



# ***FLEXIBORE***

*100 Series*

## **FLEXIBLE RISING MAIN**

Installation Manual  
&  
Technical Information

Version: GE\_M2017



[www.crusaderhose.com.au](http://www.crusaderhose.com.au)



# Contents

Introduction .....	2
Description .....	2
Advantages of Using Flexibore 100 .....	3
Applications.....	3
Benefits .....	3
Storage and Handling .....	4
Disposal.....	4
Safety .....	4
Hazards .....	4
Quality Assurance .....	4
Warranty .....	5
Flexibore 100.....	5
Specifications and Technical Data .....	5
Friction Loss Specifications .....	6
Fittings and Accessories .....	7
Borehole Considerations.....	9
Attach Coupling.....	9
Fitting the Power Cable.....	10
Securing with HD Cable Ties.....	10
Hand Assisted with Mini-Installation Roller.....	11
Hand Assisted Retrieval Procedure.....	12
Chemical Resistance Chart.....	12
Preparation and Installation Step by Step.....	14

# Introduction

**Flexibore 100** is the premier Flexible Rising Main for ground water extraction using submersible pumps.

This technical manual provides specific information on storage, installation and use of **Flexibore 100** and associated accessories.

Crusader Hose Pty Ltd is dedicated to continual product improvement to ensure the quality and performance of **Flexibore 100** is of the highest standard.

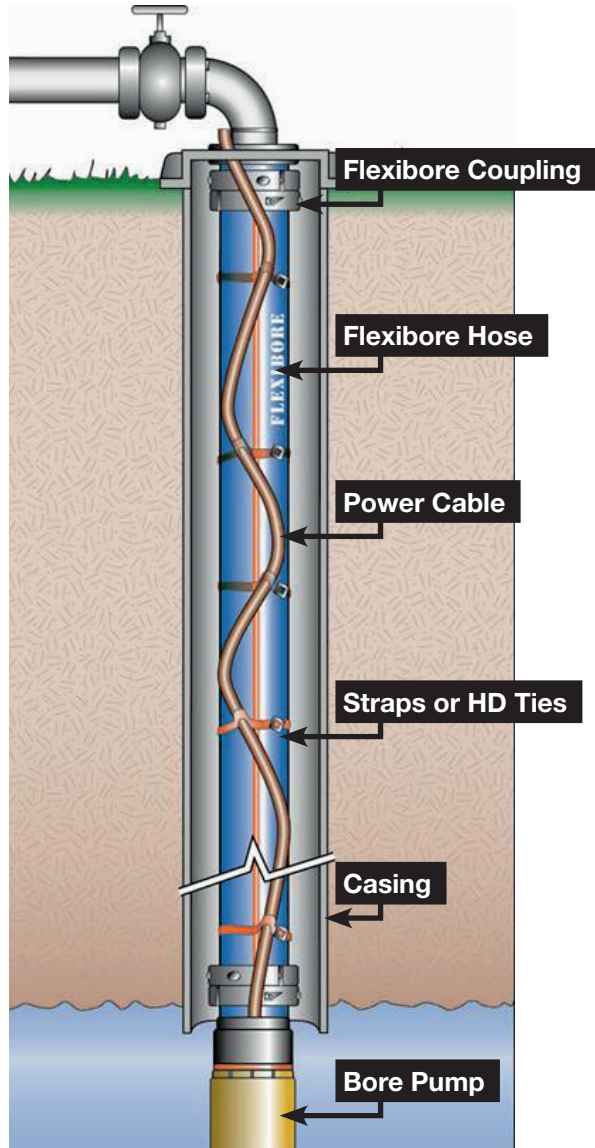
## Description

**Flexibore 100** consists of a woven high tenacity strength polyester yarn (sock) and extruded polyurethane. This combination forms a strong flexible pipeline from which submersible pumps can be suspended in boreholes.

The internal 'sock' is woven on a circular loom which forms a continuous length of fabric. The woven fabric is then covered internally and externally with polyurethane. The tough polyurethane seals and protects the fabric against abrasion damage.

A strip along the length of **Flexibore 100** is used to anchor the control cable, at one metre intervals along the strip. The strip is hot moulded to the hose, the control cable is secured at these points.

**Flexibore 100** is specifically designed to replace poly pipe or metal rigid riser pipes which are subject to rust and encrustation. Rigid risers are generally heavier and more difficult to handle. PVC risers become brittle and can kink.



## Advantages of Using Flexibore 100

- Is a proven alternative to steel, H.D.P.E (poly pipe), PVC and rigid fibreglass;
- Manufactured in continuous lengths up to 500 metres long;
- Can be installed in much less time than steel, fibreglass and most other pipes;
- Is fraction of the weight of steel or other rigid rising mains;
- Has complete resistance to corrosion and microbiological damage;
- Superior hydraulic performance;
- Is resistant to build-up of internal scale;
- Long operational life
- Has a 12 months warranty

## Applications

**Flexibore 100** has been used in a variety of new and replacement applications. These include the pumping of potable or mineral enriched ground water, regular and emergency dewatering of mines and quarries, ground water control on landfill and building sites and to create salt water barriers for the prevention of saline intrusion into potable ground water.

## Benefits

**Flexibore 100** is a flexible rising main used for ground water pumping. By extruding polyurethane into a woven textile fabric of high tenacity polyester, we produce a riser with the strength characteristics of steel.

- ☑ No internal scaling.
- ☑ Totally corrosion resistant.
- ☑ All hydrostatically tested.
- ☑ Potable water approved: AS 4020.
- ☑ Continuous lengths customised to your requirements up to 110m lengths. Application above 110m drops use Flexibore 250 series.
- ☑ Lightweight - e.g. 100 metres of 50mm (2") Dia. weighs only 48 kgs.
- ☑ Our layflat construction makes for easy storage, handling and transport.
- ☑ Every hose is hydrostatically tested for pressure rating and tensile strength.
- ☑ 2.5:1 Safety margin in both hydraulic and tensile performance.
- ☑ Corrosion and internal scaling resistant to salt water and iron bacteria.
- ☑ Compatible with all types of submersible pumps.
- ☑ Total security with our industry best, precision engineered and patented couplings.
- ☑ Low friction loss with slight inherent swell reducing operating costs and internal scaling.
- ☑ Quality Management System accreditation ISO 9001.
- ☑ Australian made providing stock and technical support.
- ☑ Reduced head losses and improved flow rates due to swelling under pressure.
- ☑ Less labour intensive due to light weight and easy handling.
- ☑ Long operational life up to 10 years.
- ☑ 12 months Warranty.

## Storage and Handling

**Flexibore** is available in continuous lengths up to 500m – for longer lengths, it is normally supplied on steel/wooden drum and for small lengths on wooden stamped pallet/crate or carton but any odd or unused lengths should be coiled loosely and covered for protection. It is recommended to keep FLEXIBORE out of direct sunlight if it's to be stored for a prolonged period.

Because FLEXIBORE is lightweight and can be rolled up flat, an ordinary van or pick-up truck can be used to transport it to site, instead of the cumbersome vehicle necessary for rigid pipes.

## Disposal

**Flexibore** will normally be supplied cut to exact length to suit the borehole but occasionally an adjustment may be necessary on site and a length of hose found surplus to requirements. This should be disposed of properly in accordance with local / national industrial waste disposal regulations.

## Safety

**Flexibore** is light in comparison to steel rising main and therefore presents a lesser hazard to personnel when handling.

Because **Flexibore** is supplied in continuous lengths care must be taken to ensure that it is either laid out neatly on site or coiled on a pallet or steel/wooden drum (if space is limited) whenever it is being installed or retrieved. An untidy workplace is a dangerous workplace.

## Hazards

**Flexibore** presents no chemical or biological hazards in normal usage, nor during installation or retrieval.

If **Flexibore** is involved in a fire, during storage or transportation, **toxic & irritating gasses** may be produced – **if inhaled, medical advice should be obtained immediately.** Polyurethane material can cause **severe burns** – no attempt should be made to remove any such contamination from the skin **but should be flushed with copious amounts of cold water and medical assistance sought without delay.**

## Quality Assurance

Crusader Hose Pty Ltd is an accredited manufacturer with ISO 9001:2000 Quality Management System.

**Flexibore 100** conforms to the highest standards of manufacture and has a reputation for high quality and reliability.

Each length of **Flexibore 100** is factory tested and issued with a serial number prior to dispatch.

For Potable Water, **Flexibore 100** is approved to AS 4020 standard - products for use in contact with drinking water.

# Warranty

**Flexibore** is covered by a 1 year warranty against faulty material or workmanship.

## The warranty does not include:

- Damage resulting from forced or incorrect application;
- Misuse;
- Accidental damage; or
- Any instance where the serial number has been tampered with.

# Flexibore 100

**Flexibore 100** will suit most borehole applications and is compatible with most submersible pumps. Manufactured in continuous lengths, **Flexibore 100** can be installed in less time with less labour.

**Flexibore 100** is attached to the pump with patented couplings. The pump and hose (with control cable attached) is lowered into the bore.

# Specifications and Technical Data

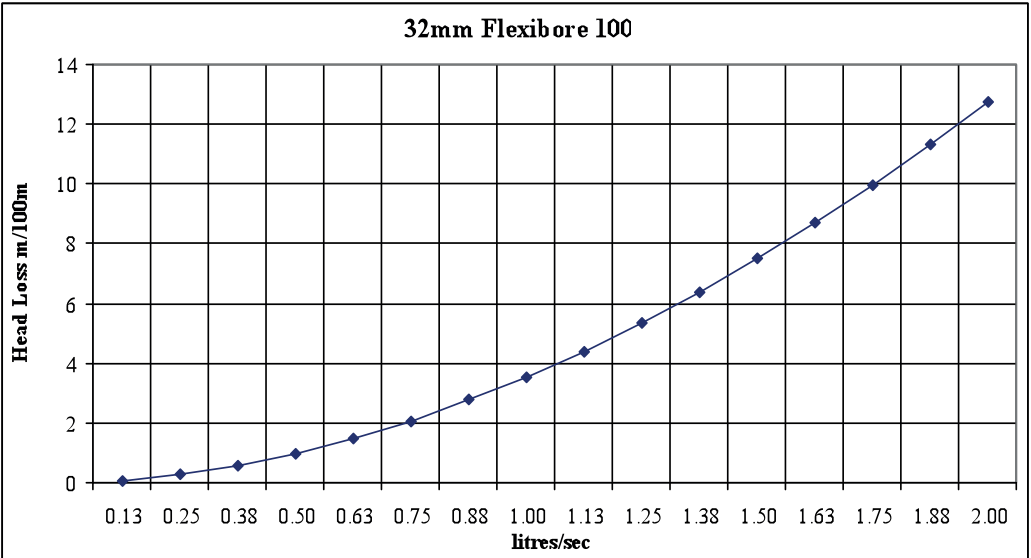
Flexibore 250 Series		
Nominal Size (inches)	1¼"	2"
Internal Diameter (mm)	32	50
Burst Pressure (bar)	70	46
Max. Recommended Operating Pressure (bar)	28	18
Peak Tensile Load (tonnes)	2.0	3.0
Max. Recommended Tensile Load (tonnes)	0.8	1.2
Weight of Flexibore (kg per metre)	0.33	0.48
Outer Diameter of Coupling (mm)	65	90
Weight of Stainless Steel Coupling (kg)	0.6	1.7
Fitting Bolt Torque	10Nm	12Nm
Weight of Water at 10% Swell (kg per metre)	1.00	2.4
Max. Flow Rate (litres per second)	2	6
Maximum Operating Temperature	40°C	
Water pH Range	4 to 9	

Maximum Pump Setting	100m
Maximum Diametric Swell	15%
Average Extension	1%
Safety Factor	2.5:1

\* For operation beyond stated recommended operating limits, contact your **Flexibore** distributor.

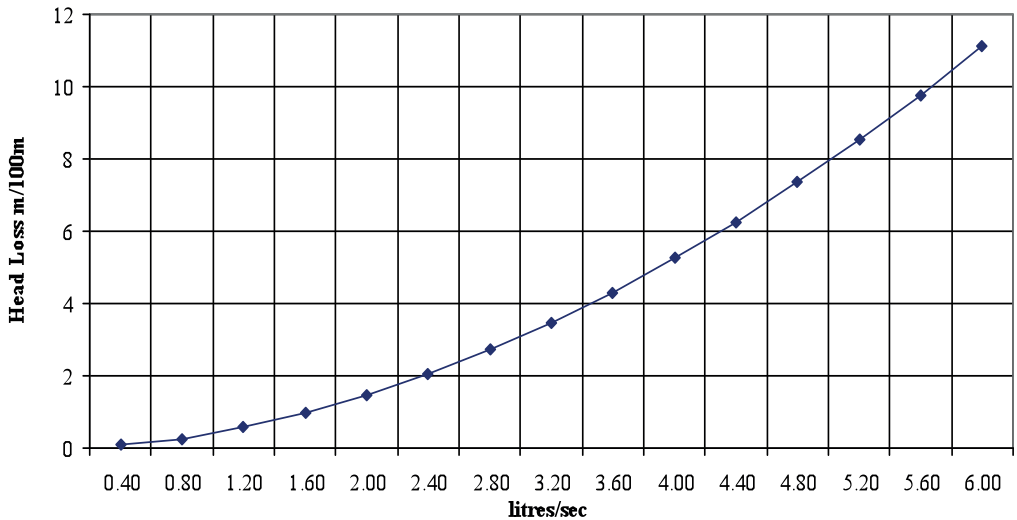
## Friction Loss Specifications

Due to the stretch properties of the textile sock, **Flexibore 100** has a built-in swell characteristic. This swelling gives excellent hydraulic performances thus keeping pumping costs down.





## 50mm Flexibore 100



## Fittings and Accessories

### Couplings

**Flexibore 100** couplings are high quality engineered fittings constructed 304 stainless steel.

**Flexibore 100** couplings consist of a single rib tailpiece with one 3-part clamp locking the hose immovably to the tailpiece.

Thread sizes on couplings correspond to hose size (i.e. the 2 inch coupling has a 2 inch thread).

Threads are standard B.S.P male tapered with other types and sizes available on request.

**Note:** Adaptors from the standard B.S.P. male coupling thread to alternative configurations are also available on request.



### Cable Ties (Option 1)

Heavy Duty cable ties (supplied by Crusader Hose) are used to secure the power cable to the hose.

Two cable ties are used for each cable loop located every 1m along the length of the hose.

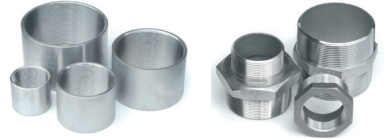
### Polyurethane Straps (Option 2)

Cable straps can also be used to secure the power cable to the hose.



## Adaptors and Sockets

High quality stainless steel adaptors and sockets that can be used in conjunction with **Flexibore** couplings are also available.



## Bore Cap

Stainless Steel or Galvanised bore caps are used at the bore head.

## Lifting Clamps

Lifting clamps are used in conjunction with a winch or vehicle to raise and lower the riser.

- Light duty clamps are used where the maximum load is limited to 3.5 tonnes.
- Heavy duty clamps are used where the load exceeds 3.5 tonnes (to a maximum load of 5 tonnes).

## Mini-Installation Roller

A roller assembly above the borehole can be used to assist to lower or lift the riser. The roller is fitted to the bore casing.

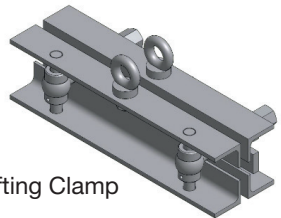
## Hose Joiner

In some circumstances existing riser may require additional lengths. In this case a hose joiner is introduced.

**Note:** Joiner must be positioned at the top of the system



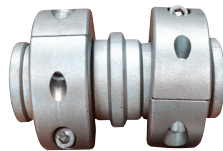
Mini Installation Roller



Lifting Clamp



Bore Cap



Hose Joiner

# Borehole Considerations

## Assembly and Installation of Flexibore 100 Rising Main:

FLEXIBORE 100 Diameter		Maximum lay-flat with coupling Width		Minimum Bore Casing Requirement Diameter	
Nominal Size (inches)	Internal Diameter (mm)	Nominal Size (inches)	Internal Diameter (mm)	Nominal Size (inches)	Internal Diameter (mm)
1¼"	32	2.5"	65	3"	76
2"	50	3.5"	90	4"	102

*\*The borehole diameter must allow adequate clearance for the power cable(s) and any additional equipment.*

### Tools Required for Installation/Retrieval

Ensure you have the following on site:

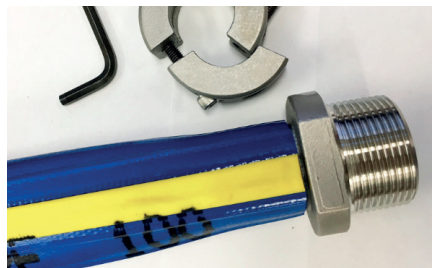
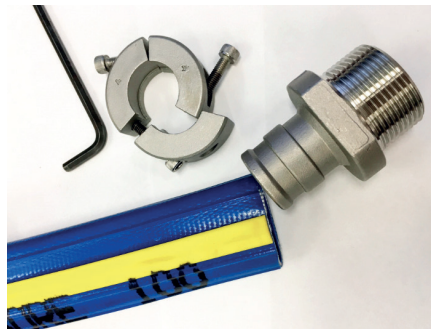
- Submersible Pump.
- Base plate and wellhead/bore cap assembly.
- The required length of Flexibore 100 hose.
- Two Flexibore Couplings & Allen Key.
- Electrical cable, equal to the length of Flexibore plus 5% minimum.
- Sufficient Flexibore HD Cable Ties.
- Short lengths of Polyethylene or PVC hose to act as a cable guard where electrical cable passes over the coupling and then secure to the coupling.
- 2 single sets of Lifting Clamps or rated slings.
- Mini-Installation Roller.

### Attach Coupling

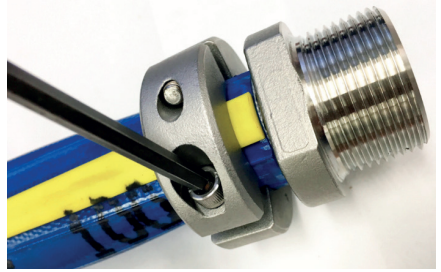
**Note:** The coupling clamps can be fitted to the hose without the need to file down the yellow strip. Connect the coupling to the **Flexibore 100** riser (if there is sufficient room, fully unroll the riser and power cable).

- To connect the coupling: Inspect the end of the riser. If uneven, trim the riser so that the end of the hose is straight.
- Stand the tail piece on the ground and push the riser onto the tail piece until it butts cleanly against the square shoulder of the hose (this does not require lubricant, which should not be used).

**Note:** it is difficult to push the riser onto the hose tail, cut two small slits opposite each other in the end of the hose (no more than 10 mm long).



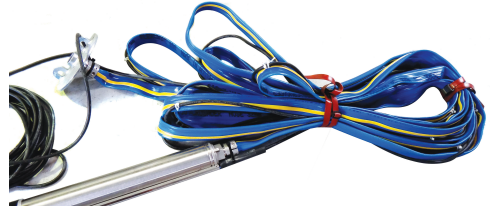
- Assemble a three-piece clamp ring over the riser. Tighten the cap screws evenly so that there is approximately a 2mm gap between each of the clamp segments.
- Firmly tighten the cap screws of both clamps.
- Fit a protective sleeve to act as a guard over the Power cable where it will pass over the coupling and secure with PVC Tape.



## Fitting the Power Cable

Roll the power cable out next to the riser, allowing a slack of 5%.

**Note:** Securing the Power cable correctly to the hose makes for trouble-free pumping.



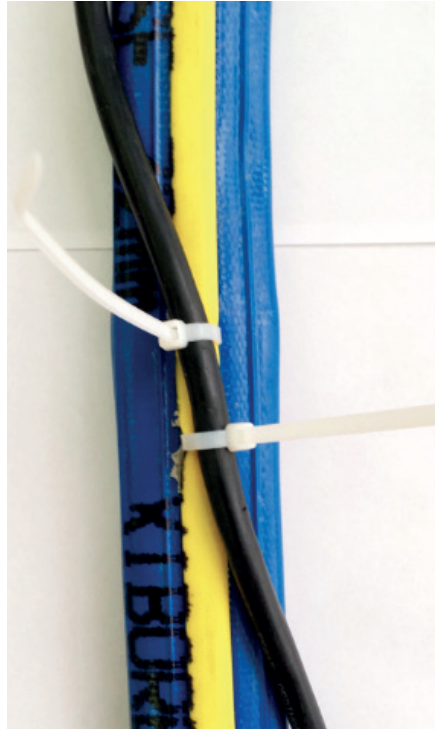
## Securing with HD Cable Ties

**Note:** It is imperative that only the approved cable ties are used. When fitting this type of tie, 2x ties must be used for application above 50m drop on each loop along the length of the hose.

Follow these steps:

- 1) Use two approved cable ties per loop for application above 50m drop and for less than 50m application use one approved cable ties per loop.
- 2) Ensure cable ties are spread apart near loop ends.
- 3) Pull the tie up very tight ensuring that the power cable cannot slide through and trim off excess cable tie.
- 4) “Snake” power cable to allow for 2% elongation to compensate for the weight of the pump and water etc. Normally 5% extra Power cable must be supplied.

**Note:** Do not attach any high or low level probes, cased in PVC as this pipe can become brittle. Probes should be hung independently in the bore.



# Hand Assisted with Mini-Installation Roller

The equipment required for a typical hand assisted installation include:

- A Mini-Installation Roller.
- Two lifting clamps (Light duty only - depending on pump weight).

## Hand Assisted Procedure:

**CAUTION:** Make sure sufficient and accurate information is calculated for suitability walked-in by hand assist installation – total weight of the pump, power cable and **Flexibore** riser must be established.

- 1) Position the pump alongside the borehole.
- 2) Fit the first clamp just above the first coupling (lay the power cable outside the clamp – NOT underneath it).
- 3) Carefully raise the pump & position over the borehole and lower the riser until the first clamp rests on the bore head casing.
- 4) Position and secure the roller assembly above the borehole and power cable must be over the roller.
- 5) Two operators may be required (depending on the pump weight) to take the tension of the Flexibore riser by hand slowly lifting the riser. Remove the first clamp then slowly walked in to lower the pump (**assuring the power cable, straps/cable ties and the riser is not touching the edge of the casing to avoid serious damage**).
- 6) Once the end of the Flexibore riser reaches the roller carefully position the second clamp resting on the bore head casing. Secure the second coupling at the end of the riser and headwork.
- 7) Remove the second clamp and finally lower the whole assembly.

**Flexibore System Installation Video via YouTube Link.** Either scan code on your smartphone, or visit the web address: <http://youtu.be/nZjCOFagp3E>

## Retrieval Techniques

Retrieval usually depends on whether the non-return valve has been drilled.

- Hand assisted;
- Vehicle assisted (*See Flexibore 250 Series Manual*)
- Mobile crane assisted (*See Flexibore 250 Series Manual*)

Make sure the retrieval devices (by hand, vehicle or mobile crane) can accommodate the full load of the **Flexibore** system during removal.



## Hand Assisted Retrieval Procedure

- 1) Stop the pump and allow the water to drain down to the static water level. Allowing 35 seconds per meter.
- 2) Disconnect the electrical supply and discharge pipe work.
- 3) Connect a safety chain cable to the bore cap, secure it to the roller assembly for safety and carefully lift the riser out of the borehole. Fit the first clamp to the riser securely resting on the bore head casing (**do not clamp the power cable**).
- 4) Secure and position the riser over the roller assembly - prepare one or two operators to walk out with the riser from the borehole and slowly lift and remove the first clamp (**by removing the first clamp, the operators taking the full weight of the pump**). Walk the riser out over the roller.

**When the Flexibore 100 system is ready to be reinstalled, double check all cable ties are in good condition, replace if necessary.**

## Chemical Resistance Chart

Medium	Temperature °C	Flexibore	Max. Volume increase %
Acetone	RT	-	
AL-chloride, aqueous, 5%	RT	++	1
Ammonia, 10%	RT	++	1
Aniline	RT	--	
ASTM Fuel A	RT	++	4
ASTM Fuel B	RT	++	10
ASTM Fuel C	20°C	+	18
ASTM oil 1	45°C	++	
ASTM oil 2	45°C	++	3
ASTM oil 3	45°C	++	6
Ethanol 96%	RT	+	11
Petrol, standard grade	RT	++	10
Petrol, premium grade	RT	-	
Benzene	RT	-	
Butanol	RT	-	
Butylacetate	RT	-	
Cyclohexanol	RT	+	5
Dibutylphthalate	RT	+	
Diesel oil	RT	++	5
Dimemethylformamide	RT	o	
Acetic acid 3 n	RT	-	

Acetic acid, 20%	RT	+	
Ethylacetate	RT	-	
Ethylether	RT	+	
Fe chloride, aqueous, 5%	40°C	+	
Glycol	RT	++	2
Glystantin / water 1:1	20	+	
Glystantin / water 1:1	45°C	+	
Isopropanol	RT	+	12
Kerosine	RT	++	3
Sodium chloride solution, conc.	RT	++	
Methanol	RT	+	10
Methylen chloride	RT	--	
Methylethylketone	RT	-	
Mineral oil	45°C	++	
Soda soap fat	RT	++	
Sodium hydroxide solution 1N	RT	+	
Nitric acid, 20%	RT	--	
Hydrchloric acid, 20%	RT	+	
Sulphuric acid, 20%	RT	+	
Sea water	RT	++	
Carbon tetrachloride	RT	-	
Toluene	RT	-	
Trichloro ethylene	RT	-	
Water	45°C	-	
Water	RT	++	1
Water	45°C	+	2

++ = Resistant over a prolonged period.

+ = Conditionally resistant, after a certain time appreciable differences are possible.

- = Not resistant, short-term contact possible under certain conditions.

-- = Not resistant, pronounced attack.

o = Soluble.

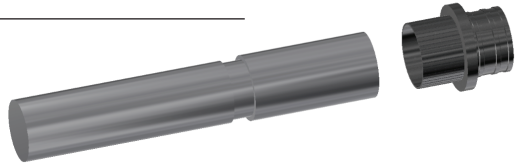
RT = Room temperature 23°C.



# Preparation and Installation

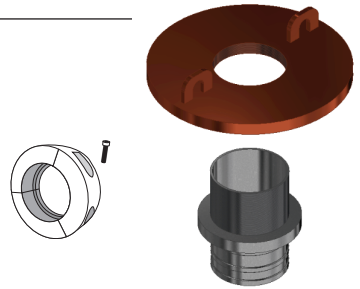
## Step 1

Screw bottom coupling tightly to pump.



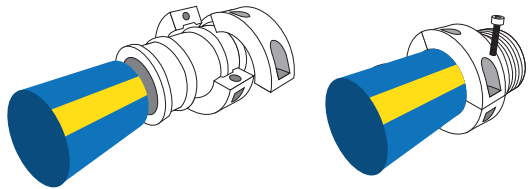
## Step 2

Prepare bore cap with top coupling.



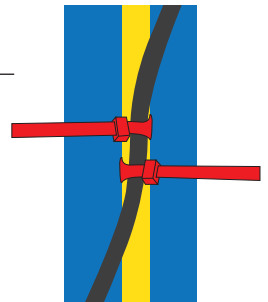
## Step 3

Connect hose to coupling and attach clamps.



## Step 4

Snake power cable and attach securely using cable ties

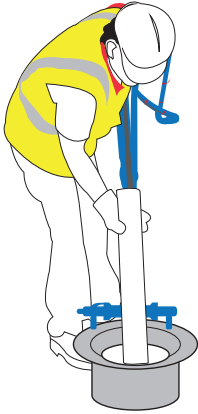




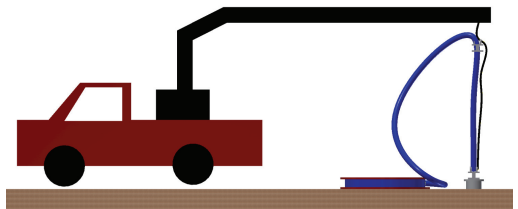
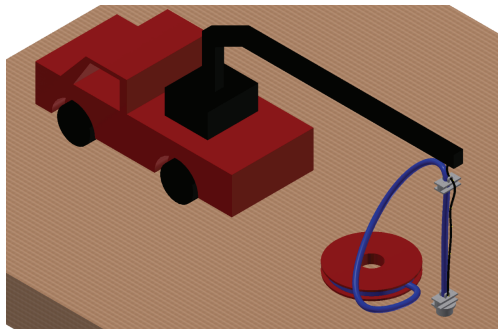
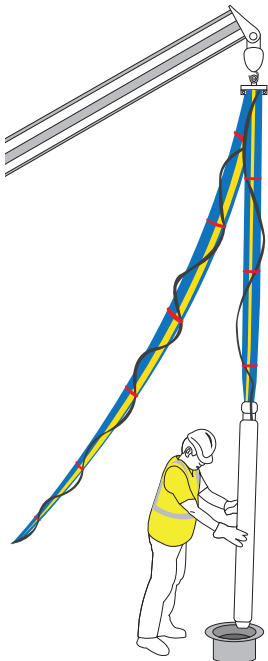
## Step 5

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- Flexibore installation over a roller assist



- 
- Flexibore installation Crane on truck assist





**For more information contact your nearest Flexibore distributor:**

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