Deutsches Institut für Bautechnik
DIBt

Member of EOTA
www.eota.eu

Approval body for construction products and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and Laender Governments

Designated according to Article 29 of Regulation (EU) No 305/2011 and member of EOTA (European Organisation for Technical Assessment)

European Technical Assessment ETA-15/0395 of 23 July 2015

English translation prepared by DIBt - Original version in German language

General Part

Technical Assessment Body issuing the European Technical Assessment:	Deutsches Institut für Bautechnik
Trade name of the construction product	Hot rolled products and therewith executed structural parts made of the steel grades Q235B, Q235D, Q345B, Q345D
Product family to which the construction product belongs	Product Area 20 - Structural Metallic Products ans Ancillaries
Manufacturer	ALSTOM Boiler Deutschland GmbH Augsburgerstrasse 712 70329 Stuttgart DEUTSCHLAND
Manufacturing plant	plant 1 plant 2 plant 3 plant 4 plant 5
This European Technical Assessment contains	9 pages, thereof 4 annexes which form an integral part of this assessment
This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of	European Assessment Document (EAD) 200017-00-0302 "Hot rolled products and structural components made of steel grades Q235B, Q235D, Q345B and Q345D" Version March 2015

The European Technical Assessment is issued by the Technical Assessment Body in its official language. Translations of this European Technical Assessment in other languages shall fully correspond to the original issued document and shall be identified as such.

Communication of this European Technical Assessment, including transmission by electronic means, shall be in full. However, partial reproduction may only be made with the written consent of the issuing Technical Assessment Body. Any partial reproduction has to be identified as such.

This European Technical Assessment may be withdrawn by the issuing Technical Assessment Body, in particular pursuant to information by the Commission according to Article 25 Paragraph 3 of Regulation (EU) No 305/2011.

Specific part

1 Technical description of the product

The products are uncoated hot-rolled plates or profiles made of the weldable steel grades Q235B, Q235D, Q345B and Q345D. The maximum thickness for profiles is 80 mm. The maximum thickness for plates made of Q235B and Q235D is 80 mm and for plates made of Q345B and Q345D is 250 mm.

The steel grades are similar to the structural steel grades according to EN 10025-2 listed in Table 1.

Table 1 – Comparison of steel grades

Steel grade	Comparable steel grade according EN 10025-2	
	Designation according EN 10027-1	Designation according EN 10027-2
Q235B	S235JR	1.0038
Q235D	S235J2	1.0117
Q345B	S355JR	1.0045
Q345D	S355J2	1.0577

Due to the manufacturing process the steel grades deviate from EN 10025-2 as follows:

- The minimum yield strengths R_{eH} and the ultimate strengths R_m differ from those specified in EN 10025-2.
- The chemical analysis differs from the analysis specified in EN 10025-2.

The Product characteristics must be identified on the basis of the Inspection document “type 3.1” according to EN 10204 (to be furnished by the supplier).

2 Specification of the intended use in accordance with the applicable European Assessment Document

The Hot rolled products and therewith executed structural parts made of the steel grades Q235B, Q235D, Q345B, Q345D are intended for use in welded, bolted or riveted steel or composite structures.

Concerning product packaging, transport, storage, maintenance, replacement and repair it is the responsibility of the manufacturer to undertake the appropriate measures and to advise his clients on the transport, storage, maintenance, replacement and repair of the product as he considers necessary. The thermo-mechanically hot-rolled long steel products made of weldable fine grain structural steel can be dismantled and recycled, but are normally not intended for re-use.
It is assumed that the product will be installed according to the manufacturer’s instructions or (in absence of such instructions) according to the usual practice of the building professionals, notably in accordance with the provisions of EN 1090-2:2008+A1:2011.

The performances given in Section 3 are only valid if the hot-rolled products of the steel grades Q235B, Q235D, Q345B and Q345D are used in compliance with the specifications and conditions given in Annex (1 to 4).

The verifications and assessment methods on which this European Technical Assessment is based lead to the assumption of a working life of Hot rolled products and therewith executed structural parts made of the steel grades Q235B, Q235D, Q345B, Q345D of at least 100 years. The indications given on the working life cannot be interpreted as a guarantee given by the producer, but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

3 Performance of the product and references to the methods used for its assessment

3.1 Mechanical resistance and stability (BWR 1)

Essential characteristic	Performance
Chemical composition	see Annex 1, Table 2 and 3

The chemical analysis shall be carried out in accordance with EN 10025-2:2004, clause 8.3.3 and 9.1. The test method shall be in accordance with EN 10025-2:2004, clause 10.1.

Yield strength	see Annex 2, Table 4.1 and 4.2
Tensile strength	
Elongation at fracture	

Location and orientation including preparation of samples and test pieces shall be in accordance with EN 10025-1 and EN 10025-2. The test method shall be in accordance with EN 10025-1, clause 10.2.1 and EN 10025-2.

Impact toughness value	see Annex 2, Table 4.1 and 4.2

Location and orientation of samples and test specimen shall be in accordance with EN 10025-2:2004, clause 9.2. The impact properties shall be determined according to EN 10025-2, clause 7.3.2.

Weldability	see Annex 1, Table 2 and 3 see Annex 3, Table 5
Improved deformation properties perpendicular to the surface	no performance assessed
Formability	no performance assessed
Suitability for hot-dip zinc-coating	no performance assessed
Surface properties	no performance assessed
Internal soundness	no performance assessed
Dimensions, tolerances on dimensions and shape, mass	no performance assessed

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Class (A1) according to EN 13501-1:2007+A1:2009

The Hot rolled products and therewith executed structural parts made of the steel grades Q235B, Q235D, Q345B, Q345D satisfy the requirements for performance class A1 of the characteristic reaction to fire, in accordance with the provisions of EC decision 96/603/EC (as amended).

3.3 Hygiene, health and the environment (BWR 3)

Essential characteristic	Performance
Content, emission and/or release of dangerous substances	no performance assessed

3.4 Sustainable use of natural resources (BWR 7)

Essential characteristic	Performance
Durability	no performance assessed

4 Assessment and verification of constancy of performance (AVCP) system applied, with reference to its legal base

According to EAD No. 200017-00-0302, the applicable European legal act is: 1998/214/EC amended by 2001/596/EC.

The system to be applied is: **2+**

5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable EAD

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at Deutsches Institut für Bautechnik.

Issued in Berlin on 23 July 2015 by Deutsches Institut für Bautechnik

Uwe Bender
Head of Department

beglaubigt:
Hahn

Deutsches Institut für Bautechnik DIBt

Table 2 Chemical analysis of the products of the steel grades Q235B, Q235D, Q345B and Q345D

Steel grade	Percent by weight [%]													
	C ≤	Si ≤	Mn ≤	P ≤	S ≤	Nb ≤	V ≤	Ti ≤	Cr ≤	Ni ≤	Cu ≤	N ≤	Mo ≤	Al ≥
Q235B	0,20	0,35	1,40	0,045	0,045	---	---	---	0,30	0,30	0,30	0,008	---	---
Q235D	0,17			0,035	0,035	---	---	---					---	0,015
Q345B	0,20	0,50	1,70	0,035	0,035	0,07	0,15	0,20	0,30	0,50	0,30	0,012	0,10	---
Q345D	0,18			0,030	0,025									0,015

Table 3 Acceptable tolerances of product analyses compared to ladle analyses

Steel grade	Percent by weight [%]													
	C	Si	Mn	P	S	Nb	V	Ti	Cr	Ni	Cu	N ≤	Mo	Al
Q235B	±0,02	±0,03	≤ 0,8:±0,03 >0,8-1,7:±0,06	-0,005 +0,000	-0,005 +0,000	---	---	---	±0,05	±0,05	±0,05	±0,005	---	---
Q235D						---	---	---					---	±0,003
Q345B		≤ 0,37:±0,03 >0,37-0,50:±0,05				±0,005	-0,02 +0,01	-0,02 +0,01					±0,01	---
Q345D														±0,003

Hot rolled products and therewith executed structural parts made of the steel grades Q235B, Q235D, Q345B, Q345D	Annex 1
Chemical Composition	

Table 4.1 Mechanical properties of steel products of the steel grades Q235B and Q235D at ambient temperature

Steel grade	Nominal thickness t [mm]	Lower yield strength R_{eL} [MPa]	Tensile strength R_m [MPa]	Elongation at fracture $L_0 = 5{,}65 \cdot \sqrt{S0}$ [%]	Impact toughness value K_v [J]
Q235B	t ≤ 16	235	370 - 500	26	≥ 27 at +20 °C
	16 < t ≤ 40	225			
	40 < t ≤ 60	215		25	
	60 < t ≤ 80	215		24	
Q235D	t ≤ 16	235	370 - 500	26	≥ 27 at -20 °C
	16 < t ≤ 40	225			
	40 < t ≤ 60	215		25	
	60 < t ≤ 80	215		24	

Table 4.2 Mechanical properties of steel products of the steel grades Q345B and Q345D at ambient temperature

Steel grade	Nominal thickness t[1)] [mm]	Lower yield strength R_{eL} [MPa]	Tensile strength R_m [MPa]	Elongation at fracture $L_0 = 5{,}65 \cdot \sqrt{S0}$ [%]	Impact toughness value K_v [J]
Q345B	t ≤ 16	345	470 - 630	20	≥ 34 at +20 °C
	16 < t ≤ 40	335			
	40 < t ≤ 63	325		19	
	63 < t ≤ 80	315			
	80 < t ≤ 100	305			
	100 < t ≤ 150	285	450 - 600	18	
	150 < t ≤ 200	275		17	≥ 27 at +20 °C
	200 < t ≤ 250	265			
Q345D	t ≤ 16	345	470 - 630	21	≥ 34 at -20 °C
	16 < t ≤ 40	335			
	40 < t ≤ 63	325		20	
	63 < t ≤ 80	315			
	80 < t ≤ 100	305			
	100 < t ≤ 150	285	450 - 600	19	
	150 < t ≤ 200	275		18	≥ 27 at -20 °C
	200 < t ≤ 250	265			

Hot rolled products and therewith executed structural parts made of the steel grades Q235B, Q235D, Q345B, Q345D

Yield strength, tensile strength and elongation at fracture

Annex 2

The carbon equivalent value CEV shall be determined according to EN 10025-1. CEV shall comply with the values specified in Table 5.

Table 5 Maximum for Carbon Equivalent Value (CEV)

Steel grade	Nominal thickness t [mm]	
	t ≤ 63	63 < t ≤ 250
Q235B, Q235D	0,37	0,40
Q345B, Q345D	0,44	0,48

Deutsches Institut für Bautechnik DIBt

Table 6 – Characteristic values of yield strength and tensile strength

	Steel grade	Product thickness t [mm]	Yield strength $f_{y,k}$ [N/mm²]	Tensile strength $f_{u,k}$ [N/mm²]
1	Q235B Q235D	$t \leq 40$	235	360
3		$40 < t \leq 80$	215	
4	Q345B Q345D	$t \leq 40$	335	470
5		$40 < t \leq 80$	315	450
6		$80 < t \leq 150$	285	430
7		$150 < t \leq 250$	265	

Hot rolled products and therewith executed structural parts made of the steel grades Q235B, Q235D, Q345B, Q345D	Annex 4
Characteristic values of yield strength and tensile strength	