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(Reaffirmed 1995)

Indian Standard

TOLERANCES FOR ERECTION OF STEEL STRUCTURES

भारतीय मानक

इस्पात संरचनाओं को खड़ा करने के लिए छूटें

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BUREAU OF INDIAN STANDARDS
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NEW DELHI 110002

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Price Group 1

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards on 24 October 1989, after the draft finalized by the Structural Engineering Sectional Committee had been approved by the Civil Engineering Division Council.

This standard is intended to serve as a guide to engineers/personnel engaged in the erection of steel structures.

Depending upon the importance and accuracy of workmanship required in the fabrication and erection, steel structures are broadly classified into three groups as follows:

Group A — Steel railway and road bridges and other structures subjected to dynamic loadings which require closer tolerances than those specified for Group B and Group C.

Group B — Steel structures having special characteristics and structures subjected to dynamic loading excluding wind/seismic, like crane gantry girders, its supporting structure, vibratory screens, crushers and their supporting structures, chimneys, microwave end transmission line towers, sub-station and power station structures, industrial buildings and bunkers, etc.

Group C — Steel structures not subjected to dynamic loading, like platform, galleries, stairs, etc, and which do not require closer tolerances as required for Group B structures.

In this standard only Group B and Group C are covered. The tolerances for the erection of Group A are not covered in this standard.

Erection tolerances for specific structures, such as, chimney, towers, bunkers, etc, reference may be made to the relevant standard.

This standard is based on the experience gathered and the practice being followed in major steel construction in the country. Erection tolerances being specified for major steel constructions of steel plants and other industries have also been kept in view.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the results of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

TOLERANCES FOR ERECTION OF STEEL STRUCTURES

1 SCOPE

1.1 This standard covers tolerances on erection of steel structures of Groups B and C categories as defined in the foreword.

1.2 Subject to the provisions of **1.3** and unless otherwise specified in approved drawings/specifications, or specified by the owner, the deviations from true position in the erected steel structures shall not exceed the tolerances specified in this standard.

1.3 The tolerances specified in this standard do not apply to steel structures where the deviations from true positions are intimately linked with and directly influence the technological process. In such cases the tolerances on erected steel structures shall be as per recommendations of process technologists/suppliers.

2 PRE-ERECTION REQUIREMENTS

2.1 Structures damaged during transport, handling and storage, etc, shall be segregated at site, to avoid erection by oversight. Such damages shall be brought to the notice of the owner. A joint inspection of the damaged structure shall be made to decide whether to rectify or reject the damaged items. In the former case the damaged structure shall be rectified to the satisfaction of the owner before erecting the structure.

2.2 Damage to painted surfaces shall be made good before erections.

3 TOLERANCES

3.1 The tolerances on deviations in the erected steel structures from true positions shall not exceed the values specified in Table 1, Table 2 or Table 3 as relevant.

Table 1 Maximum Permissible Tolerances in Erected Steel Columns

Sl. No.	Description	Tolerance
(1)	(2)	(3)
i)	Deviation of column axis at foundation top level with respect to true axis:	
	a) in longitudinal direction	±5 mm
	b) in lateral direction	±5 mm
ii)	Deviation in the level of bearing surface of columns at foundation top with respect to true level	±5 mm
iii)	Out of plumbness (verticality) of column axis from true vertical axis, as measured at column top:	
	a) For columns without any special requirements:	
	1) up to and including 30 m height	$\pm\frac{H}{1\,000}$ or ±25 mm whichever is less
	2) over 30 m height	$\pm\frac{H}{1\,200}$ or ±35 mm whichever is less
	b) For column with special requirements like cranes or such similar requirements:	
	1) up to and including 30 m height	$\pm\frac{H}{1\,000}$ or ±20 mm whichever is less
	2) over 30 m height	$\pm\frac{H}{1\,500}$ or ±25 mm whichever is less
iv)	Deviation in straightness in longitudinal and transverse planes of column at any point along the height	$\pm\frac{H}{1\,500}$ or ±10 mm whichever is less
v)	Difference in the erected positions of adjacent pairs of columns along length or across width of building prior to connecting trusses/beams with respect to true distance	±5 mm
vi)	Deviation in any bearing or seating level with respect to true level	±5 mm
vii)	Deviation in difference in bearing levels of a member on adjacent pair of columns both across and along the building	±5 mm

NOTES

1 Tolerance specified under iii(a) and iii(b) should be read in conjunction with iv and v.

2 'H' is the column height in mm.

Table 2 Maximum Permissible Tolerances in Erected Steel Trusses

(*Clause* 3.1)

Sl. No. (1)	Description (2)	Tolerances (3)
i)	Shift, at the centre of span of top chord member with respect to the vertical plane passing through the centre of bottom chord	$\pm \frac{1}{250}$ of height of truss in mm at centre of span or ± 15 mm whichever is less
ii)	Lateral shift of top chord of truss at the centre of span from the vertical plane passing through the centre of supports of the truss	$\pm \frac{1}{1\,500}$ of span of truss in mm or ±10 mm whichever is less
iii)	Lateral shift in location of truss from its true axis in plan	±10 mm
iv)	Lateral shift in location of purlin from true position	±5 mm
v)	Deviation in difference of bearing levels of trusses from the true difference	$\pm \frac{1}{1\,200}$ of span of truss in mm or ± 20 mm whichever is less

Table 3 Maximum Permissible Tolerances in Erected Steel Crane Girders and Rails

(*Clause* 3.1)

Sl. No. (1)	Description (2)	Tolerances (3)
i)	Shift in the centre line of crane rail with respect to centre line of web crane girder	$\pm \left[\frac{\text{Web thickness in mm}}{2} + 2 \text{ mm} \right]$
ii)	Shift in plan of alignment of crane rail with respect to true axis of crane rail at any point	± 5 mm
iii)	Deviation in crane track gauge with respect to true gauge:	
	a) For track gauge upto and including 15 mm	± 5 mm
	b) For track gauge more than 15 m	± [5 + 0·25 (S − 15)], mm subject to a maximum of ± 10 mm, where S in meters is true track gauge.
iv)	Deviation in the crane rail level at any point from true level	± 10 mm
v)	Difference in levels between crane track rails at:	
	a) supports of crane girders	15 mm
	b) mid span of crane girders	20 mm
vi)	Relative shift of crane rail surface at a joint in plan and elevation	2 mm subject to grinding of surfaces for smooth transition

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