



GS 114-8

HVAC - TERMINAL UNITS FOR OFFSHORE USE

August 1993

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BP GROUP RECOMMENDED PRACTICES AND SPECIFICATIONS FOR ENGINEERING											
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HVAC - TERMINAL UNITS FOR OFFSHORE USE											
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SCOPE AND PURPOSE This document specifies the general requirements for the design and construction for HVAC Terminal Unit for use offshore. Its purpose is for the specification of fit-for-purpose HVAC Terminal Units at minimum cost.											
AMENDMENTS <table border="1"> <thead> <tr> <th>Amd</th> <th>Date</th> <th>Page(s)</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td colspan="4"> </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 was developed under the BP Exploration XEU Simple Specifications Initiative. This initiative is intended to simplify the purchasing requirements through a minimum conditions of satisfaction approach in regions where there is a mature supplier resource.

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 responsible 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 114-8) 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 document specifies the requirements for HVAC Terminal Units for use on hydrocarbon production, processing and export facilities offshore.

The Vendor's scope shall include the following:-

All terminal units complete with casing, constant volume controllers, attenuators, electric terminal re-heat coils and spigots for ductwork connection.

Provision of Documentation:-

- (a) General Arrangement.
- (b) Wiring and Termination Diagram.
- (c) Terminal unit schedule.
- (d) Sound Spectrum Schedule.

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

2. GENERAL

2.1 Documentation

- 2.1.1 This Specification shall be read in conjunction with an enquiry or purchase order and the accompanying data sheets.

2.2 Exceptions

- 2.2.1 Tenders for the supply of Terminal Units shall include either an unqualified affirmation regarding compliance with the specification or a complete list of detailed exceptions.
- 2.2.2 A Vendor may offer alternative suitable proposals where price, delivery or technical advantage may accrue, but such proposals shall be in addition to the main bid/tender.



2.3 Conflicts

- 2.3.1 If any of the reference documents conflict, and definition is not established by the provisions of Section 3 of this Specification, then the Vendor or his sub-supplier shall bring this to the attention of the Purchaser.

3. STANDARD DESIGN REQUIREMENTS

3.1 Design

- 3.1.1 The terminal unit should consist of a constant volume controller, electric heater and an attenuator suitable for connection to a high velocity constant volume ductwork system.

- 3.1.2 Each controller shall have a single inlet that has been factory calibrated to maintain a constant air flow; in addition it should be capable of allowing site adjustment of air flow volume within acceptable limits.

- 3.1.3 The regulator shall be powered from the platform plant air supply having a differential pressure range of 0.50 to 10 barg; an oscillation damper shall be provided to eliminate 'hunting'.

- 3.1.4 The attenuator shall be tested to [BS 4718](#).

It should be noted that provided the vendor has a certificate of conformity for similar items then testing could be waived.

- 3.1.5 The attenuation material shall possess the following properties: adequate strength and cohesion to prevent sagging, resist erosion, resist disintegration, odour free, non-dust producing and fire retardant to [BS 476](#) Parts 4 and 7.

- 3.1.6 The heating coils shall be rated under normal operating conditions, for a maximum surface temperature of 150°C.

The reason for limiting the surface temperature to 150°C, instead of the usual design criteria of 200°C, is to avoid the possibility of ignition when the system shuts down at 60% LEL.

During shutdowns there is a significant heat build up on the electric coils; downrating to 150°C limits the heat build up.

The penalty for this downrating is a slight increase in heater size, however this will not cause installation or maintenance problems.

- 3.1.7 The maximum face velocity should not exceed 3.5 m/s.



- 3.1.8 The air temperature internal to the terminal box shall not exceed 40°C.
- 3.1.9 Two thermal cut-outs shall be provided. The high limit thermocouple shall be set at 200°C with a manual reset button mounted on the cover plate of heater terminal plate. The second thermocouple shall be set to 175°C and will be automatically reset.

3.2 General Construction

- 3.2.1 The casing, and the flanges on the low velocity air discharge, shall be manufactured from galvanised sheet steel with a minimum thickness of 1 mm galvanised to [BS 2989](#) Grade Z2.

Flanges are required to allow easy removal.

- 3.2.2 Access panels shall be provided with quick release fasteners.
- 3.2.3 Sound attenuation shall be provided internal to the casing, either by lining the casing or by the provision of internal splitters incorporating an acoustic infill.
- 3.2.4 A close weave glass cloth shall be fitted between the infill and perforated steel to prevent particles of the sound absorbent media passing into the air stream. The attenuation material shall be of adequate strength and cohesion to prevent sagging. The internal splitters shall be constructed from perforated galvanised sheet steel with a minimum thickness of 1 mm riveted to the casing. The perforated plates shall encase an infill of an inorganic mineral glass fibre.
- 3.2.5 Heating elements shall be of the sheathed black heat type, incorporating a 80/20 nickel chrome resistance wire weld to terminal pins and enclosure in an 'INCOLOY 800' tube.
- This type of material has better qualities for corrosion resistance than stainless steel and has now become the industry standard.*
- 3.2.6 The element shall be supported at intervals to completely eliminate sagging and shall be mounted on removable plates, arranged for easy withdrawal and maintenance.
- 3.2.7 All termination blocks and wiring shall be tagged and separately identified.
- 3.2.8 Provision of Vendors standard nameplate to give notice "**Danger 440 Volts**" (or 254 volts) 9 mm high lettering white on red.



3.2.9 The constant volume controller shall be manufactured to the Vendors standard.

3.2.10 All terminal units shall have the Vendors standard nameplate containing the following information:

Project Name
PO Number
Year of manufacture
Tag number
Air volume m³/s
Air pressure drop Pa
Heater Duty Kw
Electrical supply V/ph/Hz
Air Flow directional arrow
Weight kg

3.2.14 The Vendor shall provide a self adhesive label, 50 mm high, black on white, quoting the terminal unit tag number only.

This allows the operator to identify the equipment at floor level.

3.3 Power Supplies

3.3.1 The following power supplies shall be made available to the Vendors package. The frequency of the power supplies will be shown on the Data Sheets.

- (a) 440 V, three phase, four wire, solidly earthed neutral maximum prospective fault level: 80 kA, rms symmetrical.
- (b) 254 V, single phase and neutral, solidly earthed neutral.

3.3.2 The systems will be subject to the following steady state tolerances:

- (a) Voltage + 5%
- (b) Frequency + 2%

3.3.3 In addition, occasional voltage transients of up to + 5% of nominal may be encountered.

3.4 Earthing

3.4.1 Earthing shall comply with the IEE Recommendations for the Electrical and Electronic Equipment for Mobile and Fixed Offshore Installations.



- 3.4.2 Where non-metallic enclosures are used, means shall be provided to preserve the electrical continuity of the armouring and/or metallic sheaths of cables.
- 3.4.3 Earthing within the terminal unit shall be the Vendors responsibility. All enclosures and electrical equipment shall have two earth terminals with a continuous path to earth.
- 3.4.4 All insulated enclosures shall have the necessary metal inserts or continuity strips to provide earth continuity to cable armour braids.
- 3.4.5 An earthing boss should be provided to each terminal unit complete with stud, nuts and shake proof washer.

3.5 Electrical Enclosures

- 3.5.1 Electrical terminal boxes and/or enclosures shall be rated in accordance with the IP protection, indicated on the Data Sheets. External boxes and enclosures shall be designed to shed rain water and prevent the accumulation of standing water.
- 3.5.2 Junction and terminal boxes shall be certified EX 'E' 11BT3; refer to data sheets for junction and terminal box classifications.
- 3.5.3 All termination blocks and wiring shall be tagged and separately identified.
- 3.5.4 Separate junction or terminal boxes shall be provided for a.c., d.c. and IS circuits. Terminals for intrinsically safe terminals shall be coloured blue.
- 3.5.5 IS junction boxes to be separate boxes clearly marked as such. Each terminal shall be clearly and permanently numbered on the body of the terminal itself.
- 3.5.6 Within enclosures, separately mounted and screened terminal blocks/strips shall be provided for each voltage level. Terminals for three phase supplies shall be phase segregated by the installation of barriers. All a.c. terminals over 55 V shall be shrouded and fitted with hazard warning labels.
- 3.5.7 The Vendor shall route cables so that the direction of entry into the Vendor's terminal boxes and equipment is side or bottom.
- 3.5.8 The Vendor shall provide separate gland plates for glanding Purchasers cables and, where compatible with the appropriate standards and



Hazardous Area Certification, the gland plates shall be removable and undrilled.

- 3.5.9 Only one conductor shall be connected per terminal.
- 3.5.10 The junction boxes provided shall be adequately rated and sized to accept the external cabling specified. Terminals shall either be of the pressure clamp or bolted lug type. Pinch screw terminals where the screw bears directly onto the conductor are not acceptable.
- 3.5.11 All control signals from motor starters, contactors and the package unit, for starting or stopping the heaters, indicating lamps etc., shall be by volt-free contacts with a minimum rating of 110V, non-inductive unless specified otherwise.
- 3.5.12 The Vendor shall ensure the terminals have been completed and tested at his works, and the enclosures are securely fixed to the terminal unit.
- 3.5.13 All cable glands shall be certified complete with inner and outer seals, as detailed on the Data Sheets.



DEFINITIONS AND ABBREVIATIONS

Definitions

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

Abbreviations



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 Standards

[IEC 79](#) Electrical Apparatus for explosive gas atmosphere.

[IEC 529](#) Classification of degrees of protection provided by enclosures.

The Institution of Electrical Engineers (IEE)

Recommendations for the Electrical and Electronic Equipment for Mobile and Fixed Offshore Installations. IEE Regulations - 15th Edition.

[Institute of Petroleum \(IP\); IP Model Code of Safe Practice Parts 1 and 8.](#)

British Standards

[BS 476](#) Fire tests on building materials and structures: Part 4: Part 7

[BS 1449](#) Steel plate, sheet and strip: Part 1 and Part 2.

[BS 2989](#) Specification for continuously hot dip zinc coated and iron-zinc alloy coated steel flat products: tolerances on dimensions and shape.

[BS 4718](#) Methods of test for silencers for air distribution systems.

[BS EN 60947-1](#) Specification for low-voltage switchgear and controlgear.



DATA SHEET

SPS-X-XX-XX-HV-0009

Terminal Units

PROJECT		MODULE/AREA/LOCATION				DOC REF No.				
CONTRACTOR		FLOW DRG No.								REV
SYSTEM AND SERVICE		LAYOUT DRG No.								REV
EQUIPMENT TAG NO.										REV
TECHNICAL DETAILS		UNITS		DESIGN			VENDOR			
1	Air Volume	m ³ /s								
2	Face Velocity	m/s								
3	Pressure Drop	Pa								
4	Air Temperature On	C								
5	Air Temperature Off	C								
6	Duty	Kw								
7	Size	mm								
8	Diameter of Discharge Duct	mm								
9	Diameter of Inlet Duct	mm								
10	Minimum Pressure at Inlet	Pa								
11	Power Supply	V-Ph-Hz								
12	Control Voltage	V-Ph-Hz								
13	Area Classification	-								
14	Weight	Kg								
15	MATERIAL CONSTRUCTION						VENDOR			
16	Casing	-								
17	Thickness of Casing	mm								
18	Manufacture of Pressure Device	-								
19	Size of Access Door	mm								
20	Size of Earth Boss	mm								
21	Manufacture of Junction Box	-								
22	Manufacture of Terminal Box	-								
23	Sound Spectrum 10 ⁻¹² W	63 Hz	125 Hz	250	500	1K	2K	4K	8K	

Diagram showing a rectangular terminal unit with dimensions: N (North), W (Width), E (East), h (Height), and W (Width).

JB Junction Box
TB Terminal box

