INTRODUCTION TO THE MACSTEEL CABLE-LOCK™ PIPE SYSTEM

MACSTEEL CABLE-LOCK™ PIPE JOINING SYSTEM is a 25 Bar Rated socket and integral seal system very similar to the conventional Ductile Iron or PVC socketed pipe system, BUT with the addition of a “Flexwire” type lock in front of the seal to effectively lock the two pipes together.
This enables the joint to contain the axial forces generated by the line pressure attempting to force the joint apart.
The system is available with a range of bends tees and adaptors.
The system is supplied as standard galvanised to SANS 1461/121

Other coatings can be supplied on request.

Cable-Lock™ System illustrated by a bend and reducing tee to flange Cable-Lock

Cable-Lock™ to Shouldered for connecting to a valve. We can supplied any adaptor to join the Cable Lock pipes to various systems

PIPELINE DESIGN

While the Cable-Lock™ pipe system is designed to handle the axial pressure forces, a couple of points must be kept in mind during the design procedure.

1) The Cable-Lock™ Joint is capable of and is tested to twice the rated pressure. Care must be exercised to see that surge or water hammer does not overload the pipeline, allowing a reasonable safety factor, either from a burst or axial load consideration. This also means that consideration must be given to other loads on the pipeline such as weight loads, including the pipelines' own weight if mounted vertically or in a position to impose such loads on the joints. It is good practice to mount valves or sharp bends etc. such that pressure (and weight if applicable) forces are adequately catered for. This can be done by fixing the valve in position or mounting the valve on an adequately located puddle pipe.

2) It is also of note that the Cable-Lock™ joint is not rigid, unlike a bolted flange joint. This has advantages in that stress loads such as expansion and contraction, bolt pull up loads or loads due to misalignment are not transmitted from pipe to pipe. It also means that slight ground movements or misalignments are catered for as the pipeline finds its own "best fit". It is of note however that the designer should also be aware of where the line is mounted and where it is allowed to move.

3) Another factor the designer must be aware of is that Cable-Lock™ pipe does undergo some extension as pressure is applied to it. Each joint expands slightly as the load compresses the cable. This is also of advantage in redistribution of loading, but it does mean that some movement is likely to occur. It also means that if the line is rigidly mounted at various points the mountings must either be capable of some movement, or be capable of taking the axial pressure load.

4) Manifolds can be welded to the pipe provided that a drawing specifying the size and position of the manifolds is supplied.

5) Various size lengths can be manufactured; currently we do stock 2m, 3m and 6m lengths. Any special lengths can be supplied on request. A grooving machine can be supplied should a need arise to cut the pipes on site.

INSTALLATION

1) Cable-Lock™ can be installed above ground or it can be used as a buried system, or as a wall or hangar mounted system, or even a pedestal or plinth mounted system as required.

2) It can be used as socket facing upstream or socket facing downstream system; however we consider that the socket facing downstream system leads to more intuitive assembly. This is because normal assembly procedure starts at the upstream point, (i.e. closest to the pump) and proceeds downstream. As it is normally intuitive to introduce the spigot into the socket, a pipe laid socket facing downstream lends itself to have the spigot end of the next pipe introduced into it.
3) The socket facing downstream system also has the effect of pressurising the pressure activated seal system. This could be of relevance especially in low pressure high velocity systems when Bernoulli effects on a spigot facing downstream could put the seal under low pressure or even vacuum conditions, an undesirable condition for a pressure activated seal.
4) Normal procedure would involve a non-return or check valve and a socket adaptor being mounted on or close to the pump discharge, allowing for thrust, vibration, expansion and pump removal considerations, as per the requirements of the pump installation procedure.
5) The same would apply if the system is to be a gravity system, such as a discharge from a reservoir. Here the non-return valve might well be replaced with a maintenance valve (or both). A socket adaptor capable of taking end load, both from gravity and pressure considerations, should then be mounted with the socket facing downstream, ready for the insertion of the spigot end of the connecting pipes.
6) Usual procedure involves laying the pipes out on site in approximate areas of use.

7) Before installing the pipe system, inspect for damage and any foreign matter that may have collected in shipping or storage. Check that the seals are properly inserted in the socket ends and are clean and free from foreign matter, sand, stones etc.

8) Ensure that a suitable lubricant for the seals is available. This needs to be a non-toxic (especially if the pipeline is used for potable or raw water), preferably water soluble lubricant suitable for use with natural or synthetic rubbers. Soft soap, rubber lubricant or a soluble soap such as dish washing liquid is suitable.

9) Lubricate the seal in the socket and the pipe end where it is to enter the socket. Insert the spigot end of the pipe into the socket. This should slide

into the seal without undue resistance if lubricated adequately. Push the pipe in until the “Cable-Lock” grooves line up. i.e. The groove in the spigot can be seen to be in line with the groove in the socket. This can be seen to be in position through the cable insertion hole in the socket.

10) When the grooves are lined up an annulus void is formed around the pipe, with half the cavity in the spigot and half in the socket.

11) The “flex wire” or cable can then be introduced through the aperture in the socket end, and pushed in so that the end goes completely around the pipe, in the above mentioned concentric grooves. With the correct cable the end tab or ferrule on the cable should be close to the hole and the cable should be completely inserted into the concentric grooves.

12) The pipeline can be assembled in this fashion to its design.

Cable-Lock Pipe System Application/Projects

Figure 1 Underground application at Anglo Platinum, Bakoni Mine

Figure 2 An Emergency water pipeline at Extrata Mine in Steelpoort

Figure 3 A dewatering pipe line at Modikwa Platinum (Anglo Platinum Mine)

Figure 4 : Another Anglo (Mudikwa) Platinum Mine

Apart from the above, below are some of the major Cable Lock Project:

- +- 90 km of pipelines at Matla Coal Mine. The following Engineers executed the projects: Leon Hugo +27 71 852 5028 and Manie Nortjie +27 82 900 5028. All these were surface (water)projects
- Namwater projects in Namibia: Several Cable Lock projects were done in Namibia under the Namibian Water Authority called Namwater. These include: Otjimbingwe projects- 80 km of various sizes, Kalkfield project, 5.5km and Otavi project, 8km. More than 20km of other small projects were also done through various contractors in Namibia. The Engineers at Namwater are Mr Lazarus Nuhimba, +264 81 209 0785 and Mr Mutedi, +264 61 17 2100 or +264 81 140 5045.
- Sasol Project: This was a 10km x 250mm pipeline. Tokkie de Vries was in charge of the project and his contact number is +27 11 966 9300
- Newcastle Project: This was done through our Newcastle branch and Thinus Knopp was in charge. His number is +27 34 375 5631
- Ronnie Bernard Architects did a 3km Cable Lock pipeline at a farm. Their number is +264 62 568 936.