
Gas turbine exhaust systems with or without waste heat recovery

*Systèmes d'échappement des turbines à gaz avec ou sans récupération
de la chaleur résiduelle*

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Contents

	Page
Foreword	v
Introduction	vi
1 Scope	1
2 Normative references	1
3 Terms and definitions	2
4 Abbreviated terms	3
5 Proposals	5
5.1 Purchaser's responsibilities.....	5
5.2 Supplier's responsibilities.....	5
6 Basic exhaust system design	5
6.1 General.....	5
6.2 Exhaust system configuration.....	6
6.3 Service life.....	6
6.4 Supply responsibility.....	6
6.5 GT characteristic data.....	6
6.6 Required operating envelope.....	6
6.7 Equipment specification.....	6
6.8 WHRU equipment specification.....	6
6.9 Operating conditions.....	7
6.10 Operating environment.....	7
6.11 Equipment arrangement.....	7
6.12 Provision for future addition of WHRU.....	7
6.13 Electrical equipment.....	7
6.14 Field assembly and disassembly.....	8
6.15 Special tools and fixtures.....	8
6.16 Spare parts.....	8
6.17 Deviations.....	8
7 Documentation	8
7.1 General.....	8
7.2 Data sheets.....	8
7.3 Supplier document requirements.....	8
8 Exhaust system engineering and design	10
8.1 Overview.....	10
8.2 Typical WHRU configurations.....	10
8.3 General.....	10
8.4 TEG flow-induced vibrations.....	11
8.5 Exhaust system casing and ducting.....	11
8.5.1 General.....	11
8.5.2 Hot casing design and materials.....	13
8.5.3 Cold casing design material.....	14
8.5.4 Flange bolts.....	14
8.5.5 Surface preparation and treatment.....	16
8.6 Mechanical and thermal analysis.....	17
8.7 Insulation and refractory.....	17
8.7.1 Exhaust system casing and ducting external insulation (hot casing design).....	18
8.7.2 Exhaust system casing and ducting internal insulation (cold case design).....	18
8.8 Noise emission and silencing.....	21
8.9 Stacks.....	21
8.10 Expansion joints.....	22
8.11 Steel structures, stairs, ladders and platforms.....	23
8.12 Preservation, handling, packing and storage.....	24

8.12.1	Handling and storage of materials	24
8.12.2	Handling and storage of construction material and subcomponents at suppers works	24
8.13	Inspection and testing	25
8.13.1	General inspection	25
8.13.2	Specific inspection requirements	25
9	WHRU engineering and design	26
9.1	WHRU process design	26
9.2	WHRU tube bundle mechanical design	28
9.2.1	General	28
9.2.2	Pressure part design	29
9.2.3	Corrosion allowances	30
9.3	WHRU tube bundle design	30
9.3.1	Tube and bend materials	30
9.3.2	Tube bundle design conditions	30
9.3.3	TEG flow-induced vibrations	32
9.3.4	Tube supports	33
9.3.5	Tube fins	34
9.3.6	Tube bundle headers	35
10	Dampers	36
10.1	General	36
10.2	WHRU dampers	36
10.2.1	Damper and isolator types and functions	36
10.2.2	Damper and isolator design	40
10.2.3	Damper and isolator TEG leakage performance	41
10.2.4	Seal air isolation system	42
10.2.5	Damper casing and insulation	43
10.2.6	Blades, shaft and operating gear	43
10.2.7	Requirements specific to damper types	44
11	WHRU system control	45
11.1	General	45
11.2	Guidance notes	45
11.2.1	WHRU control philosophy	45
11.2.2	WHRU control philosophy — Standby units	46
11.2.3	Signals	46
11.2.4	Wiring, junction boxes and protection	46
11.2.5	Control, instrumentation and protection equipment	47
11.2.6	HTM process side valves and piping	49
12	Access, inspection and maintenance	50
12.1	TEG path access	50
12.2	WHRU	51
13	Installation	52
14	Pre-commissioning and commissioning	53
15	Performance test	55
Annex A (informative) Application of computational fluid dynamics to exhaust system design		56
Annex B (informative) Application of thermal and structural analytical techniques to exhaust system design		65
Annex C (informative) Information to be provided by purchaser		71
Annex D (informative) Fabrication and welding		84
Annex E (informative) Data sheets		94
Bibliography		95

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).

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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 192, *Gas turbines*.

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.

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Introduction

This document has been developed in response to the international market need for a specification relating to the exhaust and heat recovery systems for gas turbines. Purchasers and suppliers will benefit from a standard against which equipment can be purchased, designed and constructed - especially given the challenging nature of the turbulent exhaust gas flow and associated complexity of mechanical design. Equipment is frequently installed in remote and challenging locations both onshore and offshore where maintenance and repair can be prohibitively expensive.

A waste heat recovery unit recovers thermal energy from the waste heat available in gas turbine exhaust gases, exchanged into various heat transfer media such as water, water/glycol mixtures, thermal oils and hydrocarbon gases.

The application of heat recovery devices to gas turbines results in significant thermal efficiency gains and resultant environmental benefit from reduction in CO₂ emissions. Gas turbine exhaust is one of many sources of waste heat energy and can be classed as medium grade within a typical temperature range between 400 °C and 600 °C suitable for Rankine cycle applications.

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Gas turbine exhaust systems with or without waste heat recovery

1 Scope

This document specifies requirements and gives recommendations for the design, materials of construction, modelling, controlling, fabrication, inspection, testing, installation, start-up and operation of industrial gas turbine (GT) exhaust systems with or without waste heat recovery unit (WHRU). Gas turbines can be on-shore or off-shore for such sectors as oil and gas, chemical and process industries, utilities, or other intensive energy users.

For this document, the exhaust system means all items in the turbine exhaust gas stream between the GT exhaust gas collector outlet flange and the termination/s to the atmosphere.

The following items are not covered by this document:

- heat recovery steam generator equipment (HRSG);
- supplementary fired systems;
- auxiliary fired systems;
- exhaust gas collector (also known as exhaust plenum);
- fire detection and extinguishing systems;
- emissions controls equipment intended to modify the gaseous composition of the exhaust gas;
- WHRUs that are of the firetube type, where the turbine exhaust gas (TEG) passes through the tubes.

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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 3744, *Acoustics — Determination of sound power levels and sound energy levels of noise sources using sound pressure — Engineering methods for an essentially free field over a reflecting plane*

ISO 9614, *Acoustics — Determination of sound power levels of noise sources using sound intensity*

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

ISO 10474, *Steel and steel products — Inspection documents*

ISO 12241, *Thermal insulation for building equipment and industrial installations — Calculation rules*

ISO 13704, *Petroleum, petrochemical and natural gas industries — Calculation of heater-tube thickness in petroleum refineries*

ISO 13705:2012, *Petroleum, petrochemical and natural gas industries — Fired heaters for general refinery service*

ISO 13916, *Welding — Measurement of preheating temperature, interpass temperature and preheat maintenance temperature*