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Žerjavi - Spremljanje projektiranega delovnega obdobja žerjava

Cranes - Monitoring for crane design working period

Appareils de levage à charge suspendue - Surveillance continue de la période d'activité de conception

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Cranes

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**Cranes — Monitoring for crane design
working period**

*Appareils de levage à charge suspendue — Surveillance continue de la
période d'activité de conception*

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ISO 12482:2014(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. 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).

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 96, *Cranes*, SC 5, *Use, operation and maintenance*.

ISO 12482 cancels and replaces ISO 12482-1:1995, which has been technically revised.

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Introduction

Cranes are designed for a finite lifetime duty, which is specified in load cycles and load spectrum and is not principally related to calendar working time. Classification of crane duty provides the crane owner a means to specify the intended duty in order to achieve the intended useful operational lifetime of the crane.

Typically the operational period for industrial cranes is from 10 to 20 years. However, a specified crane classification may be related to any calendar time depending on the application, e.g. 5 to 10 years for a special limited use or 40 years for a long-term investment.

Monitoring of crane use does not in any way change requirements for periodic inspections of the cranes, independent of whatever type of instruments are used for the monitoring. Neither does it remove the requirement for regular maintenance of cranes. Inspections and monitoring of use are methods, which complete each other, giving different information of the condition.

The design working period (DWP) introduced in this standard is derived from the design classification of cranes and is not to be considered as a guaranteed operational period in any respect. Due to the probabilistic nature of metal fatigue and other influencing factors, premature failures during the DWP cannot be ruled out. However, the DWP represents a reliable estimate of a safe operational period of the crane, with due consideration to specified design regulations and standardized design safety factors.

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Cranes — Monitoring for crane design working period

1 Scope

This International Standard specifies a method for monitoring, during long-term operation, the actual duty of the crane, and a means of comparing this to the original design duty which was specified through classification. The related design standard is ISO 4301-1. Approaching the design life limit means an increased probability of hazards. Monitoring of crane use — as described herein — provides a tool for predicting the approach of the design limits and for focusing special inspections on the critical areas of a crane.

This International Standard is intended to be used for adjusting/modifying the inspections defined in ISO 9927-1.

It is applicable to cranes with a permanent construction throughout the life of the crane.

It is not applicable to mobile or tower cranes, except permanently installed tower cranes.

NOTE The method specified in this International Standard can be adapted to standards or rules other than ISO 4301-1 which specify classifications.

2 Normative references

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

ISO 4301-1:1986, *Cranes and lifting appliances — Classification — Part 1: General*

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

ISO 9927-1, *Cranes — Inspections — Part 1: General*

3 Terms and definitions

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

3.1

design duty

production capacity of a crane or hoist during its total useful operational period, specified by the original design classification

3.2

design life

estimation of the allowable period of use for a crane based on its original design specifications and taking into consideration the load cycles and load spectra expected during its intended usage

3.3

design working period

DWP

operation period in a specific actual duty, within which the design duty is reached

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3.4

special assessment

SA

thorough examination and evaluation of the crane or hoist, to be made when the actual crane or hoist duty approaches the design duty

3.5

general overhaul

GO

all refurbishment and maintenance actions based upon a special assessment (SA), required to extend the safe operation life of a crane

3.6

work cycle

operating sequence starting from hoisting a load, transferring the load, lowering and grounding the load, detaching the load and moving the unloaded load lifting attachment back to a starting position ready to hoist another load

4 Recording crane operation

4.1 General

The crane owner should keep records of the crane use, adequate to identify the criteria specified by the crane manufacturer and applicable to carry out the assessments described in this standard. Records should also be kept of maintenance, inspections, repairs, modifications and exceptional occurrences, e.g. overloads, extreme climatic conditions and collisions. Records should be updated at least once a year during periodic inspections, see ISO 9927-1.

4.2 Methods for counting duty

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Estimation of the duty history can be divided into the following categories, based on systematic and reliable data collection and documentation procedures.

- a) Crane operation data are recorded by a special, purpose-built system, which always operates automatically when the crane is in use. The crane operator does not have a possibility to switch off the recording system.
- b) The crane is provided with counters recording the crane operation data. The user collects and documents the operation data manually from the counters.
- c) The crane duty history is calculated based upon a regular process in which the crane is working. The crane is an integral part of the process. Process data are documented.
- d) The crane duty history is estimated based upon a general production data of the site where the crane is working.
- e) The crane duty history is incomplete.
- f) The crane duty history is unknown (e.g. in the case of a second-hand crane). The duty for DWP calculation is based on estimate or assumed to be according to design classification and design life reduced using the factor f_1 from [Table 1](#), item 5.

The basic Information for counting the crane use is in all cases provided by the crane owner/user.

Where recording instruments or counters are installed, the user should regularly inspect the instruments to ensure that they are properly functioning.

4.3 Safety factor for duty counting

When calculating the design working period (DWP) of a crane, the estimated duty from the history shall be increased by a safety factor, f_1 , according to [Table 1](#), to cover the unreliability in the duty recording and estimation.

Table 1 — Safety factor f_1 for duty counting

No.	Method of duty recording	f_1
1	Automatic recording system, 4.2 a) , or Counters and manual documentation, 4.2 b)	1,0
2	Estimation based upon a special, documented process, 4.2 c)	1,1
3	Estimation based upon documented production of the crane site, 4.2 d)	1,2
4	Estimation based upon undocumented, estimated production of the crane site, 4.2 e)	1,3
5	Crane duty history is unknown, 4.2 f)	1,5

5 Assessment of design working period

5.1 General

Many components of a crane may fail because of metal fatigue, which is difficult to predict or estimate by physical inspections. Safeguarding against fatigue failure by physical inspections may be difficult due to the following:

- the safe time window for an inspection from detectable to critical crack size can be short, leading to unnecessary frequent inspections;
- detecting a fatigue crack would require in many cases a full disassembly of a component;
- planning and scheduling future repairs of the crane is not possible, and non-acceptance by an inspection typically requires immediate action and possibly interruption of crane operation.

The purpose of the assessment of DWP is to estimate accumulated duty of the crane and assess its remaining life.

It is assumed that

- all periodic inspections scheduled for the crane have been carried out,
- any damage suffered during the operation is recorded and appropriately repaired, and
- maintenance work, as well as replacement of worn parts, is carried out in accordance with the manufacturer's instructions.

5.2 Schedule

Collecting the data on the use of a crane and the assessment of DWP should be carried out in conjunction with periodic inspections (see ISO 9927-1) at 12 month intervals.

5.3 DWP calculation method

The applied DWP calculation method should follow the specification and classification of the original design standard as closely as possible. [Annexes A](#) and [B](#) give DWP calculation methods for cranes classified and designed in accordance with ISO 4301-1.

The DWP calculation shall cover both the crane as a whole (structures) and the mechanisms.