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A. GENERAL

This manual describes the main design and assembly features of fire fighting system with NAF SIII we manufacture.

This manual is also intended to give a correct installation in maintenance information for these systems.

B. EXTINGUISHING AGENT

The NAF SIII is efficacious against fire class A, B, & C and its performances can be compared to Halon 1301.

NAF SIII has got all the advantages of Halon 1301, but with a minimum environmental impact.

NAF SIII does not contain bromine, which is the responsible for the damages to the ozone.

In normal conditions NAF SIII does not leave residuals, is uncoloured and not corrosive.

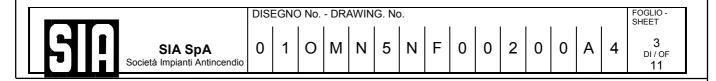
The efficacy in extinguishing, together with the low level of toxicity and the environmental impact of no value make this product the alternative to Halon 1301.

FEATURES OF EXTINGUISHING AGENT

- thermal steadiness limit

- chemical formula **HCFC Blend A** - molecular weight 92.9 - boiling point at 1 bar - 38.3°C - freezing point - 100°C - liquid density at 25°C 1.48/ml - specified heat of the liquid at 25°C 125 j/kg°C - latent heat of vaporisation 227 Kj/kg 125°C - critical temperature - critical pressure 66.5 bar - physical status liquid/vapour

- acute toxicity (alc. 15 min)ppm
- volumetric critical mass
- liquid viscosity at 25°C
- ozone deterioration index
- greenhouse effect index
640.000
580 kg/mc
0.42 (centipoise)
1.7



482°C~

C. TOXICITY CONCENTRATION

The presence of NAF SIII in a room, after a fire, may result dangerous for people, owing to its decomposition products.

The presence of non-decomposed NAF SIII, cold toxicity, can produce some harmful effects to people, depending on the concentration percentage, as below described:

From 7% to 9% No restriction

From 9% to 10% It can be used in occupied areas where

exits can be easily reached.

Rooms can contain 10% should be evacuated immediately when NAF

discharge starts.

From 10% to 15% It must not be used in normally occupied

Areas, except in areas where evacuation can be done before discharge; moreover it is necessary to prevent people from

inhaling.

Over 15% it is necessary to prevent people from

inhaling.

Usually, in occupied areas, concentration >7% are used to extinguish fires on most of combustible materials.

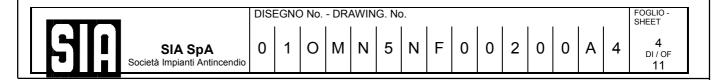
NAF SIII decomposes once it is exposed to flames or to incandescent surfaces (about 482°C).

Decomposition products are mainly: hydrogen fluoride, hydrogen chloride, fluoridecarbonile & carbonile chloride (or phosgene).

These products have a strong & acrid odour and can be notices even with concentrations lower to those retained harmful and that need an immediate evacuation. Moreover, this particular odour is itself an evacuating warning easily to be noticed for people present in the protected area.

Therefore, it is recommended to ventilate the room with air (natural or forced).

In order to avoid the presence of such products, it is important that the extinguishing agent is kept in contact with flames or with hot surfaces for the shortest possible time: this is the reason because 10" is the max. discharge time.



D. EXTINGUISHING CRITERIA

The extinguishing action of NAF SIII is carried on by blocking the combustion chain reaction.

Once NAF SIII is exposed to high temperature, its molecule spread free radicals, wichi block the combustion.

NAF SIII can be used as a "drop-in" alternative to Halon 1301. This means that it can be used in systems already installed, without bringing any substantial modification.

NAF SIII is particularly suitable for extinguishing fire of liquids, solids burning as liquids, gas electric & electronic equipment.

It is not suitable for chemical mixture, which can quickly oxide in absence of oxygen, such as cellulose nitrate and powder, or reactive metals as sodium, potassium, magnesium, titanium, uranium, plutonium, zirconium.

E. DANGERS CAUSED BY DISCHARGE ACTUATION

During activation of the discharge, some risks may arise:

NOISE

The outlet of extinguishing agent creates a big noise, which usually does not bring danger, but a little unpleasant sensation.

TURBULENCE

The extinguishing agent is released from nozzles at a high speed, which is sufficient t make object fall down of not properly fixed and consequently cause damages to people or things.

TEMPERATURE

Due to the low temperature, it may cause freezing scalds if it comes in direct contact with skin.

F. TYPE OF SYSTEM

Our NAF SIII systems are mainly of two types, i.e.:

MODULAR SYSTEM

In this type of system, NAF SIII is stored in 1 container (cylinder) located inside, or very close to the protected room.

The agent is released by means of the nozzles installed on the cylinders, or in the area and connected to the cylinder by piping.

CENTRALISED SYSTEM

In this type of system, NAF SIII is stored in a number of cylinder connected each other by means of a "battery". The release is carried on by a distribution network of pipes & nozzles.

G. COMPONENTS

CYLINDERS

They are suitable for high pressure, are made in steel and their features satisfy the standards for safety (ISPESL – IGMCT).

The filling degree of the cylinders, i.e. the kilograms of NFPA per dm3, is between 0.5 and 0.9 kg/dm3.

NAF SIII is pressurised with nitrogen at 42 bar (\pm 5%) or 25 bar (\pm 5%) at a temperature of 21°C.

The isometric diagram shows the relation between pressure inside the cylinders and the storage temperature.

The following data are shown on each cylinders:

- name of the stored extinguishing agent
- tare
- weight of extinguishing agent
- operating pressure

QUICK DISCHARGE VALVE "HVB"

It is made in stamped brass OT58 and is designed and sized to withstand the operating pressures and to guarantee a quick discharge.

The valve is provided with threaded connections for assembly on the cylinder and for connection tot he discharge system.

Moreover it is complete of the following connection and accessories:

- connection with safety valve with breakable disk
- connection for manual and/or electrical actuator
- connection with pressure gauge to allow a continuous check of the cylinder internal pressure
- check for pressure control and relevant servo circuit.

DISCHARGE MANIFOLD

It is made in steel pipe, suitable for high pressure. It allows the connections of all cylinders to the distribution network.

FLEXIBLE HOSE

It is made in steel pipe and allows the connection between the quick discharge valve and the discharge manifold.

CHECK VALVE

It is made in steel & brass OT58 and located between the hose and the discharge manifold to avoid the refluence of the agent in case that one or more cylinders are not connected when the system operates.

PRESSURE SWITCH

It is mounted on the discharge manifold and shows on the control panel that the system is operating. The pressure switch is provided with a lock devices with manual reset.

ELECTRICAL DEVICES FOR OPERATION CONTROL

The operation control can be performed in two ways:

- by means of an electrovalve
- by means of and electrical device

Devices are installed on the pilot cylinder(s).

The electrovalve, 24 V.c.c. voltage, in normal operation or explosion proof, N/C type, when it opens, it sends pressurised gas from pilot cylinder to the servo control in order to operate the other cylinders in the battery.

HEAD CONTROL ELECTRICALLY OPERATED, 24 V.c.c., in normal operation or explosion proof, allows when operates the intervention of the pilot cylinder and, by means of the servo control circuit, the intervention of the other cylinder in the battery.

PRESSURE CONTROLS

They are made in brass OT58, are mounted on cylinders (not pilot) and by means of servo control circuit they open the cylinder on which they are installed.

SERVO CONTROL CIRCUIT

It is manufactured with copper pipes c/w brass fittings, which allow the pneumatic interconnection of the control devices between pilot cylinder and the other cylinders in the battery.

A vent valve is mounted at the edge of the circuit.

CYLINDER RACK

It is manufactured with painted/galvanised metal profile for fixing the cylinder on walls. Where required, the cylinder rack can be self-standing.

DISTRIBUTION NETWORK

It manufactured with non-welded galvanised steel pipes (API 5I Gr.B sch. 40/80), connected by means of threaded fittings made in galvanised steel (ASA 2/300) a welded by means of flanges & fittings.

Piping are fixed by proper supports made in steel, galvanised/painted.

NOZZLES

Nozzles are located on the edges of piping, are made in chromium plated brass to guarantee a proper discharge.

N.B.: pipe size and nozzle drills are determined by computerised calculation. Reference standard is NFPA 2001.

H. OPERATION

The intervention of the extinguishing system is controlled:

- automatically, by the detection system with smoke, heat or other detectors. It is controlled by the signalling panel, which sends an input to the devices located on the pilot cylinders.
- Manually, remote, by means of electrical break glass push buttons connected to the signalling panel, which sends an input to the devices located on the pilot cylinders.
- Manually, local, with the operation of mechanical pneumatic device installed on the pilot cylinders.

When required, the operation of the manual control, can be made by means of a tearing device, with cable & handle, located far from the pilot cylinder.

When the number cylinders installed is substantial, the control is made by means of nitrogen or compressed air cylinder(s), which will operate as pilot cylinders.

The same devices designed for NAF cylinder will be installed on them.

I. INSTALLATION

- 1. Fix the cylinder rack on wall.
- 2. Assemble the cylinder and block it so that the pressure gauge results to be on the front side.
- 3. Assemble the nipple between the cylinder and the flexible hose (BHL-140 / BHL-120 / BHL-75 / BHL-27 / BHL-14).
- 4. Fix the flexible hose to the distribution pipe or to the discharge manifold if the unit is provided with more cylinders.
- 5. Assemble the pressure gauge with the "O-ring"; this operation shall be carried on quickly in order to avoid that the pressure pushes out the O-ring.
- 6. Connect the control electrical equipment according to drawings.
- 7. Block the manual and pressure control level, then screw it on the valve (it is not necessary to tape the threading with teflon) blocking it with a sealing key.
- 8. A the end, for cylinder BHL-140 / BHL—120 / BHL-50, assemble on the top of the valve the cap 1/4" (1) DSH 010 after checking that there are no leaks from the hole.

J. INSPECTION

Once the system has been assembled, qualified personnel shall inspect it and perform the following checks:

CYLINDERS

- Check the perfect assembly in their own cylinder rack. All pneumatic and/or electrical connection devices must be perfectly assembled and preserved from accidental damages.
- Check on pressure gauges that the value read corresponds to the one stamped on the cylinder. For this operation, people shall take into consideration the ratio temperature/pressure (see annex "A"), since at the variation of temperature the pressure varies as well.

PIPING

After installing, check piping run and diameter using the project drawing. Make sure that they are properly fixed to supports, in particular in presence of false ceilings.

Inspect the system, using the project drawing and proceed with test as described in "System Test".

K. TEST OF SYSTEM

The test of the system is performed in order to check the logic sequence of operation of the electrical controls and of the relevant optical/acoustical signals together with the release push buttons.

WITHOUT RELEASE

In this case, before to start with the test, disassemble the electrovalve or the electric controls of the cylinders and begin the operation sequence checking the operation of the electrovalve.

WITH RELEASE

This test allow the inspection of both the system operation logic and design requirements, i.e.:

- electrovalve operation
- time of discharge (shall not be higher than 10 seconds)

This period is to be evaluated from the moment that the liquid appears in the nozzle until the discharge becomes gassous.

CONCENTRATION

Check the final extinguishing concentration and the maintaining time.

Concentration value is to be verified in different points and weights.

L. MAINTENANCE

In order to guarantee the good operation of the system, inspect the unit at least twice a year. Maintenance, as well tests, must be carried out by qualified personnel.

MONTHLY

Check and take note of cylinder pressure, which must not be lower than 10% of the beginning value. In this case check the cylinder, top up and if necessary replace it.

For this operation, always take into consideration the ratio temperature/pressure. See paragraph "System Inspection".

SEMI-ANNUAL

In addition to a check on the system and on cylinder pressures, perform a test without discharge, verifying the sequence of intervention as previously described.

EVERY 5 YEARS

Systems are to be subjected to a general revision by the installation company.