

# Deutsches Institut für Bautechnik

Anstalt des öffentlichen Rechts

Kolonnenstr. 30 L  
10829 Berlin  
Germany

Tel.: +49(0)30 787 30 0  
Fax: +49(0)30 787 30 320  
E-mail: [dibt@dibt.de](mailto:dibt@dibt.de)  
Internet: [www.dibt.de](http://www.dibt.de)



# DIBt

Mitglied der EOTA  
*Member of EOTA*

## European Technical Approval ETA-10/0156

English translation prepared by DIBt - Original version in German language

Handelsbezeichnung  
*Trade name*

Langerzeugnisse aus HISTAR 355 / 355L  
und HISTAR 460 / 460L

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

Zulassungsinhaber  
*Holder of approval*

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

Zulassungsgegenstand  
und Verwendungszweck  
*Generic type and use  
of construction product*

Thermomechanisch gewalzte Langerzeugnisse aus Stahl

*Thermomechanically hot-rolled long steel products*

Geltungsdauer: vom  
*Validity: from*  
bis  
*to*

7 July 2010

7 July 2015

Herstellwerk  
*Manufacturing plant*

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

Diese Zulassung umfasst  
*This Approval contains*

9 Seiten einschließlich 3 Anhänge  
*9 pages including 3 annexes*



Europäische Organisation für Technische Zulassungen  
European Organisation for Technical Approvals

## I LEGAL BASES AND GENERAL CONDITIONS

- 1 This European technical approval is issued by Deutsches Institut für Bautechnik in accordance with:
  - Council Directive 89/106/EEC of 21 December 1988 on the approximation of laws, regulations and administrative provisions of Member States relating to construction products<sup>1</sup>, modified by Council Directive 93/68/EEC<sup>2</sup> and Regulation (EC) N° 1882/2003 of the European Parliament and of the Council<sup>3</sup>;
  - Gesetz über das In-Verkehr-Bringen von und den freien Warenverkehr mit Bauprodukten zur Umsetzung der Richtlinie 89/106/EWG des Rates vom 21. Dezember 1988 zur Angleichung der Rechts- und Verwaltungsvorschriften der Mitgliedstaaten über Bauprodukte und anderer Rechtsakte der Europäischen Gemeinschaften (Bauproduktengesetz - BauPG) vom 28. April 1998<sup>4</sup>, as amended by law of 31 October 2006<sup>5</sup>;
  - Common Procedural Rules for Requesting, Preparing and the Granting of European technical approvals set out in the Annex to Commission Decision 94/23/EC<sup>6</sup>.
- 2 Deutsches Institut für Bautechnik is authorized to check whether the provisions of this European technical approval are met. Checking may take place in the manufacturing plant. Nevertheless, the responsibility for the conformity of the products to the European technical approval and for their fitness for the intended use remains with the holder of the European technical approval.
- 3 This European technical approval is not to be transferred to manufacturers or agents of manufacturers other than those indicated on page 1, or manufacturing plants other than those indicated on page 1 of this European technical approval.
- 4 This European technical approval may be withdrawn by Deutsches Institut für Bautechnik, in particular pursuant to information by the Commission according to Article 5(1) of Council Directive 89/106/EEC.
- 5 Reproduction of this European technical approval including transmission by electronic means shall be in full. However, partial reproduction can be made with the written consent of Deutsches Institut für Bautechnik. In this case partial reproduction has to be designated as such. Texts and drawings of advertising brochures shall not contradict or misuse the European technical approval.
- 6 The European technical approval is issued by the approval body in its official language. This version corresponds fully to the version circulated within EOTA. Translations into other languages have to be designated as such.

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1 Official Journal of the European Communities L 40, 11 February 1989, p. 12

2 Official Journal of the European Communities L 220, 30 August 1993, p. 1

3 Official Journal of the European Union L 284, 31 October 2003, p. 25

4 *Bundesgesetzblatt Teil I 1998*, p. 812

5 *Bundesgesetzblatt Teil I 2006*, p. 2407, 2416

6 Official Journal of the European Communities L 17, 20 January 1994, p. 34

## **II SPECIFIC CONDITIONS OF THE EUROPEAN TECHNICAL APPROVAL**

### **1 Definition of the products and intended use**

#### **1.1 Definition of the construction products**

The products are uncoated thermomechanically hot-rolled long steel products (e.g. beams, channels) with a maximum flange thickness of 125 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. Due to the manufacturing process of special quenching and self-tempering (QST) the steel grades deviate from EN 10025-4 with more severe requirements as follows:

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

#### **1.2 Intended use**

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

The provisions made in this European technical approval are based on an assumed working life of the steel structures of 100 years, provided that the conditions laid down in section 5.1 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.

### **2 Characteristics of products and methods of verification**

The assessment of the fitness of the thermomechanically hot-rolled long steel products for the intended use in relation to the requirements for mechanical resistance and stability, safety in case of fire and safety in use in the sense of the Essential Requirements No. 1, No. 2 and No. 4 has been made in accordance with section 3.2 of the Common Procedural Rules for Requesting, Preparing and the Granting of European technical approvals set out in the Annex to Commission Decision 94/23/EC<sup>6</sup>.

Concerning Essential Requirement No. 2 (Safety in case of fire) the following applies:

The assessment of the resistance to fire performance is only relevant to the assembled structure which is not part of the ETA.

The thermomechanically hot-rolled long steel products are considered to satisfy the requirements of performance class A 1 of the characteristic reaction to fire, in accordance with the provisions of the EC Decision 96/603/EC (as amended) without the need for testing on the basis of its listing in that decision.

Concerning Essential Requirements No. 1 (Mechanical resistance and stability) and No. 4 (Safety in use) the following applies:

The material properties given in Annex 1 and Annex 2 were determined by tests with every steel grade (as far as necessary).

### **3 Evaluation and attestation of conformity and CE marking**

#### **3.1 System of attestation of conformity**

According to the Decision 99/92/EC of the European Commission<sup>7</sup> system 2+ of the attestation of conformity applies.

This system of attestation of conformity is defined as follows:

System 2+: Declaration of conformity of the product by the manufacturer on the basis of:

- (a) Tasks for the manufacturer:
  - (1) initial type-testing of the product;
  - (2) factory production control;
  - (3) testing of samples taken at the factory in accordance with a prescribed test plan.
- (b) Tasks for the approved body:
  - (4) certification of factory production control on the basis of:
    - initial inspection of factory and of factory production control;
    - continuous surveillance, assessment and approval of factory production control.

Note: Approved bodies are also referred to as "notified bodies".

#### **3.2 Responsibilities**

##### **3.2.1 Tasks for the manufacturer**

###### **3.2.1.1 Factory production control**

The manufacturer shall exercise permanent internal control of production. All the elements, requirements and provisions adopted by the manufacturer shall be documented in a systematic manner in the form of written policies and procedures, including records of results performed. This production control system shall insure that the product is in conformity with this European technical approval.

The factory production control shall be in accordance with the July 2010 issued control plan relating to the European technical approval ETA-10/0156 issued on 7 July 2010 which is part of the technical documentation of this European technical approval. The control plan is laid down in the context of the factory production control system operated by the manufacturer and deposited with Deutsches Institut für Bautechnik.<sup>8</sup>

The results of factory production control shall be recorded and evaluated in accordance with the provisions of the control plan.

###### **3.2.1.2 Other tasks for the manufacturer**

The manufacturer shall, on the basis of a contract, involve a body which is approved for the tasks referred to in section 3.1 in the field of thermomechanically hot-rolled long steel products in order to undertake the actions laid down in section 3.2.2. For this purpose, the control plan referred to in sections 3.2.1.1 and 3.2.2 shall be handed over by the manufacturer to the approved body involved.

The manufacturer shall make a declaration of conformity, stating that the construction product is in conformity with the provisions of the European technical approval ETA-10/0156 issued on 7 July 2010.

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<sup>7</sup> Official Journal of the European Communities L 80 of 18.03.1998

<sup>8</sup> The "control plan" is a confidential part of the European technical approval and only handed over to the approved bodies involved in the procedure of attestation of conformity. See section 3.2.2.

### 3.2.2 Tasks for the approved bodies

The approved body shall perform the

- initial inspection of factory and of factory production control,
- continuous surveillance, assessment and approval of factory production control

in accordance with the provisions laid down in the control plan.

The approved body shall retain the essential points of its actions referred to above and state the results obtained and conclusions drawn in written reports.

The approved certification body involved by the manufacturer shall issue an EC certificate of conformity of the factory production control stating the conformity with the provisions of this European technical approval.

In cases where the provisions of the European technical approval and its control plan are no longer fulfilled the certification body shall withdraw the certificate of conformity and inform Deutsches Institut für Bautechnik without delay.

### 3.3 CE marking

The CE marking shall be affixed on the accompanying commercial documents. The letters "CE" shall be followed by the identification number of the approved certification body, where relevant, and be accompanied by the following additional information:

- the name and address of the producer (legal entity responsible for the manufacture),
- the last two digits of the year in which the CE marking was affixed,
- the number of the EC certificate for the factory production control,
- the number of the European technical approval,
- the name of the product,
- the information on regulated characteristics of the product (nominal values).

## 4 Assumptions under which the fitness of the product for the intended use was favourably assessed

### 4.1 Manufacturing

The thermomechanically hot-rolled long steel products are manufactured in accordance with the provisions of the European technical approval using the manufacturing process as laid down in the technical documentation.

The European technical approval is issued for the product on the basis of agreed data/information, deposited with Deutsches Institut für Bautechnik, which identifies the product that has been assessed and judged. Changes to the product or production process, which could result in this deposited data/information being incorrect, should be notified to Deutsches Institut für Bautechnik before the changes are introduced. Deutsches Institut für Bautechnik will decide whether or not such changes affect the approval and consequently the validity of the CE marking on the basis of the approval and if so whether further assessment or alterations to the approval shall be necessary.

## 4.2 Design

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.

**Table 1** Comparison of steel grades

Steel grades according to this ETA	comparable steel grades according to EN 10025-4:2004
HISTAR 355	S355M
HISTAR 460	S460M
HISTAR 355L	S355ML
HISTAR 460L	S460ML

### 4.2.1 Characteristic values of resistance

For the design of components of steel or composite structures made of HISTAR the characteristic values given in Annex 1, table 3 are taken into account.

### 4.2.2 Additional rules for welded connections

For the design of welded connections the additional rules given in Annex 2 are taken into account.

## 4.3 Fabrication and installation

Unless not otherwise specified in this European technical approval and the Annexes referred to, the fabrication and installation is carried out in accordance with EN 1090-2:2008. The specific characteristic of thermomechanically hot-rolled steel is taken into account.

### 4.3.1 Additional rules for welding

For the execution of welded connections the additional rules given in Annex 2 are taken into account.

## 5 Indications to the manufacturer

It is in the responsibility of the manufacturer to ensure that the information on the specific conditions according to 1, 2, 4.2 and 4.3 (including Annexes referred to) is given to those who are concerned. This information may be given by reproduction of the respective parts of the European technical approval.

### 5.1 Use, maintenance, repair

The rules of EN 1090-2:2008 apply.

Dipl.-Ing. Georg Feistel  
Head of Division Construction Engineering  
of Deutsches Institut für Bautechnik  
Berlin, 7 July 2010

*beglaubigt*  
Ulbrich

**Table 2 - Mechanical properties of the long steel products at ambient temperature**

Steel grade	Nominal thickness [mm]	Mechanical properties		
		Upper yield strength $R_{eH}$ [MPa]	Tensile strength $R_m$ [MPa]	Elongation at fracture $L_0 = 5,65 \cdot \sqrt{S_0}$ [%]
HISTAR 355	≤ 125	355	470 to 630	22
HISTAR 460	≤ 82	460	540 to 720	17
	82 < t ≤ 125	450		
HISTAR 355L	≤ 82	355	470 to 630	22
HISTAR 460L	≤ 82	460	540 to 720	17

**Table 3 – Characteristic values for design**

Steel grade	Nominal thickness [mm]	Characteristic yield strength $f_y$ [MPa]	Characteristic tensile strength $f_u$ [MPa]
HISTAR 355	≤ 125	355	470
HISTAR 460	≤ 82	460	540
	82 < t ≤ 125	450	
HISTAR 355L	≤ 82	355	470
HISTAR 460L	≤ 82	460	540

**Table 4 – 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				

<b>Thermomechanically Hot-rolled Long Steel Products made of HISTAR</b>	<b>Annex 1</b> of European Technical Approval <b>ETA-10/0156</b>
Mechanical properties of the long steel products at ambient temperature Characteristic values for design Minimum value of impact energy for longitudinal specimen	

### Additional rules for the design of welded connections

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

**Table 5** – Correlation factor  $\beta_w$

Steel grade	correlation factor $\beta_w$ 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  $\leq 25$  s. Otherwise the producer of the HISTAR products or an expert should be asked for advise.

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, clause 4.5.3 shall be used

**Thermomechanically Hot-rolled Long Steel Products  
made of HISTAR**

Additional rules for design and execution

**Annex 2**

of European Technical Approval

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**Table 5 – Chemical composition of the ladle analysis**

Steel grade	Percent by weight													Carbon equivalent CEV <sup>2)</sup>			
	C	Si	Mn	P	S	N	Al <sup>1)</sup>	Mo	Cr	Ni	Nb	Cu <sup>4)</sup>	V	Ti	≤ 63mm	63mm < t ≤ 82mm	82mm < t ≤ 125mm
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 <sup>3)</sup>	+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.

**Thermomechanically Hot-rolled Long Steel Products made of HISTAR**

Chemical composition

**Annex 3**

of European Technical Approval

**ETA-10/0156**