Groundforce Shorco
Excavation Support

User Guide

Manhole Box Equipment

Important Notes

All excavation work must be thoroughly planned before work commences on site to identify hazards and assess risk.

These instructions form guidance for Manhole Box Equipment. Non-standard applications should be approved by a suitably qualified engineer.

Ensure all personnel engaged in installation operations are properly briefed and adequately supervised by a competent person.

THIS USER GUIDE IS NOT CONTROLLED WHEN PRINTED

To ensure you are reading the most up-to-date version of this user guide, download as a pdf from the Groundforce Technical Library.

A video animation showing a typical Manhole / Trench Box installation method is available to watch now on our YouTube channel.

IF IN ANY DOUBT SEEK FURTHER ADVICE:
ON FREEPHONE - 0800 000 345

ISOQAR REGISTERED 0026 · UKAS MANAGEMENT SYSTEMS 0026
Certification Number 14419
ISO 9001 • ISO14001 • ISO45001

Rev	Date	Comments	Initial
2.4	21/09/23	Internal & external width ranges revised for 4.5m and 5.0m Manhole Boxes due to new guidance for fully adjustable struts (Spindles)	DSW

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SAFETY

Common Symbols and Meanings

PERSONAL PROTECTIVE EQUIPMENT (PPE)	
	Use eye protection
	Use hearing protection
	Wear protective gloves
	Wear head protection
	Wear protective footwear

WARNING SYMBOLS	
	General warning
	Crushing of hands

Introduction

Manhole boxes are similar to trench boxes in their basic function, however they incorporate integral end return panels to provide additional ground support, making them ideal as an alternative to using sheets and frames when installing pre-cast manhole rings in trench runs . There are six basic sizes of Manhole Box available to cater for common sizes of pre-cast manhole rings. Each box can be assembled and installed quickly without the need for an operative to enter the unsupported excavation. Manhole Boxes can be used in most ground conditions to support trenches with depths of up to 5.5m by utilising the base module with two box tops and a variety of different strut types.

See note and YouTube link on page 6 for the recommended alternative assembly method when using 4.5m and 5.0m Manhole Boxes.

Equipment Specification

Specification	Manhole Box Type Reference (plate length)					
	2.5m Box	3.0m Box	3.5m Box	4.0m Box	4.5m Box	5.0m Box
Plate Height (m)	2.5 (base) 1.5 (top)					
Square Box Assembly Weight (kg)*	2426 (base) 1668 (top)	2702 (base) 1846 (top)	3020 (base) 2044 (top)	3269 (base) 2208 (top)	4032 (base) 2636 (top)	5038 (base) 3394 (top)
Plate Thickness (mm)	107					127
Weight of Individual Plates (kg)	1045 (base) 745 (top)	1163 (base) 824 (top)	1282 (base) 903 (top)	1400 (base) 982 (top)	1520 (base) 1070 (top)	2075 (base) 1475 (top)
Manhole Ring Diameter (mm)	1050, 1200, 1350	1350, 1500, 1800	1800, 2100	2100, 2400, 2700	2700, 3000	2700, 3000, 3660
Maximum Trench Depth (m)**	5.5					
Internal Width (m)	1.31 - 5.11 (strut length + 900mm)				1.33 - 5.45	2.27 - 6.38
External Width (m)	1.53 - 5.33 (strut length + 1120mm)				1.55 - 5.67	2.53 - 6.64
Clearance Below Strut (m)	1.5				1.4	1.4

* Typical - weights will vary with trench width
** Maximum depth is based on one base and two top extensions being connected together

Strut Compatibility

There are two basic types of box strut that are compatible with the Manhole Box range:

- Incrementally adjustable struts
- Fully adjustable Spindle Struts (used for shorter spans)

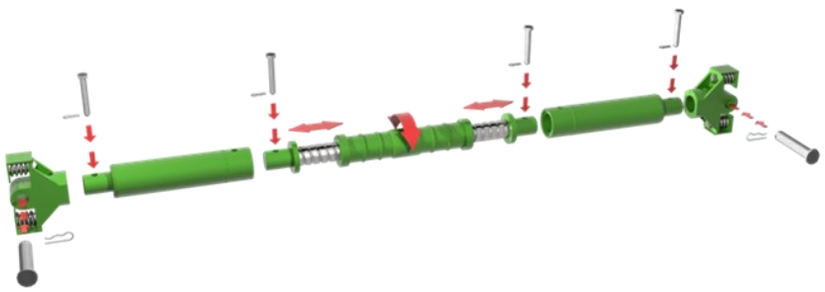
Manhole Box Type	Compatible Struts	
	Incrementally Adjustable Struts (m)	Fully Adjustable Spindle Struts (m)
2.5m, 3.0m, 3.5m, & 4.0m	**Multi Box Range** Internal Width: 1.31 - 4.16 External Width: 1.53 - 4.38	**Spindle Struts** Internal Width: 1.34 - 5.11 External Width: 1.56 - 5.33
4.5m	**Premier Range** Internal Width: 1.85 - 5.45 External Width: 2.07 - 5.67	**Spindle Struts** Internal Width: 1.33 - 1.85 External Width: 1.55 - 2.07
5.0m	**Premier Range** Internal Width: 2.79 - 6.38 External Width: 3.05 - 6.64	**Spindle Struts** Internal Width: 2.27 - 2.79 External Width: 2.49 - 3.01

For more detailed technical information on struts used in Manhole Box systems, including load capacities and size/weight ranges etc, please refer to the Groundforce Technical file.

Box Struts

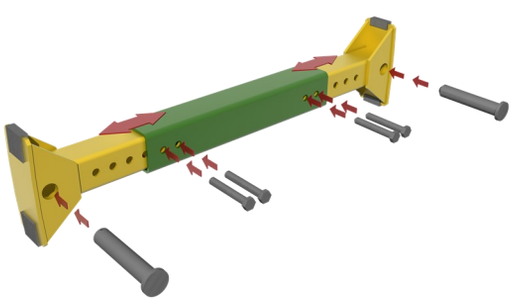
Spindle Type (Fully Adjustable)

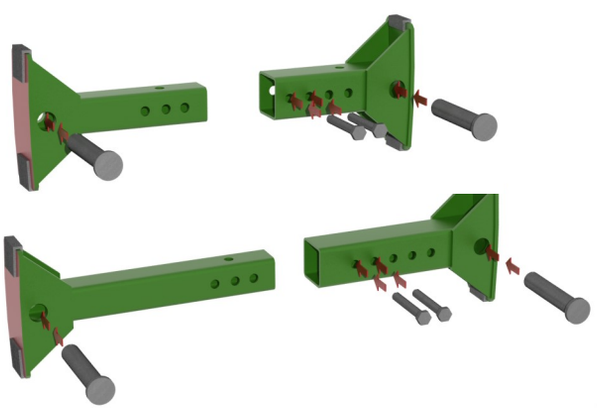
This is a fully adjustable strut, traditionally known as a spindle due to its relative slender profile. It comprises an adjustable left and right handed screw threaded section (four sizes are available) a series of fixed length “plug in” extension pieces and a pair of spring spindle holders located at each end to form the connection to the box panels. The latter allows a degree of strut articulation to facilitate a typical dig and push installation sequence.



Multi Box struts (Incrementally Adjustable)

This family of struts comprises inner and outer telescopic steel box sections incorporating end rockers with a series of pin location holes along the length to provide an incremental length adjustment firmly secured in position using double pins. The end rockers allow a degree of strut articulation to facilitate a typical dig and push installation sequence. A pair of standard rockers combine with a central oversleeve to increase their length and range of adjustment.

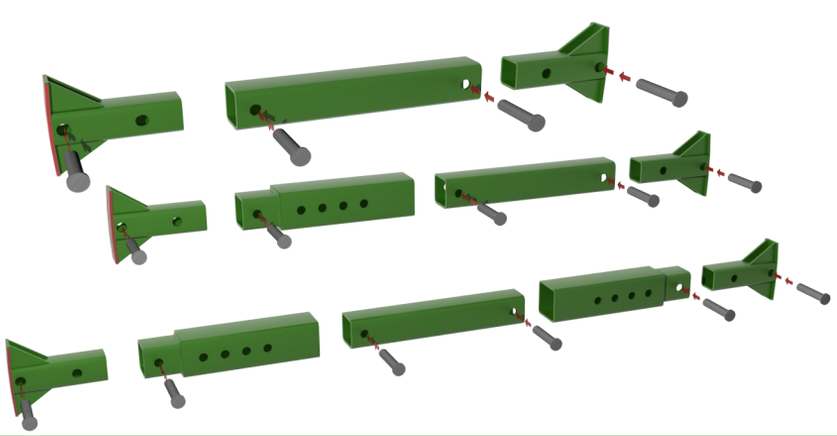




Mini and narrow rockers (shown above) only require a single pin adjustment facility and accommodate Manhole Boxes in narrower trenches. They incorporate a standard rocker but no central oversleeve.

Premier Multi-Box (Fixed / Incrementally Adjustable)

Premier Multi-Box struts are a stronger version of the Multi-Box strut and are available both as fixed or incrementally adjustable. Heavy duty end rocker units are linked together by a series of fixed length over sleeves, whilst the incrementally adjustable strut incorporates an adjustable oversleeve unit. The rockers allow a degree of strut articulation. All struts components are connected together using a 40mm dia pin.



Typical Assembly Instructions

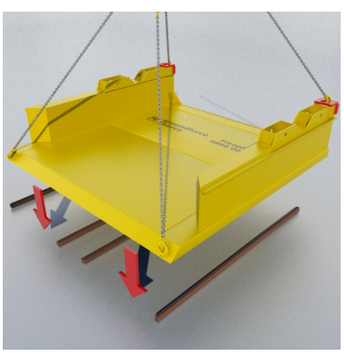
Note: Identify all components and ensure certified lifting equipment is available for the task. Use only designated lifting or handling points for chain attachment. Yellow handling points are designed for manoeuvring equipment into position and red lifting points are specifically designed for lifting equipment clear of the ground.

Safety Notes

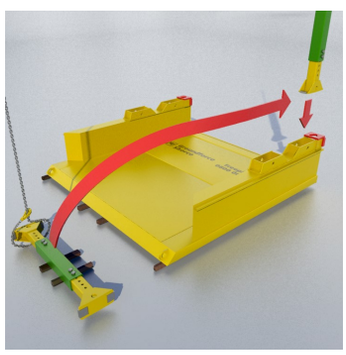
Maintain a means of safe access at all stages for the provision of contractor risk assessments The end-user has a responsibility under LOLER to ensure that all lifting equipment is suitable and fit for use including appropriate and valid certification. (See separate Groundforce Chain Sling user guide) Avoid the trapping of fingers at all stages of work

For Incrementally Adjustable Struts: Slide the appropriate Outer Sleeve(s) onto the 4 Strut Rockers on one plate and secure with 20mm Ref 3 Pins.

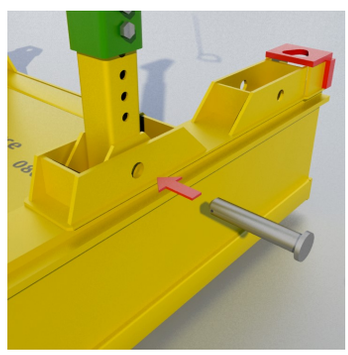
For Fully Adjustable Struts (Spindles): Slide the Spindles onto the Spring Spindle Holders and secure using 20mm Ref 3 Pins. In a similar manner, secure up to 3 Pipe Extensions to the Spindle; secure with 20mm Ref 3 Pins.



1. Position the first plate on firm level ground and orientate with the strut sockets facing upwards.

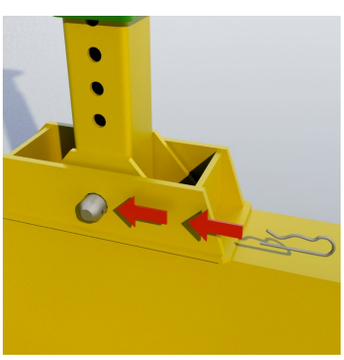


2. After assembling the required struts, locate a strut into the strut housing.

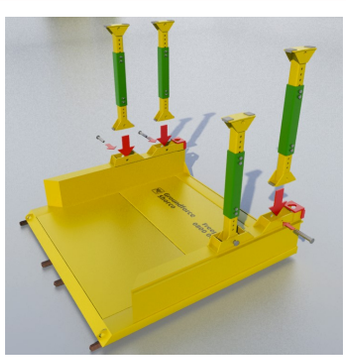


3. Insert a pin and 'R' clip. Fit the pin from the outside as shown. **See note below:**

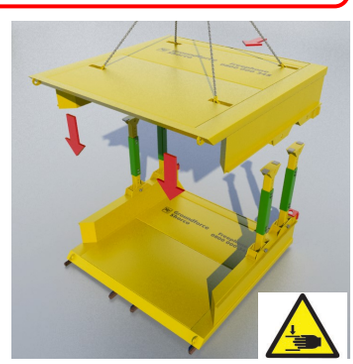
It is important that all pins are fitted from the outside to allow for a visual inspection of all 'R' clips as part of the inspection process prior to entering the box.



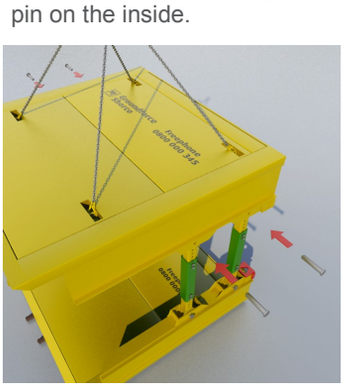
4. Fit an 'R' clip through the pin on the inside.



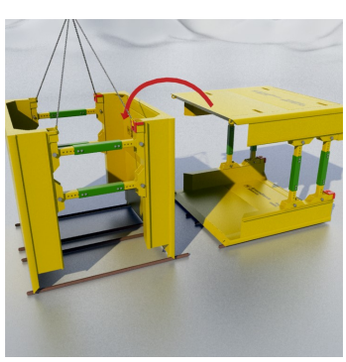
5. Repeat for all four struts.



6. Lift and invert the second panel using the handling points and manoeuvre into position above the other panel. Lower the panel towards the four struts.



7. Carefully align all four struts so that the Rockers/Spring Spindles engage in the upper plate sockets. Fit pins and clips as above.



8. Using the red lifting points, tilt the box into an upright position. **Note:** all personnel should keep well clear during this manoeuvre.

Note

If the strut length needs adjusting, assembly points 2 to 8 must be observed.

Notes on 4.5m and 5.0m Manhole Boxes

Due to the size of 4.5m and 5.0m Manhole Boxes, It is recommended that these boxes are assembled by attaching the second plate from above with the struts facing 'downwards' as shown in the video: this eliminates the need for ladders and the risks involved with working at height.

For these two heavier boxes, lay the first plate on the ground and fit the struts so they are pointing upwards. Then lay the second plate on the ground with the strut housings uppermost. Elevate and rotate the first plate with the struts attached so they are pointing down. Then fit the struts to the second plate. This installation method is available to watch now on our YouTube channel.

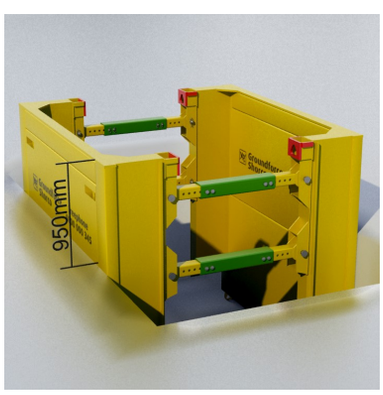
Installation

1. Excavate a nominal one metre deep guide trench.

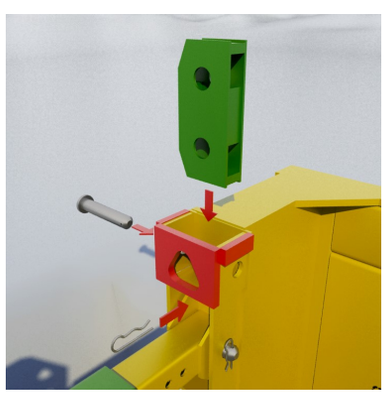
2. Lower the assembled box into the guide trench.

Safety Note: Take extra care to avoid trapping of fingers during the installation process.

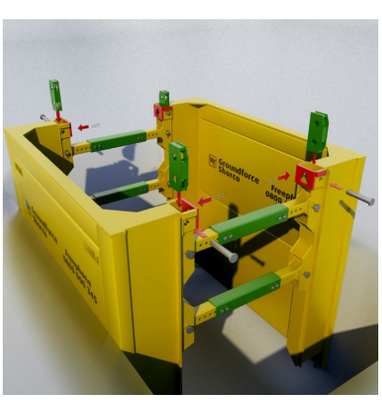
3. Push down on each corner of the box sequentially, but not more than 150mm increments, until formation achieved



4. Continue to dig and push in sequence until a 950mm upstand is left to provide a safety barrier.

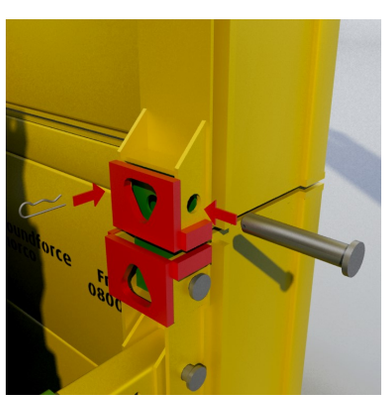


5. Insert the panel connector cassette and secure with a pin and 'R' clip.



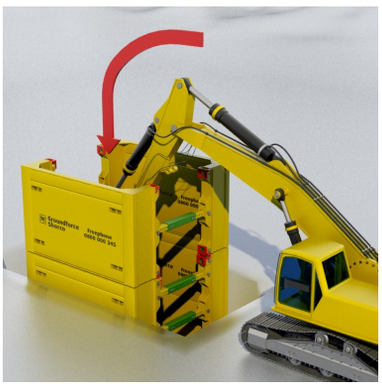
6. Repeat for all four corners

7. Prepare to fit the top box by raising it over the base box.

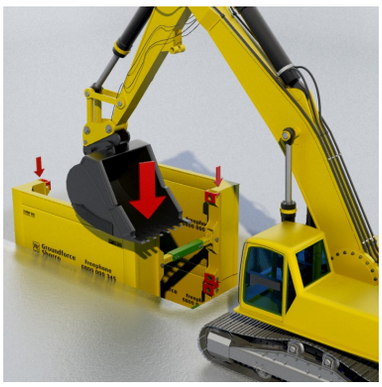


8. Secure the top box cassettes with a pins and 'R' clips.

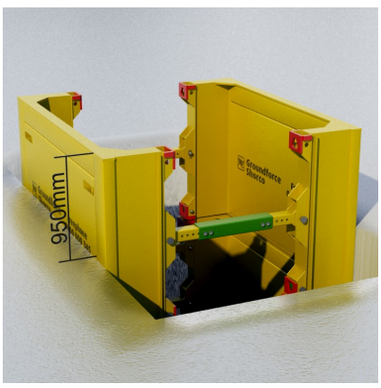
Installation Cont...



9. Excavate from within to accommodate the depth of the top box, taking care not to strike the struts.



10. Push down on each corner of the box sequentially, but not more than 150mm increments, until formation achieved.



11. Maintain a minimum 950mm safety barrier; either by leaving an upstand as shown above or by introducing edge protection.

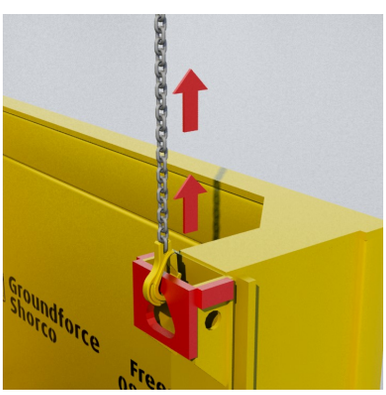
For details on **EdgeSafe** and **LadderSafe** systems, refer to the relevant user guides which are available to download as a pdf from the Groundforce Technical Library

A video showing LadderSafe systems is available to watch now on our YouTube channel.

An EdgeSafe video with related SiteSafe solutions is available to watch now on our YouTube channel.

Extraction

Safety Note: Take extra care to avoid trapping fingers during the extraction process.



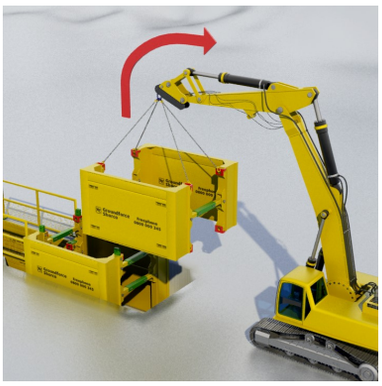
1. If edge protection is fitted, remove this and then using a single heavy duty chain, attach to each corner of the box and lift by no more than 150mm each time. (see notes below)

2. Once the **lower box** is 950mm above ground level, the upper box can be removed.

3. Remove the pins and 'R' clips to release the top box.

Notes: Using two or four lifting points may be possible where suction pressure on the boxes is not excessive. **Do not damage the chain by allowing it to snatch.**

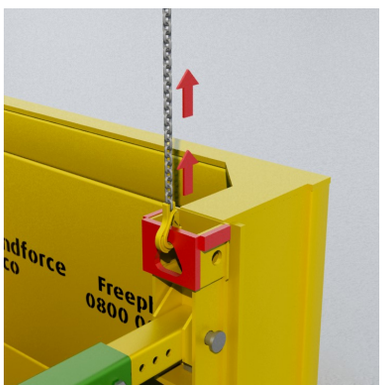
Extraction Cont...



4. Attach a four leg lifting chain to the lifting points. Lift the top box clear and set carefully to one side.

5. Unpin and remove the cassettes.

6. Begin to backfill and compact in stages.



7. Using a single heavy duty chain, attach to each corner of the box and lift by no more than 150mm each time. **Do not snatch the chain**

8. Attach a four leg chain to the lifting points and lift clear of the excavation.

9. Fill in the remaining excavation.

Notes: Panels should be stored flat to avoid tipping over. Boxes should be disassembled and cleaned before collection. Do not lose any pins or clips etc.

Do	Do Not
✓ Inspect all components at the start of every shift	X Use more than 4 No. Strut Components on spindle struts
✓ Assess weights correctly and use adequate and appropriately certified lifting equipment	X Exit the box into an unsupported area
✓ Ensure hooks engage fully into lifting points prior to lifting	X Use the struts to support trench sheets across the ends of the box
✓ Toe-out base boxes by 50mm	X Adjust the struts without laying the box down and removing the top plate
✓ Ensure all pins and clips are correctly fitted	X Push plates down by more that 150mm at a time
✓ Use four panel connectors for upper box attachment	X Snatch the chain whilst extracting the box
✓ Use only lifting or handling points for chain attachment	X Use handling points for lifting or pulling
✓ Provide support over the full height of the dig	X Climb on the struts – always use a secured ladder
✓ Provide edge protection or handrail panels	X Hang or store materials on the struts
✓ Push the plates at the corner positions only	X Excessively force the box into the ground
✓ Keep personnel clear of excavator slewing zone	X Permit personnel in the box during installation
✓ Always use a banksman	X Accidentally strike the struts
✓ Locate underground services before excavating	X Drag the box by any means
✓ Lay the box flat before dismantling	X Use more than two top boxes unless approved in writing by Groundforce
✓ Store assembled boxes on firm, level ground only or lay flat on their sides	X Store/stack plates more than 6 plates high
✓ Use a secured ladder to enter or exit a box	X “Fly” the boxes above the base of the excavation unless approved by a competent person
✓ Always work from a safe area to avoid the risk of falls from height	X Enter an unsupported trench
✓ Take care to avoid trapping of fingers	

Groundforce Training
Experts in Excavation Safety

Appreciation of Excavation Safety

The theoretical safety course is mapped to both EUSR and the National Occupational Standards and introduces the learner to the basics of working around excavations. Designed as an awareness course, particular emphasis is provided to key aspects of managing and/or overseeing excavation work. Visit the course page for more details.

The one day course can accommodate up to 20 delegates per day