Work Item Number	#2438
Title of Work Item	Notch depth tolerance and other characteristics
Ballot Revision Level	2nd Revision
Type of Ballot (Initial, Comment, Comment resolution (reference API ballot#), 1st Re-ballot, 2nd Re-ballot, etc.)	2nd Re-ballot
Submitter Name(s)	Danny Viveiros & Iulian Lucaci
API Document Modified	API 5CT
API Document, API Modifying Document(s) and Revision Level(s)	API 5CT 11th Edition
Revision Key	Current API document in black, Deletions in Blue strikethrough, Additions in Green Previous ballot text in Red

Work Item Charge: To collect actual notch depth data from undisclosed manufacturers and based on statistical analysis present to the group to negotiate new tolerance. To propose changes required in API 5CT for the notch depth and other characteristics, mainly the notch perpendicularity and control of the depth along the notch.

Ballot Text:

9.15.3 Reference Standards

(to be inserted after the 6th paragraph of 9.15.3)

~~Notch depth tolerance shall be +/- 0.002 in. (0.05 mm) or +/- 10 % of the nominal notch depth (whichever is greater) for nominal notch depths up to 0.030 in. (0.8 mm) and +/- 10 % for nominal notch depth above 0.030 in. (0.8 mm).~~

Notch depth tolerance shall be +/- 0.002 in. (0.05 mm) or +/- 10 % of the nominal notch depth (whichever is greater) provided that the actual notch depth along the entire calibrated length is not less than 0.012 in. (0.3mm).

~~The notch depth along the calibrated length shall be measured at least at startand end of the calibrated length and shall not vary by more than 0.002 in. (0.05 mm) for nominal notch depth up to 0.030 in. (0.8 mm) and by no more than 0.005 in. (0.13 mm) for nominal notch depth greater than 0.030 in. (0.8 mm). Calibrated Length is defined as the length of the notch where the depth is controlled and mainta~~

Notch depth along the calibrated length shall at a minimum be measured at the start, middle and end, and shall not vary, end to end, by more than 0.003"(0.08 mm) or 10% of nominal notch depth, whichever is ~~greater, up to 0.050"(1.27mm) nominal notch depth or 0.006"(0.15mm) for nominal notch depths greater than .050"(1.27mm)~~ while maintaining depth tolerance from paragraph above:

For notch perpendicularity when ultrasonic testing, the maximum acoustic response variation from side to side of the notch ~~(leading and trailing)~~ shall not exceed 2 dB for notches with symmetrical beam paths from opposing sides at the point of the notch with the best reflection properties.

ASTM E213 Notch Tolerance's shall be used only with written agreement between the manufacturer and purchaser.

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Table 3– Purchaser/Manufacturer agreement (Casing)

Requirement	Reference
Upset-Grade C110	5.1
Statistical tensile testing	6.2.4, A.10(SR 38)
Statistical impact testing	9.7.6, A.7 (SR 12)
Impact of non-heat-treated product	6.5.1, A.9 (SR 16)
SSC test acceptance criteria	6.14.4
SSC test Method D requirement for Grade C110 product over 50.8mm (2.0 in.) wall thickness	6.14.4, Table 13
Length other than specified in table C.22 or Table E.22	7.6
End shaping of Grade C90 and higher strength	7.12.4
Surface treatment of C110 threads	7.12.5
Thread and storage compound	7.14
Waiving NDE of Grades H40,J55,K55 couplings	8.11.3
Coupling thread surface treatment Grade Q125 only	8.14
Reduced section tensile specimens Grade Q125	9.4.6
Additional hardness testing	9.6.2
Number of specimens for NACE Method A Grades C90,T95, and C110	9.10.2
Test specimen selection and location	9.10.4
Invalidation of test for Method D mechanical compliance	9.10.6
Alternate hydrostatic test pressures	9.12.3
Plain-end Grade Q125 casing hydrostatic testing	9.12.2
NDE	9.15, A.2(SR 1), A.3 (SR 2), A.5 (SR10), A.6 (SR 11)
Notch Depth Tolerances	9.15.3
Marking requirements	10
Marking only with bands on Grade L80 3Cr couplings and pup joints with surface treatment	10.4.2-10.4.5
Driftable thread protectors	11.2.4
Include coupling certification with pipe certification	12.3 r)
Special wall thickness with S,L, and B end-finish	Table C.1 or Table E.1, footnote e; see API 5B for acceptable wall thickness ranges
Coupling blanks Grade Q125 only	8.4.2, A.4 (SR 9)
Upset casing Grade Q125 only	A.5 (SR 10)
Electric-weld casing and pup joints Grades H40,J55,K55,N80,L80 Type 1, R95	A.12 (SR 40)
Electric-weld casing and pup joints Grades P110 and Q125	5.1, A.6 (SR 11)
Alternative F factor for statistical impact testing	A.7.2 (SR 12.2)
Special size and wall thickness plain-end pipe	7.2
Supplemental inspection when hydrostatic test pressure is limited to 69.0 MPa (10,000 psi)	A.13.1 (SR 41.1) , A.13.2 (SR 41.2)

Table 6 – Purchaser/Manufacturer agreement (Tubing)

Requirement	Reference
Statistical tensile testing	6.2.4, A.10(SR 38)
Statistical impact testing	9.7.6, A.7 (SR 12)
Impact of non-heat-treated product	6.5.1, A.9 (SR 16)
SSC test acceptance criteria	6.14.4
SSC test Method D requirement for Grade C110 product over 50.8mm (2.0 in.) wall thickness	6.14.4, Table 13
Length other than specified in table C.22 or Table E.22	7.6
End shaping of Grade C90 and higher strength	7.12.4
Thread and storage compound	7.14
Waiving NDE of Grades H40,J55,K55 couplings	8.11.3
Additional hardness testing	9.6.2
Number of specimens for NACE Method A Grades C90,T95, and C110	9.10.2
Test specimen selection and location	9.10.4
Invalidation of test for Method D mechanical compliance	9.10.6
Alternate hydrostatic test pressures	9.12.3
NDE	9.15, A.2(SR 1), A.3 (SR 2), A.5 (SR10), A.6 (SR 11)
Notch Depth Tolerances	9.15.3
Marking requirements	10
Marking only with bands on Grade L80 3Cr couplings and pup joints with surface treatment	10.4.2-10.4.5
Driftable thread protectors	11.2.4
Include coupling certification with pipe certification	12.3 r)
Electric-weld casing and pup joints Grades H40,J55,K55,N80,L80 Type 1, R95	A.12 (SR 40)
Supplemental inspection when hydrostatic test pressure is limited to 69.0 MPa (10,000 psi)	A.13.1 (SR 41.1), A.13.2 (SR 41.2)
Electric-weld tubing and pup joints---Grade P110	A.6 (SR 11)
Special size and wall thickness	7.2
Casing used for tubing	7.2, Table C.22 or Table E.22

Table 8 – Optional Requirements Specified by the purchaser (Coupling Stock and Material and Accessory Material)

Requirement	Reference
Heat Treatment	5.2, Table C.3 or Table E.3
Statistical tensile testing	6.2.4, A.10 (SR 38)
Statistical impact testing	9.7.6, A.7 (SR 12)
Impact testing	6.4, 9.7, A.9 (SR 16)
SSC test acceptance criteria	6.14.4
Heat and supplementary analyses	9.3
Number of specimens for NACE Method A Grades C90, T95, and C110	9.10.2
Test specimen selection and location	9.10.4
Invalidation of test for Method D mechanical compliance	9.10.6
Notch Depth Tolerances	9.15.3
Additional markings	1.5, 10

Table C.39—Artificial Reference Indicators

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Acceptance (Inspection) Level	Notch Depth [a] Maximum %	Notch Length Maximum at Full Depth mm	Notch Width Maximum mm	Radially Drilled Hole Diameter [b] mm
1	*2*	*3*	*4*	*5*
L2	5	50	1	1.6
L3	10	50	1	3.2
L4	12.5	50	1	3.2

NOTE See Figure D.16.

[a] Depth as a percent of specified wall thickness; The minimum notch depth shall be 0.3 mm. Depth tolerance and additional notch characteristics shall be in accordance with 9.15.3.

[b] Drilled hole diameter (through the pipe wall) shall be based on the drill bit size.

Commented [PBCSI2]: Add period at after "0.3 mm" to end sentence.

Deleted: The depth tolerance shall be ±15 % of the calculated notch depth with a minimum notch depth of 0.3 mm ± 0.05 mm

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Table E.39—Artificial Reference Indicators

Acceptance (Inspection) Level	Notch Depth [a] Maximum %	Notch Length Maximum at Full Depth in.	Notch Width Maximum in.	Radially Drilled Hole Diameter [b] in.
1	*2*	*3*	*4*	*5*
L2	5	2.0	0.040	$^{1}/_{16}$
L3	10	2.0	0.040	$^{1}/_{8}$
L4	12.5	2.0	0.040	$^{1}/_{8}$

NOTE See Figure D.16.

[a] Depth as a percent of specified wall thickness; The minimum notch depth shall be 0.012 in. Depth tolerance and additional notch characteristics shall be in accordance with 9.15.3.

[b] Drilled hole diameter (through the pipe wall) shall be based on the drill bit size.

Deleted: The depth tolerance shall be ±15 % of the calculated notch depth with a minimum notch depth of 0.012 in. ± 0.002 in

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