PRECAST JACKING PIPES
TUNNELS & SHAFTS
FP McCann is the UK’s market leader in the manufacture, supply and delivery of precast concrete solutions. Our comprehensive precast concrete business extends to include:

Agriculture | Architectural Precast | Box Culverts | Building Products
Dock Levellers | Drainage | Fencing | Filter Bed Systems | Flooring
Power & Infrastructure | Rail | Specialist Precast | Structural Precast
Tanks & Chambers | Tunnels & Shafts | Walling

Modern manufacturing plants at Alnwick (Northumberland), Armagh (Northern Ireland), Byley (Cheshire), Cadeby (Warwickshire), Ellistown (Leicestershire), Grantham (Lincolnshire), Lisnaskea (Northern Ireland), Littleport (Cambridgeshire), Lydney (Gloucestershire), Magherafelt (Northern Ireland), Uddingston (Lanarkshire) and Weston Underwood (Derbyshire) incorporate the latest computerised batching, distribution, casting, curing and handling systems and are operated by skilled and experienced workforces to ensure consistency of quality. Their geographical spread gives us an unrivalled ability to serve the construction industry throughout the UK and Ireland.

By applying the DFMA principles, FP McCann’s design engineers are able to evaluate individual precast concrete products part by part, in addition to documenting the assembly process step by step. This allows them to generate the cost, part count and assembly time to provide a benchmark to measure its success and identify the parts and process improvement opportunities. In turn, this has allowed FP McCann to design and manufacture more cost-effective and efficient high-quality precast concrete products with less waste and greater on-site recycling. As a result, increased productivity, combined with a reduction in production time and costs, allows FP McCann to be more competitive within the marketplace.

Please note: all information is correct at time of going to print.

FP McCann provides an extensive range of concrete pipes and fittings. All products are manufactured from high quality raw materials and are sulphate resistant.

FP McCann’s jacking pipes enable pipe installation where the opening of trenches is neither practical nor cost-effective.

FP McCann’s jacking pipes are made from dense, durable reinforced concrete. The mix provides a design chemical class 4 (DC4), with a minimum 28 day characteristic cube strength of 50N/mm²

They are manufactured in accordance with BS EN 1916 and BS 5911-1 and certified by Quality Assessment under the kite mark scheme and ISO 9001.

FEATURES OF FP MCCANN JACKING PRODUCTS INCLUDE:
• Self-lubricating joint gasket
• Built-in handling system with an extensive range to suit most machines and shields

Q & A ON JACKING PIPES

Q. WHAT IS PIPE JACKING?
A. Pipe jacking is a technique for the installation of underground pipes, ducts and culverts with minimal environmental disruption. Jacking pipes can also act as conduits for other utilities like gas, electricity and telecommunications.

Q. HOW DOES IT WORK?
A. Tunnelling excavation, by machine or by hand, takes place between two shafts or caissons, Whilst specially designed pipes are pushed through the ground by powerful jacks.

Q. WHY IS PIPE JACKING USED?
A. Primarily to install water and sewage systems where the opening of trenches is impractical; for example, in environmentally sensitive areas, under railways, motorways, rivers, canals, buildings and in crowded urban sites.

Q. WHAT ARE THE COST ADVANTAGES?
A. Jacking is cost-effective when compared with deep open cut methods and other forms of tunnelling. It offers low maintenance costs, speed and safety of installation with fewer joints, smooth internal finishes and improved flow characteristics without the need for secondary linings required by some segmental systems.

Q. WHAT ARE THE ENVIRONMENTAL ADVANTAGES?
A. Minimum excavation means less disturbance, less pollution, less noise, fewer lorry movements and a reduction in the need for costly traffic diversions and delays. There is a reduced risk of settlement, damage or movement to other structures and services.

Q. WHAT TYPES OF CONCRETE JACKING PIPE ARE THERE?
A. Pipes with steel collars are manufactured to BS EN 1916 and BS 5911-1. Steel collar pipes incorporate an accurately rolled collar manufactured from BS EN 10025-2:2004 S275 mild steel. They can be used on both machine dug and hand dug drives.

Q. WHAT IS MEANT BY MICROTUNNELLING?
A. Refers to non-man entry sizes installed by machine, though some consider it to include larger pipes installed by remote control methods.
BE PLEASED TO DISCUSS THE SUPPLY OF ANY SIZES NOT SHOWN.

FP McCann is always interested in adding to the above range, and would manufactured to order.

Alternative length of pipes in some of the sizes shown above can be

Alternative Length of Pipes (Maximum length 2.5m)

FP McCann’s Jacking Pipe Range

<table>
<thead>
<tr>
<th>DN* (mm)</th>
<th>Bare Diameter A (mm)</th>
<th>Wall Thickness B (mm)</th>
<th>Outside Diameter C (mm)</th>
<th>Length Meters</th>
<th>Weight Kg Approx</th>
<th>Spigot Length D (mm)</th>
<th>Socket Length E (mm)</th>
<th>Parker Size Width F (mm)</th>
<th>Parker Size Thickness G (mm)</th>
<th>Int Dia to Parker H (mm)</th>
<th>Proof Load KN/m</th>
<th>Maximum Load KN/m</th>
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<td>300</td>
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</tbody>
</table>

Alternative Length of Pipes (Maximum length 2.5m) Alternative length of pipes in some of the sizes shown above can be manufactured to order. FP McCann is always interested in adding to the above range, and would be pleased to discuss the supply of any sizes not shown.

* Nominal size as given by Table 6 BS 5911-1. These items are not covered by BS EN 1916 and BS 5911-1 but have been designed and tested using the same criteria.

Weights given are the nominal weights increased by 5% to allow for variations in material unit tolerance.

Leap Pipes

Leap pipes are located at the front of the drive. It is standard practice to fit a steel shield over the leap pipe in every hand dug drive, providing protection to miners and facilitating steering. Machine dug drives do not usually require a leap pipe as the contractor can adapt the machine to fit over a standard pipe spigot.

Special Characteristics

- A flat end instead of a spigot - 600mm long by 20mm deep rebate
- Joint gaskets are not supplied as standard with leap

Grout sockets or lubrication holes

Designed to reduce friction during jacking, lubricating or grout sockets can be cast into standard pipes to suit customer requirements. They are normally 1 1/4” BSP steel sockets fitted with plugs. Conical non-return valves are supplied as standard. The ratio of pipes with grout sockets to standard pipes varies, depending on ground conditions. As a guide, it can be one pipe in every three or one in every five.

Table showing standard configurations of grout sockets.

<table>
<thead>
<tr>
<th>Pipe Diameter mm</th>
<th>Number</th>
<th>Location</th>
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</thead>
<tbody>
<tr>
<td>900 - 1800</td>
<td>2 holes per pipe</td>
<td></td>
</tr>
<tr>
<td>1950 - 2400</td>
<td>3 holes per pipe</td>
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</table>

Packer

It is important that suitable packing material is used between adjacent pipes to ensure even stress distribution and load transfer. We recommend medium density fibre board (MDF), FP McCann can supply and fix packers at works, although the contractor usually supplies and fixes them on site prior to pipe installation. It is important that packers are fitted in the correct position.

Intermediate jacking stations (interjacks)

Interjacks are frequently installed on drives where the jacking forces required exceed the capability of the pipe or the jacks. Installing interjacks relieves pressure on the whole drive length by first pushing the section of pipes in front of the interjack using jacks installed into the interjack itself; the rear section of pipes is then pushed by the main jacks. Each interjack station comprises two pipes, a leap and a trail, with a steel can or shield which is either cast integrally with the leap pipe - a fixed can, or fitted round the pipe separately - a loose can. The interjack trail pipe is common to both fixed and loose can types. The choice of interjack type is usually left to the contractor’s preference.

Fixed can interjacks

These are used with steel collar pipes. FP McCann provides the leap pipe with the can already fitted. It then becomes the contractor’s responsibility to fit suitable steel thrust rings, packers and jacks inside the can.

Loose can interjacks

Generally used with in-wall jointed pipes and have a leap pipe with a short 300mm by 20mm recess in place of the socket. The contractor provides the can as well as the thrust rings, packers and jacks.

Interjack trail pipes

Recognizable by their long 1400mm by 20mm rebate instead of the normal spigot. Two recesses are located towards the end of the rebate to take special sealing rings provided by FP McCann. Lubrication points are positioned between the recesses.
Easi-lift Handling System

To assist the contractor in adopting a safe working method for lowering heavy pipes into deep, confined spaces, the FP McCann Easi-lift handling system is available for pipes from DN 900 to DN 2400. Galvanized lifting anchors are cast into the pipe wall and are used in conjunction with certified lifting shackles and chains to provide a safe, speedy and accurate system of off-loading, stacking and placing. Anchors are positioned below the outside diameter of the pipe to avoid any potential to snag or plough.

SAFETY BENEFFITS OF JACKING PIPES

- Easi-lift ensures a positive horizontal lift every time, no weight balancing is required.
- Stainless steel collars to suit ground or effluent conditions
- Alternative mix designs to suit ground or effluent conditions
- Protective coatings or linings to suit ground or effluent conditions
- Special strength pipes with increased reinforcement
- Secondary seals can be provided, if requested

Note: special requirements or non-standard products should be ordered in advance of the anticipated delivery dates.

HANDLING AND JOINTING - GENERAL

FP McCann’s jacking pipes are robust and should arrive on site in good condition. Care in handling is simply a matter of common sense.

DO TAKE EXTRA CARE WITH THE JOINTS.

Lifting appliances should be capable of smooth hoisting, lowering and travelling with the heaviest pipe and must satisfy the required safety regulations.

EASI-LIFT HANDLING SYSTEM

This is the simplest, safest and most efficient way of handling FP McCann’s jacking pipes, DN 900 and above. Place the lifting eyes over the cast-in anchors and rotate ensuring the lugs on each eye are pointing towards the centre of the pipe before commencing the lift.

PACKERS

It is preferable to fit packers just prior to jointing as they remain clean and dry and are less likely to work loose. It is important they are fitted concentrically and should be offset from the pipe faces as per the minimum dimensions shown below, especially the inside bore.

JOINTING USING THE LAMELL SEAL

Prior to placing ensure the gasket and the joint surfaces are clean. Lubrication is not required and MUST NOT be applied.

Lamell is a fast, efficient, easy-to-fit pipe joint seal. Incorporating an innovative, self-lubricating SBR gasket, the Lamell seal is ideal for use in wet conditions. Lamell provides a reliable, flexible, water-resistant seal requiring no additional lubrication.

If easi-lift is not used then:
- Webbed slings should be used to handle pipe round the barrel rather than through the bore. Should slings be used through the bore, pipe ends must be protected from chafing. Wire ropes and chain slings are not recommended.
- Pipes should be stacked on firm, level ground. The bottom layer must be securely checked and the height of the stack should not exceed two metres.
- Store rubber rings and gaskets away from strong sunlight and frost.
It is assumed that:
All preparation of the interjack, i.e. drilling and fixing of brackets, fixing of segmented thrust rings and hydraulic jacks
The jacks are securely restrained so they will not become misaligned during use

IMPORTANT
The hydraulic jacks must be positioned so that their centre line is the same as that of the pipe wall. All thrust rings should be of adequate stiffness to prevent joint loading.

Typical position of jacks relative to pipe wall

ASSEMBLING A FIXED CAN INTERJACK
1. When installing the lead pipe into the drive a suitable spacer must be inserted into the can to provide adequate clearance between it and the pit thrust ring

IMPORTANT
No load should be applied to the end of the steel can.

2. Fit the seals to the interjack trail pipe ensuring that they are fitted in the correct position to maintain a watertight seal.
Lubrication points (usually 0.75" BSP) are provided between the two seals to allow effective lubrication.

Typical sealing arrangement of fixed and loose can interjack

3. Lubricate the two parts of the interjack station. Both the inside of the steel can and seals must be liberally coated with FP McCann lubricant. Petroleum lubricants must not be used as they will cause degradation of seals

4. While jointing ensures the trail pipe is offered up squarely and as this will cause deflection of seals

5. If the final location of the seals is in doubt, the trail pipe must be withdrawn and the procedure repeated

ASSEMBLING A LOOSE CAN INTERJACK
Follow the previous 5 steps, remembering the steel can is added separately and is usually supplied by the contractor.

Note: Standard interjack stations are designed to withstand an internal pressure of 0.07N/mm². We cannot guarantee performance at pressures above this figure. It is not normally possible to fit interjack pipes with the Easi-Lift handling system.

FP McCann’s jacking pipes are designed to meet the requirements of British Standard 5911 Part 1 and European Standard BS EN 1916. The Maximum Jacking Force (Fjmax) which can be applied to a pipe is determined by the pipe strength, the configuration of the thrust ring and the tunnel alignment, i.e. the angular deflection between pipes. The maximum load decreases as angular deflections occur during jacking. Should deflection exceed that which can be accommodated by the packer, the maximum load decreases significantly. The figures below are for guidance only. For further assistance, contact FP McCann’s technical department.

* It is important to note that the table indicates the loads for which each pipe was designed and does not include any safety factor used by the contractor (Refer to clause 5.3.4 BS EN 1916)

** The load must be perpendicular to the joint face (no deflection and all jacking forces perfectly square)

*** There is angular deflection but there is no joint gap i.e. any deflection being taken up within the packer

Table showing quantities per 24.5 tonne load

<table>
<thead>
<tr>
<th>Pipe size (mm)</th>
<th>Approx. number of pipes</th>
<th>Approx. number of metres</th>
</tr>
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Haulage Load Quantities

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<th>In-wall joint 2.5m long</th>
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<td>Approx. number of metres</td>
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<table>
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<tr>
<th>Maximum Design Loads (tonnes)</th>
<th>Angular Deflection</th>
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<tbody>
<tr>
<td>Pipe size (mm)</td>
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** The load must be perpendicular to the joint face (no deflection and all jacking forces perfectly square)**
*** There is angular deflection but there is no joint gap i.e. any deflection being taken up within the packer
AGRICULTURE
Lydney 01594 847500  Magherafelt 028 7954 9026

ARCHITECTURAL PRECAST
London 020 3905 7640

BUILDING PRODUCTS
Cadeby 01455 290780

BOX CULVERTS
Weston Underwood 01335 361269

DRAINAGE
Ellistown 01530 240000 (England/Wales)  Magherafelt 028 7954 9026 (Scotland/NI)

DOCK LEVELLERS
Weston Underwood 01335 361269

FENCING
Cadeby 01455 290780

FILTER BED SYSTEMS
Littleport 01353 861416

FLOORING
Weston Underwood 01335 361269  Uddingston 01698 803300

POWER & INFRASTRUCTURE
Cadeby 01455 290780

RAIL
Cadeby 01455 290780

SPECIALIST PRECAST
Littleport 01353 861416

STRUCTURAL PRECAST
Byley 01606 843500

TANKS & CHAMBERS
Wellesbourne 01789 336960

TUNNELS & SHAFTS
Cadeby 01455 290780

WALLING
Lydney 01594 847500  Grantham 01476 562277