

ANNEXURE-I

SCOPE OF WORK FOR REPAIRS OF ANGRE WET BASIN GATE SITUATED AT SOUTH YARD OF

MAZAGON DOCK SHIPBUILDER LIMITED

 Mr. R P Gupta DGM(Maintenance)	 Mr. Anand Gyanmote OIC / DGM (Maintenance) 11/08/2026	 Mr. Anurag Rastogi HOS / AGM (Maintenance-NY, SY & S Y Annex) 11.08.2026	 Mr. V M D'souza HOD/ GM(Maintenance) 11/08/2026
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REPAIRS OF ANGRE WET BASIN GATE:

Brief History:

- a) Gate of Kanoji Angre wet basin situated at MMP Jetty in South Yard was installed in the year 2012-13. This Angre wet basin Gate is used for berthing/un-berthing activities of various submarines / ships / Barges. The dimensions of the gate are 31 m X 12.25 m X 3 m (approx.). The Angre Wet Basin accommodates high drafts Vessels (Frigate, Destroyer class warships and Submarines). Typically, the ships/submarines under construction remain in the basin after launching and only move out for docking and sea-trials.
- b) In the recent past, it was observed frequent chances of holes formation in the plate near 'D' Deck (sea side) of the gate due to heavily pitted and corroded/ deteriorated plates & sections. Hence, needs urgent repair to avoid unforeseen circumstances in future.



Detailed Scope of Work:

Sr. No.	Description	Offer By The Bidder	Deviations	Remarks
SCOPE OF WORK				
Contractor's Scope prior commencing of work:				
a) Firm should engage a TPI agency cum Consultant (IR Class System and Solutions Ltd (ISSPL)/ Apave TIV India Pvt Ltd/ Bureau Veritas India Private Limited/ LRQA Inspection Services India LLP/TUV/DNV b) Firm should submit QAP (Quality Assurance Plan) and detailed project report (DPR) with projected timelines vetted by appointed TPI agency. c) Firm should prepare the docking plan for the gate in consultation with MDL SD&D department such that entire surface of gate can be surveyed and repair and painting can be carried out. d) Firm should prepare a repair / replacement plan and get same vetted by appointed TPI. e) Firm should prepare Welding procedures & NDT plan and get same vetted by appointed TPI agency. f) Firm should prepare stepping in plan and get same vetted by appointed TPI agency. g) Firm should prepare a trial and testing plan and get same vetted by appointed TPI agency.				
MDL's Scope:				
a) MDL (Maintenance) will provide available existing drawings of gate.				
1) Preparation for Floating of Gate:				
Contractor's Scope:				
a) Removal of all the railings on the deck A.				



b)	Replacement of Ballasting and De-ballasting pipelines and valves on Deck A & B to make the gate float worthy.			
c)	Arrangement of ropes/ slings / tools & tackles / portable compressor (if required)			
d)	Inspect and ensure the strength of the Lifting Lugs during removal/ lifting of Gate.			
e)	Repair/Replace of Lifting Lugs with suitable load carrying capacity if found weak during inspection.			
f)	Arrangement of barge crane for lifting/support of gate.			
g)	Arrangement of divers, fitting of slings/manpower etc.			

MDL's Scope:

a)	Available drawings/details of Lifting Lugs.			
b)	MDL (Maintenance) will provide available existing drawings of gate.			
c)	Supply of Electricity supply AC 440 V, 3 phase/230 V, Single phase / 110 V single phase at one location, distribution of power supply has to be arranged by the contractor and drinking water at one point will be provided by MDL.			
d)	Compressed air up to 4 bars will be available during I & II shifts on working days at nearby location, however flexible hose will be in the scope of the contractor. Compressed air beyond II shift and Saturdays/Sundays/holidays are to be arranged by Contractor on its own.			

II) Removal of Gate:

Contractor's Scope:				
a)	OEM has recommended the process of removal of gate. Before quoting firm should thoroughly study and understood the process and methodologies for removal or stepping out process.			

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b)	Removal of gate as per the OEM recommendations /procedures (Enclosed OEM's procedure for reference- Annexure-II).			
c)	Handing over of the gate in horizontal float worthy condition along with certificates /clearance (if any) to MDL.			
d)	Repair of structure /parts of Gate damaged including civil structure, sill foundation etc while removal /Installation of gate .			
MDL's Scope:				
a)	Available Drawings for Stepping out the gate with stage wise procedure.			
b)	MDL (SD&D) will vet the docking plan submitted by firm for the gate such that feasibility of repairs for entire surface of gate (both top & bottom side).			
c)	OEM's procedures (Annexure-II) for Stepping out of gate.			
d)	Towing of gate to Moghul dry dock (MDD) by MDL (SD&D).			
III) Docking of Gate to Moghul Dry dock:				
MDL's Scope:				
a)	Arrangement of dry docking blocks and dry docking of gate in MDD by MDL (SD&D) with the assistance of SB-Design dept and docking plan submitted by firm duly vetted by appointed TPI agency.			
IV) Inspection of Gate:				
Contractor's Scope:				
a)	Firm should prepare the docking plan for the gate in consultation with MDL SD&D department such that entire surface of gate can be surveyed and repair and painting can be carried out.			
b)	Detailed inspection of MMP Wet Basin Gate (both sides) by continuous NDT / AET* test for ascertaining thickness of the external plates and sections of the gate and subsequent preparation of report thereof. Based on the report, plates will be changed accordingly. AET* = Acoustic Emission Testing			
c)	Detailed report to be prepared regarding present status and condition of structure of gate with respect to thickness of the individual plates and sections.			



d)	Inspection to be carried out to check if any damage occurred to the gate while removal or shifting. Same to be repaired by firm if required.			
e)	Replacement of the damaged / defective plates after NDT/AET Inspection: All the plates damaged (if any) and exposed to sea as well basin side whose thickness at any place is found to be reduced by more than 20% or (as per standard/ appointed TPI recommendation) of its original thickness are need to be replaced.			
f)	Check the plates for the pitted corrosion (if any) and submit the report. Corrective action to be taken to remove the pitted corrosion.			
g)	Inspection of NDT will be supervised and the reports shall be vetted by appointed Third party Agency .			
V. Repair of Gate:				
Contractor's Scope:				
a)	Based on recommendation by Third Party Agency (TPA), actual quantity of steel will be finalized. Required plates (MS IS 2062) are to be procured by firm in minimum time of about 6 weeks. All test certificates of steel plates and sections are to be submitted by firm after vetting from appointed Third Party agency (TPA).			
b)	Replacement of the damaged / defective plates after NDT Inspection: All the plates damaged (if any) and exposed to sea as well basin side whose thickness at any place is found to be reduced by more than 20% or (as per standard) of its original thickness are need to be replaced.			
c)	Firm must quote for unit rate which includes removal, supply and installation, inspection & testing of steel structure (plates & section) on per ton basis. Actual quantity of steel will be certified on pro rata basis.			

d)	Due care to be taken while removal of plates and reinstallation of new plates and sections. Standard cutting and welding procedures as vetted & approved by TPA are to be followed.			
e)	Removal of scrap generated during fabrication in dry dock will be in firm's scope and will be handed over at designated location to MDL.			
g)	Arrangement of suitable Welding machines, Gas cutting machines, Portable compressor and any other machines/ equipment/ accessories/ consumables required for subject work.			
h)	Skilled /qualified/unskilled manpower along with all appropriate tools & tackles, lifting equipment such as chain pulley blocks, hydraulic jacks, mobile cranes/hydra .			
i)	To comply with all MDL's safety procedures.			
j)	Transportation of plates /machines /Tools /slings/ cranes etc.			
k)	All the material of the plates and sections shall be vetted through appointed Third-Party Agency.			
MDL's Scope:				
a)	MDL (Maintenance) will provide electric supply at one point for welding machines, distribution of power supply has to be arranged by the contractor			
b)	MDL will provide compressed air (about 4 bar) whenever available during working days and drinking water at one point.			
VI) FABRICATION:				
Contractor's Scope:				
a)	All workmanship and finish shall be of required quality. All the edges shall be free of burrs. Shearing and chipping shall be neatly and accurately done and all portions of work exposed shall be neatly finished. Materials at the site shall be kept clean and protected from weather.			



b)	Well-designed fixtures and clamps shall be employed/used during setup and assembly of joints for welding and bolting.			
c)	Any defective materials used shall be replaced by the Contractor at his own expense, care being taken to prevent any damage to the structure during removal and reinstatement.			
d)	Any faulty fabrication pointed out at any stage of work shall be rectified by the contractor at his own cost.			
e)	Plates of IS 2062 (BS EN 10025) and of same OEM's recommended thickness are to be used and replaced.			
f)	Welding machines/Gas cutting machines/consumable/Portable compressor used will be under the vendor's scope.			
g)	All the tools, manpower, lifting equipment, scaffolding etc. during cutting and fabrication of plates are under vendor's scope.			
h)	Old plates removed to be cut into pieces of size provided by MDL and are to be handed over at designated location to MDL.			
i)	Supervision of fabrication will be done by appointed Third Party Agency as per the QAP.			
MDL's Scope:				
a)	Disposal of old removed plates will be under MDL's scope.			
VII) WELDING PROCEDURES				
Contractor's Scope:				
a)	All welding work on the gate shall be done as per standard welding procedures for IS 2062 (BS EN 10025) and as per TPA vetted & approved welding procedure. Appointed Third party Agency (TPA) will be the inspection agency as per the QAP.			
b)	All defects in welds shall be chipped/gauged/ground/machined out to sound metal and such areas shall be ultrasonically tested to ensure that the defect has been completely removed before repair welding.			
c)	Welding shall be carried out only by fully trained, experienced and skilled qualified welders as per TPA approved welding procedure.			
d)	Ensure the plate and sections welded are proper and the accuracy of the straightness and alignment to be maintained as per the TPA approved			



	QAP. X-ray testing as per approved NDT plan on the all the newly welded plates and sections including old welded portions of entire gate (sea side and basin side) are to be carried out.			
e)	When welding is carried out in an open area, steps/ precautions shall be taken to protect the place of welding against wind or rain.			
f)	All the Air chambers and ballast tanks leakage/pressure testing as per standard procedure will be under firm's scope. i) For air chambers: 20 lb/in ² (1.379 bar) ii) For water chambers: 15 lb/in ² (1.03 bar)			
g)	Supervision of Welding procedures and pressure testing will be vetted through appointed Third-party Agency as per the QAP. The test certificates/ reports of pressure tests duly signed & stamped by design & drawings vetting agency & carried out in presence of & directed by the vetting agency to ensure the absolute water / air tightness of the compartments & same shall be submitted to the SB-Maintenance Dept.			
VIII)	<u>SACRIFICIAL ANODE CATHODIC PROTECTION</u>			
Contractor's Scope:				
a)	Aluminum anodes as per IS 8062 (Part -IV)/1979 shall be fitted on both sides of outer surfaces of the Angre wet basin gate for protection of the plate against corrosion. Number of anodes depends upon the calculations of the Surface area and required standards to be followed .			
b)	Calculations of number of anodes will be vetted through appointed Third-party agency.			
IX)	<u>Replacement of Rubber seals</u>			
Contractor's Scope:				
a)	All the old rubber seals are to removed and new one is to be procured, supplied & replaced along with timber with OEM's seal & timber			

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	specifications. (Drawing enclosed for reference). The timber of same dimension and quality has to be replaced. The contractor shall ensure that the sealing surfaces are properly matched to ensure that the leakage is almost nil. Rubber seals & Timber material are to be vetted and approved by appointed TPA before replacement. The Material test certificate of Rubber seals & Timber are to be submitted to MDL.			
b)	Ensure the Timber, fastening / bolting of seals are properly secured on timber / seal surfaces.			
MDL's Scope:				
a)	Drawings of the Rubber seals and Timber will be provided by MDL (Maintenance) for reference.			
X)	<u>Replacement of Wire rope</u>			
Contractor's Scope:				
a)	Replacement of old wire rope (if found damaged/defective) with new of OEM's specifications as per the drawings. Make: Usha Martin. Dia: 48 mm Construction: 6 X36 performed, Breaking Strength: :191 Tons. Length of the Wire Rope: 105 meters			
b)	Wire rope Mill test certificate along with relevant certificate of the competent authority/ Government approved authority are to be submitted along with supply.			
MDL's Scope:				
a)	Details of the wire rope will be provided by MDL (Maintenance) for reference.			
b)	Wire rope Reeving diagram (Drawing enclosed for reference)			
XI)	<u>Replacement of Pulleys</u> (complete set inclusive of bearing, seals, fasteners, locking arrangement as per the detail drawing):			



Contractor's Scope:			
a)	Removal of old Loading Pulleys (2 No's) on B-Deck.		
b)	Procurement of new Pulleys and the relevant components as per the OEM's specifications and suit to the site requirements as existing one. Test certificate of the material of Pulleys and inspection report are to be vetted and approved by the Third party.		
b)	Preparation of foundation of Pulleys and install the new Pulleys with relevant components as per OEM's Specifications and drawings. Installed pulleys are modified for strength, firm has to prepare as built and installed drawing before manufacturing.		
c)	Prepared as built and installation drawings to be approved by appointed Third Party Agency.		
MDL's Scope:			
a)	Drawings of the Pulleys (not as built) will be provided by MDL (Maintenance) for reference.		
XII)			
<u>SURFACE PREPARATION & PAINTING</u>			
Contractor's Scope:			
1. Cleanliness:			
a)	Remove oil, grease and other contaminants by suitable detergent cleaning.		
b)	Remove salts, detergents and other contaminants by high pressure fresh water cleaning.		
c)	All preparations, priming and painting, in colors selected for the Angre wet basin Gate, shall be deemed to be included in the Contract price		
d)	Remove dust, blast media and loose materials.		
e)	All damage of shop-primer and contamination from storage and fabrication should be cleaned thoroughly mechanically/ chemically prior to final painting		
2. Paint Coating			
a)	High performance coating for atmospheric and immersion service, is to be applied.		

b)	The product shall be fast drying, having fast recoating and handling time.			
c)	The paint shall be recommended for long time corrosion protection of structural steel in severe corrosive and sea water immersed environments.			
d)	The product should resist normal ambient temperatures at sea.			
e)	The product must be type approved according to PSPC requirements based on crossover testing over a wide range of shop-primers.			
f)	Painting is to be carried out throughout the gate and its inbuilt-structure, both from inside and outside			
g)	Paint film thickness indicated in the table below is minimum to be applied fresh for new plates; in case of old plates, the DFT is to be built over and above the existing paint film.			
h)	Stage wise inspection is to be offered to Paint Shop along with the details in the given proforma and the QAP.			
i)	The following coating system of OEMs or equivalents meeting the requirements of para XII (a) to XII (e) are desired (Annexure-II)			
j)	The firm to specify which scheme amongst the above it intends to apply in its proposal document			
k)	The firm to follow the application guidelines of respective OEMs as indicated in its product specification and product data sheets. The same also needs to be uploaded in the proposal document.			
l)	The contact details of OEMs above are as follows:			
1. M/s Akzo Nobel Coatings India Pvt Ltd Registered Office:- Plot No. 62P, 62A, 62B, 43E Hoskote Industrial Area Bangalore – 562 114 Tel: 080-2289 5000 Fax: 080-2289 5500		2. M/s Hempel Paints Indi Pvt Ltd 801, 8 th Floor, Vikas Centre Near Basant Cinema, C Gidwani Road Chembur. Mumbai. 400 074. Tele: +91 22 2520 3921/22/23 +91 22 6139 2555		

Marketing Office:-

1/1, TTC Industrial Area,
Thane-Belapur Road,
Kopar Khairane
Navi Mumbai – 400 709
Tele: 022-3920 1000/3920 1004
Fax: 022-3920 1090
Website: www.akzonobel.com

Email: arra@hempel.com
Website: www.hempel.com

3. M/s Jotun India Private Limited

2nd Floor, Prince Plaza,
73 Pantheon Road,
Egmore,
Chennai – 600 008
Tele: 044-28419420
Fax: 044- 28419513
Website: www.jotun.com

4. M/s PPG Coatings India Private Limited

412/413, Palmspring,
Link Road, Next to D Mart,
Malad (West)
Mumbai-400 064
Tele: 022-2844 9056/6775 5000
Fax: 022-2844 9054
Website: www.ppgpmc.com

m)	Paint Inspection report should be submitted as per Annexure-III			
n)	Supervision of surface preparation and painting will be done by appointed Third party Agency along with MDL (Paint Shop).			
XIII)	Re-inspection and testing of gate in dry dock:			
Firm's Scope:				
a)	Air chambers and ballast tanks leakage/pressure testing will be in firm's scope and subsequent preparation of report thereof. All reports will be vetted by appointed TPI agency.			
XIV)	Shifting of gate from Moghul Dry Dock to site location: (MDL SD&D scope)			
XV)	Lowering or stepping in of gate: (Firm scope) under the supervision of appointed TPI AGENCY			

XVI)	Locking of gate as per OEM's procedure. (Firm scope)			
XVII)	Trial and testing of gate: (Firm scope) under the supervision of appointed TPI AGENCY.			
XVIII)	Life certificate of gate to be given by Firm through appointed TPI AGENCY.			
XIX)	Note:			
i)	Above scope is limited, anything required for completion of job will be in firm's scope.			
ii)	Firm should visit and understand the complete scope of work prior quoting.			
iii)	MDL does not have any experience of stepping or un stepping of gate. Complete responsibility will be of firm. If any damage occurred at Sill level mechanism during stepping / un stepping to be rectified by firm only.			
iv)	Drawings cannot be attached with tender; firm must visit and study the available drawings prior quoting.			
v)	Gate needs to be repaired from all sides including Sea Side as well as basin side. Appropriate Procedure/ Methodology for flipping of gate in dry dock need to be adopted & to be mentioned in technical bid by firm.			
vi)	All the critical activities (procedure of un stepping / stepping, fabrication, welding procedures, NDT/ Pressure Testing etc.) included during removal, repairs of Wet basin gate are to be approved by appointed Third Party Inspection agency.			
vii)	Safety of man and material during complete project will be of firm responsibility. Necessary work permissions and permits to be adhered. If any incident/ accident occurs during entire project, firm will be held responsible. Necessary safety precautions, PPEs, safety training of manpower to be done prior commencing work. Adequate experienced personnel must be deputed as per the job requirement.			
viii)	Maintenance/ repair procedure plan & schedule are to be provided and to be vetted by appointed TPI agency.			

viii)	Complete project must be under supervision of third-party inspection agency (TPIA). Charges of third party to be borne by firm. Obtaining statutory and other relevant approvals/ permissions for entire execution of the work will be under the Vendor's scope.			
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Completion Period: -

The overall time period for completion of the work from the date of placement of Work order is 06 (Six) months (Fair weather)

Annexure- III

Coat	Akzonobel	Hempel	Jotun	PPG
Primer	Intergard 269 1 x 50 μ	Hempadur 17634 1 x 150 μ	Quattro Penguard Primer 1 x 50 μ	Sigmacover 280 1 x 50 μ
Anticorrosive	Intershield 301/303 1 x 150 μ	Aluminium Hempadur 17634 1 x 200 μ	Quattro Balloxy HB Light 2 x 150 μ	Sigmaguard 425 1 x 300 μ
Anticorrosive	Intershield Bronze 300/303 1 x 150 μ			

Annexure-IV

PANT INSPECTION REPORT

Inspection Report No:

Deutscher

Departments' Stores:

Cost Centre :

Paint Products:

Order No.:
Batch No.:

Date:

Exhibits:

[illegible]

Finish smooth - Painted job must be free from dust dirt & no bitty / rough finish observed

SIGNATURE OF CONTRACTOR

CERTIFIED BY Paint Shop

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ANNEXURE-II

1. GATE UNSTEPPING INSTRUCTIONS of Angre Wet basin gate:

1.1. Unstepping

This should be read in conjunction with Drawings 3H6543/TD/T 12, /T 15, and /T 21.

The gate may be unstepped at any tide level between +3.40m CD and +1.75m CD, but ideally the unstepping procedure should be planned to be carried out during a neap tide.

The initial unstepping process onto the bearings will ideally be carried out at mid tide, but it will also be achievable with water levels between MHWN (+3.30 m CD) and MLWN (+1.85m CD).

1.2. Preparatory Work

Ensure that the basin filling valves are open, and the basin water level is operating with the sea level.

Valves and pipe attachments, facing towards the basin, will need to be fitted, after two blanking flange plates "V1" have been removed, one from each of the lower ballast tanks "5a" and "5b" flooding pipes. Once the valves have been securely fitted, they must be closed off.

Provided the water level is below B Deck, the two access hatches to the water ballast tanks should be removed.

The blanking flange plates to the air valves "A1", "A2", and "A3" need removing and end connections to suit an airline need to be fitted to air valves "A1".

Air Valves "A3" do not need any air pipes or air lines fitted, since they will be filled from the seaward face of the gate at the end of the unstepping operation.

Check all air valves "A1" and air pipes do not leak.

Ensure gate is marked with waterline tolerances as detailed in the Wet Basin Gate and Associated Equipment Stepping Manual (Document 3H6543/R017/1).

Remove handrailing and stanchions.

The sill protection plates should be lifted, and tied up by divers.

Check all drainplugs "DP" and "DP 1" are fitted on tight.

Attach 6 No. 15 tonnes SWL ropes to the top and bottom of gate, as detailed in the Wet Basin Gate and Associated Equipment Stepping Manual (Document 3H6543/R017/1).

Check that compressed air and sufficient hoses and pumps are available and in working order.

Suitable timber or rubber protection should be mounted on the ends of the gate to protect the sheaves from accidental damage whilst manoeuvring the gate.

Ensure all removable fenders near the entrance of the basin are removed along with any other items that could get in the way during the movement of the gate.

1.3. Floating the Gate

Ensure the basin flooding valves are open, and the basin water level is tidal. This operation should be carried out during a high tide, below +3.40m.

Standby the temporary winches or capstans to restrain the 6 No. gate ropes.

Tanks "2a" and "2b" should slowly be emptied of water by carefully lowering a pump into each tank through the access hatches on Deck B, provided the basin water level is below Deck B. If the water level is above Deck B, the blanking flanges to filling holes "F1" are to be removed and pipes will need to be lowered into the tanks to enable the water to be pumped out.

It is likely that the bottom of the gate will try to move out toward the basin, so the bottom ropes will need to be fully tightened and restrained, with tension being applied in the seaward direction.

Once tanks "2a" and "2b" have emptied, close off the valves "A2", and install blanking flanges to filling holes "F1".

Provided the basin water level is below Deck B, a visual inspection should be carried out to ensure that as much water as possible has been removed from tanks "2a" "2b". Any water that remains in these tanks reduces the stability when it is unstepped.

The gate winch rope should now be removed, with the gate being held tight with ropes.

Attach compressed air lines to the two valves "A1", and open up the valves "V1" to the tanks "5a" and "5b". Slowly blow the water out.

Once tanks "5a" and "5b" are approximately 60% empty, the gate should begin to start to lift out of the trunnions and begin to float.

The lower restraints should be held tight. It may be necessary to gently pull the top of the gate away from the entrance to ensure that the gate rotates the correct way.

1.4. Preparation of gate for Dry Docking

Tanks "5a" and "5b" can now be continued to be slowly emptied, as above.

During the unstepping operations, longitudinal trim of the gate must be checked by measuring the freeboard at each end.

Tanks 5a and 5b should be blown to approximately 70% empty before the gate is manoeuvred away from the entrance. As the tanks are emptied, the gate becomes inherently unstable, and will rotate relatively quickly. Due to this, it is critical that the control of the gate is maintained at **ALL** times.

Once tanks "5a" and "5b" have emptied, close off the valves "V1" and "A1"

The gate should now be at approximately 8 degrees to the horizontal, seaward face up, with the sill timber just visible above the surface of the water.

All compressed air lines should be removed, and it should be ensured that all valves "A1" and "A2" are closed off.

The gate should now be ready to be safely towed to the dry dock.

Whenever the gate is unstepped for maintenance, it is important that the Sill Posts are also thoroughly inspected for any damage, and checked again after the gate is re-stepped back into place. If necessary, the Sill Post Caps may need to be re-fabricated as in the Wet Basin Gate and Associated Equipment Operation and Maintenance Manual (Document 3H6543/R017/1).



2. GATE DRAWINGS

Drawing No.	Title	
3H6543/TD/T01	Dock Gate General Arrangement	Rev "0"
3H6543/TD/T12	Dock Gate Reverse Head Post Details	Rev "0"
3H6543/TD/T15	Dock Gate Layout and Details of Pipes, Valves, Plugs and Fittings	Rev "0"
3H6543/TD/T21	Dock Gate Unstepping Details	Rev "0"



1. GATE STEPPING INSTRUCTIONS

1.1 General

This should be read in conjunction with Drawings 3H6543/TD/T12, /T15, and /T20.

The gate may be stepped at any tide level between +3.40m CD and +1.75m CD, but ideally, the stepping procedure should be planned to be carried out during a neap tide.

The final stepping process onto the bearings will ideally be carried out at mid tide, but it will also be achievable with water levels between MHWN (+3.30 m CD) and MLWN (+1.85m CD).

1.2 Preparatory Work

Weld on rope attachment brackets (2 No. near bottom, 4 No. near top, the reverse head brackets may also be used if necessary) to dock gate for manoeuvring the gate during stepping. The brackets should have a minimum S.W.L. 15 tonnes.

Provide 6 No. ropes for gate handling.

Provide 4 No. suitable pumps and hoses for pumping water into ballast tanks.

Fit 2 No. valves "V1" to the ballast flooding pipes for water filling, with pipe attachment facing "seaward". There should be One valve attached to each tank "5a" and "5b", the other 2 valves "V1" should be blanked off.

Fit 2 No. air pipe valves "A1" to the ballast tanks "5a" and "5b" for removal of air from the ballast tanks. The air outlets should be suitable for connecting to a compressed air supply in case of the need to blow water out of the tanks if overfilled.

Fit 2 No. drain plugs "DP" to tanks "2a" and "2b", and 4 No. drain plugs "DP1" to tanks "5a" and "5b".

Suitable timber or rubber protection should be mounted on the ends of the gate to protect the sheaves from accidental damage whilst manoeuvring the gate.

Place two nails in the gates timber rest blocks for trial testing of the gate. The nails shall protrude by 25mm.

Provide 2 No. capstans (minimum 5 tonnes capacity) for controlling the top of the gate from the basin side. It may be possible to utilise the capstans at the basin entrance (if operational).

It is anticipated that restraint to the bottom of the gate can be provided manually using handling ropes to the bollards on the basin cope provided they have been fitted.

Ensure that all removable fenders near the entrance of the basin are removed along with any other items that could get in the way during the movement of the gate.

Record actual levels and distance centre to centre of gate bearings and trunnions, and reverse head support brackets, and establish actual fabricated gate dimensions: - underside of trunnion to top of gate — at each end of the gate — distance between outer ends of vertical sheave bosses (including temporary protection) distance from underside of trunnion to top of vertical sheaves at each end of the gate, distance between reverse head supports brackets, etc.

Compare fabricated gate dimensions with as-built basin dimensions to ensure that everything fits.

1.3. Check List Prior to Floating of Gate

Check blanking flanges and gaskets are fitted to all ballast water filling holes.

Check all watertight manhole covers and gaskets are in place and secured.

Check blanking plates with plugs are fitted to all drain plug holes "DP", and "DP1".

Check valves "V1" operate satisfactorily for water filling and are left in the closed position.

Check that suitable blanking flanges for valve openings have been tried for fit and are to hand. The blanking flange to the filling holes "F1" should be fitted.

Check air pipes "A1" and "A2", and air pipe valves operate satisfactorily and are left in the closed position.

Check 6 No. stepping ropes SWL 15 tonnes are attached to gate. 2 No. ropes at Deck A at either end of the gate and 1 No. rope at Deck E at either end of the gate.

Check protection of sheaves.

Check that sill protection plates have been fitted, and securely tied up to ensure that they do fall during the stepping procedures.

Check that handtrailing and sanctions have NOT been fitted.

Check that 2 or 3 concrete keel blocks or steel scrap (say) are available for emergency ballasting.

Check that compressed air and sufficient hoses are available and in working order.

Check that pumps and hoses for pumping water are available and in working order.

Ensure the gate is marked with a Waterline on the seaward faceplate at a distance of 7.84m from the top of the sill cheek-plate.

1.4. Floating of Gate

Reference Drawing No. 3H6543/TD/T20 stage 1.

When the gate is first floated, the two air valves "A3" should be closed to prevent air from escaping from the trapped air spaces. The gate should remain in this condition when being manoeuvred in and around the basin entrance prior to the stepping.

All internal spaces must be sealed and airtight before float out of the gate is commenced.

The gate should be controlled by manually handling the stepping ropes.

1.5. Transfer of Gate to Basin Entrance

Reference Drawing No. 3H6543/TD/T20 stage 2.

The gate is now relatively stable and can be manoeuvred through the basin entrance.

Once inside the basin, the gate should be positioned such that the trunnions are facing towards the basin entrance and in a position ready for rotation to the stepping attitude.

The 6 No. stepping ropes should be tied on position ready for use.

1.6. Release of Air from Trapped Air Spaces



Reference Drawing No. 3H6543/TD/T20 Stage 3

Open the two air valves "A3" and the gate will slowly rotate to an angle of approximately 8°.

The valves should remain open for the remainder of the stepping operations.

1.7. Water Ballasting to Bring Gate to Stepping Attitude

Reference Drawing No. 3H6543/TD/T20 Stage 4.

The two filling valves "V1" and air valves "A1" should be opened to the lower permanent ballast tanks, and the tanks allowed to begin filling with water.

Flooding is to be carried out slowly and carefully using the filling valves and their corresponding air valves.

Adequate time must be made to allow the air to escape via the air valves.

When the tanks are almost $\frac{1}{3}$ full, the gate should be at the required stepping angle of approximately 30 degrees to the vertical, with the water level at the marked waterline.

The required attitude of the gate should be approached slowly and carefully. An attitude within the tolerances marked should be achieved. The marked tolerances ensure that the toes of the trunnions will be below the top of the steel stepping faces, provided the tide level is within the criteria set out above.

During the flooding operations the longitudinal trim of the gate must be continually checked by measuring the freeboard at each end.

A level trim can be maintained by adjusting the amount of water entering via the filling valves "V1" into the two tanks.

Once the gate is at the required attitude, the valves "V1" should be immediately closed.

When the correct attitude has been achieved, the lower ballast tanks "5a" and "5b" will be only partially flooded, and the gate will have a low inherent stability. As such, it is critical that the control of the gate with the ropes be maintained at ALL times.

1.8. Positioning of the Gate

Reference drawing No. 3H6543/TD/T20 Stages 5.



The gate can now be positioned in the basin entrance, centred up and offered to the meeting face.

Great care must be taken to prevent damage to the sheaves at each end of the gate during this operation.

The "toes" of the trunnions should be resting against the steel stepping plates that have been provided and the gate should be made fast with the ropes.

The 2 No. ropes from the top of the gate should be restrained to bollards situated on each side of the entrance walls. Restraint should also be provided to the ropes to the bottom of the gate.

The remaining 2 ropes at the top of the gate should be tied to a support vessel inside the basin.

1.9. Sinking Gate into Bearings

Reference Drawing No. 3H65453/TD/T20 stage 6.

The two air valves "A1" and filling valves "V1" to the permanent ballast chambers (tanks "5a" and "5b") should now be partially opened. The stem of the gate will now slow in its rate of sinking as the gate becoming more upright, and stable. The top ropes should be slowly and carefully hauled in towards the dock. Light

tension being maintained on the bottom ropes, paying out as necessary to keep the toes of the trunnions in contact with the stepping faces.

As the gate approaches approximately 20 degrees to the vertical, the toes of the trunnions will slide down into the bearing blocks. The angle at which this occurs will vary, depending on the level of the tide. The angle of 20 degrees is based on the water being at MSL (+2.51 m).

The seating of the trunnions in the bearing blocks will be indicated by a change in the behaviour of the gate. The bottom ropes will become redundant in their use, and have no effect on the gate at this point, but tension must be kept in the ropes, as the bottom of the gate will try to pull into the basin until the gate installation is completed.

The valves "A1" and "V1" should remain open until the bottom tanks are approaching 40% full, and the top of the gate approximately 2.0m from being in contact with the quoin.

The filling valves "V1" and air valves "A1" should now be closed.

Apply nominal pull on the ropes so that the gate is held steady. Inspect the location of the trunnions in the bearings with divers.

1.10. Bringing Gate to the Vertical Position

The filling of tanks "5a" and "5b" should now be continued, by opening the air valves "A1" and the filling valves "V1" until they are full. It will be evident that the tanks are full when water is expelled through the air valves "A1".

The winch rope should now be pulled tight.

The restraining ropes putting the bottom of the gate towards the meeting face (seaward) should be held tight at all times. The gate will rotate slightly as the tide level changes in this condition.

The protection to the sheaves can now be removed and the gate winch rope installed.

1.11. Completion of Gate Installation

Once tanks "5a" and "5b" are full then the filling holes "F1" to tanks "2a" and "2b" can be opened and filled with water.

All filling valves "V1" and air valves "A1" should be closed.

Valves "A2" should be opened and tanks "2a" and "2b" should be flooded by piping water through filling holes "F1" until the tanks are full.

Throughout these next stages the basin flooding valves should be kept open to ensure that the basin water level rises and falls with the tide. This is to ensure that there is no differential water pressure acting on the gate.

Once tanks "5a", "5b", "2a", and "2b" are completely full, divers should be sent to check that the meeting face timbers and rubber seals are adequately positioned. An inspection of the Reverse Head Sill Posts should also be carried out, and their positions relative to the gate should be checked.

The sill protection plates can now be untied, and carefully lowered onto the sill. The sill plates are extremely heavy and will ideally be lowered from ropes through the eyelets from the road deck above.

The handrails and stanchions can now be fitted.

Any fenders or other equipment that had been removed to facilitate the stepping of the gate should now be replaced.

1.12. Alignment and Fabrication of Reverse Head Sill Post Caps

Reference drawing 3H6543/TD/T12.

With the gate in its final closed position, the Reverse Head Sill Post Caps should be installed as detailed in the Wet Basin Gate and Associated Equipment Operation and Maintenance Manual (Document 3H6543/R017/3).

The gate is now ready for trial operations.

1.13. Preparations for Trial Operation of the Gate

The test nail should be inspected by diver to ensure it still protrudes by 25mm.

1.14. Trial Operation of the Gate

The gate may now be lowered by the gate winch as detailed in the Wet Basin Gate and Associated Equipment Operation and Maintenance Manual (Document 3H6543/R017/3).

The gate can then be raised as detailed in the Wet Basin Gate and Associated Equipment Operation and Maintenance Manual (Document 3H6543/R017/3) and should return to a satisfactory closed position.

The gate winch limit switches, slack rope and overload devices can now be set. All functions and controls of the gate winch should be fully tested.

Check that the nails have penetrated the blocks to ensure the gate rest pads are aligned with the gate rests, and that the gate was fully lowered.

Should it be evident that the gate did not fully lower, than additional weight, in the form of billet bars, will need to be added.



1.15. Completion of Stepping of Gate

Once the gate is operating satisfactorily then all filling valves "V1" should be removed, and the blanking plates should be fitted to valves "V1" and "F1" Now the watertight flange covers must be fitted to the 2 No. air valve holes "A1", the 2 No. air valve holes "A2", and the 2 No. air valve holes "A3".

1.16. Installation of Reverse Head Locking Pin and Hydraulic Ram

The following installation instructions are only relevant during the initial stepping of the gate.

The reverse head locking pin, ram, and channel assembly need now be aligned and installed as detailed in the Wet Basin Works Contract Documents, Volume III—Employers Requirements— Part 3 Materials and Workmanship, in section 31.16 (Document 3H6543/R014-3).

The installation should be carried out with the basin water level higher than the sea level.

2. GATE DRAWINGS

Drawing No.	Title	
3H6543/TD/T01	Dock Gate General Arrangement	Rev "0"
3H6543/TD/T12	Dock Gate Reverse Head Post Details	Rev "0"
3H6543/TD/T15	Dock gate Layout and Details of Pipes, Valves, Plugs and Fittings	Rev "0"
3H6543/TD/T20	Dock Gate Installation and Stepping Details	Rev "0"