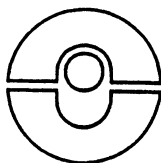


INTERNATIONAL



UNION OF RAILWAYS

U I C CODE

Leaflet to be classified in Volumes :

- V - TRANSPORT STOCK
- VI - TRACTION
- VIII - TECHNICAL SPECIFICATIONS

840-2



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**TECHNICAL SPECIFICATION
FOR THE SUPPLY OF STEEL CASTINGS
FOR TRACTIVE
AND TRAILING STOCK**

(Reprint, 01-10-1988)

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1 - SUBJECT

This specification governs the supply of rough or finished steel castings for tractive and trailing stock (1).

The castings are classified in two categories :

- category 1 (C1) : Heavy duty parts or those that fulfil a vital function in the operation of the vehicle.
- category 2 (C2) : Other parts.

1.1 - Wording of purchase orders

The particulars required for the execution of the order, especially those concerning the application of paragraphs 1, 2.1, 2.1.3, 2.2.1.2, 2.2.1.4, 2.2.1.5, 2.2.3, 3.2.2, 3.2.3, 4.1, 4.2.2, 4.2.4.6, 4.2.4.8, 4.2.4.9, 4.2.4.10, 4.2.4.11 in this specification should be mentioned in the order or its appended documents.

1.2 - List of reference documents

In this Specification, reference is made to the following documents :

ISO Recommendations	: ISO/R 79
	ISO/R 80
	ISO/R 81
	ISO/R 82
	ISO/R 148

ASTM Standard E 446.75

(1) Including automatic coupler components, except for the coupler head for which a separate Specification is provided.

2 - CHARACTERISTICS

2.1 - Material

The castings shall be manufactured from one of the following grades of steel :

- E 230-400 - M
- E 260-450 - M
- E 300-520 - M
- E 370-620 - M (1)
- E 420-630 - M (1)

- the letter «E» shows that the main characteristic of these grades of steel is the yield point ;

- the first 3-digit number shows the minimum yield point expressed in MPa ;

- the second 3-digit number shows the minimum tensile strength expressed in MPa ;

- the letter «M» preceded by a dash shows that the symbol applies to cast products.

- In addition, for grades to be used in the manufacture of parts which are to be welded, the above identification shall be completed by the letter «S» and the requirements of Footnote (1) in § 2.1.1 of this specification shall be observed.

In all cases, identification of the grade must be followed by the category C1 or C2 in which the casting is classified.

Example of identification :

E 260-450 - MS C1

(1) Grades used for certain parts of the automatic coupler, Grade E 370-620 - M being intended for surface treated parts.

2.1.1 - Chemical characteristics (sample removed from casting)

Grade	Carbon %	Silicon %	Manganese %	Chromium %	Nickel %	Molybdenum %	Phosphorus %	Sulphur %
E 230-400-M E 260-450-M E 300-520-M E 370-620-M E 420-630-M	(1) 0.42/ 0.50 ≤ 0.30	(1) 0.25/ 0.60 ≤ 0.60	(1) 0.50/ 0.80 ≤ 1.50	(1) ≤ 0.25	(1) ≤ 0.35	(1) ≤ 0.10	≤ 0.04 (2) ≤ 0.04 ≤ 0.04	≤ 0.04 (2) ≤ 0.04 ≤ 0.04

(1) If the castings are to be welded, the following composition must be adhered to :

C ≤ 0.25%, Si ≤ 0.50%, Mn ≤ 1.00%, Cr ≤ 0.25%, Ni ≤ 0.35%, Mo ≤ 0.10%.

(2) 0.05% for grades obtained by an acid process

2.1.2 - Mechanical characteristics

Grade	Delivery condition (1)	Yield point at 0.2% MPa ≥	Tensile strength MPa	Elongation after fracture % ≥	Notched bar impact strength at +20°C (V notch) Fracture energy J ≥ (2)	Variation of Brinell hardness on castings in the same batch ≤
E 230-400-M E 260-450-M E 300-520-M E 370-620-M E 420-630-M	N N N N TR (3)	230 260 300 370 420	≥ 400 ≥ 450 ≥ 520 620/770 630/780	25 20 17 14 15	30 25 20 15 40	30 30 30 30 30

(1) N = Normalised ; TR = Hardened and tempered.

(2) Average result of 3 tests : no individual result must be less than 2/3 of the value laid down.

(3) In normalised condition, the characteristics of this steel are those of E 300-520-M.

2.1.3 - Magnetic characteristics

- Grades E 260-450 - M and E 260-450 - MS

When a verification of magnetic characteristics is specified in the purchase order or its appended documents, the requirements in the following table must be met :

Number of Ampere- turns per metre	750	1 500	3 000	6 000	12 000	25 000
Minimum induction in Tesla	1.00	1.37	1.55	1.70	1.83	2.00

For other grades, the magnetic characteristics must be stated in the order or its appended documents.

2.2 - Castings

2.2.1 - Physical characteristics

2.2.1.1 - Appearance

The castings must be carefully fettled, trimmed, freed of any loose oxide and casting gates, risers and feeder heads. All these operations must be conducted in such a way as to ensure that the appearance is satisfactory and that the casting can be fitted and can function without difficulty.

2.2.1.2- Soundness

The parts must be sound throughout and show no defect likely to be harmful in use.

When a magnetic particle or dye penetrant test is required for the whole or part of the casting, no unit of area measuring 105 mm x 148 mm shall contain line or volume defects corresponding to a quality classification, as defined by the tables in the appendix, which is higher than that specified in the order or its appended documents.

When an ultrasonic examination is specified, the results to be obtained must be stated in the order or its appended documents.

When a radiographic examination is specified, the radiographs obtained must not reveal defects greater than those represented on the reference radiographs in Standard ASTM E 446-75 corresponding to the quality classification specified for each type of defect in the order or its appended documents.

2.2.1.3- Texture

The texture must be fine, uniform and free from bright crystals,

2.2.1.4- Leak and pressure tightness

The castings must withstand any leak or pressure test conditions stated in the order or its appended documents, without leakage, sweating or deformation.

2.2.1.5 - Weight

The weight and permitted tolerances shall be as stated in the purchase order or its appended documents.

2.2.2 - Geometrical characteristics

The shape, dimensions and permitted tolerances on these dimensions shall comply with those stated in the purchase order or its appended documents. Where no tolerances are given in these documents, the values in the following table shall be applied :

TABLE 1

On the distance between two rough surfaces or where only one surface is rough.

The dimensions measured in mm	Greatest dimensions of the parts		
	up to 250 mm	above 250 and up to 1000 mm	above 1000 mm
up to 40	± 1	± 1.5	± 2
above 40 up to 100	± 2	± 2	± 2.5
above 100 up to 250	± 2	± 3	± 3
above 250 up to 400	-	± 3	± 4
above 400 up to 630	-	± 4	± 5
above 630 up to 1000	-	± 6	± 6
above 1000 up to 1800	-	-	± 8
above 1800 up to 2500	-	-	± 11