

Agenda Item 620-2057

Title: Add EN 10025 and ISO 630 Grade S355 Structural Shapes

Date: May 12, 2021

Revision: 0

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Purpose: To permit the use of EN 10025 and ISO 630 Grade S355 structural shapes in API 620.

Source: Sean Cochrane (CB&I Storage Solutions) March 30, 2021 email to Justin Kline.

Impact: Greatly improved availability of material in eastern hemisphere.

Discussion:

History:

- ISO 630 structural shapes (as well as plates) in the E275 strength grade have been in API stds for many years.
- EN 10025 materials were added to API 620 via agenda item 620-297 in 2009.
- The EN spec and the ISO spec in latest editions they have become almost identical.
- In 2009 the grades of EN plate (S275 and S355) and shapes (S275) added corresponded to the grades of ISO plate (E275 and E355) that were already in API 620.
- Shapes in EN S355 and ISO E355 existed in the EN and ISO specs but in 2009 our SCAST agenda item simply matched EN coverage of shapes to the ISO coverage already in 650.

Rationale:

- The 355 grades of shapes under EN10025 and ISO 630 both are now widely used in many locations worldwide in the same way that stronger A992 shapes have taken over much market share from the mild steel A36 shapes in the ASTM world.
- Composition limits and mechanical test requirements for the 355 grades are the same for both plate (which are currently recognized in API 650) and sections. So there is no big technical issue with these sections. This is mainly an administrative change.

Below table is provided for information as part of the rationale for the item. It is not for publication.

	CVN Test Temp (F)	min YS (ksi)	min TS (ksi)	book Carbon (% max)	book Mn (% max)	book Deox
ISO630 S355B	+68 ^d	51.5 ^b	68.1	0.24	1.60	Non-rimming
EN10025 S355JR	+68 ^d	51.5 ^b	68.1	0.24	1.60	Non-rimming
ISO630 S355C	+32 ^e	51.5 ^b	68.1	0.20 ^c	1.60	Non-rimming
EN10025 S355J0	+32 ^e	51.5 ^b	68.1	0.20 ^c	1.60	Non-rimming
ISO630 S355D	-4 ^e	51.5 ^b	68.1	0.20 ^c	1.60	Fully Killed
EN10025 S355J2	-4 ^e	51.5 ^b	68.1	0.20 ^c	1.60	Fully Killed

^a Information provided from EN 10025-2:2019 and ISO 630-2:2021

^b 50.0 ksi for T > 16 mm

^c 0.22% for T > 30mm

^d Actual test verification only when specified in order

^e Impact tests carried out for T ≥ 6 mm, frequency is one test per each 60 to 80 tonnes.

Proposed Changes:

4.5 Structural Shapes

All structural shapes that are subject to pressure-imposed loads or are otherwise important to the structural integrity of a tank shall be made only by the open-hearth, electric-furnace, or basic-oxygen process. If structural shapes have design metal temperatures below –20 °F, the materials shall conform to Tables R-1 and/or R-3. Structural shapes shall conform to one of the following specifications:

- a) ASTM A36;
- b) ASTM A131;
- c) ASTM A633 (Grade A only);
- d) ASTM A992;
- e) CSA G40.21 (Grades 38W, 44W, and 50W only; if impact tests are required, these grades are designated 38WT, 44WT, and 50WT);
- f) ISO 630, Grade S275, [and S355](#), Qualities B, C, and D;
- g) EN 10025, Grade S275, [and S355](#), Qualities JR, J0, J2, and K2.

Table 5-1—Maximum Allowable Stress Values for Simple Tension

Specification (See Note 1)	Grade/Class	Notes	Specified Minimum		Maximum Allowable Tensile Stress for Tension, S_{ts} (lb/in. ² , See Notes 2 and 3)
			Tensile Strength (lb/in. ²)	Yield Point (lb/in. ²)	
Plates					
ISO 630	S275 Quality C, D	4	59,500	37,000 39,400	16,400
ISO 630	S355 Quality C, D	4	68,100	48,500 51,500	18,800
EN 10025	S275 Quality J0, J2	4	59,500	37,000 39,400	16,400
EN 10025	S355 Quality J0, J2, K2	4	61,100	48,500 51,500	18,800
Structural Shapes Resisting Internal Pressure					
ISO 630	S275 Quality C, D	4 and 6	59,500	37,000 39,400	15,200
ISO 630	S355 Quality C, D	4 and 6	68,100	48,500 51,500	15,200
EN 10025	S275 Quality J0, J2	4 and 6	59,500	37,000 39,400	15,200
EN 10025	S355 Quality J0, J2, K2	4 and 6	68,100	48,500 51,500	15,200

The steel spec has been revised and the API table needs to catch up. Fortunately, the YS does not control the allowable stress