



GS 130-10

Guidance for Specification 130-10

SPECIFICATION FOR THE SUPPLY OF FIRE & GAS SYSTEMS

January 1994

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SCOPE AND PURPOSE This document specifies the minimum requirements for the design of Fire and Gas Systems. Its purpose is for the specification of fit-for-purpose Fire and Gas Systems at minimum cost.											
AMENDMENTS <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 15%;">Amd</th> <th style="width: 15%;">Date</th> <th style="width: 20%;">Page(s)</th> <th style="width: 50%;">Description</th> </tr> </thead> <tbody> <tr> <td colspan="4" style="height: 150px;"> </td> </tr> </tbody> </table>				Amd	Date	Page(s)	Description				
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FOREWORD

Introduction to BP Group Recommended Practices and Specifications for Engineering

The Introductory Volume contains a series of documents that provide an introduction to the BP Group Recommended Practices and Specifications for Engineering (RPSEs). In particular, the 'General Foreword' sets out the philosophy of the RPSEs. Other documents in the Introductory Volume provide general guidance on using the RPSEs and background information to Engineering Standards in BP. There are also recommendations for specific definitions and requirements.

Value of this Guidance for Specification

This Guidance for Specification identifies the minimum requirements for the design of fire and gas systems. The intention is to simplify the purchasing requirements when dealing with a known and mature supplier source.

Application

This Guidance for Specification is intended to guide the purchaser in the use or creation of a fit-for-purpose specification for enquiry or purchasing activity.

Text in *italics* is Commentary. Commentary provides background information which supports the requirements of the Specification, and may discuss alternative options.

This document may refer to certain local, national or international regulations but the responsibility to ensure compliance with legislation and any other statutory requirements lies with the user. The user should adapt or supplement this document to ensure compliance for the specific application.

Specification Ready for Application

A Specification (BP Spec 130-10) is available which may be suitable for enquiry or purchasing without modification. It is derived from this BP Group Guidance for Specification by retaining the technical body unaltered but omitting all commentary, omitting the data page and inserting a modified Foreword.

Feedback and Further Information

Users are invited to feed back any comments and to detail experiences in the application of BP RPSE's, to assist in the process of their continuous improvement.

For feedback and further information, please contact Standards Group, BP International or the Custodian. See Quarterly Status List for contacts.



1. INTRODUCTION

1.1 Scope

This specification, details the basic minimum requirements for the design of Fire & Gas panels and equipment.

For system procurement, this specification will need to be supplemented by details of the functional requirements for the specific application.

It is intended for use in conjunction with a functional specification and associated Data Sheets and drawings which give specific project requirements.

1.2 Quality Assurance

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 should be inserted to require the vendor to operate and be prepared to demonstrate the quality system to the purchaser. The quality system should 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.

Further suggestions may be found in the BP Group RPSEs Introductory Volume

1.3 Functional Specification

A functional specification should cover the following subjects:-

Introduction

Scope of Supply:-

General

Testing

Documentation

Work by others

Commissioning

Special requirements

Information required with quotation

Appendices:-

System description (see Appendix C1)

Environment, area classification and utilities (see Appendix C2)

Fire area based field I/O schedule (see Appendix C3)

Applicable Codes, Standards and Regulations (see Appendix C4)



2. SYSTEM REQUIREMENTS

- 2.1 The Fire & Gas System shall provide the interface to a range of field devices monitoring the platform (or plant) condition and, in the event of a detected or confirmed hazard, take appropriate action to initiate shutdown of equipment, release extinguishant and initiate platform (or plant) and local alarms.

Shutdown initiation should be via the Emergency Shutdown (ESD) system, damper closure via the HVAC system, extinguishant release via the protection system and platform (or plant) alarms via the PA system.

- 2.2 The design shall meet the requirements necessary to gain approval of any appropriate third party or regulatory authorities together with any testing requirements.

2.3 Panel facilities shall include:-

A control action matrix to provide fire area based alarm/status indications and manual controls. Manual controls shall be key protected and bypass the logic system.

A fire pump matrix to provide fire pump and firewater main indications and controls.

A common facilities matrix to provide common alarm and fault indications and controls.

The control action matrix should provide status of fire detection and fire protection inputs and outputs, plus provide controls for extinguishant release and output inhibits. Each matrix line should be devoted to a specific fire area, as designated by the Fire & Gas cause and effect charts.

The fire pump matrix should also include foam system controls and indications if required.

Typical common facilities matrix controls and indications include power supply healthy, module faults, common alarm and fault indications, alarm/fault accept and reset, and manual/auto self-test.

- 2.4 Separate termination areas shall be provided for the main logic panel(s) connected via plugs and sockets. This is to allow for the termination of field cables prior to delivery of the main section of the panel. Terminals shall be the isolating type for ease of commissioning and maintenance.

- 2.5 The Supplier shall submit his proposal for the preferred method of logic operation to enable the required functions to be performed, yet maintaining a cost effective solution.



If a programmable electronic system is used for logic operation, the control action matrix display input alarms shall be derived such that they are not dependant on the logic operation. Where a programmable system is proposed this shall maximise the use of standard proven software thus minimising the amount of custom programming necessary. An established method for controlling and validating software development and subsequent modification shall be available. All software and associated hardware necessary for programming and modifying system software shall be included in the supply.

The manual output initiation of protection systems from the control action matrix should not be dependant on the logic operation.

If a Fire & Gas system does not have fall-back routes independent of the processor system, then solid state logic systems should be used. Configuration software should be provided with usable facilities for modification, with validation and consistency checking.

Access for software revision must be restricted and each software revision must be identified by a revision number to ensure correspondence with documentation.

2.6 Fire & Gas Display System

The Fire and Gas Display System shall consist of either a hardwired mimic or VDU display system, which will provide overall and detailed information of the fire and gas system, detection and control actions and status to the Operator. Logging the information and recall of historical data onto displays and printer(s) shall also be provided.

The overall display system response shall be such that indication of hazard and access to detail information is given to the operator. Access to detail information from overview shall be possible with minimal key strokes.

The supplier shall detail his capabilities to interface with third party control systems and demonstrate any benefit in adopting this approach in preference to providing a separate display system.

The VDU displays should be capable of providing the operator with area mimics plus alarm, fault and event logs. Detailed displays may also be required to detector identification level, with gas detector bar charts.

Proprietary based process control system displays and data reporting systems are not always suitable for Fire & Gas system displays and should be thoroughly investigated before being approved for use.

2.7 Post Red Shutdown Panel

A Post Red Shutdown panel shall only be provided where specified and primarily on offshore installations. Following a red shutdown, when



the Fire & Gas and ESD systems will be isolated, any areas left powered and not suitable for a zone 1 area, shall be electrically isolated directly from the Post Red System on confirmed flammable gas in that area.

Under normal operating conditions, the Post Red System shall be powered-up with control action outputs inhibited unless otherwise specified. Receipt of a red shutdown signal shall enable the outputs which shall initiate the relevant electrical isolation on detection of gas. The panel shall include a matrix display of detection and control actions.

The Post Red Shutdown panel should also include its own dedicated common facilities matrix and be supplied from an un-interruptable power supply.

2.8 Local Mimic Fire Panels

In order to assist personnel to evacuate accommodation areas safely under a hazardous situation, each level of accommodation shall be provided with a Local Mimic Fire panel to indicate the location of that hazard.

Each panel shall indicate the geographical layout and status of detection on that level, together with group fire and gas information for the remaining levels. Where a room contains more than one detector, only one LED for fire and one for gas is required. The indications may be transmitted via serial link.

2.9 Reliability and Availability

Each part of the Fire and Gas and Post Red panel shall have self test and diagnostic facilities to enable first line fault repair using 'non-expert' multi-trade technicians. Wherever possible, the fault shall be confirmed to board level. There shall be no need for a total system shutdown to repair faults, and the facilities lost during any fault period shall be minimised.

Inhibit facilities shall be provided for routine testing of the system and inputs/outputs without significant reduction in the available detection/protection. All inhibits shall be reported to the operator and indication shall not be cancelled until the inhibit has been removed.

The supplier shall provide a detailed assessment of reliability and availability. This shall take into account all system components including field devices and cabling.



The supplier shall carry out a failure modes effects analysis of the system considering the consequences of a component module failure. This shall be used to demonstrate that unrevealed common mode failure does not occur, which could jeopardise the integrity of the system.

- 2.10 The panels and fitted equipment shall be suitable for the environment and due regard shall be taken of mounting vibration and panel noise where appropriate.

3. FIELD EQUIPMENT

- 3.1 Self test detectors shall be used where viable, to reduce maintenance requirements offshore. All field devices shall be compatible with their detector interface modules, and shall be suitable for the environment in which they are located, including hosing down operations. The minimum enclosure for external areas shall be IP 55, [IEC 529](#) classification as a minimum.
- 3.2 Non-certified fire detectors may be used in internal accommodation area(s).
- 3.3 Consideration should be given to utilising addressable fire and gas field devices where proven technology can be used. Any fire area shall contain a minimum of two addressable detectors, each on separate addressable loops, with each loop being fed from a separate controller or field interface module.
- 3.4 Fire & Gas I/O shall be normally de-energised, energising to alarm/trip, and require line monitoring for open and short circuit faults.

To enable a rapid system response, specialist advice should be sought to ensure the correct detector is installed for any given environment.

Point type smoke detectors shall be either ionisation or optical, dependent on the type of fire likely to be encountered. High sensitivity smoke detection may be required in electronic data processing areas, and carbon monoxide detection may be more beneficial in HVAC air intakes.

Heat detectors shall be fixed temperature, rate-of-rise with fixed temperature, rate compensated, or linear heat type.

Flame detectors shall be the infrared type for hydrocarbon fires. For non-hydrocarbon fires, ultraviolet flame detectors should be used.

Flammable gas detectors shall be the infrared point or beam type.

Toxic gas detectors shall preferably be the electrochemical or the composite catalytic/semiconductor type.



In some areas, oil mist detectors may provide an early response prior to the outbreak of fire.

Where there is a requirement for easier personnel access in accommodation corridors and stairwells, magnetic door releases shall be installed to hold open doors. These units shall be normally energised and incorporate a means of closing the door locally. Under a local fire situation, the doors shall close automatically.

4. SYSTEM INTERFACES

The Fire and Gas system may be required to interface with several systems, e.g. ESD, fire protection, fire pumps, Public Address and HVAC. Details of the required interface will be provided by the Purchaser on Data Sheets. Control action outputs shall be hardwired from the Fire and Gas panel.

(i) Extinguishant system interface:-

Discharge solenoid valves
Discharge pressure switches
Vent air pressure switches
Sprinkler pressure switches
Skid lock-out status switches
Electrical release points
Pre-discharge audibles (gaseous system only)
Status lamps (gaseous system only)
Firewater pumps and ringmain pressure switches
Isolating valve status switches

(ii) HVAC interface:-

In a fire situation, confirmed fire or gas control action outputs to the HVAC control panel shall initiate the relevant stopping of fans and closing of dampers. Outputs from the Fire and Gas panel shall be normally energised, normally open volt-free contacts, closed when energised.

Confirmed damper status shall be input from the HVAC control panel to the central fire and gas panel.

Manual HVAC controls shall override automatic controls from the fire and gas panel.

(iii) ESD interface:-



In a fire or gas situation, initiation of ESD shall be via volt free contacts from de-energised dual relays, or a similar reliable configuration, located in the fire and gas panel.

(iv) Public Address System:-

Confirmed fire and gas alarms shall be output to the PA system on an areas basis, to initiate audible and visual alarms as specified.

(v) Fire pumps:-

Control actions will be required for automatic starting of pumps, where specified. Additional manual controls, alarms and status indications will also be required from the fire pump matrix.

In certain areas, single fire or gas alarms will initiate the PA system, e.g. cabins.

Other system interfaces could include, Drillers fire & gas panel, Turbine package fire & gas panel, Pedestal Crane fire & gas system, etc.

5. TESTING

- 5.1 The supplier shall produce a detailed test procedure which will demonstrate design integrity along with the correct operation of each element of the system. The test procedure shall ensure that on-site testing and remedial work is minimised. All testing shall be recorded and such records shall be retained for inspection for audit purposes.

6. DOCUMENTATION

Documentation shall be provided to enable assessment of design. This shall be limited to that essential to verify conformance with specified functionality and as necessary to permit installation, operation, calibration and maintenance of the system.

Requirements should be detailed in the Functional Specification and would consist typically of the following:-

- (i) *Information Required With Quotation*
- *Detailed description of proposed system, detectors and ancillary panels/items.*
 - *Reliability and availability assessment.*



- *List of deviations from the specification, associated documentation or Codes and Standards.*
- *Statement of capabilities and proposals for providing installation supervision (on/offshore) and testing/commissioning (on/offshore).*
- *Programme for construction, testing and delivery.*
- *Proposals for testing and commissioning.*
- *Spares and test equipment proposals together with prices.*

(ii) *Documentation Required During Design Build and Test*

The prime objective is to eliminate unnecessary documentation, reformatting and approvals, thereby realising large savings in vendor and contractor costs.

- *Documentation must be limited to the minimum required to design the installation and to operate and maintain the equipment.*
- *It should be recognised that it is the responsibility of the vendors to approve the detailed design drawings and not the design contractor. This is a new approach and will substantially reduce the volume of documentation required.*
- *The specific documentation requirements will need to be defined by the design contractor for each particular application.*

The document approval category requirements for the above will need definition for specific applications. The requirement for approval before continuation of manufacture should be minimised.

It is suggested that the following is used as a basis for agreeing the documentation requirements:-

8 weeks after confirmation of order

- *Front of panel and matrix layout drawings.*
- *Logic diagrams.*
- *Panel power and heat load estimates.*
- *Wiring, electrical distribution, earthing, inter-connection and termination drawings.*
- *Installation and terminal point details.*
- *Equipment lists, schedules and Data Sheets for input to operational maintenance database systems (where specified).*
- *I/O and interface schedules including signal state.*



- *Detailed spares and test equipment listings to cover commissioning and two years operation.*
- *Functional design specification of any bespoke hardware, software or system configuration.*
- *Failure modes and effects analysis.*

8 weeks prior to Factory Test

- *Detailed procedure, programme and test sheets for system testing at the factory, on site commissioning and for subsequent routine operation and maintenance. These are to include for the system, detectors and any sub-vendors or ancillary equipment.*
- *Equipment safety certification dossier.*
- *Operation and maintenance manuals with all information necessary for continued operation during the life of the installation.*

On delivery

- *As built documentation*
- *Confirmed weight and Centre of Gravity (Offshore only or as specified)*

The document approval category requirements for the above will need definition for specific applications. The requirement for approval before continuation of manufacture should be minimised.



DEFINITIONS AND ABBREVIATIONS

Definitions

Standardised definitions may be found in the BP Group RPSEs Introductory Volume.

Abbreviations

ESD	Emergency Shutdown System
IEC	International Electrotechnical Commission
I/O	Input Output
IP	Ingress Protection
PA	Public Address
VDU	Visual Display Unit



LIST OF REFERENCED DOCUMENTS

A reference invokes the latest published issue or amendment unless stated otherwise.

Referenced standards may be replaced by equivalent standards that are internationally or otherwise recognised provided that it can be shown to the satisfaction of the purchaser's professional engineer that they meet or exceed the requirements of the referenced standards.

International Documents

[IEC 529](#) Degree of protection provided by enclosures



FUNCTIONAL SPECIFICATION DATA SHEETS

C1. SYSTEM DESCRIPTION

C1.1 General

-- HOLD --

(Note: Description of the project, location and application)

C1.2 System Layout

-- HOLD --

Note: Summary of the system and any particular features/requirements for the application)

C1.3 System Availability/Reliability

-- HOLD --

(This need not necessarily be a quantified requirement, but more a statement of design principles, thus allowing the supplier to detail and propose their optimum solution. This should address the need, or otherwise, for redundancy and degree of self test necessary where minimum manning is being proposed.)

C1.4 Display and Operator Interface Arrangement

Vendor to advise optimum solution.

C1.5 Automatic Protection Systems and Manual Controls

-- HOLD --

(Note: Detail all systems where control and interface with the Fire and Gas Panels is required. The amount of remote control for manual over-ride for initiation of protection systems also needs to be detailed.)

C1.6 Integration with other Systems

-- HOLD --

(Note: Describe functional requirements and request supplier to propose optimum solutions.)



C1.7 Special to Project Maintenance Facilities

-- HOLD --

(Note: Agree any special requirements with the Operator.)

C1.8 Device and Equipment/Panel Tag Numbering.

-- HOLD --

(Note: Detail to fit project philosophy but with due regard to supplier system capability.)

C1.9 Panel Maximum Noise Levels

Control Room Panels: -- HOLD --

(Note: Consider requirements for continuous manning.)

Equipment Room Panels: -- HOLD --

(Note: Should be less onerous as usually not normally manned.)

C2. ENVIRONMENT, AREA CLASSIFICATION AND UTILITIES

Environmental Conditions and Area Classification

Field equipment

Field equipment will be subjected to a marine environment with a salt laden atmosphere.

Max. ambient temperature	°C
Min. ambient temperature	°C
Max. Rel. Humidity	%

Area Classification	Zone
Gas Group	II
Temperature Class	T

Central control/Field equipment rooms

The control/ equipment rooms shall be classified as a safe area and suitable for general purpose equipment such as control panels and printers.

Max. ambient temperature	°C
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<i>Min. ambient temperature</i>	°C
<i>Max. Rel. Humidity</i>	%

Utilities and Services

Electrical power

1.	<i>Voltage</i>		V AC	V AC
	<i>Frequency</i>		Hz	Hz
	<i>Regulation</i>	-	VTA	
	<i>Harmonic Distortion</i>	-	VTA	
	<i>Switching Transients</i>	-	VTA	
2	<i>Voltage</i>		V DC	V DC
	<i>Regulation</i>	-	VTA	
	<i>Ripple</i>	-	VTA	
	<i>Harmonic Distortion</i>	-	VTA	

Instrument Air

<i>Inst. Air Pressure</i>	<i>barg (max.)</i>	<i>barg. (min.)</i>
<i>Dew Point</i>	°C	

VTA - Vendor to advise with submission



C3. FIRE AREA BASED FIELD I/O SCHEDULE

INPUTS	FIRE AREA			COMMENTS
Smoke- Ionisation				
- Optical				
-VESDA				
-IR Beam				
Heat - Rate of Rise				
- Rate Compensated				
- Linear				
Flame - IR				
- UV				
- UV/IR				(Not Offshore)
Flam. Gas - IR Point				
- IR Beam				
- Catalytic				
Toxic Gas - H ₂ S				
- Other				
Oil Mist				
Extinguishant Release Point				
MAC (Devices/No. of Loops)				
Other				
STATUS- Sprinkler				
- Extinguishant				
- Door Position				
- Shutdown				
- Dampers				
- Fans				
- Fire Pumps				
- Other				
OUTPUTS				
Shutdown - ESD				
- HVAC				
- Elect. Isolation				
Extinguishant - Deluge				
- CO ₂				
- Other				
- Manual				
- Pre alarm				
- Status Ind.				
General Alarm - By Area				
- Total				
Magnetic Door Release				
Fire Pump - Start				
- Manual Control				
Remote smoke alarm indicator				



C4. CODES, STANDARDS AND REGULATIONS

The following Codes, Standards and Regulations are applicable to the UK and most of Europe. Where local or National equivalents exist for the area of application, these should be used. Where none exist, however, then these Codes and Standards should be applied with the agreement of local installation management.

General

- BS 5455** *Components of automatic fire detection systems
(Pt. 5 identical to EN 54 Pt. 5) Part 5: Heat sensitive detectors
- point detectors containing a static element
(Pt. 7 identical to EN 54 Pt. 7) Part 7: Point type smoke
detectors using scattered light, transmitted light or ionisation
(Pt. 8 identical to EN 54 Pt. 8) Part 8: High temperature heat
detectors*
- BS 5446** *Specification for components of automatic fire alarm systems
for residential premises.
Part 1: Point-type smoke detectors*
- BS 5839** *Fire detection and alarm systems in buildings
Part 1: Code of practice for system design, installation and
servicing
Part 2: Specification for manual call points
Part 3: Specification for automatic release mechanisms for
certain fire protection equipment
Part 4: Specification for control and indicating equipment
Part 5: Specification for optical beam smoke detectors*
- BS 6020** *Instruments for the detection of combustible gases
(Pt. 1 identical to EN 50054 Part 1: Specification for general
requirements and test methods
(Pt. 4 identical to EN 50057 Part 4: Specification for
performance requirements for Group 11 instruments reading
up to 100% lower explosive limit*
- BS 6266** *Code of practice for the selection, installation, use and
maintenance of apparatus for the detection and measurement
of combustible gases (other than for mining applications or
explosives processing and manufacture)*
- EEMUA Publ.
1988** *Standard test method for comparative performance of No. 155
Flammable Gas Detectors against poisoning*
- Health and Safety Executive Occupational Exposure Limits
Guidance Note EH 40*



[*NFPA 72E*](#)

Automatic Fire Detectors

Onshore

[*Office, Shops and Railway Premises Act 1963*](#)

[*Fire Precautions Act 1971*](#)

Offshore

[*The Mineral Workings \(Offshore Installations\) Act 1971*](#)

[*UK Statutory Instruments The Offshore Installations 1974 No. 289 \(Construction Survey\) Regulations plus Guidance Notes*](#)

[*UK Statutory Instrument The Offshore Installations 1978 No. 611 \(Fire-Fighting Equipment\) Regulations plus Guidance Notes*](#)

[*UK Statutory Instruments The Offshore Installations 1976 No. 1019 \(Operational Safety Health and Welfare\) Regulations*](#)

[*UK Statutory Instruments The Merchant Shipping \(Fire Protection\) 1984 No. 121 Regulations*](#)

SOLAS 1974 Solas Convention

1978 Solas Protocol

1981 and 1983 Solas Amendments

