

Sinorix NXN Natural agent extinguishing

Planning Tool

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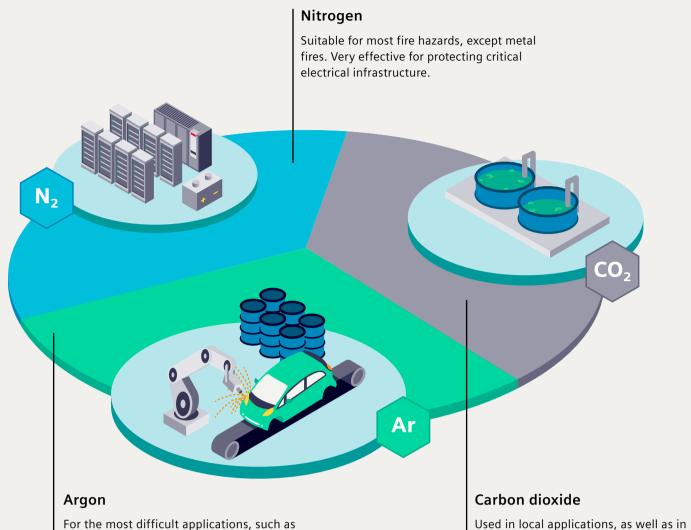
people and helps customers to better use resources. ecosystem that intuitively responds to the needs of We work together with customers and partners to create an

and work. buildings and industries to adapt and evolve the way we live Smart Infrastructure intelligently connects energy systems,

Sinorix NXN Natural inert gas extinguishing technology

Sinorix NXN features the latest generation of inert gas extinguishing technology. It is based on the three natural extinguishing agents, Argon, Nitrogen and Carbon dioxide. In pure form or mixed compounds, these natural extinguishing agents provide outstanding properties to combat a wide variety of fire hazards without harming the environment.

Their respective properties give Sinorix NXN great flexibility when designing the appropriate fire safety concept.



For the most difficult applications, such as chemical storage rooms and where there are risks for metal fires.

The Sinorix extinguishing agents are excellent for fire classes A, B, C, D and E.

Naturally friendly, residue-free extinguishing

Sinorix NXN only uses agents and compounds which are found naturally in our atmosphere and do not harm the environment. They are neither subject to any regulatory restrictions, nor do they damage the ozone layer, ensuring the sustainability of your extinguishing system.

Sinorix extinguishing solutions follow the principle of inertization. When released, the gas displaces the oxygen in the flooding area and thus suppresses the fire within seconds. Fires are extinguished without incurring collateral damage and they do not leave behind any residue for clean up or disposal. This ensures minimal damage and a quick resumption of business operations. Their poor electrical conductivity makes them ideal for the protection of electrical components or systems.

Our Offering

Support along the entire lifecycle

Providing extinguishing solutions requires considerable expertise, especially during planning and design. Siemens provides the latest digital planning and design tools, online product catalogue, system configuration, BIM, Step and DWG data including online ordering process, as well as calculation, planning tools and specification texts. Furthermore, Siemens design experience and technical support is invaluable to avoid overengineering. Optimal design can greatly reduce project costs as well as ensuring maximum safety.

Online planning

- Product catalogue (HIT)
- Ordering process with iMall
- Calculation tool
- (HIT Configurator)
- Project documentation: Bill of Material (BOM), data sheets, certificates

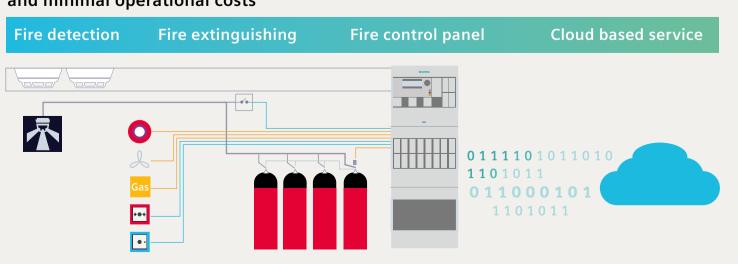
Local and international representation

In addition to local representation, Siemens provides its customers and partners with optimal technical support via its International Center of Competence in Vienna (Austria), and a test laboratory in Altenrhein (Switzerland), where new application solutions are developed and perfected. With Sinorix NXN, people, assets, business operations and the environment are all perfectly protected.

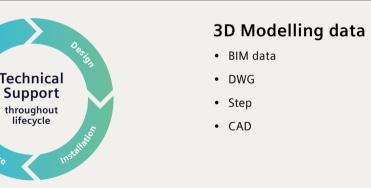
Integrated fire protection offering

A complete fire safety system goes beyond fire extinguishing in many projects; and it is important to know that Sinorix extinguishing systems are developed to be easily integrated into complete fire safety solutions, including detection and evacuation. Communication and integration between the various parts of a fire safety system is one of the significant sources of risk unless correctly engineered. Sinorix NXN integrates seamlessly into Siemens fire panels, further increasing safety and reducing risk. This integration also optimizes facility management by enabling cloud-based, digital services that substantially reduce operational and maintenance costs. By choosing Siemens Sinorix NXN, people, assets, business operations and the environment are all perfectly protected.

All elements working together to provide highest fire safety and minimal operational costs



unmanned and confined areas, like transformer stations and oil baths.



Sinorix NXN Key portfolio components (Not to scale)

ADV*technology*



Check valve and pressure regulator

Quantum double sleeve

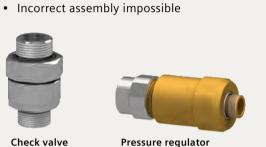
• One type for all agents

Manifold

• O-ring sealing

Quantum connection

• Contactable by hand (no tools)



Pneumatic and manual actuator

- Activation range 8 360 bar
- Control line remains intact during cylinder replacement







• All functions monitored such as, unblocked, blocked, actuator installed

Manifold

- Blocking with standard padlock
- Actuator cable with LED
- Include with blocking device



Control and discharge hose

• One type for all gases PN360 Flexible material for easy installation



Sinorix Silent Extinguishing Technology

Sinorix CDT – Constant Discharge Technology

Sinorix Constant Discharge Technology (CDT) is a technology where the cylinder valve releases the extinguishing agent at a constant mass flow.

But why is this important?

Conventional extinguishing systems are called unregulated, as they do not regulate the flow rate at which the extinguishing agent is released. This means that there is a huge pressure peak at the start of discharge, requiring large overpressure flaps. In addition to overpressure, unregulated systems also generate a lot of noise during discharge. The resulting vibrations can severely impair the operation of hard disks or other sensitive equipment, for example in server rooms and data centers. Sinorix CDT eliminates this pressure peak, resulting in lower noise levels and allowing the size of the overpressure flaps to be reduced by up to 70%.

Sinorix silent nozzle

In combination with Sinorix CDT, the Sinorix silent nozzle forms an unbeatable combination for protecting sensitive hard disks. Its ingenious design further reduces the noise level during discharge of the extinguishing agent.



Scan the QR Code to access the HIT product catalogue:



ADV*technology* A small change with a big impact

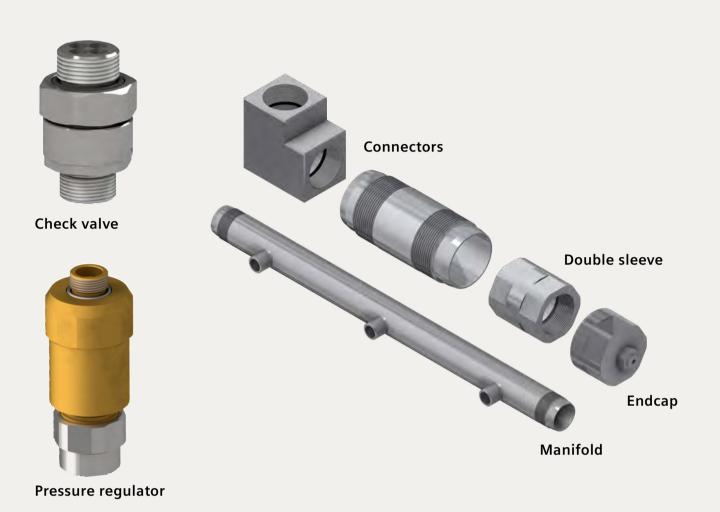
By applying ADVtechnology the number of different components has been significantly reduced. This facilitates handling and leaves no room for confusion, as only one type of each component is used. At the same time, the actuators have been reduced in size, making them lighter and easier to handle during installation and maintenance. Due to an adaptation in the mechanical design of the cylinder valve, the gas cylinder can open with a lower pneumatic pressure. This means that only one type of manifold, control hose, discharge hose and pneumatic actuator is needed – covering the full pressure range (8 – 360 bar).

Furthermore, this new cylinder valve can accommodate either an electric or a pneumatic actuator, so only one type of valve body is needed.



Assembly by hand, without additional sealants!

The check valve, pressure regulator, manifolds and connectors are all designed and equipped with the O-ring sealing mechanism. With a few twists of the wrist, and minimal force, all components are assembled by hand without needing special mechanical tools or additional sealants, such as hemp string or teflon tape.



Sinorix NXN – typical applications



Data centers and server rooms



Li-ion battery energy storage systems



Power distribution/E-houses





Gas turbines



Telecommunication systems



Industrial applications



Electrical switching rooms

Sinorix NXN CDT – planning example for regulated inert gas extinguishing systems (single zone)

01 | Selection of extinguishing agents

Environmentally friendly and residue-free

The natural agents used with Sinorix NXN are N₂ (IG100), Ar (IG01), CO₂ or mixtures such as IG55 or IG541. They present no environmental hazards. This allows not only environmentally friendly extinguishing, but also rapid resumption of operation within the extinguished zones after a flooding thanks to simple overpressure ventilation. In addition, the extinguishing agents have poor electric conductive properties and are chemically inert. This means that there will be no harmful reaction products when they come into contact with fire, preventing damage.

Excellent extinguishing properties

Whether nitrogen, argon, carbon dioxide or mixtures such as IG55 or IG541 – natural agents excel thanks to their excellent extinguishing properties for fire classes A (solids), B (flammable liquids), and C (flammable gases). Argon is also optimally suited for fire class D (metal fires).

Fast and easy refilling

Natural agents are easy to refill in case of a discharge as they are widely available. Thus, you can always refill the cylinders within a very short period of time. This minimizes the downtime of the extinguishing system after a discharge and reduces costs.

General requirements

For safe operation, extinguishing systems must comply with generally accepted technical standards and be operated properly. Sinorix NXN extinguishing systems fall into the lowest hazard class (extinguishing gas concentration below NOAEL and oxygen concentration above 12%).

Alarm device

and, if necessary, optical alarm devices to warn persons in the danger area. Warning time

Extinguishing areas must be equipped with acoustic

The warning time must be such that the endangered areas can be left from any point without haste.

Blocking mechanism The activation of an extinguishing system must be elec-

trically or mechanically blockable, depending on country-specific regulations.

Pipe network

Pipes must be electrically earthed.

Room integrity

In principle, the tightness of the rooms should be checked: Cable and pipe bulkheads must be tightly closed.

Escape routes Escape routes must be available for all extinguishing areas.

Doorways Door must be self-closing and open outwards.

Warning

A warning of the danger point/extinguishing system must be placed at all entrances to the extinguishing area. Additional storage of material that cause further fire loads in the extinguishing area is not allowed.

Careful closing of all openings is essential to achieve the required holding times.

Room requirements Concentration after holding time Regulation Minimum holding time EN15004 85% of the design concentration ISO14520 at the height of protected content NFPA2001 10 minutes 85% of the design concentration VdS2080 at 10% and 90% of the maximum room height MEC at 10% and 90% of the APSAD R13

03 | Determination of the quantity of extinguishing agent

The table below shows the quantity of extinguishing agent without any safety margins.

Room volume (m3)															
1				100				250				500			
IG01	IG55	IG100	IG541	IG01	IG55	IG100	IG541	IG01	IG55	IG100	IG541	IG01	IG55	IG100	IG541
1.33	1.13	0.93	1.13	132.6	112.8	93.0	113.1	331.5	282.0	232.5	282.8	663.0	564.0	465.0	565.5
1.29	1.10	0.91	1.10	128.9	109.7	90.5	110.0	322.3	274.3	226.3	275.0	644.5	548.5	452.5	550.0
1.25	1.07	0.88	1.07	125.4	106.6	88.0	107.0	313.5	266.5	220.0	267.5	627.0	533.0	440.0	535.0
1.22	1.04	0.86	1.04	121.9	103.7	85.5	104.0	304.8	259.3	213.8	260.0	609.5	518.5	427.5	520.0
1.18	1.01	0.83	1.01	118.4	100.7	83.1	101.1	296.0	251.8	207.8	252.8	592.0	503.5	415.5	505.5
1.15	0.98	0.81	0.98	115.1	97.9	80.8	98.2	287.8	244.8	202.0	245.5	575.5	489.5	404.0	491.0
1.12	0.95	0.79	0.95	111.8	95.1	78.5	95.4	279.5	237.8	196.3	238.5	559.0	475.5	392.5	477.0
1.09	0.92	0.76	0.93	108.6	92.3	76.2	92.7	271.5	230.8	190.5	231.8	543.0	461.5	381.0	463.5
1.05	0.90	0.74	0.90	105.4	89.7	74.0	90.0	263.5	224.3	185.0	225.0	527.0	448.5	370.0	450.0
1.02	0.87	0.72	0.87	102.3	87.0	71.8	87.3	255.8	217.5	179.5	218.3	511.5	435.0	359.0	436.5
0.99	0.84	0.70	0.85	99.3	84.4	69.7	84.7	248.3	211.0	174.3	211.8	496.5	422.0	348.5	423.5
0.96	0.82	0.68	0.82	96.3	81.9	67.6	82.2	240.8	204.8	169.0	205.5	481.5	409.5	338.0	411.0
0.93	0.79	0.66	0.80	93.3	79.4	65.5	79.6	233.3	198.5	163.8	199.0	466.5	397.0	327.5	398.0
0.90	0.77	0.64	0.77	90.4	76.9	63.5	77.2	226.0	192.3	158.8	193.0	452.0	384.5	317.5	386.0
0.88	0.75	0.62	0.75	87.6	74.5	61.5	74.8	219.0	186.3	153.8	187.0	438.0	372.5	307.5	374.0
0.85	0.72	0.60	0.72	84.8	72.1	59.5	72.4	212.0	180.3	148.8	181.0	424.0	360.5	297.5	362.0
0.82	0.70	0.58	0.70	82.1	69.8	57.6	70.0	205.3	174.5	144.0	175.0	410.5	349.0	288.0	350.0
0.79	0.68	0.56	0.68	79.4	67.5	55.7	67.7	198.5	168.8	139.3	169.3	397.0	337.5	278.5	338.5
0.77	0.65	0.54	0.66	76.7	65.2	53.8	65.5	191.8	163.0	134.5	163.8	383.5	326.0	269.0	327.5
0.74	0.63	0.52	0.63	74.1	63.0	52.0	63.2	185.3	157.5	130.0	158.0	370.5	315.0	260.0	316.0
0.72	0.61	0.50	0.61	71.5	60.8	50.2	61.0	178.8	152.0	125.5	152.5	357.5	304.0	251.0	305.0
0.69	0.59	0.48	0.59	69.0	58.7	48.4	58.9	172.5	146.8	121.0	147.3	345.0	293.5	242.0	294.5

agent quantity (kg)

02 | Determination of extinguishing agent concentration

Electrical ris	ks in server	and electrical	switching roo	ms and telec	communicatio	on systems be	long to Class	A – High Haz	ard (HH)
Extinguishing concentrations for inert gasses									
Fire class	Type of agent	ISO14520-13 ed2016		EN15004-X ed2018		VdS2380 ed2019		NFPA2001 ed2018	
		Safety margin	Design concentra- tion	Safety margin	Design concentra- tion	Safety margin	Design concentra- tion	Safety margin	Design concentra- tion
	IG01	1.3	41.9%	1.3	41.9%	1.3*	39.9%	1.2	50.4%
Class A	IG55	1.3	40.3%	1.3	40.3%	1.3*	41.1%	1.2	37.9%
	IG100	1.3	40.3%	1.3	40.3%	1.3*	37.2%	1.2	37.2%
	IG541	1.3	39.9%	1.3	39.9%	1.3*	36.5%	1.2	34.2%
	IG01	1.3	48.3%	1.3	49.2%	1.3*	49.1%	1.35	54.6%
Class A – high	IG55	1.3	45.1%	1.3	45.2%	1.3*	45.2%	1.35	42.7%
hazard**	IG100	1.3	41.5%	1.3	45.2%	1.3*	45.2%	1.35	41.9%
	IG541	1.3	41.7%	1.3	45.7%	1.3*	45.7%	1.35	38.5%
	IG01	1.3	50.8%	1.3	51.7%	1.3*	51.7%	1.3	54.6%
Class B	IG55	1.3	47.5%	1.3	47.6%	1.3*	47.6%	1.3	45.5%
	IG100	1.3	43.7%	1.3	47.6%	1.3*	47.6%	1.3	41.9%
	IG541	1.3	43.9%	1.3	48.1%	1.3*	48.1%	1.3	40.3%



* + 10% up to 19 cylinders, + 5% as from 20 cylinders. ** Class C for NFPA All concentrations reported are at 20°C (ISO/EN/VdS) respectively 70°F (NFPA).

04 | Cylinder size/number of cylinders

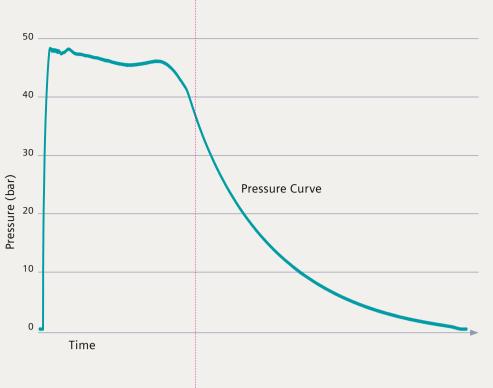
The maximum net-filling quantity per cylinder is subject to short and simple pipe networks. If several cylinders are needed, the total quantity must be divided evenly over all cylinders. In addition to the amount of useable extinguishing agent, the lost quantity must be filled. Only cylinders with the same filling pressure may be used for one flooding zone within an extinguishing system.

Cylinder capacity – filling quantity											
	2,7 liter		10 liter		20 liter		80 liter		140 liter		
	Reference	200 bar	Reference	200 bar	Reference	300 bar	Reference	200 bar	300 bar	Reference	300 bar
IG100	CYF-2.7 200 N2	0,6kg	CYF-10 200 N2	2,2kg			CYF-80 200 N2	17,9kg			
IGTOO					CYF-20 300 N2	6,2kg	CYF-80 300 N2			CYF-140 300 N2	43,3kg
IG01							CYF-80 300 Ar			CYF-140 300 Ar	71,6kg
IG541							CYF-80 300 541			CYF-140 300 541	58,3kg
IG55							CYF-80 300 55			CYF-140 300 55	56,4kg

10 | Pressure release

During flooding by the extinguishing agent, the room pressure varies according to the pressure curve, shown below. Suitable pressure relief devices must be provided. The table shows values for the different inert agents based on their corresponding concentration and for rooms of different size with the regulated extinguishing system Sinorix NXN CDT.

Maximum admitted pressure in the	Type of	Volume							
protected risk	agent	100 m³	250 m³	500 m³	1,000 m ³				
	IG01	0.18	0.44	0.89	1.77				
100 Pa	IG55	0.15	0.38	0.76	1.51				
100 Fa	IG100	0.14	0.36	0.72	1.44				
	IG541	0.15	0.38	0.77	1.54				
	IG01	0.10	0.26	0.51	1.02				
300 Pa	IG55	0.09	0.22	0.44	0.87				
500 Fa	IG100	0.08	0.21	0.42	0.83				
	IG541	0.09	0.22	0.44	0.89				
	IG01	0.08	0.20	0.40	0.79				
500 Pa	IG55	0.07	0.17	0.34	0.68				
500 Fa	IG100	0.07	0.16	0.32	0.65				
	IG541	0.07	0.17	0.34	0.69				



09 | Design of the pipe network

Pipe capacity ³/₈ ¹/₂ ³/₄ 1 1¹/₄ 1¹/₂ 2 2¹/₂ 3 Pipe size (inch) DN15 DN20 DN25 DN32 DN40 DN50 DN65 DN80 DN10 Maximal flow rate (kg/min.) 105 158 280 350 18 35 70 578 Balanced system design A balanced system will ensure an equal extinguishing agent concentration in all zones. nbalanced Balance

08 | Selection of nozzles

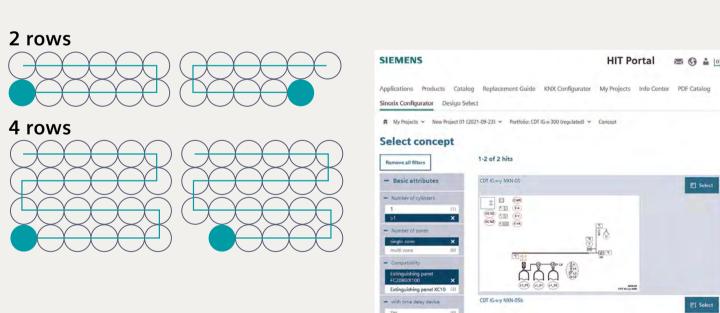
The table below shows the maximum dischargeable extinguishing agent quantity in kg/sec for type 2002 and 2003 extinguishing nozzles.

	Max flow nozzle
3/8″	0,3 kg/sec
1/2″	0,6 kg/sec
3/4"	1,2 kg/sec
1″	1,8 kg/sec
1″1/4	2,6 kg/sec
1″1/2	4,7 kg/sec
2″	5,8 kg/sec

05 | Cylinder arrangements

Arrangement limits & pneumatic activation of the cylinders

- The extinguishing system can be triggered manually or automatically.
- The master cylinder (dark green) should always be on the front row
- 80 and 140 l cylinder banks up to 4 rows
- (max. 15 cyl in a row)
- The maximum number of extinguishant cylinders per master cylinders is 80. If more cylinders are required, a booster set will be added



06 | Cylinder rack

For racks, we have to choose between wall-mounted and free-standing variants.

Three variants are possible:

- Solid concrete wall mounted 1 row, 2 row rack
- For all other arrangements freestanding rack 1,2 & 4 row rack
- Special arrangement realizable with additional cylinder banks possible





07 | Actuation

During the flooding of the extinguishing agent the room pressure varies according to the pressure curve, shown in section 10. Suitable pressure relief devices must be provided. The table shows values for the different inert agents based on their corresponding concentration and for rooms of different size with the regulated extinguishing system Sinorix NXN CDT.

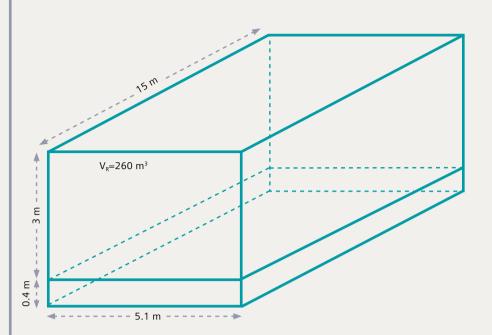
All points from 5 – 7 are supported with the system configuration in the HIT Configurator.



Application planning example

A low-voltage switchgear must be protected in a switching room with a false floor, with a total volume of 260 cubic meter (m³), with an overall room height including false floor of 3.4 m whereby the false floor is 40 cm high.

The pressure resistance of the room is specified as 300 Pa or 3 mbar.



01 | Determination of the extinguishing agent concentration Extinguishing system is to be planned and installed in accordance with guideline VdS 2380. The electrical risk falls into hazard class A HH.

02 | Determination of the quantity of extinguishing agent For 260 m³ we need 182.3 kg of nitrogen. This means we need at least 8 cylinders of N2 at 300 bar. In addition, we calculate the extra amount of 10% required by VdS: 182.3 kg + 18.2 kg = 200.5 kg.

03 | Type and number of cylinders

The required quantity of extinguishing agent can be stored in nine 80 l cylinders at 300 bar.

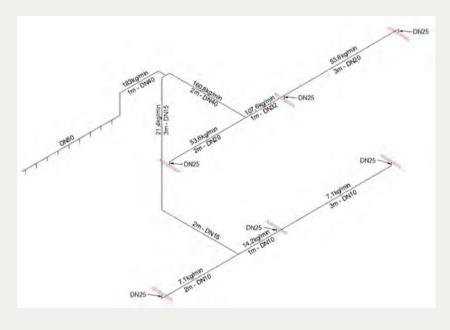
05 – 07 | Cylinder arrangement and activation The 9 extinguishing containers can be arranged in 1 or 2 rows. If the wall is solid, the choice of wall-mounted rack reduces the amount of parts. Activation is done by an electrical actuator on the first cylinder (master-cylinder).

08 | Selection of nozzles

With a given room volume breakdown, 160.8 kg of the extinguishing agent is allocated to the room and 21.4 kg to the false floor. According to VdS (maximum 30 square meter area per nozzle) 3 nozzles are to be placed on a total area of 76 square meter per flooding area. With the given agent quantity follows the usage of 3 nozzles of type 2002- G3/4 inch in the room and 3 2003-G3/8 nozzles in the false floor.

09 | Design of the pipe network

By making a sketch of the pipe network, extinguishing agent flows can be illustrated and the pipe dimensions determined.



10 | Pressure release

Beside table shows for 250 m³ at 300 Pa a relief area of 0.21 m². In our example we have 10 m³ more room volume. For a volume of 100 m³ we need a relief vent of 0.08 m². A simple calculation gives a necessary relief area of 0.008 m² for 10 m³ (10% of 100 m³). This makes a total relief area of 0.22 m².