International Standard 6305/3

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Railway components — Technical delivery requirements — Part 3 : Steel sleepers

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been authorized has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 6305/3 was developed by Technical Committee ISO/TC 17, *Steel*, and was circulated to the member bodies in August 1982.

It has been approved by the member bodies of the following countries :

Australia	Hungary	South Africa, Rep. of
Austria	India	Sweden
Belgium	Iran	Switzerland
Canada	Japan	Tanzania
Egypt, Arab Rep. of	Korea, Dem. P. Rep. of	Turkey
France	Korea, Rep. of	United Kingdom
Germany, F. R.	Romania	USSR

No member body expressed disapproval of the document.

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Railway components — Technical delivery requirements — Part 3 : Steel sleepers

1 Scope and field of application

This part of ISO 6305 specifies the quality requirements of the product and the conditions of acceptance testing for steel sleepers. When the products are to be manufactured from flat plates, an alternative but equivalent specification may be agreed between the purchaser and the manufacturer.

2 References

ISO 82, *Steel — Tensile testing.*

ISO 85, *Bend test for steel.*

ISO 2859, *Sampling procedures and tables for inspection by attributes.*

3 Conditions of manufacture

3.1 Steelmaking process

The steelmaking process shall be at the manufacturer's option. If requested by the purchaser, the manufacturer shall state in his tender the type and the principal characteristics of the steelmaking process; he may not alter them without advising the purchaser's representative.

The steel used shall be of one of the grades defined in table 1 below with a maximum sulphur and phosphorous content of 0,06 %. The choice of grade shall be left to the purchaser.

Table 1

Tensile strength, R_m N/mm^2	Minimum elongation %
380 to 460*	24*
430 to 510*	20*
510 to 620	18

* Following an agreement between the parties, the two quantities can be regarded as a single quality, with a minimum guaranteed elongation of 20 %.

3.2 Manufacture

The sleepers shall be manufactured by cutting to length a rolled section or plate followed by hot or possibly cold forming.

They shall be finished in accordance with drawings supplied by the purchaser.

Throughout the production process, the manufacturer shall use the best techniques so that the sleepers satisfy the requirements of this standard. Continuously cast blooms may be used in addition to blooms made from ingots.

3.3 Coatings

If specified in the invitation to tender, the sleepers shall be supplied tar coated, or with another protective coating as agreed between the manufacturer and the purchaser.

3.4 Drawings and working gauges

A copy of the final drawings shall be supplied to the manufacturer by the purchaser together with the notification of approval of the order.

If stated in the order, the manufacturer before starting production shall make up two sets of maximum and minimum working gauges, incorporating the specified dimensional tolerances. If required by the purchaser, the working gauges shall be stamped after approval by the purchaser's representative.

Only these working gauges shall be valid for checking purposes.

One set of working gauges shall be made available to the receiving inspector for the period of acceptance testing.

The working gauges shall be provided at the manufacturer's expense. New working gauges need not be provided for items ordered in quantities of less than 10 000 at any one time.

When the working gauges have been approved by a purchaser, or by an outside testing agency, these shall be used for other purchasers wherever possible.

3.5 Marking

The sleepers shall carry the following marks :

3.5.1 Compulsory marks

3.5.1.1 From rolled section

The sleepers from rolled sections shall carry, on one of the outside surfaces, in legible relief characters approximately 20 mm high and 15 mm wide, the following marks :

— the identification mark of the manufacturer's works

— the last two figures of the year of manufacture.

3.5.1.2 Cold stamped

Sleepers manufactured from flat steel plates shall carry cold-stamped marks as specified in 3.5.1.1.

3.5.2 Optional marks

The purchaser may specify one or several of the following marks in the invitation to tender :

3.5.2.1 Mark in relief : a symbol indicating the section of the sleeper.

3.5.2.2 Cold-stamped mark : if the sleepers are manufactured from flat steel plates, a symbol indicating the section of the sleeper.

3.5.2.3 Hot stamped : Identification number of the cast.

3.6 Freedom from defects

The sleepers shall be free from defects adversely affecting their behaviour in service.

Slight defects away from the bearing surfaces, may be accepted by the purchaser.

The edges of the sleepers shall not show any sharp ridges and shall be trimmed if necessary.

Any operation carried out either in the cold or hot state with the object of concealing a defect is not permitted.

3.7 Finishing

The holes shall be produced by drilling or slotting.

Slots and holes of special shape shall be produced by any suitable method.

Burrs on punched holes shall be removed. The edges of the holes shall not be torn, or cracked or unduly deformed; deformation up to a maximum of 0,5 mm, at a distance of 4 mm from the edge of the holes, is tolerated if the rail seating and fastening surface remains flat.

3.8 Dimensional and straightness tolerances

The methods and means of checking the principal dimensional tolerances are defined in table 2.

Table 2

	Tolerances*	Checking methods in accordance with annexes
Thickness	± 0,75	Micrometer calipers
Length of holes	± 0,50 mm**	min/max gauge annex A
Width of holes	± 0,50 mm**	min/max gauge annex A
Distance between outer edges of extreme fixing holes	± 1,5 mm	min/max gauge annex A
Distance between outer edges of fixing holes of the same rail seat	± 0,75 mm	min/max gauge annex A
Inclination of rail seats measured in rail seating area of the sleeper defined by the rail flange and its fittings	± 7/1 000	gauge and slip gauge annex B
Height of turn-downs	± 20 mm	Sleeper turned over and resting on a flat surface, the height of turn-down is measured in relation to this reference surface

* Whatever the position of the tolerances, the range shall stay the same.

** For punched holes : The above tolerances are increased by 0,10 times the thickness for the exit side of the punch.

If, for normal operations and by agreement between the manufacturer and the purchaser, gauges different from but equivalent to those given in 3.4 are used, only the latter shall be used in case of dispute, where applicable.

3.9 Flatness

The surfaces on which the rails bear shall not deviate from flatness by more than 0,5 mm. The purchaser shall specify in the order whether the surface may be convex or concave.

4 Conditions of acceptance testing

4.1 Preliminary notes

The tests shall be carried out in the manufacturer's works; the preparation of the testpieces and the tests shall be at the manufacturer's expense.

4.1.1 Type and extent of tests

One tensile test and one bend test shall be carried out per cast for casts of 50 t or less. Two tensile tests and two bend tests shall be carried out per cast higher than 50 t.

4.1.2 Dimensions and finish

Inspection of dimensions shall include the following dimensions and measurements :

— thickness;

— length of holes;

— width of holes;

— distance between the outside edges of extreme fixing holes;

— distance between the outside edges of fixing holes of the same rail seat;

— inclination of the rail seats;

— flatness of rail support surface.

The other dimensions for which tolerances are specified in table 2 may at any time be checked by the receiving inspector, but are not subject to the inspection specified in 4.2.2.

4.2 Selection of test pieces

4.2.1 Mechanical test pieces

The test pieces shall be selected for sampling as directed by the receiving inspector.

The receiving inspector shall stamp, from each batch offered, the sleeper(s) intended for testing. His selection may include crops from sleepers or from rolled bars intended for their manufacture.

A sample section of sufficient length shall be cut from the non-stamped portion to enable one tensile test piece and one bend test piece to be taken longitudinally. This section may be flame cut and, for wide sleepers, the bend test may be carried out with half-width test pieces obtained by flame-cutting a sleeper down the middle.

Cutting and finishing shall be carried out entirely in the cold state, by means of machine tools and without any hammering, cold deformation, hardening or annealing.

The samples and test pieces selected for sampling shall be marked by the receiving inspector, and these marks shall be kept intact until the end of the acceptance testing operations.

The dimensions of the rectangular section testpiece shall be in accordance with ISO 82.

The width of the testpiece shall be a maximum of three times the thickness. The thickness of the testpiece is the thickness of the product at the centre of the rail seat.

4.2.2 Dimensional checks

The parts selected for sampling shall be grouped in batches of the same kind. The samples shall be selected in such a way that they are representative of the batches submitted. The size of a batch shall be not less than 1 000 parts, nor more than 5 000 parts.

The receiving inspector has the right to break down or form batches for inspection purposes.

The samples and test pieces shall be marked by the receiving inspector, and these marks shall be kept intact until the end of the acceptance testing operations.

4.3 Checks

4.3.1 Mechanical test methods

4.3.1.1 Tensile test

The tensile test shall be carried out in accordance with ISO 82.

The steel tested shall meet the quality requirements corresponding to one of the grades shown in clause 3.1.

4.3.1.2 Bend test

The bend test shall be carried out in accordance with ISO 85.

The diameter D of the mandrel is equal to four times the thickness e of the sleeper, measured at a right angle to the rail seat, but not less than 50 mm. The radius of the rollers is 25 mm.

On the outside surface, distorted by stretching, no crack or flaw of any kind shall occur after bending.

4.3.2 Re-tests

If, from the batch corresponding to a cast or part cast, the single part selected for the test does not satisfy the conditions laid down, two re-tests shall be carried out as directed by the receiving inspector. If one of these re-tests is not satisfactory the corresponding batch shall be rejected.

4.3.3 Interpretation of dimensional inspection

Any sleeper which is found to have at least one measurement exceeding the tolerances, or which does not satisfy the finish specified in 3.6 shall be deemed not to conform.

Dimensional inspection shall be carried out by sampling from batches of sleepers.

The statistical sampling programme to be used shall be agreed between the purchaser and the manufacturer. The agreement shall define the acceptable levels of quality and risks and the size of the batch and of the sample.

In the absence of such an agreement, the statistical sampling plan shall be carried out according to the Wald diagram or according to the corresponding table of standard ISO 2859 which involves the same risks for the manufacturer and the user of this diagram. The two control plans are more or less equally efficient but the sequential plan is much more economical.

The risks incurred in the plan represented by the diagram (annex C) are as follows :

— a 5 % maximum probability of the rejection of a batch containing no more than 5 % of faulty parts;

— a 5 % maximum probability of the acceptance of a batch containing not less than 15 % of faulty parts.

The test shall be terminated as soon as the point representing the progress of the check enters the acceptance or rejection area.

In the case of a rejection, the manufacturer shall be entitled to sort the parts of the faulty batch, at his own expense, and to re-submit the batch for acceptance.

For the purpose of this second submission, the inspection shall be carried out in accordance with a progressive plan (annex D) which provides a smaller risk for the purchaser.

The purchaser may waive the dimensional inspection in the conditions stated in 4.3.4.

4.3.4 Alternative to dimensional inspection by selection from batches — Quality control cards

When the manufacturer makes a regular practice of using a system of quality control cards agreed by the purchaser for these products, the purchaser may arrange at his option the frequency of the dimensional inspection by sampling from batches.

The results recorded on the quality control cards shall then be considered as constituting an acceptance inspection.

The quality control cards shall be retained at the receiving inspector's disposal, who shall be free, at any time, to inspect the correct application of the procedure, by any method chosen by the purchaser.

The quality control cards shall contain any information necessary for the purpose of clearly identifying the product. They shall be retained by the manufacturer at least until 31 December of the third year following the year shown on the parts.

5 Information to be supplied by the purchaser

The attention of users of this document is drawn to the fact that an invitation to tender should normally be accompanied by a definition of the conditions of use and other relevant documents for carrying out the order, and in particular those concerning the application of the clauses in this specification.

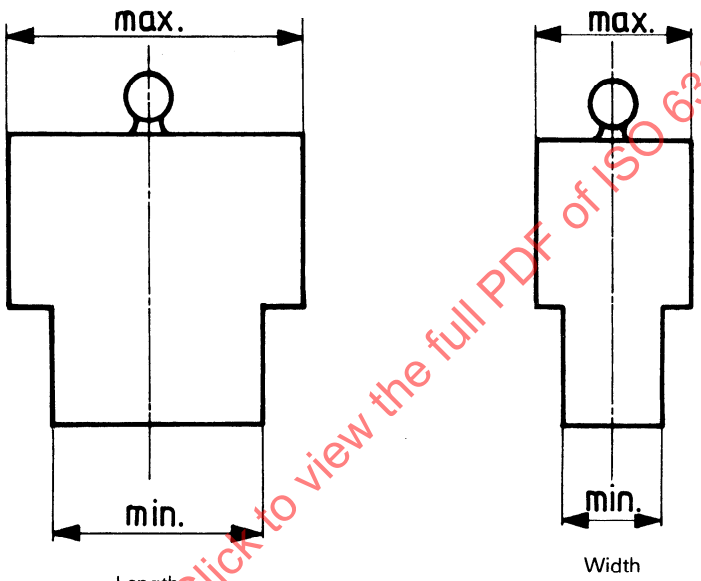
Annex A

Checking of dimensions and tolerances

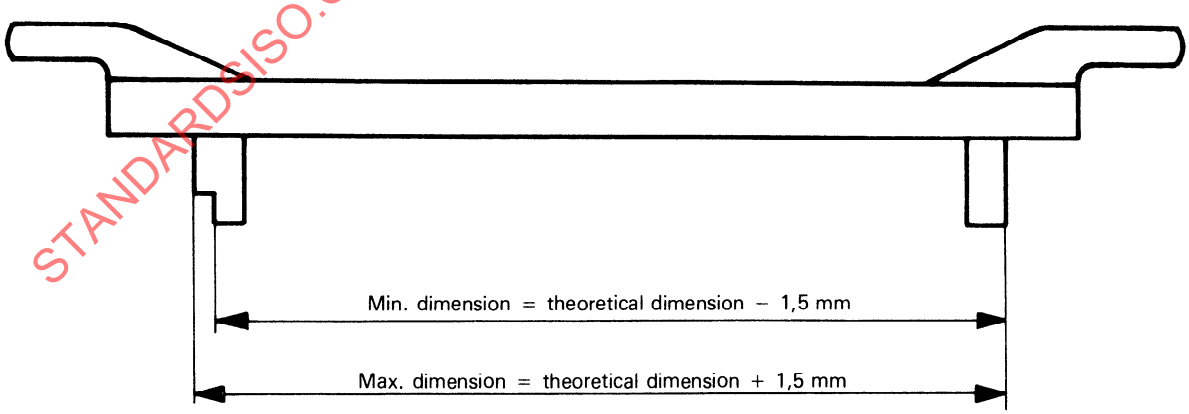
(Forms part of the Standard.)

A.1 Gauges for checking length and width of holes

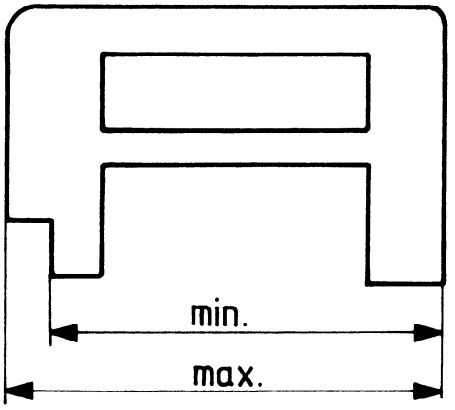
The thickness of the gauge shall not interfere with the checking of the holes.



A.2 Gauge for checking distance between outer edges of extreme fixing holes



A.3 Gauge for checking distance between outer edges of fixing holes of one rail seat



Annex B

Check gauge for inclination of the rail seats

(Forms part of the Standard.)