proves defective when properly applied in service, may be rejected, and the manufacturer so notified. If tests that require the destruction of material are made, any product which is proven

not to meet the requirements of this Standard shall be rejected. Disposition of rejected product shall be a matter of agreement between purchaser and manufacturer.

11.1.16 API Specification 5CT – Annex H.18.3
The pipe ends shall be either treated in accordance with 10.15.13 a) or c), or inspected after end finishing (and before coupling installation on threaded and coupled tubulars) using the wet magnetic-particle method, or a method agreed between purchaser and manufacturer.

11.1.17 API Specification 5CT – Annex H.18.4.4
Coupling stock shall be inspected for longitudinal and transverse imperfections on the inside surface using ultrasonic shear-wave techniques to acceptance level L4. By agreement between the purchaser and manufacturer, alternative NDE methods which demonstrate the capability to detect the reference indicators may be used.