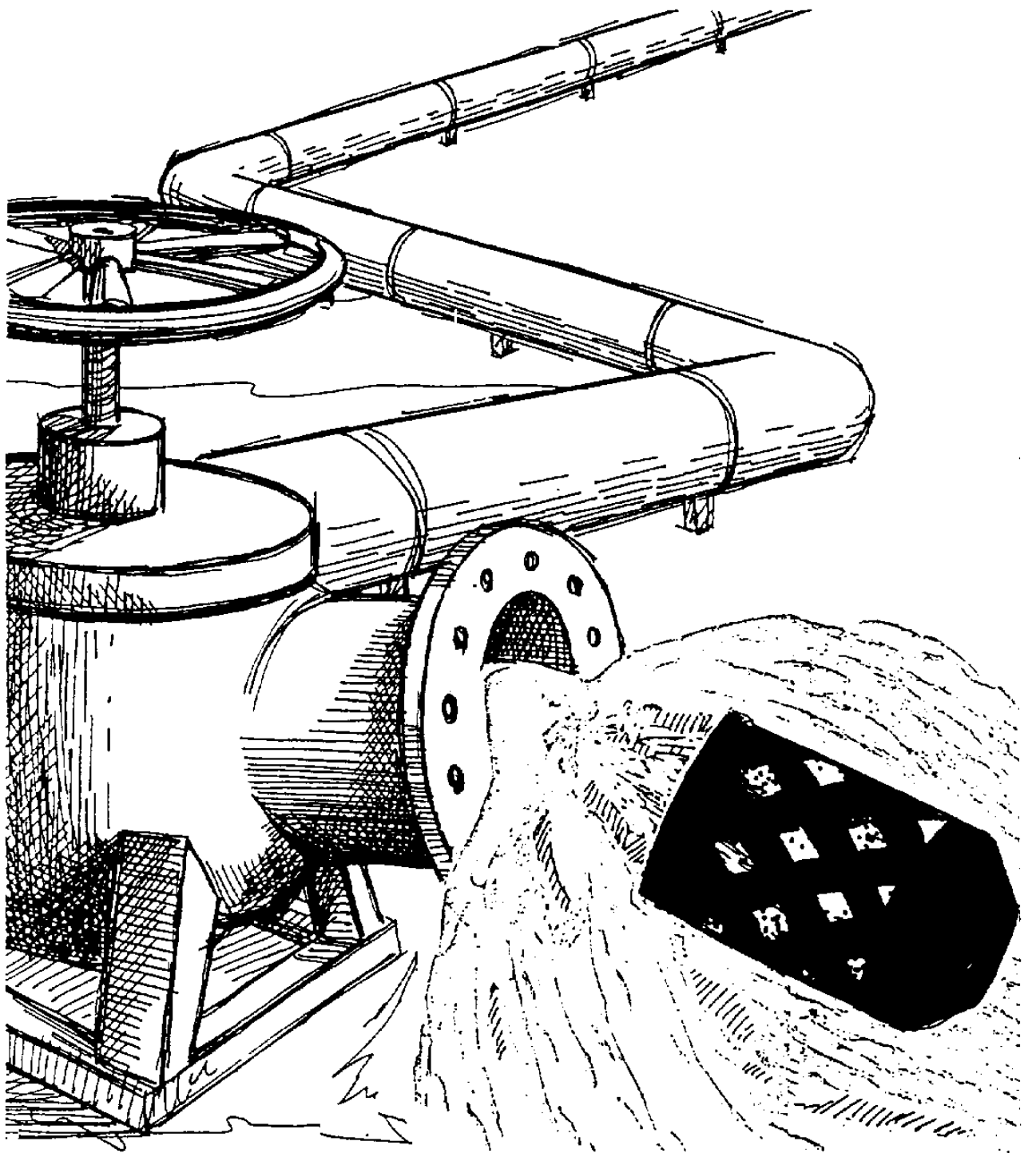
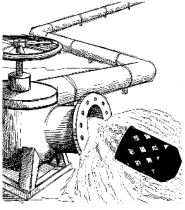


COBALCH PIPE CLEANING

All pipes can be cleaned





General about pigging

The necessity of cleaning pipelines has gradually become more and more required, as the pipelines has been equipped with high-class and thereby more sensitive instruments, but also the demands for the pipe, valves and pumps longer lifetime and the pipelines capacity.

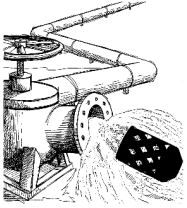
One of the many methods that recently have had the most progress is the use of pigging. Pigs is build on a simple idea - a cylindrical flexible cylinder of synthetic material - which is forced forward by help from a pressure media. This media is either water or airgas. The pigs are manufactured of open cell foam in LD, MD or HD hardnesses.

Because of the materials elasticity, the pig fill out the pipe and change shape after the pipe through bendings and valves. The pig type ASK can be reduced up to 25% of it's normal diameter and is capable to go through 90° bendings, turn out of a T-piece and cleans quick and economic kilometre after kilometre of pipelines.

To clean different type of pipes to different medias such as drinking water, new district heating, wastewater, gas, oil, process ect. there is a large selection of materials and dimensions.

Pigging with pigs can also clean the most dirty pipes to very low costs without turning down the production. For example can you immediately after the cleaning without any delays reestablish the pipeline for use.

Cleaning with pigs are the easiest and quickest way to clean the pipe for deposit and at the same time have maximum capacity on the pipeline. It will therefore be the most economically solution to keep the pipes and at the same time have full capacity.



ALL pipes can be cleaned

Waterpipelines

- Greater digging unnecessary
- Suitable for both old and new pipelines
- Suitable for all kinds of pipelines
- Cost at a fraction of new pipes
- Removes sludge, air, iron, manganese, ochre and other contamination
- Gives a cleaner media

District heating pipelines

- Clean the pipeline for rust, sludge, welding cinder, ect. before filling treated water.
- Removes "forgotten" objects such as tools, welding electrodes, stones, barriers ect.
- Eliminate capacity reduction and destruction of filter and pump during start-up.

Processpipelines

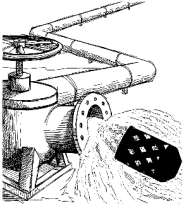
- Increases the capacity
- Eliminate the risk for capacity reduction
- Gives a result fast

Oil- and gaspipelines

- Cleaning under production
- Removes waterremnant
- Work as a hydrostatics test

Pressurepipelines

- Increases the capacity
- Reduces pump wear and tear
- Gives great energysaving
- Prevents water and airpockets
- Gives less turbulens and lamination
- Can be used as a seperation between two medias



How does POLLY PIG work

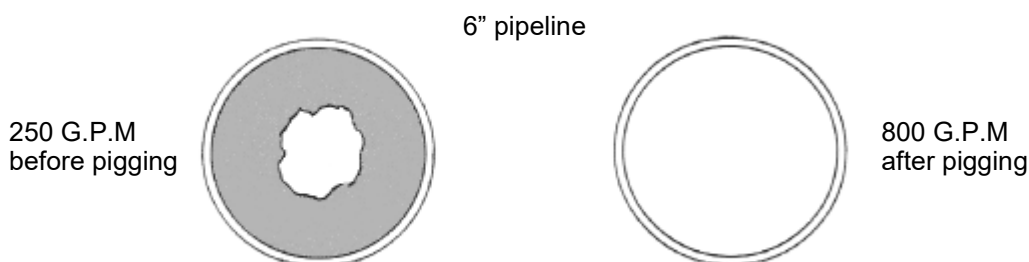
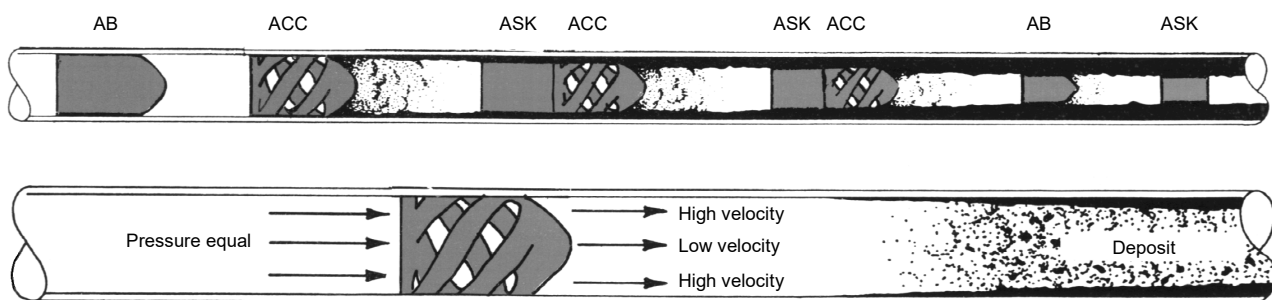
The GIRARD Polly Pigs is constructed of polyurethane open cell foam of varying densities and various type of external coating. Each pig type has a specific application for which it is designed: However, some are interchangeable according to the users preference.

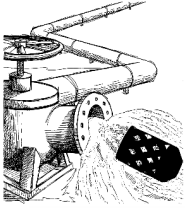
The polyurethane foam material, with specific densities of 30, 80 og 130 kg/m³, is moduled into the basic shape. The basic shape of the GIRARD Polly Pig is normally that of a bullit, primarily to aid of traversing fittings and valves. The length is app. two times diameter in order to reduce the possibility of the pig tumbling or turning within the pipe. The diameter is normally slightly oversized, app. two % larger than the inside diameter of the pipe. This is done in order to exert the frictional drag between the pig and the pipewall.

The standard pig have a concave bottom plate covered with 90 durometer dense polyurethane, which provides a maximum rear sealing surface for the propelling forces of the fluid or gases beeing used. Swabs or bare pigs with bases only coated are normally used in drying or batching operations. Special double nose or double dished pigs are utilized in bi-directional services.

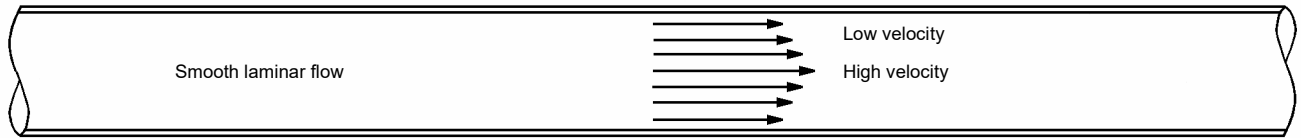
The exterior coatings on the foam bodies consist of criss-cross type spirals of 90 durometer polyurethane. These spirals add strength and also give a greater sweeping action as compared to plain foam. GIRARD manufactures two types of criss-crossing pigs, the old original pattern as well as the new patented "Turning pattern" design. GIRARD's patented "Turning pattern" design assures that the pig will slowly revolve in the pipe allowing much more life to the pig due to more even wear. Wire brushed, silicon carbide or teflon straps are often imbedden in these polyurethane spirals to add maximum scraping or brushing action.

The cleaning action of the GIRARD Polly Pig is created by the frictional drag provided by the oversized diameter. In addition, the pressure created by the propelling media in the pig compresses longitudinally and expands it radially. This increase the friction drag and scraping action. Also some of the product passes between the pig and the pipewall creating a high velocity. Low volumen jetting bypass. This bypass flushes debris ahead of the pig as well as suspending the debris in solution and washing it out of the pipe.



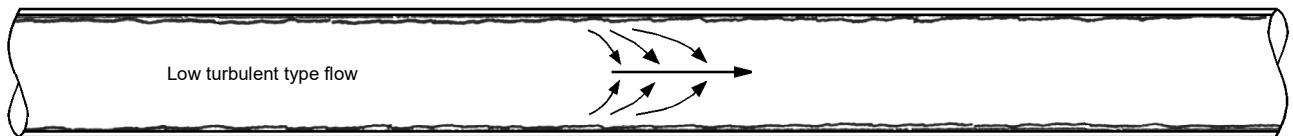


Pipe flow relationships



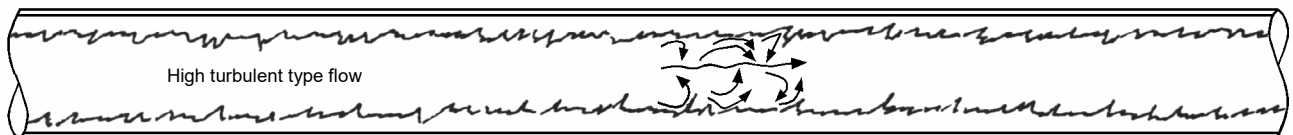
Clean pipe

Laminar flow is created in this manner when pipes are clean. Type of pipe or media has no effect. The lower velocities allow solids to drop out of the flow and begin to adhere to the walls of the pipe.



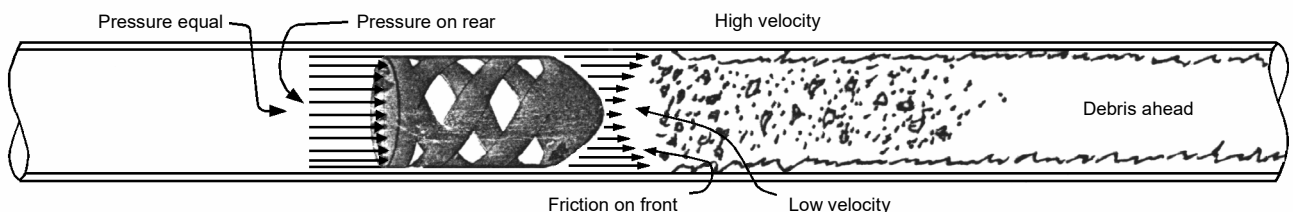
Dirty pipe

Turbulent flow can also occur in dirty pipes containing uneven deposits. Wavy deposits as slight as 1/32" (soft or hard) can cause flow to be reduced by one third. PVC, fiberglass, metal, non-ferrous and lined pipes can suffer this problem.



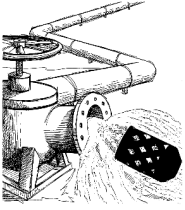
Choked down pipe

Turbulent flow is created when pipelines contain large buildups such as tuberculation. Cast iron and steel pipes often develop stalagmite/stalagmite types of growths. It is at this point the flow changes from laminar to turbulent reducing flow and increasing pumping pressures.



Cleaning

When a GIRARD Polly PIG is run through the line the following takes place: A - friction drag on the front, B - pressure applied to the rear, C - these two forces meet in the middle making the pig shorter and directing the forces to the outside, D - a high velocity bypass from rear to front pass the pig resulting in a sliding seal thus helping to cut loose deposits and flushing ahead of the pig.



GIRARD progressive pigging method

For lines with intermediate buildups:

1. Isolate the line to be clean from the system. Close down all branch lines.
2. Check to make sure all valves are fully open.
3. All branches has to be closed.
4. Turn on water to check the direction of flow.
5. Run a full sized ASK (30 kg/m³) through to control the pipediameter and how much the debris is.
6. After that run a full sized AB (80 kg/m³) to measure the "true" pipediameter.
Repeat the process until the pig is recieved in reusable condition.
7. After that run a full sized ACC (80 kg/m³) until desired cleaning results are accomplished.
8. Run a full sized ASK (30 kg/m³) to sweep out any loose debris.

Special notes for best cleaning results:

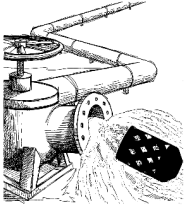
1. Flush the line after pig run until water is clear.
2. Run pigs until desired flow rate is reached.
3. To ensure against excessive abrasion do not run more than two wirebrush pigs in the final stage.
(Consult COBALCH if in doubt).
4. Flush all branch lines that were affected during the operation, in sequence from point of launch to point retrieval.
5. Depending on the size of line and type of pigs to be used special launching facilities may be required. (Consult COBALCH for advice on launching if in doubt).
6. Ideal pigging speed is around 1 meter per second.
7. For lines of less than 4"/100 mm, keep pig runs under 100 meter..

GIRARDS 2% rule:

When using GIRAD Polly Pigs to clean water main and supply lines, the following rule should be applied:

Rule A water line can be considered clean and pigging should be stopped, when:
The time elapsed between the moment that the effluent begins to blacken and the moment the Polly Pig exits from the line is equivalent to 2% of the total time of the pig run.

Example Pig run time, from launch to retrieval; 20 minutes and 20 seconds, total 1220 seconds. $1220 \times 0.02 = 24.5$.
Pigging should be stopped when the water begins to blacken 1195.5 seconds, or 19 minutes, 55 1/2 second into pig run.



Hardness test

This test can be used in field tests and coversation to determine and describe materials to be removed from pipeline. Usually by using this method the type pigs and method of pigging can be determined.

The resistance offered by a mineral to abrasion or scratching is termed hardness. It is of great importance in the rapid recognition of minerals, for the approximate hardness of a specimen can be very easily determined. Hardness is indicated relatively in terms of "Moh's Scale", which consists of 10 common minerals arranged in order of increasing hardness, as follows:

- | | |
|-------------|-------------|
| 1. Talc | 6. Feldspar |
| 2. Gypsum | 7. Quartz |
| 3. Calcite | 8. Topaz |
| 4. Fluorite | 9. Corundum |
| 5. Apatite | 10. Diamond |

Beryl, 7,5 to 8 in hardness, is often substituted for topaz in the above scale. The values assigned to the members of this scale indicate simply the relative hardness.

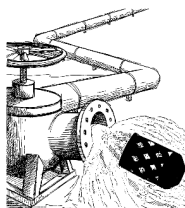
Substances scratched by, and which in turn scratch, some one member of the scale are said to have the hardness assigned to that member. If a mineral is scratched by quartz (7) but not by feldspar (6), it is said to have a hardness of 6,5. In determining the hardness of a mineral the scratch made should be as short as possible, not over 5-6 mm, and care exercised to distinguish between a scratch and a chalk mark. The latter is easily removed by rubbing.

The determination of the approximate hardness is greatly simplified by using a finger nail, coppercoin, knife blade, a piece of window glass or a steel file, which possess the following values:

- | | |
|--------------|----------------------|
| Finger nail | up to a hardness 2,5 |
| Coppercoin | up to a hardness 3,0 |
| Knife blade | up to a hardness 5,5 |
| Window glass | up to a hardness 5,5 |
| Steel file | up to a hardness 6-7 |

Since the majority of the minerals are less than 6 in hardness, this simplified scale is of great convenience in determining the approximate hardness in the laboratory and field.

Another simple test to determine if a pig can clean the line is to draw a piece of wire brush and a piece of carbide strap across the material to be removed (which should be provided by the customer) and if there is any breakdown of the materials to be removed, it can be determined that a GIRARD Polly Pig will clean the line.



Approximate pressures and flow suggested for GIRARD Polly Pig

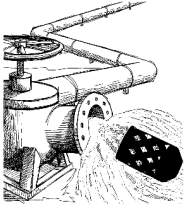
Nominel pipediameter		Pressure i bar		Liquid flow liter per minute	Gaseous flow m³ per minute
		Launching	Running		
2"	50 mm	6,9 - 13,7	2,7 - 6,8	113 - 189	0,6 - 2,7
3"	80 mm	6,9 - 10,3	2,4 - 5,8	264 - 378	1,3 - 4,8
4"	100 mm	5,1 - 8,6	2,0 - 5,5	454 - 757	2,0 - 7,7
5"	125 mm				
6"	150 mm	3,5 - 6,9	2,1 - 5,1	946 - 1703	3,8 - 14
8"	200 mm	2,0 - 5,5	1,8 - 4,9	1703 - 3028	6,8 - 21
10"	250 mm	2,1 - 4,1	1,8 - 3,4	2838 - 4731	8,9 - 27
12"	300 mm	2,1 - 3,4	1,4 - 3,1	3785 - 6813	13 - 34
14"	350 mm	1,4 - 3,4	1,1 - 2,7	5299 - 9463	14 - 47
16"	400 mm	1,1 - 3,1	0,7 - 2,7	6813 - 11355	15 - 53
18"	450 mm	1,1 - 2,7	0,7 - 2,0	7570 - 15140	19,3 - 68
20"	500 mm	0,7 - 1,7	0,35 - 1,4	10598 - 18925	23,8 - 72
22"	550 mm		0,35 - 1,4	11355 - 22710	
24"	600 mm	0,7 - 1,7	0,35 - 1,4	15140 - 26495	34,3 - 103
26"	650 mm		0,35 - 1,4	18925 - 30280	
28"	700 mm		0,35 - 1,4	22710 - 34065	
30"	750 mm	0,7 - 1,3	0,35 - 1,1	29710 - 41635	53 - 134
32"	800 mm				
36"	900 mm	0,7 - 1,3	0,35 - 0,7	37850 - 60560	77 - 194
40"	1000 mm	0,7 - 1,3	0,35 - 0,7	45420 - 75700	95 - 239
42"	1050 mm	0,7 - 1,3	0,35 - 0,7	49205 - 83270	105 - 264
48"	1200 mm	0,7 - 1,3	0,35 - 0,7	64345 - 104830	137 - 344
54"	1350 mm	0,7 - 1,3	0,35 - 0,7	83270 - 143830	174 - 436
60"	1500 mm	0,7 - 1,3	0,35 - 0,7	98410 - 158970	214 - 538
72"	1800 mm	0,7 - 1,3	0,35 - 0,7	140045 - 246025	309 - 776

Liter per minut are based on 1 - 1,5 meter per second!

M³ per minut are based on 1,5 - 3 meter per second!

NOTE:

Volumes and pressure are recommend only. NOT TO BE CONSIDERED AS ABSOLUTE REQUIREMENTS. Requirements will vary according to the type of pipe, fluid, gas, materials in pipe, viscosity, temperature ect..



What to do if a Pig becomes stuck?

1. Check that the fluid is getting through.
2. Increase volume and pressure
3. Remove pressure and put it on again.
4. Remove volume and pressure and then allow the pipeline to drain down. This will cause a water hammer and usually force the pig on through the tight spot.
5. Remove volume and pressure and leave the system down for 30 min. to 1 hour. Due to normal movement of the pig whereby pressure is applied to the rear of the pig and friction drag is applied to the front, a pig has natural response to compress in the line. By allowing to rest, it can return to normal length and when the system is returned to normal pigging condition, the pig will probably begin to move again without any significant increase in pressure.
6. Insert a ASK (30 kg/m³) and move up to the stucked pig to create a new positive seal to bring the pig out.
7. Apply pressure in reverse direction. Usually there is no need to return pig to the launch end, but back it up a few feet, then begin pigging procedure again.
8. Provided that there are air/fluid coming through the pipeline you can send in a locationsequiupment tied to a pig type ASK, which will move up behind the stucked pig. After that you are able to find the stucked pig with a receiver, that are able to find the locationsequiupment within +/- 1 metre and down 4-5 metre depth.