INTERNATIONAL STANDARD

ISO 4301-2

Third edition
2020-11

Cranes — Classification —

Part 2: Mobile cranes

Appareils de levage à charge suspendue — Classification —

Partie 2: Grues mobiles

Reference number
ISO 4301-2:2020(E)

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 96, *Cranes*, Subcommittee SC 6, *Mobile cranes*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

This third edition cancels and replaces the second edition (ISO 4301-2:2009), which has been technically revised.

The main change compared to the previous edition is the introduction of the cycle-based classification for mobile cranes equipment following ISO 4301-1:2016.

A list of all parts in the ISO 4301 series can be found on the ISO website.

Introduction

Mobile cranes play a part in the handling of materials by raising and moving loads, the mass of which is within their rated capacity. However, there can be wide variations in their duty. The design of the crane should take account of the duty in terms of conditions of service, in order to reach an appropriate level of safety and useful life which is in line with the purchaser's requirements.

Classification serves as a reference framework between purchaser and manufacturer, by which a particular mobile crane can be matched to the intended service. It also is the system used to provide a means of establishing rational bases for the design of mobile cranes.

Cranes — Classification —

Part 2:
Mobile cranes

1 Scope

This document establishes a general classification of mobile cranes and related crane mechanisms based on the service conditions, mainly expressed by the following:

— the total number of working cycles to be carried out during the specified design life of the crane;

— the load spectrum factor which represents the relative frequencies of loads to be handled;

— the average load displacements.

This document is applicable for the work spectrum between moderate to very heavy number of work cycles as described in Table 2.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 4301-1, *Cranes — Classification — Part 1: General*

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

ISO 4306-2, *Cranes — Vocabulary — Part 2: Mobile cranes*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 4301-1, ISO 4306-1 and ISO 4306-2 apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

4 Classification

4.1 General

For the purpose of classification, a crane working cycle is a sequence of movements which begins when the crane is ready to hoist the load and ends when the crane is ready to hoist the next load within the same task. A task can be characterized by a specific combination of crane configuration and sequence of intended movements.

4.2 Classification of the crane

The total number of working cycles, C, is the sum total of all working cycles during the design life of the crane. The total number of crane working cycles during the design life of a crane can be separated into the numbers of working cycles corresponding to several typical tasks. The total number of crane working cycles is related to the frequency of use (e.g. daily) and the intended life (in years) of the crane. For convenience, the range of the total number of mobile crane working cycles has been divided into 9 classes of utilization (see Table 1), identical to the corresponding classes in ISO 4301-1:2016.

Table 1 — Classes of utilizazion (U) of total numbers of mobile crane working cycles, C

Class of utilization	Total number of mobile crane working cycles, C
U_0	$C \leq 1{,}6 \times 10^4$
U_1	$1{,}6 \times 10^4 < C \leq 3{,}15 \times 10^4$
U_2	$3{,}15 \times 10^4 < C \leq 6{,}3 \times 10^4$
U_3	$6{,}3 \times 10^4 < C \leq 1{,}25 \times 10^5$
U_4	$1{,}25 \times 10^5 < C \leq 2{,}5 \times 10^5$
U_5	$2{,}5 \times 10^5 < C \leq 5 \times 10^5$
U_6	$5 \times 10^5 < C \leq 1 \times 10^6$
U_7	$1 \times 10^6 < C \leq 2 \times 10^6$
U_8	$2 \times 10^6 < C \leq 4 \times 10^6$

The load spectrum factor, K_p, is one of the parameters used to specify the duty of the crane by describing the different net loads to be handled during the working movements. The load spectrum factor takes into account the number of times a load of a particular magnitude, in relation to the rated capacity of the crane, is lifted.

The load spectrum factor, K_p, shall be determined in accordance with ISO 4301-1:2016, 6.3.

Having determined the class of utilization U (see Table 1) and the state of loading (see ISO 4301-1:2016, Table 3), they can be combined into a single group classification for the crane as a whole.

The classification by group of mobile cranes shall be in accordance with Table 2.

The minimum group classification for mobile cranes is shown in Table 3.

Table 2 — Classes A for group classification for the whole mobile crane

State of loading class Q_p	Design value of load spectrum factor K_p	Class of utilization (U) and total number of work cycles								
		U_0	U_1	U_2	U_3	U_4	U_5	U_6	U_7	U_8
		$1{,}60 \times 10^4$	$3{,}15 \times 10^4$	$6{,}3 \times 10^4$	$1{,}25 \times 10^5$	$2{,}5 \times 10^5$	$5{,}0 \times 10^5$	$1{,}0 \times 10^6$	$2{,}0 \times 10^6$	$4{,}0 \times 10^6$
Q_p0	0,031 3	—	—	—	—	A1	A2	A3	A4	A5
Q_p1	0,062 5	—	—	—	A1	A2	A3	A4	A5	A6
Q_p2	0,125 0	—	—	A1	A2	A3	A4	A5	A6	A7
Q_p3	0,250 0	—	A1	A2	A3	A4	A5	A6	A7	A8
Q_p4	0,500 0	A1	A2	A3	A4	A5	A6	A7	A8	—
Q_p5	1,000 0	A2	A3	A4	A5	A6	A7	A8	—	—

NOTE 1 For other crane classes, see ISO 4301-1.

NOTE 2 Moderate to very heavy number of work cycle.

Table 3 — Minimum group classification for mobile cranes

Crane operating conditions	Service conditions	Group classification of equipment as whole
General hook duties – not used for continuous service	Light use	A1
	Intermittent use	A2
	Intensive use	A3
Equipped with bucket, grapple or magnet	Regular Intermittent use	A3
	Intensive use	A4
Heavy-duty (e.g. container handling or general dock service)	Regular Intermittent use	A4
	Intensive use	A5

Design number of full load cycles are listed in ISO 4301-1:2016, Table 5.

Average displacements are determined from the average process condition of the mobile crane.

Average displacements shall be selected and classified in accordance with ISO 4301-1:2016, 6.5.

4.3 Classification of components and mechanisms

4.3.1 General

Typical components for which classification may be applied are drives for hoisting, slewing, luffing, telescoping and travelling. The classification may be different for individual components in a particular crane and may be different for the group classification for the whole mobile crane.

The total number of component working cycles may be derived from the working cycles of the crane. There are component working cycles that occur less frequently than the working cycles of the crane, such as the following:

a) raising/lowering the boom of a mobile crane;

b) assembly/disassembly of a mobile crane;