



Exploration & Production

GENERAL SPECIFICATION

HVAC

GS HVA 212

Pneumatic Fire Dampers

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1. Scope

The purpose of this document is to define the minimum requirements for design, construction and supply of pneumatic fire dampers.

Within HVAC documents, expression in CAPITAL CHARACTERS AND *ITALIC* are defined within the "Terminology, definitions and abbreviations" specification.

When other words require a definition only for using within that document, the definition is given in a paragraph of that document and the defined word is marked in small and *italic* letters.

2. Reference documents

Equipment and installations must be in accordance with (in order of precedence):

- The country local regulations where equipment and/or installations will operate
- The Project specifications
- The International Standards
- The French Regulation (when Country local regulation does not exist)
- International System of Units (SI).

Notes: In case of discrepancy between documents the more stringent requirements shall apply.

The HVAC VENDOR or CONTRACTOR may propose proven improvements to the reference documents but must obtain written approval of the COMPANY prior to implementation.

An International Standard is a good "engineering practice" which shall be recognised and taken into consideration by VENDOR, SUPPLIER, MANUFACTURER and/or CONTRACTOR. If required, the translation of the standards must be included into HVAC scope.

The latest revision of Standards, codes, regulations and the published errata if any must be used and applied by VENDOR, SUPPLIER, MANUFACTURER and CONTRACTOR.

The reference documents listed below form an integral part of this General Specification. Unless otherwise stipulated, the applicable version of these documents, including relevant appendices and supplements, is the latest revision published at the EFFECTIVE DATE of the CONTRACT.

Standards

Reference	Title
BS 4870: Part 1: 1981	Specification for approval testing of welding procedures. Fusion welding of steel
BS 4870-3: 1985	Specification for approval testing of welding procedures. Arc welding of tube to tube-plate joints in metallic materials
BS 4870: Part 4: 1988	Specification for approval testing of welding procedures. Specification for automatic fusion welding of metallic materials, including welding operator approval
PR NF EN 10 204 August 2000	Metallic materials - Types of inspection documents

Professional Documents

Reference	Title
SMACNA	Sheet Metal and Air Conditioning CONTRACTORS' National Association. (All documents concerning duct)

Regulations

Reference	Title
Not applicable	

Codes

Statutory by law or recognised professional body approved by COMPANY.

Reference	Title
IMO Resolution A.754 (18)	IMO resolution for testing
NORSOK Standard H-001	Gas Dampers
SOLAS	International convention for Safety Of Life At Sea 1974 and amendments of November 1981, June 1983.Consolidated Edition 2002
MED directive	Compliance with Marine Equipment Directive (MED) 96/98/EC as modified by Commission Directives 98/85/EC, 2001/53/EC and 2002/75/EC

Other documents

Reference	Title
EN 1751 December 1998	Ventilation for buildings. Air terminal devices. Aerodynamic testing of dampers and valves

Total General Specifications

Reference	Title
GS HVA 000	List of HVAC specifications (all applicable)
GS COR 350	External protection of structures and equipment by painting
GS ELE 079	Electrical apparatus for potentially explosive gas atmospheres

3. Definitions

Frame: part of the fire damper which is used as a duct to drive air from the upstream ducting to the downstream ducting.

Height (for a fire damper): vertical dimension (horizontal duct) or more important dimension (vertical ducting) measured inside the section of the fire damper, where air is passing.

Width (for a fire damper): horizontal dimension (horizontal duct) or smaller dimension (vertical ducting) measured inside the section of the fire damper, where air is passing.

4. Operation

The fire damper must be designed and used for ductwork/bulkhead/deck installation to prevent the spread of fire and smoke from an *AREA* to another *AREA*.

The fire damper must be certified by notified body for use in fire resisting divisions as defined in IMO Resolution A.754 (18) and to the classification (A0, A60, H60, H120) according to the location of the fire damper.

The acceptable notified body are the followings:

- BV
- Lloyd's Register
- DNV
- ABS
- MED (A0, A60).

The fire damper (A0, A60) has to be in accordance with Marine Equipment Directive (MED) 96/98/EC as modified by Commission Directives 98/85/EC, 2001/53/EC and 2002/75/EC. Supplier has to affix a MED mark with the Year of Manufacturing and Number of the Notified Body on the fire damper (A0, A60).

A Certificate, issued from the above notified body, must be supplied for each fire damper or for several fire dampers if they are all covered by that Certificate.

5. Construction

The fire damper material must be chosen according to its location on the *HVAC* plant:

Location	Construction (frames, blades)
Fire damper outside of building	Stainless steel 316L (*)
Fire damper on the outside wall of building (whatever the side of location (inside or outside))	Stainless steel 316L (*)
Fire damper inside the building (on fresh air duct)	Stainless steel 316L (*)
Fire damper inside the building on chemical hood, chemical fume cupboard, battery room, photocopy room	Stainless steel 316L (*)
Fire damper inside the building, on other rooms that the above	Stainless steel 316L (*)

(*) Stainless steel AISI 316L with C < 0.03% and Mo > 2.5%.

Note 1: for shafts C < 0.03% and Mo > 2.0%.

Note 2: for bearings C < 0.03% and Mo > 2.0%.

The welding must be continuous by Metal Inert Gas (MIG) process.

The fire damper must be supplied non-insulated (insulation must be carried out on site, in accordance with the requirements of *MANUFACTURER*). Detailed installation instructions, drawings and insulation specification must be provided by the *MANUFACTURER* to respect certifying authorities requirements and to obtain agreement from the Insurance COMPANY.

5.1 Frame

Material of the *frame* must be in accordance with the above table. Material certificate type 3.1 B must be supplied by the *MANUFACTURER* (mandatory).

The fire damper casing must be continuously welded by metal inert gas (MIG). The placement of the sheet of metal to weld, must be ensured by a robot, in order to assure an air/smoke tightness, in accordance with the tested equipment (mandatory).

All the weldings must be cleaned by sinking welded parts to the passivation or acid liquid.

The *frame* must be formed from 3, 4 or 5 mm sheet according to SOLAS 74 and SOLAS Consolidated Edition, 2002 and according to the table here under (mandatory).

Whatever the classification of the fire damper (classification A0 to A60, classification H60 to H120), the *frame* material thickness, depending on the *width* and from the *height* of the fire damper must be in accordance with the following table:

Width (mm)	Height (mm)	≤ 100	≤ 150	≤ 200	≤ 250	≤ 300	≤ 350	≤ 400	≤ 450	≤ 500	≤ 550	≤ 600	≤ 650	≤ 700	≤ 750	≤ 800	≤ 900	≤ 1000	≤ 1100	≤ 1200	≤ 1300
≤ 100	≤ 100	3 mm	3 mm	3 mm	3 mm	3 mm	3 mm	3 mm	4 mm	4 mm	4 mm	4 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm
≤ 150	≤ 150	3 mm	3 mm	3 mm	3 mm	3 mm	3 mm	3 mm	4 mm	4 mm	4 mm	4 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm
≤ 200	≤ 200	3 mm	3 mm	3 mm	3 mm	3 mm	3 mm	3 mm	4 mm	4 mm	4 mm	4 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm
≤ 250	≤ 250	3 mm	3 mm	3 mm	3 mm	3 mm	3 mm	3 mm	4 mm	4 mm	4 mm	4 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm
≤ 300	≤ 300	3 mm	3 mm	3 mm	3 mm	3 mm	3 mm	3 mm	4 mm	4 mm	4 mm	4 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm
≤ 350	≤ 350	3 mm	3 mm	3 mm	3 mm	3 mm	3 mm	3 mm	4 mm	4 mm	4 mm	4 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm
≤ 400	≤ 400	3 mm	3 mm	3 mm	3 mm	3 mm	3 mm	3 mm	4 mm	4 mm	4 mm	4 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm
≤ 450	≤ 450	4 mm	4 mm	4 mm	4 mm	4 mm	4 mm	4 mm	4 mm	4 mm	4 mm	4 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm
≤ 500	≤ 500	4 mm	4 mm	4 mm	4 mm	4 mm	4 mm	4 mm	4 mm	4 mm	4 mm	4 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm
≤ 550	≤ 550	4 mm	4 mm	4 mm	4 mm	4 mm	4 mm	4 mm	4 mm	4 mm	4 mm	4 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm
≤ 600	≤ 600	4 mm	4 mm	4 mm	4 mm	4 mm	4 mm	4 mm	4 mm	4 mm	4 mm	4 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm
≤ 650	≤ 650	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm
≤ 700	≤ 700	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm
≤ 750	≤ 750	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm
≤ 800	≤ 800	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm
≤ 900	≤ 900	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm
≤ 1000	≤ 1000	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm
≤ 1100	≤ 1100	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm
≤ 1200	≤ 1200	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm

When requested, a specific size of fire damper must be available in 1 mm division compare to 50 mm.

Depth of the *frame* must be in accordance with the drawing and table here under:

Fire damper with A class

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Fire damper with H-class

The flanges width of the fire damper must be 27 mm minimum in A-class and 40 mm minimum in H-class.

The fire damper must be drilled in accordance with the following drawing:

Fire damper A0 to A60 class

Fire damper H60 to H 120 class

Circular connection

When circular connection is required, additional spigot adaptors in Stainless steel AISI 316L with $C < 0,03\%$ and $Mo > 2,5\%$ of 3, 4 or 5 mm must be used in accordance with SOLAS. However in this case the overall flange dimension must be in accordance with the drawing here under:

5.2 Blades/shafts

Material of the blades must be stainless steel AISI 316L with $C < 0.03\%$ and $Mo > 2.5\%$. Material Certificate type 3.1 B must be supplied by the *MANUFACTURER* (mandatory).

The blades must be double sheet construction to obtain a blade with minimum thickness = 20 mm (mandatory). The blade movement must be opposed type.

The shaft of each blade must be solid diameter 15 mm stainless steel AISI 316L with $C < 0.03\%$ and $Mo > 2.0\%$. Material Certificate type 3.1 B must supplied by the *MANUFACTURER* (mandatory).

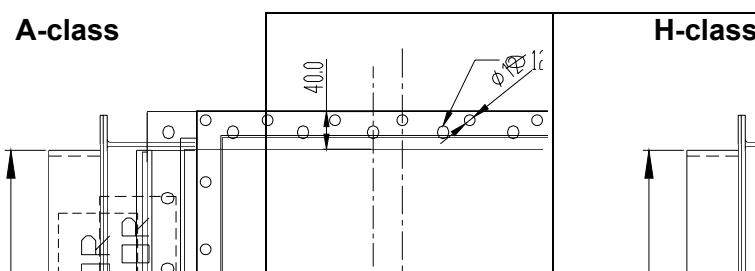
The blades for A0 (A60) must contain silicon gasket (effective up to 300 °C) and thermal expansion graphite seal gasket (effective from 150 °C). The same technology must be used concerning the air tightness between the *frame* and the blades.

The blades for H60 (H120) must contain thermal expansion graphite seal gasket (effective from 150 °C).

Stainless steel bearings must be placed inside the *frame* to support the shafts.

The blades must be dismantled.

A local mechanical device indicating blades position (open or closed) must be provided. Indicator must be readable outside of the fire damper. The indicator must be readable after insulation installation, without dismantling and without to have to remove the insulation.



5.3 Control housing

All control equipment must be housed in stainless steel AISI 316L with $C < 0.03\%$ and $Mo > 2.5\%$. Material Certificate type 3.1 B must be supplied by the *MANUFACTURER* (mandatory). The thickness housing must be 1.5 mm minimum. The enclosure must be fitted with a removable access cover.

The location of the control housing must be as indicated on the fire damper data sheet (right side, left side, topside, bottom side) given by the *HVAC CONTACTOR*.

The control housing must be located with an enough distance to allow the installation of insulation part on the four sides of the fire damper in order to obtain the maintenance access to the control housing without dismounting the insulation.

The control housing must be delivered with cable glands to assure safe installation of the cables and piping.

5.4 Actuator

The fire damper must be pneumatically operated by single action spring return rotating actuator arranged to fail in predefined position upon loss of pneumatic supply pressure.

Actuator must be directly coupled to a stainless steel bodied quick exhaust valve to shorten damper closure time < 2 seconds.

5.5 Tubing

All instrument tubing and fitting on damper package shall be in accordance with the following table:

Frame	Tubing
Stainless steel 316L (*)	Stainless steel 316L (*)
Stainless steel 316L (*)	Stainless steel 304 (*)

(*) Stainless steel AISI 316L with $C < 0.03\%$ and $Mo > 2.5\%$.

For the both above construction, outside diameter of the tubing using for the connection of the component in the enclosure must be ≥ 6 mm.

5.6 Control

Remote indication of blades fully open and fully closed status must be monitored by position switches or proximity sensors installed on the drive shaft which will be positively connected to the damper blades.

Location of the fire damper	Type of status detection
Non hazardous area	Position switch
Hazardous area	Proximity sensor (Sensors must be designed to operate on intrinsically safe circuits (IS).

The position switches (or proximity sensors) must be mounted in order to be activated when the blade(s) of the fire damper is (are) fully open and when the blade(s) of the fire damper is (are) fully closed.

The fire damper must be provided by the *MANUFACTURER* with two changeover position switches (proximity sensors) on open position and two changeover position switches (proximity sensors) on closed position of the fire damper. One of the open position position switches (proximity sensor) and one of the closed position switch (proximity sensor) must be used for *HVAC* automation. The two other position switches (proximity sensors) must be used by the Instruments Discipline for F&G system.

The position switches (proximity sensors) must be provided with a minimum of 1,0 m length of cable.

The fire damper must be delivered with a solenoid valve operating with 24 VDC.

The electrical classification of the solenoid valve coil must be in accordance with the location of the fire damper.

The fire damper must be operated by compressed air (from 4 to 10 bar).

In case of use within hazardous area:

- Each fire damper must be provided with an AISI 316 junction box EEx e explosion proof
- Fire damper (complete fire damper, including mechanical and electrical accessories) must be certified by a notified body, in accordance with ATEX requirements (auto certifying of the complete fire damper and /or auto certifying of the electrical components only will be rejected).

5.7 Fusible link

A fusible link will assure fire detection. Maximum temperature release of the frangible bulb must be 74 °C.

When the temperature will rise above the release temperature, fusible link must cut the air supply to the actuator in order to assure the closing of the fire damper.

The fusible link must be removable for checking or for replacement; an easy access must then be provided.

5.8 Pressure regulator

A pressure regulator must be provided in the installation in order to assure a pressure range between 4 to 10 bar in a front of each fire/gas damper.

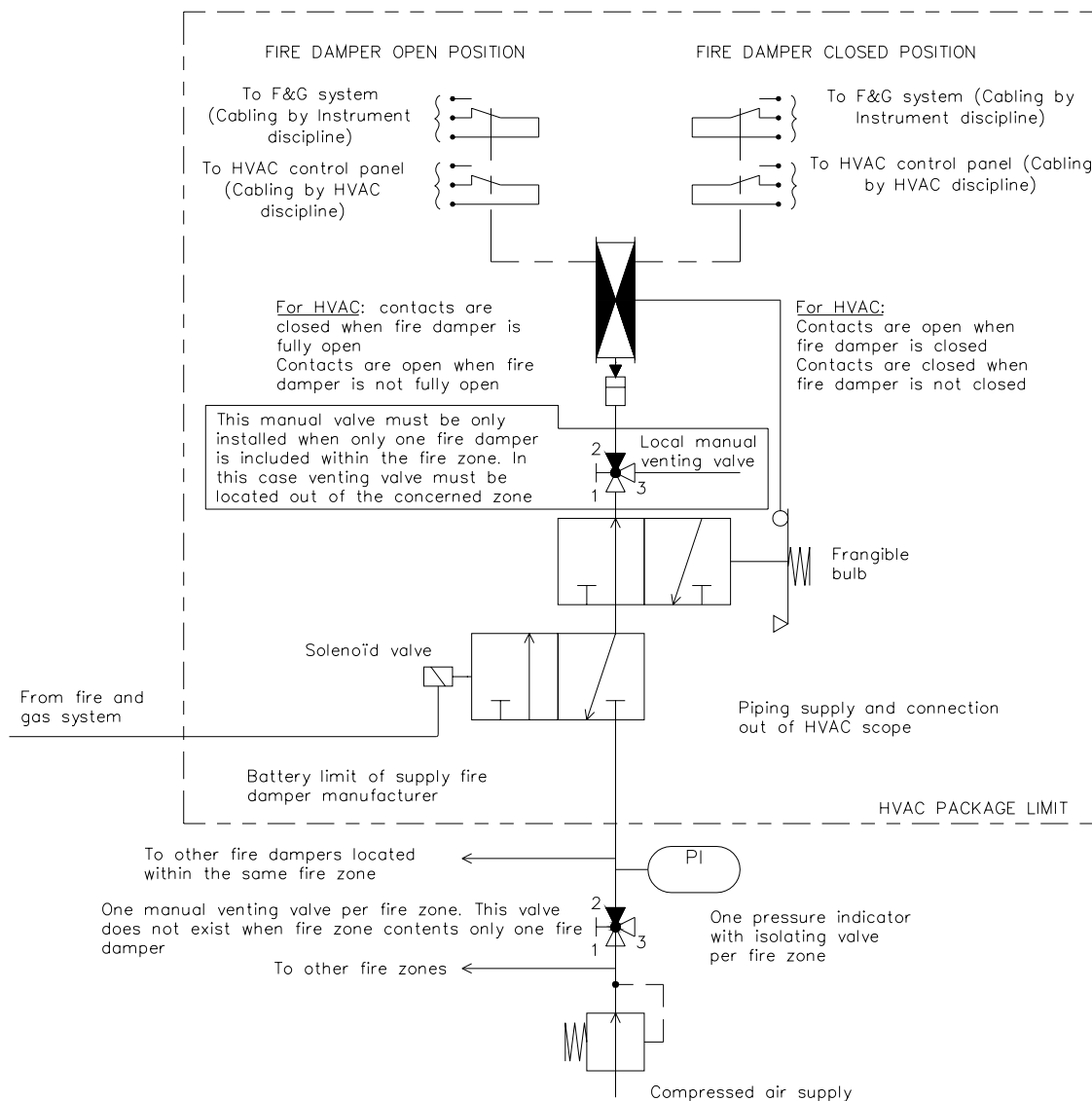
5.9 Junction box

To enable the connection of cables to the solenoid valve and to the proximity sensors, terminals must be installed inside a stainless steel box located within control housing. The cabling between the accessories of the fire dampers and the terminals must be realised by the fire damper *MANUFACTURER*.

According to the location of the fire damper, the junction box and the cable glands must be made of different materials (for building type, refer to "HVAC basis of design" specification):

"Building type"	Location of fire damper	AREA	Material
RU	Inside closed AREA	Hazardous AREA	Brass
		Non hazardous AREA	Brass Polyamide
	Open AREA	Hazardous AREA	Brass
		Non hazardous AREA	Brass
IN	Inside closed AREA	Hazardous AREA	Brass
		Non hazardous AREA	Brass Polyamide
	Open AREA	Hazardous AREA	Stainless steel AISI 316 L
		Non hazardous AREA	Brass
INT	Inside closed AREA	Hazardous AREA	Brass
		Non hazardous AREA	Brass Polyamide
	Open AREA	Hazardous AREA	Brass
		Non hazardous AREA	Brass
MA	Inside closed AREA	Hazardous AREA	Brass
		Non hazardous AREA	Brass Polyamide
	Open AREA	Hazardous AREA	Stainless steel AISI 316 L
		Non hazardous AREA	Stainless steel AISI 316 L
MAT	Inside closed AREA	Hazardous AREA	Brass
		Non hazardous AREA	Brass Polyamide
	Open AREA	Hazardous AREA	Stainless steel AISI 316 L
		Non hazardous AREA	Brass

5.10 Pipe and instrument diagram



Note: The “venting valve” (indicated on the above sketch) must be located at about 1.5 m from the floor.

Status of fire damper components

Situation	Action on	Status				
		Solenoid valve	Frangible bulb distributor	Manual three-way valve		Fire damper blades
				Fire damper	Fire zone	
Normal	No action	On	On	1-2 open	1-2 open	Open
Emergency	Manual venting valve (fire zone)	On (atmospheric pressure)	On (atmospheric pressure)	1-2 open	1-2 closed 2-3 open	Closed
	Solenoid valve (by F&G)	Off (venting)	On (atmospheric pressure)	1-2 open	1-2 open	Closed
	Frangible bulb	On	Off (atmospheric pressure)	1-2 open	1-2 open	Closed
	Remote control	Off (venting)	On (atmospheric pressure)	1-2 open	1-2 open	Closed
Test	Remote control	Off (venting)	On (atmospheric pressure)	1-2 open	1-2 open	Closed
Absence of compressed air	No action	On	On	1-2 open	1-2 open	Closed

5.11 Tagging

The fire damper must be delivered with its tagging plates made of 316 L stainless steel.

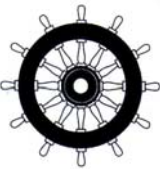
For each damper, two nameplates must be supplied (one must be fixed on the fire damper, the other must be delivered non-installed).

The non-installed tagging plate must be installed on the mechanical protection of the insulation.

The tagging plates are not subjected to the specifications related to protection against corrosion.

The nameplates must be in accordance with the example here under and the following information must be indicated as a minimum:

A-class tagging

Firedamper	(a) A-0 (A-60)	
(b)	(d)	
(c)	No: XXXX XXXX	
	(e) 0062/XX	

H-class tagging

Firedamper	(a) H-0 (H-120)
(b)	(d)
(c)	No: XXXX XXXX

Common legend to the A/H class:

- Classification of the fire damper A 0 to A 60/H60 to H120 (a)
- Fire damper name (b)
- MANUFACTURER name (c)
- Tag number (d)
- MED number (not for H-class) (e)

6. Performances

Subject	Area classification	Performance
Explosion proof classification: (for electrical components)	Non hazardous area	Non classified equipment
	Hazardous area	EEx II B T 4 + ATEX
	Battery room	EEx II C T 3 + ATEX (refer to GS ELE 079)
Safety solenoid valve air supply		From 4 to 10 bars
Electrical solenoid valve voltage		24 VDC
Minimum insulation density		150 kg/m ³ (for A60 classification)
Minimum insulation thickness		Refer to "Installation" section
Damper closure time		2 seconds maximum
Rupture temperature of fusible link		74 °C ± 5 °C
Fire classification (A60, etc.)		See specific documents

Fire damper ("A" and "H" classes) must fulfil both normal condition (*) and fire condition (**) leakage limits, whatever the size of the damper, the classifications and type of actuators (mandatory):

(*) Normal condition means that the blade(s) of the fire damper is (are) in a contact with ambient temperature (between 18 °C and 25 °C).

(**) "Fire" Conditions means that the blade(s) of the fire damper is (are) in a contact in one side with a fire (average temperature minimum 500 °C).

In normal condition (**), leakage of air/gas/smoke must be $\leq 250 \text{ m}^3/\text{h}/\text{m}^2$ under a differential pressure of 2000 Pa.

In "fire" condition 500 °C (see Figure 1): leakage of air/gas/smoke must be $\leq 35 \text{ m}^3/\text{h}/\text{m}^2$ under a differential pressure of 1000 Pa in accordance with the curve here under (tested in vertical position) (mandatory). The test must be realised during a period in accordance with the fire rating classification (i.e. A60: test during 60 min, H120: test during 120 min).

The above acceptable values have to be measured for each fire damper whatever the fire damper class and sizes. In case of several fire dampers with the same dimensions (**width and height**), only one leakage test is acceptable.

Concerning the leakage values, for fire conditions, the following approaches are forbidden:

- Mathematical approach shall be rejected
- Mathematical adaptation of the leakage rate from "normal" conditions (18 °C to 25 °C) to "fire" conditions (500 °C as minimum) shall be rejected.

The above tests regarding the leakage air flow rate have to be certified by a Certifying Authority.

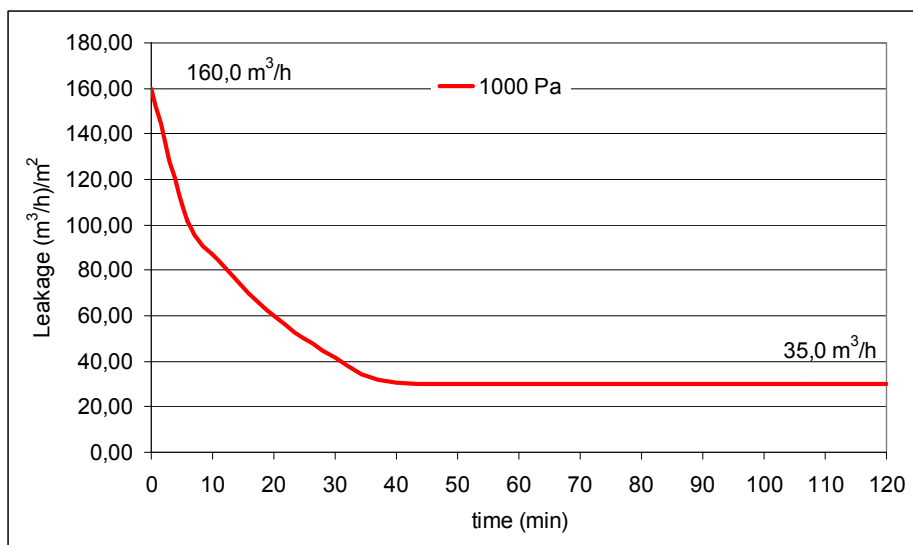
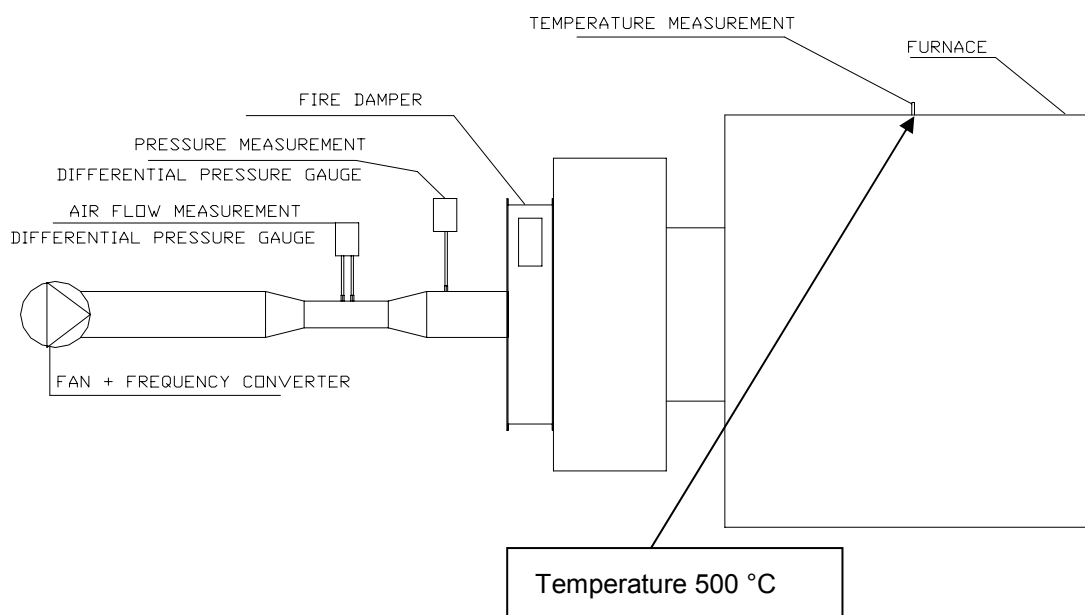
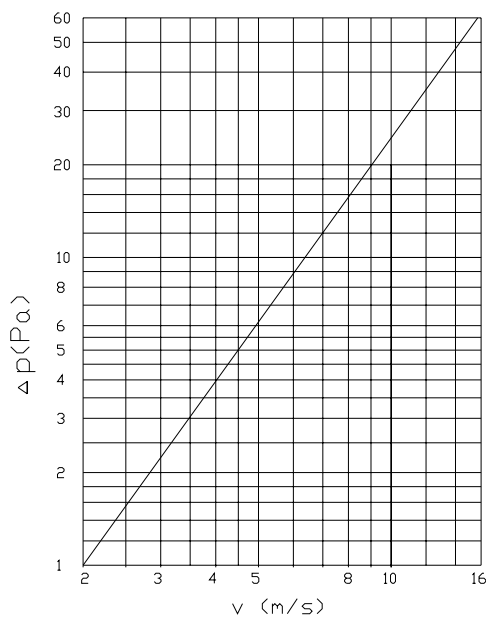


Figure 1 – Leakage air flow rate in “fire” conditions



Operating Pressure Drop

In open position, the fire damper pressure loss must be inferior to the pressure drop curve here under, whatever the size of the damper, the classification (A0, A60, H60 to H120) and the type of actuator:



7. Installation

The fire damper will be approved for use in ducts penetrating bulkhead or deck Class A-0/A-15/A-30/A-60/H-0/H-60/H-120 when damper and ventilation penetration are insulated similarly. The arrangement and necessary insulation of fire damper *frame* and ducting in the vicinity of the partition is subject to approval in each case.

Sleeve

Thickness	Sleeve metallurgy
3, 4, 5 mm in accordance with SOLAS and Table in Part 4.1	According to frame material + painting in accordance with <i>COMPANY</i> specifications

The sleeve length has to be defined in accordance with the fire damper. Indeed if the fire damper is stated at "x" distance from the fire *WALL*, in this case, the sleeve length has to be fire rated with the same class of the fire *WALL*, on the same distance.

Insulation

Bulhead or Deck Classification	Insulation
A 0	No needing
A 30	50 mm of mineral wool: 175 kg/m ³ /length 450 mm of each side of fire damper/gas damper.
A 60	75 mm of mineral wall: 175 kg/m ³ /length 450 mm of each side of fire damper/gas damper.
H 60	2 layers 50 mm (2 x 50 mm) of Firebatt 150 (Rockwool)
H 120	2 layers 65 mm (2 x 65 mm) of Firebatt 150 (Rockwool)

A "remote control system" must be install to manually close the fire damper. That "remote control system" must be operating from the both side of the wall/partition on which the fire damper is installed, without to have to dismantle a false false, a false ceiling, etc.

The "remote control system" can consist of switches located inside a box (opening by specific key). The location of this box must be in accordance with the following table:

Duct penetration	Position of the fire damper "remote control system"
Wall	On the wall/partition on which the fire damper is installed (1, 2 to 1, 7 meter from the floor)
Floor or false ceiling	On a wall/partition near of the fire damper (1, 2 to 1, 7 meter from the floor)

Each "remote control system" must be tagged as follow:

- FIRE DAMPER XXXX
- MANUAL CLOSURE

where XXXX corresponds to the tag number of the fire damper.

8. Additional documents to provide

8.1 Submission class of documents

The submission class of documents is indicated in following table, within the column "Class". It must be in accordance with the following definitions:

- Class A: document required for approval; *VENDOR* must not proceed on until receipt of the *PURCHASER*'s approval or first working day after the end of the review cycle, first coming.

- Class B: document required for comment; *VENDOR* must be allowed to proceed on before the end of the review cycle, but shall take into account at no cost/schedule impact any PURCHASER's comment(s) issued within the review cycle.
- Class C: document required for information.

8.2 Documents to provide

The following documents have to be provided by the *VENDOR*:

Item	Document Title	Class	With Bid
MANAGEMENT			
MGT01	<i>VENDOR</i> Document Schedule - VDS	A	Mandatory
MGT02	Organisation Brief	B	Mandatory
MGT04	Schedule showing Engineering, Procurement, Fabrication, Testing, Delivery	B	Mandatory
QUALITY			
QAC01	Project Quality Plan	B	
QAC02	Quality Manual	B	Mandatory
QAC03	QC Inspection Plan	A	
QAC04	QC Procedures	A	
HEALTH, SAFETY, ENVIRONMENT			
HSE02	Material Safety and product Data sheets	B	
INTERFACE			
INT02	Electrical & Instrumentation wiring drawings	B	
INT03	Equipment Data Sheets	B	Mandatory
INT04	Reliability Availability Maintainability calculations/reports	B	Estimate
INT05	Performance curves	B	Mandatory
INT07	Functional description	B	Mandatory
INT08	General arrangements drawings	B	Mandatory
INT09	Mechanical Equipment List	B	
INT10	Electrical Equipment List	B	
INT11	Control & Instrument List	B	
INT12	Interface Block diagrams	B	
INT13	Junction box termination drawings	B	
INT14	Functional logic diagram	A	
INT15	P&ID's	A	

Item	Document Title	Class	With Bid
INT16	Utility Consumption List	B	Mandatory
INT17	Power supply requirements	A	Mandatory
INT19	Earthing details	B	
INT20	Weight/Centre of gravity drawings & data's	B	
INT21	External Static and Dynamic Forces & Moments (present during start-up, normal/maximum operation, shutdown, and other conditions of service)	B	
INT22	Anchor bolt details drawings(incl. size, type, locations relative to the equipment centre-lines in three planes)	B	
ENGINEERING			
ENG01	Detailed Functional Design Specification	B	
ENG02	Detailed Overall Description	C	
ENG03	Mechanical Detailed Specifications (one per component)	B	
ENG04	Detailed design/fabrication drawings	B	
ENG06	Assembly drawings	B	
ENG07	Design calculation notes	B	
ENG09	Piping Detailed Specifications (one per component)	B	
ENG10	Piping routing	B	
ENG11	Valves & Instruments location drawings (incl. provisions for operational and maintenance access)	B	
ENG12	Electrical Detailed Specifications (one per component)	B	
ENG13	Electrical cables routing (including junction boxes)	B	
ENG14	Electrical equipment location drawings (incl. provisions for operational and maintenance access)	B	
ENG16	Electrical control schematics	B	
ENG17	Instrument & Control Detailed Specifications (one per component)	B	
ENG18	Instrument cables routing (incl. cable trays & junction boxes)	B	
ENG19	Instrument equipment location drawings (incl. provisions for operational and maintenance access)	B	
ENG21	Wiring Loops diagrams	B	
ENG22	Instrument control schematics	B	

Item	Document Title	Class	With Bid
ENG23	Instrument mounting & housing instructions	C	
ENG24	Power distribution & consumption (air supply)	B	
ENG25	Cause & Effect Charts	B	
ENG26	Software system diagrams	B	
ENG27	Software system specifications	B	
ENG28	Insulation mounting drawings	B	
PROCUREMENT			
PRO01	Procurement procedure (covering Purchase, Expediting, QC)	A	Mandatory
PRO02	List of sub-suppliers (table giving: part of equipment, tag nb, sub-supplier reference)	A	Mandatory
PRO03	Unpriced copy of sub-orders	C	
MANUFACTURING			
MAN01	Weighting procedure	B	
MAN02	Surface preparation and painting procedures	B	
MAN04	Welding procedure specification (including repair procedures).	B	
MAN05	Welder qualification procedure	B	
TESTING			
TES01	Pneumatic Testing Procedure (Tightness test)	B	
TES02	Performances & Functional Test Procedure	B	Mandatory
RECORDS, REPORTS & CERTIFICATES			
RRC01	Material Inspection Certificate (BS En 10204 , DIN 50049)	C	
RRC02	Testing Authority Approval Certificate	C	
RRC03	Hazardous Area Certificates.	C	
RRC05	Conformity Certificates and Temporary Certificates.	C	
RRC07	Welding procedure qualification record	B	
RRC08	Welder qualification records.	B	
RRC09	NDT Operator Qualifications	B	
RRC10	Detailed NDT reports	B	
RRC11	Weld/ NDT Identification Diagram.	B	
RRC12	Dimensional Control Reports	B	
RRC16	Pressure Test Reports/Certificates	B	

Item	Document Title	Class	With Bid
RRC17	Functional Test Report/certificates	B	
RRC22	Cable continuity and resistance test reports	B	
RRC26	Surface preparation & Coating reports	B	
RRC27	Certified Weight certificates	B	
INSTALLATION			
INS01	Weight	B	
INS02	Sub-assembly Documentation	C	
INS03	Sub-assembly Drawings	C	
INS04	Erection/Installation & Tie-in Documentation	B	
INS05	Erection/Installation & Tie-in Drawings	B	
INS06	Lifting Procedure (Onshore/Offshore)	B	
INS07	Name Plate Documents	C	
INS08	Handling, Transportation & Storage Instructions	C	
INS09	Unpacking & Inspection Instructions	C	
INS10	Packing List	C	
OPERATION & MAINTENANCE			
OPM01	Operating Instructions	C	
OPM02	Maintenance Instructions	C	
OPM03	Commissioning & Start-up Manual	C	
OPM04	List of Spare Parts Commissioning & Start-up	C	Mandatory
OPM05	List of Spare Parts 2 Years Operation	C	Mandatory
OPM06	List of Special Tools	C	Mandatory
OPM07	Lube Oil Schedule	C	
OPM08	Software Manual (incl. Troubleshooting)	C	

A temporary certificate, which will prove that equipment is in accordance with fire rate requirements, must be delivered with equipment.

A final certificate must be delivered when insulation is carried out on site properly (by classification society).

8.3 Quantities of documents

The hereafter indicated values are minimum. In case of more important quantity of copies required by the Contract, the values indicated hereafter must be increased as per requirement.



For Review:

- Drawings: 3 hard-copy + 1 electronic
- Documents: 3 hard-copy + 1 electronic
- *VENDOR's* Book: 2 sets + 1 electronic.

Final Submission (Certified Finals):

- Drawings: 6 hard-copy + 2 electronic (CD-Rom)
- Documents: 12 hard-copy + 2 electronic (CD-Rom)
- Data Books: 3 Original + 3 copies + 2 electronic (CD-Rom).

8.4 Format of documents

8.4.1 Electronic copy

An electronic copy of all project specific documents must be submitted in Native File Format (.doc, .xls & .dwg preferred). Standard documentation may be .pdf or .tif format. Data must be provided on CD.

8.4.2 Hard Copy

All documents must be full size based on "A" series sizes, A0 size is not acceptable.

All documents shall be checked before submission, unchecked documents may be returned un-reviewed.

All documents submitted must be clearly marked with the Purchase Order No., Item No, *VENDOR* Job No., Equipment/Tag No. (if applicable), *VENDOR* Document No., PURCHASERS Document No.

All documents and technical data must be in the English language with dimensions and units in accordance with ISO.

A3 and A4 documents must be submitted with a project document front sheet, which will carry the PURCHASER's review status on return to the *VENDOR*.

All document prints larger than A4 must be folded to A4 size with identification data visible at the bottom right.

Note I: The documents to provide represent an important part of the *VENDOR's* supply. If one or several documents were not delivered, the Buyer would be able to suspend his payment.

Note III: The documents provided by the *VENDOR*, correspondence between the *VENDOR* and the Buyer or between the *VENDOR* and *ENGINEERING* must be typed. Hand-written correspondence will be rejected.

9. Equipment inspection

For the fire damper(s), the *COMPANY* can require an equipment inspection according to the following table:

Level 0	☐	No inspection required
Level 1	☒	Final inspection prior to shipment and <i>FAT</i>
Level 2	☐	In-progress surveillance, meetings, all witness and hold points, final inspection and release for shipment or final acceptance
Level 3	☐	Continuous monitoring by resident inspector

10. Data sheet

This data sheet must be filled and transmitted to *COMPANY*:

[illegible]



Exploration & Production

General Specification

Date: 10/04

GS HVA 212

Rev: 00

Document number:												Page : 2/3		
53	Tag number	Sizes										Weight kg	Metal Thickness mm	Actuator location*
		Nominal						Maintenance						
		Aw	Ah	Ad	Fw	Fh	Fd	Ht	Hb	Wl	Wr			
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110	* : air is coming to the reader													



Document number:						Page : 3/3					
111	Tag number	Inside a room	Outside	Area classif. (0,1,2)	Electrical equipment classification	Closure time (s)	Leakage air flow rates (l/s) under differential pressure (Pa) of				Air flow rate through fire damper m ³ /h
112							500	750	500	750	
113							Out of fire	When fire			
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