
Gas turbines — Procurement —

Part 1: General introduction and definitions

Turbines à gaz — Spécifications pour l'acquisition —

Partie 1: Introduction générale et définitions



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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 3977-1 was prepared by Technical Committee TC 192, *Gas turbines*.

This first edition of ISO 3977-1, together with subsequent parts, cancels and replaces ISO 3977:1991, which has been technically revised.

ISO 3977 consists of the following parts, under the general title: *Gas turbines – Procurement*

- *Part 1: General introduction and definitions*
- *Part 2: Standard reference conditions and ratings*
- *Part 3: Basic requirements for mechanical drive and electric drive*
- *Part 4: Packaging and auxiliary equipment*
- *Part 5: Controls and instrumentation*

Further parts are in preparation.

Annex A of this part of ISO 3977 is for information only.

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Introduction

ISO 3977 provides technical information to be used for the procurement of gas turbine systems, including combined-cycle systems and their auxiliaries, by a purchaser from a manufacturer.

NOTE — Where the term "manufacturer" is used in this International Standard, it is deemed to mean the gas turbine manufacturer or the appropriate responsible contractor.

This International Standard provides a basis for the submission of proposals in line with the different environmental and safety requirements. It also specifies, wherever possible, criteria to establish whether these are met. It does not attempt to deal with local or national legal requirements to which the installation may be required to conform.

Because of the very widely varying operating modes for gas turbines in practice, distinct categories of operating modes are specified with which a "standard" rating can be associated. These ratings are made on the basis of the ISO standard ambient reference conditions.

The various parts of ISO 3977 define a standard framework for dealing with questions of fuel and other matters, such as the minimum information to be provided by both the purchaser and the manufacturer. They do not, however, purport to include all necessary information for a contract and each gas turbine installation should be considered in its entirety. Attention is drawn to the need for technical consultation between the manufacturer and the purchaser to ensure compatibility of equipment being supplied, particularly where the responsibility for supply is divided.

ISO 3977 is applicable to open-cycle gas turbine power plant using combustion systems, and to closed-cycle, semiclosed-cycle and combined-cycle gas turbine power plants. In the case of turbines using free piston gas generators or special heat sources (e.g. chemical process, nuclear reactors, furnaces for super-charged boilers), it may be used as a basis but will need to be suitably modified.

This International Standard is not applicable to gas turbines used to propel aircraft, road construction and earth-moving machines, agricultural and industrial types of tractors and road vehicles.

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Gas turbines — Procurement —

Part 1: General introduction and definitions

1 Scope

This part of ISO 3977 groups together the terms and definitions given in ISO 11086 that are relevant to the procurement of gas turbine systems, and defines additional terms.

2 Definitions

For the purposes of all parts of ISO 3977, the following definitions apply.

2.1

gas turbine

Machine which converts thermal energy into mechanical work; it consists of one or several rotating compressors, a thermal device(s) which heats the working fluid, one or several turbines, a control system and essential auxiliary equipment. Any heat exchangers (excluding waste exhaust heat recovery exchangers) in the main working fluid circuit are considered to be part of the gas turbine.

NOTE — Examples of gas turbine systems are shown in figures 1 to 9.

2.2

gas turbine power plant

Gas turbine engine and all essential equipment necessary for the production of power in a useful form (e.g. electrical, mechanical or thermal). [ISO 11086]

2.3

open cycle

Thermodynamic cycle in which the working fluid enters the gas turbine from the atmosphere and is discharged into the atmosphere. [ISO 11086]

2.4

closed cycle

Thermodynamic cycle having a recirculating working fluid independent of the atmosphere. [ISO 11086]

2.5

semiclosed cycle

Thermodynamic cycle utilizing combustion in a working fluid that is partially recirculated and partially exchanged with atmospheric air. [ISO 11086]

2.6

simple cycle

Thermodynamic cycle consisting only of successive compression, combustion and expansion. [ISO 11086]

2.7

regenerative cycle

Thermodynamic cycle employing exhaust heat recovery, consisting of successive compression, regenerative heating, combustion, expansion and regenerative cooling (heat transfer from the exhaust to the compressor discharge fluid) of the working fluid. [ISO 11086]

2.8**intercooled cycle**

Thermodynamic cycle employing cooling of the working fluid between stages of successive compression.
[ISO 11086]

2.9**reheat cycle**

Thermodynamic cycle employing the addition of thermal energy to the working fluid between stages of expansion.

2.10**combined cycle**

Thermodynamic cycle employing the combination of a gas turbine cycle with a steam or other fluid Rankine cycle.

NOTES

1 In a common example, the gas turbine exhaust heat is used to generate steam for the Rankine cycle.

2 The superior thermal performance of this cycle is due to a combination of the best thermodynamic attributes of each cycle, namely the addition of thermal energy at higher temperatures in the gas turbine cycle and the rejection of thermal energy at lower temperatures in the Rankine cycle.

[ISO 11086]

2.11**single-shaft gas turbine**

Gas turbine in which the compressor and turbine rotors are mechanically coupled and the power output is taken either directly or through gearing.

2.12**multi-shaft gas turbine**

Gas turbine combination including at least two turbines working on independent shafts.

NOTE — The term includes cases referred to as compound and split-shaft gas turbines.

2.13**bled gas turbine**

Gas turbine which has, for external use, extraction of compressed air between compressor stages and/or at the discharge of the compressor, or extraction of hot gas at the inlet of the turbine and/or between turbine stages.

2.14**gas generator**

Assembly of gas turbine components that produces heated pressurized gas to a process or to a power turbine.

NOTE — It consists of one or more rotating compressor(s), thermal device(s) associated with the working fluid, and one or more compressor-driving turbine(s), a control system and essential auxiliary equipment.

[ISO 11086]

2.15**compressor**

That component of a gas turbine which increases the pressure of the working fluid.

2.16**turbine**

Term which when used alone refers to the turbine action only. It is that component of the gas turbine which produces power from expansion of the working fluid.

2.17**power turbine**

Turbine having a separate shaft from which output is derived.

2.18**combustion chamber (primary or reheat)**

Heat source in which the fuel reacts to increase directly the temperature of the working fluid.