



M^cC

Shafts & Tunnels

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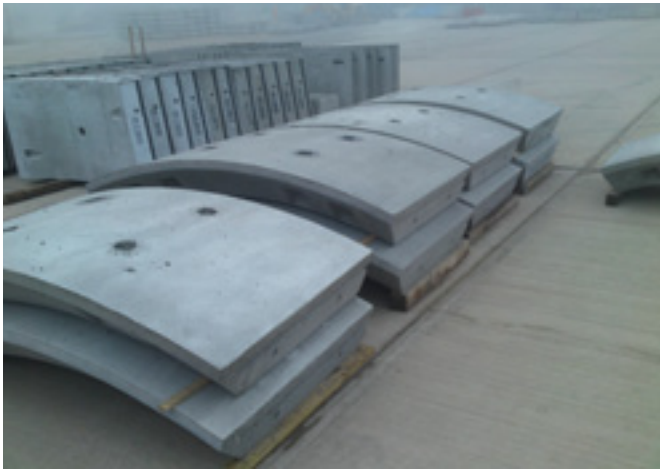
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Shafts & Tunnels

The McCann range of shaft and tunnel products have been developed to meet the requirements of the latest industry standards which include the British Tunnelling Society Specification and the Civil Engineering Specification for the Water Industry. Designed with consideration to the ease of construction and speed of installation, the McCann shaft and tunnelling systems offer strength, stability and overall performance in all types of ground conditions. Shaft and tunnel products are manufactured in accordance with FP McCann's quality management system, BSI accredited to BS EN 9001.

Products manufactured include:

- Smoothbore Shaft and Tunnel Segments
- Cover and Landing Slabs
- Caisson Shaft Units
- Jacking Pipes



FP McCann has launched and is developing a comprehensive range of smoothbore shaft and tunnel linings. Each size is specifically designed to meet the tunnelling industry's exacting and varied needs, recognising the key criteria as being strength, stability and the capability of performing in all types of ground conditions.

Design Features:

All rings, with the exception of the cutter choker comprise of ordinary segments and two top segments. The top segments have one tapered cross joint in order that they can be installed with EPDM gasket. The cutter choker comprises all ordinary segments.

Sealing:

FP McCann are the only precast concrete manufacturer to supply pre-fitted, tailor made EPDM rubber gaskets on the complete range of smoothbore shaft and tunnel linings. The gaskets provide an immediate water tight seal on construction and are fully compliant with the requirements of the British Tunnelling Society specification. Speed of build, safety and increase in site productivity are key benefits.

Connection:

Cross joint connections are made using a spear bolt passing through a pocket in one segment and a plastic socket in the adjacent segment. Circle joint connections are made using a T bolt passing through a hole in one segment and into a T box in the adjacent segment. Bolts are designed to fully compress the gasket. All connections are sheradised. (Other finishes to fittings, including galvanised, are available on request). Additionally, FP McCann offer a safer and more efficient back bolting system for the caisson build method.

Ring Types:

Segmental ring types provided by FP McCann:

Segmental rings in stock are front or back bolted.

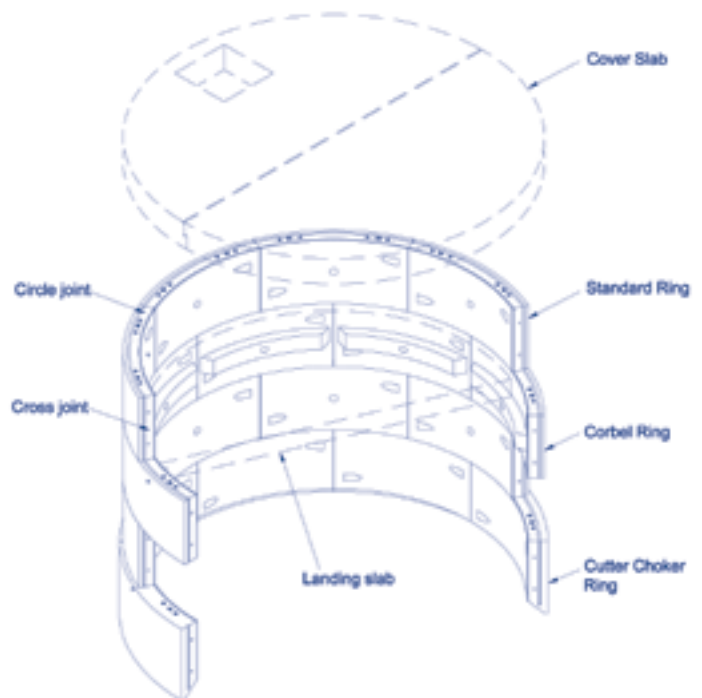
1. Standard rings
2. Corbel rings
3. Recessed rings (standard, choker or cutter choker)
4. Choker rings
5. Combined cutter choker rings

Mix and reinforcement:

Each segment is wet cast to achieve a smooth internal finish. The concrete mix provides a Design Chemical Class 4 (DC4) with a minimum 28 day characteristic strength of 55 N/mm². Alternative mixes are available. The segments are reinforced with either a reinforcing cage or structural synthetic and steel fibres to suit both design and customer requirements.

Build Methods:

The segmental rings are suitable for underpinning, caisson and chimney construction methods.



Quality:

F P McCann conducts all operations using an Integrated Management System accredited to BS EN ISO 9001.

Key Features and Benefits:

- Smooth internal faces
- Simple locking process
- Speedy installation
- Immediate water tight seal
- Cost reducing
- Added safety features
- Technical advice and support

McCann Smoothbore Shaft Linings

Size (Standard ring)			Segments per ring (Std ring)		Vol per ring (Std ring) (m ³)	Wt per Standard ring* (tonnes)	Standard segment weight* (Kg)	Corbel segment weight* (Kg)	Choker segment weight* (Kg)	Cutter / choker seg wt* (Kg)	Excavations m ³ per standard ring			Grout per ring (m ²)	Caulking	
Internal diameter (m)	External diameter (m)	Width (m)	Ord	Top							mm over extrados				Circle (lin m)	Cross (lin m)
											0	25	50			
3.660	4.060	1.00	4	2	2.43	6.06	1011	1140	1280	1345	12.95	13.27	13.59	12.75	11.58	6.00
4.000	4.400	1.00	5	2	2.64	6.60	942		1192		15.21	15.55	15.90	13.82	12.64	7.00
4.500	4.900	1.00	5	2	2.95	7.38	1055	1194	1332	1400	18.86	19.24	19.63	15.39	14.22	7.00
5.000	5.400	1.00	6	2	3.27	8.17	1021	1156	1289	1354	22.90	23.33	23.76	16.96	15.79	8.00
5.500	5.900	1.00	6	2	3.58	8.95	1119		1411		27.34	27.81	28.27	18.54	17.36	8.00
6.000	6.450	1.00	7	2	4.40	11.00	1222		1506		32.67	33.18	33.70	20.26	18.93	9.00
6.500	6.950	1.00	8	2	4.75	11.88	1188		1463		37.94	38.48	39.04	21.83	20.50	10.00
7.500	7.950	1.00	9	2	5.46	13.65	1241	1416	1527	1605	49.64	50.27	50.90	24.98	23.64	11.00
8.000	8.500	1.00	9	2	6.48	16.20	1473		1778		56.75	57.41	58.09	26.70	25.21	11.00
9.000	9.500	1.00	10	2	7.26	18.16	1514		1826		70.88	71.63	72.38	29.85	28.35	12.00
10.500	11.100	1.00	12	2	10.18	25.45	1818		2130	2284	96.77	97.64	98.52	34.87	33.07	14.00
12.500	13.200	1.00	12	2	14.13	35.32	2523		2895		136.85	137.89	138.93	41.47	39.35	14.00
15.000	15.700	1.00	14	2	16.88	42.20	2637		3024		193.59	194.83	196.07	49.32	47.20	16.00
20.000	20.900	1.00	18	2	28.91	72.28	3614		4025		343.07	344.71	346.36	65.66	62.91	20.00
25.000	25.900	1.00	22	2	35.98	89.95	3748		4172		526.85	528.89	530.93	81.37	78.62	24.00

*Nominal weights. Increase by 5% for sizing of lifting equipment and reduce by 5% for floatation design.

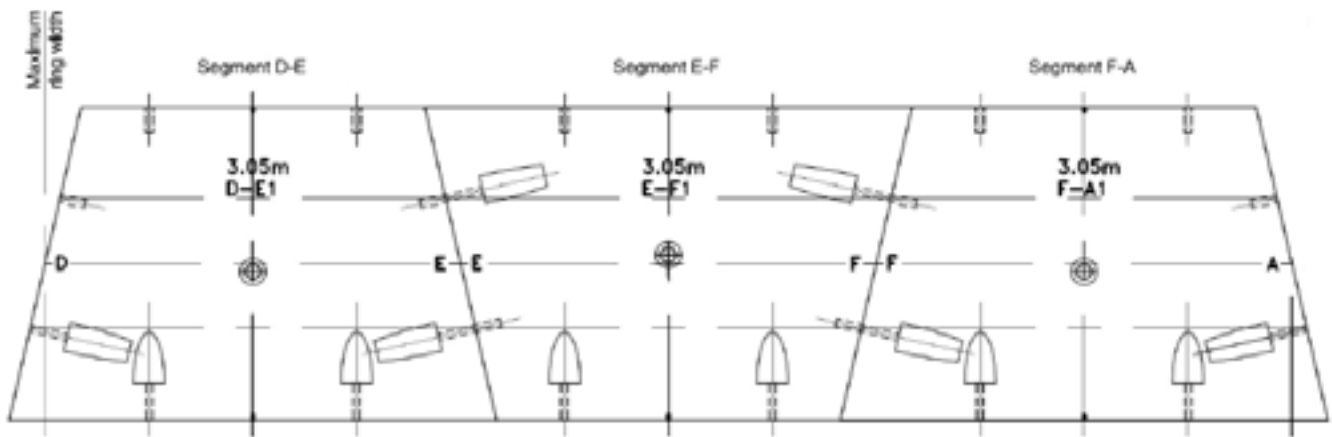
Sizes show in italics are currently under development.



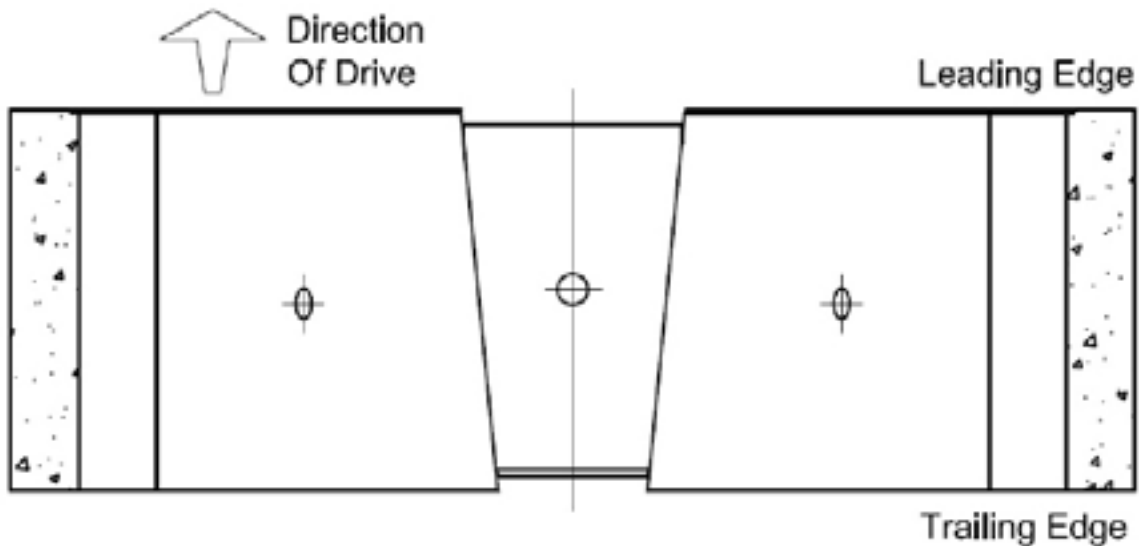
FP McCann design and manufacture a bespoke range of both Trapezoidal and Expanded Segmental Smoothbore tunnel linings, designed to provide durability, speed and ease of installation in tunnel construction. Trapezoidal tunnel linings are developed to work alongside technologically advanced tunnel boring machines, with linings designed and manufactured to suit exacting project requirements.

Tunnel segments can be modified to suit a variety of joint fixings, segment thickness and tunnel diameter's. The latest manufacturing techniques incorporate steel fibre dosing to guarantee a high quality, reliable product. The wedge shape design of individual segments eliminates the requirement for a special closure segment.

Trapezoidal Segment



Expanded Lining



Trapezoidal Tunnel Linings

Size				Segments per ring	Vol per ring (m ³)	Wt per ring* (tonnes)	Maximum piece weight* (kg)	Bolts per ring (number x dia x length mm)
Internal diameter (m)	External diameter (m)	Max Ring Width (m)	Min Ring Width (m)					
2.440	2.800	1.0075	0.9925	6	1.48	3.70	622	24 x M18 x 260 Spear Bolts
2.590	2.950	1.0075	0.9925	6	1.57	3.92	658	24 x M18 x 260 Spear Bolts
2.820	3.180	1.0075	0.9925	6	1.70	4.24	712	24 x M18 x 260 Spear Bolts
2.870	3.230	1.0075	0.9925	6	1.72	4.31	724	24 x M18 x 260 Spear Bolts
3.050	3.400	1.211	1.189	6	2.13	5.32	893	24 x M18 x 260 Spear Bolts

*Nominal weights increase by 5% for sizing of lifting equipment and reduce by 5% for flotation design.

Expanded Tunnel Linings

Size			Segments per ring			Vol per ring (m ³)	Weight per ring* (tonnes)
Internal diameter (m)	External diameter (m)	Ring Width (m)	Ord	Top	Key		
2.590	2.950	1.000	5	2	1	1.57	3.92
3.050	3.400	1.200	5	2	1	2.13	5.32

*Nominal weights increase by 5% for sizing of lifting equipment and reduce by 5% for flotation design.

Shaft Cover and Landing Slabs

Reinforced Shaft Cover and Landing Slabs are an integral part of FP McCann’s shafts and tunnels product range, manufactured at the Company’s specialist precast concrete facility.

Both cover and landing slabs are cast to design specifications and made to order for ‘just in time’ delivery. On site, the slabs can be quickly installed and provide an integral secure shaft cover or internal landing.

Sizes:

Cover and Landing slabs are generally circular to match the McCann range of smoothbore shaft segments and other segmental linings. They are available in 1, 2, 3 and 4+ sections. The standard size range is highlighted below. A bespoke design facility is available for non-standard shapes and sizes.

Standard Slab Dimensions:

One piece Cover Slabs			
Shaft internal diameter (mm)	Shaft external diameter (mm)	Slab thickness (mm)	Total slab weight (T)
2100	2350	250	2.82
2400	2680	275	4.03
2700	3000	275	5.05
3000	3360	300	6.92
3660	4060	325	10.94
Two piece Cover Slabs			
Shaft internal diameter (mm)	Shaft external diameter (mm)	Slab thickness (mm)	Total slab weight (T)
3000	3360	300	6.92
3660	4060	325	10.94
4000	4400	350	13.84
4500	4900	375	18.39
5000	5400	400	23.82
Three piece Cover Slabs			
Shaft internal diameter (mm)	Shaft external diameter (mm)	Slab thickness (mm)	Total slab weight (T)
5000	5400	400	23.82
5500	5900	425	30.21
Four + piece Cover Slabs			
Shaft internal diameter (mm)	Shaft external diameter (mm)	Slab thickness (mm)	Total slab weight (T)
5500	5900	425	30.21
6000	6450	450	38.23
6500	6950	475	46.85
7500	7950	525	67.76
8000	8500	550	81.15
9000	9500	600	110.58
10500	11100	675	169.83
12500	13200	775	275.75

Cover Slabs with RC Beams			
Shaft internal diameter (mm)	Shaft external diameter (mm)	Slab thickness (mm)	Number of RC beams
8000	8500	250	2
9000	9500	250	2
10500	11100	275	2
12500	13200	350 to 250	2, 3 or 4
15000	15700	400 to 300	2, 3 or 4
Cover Slabs with RC Beam or Pre-stressed Beams			
Shaft internal diameter (mm)	Shaft external diameter (mm)	Slab thickness (mm)	Number of RC beams
20000	20900	Special	Special
25000	25900	Special	Special
One piece Landing Slabs			
Shaft internal diameter (mm)	Slab diameter (mm)	Slab thickness (mm)	Total slab weight (T)
2100	2050	175	1.50
2400	2350	175	1.97
2700	2650	200	2.87
3000	2950	200	3.55
Two piece Landing Slabs			
Shaft internal diameter (mm)	Slab diameter (mm)	Slab thickness (mm)	Total slab weight (T)
3000	2950	200	3.55
3660	3610	225	5.99
4000	3950	250	7.97
4500	4450	275	11.12
5000	4950	300	15.01
5500	5450	325	19.71
6000	5950	350	25.30
Three + piece Landing Slabs			
Shaft internal diameter (mm)	Slab diameter (mm)	Slab thickness (mm)	Total slab weight (T)
6000	5950	350	25.30
6500	6450	375	31.86
7500	7450	425	48.17
8000	7950	450	58.08
9000	8950	500	81.79

Mix and reinforcement:

Slab sections are wet cast in fabricated steel moulds and steel cage reinforced. The concrete mix design is to a standard characteristic strength of 55N/mm² at 28 days. Alternative mixes are available.

Design Features:

Slabs are designed to resist forces in line with the recommendations of BS 8110: Part 1 (Fill) and super imposed loading (BS 6399). Where highway trafficking is specified, BD37/01 is referenced.

Design and detailing may be undertaken by FP McCann or to the customers design specification. Reinforced cover slabs are designed to carry 30 or 45 units HB or loading specific to contract, and landing slabs an imposed load of 5kN/m². Shaft cover slabs can accommodate up to a maximum of 4.0 metres depth of fill.

Lifting and Handling:

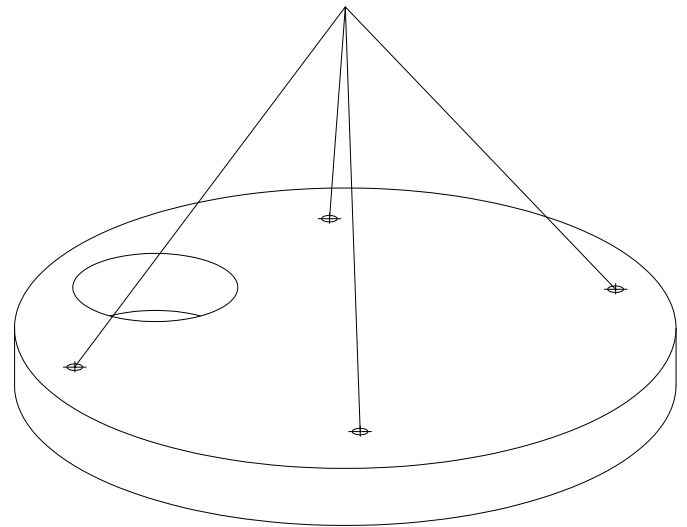
Depending on lifting requirements on site FP McCann are able to supply fitted lifting loops or cast in sockets and spherical head lifting anchors.

Quality standards:

Shaft Cover Slabs and Landing Slabs are manufactured in accordance with FP McCann's quality management system, BSI accredited to BS EN 9001.

Key Features and Benefits:

- No formwork or ready mixed concrete required
- Simple jointing system
- Speedy installation
- Bespoke design and casting service
- Technical advice and support



FP McCann manufactures a range of reinforcing units suitable for sinking by the caisson method. Caisson shaft units can be supplied with diameters of 2100mm up to 4000mm. Caissons are manufactured in accordance with the requirements of BS EN 1917, and have Kitemark certification where relevant to the scope of BS5911 (2100mm – 3000mm diameters). However 3600mm and 4000mm diameters remain operative within the scope of the ISO9001 accredited Quality Management System.

Open caisson-sinking techniques permit a shaft structure to be progressively sunk, either under its own weight or with the aid of caisson jacks, in a controlled manner from the surface to a predetermined depth. Caisson shafts are constructed using a metal cutter ring and base section with rings being added on top as excavation proceeds. The technique is suited to shaft construction through weak soils, high-plasticity clays, silts, sands and gravels; particularly below the water table.

FP McCann Caisson Range

Caissons Shafts DN	Available Depths (mm)			Barrel DN	Wall Thickness	Lifting (Cast in Socket) Qty per unit
	1000	750	500			
2100	√	√	√	2350	125	3 No. RD24 Wavy Tail Inserts
2400	√	√	√	2680	140	3 No. RD24 Wavy Tail Inserts
2700	√	√	√	3000	150	3 No. RD30 Wavy Tail Inserts
3000	√	√	√	3360	180	3 No. RD30 Wavy Tail Inserts
3600	√	√	√	3970	185	3 No. RD30 Wavy Tail Inserts
4000*	√	√	X	4400	200	6 No. RD36 Wavy Tail Inserts

*DN4000 supplied as a two piece unit.



Caisson Rings – Table of Weights (DN 2100-4000)

Caissons Shafts DN	Cutting Shoe Weight (Kg)		Approx. Weight p/meter Caisson (with cutting shoe) (Kg)**		Approx. Weight p/meter Caisson (without cutting shoe)**
	10mm	20mm	10mm	20mm	Kg
2100	320	581	2590	2851	2270
2400	378	635	3278	3535	2900
2700	441	794	3931	4284	3490
3000	529	953	5209	5633	4680
3600	641	1148	6061	6568	5420
4000*	725	1298	7585	8158	6860

* DN4000 supplied as a two piece unit.

** Nominal weights increase by 5% for sizing lifting equipment and reduce by 5% for floatation design.

Base units may be fitted with a light duty (10mm) or a medium duty (20mm) cutting shoe.

- FP McCann Jacking Pipes enable pipe installation where the opening of trenches is neither practical nor cost effective
- They provide an environmentally suitable solution
- FP McCann jacking pipes are made from dense, durable, steel cage reinforced, sulphate resistant concrete having a minimum strength of 50N/mm²
- They are manufactured in accordance with BSEN 1916 and BS 5911-1 and certified by Quality Assessment under the Kitemark Scheme and BS EN ISO 9001
- Features of FP McCann jacking products include
 - self-lubricating joint gasket (Lamell type F-146)
 - built-in handling system with an extensive range to suit most machines and shields
- FP McCann is a member of the Pipe Jacking Association



Pipe			Dimensions					
DN* mm	Length Metres	Weight Kg approx	Bore Diameter A mm	Wall Thickness B mm	Outside Diameter C mm	Spigot Length D mm	Socket Length E mm	Recess (lead pipe only) F mm
450	1	342	450	75	604	115	110	-
450	1.2	410	450	77	604	115	110	-
600	1	500	585	87.5	764	115	110	-
600	1.2	600	585	90	764	115	110	-
600	2.0	1000	585	90	764	115	110	-
900	2.5	2100	904	100	1100	130	125	1060
1000	2.5	2550	980	110	1200	130	125	1160
1200	1.2	1540	1200	115	1430	130	125	1390
1200	2.5	3200	1200	115	1430	130	125	1390
1350	2.5	3900	1350	125	1600	130	125	1560
1500	2.5	4900	1500	140	1780	130	125	1740
1800	2.47	6480	1830	155	2140	134	125	2100
1950	2.35	8170	1950	190	2330	134	125	2290
1950	2.5	8691	1950	190	2330	134	125	2290
1980	2.5	8200	1980	175	2330	134	125	2290
2100	2.5	7850	2076	165	2410	134	125	2370
2400	2.5	11100	2425	200	2825	145	140	2785

Short Length Pipes

Short length 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.

* The nominal sizes shown take account of current and future European standard sizes.

These items are not covered by BSEN 1916 and BS 5911 Part 1 but have been designed and tested using the same criteria.



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