

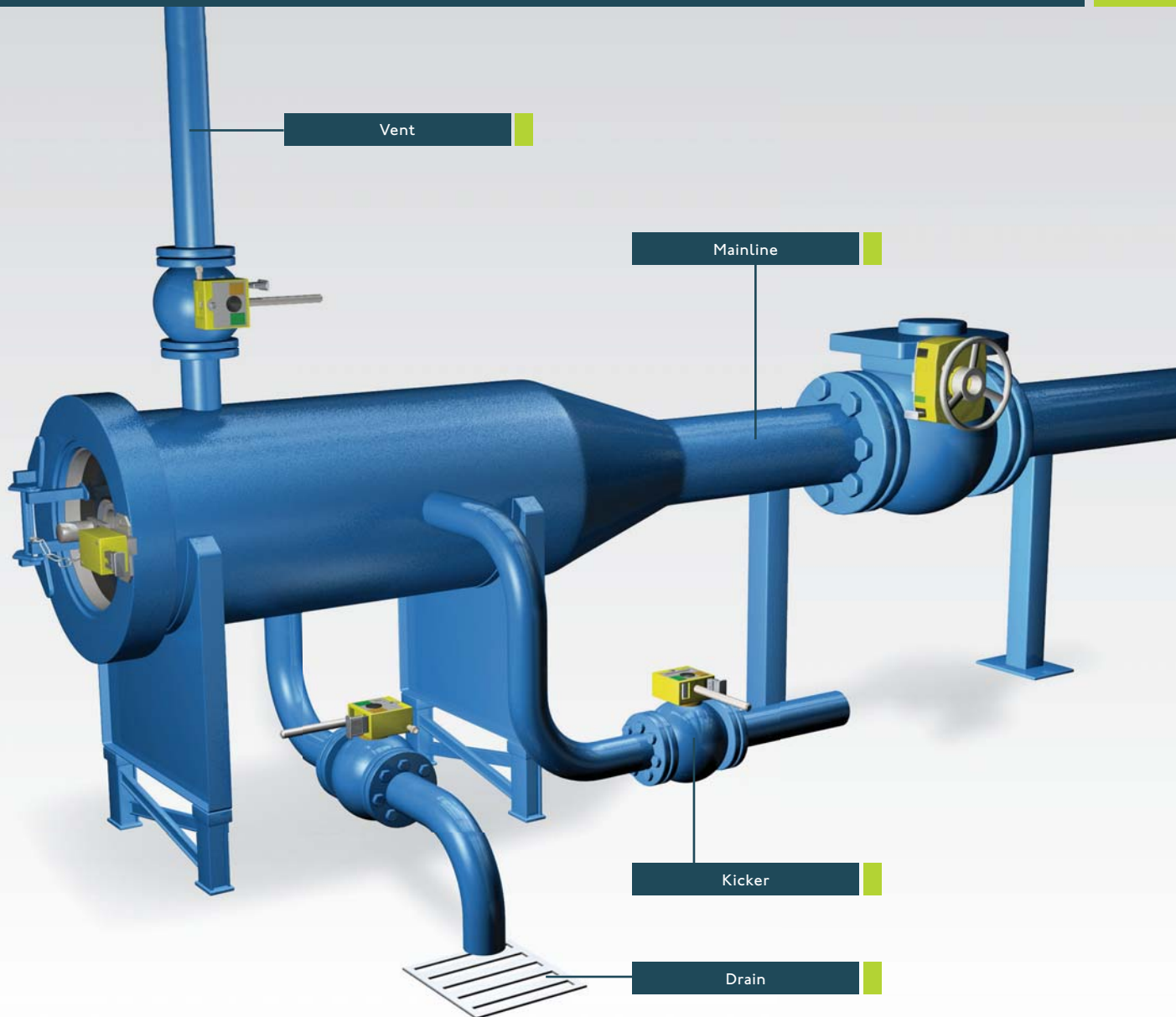


SMITH
FLOW CONTROL LTD

SFC KEY INTERLOCKS & PROCESS MANAGEMENT SYSTEMS



APPLICATIONS PIG Trap Interlocking



PIG TRAPS

Pig trap accidents involving operator intervention can be prevented by SFC coded-card key interlock systems.

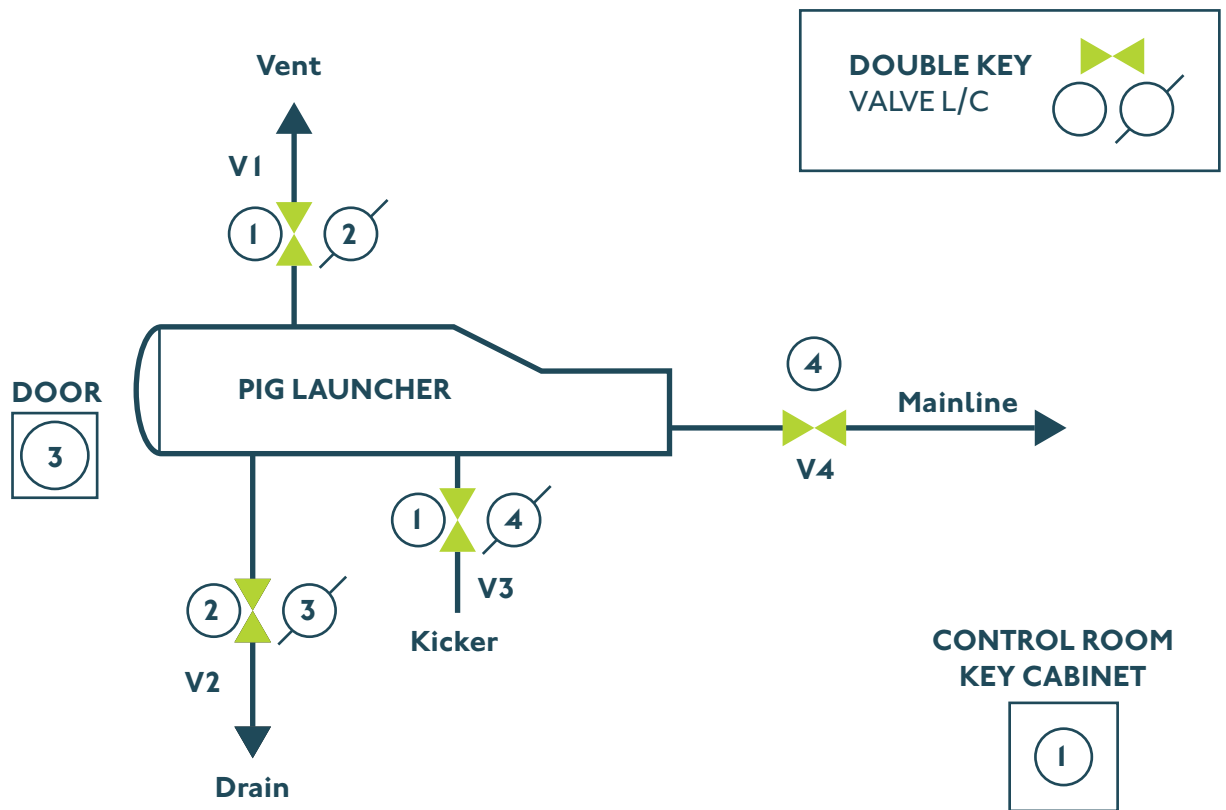
ASME and API codes recognise pig trap hazards – especially in relation to the risk of opening closures while the vessel remains under pressure. The Pipelines Safety Regulations 1996 enacted into UK law in April 1996 requires operators of pipelines to provide safety systems that ensure persons are protected from risk to their health and safety – again describing the hazard of opening pig trap vessels under pressure.

Many major OpCos also have their own written design standards specifying safety interlocks as an essential feature in their pig trap designs.

SFC interlocks can be specified to ensure the minimum safety arrangement of interlocking the vessel vent valve with the pig trap closure. This arrangement ensures (to the exclusion of all other methods) the vessel VENT valve is OPEN before any attempt can be made to open the closure.

With interlocks fitted to both the vent valve and pig trap closure, a key is released when the vent valve is opened – removing the key from the vent valve locks the valve in the open position. This key is coded in common with the closure lock – only by opening and locking the vent valve can the operator secure the correct key to proceed to unlock and open the closure.

PIG TRAP SCHEMATIC AND SEQUENCE



System Start Condition,

- a) All valves are closed and locked closed
- b) Vessel door closed & locked closed
- c) Key 1 is located in the Control Room Key Cabinet.

1 To Load Pig(s)

- a) Insert Key 1 into V1, unlock and open, lock open by releasing key 2.
- b) Key 2 into V2, unlock and open, lock open by releasing key 3.
- c) Key 3 into door lock. Unlock and open the vessel door, key 3 is retained all the time the door is unlocked and/or opened.

Load Pigs

2 To Re-Isolate, pressurise then launch

- d) Close and lock closed the vessel door, key 3 is released.
- e) Key 3 into V2, unlock and close, lock closed by releasing Key 2.
- f) Key 2 into V1, unlock and close, lock closed by releasing Key 1.
- g) Key into V3, unlock and open, lock open by releasing key 4.
- h) Key 4 into V4, unlock and open.

Pig(s) Launched

3 Re-Isolate after launch

- l) Close lock by releasing key 4.
- k) Key 4 into V3, unlock and close, lock closed by releasing key 1.

4 Depressurise Trap

- l) Key 1 into V1, unlock and open, Lock open by releasing key 2.
- m) Key 2 into V2, unlock and open, lock open by releasing key 3.
- n) Key 3 into V2, unlock and close, lock closed by releasing key 2.
- o) Key 2 into V1, unlock and close, lock closed by releasing key 1.

5 To Leave Trap in 'Dormant/Start' Condition

- p) Key 1 is returned to the Control Room Key Cabinet.

Proposed Sequence Ends

PIG TRAP INTERLOCKING

‘...Imagine the consequences of opening a Pig Trap closure with product and or pressure in the barrel’

‘...Imagine the effect of attempting to pass a pig through a partially open outlet valve’

‘...Imagine being exposed to H₂S’

...These things can happen - have happened!



Various switch options are available for the SFC DL3 interlock, should additional indications of the door/closure status be desired.

MECHANICAL KEY SAFETY

Mechanical key safety interlocking is the **ONLY** technology that can assure the universally accepted requirement in the loading and unloading of pig traps that the vessel is vented **BEFORE** it is possible to open the vessel closure. A key is released when the vent valve is unlocked and opened which then enables unlocking of the closure mechanism. This imperative is defined variously in the following standards and regulations:-

ASME VIII - Appendix M

1996 No. 825 - (UK) Pipeline Safety Regulations (Section 6 - Para. 37 of Guidance on Regulations - UK Health & Safety Executive).

US DoT - Pipeline Safety Regulations - Part 195 Transportation of Hazardous Liquids by Pipeline (§195.426 Scraper & Sphere Facilities).

Shell DEP 31.40.10.13 - Gen : Design of Pipeline Pig Trap Systems.

Other major OpCos including Statoil, Hydro, ADCO & BP among others have well defined specification requirements for interlocking of their launchers and receivers.



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