

Approval body for construction products
and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and
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European Technical Assessment

ETA-10/0156
of 11 December 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

Long products made of HISTAR 355 / 355L and HISTAR
460 / 460L

Product family
to which the construction product belongs

Thermomechanically hot-rolled long steel products

Manufacturer

ArcelorMittal Belval&Differdange
ArcelorMittal Commercial Sections S.A.
66, rue de Luxembourg
4221 ESCH/ALZETTE
LUXEMBURG

Manufacturing plant

ArcelorMittal Belval&Differdange
ArcelorMittal Commercial Sections S.A.
66, rue de Luxembourg
4221 ESCH/ALZETTE
LUXEMBURG

This European Technical Assessment
contains

7 pages including 3 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)
200022-00-0302

This version replaces

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**European Technical Assessment
ETA-10/0156**

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Specific Part

1 Technical description of the product

The products are uncoated thermo-mechanically hot-rolled long steel products (e.g. beams, channels) with a maximum flange thickness of 140 mm made of weldable fine grain structural steel (HISTAR).

The steel grades are comparable with the structural steel grades S355M/ML and S460M/ML according to EN 10025-4:2004. Due to the manufacturing process of special quenching and self-tempering (QST) the steel grades deviate from EN 10025-4:2004 with more severe requirements as follows:

- For thicknesses larger than 16 mm the minimum yield strengths R_{eH} and the ultimate strengths R_m are greater than those specified in EN 10025-4:2004 (see Annex 2).
- The chemical analysis differs from the analysis specified in EN 10025-4:2004. This results in a lower carbon equivalent value (CEV) than specified in EN 10025-4:2004 for S355M/ML and S460M/ML (see Annex 3).

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

The thermo-mechanically hot-rolled long steel products made of HISTAR are intended for use in welded, bolted or riveted structures.

The performances given in Section 3 are only valid if the thermo-mechanically hot-rolled long steel products are used in compliance with the specifications and conditions given in Annexes.

The verifications and assessment methods on which this European Technical Assessment is based lead to the assumption of a working life of the thermo-mechanically hot-rolled long steel products of at least 100 years provided that the conditions laid down in EN 1090-2:2008+A1:2011 for the maintenance/repair are met. 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 3 Table 5
Yield strength	see Annex 1 Table 1
Tensile strength	see Annex 1 Table 1
Elongation at fracture	see Annex 1 Table 1
Impact toughness value	see Annex 1 Table 3
Weldability	see Annex 3 Table 5
Load bearing capacity of filled welds	no performance assessed
Improved deformation properties perpendicular to the surface	no performance assessed
Formability	no performance assessed
Suitability for hot-dip zinc-coating	no performance assessed

Essential characteristic	Performance
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	no performance assessed

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. 200022-0302, the applicable European legal act is: 1998/214/EC, amended by 2001/596/EC.

The system(s) to be applied is (are): **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 11 December 2015 by Deutsches Institut für Bautechnik

Uwe Bender
Head of Department

beglaubigt:
Hahn

Table 1 – Mechanical properties of the long steel products at ambient temperature

Steel grade	Nominal thickness [mm]	Mechanical properties		Elongation at fracture $L_0 = 5,65 \cdot \sqrt{S_0}$ [%]
		Upper yield strength R_{eH} [MPa]	Tensile strength R_m [MPa]	
HISTAR 355	≤ 140	355	470 to 630	22
HISTAR 460	≤ 100	460	540 to 720	17
	100 < t ≤ 140	450		
HISTAR 355L	≤ 125	355	470 to 630	22
HISTAR 460L	≤ 100	460	540 to 720	17
	100 < t ≤ 125	450		

Table 2 – Characteristic values for design

Steel grade	Nominal thickness [mm]	Characteristic yield strength $f_{y,k}$ [MPa]	Characteristic tensile strength $f_{t,k}$ [MPa]
HISTAR 355	≤ 140	355	470
HISTAR 460	≤ 100	460	540
	100 < t ≤ 140	450	
HISTAR 355L	≤ 125	355	470
HISTAR 460L	≤ 100	460	540
	100 < t ≤ 125	450	

Unless not otherwise specified in this European technical approval and the Annexes referred to, the rules for the comparable steel grades according to Table 1 given in EN 1993 and EN 1994 are used for the design. The steel grades HISTAR 355, HISTAR 460, HISTAR 355L and HISTAR 460L of this ETA are in this order comparable to the steel grades S355M, S460M, S355ML and S460ML according to EN 10025-4:2004.

Table 3 – Minimum value of impact energy for longitudinal specimen

Steel grade	Minimum value of impact energy [J] at test temperature [C°]			
	-50	-40	-30	-20
HISTAR 355	---	---	---	40
HISTAR 460				
HISTAR 355L	27	31	40	47
HISTAR 460L				

Thermo-mechanically hot-rolled long steel products made of HISTAR

Mechanical properties of the long steel products at ambient temperature
Characteristic values for design
Minimum value of impact energy for longitudinal specimen

Annex 1

Additional rules for the design of welded connections

Deviating from EN 1993-1-8:2005+AC:2009, clause 4.5.3 the following correlation factors shall be used for the design of fillet welds:

Table 4 – Correlation factor β_w

Steel grade	correlation factor β_w for fillet welds
HISTAR 355/355L	0,85
HISTAR 460/460L	0,80

Additional rules for the execution of welded connections

The cooling-off time from 800 °C to 500 °C should be ≤ 25 s. Otherwise the producer of the HISTAR products or an expert should be asked for advice.

Due to the low carbon equivalent value (CEV) a preheating of the welding area is not necessary as long as the temperature of the components is at least 0°C at the beginning of the welding process and the welding area is shielded from to fast cooling.

If for fillet welds made of steel HISTAR 460 or 460L the preheating temperature is $> 100^\circ\text{C}$ or the heat input is $> 18\text{kJ/cm}$ it has to be verified that the hardness of the weld deposit is at least 210HV10.

Otherwise the correlation factor of EN 1993-1-8:2005+AC:2009, clause 4.5.3 shall be used.

Thermo-mechanically hot-rolled long steel products made of HISTAR

Additional rules for design and execution

Annex 2

Thermo-mechanically hot-rolled long steel products made of HISTAR

Annex 3

Table 5 – Chemical composition of the ladle analysis*

Steel grade	Percent by weight														Carbon equivalent CEV ²⁾		
	C ≤	Si ≤	Mn ≤	P ≤	S ≤	N ≤	Al ¹⁾ ≥	Mo ≤	Cr ≤	Ni ≤	Nb ≤	Cu ⁴⁾ ≤	V ≤	Ti ≤	t ≤ 63mm	63mm <t ≤ 125 mm	125m m <t ≤ 140m m
HISTAR 355	0,12	0,50	1,60	0,035	0,030	0,015	0,020	0,20	0,30	0,30	0,05	0,55	0,10	0,05	0,39	0,39	0,39
HISTAR 460	0,12	0,60	1,70	0,035	0,030	0,025	0,020	0,20	0,30	0,70	0,05	0,55	0,12	0,05	0,41	0,43	0,43
HISTAR 355L	0,12	0,50	1,60	0,030	0,025	0,015	0,020	0,20	0,30	0,30	0,05	0,55	0,10	0,05	0,39	0,39	-
HISTAR 460L	0,12	0,60	1,70	0,030	0,025	0,025	0,020	0,20	0,30	0,70	0,05	0,55	0,12	0,05	0,41	0,43	-
Deviation ³⁾	+0,02	+0,05	-0,05 +0,10	+0,005	+0,005	+0,002	-0,005	+0,03	+0,05	+0,05	+0,01	+0,05	+0,02	+0,01	+0,02	+0,02	+0,02

¹⁾ If sufficient other N-binding elements are present the minimum total Al content does not apply.

²⁾ $CEV = C + Mn/6 + (Cr + Mo + V)/5 + (Ni + Cu)/15$

³⁾ acceptable deviations of product analyses from limit values of ladle analyses

⁴⁾ Cu content above 0,40% may cause hot shortness during hot forming.

* Regarding the Weldability the following applies (in accordance with EAD 200017-00-0302): The carbon equivalent value CEV shall be determined according to EN 10025-1:2004. CEV shall comply with the values specified in Table 5.