

## SCRAPPER VALVES AND PIG TRAP STATIONS

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## 1. General

Without any maintenance at a pipeline several problems can appear:

- The diameter decreases because of solids settle at the wall of the pipe
- Condensation water accumulates in gas pipelines and reduce the diameter of the pipe
- Corrosion and damages of the pipe cannot be detected early enough to prevent ruptures of the pipe.

These problems can be prevented by scraping the pipes with adequate pigs, which are used for following operations:

- Cleaning
- Draining / drying
- Separation of products
- Inspection

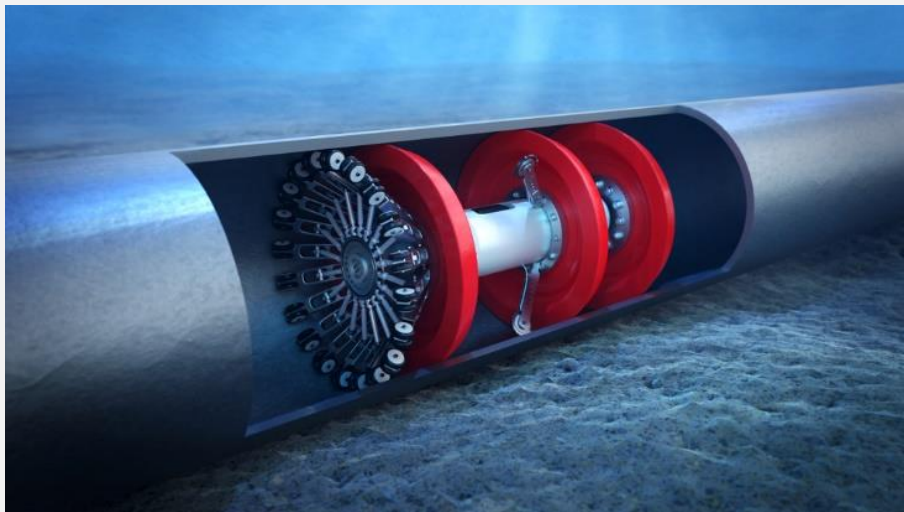
Adequate pigs are also used for the separation of products in polyducts.

Depending on the purpose of the scraping, different types of pigs are used. Short cylindric cup pigs in many different shapes are used mainly for cleaning, short spherical pigs are used mainly for separation of products.

So called “intelligent pigs” are used for inspection, in different versions for:

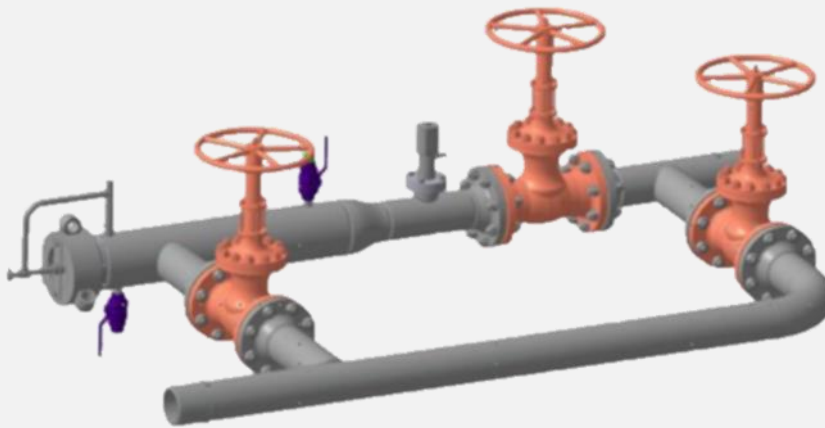
- Leak detection
- Surface crack detection
- Examination of internal shape
- Check of wall thickness

These intelligent pigs require a power supply for the sensing head, which are normally battery packs added to the sensing head. These intelligent pigs are normally much longer than cleaning or product separation pigs.



## 2. Pig trap stations

A standard method to launch and receive a pig is the pig trap station.

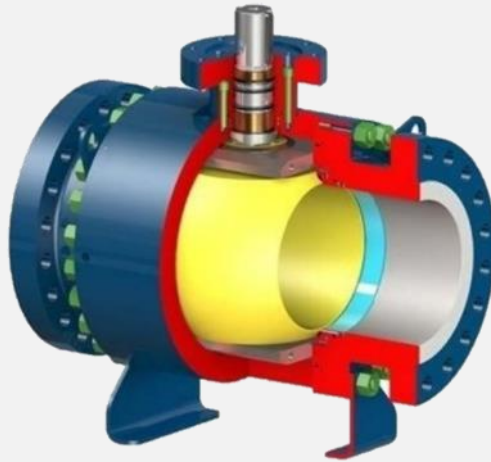


Such a station requires several valves and further equipment, the advantage is that it can handle pigs of any length. It needs some space; it is quite expensive and not very easy to operate. The integration in an existing pipeline may be a demanding exercise.

## 2.1 Components of a pig trap station

### 2.1.1 Valves

Recommended in this application is to use ball valves, for the line and the bypass. These ball valves should be zero leakage to prevent that fluid into the trap when the door is open, and it is recommended to use metal seated valve to prevent that the dirt transported before the pig damages the seats of the valves.



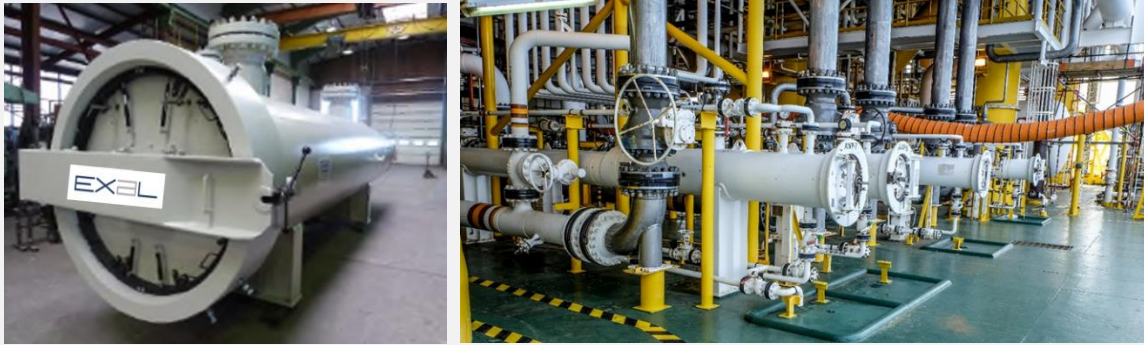
### 2.1.2 Trap

The trap itself, with the quick opening safety door, must be adapted to:

- Pressure class of the line
- Maximum length of the scraper used
- Designed as launching, receiving or for both operations, by defining the position of the bypass connection.

The diameter is normally one size larger than the size of the pipeline

The position of the bypass valve or valves depend on the operation (launching, receiving or both)



The door is equipped with a venting valve mechanically interlocked with the door, so that the opening is impossible with the venting valve closed.

The design of the traps can be done according to PED or ASME, and an inspection certificate extended by German authorities can be supplied on request.

Traps can be supplied in sizes up to ND 1500 (60") and pressure class up to PN 160 (900#).

### 2.1.3 Safety doors

In the cases where the trap is supplied by the piping contractor, EXaL Technology can supply the door independently. The door can be supplied for welding or flanged connection to then pipe of the trap.

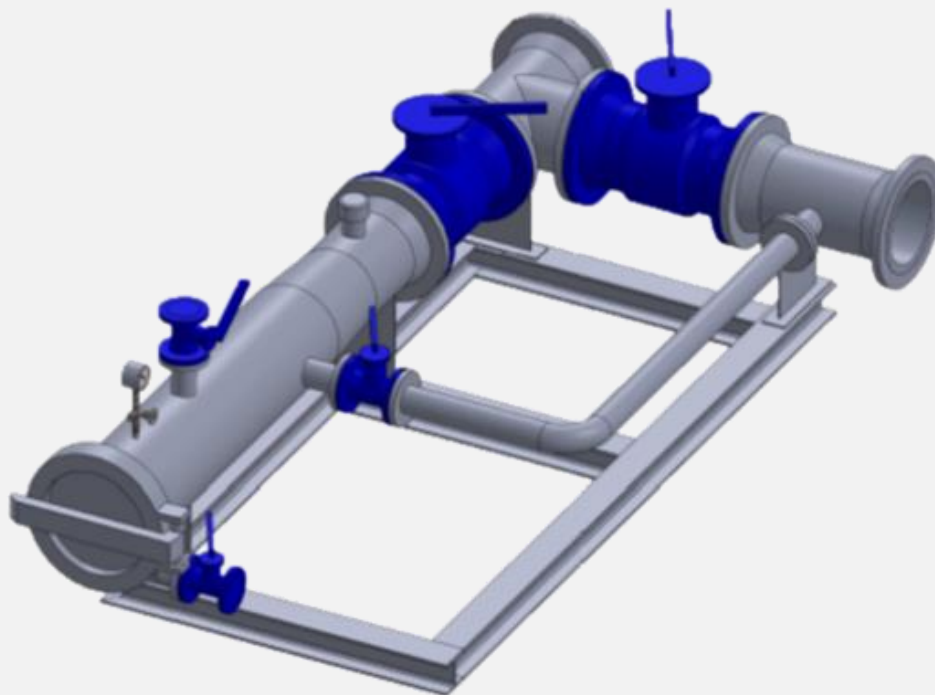


## 2.1.4 Trap skids

According to the local regulations to make the scraping of pipelines, the intervals are quite different. Normally cleaning, dewatering or separation pigs, which are short, must be used often, while intelligent pigs for inspection are used in long intervals, normally of several years, often every 10 years.

For the short pigs, the use of scraper valves is more convenient than the installation of complete stations, they are cheaper in the original investment, easier and quicker in their operation. The problem of scraper valves is that they cannot be used for long, intelligent inspection pigs.

To prevent the investment in complete pig stations, which are used once in many years, users that have many pipelines, can invest in transportable skids. These types of skid can be supplied in the pipe size required and be transported to the pipeline every time an inspection scraper must be used.



## 2.1.5 Accessories

As accessories pig detectors can be supplied, for installation at the entrance of the trap, which indicates that the pig has entered the trap.



## 3. Scraper valves

The principle of a scraper valve is a ball valve in which an access door is added to enter or extract a pig into the line.



## 3.1 Operation & Function

Scraper valves operate in a simple, safe, and quick way for launching and receiving pigs in pipelines. The advantages compared with trap stations are:

- Easy of operation
- Safe handling
- Compact installation
- Lower investment

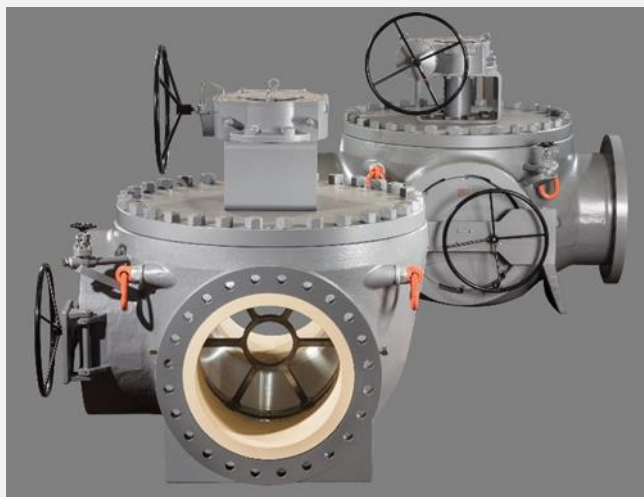
Scraper valves are used for pigs with following purposes

- Cleaning
- Dewatering of pipes
- Product separation

The standard scraper valve is designed for a maximum pig length of 1,4 times the nominal diameter of the pipe. Special design for longer scrapers (max 2 times the nominal diameter of the pipe) upon request.

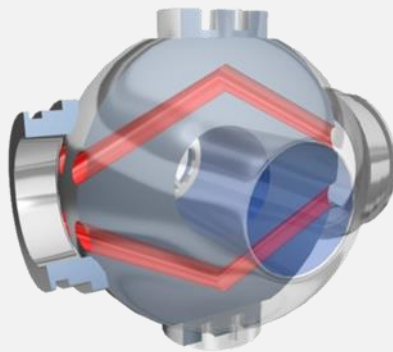
## 3.2 Design

Scraper valves are of the same design as standard trunnion guided ball valves, but with an additional access door for the pig. The door is closed by a bayonet system, for safe actuation.





Scraper valves can be manufactured with an internal bypass, which allow a continuation of the flow in the pipeline during the insertion of the scraper. The flow will be restricted to approx. 25% of the nominal flow



### 3.3 Method of operation

For launching or receiving the pig, the ball must be turned into the valve closed position. Before opening the trap door, the cavity of the valve must be depressurized by opening the venting valve. The venting valve is mechanically interlocked with the door, so that an opening with the venting valve closed is impossible.

For launching, once the door is open, the pig can be. Then the door is closed, locked and the venting and purging valves must be closed. For launching the scraper, the valve is moved into its open position, so that the pig can be transported by the fluid through the pipe.

Recommended is that the transport speed of the pig should not exceed 0,5 m/sec.

At the receiver valve, the pig will be stopped by the internal stopper grid at the end of the bore of the ball. After closing the valve, the purge valve must be opened to purge the dirt transported in front of the pig, and the venting valve must be opened to depressurize the cavity of the valve.

Only than the door can be opened, and the scraper can be removed.

