



GS 114-3

HVAC - CENTRIFUGAL FANS FOR OFFSHORE USE

October 1993

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BP GROUP RECOMMENDED PRACTICES AND SPECIFICATIONS FOR ENGINEERING											
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Document Title HVAC - CENTRIFUGAL FANS FOR OFFSHORE USE											
APPLICABILITY Regional Applicability: United Kingdom											
SCOPE AND PURPOSE This document gives specification guidance on the offshore installation, application and testing requirements for HVAC Centrifugal Fans. Its purpose is for the specification of fit-for-purpose HVAC Centrifugal Fans at minimum cost.											
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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 114-3) 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 Centrifugal Fans for use on hydrocarbon production, processing and export facilities offshore.

The Vendor's scope shall include the following:-

Centrifugal fans complete with motors, support frames, drives, belts, anti-vibration mountings, instrumentation and flexible connections as indicated on the Data Sheets.

Provision of Documentation:-

- (a) General Arrangements.
- (b) Wiring and Termination Diagrams.
- (c) Noise Spectrum for each fan.

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 Centrifugal Fans 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 proposal 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 Centrifugal Fans shall be suitable for continuous operation at the design duty selected, with an efficiency of at least 75%.

- 3.1.2 Fans shall be selected to achieve the following rates of air flow at the stated wind speeds.

At 25m/s (300pa) 100% volume flow.
At 44m/s (930pa) 80% volume.

A wind co-efficient of 0.8 has been included in the above conversions of wind speed to dynamic pressure.

- 3.1.3 Fan air discharge velocity shall be a maximum of 15 m/s.

- 3.1.4 Fan impellers shall be backward curved aerofoil blades.

The reason for this is high efficiency and non-overloading power characteristics.

- 3.1.5 Anti-spark and anti-static features should be provided in accordance with [BS 2044](#) and [BS 2050](#) and as indicated on the Data Sheets.

- 3.1.6 Fans shall be selected to give a margin for adjustment of +10% performance without reaching critical shaft or impeller speeds.

- 3.1.7 Fan bearings shall be designed to give operation of 40,000 hours continuously rated.

3.2 General Construction

- 3.2.1 Fan casings shall be constructed from continuously welded mild steel plate to [BS 1449](#) Part 1, with a minimum thickness of 3 mm; the casing shall be hot dipped galvanised after manufacture to [BS 729](#) Table 1. Depending on the fan size, fans shall be split horizontally with sections flanged and bolted together.



- 3.2.2 Fans located in exposed areas shall be stainless steel to [BS 1449](#) Part 2 type 316L.
- 3.2.3 All fans shall have an access door, drain cock, flanged inlet and outlet connections and an easily removable inlet cone.
- Inlet cones are used to reduce pressure loss.*
- 3.2.4 The fan motors shall be mounted outside the casing on the skid base with the fans being driven by a multi-belt drive with not less than 2 belts on the drive. Belt tensioning and motor alignment facilities shall be provided.
- 3.2.5 The complete belt drive guard assembly shall be constructed from mesh. Provision shall be provided for fan and motor speed checks via 50 mm access holes, also a slot shall be provided so that belt tension checks can be made without the removal of fan belt drive guard.
- 3.2.6 The belt guard shall incorporate a brass anti-spark track as indicated on the Data Sheet.
- 3.2.7 The fan impeller shall be painted to the Vendors standard for off-shore application.
- 3.2.8 Each fan assembly shall have fully enclosed anti-vibration mountings to provide a minimum of 95% vibration isolation.
- 3.2.9 Flexible connections shall be provided on inlet and outlet nozzles, complete with mating flanges. The minimum length shall be 200 mm.
- A flexible material that has been used successfully in the past is Revertex ANI.*
- 3.2.10 The fan assembly shall include an integral support frame. This frame shall be suitable for lifting and transporting without any permanent deflection. Lifting lugs or eyes shall be provided within the structural support frame.
- 3.2.11 The fan anti-vibration mounting shall be supplied bolted to the support frame.
- 3.2.12 An earth boss should be welded to the frame, complete with stud, nuts and shake proof washer.
- 3.2.13 When indicated on the Data Sheets speed sensors should be provided. These should be mounted on the fan casing with all termination's completed by the Vendor.



- 3.2.14 All fans shall have Vendors standard nameplates containing the following information:

Project Name
P O Number
Vendors Serial Number
Year of Manufacture
Tag Number
Duty m³/s
Motor Duty kW
Fan Speed RPM
Motor Speed RPM
Weight kg
Fan Size and type

3.3 Electric Motors

- 3.3.1 The Vendors standard fan motors will be acceptable provided they meet the requirements of BP Group [GS 112-3](#) Low Voltage Induction Motors. The motor should be rated and certified in accordance with the requirements shown on the Data Sheets.

BP/Purchaser shall provide the local motor control stations, not the Vendor. This is done for overall standardisation.

3.4 Terminal and Junction Box Enclosures

- 3.4.1 Terminals and junction boxes shall be rated in accordance with the IP protection indicated on the Data Sheets.
- 3.4.2 The Vendor shall ensure the terminals have been completed and tested at his works, and the enclosures are securely fixed to the skid.
- 3.4.3 All cable glands shall be certified complete with inner and outer seals as detailed on the Data Sheets.
- 3.4.4 All terminal and junction boxes externally mounted shall be designed to shed rain water and prevent the accumulation of standing water on any part of the enclosure.



DEFINITIONS AND ABBREVIATIONS

Definitions

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

Abbreviations

IEC International Electrotechnical Commission



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.

British Standards

BS 476	Fire tests on building materials and structures: Part 4: Part 7: Part 8.
BS 729	Specification for hot dipped galvanised coatings on iron and steel articles.
BS 848	Fans for general purposes Part 1: Part 2
BS 970	Specification for wrought steels for mechanical and allied engineering purposes Part 1 grade 316L.
BS 1449	Steel plate sheet and strip Part 1: Part 2
BS 1486	Lubricating nipples and adapters for use on machinery and vehicles: Part 1
BS 2044	Determination of resistivity of conductive and antistatic plastics and rubbers.
BS 2050	Specification for electrical resistance of conducting and antistatic products made from flexible polymeric material.
BS 3790	Specification for endless wedge belt drivers and endless V-belt drives.
BS 4675	Mechanical vibration in rotating machinery Part 1
BS 5265	Mechanical balancing of rotating bodies: Part 2.



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

[BS 6861](#) Balance quality requirements of rigid motors: Part 1

BP Group Documents

BP Group [GS 112-3](#) Low Voltage Induction
(replaces BP Std 221)

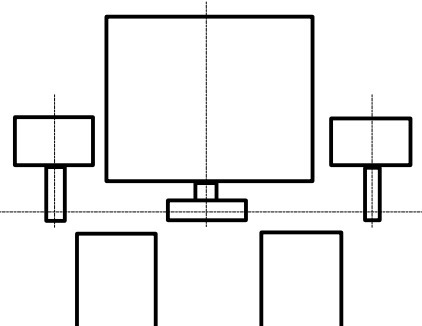


DATA SHEET

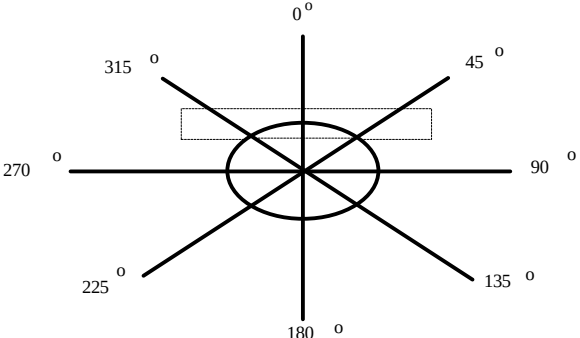
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Centrifugal Fans

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	Fan System Total Pressure	Pa									
3	Fan Speed	RPM									
4	Motor Speed	RPM									
5	Motor Power - absorbed	amps									
6	Motor Power - rated	Kw									
7	Power Supply	V-Ph-Hz									
8	Control Supply	V-Ph-Hz									
9	Area Classification	-									
10	Motor Rating	IP									
11	Inlet Diameter	mm									
12	Discharge Size	mm									
13	Speed Sensor	-		Yes		No					
14	Anti Static Features	-		Yes		No					
15	Weight of Assembly	Kg									
16	MATERIALS CONSTRUCTION							VENDOR			
17	Casing	-									
18	Grade	-									
19	Thickness	mm									
20	Material of Name Plate	-									
21	Length of Flexible Connection	mm									
22	Type of Antivibration Mounting	-									
23	Size of Earthling Boss	mm									
24	Manufacture of Junction Box	-									
25	Manufacture of Terminal Box	-									
26	Sound Spectrum 10 ⁻¹² W	63Hz	125Hz	250H	500Hz	1K	2K	4K	8K		



MOTOR AND ACCESSORIES POSTION



FAN OUTLET POSITION
VIEWED
FROM INLET SIDE

