



**DELIVERING
GLOBAL ENGINEERED
SOLUTIONS SINCE 1986**



ESC GLOBAL PIPES PROJECTS

CASE STUDIES



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OUR APP
"ESC GROUP"**

About ESC

ESC has been serving various global industries over the last 30 years, providing high quality complete foundation and structural solutions to ports, bridges, buildings and more. With strategically located manufacturing and engineering offices around the world, ESC is well positioned to provide an unparalleled combination of services and products.

ESC Group is proud to announce that it is now an affiliate company of Marubeni-Itochu Steel Inc. (MISI), Japan. MISI is one of the largest steel trading companies in Japan and in fact the world. This joining of ESC and MISI firms up a 10+ year successful relationship of two like-minded and driven corporations.

ESC will continue to follow its path of engineering value added products and projects for the world with MISI's worldwide network, logistics, finance and human resources, now the scope that ESC will cover has increased significantly. This allows larger project volumes and values to be carried out.



COMPANY CERTIFICATION

ESC products are produced & designed in accordance with the latest international standards 9001:2015, ISO 14001:2015, ISO 45001:2018 certifications for both supply, design and installation scopes related to sheet piling and piling related products.



ESC serves the global market from a range of strategic locations. ESC Group operates with over 15 agent and ESC offices around the world. Highlighted on the left are the representative offices for the steel structures division.

About ESC

Across the globe, the ESC Group of Companies now consists of the following registered enterprises:

- ▶ ESC Al Sharafi Steel LLC
- ▶ ESC Al Sharafi General Contracting LLC
- ▶ ESC Steel Engineering Sdn Bhd
- ▶ Acerlum ESC SAPI de CV
- ▶ ESC Nigeria Ltd.
- ▶ ESC Steel Philippines Inc.
- ▶ ESC-Beregstal Jsc
- ▶ ESC Steel LLC
- ▶ PT ESC Steel

And partners,

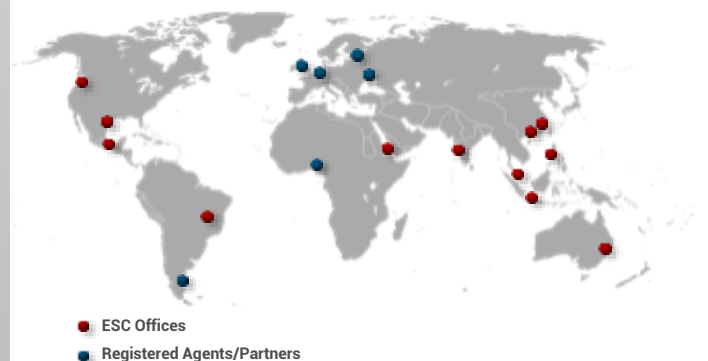
- ▶ Cimtronic Design & Engineering
- ▶ Europile B.V.
- ▶ Mageba Ukraine LLC
- ▶ Bulkplus Integrated Limited

The ESC Group has manufacturing plants located in China and the United Arab Emirates.

The ESC Group is also represented by agents of our own officers across Asia, Europe, North & South America, India, Africa and the Pacific.

The ESC Case Study Booklet aims to highlight and explain the more technical components of some older and more recent jobs that ESC has completed.

Global Locations



Project Case Studies Index

PROJECT TITLE	LOCATION	PAGE
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BHP GAS PIPE, AUSTRALIA

GAS PIPE PROJECT

Project Name	Gas Pipe Project
Location	Illawarra, New South Wales, Australia
Product	SSAW Pipes
Total Tonnage	800 MT
Year	2013

ESC SCOPE OF SUPPLY

SSAW PIPES

ESC was awarded the supply for a project in Australia. The products for this project include galvanized spiral submerged arc welding pipe with groove.

The pipe was produced strictly in accordance with the Standard: API 5L PSL1, with Grade X42.

Pipe specification:

OD: 450NB, 600NB, 900NB.

Thickness: 8.7mm & 9.5mm.

Lengths: 1m, 5.9m, 6m.

Incoming raw material is strictly

controlled: each raw material certificate is reviewed, coil dimension checked and steel retests are performed on each heat number for chemical composition and mechanical properties prior to commencement of the production process.

All inspection was carried out strictly in accordance with the approved Inspection and Test Plan



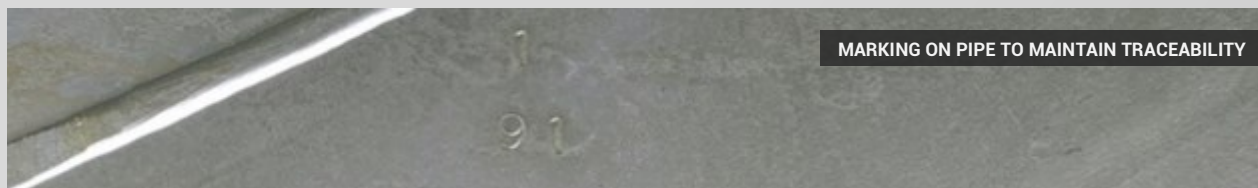
Radiographic Test

SSAW PIPE FORMING

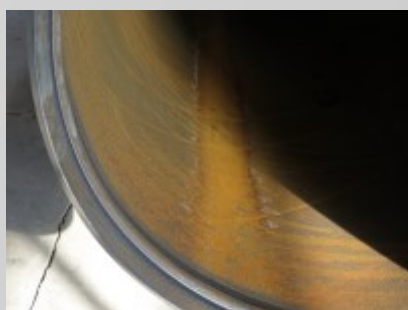


GROOVING

Groove dimension followed requirements as stated in Victaulic AGS Roll Groove specification. Pipe dimension is rechecked / reconfirmed prior to commencement of galvanizing.

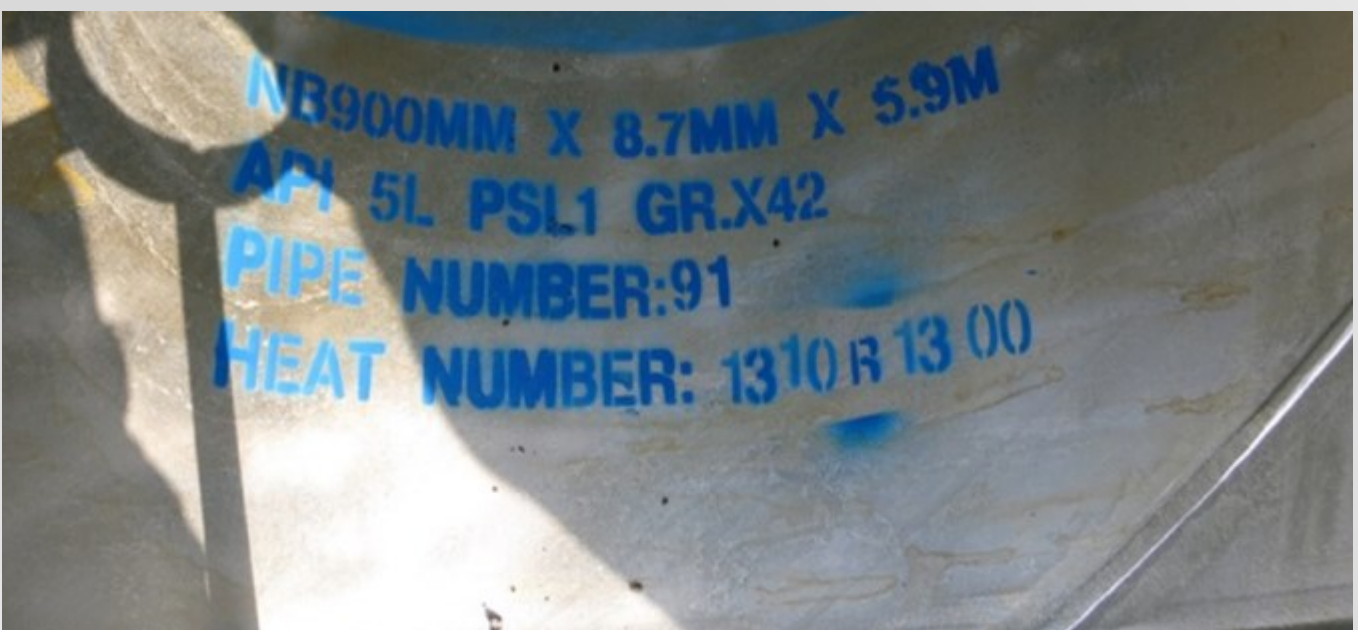


MARKING ON PIPE TO MAINTAIN TRACEABILITY



GALVANIZING

Pipe galvanized with an average thickness of more than 85 micron.



PACKING & HANDLING

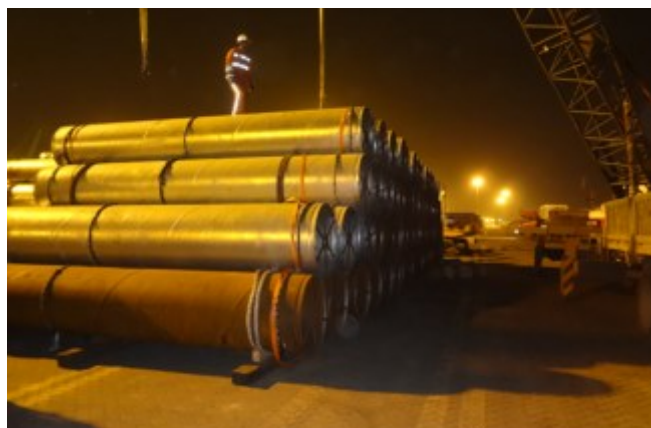
Both ends welded with spider to prevent deformation.



LOADING & DELIVERY



LOADING & DELIVERY

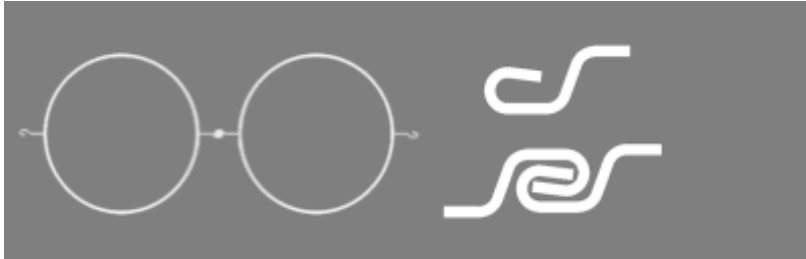




BHP TUG HARBOUR , AUSTRALIA

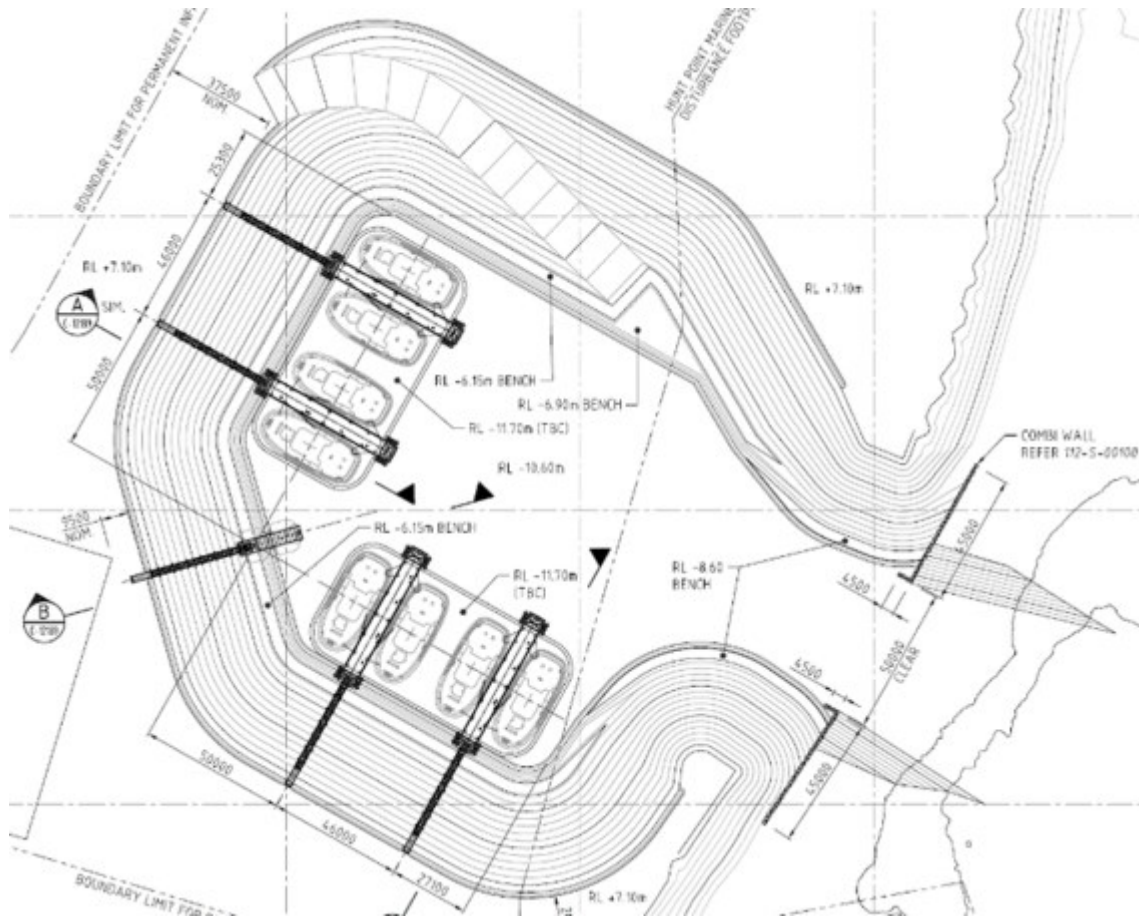
TUG HARBOUR PROJECT

Project Name	Tug Harbour
Project Location	Port Headland, Australia
Product	Tubular Pile with Clutches and Mooring Pipes
Total Tonnage	2,242 MT
Year	2016



The project covered two aspects:

1. Mooring spuds with 3 LPE Coating that were used for the Tug Pontoon & Jetties.
2. Clutched Tubular Piles for the breakwater at the entrance to the harbor.



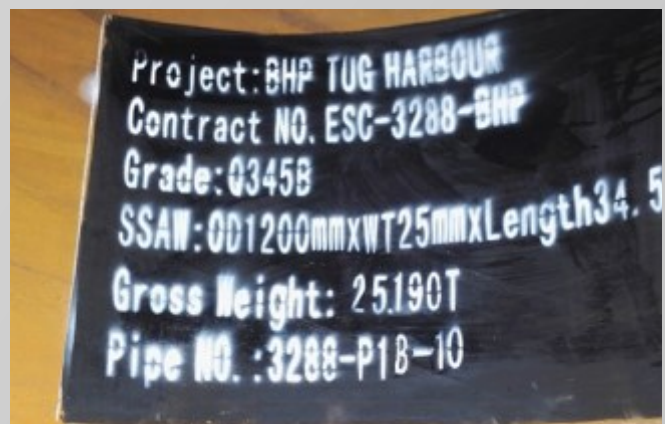
PRODUCT & PROCESS AUDIT



Clients mill visit.



WELDED TUBULAR PILES

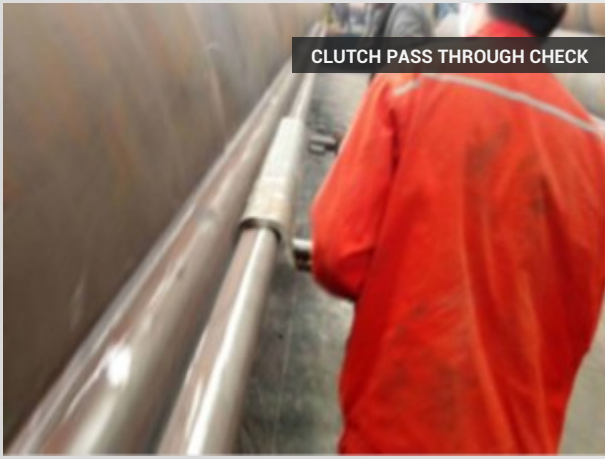


RAW MATERIAL RETEST

INSPECTION



PIPE INSPECTION PRIOR TO COATING

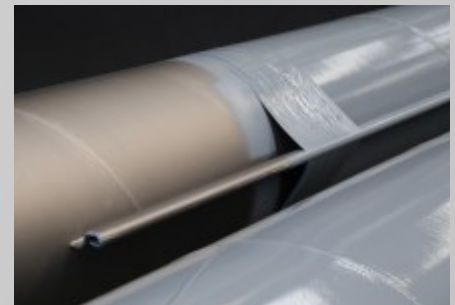


SURFACE PREPARATION

BLASTING



PAINTING OF PIPES



MDPE COATING



HEAT SHRINK SLEEVE INSTALLATION



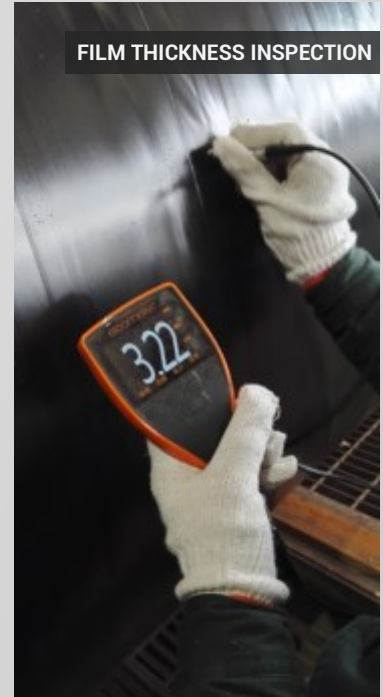
PAINTING INSPECTION



SURFACE ROUGHNESS INSPECTION



HOLIDAY TEST



FILM THICKNESS INSPECTION



WFT TEST



DFT TEST

PACKING & STACKING



CARGO STACKING



CARGO LOADING



CARGO LOADING PROTECTION



PREVENT CLUTCH CONTACT



WOODEN WEDGE WITH PAD



LASHING



LASHING

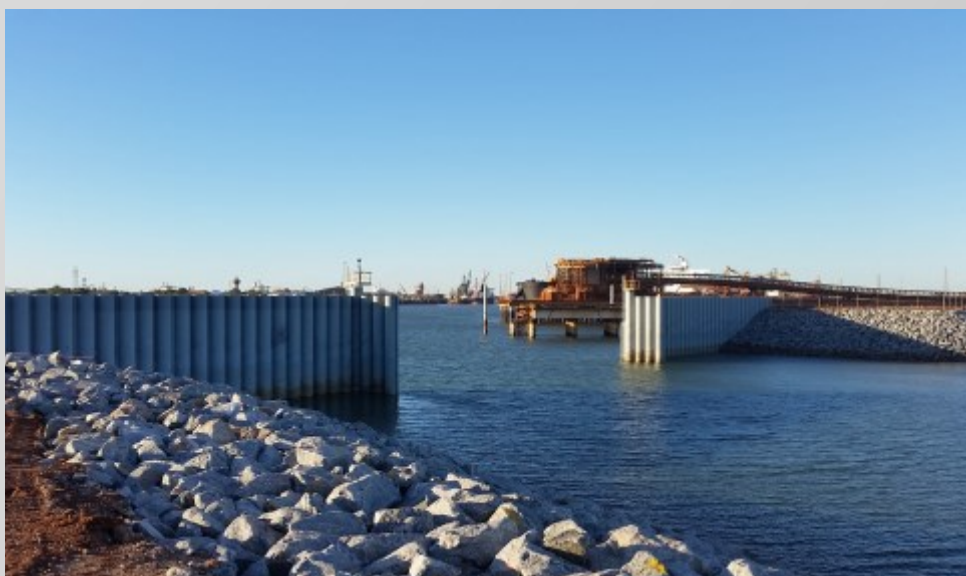
SHIP LOADING



ON-SITE INSTALLATION



PROJECT COMPLETED





BUNGE NORTH AMERICA PROJECT

MONOPILE PROJECT

Project

Bunge Grain Terminal, Louisiana

Delivery Date

Nov 2014

Total Tonnage

2,213 MT

ESC SCOPE OF SUPPLY

LSAW PIPE

ESC was awarded the job to supply painted LSAW pile for Bunge North America Project. The product includes steel pipe in various sizes up to OD2438mm, thickness 63.5mm, and length 49m. All steel pipes with steel grade of ASTM A252 Gr.2 and are manufactured in accordance with API Spec. 2B.



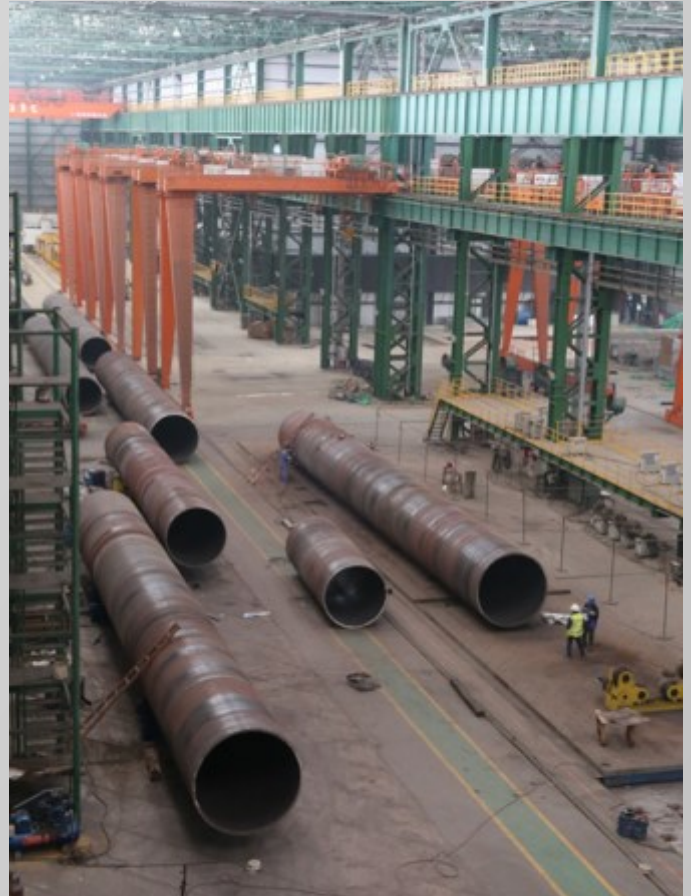
Opening meeting with client representatives.

MONOPILE ROLLING PROCESS



PILE FORMING PROCESS

Preheat of weld to 110°C
in accordance with AWS
D1.1



AUDIT & INSPECTION

The project processes and products were audited by AWS D1 committee member - James K Merrill and Chairman of ASNT Certification Management Council Level III Division - John Kinsey.



The project is fully monitored and inspected by Third Party Company (Caltrop) from incoming raw material to ship loading process.



BLASTING & PAINTING



MONOPILE BLASTING PROCESS



NORMAL PILE BLASTING PROCESS



AUTOMATIC PAINTING TO REPLACE THE MANUAL PAINTING PROCESS PRODUCED VISUALLY CONSISTENT SURFACE AND PAINTING DFT WITH VERY SMALL VARIATION.

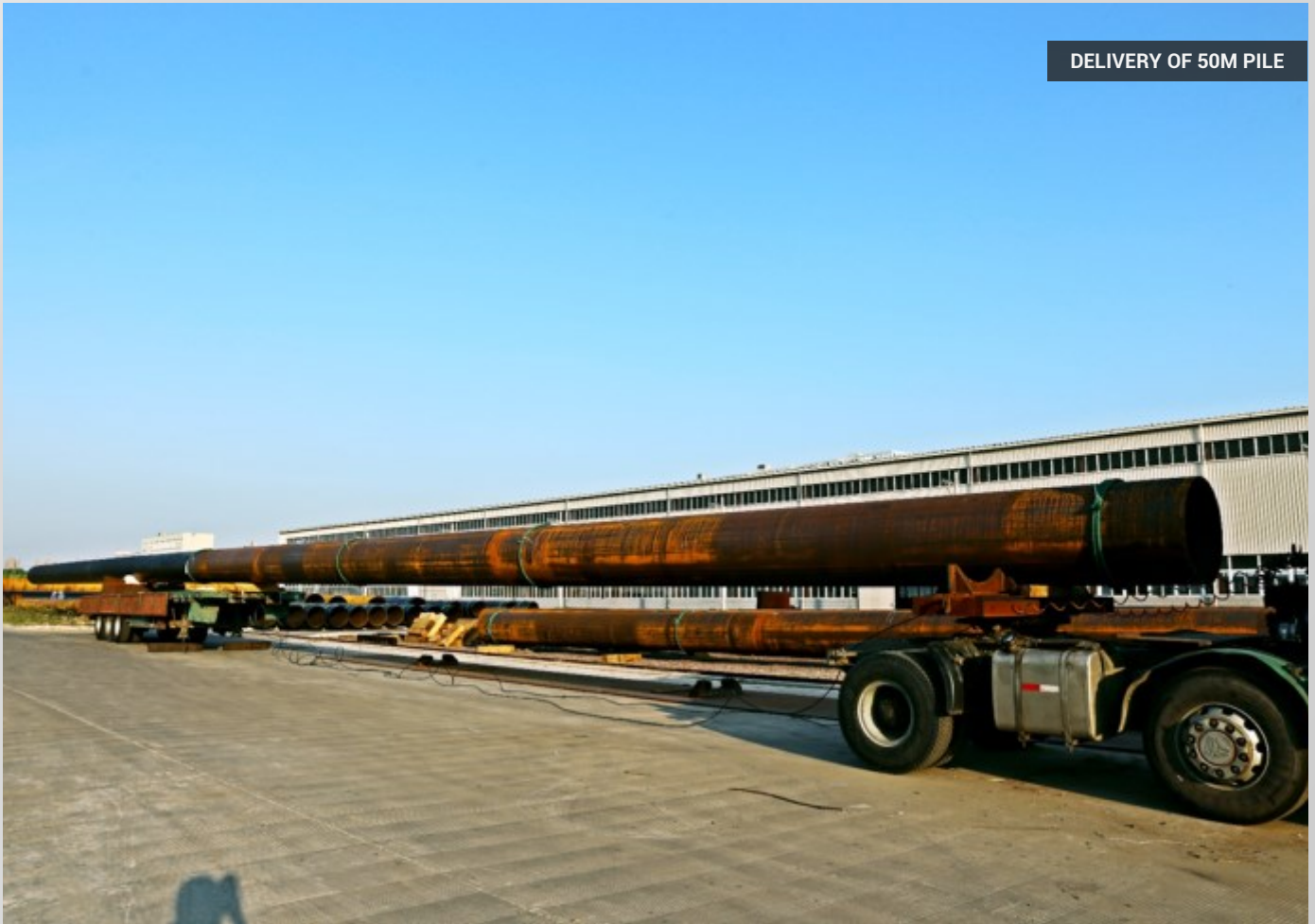


FINISHED PRODUCT



DELIVERY & SHIP LOADING

DELIVERY OF 50M PILE



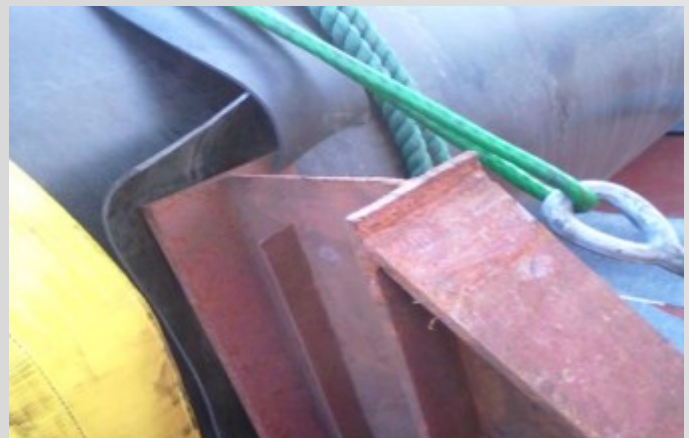
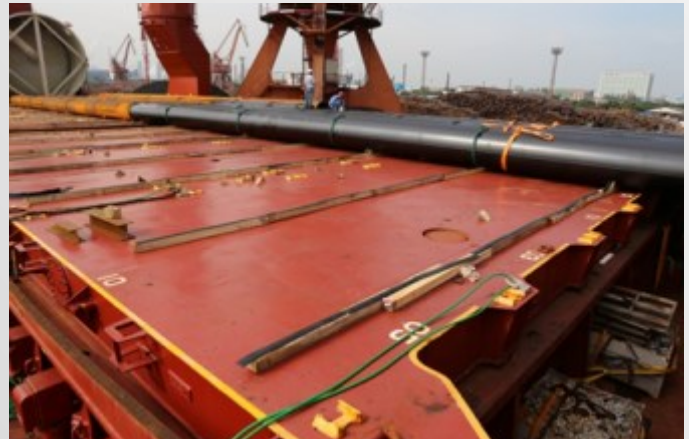
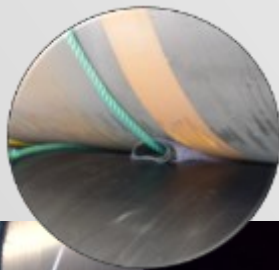
DELIVERY OF MONOPILE FROM FACTORY TO SHANGHAI PORT



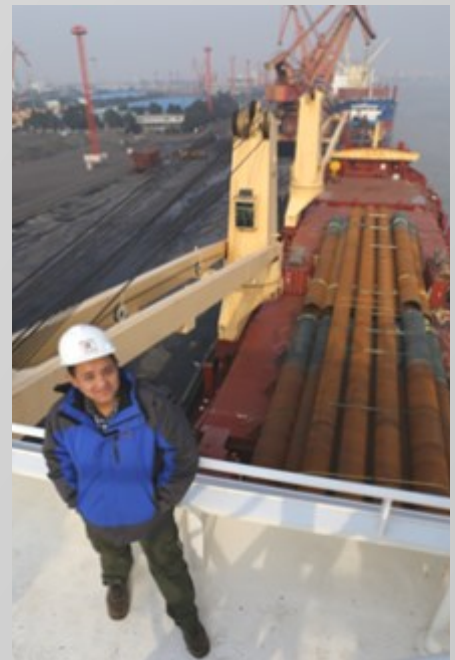
DELIVERY & SHIP LOADING

PROTECTION OF PIPE DURING SHIPMENT TO PREVENT DAMAGE

The pipe is protected to ensure that there is no direct contact of the pipe surface with other metallic (or hard) surfaces. The pipe is properly secured to ensure safety and prevent damage during the shipping process.



DELIVERY & SHIP LOADING



ON-SITE INSTALLATION



CRUISE SHIP DOCKING FACILITY

SHIP DOCKING FACILITY PROJECT

Project Name	Amber Cove, Dominican Republic
Location	Bahia De Maimon, Dominican Republic
Product	SSAW Pipe
Total Tonnage	4,346 MT

ESC SCOPE OF SUPPLY

SSAW PIPE

ESC was awarded the job to supply painted tubular pile for the construction of a cruise ship docking facility located in the Dominican Republic.

ESC supplied the required SSAW pipe with outside diameter range from 508mm ~ 1371.6mm at a thickness of 16mm. Length of pipe varies from a range of 31.396m ~ 54m.

The entire 4,346 tons of painted pipes were delivered to site within 90 days of order.

ESC coordinated with the contractor to ensure the vessel was able to directly unload to their barge at the project site to save time and cost.



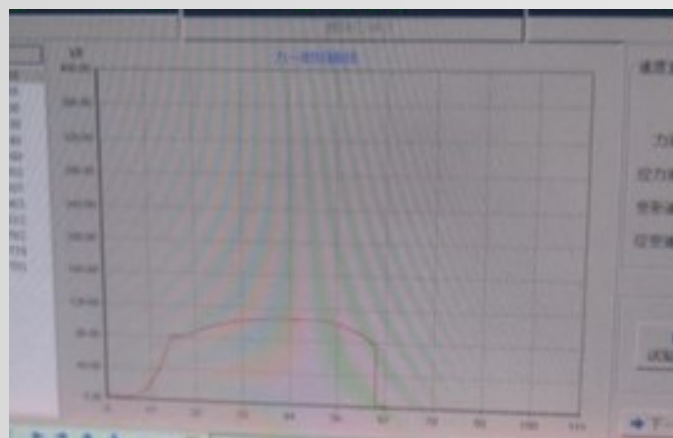
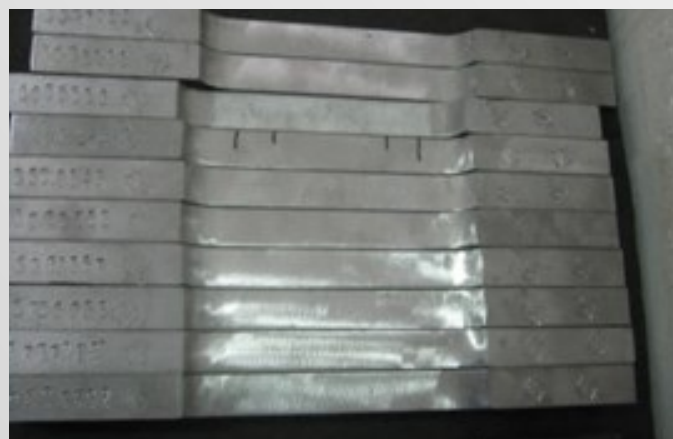
Overall site map.

RAW MATERIAL INSPECTION



The quality of the raw material is critical to ensure the final product meets the project specification. Thickness of each coil is inspected and the identity of the material shall be traceable with each coil.

Raw material (hot rolled steel coil) for the project supplied in accordance with ASTM A1018 Gr50 at a thickness of 16mm.



Mechanical properties test and chemical composition analysis is carried out on each available heat number. Each test is performed with the witness from ABS (third party inspector).

Raw material must pass dimensional inspection, visual inspection, traceability inspection, mechanical properties test, and chemical composition analysis before the production process can be started.

PIPE FORMING

Traceability: Stencil marking on the pipe inner surface once the pile is formed to ensure traceability is under control throughout the whole production process.



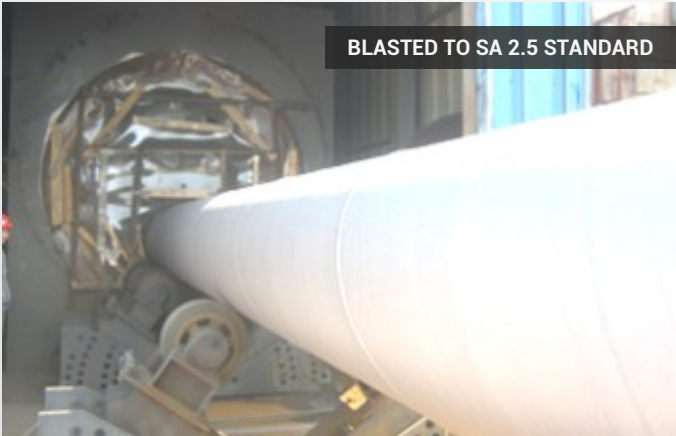
A third party inspector was present during the entire production process including all quality control processes, ABS (American Bureau of Shipping) was the third party inspector.

Quality Control: 100% visual inspection, online UT as well as manual UT performed on both spiral and plate end welds, 100% dimensional inspection including ovality, straightness, diameter, length, and squareness of pipe ends.

SURFACE PREPARATION & PAINTING



AMBIENT CONDITION MEASUREMENT



BLASTED TO SA 2.5 STANDARD



BLASTED PIPE



PAINTED WITH BLACK COLOUR COAL TAR EPOXY PAINT WITH TOTAL DRY FILM THICKNESS OF 410µM



CHECK SUBSTRATE TEMPERATURE PRIOR TO EACH LAYER OF COATING



RANDOM SAMPLE ADHESION TEST



DFT INSPECTION IN ACCORDANCE WITH SSPC PA2



100% HOLIDAY TEST

PACKING, STACKING & SHIP LOADING



SHIP LOADING



ARRIVAL AT DESTINATION



DOMINICAN REPUBLIC CRUISE SHIP DOCKING FACILITY



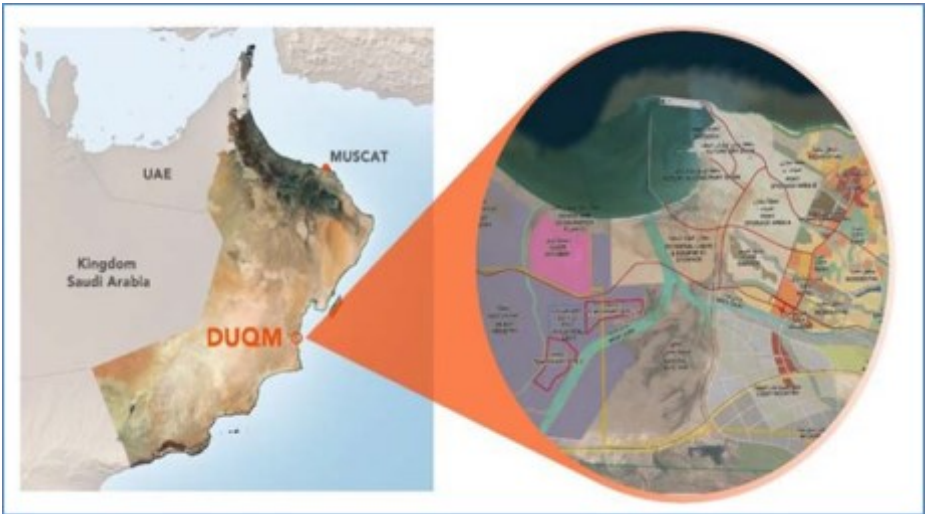


DUQM LIQUID BULK BERTHS PROJECT

LIQUID BULK BERTHS PROJECT

Project Name	DUQM Liquid Bulk Berths Project
Location	Sultanate of Oman
Product	LSAW Pipe
Total Tonnage	5,046MT
Corrosion Protection System	Interzone 505 (Total DFT: 800µm)
Delivery Date	November 2017

INTRODUCTION



Location map & master plan details.

The Government of The Sultanate of Oman is in the process of developing Duqm town and the Port of Duqm, as a strategic dry dock, free trade zone, industrial and tourism destination. The Port of Duqm is seen as a catalyst for the development of the Al Wusta region. The Port and Dry Dock are being developed to increase the trade; i.e. cargo trans-shipments, ship repair, manufacturing and tourism. The site enjoys proximity to the busy regional sea-lanes of Oman's coastal waters and is characterized by a friendly climate.

ESC SCOPE OF SUPPLY

LSAW PIPE

ESC was awarded the job to supply 5,046MT of painted LSAW pipe (specification: OD1219, thickness 22mm, length from 13m ~ 24.5m) with material API Spec. 5L grade X60. The LSAW pipe is required to be fabricated in accordance with client supplied project specific specifications.



PRODUCTION & INSPECTION

PROCESSES



SURFACE PREPARATION

ACTIVITIES

Past president of SSPC: year 2016~2017, with NACE level III, and SSPC level III qualification) along with his assistant (NACE level III qualification) are assigned by client to audit ESC about the painting process to minimize the risk of failure.

PRE-BLASTING INSPECTION



SURFACE QUALITY CHECK (ISO 8501-3 GRADE P2)



AMBIENT CONDITION CHECK



ABRASIVE CONTAMINATION CHECK

SHOT BLASTING TO SA2.5



POST-BLASTING INSPECTION



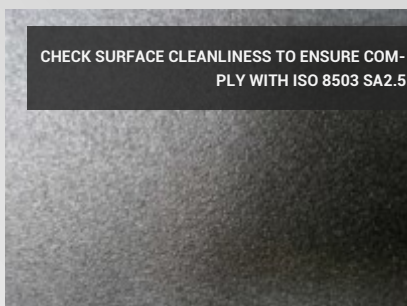
COMPRESSED AIR CLEANLINESS INSPECTION IN ACCORDANCE WITH ASTM D4285



DUST REMOVAL USING COMPRESSED AIR



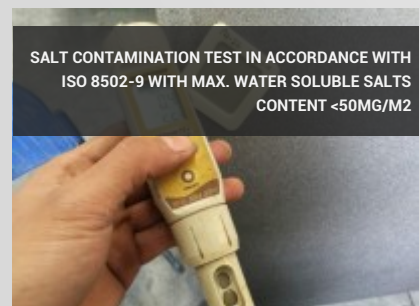
DUST TEST COMPLYING WITH ISO 8502-3 MINIMUM CLASS 2



CHECK SURFACE CLEANLINESS TO ENSURE COMPLY WITH ISO 8503 SA2.5



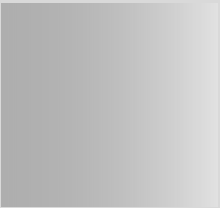
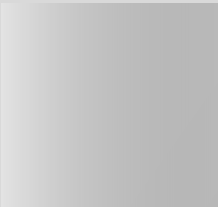
SURFACE ROUGHNESS INSPECTION IN ACCORDANCE WITH ASTM D4417 METHOD C



SALT CONTAMINATION TEST IN ACCORDANCE WITH ISO 8502-9 WITH MAX. WATER SOLUBLE SALTS CONTENT <50MG/M2

PAINTING PREPARATION

ACTIVITIES



- Check substrate temperature
- Check paint temperature
- Check amount of thinner added
- Monitor paint mixing ratio

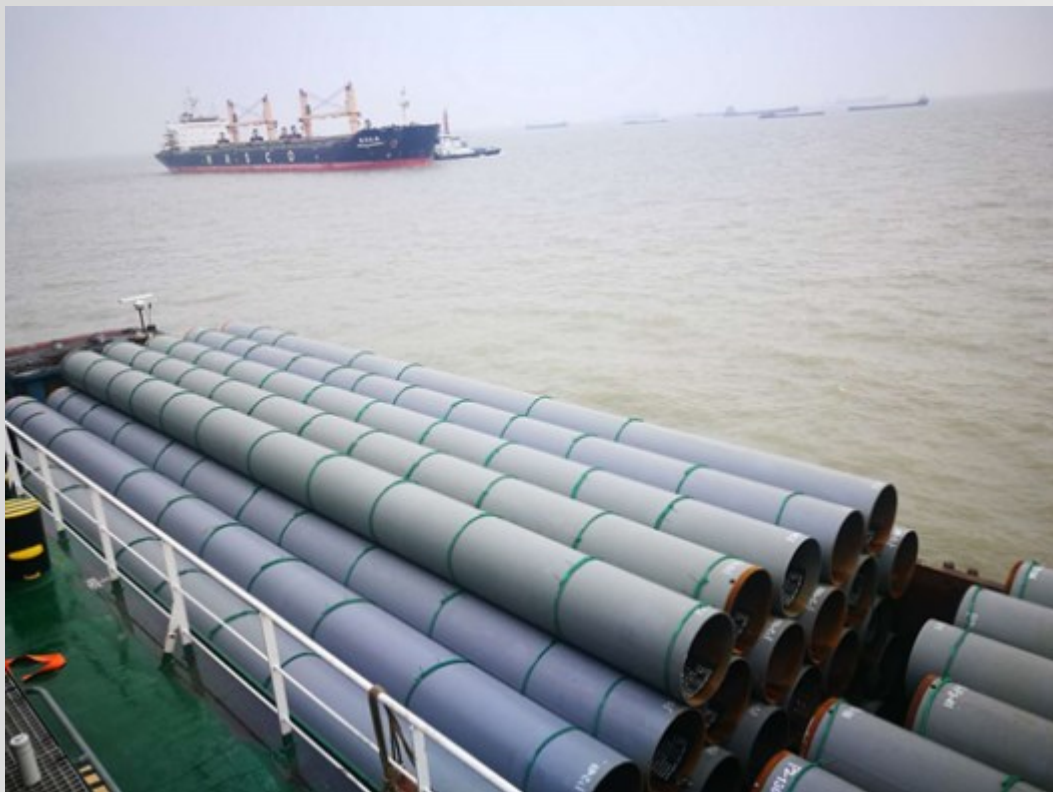
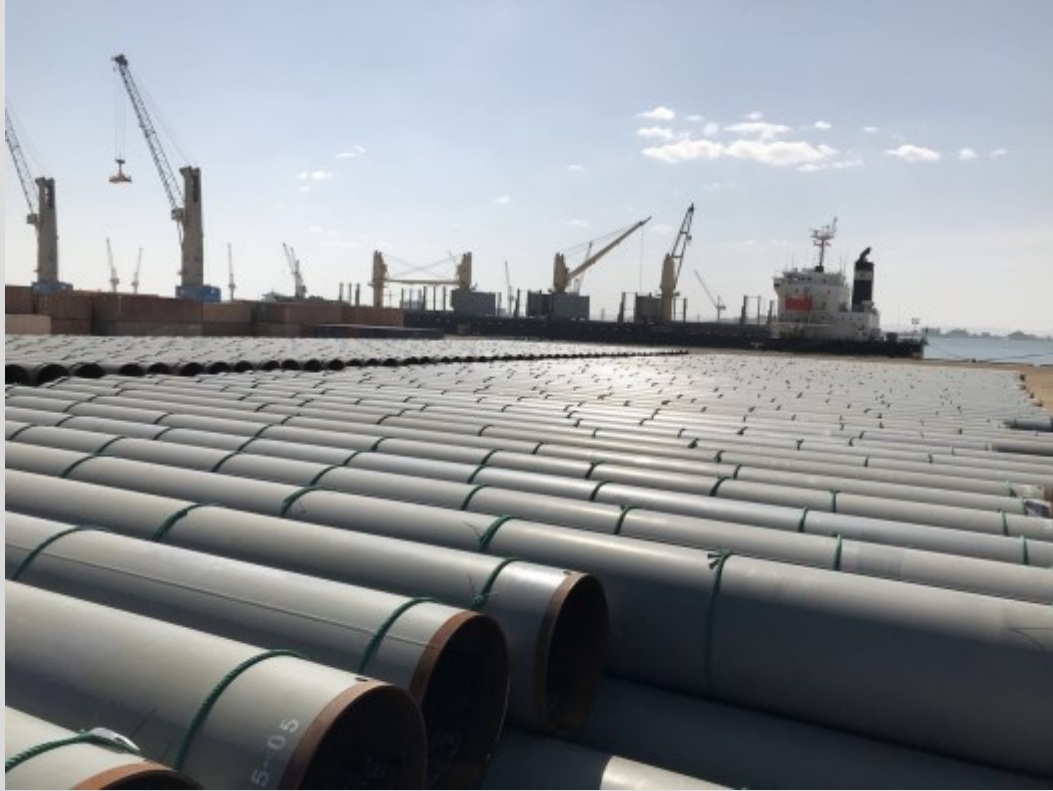


PAINTING

ACTIVITIES



FINISHED PRODUCT



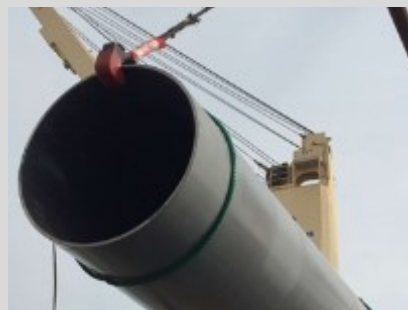
SHIP LOADING



Customized lifting hooks used for lifting to prevent damage.



Stopper with pad at side edge to prevent pipe sliding.



Wooden pad at the bottom for the pipe to prevent direct contact of painted pipe with hard seating surface.



ON-SITE INSTALLATION





FALKLANDS MARE HARBOUR PROJECT

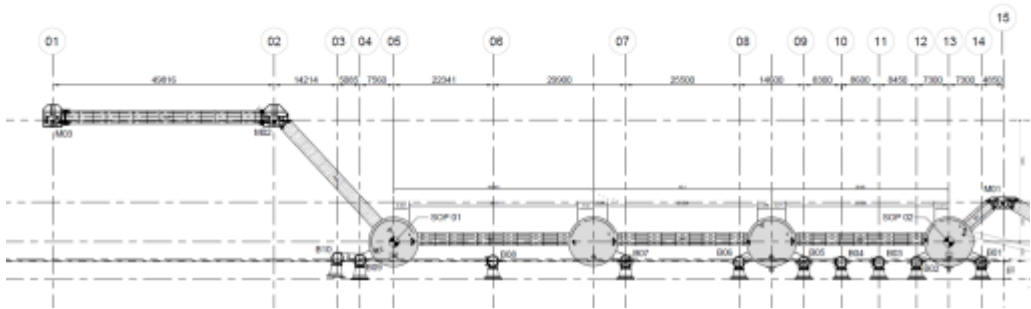
HARBOUR PROJECT

Project Name	Falklands Mare Harbour Project
Location	Mare Harbour, Falklands Island
Product	LSAW Pipe
Total Tonnage	800 MT
Delivery Date	Mar 2017

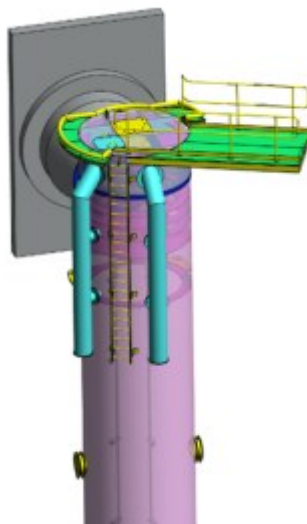
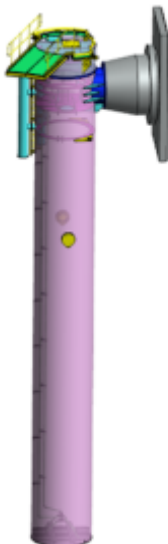
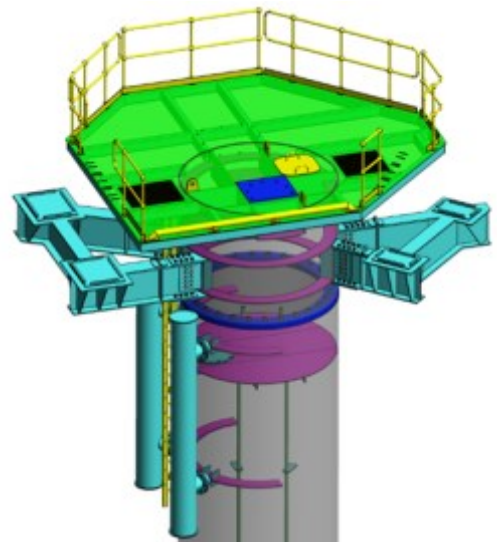
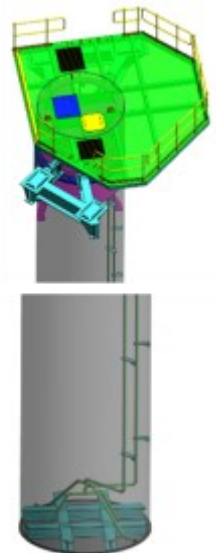
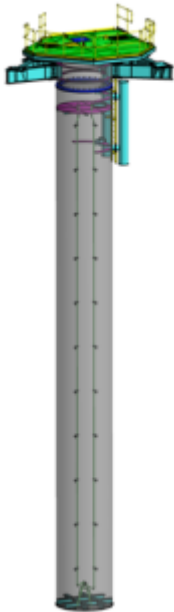
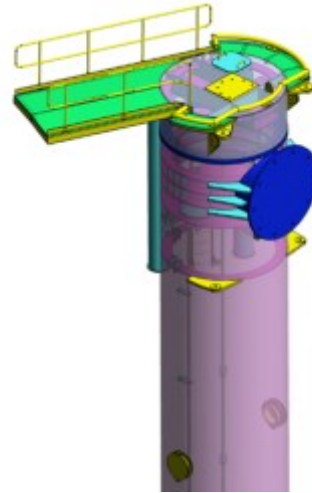
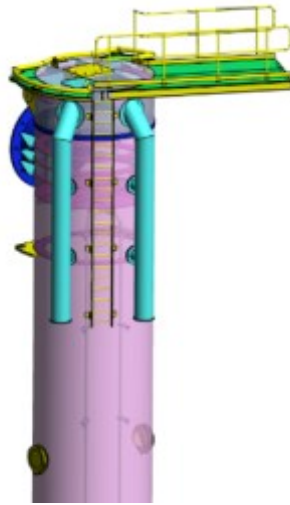
ESC SCOPE OF SUPPLY

LSAW PIPE

ESC has been awarded the contract to supply 800MT of mooring pile for Mare Harbour RoRo facility upgrade project in the Falkland Islands. ESC's scope of supply include the pipe pile and the pile head steel structure (bollards, anchor bolts, fenders, chains, and other related connection parts). The pipe with external diameter of 1067 ~ 2489mm and the steel grade of the project are S355J2, API 5L X70 and X80.



PILE DESIGN 3-D DRAWINGS



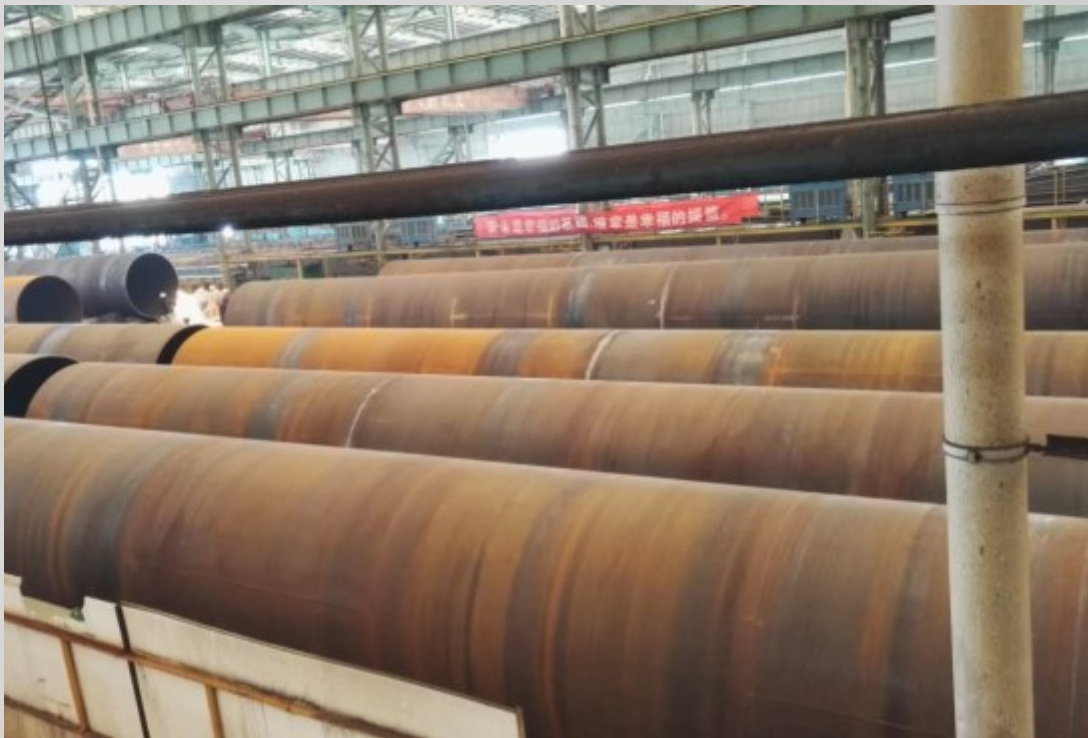
LSAW STEEL PIPE FORMING

Each heat number is retested to confirm all material mechanical properties and chemical composition is as per requested by the client.

Material traceability (part number and heat number) is maintained (physical marking and paper records) throughout the production processes starting from incoming raw material to the finished

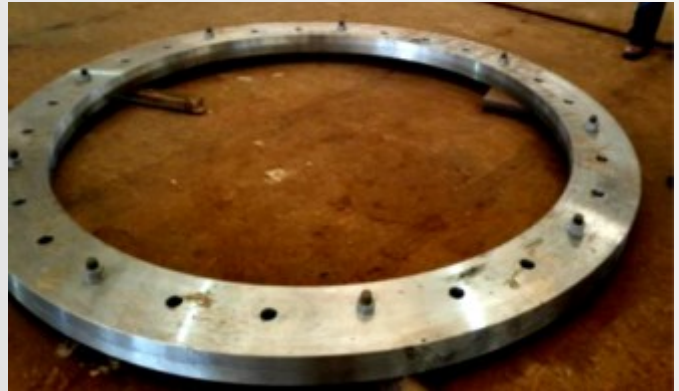
product.

Welding is carried out in accordance with ISO 15614 standard. All welds are tested with 100% visual inspection, 100% ultrasonic test, and 10% magnetic particle inspection with quality level complying BS EN 5817 category C.

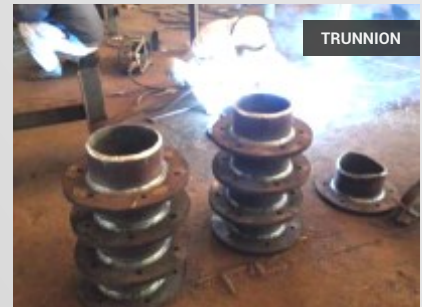


MOORING PILE HEAD FORMING

All components that are delivered as loose items are trial assembled as per design drawings to ensure all items fit and to minimize the risk of delivering defective components to the field.



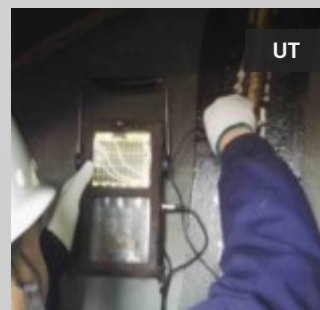
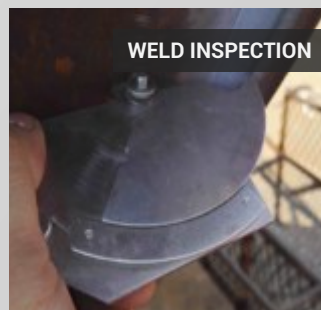
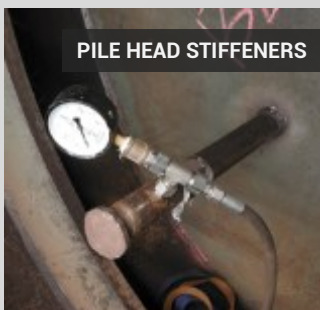
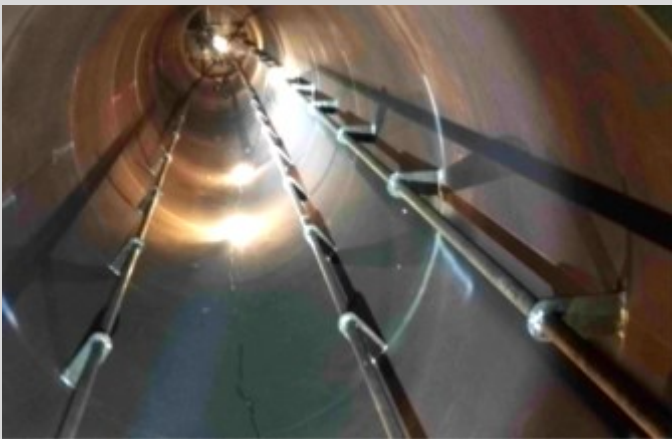
MOORING PILE HEAD COMPONENTS



WELDED COMPONENTS

STEEL PIPE WITH WELDED COMPONENTS

After the welding of grout pipes, all grout pipes are tested with a water pressure test at the pressure of 2MPa with a holding time of 15 minutes to ensure no leakage during the application.



PAINTING

SURFACE CONDITION

Surface Cleanliness: Sa 2.5

Surface Roughness: >75 microns



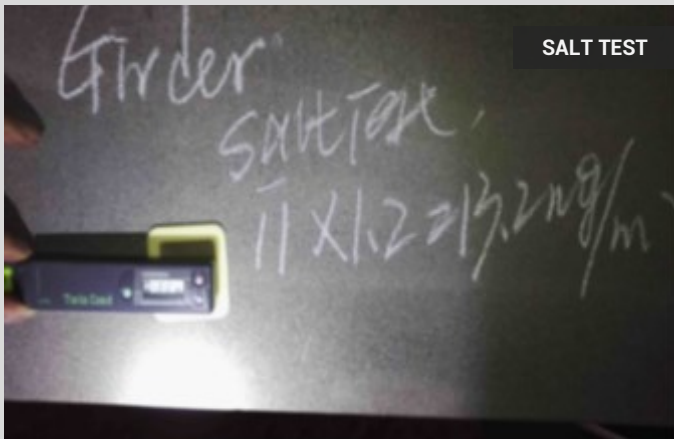
ANTI-SKID COATING



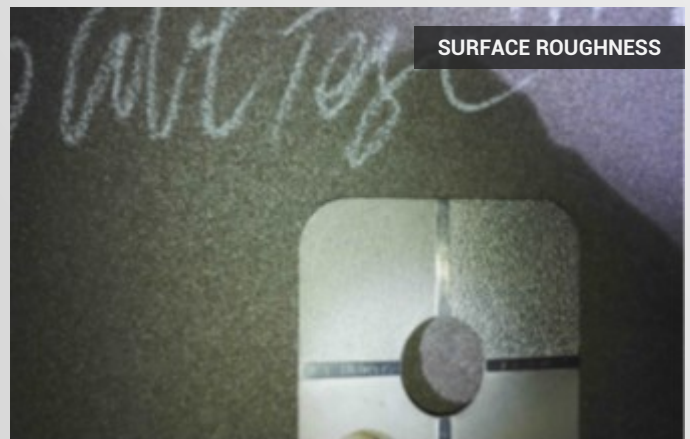
PAINTED COMPONENTS



PAINTED PILE BODY



SALT TEST



SURFACE ROUGHNESS



VISUAL & DFT

PAINTING SYSTEM

1st Coat: Interzone 505 (440 microns)

2nd Coat: Interzone 505 (440 microns)

Total DFT: 880 microns

Application method: Airless Spray

PACKING & STACKING

All materials are properly packed, protected, and stacked to ensure no damage during the handling process.



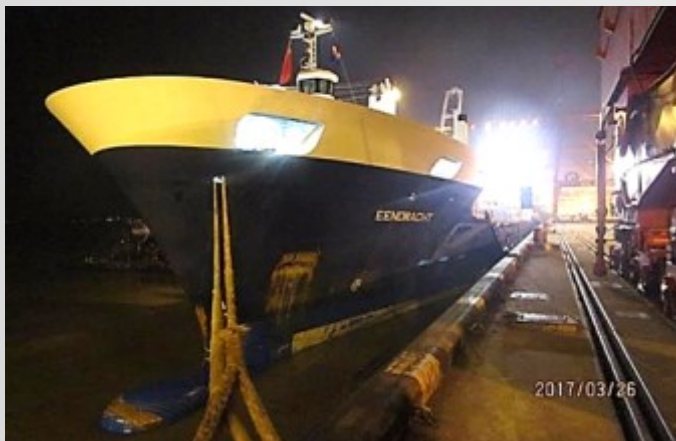
Packing and stacking is designed to ensure no painted surface comes in contact with any hard surface.

Spider is used to prevent the pipe from deformation.

Rack is used on loose small components.



SHIP LOADING



LASHING CONDITION



ON-SITE INSTALLATION



HINKLEY POINT C – AGGREGATE JETTY PROJECT

AGGREGATE JETTY PROJECT

Project Name	HPC – Hinkley Point C – Aggregate Jetty Project
Location	Somerset, England
Product	LSAW / SSAW Pipe
Total Tonnage	3,990 MT
Delivery Date	Oct 2016

INTRODUCTION

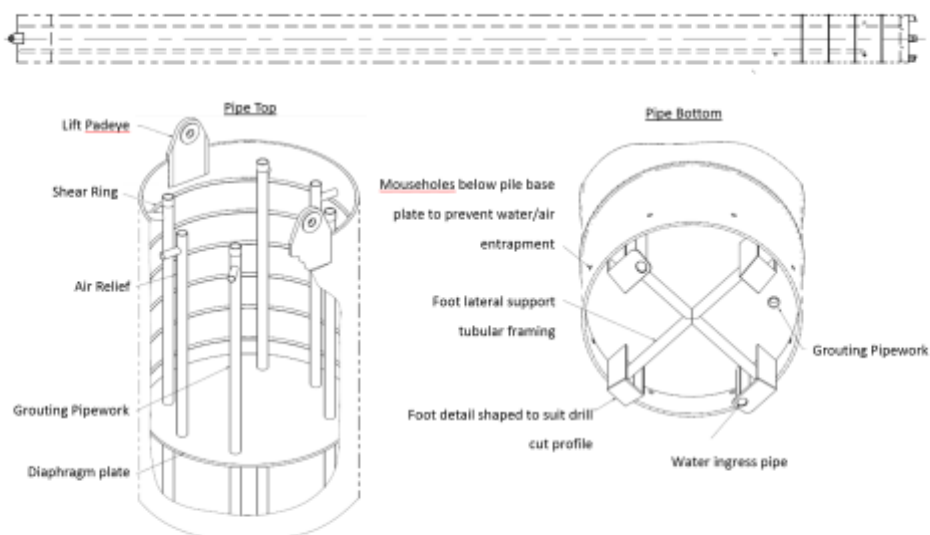


UK EPR is located at Hinkley Point, on the bank of Bristol Channel in Somerset. Two nuclear power stations are currently located on the site: Hinkley Point A (currently decommissioning) and Hinkley Point B (Operating). The new planned power station is Hinkley Point C (HPC).

ESC SCOPE OF SUPPLY

LSAW PIPE

ESC has been awarded with the contract to supply 3,990MT of pipe pile for the HPC temporary aggregate jetty (Berthing Island, Dolphins, and Jetty Bridge). The pipe piles outside diameter varies from 914mm to 3,600mm and various steel grades (S460M, S420MH, and S355J2).



INCOMING RAW MATERIAL

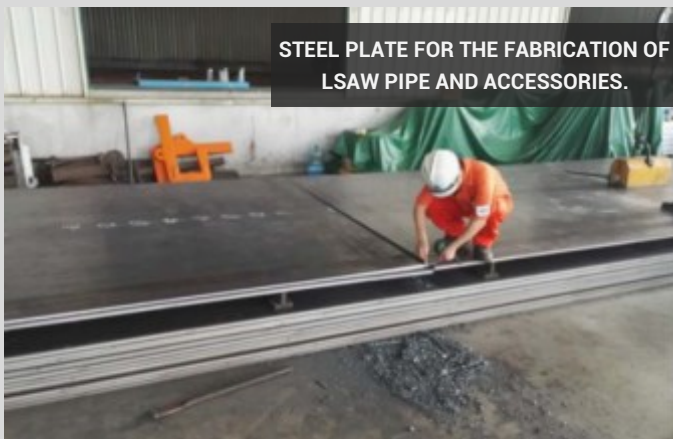
Berthing Island – Consists of SSAW pipe pile with LSAW pile head.

Dolphin – Consists of LSAW pipe pile.

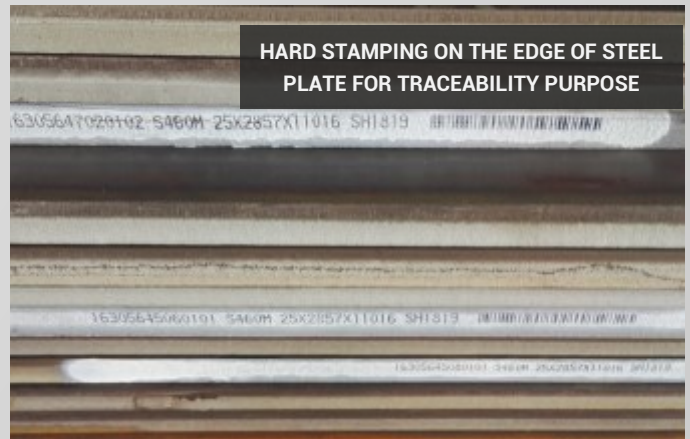
Jetty Bridge – Consists of a mix of SSAW pipe pile with LSAW pipe pile.



STEEL COIL FOR THE FABRICATION OF SSAW PIPE



STEEL PLATE FOR THE FABRICATION OF LSAW PIPE AND ACCESSORIES.



HARD STAMPING ON THE EDGE OF STEEL PLATE FOR TRACEABILITY PURPOSE



SEAMLESS PIPE FOR THE FABRICATION OF GROUT PIPE



ELBOW



HEX HEAD PLUG



FITTINGS FOR GROUT PIPE OUTLET

PIPE FORMING

PIPE FORMING

Sample test plates are taken from each heat number for mechanical properties and chemical composition retest prior to the production process being started.



RAW MATERIAL RETEST



RAW MATERIAL RETEST

SSAW PIPE FORMING

Production for the SSAW pipe forming process includes coil feeding, beveling, welding, and online Ultrasonic Test.



LSAW PIPE FORMING



PRE-BENDING



ROLLING



FORMED PIPE CAN

FORMING & WELDING ACCESSORIES

FABRICATION OF ACCESSORIES



PIPE FOOT



GROUT PIPE SUPPORT



ASSEMBLY OF GROUT PIPE

WELDING OF SHEAR RINGS

There are two types of shear ring applicable to this project: Shear ring formed by using surface weld of height 15mm x width 30mm. Shear ring formed by fillet weld at a height 20mm x width 25mm square bar.



WELDING OF GROUT PIPE, LIFT PADEYE, FOOT AND DIAPHRAGM PLATE



WELDING INSPECTION, TRACEABILITY AND OTHER TESTING

The production and inspection process is carried out in accordance with EN 1090-2 class EXC3. Generally, 100% of ultrasonic test and 20% of magnetic particle inspection performed on full penetration butt weld; 10% of magnetic particle inspection performed on fillet weld of ancillaries.



Hydrostatic test performed on each grout pipe and grout hose. The test was carried out with the water pressure of 1.5MPa with a holding time of 15 seconds.



During the production process the welding and inspection information are stenciled on the pipe body. A final product stencil marking will be made at the end of the internal surface for each pipe.

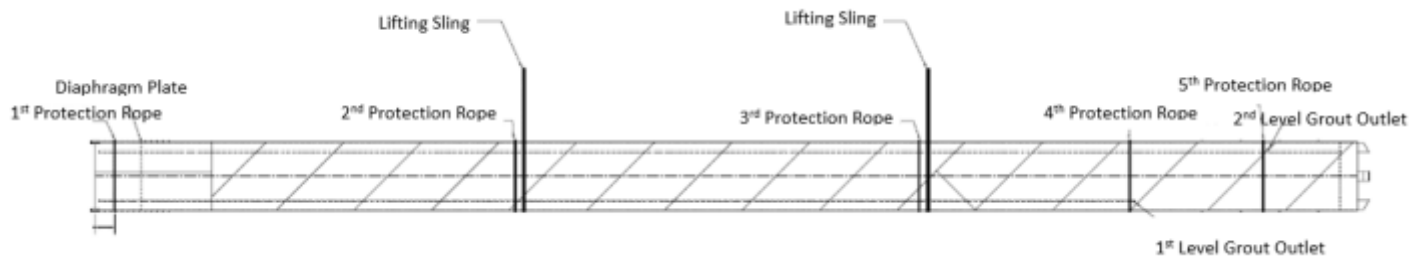


FINISHED PRODUCT

ESC assigned a fulltime qualified inspection QA/QC staff member (AWS CWI) to monitor, witness, and perform inspection in the factory throughout the production process (from incoming raw material to ship loading process) to ensure all products were delivered as per project requirements.



PACKING & STACKING



Careful consideration was made when designing the packing method to prevent damage to the pipe and welded components. Each pipe is protected with protection ropes and two lifting slings are provided.



SHIPPING, STACKING & LOADING

There are a total of two shipments, both shipments carried out in Taicang wharf of Jiangsu at 14th September 2016 (1st shipment) and 15th ~ 17th October 2016 (2nd shipment).

The entire loading and stacking process is fully witnessed by ESC representatives and a third party inspector to ensure products are properly loaded, stacked, and secured to prevent damage during the shipping process.

All products stacked in the wharf yard are padded and stoppers used to prevent damage and sliding. Two different loading processes used: 1) Directly from barge to ship, 2) From wharf yard to ship.

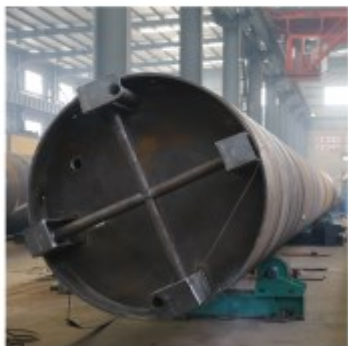


SHIPPING OF LOADED PIPES





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