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Gas turbine applications—Safety



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- Engineers Australia
- Gas Appliance Manufacturers Association of Australia
- Gas Energy Australia
- Gas Technical Regulators Committee
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Australian Standard®

Gas turbine applications—Safety

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PREFACE

This Standard was prepared by the Standards Australia Committee AG-011, Industrial and Commercial Gas-Fired Appliances.

The objective of this Standard is to provide the safety requirements for gas turbine applications using liquid or gaseous fuels, and the safety related control and detection systems and essential auxiliaries for all types of open cycles (simple, combined, regenerative, reheat, etc.) used in onshore and offshore applications, including floating production platforms.

This Standard is identical with, and has been reproduced from ISO 21789:2009, *Gas turbine applications—Safety.*

As this Standard is reproduced from an International Standard, the following applies:

(a) In the source text 'this International Standard' should read 'this Australian Standard'.

(b) A full point substitutes for a comma when referring to a decimal marker.

References to International Standards should be replaced by references to Australian or Australian/New Zealand Standards, as follows:

Reference to International Standard		*Australian Standard*	
ISO		AS	
4413	Hydraulic fluid power—General rules relating to systems	2671	Hydraulic fluid power—General requirements for systems
4414	Pneumatic fluid power—General rules relating to systems	2788	Pneumatic fluid power—General requirements for systems
6183	Fire protection equipment—Carbon dioxide extinguishing systems for use on premises—Design and installation	6183	Fire protection equipment—Carbon dioxide extinguishing systems for use on premises—Design and installation
		AS/NZS ISO	
14001	Environmental management systems—Requirements with guidance for use	14001	Environmental management systems—Requirements with guidance for use
		AS ISO	
14520	Gaseous fire-extinguishing systems—Physical properties and system design	14520	Gaseous fire-extinguishing systems—Physical properties and system design
14520-1	Part 1: General requirements	14520.1	Part 1: General requirements

IEC	
60079	Explosive atmospheres
60079-0	Part 0: Equipment—General requirements
60079-14	Part 14: Electrical installations design, selection and erection
60079-17	Part 17: Electrical installations inspection and maintenance
60079-29-1	Part 29-1: Gas detectors—Performance requirements of detectors for flammable gases
60079-29-2	Part 29-2: Gas detectors—Selection, installation, use and maintenance of detectors for flammable gases and oxygen
60079	Electrical apparatus for explosive gas atmospheres
60079-4	Part 4: Method of test for ignition temperature
60079-10	Part 10: Classification of hazardous areas
60079-20	Part 20: Data for flammable gas and vapours, relating to the use of electrical apparatus
IEC	
60204	Safety of machinery—Electrical equipment of machines
60204-1	Part 1: General requirements
60204-11	Part 11: Requirements for HV equipment for voltages above 1000 V a.c. or 1500 V d.c. and not exceeding 36 kV
60529	Degrees of protection provided by enclosures (IP Code)
61000	Electromagnetic compatibility (EMC)
61000-6-4	Part 6-4: Generic standards—Emission standard for industrial environments
61508	Functional safety of electrical/electronic/programmable electronic safety-related systems
61508-1	Part 1: General requirements
61511	Functional safety—Safety instrumented systems for the process industry sector
61511-1	Part 1: Framework, definitions, systems, hardware and software requirements

AS/NZS	
60079	Explosive atmospheres
60079.0	Part 0: Equipment—General requirements
60079.14	Part 14: Electrical installations design, selection and erection
60079.17	Part 17: Electrical installations inspection and maintenance
60079.29.1	Part 29.1: Gas detectors—Performance requirements of detectors for flammable gases
60079.29.2	Part 29.2: Gas detectors—Selection, installation, use and maintenance of detectors for flammable gases and oxygen
60079	Electrical apparatus for explosive gas atmospheres
60079.4	Part 4: Method of test for ignition temperature
60079.10	Part 10: Classification of hazardous areas
60079-20	Part 20: Data for flammable gas and vapours, relating to the use of electrical apparatus
AS	
60204	Safety of machinery—Electrical equipment of machines
60204.1	Part 1: General requirements
60204.11	Part 11: Requirements for HV equipment for voltages above 1000 V a.c. or 1500 V d.c. and not exceeding 36 kV
60529	Degrees of protection provided by enclosures (IP Code)
61000	Electromagnetic compatibility (EMC)
61000.6.4	Part 6.4: Generic standards—Emission standard for industrial environments
61508	Functional safety of electrical/electronic/programmable electronic safety-related systems
61508.1	Part 1: General requirements
AS IEC	
61511	Functional safety—Safety instrumented systems for the process industry sector
61511.1	Part 1: Framework, definitions, systems, hardware and software requirements

Only normative references that have been adopted as Australian or Australian/New Zealand Standard have been listed.

The terms ‘normative’ and ‘informative’ have been used in this Standard to define the application of the annex to which they apply. A ‘normative’ annex is an integral part of a Standard, whereas an ‘informative’ annex is only for information and guidance.

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INTRODUCTION

This document is a type C standard as stated in ISO 12100 (all parts). A type C standard is “a standard dealing with the detailed safety requirements for a particular machine or group of machines”.

The machinery concerned and the extent to which hazards, hazardous situations and hazardous events are covered are indicated in the Scope of this International Standard.

When provisions of this type C standard are different from those that are stated in type A or B standards, the provisions of this type C standard take precedence over the provisions of the other standards for machines that have been designed and built according to the provisions of this type C standard.

The extent of the applicability of the references may be limited by the context of the text within ISO 21789. Where a dated standard is specified this does not preclude the use of later versions provided that the requirements continue to meet the safety issues and identified hazards detailed in this standard. Where a reference is made to a specific clause in a standard only the text of that clause and references therein apply.[1)]

In addition to covering the relevant safety requirements, this International Standard has also been produced to assist designers, manufacturers and others by providing methods of compliance with the relevant, essential safety requirements of the following European Legislation for gas turbine applications without prejudicing compliance with this International Standard outside the European Union:

— Machinery Directive (2006/42/EC);

— ATEX (Equipment) Directive (94/9/EC);

— Pressure Equipment Directive (97/23/EC).

Methods are also provided as far as practical and where relevant for compliance with the relevant, essential safety requirements of the following European Legislation:

— ATEX (Workplace) Directive (1999/92/EC);

— Low Voltage Directive (2006/95/EC);

— Electromagnetic Compatibility Directives (91/236/EEC – 92/31/EEC – 93/68/EEC – 2004/108/EC);

— Integrated Pollution Prevention and Control Directive (96/61/EC);

— Environmental Noise Directive (2002/49/EC);

— Chemical Agents Directive (98/24/EC);

— Classification, Packaging, and Labelling of Dangerous Substances Directive (97/69/EC).

1) References within Notes are provisions but not normative provisions of this document and are listed in the Bibliography.

AUSTRALIAN STANDARD

Gas turbine applications—Safety

1 Scope

This International Standard covers the safety requirements for gas turbine applications using liquid or gaseous fuels and the safety related control and detection systems and essential auxiliaries for all types of open cycles (simple, combined, regenerative, reheat, etc.) used in onshore and offshore applications including floating production platforms.

This International Standard applies to driven machinery only where it is an integral part of the gas turbine (e.g. a gearbox integral to the gas turbine), or is located within the gas turbine enclosure and forms part of the enclosure hazardous area classification (e.g. a generator within the gas turbine enclosure), or where the driven machinery has a direct effect on the operational safety of the gas turbine.

This International Standard details the anticipated significant hazards associated with gas turbines and specifies the appropriate preventative measures and processes for reduction or elimination of these hazards. This International Standard addresses the risks of injury or death to humans and risks to the environment. Equipment damage without risk to humans or the environment is not covered.

Gas turbine packages are generally specified using International Standards and national standards. Achieving safety is promoted by using additional safety codes and standards, which are shared by gas turbines with other technologies. It is necessary to recognize that local legislation in the country in which the equipment is to be put to use may not be covered by this International Standard.

This International Standard approaches gas turbine safety from an international perspective based on the content of existing, recognized ISO and IEC standards to the greatest extent possible. Where no ISO or IEC standard exists, other codes or standards (such as EN, NFPA, etc.) have been included. Where local or national legislation accepts other established codes or standards, or an alternative international or national standard providing equivalent requirements for achieving the desired tolerable level of risk, the use of these alternative codes or standards in place of the references provided in Clause 2 is permissible.

This International Standard excludes gas turbines used primarily for direct and indirect propulsion, special heat source applications and in research and development programmes. It also excludes gas turbines for closed-cycle and semi-closed cycle applications, and compressed-air energy storage plants. Where appropriate, this International Standard can be used to give general guidance in such applications.

This document is not applicable to machinery or safety components that were manufactured before the date of its publication as an International Standard.

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 3977-1:1997, *Gas turbines — Procurement — Part 1: General introduction and definitions*

ISO 3977-3:2004, *Gas turbines — Procurement — Part 3: Design requirements*

ISO 3977-9:1999, *Gas turbines — Procurement — Part 9: Reliability, availability, maintainability and safety*

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