



Exploration & Production

GENERAL SPECIFICATION

HVAC

GS EP HVA 402

Fire Damper(s) Installation

03	01/2012	Cabling of position switches – Arrangement for A60 fire dampers - Rooms involved in a black start procedure
02	10/2009	Installation details for fire dampers
01	10/2008	Insulation details for fire dampers A & H, cabling
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1. Scope

The purpose of this document is to define the minimum requirements for installation of fire dampers (electrically or pneumatically actuated).

The words and expressions in CAPITAL CHARACTERS AND *ITALIC* are defined inside the general specification **GS EP HVA 801**.

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When other words require a definition only to be used in the present document, then the definition is given in a dedicated paragraph of the present document and the defined word, when used, is marked in small and *italic* letters.

2. Reference documents

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.

Order of precedence of documents is defined in **GS EP HVA 100**.

Notes:

- In case of discrepancy between documents (whatever the documents and / or whatever origins), the most expensive solution shall be quoted by the BIDDER. During the studies (Basic Engineering and / or Detailed Engineering) CONTRACTOR(s) shall raise the discrepancy in question to the COMPANY's HVAC specialist who will then review and advise which document(s) is (are) to be specified for the project.
- The HVAC VENDOR or CONTRACTOR may propose proven improvements to the reference documents but shall 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 shall be included into HVAC scope.
- The latest revision of Standards, codes, regulations and the published errata if any shall be used and applied by VENDOR, SUPPLIER, MANUFACTURER and CONTRACTOR.

Standards

Reference	Title
Not applicable	

Professional Documents

Reference	Title
Not applicable	



Regulations

Reference	Title
Not applicable	

Codes

Reference	Title
IMO Resolution A.754 (18) SOLAS	IMO resolution for testing International convention for Safety Of Life At Sea 1974 and amendments of November 1981, June 1983. Consolidated Edition 2004

Other documents

Reference	Title
Not applicable	

Total General Specifications

Reference	Title
GS EP HVA 100	HVAC Basis of design
GS EP HVA 212	Fire Damper(s) Pneumatically Actuated
GS EP HVA 213	Fire Damper(s) Electrically Actuated
GS EP HVA 801	Terminology, definitions, abbreviations

3. Definitions

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

Position switch: device equipped with a mechanical switch to monitor the position of one component of a piece of equipment. A change in a component position drives a shaft displacement which induces a modification of switch status.

Proximity sensor: device monitoring the position of one component of a piece of equipment. The device status is modified when a component of the piece of equipment to monitor is at lower distance of *proximity sensor*. A physical contact between *proximity switch* and equipment is not required.

4. General

The fire dampers shall be designed and built in accordance with **GS EP HVA 212** (General Specification) - without deviation.

It is *CONTRACTOR*'s part of scope to demonstrate the fire integrity of duct penetrations. The goal of fire resistance tests is to demonstrate the fire integrity of duct penetration. Implementation of these tests is the only accepted way to demonstrate the fire integrity of duct penetration.

The fire dampers shall be provided with its dedicated fire test certificate indicating the fire damper classification. It is reminded that fire test certificates (deck and bulkhead) shall be provided for each the following scenarios:

- Fire is coming from room where the fire damper is installed (as per **SOLAS / IMO resolution A.754 (18)**)
- Fire is coming from the adjacent room where the fire damper is installed.

The fire dampers installation shall be in accordance with these fire test certificates.

Fire dampers shall be connected to ducting without ducting transformation (reducing or enlargement).

In order to avoid any difficulty with Certifying Authority, the following documents shall be transmitted by *CONTRACTOR* to the fire damper(s) *MANUFACTURER*:

- The present General Specification
- **GS EP HVA 212**
- **GS EP HVA 213.**

In case of comment(s) (on technical, law, ..., point of view), the fire damper *MANUFACTURER* shall inform *COMPANY* and *CONTRACTOR*, and shall propose solution(s) to solve it (them).

5. Fire damper installation

Fire damper installation shall be done in accordance with the following drawings. It has to be noted that fire insulation is not shown on the "A" class drawings but this insulation shall be installed as per arrangement (material, thickness, density, adhesive, ...) considered during the fire dampers certification tests.

The principle of this installation, shown on these drawings, takes into account fire coming from both sides.

Details regarding installation (type of gaskets, insulation, ...) shall be in full accordance with the details of fire tests (mandatory). It means that:

- Deviation request (whatever the form: Technical Query, ...) shall be rejected by *COMPANY*
- Any deviation from fire test arrangement, during installation, regarding the insulation (material, thickness, density, adhesive, ...) shall be rejected by *COMPANY*.

The fire insulation system (material, thickness, density, number of layers, adhesive, length, ...) and gasket between fire damper and ducting validated during the fire resistance test shall be implemented (mandatory) for fire dampers installation.

In addition to the fire test arrangement, the following arrangement shall be realised for each fire damper:

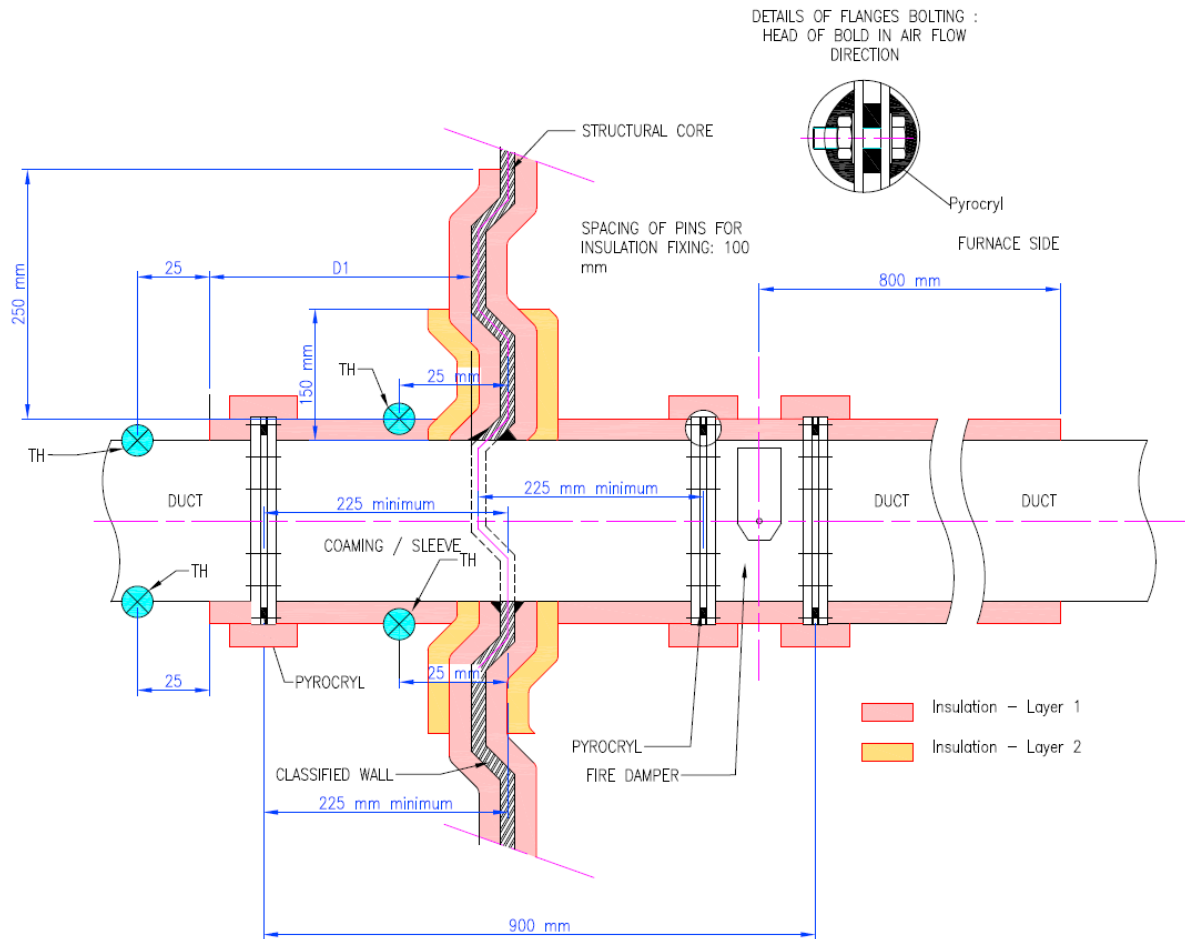
- Insulation system shall be applied on both sides of each fire damper
- The coaming / spigot shall also be installed for fire dampers located on a duct ending at a *WALL* penetration. Depending on fire damper rating, a duct with sufficient length shall be connected outside, to the coaming / spigot. This length of duct shall allow the proper installation of insulation system as per the requested length indicated on the fire damper certificate. The coaming / spigot shall be of the same material than the fire damper frame
- For each "H" class fire damper, a flange shall be welded to the structural core of *WALL* and to the coming / spigot. This flange shall be continuously welded on each periphery. The flange shall be composed of one or several juxtaposed metal sheets. The thickness of the welded flange has to be calculated to obtain a flange weight identical to the fire damper weight
- Gaskets between flanges shall be fire retardant intumescent sealant based on acrylic emulsion type (Pyrocryl for fire dampers exposed to temperatures between -20 (minus twenty)°C and 60°C and Pyropol when temperature is lower than -20 (minus twenty)°C up to -40 (minus forty)°C - Curust Industries). This gasket shall be installed on each flange of the fire damper and between flanges of coaming / ducting.

The coaming / spigot minimum thickness shall be in accordance with the following table:

Width or diameter of duct (mm)	Minimum thickness
Up to and including 300 mm	3 mm
From 301 to 530 mm	4 mm
531 mm and over	5 mm

The detailed arrangement is indicated hereafter:

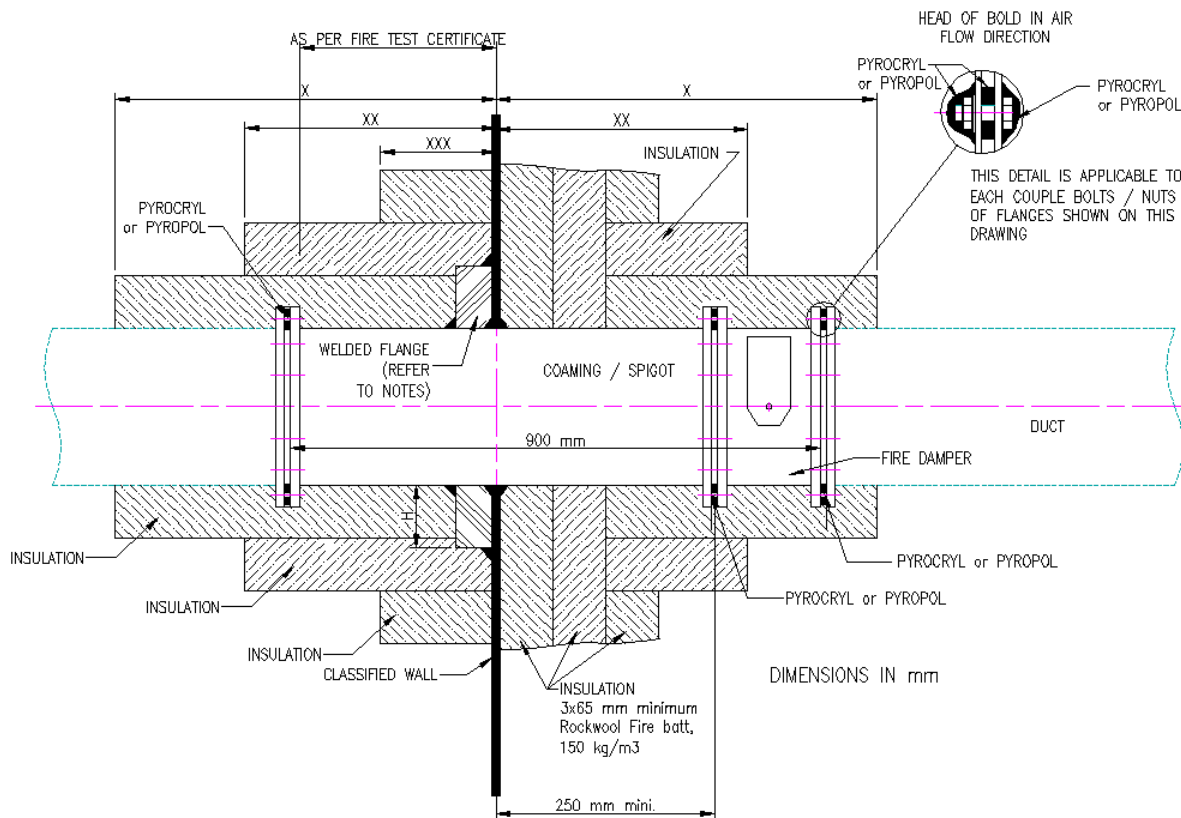
For A0, A30, A60 fire dampers:



Arrangement applicable for bulk and for deck

For H30, H60, H120 fire dampers:

The two following figures show installed fire dampers with insulation. This kind of arrangement is a minimum requirement but, in case of "H" class fire damper certifications require more stringent precautions, the fire dampers arrangement used for certification shall be applied on site.



Notes:

- H = 70 mm
- Welded flange thickness shall be calculated to obtain a flange weight identical to the fire damper weight.

The required insulation layers length when used the Rockwool insulation with the density of $\geq 150 \text{ kg/m}^3$ is presented in the following table. The marking (X), (XX) and (XXX) are as shown in the above drawing.

Fire class	Damper sizes (mm x mm)	Required insulation length with thickness of 1 x 65 mm Dimension (X)	Required insulation length with thickness of 2 x 65 mm Dimension (XX)	Required insulation length with thickness of 3 x 65 mm Dimension (XXX)
H120	100 x100	1000 mm	450 mm	100 mm
	400 x 400	1200 mm	450 mm	-
	800 x 800	1400 mm	450 mm	-
	1200 x 1200	1700 mm	450 mm	-
H60	100 x100	500 mm	100 mm	-
	400 x 400	800 mm	300 mm	-
	800 x 800	1200 mm	300 mm	-
	1200 x 1200	1700 mm	300 mm	-
H30	100 x100	450 mm	-	-
	400 x 400	800 mm	-	-
	800 x 800	1200 mm	-	-
	1200 x 1200	1600 mm	-	-

Note: The minimum distance required by FTP Code, between the structural core and the fire damper has to be understood as the distance between the flange of the coaming and the nearest position of the structural core.

6. Fire resistant ducting insulation

In case the fire damper is not connected to the coaming / spigot flange (as per the fire test arrangement), the duct part between the coaming / spigot and the fire damper shall be fire insulated. The fire rating shall be identical to the WALL fire rating. The insulation material shall be selected in accordance with the following table.

	Proposal 1		Proposal 2		For Proposal 1 & 2		
	Insulation		Insulation		Jacketing		
Insulation service	Material	Thickness	Material	Thickness		Jacketing minimum thickness (mm)	
					Material	Outer diameter < 1200 mm	Outer diameter > 1200 mm
Fire proofing A0	NA (NA=Not Applicable)	NA	NA	NA	NA	NA	NA

	Proposal 1		Proposal 2		For Proposal 1 & 2		
	Insulation		Insulation		Jacketing		
Fire proofing A30	Mineral Wool of rock-type, 150 kg/m ³	50 mm	Paroc Fire Strab, 100 kg/m ³	50 mm	Stainless steel	7/10	8/10
Fire proofing A60	Mineral Wool of rock-type, 150 kg/m ³	75 mm	Paroc Fire Strab, 100 kg/m ³	75 mm	Stainless steel	7/10	8/10
Fire proofing H0	Ceramic fibre, 128 kg/m ³	2 x 25 mm	Rockwool Fire batt, 150 kg/m ³	2 x 65 mm	Stainless steel	7/10	8/10
Fire proofing H60	Ceramic fibre, 128 kg/m ³	2 x 38 mm	Rockwool Fire batt, 150 kg/m ³	3 x 65 mm	Stainless steel	7/10	8/10
Fire proofing J30	Ask COMPANY	Ask COMPANY	Ask COMPANY	Ask COMPANY	Ask COMPANY	Ask COMPANY	Ask COMPANY
Fire proofing J60	Ask COMPANY	Ask COMPANY	Ask COMPANY	Ask COMPANY	Ask COMPANY	Ask COMPANY	Ask COMPANY

The above insulation density is minimum value (mandatory).

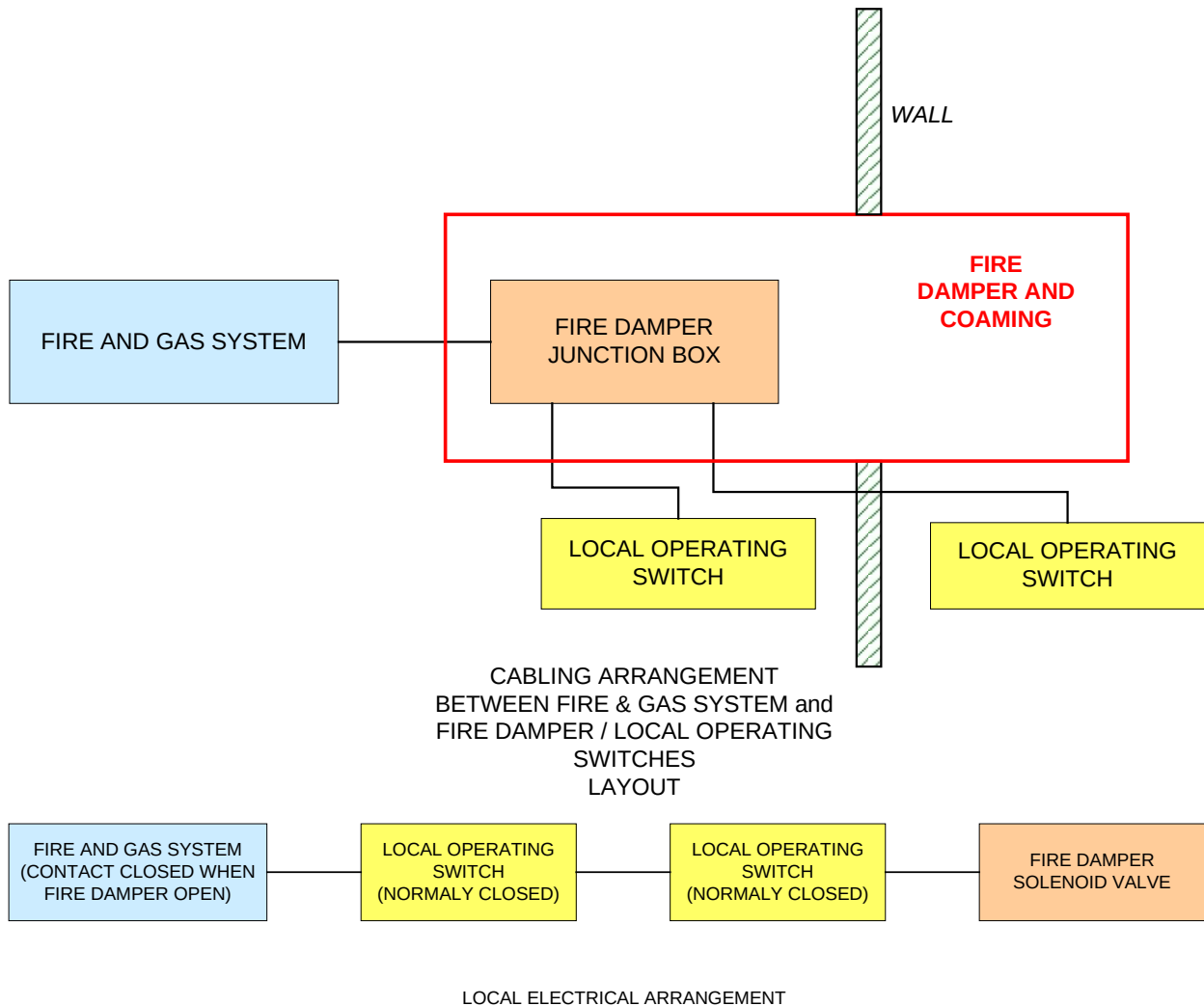
7. Local operation of fire damper

A "local operation" system shall be installed to manually close the fire damper. This "local operation" system shall be installed and be accessible on both sides of the *WALL* on which the fire damper is installed, without removing any raised floor, suspended ceiling, etc.

The "local control" system consists in switches protected against unexpected shock by a box. The location of this box shall be in accordance with the following table:

Refer also [GS EP HVA 212](#) / [GS EP HVA 213](#).

Wall penetration	Position of the fire damper "local control system"
Wall	On the wall / partition on which the fire damper is installed (1.2 to 1.5 meter from the floor)
Floor or suspended ceiling	On a wall / partition close to the fire damper (1.2 to 1.5 meter from the floor)



8. Fire dampers cabling

8.1 Cabling to HVAC control cabinet

Cabling of fire dampers position switches to *HVAC* control panel is in charge of *CONTRACTOR*. The two position switches of each fire damper, dedicated to *HVAC* control panel shall be hard wired to *HVAC* control panel. Information from position switches shall be taken into account for fans interlocking.

In case a fire damper is installed on the *WALL* of a room for which the ventilation is not managed by a *HVAC* system, the position switches of the fire damper shall be wired to the cabinet which manages the ventilation of this room (instead of being wired to the *HVAC* control cabinet (*HVAC CC*)).

8.2 Cabling to F&G system

Cabling of fire dampers position switches to *F&G* system is not in the scope of work of the *HVAC CONTRACTOR*. The two position switches of each fire damper, dedicated to *F&G* system, shall be used and hardwired to *F&G* system in accordance with Safety and Instrument Disciplines requirements.

8.3 Particular cabling for rooms involved in a black start procedure

The present requirement is only applicable for the plants which are not supplied from an external power supply.

Some room(s) of the plant can be required to enable the starting of the plant during a black start or in case of a power generation shut-down. In case this (these) room(s) is (are) equipped with fire damper(s), the following arrangement shall be provided:

- Each fire damper of the concerned room shall be provided with an additional cable gland for an alternative power supply of the fire damper
- The cable enabling an alternative power supply, wired to the concerned fire damper and to a dedicated cabinet containing the alternative power supply
- A cabinet containing the alternative power supply. The cabinet shall include:
 - The terminals for connection of the cable providing the alternative power supply to the concerned fire damper. The terminals shall enable to open the circuit supplying each fire damper connected to the cabinet
 - The internal support for battery(ies) providing the alternative power supply
 - The battery(ies) providing the alternative power supply
 - A mechanical timer limiting the duration of the alternative power supply to the fire damper
 - The internal cabling between the battery(ies), the timer, the circuit breakers, the terminals and, generally speaking, between the required components of the cabinet
 - The protection of the distribution of the alternative power supply
 - The required diodes (in case of several fire dampers are supplied from the cabinet), in order to maintain the individual command of each fire damper, from Fire and Gas System
 - A flashing LED in front of the cabinet, in order to indicate that the alternative power supply is delivered to the connected fire damper(s)
 - The components required for the correct operation of the system.

8.3.1 Operating principle

In case of black start, energy is not available on the plant. In order to start the plant, the fire damper(s) of the room(s) involved for plant starting, have to be opened. The required energy shall be provided from the alternative power supply. A battery or a set of batteries (preliminary charged by operator) shall be installed inside the alternative power supply cabinet. After verification by an operator that the fire damper(s) connected to this alternative power supply can be energized (and, therefore opened), the mechanical timer shall be activated in order to deliver the alternative power supply to the fire damper(s).



Each concerned fire damper actuator (in case of fire damper electrically actuated) or its solenoid valve (in case of fire damper pneumatically actuated) shall be energized until the alternative power supply is maintained. At the end of the temporisation time chosen by the operator, the alternative power supply shall be automatically interrupted by the mechanical timer.

8.3.2 Capacity of the battery(ies)

The capacity of the battery(ies) to be provided shall be defined according to the following parameters:

- The number of fire dampers to be supplied from the alternative power supply
- The consumption of each fire damper (actuator or solenoid valve)
- A minimum opening of the fire damper(s) of 2 hours
- The capacity of the batteries shall be calculated for the minimum temperature on the site.

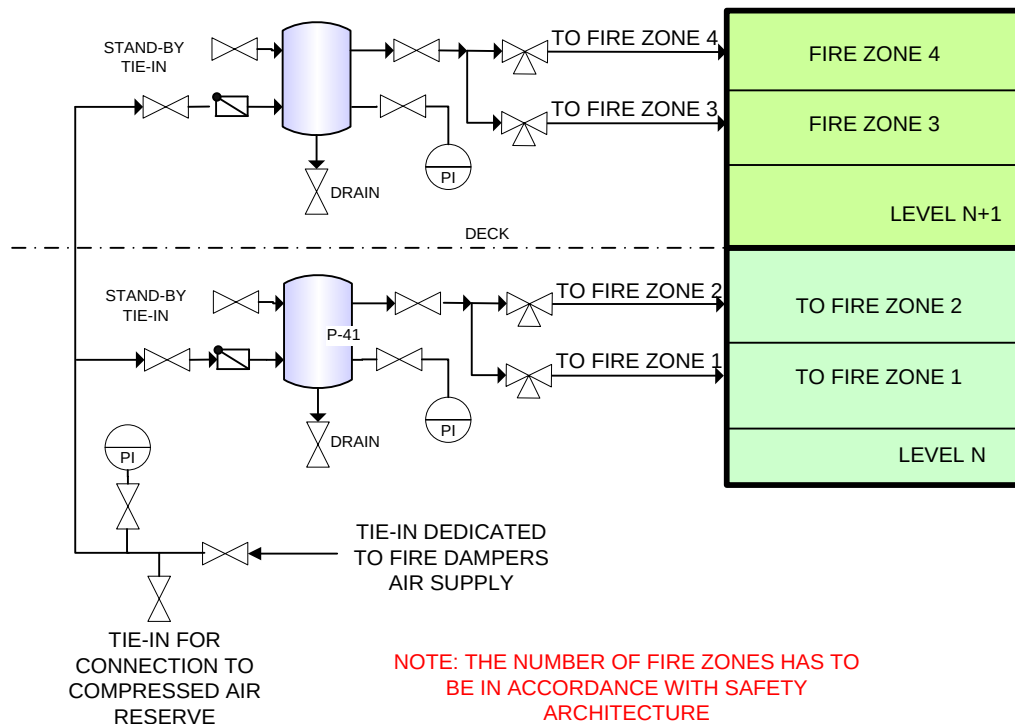
9. Compressed air supply and distribution to fire dampers (for pneumatically actuated fire damper(s) only)

The compressed air supply to the fire dampers shall be provided by the compressed air network of plant. The requirements for air supply quality (minimum pressure, dew point, lubrication, ...) have to be in accordance with the requirements of the fire dampers *MANUFACTURER*.

A tie-in valve, dedicated to the fire dampers, shall be supplied on the instrument air supply network, for each building of the plant.

At each building level, an air compressed vessel shall be installed. Each compressed air vessel shall be equipped as per "Compressed air distribution principle" scheme below.

The compressed air piping architecture shall be in accordance with the below scheme, to be developed during detailed engineering.



Compressed air distribution principle

The capacity of each tank shall be defined with the following formulae:

$$V = 1,3 \cdot \frac{P_{MIN} \cdot (\sum V_A + V_C)}{(P_N - P_{MIN})}$$

With: P_N = Nominal pressure of compressed air (barg)

P_{MIN} = Minimum operating pressure of actuators (barg)

$\sum V_A$ = Air consumption by actuators for opening (litre)

V_C = Air volume of piping (litre)

V = Volume of tank (litre)

The volumes V_A and V_C concern the supplied fire dampers associated to the vessel.

10. Fire dampers pre-commissioning phase

The pre-commissioning phase shall be organised in two times. This paragraph only concerns the first step of pre-commissioning.

Due to the presence of insulation on fire damper and fire damper sleeve, the *CONTRACTOR* is required to invite *COMPANY* to the first step of pre-commissioning before insulation of fire dampers and / or fire dampers sleeve is installed. *COMPANY* will be informed by letter from *CONTRACTOR* about the "ready for pre-commissioning phase 1", three weeks before insulation works starting. This information to *COMPANY* is mandatory and insulation shall be removed by



CONTRACTOR if *COMPANY* is not informed by *CONTRACTOR* about the "ready for pre-commissioning phase 1".

For each fire damper, *CONTRACTOR* will report checking made by *COMPANY* regarding the following construction details:

- Sleeve position regarding *WALL*
- Sleeve length
- Presence of welded flange on sleeve / *WALL*
- Dimensions of welded flange.