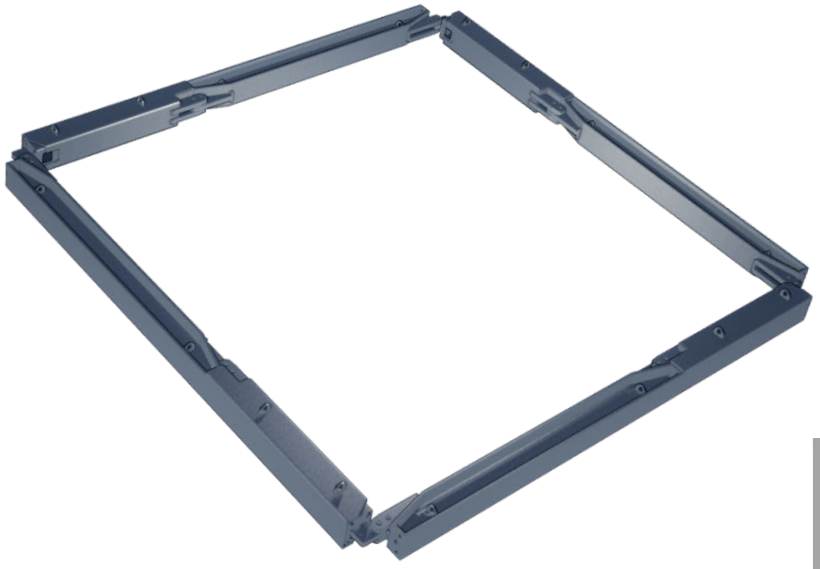
PRODUCT USER GUIDE

SUPER SHAFTBRACE



Use in combination with

- Shaftbrace waling system
- Supershaft Plus waling system
- Hydraulic Bracing Strut
- Mechanical Bracing Strut

Introduction

Mabey Hire Pty, Super Shaftbrace system is intended to be used as a temporary waling system to sheeted excavations. It is not intended for other purposes.

Mabey Hire Pty, offer a design service and can, on request, also provide information on the strength capacities of Super Shaftbrace products for clients undertaking their own designs.

This booklet gives information for frame dimensions for Super Shaftbrace Walings. When Super Shaftbrace is used in combination with Shaftbrace or Supershaft Plus consult Mabey Hire staff for frame dimensions. For details of these waling systems and bracing struts within Mabey Hire Pty range, refer to the appropriate set of user information.

No information on design is 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 Super Shaftbrace products.

This booklet provides basic information for users of Super Shaftbrace to assist them in their preparation of a safe system of work on site. Super Shaftbrace should NOT be used in seawater applications without prior consultation with Mabey Hire Pty.

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 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,

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

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1. General Guidance notes

Safe System of Work

Assuming that the location, plan size and depth of an excavation, together with an arrangement of sheets and frames has already been determined, the Health and Safety at Work Act requires that a safe system of work is adopted to carry out the work on site.

These guidance notes are intended to draw the client's attention to practical aspects of Super Shaftbrace installation which need to be considered in compiling method statements for a safe system of work.

In particular, the client's attention is drawn to the lengths and weights of the frame members 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.
- Slinging should always be carried out by suitably experienced and competent personnel.
- The weights of components and assemblies are given in this guide.
- Smaller components should always be stored in skips/bins.

Personnel

The Health and Safety legislation requires that personnel deployed are suitably trained and experienced and supervised by a competent person. The main activities associated with Super Shaftbrace installation are:

- Unloading the delivery vehicle.
- Bolting up and pinning steelwork together to form walings of the required length.
- Slinging and lifting walings into position in the excavation and connecting the corners to form frames.
- Connecting the pump to each waling in turn, pressurising the frames and fitting restraint chains.

Plant and Lifting Equipment

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 the walings are to be lifted into the excavation, then the appliance should be located 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 excavator must have been allowed for in the excavation brief/ design.
- In this booklet 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.

- No more than one assembled component must be lifted into or out of position at a time.

Small Plant, Tools and Lifting Chains

Essential equipment required is:

- Suitable battery or petrol ump will be provided to extend and retract the hydraulic extension.
- Sledgehammers for making pinned connections.
- Podgers/spanners for making bolted connections. (Bolt sizes are M24 for walings).
- Lifting chains of suitable length and capacity and with current certification. The walings have lifting lugs designed to take 10mm safety hooks.

In most cases the centre of gravity of the lifts involved will not be at mid-length so shortening clutches are advisable. Mabey Hire Pty, offer sets of 2 leg chains for hire - though clients should check that the leg length is suitable to use with their lifting appliance.

Access & Egress and Edge Protection

- Edge protection, ladders and possibly other provisions to provide safe access into and out of the excavation (Edge Protection and Ladder Access Platforms can be supplied by Mabey Hire Pty).

During Installation Works

- If Mabey Hire Pty., 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 Installation Works

- Plan for edge protection to be installed as early as possible. Regularly inspect the excavation for signs of excessive movements of sheets or walings. Check the hydraulic walings 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 assembled as supplied.
- Ensure all equipment is loaded to the satisfaction of the vehicle driver and is securely restrained to the vehicle bed.

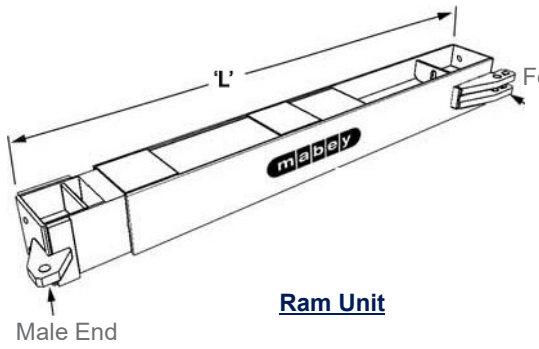
2. Component Identification

2.1 Ram Unit Assembly

Hydraulic Adjustments

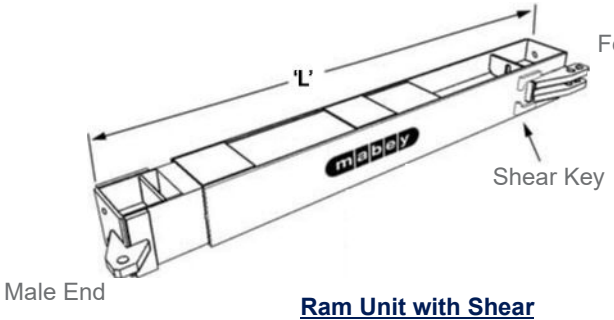
The Super Shaftbrace system incorporates a hydraulic system of adjustment which is designed to extend or retract the frames under conditions of no or low loading: e.g. as when first installed or as they become redundant after backfilling the excavation.

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.



Ram Unit

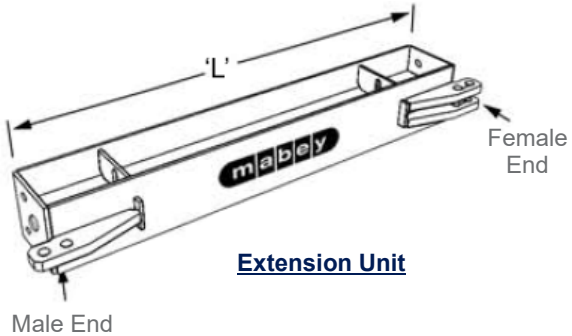
Ram Unit				
Type	Code	Length 'L' (mm)		Weight (kg)
		Min.	Max.	
E	SSB-024	2000	2650	860
D	SSB-010	3000	4000	1123
A	SSB-001	6400	7400	1742
B	SSB-002	8950	9950	2202
C	SSB-003	10650	11650	2538



Ram Unit with Shear Keys

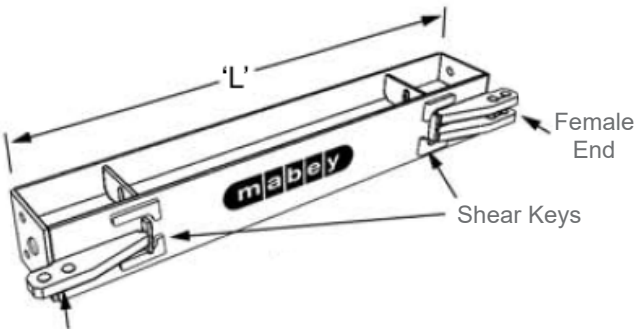
Ram Unit with Shear Keys			
Code	Length 'L' (mm)		Weight (kg)
	Min.	Max.	
SSB-010/SK	3000	4000	1133
SSB-001/SK	6400	7400	1752
SSB-002/SK	8950	9950	2212
SSB-002/SK/GR50	8950	9950	2405
SSB-003/SK/GR50	10650	11650	2765

2.2 Intermediate Extension Units



Extension Unit

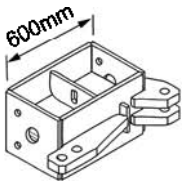
Intermediate Extension Unit		
Code	Length 'L' (mm)	Weight (kg)
SSB-004	850	261
SSB-004/GR50	850	281
SSB-011	1325	360
SSB-005	1700	431
SSB-006	2550	525
SSB-007	3400	736
SSB-008	6800	1379
SSB-009	11050	2175



Extension Unit with Shear Keys

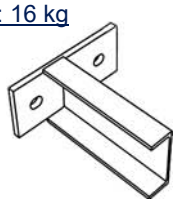
Intermediate Extension Unit with Shear Keys		
Code	**Length 'L' (mm)**	**Weight (kg)**
SSB-005/SKF	1700	441
SSB-006/SK	2550	545
SSB-006/SKM	2550	535
SSB-007/SK	3400	756
SSB-007/SK/GR50	3400	840
SSB-008/SK	6800	1399
SSB-008/SK/GR50	6800	1568
SSB-009/SK	11050	2195

2.3 Super Shaftbrace Accessories

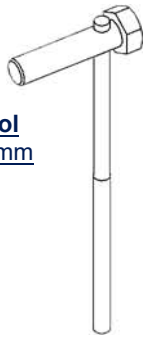


End Extension Unit
Weight: 210 kg

Corner Unit
Size: 330x175x450mm
Weight: 16 kg



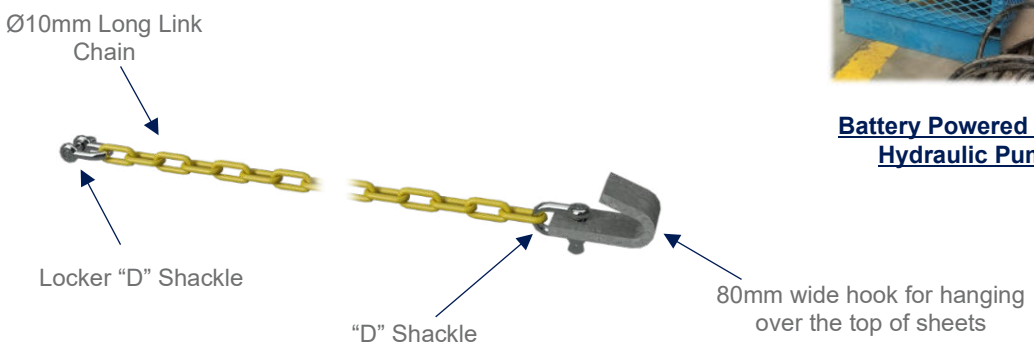
Pin Removal Tool
Size: 54x174x500mm
Weight: 3 kg



Installation Kit:

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

Battery Powered Pump
Hydraulic Pump



Restrain Chains

Length: 3300 mm
Weight: 12 kg
Capacity: 3200 kg
10mm Chain

3. Connection Details and Site Assembly

3.1 Frame Dimensions and Weights

Leg Arrangement	Clear Internal Dimensions (see notes below)				Corner Pin to Pin Dimension (mm)		Dimension to face of sheet (mm)		Approx. max. Deflec-tion per waling (mm)	Approx. Weight of one Leg (kg)
	Between Waling Flanges except at intermediate connection (mm)		Between Walings at intermediate connection (mm)							
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.		
SSB-024	2140	2790	N/A	N/A	2000	2650	2880	3530	40	897
SSB-024+ SSB-025	2740	3390	2460	3110	2600	3250	3480	4130	40	1107
SSB-010	3140	4140	N/A	N/A	3000	4000	3880	4880	40	1160
SSB-010+ SSB-004	3990	4990	3710	4710	3850	4850	4730	5730	40	1430
SSB-010+ SSB-005	4840	5840	4560	5560	4700	5700	5580	6580	40	1600
SSB-010+ SSB-006	5690	6690	5410	6410	5550	6550	6430	7430	40	1690
SSB-001	6540	7540	N/A	N/A	6400	7400	7280	8280	46	1780
SSB-001+ SSB-004	7390	8390	7110	8110	7250	8250	8130	9130	60	2040
SSB-001+ SSB-005	8240	9240	7960	8960	8100	9100	8980	9980	80	2200
SSB-002	9090	10090	N/A	N/A	8950	9950	9830	10830	93	2455
SSB-002+ SSB-004	9940	10940	9660	10660	9800	10800	10680	11680	107	2715
SSB-003	10790	11790	N/A	N/A	10650	11650	11530	12530	121	2790
SSB-003+ SSB-004	11640	12640	11360	12360	11500	12500	12380	13380	135	3050
SSB-003+ SSB-005	12490	13490	12210	13210	12350	13350	13230	14230	153	3230
SSB-003+ SSB-006	13340	14340	13060	14060	13200	14200	14080	15080	172	3370
SSB-003+ SSB-007	14190	15190	13910	14910	14050	15050	14930	15930	189	3530

NOTES:

- The clear internal dimensions tabulated do not include any allowance for deflection of the walings under load.
- These waling deflections are listed separately above and generally it will be necessary to increase the clear internal dimension by twice the appropriate waling deflection.
- Weights for legs using the type 'B' (SSB-002) and 'C' (SSB-003) ram units are based on the weight for the heavier U.C. 356x368x202kg/m in GR50 material.
- N/A = Not Applicable

3.2 Stackling and Handling

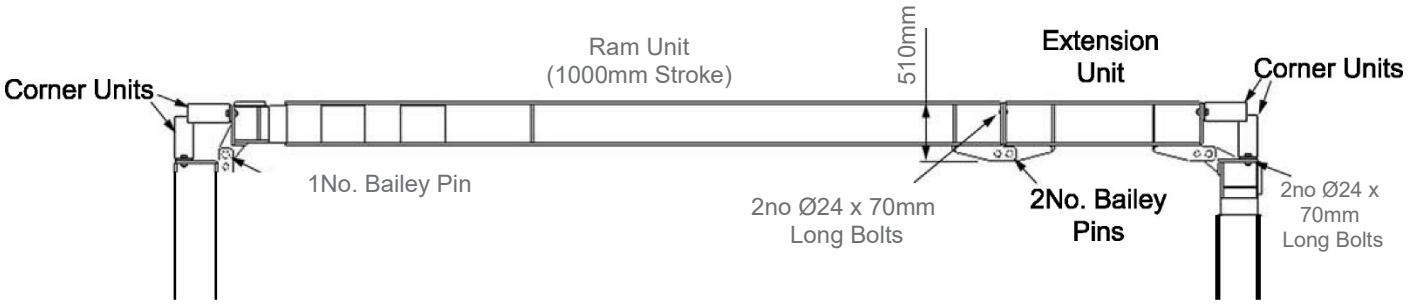
Suitable firm level dry areas should be made available on site for stacking and pre-assembly work.

Suitable lifting equipment of adequate capacity should be provided for off-loading, pre-assembly work, installation and dismantling. Slinging should always be carried out by suitably experienced and competent personnel. Weight of legs and other components are given in Section 7 and Section 12.

Return pre-assembled legs and struts as supplied.

Always stack all items in single layers wherever possible. If space does not permit this, walings should be stacked on 3" x 4" timbers in rows of 4no (max height 3 rows).

3.3 Typical Assembly



The legs of the brace are made to the correct length range where possible prior to delivery, so that only the corners and the corner units need be connected using Bailey pins, spring retention clips and bolts supplied.

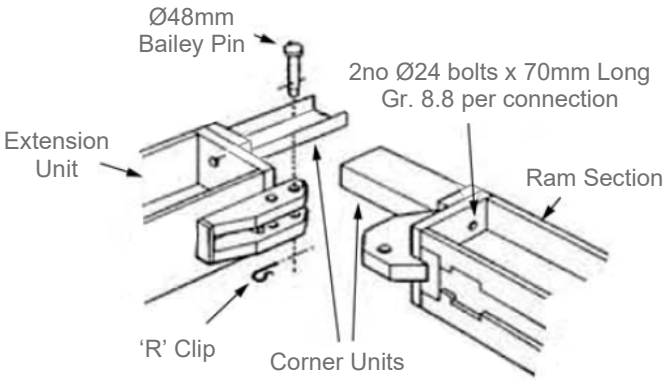
The lug is a close fit in the clevis, so that the legs should be as level as possible during assembly to make it easier to assemble the joint. It is worth spending some time on levelling the ground on which the frame is to be assembled. If the legs have to be altered to another range on site, i.e. by adding or removing an extension section, the intermediate connection detail is used. This consists of 2no Bailey pins and spring retention clips and 2no M24 bolts, for which a 36mm A/F spanner is required.

IMPORTANT: Before lifting each leg into the excavation:

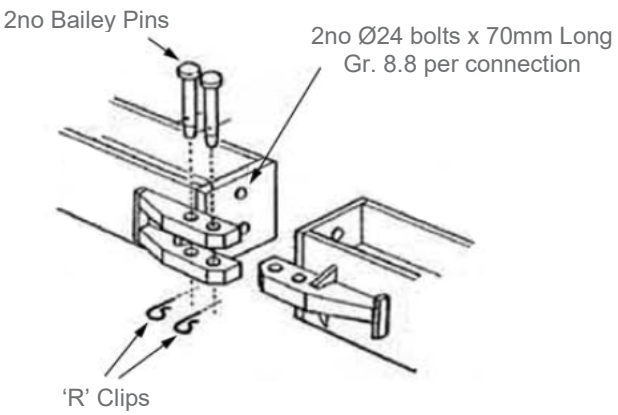
1. Ensure that 2no Bailey Pins are always fitted at each intermediate connection.
2. Ensure that the correct bolt sizes are fitted and that bolts are fully tightened.

3.4 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 bolts and removing the 2no Bailey pins.



Corner Connection

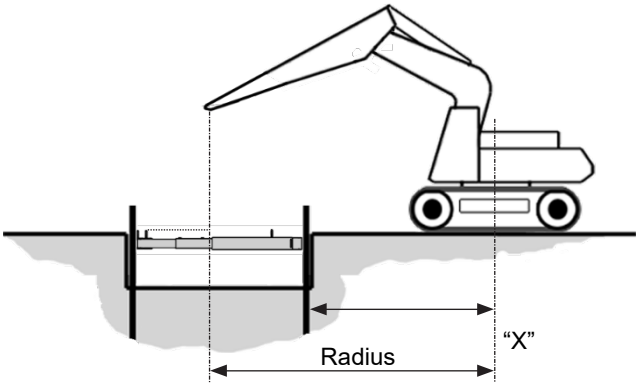


Extension Connection

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 = ½ 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

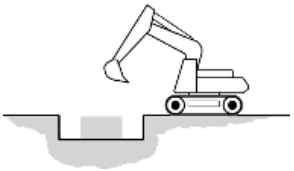
WARNING Refer to safety information in Sections 3.4 and 3.5 regarding excavators being used for lifting operations.

► Method 1 (Dig and Push)

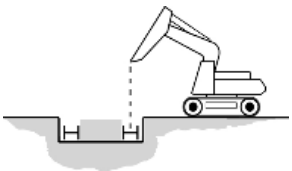
Installation of 2 frames by excavator, without piling hammer, placing one leg at a time.

1. Fully excavate to first frame level.

1b. Alternatively excavate slit trench only to first frame level.



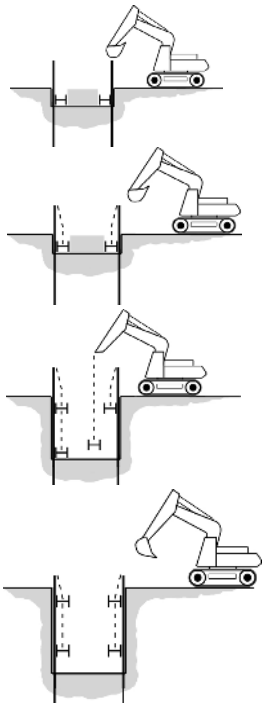
2. Place each leg in excavation and assemble the frame.
Connect hydraulics and pump frame out to correct dimension. Remove hydraulics.



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.

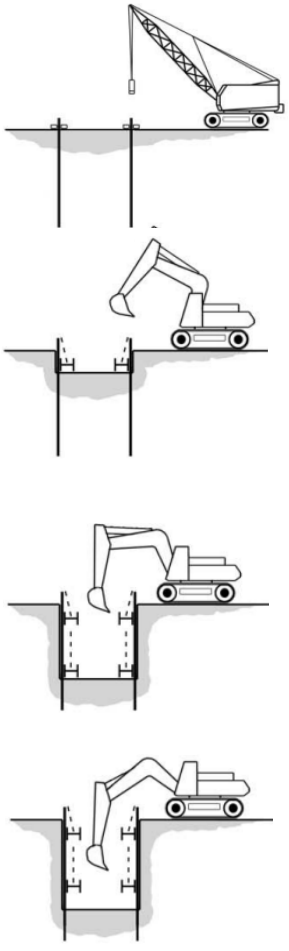


► Method 2 (Pre-driven sheets)

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

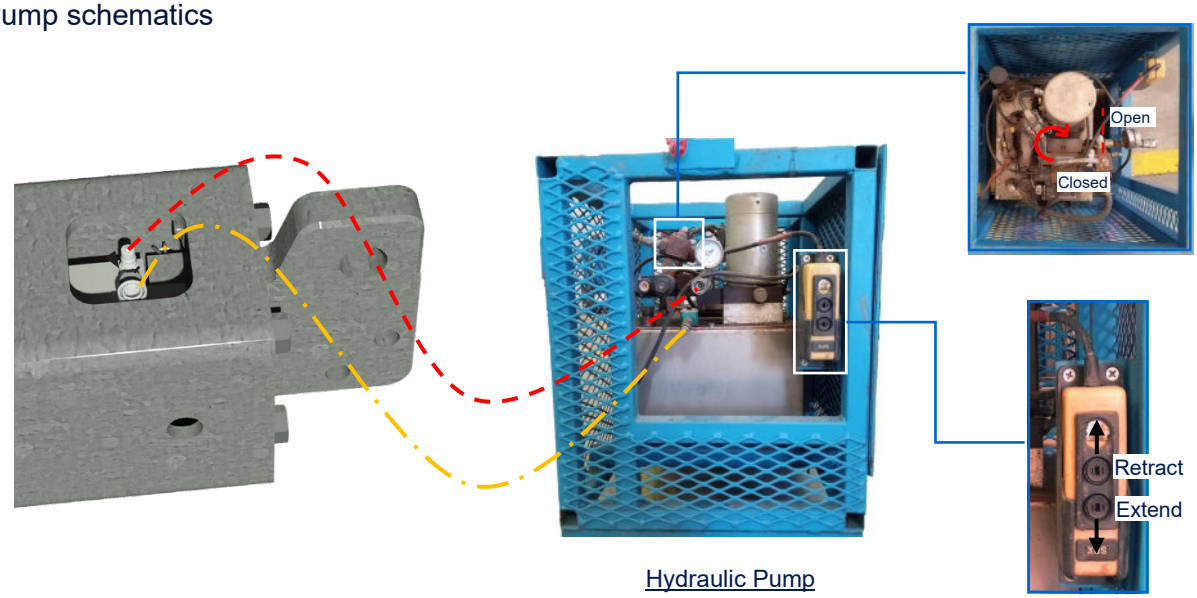
1. Fully drive sheets/piling using a piling guide.
2. Remove piling guide and excavate to first frame level.
3. Place each leg into the excavation and assemble the frame.
4. Connect restraint chains as per scheme drawing.
5. Connect hydraulics and individually pressurise all ram units to 1000psi., close 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.

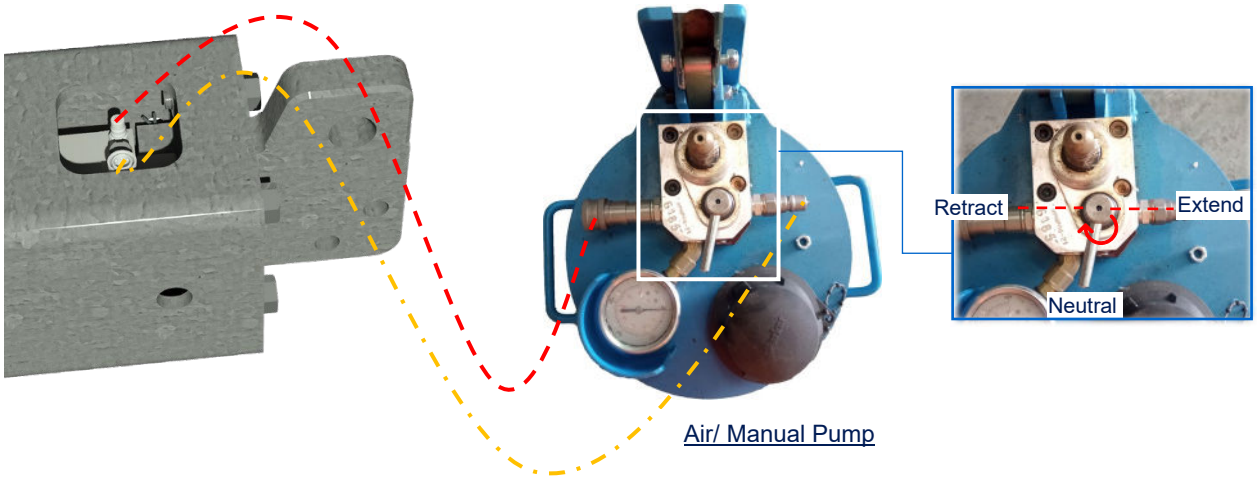


4.4 Details and Procedures for Extending/Retracting Walings

4.4.1 Pump schematics



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.

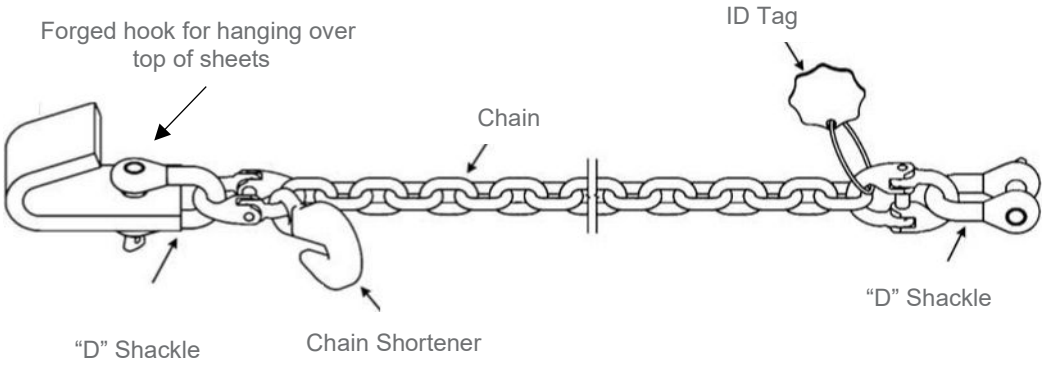
- Close the lock off valve by rotating clockwise.
- Set the pump control valve to ‘Neutral’.
- Disconnect the pump hoses from the ram unit.
- Repeat the above steps for each waling of the frame in turn.

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*

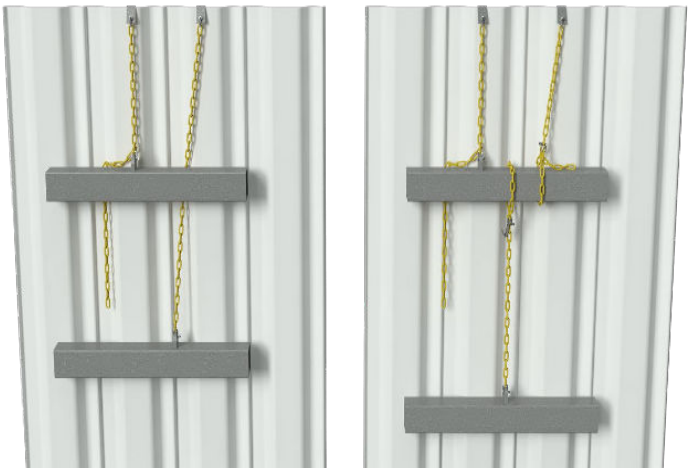
Restraint chains are provided as a back-up support arrangement in the unlikely event of hydraulic failure of one of the Multibrace hydraulic legs. They are NOT to be used for any other purposes and particularly are NOT to be used as lifting chains. They are NOT intended to be a mean of suspension to 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.

Chain Shortener

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:

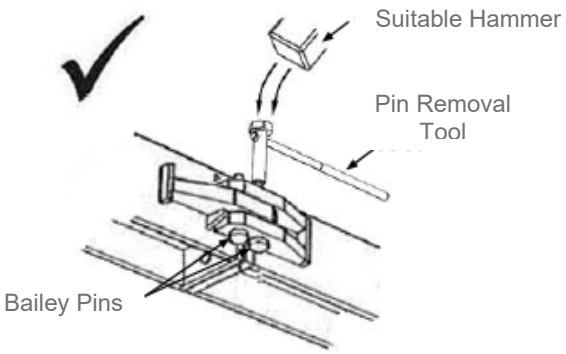
- PURGE AIR FROM THE HOSES - disconnect hoses from ram and connect hose ends together. Pump for several strokes until fluid can be heard returning to the tank. Repeat with lever in opposite position.
- PURGE AIR FROM THE RAM - connect hoses and pump ram to full extension. Reverse lever and pump until fully closed. Repeat until there is no sign of ram springing back. If ram still does not function, refer to your nearest depot.

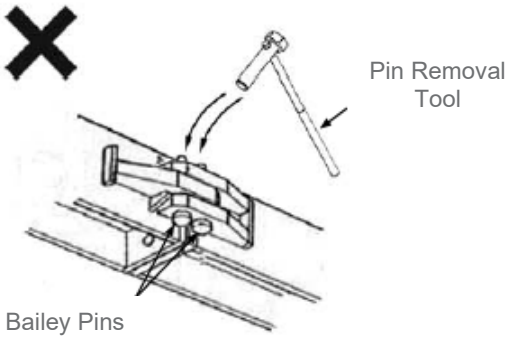
4.7 Removal of Frames

- 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 comer 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.

Using the Pin Removal Tool

The Pin Removal Tool (SBS-033) can be used to safely remove any Bailey Pin that has become stuck during use. When using the tool ALWAYS use a suitable hammer to strike the tool and never use the tool as a hammer to release the stuck Bailey Pin.





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 Dont's

- 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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