

ISO

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION

ISO RECOMMENDATION R 1005/VI

RAILWAY ROLLING STOCK MATERIAL
SOLID WHEELS FOR TRAILER STOCK

1st EDITION

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BRIEF HISTORY

The ISO Recommendation R 1005/VI, *Railway rolling stock material - Solid wheels for trailer stock*, was drawn up by Technical Committee ISO/TC 17, *Steel*, the Secretariat of which is held by the British Standards Institution (BSI).

Work on this question led to the adoption of a Draft ISO Recommendation based on a corresponding UIC* code.

In January 1968, this Draft ISO Recommendation (No. 1380) was circulated to all the ISO Member Bodies for enquiry. It was approved, subject to a few modifications of an editorial nature, by the following Member Bodies :

Austria	Hungary	South Africa, Rep. of
Belgium	India	Spain
Canada	Israel	Sweden
Colombia	Italy	Switzerland
Czechoslovakia	Netherlands	Turkey
Denmark	New Zealand	U.A.R.
Finland	Norway	United Kingdom
France	Poland	Yugoslavia
Germany	Romania	

One Member Body opposed the approval of the Draft :

Japan

The Draft ISO Recommendation was then submitted by correspondence to the ISO Council, which decided, in May 1969, to accept it as an ISO RECOMMENDATION.

* Union Internationale des Chemins de fer (International Union of Railways).

RAILWAY ROLLING STOCK MATERIAL

SOLID WHEELS FOR TRAILER STOCK

1. SCOPE

This ISO Recommendation applies to the manufacture of solid rolled unalloyed steel wheels for trailer stock, as-rolled, rough-machined, half-finished or fully finished.*

2. CLASSIFICATION

This ISO Recommendation covers two classes of solid rolled unalloyed steel wheels :

- class BV 1
- class BV 2

3. CHEMICAL COMPOSITION

Solid wheels for trailer stock should be manufactured from non-alloy steel** of the following chemical purity :

phosphorus	$\leq 0.05 \%$
sulphur	$\leq 0.05 \%$
phosphorus + sulphur	$\leq 0.09 \%$

* The terms in question are defined as follows :

- (a) *As-rolled.* A wheel obtained by hot-working and which, having to be subsequently machined, has not yet undergone any machining whatsoever.
- (b) *Rough-machined.* A wheel having received no final machining, but having been rough-machined on all or certain portions, which have to be machined.
- (c) *Half-finished.* A wheel having received final machining on certain portions which have to be machined.
- (d) *Fully finished.* A wheel in which all portions having to be machined have undergone their final machining.

** For this steel, the content of elements other than carbon should not exceed the following limits :

manganese	1.20 %	molybdenum	0.05 %
silicon	0.50 %	vanadium	0.05 %
nickel	0.30 %	copper	0.30 %
chromium	0.30 %		

4. MECHANICAL PROPERTIES

4.1 Tensile strength R_m

The tensile strength of the solid wheels should be as follows :

class BV 1 : between 60 and 72 kgf/mm²;

class BV 2 : between 70 and 84 kgf/mm².

Narrower ranges coming within the limits shown above may be used if indicated on the order.

4.2 Coefficient of quality C

The coefficient of quality (defined in Table 1, below) should be as follows :

wheels which have not been normalized : $C \geq 95$ with $A \geq 8\%$ on a test piece having a gauge length $L_0 = 5.65 \sqrt{S_0}$, for class BV 2;

normalized wheels : $C \geq 109$.

TABLE 1 - Coefficient of quality C

L_0	C
$8.16 \sqrt{S_0}$	$R_m + 2.5 A$
$5.65 \sqrt{S_0}^*$	$R_m + 2.2 A$
$4 \sqrt{S_0}$	$R_m + 2 A$

* This formula should preferably be adopted.

The other formulae are retained provisionally.

where

L_0 is the gauge length used to measure the elongation after fracture, expressed in millimetres;

S_0 is the cross-sectional area of the gauge length of the test piece, expressed in square millimetres;

R_m is the tensile strength, expressed in kilogrammes-force per square millimetre;

A is the percentage elongation after fracture.

4.3 Resistance to impact

The wheel should be able to withstand consecutive blows which cause a permanent deflection of at least 10 % of the radial length of the web, without incurring flaws, cracking or breaking.

4.4 Notched bar impact strength KCU

(Applicable only where the wheels are in the normalized condition)

The notched bar impact strength should be as follows :

class BV 1 : KCU at + 20 °C ≥ 3 kgf.m/cm²;

class BV 2 : KCU at + 20 °C ≥ 2 kgf.m/cm².

4.5 Brinell hardness

The difference between the extreme Brinell hardness values of wheels from the same cast should not be more than 30 HB units.

5. PHYSICAL CHARACTERISTICS

5.1 Macrostructure and macrographic appearance

After ordinary polishing, the surface examined should show no sign of any piping or discontinuity.

The sulphur print obtained should not reveal worse faults than those shown in the prints contained in the album forming an Annex to this ISO Recommendation.

5.2 Soundness and appearance

The wheels should be sound throughout and without cracks, blow-holes, inclusions, flaws, burrs, lack of metal, laps, or any other defect detrimental to their use.

The texture should be of a fine, close structure, with no discontinuities or traces of foreign matter.

The portions remaining black should be perfectly trimmed without trace of diejoint or other defect liable to impair the appearance or use of the wheels.

The finish of the machined surfaces should comply with the indications given on the drawing or comparison specimens.

5.3 Static balance

(To be verified only on half-finished or fully finished wheels for which only the rough-machined bore remains to be brought to the final dimension.)

The out-of-balance of the solid wheels should be capable of correction by a balance weight attached to the wheel at a distance of 500 mm from the centre and having a maximum mass of 250 g*.

The radial position and value of the residual out-of-balance should be stamped according to the requirements stated in the specification or drawing.

* For certain vehicles, the order can stipulate a lower limit for the maximum out-of-balance.