→ Delivering

FASTCAST™ CONCRETE SOLUTIONS

Tunnelling and underground products

COMMUNICATIONS  TRANSPORT  WATER  UTILITIES

An AMEC company
The Buchan PROMISE

CHANGES IN THE WAY WE LIVE AND WORK HAVE CREATED AN INCREASING DEMAND FOR MORE MODERN METHODS OF CONSTRUCTION.

At Buchan, we promise to deliver more efficient, cost effective and safety-focused sustainable solutions.

Our vision is to exceed our customers’ expectations as the premier off-site concrete solutions provider.

FASTCAST™ UNDERGROUND

FASTCAST UNDERGROUND FROM BUCHAN CONCRETE SOLUTIONS HAS BEEN DEVELOPED TO OFFER A COMPREHENSIVE RANGE OF SUPPORTING MATERIALS FOR USE IN BELOW-SURFACE CONSTRUCTION PROCESSES.

FASTCAST Underground aims to provide customers with a safe, precast product that can be easily installed, with minimum finishing required, when working in an underground environment.

Buchan offers a bespoke service for specific tunnel and shaft projects, based on 40 years experience in supplying the tunnelling industry worldwide as well as providing proprietary standard products.

Contents:

Please view our website for our other FASTCAST solutions.
Bucline Shaft Linings

A Bucline shaft is a smooth segmental shaft joined together by hidden mechanical fixings. The strong connections bolt together segment to segment and ring to ring, complete with seals if required, to form a finished shaft lining.

Our patented system retains all the benefits of strength, flexibility and speed of erection associated with a bolted ring, whilst at the same time, provides the client with a smooth finished shaft.

Range: 2.440m to 25.000m
Smoothbore, single pass shaft lining
Fast construction with minimum finishing required
Full range of ancilliary products
Bucline Shaft Linings

Materials
Concrete
The concrete mix design normally used provides for a characteristic strength of 50N/mm² at 28 days.

All raw materials comply with current British and European standards.

Manufacturing is carried out in accordance with the requirements of our quality management system, audited by the British Standards Institute (BSI) to comply with BSEN ISO 9001:2000.

Caulking grooves and sealing grooves
Segments are cast with caulking grooves on the internal circumferential and longitudinal sides.
Rings also have grooves cast into the joint faces of each segment, for hydrophilic sealing strip.
Special rings can be supplied to meet the specific requirements of a contract or a sealing system.

Grout/Lifting sockets
Each segment has one coarse threaded plastic lifting/grout socket complete with a threaded plastic grout plug.

Non return valves
Plastic non return valves are provided.

Packings
Bituminous felt packing 3mm nominal thickness are used on all longitudinal joints and will be supplied with the rings.

Building equipment
Details of underpinning devices can be supplied on request.

Special rings
Landing support is accommodated by standard sized rings with an integral corbel. Cutting edge and choker rings are available for many sizes to enable shaft sinking by caisson techniques.
Bucline Shaft Linings

Typical segment layout

Bucline shaft details

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Bucline Shaft Linings

Shaft constructed as a caisson

- Heavy duty cover slab
- Standard ‘Bucline’ shaft ring
- Corbel ring
- Choker ring
- Intermediate landing slab
- Bolt pockets in cutting edge & choker for ease of building
- Cutting edge
- ‘Panelled’ rings for shear-key purposes

Sealants:
- Caulking (standard)
- Hydrophilic strip (optional)

Grout hole:
- Threaded plastic socket complete with plug and NRV.

Standard ‘Bucline’ shafts available with:
- Heavy duty cover slab
- Corbel ring
- Intermediate landing slab
- Choker ring
- Cutting edge
- ‘Panelled’ rings for shear-key purposes
Bucline Caisson Shaft Linings

A Bucline Caisson shaft is a smooth segmental shaft joined together by external fixings. The strong connections bolt together segment to segment and ring to ring, complete with gaskets, to form a finished shaft lining.

Our system retains all the benefits of strength, flexibility and speed of erection associated with a bolted ring, whilst providing the client with a safer system of working, by reducing man-entry into the shaft and working at height.

Range: 6.000m to 15.000m
Smoothbore, single pass shaft lining
Fast construction with minimum finishing required
Full range of ancillary products
Materials
Concrete
The concrete mix design normally used provides for a characteristic strength of 50N/mm² at 28 days.

All raw materials comply with current British and European standards.

Manufacturing is carried out in accordance with the requirements of our quality management system, audited by the British Standards Institute (BSI) to comply with BSEN ISO 9001:2000.

Caulking grooves and sealing grooves
Segments are cast with caulking grooves on the internal circumferential and longitudinal sides. Rings also have grooves cast into the joint faces of each segment, for EPDM Gaskets.

Special rings can be supplied to meet the specific requirements of a contract or a sealing system.

Grout sockets
Each segment has one coarse threaded plastic grout socket complete with a threaded plastic grout plug.

Non return valves
Plastic non return valves are provided.

Packings
Bituminous felt packing 3mm nominal thickness are used on all longitudinal joints and will be supplied with the rings.

Special rings
Landing support is accomodated by standard sized rings with an integral corbel. Combined cutting edge and choker rings are available for many sizes.
Bucline Caisson Shaft Linings

Typical joint arrangement

Caisson shaft details

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Bucline Caisson Shaft Linings

Shaft constructed as a caisson

Standard ‘Bucline Caisson’ shafts available with:-

- Heavy duty cover slab
- Corbel ring
- Intermediate landing slab
- Combined cutting edge and choker ring
- ‘Panelled’ rings for shear-key purposes

Sealants:-

- Caulking (standard)
- EPDM gasket (standard)

Grout hole:-

- Threaded plastic socket complete with plug and NRV.

Heavy duty cover slab

Standard ‘Bucline Caisson’ shaft ring

Corbel ring

Intermediate landing slab

Combined cutting edge and choker ring with panelled inner surface for shear key

Radiused bolt holes

Choker for ease of building
Caisson Shaft Units

Range: 2.550m to 3.000m

Full range of ancilliary products

Buchan Concrete Solutions produce a range of standard one piece caisson units suitable for fast and simple construction of small diameter shafts. They bolt together vertically, complete with seals, to form a finished shaft lining.

Special designs are also available.
Caisson Shaft Units

Materials
All raw materials comply with current British and European standards.

Manufacturing is carried out in accordance with the requirements of our quality management system, audited by the British Standards Institute (BSI) to comply with BSEN ISO 9001:2000.

Seals
The flexible joint seals are manufactured from uncurved butyl rubber which meets the requirements of the ‘Civil Engineering Specification for the Water Industry’.

Caulking grooves
All units are cast with a caulking groove on the bottom of the internal circumferential joint.

Grout holes and plugs
Caisson units are supplied with coarse thread plastic sockets and plugs with sealing washers. Plastic non-return valves are provided.

Lifting
Caisson units are supplied with three threaded lifting sockets.

Caissons must be lifted using an appropriate three leg chain and M20 lifting loops. The angle of the chain with the horizontal must be no less than 45 degrees.

Lifting loops are available on request. Cover slabs are supplied with strand lifting loops. Slabs must be lifted using suitably balanced chains and shackles with a minimum 40mm diameter pin through all the strand lifting loops and provided with a minimum chain angle of 60 degrees between slab and chain.

Special units
Caisson Units
Units can be manufactured to suit alternative specifications for a particular contract.

Cutting edge
Steel cutting edges can be supplied as an alternative.

Platform supports and landing slabs
Galvanised mild steel open mesh landing slabs and angle supports can be supplied as an alternative to give a greater clearance during construction.

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<th>Nominal dia.</th>
<th>Internal dia.</th>
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![Diagram of Caisson Shaft Units](image_url)
Caisson Shaft Units

Cover slab
Combined cutting edge and choker ring

Standard caisson unit

Combined concrete cutting edge and choker ring

Steel cutting shoe (optional) supplied ready, fitted to standard ring

Sealants:- Butyl rubber

Grout hole:- Threaded plastic socket with plug and NRV

Cover slab
Shaft Cover and Landing Slabs

Range: 1.520m to 15.000m

Normal reinforced concrete design

Made to order, fast availability on standard designs

Buchan Concrete Solutions produce a range of sectional cover slabs and internal landings.

Special designs also available to accommodate crane capacity constraints.
Shaft Cover and Landing Slabs

**Design**
Slabs are manufactured to your requirements, designed in line with the recommendations of B.S. 8110: Part 1.

i) Intermediate slabs are designed to carry an imposed load of 5kN/m².

ii) Heavy duty cover slabs are designed to carry 45 units of H.B. wheel loading as defined in B.S. 5400: Part 2, together with up to 4m depth of fill.

It is not recommended that slabs be placed less than 0.6m below the road surface.

Cover to reinforcement complies with B.S. 8110, Table 3.4 - Severe exposure.

The concrete mix design normally used provides for a characteristic strength of 50N/mm² at 28 days, when cubes are cured and tested in accordance with B.S. 1881.

The standard range of cover slabs includes one access opening of 900mm square or diameter.

Special slabs can be designed to meet non standard loading or access hole layouts.

**Installation**
Units should be laid on a flat level sand/cement mortar bed, minimum thickness 15mm.

Joints on the top surface and the vertical joints on the end of the units are provided with rebates which should be pointed with sand/cement mortar or sealed with an appropriate jointing or caulking compound, depending upon the site conditions.

**Joint details**
Unless otherwise indicated on the drawing, all joints between units are construction joints and are not designed to transmit load.

Construction joints should be sealed using 40 x 25 Tokstrip (or similar approved), placed centrally on the step prior to the placing of units.

**Lifting details**
Slab units are supplied with four strand lifting loops.

Slabs must be lifted using suitable balanced chains and shackles with a minimum 40mm diameter pin through all the strand lifting loops provided, with a minimum chain angle of 60 degrees between slab and chain.
### Heavy duty cover slabs

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*Note: Sizes may vary to suit individual customers requirements.*

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<td>5</td>
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</tr>
</tbody>
</table>

*Note: Sizes may vary to suit individual customers requirements.* *No opening in standard half slab.*
Buclock Tunnel Linings

Range: 1.200m to 2.440m

- Smoothbore single pass tunnel lining
- Fast construction with minimum finishing
- Patented connections

A Buclock tunnel is a completely smooth segmental tunnel lining joined together by hidden mechanical fixings.

This range of linings has been developed to provide accurate construction with conventional tunnelling shields.

The patented system of connections provides a lining that is strong, flexible and fast to build, whilst providing a smooth finished tunnel.
Buclock Tunnel Linings

Materials
Concrete
The concrete mix design normally used provides for a characteristic strength of 50N/mm² at 28 days.
All raw materials comply with current British and European standards.
Manufacturing is carried out in accordance with the requirements of our quality management system, audited by the British Standards Institute (BSI) to comply with BSEN ISO 9001:2000.

Manufacture
Caulking grooves and sealing grooves
All segments are cast with caulking grooves and sealing grooves to suit Bucseal hydrophilic strip on the circumferential and longitudinal sides.

Grout/Lifting holes and plugs
Each segment has one 50mm nominal diameter coarse threaded plastic lifting/grout socket, complete with threaded plastic grout plugs to facilitate fast and safe machine erection. Non return valves are provided.

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Segments per ring</th>
<th>Vol. per ring</th>
<th>Wt. per ring</th>
<th>Wt. per seg.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Int. dia. metres</td>
<td>Ext. dia. metres</td>
<td>Width Metres</td>
<td>I  O  T  K</td>
<td>m³</td>
</tr>
<tr>
<td>1.20</td>
<td>1.42</td>
<td>0.61</td>
<td>1 4  -  -</td>
<td>0.274</td>
</tr>
<tr>
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<td>1.77</td>
<td>0.61</td>
<td>1 2 2 1</td>
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<td>1.93</td>
<td>0.61</td>
<td>1 2 2 1</td>
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<td>2.44</td>
<td>2.74</td>
<td>0.61</td>
<td>1 2 2 1</td>
<td>0.745</td>
</tr>
</tbody>
</table>

Smoothbore linings for larger sizes are provided with other connections, please contact our Technical Department for details.
Note: Buchan have a policy of continuous product development and reserve the right to change the specification without prior notice.
Six Segment Trapezoidal Tunnel Linings

Range: 2.070m to 3.840m

- Smoothbore, single pass construction
- Tapered lining for curved and straight driving
- Avoids a cruciform joint between segments

Developed in conjunction with leading consultants and contractors, these single pass smoothbore linings have been designed for use with closed face tunnelling machines.

The linings can be designed to accommodate elastomeric compression gaskets or hydrophilic seals. Individual segments are wedge shaped thus eliminating the need for a special closure segment.
Six Segment Trapezoidal Tunnel Linings

**Design**
The six segment smoothbore rings incorporate the latest in lining technology and have been designed to accommodate the increasing demands from modern Tunnel Boring Machines (TBMs) and bad ground conditions. Segments are designed to be machine handled with a rotating arm erector and are provided with an innovative and fast coarse thread plastic socket at the centroid for lifting and grouting.

A thicker smoothbore ring section has been designed to cater for larger shield ram shove forces and to incorporate elastomeric gaskets.

The patented Buclock connection is incorporated on the circumferential joints in place of the bolted connection: Combining the advantages of a solid dowel and a secure threaded connection, it is fast and easy to build and eliminates pockets on the circle joints.

The rings have been used in some of the worst tunnelling conditions in the United Kingdom with very high external water pressures. A major advantage of this design is the reduced incidence of cruciform joints (where the corners of four segments meet). This has always proved an area prone to water ingress in previous designs with gaskets. Even when rings are built with the same orientation, a full segment in the invert, the cruciform joint is avoided completely.

The trapezoidal joint arrangement also assists a good ring build and helps maintain the ring shape prior to grouting. With this type of ring the last segment erected is always in the top half of the bore.

**Materials**
All raw materials comply with current British and European standards. Manufacturing is carried out in accordance with the requirements of our quality management system, audited by the British Standards Institute (BSI) to comply with BSEN ISO 9001:2000.

**Caulking grooves and Sealing grooves**
All segments are cast with caulking grooves on the circumferential and longitudinal sides. Sealing grooves for either hydrophilic strip or elastomeric compression gaskets can be incorporated at the time of casting.

**Grout/Lifting sockets**
Each segment has one coarse threaded plastic lifting/grout socket and threaded plastic grout plug with sealing washer. Plastic non return valves are provided.

**Grumets**
Standard segments are normally cast with shaped bolt hole recesses designed to accommodate gel impregnated grumets: these grumets can be supplied if required.

**Packings**
Bituminous felt packings of 3mm nominal thickness should be used on all longitudinal joints and can be supplied if required.

**Circumferential packings**
Circumferential packings made from 3mm bituminous felt or 3mm or 6mm timber can be supplied if required.

**Special rings**
The rings currently available have a taper across one axis as detailed in the table opposite. Non standard tapers can be manufactured to the purchaser’s specific requirements.

**Buclock Connectors**
Buclock connectors are resistant to microbiological attack and are suitable for use with potable water.
Six Segment Trapezoidal Tunnel Linings

Ring details

![Ring details diagram]

**Standard ring dimensions**

<table>
<thead>
<tr>
<th>Internal dia.</th>
<th>External dia.</th>
<th>Max. ring width</th>
<th>Min. ring width</th>
<th>Wt. per segment</th>
<th>Ring wt.</th>
<th>Bolts per ring*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metres</td>
<td>Metres</td>
<td>mm</td>
<td>mm</td>
<td>kg</td>
<td>tonnes</td>
<td>No. x dia. x length (mm)</td>
</tr>
<tr>
<td>2.07</td>
<td>2.43</td>
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<td>990</td>
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<td>12 x M16 x 295</td>
</tr>
<tr>
<td>2.44</td>
<td>2.80</td>
<td>1007</td>
<td>993</td>
<td>600</td>
<td>3.60</td>
<td>12 x M16 x 355</td>
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<td>2.85</td>
<td>3.21</td>
<td>1007.5</td>
<td>992.5</td>
<td>700</td>
<td>4.19</td>
<td>12 x M16 x 365</td>
</tr>
<tr>
<td>2.90</td>
<td>3.26</td>
<td>1005</td>
<td>995</td>
<td>710</td>
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<td>12 x M16 x 365</td>
</tr>
<tr>
<td>3.35</td>
<td>3.71</td>
<td>1010</td>
<td>1000</td>
<td>820</td>
<td>4.89</td>
<td>12 x M16 x 400</td>
</tr>
<tr>
<td>3.38</td>
<td>3.84</td>
<td>1083</td>
<td>1051</td>
<td>1200</td>
<td>6.80</td>
<td>12 x M20 x 490</td>
</tr>
<tr>
<td>3.84</td>
<td>4.24</td>
<td>1015</td>
<td>985</td>
<td>1040</td>
<td>6.20</td>
<td>12 x M20 x 410</td>
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</tbody>
</table>

*All bolts have a 300m radius except the 3.38 I.D. ring - 340m radius

The bolt lengths listed above serve only as a guide and clients should satisfy themselves that they are sufficient for their purposes.

Note:- Buchan have a policy of continuous product development and reserve the right to change the specification without prior notice.
Six Segment Trapezoidal Tunnel Linings

**Fig 1.** The rings consist of three different segment types. Segments are supplied to the erector in a predetermined sequence dependant upon the alignment required.

The ring orientation is altered by erecting segments in a different order.

**Fig 2.** The staggered joint pattern, avoiding the cruciform joint (where the edges of four corners meet) is a major feature.

Bolt pockets and caulking grooves are caulked or pointed to provide the finished lining.

**Fig 3.** The plastic grout/lifting socket has a specially developed coarse thread for tunnel and shaft linings which allows easy thread starting and fast fixing.

Plastic non-return valve, threaded grout plug and sealing washer are also available.
Buclock

Plastic tunnel lining connection

Patented high strength connection

Reduced erection and finishing time

Available for use by clients designer or manufacturer

Combining the advantages of a solid dowel and a secure threaded connection, this patented self-locking plastic connector provides a superb circle joint fixing for tunnel linings.

Suitable for use with packings, hydrophilic seals and EPDM compression gaskets, it is fast and easy to build and has no pockets/recesses to fill.
Buclock

Plastic tunnel lining connection

Design
The Buclock circle joint connection has been developed over many years to provide the ideal connection between tunnel rings. Manufactured from a high strength durable plastic it combines the advantages of a bolted connection with the speed, economy and alignment characteristics of a dowel.

The system has been developed in conjunction with major tunnelling contractors and is suitable for use in traditional open face shields or with the latest full face tunnel boring machines. The dowels allow a very fast ring erection sequence and are designed to reduce lipping between segments.

The secure interlocking system is tolerant of a dirty environment and allows for the initial misalignment of segments to compensate for tapered joints and gaskets, thus it is suitable for use with all types of tunnel rings and, in particular, with the trapezoidal segment rings. It has been used in some of the worst soft ground tunnelling conditions in the U.K.

Major advantages
- Highly durable connection with no corroding parts
- Fast ring construction sequence
- Minimum building clearance (50mm standard, 75mm heavy duty) allows the use with most types of tunnelling machine and ram length
- The rigid dowel action of the coupler re-aligns the segment and minimises the stepping of joints
- Self-locking
- Self-aligning
- No extra reinforcement required
- Suitable for trapezoidal segment rings
- Simple and easy to use
- Does not induce bursting forces in the concrete
- No circle joint pockets to fill
- Suitable for use with all types of sealing system, including EPDM compression gaskets and hydrophilic seals.
Buclock

Plastic tunnel lining connection

Test results for Buclock fixings

Assembly load

Average load required to achieve joint closure (without gasket)
Standard = 8KN,
Heavy duty = 11KN.

Shear strength

Shear strength at failure
Standard > 6 tonnes,
Heavy duty > 10 tonnes.

The graph opposite shows typical test results from shear tests carried out with Buclock fixings cast into concrete test pieces.

Tensile strength

Tensile strength at failure,
Standard > 1.25 tonnes,
Heavy duty > 3.0 tonnes.

The graph opposite shows typical test results from tensile tests carried out with Buclock fixings cast into concrete test pieces.
Buclock

Plastic tunnel lining connection

Compatibility with gaskets
Buclock is fully compatible with elastic compression gaskets. The elastic performance of the connection compliments the compression characteristic of the gaskets, which means that it can be used with a stiff gasket and copes with varying joint gaps.

The graph below shows the compression curve for a stiff EPDM compression gasket with a compression force to closure of 25kN/m², superimposed on the extension characteristic of the heavy duty Buclock connection when used with a 2.44m I.D. tunnel lining.

Buclock/gasket interaction

![Diagram of Buclock/gasket interaction]

A resultant joint gap of 1.5mm @ equilibrium.
Gasket sealing performance remains unaffected
Standard Bolted Linings

Buchan Concrete Solutions produce a standard range of high quality concrete bolted segments for all types of tunnels.

All standard bolted rings can be used for the construction of tunnels, shafts and manholes. Segments can also be designed to suit individual circumstances. A full range of cutting edges, choker rings, platform support rings and cover slabs are available to assist in shaft construction.

Range: 1.520m to 25.000m

Economical and simple to build

Full range of ancilliary products
Standard Bolted Linings

Materials
Concrete
The concrete mix design normally used provides for a characteristic strength of 50N/mm² at 28 days.

All raw materials comply with current British and European standards.
Manufacturing is carried out in accordance with the requirements of our quality management system, audited by the British Standards Institute (BSI) to comply with BSEN ISO 9001:2000.

Caulking grooves and sealing grooves
All segments are cast with caulking grooves on the internal circumferential and longitudinal sides. Rings also have grooves cast into the joint faces of each segment for hydrophilic sealing strip.
Special rings can be supplied to meet the specific requirements of a contract or a sealing system.

Grout holes and plugs
Each segment has one coarse threaded plastic socket and plug. Non return valves are provided.

Grummets
All standard segments are cast with shaped bolt hole recesses, designed to accommodate gel impregnated grummets; these grummets can be supplied if requested.

Packings
Bituminous felt packing, 3mm nominal thickness, should be used on all longitudinal joints and can be supplied if requested.

Circumferential packings
Circumferential packings made from 3mm thick bituminous felt or 3mm, 6mm or 10mm timber can be supplied, if required, to correct for line and level or for large radius curves.

Special Rings
Tapered rings
Precast concrete tapered rings or precast concrete tapered packings can be manufactured to purchaser's specific requirements.

Landing support
Standard rings with an integral corbel are available.

Cutting edges/Choker rings
Cutting edges and choker rings are available for many sizes to enable shafts to be constructed by the caisson technique.
## Standard Bolted Linings

### Standard bolted concrete segmental rings

<table>
<thead>
<tr>
<th>Int. dia.</th>
<th>Ext. dia.</th>
<th>Width</th>
<th>Segments per ring</th>
<th>Volume per ring</th>
<th>Weight per ring</th>
<th>Max. Piece Wt.</th>
<th>Cross &amp; Circle No. dia. x length</th>
<th>Key No. dia. x length</th>
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<tr>
<td>Metres</td>
<td>Metres</td>
<td>mm</td>
<td></td>
<td>m³</td>
<td>tonnes</td>
<td>tonnes</td>
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<tr>
<td>1.52</td>
<td>1.77</td>
<td>610</td>
<td>3 2 1</td>
<td>0.292</td>
<td>0.70</td>
<td>0.139</td>
<td>18 M20 x 165</td>
<td>2 M20 x 255</td>
</tr>
<tr>
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<td>1.93</td>
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<td>3 2 1</td>
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<td>0.80</td>
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<td>23 M20 x 165</td>
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<td>2.43</td>
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<td>3 2 1</td>
<td>0.460</td>
<td>1.10</td>
<td>0.219</td>
<td>23 M20 x 180</td>
<td>2 M20 x 265</td>
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<td>2 M20 x 265</td>
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<td>2 M20 x 265</td>
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<tr>
<td>3.05</td>
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<td>4 2 1</td>
<td>0.622</td>
<td>1.49</td>
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<td>28 M20 x 180</td>
<td>2 M20 x 265</td>
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<td>3.35</td>
<td>3.65</td>
<td>610</td>
<td>4 2 1</td>
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<td>2 M20 x 265</td>
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<td>148 M30 x 420</td>
<td>4 M30 x 210</td>
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</table>

*Bolt lengths allow for two standard washers and gel grummets and 3mm thick packings between joints. All bolts have 100mm thread length. The bolt lengths listed above serve only as a guide and clients should satisfy themselves that they are sufficient for their requirements. Some ring dimensions are approximate as a result of conversion from imperial to metric dimensions.

NOTE: Buchan have a policy of continuous product development and reserve the right to change the specification without prior notice.
Shaft constructed as a caisson

Standard Bolted Shaft Linings

- Heavy duty cover slab
- Standard shaft ring
- Grout hole
- Corbel ring (corbel at ring centre on small diameter)
- Intermediate landing slab
- Standard shaft ring
- Choker ring
- Cutting edge

Standard bolted shafts available with:-

- Heavy duty cover slab
- Corbel ring or platform support ring
- Intermediate landing slab
- Choker ring
- Cutting edge

Sealants:-

- Caulking
- Hydrophilic rubber strip (optional)

Grout hole:-

- Coarse threaded plastic with plug and NRV
Jacking Pipes

Range: 1.200m to 2.400m

Special pipes can be designed to individual requirements

Buchan Concrete Solutions produce a comprehensive range of standard jacking pipes to suit the requirements of the latest generation of pipe jacking systems.

The pipes incorporate the well proven butt joint with integral steel band. This joint design ensures that the jacking forces are transmitted over the maximum area of the pipe, thus reducing the possibility of damage due to jacking loads.
Jacking Pipes

Materials
All raw materials comply with current British and European standards.

Manufacturing is carried out in accordance with the requirements of our quality management system, audited by the British Standards Institute (BSI) to comply with BSEN ISO 9001:2000.

Joint bands
The joint bands are manufactured from mild steel. Stainless steel may be provided at extra cost.

Seals
The flexible joint seals are manufactured from natural rubber, or E.P.D.M.

Compressible packings
A compressible packing is to be positioned between every pipe to ensure even distribution of the jacking load. The recommended packing is an 18mm thick 650/675kg/m³ density chipboard firmly anchored in position.

Bentonite injection holes
Pipes can be supplied with or without threaded screwed sockets and plugs. These are cast in to meet the purchasers specific requirements.

Special pipes
Interjack station pipes
A standard range of specially developed Interjack station pipes are available and can be designed to meet the requirements of the majority of contracts.

Shield pipes (Lead pipes)
These pipes can be produced to suit the requirements of the contractor's shield and excavation method.

Corrosion resistant pipes
All pipes are available with various corrosion resistant finishes. These finishes are cast into the pipes at manufacture and form an integral part of the pipe.

The corrosion resistant finishes are available on either the external or internal surfaces of the pipe and include full joint details, thus providing a pipeline resistant to chemical attack from ground water or effluent.
Jacking Pipes

Standard pipe

![Diagram of Standard pipe]

Standard interjack arrangement

![Diagram of Standard interjack arrangement]

Standard jacking pipes

<table>
<thead>
<tr>
<th>Nominal Dia. mm</th>
<th>I.D. mm</th>
<th>O.D. mm</th>
<th>Length mm</th>
<th>Wt. Pipe kg</th>
<th>Jacking Load Max.</th>
<th>(Tonnes) Deflected</th>
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</tr>
<tr>
<td>2400</td>
<td>2375</td>
<td>2825</td>
<td>2500</td>
<td>11700</td>
<td>1800</td>
<td>900</td>
</tr>
</tbody>
</table>

**IMPORTANT**
The maximum jacking load quoted above is the load which the pipe is designed to take evenly distributed over the full circumference of the pipe end. The deflected jacking load quoted for the jacking pipes are for guidance only and are based on assumptions allowing for a maximum of 0.25 degrees deflection in any plane between the axis of two connecting pipes provided the recommended packing is in the correct position. Non standard pipes can be designed to meet specialist requirements.
Jacking Pipes

Joint deflection v Jacking load (typical)

Fig 1. Technical advice on pipe performance is available from our technical department.

Fig 2. The rubber seal is designed to be located in a pre-formed groove at the spigot end of the pipe, in order to provide a watertight joint.

Fig 3. Pipes can be designed to suit individual customer requirements. These 2,100mm diameter pipes used at the MEPAS contract in Liverpool were produced with 50mm cover to reinforcement.

Fig 4. Superb quality is achieved. The pipes are vertically cast to ensure a completely homogeneous structure for the wall and are reinforced with an all welded spiral double cage.
DIRECTIONS FROM THE NORTH AND SOUTH

Exit M6 at junction 18. Follow A54 towards Middlewich for approximately 2 miles. At the first roundabout (Salt Cellar pub on left) turn right sign posted Northwich/Knutsford for approximately 200 yards. Take the first right sign posted Kutsford/Byley (B5081).

Follow road for approximately 2.7 miles passing Byley village crossroads, look for Stublach Dog Kennels on the left hand side, turn immediately right into Kings Lane and Buchan is approximately 200 yards on the right.