AMERICAN NATIONAL STANDARD

Procurement Standard for

Gas Turbine Maintenance and Safety

ANSI B133.12 - 1981

SECRETARIAT

THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

PUBLISHED BY

THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

United Engineering Center 345 East 47th Street New York, N. Y. 10017

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Date of Issuance: May 31, 1982

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FOREWORD

The purpose of the B133 Standards is to provide criteria for the preparation of gas turbine procurement specifications. These Standards will also be useful for response to such specifications.

The B133 Standards provide essential information for the procurement of gas turbine power plants. They apply to open cycle, closed cycle, and semiclosed cycle gas turbines with conventional combustion systems for industrial, marine, and electric power applications. Auxiliaries needed for proper operation are covered. Not included are gas turbines applied to earth moving machines, agricultural and industrial-type tractors, automobiles, trucks, buses, and aeropropulsion units.

For gas turbines using unconventional or special heat sources, such as chemical processes, nuclear reactors, or furnaces for supercharged boilers, these Standards may be used as a basis, but appropriate modifications may be necessary.

The intent of the B133 Standards is to cover the normal requirements of the majority of applications, recognizing that economic tradeoffs and reliability implications may differ in some applications. The user may desire to add, delete, or modify the requirements in this Standard to meet his specific needs, and he has the option of doing so in his own procurement specification.

B133.12 is intended to provide a basis for the exchange of information regarding maintenance activities, support services, and those safety elements controllable by design.

Suggestions for improvement of this Standard will be welcome. They should be sent to the American Society of Mechanical Engineers, United Engineering Center, 345 East 47th Street, New York, New York 10017.

This Standard was approved as an American National Standard on December 8, 1981.

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Procurement Standards for Gas Turbines

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AMERICAN NATIONAL STANDARD

PROCUREMENT STANDARD FOR GAS TURBINE MAINTENANCE AND SAFETY

1 MAINTENANCE

1.1 General

1.1.1 Purpose. The purpose of this Section is to provide a basis for the exchange of maintenance information between the gas turbine user and manufacturer to permit the user to evaluate and compare bids and to advise the manufacturer of user preferences and requirements regarding maintenance. Information is to be exchanged in the specific areas of maintenance activities and schedules and support services.

1.1.2 Scope. The provisions of this Section are intended to apply to all elements of the gas turbine or gas turbine power plant, including, but not limited to driven equipment and accessories such as:

compressor(s)
turbine(s)
combustion system(s)
intercooler(s)
regenerator or recuperator
control systems(s)
fuel system(s)
lubricating systems(s)
cooling water system(s)
rotor bearings
gears
couplings
air intake
  duct(s)
  filter(s)
  cooler(s)
  silencer(s)
regenerator air ducts
  piping
  expansion joints
  spring supports
exhaust
  duct(s)
  expansion joint(s)
  silencer(s)
mounting system
enclosures and ventilation system
starting equipment (when supplied by the gas turbine manufacture)

1.2 Maintenance Activities and Schedules

1.2.1 Purpose. The purpose of this Section is to establish a basis for a maintenance plan.

1.2.2 User Responsibilities. The user shall outline the manner in which equipment is to be operated and maintained, specifying:

(*a*) location/environment/air quality;

(*b*) numbers of operating and maintenance personnel;

(*c*) personnel skill levels;

(*d*) user maintenance facilities and capabilities;

(*e*) duty cycle (loads, hours per day, hours per year, number of starts, etc.);

(*f*) type and specifications of fuel (refer to ANSI B133.7, Procurement Standard for Gas Turbine Fuels).

NOTE: Specific entries may duplicate other areas of the Standard and are listed for completeness.

1.2.3 Manufacturer Responsibilities

1.2.3.1 The manufacturer shall provide a preventive maintenance plan (or schedule) which identifies recommended scheduled maintenance and inspection activities that are needed. Each identified preventive maintenance task shall relate the following information:

(*a*) recommended interval;

(*b*) task description;

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(*c*) estimated parts and/or material requirements;
(*d*) estimated personnel man-hour and task time requirements;
(*e*) personnel skill requirements;
(*f*) weight of heaviest item to be lifted;
(*g*) special tool or equipment requirements.

If operations are to be performed at a repair center, the manufacturer should state the estimated availability of repaired, exchange, and/or replacement components.

1.2.3.2 The manufacturer shall identify corrective maintenance activities to be taken in response to failures which can be anticipated during the operational life of the gas turbine and associated equipment. The following shall be described for each activity:

(*a*) task description;
(*b*) estimated parts and/or material requirements;
(*c*) estimated personnel man-hour requirements;
(*d*) anticipated outage requirements;
(*e*) skill level, tools, and facility requirements;
(*f*) recommended location for task accomplishment;
(*g*) weight of heaviest item to be lifted.

If operations are to be performed at a repair center, the manufacturer should state the availability of repaired, exchange, and/or replacement components.

1.2.3.3 The manufacturer shall provide a list of recommended critical spare parts and procurement lead times based on the duty cycle defined in 1.2.2.

1.2.3.4 The manufacturer shall describe instruction or training programs available to user's operating and maintenance personnel.

1.2.3.5 The manufacturer shall provide a list of the operating and maintenance documents and plans/drawings which are to be furnished the user.

1.2.3.6 The manufacturer shall provide a list of special tools and equipment required to perform maintenance, which can be purchased with the unit.

1.3 Support System

1.3.1 Purpose. The purpose of this Section of the Standard is to establish a basis for the technical and material support of gas turbines and associated equipment in operational service.

1.3.2 User Responsibilities

(*a*) The user shall identify the normal point of delivery for material shipments.

(*b*) The user shall indicate which maintenance actions are to be accomplished by his personnel, by manufacturer's personnel, or by local contract labor.

1.3.3 Manufacturer's Responsibilities

(*a*) The manufacturer shall identify the service organizations and locations responsible for providing service support.

(*b*) The manufacturer shall identify off-site maintenance locations to which material may be sent for repairs and services.

(*c*) The manufacturer shall identify locations at which various replacement parts and materials may be obtained.

(*d*) The manufacturer shall specify any maintenance support activities which he declines to perform, and identify organizations from which such support can be obtained.

1.3.4 Maintenance Contracts. The manufacturer shall state the availability of a maintenance contract if the user requests such information. If a maintenance contract is requested, it will form the subject of negotiations separate from the requirements of this Standard.

1.3.5 Preventive Maintenance

1.3.5.1 Purpose. Manufacturers shall provide a recommended schedule for preventive maintenance inspections, replacements, and services. The manufacturer shall state the type, frequency, and degree of inspection and/or overhaul associated with the user's planned operation as defined in 1.2.2.

1.3.5.2 Documentation

(*a*) The manufacturer shall provide manuals, drawings, and/or illustrations in sufficient detail for the operation, repair, and servicing of equipment. These manuals shall identify and describe all tasks which users can be reasonably expected to perform or have performed during the life of the equipment. Associated with each task, the following information shall be furnished:

(*1*) need for special skills, tools, or equipment;
(*2*) material needs (parts, lubricants, etc.);
(*3*) prescribed maintenance interval.

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(*b*) The manufacturer shall provide a recommended preventive maintenance schedule.

(*c*) The manufacturer shall provide a recommended list of spare parts, materials, lubricants, etc.

(*d*) The manufacturer shall furnish supplemental operating and maintenance information to promote improved equipment performance as such information becomes available via bulletins, service letters, etc.

2 SAFETY

2.1 Safety Scope

The Section shall confine itself to those aspects of safety that are controllable by adequate design and implementation of the design. This Section does not cover such safety considerations as personnel training, procedures, and usage of personnel protective equipment.

2.2 Regulatory Compliance

2.2.1 The design and configuration of the installed gas turbine system shall make every effort to conform to all applicable requirements of United States recognized codes and regulations applicable to the particular class of fuel for which it is intended.

2.2.2 Compliance with other codes and regulations including international standards, if applicable, is subject to agreement between the manufacturer and the user. The user shall specify which sections of special or local codes and regulations the gas turbine manufacturer must comply with.

2.3 Safety Elements

2.3.1 Safety is of paramount importance in any power plant including the gas turbine power plant. Protection from both human and equipment safety hazards is required. Design and its implementation shall be in accordance with applicable mandatory regulations, standards, etc. Careful attention should be given to the following safety elements:

(*a*) minimization of fire hazard and provisions for appropriate fire control;

(*b*) control systems designed to ensure adequate protection of personnel and equipment;

(*c*) alarms to warn of unsafe operating conditions;

(*d*) suitable safety trips to protect operating personnel and/or equipment;

(*e*) guards, insulation, handrails, etc., should be applied to protect personnel from accidental contact with dangerous elements;

(*f*) plant design should minimize the possibility of a fire fed by lube oil and fuel oil leaks (Localizing any potential leaks should be given careful attention.);

(*g*) adequate ventilation and means of escape should be provided for any station personnel who will be near the power plant when it is operating. Recognition should be given to the fact that fire protection systems in a confined area can be dangerous to operating personnel.

(*h*) the gas turbine protective equipment and its possible effect on other power plant or system equipment should be considered;

(*i*) adequate lighting for personnel safety shall be provided in normally occupied areas;

(*j*) the design and configuration of each item of electrical equipment shall conform to the safety requirements imposed by ANSI B133.5, Procurement Standard for Gas Turbine Electrical Equipment, and be in accordance with applicable mandatory governmental regulations and standards.

2.3.2 Operating and Maintenance Systems Considerations

(*a*) Proper handling equipment and tools should be available to maintenance personnel. Particular attention is required for safe handling of heavy equipment including rigging or blocking tools, slings, hoists, and cranes.

(*b*) The manufacturer shall make recommendations relative to personnel entering into the gas turbine enclosure during operation of the turbine.

(*c*) The manufacturer's Operating and Maintenance Manuals should include instructions to promote safe operation and maintenance of the gas turbine power plant.

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AMERICAN NATIONAL STANDARDS FOR GAS TURBINES

TITLE OF STANDARD

Gas Turbine Terminology B133.1
Basic Gas Turbine B133.2
Gas Turbine Auxiliary Equipment B133.3
Gas Turbine Control and Protection Systems B133.4
Gas Turbine Electrical Equipment B133.5
Gas Turbine Ratings and Performance B133.6
Gas Turbine Fuels B133.7
Gas Turbine Installation Sound Emissions B133.8
Gas Turbine Environmental Requirements and Responsibilities B133.9
Gas Turbines–Information to Be Supplied by User and Manufacturer B133.10
Gas Turbines–Shipping and Installation. B133.11
Gas Turbines–Maintenance and Safety B133.12
Gas Turbine Marine Applications B133.16

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