



## **Safety Valves for Refrigeration Plant**

**by**

**Anand Joshi**

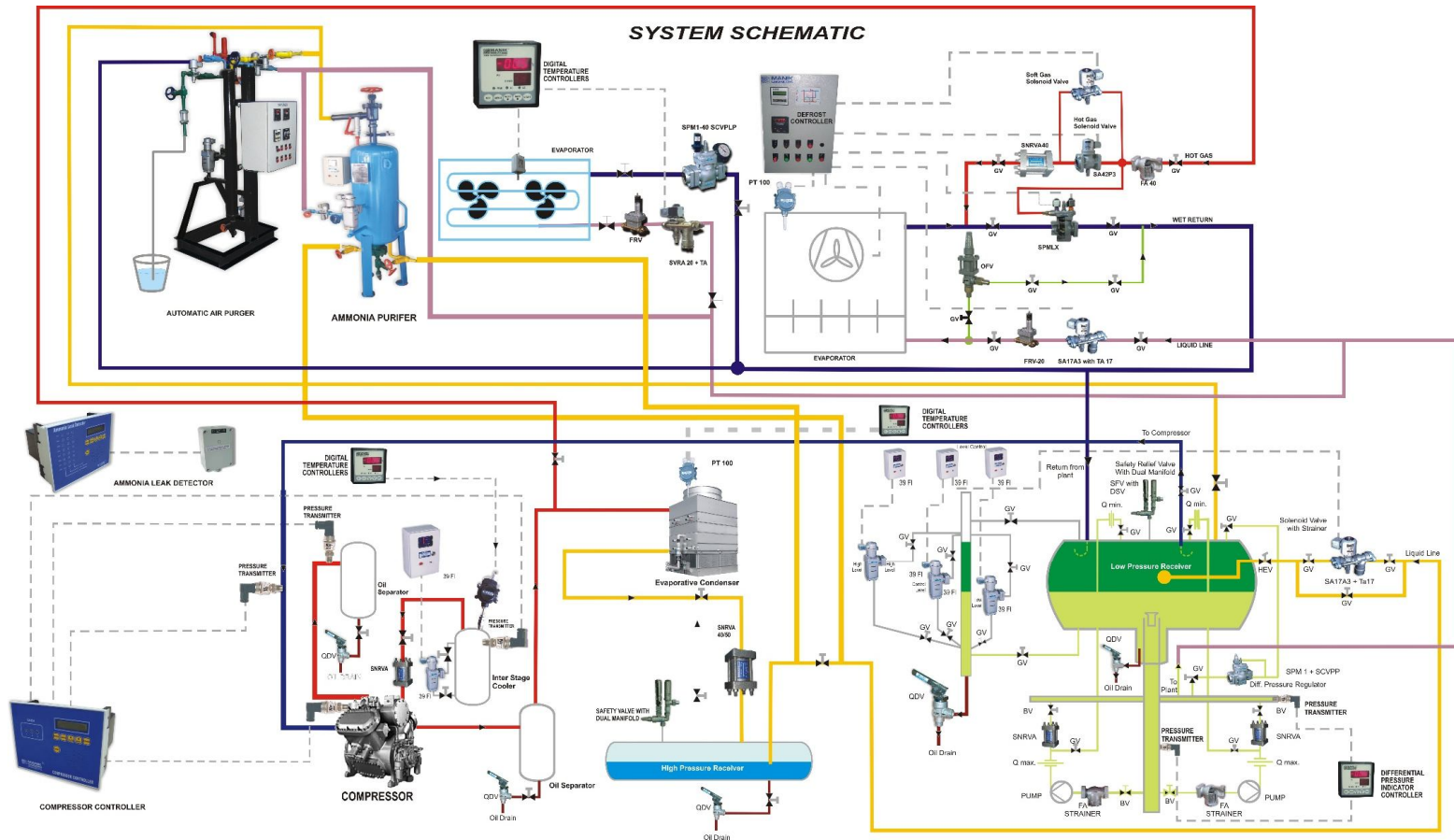
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# SAFETY VALVES AND DUAL MANIFOLD

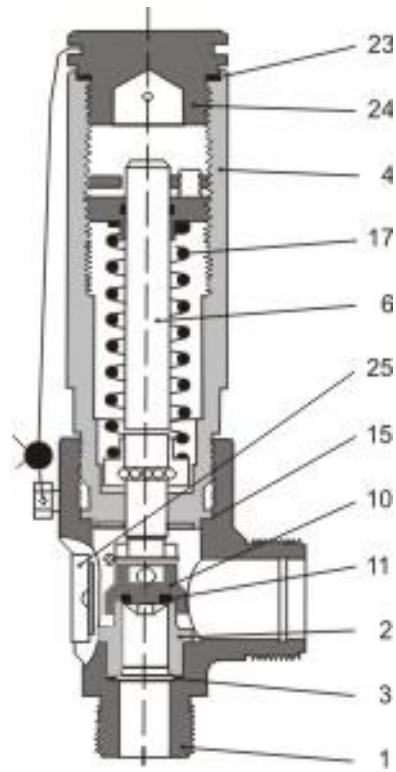


- Single Safety Valve
- Dual Manifold for Safety Valve
- Various Sizes of Safety valves

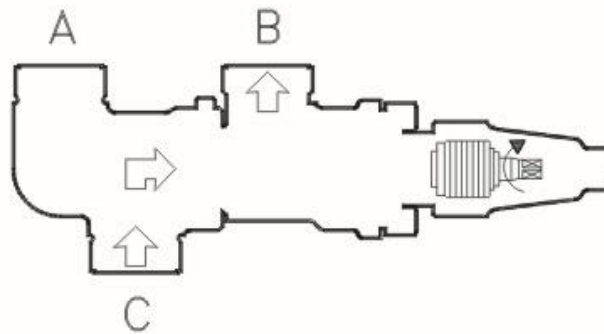
## Single Safety Valve or Dual Manifold ?

- Single Pressure Relief Valve for Vessel of internal gross volume more than 3 cu. ft or less than 10 cu. Ft
- Dual Manifold for all pressure vessels with internal gross volume more than 10 cu. Ft.

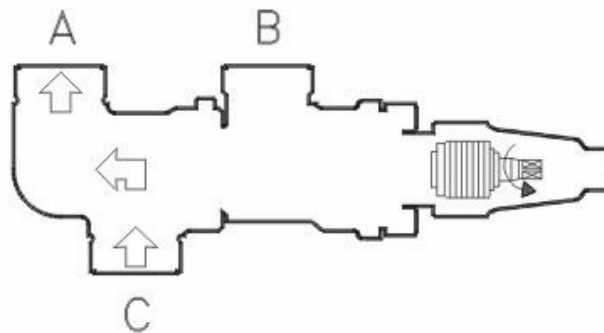
# SAFETY VALVE OPERATION



# THREE WAY VALVE / DUAL MANIFOLD

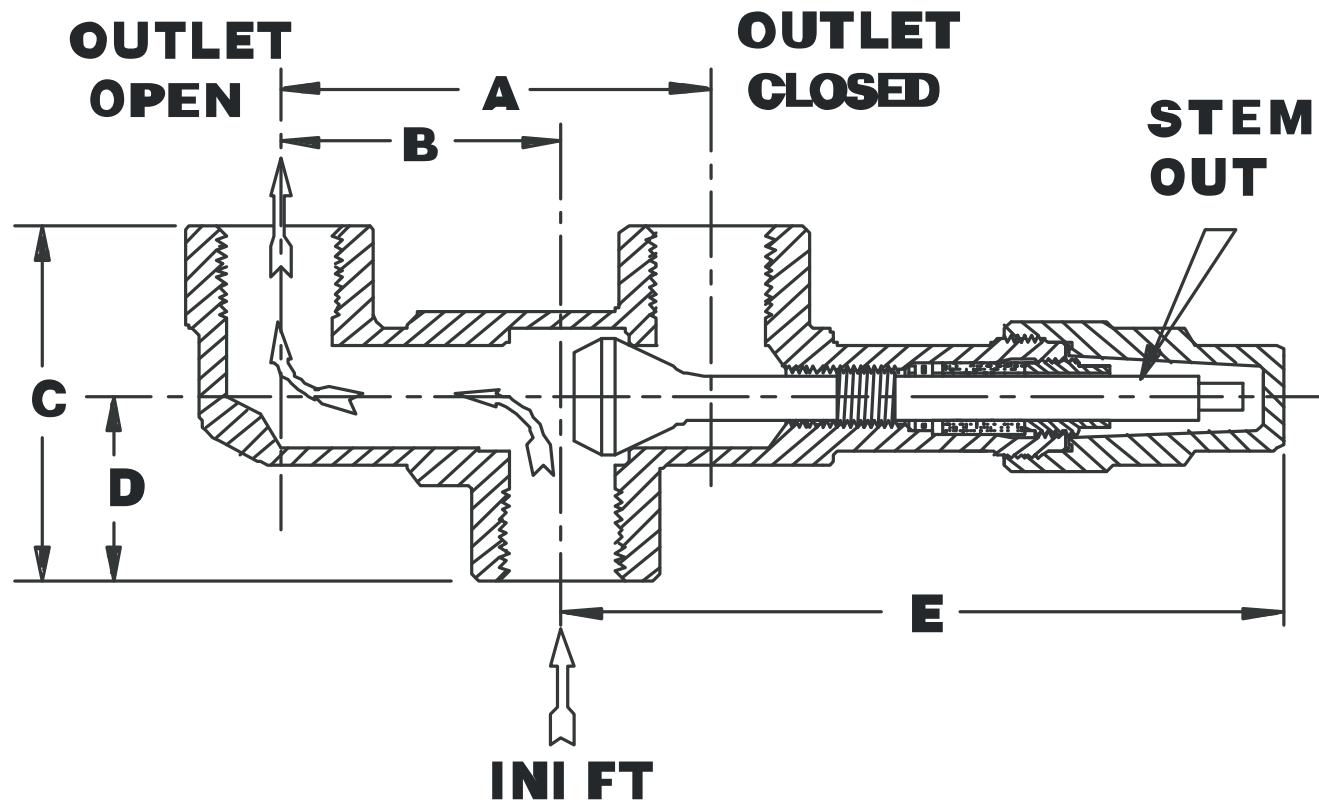


*Fig. 1*



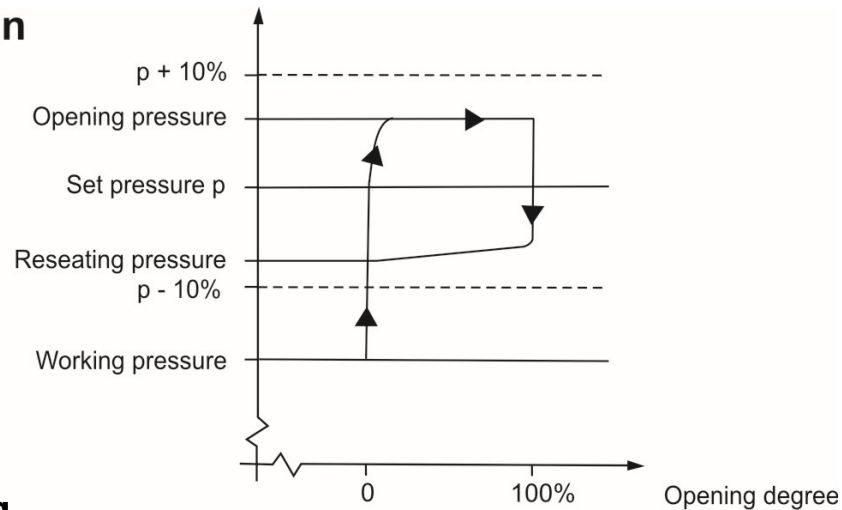
*Fig. 2*

# THREE WAY VALVE / DUAL MANIFOLD



# SAFETY VALVE RELIEF SETTING

## Design



## Pressure Setting

Pressure-relief valves shall start to function at a pressure not to exceed the design pressure of the parts of the system protected.

The relief valve setting should be atleast 25% above the maximum expected operating pressure to avoid "seeping," but must never be higher than the design pressure of the vessel.

# SIZING OF SAFETY VALVE

Ammonia Pressure Vessel	IP	SI
General	$C = 0.5DL$	$C = 0.04DL$
If combustible materials are used within 20 ft (6.1 m)	$C = 1.25DL$	$C = 0.1DL$
For plate heat exchanger or double-pipe condenser	$C = 0.5(A/2)$	$C = 0.04(A/2)$

where

$C$  = required discharge capacity , lb(air)/min [kg/s]

$D$  = OD of vessel, ft [m]

$L$  = length of vessel, ft [m]

$A$  = Overall external surface, ft<sup>2</sup> [m<sup>2</sup>]



# SIZING EXAMPLE

1. Select a relief valve for an ammonia vessel 6 feet diameter by 16 feet long.

$$C = f D L = 0.5 \times 6 \times 16 = 48 \text{ lb-air/min}$$

2. Select the desired pressure setting of 225 psig.
3. Refer to the capacity table / Use Discharge Capacity Graph Provided by Manufacturer.
4. select model.

# SIZING OF SAFETY VALVE

PRESSURE-RELIEF VALVE CAPACITY RATINGS

Cat. No.	Air Capacity	Standard Pressure Settings (psig)									
		150	175	200	225	250	275	300	325	350	400
SH5600R	lb/min.	10.6	6.12	13.9	15.6	17.2	18.9	20.5	22.1	23.8	27.1
SH5602R	scfm	141	166	185	207	229	251	273	294	317	360
SH5600A	lb/min.	31.3	36.1	40.9	45.7	50.5	55.3	60.1	64.9	69.7	74.5
	scfm	417	480	544	608	672	736	799	863	927	992
SH5601	lb/min.	35.8	41.3	46.8	52.2	57.7	63.2	68.6	74.1	79.6	
SH5602	scfm	476	549	622	695	768	841	913	986	1059	

# SAFETY VALVES AND DUAL MANIFOLD

## Installation & Maintenance Tips

- No stop valve before safety valve
- For Leak testing of the Plant remove all safety pressure relief devices and cap or plug the openings.
- The discharge pipe shall be not less than the size of the relief-device outlet
- Pressure-relief devices shall be connected as close as practicable to the refrigerant container or evaporator it serves and above the refrigerant level in such container.
- Pressure-relief devices shall discharge to the atmosphere at a location not less than 15 feet above the adjoining ground level, not less than 20 feet from any window, ventilation opening or exit in a building.

# SAFETY VALVES AND DUAL MANIFOLD

## Installation & Maintenance Tips

- Calibration of safety valve every year
  - Replace safety valve after every 5 years
- Always replace relief valves once they have discharged. Do not discharge relief valves prior to installation or when pressure testing. IIAR Bulletin 109, Guidelines for IIAR
- Minimum Safety Criteria for a Safe Ammonia Refrigeration System, states "Pressure relief valves discharging to atmosphere should be replaced or inspected, cleaned and tested every five years of service."

# SAFETY VALVES AND DUAL MANIFOLD



# SAFETY VALVES AND DUAL MANIFOLD



Stop valve Below  
Safety Valve  
Not Recommended

# SAFETY VALVES AND DUAL MANIFOLD





# SAFETY VALVES AND DUAL MANIFOLD

