GROUNDWORKS
MANHOLE BRACE (D.A)
User Guide

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Altrad Generation Hire & Sale

Support for Construction & Industry

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Contents

Double Acting Manhole Brace

Generation Groundwork's Double Acting Manhole Brace system is intended to be used as a temporary waling system to sheeted excavations. It is not intended for other purposes.

This booklet provides basic information for users of Double Acting Manhole Brace to assist them in their preparation of a safe system of work on site. Double Acting Manhole Brace should NOT be used in seawater applications without prior consultation with Generation.

Design

No information on designs are included in this booklet. Clients are strongly advised to ensure that a competent engineer is employed to provide a suitable design for excavation schemes requiring the use of Double Acting Manhole Brace products.

Generation UK offer an independant design service and can, on request, also provide information on the strength capacities of Double Acting Manhole Brace products for clients undertaking their own designs.

Hydraulic Adjustment

The Double Acting Manhole Brace system incorporates a hydraulic system of adjustment which is designed to extend or retract the frames under conditions of no or low loading: e.g. as when first installed or as they become redundant after backfilling the excavation.

Once they are sustaining significant ground loads, hydraulic extension or retraction of the frames is inadvisable and is unlikely to be possible. Methods of working should therefore avoid the need for frame adjustment/ removal whilst the walings are heavily loaded.

General Guidance

Safe System of Work and Method Statement
Assuming that the location, plan size and depth of an excavation, together with an arrangement of sheets and frames has already been detennined, the Health and Safety at WorkAct requires that a safe system of work is adopted to carry out the work on site. These guidance notes are intended to draw the clienfs attention to practical aspects of Double Acting Manhole Brace installation which need to be considered in compiling method statements for a safe system of work.

In particular, attention is drawn to the lengths and weights of the frame members and the need for plannlng the llftlng operations Involved. All major components of the Double Acting Manhole Brace system are fitted with lifting lugs for safe slinging.

General Guidance

Manpower

The Health and Safety legislation requires that personnel deployed are suitably trained and experienced and supervised by a competent person. All lifting operations are to be controlled by an appointed person in accordance with LOLER regulations.

The main activities associated with Double Acting Manhole Brace installation are:

- Unloading the delivery vehicle.
- Slinging and lifting walings into position in the excavation, and connecting the comers to form frames.
- Connecting the pump to each leg in tum, pressurising the frames and fitting restraint chains.

Plant and Lifting

A suitable appliance is required for off-loading and installation. For off-loading there needs to be sufficient clearance under the main hook to allow lifting with a safe angle between the lifting sling legs. **WARNING:** If an excavator is being used for lifting operations refer to the safety information.

If the legs are to be lifted into the excavation then the appliance should be located a safe distance from the edge of the excavation. A surcharge for the excavator must have been allowed for in the excavation brief/ design. It is assumed that the frames will be lifted into the excavation one leg at a time and assembled in the excavation. Likewise, for removal, it is assumed that the frame will be dismantled in the excavation and the legs removed one at a time.

Small Plant, Tools and Lifting Chains for Handllng

Essential equipment required is:

- Sledgehammers for making pinned connections.
- Lifting chains of suitable length and capacity and with current certification. The legs have lifting lugs designed to take hooks.

In most cases the centre of gravity of the lifts involved will not be at mid-length so shortening clutches are advisable. Generation UK offer sets of 4 leg 10mm chains with 4.0m leg length complete with shortening clutches and safety hook.

General Guidance

During Excavation Works on Site

If Generation UK have designed the sheeting and frame arrangement for the excavation, they will have used ground data provided by the client.

If during the excavation it is noted that the actual ground conditions and/or ground water levels differ from those provided at design stage, it is advisable to have the schemed rechecked.

After Excavation Works are Completed

Plan for edge protection to be installed as earty as possible. Regularty inspect the excavation for signs of excessive movements of sheets or walings. Check the hydraulic legs for signs of fluid leakage. Keep plant, soil heaps and stored materials well clear from the edge of the excavation.

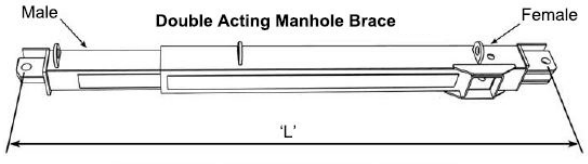
Return of Equipment Off Hire

Clients should ensure that on removal, the equipment is returned clean and in lengths as supplied.

Transportation

Ensure all equipment is loaded to the satisfaction of the lorry driver and is securely restrained to the vehicle bed.

Identification of Components



CODE	LEG	EXTERNAL MIN	EXTERNAL MAX	WIDTH OF BEAM	WEIGHT
085105	Type A	1600mm	2200mm	140mm	125kg
085106	Type B	2100mm	3000mm	140mm	150kg
085107	Type C	2700mm	4200mm	150mm	208kg
085108	Type D	3700mm	6000mm	180mm	316kg
085109	Type E	6347mm	9447mm	250mm	1300kg

Accessories

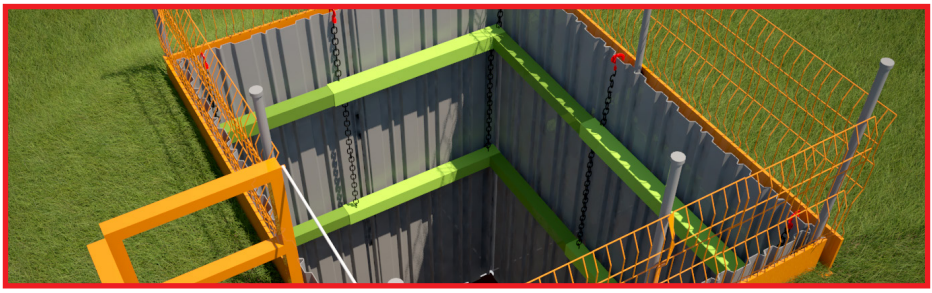
- Installation Kit:

- Double Acting Pump (Weight: 18 kg empty, 43 kg full).
- Hose Extensions.
- Lifting Chain (Weight: 47 kg, 10mm 4 leg chain sling, 4m E.L.L. c/w 4no safety hooks and 4no shortening clutches). Refer to Lifting Chain User Information for further details.
- Restraint Chain (Weight 5.8 kg. 2m E.L.L. Capacity 2000 kg).

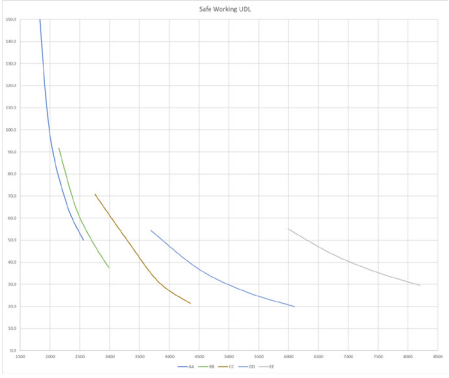
Standard Hydraulic Manhole Brace

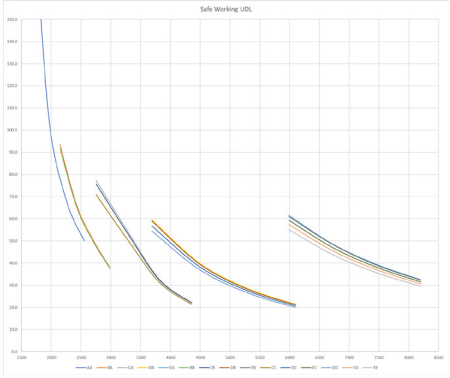
Hydraulic Manhole Braces are suitable for both square and rectangular excavations from 1.6m up to 9.4m.

It should be used with Generation Trench Sheets to create a hydraulically operated four-sided support system and allow a safe working environment for manhole inspection work or new build projects. Hydraulic Manhole Brace is used when the soil conditions do not allow for a Manhole Box to be used, or, if cross services are involved in the scheme.



LEG TYPE	CLEAR INTERNAL DIMENSION (X)		DIMENSION OVER FRAME (Y)		FRAME WEIGHT
	MIN	MAX	MIN	MAX	
A	1320mm	1920mm	1600mm	2200mm	500kg
B	1820mm	2720mm	2100mm	3000mm	600kg
C	2420mm	3920mm	2700mm	4200mm	832kg
D	3340mm	5720mm	3700mm	6000mm	1264kg
E	5847mm	8947mm	6347mm	9447mm	5200kg





Typical Leg Assembly and Site Connection Details

Assembly

To assemble the frame, only the comers need to be connected using Bailey pin complete wilh spring retention clip as supplied. The lug is a close fit in the clevis, so that the legs should be as level as possible during assembly to make it easier to assemble the joint. It is worth spending time on levelling the ground on which the frame is to be assembled.

Typical Sequence of Sheet and Frame Installation

Installation of 2 frames by excavator, without piling hammer, placing one leg at a time.
Warning:

1. Fully excavate to first frame level. Altematively excavate slit trench only to first frame level.
2. Place each leg in excavation and assemble the frame. Connect hydraulics and pump frame out to correct dimension. Remove hydraulics.
3. Using the frame and excavated face as a guide, place sheets and using the relevant drive cap drive with excavator bucket as far as possible.
4. Connect restraint chains as per scheme drawing.
5. Connect hydraulics and individually pressurise all frame ram units to 2500 p.s.i., close lock-off valves and remove hydraulics.
6. Dig through to next frame position and push sheets down.
7. Reposition restraint chains as necessary.
8. Place legs of second frame in excavation and assemble (safe working must be maintained).
9. Attach restraint chains between second frame and the top of the sheets/piling.
10. Connect hydraulics and individually pressurise all lower frame ram units, close lock-off valves and remove hydraulics.
11. Push sheets down to give "toe-in" required and complete dig.

NOTE: This method requires operatives working in the excavation and the contractor must ensure safe working conditions at all times.

Removal of Frames

Backfill to the underside of the lowest frame and cany out any compaction required. Ensure frame is securely packed or supported from below. Connect hydraulics and individually open lock-off valves (max 2 turns) and fully retract all lower frame ram units. Remove restraint chains. Remove pins, attach lifting sling to lifting eyes and lift each leg one at a time from excavation. Follow the above procedure for the upper frame.

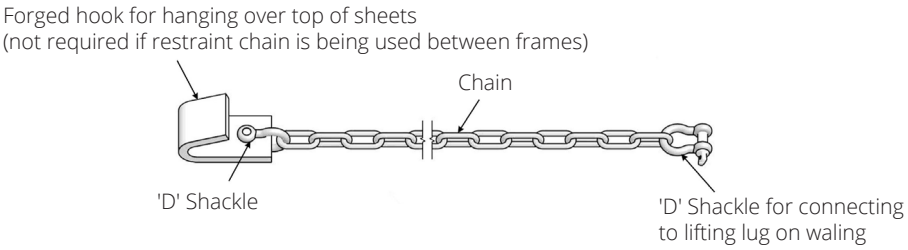
When the frames have been removed and the excavation backfilled, the sheets can be removed, one at a time using a trench sheet extractor.

Use of Restraint Chains Capacity 2.0T*

Restraint chains are provided as a back-up support arrangement in the unlikely event of hydraulic failure of one of the Double Acting Manhole Brace hydraulic legs. They are NOT to be used for any other purposes and particularly, are NOT to be used as lifting chains. They are NOT intended as a means of suspension to be relied upon during installation of removal of the frames.

Always ensure all the restraint chains are fitted as per arrangement shown on the scheme drawing, or if no scheme has been prepared 1 no chain every 2.5m approx of waling. Remove as much slack as possible from the chain by repositioning the lower 'D' shackle.

Users must ensure that frames are securely supported by means other than the restraint chains prior to depressurising the frames.



NOTE: When used with **S???** / L8 sheets, Restraint Chain capacity reduces to 1000 kg.

Standard Frame Dimensions and Weights

Frame	Clear Internal Dimensions (mm)		Sheet to Sheet Dimensions (mm)		Frame Weight (kg)
	Min	Max	Min	Max	
A	1320	1920	1600	2200	500
B	1820	2720	2100	3000	380
C	2420	3920	2700	4200	1004
D	3340	5720	3700	6000	1720
E	5746	8846	6347	9447	5200

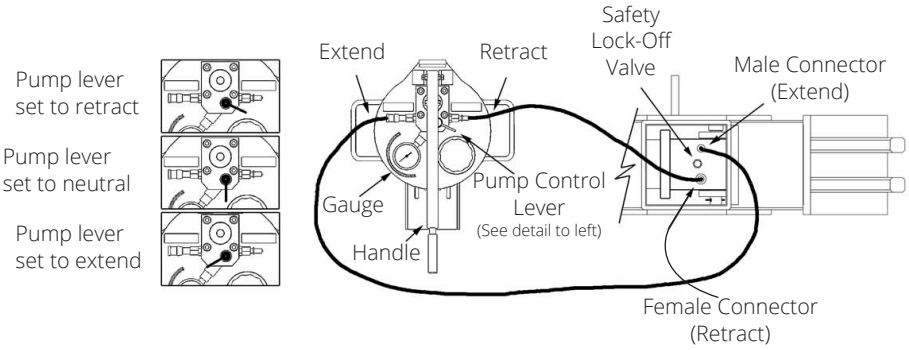
Notes:

1. The clear internal dimensions tabulated do not include any allowance for deflection of the walings under load.
2. Double Acting Manhole Brace rectangular frames can also be assembled e.g. 2no E legs plus 2no D legs.

Mechanical Pump Details and General Guidance

Introduction

It is advisable before commencing installation to read the notes below to become familiar with the procedures involved. The diagram below shows the pump control lever, gauge, hose connections and safety lock-off valve referred to in the procedures.



Preliminaries

- Check there is sufficient of the correct shoring fluid in the tank. Only Generation UK shoring fluid should be used.
- Set the pump control lever to "Neutral".
- Purge the hoses of air. To do this, connect the hoses together and pump for several strokes with the pump control lever set to "Extend". When satisfied that any air has been expelled, set the pump control valve to "Neutral".

Shoring Fluid

The pump is normally supplied with a full tank of pre-mixed fluid. If the fluid is separately supplied ·near in 5 litre orange coloured containers, it should be poured into the pump and cold, clean water added according to prevailing temperature conditions. (See the table).

Temp Range (°C)	Shoring Fluid (Litres)	Water (Litres)
Above 0	5	20
-6 ro 0	10	20
-10 to -7	15	15
-10 and below	Neat Only	-

Protective gloves should always be worn when handling shoring fluid.

NOTE: A Shoring Fluid safety data sheet is available on request from Generation UK

Mechanical Pump Details and General Guidance

Procedure for extending walings to predetermined lengths - or pressurising a frame

- Ensure each waling is set up level and safely on packs just clear of the ground so that it will be free to extend.
- Connect both hoses as per the diagram.
- Set the pump control lever to 'Extend'.
- Ensure that the safety lock-off valve on the ram is open by turning anti-clockwise no more than 2 turns.
- Pump to required size. If the ram does not move, refer to fault finding (Section 13.6). If necessary, the frame can also be pressurised by continuing to pump. The pump will develop a pressure of 2500 p.s.i. before cutting out, corresponding to a load of about 6 tonnes.
- Close safety lock-off valve with tool provided - hand pressure is sufficient.
- Move pump control lever between extend and retract a few times. This relieves pressure on the couplers and allows easy removal and replacement of the hoses.
- Remove hoses and repeat the above steps for each waling of the frame in turn.

Procedure for releasing walings and retraction

- Ensure the waling is secured against dropping before setting about releasing.
- Set the pump control lever to "Neutral".
- Connect the pump hoses to the ram unit of the waling.
- Slowly open the safety lock-off valve, release the hydraulic fluid pressure and fluid will flow back through the pump.
- To release frames, it will be necessary to retract the walings in tum by setting the pump control valve to 'Retract' and operating the pump until it is fully retracted.
- On completion of retraction, set the pump control valve to "Neutral".
- Close lock-off valve in ram unit and disconnect pump hoses from the ram.

Fault Finding

In the event of the frames not extending or retracting when pumped, check the following points:

- Pump is adequately filled with shoring fluid
- Pump Control Lever is in the correct position for required operation
- Both hoses are connected - double check connections to the couplers on the rams
- Safety lock-off valve is open (rotated anti-clockwise - max. 2 tums)
- Frame is not heavily loaded
- If the frame still does not move, there may be air in the system which may be indicated by the ram springing back, this must be purged as follows:
- To purge pump - disconnect hoses from ram and connect hose ends together. Pump for several strokes until fluid can be heard returning to the tank. Repeat with lever in opposite position.
- To purge ram - connect hoses and pump ram to full extension. Reverse lever and pump until fully closed. Repeat until there is no sign of ram springing back. If ram still does not function, refer to your nearest depot.

Do's and Don'ts

Do

- Install the legs of each frame one at a time
- Install frames as level as possible
- Use restraint chains between each frame to the top of the sheets
- Ensure the lock-off valves are open prior to pumping
- Ensure that the pressure is being held on the rams before closing the lock-off valves
- Release the pump pressure after closing the lock-off valves to ease removal of hoses
- Keep the couplers of the hoses dirt free by clipping male and female ends together after use

Don't

- Attempt to install or remove by lifting complete frames
- Over pressurise the system as this can damage the rails
- Pressurise a frame with a large gap between the rails and the sheets. A packer must be inserted to fill the gap first
- Attempt to disconnect a hose until the lock-off valve has been fully closed, and pressure has been released at the pump
- Release the ram pressure by depressing or striking the coupler nipple
- Use restraint chains as a means of suspension during installation or removal of the frames

Notes

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