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Guidance on Industry Standard for Forced Draught Burners for Water Tube Land Boilers

GIS 56-103

BP GROUP
ENGINEERING TECHNICAL PRACTICES

Foreword

This is the first issue of Engineering Technical Practice (ETP) BP GP 56-103. This Guidance on Industry Standard (GIS) is based on parts of heritage documents from the merged BP companies as follows:

British Petroleum

GS 156-1

Forced Draught Burners For Water Tube Land Boilers

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1. Scope

- a. This GIS covers general requirements for forced draught burners suitable for firing liquid fuel and gas, both singly and combined.
- b. This GIS specifies requirements for manufacture, performance, and flame stability for forced draught burners.
- c. This GIS outlines tests that these burners shall meet.
- d. If necessary, this GIS shall be used with supplementary specification to adapt for each specific application for installation in water tube boilers generating steam or hot water.
- e. This GIS does not cover burner instrumentation or burner piping, other than flexible hoses (see 7.2.14) and construction materials (see 7.2.15). Instrumentation and piping shall be specified separately, if necessary.

2. Normative references

The following normative documents contain requirements that, through reference in this text, constitute requirements of this technical practice. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this technical practice are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies.

BP

GIS 52-101	Insulation
GP 6-60	Onshore and Offshore Paints and Coatings
GP 60-50	General Issues – Equipment Packages

British Standards Association (BS)

BS 3405	Measurement of Particulate Emission Including Grit and Dust (simplified method).
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3. Terms and definitions

For the purposes of this GIS, the following terms and definitions apply:

Burner

Complete device for mixing air and fuel, and for stabilising flame, including:

- a. Valves for fuels and atomising medium attached to burner.
- b. Gas manifolds.
- c. Gas guns.
- d. Liquid fuel gun.
- e. Air register.
- f. Air control linkages.
- g. Refractories, including refractory quarl (tile) in furnace floor or wall.
- h. Primary block.



- i. Igniter.
- j. Gas pilot.
- k. Means of attaching burner to boiler.

Liquid fuel

Normally fuel oil but may be waste fuel. Details will be specified by BP.

4. Symbols and abbreviations

For the purpose of this GIS, the following symbols and abbreviations apply:

MCR	Maximum continuous rating.
QA	Quality assurance.
RDL	Register draught loss.

5. Application of specification

- a. Sufficient requirements necessary for Vendor to make offer will be specified by BP.
- b. Requirements will include:
 - 1. Physical and chemical properties of fuels to be burned.
 - 2. Rates of heat liberation required under anticipated operating conditions.
 - 3. Condition of available atomising medium.
 - 4. Nature and extent of testing.
- c. Unless specified otherwise by BP, to meet requirements of this GIS, witnessed test shall be performed on burner of same type. See Section 8.
- d. Test is recommended on sample of any burner type that has not been previously demonstrated satisfactorily to BP.

Note that BP performs tests on commercial burners as required for the BP Group and third party projects. Advice should be sought from the Custodian on current experience and any need for testing.

6. Quality assurance

The quality system shall ensure that the technical and QA requirements specified in the enquiry and purchase documents are applied to all materials, equipment and services provided by sub-contractors and to any free issue materials

Verification of the vendor's quality system is normally part of the pre-qualification procedure, and is therefore not specified in the core text of this specification. If this is not the case, clauses shall be inserted to require the vendor to operate and be prepared to demonstrate the quality system to the purchaser.



7. Design

7.1. General

7.1.1. Flame failure detection

Burners shall have self checking type flame failure detection equipment.

7.1.2. Oil / gas guns

- a. Oil guns shall be located at centre of swirler.
- b. Gas guns may consist of a number of gas “spuds” close to periphery of swirler, which would suit dual fuel firing.
- c. Alternatively, central gas gun may be acceptable if single fuel is required.

7.1.3. Ignition

- a. For igniting main flame, burners shall have interruptible pilot burner that has dedicated electrical ignitor.
- b. Pilot burner shall be shut down after ignition of main flame has been proven.
- c. Continuously ignited pilots are permissible for waste fuels with potential large variation in calorific value.
- d. Pilot flame shall be monitored by flame detection rod.
- e. Capacity of pilot burner shall not be less than 100 kWh (341,214 BTU).
- f. Pilot flame shall be visible through burner.

7.1.4. Atomisers

- a. Liquid fuel atomisers shall be twin fluid type.
Steam is normally used as atomising medium. However, fuel gas or compressed air as atomising medium may be specified by BP.
- b. Steam supply
 1. Availability of reliable supply of dry saturated steam for atomising purposes under cold start conditions will be specified by BP.
 2. If dry saturated steam will not be available, alternate method of atomising for startup period will be either specified by BP or shall be subject to BP approval.

7.1.5. Fuel guns

- a. Liquid fuel guns and gas guns shall discharge within $\pm 2.5\%$ of required flow at design heat liberation operating pressure.
- b. For operation with very low excess air, reduced tolerance may be specified by BP.
- c. Fuel guns shall be flow tested under conditions, subject to BP approval.
- d. BP may wish to witness tests.
- e. Record of tests shall be issued with fuel guns (see 8.3.1).

To operate multiburner system at low excess air, it is necessary to have equal flow to each fuel gun and have even air distribution.

Flow testing fuel tips and correcting as necessary will ensure they are within required tolerance. To maintain required flow tolerance, periodic testing of fuel tips can be performed.

