MECHANICAL ISOLATION

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Mechanical Isolation:

Mechanical isolation is isolation equipments from each other in order to conduct maintaince, repair or modification. Isolation can be implemented by valve isolation or positive isolation (Blind,Spade…etc). Positve isolation is crucial that it remove all risk.

Positve isolation means that we are using blind flange/spade/spectecale blind.

Fluids can be isolated in various ways:

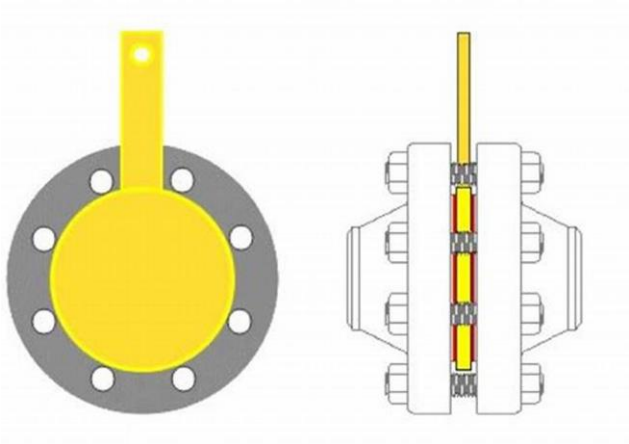
- Blinding
- Double Block and bleed
- Single block or single block and bleed.
- Disconnection

Blinding:

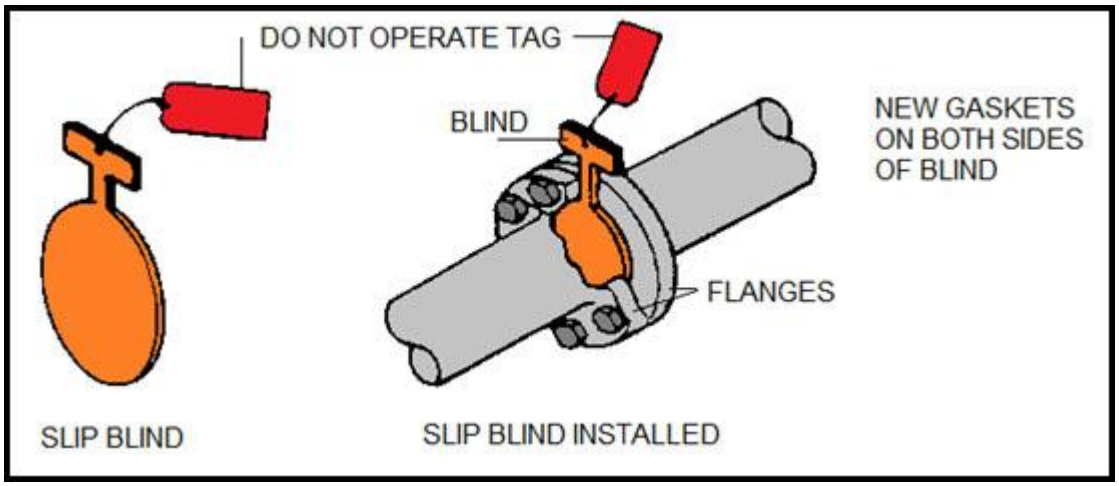
Blinding is inserting spade or spectecle blind between two flanges.Also, A blind flange is used to cap the end of pipe. They provide flexibility during operation and maintencne.

Types of blinds:

1- Slip blind (Spade)



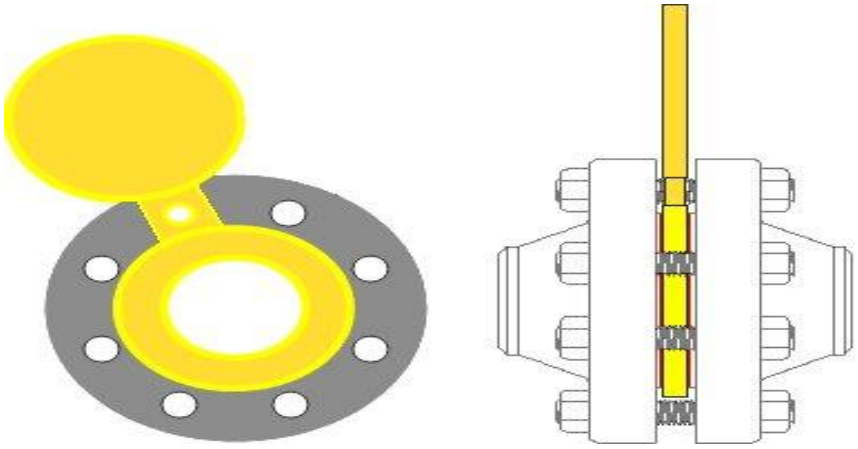
A spade is inserted between two flanges to prevent flow in either direction.
It is a good option when the pipe is large.
A new Gaskets is used in both sides of the spade.



2- Spectacle Blind

Consist of a blind and spacer. The shape is similer to a spectecale. They are permenantly installed and rotated as needed.

Spectecle blind is used if the flange to routinely used or flow needs to be interupted from time to time.



3- Blind flange

Blind flange is used to blank off a pipe. Its worth to mention that it is bolted to a flnage.

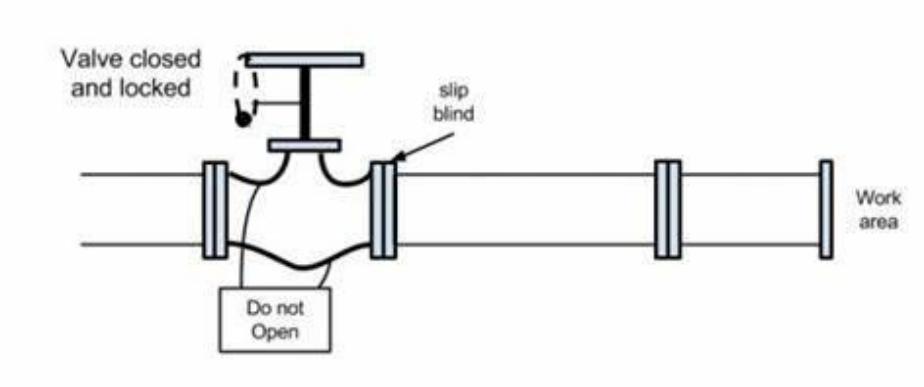
When to blind:

- Confined space entry
- Welding equipment start up
- Maintenance
- Repairs
- Shutdwon

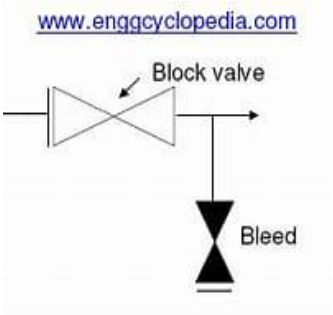
Note: Blinds and spades pressure rating has to be same sa the line that they will be connected to.

Single isolation or double isolation:

Single isolation should be done by single block valve. The valve can be Gate or ball valve.
Double isolation can be done by two valve in series or single block valve with spectacle flange or blank flange.



Or Block valve and bleed (SBB)



The reliability of the seal and integrity of the valve is signifigant since the isolation depends on it.

- Good for routine
- Short duration
- Low pressure
- Cold work

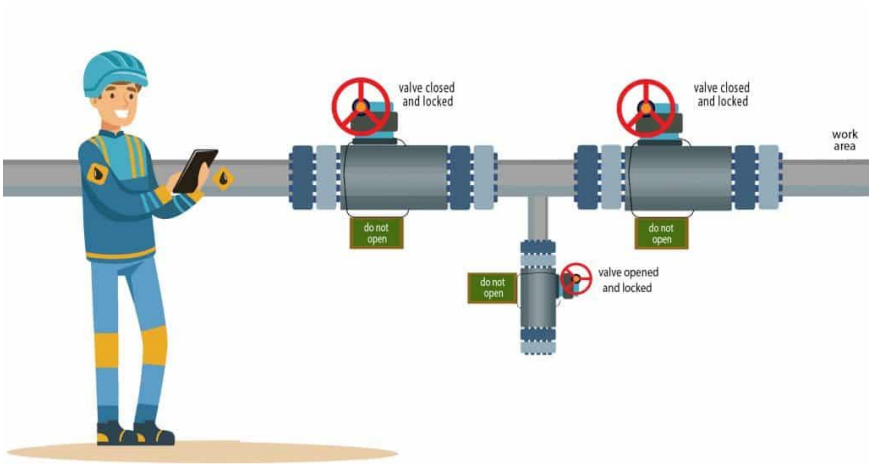
Double block and bleed:

Double block and bleed isolation is done by two block valves and one bleed(vent or drain) between the two valves.
It is the most secured form of valve isolation. Therefore, it can be used in high pressure isolation.

DBB reduce the time, manpower and it is more secured.

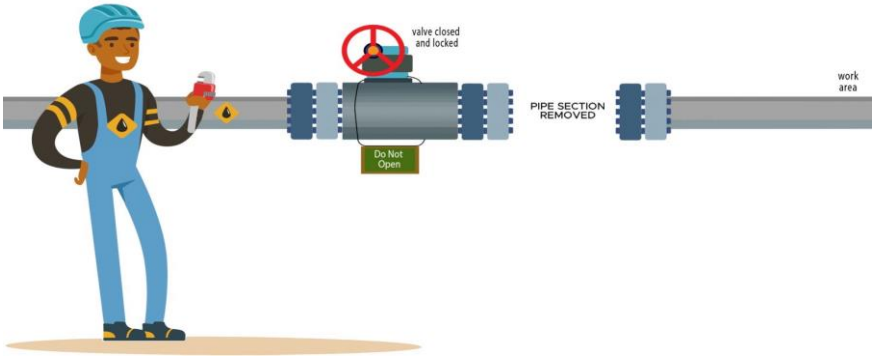
DBB can be two seprated block valves and and one bleed valve OR a single unit in a compact design.

Mostly, in oil and gas industry, the tradition double blook and bleed is used.
DBB shall be provided for isolation in all 900# and higher.



Disconnction:

Physical disconnection is the preffered way for isolation since achives the acual, physucal sepration of the source. It can be implemented by removing a spool and installing a blind flange



The disadvange with this method is that, if the pipe is large, it is difficult to remove the spool. In addition, lifting equipment and more manpower are needed to achive isolation.

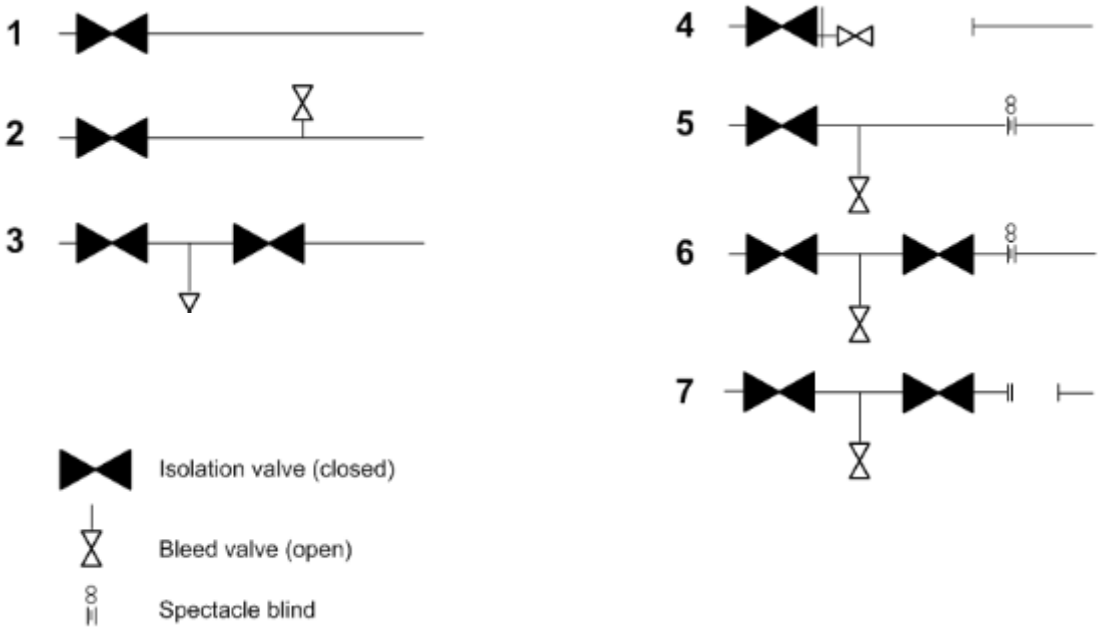
- Time consuming
- Not suitable for routine maintenance
- Used when isolation is expected to be longer than a month

However; to achieve more secured isolation, a combination of the isolation method can be done.

For example:

- Double block and bleed can be implemented with line break.
- Block and bleed with spectecle blind.

  By combination, there are many levels of isolation:



Level 1: Closed Valve
Level 2: Closed Valve with open Bleeder
Level 3: Double Block and Bleed
Level 4: Block and Bleed with Break Line
Level 5: Block and Bleed with Spectacle Blind
Level 6: Double Block and Bleed with Spectacle Blind
Level 7: Double Block and Bleed with Line Break

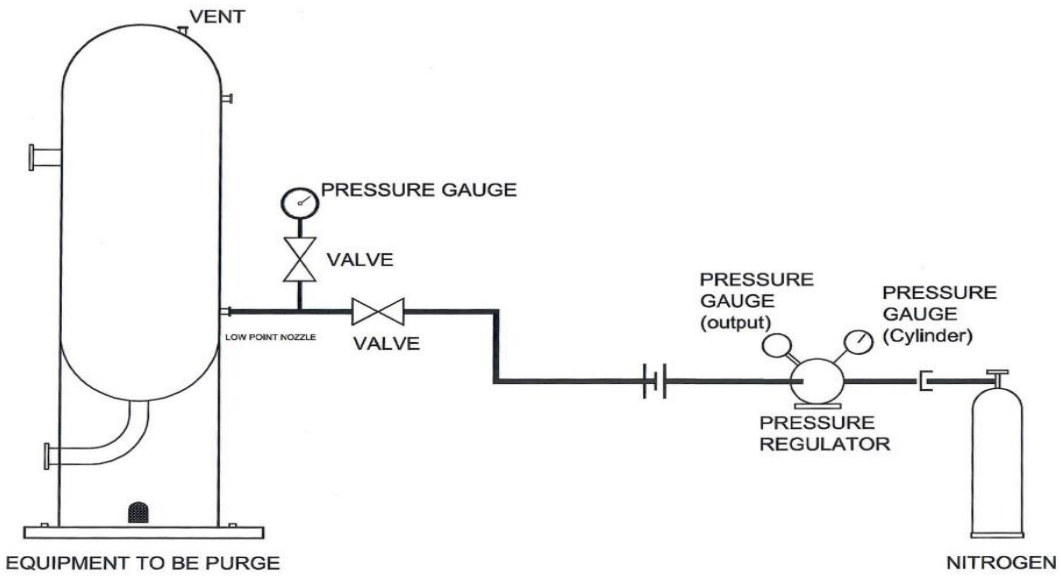
Venting: Its Area Authority responsibility and they must present AT ALL TIME during venting operation.
If there is too much wind, a lot of gas and flammable, another hot work job is closed, then the permit shall be suspended

Water flushing:

Area Authority is responsible for depressurizing and drain the hydrocarbon from equipment.
Ensuring that there is no hydrocarbon is done by taking sample.
Check Valve must be in the process.

Nitrogen purging

A nitrogen is used to push out other fluids and gases.
Connect a hose from a low-pressure nitrogen source to a suitable purge connection with check valve.
Then open the valve and control the discharge pressure at the nitrogen source. A pressure regulator must be used in the process.



Oxygen level monitor must be in the work area

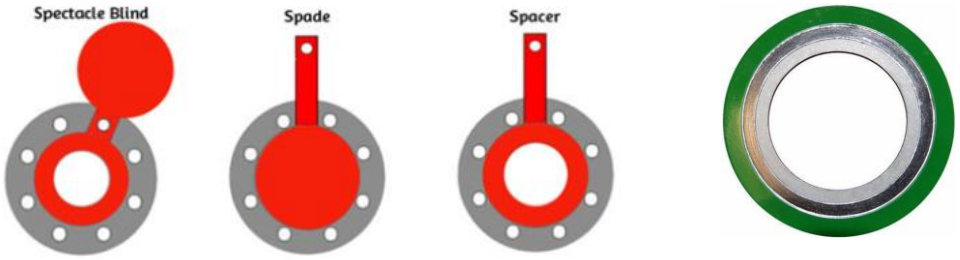
Breathing apparatus is required when Oxygen level is less than 19.5%

Before mechanical isolation:

- The valve isolation is in place, and all are locked and tagged.

- Pipes is depressurized and has no hazardous fluid.

- Isolation devices (Blinds) and New Gasket are in correct rating.



- The place of blinds is already determined.
- Instrumentation associated with the piping/ vessel equipment should be disconnected, removed, and capped.

After Ensuring the correct process line, system or equipment is positively isolated and fully depressurized, the process line is opened.

After opening the line, a nitrogen compatible gas detection monitor is used at the open flange to check if there is any flammable or toxic gas. It shall be conducted by Authorized Gas Tester.

Standard Pallister type is not accepted, so a gas detection monitor, which is suitable for use in inert gas atmospheres, is required.

Isolation Methods:

Isolation standard 1: Physical Disconnection and fitting of blind, or inserting spade or spectacle blinds.

Isolation standard 2: Double block and bleed (DBB).

Isolation standard 3: single valve isolation (Low Pressure).

Pressure	Isolation Phase	FLUIDS & PROPERTIES				
		Crude Oil Hydrocarbon Gas Condensate NGLs Methanol (toxic, flammable and flashing liquid)	Treatment Chemicals Hypochlorite Biocides Scale & Corrosion Inhibitors Demulsifiers (non-flammable, non-flashing, irritant liquid)	Diesel Glycol (Flammable liquid–store below flash point)	Nitrogen Gas Liquid Nitrogen CO_2	Firewater Potable Water Cooling Water Plant Air Instrument Air Domestic Water
Above 720 psig	Initial Isolation	St 2 (DBB)	St 2 (DBB)	St 2 (DBB)	St2 (DBB)	St2 (SBB)
	Final Isolation	St 1 (Positive)	St1 (Positive)	St 1 (Positive)	St1 (Positive)	St1 (Positive)

St 1	Standard-1 (Physical Disconnection)
St 2	Standard-2 (Double block and bleed Isolation)
St 3	Standard-3 (Single Valve Isolation)
SBB	Single valve bleed
DDB	Double Block and Bleed
Positive	Physical disconnection (Spade/Blinds/Blank Flanges)

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Between 147 and 720 psig	Initial Isolation	St 3/St 1 (DBB)/ (SBB)	St 3 (SBB)	St 3 (SBB)	St 3 (SBB)	St 3 (SBB)
	Final Isolation	St 1 (Positive)	St 2 (DBB)	St 2 (DBB)	St 2 (DBB)	St 3 (SBB)

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Below 147 psig	Initial Isolation	**St 3** (SBB)	**St 3** (SBB)	**St 3** (SBB)	**St 3** (SBB)	**St 4** (DB/SB)
	Final Isolation	**St 1** (Positive)	**St 3** (SBB)	**St 3** (SBB)	**St 3** (SBB)	**St 3** (SBB)

Pressure	Isolation Phase	FLUIDS & PROPERTIES				
		Crude Oil Hydrocarbon Gas Condensate NGLs Methanol (toxic, flammable and flashing liquid)	Treatment Chemicals Hypochlorite Biocides Scale & Corrosion Inhibitors Demulsifiers (non-flammable, non-flashing, irritant liquid)	Diesel Glycol (Flammable liquid–store below flash point)	Nitrogen Gas Liquid Nitrogen CO_2	Firewater Potable Water Cooling Water Plant Air Instrument Air Domestic Water
Flare systems & closed drains below 45 psig	Initial Isolation	**St 3** (SBB)				
	Final Isolation	**St 1** (Positive)				

In all cases: if the task is going to take more than one shift or a long term, Blind/spade must be installed.

Note: if the pressure is above 720 psi, and there is no DDB, Shutdown is required

Globe, control, check valve cannot be used for isolation.

Deisolation must be done same as the isolation process but in reverse.