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Guidance on Industry Standard for API 611 General Purpose Steam Turbines

GIS 34-301

BP GROUP
ENGINEERING TECHNICAL PRACTICES

Foreword

This is the first issue of Engineering Technical Practice (ETP) BP GIS 34-301. This Guidance on Industry Standard (GIS) is based on parts of heritage documents from the merged BP companies as follows:

Amoco

- | | |
|-------------------|---|
| A RE-TURB-611-P | Rotating Equipment—Turbine—API 611 Steam—General Purpose—
Procurement Specification. |
| PTA RE-TURB-611-P | Rotating Equipment—Turbine—API 611 Steam—General Purpose—
Procurement Specification. |

ARCO

- | | |
|-------|--|
| ES 70 | General Purpose Steam Turbines for Refinery Service. |
|-------|--|

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Introduction

- a. Guidance for general purpose steam turbines is based on American Petroleum Institute (API) Standard 611, fourth edition, June 1997.
- b. Guidance statements of this GIS are modifications to API Std 611.
- c. Modifications to API Std 611 are identified as Add, Modify to Read, or Delete.
- d. Paragraph numbers in this specification correspond to API Std 611.
- e. Paragraphs of API Std 611 that are not revised remain applicable.



4 Basic design

4.1 General

4.1.5 Add

The Vendor shall specify the relief valve settings for all inlets and outlets to the turbine.

4.1.6 Add

If immediate starting is required for a multi-stage design, the data sheet so indicates, and proposal shall state precautions required.

4.1.7 Modify to Read

The turbine wheels for multistage units shall be located between bearings. Other arrangements require specific BP approval.

4.1.10 Modify to Read

Unless specified otherwise, driven equipment vendor shall assume full unit responsibility.

4.1.13 Modify to Read

Motors, electrical components and electrical installations shall be suitable for the area classification specified by BP.

4.1.15 Add

Refer to GP 44-20 for guidance on the ergonomic layout of equipment.

Add

4.1.17 Components shall not be made of plastic.

4.2 Pressure casings

4.2.1 Add

Operation shall include coupled and also uncoupled from the load.

4.2.4 Modify Last Sentence to Read

Axially split multistage turbine casings may be additionally split radially between high and low pressure portions to facilitate material change.

- a. In this case, vertical joints should have sealant grooves and tapped access holes to grooves.
- b. Packing should be replaceable without disturbing top half of casing.

4.2.6 Add

If wobble plate type support is provided, the following shall be provided with quotation:

- a. Calculated expansions expected in the lateral and/or axial direction.
- b. Explanation of how the design prevents torsional roll, off centreline growth, and the like.

4.2.7 Add

- a. Sufficient space shall be allowed to permit field installation of valve and drain piping.
- b. Connections between equipment and first flange shall be welded.
- c. For turbines specified for unattended, automatic start up the Vendor shall provide steam traps to automatically drain condensate from the casing.



4.2.13 Modify to Read

Turbine feet shall have vertical jackscrews installed.

Hold down boltholes on equipment feet shall have a diameter at least 3 mm (1/8 in) greater than bolt diameter.

4.2.14 Modify to Read

- a. Feet of equipment at coupling end only shall be drilled with pilot holes for use in final doweling in the field.
- b. A M10 (3/8 in) diameter tapped hole shall be provided on one foot for earth (ground) protection.

4.4 **Casing connections****4.4.1** Add

The casing connections shall also be suitable for the applicable relief valve setting pressure.

Valved vent, drain and instrument connections shall be supported.

4.4.3 Modify to Read

- a. With the possible exception of shaft gland, governor valve stem leak off connections, steam connections in casing and steam chest (governor valve body) shall be arranged for flanged connections.
- b. Proposed threaded openings shall be listed in proposal.

4.4.3.3 Modify to Read

Pipe nipples shall have welding neck or socket weld flanges.

Use of threaded connections should be consistent with piping specifications.

4.4.7 Modify to Read

- a. Tooling shall be selected to provide surface finish as specified in Table 1.
- b. For vacuum service, contact surface roughness (Ra) of 125-500 is acceptable.

4.6 **Rotating elements****4.6.2** **Shafts**Modify Last Sentence of Second Paragraph to Read

These areas shall be demagnetised to levels specified in API Std 670 or otherwise treated such that combined total electrical and mechanical run out does not exceed the following:

- a. For areas to be observed by radial vibration probes, 5 micrometers (0.2 mil). Add shaft burnishing automatically if provisions for vibration probes are specified.
- b. For areas to be observed by axial-position probes, 10 micrometers (0.4 mil) maximum allowed peak to peak vibration amplitude.

Electrical and mechanical runout of rotor shaft sensing areas should not be based upon a percentage of maximum allowable peak-to-peak vibration amplitude. There is no relationship between maximum allowable peak-to-peak vibration amplitude and a manufacturer's ability to prepare probe areas.

4.6.2.1

If plating is allowed, Tungsten Carbide applied by Linde Proprietary D-Gun method is preferred.

