



## Gas turbine applications – Safety

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This Australian Standard® was prepared by Committee AG-011, Industrial and Commercial Gas-Fired Appliances. It was approved on behalf of the Council of Standards Australia on 11 April 2014.

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- Gas Energy Australia
- Gas Technical Regulators Committee
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- 

This Standard was issued in draft form for comment as DR AS ISO 21789.

Standards Australia wishes to acknowledge the participation of the expert individuals that contributed to the development of this Standard through their representation on the Committee and through the public comment period.

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Australian Standard<sup>®</sup>

**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:

<i>Reference to International Standard</i>		<i>Australian Standard</i>	
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		AS/NZS	
60079	Explosive atmospheres	60079	Explosive atmospheres
60079-0	Part 0: Equipment—General requirements	60079.0	Part 0: Equipment—General requirements
60079-14	Part 14: Electrical installations design, selection and erection	60079.14	Part 14: Electrical installations design, selection and erection
60079-17	Part 17: Electrical installations inspection and maintenance	60079.17	Part 17: Electrical installations inspection and maintenance
60079-29-1	Part 29-1: Gas detectors—Performance requirements of detectors for flammable gases	60079.29.1	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	60079.29.2	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	Electrical apparatus for explosive gas atmospheres
60079-4	Part 4: Method of test for ignition temperature	60079.4	Part 4: Method of test for ignition temperature
60079-10	Part 10: Classification of hazardous areas	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	60079-20	Part 20: Data for flammable gas and vapours, relating to the use of electrical apparatus
IEC		AS	
60204	Safety of machinery—Electrical equipment of machines	60204	Safety of machinery—Electrical equipment of machines
60204-1	Part 1: General requirements	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	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)	60529	Degrees of protection provided by enclosures (IP Code)
61000	Electromagnetic compatibility (EMC)	61000	Electromagnetic compatibility (EMC)
61000-6-4	Part 6-4: Generic standards—Emission standard for industrial environments	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	Functional safety of electrical/electronic/programmable electronic safety-related systems
61508-1	Part 1: General requirements	61508.1	Part 1: General requirements
61511	Functional safety—Safety instrumented systems for the process industry sector	AS IEC	
61511-1	Part 1: Framework, definitions, systems, hardware and software requirements	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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## CONTENTS

<b>1</b>	<b>Scope .....</b>	<b>1</b>
<b>2</b>	<b>Normative references .....</b>	<b>1</b>
<b>3</b>	<b>Terms and definitions .....</b>	<b>4</b>
<b>4</b>	<b>List of significant hazards .....</b>	<b>5</b>
<b>5</b>	<b>Safety requirements .....</b>	<b>5</b>
<b>5.1</b>	<b>General .....</b>	<b>6</b>
<b>5.2</b>	<b>Risk assessment.....</b>	<b>6</b>
<b>5.3</b>	<b>Modifications and replacement parts .....</b>	<b>7</b>
<b>5.4</b>	<b>Foreseeable misuse .....</b>	<b>7</b>
<b>5.5</b>	<b>Lifetime .....</b>	<b>7</b>
<b>5.6</b>	<b>Hazard combinations .....</b>	<b>7</b>
<b>5.7</b>	<b>Noise .....</b>	<b>8</b>
<b>5.8</b>	<b>Mechanical .....</b>	<b>8</b>
<b>5.8.1</b>	<b>Guarding.....</b>	<b>8</b>
<b>5.8.2</b>	<b>Accessibility for maintenance.....</b>	<b>8</b>
<b>5.8.3</b>	<b>Casing design .....</b>	<b>9</b>
<b>5.8.4</b>	<b>Gas turbine compressor surge .....</b>	<b>9</b>
<b>5.8.5</b>	<b>Stability and handling .....</b>	<b>9</b>
<b>5.8.6</b>	<b>Overload of rotating shafts due to torque .....</b>	<b>9</b>
<b>5.8.7</b>	<b>Vibration .....</b>	<b>9</b>
<b>5.8.8</b>	<b>Mechanical failure caused by corrosion .....</b>	<b>10</b>
<b>5.8.9</b>	<b>Design methods and materials .....</b>	<b>10</b>
<b>5.8.10</b>	<b>Gas turbine temperatures.....</b>	<b>10</b>
<b>5.8.11</b>	<b>Environmental loads .....</b>	<b>10</b>
<b>5.8.12</b>	<b>Assembly features.....</b>	<b>11</b>
<b>5.8.13</b>	<b>Couplings .....</b>	<b>11</b>
<b>5.8.14</b>	<b>Rotor bearings .....</b>	<b>11</b>
<b>5.8.15</b>	<b>Rotating part failure .....</b>	<b>11</b>
<b>5.8.16</b>	<b>Foreign object damage (FOD) screen .....</b>	<b>12</b>
<b>5.8.17</b>	<b>Gearbox .....</b>	<b>12</b>
<b>5.8.18</b>	<b>Starting systems.....</b>	<b>12</b>
<b>5.8.19</b>	<b>Low ambient temperature conditions .....</b>	<b>13</b>
<b>5.9</b>	<b>Gas turbine compressor air inlet system.....</b>	<b>13</b>
<b>5.9.1</b>	<b>General .....</b>	<b>13</b>
<b>5.9.2</b>	<b>Inlet air contamination .....</b>	<b>13</b>
<b>5.9.3</b>	<b>Icing monitoring and prevention.....</b>	<b>13</b>
<b>5.9.4</b>	<b>Implosion protection .....</b>	<b>14</b>
<b>5.9.5</b>	<b>Inlet explosion protection.....</b>	<b>14</b>
<b>5.9.6</b>	<b>Waste disposal through combustion .....</b>	<b>14</b>
<b>5.9.7</b>	<b>Recirculation .....</b>	<b>15</b>
<b>5.9.8</b>	<b>Gas turbine compressor air inlet ducting .....</b>	<b>15</b>
<b>5.10</b>	<b>Fuel systems .....</b>	<b>15</b>
<b>5.10.1</b>	<b>General .....</b>	<b>15</b>
<b>5.10.2</b>	<b>Fuel supply quality and supply conditions.....</b>	<b>15</b>
<b>5.10.3</b>	<b>Pressure testing.....</b>	<b>16</b>
<b>5.10.4</b>	<b>Fuel supply heating .....</b>	<b>16</b>
<b>5.10.5</b>	<b>Gas fuel systems .....</b>	<b>16</b>

5.10.6	Liquid fuel systems .....	20
5.10.7	Multi-fuel systems.....	23
5.10.8	Fuel purging .....	23
5.10.9	Fuel drainage.....	24
5.11	Combustion supervision.....	24
5.11.1	General.....	24
5.11.2	Requirements for ignition .....	24
5.11.3	Extinction safety time.....	25
5.12	Exhaust system.....	25
5.12.1	Damper controls .....	25
5.12.2	Flexible joint location .....	25
5.12.3	Exhaust stack.....	25
5.12.4	Explosion protection .....	25
5.13	Enclosures.....	26
5.13.1	General.....	26
5.13.2	Enclosure structure.....	26
5.13.3	Enclosure fire precautions.....	27
5.13.4	Explosion prevention and protection — Area classification — Ventilation .....	27
5.13.5	Gas detection .....	27
5.13.6	Enclosure purging .....	27
5.13.7	Mist detection.....	27
5.13.8	Access and doors .....	28
5.13.9	Entrapment .....	28
5.14	Lighting.....	28
5.15	Fire precautions .....	28
5.15.1	General.....	28
5.15.2	Structural fire risk reduction .....	28
5.15.3	Hydrocarbon fire risk reduction .....	29
5.15.4	Fire protection.....	29
5.15.5	Fire detection .....	30
5.15.6	Fire extinguishing systems.....	30
5.15.7	Water mist extinguishant.....	31
5.15.8	Extinguishing system controls .....	31
5.15.9	Escape.....	33
5.15.10	Uncontrolled release of media and loss of propellant pressure.....	33
5.15.11	Vessel thermal relief (burst disc).....	33
5.15.12	Vessel and/or pipe failure .....	33
5.15.13	Release of extinguishant into gas turbine halls, control rooms, etc. ....	34
5.16	Hazardous area classification and explosion prevention and protection .....	34
5.16.1	General.....	34
5.16.2	Area classification .....	34
5.16.3	Explosion prevention .....	34
5.16.4	Ignition source control .....	35
5.16.5	Reduction of explosion effects in an enclosed space.....	35
5.17	Ventilation.....	37
5.17.1	General.....	37
5.17.2	Cooling.....	37
5.17.3	Heating.....	37
5.17.4	Hazardous area control .....	38
5.17.5	Hot surfaces .....	38
5.17.6	Ventilation inlet location .....	38
5.17.7	Ventilation inlet filtration.....	38
5.17.8	Ventilation inlet ducting .....	38
5.17.9	Ventilation outlet location .....	39
5.17.10	Flow monitoring — Artificial ventilation.....	39
5.18	Fans.....	39
5.18.1	Fan guards and structural failure.....	39
5.18.2	Air blast oil coolers.....	39
5.19	Flammable gas detection .....	39
5.19.1	General.....	39

5.19.2	Type/selection principles.....	39
5.19.3	Location principles.....	40
5.19.4	Settings.....	40
5.19.5	Enclosures containing hot surfaces — Screening tool.....	40
5.19.6	Maintenance and calibration.....	40
5.20	Control and automatic protection systems.....	41
5.20.1	General.....	41
5.20.2	Environmental suitability.....	41
5.20.3	Ergonomics.....	41
5.20.4	Failure.....	41
5.20.5	Calibration.....	41
5.20.6	Testing.....	41
5.20.7	Speed control.....	42
5.20.8	Gas turbine emergency shut-down system.....	42
5.20.9	Interlocks.....	43
5.21	Electrical.....	43
5.21.1	Design/Installation.....	43
5.21.2	Isolation and stored energy.....	43
5.21.3	Electrostatic energy and bonding.....	44
5.21.4	Water ingress.....	44
5.21.5	Lightning.....	44
5.21.6	Electromagnetic compatibility (EMC).....	44
5.21.7	Battery installations.....	45
5.21.8	Electrical overload.....	45
5.21.9	Electrical power failure.....	45
5.22	Drains, vents and bleeds.....	45
5.22.1	General.....	45
5.22.2	Vents for flammable gases.....	46
5.22.3	Toxic and hazardous emissions.....	46
5.22.4	Gas turbine compressor bleeds.....	46
5.23	Pressure equipment.....	47
5.23.1	General.....	47
5.23.2	Design.....	47
5.23.3	Hazards.....	47
5.23.4	Misuse.....	47
5.23.5	Safe handling and operation.....	47
5.23.6	Isolation, draining and venting.....	48
5.23.7	Fluid injection.....	48
5.23.8	Assemblies.....	48
5.23.9	Safety accessories.....	49
5.23.10	Flexible piping (and metal hoses).....	50
5.23.11	External fire.....	50
5.23.12	Material embrittlement and corrosion.....	50
5.23.13	Ultra-violet (UV) resistant pipework.....	51
5.24	Auxiliary systems.....	51
5.24.1	Lubrication systems.....	51
5.24.2	Water systems.....	51
5.24.3	Hydraulic and pneumatic systems.....	52
5.24.4	Utility supplies.....	52
5.25	Installation in a hazardous area.....	52
5.26	Unenclosed gas turbines in a hall.....	53
5.27	Decommissioning and disposal.....	53
6	Compliance verification.....	53
6.1	Quality assurance.....	53
6.2	Verification of safety requirements.....	54
7	Information for use.....	54
7.1	General.....	54
7.2	Language.....	54
7.3	Packaging.....	54

	<i>Page</i>
7.4 Commissioning .....	54
7.5 Operation .....	55
7.5.1 General.....	55
7.5.2 Safety instructions and emergency procedures .....	56
7.6 Enclosure access.....	57
7.6.1 General.....	57
7.6.2 Risk assessment for accessing enclosures .....	57
7.6.3 Limitations under operational conditions .....	58
7.6.4 Limitations under non-operational conditions .....	58
7.6.5 Access during commissioning and re-commissioning .....	58
7.6.6 Installations in a hazardous area .....	58
7.7 Maintenance .....	58
7.7.1 General.....	58
7.7.2 General maintenance hazards .....	59
7.7.3 Accessibility, isolation and energy dissipation.....	59
7.7.4 Pressure equipment .....	59
7.7.5 Fire protection systems .....	60
7.7.6 Gas detectors .....	60
7.7.7 Control systems: maintenance, calibration and testing.....	60
7.7.8 Hazardous materials.....	61
7.8 Warning signs and notices .....	61
7.9 Permit to work (PTW).....	62
7.10 Training .....	62
7.11 Decommissioning and disposal.....	62
<b>Annex A (informative) List of significant hazards.....</b>	<b>63</b>
<b>Annex B (normative) Verification of safety requirements and/or measures.....</b>	<b>71</b>
<b>Bibliography.....</b>	<b>77</b>
<b>Index.....</b>	<b>79</b>

## 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.<sup>1)</sup>

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).

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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*