

GROUNDWORKS MANHOLE BOXES

User Guide



GENERATION
HIRE & SALE

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Introduction



Health and safety legislation states that construction equipment users should formulate a site specific Safe System of Work to undertake any work they are planning. This guide was designed to offer basic instruction of Shoring Equipment Systems including the assembly, installation and extraction of the Manhole Box, including the Manhole and Backhoe Manhole Boxes. The correct sizes and weights of the components will also be shown so that use of equipment can be planned ahead. It is necessary that users enforce the appropriate safety practices of excavations and trenching throughout installation.

The users of Shoring Equipment should be familiar, confident and competent when handling and installing boxes and accessories. Altrad Generation Hire & Sale excavation systems can be supplied with a full range of additional safety products including ladder access and guardrails as well as various other ancillary products. These products are designed to act in accordance with the practice of Shoring Equipment and meet the requirements of the Lifting Operations & Lifting Equipment Regulations, Work at Height Regulations and the Confined Spaces Regulations.

Personnel should make themselves aware that certain conditions such as the close proximity of structures, site roads, railways and excavated materials near the trench can all increase surrounding earth pressures. If in doubt please seek advice.

For additional details please contact your local Altrad Generation Hire and Sale branch.

All Manhole Boxes are manufactured and designed in accordance with the following: BS EN 13331 2002 parts 1 & 2 Trench lining systems and BS 5975 (2008) Code of practice for Temporary Works Procedures and the Permissible Stress Design of Falsework.

Backhoe Manhole Box

Backhoe Manhole Boxes are four-sided excavation boxes with integral end-return panels for added support, ideal for installing pre-cast manhole rings. The "Dig and Push" installation supports side walls and reduces accident risk. Various strut lengths available for non-square configurations and end closure panels to support the open ends of the box.



Key Features

- Provides safe working area below ground
- Easily Assembled
- Dig and Push installation method
- Pin and Clip System
- Closing panels available
- Additional equipment available

BVB - Backhoe Manhole Box

BVB - Backhoe Manhole Box	2m		2.5m		3m	
	Base	Top	Base	Top	Base	Top
Panel Length (mm)	2000		2500		3000	
Panel Height (mm)	2000	1000	2000	1000	2000	1000
Panel Thickness (mm)	60		60		60	
External Trench Width (mm)	1690-3690		1690-3690		1690-3690	
Internal Trench Width (mm)	1570-3570		1570-3570		1570-3570	
Weight (kg)	1186	711	1326	769	1190	680
Distance Between Struts (mm)	1630		2130		2630	
Clearance Below Strut (mm)	980	-	980	-	980	-
Permissible SWL (kN/m ²)	38.0		30.4		32	
Max Depth (mm)	2960		2960		2960	

JVB - Backhoe Manhole Box

JVB - Backhoe Manhole Box	2m		2.5m		3m	
	Base	Top	Base	Top	Base	Top
Panel Length (mm)	2000		2500		3000	
Panel Height (mm)	2000	1000	2000	1000	2000	1000
Panel Thickness (mm)	60	60	60	60	60	60
External Trench Width (mm)	1690-3690		1690-3690		1690-3690	
Internal Trench Width (mm)	1570-3570		1570-3570		1570-3570	
Weight (kg)	808	507	875	460	975	508
Distance Between Struts (mm)	1840		2340		2840	
Clearance Below Strut (mm)	1200	-	1200	-	1200	-
To Suit Ring Size (mm)	1050 / 1200		1050 / 1200 / 1350		1350 / 1500 / 1800	
Permissible SWL (kN/m ²)	20		20		20	
Max Depth (mm)	2960		2960		2960	

Standard Manhole Box

The Manhole Box is a four-sided excavation system ideal for installing pre-cast concrete manholes and small chambers or tanks where ground movement isn't critical. Each box can be quickly assembled and installed without requiring anyone to enter an unsupported excavation.



Key Features

- Four Sided
- Closing Panels Available
- Edge Safe Systems Available
- Dig & Push Method Used
- Additional Extension Boxes
- Ladder Access System Available
- Pin and Clip System

BV100 - Standard Manhole Box

BV100 - Manhole Box	2.5m		3m		3.5m		4m		4.5m		5m	
	Base	Top										
Panel Length (mm)	2500		3000		3500		4000		4500		5000	
Panel Height (mm)	2360	1470	2360	1470	2360	1470	2360	1470	2360	1470	2360	1470
Panel Thickness (mm)	100		100		100		100		100		100	
External Trench Width (mm)	1900-4900		1900-4900		1900-4900		1900-4900		1900-4900		1900-4900	
Internal Trench Width (mm)	1700-4700		1700-4700		1700-4700		1700-4700		1700-4700		1700-4700	
Weight (kg)	2026	1449	2226	1589	2426	1729	2616	1869	3326	2329	3576	2509
Clearance Between Struts (mm)	2080		2580		3080		3580		4080		4580	
Clearance Below Strut (mm)	1540	-	1540	-	1540	-	1540	-	1540	-	1540	-
Permissible SWL (kN/m ²)	55.7		46.4		39.7		31.85		30.6		24.5	
Max Depth (mm)	5300		5300		5300		5300		5300		5300	

JV100 - Standard Manhole Box

JV100 - Manhole Box	2.5m		3m		3.5m		4m		4.7m	
	Base	Top	Base	Top	Base	Top	Base	Top	Base	Top
Panel Length (mm)	2500		3000		3500		4000		4700	
Panel Height (mm)	2500	1500	2500	1500	2500	1500	2500	1500	2500	1500
Panel Thickness (mm)	100		100		100		100		100	
External Trench Width (mm)	1900-4900		1900-4900		1900-4900		1900-4900		1900-4900	
Internal Trench Width (mm)	1700-4700		1700-4700		1700-4700		1700-4700		1700-4700	
Weight (kg)	2402	1374	2608	1670	2800	1800	3570	2370	4850	2910
Clearance Between Struts (mm)	2220		2720		3220		3780		4490	
Clearance Below Strut (mm)	1500	-	1500	-	1500	-	1500	-	1500	-
To Suit Ring Size (mm)	1050 / 1200 / 1350		1350 / 1500 / 1800		1800 / 2100		2100 / 2400 / 2700		3000	
Permissible SWL (kN/m ²)	40		40		40		40		35	
Max Depth (mm)	5300		5300		5300		5300		5300	

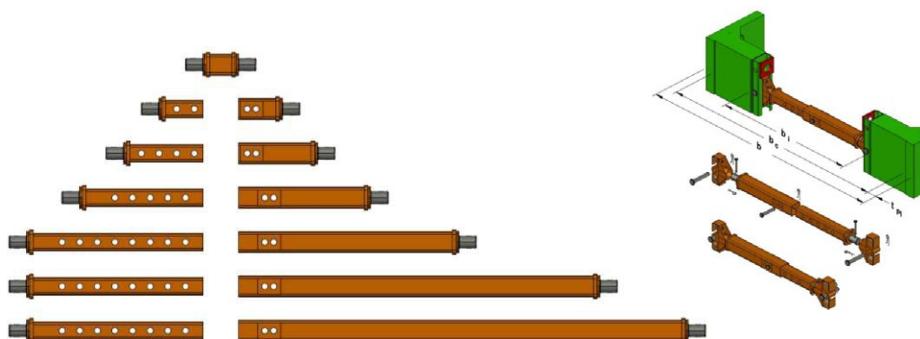
Manhole Box Struts

Tensile Forces

Lifting eyes at the plate head $R_d = 229$ kN
 Bottom Eyes $R_d = 47$ kN

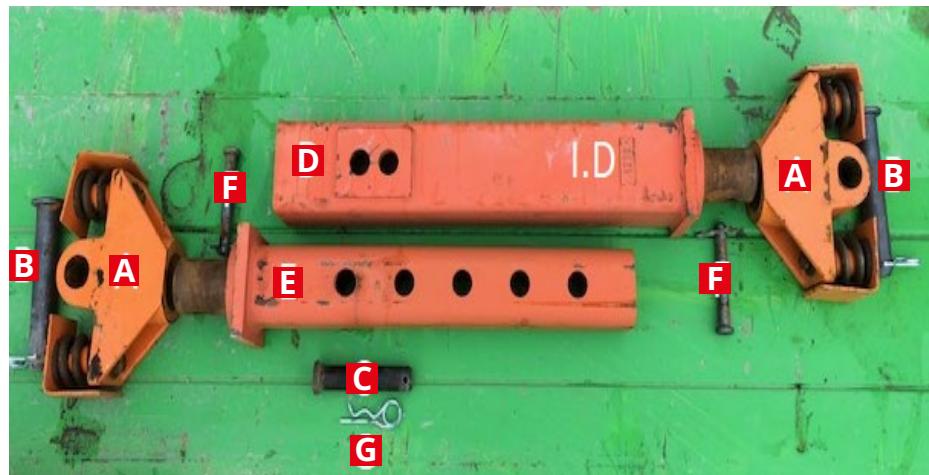
Telescopic Struts 80/60

bolt Ø20*148mm - connect telescopic strut and Spring Mushroom
 bolt Ø33*175mm - connect outer tube and inner tube
 bolt Ø40*226mm - connect Spring Mushroom and plate



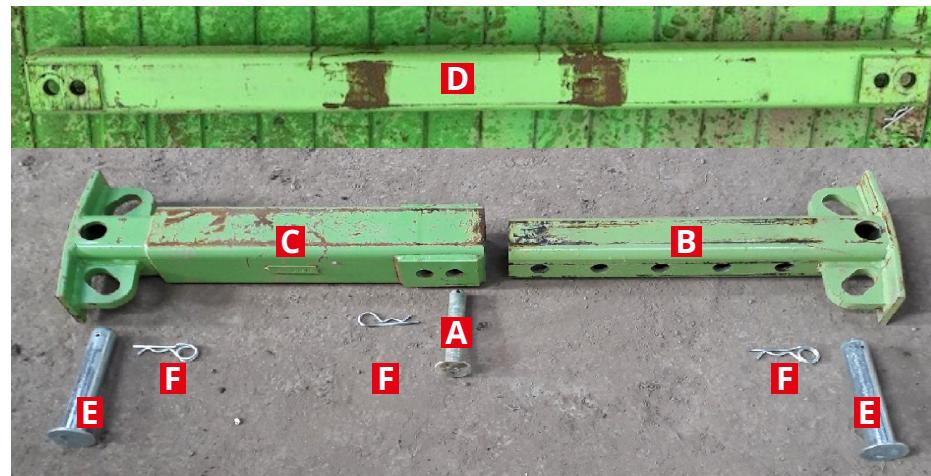
Type	Stroke	Strut Length	Internal Width	External Width	Inner Tube 100 / 100	Outer Tube 120 / 120	Weight G
		bl	bc	b	No. of Holes	min working width (mm)	(kg)
	(mm)	(mm)	(mm)	(mm)			
A	-	600	1600	1800	-	600	52.3
B	100	700 - 800	1700 - 1800	1900 - 2000	2	700	62.5
C	300	900 - 1200	1900 - 2200	2100 - 2400	4	900	72.8
D	400	1200 - 1600	2200 - 2600	2400 - 2800	5	1200	87.3
E		1700 - 2400	2700 - 3400	2900 - 3600		1700	108.4
F	700	2500 - 3200	3500 - 4200	3700 - 4400	8	2500	130.4
G		3000 - 3700	4000 - 4700	4200 - 4900		3000	144.2

Preferred Strut Assembly (LTW Extendable)



Part	Code	Description	ID Plate	No. Of Holes
A	084791	BV100 MUSHROOM FP80		
B	084827	212 X 43MM BV100 BOLT		
C	084840	BV100 STRUT CENTRE PIN		
D	084841	700 - 800 BV100 O/STRUT	700	
E	084842	700 - 800 BV100 I/STRUT		2
D	084843	900 - 1200 BV100 O/STRUT	815	
E	084844	900 - 1200 BV100 I/STRUT		4
D	084845	1300 - 1600 BV100 O/STRUT	1300	
E	084846	1300 - 1600 BV100 I/STRUT		5
D	084847	1700 - 2400 BV100 O/STRUT	1700	
E	084848	1700 - 2400 BV100 I/STRUT		8
D	084849	BV100 STRUT 2500 - 3200 OUTER	2500	
D	084851	BV100 STRUT 3000 - 3700 OUTER	3000	
F	084826	125 X 20MM BV100 BOLT		
G	084063	CONNECTOR R CLIP		

Alternative Strut Assembly (P Strut)

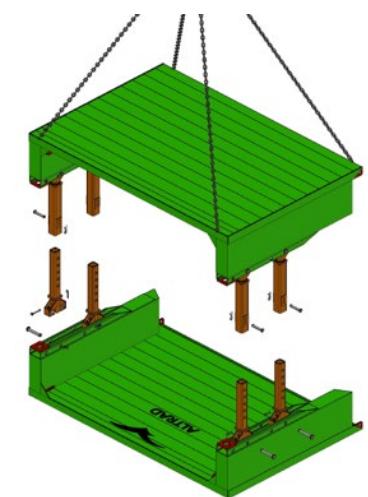


Part	Code	Description
A	084270	P STRUT CENTRE PIN
B	084271	P STRUT 0 INNER
C	084272	P STRUT 0 OUTER 600-800MM
B	084273	P STRUT 1 INNER
C	084274	P STRUT 1 OUTER 800-1200MM
D	084275	P STRUT 2 OUTER 1250-2050MM
D	084276	P STRUT 3 OUTER 2000-2800MM
D	084277	P STRUT 4 OUTER 2700-3500MM
E	084278	P STRUT CONNECTOR PIN
F	084063	CONNECTOR R CLIP

Manhole Box Assembly & Operating Manual

Manhole Box Assembly Instructions

1. Lay the first manhole box panel on level ground with the guide post pointing upwards.
2. Insert the spring loaded Mushroom fitting into the guide post, inserting the locating pins into the holes provided in the guide post, through the mushroom fitting and secure with R clips.
3. Release the mushroom fitting by releasing the locking nuts.
4. Adjust the Telescopic Struts to the desired trench width. Connect outer tube and inner tube with 33mm dia x 175mm locating pin.
5. Insert the strut assembly into the mushroom fitting, inserting the 20mm dia x 148mm locating pins and secure with R clips.
6. If using adjustable spindles insert spacer bars into spindle assembly to reach desired width, insert the locating pins and secure with R clips.
7. Ensure that all strut/spindle assemblies are in an offset arrangement.
8. Place the second manhole box panel fitted with Mushroom units onto the strut or spindle assemblies and secure with 20mm dia x 148mm locating pin and R clips in the manner described above. Please refer to data sheets for the weights.
9. Using the Altrad Generation 4 leg lifting chain, rotate box into vertical position for use. All personnel should be kept well clear during process.





Manhole Box Assembly & Operating Manual

Manhole Box Installation Instructions

The manhole box is designed to be driven into the ground and extracted using the corner posts. Attempting to drive it in at any other point will result in damage and reduce the efficiency of the equipment.

1. Excavate soil from within manhole box and push down on each corner plate, ensuring no more than 150mm increments using excavator bucket.
2. If using end panels, dig and push in similar fashion to box ensuring minimum contact of 150mm each side with box panels and backfill to secure excavation
3. Continue to dig and push until manhole box is at required depth. If a top box is required, allow a minimum of 950mm upstand to allow for edge protection when attaching top box.
4. Connect top box using manhole box connector and secure using connector pins and R clips.
5. Dig and push to required depth. Repeat step if using additional top boxes.
6. Attach Generation trenchguard & laddersafe module to top edge of panel (see Trenchguard & Laddersafe installation manual)

Extraction Process

- Reversal of installation process using a Generation snatch chain to apply force to each corner of panel to break any adhesion caused by ground settlement.
- Always backfill and compact when extracting manhole box and never leave any unsupported ground.

Maintenance

- Inspect all panels prior to entering any excavation at start of shifts
- Inspect all pins and R clips prior to entry
- Inspect all handrail components regularly and ensure that all screw threads are tight.

Manhole Box Assembly & Operating Manual

Summary do's and don'ts:

- Do:

- Use all relevant PPE at all times
- Ensure that all operatives are familiar with the safety and operating instructions.
- Check that all connecting pins are in place and properly secured with R clips.
- Follow the basic maintenance instructions.
- Always lower the box into a pre dug excavation.
- Use a ladder and Laddersafe platform to enter excavations.
- Provide and use all edge protection equipment supplied.
- Support all stages of excavation down to required depth.
- Use Generation end panels to close and support open ends of excavations.
- Inspect and use all red lifting points prior to and during lifting and ensure all personnel are away from operation and excavator slewing area.
- Always take measures to avoid risk of falls from height.
- Always take measures to avoid trapping of fingers or limbs in equipment.

Do not:

- Move box with personnel inside.
- Move boxes by pulling or lifting on struts or spacers.
- Use more than two extension boxes (1 extension with backhoe boxes).
- Push box down by more than recommended 150mm increments.
- Use more than the allocated strut/spindles & spacer bars or go over max specified width per box.
- Use unsafe lifting equipment or practices.
- Hammer the panels with the excavator.
- Use the struts to enter manhole box, always use properly secured ladder and Altrad Generation Laddersafe platform.
- Enter unsupported parts of the excavation.
- Allow personnel inside box during installation.
- Apply lateral loads to extensions, struts or spindles (eg: with trench sheets).
- Strike the struts when installing or extracting.
- Use the struts to move or extract the box, use lifting points only.
- Drag the box in anyway.
- 'Fly' the box above the base of the excavation on unsupported ground.

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