POWER LOCK

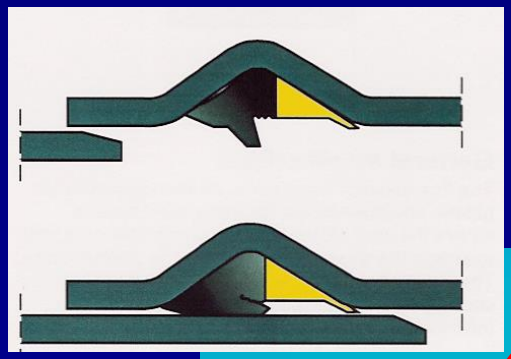
The fully integrated sealing system for PVC pipe

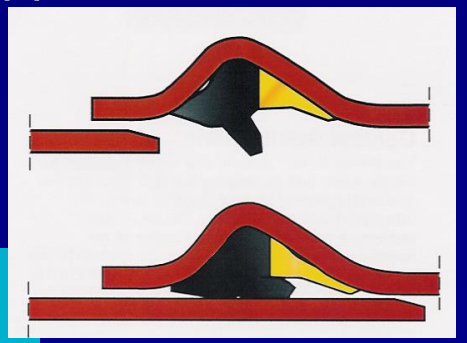
LARETER

F-601 POWER LOCK

F-605 SEWER LOCK

PP-Ring, Belling and groove forming support

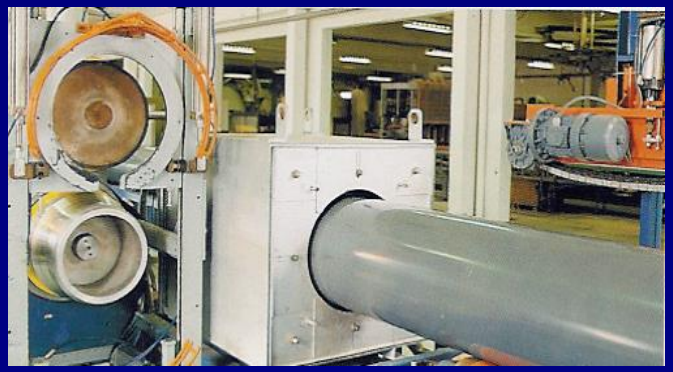


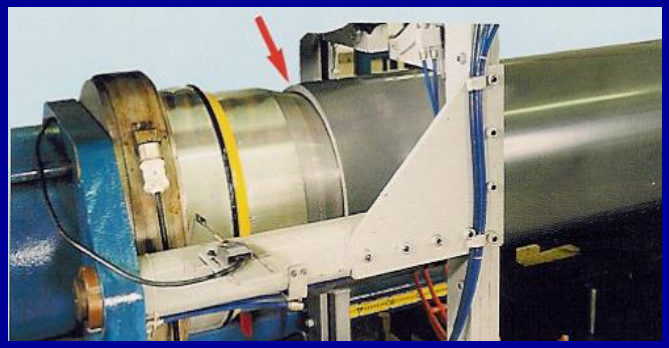


Sealing ring in EPDM Rubber

Sealing ring TPE (Thermo-Plastic Elastomere)

The Power Lock System
Integrated Sealing System



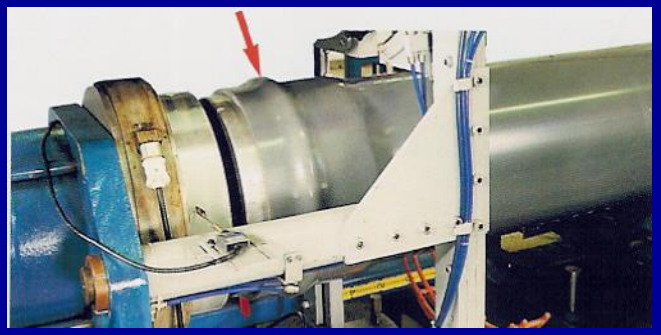


The Power Lock System is the most performant Integrated Sealing System for water pipes.

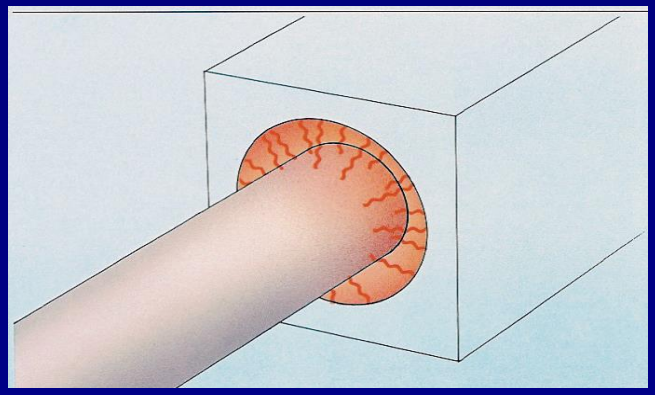
Thanks to an integral belling process,
the seal insertion is fully automatic and occurs during pipe manufacturing

The Power Lock System includes

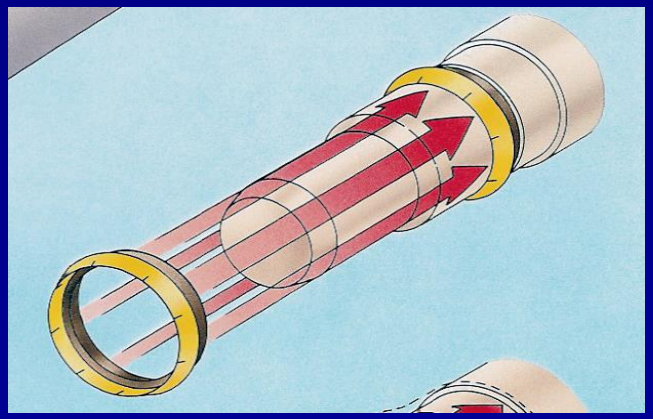
- Power Lock seal for Pressure (PWL)
- Sewer Lock seal for Sewerage and non pressure applications (SWL)



Integrated Belling Process

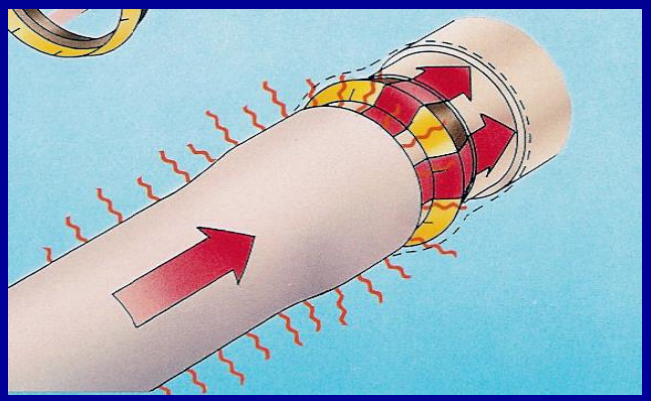


1. The end of the pipe is heated until it softens



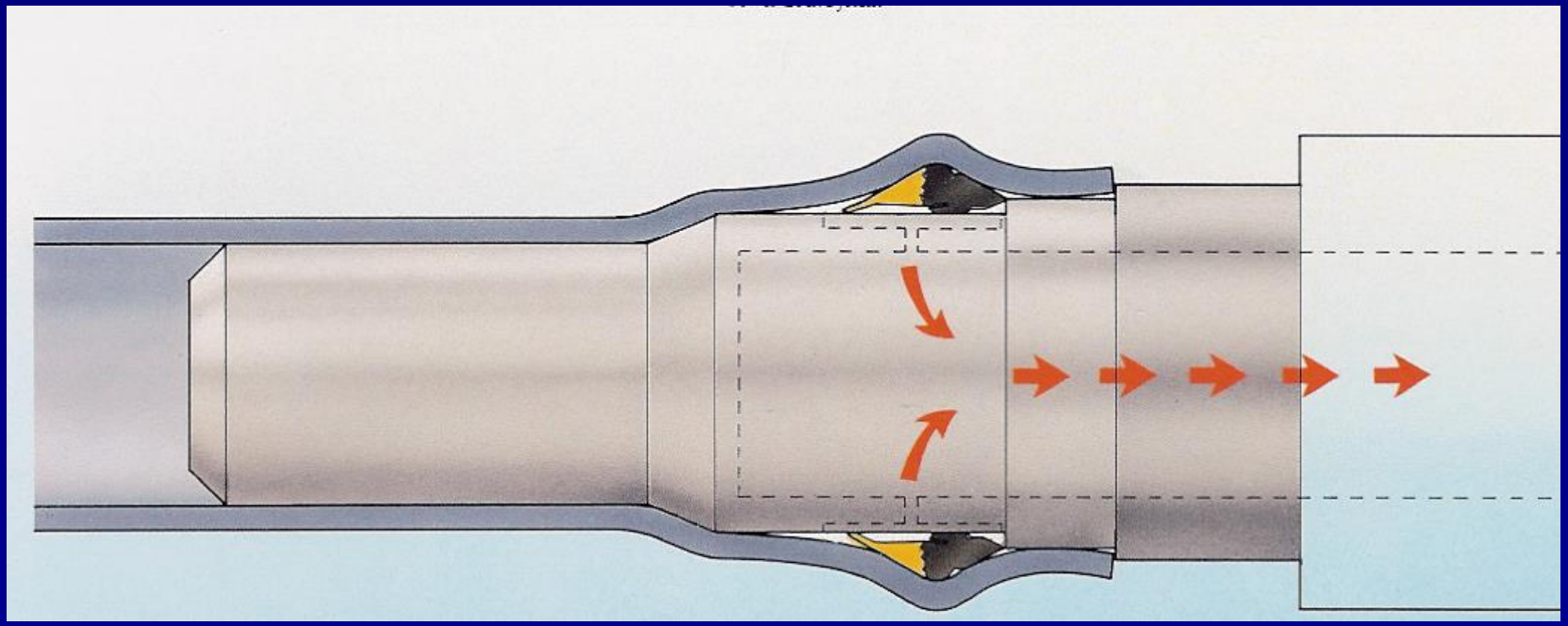
2. Each Power Lock seal is loaded onto the mandrel from a magazine and positioned with precision

Seal position on Mandrel before belling



3. The soft pipe end is pushed over the forming mandrel. The smooth design allows the pipe to slide easily over the heated mandrel and the sealing ring.

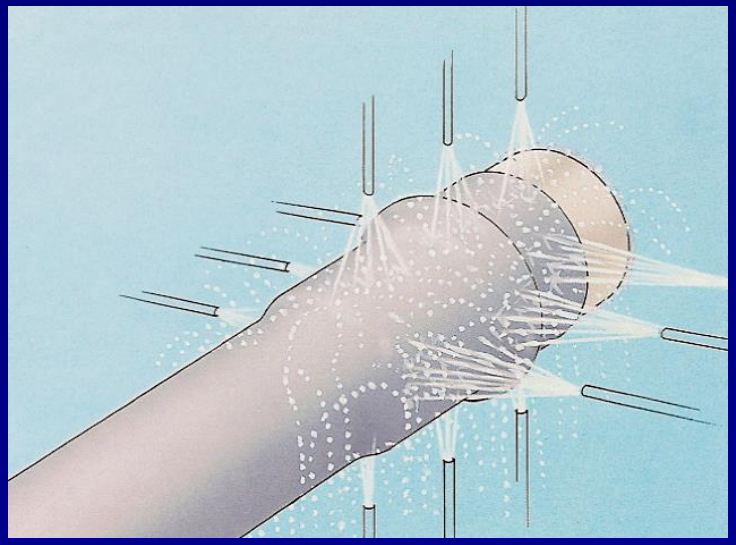
Integrated Belling Process



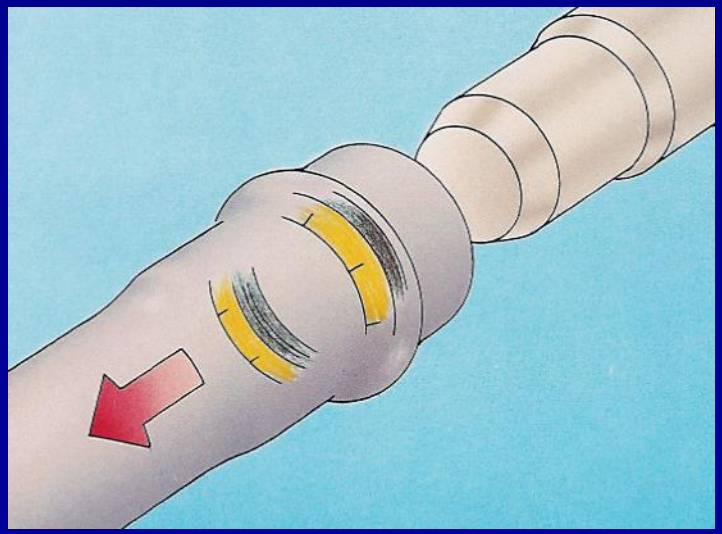
4. Vacuum is applied via ducts in the mandrel. An external pressure system can be used instead, if required

   The soft pipe is drawn over the seal and clines to its contours. The pipe is formed tightly around the seal, pretensioning the socket against the rigid reinforcement.

Integrated Belling Process



5. The pipe socket is cooled with air or water over the sealing ring and forming mandrel



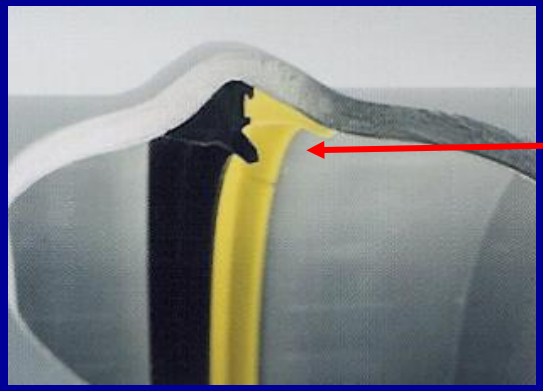
6. The forming mandrel is withdrawn from the finished socket and the Power Lock seal is held firmly in place by the rigid reinforcement

INTEGRATED BELLING PROCESS : THE RESULT

Power Lock
during pipe assembly

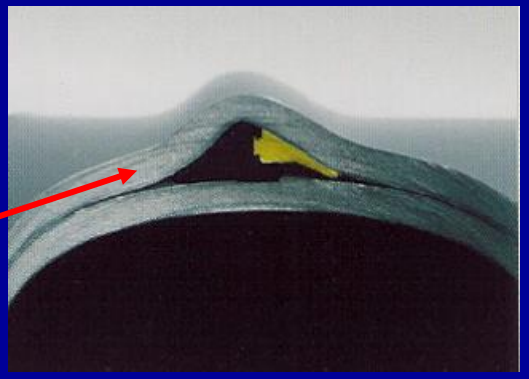
(Cut-away for illustration only)

Sewer Lock



Before assembly

After assembly



POWER LOCK
PROPERTIES & BENEFITS

PROPERTIES	BENEFITS for Pipe Producer	BENEFITS for Contractor
Integrated Production	- Less Supervision needed - Less Mandrel maintenance - Minimal reject rate **=> Higher Productivity** **=> Cost saving**	
Joint Reliability **2 tolerances to be considered** (instead of 4 with conventional joints)	- Higher accuracy in pipe dimensions - Higher pipe quality - Less reject rate - Time saving in measurements - Minimal risk of complaints **=> Cost saving**	- Greater reliability in JOINT TIGHTNESS - High Seal Performance - Pipe and seal arrive together on site - No muddy seal insertion on site - No seal missing - No risk of untight pipeline - Higher Compatibility with other pipes - Less reject rate - Time saving in testing - Minimal Risk of Seal Displacement **=> Cost saving**
Low Assembly Forces	- Minimal risk of complaints	- Easier, faster, safer to use and assemble - Time saving in pipe Assembling - reduced Manpower - No special machines needed for assembling - Minimal Risk of Seal Displacement **=> Cost saving**
Deflection Capability up to 3°	- Exceeds WRC's 1° value - Minimal risk of incident and complaint	- Assured joint tightness despite deflection - Less risk of seal and pipe displacement in difficult terrain - Minimal risk of incident and complaint

Power Lock Integrated Production

Proven Reliability And Economy

Bastian Brøske
Plant Manager
Mabo, Norway.

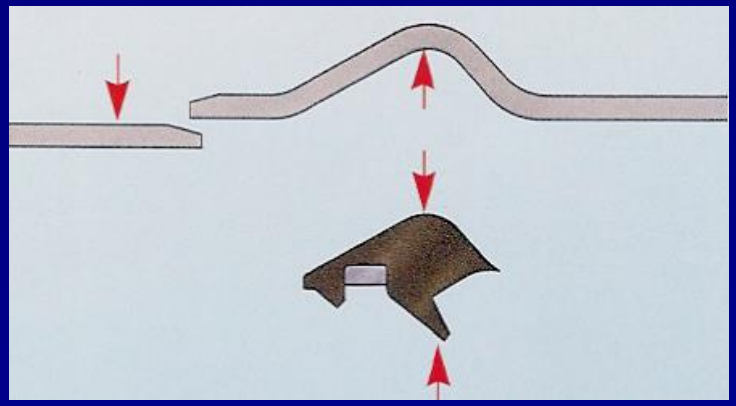
"The Power-Lock system certainly brings greater efficiency. Our productivity has increased some 10%. Virtually no mandrel maintenance is required, reducing our total maintenance costs by about 30%. Reject costs for the joint are close to zero instead of some 3—4% of invoiced value, with our previous system.

Our customers now buy more Power-Lock pipes then the traditional products we made before. We have also achieved a significant increase in market share".

- Il sistema power lock ……..

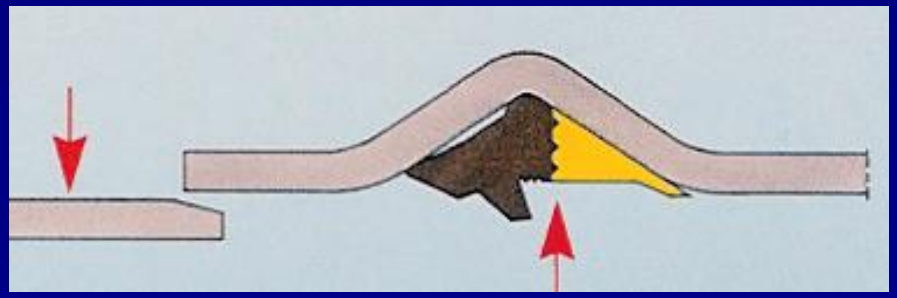
Power Lock
Joint Reliability

Traditional Anger Groove



Traditional seal subsequently inserted

Power Lock integrated Groove



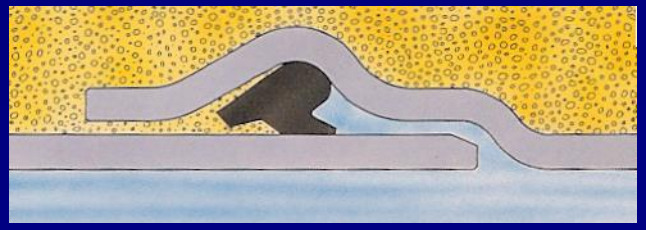
Integrated **Power Lock seal**

In a conventional joint system there are four tolerances to be considered :

- The internal diameter of the socket
- The external diameter of the seal
- The internal diameter of the seal
- The external diameter of the spigot

With the Power- Lock joint, only the internal diameter of the seal and the external diameter of the spigot remain. The removal of the two other tolerances gives greater reliability and joint tightness, HIGHER SEAL PERFORMANCE.

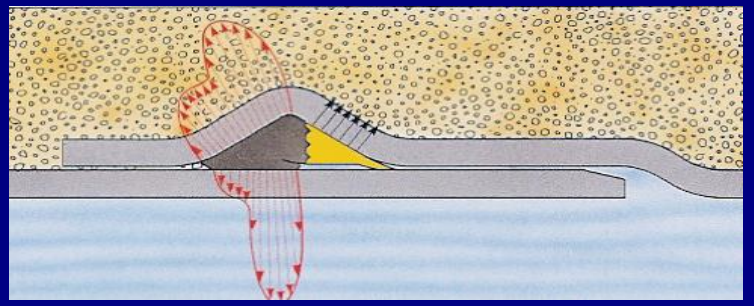
Power Lock
Joint Reliability



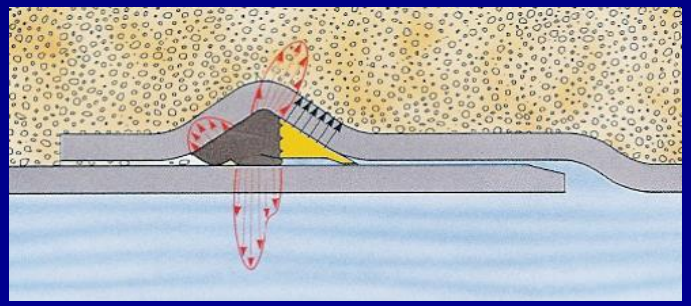
Traditional Seal :
Pulsation test under negative pressure. After several pulsations sand ingress starts to wear the seal

Traditional Seal :
Under positive pressure, after approx. 500 pulsations, water leakage occurs

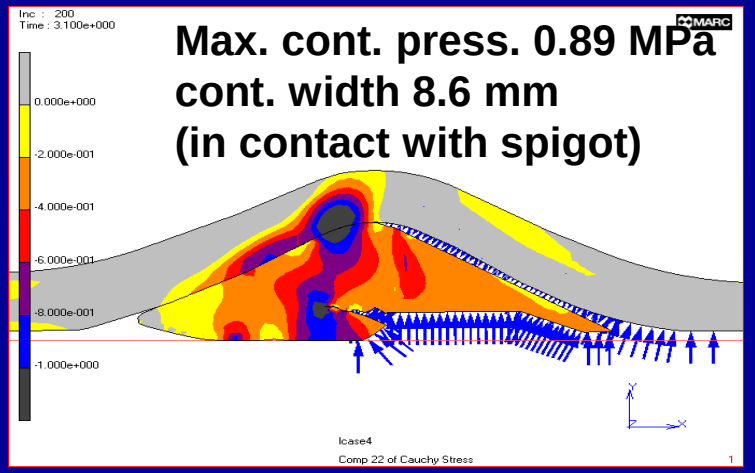
Traditional Seal :
Under negative pressure, after approx 500 pulsations, contamination enters the pipe



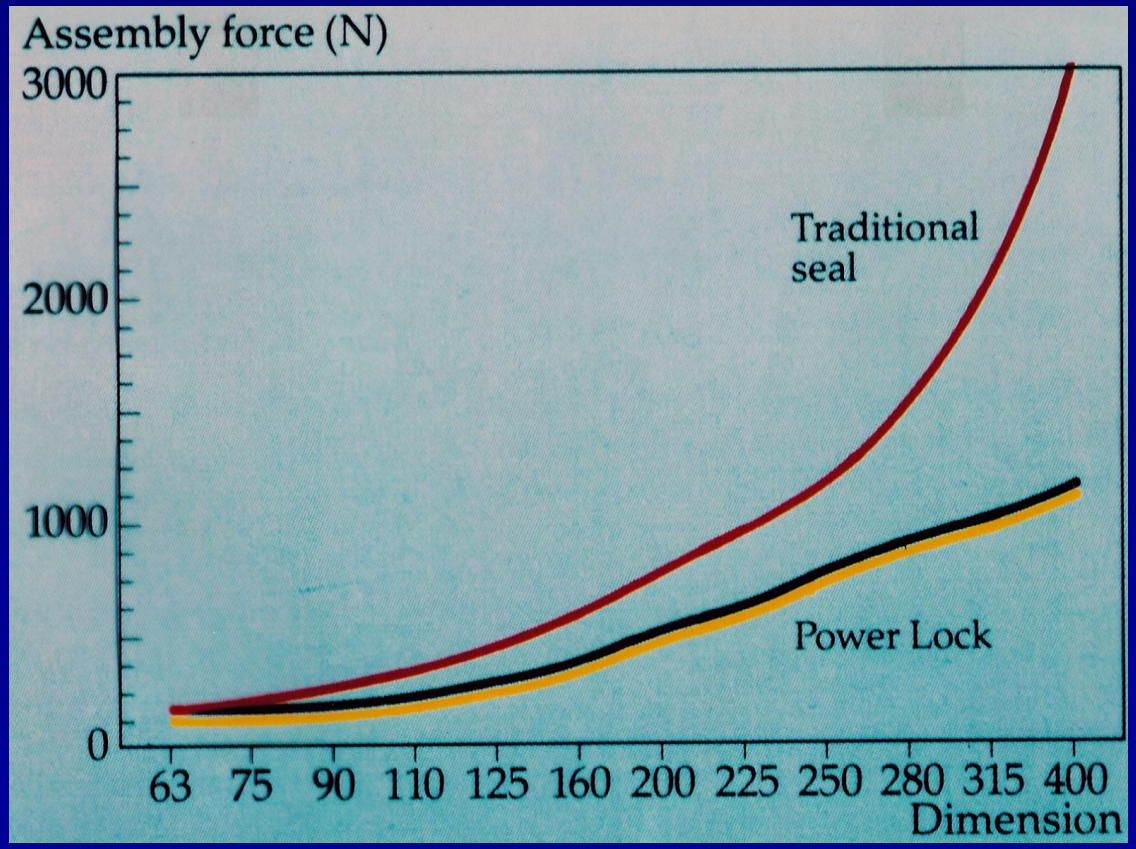
Power Lock : Positive pressure – no leakage



Power Lock : Negative pressure – no leakage



Power Lock
Assembly Forces Comparison



Power Lock
Deflection Capability

Diagram of a 630 mm pipe deflected to 3°. Yellow line indicates centre line

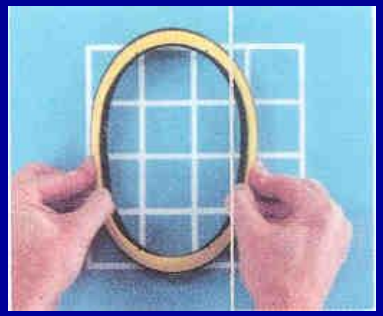
Power Lock :
A commitment to Progress

Forsheda was the first rubber seals producer to make and market integrated sealing systems. The first system Forsheda produced was the Rieber seal, which consists of a rubber ring containing a metal ring giving the hardness necessary for integral belling.

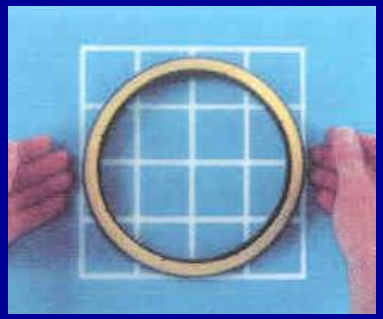
Why did Forsheda develop Power Lock to replace Rieber seal ?

- More hygienic : no metal contents in a potable water environment.
- Less reject rate compared to Rieber, thanks to the PP ring allowing a better integral belling with less waste. Integral belling on a rubber surface seal can cause the pipe to hurt and alter the seal surface, which can either cause a wasted pipe or later prevent a reliable joint tightness.
- Power Lock is non deformable, unlike Rieber (see below)

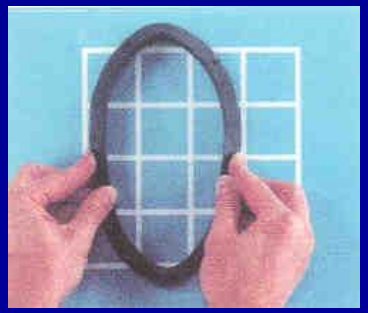
POWER LOCK



POWER LOCK



RIEBER



RIEBER