

Clean Agent Fire suppression System

Blazero-100™

Nitrogen (IG-100) clean agent fire suppression system

“A small but strong company”

“Holding a distinguished system”

“Providing solution for total fire suppression”



HANJU CHEMICAL CO., LTD.



Bla zero-100™



Clean agent

- Using nitrogen that makes up 78% of atmosphere.
 - Zero ODP(Ozone Depletion Potential) , Zero GWP(Global Warming Potential), Zero ALT (Atmospheric Life Time)
-

Harmless for human body

- Colorless, odorless, non-toxic gases.
 - Because it doesn't pyrolyze when burning, fire hazards of materials (HF) are not produced.
 - Easy evacuation since a clear view is secured due to not cloud and mist when agent is released.
-

Protection of equipment

- Non-conductive to electricity.
 - No residue when extinction agent is released.
-

Economically wise

- Agent is inexpensive since atmosphere is used.
- It is cost effective since 28mpa big sized 84L cylinders are used, using much less cylinders compared to other companies.

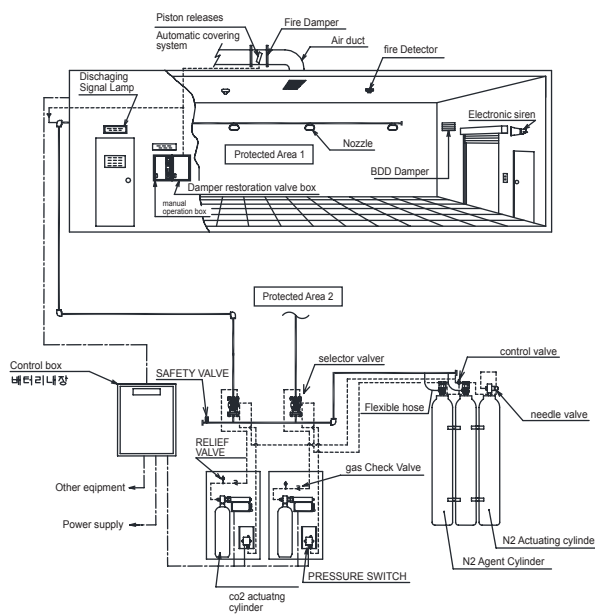
Gas fire suppression system

It is a suitable system for National Fire Standard Code(NFSC 107A) of Clean Fire Suppression System and designed by an installation program approved by Korea Institute of Fire Industry & Technology (KFI).

▪ Central Storage System

The system protects more than two protection areas at the same time by storing the agent in the largest one of many seal protection areas in the separate storage.

[a distribution diagram of central storage system]



[completed collecting pipe of cylinder]

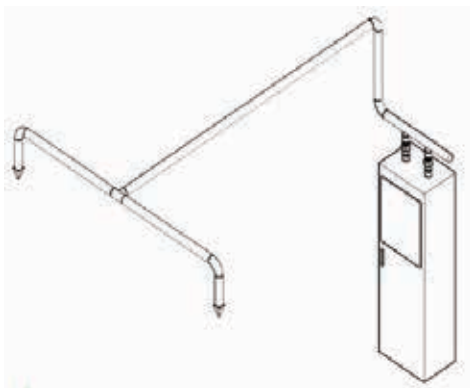


[installation of selection valve]

▪ Modular System

Unlike a central storage system, it doesn't have a separate system. Instead, it stores the agent inside a protection area and installs pipes and discharge heads in protection areas accordingly.

[a distribution diagram of modular system]









[Installation of modular system]

Blazero-100™ Features of fire suppression system

CATEGORY		Blazero -100
Certification number		temporary installation 15-2
Discharge type		Total flooding system
Minimum allowable Design Concentration	A, C level	37.8%
	B level	45.76%
Maximum Allowable Design Concentration		43% (when a human supervises on the spot all the time)
Cylinder	84ℓ	20.6m ³
Ratio of volume of pipeline against the volume of the agent		103.6%
Discharge nozzle's protection width		144m ²
Discharge nozzle's installation height		0.3m to 7m
Discharge nozzle's minimum design pressure		12.93bar
Discharge time		36.5 sec to 60 sec

Blazero-100™ Installation place

Places for protection	specific examples
	<p>Communication equipment, electricity management room, etc.</p> <p>Communication and wireless machine room, data room, computation room, telephone office, server room, electricity management room, power transformer room, electric control room, transformer room, CVCF, generator room, standby generator room, emergency generator room, EPS room, underground cable pit, cable room, etc. server room, electricity management room, power transformer room, electric control room, transformer room, CVCF, generator room, standby generator room, emergency generator room, EPS room, underground cable pit, cable room, etc.</p>
	<p>Control room, etc.</p> <p>Disaster prevention center, central management room, control room, electrical control room, control tower, control booth, power engine room, etc.</p>
	<p>Parking lot, machine room</p> <p>Parking lot, slope of a road, automobile repair shop, vehicle lab, automobile hangar, machine room, elevator machine room, mechanical room, pump room, boiler room, dry room, heat-source equipment room, hot and cold water generator, etc.</p>
	<p>Storage for films, etc.</p> <p>Storage for films and tapes, VTR room, projection room, MT room, etc.</p>
	<p>Stack room, display room, etc.</p> <p>Stack room, KARTE (medical examination record card), library, morgue, archives room, display room, art piece display room, important cultural properties storage, showcase, etc.</p>
	<p>Handling oil</p> <p>Stamp booth, oil repository, etc.</p>

BlaZERO-100™ Physical properties of Blazero-100 extinction agent

CATEGORY	CONTENT	UNIT
Extinction agent	IG-100	N/A
Chemical formula	N ₂	N/A
Molecule amount	28.0	N/A
Steam density (air=1)	0.967	kg/m ³
viscosity	0.0179	Centi-poise
Freezing point	-210	°C
Critical temperature	-146.9	°C
Critical pressure	3,399	Kpa
Steam specific heat(@1atm,25°C)	1.04	KJ/kg · °C
Relative conductivity (1atm 734 mmHg, 25°C) N ₂ =1	1.0	N/A
Boiling point	-195.8	°C
Solubility in water(@25°C)	0.0013	%
Evaporation heat(@Boiling Point)	199	KJ/kg

- The most environmentally-friendly agent that makes up 78% of atmosphere
- ODP (Ozone Depletion Potential) =0
GWP (Global Warming Potential) = 0
ALT (Atmospheric Life Time) = 0
- Colorless, odorless, non-toxic agent

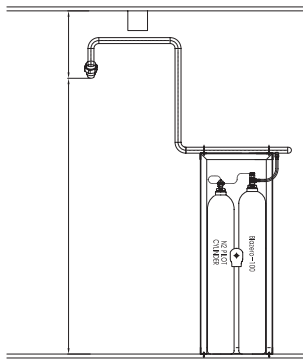
BlaZERO-100™ Excellency and credibility of Blazero-100 design

- Acquired KFI performance certificate (temporary installation 15-2)
- Installation of the longest pipe line in Korea
- Higher credibility on installation through joint development with JENSEN HUGHES, the world authoritative
- The highest discharge nozzle in Korea
- Protection area per discharge nozzle

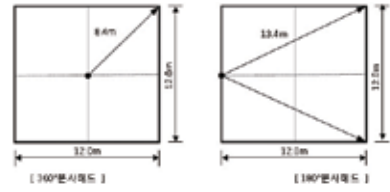
▶ installing discharge nozzle every 7 meters from the ground, reducing the number of nozzles and minimizing equipment interference.

Within 1 meter from the ceiling

Installing nozzles every 7 meters from the ground



▶ protection area is 144m² per nozzle, minimizing the number of nozzles.



The effect on environment

▶ Nitrogen among clean is excellent in the effect on the environment.

Name of extinction agents	IG-100	HFC-23	HFC-125	HFC-227ea	Novec-1230
The effect on environment					
GWP ¹⁾	0	12400	3170	3350	1
ODP ²⁾	0	0	0	0	0
ALT ³⁾	0	270	65	34	0.014

* IPCC(intergovernmental Panel on Climate Change): international consultative body under UN established jointly by WMO (world meteorological organization) and UNEP (United Nations Environment Program) to evaluate the global danger related to climate change and make international measures.

1) GWP (Global Warming Potential) is an index that indicates how much it contributes to global warming by comparing the amount of heat trapped by a certain mass of the gas in question to the amount of heat trapped by a similar mass of carbon dioxide.

2) ODP (Ozone Depletion Potential) is the relative amount of degradation to the ozone layer it can cause, with CFCL3 being fixed at an ODP of 1.0.

3) ALT(Atmosphere Life Time) is the period during which certain materials exist remaining undecomposed after being released.

Blazero-100™ Component of Blazero-100

Cylinder



IG-100 fire extinction cylinder was made by cylinder manufacturer according to the High Pressure Gas Safety Management Law or KS standard and approved by a related law.

Actuating Cylinder



IG -100 actuating cylinder was made by cylinder manufacturer according to the High Pressure Gas Safety Management Law or KS standard and approved by a related law.

Cylinder Valve



Cylinder valve should be attached to agent cylinder and releases agent effectively at fire incidents. It was made by valve manufacturer according to the High Pressure Gas Safety Management Law or KS standard and approved by a related law.

Actuating Cylinder-Valve



It releases nitrogen agent provided in nitrogen cylinder. Only products approved by Korea Gas Safety Corporation should be used.

Flexible Hose



It is a part installed between a cylinder valve and collecting pipe. It induces discharge of agent and absorbs vibration when being discharged.

Selection Valve



It induces the discharge of agent into only a selected protection area at fire incidents using selection valve by multi- areas protection system. It was nationally authorized.

Needle Valve



It is attached to actuating cylinder-valve and activates nitrogen cylinder-valve for fire extinction by breaking copperplate of cylinder-valve with needle pin.

Discharge nozzle



It discharges agent into the entire protection areas evenly and swiftly.

Relief Valve



It is used to prevent malfunction caused by gas leaked from actuating cylinder valve.

Pilot Cylinder Set



It consists of external cases, actuating cylinder, solenoid valve, pressure switch. At fire incidents, solenoid valve is activated, opening actuating cylinder. Discharged gases activate selection valve, actuating nitrogen cylinder, pressure switch.

Blazero-100™ IG-100 performance Certificate of Blazero-100



Blazero-100TM

IG-100 Clean Agent Fire Suppression System

Manual

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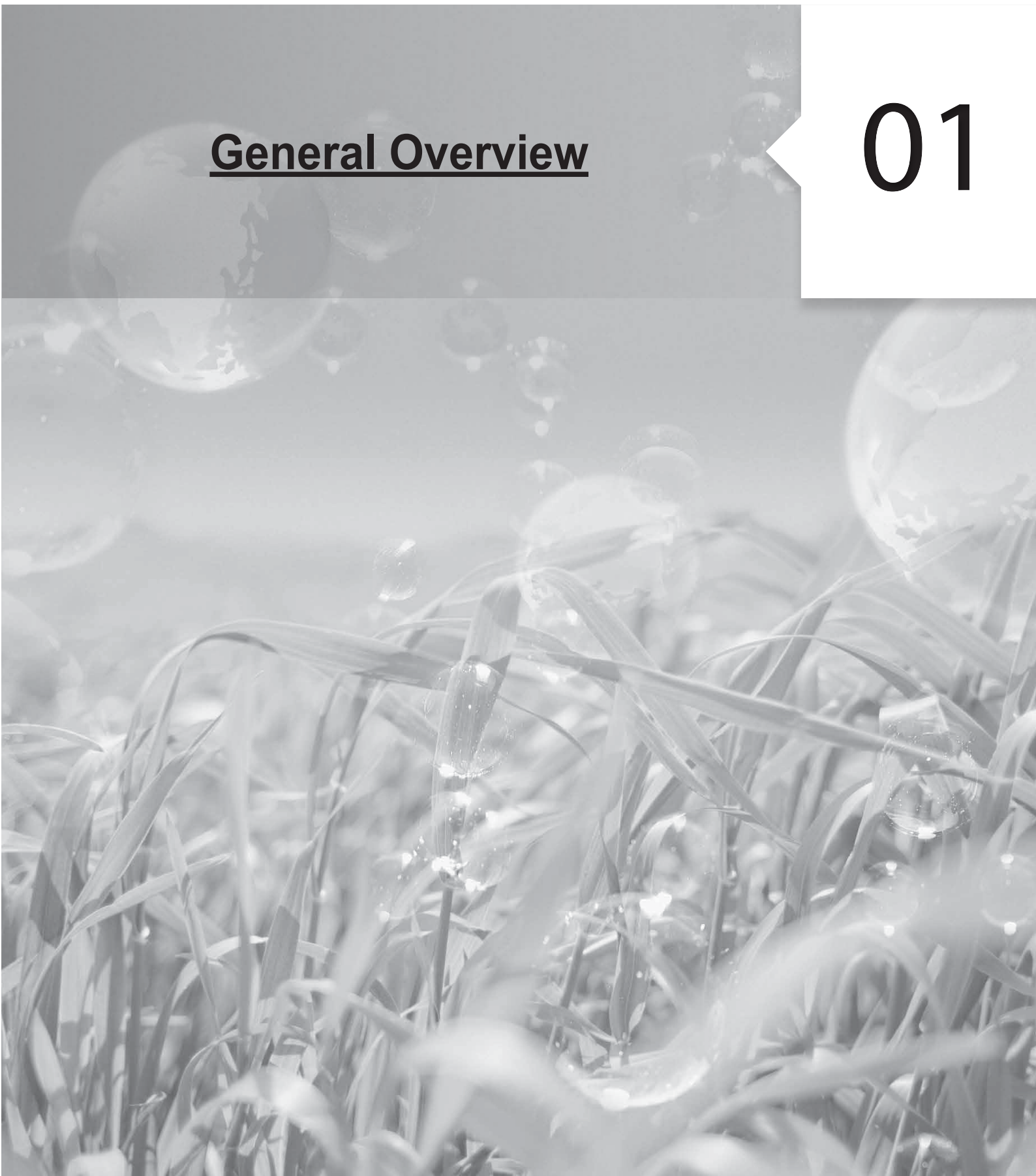
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Installation, Maintenance

General Overview

01



1.General Overview

1.1 Overview of Blazero-100(IG-100) clean agent Fire Suppression system

Blazero-100 of Hanju Chemical Ltd. is clean agent Fire Suppression system that uses nitrogen and acquired performance certificate from Korea Institute of Fire Industry & Technology (KFI). It discharges agent to the entire area on fire to extinguish A, B and C level fire effectively and is a suitable system for fire safety standard(NFSC 107A) of clean agent Fire Suppression system.

1.2 Physical features of Blazero-100(IG-100) agent

Nitrogen is natural gas which makes up about 78% of atmosphere. It is harmless to global environment, free from ozone depletion, global warming problems, etc. It is colorless, odorless and non-toxic gas at a room temperature. It is electrical non-conductive and environmentally-friendly agent which leaves no residue. It is a suffocating extinguishing system by diluting oxygen concentration and extinguishes fire by reducing oxygen concentration in the air.

1.2.1 Physical features of IG-100 agent

CATEGORY	CONTENT	UNIT
Agent	IG-100	N/A
Chemical formula	N ₂	N/A
Molecule amount	28.0	N/A
Steam density (air=1)	0.967	kg/m ³
Viscosity	0.0179	Centi-poise
Freezing point	-210	°C
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Solubility in water(@25°C)	0.0013	%
Evaporation heat(@Boiling Point)	199	KJ/kg

1.3. Features of Blazero-100(IG-100)

1.3.1 Safe for human body

Although Blazero-100(IG-100) can be safely used where humans exist all the time thanks to 43% of its max. design concentration, some safety measures should be taken into consideration when agent is discharged.

Because when agent is discharged, there is low chance to breathe the gas in directly but it can be harmful for human body, people in the area should be evacuated as swiftly as possible when the agent is released. Entering the area should be allowed only after the area is ventilated well enough after fire is extinguished. Also, a cylinder of IG-100 should usually be stored as gas under high-pressure and treated and used carefully.

Agent	No Effect Level* (%)	Low Effect Level*(%)
IG-100	43	52

* No Effect Level (NEL): It is maximum allowable concentration where no toxic or physiological adverse effect is detected. It is maximum design concentration according to national fire safety standard in Korea.

* Low Effect Level(LEL): It is minimum concentration level where toxic or physiological adverse effect begins to be detected. As of NFPA 2001, it is allowed to be used to this level depending on evacuation time.

* Because maximum allowable design concentration of IG-100 agent applies NOAEL(43%) and more than maximum allowable design concentration(43%) in areas where humans exist all the time, it cannot be designed.

1.3.2 the Effect on the Environment

The most outstanding feature of nitrogen is that it doesn't harm the environment at all. Unlike clean agent, halogen compounds synthesized chemically, main substance of nitrogen doesn't harm the environment since it is natural gas that makes up the largest portion of the air. Therefore, its GWP (Global Warming Potential), ODP (Ozone Depletion Potential) and ALT(Atmosphere Life Time) is zero.

1.4 Application of Blazero-100(IG-100) installation

Because nitrogen is stored in a cylinder in a compressed gas state, it lowers temperature in protection areas due to its adiabatic expansion when discharged, It is less likely to cause thermal shock to electronic and communication equipment sensitive to temperature as it doesn't reduce room temperature significantly like CO₂. Also, communication and electronic equipment, etc is free from erosion. Because it is in a liquid state, it has low friction resistance in pipe lines when discharged.

Therefore, the relatively long one between storage cylinder room and protection area can be designed. As of skyscrapers or big-sized building, one storage cylinder can be put in a cylinder storage room so that each protection area can be easily designed, installed and protected using selection valve from a long-distance. However, compared to halogen chemicals, clean agent, it needs much more storage, which should be considered when building is designed. Also, over-pressurization vent should be considered when designed so that indoor increasing pressure is properly released after nitrogen areas is discharged into protection area.

1. General Overview

1.4.1. Targets of Blazero-100(IG-100)

Nitrogen fire suppression system is used to suppress fire caused by equipment at an early stage At fire incidents or special protection areas such as the place in need of electrical non-conductive agent, the place vulnerable to the second damage by residue after fire suppression, normal resident area as protection area and etc. nitrogen fire extinction system can be used in A, B, C level of fire. The following are specific objects protected from fire:

Objects protected from fire	Specific examples
Communication machine room, etc	Communication and wireless machine room, telephone exchange office, data room, telephone office, communication machine control room, data printer room, server room, etc.
Control room, etc	Fire protection center, central management room, electricity control room, control room, engine room
Electricity room, etc	Electricity room, power transformation room, electric control room, UPS room, battery room, transformer room, CVCF room
Generator room, etc	Generator room, standby generating room, emergency generator room
Cable room, etc	EPS room, underground cable pit, cable room, cable treatment room
Storage room for films and others	Film and tape storage room, VTR room, projection room, MT room
Parking lot, etc	Parking lot, road slope, automobile repair shop, vehicle lab, automobile hangar
Machine room, etc.	machine room, elevator machine room, mechanical room, pump room, boiler room, dry room, heat-source equipment room, hot and cold water generator, etc.
Stack room, etc	stack room, KARTE (medical examination record card), library, morgue, archives room
Art piece display room, etc	display room, art piece display room, important cultural properties storage, showcase
Handling Oil	Stamp booth, oil repository, etc.

1.4.2 Restrictions of fire suppression system

Like other clean agent fire suppression system, nitrogen is not recommended to use for the following fire protection objects:

- In the place where people exist all the time and maximum allowance design concentration(43%) is exceeded.
- In the place where reactive metals are detected such as natrium, magnesium, titanium, zirconium, uranium(the third type of hazardous materials).
- In the place with chemicals that can break down automatically by thermion such as peroxides complex, hydrogen. (the fifth type of hazardous materials). Excluded are Hazardous materials that can properly suppress fire.

Nitrogen (IG-100) clean agent fire suppression system

System Design

02

2. System Design

1. Conitions of Blazero-100(IG-100) system design

1.1 Design conditions

Check the kind and amount of inflammables in building structures and protection area of objects protected from fire. Wall, pillar, floor or ceiling (including a girder, roof) of protection areas should be made with noncombustible materials. Automatic closing appliances should be installed in every opening part.

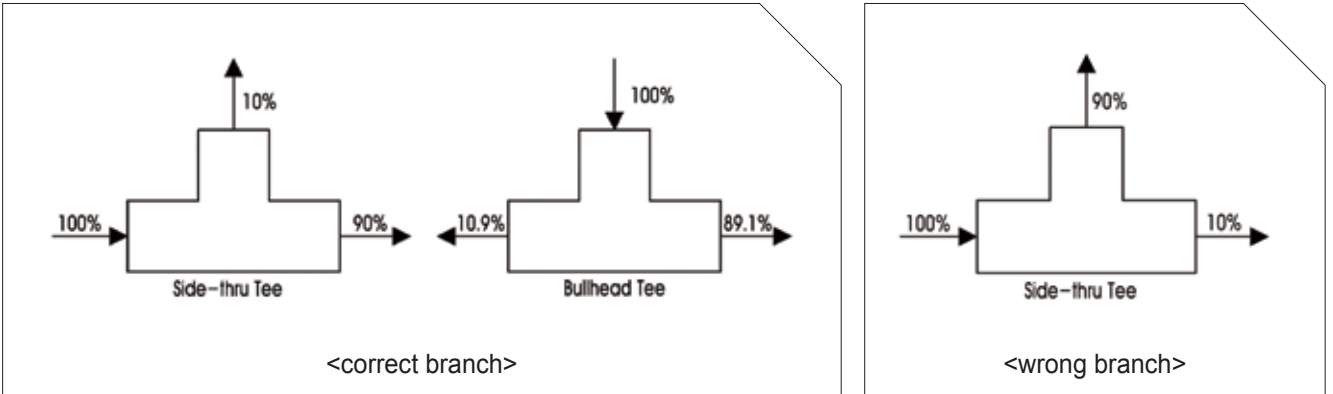
The following are main conditions applied to design.

Restrictions	Limiting value and contents
1. Maximum Ratio of volume of pipeline against the volume of the agent	Maximum 103.6%
2. Minimum distance from cylinder to the first pipe fittings	5%
3. Minimum and maximum discharge time	36.5 Second ~ 60 Second
4. Maximum pressure variation of discharge nozzle	1,150kPa(11.5 bar)
5. Portion of orifice of discharge nozzle to cross section of connecting pipe	15% ~ 56%
6. Maximum time that it takes for fire extinction to reach discharge nozzle	1 second
7. Restriction of pipe length of front and back of Tee	10 Diameter
8. Side Tee's maximum amount of agent branch	Maximum 50%, minimum 10%
9. Bull Tee's maximum amount of agent branch	Maximum 50%, minimum 10.9%
10. Restriction related to change in vertical height of pipe.	±50m
11. Minimum design pressure of discharge nozzle	Minimum 1,293kPa(12.93bar)
12. Maximum allowable pressure of pipe on the second side of cylinder valve	8,000kPa(80bar)
13. Operation temperature of system (storage temperature of fire extinction cylinder)	0 ~ 35°C
14. Types of adaptive discharge nozzle	360, 180

- ① Discharge manner : total flooding system
- ② Temperature : 0 to 35°
- ③ Fire suppression concentration : level A and C -31.5%, level B-35.2%
- ④ Maximum design concentration : 43%
- ⑤ Cylinder : 84l of cylinder/IG-100 filling of 20.6m³
- ⑥ Pipe method : balanced or unbalanced
- ⑦ Protection area of discharge nozzle: 144 m² (radius 8.4m is standard) in area,7.0m in height

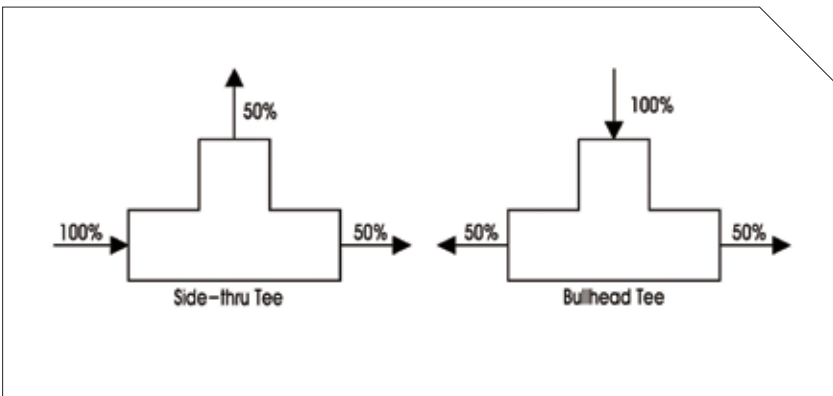
1.2 Restriction of Tee branch

① Minimum branch amount



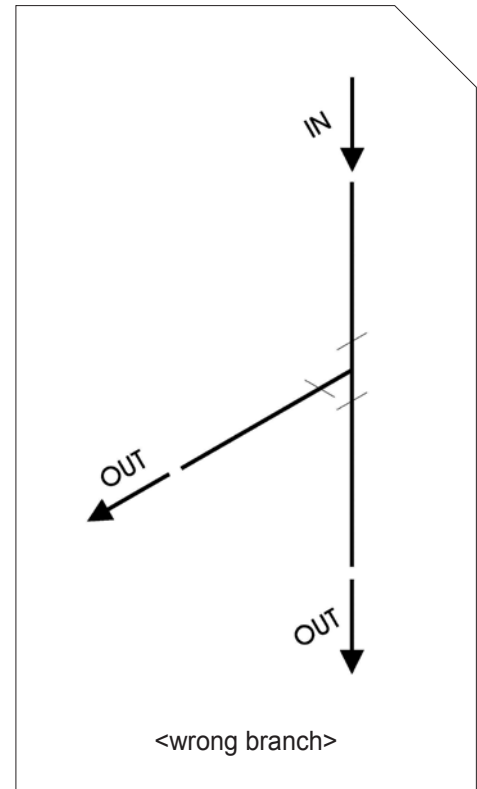
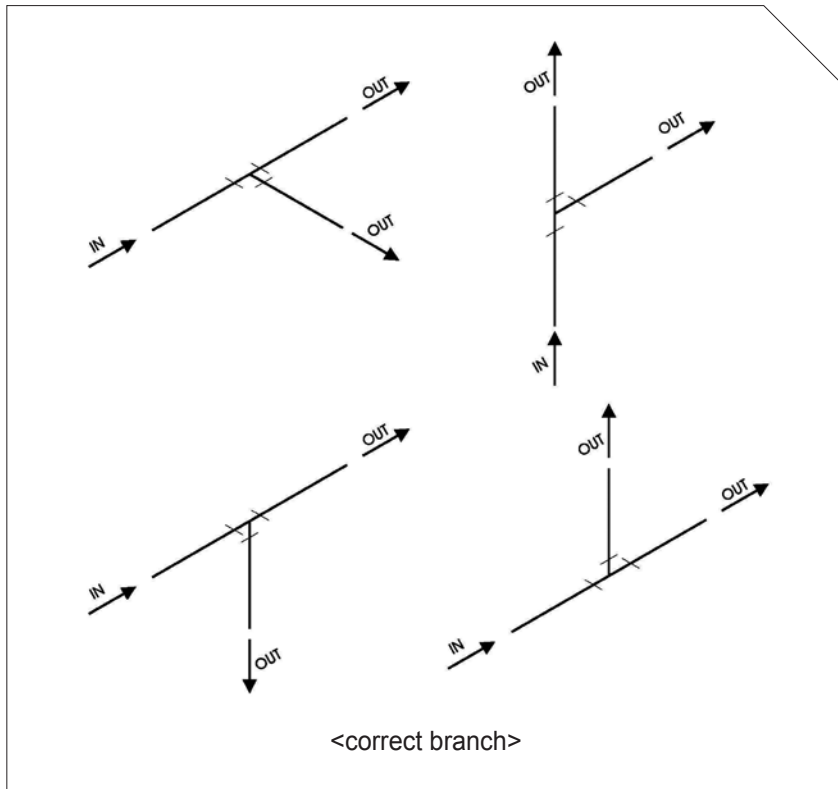
* On Side-True Tee, the branch amount of Thru tee in the same direction with the flow of agent should be equal to or larger than the branch amount of Side Tee.

② Maximum branch amount

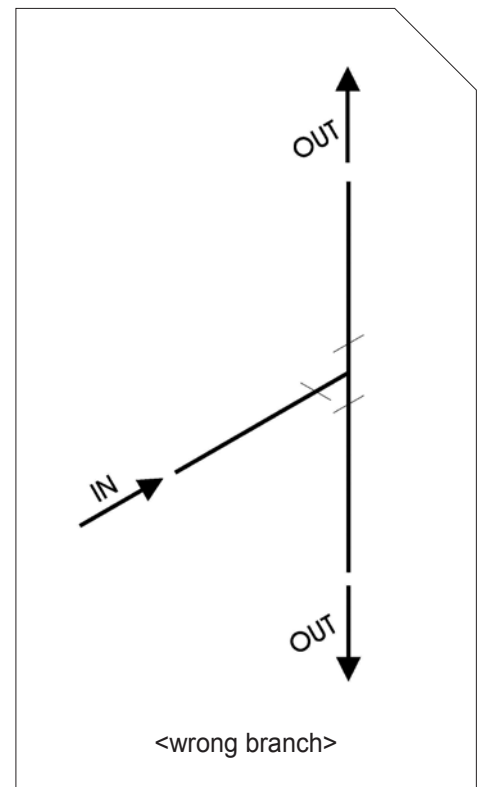
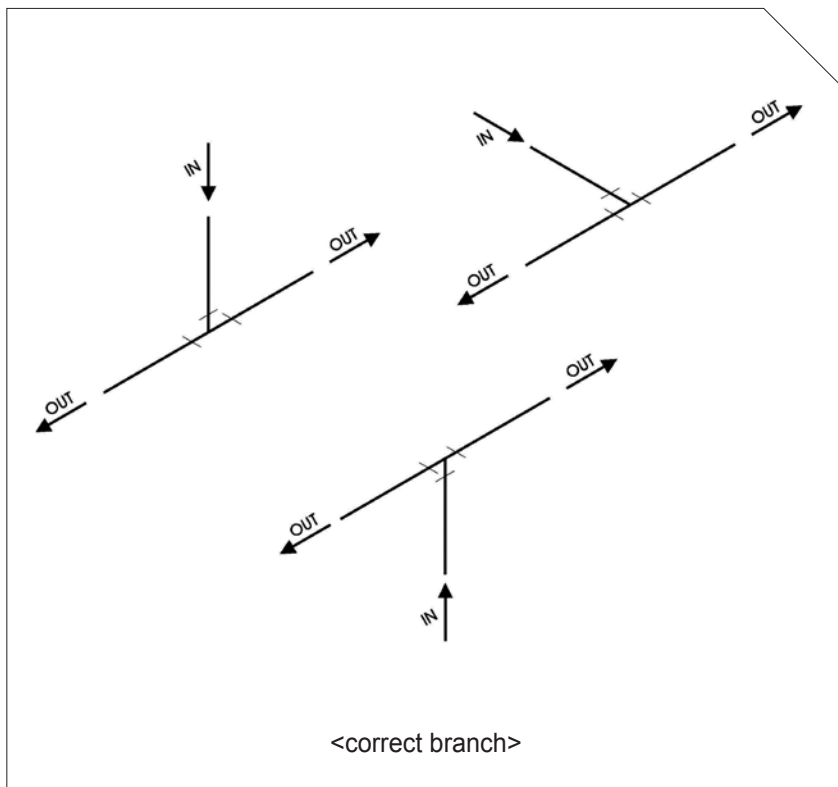


2. System Design

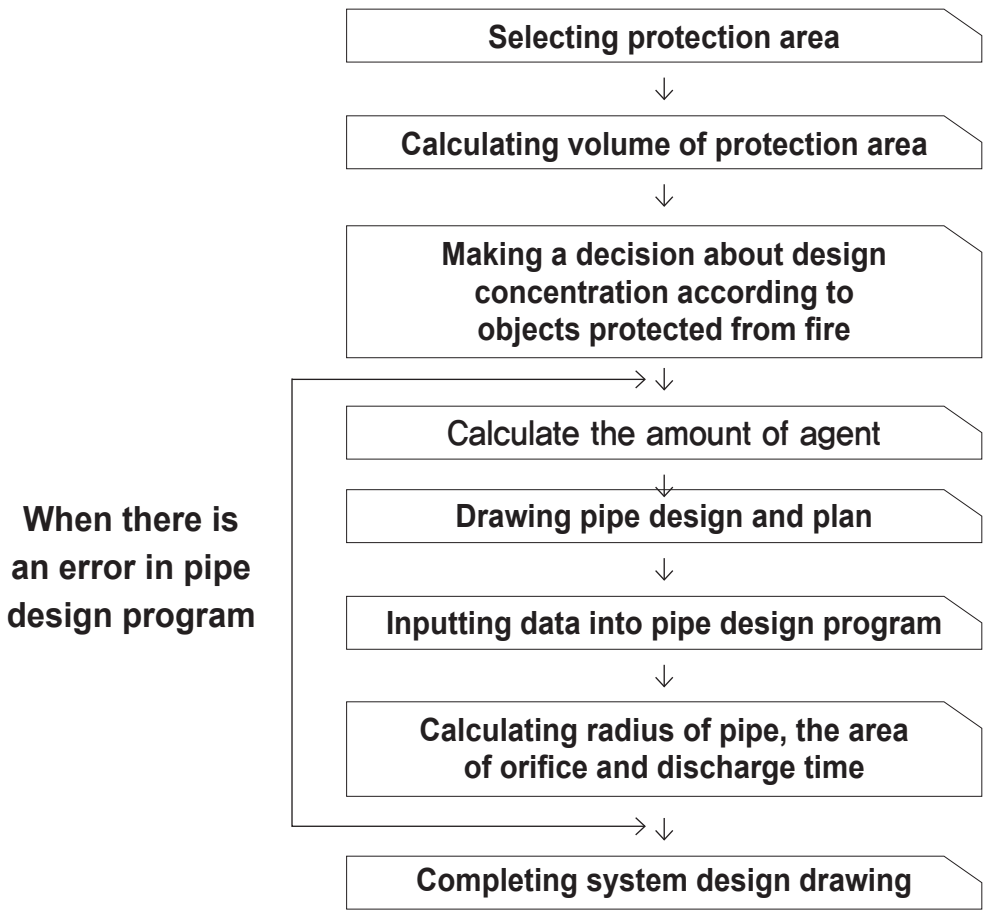
③ Side-True Tee



④ Bullhead Tee



2. Design of Blazero-100(IG-100) system



2.1 Deciding minimum design concentration

Specifies the type of the fire protection section and determines the minimum design concentration.

[fire suppress concentration and minimum design concentration according to fire type]

Fire type	Fire extinction concentration	Minimum design concentration
Level A, C	31.5%	37.8%
Level B	35.2%	45.76%

* Design concentration(%)of level A and C should be applied 1.2 times safety rate of level A, C fire extinction concentration, Design concentration(%)of level B should be applied 1.3 times safety rate of level B fire extinction concentration,

2. System Design

2.2 Calculating volume of agent

① The first step is to use agent of National Fire Safety Standard.

$$X = 2.303(Vs/S) \times \text{Log}_{10} [100 / (100-C)]$$

X : additional volume of agent per space volume(m³/m³)

VS : specific volume of agent at 20°C

S : line-type arithmetic per agent (0.7997+0.00293Xt)(m³/kg)

C : 체적에 따른 소화약제의 설계농도(%)

T : minimum expected temperature(°C) of protection area

② The second step is to decide the amount of Blazero-100(IG-100) referring to the following Total Flooding Quantity Table depending on room temperature. When the lowest temperature in protection area is 20°C and design concentration 37.8%, Flooding Factor is 0.4748. Therefore 784m³X0.4748=372.2432m³ is a needed amount of Blazero-100(IG-100).

[Total Flooding Quantity Table]

temperature t(°C)	Steam specific volume s(m ³ /kg)	Quantity of Needed agent per volume of protection area/ design concentration in protection area (%)								
		35	36	37.8	40	42	45.76	46	50	54
-40	0.6826	0.5418	0.5613	0.5972	0.6424	0.6851	0.7694	0.7750	0.8717	0.9766
-30	0.7119	0.5195	0.5382	0.5726	0.6160	0.6569	0.7377	0.7431	0.8359	0.9364
-20	0.7412	0.4989	0.5169	0.5499	0.5916	0.6309	0.7085	0.7137	0.8028	0.8994
-10	0.7704	0.4800	0.4972	0.5290	0.5691	0.6069	0.6816	0.6865	0.7723	0.8652
0	0.7997	0.4624	0.4790	0.5096	0.5483	0.5847	0.6566	0.6614	0.7440	0.8335
10	0.829	0.4460	0.4621	0.4916	0.5289	0.5640	0.6334	0.6380	0.7177	0.8040
20	0.8582	0.4308	0.4463	0.4748	0.5109	0.5448	0.6118	0.6162	0.6932	0.7766
30	0.8875	0.4166	0.4316	0.4592	0.4940	0.5268	0.5916	0.5959	0.6703	0.7509
40	0.9168	0.4033	0.4178	0.4445	0.4782	0.5099	0.5727	0.5768	0.6489	0.7269
50	0.9461	0.3908	0.4049	0.4307	0.4634	0.4942	0.5550	0.5590	0.6288	0.7044
60	0.9753	0.3791	0.3927	0.4178	0.4495	0.4793	0.5383	0.5422	0.6099	0.6833
70	1.0046	0.3680	0.3812	0.4056	0.4364	0.4653	0.5226	0.5264	0.5921	0.6634
80	1.0339	0.3576	0.3704	0.3941	0.4240	0.4522	0.5078	0.5115	0.5753	0.6446
90	1.0631	0.3477	0.3602	0.3833	0.4123	0.4397	0.4938	0.4974	0.5595	0.6268
100	1.0924	0.3384	0.3506	0.3730	0.4013	0.4279	0.4806	0.4840	0.5445	0.6100

* NFPA 2001 「Standard On Clean Agent Fire Extinguishing Systems」 Table A.5.5.2(d) IG-100 Total Flooding Quantity reference

2.3 Adjusting the quantity of agent according to the altitude

Design quantity of clean agent should be adjusted to compensate when atmosphere pressure change by more than 11%(about 915m change in altitude) from standard sea level pressure(760mmHg at 0°C).

[Atmospheric Correction Factors]

Altitude		Enclosure Pressure (mm Hg)	Atmospheric pressure correction figures
From(meters)	To(meters)		
-914	-610	840	1.11
-609	-305	812	1.07
-304	-1	787	1.04
0	304	760	1
305	609	733	0.96
610	914	705	0.93
915	1218	678	0.89
1219	1523	650	0.86
1524	1828	622	0.82
1829	2133	596	0.78
2134	2438	570	0.75
2439	2742	550	0.72
2743	3047	528	0.69
3048	3352	505	0.66

* NFPA 2001 「Standard On Clean Agent Fire Extinguishing Systems」 Table 5.5.3.3 IG-100 Atmospheric Correction Factors reference

* In Blazero-100 System, 21°C, 1 pressure is recommended to be standard when designed except for special case.

2.4 Choosing the number of Blazero-100(IG-100) cylinder

The number of cylinder is calculated using the following formula

$$N \geq \frac{W}{W_F}$$

N: the number of cylinder(bottle)

W: the amount of needed agent (m³)

WF: filled quantity of agent per cylinder(bottle)

EX) when 384.16m³ of agent is needed, $384.16 \div 20.6 = 18.65$. It should be rounded to quorum. 19 cylinders are needed.

2. System Design

2.5 Choosing installation location for discharge nozzle and the number of discharge nozzle

① Discharge nozzle should be installed according to standard of each item.

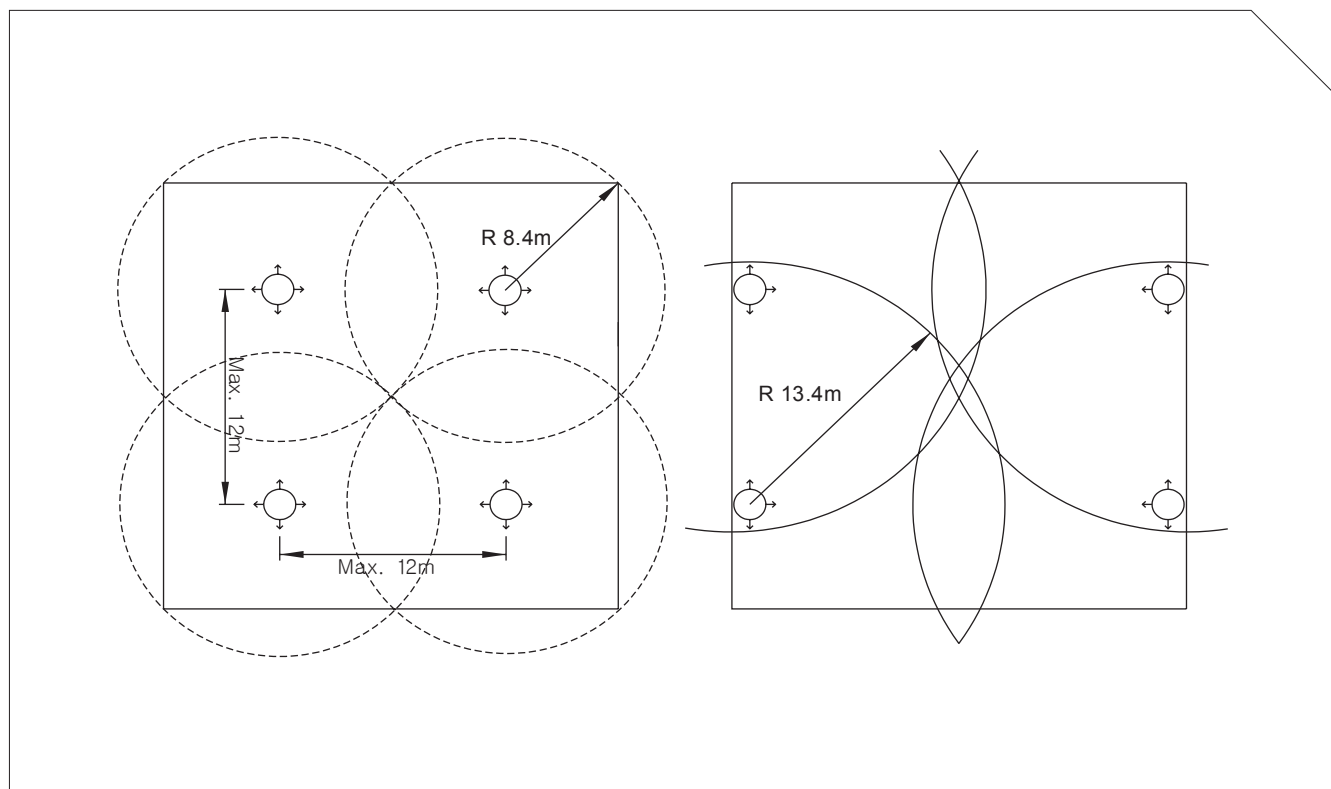
· Installation height of discharge nozzle should be at least over 0.3m from the floor of protection area and lower than 7.0m.

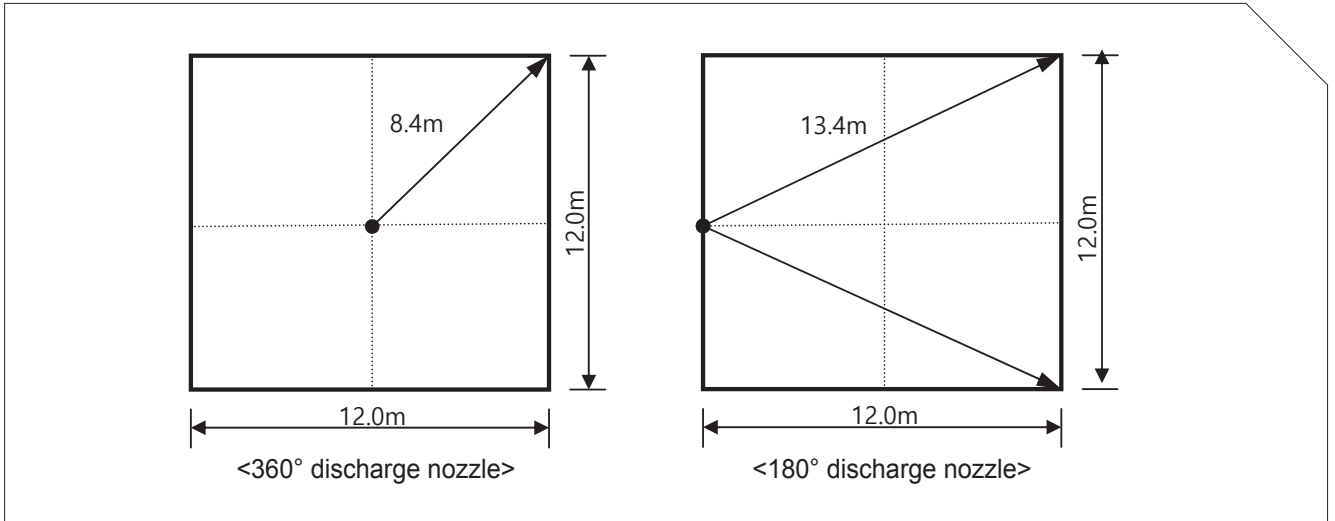
If it exceeds 7.0m, addition line of discharge nozzle should be installed.

· Discharge nozzle should be installed within 0.3m from the ceiling. IF it is hard to install the nozzle within 0.3m from the ceiling due to crossbeam, it can be installed within 1m.

② Protection area and installation location of discharge nozzle.

Nozzle size(A)		15A, 20A, 25A, 32A, 40A, 50A
The largest area of protection		12.0m x 12.0m
The longest length of protection	360°	8.4m
	180°	13.4m
The maximum height of protection		7.0m
The longest length between nozzles		12.0m





• Caution

Discharge nozzle should be designed for protection area to be overlapped as shown in table above and clearance between discharge nozzles should be at least 1 m. maximum distance should not be more than 12.0m when 360° discharge nozzle is installed and 180 °C discharge nozzle should be installed within max.0.3m from the wall.

[Minimum & Maximum Flow Rate per Discharge Nozzle]

Unit: m³/min

	15A	20A	25A	32A	40A	50A
Min. flow rate	3.9	7.1	11.8	21.0	29.0	49.0
Max. flow rate	22.0	39.7	66.0	117.5	162.5	274.7

2.6 Expecting parts and size of collecting pipe, selection valve, pipe components

① expecting flow rate in pipe

Discharge time is within 1 min and flow rate is calculated by the following formula.

$$Q = \frac{W}{T}$$

Q: flow rate

W: quantity of agent

T: discharge time

② The diameter of collecting pipe, selection valve, pipe are expected by calculated flow rate. The diameter of collecting pipe, pipe is automatically calculated by design program, but inserting expected diameter in advance can reduce time spent designing.

2. System Design

[Minimum & Maximum flow rate]

Diameter	Minimum flow rate	Maximum flow rate
15A	3.92	22.00
20A	7.09	39.74
25A	11.77	66.01
32A	20.96	117.49
40A	28.98	162.46
50A	49.00	274.71
65A	71.19	399.15
80A	112.40	630.17
100A	199.01	1115.75
125A	320.10	1794.43
150A	470.98	2640.50

③ Make sure to select the minimum number of bottles referring to [Minimum & Maximum flow rate].

As in Blazero-100(IG-100), the diameter of collecting pipe cannot be designed to be lower than minimum number of bottle.

[Minimum number of bottle]

Diameter	Minimum flow rate	Minimum number of bottles
25A	3.92	1
32A	7.09	1
40A	11.77	1
50A	28.98	1
65A	49.00	2
80A	71.19	4
100A	112.40	4
125A	199.01	7
150A	320.10	10

④ Equivalence length

To conduct design program, equivalence length of pipe parts and selection valve should be applied. Since Information about Equivalence length is inserted in design program and automatically calculated, all design program user should do is decide type of selection valve. Only when using addition pipe parts such as Ball valve in addition to normal parts such as Elbow, Tee, Union, should equivalence length of related parts should be inserted.

2.7 Calculating area of pressure relief venting

Area of pressure relief venting should be larger than area calculated by the following formula:

$$A[m^2] = \frac{Q_{max}}{0.61 \times \sqrt{\frac{2P}{\rho}}}$$

A : needed pressure relief venting(m²) (caution1)

Q : maximum discharge flow rate from discharge nozzle within protection area

ρ : density of nitrogen, mixed air gas within protection area.

P : allowable pressure(Pa) within protection area (caution 2)

Caution 1 : When deciding the size of pressure relief venting, it should be considered that area of valid opening of pressure relief venting can be the area of pressure relief venting.

Caution 2 : Allowable pressure p within protection area is the minimum intensity of wall making up of protection area. Every protection area should be investigated. If it is not clear, it should be calculated with allowable pressure value within protection area in the following table.

[allowable pressure within protection area]

Structure of wall of protection area	Allowable pressure within protection area
Light weight structure	0.12 kg/cm ² (1200 Pa)
Block closing	0.025 kg/cm ² (2400 Pa)
Reinforcing rod concrete structure	0.049 kg/cm ² (4800 Pa)

Nitrogen (IG-100) clean agent fire suppression system



Blazero-100TM

The background of the page is a grayscale photograph of a field of grass. Numerous water droplets of various sizes are scattered across the grass blades, some in sharp focus and others blurred. In the upper left quadrant, a semi-transparent globe of the Earth is visible, showing the continents. The overall composition is soft and naturalistic.

Specification

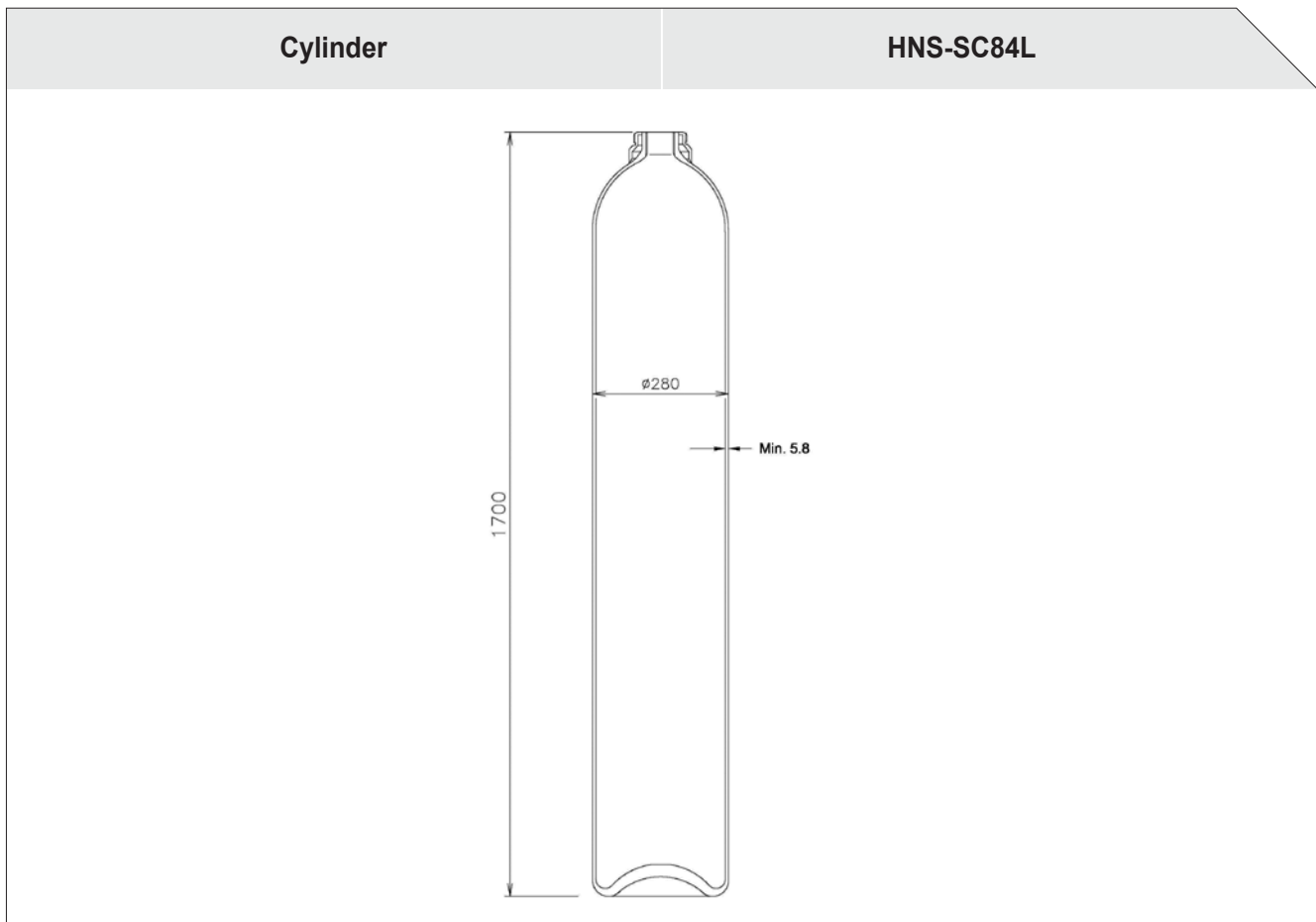
03

3. Specification

3. Specification of Blazero-100(IG-100) system

3.1 Cylinder

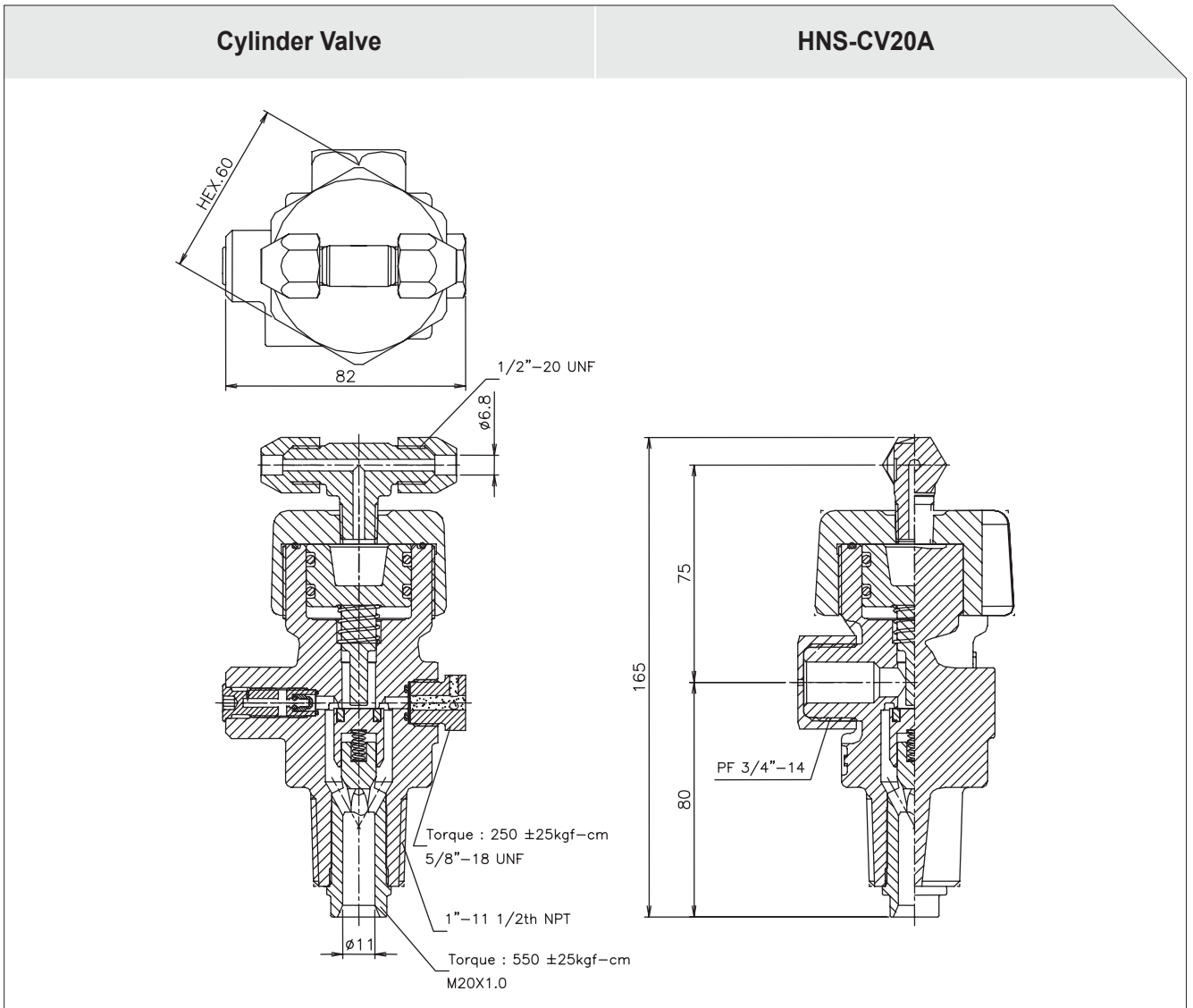
Cylinder of Blazero-100(IG-100) is a cylinder with 84L of internal volume and the filling pressure of nitrogen agent is 28MPa at 21°C. It volume is filled with 20.6m³ under atmospheric pressure. Also. The cylinder has been approved by Korea Gas Safety Corporation or made according to KS.



- Internal volume : 84ℓ
- Agent quantity per cylinder:IG-100 20,6m³ (stored in a gas state)
- Material: Cr-Mo Steel (KGS AC 212)
- Store pressure inside cylinder : 28MPa (@21°C)
- Internal pressure test pressure : 50MPa
- Size: 280 mm O,Dx1700mmH(106kg weight)
- Checking filling quantity & pressure: as in a gas state, it is possible to check only by pressure gauge attached to cylinder valve

3.2 Cylinder Valve

Cylinder valve of nitrogen agent cylinder has depression function which lowers storage pressure under high pressure to 8.0MPa when released which is stored in 28MPa at 21°C while fire suppressions system is operating. Cylinder valve should be operated under over 8.9 MPa and under actuating nitrogen cylinder filling pressure. Since it doesn't operate with pressure of CO₂ actuating cylinder, actuating nitrogen cylinder filled with additional 9.3MPa(at 21°C) should be installed. Products that passed a test by Korea Gas Safety Corporation should be used.

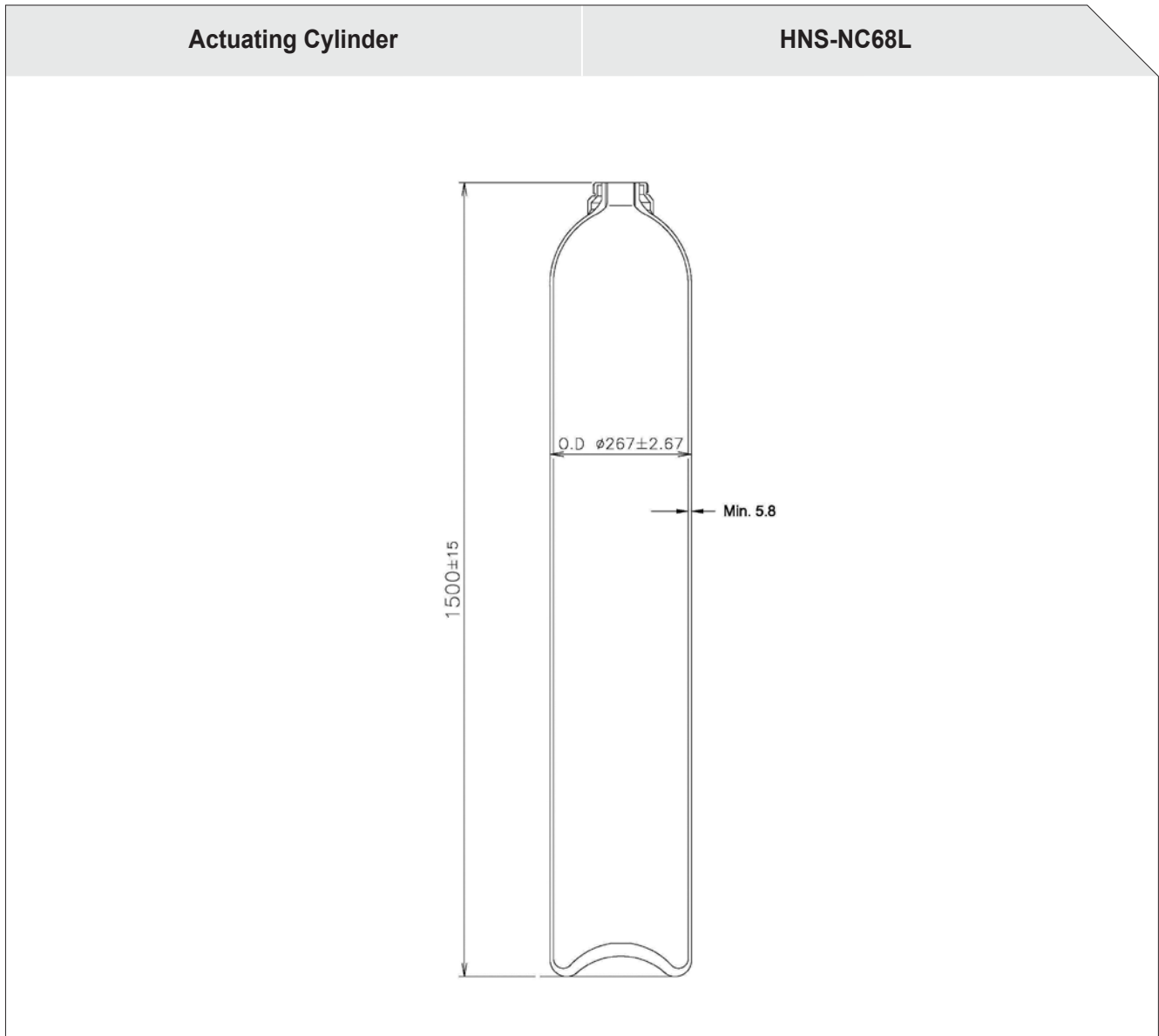


- Material : Brass(KS D 5101 C3771BE)
- Operating pressure : 30MPa
- Internal pressure test pressure : 50MPa
- Actuating pressure : 8.9MPa ~ 9.3MPa

3. Specification

3.3 Actuating nitrogen cylinder

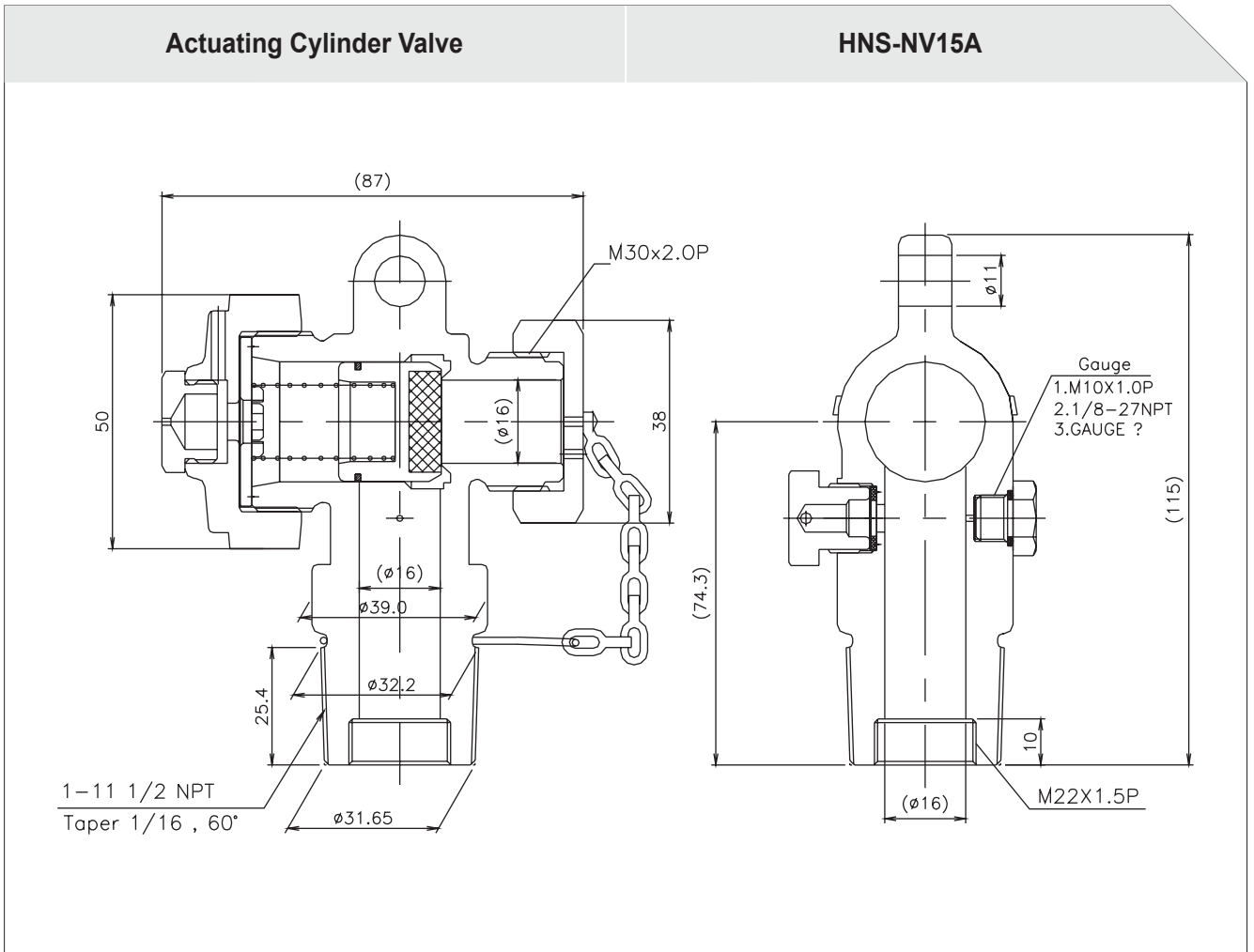
In Blazero-100(IG-100) system, actuating pressure of agent cylinder needs at least 8.9MPa. The way to open actuating nitrogen cylinder is by using pressure of CO₂ gas(the first actuating) of actuating cylinder and nitrogen agent cylinder valve can be opened using pressure of 9.3MPa of nitrogen(the second actuating) stored in the cylinder, releasing the agent from cylinder. One bottle of actuating nitrogen gas cylinder is installed every time actuating fire extinction bottle is lower than the maximum number. The cylinder has passed a test by Korea Gas Safety Corporation or suitable for KS as shown below.



- Operating pressure : 15MPa
- Internal pressure test pressure : 25MPa
- Filling pressure : 9,3MPa
- Maximum number of actuating bottles : 110 bottles

3.4 Actuating nitrogen cylinder valve

Actuating nitrogen cylinder valve releases nitrogen agent stored in nitrogen cylinder. Cylinder valve operates when a copperplate on the back of cylinder valve is ruptured, lowering pressure and releasing as movement inside the valve move backward. Even a small impact on Cylinder valve can cause the agent to leak. Therefore, it should be constructed and installed with special care and unnecessary huge pressure should be prohibited from being put. Products that passed a test by Korea Gas Safety Corporation should be used.

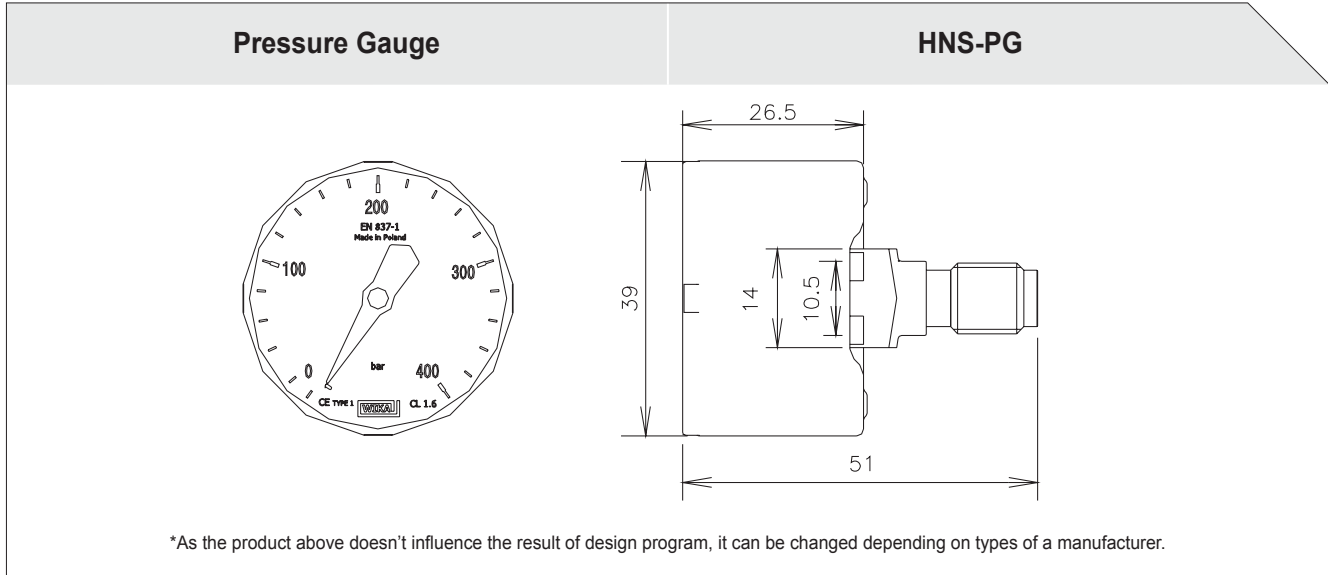


- Material : Brass(KS D 5101 C3771)
- Operating pressure : 14.7MPa
- Internal pressure test pressure : 24.5MPa

3. Specification

3.5 Pressure gauge

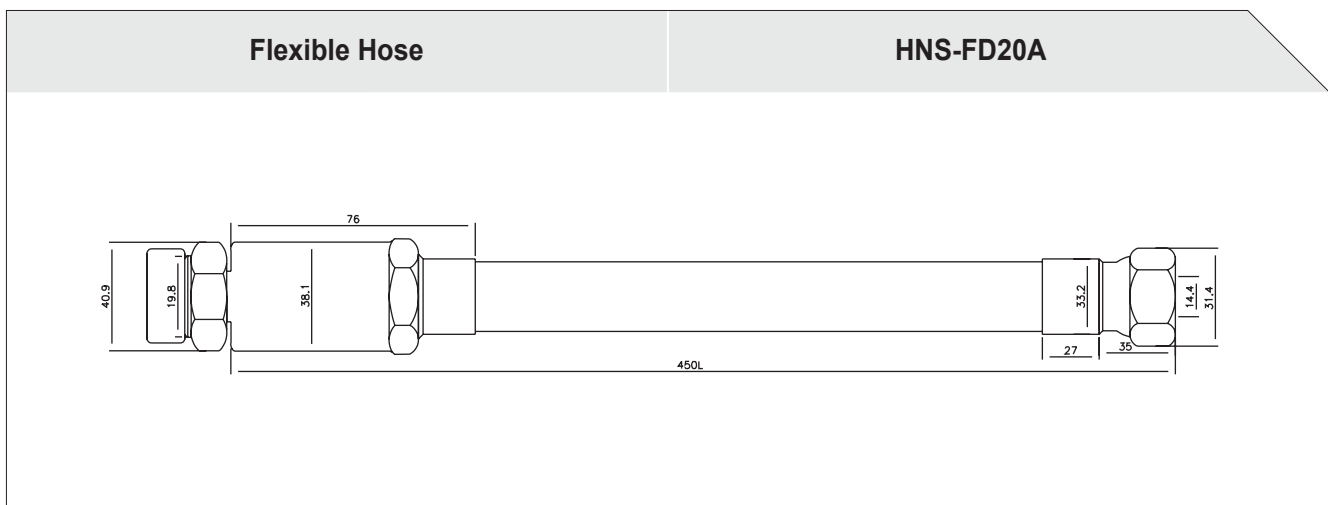
Pressure gauge is used to check filling pressure of cylinder filled with IG-100 agent and pressure gauge is attached to pressure gauge port.



- Gauge Connection : M10
- Indication Range : 0 ~ 40MPa

3.6 Flexible Hose

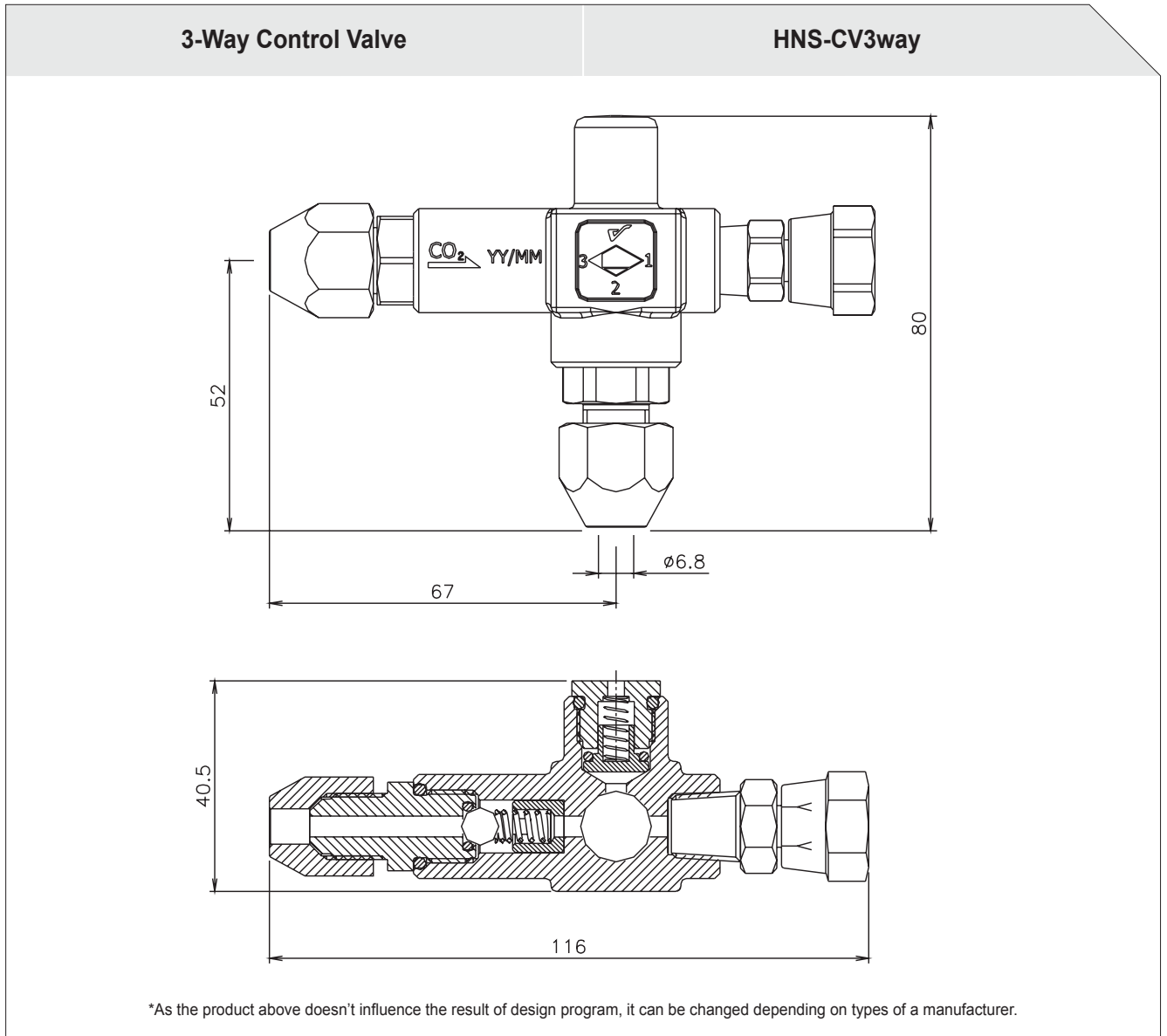
It is installed between cylinder valve and collecting pipe and should be disconnected during refilling and repairing. It guarantees proper flexibility and IG-100 agent is released through flexible hose to protection area. (check valve is built in)



- Materials : Stainless Steel(KS D 3706 STS 304)
- Operating pressure : 10MPa
- Size : 20A×450mm

3.7 Three-way control valve

Three-way control valve is installed to release water in agent cylinder selectively and controls the flow of actuating nitrogen gas. Installation location is copper tube between extinction agent cylinder valves and things attached to high pressure tube.

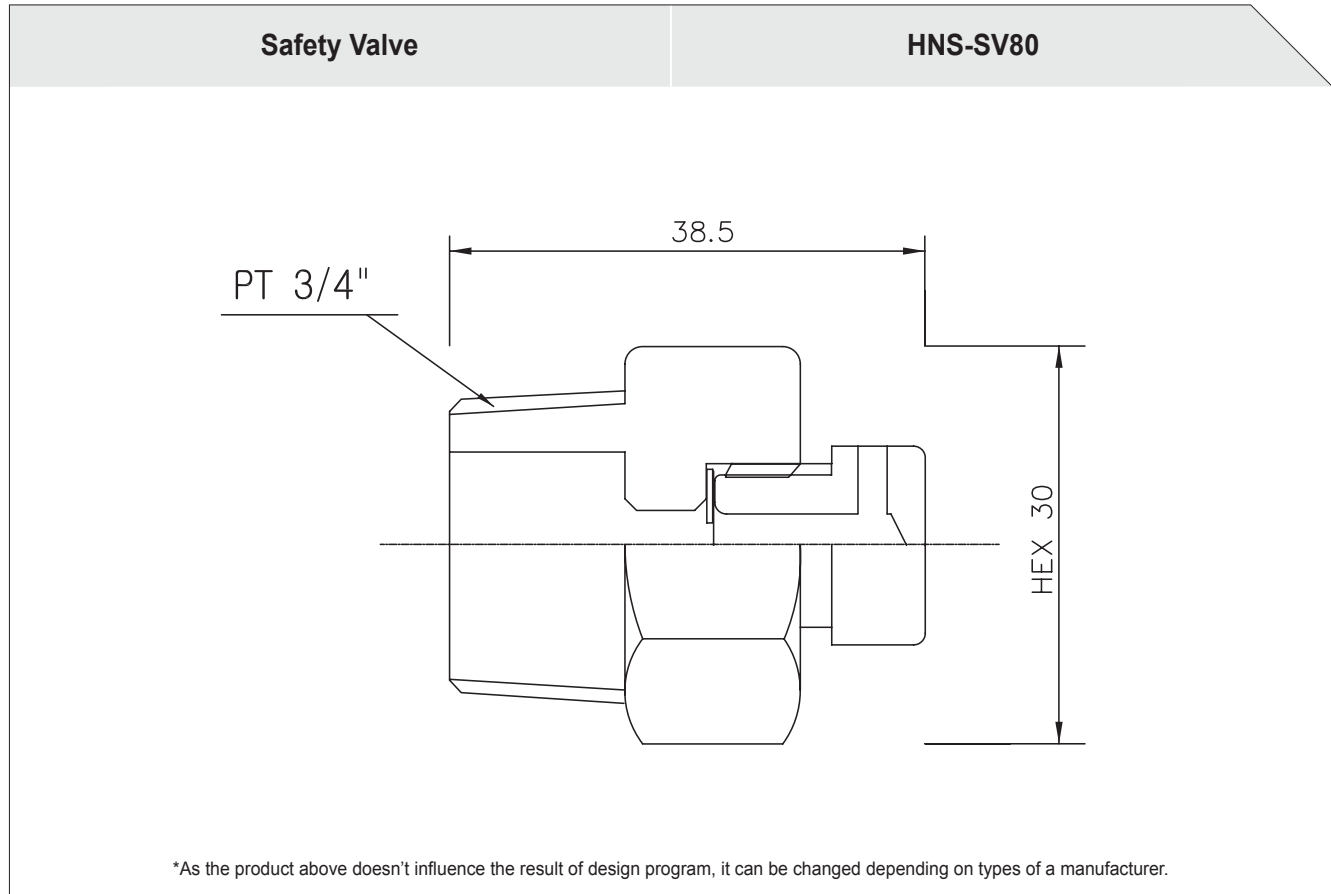


- Material : Brass (KS D 5101 C3771BE)
- Secret test pressure : 10MPa
- Internal pressure test pressure : 15MPa이상
- Pipe diameter : 6A

3. Specification

3.8 Safety valve

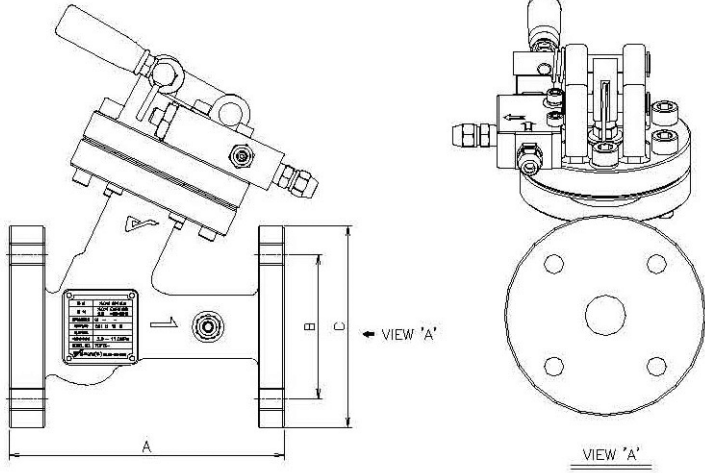
It is installed to prevent damage to collecting pipe when excessive pressure is put on collecting pipe temporarily.



- Material : Brass (KS D5101 C3604BD)
- Size : 20A
- Operating pressure: breaking under over 8,0MPa

3.9 Selection Valve

As one storage cylinder, it is selection valve system that protects multi-protection areas by using pipe selection valve approved by national inspection. It induces release of agent only into certain protection area at fire incidents. It operates using pressure of CO₂ actuating cylinder and can be opened manually by hand lever. Opened valve can be returned to normal by pressing its stem.

Selection Valve		HNS		
				
Model No.	A	B	C	등가길이 m
HNS-S25A	170mm	90mm	125mm	7.6
HNS-S32A	190mm	100mm	135mm	10.1
HNS-S40A	200mm	105mm	140mm	11.7
HNS-S50A	215mm	120mm	155mm	15.1
HNS-S65A	257mm	140mm	175mm	19
HNS-S80A	284mm	160mm	200mm	22.5
HNS-S100A	330mm	185mm	225mm	29.6
HNS-S125A	372mm	225mm	270mm	36.8
HNS-S150A	415mm	260mm	305mm	43.7

- Operation method : Pneumatic Operation
- Material : Stainless Steel(KS D 4103 SSC13A)
- Operating pressure : 11 MPa
- Secret test pressure : 13,2 MPa
- Internal pressure test pressure : 16,5 MPa
- Main body intensity test pressure : 44,0 MPa
- Minimum operating pressure : 0,2 ~ 1,0
- Manual actuating level : Hand Lever
- Size: 25A to 150A flange-style connection(supplying companion flange)

3. Specification

3.10 Discharge nozzle

Discharge nozzle discharges Blazero-100(IG-100) agent into protection area evenly and swiftly. The area protected by one discharge nozzle is 144m²(radius 8.4m standard) and the maximum installation height is 7.0m.

When the height of protection area exceeds 7.0m, additional line of discharge nozzle should be installed.

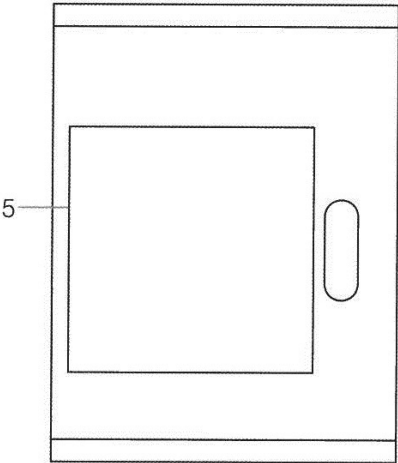
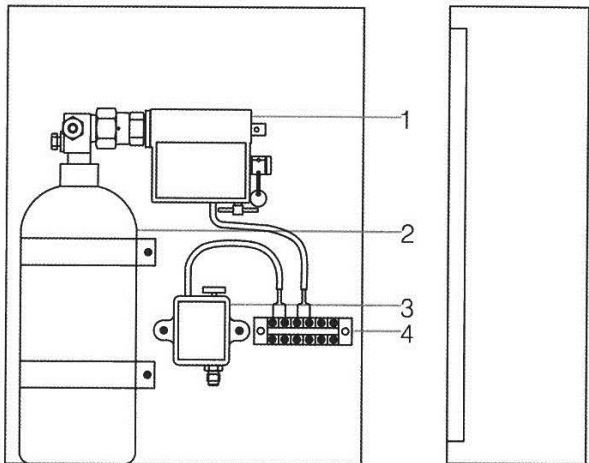
Discharge Nozzle		HNS-N360,180 15A~50A						
MODELNo.	A	B	C	D				
HNS-N360-15A	48	28	18.8	Ø4.6 18hole				
HNS-N360-20A	55	35	23.9	Ø6.2 18hole				
HNS-N360-25A	65	42	30.4	Ø7.9 18hole				
HNS-N360-32A	75	52	39.3	Ø10.2 18hole				
HNS-N360-40A	80	60	45.1	Ø12.0 18hole				
HNS-N360-50A	90	70	55.0	Ø15.0 18hole				
MODELNo.	A	B	C	D	E	F	G	T
HNS-N180-15A	28.5	32.5	26	5.0	9.0	2.6	23.5	4.0
HNS-N180-20A	35.0	40.3	32.0	5.0	10.0	4.5	28.5	4.0
HNS-N180-25A	42.0	47.0	40.0	6.0	12.2	2.4	29.5	4.0
HNS-N180-32A	50.0	55.0	49.0	7.0	15.2	7.4	30.5	4.5
HNS-N180-40A	57.0	63.0	56.0	8.0	20.5	3.0	33.5	4.5
HNS-N180-50A	70.0	75.0	68.0	8.3	28.7	7.6	35.5	5.0

· Materials: Brass(KS D 5101 C3604)Ni-Cr Coated) or Aluminum(KS D 6763 A6061)

· Standard : 15A ~ 50A PT, Female

3.11 Actuating Device Unit

Actuating Device Unit consists of CO₂ actuating cylinder, Solenoid Valve, Pressure switch and outdoor enclosure. A copper plate of CO₂ actuating cylinder(Pilot Cylinder) is ruptured by actuating Solenoid Valve in fire incident, releasing CO₂ gas and opening cylinder valve and selection valve of nitrogen cylinder.

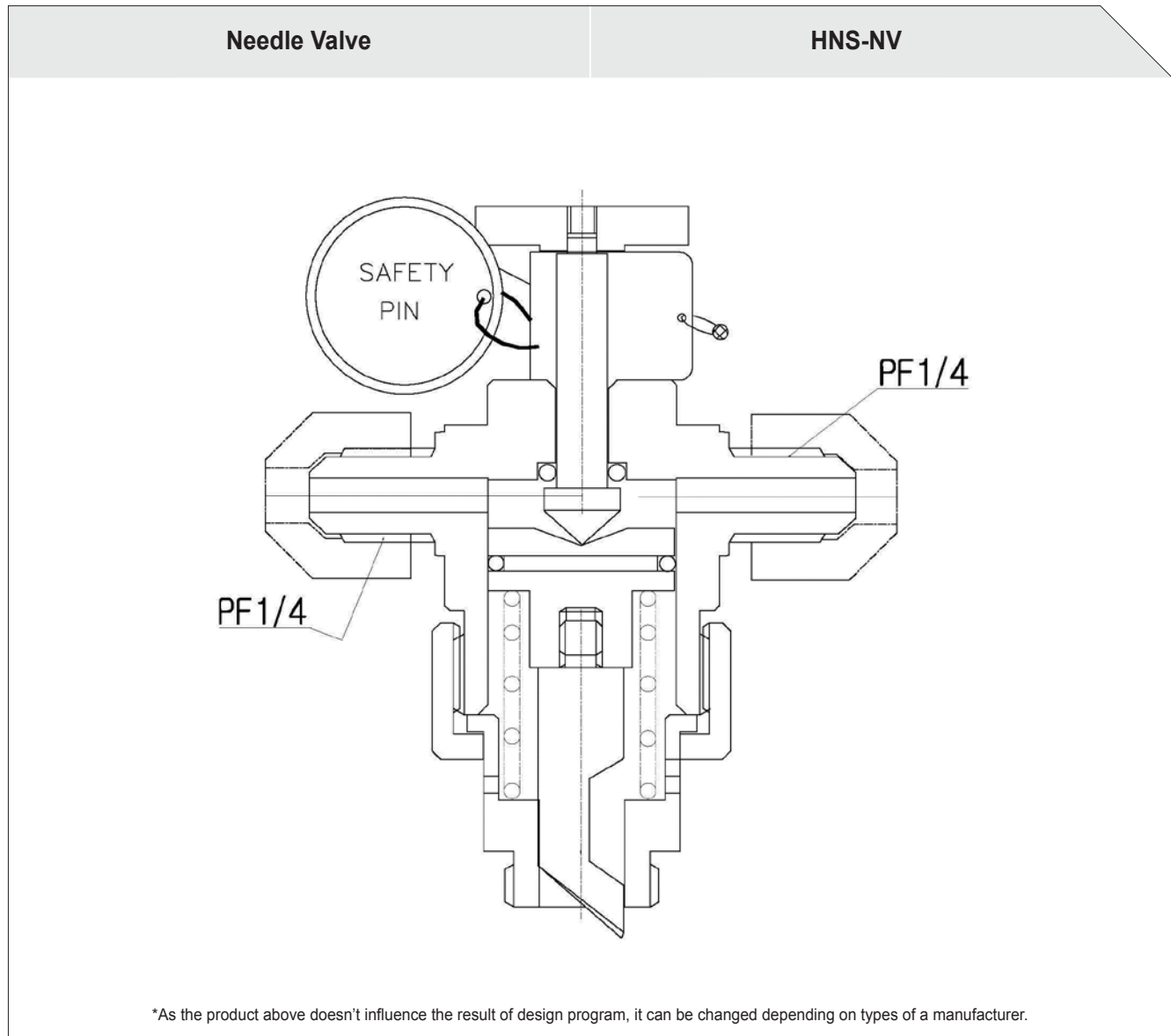
Pilot Cylinder Set	HPCP-23																			
																				
<p><u>PART NAMES</u></p> <table style="width: 100%;"> <tr> <td>1. Solenoid</td> <td>4. Terminal block</td> </tr> <tr> <td>2. CO₂ cylinder</td> <td>5. Manual</td> </tr> <tr> <td>3. Pressure switch</td> <td></td> </tr> </table>		1. Solenoid	4. Terminal block	2. CO ₂ cylinder	5. Manual	3. Pressure switch														
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2. CO ₂ cylinder	5. Manual																			
3. Pressure switch																				
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="3">MODEL</th> </tr> </thead> <tbody> <tr> <td style="width: 25%;">Cylinder outdoor enclosure</td> <td style="width: 25%;">Size</td> <td style="width: 50%; text-align: center;">310(W)x410(H)x125(D)</td> </tr> <tr> <td rowspan="3" style="text-align: center;">Actuating cylinder</td> <td style="text-align: center;">Internal volume</td> <td style="text-align: center;">1.0±0.11</td> </tr> <tr> <td style="text-align: center;">Internal pressure test pressure(MPa)</td> <td style="text-align: center;">25</td> </tr> <tr> <td style="text-align: center;">CO₂ filling quantity(kg)</td> <td style="text-align: center;">0.65</td> </tr> <tr> <td style="text-align: center;">Solenoid Valve</td> <td style="text-align: center;">Operating power</td> <td style="text-align: center;">DC 24V 1.5A</td> </tr> <tr> <td style="text-align: center;">Power switch</td> <td style="text-align: center;">Operating power</td> <td style="text-align: center;">DC 24V 3A</td> </tr> </tbody> </table>		MODEL			Cylinder outdoor enclosure	Size	310(W)x410(H)x125(D)	Actuating cylinder	Internal volume	1.0±0.11	Internal pressure test pressure(MPa)	25	CO₂ filling quantity(kg)	0.65	Solenoid Valve	Operating power	DC 24V 1.5A	Power switch	Operating power	DC 24V 3A
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Solenoid Valve	Operating power	DC 24V 1.5A																		
Power switch	Operating power	DC 24V 3A																		
<p><small>*As the product above doesn't influence the result of design program, it can be changed depending on types of a manufacturer.</small></p>																				

* Size of actuating cylinder box can be different depending on the field.

3. Specification

3.12 Needle Valve

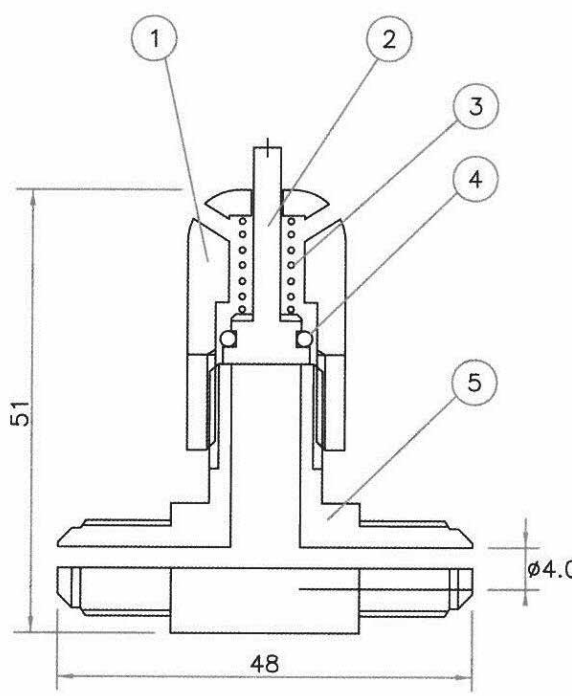
It is attached to nitrogen actuating cylinder valve and the copper plate of nitrogen actuating cylinder gets broken by Needle Pin in fire incident, operating cylinder valve. Needle valve automatically operates by CO₂ released from actuating cylinder. In case it doesn't work, remove safety pin and strongly pound push button and press needle pin, it will start to work.



- Materials : KS D 5101 C3771BD
- Operating pressure : 0,98MPa
- Size of Actuating line screw : PT 1/4"
- Valve fastening : M18 x P1,5

3.13 Relief valve

Relief valve releases CO₂ gas slightly leaked from CO₂ actuating cylinder. When CO₂ actuating cylinder works and releases gas, relief valve becomes shut down and CO₂ gas normally open selection valve and nitrogen actuating cylinder.

Relief Valve	HNS-R																		
 <p style="text-align: center;">*As the product above doesn't influence the result of design program, it can be changed depending on types of a manufacturer.</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr style="background-color: #cccccc;"> <th>NO.</th> <th>PART NAME</th> <th>Q'ty</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">BODY</td> <td style="text-align: center;">1</td> </tr> <tr> <td style="text-align: center;">2</td> <td style="text-align: center;">MOVEMENT</td> <td style="text-align: center;">1</td> </tr> <tr> <td style="text-align: center;">3</td> <td style="text-align: center;">SPRING</td> <td style="text-align: center;">1</td> </tr> <tr> <td style="text-align: center;">4</td> <td style="text-align: center;">ORING</td> <td style="text-align: center;">1</td> </tr> <tr> <td style="text-align: center;">5</td> <td style="text-align: center;">NIPPLE</td> <td style="text-align: center;">1</td> </tr> </tbody> </table>	NO.	PART NAME	Q'ty	1	BODY	1	2	MOVEMENT	1	3	SPRING	1	4	ORING	1	5	NIPPLE	1
NO.	PART NAME	Q'ty																	
1	BODY	1																	
2	MOVEMENT	1																	
3	SPRING	1																	
4	ORING	1																	
5	NIPPLE	1																	

- Materials : Brass(KS D 5101 C3604)
- Secret test pressure : 5,59MPa
- Size: 6A expanding pipe connection

● Caution

We are liable only when the entire parts of IG-100 fire extinction system are purchased which acquired "performance test approval" by Korea Fire Institute(KFI). Be cautious that we are not liable for any damage in case where parts have been randomly changed.

Nitrogen (IG-100) clean agent fire suppression system



Blazero-100TM



Installation & Maintenance

4. Installation & Maintenance

1. Installation & Maintenance of Blazero-100(IG-100) fire suppression system

This installation and maintenance manual is applied to inert gas clean agent IG-100 fire suppression system among clean agents suitable for Fire Safety Standard(NFSC 107A) of Clean agent Fire Suppression System, 'NFPA 2001 Standard On Clean Agent Fire Extinguishing Systems'

1.1 Preparation for Installation & Maintenance

For Installation & Maintenance of Blazero-100(IG-100) fire suppression system guides and orders instructed in this manual should be followed. Otherwise, unexpected malfunction of fire suppression system may occur. Please observe the following steps:

- ① Figuring out function, structure and performance of fire suppression system before installation and inspection.
- ② Keep in mind the fire behavior of IG-100 agent all the time.
- ③ Make sure to understand operating principle of system and others well in advance referring to manual.
- ④ Prepare and check measuring instrument, inspection tools, consumables and others in advance.
- ⑤ Discuss thoroughly range, details, time of inspection work with an interested person before installation and inspection
- ⑥ Discuss thorough supervising fire with other system since no fire suppression system cannot be used during inspection.

1.2 Installation

1.2.1 Cylinder

- ① IG-100 agent cylinder should be installed at between 0° and 35°C of room temperature. Be careful that cylinder doesn't fall or roll while being stored and it is not exposed to sunlight or heat directly.
- ② It should be installed in places other than protection areas. If installed in a protection area, it should be installed near an escape hatch, making it easy to escape and handle it.
- ③ Temperature in installation places should be lower than 35°C and there should be little change in temperature, free from fear that direct sun light and rain drop will infiltrate.
- ④ Fire door should be installed in compartment room.
- ⑤ In installation location, attached should a sign be that a cylinder is installed.
- ⑥ As Blazero-100(IG-100) agent cylinder weighs more than 140kg, gloves and safety shoes should be worn in case of an accident while handling.
- ⑦ Blazero-100(IG-100) agent should be carried complete with cylinder cap. As it is more than 180 cm in height, take center of mass into consideration and be careful not to fall off. After installing Blazero-100(IG-100) agent in certain location, fix cylinder with cylinder bracket.
- ⑧ Maintain 300mm between installed cylinders.

- ⑨ After finishing installing cylinder, disconnect cylinder cap first and remove cap on discharge vent on the side of cylinder valve and connect it to flexible hose cylinder valve and collecting pipe.
- ⑩ Complete pressure gauge with installed cylinder cylinder valve pressure gauge port and check the pressure. Then the pressure should be 28MPa(280bar)±5%. If the pressure loss exceeds 5%, a cylinder should be refilled or replaced.

1.2.2. Selection Valve and Selection Valve Header.

- ① It has passed a test given by national organization and standard products applied in design program should be used.
- ② As one object subject to firefighting or there are more than two protection areas on that part, when cylinder of agent is shared, selection valve should be installed in every protection area.
- ③ Each protection area should be marked on selection valve.
- ④ Several selection valve should be installed on upper part of selection valve header and connected to discharging pipe. The length of selection valve header is different depending on the number of selection valve.
- ⑤ The size of selection valve is 25A to 150A and same as or smaller than one of main pipe. If selection valve is smaller than main one, reducer should be installed and connected to inlet/outlet.
- ⑥ When selection valve is installed after selection valve header, because it is heavy, put it onto flange using chain block or others and have operating parts face front with selection valve being open and connect it to bolt.
- ⑦ Header frame is made on the field and selection valve is installed on its upper part. Install Actuating cylinder on the front and fix expansion anchor on the floor.

1.2.3 Installing Actuating Device Unit and Actuating Line

- ① Attach an actuating device unit to the front of header frame 50mm apart from the floor. Also, one of two copper pipe connections which are connected to upper part of actuating device unit is connected to CO₂ actuating cylinder and should be connected to actuating device which is complete with nitrogen actuating cylinder's valve through selection valve and the other one connected to pressure switch should be connected to the second selection valve discharge checking connection.
- ② CO₂ actuating line is heat-treatment copper pipe(outside diameter: 6m, inside diameter:4m). It should be cut at a right angle with copper pipe working tools and shave scar inside and install copper pipe after expanding it.

● Caution

Be careful not to leave any hole or partial disposition when expanding copper pipe.

4. Installation & Maintenance

1.2.4 Actuating device

1.2.4.1 Manual actuating device

Install according to the following standard. In this case, install emergency switch(automatic return to normal. It stops a timer of actuating device instantly) that can delay release of agent near manual actuating device.

- ① Install it in every protection area
- ② Install it where a controller can easily escape such as near the exit of protection area concerned.
- ③ Actuator of actuating device should be installed at least higher than 0.8 m and lower than 1.5m and protecting device should be installed on protection plate.
- ④ “ Clean agent Fire Suppression System Actuating Device” should be marked on actuating device where easily read and close to read.
- ⑤ Power indicator should be installed on actuating device that uses electricity.
- ⑥ A switch of actuating device for discharge should be able to be controlled, interlocked with acoustic alarms.
- ⑦ It should be designed to be actuated with lighter than 5kg of power.

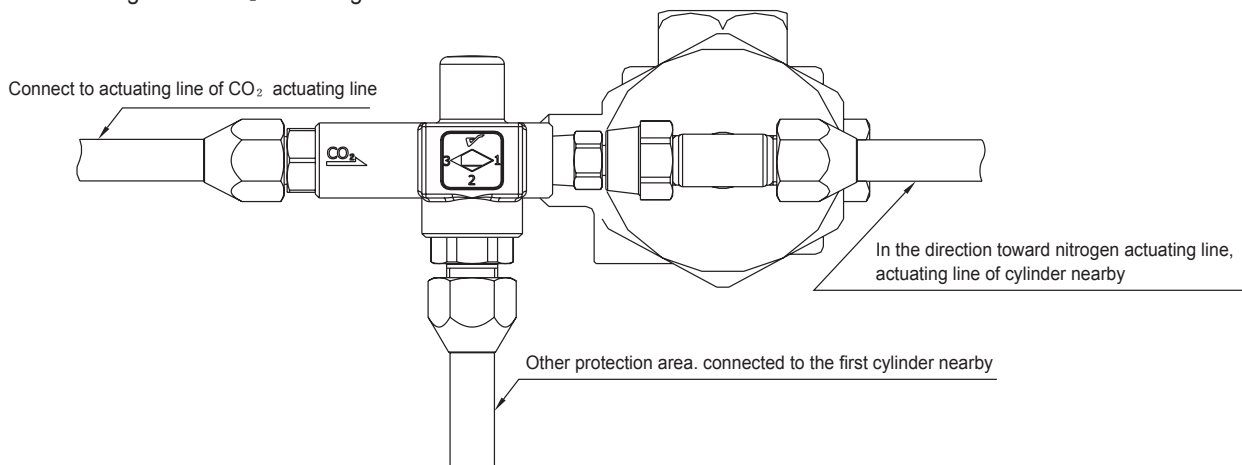
1.2.4.2 Automatic Actuating Device

It is interlocked with work of detector of automatic fire detecting system. Install it according to the following standard.

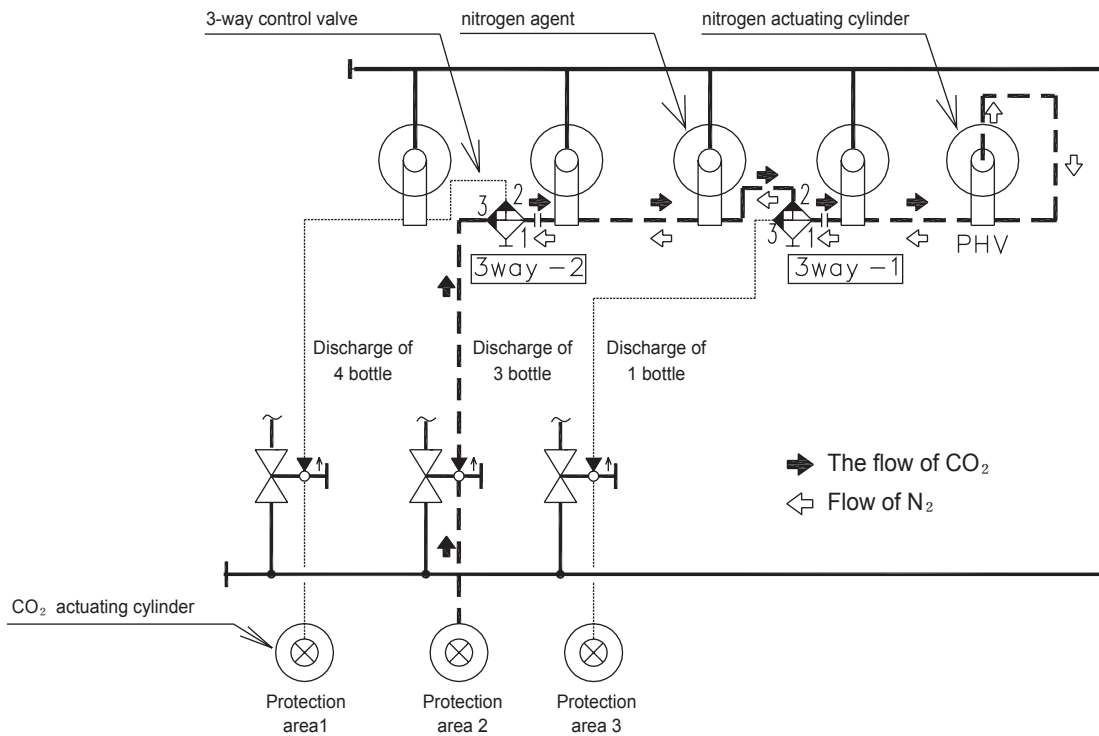
- ① Install with manual actuating device.
- ② Install in the way it works by machine, electricity or gas power.
- ③ Install a discharge signal lamp that indicates release of agent at the exit of the area where fire extinguishing system is installed.

1.2.5 Actuating Device

- ① Install 3-way control valve by taking the following steps
 - Depending on the number of nitrogen agent cylinder that is released into a certain protection area, start to install nitrogen agent cylinder near nitrogen actuating cylinder and the last bottle of necessary cylinder in a certain protection area.
 - There are three places where 3-way control valve can be connected as shown below:
 - No.1 : Tee, downstream of actuating line of the bottle produced at last.
 - No.2 : A Actuating line of the first nitrogen agent cylinder nearby which is released into other areas.
 - No.3 : Actuating line of CO₂ actuating line



② Diagram of actuating line of 3-way control valve



1.2.6 Installing pipe

- ① Pipe and fitting of Blazero-100(IG—100) is plated with Zinc and should be able to withstand internal pressure during discharge from cylinder. The ratio of volume of cylinder to that of pipe should be less than 103.6%.
- ② Collecting pipe of cylinder, selection valve header and discharge pipe should be made strong enough to withstand the impact by discharge of Blazero-100(IG—100) agent and Branch pipe should be supported safely enough to withstand the load of pipe depending on installation location of branch pipe. Also, to prevent shaking of pipe when gas is discharged, it should be more than 65X65X6t angle and fixed with U-Bolt by making and installing brackets.
- ③ Install support for pipe depending on the size of pipe putting apart in distance as shown below:

[distance between pipes when installing depending on the size of pipes]

Diameter of pipes	Distance
15A ~ 20A	2m
25A ~ 40A	3m
50A ~	5m

Clean pipes by inserting nitrogen and blowing foreign materials

● Caution

For safety, make sure there is no human being in protection area when nitrogen is sprayed into protection area to clean inside pipes.

1. General Overview

1.2.7 Installing discharge nozzle

- ① When discharge nozzle is installed in protection area, fix discharge nozzle tightly to the end of pipes using spanner.
- ② One discharge nozzle can protect at best 144 m² of area (radius 8.5m of round is standard) and 7.0m high.

• Caution

- Install discharge nozzle only after checking if it fits the standard size of orifice hold and its size on a diagram marked in 'mm' unit.
- If the ceiling is higher than 7.0m, additional line of discharge nozzle should be installed. Make sure that the direction and angle of additionally installed discharge nozzle fits those drawn on a diagram and there is no obstacle near discharge nozzle that can block discharge.

1.2.8 Control Panel

Control panel and fire indicating unit of Blazero-100 (IG-100) fire suppression system should be installed according to the following standard. Fire indicating unit is not necessary if control panel of receiver of automatic fire detecting system includes fire indicating unit.

- ① Control panel has controlling functions such as receiving signal from manual actuating device or detector, actuating acoustic alarm, discharging agent or delaying. Power indicator should be built in control panel.
- ② Fire indicating unit receives signal from control panel and operates. It should be installed according to the following standard:
 - a. Alarm such as a bell or a buzzer should be installed in each protection area which works interlocked with an indicator that indicates controlling of acoustic alarming device and work of detector. In this case, it is possible to use an indicator as well that indicates controlling of acoustic alarming device and work of detector
 - b. As of manual actuating device, install an indicator that indicates work of switch for discharge.
 - c. Install an indicator that indicates the release of agent.
 - d. As of automatic actuating device, install an indicator that turns automatic into manual vice versa
- ③ Control panel and fire indicating unit should be installed in the place that is convenient to inspect and free from worries about impact or vibration caused by fire or erosion.
- ④ Provide circuit diagram and manual in control panel and fire indicating unit.

1.2.9 Acoustic Alarming Device

- ① As of installation of manually actuating device, in the process of controlling actuating device, install automatic actuating device interlocked with fire detector so that alarm goes off automatically
- ② Alarm can continue to go off for longer than one minute after agent starts to be released. It can effectively warn people in the protection area or place where there are objects subject to fire extinction.

1.2.10 When installing alarm through broadcast.

- ① An amplifier reproduction device is incombustible when fire breaks out. Install it in convenient place to maintain.
- ② Vertical distance from the part of compartment where there are objects protected from fire to speakers should be closer than 25m.
- ③ Alarm should be designed to continue to go off even when restoration switch is controlled.

1.2.11 Automatic shut-down device

- ① Ventilating device should be designed to stop before Blazero-100(IG-100) agent is discharged.
- ② It should be designed to recover outside protection area or the compartment where there are objects protected from fire and the location should be marked.

1.2.12 emergency power

Emergency power of Blazero-100(IG-100) fire suppression system is private electric generator or storage battery system(also when control panel is built in). It should be installed according to the following standard:

- ① It is an easy place to inspect and free from damage caused by disasters such as fire, flood, etc.
- ② fire suppression system should be able to work effectively longer than 20 minutes.
- ③ When supply of power stops from prime power, power can be supplied from emergency power automatically.
- ④ Emergency power should be installed in the place other than protection areas. In the place there should not be anything except for equipment necessary to supply emergency power or facilities – equipment or system necessary for combined heat generation system is excluded.
- ⑤ when installing emergency power indoor, emergency lamp should be installed indoor.

1.2.13 Overpressure vent installation

1.2.13.1 How to discharge pressure

Pressure discharge releases gas through overpressure vent or safely release gas through duct. Gas naturally is discharged naturally from overpressure vent due to pressure increase.

1.2.13.2 Location for installation of overpressure vent

The lower part of damper of overpressure vent on the side wall of protection area should be installed within 1m from the ground.

1. General Overview

1.2.13.3 When installed on the wall of protection area

When overpressure vent is installed on the wall of protection area, kinds of architectural finishing materials should be taken into consideration and the wall should be at least 100mm thick.

When overpressure vent is installed, the beauty of the wall should be taken into consideration, then grille or louver should be additionally installed on the front and back of overpressure vent.

- Concrete and masonry wall
10mm larger sleeve all direction than measurement of overpressure vent written on design diagram should be installed when the wall is constructed. When Blazero(IG-100) fire suppression system is constructed, remove sleeve and install overpressure vent, and then finish gaps of walls with incombustible materials.
- Panel wall such as plaster board.
- Cut into 10mm larger all direction than outward measurement written on design diagram, install overpressure vent and finish gaps between wall

1.3 Testing

1.3.1 Pipe secret testing

After shutting down all the pipes, increase air pressure to 2.8kg/cm^2 (40psig), keeping it its 20% from being released for 10 minutes.

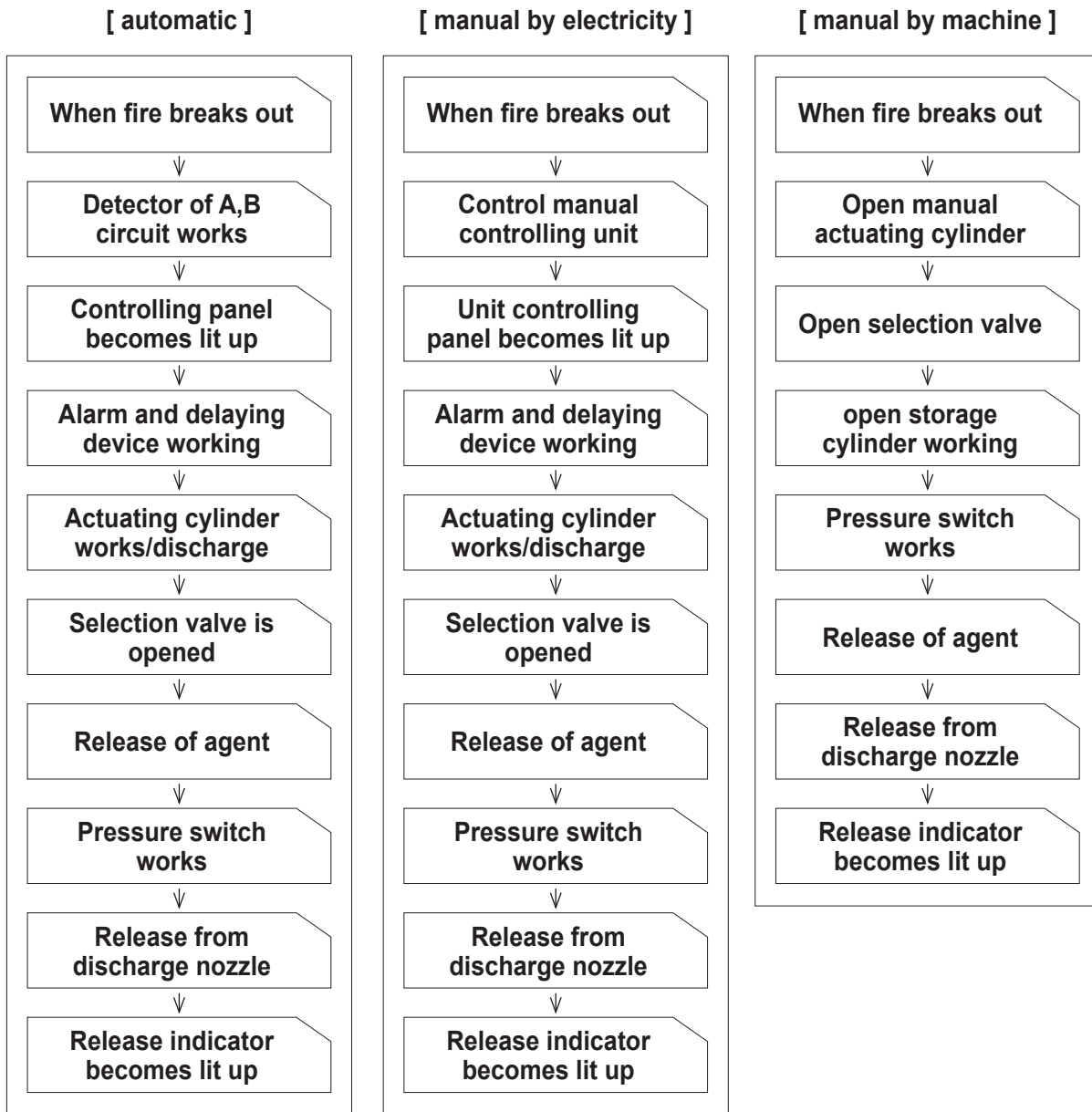
1.3.2 Testing actuating device

Disconnect solenoid valve from CO_2 actuating cylinder, check if solenoid is working properly by manually controlling or actuating controlling panel of Balzero-100(IG-100) fire suppression system and then check if solenoid is working properly by actuating a detector as of automatic actuating system.

1.3.3 Testing discharge

When manual controlling unit or an indicator in each protection area is actuated, acoustic alarm should go off, agent cylinder becomes opened, selection valve of protection area concerned begins to work certainly and agent should be released from discharge nozzle. Then an indicator of release of agent should get lit and all the outlet(damper, exit, etc) should be shut down when agent is discharged. After testing, restore every device to normal and replace agent cylinder and actuating cylinder.

1.3.4 Operation



1.4 Inspection, maintenance

1.4.1 Storage cylinder

- ① Insert pressure gauge into pressure gauge port of cylinder valve of installed storage cylinder and check if pressure is 28MPa(280bar)±5%. If pressure loss exceeds 5%, refill or replace cylinder.
- ② storage cylinder is valid within 5 years and should be inspected again when expiration date is due. But even if expiration date is due, if agent is intact, then it is not affected by the expiration.

1. General Overview

1.4.2 Actuating cylinder set

- ① Fill or replace actuating cylinder if it is less than standard after checking the filling amount of CO₂ .
- ② Check whether damaged or broken after disconnecting solenoid from actuating cylinder and check whether it works properly both automatically and manually.
- ③ Inspect automatic and manual operation of pressure switch, check if it works properly. Replace if points of connection are damaged or work poorly.

1.4.3 Copper plate for actuating and related appendage

- ① Check with your own eyes if it matches installation diagram or it is damaged and connected for sure.
- ② By comparing it with installation diagram, check with spanner attached location, direction of check valve and connection and removal of controlling copper plate, etc.
- ③ By removing check valve, check if it works properly with testing gas. Replace it if it works poorly.

1.4.4 Manual actuating device

- ① Check cautions and installation height of controlling panel.
- ② Check of power indicator and discharge indicator become lit up.
- ③ Check if actuating switch and stop switch works properly, there is no deformation, damage, significant erosion in protecting cover and if the cover is tightly fixed

1.4.5 Selection valve

- ① Check if there is any damage, breakdown in valve and check connection point of flange and nuts of actuating line if they are tightly connected.
- ② Check if manual lever works properly and closes in the right location and check if motor operated valve is working properly.
- ③ Check if names of protection area, names of objects protected from fire are marked clearly.

1.4.6 Discharge Nozzle

- ① Check if discharge nozzle is installed in right angle.
- ② Check if there are no obstacles near the nozzle that block discharge and if it is installed well so that it can effectively spray the entire protection area and objects protected from fire.

1.4.7 Alarming device

By controlling detector or manual actuating device, when alarming device works, alarming sound such as siren goes off and then voice broadcasting is aired normally. Replace the device if it works poorly.

Blazero-100™ IG-100 Selection valve Type Approval Certificate (25A to 150A)



제 201500573 호

형 식 승 인 서

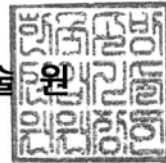
신청인 성 명 : 이광호
 상 호 : 영도산업(주)
 사업장주소 : 부산광역시 강서구 녹산산업중로 22 (송정동)

소방시설설치유지및안전관리에관한법률 제36조제1항 · 제37조제1항
 및 소방용품의품질관리등에관한규칙 제8조 · 제9조제3항에 따라 다음과 같이
 아래 소방용품의 형식을

- 1. 종 별 가스관선택밸브
- 2. 형 식 자동개방형, 호칭 25, 32, 40, 50, 65, 80, 100, 125, 150A, 퍼
스톤릴리스방식사용압력 3MPa~11MPa
- 3. 형식승인번호 선15-4
- 4. 조 건
- 5. 비 고 선13-1, 선13-2, 선13-3, 선13-4, 선13-5, 선13-6, 선13-7,
선13-8, 선13-9 호칭통합승인

2015 년 07 월 02 일

한 국 소 방 산 업 기 술





HANJU CHEMICAL CO., LTD. HANCHANG

Hanju Chemical. co.,Ltd. / Sales : HanChang co., Ltd.

Factory office : (445-010) Gyeonggi-do, Hwaseong, ssangsongbuk road 52-18
TEL : 031-357-5601~2 FAX : 031-357-5603

Seoul office : 150-874 City of Seoul, Yeongdeungpo-gu, Gukhwedae 62 street 21,
Dongsong building 11th floor

TEL : 02-850-6631~5 FAX : 02-851-4555

E-mail: hfc23@hanchang.co.kr

<http://www.hanjufire.com> <http://www.hanchang.co.kr>