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Cranes — Tolerances for wheels and travel and traversing tracks —

Part 1: General

Appareils de levage à charge suspendue — Tolérances des roues et des voies de roulement et de déplacement —

Partie 1: Généralités

Reference number
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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 preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established 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. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 12488-1 was prepared by Technical Committee ISO/TC 96, *Cranes*, Subcommittee SC 8, *Jib cranes*.

This first edition cancels and replaces ISO 8306:1985, of which it constitutes a technical revision.

ISO 12488 consists of the following parts, under the general title *Cranes — Tolerances for wheels and travel and traversing tracks*:

— *Part 1: General*

— *Part 4: Jib cranes*

Introduction

This part of ISO 12488 establishes requirements and gives guidance and design rules that reflect the present state of art in the field of crane machine design. The rules given represent good design practice that ensures fulfilment of essential safety requirements and adequate service life of components. Deviation from these rules normally leads to increased risks or reduction of service life, but it is acknowledged that new technical innovations, materials etc. may enable new solutions that result in equal or improved safety and durability.

Cranes — Tolerances for wheels and travel and traversing tracks —

Part 1: General

1 Scope

This part of ISO 12488 specifies tolerances for construction assemblies and operational conditions of cranes and associated crane tracks as defined in ISO 4306-1. The purpose of the requirements in this part of ISO 12488 is to promote safe operation and achievement of the expected life of components by the elimination of excessive load effects due to deviations or misalignments from the normal dimensions of the structure.

Tolerances given are extreme values. The elastic deformations due to load effects are outside the scope of this part of ISO 12488. These will need to be taken into account at the design stage using other criteria to achieve the intended operation and performance.

Specific values for particular crane types are given in other parts of ISO 12488.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 286-2:1988, *ISO system of limits and fits — Part 2: Tables of standard tolerance grades and limit deviations for holes and shafts*

ISO 1101, *Geometrical Product Specifications (GPS) — Geometrical tolerancing — Tolerances of form, orientation, location and run-out*

ISO 4306-1, *Cranes — Vocabulary — Part 1: General*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
construction tolerance
amount by which a specific dimension is permitted to vary, resulting from the assembly of the complete crane and its tracks, in new, modified, rebuilt or repaired buildings, before operational use

NOTE 1 This applies to new build or repaired or modified cranes and tracks.

NOTE 2 The amount is given either by the absolute value of the difference between the limits of size, or by the allowable geometric variation.

3.2
operational tolerance
amount by which a specific dimension is permitted to vary, resulting from the use of the crane and its tracks

NOTE The amount is given either by the absolute value of the difference between the limits of size, or by the allowable geometric variation.

4 Symbols

A	Tolerance of the span, related to the rail centre of travelling or traversing tracks, at each point of the track or to the wheel centre of crabs or cranes
B	Tolerance of the horizontal straightness, in ground plan, at each point of the travelling track
b	Tolerance of horizontal straightness related to a test length of 2 metres in ground plan, (sample value) at each point of the rail head
C	Tolerance of straightness related to the height of the crane rail centre at each point of the travelling track
c	Tolerance of straightness related to a test length of 2 metres (sample value) at each point of height of the crane rail
A	Centre-to-centre distance between the horizontal guide rollers, in longitudinal direction of rail
E	Centre-to-centre distance between two wheels or bogeys, in longitudinal direction of rail
h_F	Distance between the top edge of a rail and the bottom edge of horizontal guide rollers
S	Span from centre to centre of the rail
0/00	Angle of inclination expressed as vertical points per horizontal thousand
D	Wheel diameter
E	Height tolerance related to opposite measuring points at right angles to each point of the track
$\pm F_{max}$	Parallelism tolerance of end stops or buffers
G	Angularity tolerance related to rail cross-section with plane surface
H_F	Vertical offset of a welded connection
H_S	Horizontal offset of a rail head
K	Parallelism tolerance of a rail with reference to the web
ΔD	Allowable difference in diameter of the coupled wheels of a coupled drive
Δe	Tolerance of the base of a wheel in ground plan
ΔF	Alignment tolerance of guide rollers in ground plan
Δhr	Height tolerance of the points of wheel contact
ΔN	Tolerance of parallel offset of the wheels in ground plan
αF	Axle tolerance of parallelism of guide rollers across the track

βF Axle tolerance of parallelism of guide rollers across the track

φk Axle tolerance of parallelism in a ground plan of the hole (inclination of axis)

φr Axle tolerance of parallelism in a ground plan of the wheel (inclination of wheel)

τk Axle tolerance parallelism in elevation of the hole (axle camber)

τr Axle tolerance of parallelism in elevation of the wheel (wheel camber)

These symbols and their meanings are applicable to all parts of ISO 12488.

Where symbols for construction tolerances are also applicable to operational tolerances (e.g. in operator instructions), the suffix w is used (e.g. A_w, B_w, C_w, E_w).

Where necessary, an additional suffix may be added, for example,

A_{w1} operational tolerance for travelling tracks,

A_{w2} operational tolerances for traversing tracks,

A_{w3} operational tolerances for cranes,

A_{w4} operational tolerances for crabs.

5 Classification of tolerances

The main criteria for determining the class of tolerance is the total amount of travel throughout the life of the crane; however, system sensitivity shall be considered along with the class of tolerance as given in other parts of ISO 12488.

NOTE In the context of this part of ISO 12488, system sensitivity is considered to be the amount of reaction of the system in terms of load effect resulting from the tolerance considered as unintentional displacement (see ISO 8686-1:1989, 6.1.5). In the case of highly sensitive systems, it could be appropriate to select a higher tolerance class than that shown in Table 1.

Table 1 — Tolerance classes

Tolerance class	Limits of travelling and traversing distance km
1	$50\,000 \leqslant L$
2	$10\,000 \leqslant L < 50\,000$
3	$L < 10\,000$, for stationary erected tracks
4	Temporarily erected tracks for building and erection purposes
NOTE L is calculated as the product of the normal travel speed and the specified working time of the relevant travel/traverse mechanism, either by application of customer specified values or through reference to the classification of the mechanism.	

6 Tolerances

6.1 General

The tolerances for the various classes and parameters shall be as given in Tables 2, 3, 4, 5, 6 and 7.

6.2 Thermal effects

The tolerances given in Tables 2, 3, 4, 5, 6 and 7 shall be used for an ambient temperature of 20 °C. Where the average ambient temperature for the operational position of the crane differs from 20 °C, the tolerances shall be adjusted accordingly.

6.3 Application of vertical out-of-plane tolerance

The tolerance Δhr given in Tables 4 and 5 for the vertical out-of-plane displacement of a corner of rail wheel of a crane or crane crab, and the corresponding tolerances for tracks given in Tables 2 and 3 are valid for rigid structures travelling or traversing on the rails, i.e. for box beam structures of main girders, crabs or portals. For frames built from open sections, the tolerances used may be one or two classes lower.

6.4 Construction tolerances

6.4.1 General

The measurements shall be taken in the unloaded condition with the crane and its associated tracks supported in the manner in which they will be operated. Tables 2 to 6 show the appropriate tolerances.

If technical documentation requires a means for differentiation of the tolerances, a suffix shall be added to the tolerance symbol, corresponding to the relevant table in this part of ISO 12488.

EXAMPLE A_2 is the construction tolerances for travelling tracks as per Table 2.

6.4.2 Rail joints

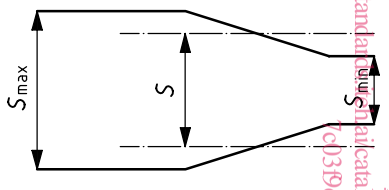
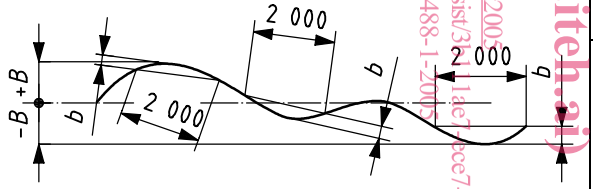
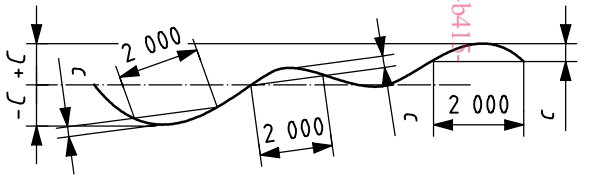
Construction tolerances shall be in accordance with Table 6.

6.5 Operational tolerances

The operational tolerances given in Table 7 shall be measured with the crane in the unloaded condition.

NOTE Tolerances in excess of those shown in Table 7 can result in unacceptable ride characteristics and additional stresses, leading to increased wear on rails, wheels, guide rollers etc., and possible damage to the supporting structure. If any measurements are beyond the tolerances in Table 7, then investigations should be undertaken by a competent engineer and the appropriate action taken.

Table 2 — Construction tolerances for travelling tracks of tolerance classes 1 to 4

Tolerance parameter			Tolerance				
Symbol	Description with respect of this table	Graphical representation	Class 1	Class 2	Class 3	Class 4	Unit
A	Tolerance of span *S* of the crane rails related to rail centre at each point of travelling track		± 3 Valid for all spans $S \leqslant 16$ m ± [3+0,25(S–16)] ± 10 max. Valid for spans $S > 16$ m, S in metres	± 5 Valid for all spans $S \leqslant 16$ m ± [5+0,25(S–16)] ± 15 max. Valid for spans $S > 16$ m, S in metres	± 8 Valid for all spans $S \leqslant 16$ m ± [8+0,25(S–16)] ± 20 max. Valid for spans $S > 16$ m, S in metres	± 12,5 Valid for all spans $S \leqslant 16$ m ± [8+0,25(S–16)] ± 25 max. Valid for spans $S > 16$ m, S in metres	mm
B	Tolerance of horizontal straightness of rail head at each point of travelling track	Position of crane rail in ground plan	± 5	± 10	± 20	± 40	
b	Tolerance of horizontal straightness related to test length of 2 000 mm (sample value) at each point of rail head		1	1	2	4	
C	Tolerance of straightness related to height of crane rail centre at each point of travelling track	Height of crane rail (axial slope)	± 5	± 10	± 20	± 40	
c	Tolerance of straightness related to test length of 2 000 mm (sample value) at each point of height of crane rail		1	2	4	8	