

INTERNATIONAL STANDARD

**ISO
4304**

First edition
1987-06-01



INTERNATIONAL ORGANIZATION FOR STANDARDIZATION
ORGANISATION INTERNATIONALE DE NORMALISATION
МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ

Cranes other than mobile and floating cranes — General requirements for stability

*Appareils de levage autres que grues mobiles et grues flottantes — Exigences générales
relatives à la stabilité*

Reference number
ISO 4304:1987 (E)

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.

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. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 4304 was prepared by Technical Committee ISO/TC 96, *Cranes, lifting appliances and related equipment*.

Users should note that all International Standards undergo revision from time to time and that any reference made herein to any other International Standard implies its latest edition, unless otherwise stated.

Cranes other than mobile and floating cranes — General requirements for stability

1 Scope and field of application

This International Standard specifies the conditions to be met when verifying, by calculation, the stability of all crane types defined in ISO 4306-1 that are subject to tipping (except mobile cranes and floating cranes); it assumes that they are standing on a firm, level supporting surface or track.

The sliding of cranes on their tracks is not covered by this International Standard.

2 References

ISO 4302, *Cranes — Wind load assessment*.

ISO 4306-1, *Lifting appliances — Vocabulary — Part 1: General*.

3 Stability

3.1 Calculations

3.1.1 A crane is said to be stable when the algebraic sum of the stabilizing moments is greater than the sum of the tipping moments.

3.1.2 Calculations shall be made to verify the stability of the crane by computing the sum of the tipping moments using the values given in the table.

In all calculations, the position of the crane and its components, and the effect of all loads and forces, shall be considered in their least favourable combination, direction and effect.

3.1.3 Where a crane is required to operate on an inclined surface, the manufacturer shall take the specified conditions into account in calculating stability.

3.1.4 For cranes designed to travel with load, the forces induced by the maximum allowable vertical track variation as specified by the manufacturer shall be taken into account, in addition to other loads specified in case II of the table.

3.1.5 For cranes that are to be permanently installed, earthquake effects appropriate to the particular site or zone shall be considered as an additional loading under cases I, II and III of the table.

3.1.6 In the calculations shown in the table, consideration shall be given to the loads induced by the weight of the crane and its components, including any lifting attachments which are a permanent part of the crane in its working condition.

3.2 Backwards stability in service conditions

When a crane is in an unladen state and with all operationally movable components retracted to positions closest to the backward tipping edge, backwards stability in service conditions shall be verified as indicated in either 3.2.1 or 3.2.2 (see also the table, case IV).

3.2.1 Moment method

The tipping moment caused by in-service wind W_1 and inertia forces D shall not be greater than 90 % of the stabilizing moment.

3.2.2 Gravity method

The projection of the centre of gravity of the static crane in calm air onto a horizontal plane shall be at a position not exceeding 80 % of the distance from the forward supporting point to the backward tipping edge. Typical examples are shown in the figure.

3.3 Application of wind loads

3.3.1 In-service wind forces shall always be applied in the least favourable direction.

3.3.2 Out-of-service wind forces shall be applied in the least favourable direction for those cranes which are not free to rotate with the wind. For those cranes which are designed to rotate with the wind, the wind force shall be applied on the superstructure in the direction contemplated, and in the least favourable direction on the lower structure.