Integrated Manhole Ladder System

CASWICK
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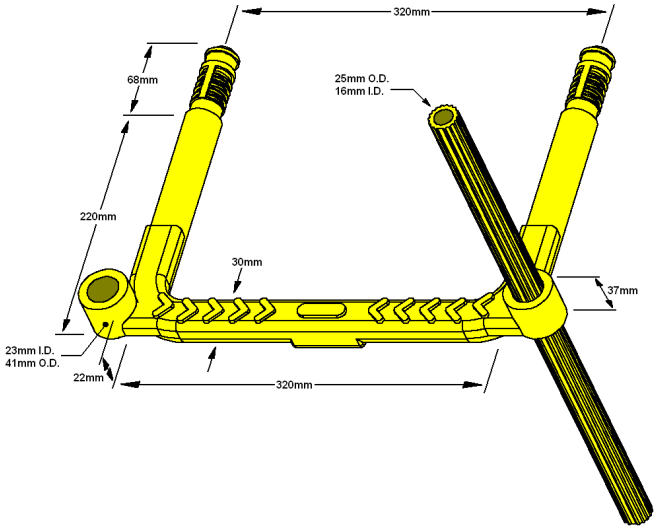
Application:

This innovative product has been designed to provide safe access and egress to precast concrete manholes and inspection chambers. It can also be used within any other underground concrete structure including confined spaces such as sumps and pumping chambers.

The system meets the essential requirements of existing and new design codes in terms of dimensions and performance.

An innovative range of castin plastic inserts are incorporated by the manhole manufacturer to make fixing quick, cost effective, reliable and safer than conventional ladders.



Advantages and Benefits:

Ease of Installation

The rungs are both supplied and fitted by the manhole manufacturer meaning minimal access to a confined space to fit the ladder. This means no lifting, drilling or temporary access is required to the manhole.

Flexibility

The rungs meet the relevant requirements for both steps and ladders and can be used with or without the stringers. The incorporation of the rung in the manhole automatically takes account of variation in depth to design. This means bespoke ladders do not need to be estimated, surveyed, ordered or manufactured. Spare rungs and stringer can be retained for the next ladder.

Safety

The polypropylene polymer encapsulation gives high visibility and no sharp edges. The rung has a tread pattern providing excellent slip resistance and has a cross section designed to give a secure hand grip. Also, the stringer has a profile to give a secure hand grip unlike a conventional ladder which is often too large to safely hold on to.

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Ref: 1009
Rev: 1

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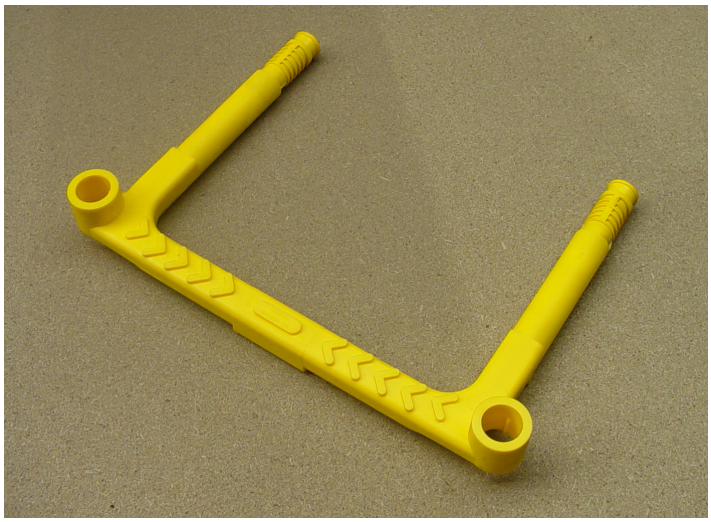

Durability
The chemical resistance of polypropylene can be considered equivalent to Grade 316 stainless steel.

Economy
It is very cost effective in terms of supplied and installed cost.

Strength
Every rung is fixed to the manhole wall and the reinforcement is high tensile steel providing non brittle deformation under extreme loads.

Standards
The system has been designed and manufactured in accordance with the requirements specified in the following documents. Please note that there are areas of conflicting advice where we have had to make an interpretation. Further detailed information is available upon request.

Product Standards
BS EN 13101: 2002 Steps for underground man entry chambers

BS EN 14396: 2004 Fixed ladders for manholes

Note: Both of these documents are harmonised under the Construction Products Directive and include CE marking requirements.

Design Standards
BS EN 752-3: 1997 Drain and sewer systems outside buildings - Planning

BS 4211: 2005 Permanently fixed ladders

Application Codes of Practice
Civil Engineering Specification for the Water Industry
Sewers for Adoption
Sewers for Scotland
Specification for Highway Works

Approvals
This system has WRc approval, see approval PT/478/1120 and the rung is CE, CA and Kitemarked to EN13101

wrc approved
PT/478/1120
Valid: 01/11/2020 - 01/11/2025

EN13101

CE

UK CA

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Quality
The company operates a quality system to the ISO 9001. It holds British Standards Institution (BSI) Kitemark Certification for manhole steps to BS EN 13101 including the rung used in this system.

Materials
The step rungs are reinforced with high tensile steel tube.

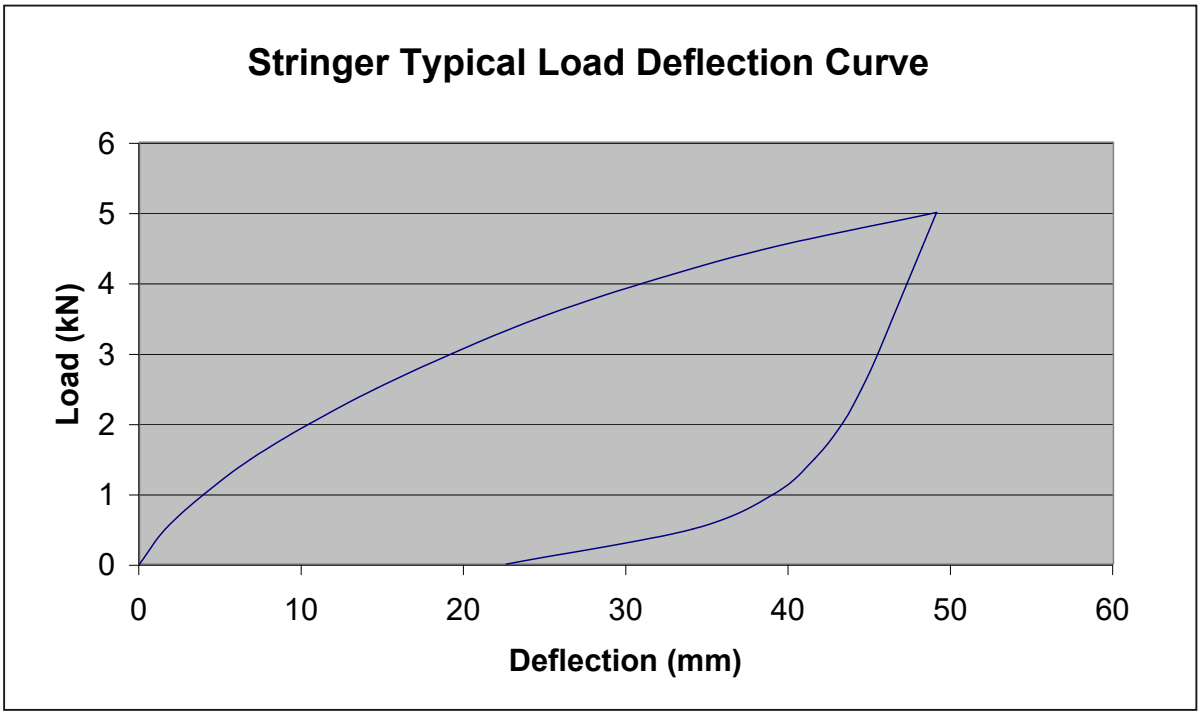
The polypropylene copolymer encapsulation is schemed by injection moulding a 5mm thick cover under high pressure. Only high impact virgin polymer is used to ensure compliance with the stringent performance requirements of the EN 13101.

The stringer is extruded polypropylene copolymer with a minimum wall thickness of 2mm. This material is subjected to load testing in accordance with an internal test procedure.

Ancillary fitting brackets are made from stainless steel Grades 304 or 316.

Performance

Pullout resistance of rungs	5 kN
Deflection under 2 kN load	10mm
Permanent set after 2 kN load	2mm
Permanent set after 4 kN load	10mm
Impact resistance, 20 kg from 1 m	No cracks
integrity of plastic	1 mega ohm at 500V
Thickness of plastic	3mm
Cross section of rung	25mm
Cross section of stringer	25mm
rung stringer hole strength	2.5 kN per hole
Stringer strength, proof load, 500N @ 250mm centre	10mm max
Stringer strength, ultimate load, 5.0 kN	No failure



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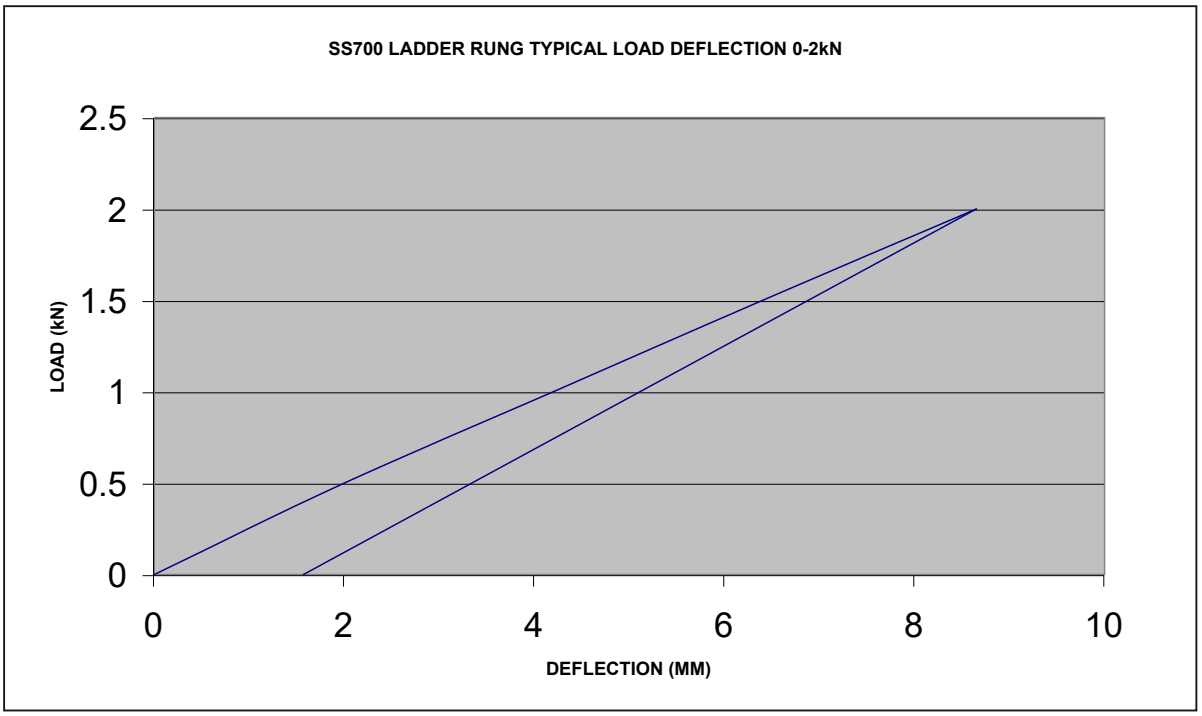

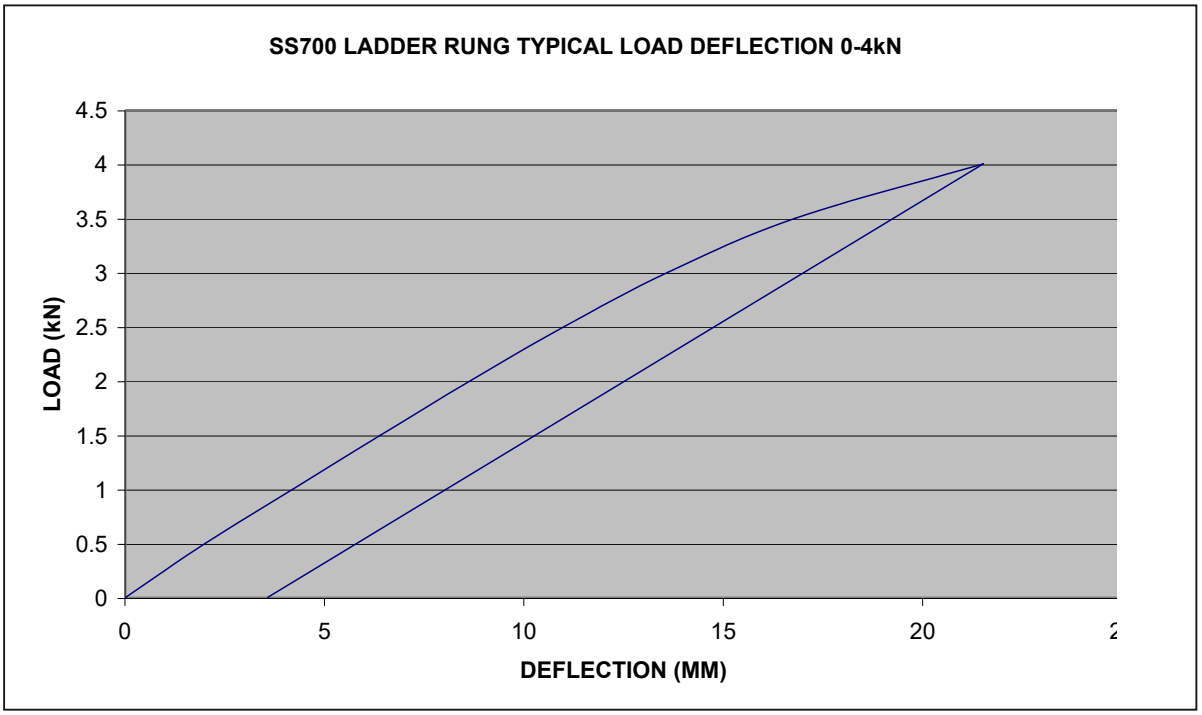

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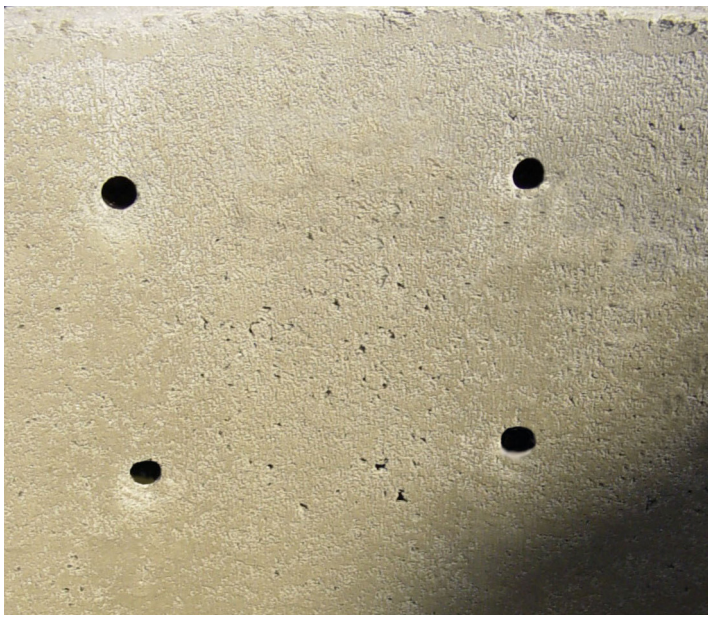
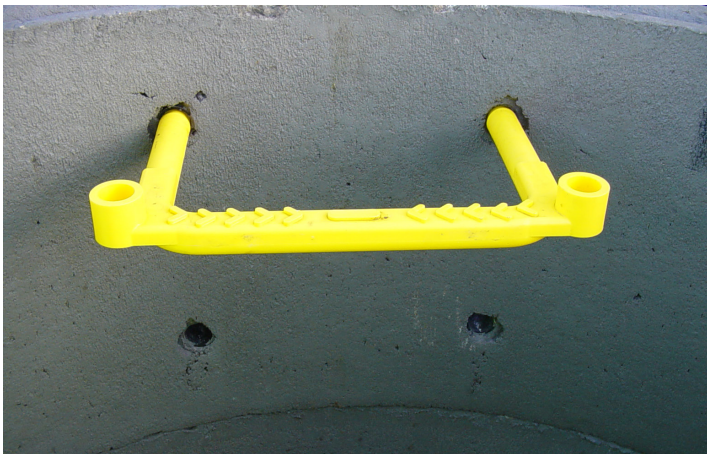
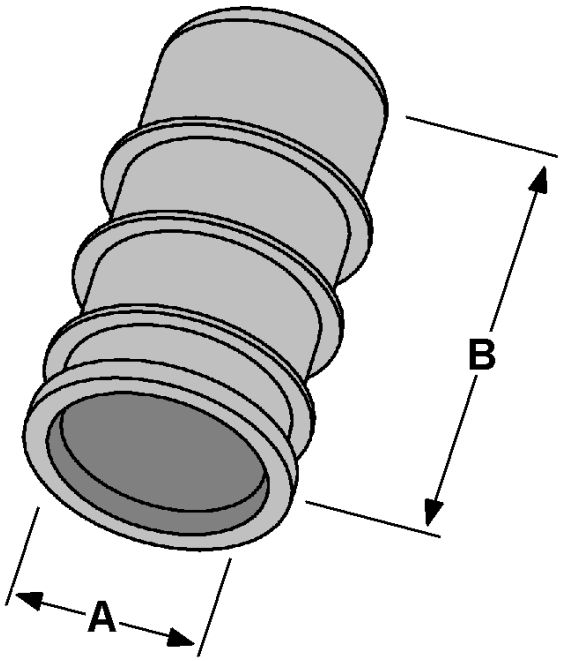




Fitting Instructions - Manhole Manufacturer
Precast concrete manhole section is manufactured to BS EN 1917 with special plastic inserts cast in place at 320 centres +/- 2mm during the making of the concrete.

When the concrete has achieved adequate compressive strength the rung is hammered into the plastic inserts and checked for side and vertical alignment using a rigid tube of 22mm diameter. When hammering the step in, take care not to strike the stringer holes.

The manholes rings are marked during or after production with a line indicating position of steps/rungs to enable them to be handled without damage and to facilitate alignment on site.



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Site Fitting Instructions
Review drainage scheme design to establish correct position of ladder to invert and surface.

Lower first manhole section into place and note position of marking on the manhole indicating step position.

Lower remaining sections and ensure the alignment mark is within +/- 5mm.

Slide stringer down side and allow sufficient overhang at each end to accommodate benching, coverslab and seating rings (corbel units/bricks). Only use continuous lengths of stringer.

Cast bottom end of stringers into benching.

Locate top of stringer using the location brackets between the top manhole ring and coverslab or between seating rings. Cut to required light and fit end plugs. Brackets give provision for fixing by screw, mortar or manhole wall. The maximum unsupported length of stringer above the top fixing is 150mm.

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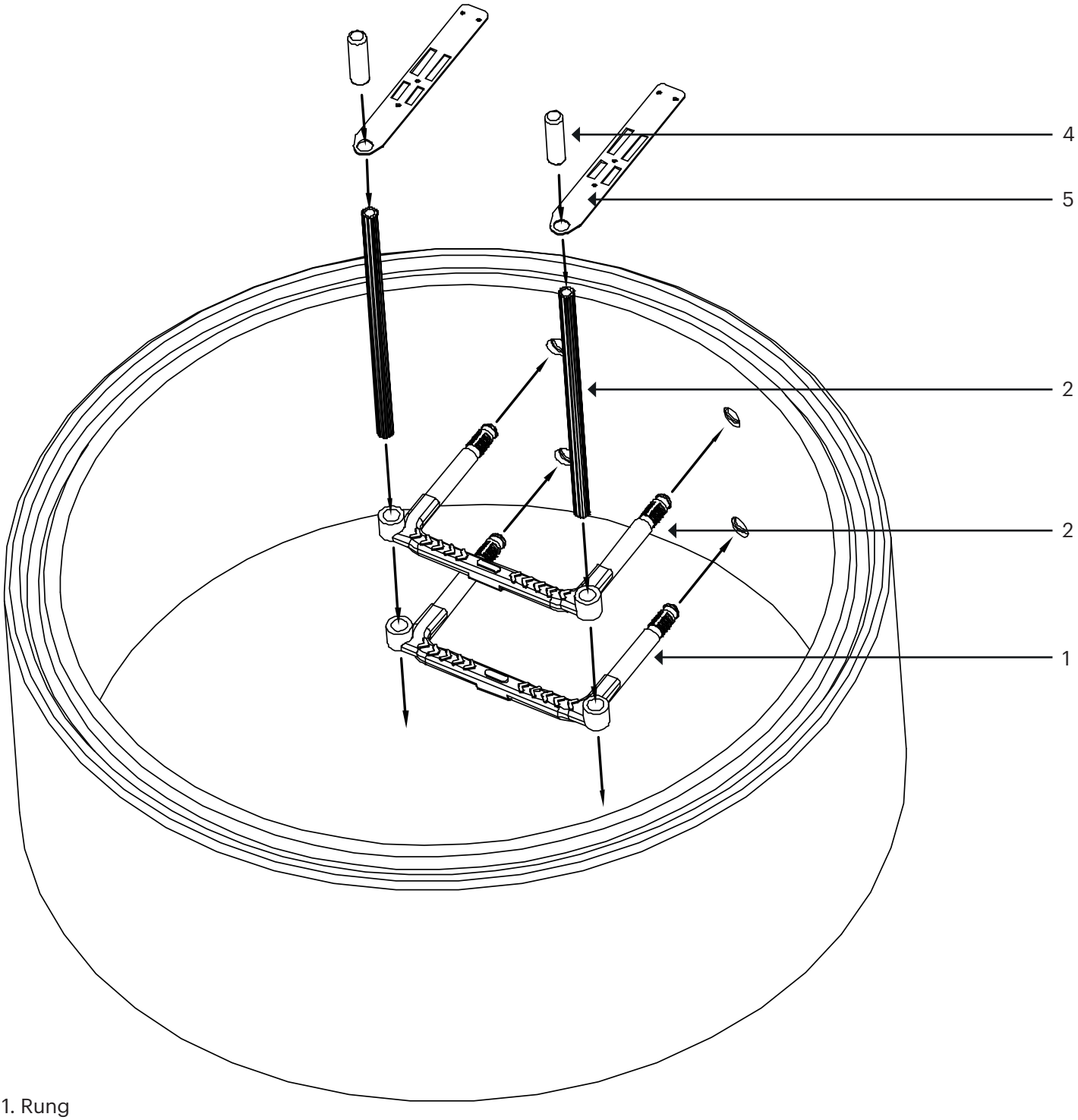

1. Rung
2. Plastic Insert
3. Stringer
4. Endcap
5. Fixing bracket

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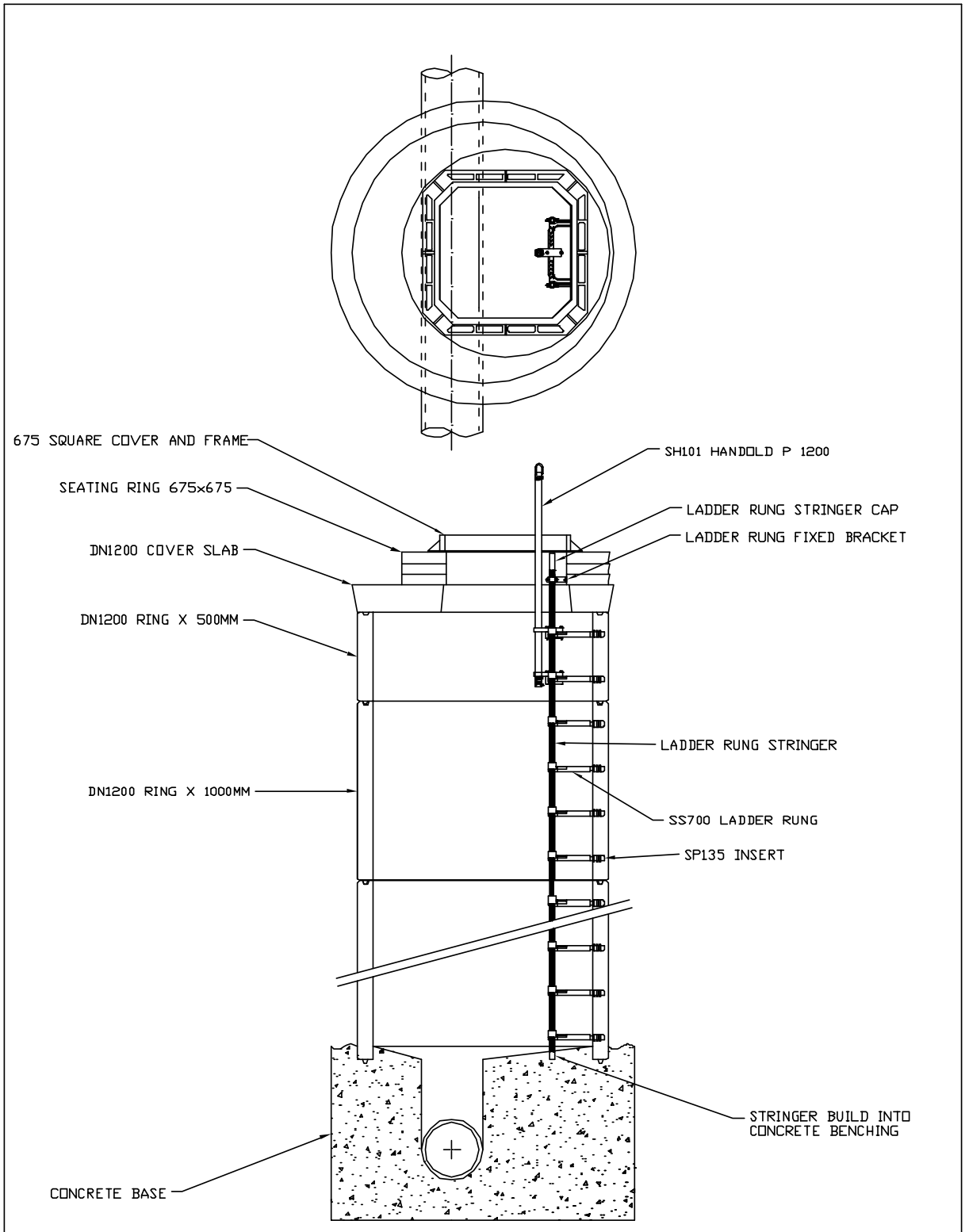

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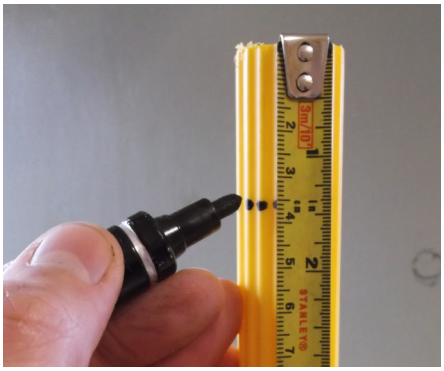
Optional Stringer Link

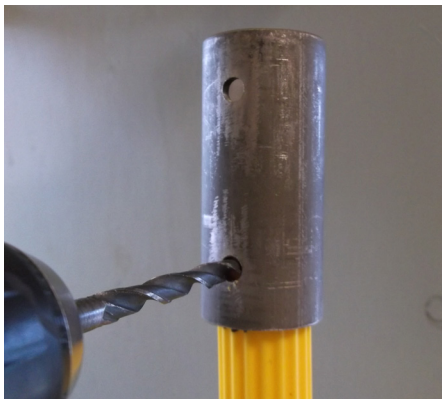
Caswick recommend that the stringer is one continuous length, however, a link piece is available should two pieces of stringer need to be joined. The link sleeve is manufactured from 304 stainless steel and bolted to the stringer.

Fitting

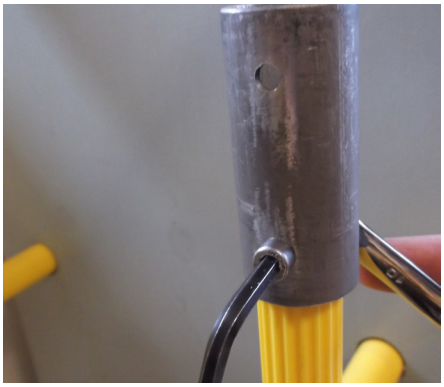
1. Install the first length of stringer through the steps as detailed in the integrated ladder fitting instructions. Cut the end of the installed stringer approximately equidistant between two rungs, ensure the cut is square. Any single length of stringer must be supported by at least 2 rungs.



2. Mark the stringer 35mm from the cut end with a pen.

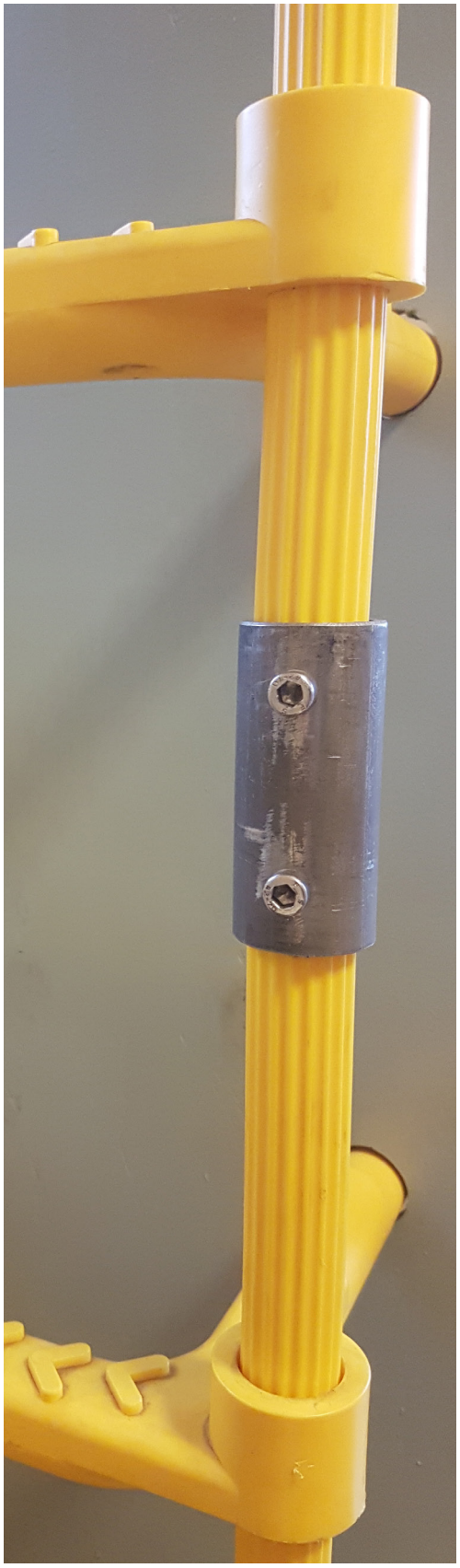


3. Slide the connector over the cut end of the stringer upto the pen mark and drill a 6mm hole through the stringer using the drilled holes in the connector as a guide.



4. Pass the bolt through the connector and stringer and fully tighten the nut using a 10mm spanner and 5mm allen key.

5. Square cut the additional length of stringer, pen mark 35mm from the cut end and fit to the rungs. Slide the stringer into the connector upto the pen mark, drill and bolt in place as above.



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