



GS 114-1

HVAC - DAMPERS FOR OFFSHORE USE

August 1993

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BP GROUP RECOMMENDED PRACTICES AND SPECIFICATIONS FOR ENGINEERING											
Doc. No. GS 114-1		Issue Date Latest Amendment Date	August 1993								
Document Title HVAC - DAMPERS FOR OFFSHORE USE											
APPLICABILITY - Does not preclude adaptation for other applications Regional Applicability: United Kingdom											
SCOPE AND PURPOSE This document gives specification guidance on off-shore installation, application and testing requirements for HVAC Dampers. Its purpose is for the specification of fit-for-purpose HVAC Dampers at minimum cost.											
AMENDMENTS <table border="0" style="width: 100%;"> <tr> <td style="width: 15%;">Amd</td> <td style="width: 25%;">Date</td> <td style="width: 25%;">Page(s)</td> <td style="width: 35%;">Description</td> </tr> <tr> <td colspan="4"> </td> </tr> </table>				Amd	Date	Page(s)	Description				
Amd	Date	Page(s)	Description								
CUSTODIAN (See Quarterly Status List for Contact) Mechanical Systems											
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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. It also gives guidance on the implementation of any 'Specification' or 'Approval' actions; specific actions are indicated by an asterisk (*) preceding a paragraph number.

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 114-1) 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 Dampers for use on hydrocarbon production, processing and export facilities offshore.

The Vendor's scope shall include the following:-

Dampers complete with casings, actuators, controls and pneumatic pipework.

Provision of Documentation:-

- (a) General Arrangements.
- (b) Damper Schedule.
- (c) Internal Pneumatic Pipework layout.
- (d) Internal Wiring and Termination Diagrams.
- (e) Certificate of conformity for the fire rating as indicated on the Data Sheets.

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

This document is intended for use in conjunction with a functional specification and associated data sheets and drawings which give specific project requirements.

- 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 Dampers 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 other suitable proposals where price, delivery or technical advantage may accrue, but such proposals shall form a supplement 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 Purchaser.

3. STANDARD DESIGN REQUIREMENTS

3.1 Design

- 3.1.1 All types of Dampers shall be constructed to withstand and/or close against an internal pressure of 1500 Pa and a duct velocity of 15 m/s.
- 3.1.2 When in the fully open position, damper pressure loss at an approach velocity of 10 m/s shall not exceed 35 Pa.
- 3.1.3 When measured with a pressure differential over the closed damper of 2500 Pa, for a 1000 x 1000 damper, the damper air stream leakage rates shall not exceed 0.1 m³/s per m² of damper duct face area.
- 3.1.4 All remotely operated dampers must open and close within 3 seconds.
- 3.1.5 All dampers shall be suitable for mounting within ductwork and/or Air Handling Units.

3.2 General Construction

- 3.2.1 The complete assembly for externally mounted dampers shall be stainless steel to [BS 1449 Part 2](#) and [BS 970 Part 1](#) grade 316.
- 3.2.2 Internally mounted dampers are acceptable in mild steel to [BS 1449](#) and hot dipped galvanised after manufacture to [BS 729](#) Table 1.

In general, stainless steel dampers have become the vendor's standard product and it may be found that there are no cost incentives in using galvanised mild steel for internal dampers.

- 3.2.3 Damper casings, including flanges and lifting eyes, shall be welded from material with a minimum thickness of 3 mm.
- 3.2.4 Casing to be stiffened so that blades and shafts are kept in proper alignment to prevent chattering or binding on the inside of the casing.



- 3.2.5 The casing depth for all dampers shall be 300 mm flange to flange.
- 3.2.6 Dampers shall have a mechanical indicator to indicate the open and closed positions.
- 3.2.7 All damper locations, hazardous types of junction boxes, micro switches, solenoid valves shall be contained on attached Data Sheets.
- 3.2.8 All dampers shall have vendor standard nameplates containing the following information:-
- Project Name
P O Number
Vendors Serial Number
Year of Manufacture
Tag Number
Duty m³/s
Size W (mm) x H (mm) x D (300 mm)
Weight kg
Fire Rating (fire dampers only)
- 3.2.9 The Vendor shall provide a self adhesive label, 50 mm high, black on white, quoting the damper Tag Number.
- The reason for the self adhesive label is to allow the operator to see at a glance, and maybe 4 metres below, the damper tag number; this will assist the operator during damper open/close routine.*
- 3.2.10 All blades shall be of an aerofoil configuration and constructed on a continuous 19.05 mm (3/4") diameter shaft.
- 3.2.11 Where dampers are exposed to untreated or contaminated airstreams, as shown on the Data Sheets, the Vendor shall pay particular attention to the selection of bearings, type and material, to ensure that correct damper operation is maintained.
- 3.2.12 All dampers shall have top, bottom and side seals to ensure an air tight seal is maintained when the blades are closed.
- 3.2.13 Blade linkages shall be attached to extended spindles by pinning and arranged for operation on one side of the damper casing only.
- 3.2.14 Linkage arrangement shall not prevent replacement of bearings.
- 3.2.15 All damper controls shall be designed for fail safe operation (i.e. close on air or electrical failure)

- 3.2.16 Remotely operated dampers shall be provided with an earth boss, complete with stud, nuts and a shake-proof washer, welded to the damper casing.

3.3 Types of Dampers

3.3.1 Fire and Gas Dampers

Fire and Gas Dampers shall be pneumatically operated by a single action spring return actuator with detachable linkage.

Actuators shall be provided with rapid air dumping devices and the actuator piped to a pneumatically operated air valve, fusible element, plug operated air valve, and 2-3 port electric solenoid valves. Refer to Appendix C for control action of the dampers.

The electrical supply to the solenoid valves shall be 100 V a.c., with the status indication being 24 V d.c. and a rating of 10 W.

A by-pass facility shall be provided to open the damper from a remote location.

The fusible element or probe assembly shall have a 3 port stainless steel valve arranged to vent the damper actuator, upon rupture of the thermal device within the air stream, such that this action cannot be by-passed except by operation of the remote switch.

The fusible element or probe should operate at $68^{\circ}\text{C} \pm 2^{\circ}\text{C}$ and have a Response Time Index (RTI) of less than 85 as defined in LP1039 issue 3.

The fusible element shall be securely fixed to the internal casing of the damper.

The fusible element or probe shall be replaceable without the need to disconnect pneumatic tubing. An access door shall be provided to allow for removal of the fusible loop system. No access is required to the probe system.

All pneumatic components shall be suitable for a pressure range of 4 to 13 barg, with the normal operating pressure being 8.5 to 9.5 barg.

All vent ports shall be fitted with dust excluders. The damper assembly shall be internally wired by the Vendor and terminate at the Vendors supply junction box. The junction box rating shall be as detailed on the Data Sheet.

The control devices for damper operation shall be provided within a removal enclosure and constructed from 1.6 stainless steel or galvanised mild steel, giving full 180 degrees access to the control assembly.

Dampers having A60 and above fire rating shall have the rear of control enclosure pre-insulated in accordance with the fire rating certificate of the damper.

3.3.2 Automatic Shut-Off & Non-Return Dampers

These dampers shall be used on fan discharges as indicated on the Data Sheets. The dampers shall be pneumatically operated by a single acting spring return actuator fitted with detachable linkages.

In general, the requirements of the dampers shall be as clause 3.3.1. The actuator shall be pneumatically piped to a normally de-energised 3-port electric solenoid valve arranged to vent the actuator and close the damper.

Each damper shall be provided with a micro switch to provide open and closed status.

On a number of projects, gravity type non-return dampers have been used. Experience has shown that this type of damper is difficult to commission and not very good in operation. Only use pneumatic dampers.

3.3.3 Automatic Pressure Control Dampers

These dampers should be used for maintaining an overpressure within a room/area of 70 Pa.

This type of damper is fitted on extract ducts only.

On automatic Pressure Control Dampers, the actuators shall be pneumatically piped to an air signal operated pilot-positioner arranged to stroke the damper from fully closed to fully open.

The pilot positioner shall be proportionalised to suit the pressure characteristics of the damper through the damper open/closed travel.

In general, the requirements of the dampers shall be as clause 3.3.1.

Each damper shall be provided with a microswitch to provide open-closed status.

3.3.4 Volume Control Dampers

These dampers are used to provide air volume control and fan equipment isolation.

Each damper shall be provided with a quadrant type blade operator with locking screw wheel. The quadrant device shall be used as a mechanical indicator for damper operating status.



3.3.5 Spring Control Pressure Relief Dampers

Spring controlled dampers shall open against the resistance of a tensioned stainless steel spring return device having an adjustable set point suitable for an operational range of 25 Pa to 125 Pa, to correspond with the installed pressure characteristics of the particular damper.

These dampers should only be used when no dedicated extract system is provided. If a mechanical extract is available then the dampers in clause 3.3.3 must be used.

3.4 Air Reservoirs

3.4.1 As indicated on the Data Sheets, air reservoirs for external locations shall be stainless steel type 316L and, for internal locations, mild steel to [BS 1449](#), designed and manufactured to [BS 5169](#). The air reservoir shall be suitable for an operating pressure of 150 psig and come complete with a pressure regulating valve, 2 non return valves in series, fusible plugs and a pressure gauge.

Air reservoirs shall be sized to allow two complete damper cycles based on the use of 30 metres of 10 mm O/D piping and an operating pressure of 8.5 barg.

3.5 Microswitches

3.5.1 Where indicated on the Data Sheets, dampers shall include two micro switches to indicate the fully open and fully closed status.

3.5.2 Microswitches, which shall be single pole sealed units with gold plated or solid platinum contacts, shall operate on a 24 V d.c. supply. They shall have micrometer adjustment and should operate at less than 5% of the actuator travel.

3.6 Instrument Air Tube and Fittings

3.6.1 Tubing and fittings with the damper package shall be stainless steel to [BS 1449](#) Part 2 quality 316L with twin ferrule fittings in metric sizes 6 mm; 10 mm or 12 mm OD.

3.6.2 The tube and fittings should be suitable for instrument air with a test pressure of 20 barg.

3.6.3 The Vendor to provide A-lok type bulkhead fittings at the damper limits.

3.7 Electrical and Instrument Enclosures

- 3.7.1 All electrical and instrument components and enclosures shall have the degree of IP protection as indicated on the Data Sheets.
- 3.7.2 Enclosures mounted externally shall be designed to shed rain water and prevent the accumulation of standing water on any part of the enclosure.
- 3.7.3 Solenoid valves shall be rated as indicated on the Data Sheets.

3.8 Junction Boxes

- 3.8.1 Junction boxes shall be rated in accordance with the protection indicated on the Data Sheets.
- 3.8.2 The Vendor shall ensure that the terminals have been completed and tested, and the junction box is securely fixed to the damper assembly.
- 3.8.3 All junction boxes externally mounted shall be designed to shed rain water and prevent the accumulation of standing water on any part of the enclosure. The location of dampers and junction boxes is shown 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

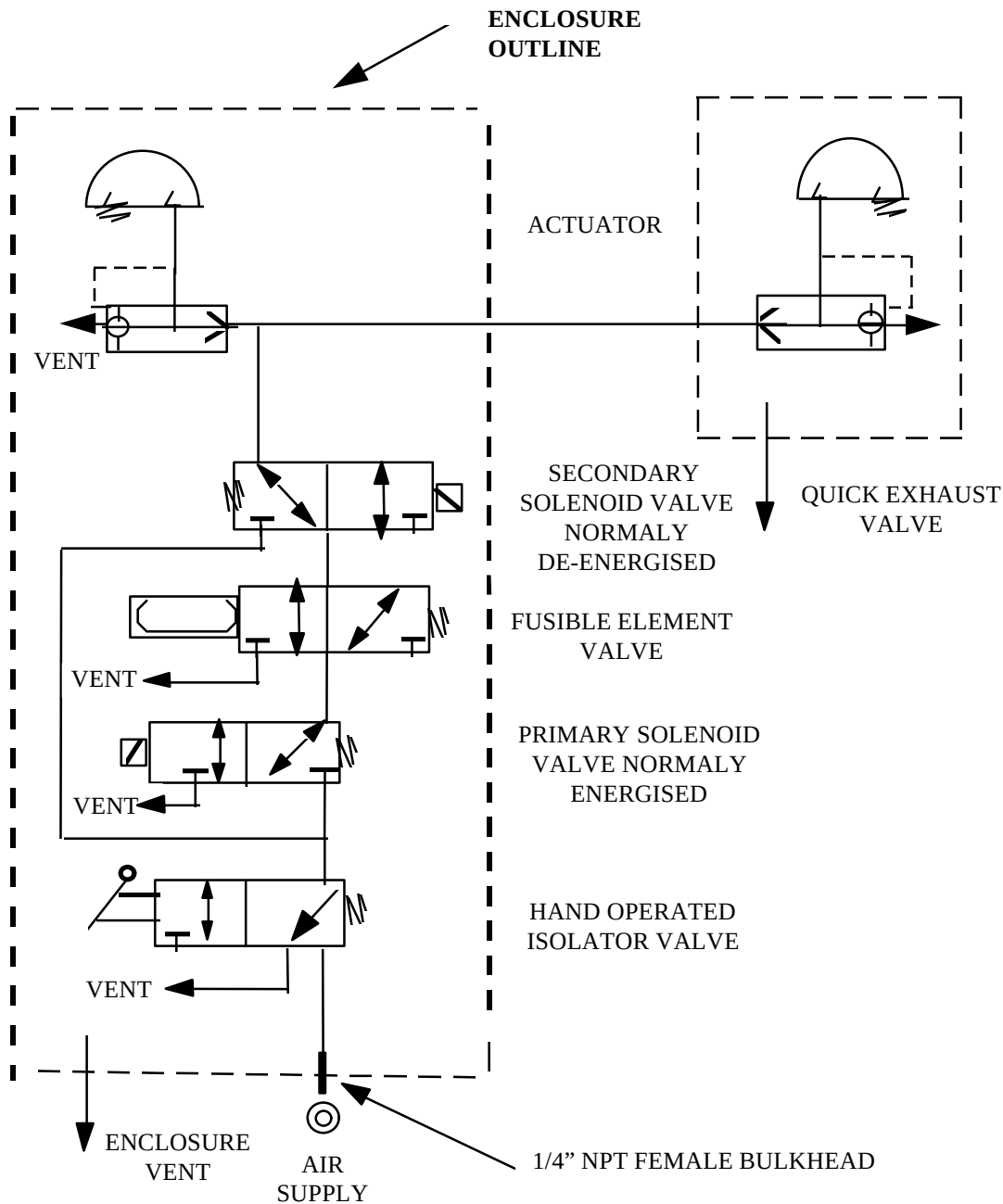
A reference invokes the latest published issue or amendment unless stated otherwise.

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.

British Standards

BS 476	Fire tests on building materials and structures: Part 3: Part 7.
BS 729	Specification for hot dipped galvanised coatings on iron and steel articles.
BS 970	Specification for wrought steels for mechanical and allied engineering purposes: Part 1 grade 316L.
BS 1449	Steel plate sheet and strip: Part 2.
BS 5169	Specification for fusion welded steel air receivers.
BS EN 60947-1	Specification for low-voltage switchgear and controlgear.

CONTROL AND PNEUMATIC DIAGRAM



DATA SHEET

SPS-X-XX-XX-HV-0002

Dampers

PROJECT		MODULE/AREA/LOCATION		DOC REF No.	
CONTRACTOR		FLOW DRG No.			
SYSTEM AND SERVICE		LAYOUT DRG No.			
EQUIPMENT TAG NO.					
TECHNICAL DETAILS		UNITS	DESIGN	VENDOR	
1	Air Flow Rate	m ³ /s			
2	Rating	m			
3	Size	mm			
4	Face Velocity	m/s			
5	Pressure Drop	Pa			
6	Leakage Rate	m ³ /s			
7	Control Enclosure Size	mm			
8	Number of Damper Units	-			
9	Weight of Assembly	Kg			
10	System Design Pressure	Pa			
11	Actuator Position	-			
12	Area Classification				
13	Spring Set Point	Pa			
14	Junction Box Locating and Rating	IP			
15	Closure Time	seconds			
16	Micro Switch Rating	IP			
17	Damper Location	-			
18	Provision of Air Reservoirs	-			
19	MATERIAL CONSTRUCTION			VENDOR	
20	Casing				
	Material	-			
	Grade	-			
	Thickness	mm			
21	Blades	-			
	Material	-			
	Grade	-			
	Thickness	mm			
	Type	-			
22	Material of Name Plate	-			
23	Number of Lifting Eyes	-			
24	Provision of Adhesive Label	-			
25	Type of Actuator	-			
26	Manufacture of Actuator	-			
27	Manufacture of Junction Box	-			
28	Manufacture of Micro Switch	-			
29	Rapid Dumping	-			
30	Type of Fusible Element	-			
31	Rating of Fusible Element	°C			
32	Min. Working Pressure	PSI			
33	Max. Working Pressure	PSI			
N W S E Acutuator Postion viewed in direction of Air Flow					



