Boreline Flexible Drop Pipe

Installation Procedure

Thank you for choosing Boreline Flexible Drop Pipe.

As you know, Boreline has been specifically designed to replace rigid risers used with submersible pumps. A pump and column can be installed and retrieved in a fraction of the time required for a rigid riser.

Boreline does not corrode or scale internally. We offer you a 10 Year Warranty while the Life Expectancy is in excess of 50 years.

There are many other benefits of using Boreline but then, you know about all those…… You have chosen wisely.

Should you not understand any part of the Installation Procedure, please contact your local supplier, or feel free to call our office at (480) 607 1507 or send an email to sales@allhoses.com

We have more information available on our web site at www.allhoses.com

Thanks again for choosing Boreline and may you have many, many years of total happiness and absolute satisfaction.
Before you start

Ensure you have the following on site:

- **Submersible Pump and motor**
- **Electrical cable** – equal to the length of Boreline - **plus 5%**
- **Base plate and well head assembly**
- **2 Boreline Fittings.** Each fitting consists of a body and two outer rings. Each outer rings consist of three equal segments.
- **The required length of Boreline**
- Sufficient **Boreline Cable Straps** needed to attach the power cable to the Boreline along the entire length of the riser. A safe guide is one Cable Strap for 3 ft of riser with deep settings greater than 300ft (100m) and one Cable Strap every 5ft on shallow settings.
- **2 Boreline Installation Clamps**
- Tripod or crane and the Rolling Wheel Assembly
- **Allen keys, file, knife.**
**Attaching the Boreline fitting and riser to the pump**

1. Make sure the ends of the riser are cut square. Trim with a sharp knife or hacksaw if necessary.

2. Screw the Boreline fitting into the check-valve located at the top of the pump.

3. Push the Boreline riser over the fitting body making sure the end of the riser is flush with the shoulder at the threaded end of the fitting. **Note: Do not use lubricant.** (Dipping the end of the Boreline in hot water can help with this)

4. Fit the first ring, with the three segments, into the groove closest to the threaded end of the fitting body. Tighten all three screws evenly, ensuring the gaps between the segments are even. When fully tightened the gaps between these segments should be about 7/8” to 1 1/4”.

5. Fit the second ring into the second groove, positioning the gaps off-centre to the gaps of the first ring. Tighten the rings as explained in 4 above.

6. **Please note:** To ensure the Boreline is empty when removing the pump, drill a ¼” hole into the check valve before attaching the fittings. This will allow the water to drain back through the pump when not in operation.
1. The Boreline riser should be laid on the ground with the rib facing upwards.

2. Push the Boreline Cable Strap through the cable rib openings that appears along the length of the riser. The openings appear approximately every 2 to 3 ft. Turn the riser over as you proceed to the next opening so that by the time all the cable straps have been inserted, the rib of the riser is facing down.

3. Roll the power cable out next to the riser.

4. Connect the power cable to the pump motor. *(This work should be carried out by a qualified electrician only)*

5. Starting from the end nearest the pump lift the power cable onto the centre of the riser. Bring the cable strap around the riser, over and around the power cable, and towards the buckle.

6. Bring the Strap back under the power cable and around and push it between the power cable and the strap. Pull the cable strap tight, ensuring the power cable is hard against the Boreline riser. Buckle the strap. The result is a “Clove Hitch Knot”

7. Move to the next cable strap. Before tightening the power cable, snake the power cable along the riser. *(see diagram)* The power cable should be fitted as shown so as to accommodate the extension characteristics of the riser in use.

8. Repeat the procedure for fastening the cable strap and then move to the next cable strap. *(Remember to snake the power cable along the entire length of the riser allowing approximately 5% slack as shown in the diagram)*

9. Attach the top end of the Boreline and fitting into the elbow or head works.

Any additional transducers, tubes, high/low level probes etc. can be attached directly to the power cable using standard cable ties.
Boreline Installation Procedure

Vertical Installation:

1. For heavy pumps, a pump rig will be required to lift the pump into the well. Small pumps can be lifted into position by hand.

2. Using the Boreline clamps, clamp the Boreline riser above the pump making sure the power cable is not clamped or squeezed.

3. Lift the pump using the clamp and lower it into the well until the clamp comes to rest on the well-head or casing.

4. Attach the second clamp along the length of the Boreline again making sure the power cable is not clamped.

5. Lift the clamp and the Boreline, raising the first clamp from the casing.

6. Loosen the first clamp and lower the length of Boreline into the well allowing the second clamp to come to rest on the casing.

7. In this manner, the pump and Boreline will be safely lowered into the well in one, continuous length with the head works coming to rest on the surface.
Horizontal Installation:

1. For heavy pumps, a pump rig will be required to lift the pump into the well. Light pumps can be lifted into position by hand.

2. Using the Boreline clamps, clamp the Boreline riser above the pump making sure the power cable is not clamped or squeezed.

3. Lift the pump using the clamp and lower it into the well until the clamp comes to rest on the wellhead or casing.

4. Bring the rolling wheel to the well and make sure it is centrally positioned and secured directly over the well casing. *An unsecured roller can move and cause injury to the operator*

5. Lift the Boreline over the rolling wheel with the power cable positioned on top of the riser.

6. Attach the second Boreline clamp to the top end of the riser and secure it to the installation vehicle. Back the vehicle up so that it now takes the weight of the pump. Remove the clamp that is just above the well casing. *The full load will now be taken by the vehicle and rolling wheel*

7. Drive the vehicle slowly towards the well, allowing the pump and riser to be lowered into the well. Joiners, fittings and clamps must not pass over the rolling wheel.

   **Please note:** Make sure the Boreline remains face down with the power cable on top as it is dragged along the ground. Avoid the edges folding and rubbing and make sure the power cable does not touch the ground.

8. When the vehicle is close to the rolling wheel, clamp the Boreline above the wellhead and continue forward, lowering the riser so that this clamp now rests on the wellhead. Remove the clamp from the vehicle.

9. Lift the Boreline, remove the clamp and lower the assembly allowing the head works to come to rest on the well casing.
Boreline Retrieval Procedure

1. Stop the pump. If a ¼" hole has been drilled into the check valve, allow the water to drain down to the static water level.

2. Disconnect the electrical supply and discharge pipe-work at the surface.

3. Lift the Boreline out of the well and clamp the riser using the Boreline clamps.

4. For a vertical retrieval, follow the installation steps in reverse order. Same for the horizontal retrieval.

5. Please note: If the Boreline and pump have to be removed while full of water the column will be heavier than normal. In this case make sure to provide for the extra weight when using lifting devices and vehicles.

The table in the Boreline Specifications section on the following page gives the nominal weight of the Boreline and water column per foot/meter. Please note that the weights of the pump, cable and accessories should be added to establish the total weight of the column.
Boreline Specifications

Material
The Flexible Drop Pipe shall be constructed from high-tenacity polyester yarns, which are circular woven and then totally encapsulated to form an integrated cover and lining of a high performance polyurethane elastomer, which is approved for use with potable water. A special rib will be incorporated in the cover to facilitate the attachment and securing cable straps for the purpose of supporting the power cable.

Performance
The Drop Pipe must have a minimum theoretical short length burst pressure and tensile strength as stated in the table below. The maximum extension should be no more than 4% and the maximum diameter swell 15%. The material should be capable of operating in water with a pH from 4 to 9. The manufacturer should provide a warranty of not less than 10 years against materials and manufacturing defects.

Fittings
The Drop Pipe shall be fitted with fully re-usable fittings each comprising of a body and two outer fastening clamps. The body of the fitting must contain two grooves over which the hose fits and the clamps are tightened. The two fastening clamps must be split into three equal parts. The materials of construction shall be 316 stainless steel for use with drinking water or where water is of an aggressive nature. The fittings shall be supplied with either BSP or NPT male thread for attachment to the pump at one end and the head works at the surface.

Certification
The manufacturer of the Drop Pipe should possess the ISO 9002 QA registration. Certification should include NSF and other pertinent requirements based on the end-use of the Drop Pipe.

Technical Specifications
The Technical Specifications can be found in the table below.

<table>
<thead>
<tr>
<th>Nominal size</th>
<th>1&quot;</th>
<th>1 1/2&quot;</th>
<th>2&quot;</th>
<th>3&quot;</th>
<th>4&quot;</th>
<th>5&quot;</th>
<th>6&quot;</th>
<th>8&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inside diameter</td>
<td>24 mm</td>
<td>40 mm</td>
<td>50 mm</td>
<td>76 mm</td>
<td>102 mm</td>
<td>127 mm</td>
<td>152 mm</td>
<td>202 mm</td>
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<tr>
<td>Theoretical Burst Pressure</td>
<td>70 bar</td>
<td>65 bar</td>
<td>65 bar</td>
<td>60 bar</td>
<td>58 bar</td>
<td>58 bar</td>
<td>58 bar</td>
<td>42 bar</td>
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<tr>
<td>Operating Pressure</td>
<td>35 bar</td>
<td>30 bar</td>
<td>30 bar</td>
<td>25 bar</td>
<td>25 bar</td>
<td>22 bar</td>
<td>22 bar</td>
<td>14 bar</td>
</tr>
<tr>
<td>Theoretical Tensile Strength</td>
<td>1 400 kgs</td>
<td>3 000 kgs</td>
<td>4 000 kgs</td>
<td>7 000 kgs</td>
<td>12 000 kgs</td>
<td>16 000 lbs</td>
<td>26 000 lbs</td>
<td>15 000 kgs</td>
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<tr>
<td>Weight of Boreline</td>
<td>0.20 kg/m</td>
<td>0.50 kg/m</td>
<td>0.55 kg/m</td>
<td>0.95 kg/m</td>
<td>1.40 kg/m</td>
<td>1.70 kg/m</td>
<td>1.70 kg/m</td>
<td>2.50 kg/m</td>
</tr>
<tr>
<td>Outer Diameter of Fitting</td>
<td>60 mm</td>
<td>80 mm</td>
<td>95 mm</td>
<td>140 mm</td>
<td>165 mm</td>
<td>200 mm</td>
<td>230 mm</td>
<td>320 mm</td>
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<td>15 kgs</td>
<td>18 kgs</td>
<td>26 kgs</td>
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<tr>
<td>Weight of Water</td>
<td>0.6 kg/m</td>
<td>2 kg/m</td>
<td>3 kg/m</td>
<td>6 kg/m</td>
<td>10 kg/m</td>
<td>15 kg/m</td>
<td>21 kg/m</td>
<td>37 kg/m</td>
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</tbody>
</table>
Boreline Questions & Answers

1. Will the Drop Pipe withstand the forces and stresses involved in pumping?
   It can operate continuously at pressures up to 25 bar with a good safety factor over its life while also maintaining its design tensile load. In practice most wells operate far below the design pressure and tensile loadings of Boreline thus giving safety factors way in excess of the requirement.

2. Abrasion resistance. Will Boreline cope with sand in the pumped water?
   The materials used in Boreline are particularly resistant to abrasion and have been shown to resist particulate matter such as sand extremely well.

3. Can Boreline tolerate dragging across the ground?
   Normal dragging and abrasion encountered during riser installation causes no visible damage. Care should, though, be taken to avoid any snagging of the hose on the well head or any sharp objects in the vicinity.

4. Temperature of Operation. What water temperatures can be tolerated?
   Boreline will safely handle water up to 60°C - this includes the vast majority of likely applications. (Use of Boreline in water temperatures above 60°C will reduce its working life.) For advice refer to your Boreline distributor.

5. Water Quality. Is Boreline restricted with respect to Water Quality?
   A pH range of 4-9 can be safely tolerated for pumped water temperatures below 30°C. At temperatures in the 30°C to 55°C the recommended pH range is from pH5 to pH9. Boreline is resistant to a wide variety of chemicals, details of which are available on request.

6. Failure of the Riser. How can I retrieve the pump if the riser fails?
   In the event of very severe riser misuse, Boreline is designed to fail safe, i.e. if the riser bursts it retains its longitudinal strength and the pump can be withdrawn attached to the riser.

7. Can I use the riser for applications other than rising mains?
   Boreline can be used for most submersible pump operations and may also be used as a delivery hose for a wide range of fluids. However, Boreline is designed to a higher specification than most other delivery requirements and for more general application you should contact your local Flexible Pipeline distributor or the manufacturer for advice on the most economic systems.
8. What couplings are available?
A range of reusable couplings is available specifically designed for on-site attachment. The stainless steel or aluminium bronze couplings ( & High Tensile Polymer in 1½” & 2” sizes ) complement the riser, having a good resistance to aggressive water and the benefits of long life and low maintenance.

9. How do the couplings work?
1½” to 8” couplings are double ribbed with clamps ensure no movement in any direction.

10. How strong are the couplings? Can the riser pullout?
Provided the manufacturer's instructions are followed, the couplings are stronger than the riser. The riser will tear or burst before the couplings lose their grip.

11. How's the power cable attached?
Normally cables supplying submersible pumps are attached diametrically opposite to the ridge specifically provided along the outside of the riser. The cable is attached using straps tied in a clove hitch as shown on page 14. When the pump and riser assembly are a tight fit within the casing or in dog-leg wells. the power cable should be protected particularly as it passes over the top of the pump. For absolute stability the use of a spider or centralising device is recommended.

12. What if the cable is heavy or I have several items to attach?
If a safety cable/dosing tube/dip tubes, etc. are included in any installation these may be secured to the riser in the same way as the power cable or, if preferred, attached to the power cable. On lowering into the borehole care must be taken to ensure Boreline takes all the load.

13. Can I retain the pump's non-return valve?
It is important to assist lifting of the pump and riser that the water is allowed to drain from the riser. Removing of the pump's non-return valve allows the riser to drain, thus making removal of the pump from the well easier and a non-return valve fitted at the wellhead will stop the surface system draining back through the pump. Otherwise, providing you do not contravene the pump warranty, we recommend that a 6 mm (1/4”) hole is drilled in the non-return valve retained in the pump. If further advice is required consult your distributor.

14. What if I forget to drill or remove the non-return valve and the riser remains full of water?
This is not detrimental to performance but care must be taken on lifting the riser full as the standard lifting clamps may not be sufficiently rated for the loading. Details of pump weight, riser size and depth should be passed to your distributor who will advise on lifting methods.
15. How can I earth my pump with your riser?
Pump manufacturer’s recommendations should be followed with regard to the equipment and its electrical safety. If no other guidance is given, we would recommend using a separate earth cable from the pump to a suitable surface earthing point.

16. Does the pump torque twist the riser?
At pump start-up there is a partial rotation of the riser in the area of the pump which ceases immediately the pump speed increases and the riser fills to become a rigid system. This is not detrimental to the performance of the system, merely a consequence of the elastic nature of the riser. This property has major benefits in the resistance of shock loadings.

17. Steel risers sometimes suffer from solid deposits building up-how does Boreline perform?
In operation the riser will flex continually – though imperceptibly. On stopping the pump the riser will drain and collapse to its original lay-flat state provided the non-return valve has been removed or drilled out. Because of these features solid encrustation cannot gain a grip on the Boreline.

18. Does slime and other algae-based deposit build-up inside Boreline?
One of the features of the polyurethane material used in the manufacture of Boreline is that it does not support algae growth. Tests performed by the manufacturer and repeated by the Water Research Centre (U.K.) have shown that algae will not grow on the riser material.

19. What pressure losses can be expected with Boreline?
Pressure losses through Boreline are lower than with any other type of riser. This Super Hydraulic Performance is achieved by the avoidance of internal deposit build-up. (i.e. Friction factors claimed for rigid pipe are valid only in new systems and corrosion / sedimentation in use will soon have a detrimental effect.) Being of flexible construction Boreline is also designed to swell under pressure. This flexibility allows increases in the diameter, thus further reducing head loss when compared to rigid risers.

20. Will Boreline and its couplings stand up to long-term use?
Extensive laboratory trials and decades of practical experience in thousands of wells worldwide, has shown that Boreline and its fittings are capable of long life in conditions where steel riser would quickly fail. The recommendations made in this literature generally assume that the most extreme conditions will apply simultaneously and continuously. In practice this is generally not the case. Safety margins are therefore very high.
21. How can you be sure of the precise pump setting?
By careful design of the Boreline reinforcement, the extension of the riser has been minimised by balancing the extension effect of axial loads against the reverse effect of internal pressure. The precise extension of the Boreline riser can be predicted with reasonable accuracy, but as a rule, this will not exceed 4%. The diametric swell can be up to 15% at the maximum operating pressures, further benefiting hydraulic efficiency.

22. Can the Boreline withstand the surge pressure due to sudden valve operation?
The ability of Boreline to safely expand under pressure minimises the effect of surge pressure. This is a major advantage over rigid risers as water-hammer is better absorbed along the length of the drop pipe.

23. Who has approved the riser?
The potable water qualities of the riser have a number of national approvals including United States, United Kingdom, Germany, South Africa and Australia. Boreline, has been installed in many countries and in a wide range of operating conditions over the last couple of decades. It has proved to be a revolutionary solution to aggressive water problems and when the additional installation and handling costs of steel pipe are considered, it is a cost effective solution in almost all water well applications.

24. Boreline - Does Chlorine affect its properties?
Under known conditions of application to the well water, chlorine has no detrimental effect on the mechanical performance of the riser. Use of high concentrations (above 5ppm) should be discussed with your local distributor.

25. What guarantees do we have with Boreline?
Boreline carries a 10 Year Warranty. For example, if within six months of ex-works delivery and provided that the customer notifies the company immediately of any defect arising from faulty workmanship or material will result in free of charge replacement of the goods. Departure from recommended operational usage and use of materials not supplied by the company will invalidate this. The warranty does not cover incidental costs incurred in removal and installation of the riser. Please see following section for more information.

26. How must Boreline be stored?
Boreline should be stored out of direct sunlight and between 10°C and +30°C to ensure maximum working life. Exposure to humid or damp conditions is not detrimental.
10 Year Warranty - Terms and Conditions

All due precaution is taken during the Manufacturing Process to ensure quality products. The situation may however arise where a Manufacturing Fault is not identified during the testing phase. If a problem should arise the following conditions apply:

- Hose Manufacturers (the manufacturer) must be informed promptly and supplied with all requested information and samples to fully investigate the complaint.
- The Warranty is only valid on Workmanship or Material problems identified as a Manufacturing or Production problem.
- Boreline that has been misused or damaged in any way due to incorrect application or mishandling before, during or after installation is excluded from any Warranty Claim.
- Boreline that is not used for the intended and designed purpose is excluded from any Warranty Claim and is for the risk of the user.
- Boreline must only be joined or connected using the supplied Double Ribbed Boreline Couplings and where this is found to not be the case, no claim will be considered.
- Boreline Cable Straps must be used to support the power cable along the entire length of the hose.
- Not registering your Boreline can prejudice any claim at the manufacturers discretion.
- The Warranty applies to the Original Purchaser in respect of the Boreline cost and excludes any claim for any direct or indirect costs or consequential damage or loss.
- The Warranty Costs are subject to the following conditions taking into consideration the service already obtained from the Boreline:

<table>
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<tr>
<th>Months from Purchase*</th>
<th>0 to 6</th>
<th>6 to 24</th>
<th>24 to 36</th>
<th>36 to 48</th>
<th>48 to 60</th>
<th>60 to 120</th>
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<tr>
<td>Discount on Replacement Hose **</td>
<td>Free</td>
<td>80%</td>
<td>60%</td>
<td>40%</td>
<td>20%</td>
<td>10%</td>
</tr>
</tbody>
</table>

Please note:
* “Months from Purchase” defines the time from when the hose was despatched from Hose Manufacturers or their approved agents.
** “Discount on Replacement Hose” denotes the discount to the user of a replacement hose at current prices.

Should you not understand any part of this Warranty, we ask you to please consult Hose Manufacturers or its approved agents to verify any issues prior to purchasing any products.