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| STN | Parné turbíny Časť 1: Špecifikácie | STN EN IEC 60045-1 08 0030 |
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Steam turbines - Part 1: Specifications

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

Táto norma bola oznámená vo Vestníku ÚNMS SR č. 10/20

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EN IEC 60045-1

NORME EUROPÉENNE

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July 2020

ICS 27.040

Supersedes EN 60045-1:1993 and all of its amendments
and corrigenda (if any)

English Version

**Steam turbines - Part 1: Specifications
(IEC 60045-1:2020)**Turbines à vapeur - Partie 1: Spécifications
(IEC 60045-1:2020)Dampfturbinen - Teil 1: Anforderungen
(IEC 60045-1:2020)

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European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

EN IEC 60045-1:2020 (E)**European foreword**

The text of document 5/231/FDIS, future edition 2 of IEC 60045-1, prepared by IEC/TC 5 "Steam turbines" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 60045-1:2020.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2021-03-17
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2023-06-17

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In the official version, for Bibliography, the following notes have to be added for the standards indicated:

| | | |
|------------------------|------|--|
| IEC 60300-3-3 | NOTE | Harmonized as EN 60300-3-3 |
| IEC 60812 | NOTE | Harmonized as EN IEC 60812 |
| IEC 61025 | NOTE | Harmonized as EN 61025 |
| IEC 61326 (series) | NOTE | Harmonized as EN IEC 61326 (series) |
| IEC 61508 (series) | NOTE | Harmonized as EN 61508 (series) |
| IEC 61508-5:2010 | NOTE | Harmonized as EN 61508-5:2010 (not modified) |
| IEC 61511 (series) | NOTE | Harmonized as EN 61511 (series) |
| IEC 61511-1 | NOTE | Harmonized as EN 61511-1 |
| IEC 61511-3:2016 | NOTE | Harmonized as EN 61511-3:2017 (not modified) |
| IEC 61882 | NOTE | Harmonized as EN 61882 |
| IEC 62381 | NOTE | Harmonized as EN 62381 |
| IEC 62541 (series) | NOTE | Harmonized as EN 62541 (series) |
| IEC 62682 | NOTE | Harmonized as EN 62682 |
| ISO/IEC 15408 (series) | NOTE | Harmonized as EN ISO/IEC 15408 (series) |

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| IEC/IEEE 82079-1 | NOTE | Harmonized as EN IEC/IEEE 82079-1 |
| ISO 2553 | NOTE | Harmonized as EN ISO 2553 |
| ISO 3834 (series) | NOTE | Harmonized as EN ISO 3834 (series) |
| ISO 3834-1:2005 | NOTE | Harmonized as EN ISO 3834-1:2005 (not modified) |
| ISO 5817 | NOTE | Harmonized as EN ISO 5817 |
| ISO 9241 (series) | NOTE | Harmonized as EN ISO 9241 (series) |
| ISO 9606 (series) | NOTE | Harmonized as EN ISO 9606 (series) |
| ISO 9692 (series) | NOTE | Harmonized as EN ISO 9692 (series) |
| ISO 9712 | NOTE | Harmonized as EN ISO 9712 |
| ISO 11970 | NOTE | Harmonized as EN ISO 11970 |
| ISO 12932 | NOTE | Harmonized as EN ISO 12932 |
| ISO 13857 | NOTE | Harmonized as EN ISO 13857 |
| ISO 13916 | NOTE | Harmonized as EN ISO 13916 |
| ISO 13919-1 | NOTE | Harmonized as EN ISO 13919-1 |
| ISO 14731 | NOTE | Harmonized as EN ISO 14731 |
| ISO 14732 | NOTE | Harmonized as EN ISO 14732 |
| ISO 15613 | NOTE | Harmonized as EN ISO 15613 |
| ISO 15614 (series) | NOTE | Harmonized as EN ISO 15614 (series) |
| ISO 17659 | NOTE | Harmonized as EN ISO 17659 |
| ISO 17663 | NOTE | Harmonized as EN ISO 17663 |

EN IEC 60045-1:2020 (E)**Annex ZA**
(normative)**Normative references to international publications
with their corresponding European publications**

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.

NOTE 1 Where an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu.

| <u>Publication</u> | <u>Year</u> | <u>Title</u> | <u>EN/HD</u> | <u>Year</u> |
|--------------------|-------------|--|------------------|-------------|
| IEC 60034-3 | - | Rotating electrical machines - Part 3: Specific requirements for synchronous generators driven by steam turbines or combustion gas turbines and for synchronous compensators | - | - |
| IEC 60079 | series | Explosive atmospheres | - | - |
| IEC 60204-1 | - | Safety of machinery - Electrical equipment of machines - Part 1: General requirements | EN 60204-1 | - |
| IEC 60953 | series | Rules for steam turbine thermal acceptance tests | - | - |
| IEC 61000-6-2 | - | Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity standard for industrial environments | EN IEC 61000-6-2 | - |
| IEC 61000-6-4 | - | Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments | EN IEC 61000-6-4 | - |
| IEC 61064 | - | Acceptance tests for steam turbine speed control systems | EN 61064 | - |
| ISO 1940 | - | Mechanical vibration - Balance quality requirements for rotors in a constant (rigid) state | - | - |
| ISO 7919-3 | - | Mechanical vibration - Evaluation of mechanical vibration by measurements on rotating shafts - Part 3: Coupled industrial machines | - | - |

EN IEC 60045-1:2020 (E)

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|--------------|------|--|--------------|------|
| ISO 10494 | - | Turbines and turbine sets - measurement of emitted airborne noise - engineering/survey method | - | - |
| ISO 11342 | - | Mechanical vibration - Methods and criteria for the mechanical balancing of flexible rotors | - | - |
| ISO 10816-3 | - | Mechanical vibration - Evaluation of machine vibration by measurements on non-rotating parts - Part 3: Industrial machines with nominal power above 15 kW and nominal speeds between 120 r/min and 15 000 r/min when measured in situ | - | - |
| ISO 12100 | 2010 | Safety of machinery - General principles for design - Risk assessment and risk reduction | EN ISO 12100 | 2010 |
| ISO 13850 | - | Safety of machinery - Emergency stop function - Principles for design | EN ISO 13850 | - |
| ISO 20816-1 | - | Mechanical vibration - Measurement and evaluation of machine vibration - Part 1: General guidelines | - | - |
| ISO 20816-2 | - | Mechanical vibration - Measurement and evaluation of machine vibration - Part 2: Land-based gas turbines, steam turbines and generators in excess of 40 MW, with fluid-film bearings and rated speeds of 1 500 r/min, 1 800 r/min, 3 000 r/min and 3 600 r/min | - | - |
| ISO 21940-31 | - | Mechanical vibration - Rotor balancing - Part 31: Susceptibility and sensitivity of machines to unbalance | - | - |



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Edition 2.0 2020-05

INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Steam turbines –
Part 1: Specifications**

**Turbines à vapeur –
Partie 1: Spécifications**





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IEC 60045-1

Edition 2.0 2020-05

INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Steam turbines –
Part 1: Specifications**

**Turbines à vapeur –
Partie 1: Spécifications**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

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CONTENTS

| | |
|---|----|
| FOREWORD..... | 7 |
| INTRODUCTION..... | 9 |
| 1 Scope..... | 10 |
| 2 Normative references | 10 |
| 3 Terms and definitions | 11 |
| 3.1 Turbine types..... | 11 |
| 3.2 Methods of initial steam admission..... | 13 |
| 3.3 Interfaces and terminal conditions..... | 13 |
| 3.4 Speeds | 16 |
| 3.5 Powers | 17 |
| 3.6 Steam flow rate and steam rate..... | 18 |
| 3.7 Heat rates | 18 |
| 3.9 Operational regimes (modes)..... | 19 |
| 3.10 Methods of load variation | 19 |
| 3.11 Operational life | 20 |
| 3.12 Control and protection..... | 20 |
| 4 Guarantees..... | 21 |
| 4.1 General..... | 21 |
| 4.2 Thermal performance guarantees | 21 |
| 4.2.1 Performance codes..... | 21 |
| 4.2.2 Turbine plant thermal efficiency or heat rate or steam rate | 21 |
| 4.2.3 Output or steam flow capacity..... | 22 |
| 4.2.4 Auxiliary plant power | 22 |
| 4.2.5 Steam tables | 22 |
| 4.2.6 Tolerances | 22 |
| 4.2.7 Ageing | 23 |
| 5 Product safety | 23 |
| 5.1 General..... | 23 |
| 5.2 Risk assessment..... | 23 |
| 5.2.1 General | 23 |
| 5.2.2 Limits of the assessments..... | 23 |
| 5.2.3 Definition of hazards to be considered | 24 |
| 5.2.4 Hazard identification | 24 |
| 5.2.5 Risk estimation | 24 |
| 5.3 Risk reduction..... | 25 |
| 5.4 Interface descriptions..... | 25 |
| 5.5 Documentation..... | 26 |
| 6 Operation and maintenance | 26 |
| 6.1 Normal operation | 26 |
| 6.1.1 General | 26 |
| 6.1.2 Start-up categories | 26 |
| 6.1.3 Specification of load collective..... | 26 |
| 6.1.4 Start-up time..... | 27 |
| 6.1.5 Steam generator characteristics | 27 |
| 6.1.6 Expected load operation | 27 |
| 6.1.7 Turbine by-pass system..... | 28 |

| | | |
|-------|---|----|
| 6.1.8 | Auxiliary steam | 28 |
| 6.2 | Limits of variation of parameters from rated conditions | 28 |
| 6.2.1 | General | 28 |
| 6.2.2 | Initial pressure | 29 |
| 6.2.3 | Initial and, where applicable, reheat temperature | 29 |
| 6.2.4 | Turbine exhaust pressure/temperature | 31 |
| 6.2.5 | Speed | 32 |
| 6.3 | Abnormal operation | 32 |
| 6.3.1 | Cases | 32 |
| 6.3.2 | Limitations from abnormal turbine operation | 32 |
| 6.3.3 | Boundary conditions at abnormal turbine operation | 32 |
| 6.4 | Installation conditions | 33 |
| 6.4.1 | Indoor/outdoor | 33 |
| 6.4.2 | Seismic condition | 33 |
| 6.5 | Maintenance | 33 |
| 6.6 | Operating instructions | 33 |
| 7 | Components | 34 |
| 7.1 | Materials, construction and design | 34 |
| 7.2 | Parts subject to high temperatures | 34 |
| 7.2.1 | Unstressed parts | 34 |
| 7.2.2 | Stressed parts | 34 |
| 7.3 | Casings and pedestals | 34 |
| 7.4 | Rotors | 34 |
| 7.4.1 | Balancing | 34 |
| 7.4.2 | Critical speeds | 34 |
| 7.4.3 | Overspeed | 35 |
| 7.4.4 | Short-circuit and other abnormal torque loads | 35 |
| 7.4.5 | Shaft train | 35 |
| 7.5 | Valves | 36 |
| 7.6 | Main bearings and housings | 36 |
| 7.7 | Cylinder and interstage glands | 36 |
| 7.8 | Thermal insulation | 36 |
| 7.9 | Welding | 36 |
| 8 | Foundations and buildings | 37 |
| 9 | Extractions, bleeds and exhausts | 37 |
| 9.1 | General | 37 |
| 9.2 | Requirements on steam parameters and volume flow | 38 |
| 9.3 | Design of steam outlets | 38 |
| 9.4 | Limits of supply | 38 |
| 9.5 | Boundary conditions for guarantees | 39 |
| 9.6 | Protection devices against backflow of water and steam | 39 |
| 9.6.1 | Water ingress from the feedwater heating system or other condensation systems | 39 |
| 9.6.2 | Preventing steam backflow to steam turbine to avoid overspeed | 40 |
| 9.6.3 | Unwanted steam from cold reheat system | 40 |
| 10 | Turbine auxiliary systems | 41 |
| 10.1 | General | 41 |
| 10.2 | Lubricating oil | 41 |
| 10.3 | Control fluid | 42 |

| | | |
|--------|---|----|
| 10.4 | Sealing system for rotor and valve glands | 42 |
| 10.5 | Drains | 42 |
| 10.6 | Vents | 42 |
| 10.7 | Turning gear | 43 |
| 10.8 | Piping | 43 |
| 11 | Automation | 43 |
| 11.1 | General..... | 43 |
| 11.2 | General requirements in relation to the steam turbine automation system | 43 |
| 11.2.1 | Environmental conditions | 43 |
| 11.2.2 | Electromagnetic compatibility | 44 |
| 11.2.3 | Requirements as to hardware and software design | 44 |
| 11.2.4 | Tests of the steam turbine automation system | 45 |
| 11.3 | Turbine Control System (TCS) | 46 |
| 11.3.1 | General | 46 |
| 11.3.2 | Functional requirements as to governing system..... | 46 |
| 11.3.3 | Speed and load adjustments..... | 47 |
| 11.3.4 | Controller characteristics | 47 |
| 11.3.5 | Performance characteristics | 47 |
| 11.3.6 | Valve testing control | 48 |
| 11.3.7 | Facilities | 48 |
| 11.3.8 | Control functions for auxiliary systems..... | 48 |
| 11.3.9 | Monitoring functions and/or informative messages..... | 49 |
| 11.4 | Steam turbine protection | 49 |
| 11.4.1 | Functional requirements for protection..... | 49 |
| 11.4.2 | Requirements as to the design of the protection system | 51 |
| 11.5 | Instrumentation | 52 |
| 11.5.1 | General | 52 |
| 11.5.2 | Standard instruments..... | 52 |
| 11.5.3 | Turbine supervisory instrumentation (TSI) | 52 |
| 11.5.4 | Additional instruments | 53 |
| 11.5.5 | Test measuring points | 53 |
| 12 | Other devices for protection of the turbine and of interfacing systems | 54 |
| 12.1 | Low-pressure casing and condenser pressurization | 54 |
| 12.2 | Valve casing pressurization | 54 |
| 13 | Vibration..... | 54 |
| 13.1 | General..... | 54 |
| 13.2 | Vibration measured at the bearing housing | 54 |
| 13.3 | Vibration measured at the shaft | 54 |
| 14 | Noise..... | 54 |
| 14.1 | General..... | 54 |
| 14.2 | Noise emitted by the steam turbine | 55 |
| 14.3 | Noise level in the vicinity of the turbine unit | 55 |
| 15 | Tests | 55 |
| 15.1 | General..... | 55 |
| 15.2 | Testing of pressurized components..... | 55 |
| 15.3 | Performance tests..... | 55 |
| 15.4 | Test results and data | 56 |
| 16 | Delivery and installation..... | 56 |

| | | |
|-----------------------|--|----|
| 16.1 | Transport to site and temporary protection | 56 |
| 16.2 | Erection and commissioning | 56 |
| 17 | Design information to be supplied by the purchaser | 56 |
| 17.1 | General..... | 56 |
| 17.2 | Characteristics of the turbine and its accessories..... | 56 |
| 17.3 | Steam and water conditions | 57 |
| 17.4 | Conditions for condensers and coolers (where this equipment is within the supplier's scope of supply)..... | 58 |
| 17.5 | Information on regenerative feedwater heating..... | 58 |
| 17.6 | Applications: installation and mode of operation..... | 59 |
| 17.7 | Foundations | 60 |
| 17.8 | Terminal points | 60 |
| 17.9 | Delivery site conditions | 60 |
| 17.10 | Tests | 61 |
| 17.11 | Automation system | 61 |
| 17.12 | Documentation..... | 61 |
| 17.13 | Quality measures | 61 |
| 17.14 | Participation in risk assessment..... | 61 |
| 18 | Design information to be provided by the supplier..... | 61 |
| 18.1 | General..... | 61 |
| 18.2 | Piping | 62 |
| 18.3 | Thermal expansion | 62 |
| 18.4 | Information on regenerative feedwater heating..... | 62 |
| 18.5 | Pipe connections | 62 |
| 18.6 | Time schedule | 62 |
| 18.7 | Auxiliary media and electrical supply | 62 |
| 18.8 | Turbine foundations | 62 |
| 18.9 | Instrumentation and control..... | 63 |
| 18.10 | Heat emissions | 63 |
| Annex A (informative) | Welding of stationary components of steam turbines | 64 |
| A.1 | General..... | 64 |
| A.2 | Principles for design, qualification and execution of welding | 64 |
| A.3 | Welding supervision, welding personnel..... | 66 |
| A.4 | Testing | 67 |
| A.5 | Documentation..... | 67 |
| Bibliography | | 68 |
| Figure 1 | – Condensing steam turbine interfaces | 14 |
| Figure 2 | – Extraction steam turbine interfaces | 14 |
| Figure 3 | – Single shaft combined cycle with multi casing steam turbine interfaces | 15 |
| Table 1 | – Permissible variations for rated pressure..... | 29 |
| Table 2 | – Permissible temperature variations for rated temperature up to 566 °C | 30 |
| Table 3 | – Permissible temperature variations for rated temperature higher than 566 °C up to 630 °C | 31 |
| Table 4 | – Environment classes | 43 |
| Table 5 | – Controller droop and dead band characteristics..... | 47 |

| | |
|---|----|
| Table 6 – Maximum load non-linearity and load stability..... | 48 |
| Table A.1 – Correlation between function and foreseeable risk potential and manufacturer's quality requirements according to ISO 3834 | 65 |
| Table A.2 – Correlation of structural integrity and quality levels | 65 |
| Table A.3 – Qualification of welding procedures (WPQR) for processes 111, 14, 12, 13, 15, 51 (electron beam welding), 52 (laser welding) | 66 |

INTERNATIONAL ELECTROTECHNICAL COMMISSION

STEAM TURBINES –

Part 1: Specifications

FOREWORD

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International Standard IEC 60045-1 has been prepared by IEC technical committee 5: Steam turbines.

This second edition cancels and replaces the first edition published in 1991. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) Scope clarification and boundaries of applicability;
- b) general update to state-of-the-art technology;
- c) integration of product safety: Clause 5;
- d) integration of automation, incorporating the former annex on electronic governors: Clause 11;
- e) Informative Annex A on welding added.

The text of this International Standard is based on the following documents:

| | |
|------------|------------------|
| FDIS | Report on voting |
| 5/231/FDIS | 5/232/RVD |

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts in the IEC 60045 series, published under the general title *Steam turbines*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

INTRODUCTION

The first edition of IEC 60045 was issued in 1931. Subsequent revisions were made, the last being in 1991. In daily practice this document has added tremendous value throughout the years giving guidance in the tendering processes for steam turbines worldwide. Intensive development has resulted in new specific application requirements, the availability of more highly rated turbines, and tremendous advances in automation and control. The new revision of this document was consequently driven by the motivation to close the gap to available technology and a wish to provide a single standard valid for a wide range of industrial and utility steam turbine applications.

Specifically, in the beginning of the 21st century renewable energy sources are rapidly taking shares on the electricity market and steam turbines play an important role in the shift of energy systems:

- They are key components for new power plant concepts as for concentrated solar power (CSP), for geothermal power or in combined heat and power applications;
- They are requested to provide flexible thermal backup power generation with high efficiency (combined cycle) to compensate the increased volatility of the electrical grids;
- Higher steam parameters are technically viable and contribute to more efficient utilisation of energy sources and investments.

In the area of automation and controls the integration of relevant safety standards was necessary and a complete new Clause 5 is dedicated to this. Also, automation itself has formed its own Clause 11 integrating the former aspects of governing, controls, instrumentation and protection paving the way towards digitalization of power plants.

The overall structure of the document is intentionally kept close to the former revision to promote seamless application of the document.

Wherever practicable, this document takes into account the scope for applying to smaller turbines developments originally intended for larger machines, without implying that such applications would always be necessary or advantageous.

STEAM TURBINES –

Part 1: Specifications

1 Scope

This part of IEC 60045 is applicable primarily to land-based horizontal steam turbines driving generators for electrical power services. Some of its provisions are relevant to turbines for other applications. Generator, gear box and other auxiliaries which are considered as a part of the system are also mentioned in this document. Detailed specifications for this equipment are not included in this document.

The purpose of this document is to make an intending purchaser aware of options and alternatives which it may wish to consider, and to enable it to state its technical requirements clearly to potential suppliers. Consequently, final technical requirements will be in accordance with an agreement between the purchaser and the supplier in the contract.

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.

IEC 60034-3, *Rotating electrical machines – Part 3: Specific requirements for synchronous generators driven by steam turbines or combustion gas turbines*

IEC 60079 (all parts), *Explosive atmospheres*

IEC 60204-1, *Safety of machinery – Electrical equipment of machines – Part 1: General requirements*

IEC 60953 (all parts), *Rules for steam turbine thermal acceptance tests*

IEC 61000-6-2, *Electromagnetic compatibility (EMC) – Part 6-2: Generic standards – Immunity standard for industrial environments*

IEC 61000-6-4, *Electromagnetic compatibility (EMC) – Part 6-4: Generic standards – Emission standard for industrial environments*

IEC 61064, *Acceptance tests for steam turbine speed control systems*

ISO 1940, *Mechanical vibration – Balance quality requirements for rotors in a constant (rigid) state*

ISO 7919-3, *Mechanical vibration – Evaluation of mechanical vibration by measurements on rotating shafts – Part 3: Coupled industrial machines*

ISO 10494, *Turbines and turbine sets – Measurement of emitted airborne noise – Engineering/survey method*

ISO 11342, *Mechanical vibration – Methods and criteria for the mechanical balancing of flexible rotors*

ISO 10816-3, *Mechanical vibration – Evaluation of machine vibration by measurements on non-rotating parts – Part 3: Industrial machines with nominal power above 15 kW and nominal speeds between 120 r/min and 15 000 r/min when measured in situ*

ISO 12100:2010, *Safety of machinery – General principles for design – Risk assessment and risk reduction*

ISO 13850, *Safety of machinery – Emergency stop – Principles for design*

ISO 20816-1, *Mechanical vibration – Measurement and evaluation of machine vibration – Part 1: General guidelines*

ISO 20816-2, *Mechanical vibration – Measurement and evaluation of machine vibration – Part 2: Land-based gas turbines, steam turbines and generators in excess of 40 MW, with fluid-film bearings and rated speeds of 1 500 r/min, 1 800 r/min, 3 000 r/min and 3 600 r/min*

ISO 21940-31, *Mechanical vibration – Rotor balancing – Part 31: Susceptibility and sensitivity of machines to unbalance*

koniec náhľadu – text ďalej pokračuje v platenej verzii STN