

PRODUCT USER GUIDE

MULTIBRACE



Introduction

This booklet is intended to provide basic information for users of the Mabey Hire Pty., Multibrace system and to draw the client's attention to the practical aspects of Multibrace assembly, installation and removal which need to be considered when compiling method statements, risk assessments and safe system of works. It is assumed that clients are familiar with general safe practices applicable to this type of work.

The Multibrace system is intended to be used as a temporary waling system to sheeted excavations. The frames have 4-way hydraulic adjustment. It is not intended for other purposes.

The Multibrace system is frequently used in conjunction with Mabey Hire Pty., Super Shaftbrace waling systems and Mechanical Bracing Strut. Details of the other systems can be found in the dedicated user guide for that product.

It is advisable, before commencing installation, to read the notes below and to become familiar with the procedures involved when using Multibrace.

Multibrace should not be used in seawater applications without prior consultation with the Mabey Hire Pty., Engineering Department.

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 the typical installation of Bracing. 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,

All hire for this equipment will usually be accompanied by a general arrangement or scheme specific drawing. This must be read in conjunction with these instructions.

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Contents

1. General Guidance Notes	3
▶ Safe System of Work and Method Statement	3
▶ Access, Hard standing Areas, and Site Storage	3
▶ Personnel	3
▶ Plant and Lifting Equipment	3
▶ Sling Warning	3
▶ Small Plant, Tools, and Lifting Chains	3
▶ Access & Egress and Edge Protection	3
▶ During Installation Works	3
▶ After Installation Works	3
▶ Return of Equipment Off-Hire	3
2. Component Identification	4
▶ RAM Unit Assembly	4
▶ Intermediate Extension Units	4
▶ Multibrace Accessories	4
3. Connection Details and Site Assembly	5
▶ Frame Dimensions and Weights	5
▶ Waling Assembly Details	6
▶ Site Connections Details	6
4. Installation and removal Details	7
▶ Excavator Lifting Requirements	7
▶ Mabey Hire Pty Shoring Fluid	7
▶ Typical Sequence of Sheet and Frame Installation Procedure	7
▶ Details and Procedures for Extending /Retracting Walings	9
▶ Use of Restraint chains – Capacity 3.2 Tonne	11
▶ Installation - Points to watch	11
▶ Removal of Frames	12
5. General	12
▶ Basic Maintenance	12
▶ Do's & Don'ts	12

1. General Guidance notes

Safe System of Work

Assuming that the appropriate Multibrace has been selected for use, the Health and Safety at Work Act requires that a safe system of work is adopted to carry out the works on site. These guidance notes are intended to draw the client's attention to practical aspects of Mabey Hire Pty., range of Multibrace components during use and basic maintenance which need to be considered when completing method statements for a safe system of work.

In particular, the client's attention is drawn to the size and weights of components and the need for planning the lifting operations involved.

Access, Hard standing Areas and Site Storage

- Suitable firm, level, dry areas should be made available on site for storage and pre-assembly work.
- Suitable lifting equipment of adequate capacity should be provided for off-loading and installation.
- Slings should always be carried out by suitably experienced and competent personnel.
- The weights of components and assemblies are given in this guide.
- All components should be stored in single layers wherever possible. If space does not permit this, walings should be stacked on 3" x 4" timbers in rows of 4no wide and a maximum height of 3no rows.
- Smaller components should always be stored in skips/bins.

Personnel

The Management of Health and Safety at Work Regulations require that personnel deployed are suitably trained, experienced, and supervised by a competent person.

The main activities associated with Multibrace use are:

- Unloading the delivery vehicle.
- Slings and lifting the Multibrace into position in the excavation and connecting the corners to form frames.
- Connecting the pump to each waling in turn, pressurising the frames
- Fitting restraint chains.

Plant and Lifting Equipment

A suitable appliance is required for off-loading, installation, and re-loading of equipment, together with lifting chains, available from Mabey Hire Pty Ltd., of suitable length and capacity and with current certification.

WARNINGS:

- All major components of the range of Multibrace are fitted with lifting lugs for safe slinging.
- All equipment must be disassembled prior to lifting.
- If Multibrace components are to be lifted in or around an excavation, the appliance should be located at a safe distance from the edge of the excavation and the lifts and radii checked against the safe lifting capacities of the appliance.

- A surcharge for the appliance must have been allowed for in the excavation brief / design.
- No more than one assembled component must be lifted into or out of position at a time.

Sling Warning

If a sling is to be used on an excavator, be aware of the following:

- It is very important that a means of allowing the sling to swivel be introduced above the master (top) ring. This will allow the sling, and in particular the master ring, to turn and align with the load.
- Without a swivel arrangement, the load may severely twist the master ring, resulting in damage or failure.
- All lifting accessories attached to the excavator lifting point must hang freely and be free to move at all times.
- Tilting the head of the dipper arm / quick hitch upwards may prevent freedom of movement and so twist, damage or fail the lifting equipment.

Small Plant, Tools and Lifting Chains

- Suitable battery or petrol pump will be provided to extend and retract the hydraulic extension.
- A sledgehammer for making pinned connections. (Not in Mabey Hire Ltd supply).
- Podgers/spanners for making bolted connections. (Not in Mabey Hire Ltd supply).
- Lifting chains of suitable length and capacity and with current certification. Multibrace walings have lifting lugs designed to take size 10 hooks.

Access & Egress and Edge Protection

- Install the edge protection as soon as possible before entry into the excavation.
- A competent person should inspect the means of access and egress regularly.

During Installation Works

- Check that all bolted connections remain tight.
- Check that all pinned connections are intact and complete with an 'R' clip, where required.
- Avoid striking equipment or loading it inappropriately.

After Installation Works

Each excavation must be inspected daily before personnel begin work.

Return of Equipment Off-Hire

- Clients should ensure that on removal, the equipment is returned clean and assembled as supplied.
- Ensure all equipment is loaded to the satisfaction of the vehicle driver and is securely restrained to the vehicle bed.

2. Component Identification

2.1 Ram Unit Assembly



2.2 Intermediate Extension Units

Gr.	Code	Length 'L' (mm)	Weight (kg)
Standard	MBRACE-015	750	90
	MBRACE-010	1325	216
	MBRACE-011	1700	256
	MBRACE-012	2550	347
	MBRACE-013	3400	438
	MBRACE-014	4250	531



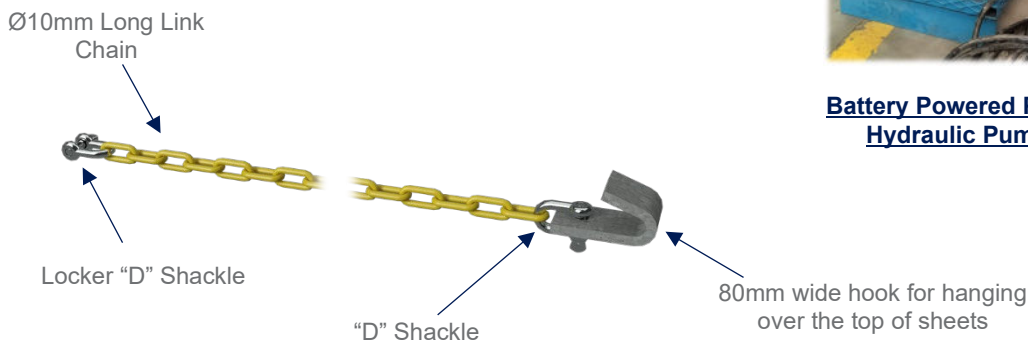
Intermediate Extension Unit
Intermediate Extension Units are made from:
254 x 254 x 107 kg/m UC

2.3 Multibrace Accessories

- Installation Kit:
 - Battery Pump (Weight: 75 kg Full)
- Ø48mm Bailey Pin and 'R' Clip
- Restraint Chains



**Battery Powered Pump
Hydraulic Pump**



Restraint Chains

Length: 3300 mm Capacity: 3200 kg
Weight: 12 kg

3. Connection Details and Site Assembly

3.1 Frame Dimensions and Weights



Strength / Allowable Loads

Mabey Hire Pty., offers a design service and can, on request, also provide information on the strength capacities of Multibrace products for clients undertaking their own designs. If Mabey Hire Pty have designed the sheeting and frame arrangement for the excavation, ground data provided by the client will of been used.

The Multibrace 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.

Standard Leg Arrangement	Clear Internal Dim's (mm)				Sheet to Sheet Dim's (mm)		Leg Wt. (kg)
	Between Waling Flanges		Between Waling Joints				
	Min.	Max.	Min.	Max.	Min.	Max.	
RAM UNIT - MBRACE-001	1990	2990	N/A	N/A	2525	3525	646
RAM UNIT + 0.75 EXT	2740	3740	2625	3625	3275	4275	805
RAM UNIT + 1.32 EXT	3315	4315	3200	4200	3850	4850	908
RAM UNIT + 1.7 EXT	3690	4690	3575	4575	4225	5225	958
RAM UNIT + 2.55 EXT	4540	5540	4425	5425	5075	6075	1075
RAM UNIT + 3.4 EXT	5390	6390	5275	6275	5925	6925	1188
RAM UNIT + 4.25 EXT	6240	7240	6125	7125	6775	7775	1302
RAM UNIT + 3.4 EXT + 1.32 EXT	6715	7715	6600	7600	7250	8250	1442
RAM UNIT + 4.25 EXT + 1.32 EXT	7565	8565	7450	8450	8100	9100	1562
RAM UNIT + 4.25 EXT + 1.7 EXT	7940	8940	7825	8825	8475	9475	1612
RAM UNIT + 4.25 EXT + 2.55 EXT	8790	9790	8675	9675	9325	10325	1724
RAM UNIT + 3.4 EXT + 3.4 EXT	8790	9790	8675	9675	9325	10325	1520

NOTES:

- The clear internal dimensions tabulated do not include any allowance for deflection of the walings under load.
- A deflection allowance should be added to the clear internal dimensions given. Clear internal dimensions should be reduced by: rail length (mm) / 30. E.g., For a 7000mm pin to pin long rail, the clear dimension should be reduced by: 7000 / 30 = 233 mm i.e. 117mm per rail (based on maximum load).
- Allowance should also be made for the depth of sheeting to work out the complete excavation size.

3.2 Waling Assembly Details

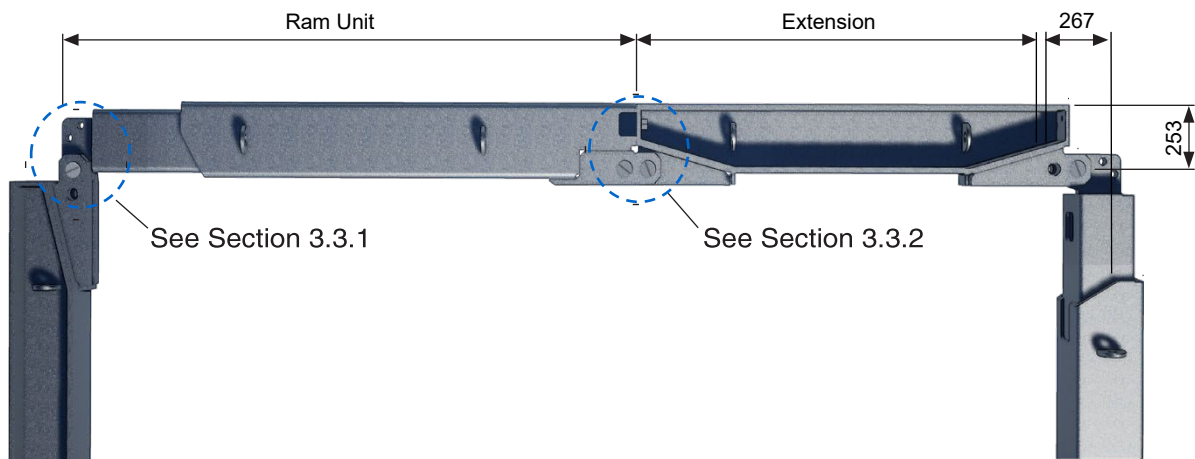
The legs of the brace are made to the correct length range where possible prior to delivery, so that only the corners need to be connected, using Bailey Pins and 'R' Clips. The lug is a close fit to the clevis, so the legs should be as level as possible during assembly to make it easier to insert the pin and assemble the joint.

It is worth spending some time on levelling the ground on which the frame is to be assembled. If the legs have to be altered to another range on site, i.e. by adding or removing an extension section, the intermediate connection detail is used. This consists of 2no Bailey Pins and 'R' Clips and 2no M24 bolts, for which a 36mm A/F spanner is required.

IMPORTANT NOTES:

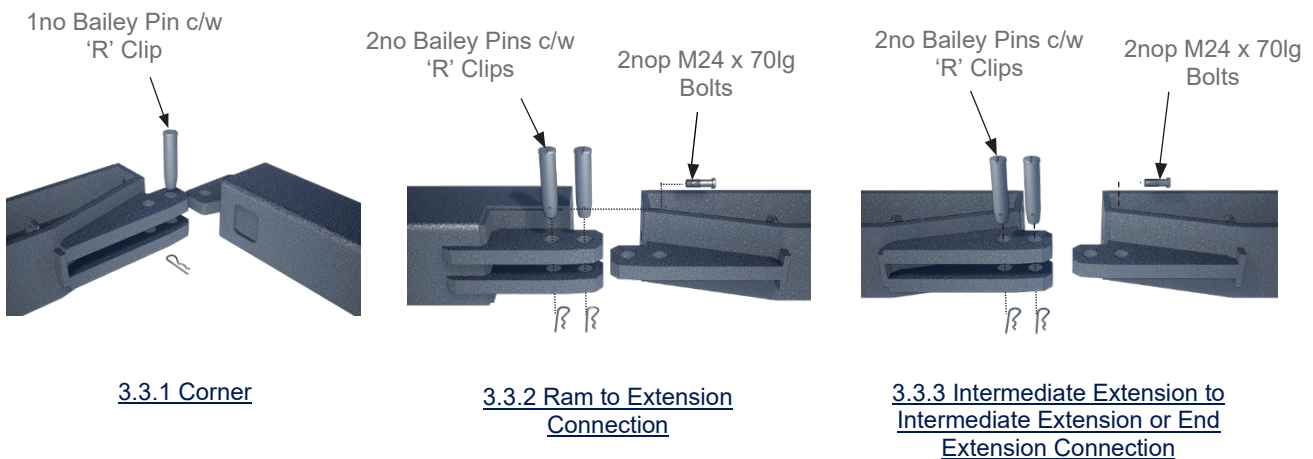
Before lifting each leg into the excavation:

- Ensure that 2no Bailey Pins are always fitted at each extension to extension and ram to extension connection.
- Ensure that the correct bolt sizes are fitted and that bolts are fully tightened.



3.3 Site Connection Details

Extensions are normally attached where possible prior to delivery, but to suit site conditions the extensions can be changed by unbolting the 2no M24 bolts and removing the 2no Bailey Pins. The leg building process is substantially eased if the components are laid with the connecting lugs upwards.



4. Installation and Removal Details

4.1 Excavator Lifting Requirements

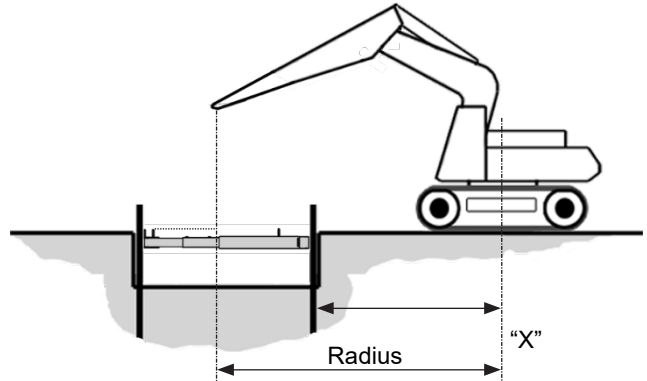
'X' = Dimensions from the rear face of the excavation to the centre line of the lifting appliance (excavator/crane) when standing at a safe distance from the excavation.

Multibrace equipment is not intended to be installed or removed in complete frames. It is only to be installed as described below, i.e. one leg at a time.

Maximum Lift Weight = Leg Weight + Weight of Chains

Required Radius = $\frac{1}{2}$ Length of Leg + 'X'

Refer to Lifting Appliance manufacturer for machine load and capacity.



4.2 Mabey Hire Ltd Shoring Fluid

The pump is normally supplied with a full tank of pre-mixed shoring fluid. If the shoring fluid is separately supplied 'neat' in 5 litre containers, it should be poured into the pump and cold clean water added according to the prevailing weather conditions (see table to the right). Protective gloves should always be worn when handling shoring fluid.

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

NOTE: A shoring fluid safety data sheet is available on request.

4.3 Typical Sequence of Sheet and Frame Installation Procedure

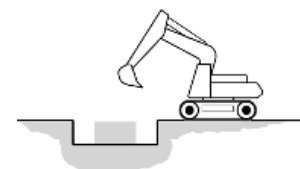


WARNING Refer to safety information in Sections 3.4 and 3.5 regarding excavators being used for lifting operations.

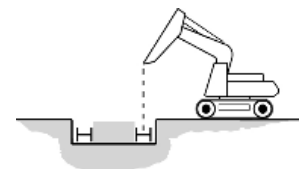
► Method 1 (Dig and Push)

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

1. Fully excavate to first frame level.
- 1b. Alternatively 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.



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.

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 1000 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 the excavation and assemble (safe working conditions must be maintained).
9. Attach restraint chains between the second frame and the top of the sheets/piling.
10. Connect hydraulics and individually pressurise all lower frame ram units to 1000 p.s.i., close lock off valves and remove hydraulics.
11. Push sheets down to give 'toe-in' required and complete the dig.

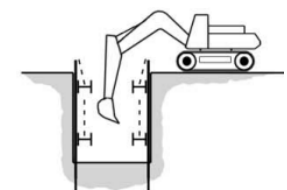
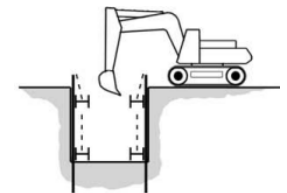
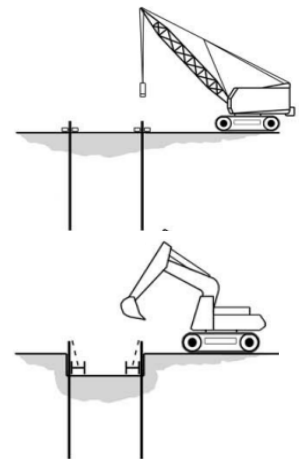
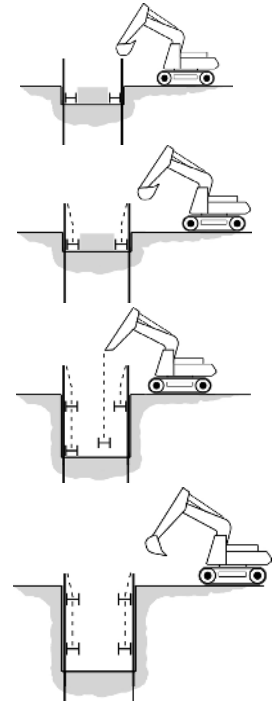
NOTES: This method requires operatives working in the excavation and the contractor must ensure safe working conditions at all times.

► **Method 2 (Pre-driven sheets)**

Installation of 2 frames by fully driving sheets/piling with a piling hammer.

1. Fully drive sheets/piling using a piling guide.
2. Remove piling guide and excavate to first frame level.
3. Place each leg into the excavation and assemble the frame.
4. Connect restraint chains as per scheme drawing.
5. Connect hydraulics and individually pressurise all ram units to 1000psi., close lock off valves and remove hydraulics.
6. Dig through to next frame position.
7. Weld angle brackets to the piling, if required, to support the frame.
8. Place legs of second frame in the excavation and assemble (safe working conditions must be maintained).
9. Attach restraint chains between the second frame and the top of the sheets/piling.
10. Connect hydraulics and individually pressurise all lower frame ram units to 1000 p.s.i., close lock off valves and remove hydraulics.
11. Complete the dig.

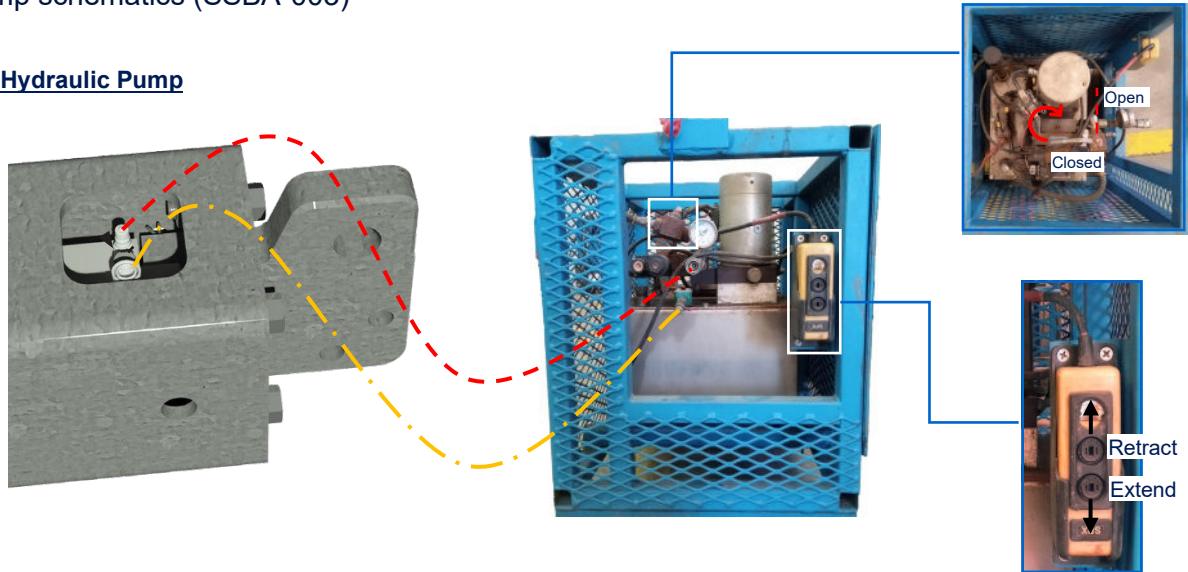
NOTES: This method requires operatives working in the excavation and the contractor must ensure safe working conditions at all times.



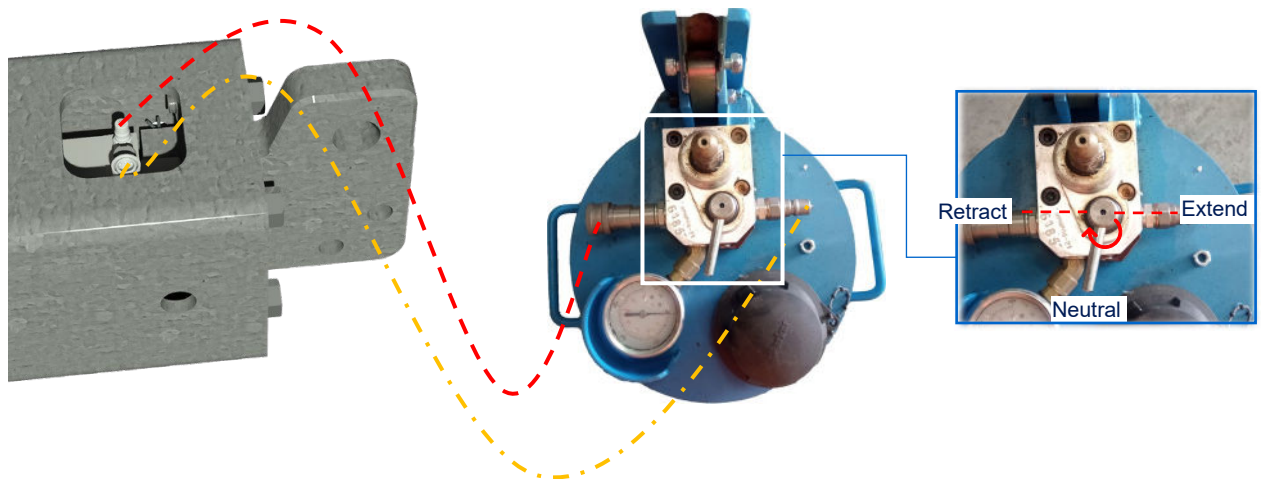
4.4 Details and Procedures for Extending/Retracting Walings

4.4.1 Pump schematics (SSBA-003)

Hydraulic Pump



Air/ Manual Pump



4.4.2 Preliminaries

- Check there is a sufficient amount of the correct concentration of Mabey Hire Ltd. shoring fluid in the tank. Only Mabey Hire Ltd. shoring fluid is allowed to be used, refer to Section 4.2 for information relating to Mabey shoring fluid.
- Set the pump control valve to 'Neutral'.
- Purge the hoses of air. To do this, connect the hoses together and run the pump for a few seconds with the control valve set to 'Extend'. When satisfied that all, if any, air has been expelled, set the pump control valve to 'Neutral'.
- At no time must the pump be left operating whilst unattended.

4.4.3 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.
- Set the pump control valve to 'Neutral'.
- Connect both hoses as per the diagram.

- Open the lock off valve on the ram by rotating anti-clockwise.
- Set the pump control lever to 'Extend' and press the extend button on control device.
- Watch the ram unit extend to the required length.
- Shut down the pump by letting go the button.
- Close the lock off valve on the ram by rotating clockwise.
- Set the pump control valve to 'Neutral'.
- Remove hoses and repeat the above steps for each waling of the frame in turn.

4.4.4 Procedure for extending and pressurising walings of a previously installed frame against the sheets of an excavation

- Ensure all restraint chains are in place and the frame is level.
- Set the pump control valve to 'Neutral'.
- Connect the pump hose to the ram unit of the first waling.
- Open the lock off valve by rotating anti-clockwise.
- Set the pump control valve to 'Extend' and press the external button on control device.
- Watch the waling extend until the pump pressure gauge starts rising, indicating that the frame is beginning to push against the sheets.
- Allow the pressure to build up to 1000 p.s.i. corresponding to a waling load of approximately 6 tonnes.
- Shut down the pump by letting go off the button, and check the hydraulic pressure is being maintained on the pump pressure gauge.

NOTE: DO NOT MOVE THE PUMP CONTROL VALVE TO NEUTRAL AT THIS STAGE AS THIS WILL SIMPLY RELEASE THE PRESSURE.

- Close the lock off valve by rotating clockwise.
- Set the pump control valve to 'Neutral'.
- Disconnect the pump hoses from the ram unit.
- Repeat the above steps for each waling of the frame in turn.

4.4.5 Procedure for releasing walings and retraction

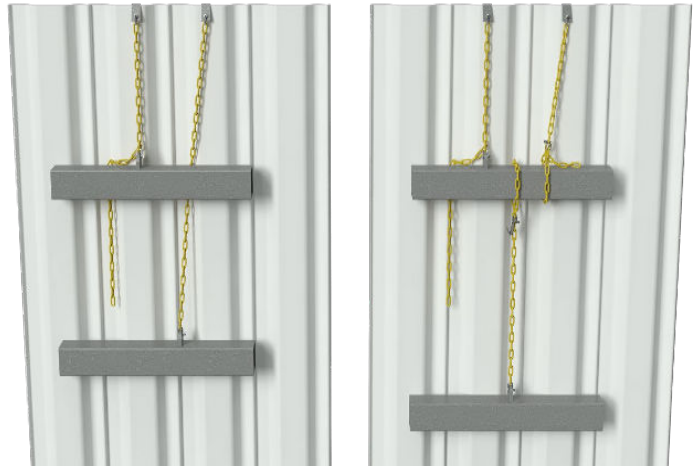
- Ensure the waling is secured against dropping before setting about releasing.
- Set the pump control valve to 'Neutral'.
- Connect the pump hoses to the ram unit of the waling.
- Slowly open the safety lock off valve (max 2 turns), release the hydraulic fluid pressure and fluid will flow back through the pump.
- To release frames, it will be necessary to retract the walings in turn by setting the pump control valve to 'Retract' and pressing return on control device 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.

4.5 Use of Restraint Chains - Capacity 3.2 Tonne*

Restraint chains are provided as a back-up support arrangement in the unlikely event of hydraulic failure of one of the Multibrace 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 to be a mean of suspension to be relied upon during installation or removal of the frames.

Always ensure all the restraint chains are fitted as per the arrangement shown on the scheme drawing, or if no scheme has been prepared install 1no chain every 2.5m of waling (approximately). 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.



Restraint Chains Installed on Both Frames Separately

Alternative Option - Chains Wrapped Around Top Frame



NOTE: Reduces chain capacity

IMPORTANT NOTES:



- Chains can be linked together for greater length, ensure appropriate connections are used.
- If long chains are undesirable, refer to the Alternative Option shown above and link to bottom hanging points (if available) or else wrap the chains. **CAUTION** that this reduces the effective strength of the chain. Contact Mabey Hire Pty. for more information.
- Ensure all levels of hanging chains are able to take the full burden of any levels of frames hung below.

4.6 Installation - Points to Watch

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.
- Lock off valve is open (rotated anti-clockwise - max. 2 turns)
- 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:

- PURGE AIR FROM THE HOSES - 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.
- PURGE AIR FROM THE 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.

4.7 Removal of Frames

- Backfill to the underside of the lowest frame and carry out any compaction required. Ensure frame is securely packed or supported from below.
- Refer to Section 4.4.5 for the procedure for retracting the legs.
- Remove restraint chains.
- Remove corner 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.

5. General

Basic Maintenance

- ▶ Regularly check that all pins are secured in place and complete with 'R' clip.
- ▶ Replace damaged components.
- ▶ Remove debris from hydraulic legs.
- ▶ Ensure couplers of the hydraulic hoses are dirt free by clipping male and female ends together after use.
- ▶ Ensure there is always sufficient amount of shoring fluid in the pump tank.
- ▶ Always use the correct concentration of Mabey shoring fluid only.
- ▶ When not in use, ensure the hydraulic legs are fully retracted and stored as Section 4.4.5.

IMPORTANT NOTE: Failure to observe the following points could result in serious bodily injury.

Do's and Don'ts

- ▶ DO install the legs of each frame one at a time.
- ▶ DO install frames as level as possible.
- ▶ DO use restraint chains between each frame to the top of the sheets.
- ▶ DO ensure the lock off valves are open prior to pumping.
- ▶ DO ensure that the pressure is being held on the rams before closing the lock off valves.
- ▶ DO release the pump pressure after closing the lock off valves to ease removal of hoses.
- ▶ DO keep the couplers of the hoses dirt free by clipping male and female ends together after use.
- ▶ Do NOT attempt to install or remove by lifting complete frames.
- ▶ Do NOT over pressurise the system as this can damage the rails.
- ▶ Do NOT pressurise a frame with a large gap between the rails and the sheets. A packer must be inserted to fill the gap first.
- ▶ Do NOT attempt to disconnect a hose until the lock off valve has been fully closed, and pressure has been released at the pump.
- ▶ Do NOT release the ram pressure by depressing or striking the coupler nipple.
- ▶ Do NOT use restraint chains as a means of suspension during installation or removal of the frames.

Since our policy is one of continual improvement, components may vary in detail from the descriptions given in this publication.

While information in this Guide is correct at time of printing, product specifications and product availability are subject to change without further notice. Please visit our website for the most up to date information. Job site photos are strictly intended for general product illustration only and may not comply with all applicable safety standards or site requirements. Specification data has been taken from manufacturers' serialised specific tabulated data.

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