

MARINE LOADING ARMS

JIANGSU CHANGLONG TECHNOLOGIES CO., LTD.



CONTENTS

- 01** Introduction
- 02** Technology developing department
- 03** Manufacture test and inspection
- 05** Summary
- 06** FB(Full Balance) Marine Loading Arms
- 07** RC(Rotation Counterweight) Marine Loading Arms
- 08** RC(Rotation Counterweight) Marine Loading Arms (Manual operated)
- 09** RC(Rotation Counterweight) Marine Loading Arms (Hydraulically operated)
- 10** RC(Rotation Counterweight) Marine Loading Arms (With Vapor Recovery Hydraulically operated)
- 11** Cryogenic Marine Loading Arms
- 12** Arm on Vehicle
- 13** Hose Crane
- 14** Design Information
- 17** Base of loading arm/ standard base plate to see the table and drawing
- 18** Swivel Joint
Double Ball Valve / Emergency Release Coupler (DBV/ERC)
- 19** Quick Connect/ Disconnect Coupler (QC/DC)
Electric-hydraulic Control QC/DC
- 20** Adjustable Support Jack
- 21** Removable Elbow
- 22** Marine Loading Arms Envelope
- 23** Electro-hydraulic Control System
- 24** Reference



Introduction

Changlong Technologies (CCL) is one of the world's leading companies of fluid loading systems with a high reputation in solutions for marine, truck/railcar truck fluid handling systems. Our services include design, manufacture, installation and maintenance of marine loading arm, truck/railcar loading arm, emergency release coupler, twin seal guide way valve, quick release hook and gangway. Supported by COSCO Group (China Ocean Shipping Corporation) and Changlong Group, the loading systems offer customers advanced technology and qualified certificates: ISO 9001:2000, API. Our customers include SINOPEC, CNPC, CAOSC, ESSO, SHELL, TOTAL, ArC, ELF, BP, BASF and other brand companies. Benefited from the booming Chinese economy and development of technology, we are trying to be the best supplier in this area, contributing high quality and cost-effective products to our customers.



API Certification



ISO Certification



Certification of first class supplier



Recommended products by SINOPEC

Technology developing department



Quality Assurance

1	2
3	4
5	

1. Research and development department

2. Ultrasonic gage

3. Magnetic particle test

4. Shot blasting

5. Loading arm assembly

Manufacture test and inspection



1	
2	3
4	5

1. CNC lathe workshop
2. Chemical analysis
3. Balance adjusting

4. Cryogenic test (-196°C)
5. Life test of swivel joint

Marine Loading Arms



Summary

- Being designed for transferring liquids and gases between the pipe system of a jetty and tanker or barge.
- Following the normal movements of moored vessels.
- Can be equipped with a Monitoring system to provide visual and audible alarms prior to the ships manifold moving outside the nor working area.
- Can be manoeuvred manually and electro -hydraulically depending on loading arm size ,type and duty.
- **Nominal Diameter :** DN100 – DN600 (4 " – 24 ")
- **Design Pressure:** –0.06 MPa – +10 MPa
- **Design temperature:** –196°C– +250°C
- **Pipe Material:** Carbon Steel Stainless Steel
Low - Temp.Steel Lined with PTFE



FB(Full Balance) Marine Loading Arms

Features:

- Easy operation Small dead weight Small space required Minimal wind load
- The model FB is designed as a self supporting arm with larger swivel joints to take up all external and internal load and flexible torque.
- The risey, trunnion assembly and apex swivel joints are equipped with hardened races and designed to take up all load and flexible torque.
- During loading or unloading only the weight of the product in the inboard and outboard arm and wind force imposing on the tanker flange.

Nominal Diameter :

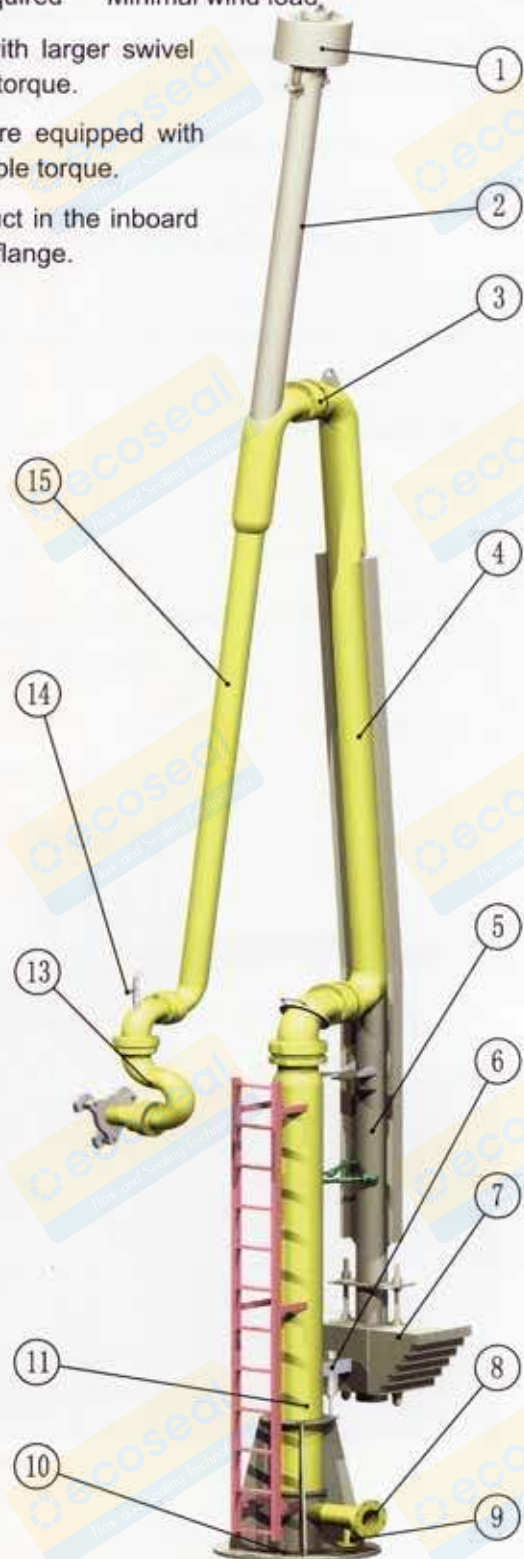
DN100 - DN250 (4 " - 10 ")

Pipe Material:

Carbon Steel Stainless Steel Low - Temp. Steel



- (1) Outboard Arm Counterweights
- (2) Counterweight Beam
- (3) Apex Swivel Joint
- (4) Inboard Arm
- (5) Counterweight Beam
- (6) Locking Device
- (7) Counterweight
- (8) Inlet Flange
- (9) Drain
- (10) Base Plate
- (11) Riser
- (12) Ship Connecting Flange
- (13) Triple Swivel Assembly
- (14) Vacuum Breaker System
- (15) Outboard Arm



RC(Rotation Counterweight) Marine Loading Arms

Features:

- Easy operation Easy seal change Separate support structure
- The diameter of swivel joints and pipeline are identical.
All swivel joints are identical.
- The model RC features a separate support structure with its own generously sized mechanical bearings, which take up all major external load and flexible torque.
- The swivel joints and pipeline only are affected by the stress of internal pressure and weight.
- Pipeline is attached to support structure by flexible parts for compensating overstress.
- Counterweight balancing system makes the loading arm to balance in all positions, balancing Inboard and outboard arm by a moving counterweight.
- The model RC developed especially to meet the increased requirements for loading critical media. Furthermore, the model can be designed for long reach capability.
- The model RC equipped with three hydraulic driving assemblies for independent movements of the inboard arm, outboard arm and the slewing movements around its vertical axis. The driving assemblies are Interchangeable. The 3 cylinders are operated by an electro/ hydraulic control console. A portable remote control system can also be installed to control the arm movements from other points of the jetty or from tanker's deck.
- The model RC can be equipped with double ball valve or double disk valve / emergency release coupling (DBV/ERC,DDV/ERC) which are automatically actuated when the tanker manifold flange to which the loading arm is connected moves outside the working and safety envelope.
- The model RC marine loading arm can be equipped with QC/DC, it is suitable for different manifold flange of the vessel. In this case, the operation is very conveniently and quickly.
- The model RC can be equipped with a vapour return line as per client's requirement.



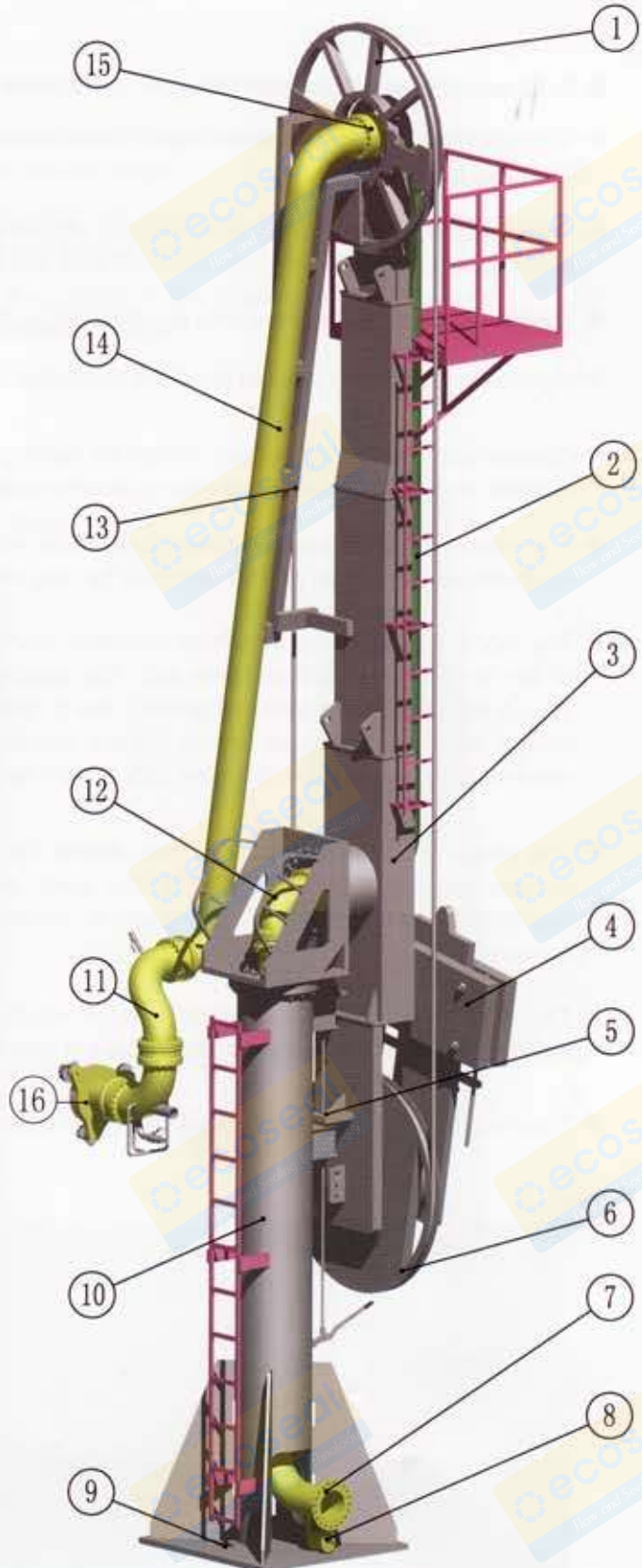
RC(Rotation Counterweight) Marine Loading Arms (Manual operated)



Nominal Diameter :

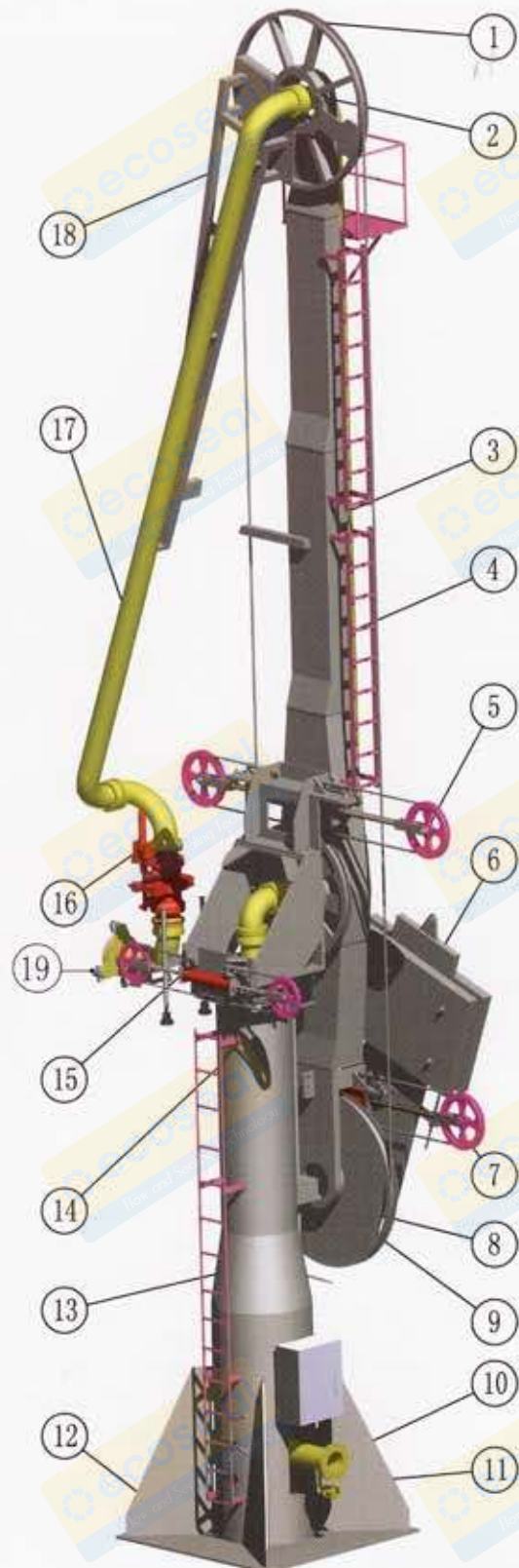
DN100 - DN250 (4 " - 10 ")

- (1) Apex Sheave
- (2) Inboard Arm
- (3) Inboard Arm Support
- (4) Counterweight
- (5) Locking Device
- (6) Cable Sheave
- (7) Connection Flange
- (8) Drain Nozzle
- (9) Base Plate
- (10) Riser
- (11) Triple Swivel Assembly
- (12) Removable Elbow
- (13) Outboard Arm support
- (14) Outboard Arm
- (15) Apex Swivel Joint
- (16) Manual QC/DC



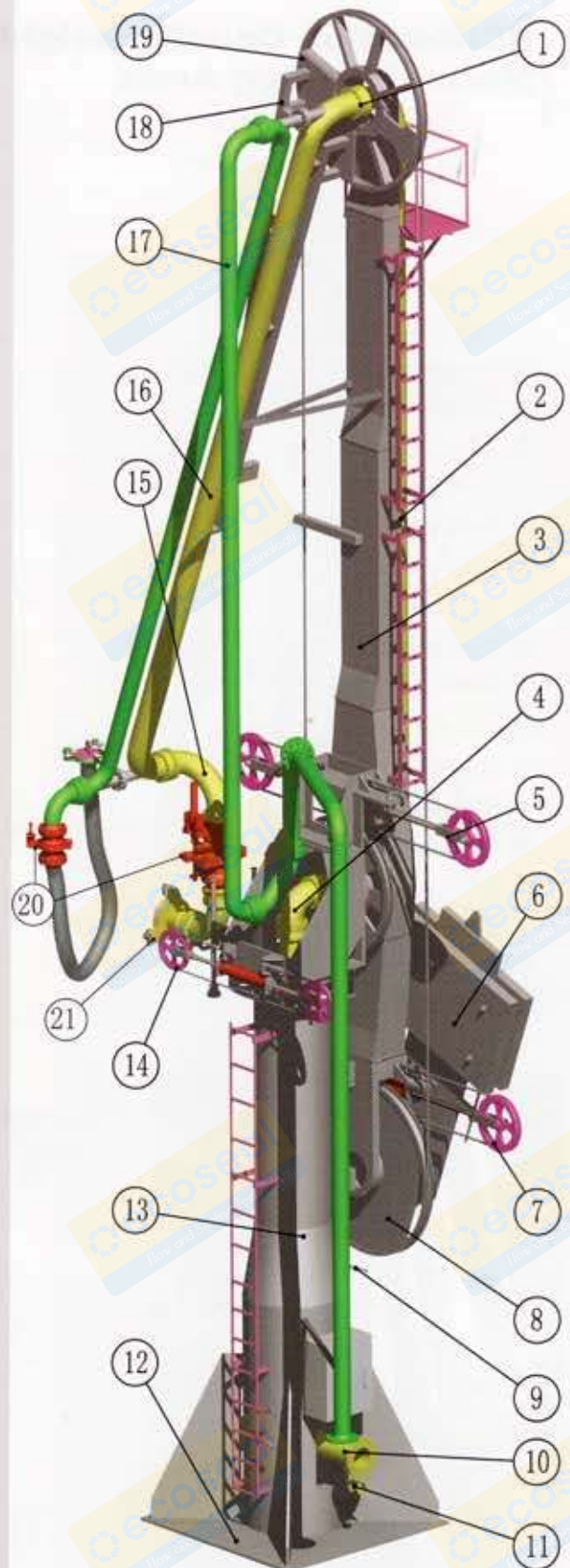
RC(Rotation Counterweight) Marine Loading Arms (Hydraulically operated)

- (1) Apex Sheave
- (2) Apex Swivel Joint
- (3) Inboard Arm
- (4) Inboard Arm Support
- (5) Inboard Arm Drive
- (6) Counterweight
- (7) Outboard Arm Drive
- (8) Cable Sheave
- (9) Locking Device
- (10) Connection Flange
- (11) Drain Nozzle
- (12) Base Plate
- (13) Riser
- (14) Slewing Drive
- (15) Removable Elbow
- (16) ERC
- (17) Outboard Arm
- (18) Outboard Arm Support
- (19) Manual QC/DC



RC(Rotation Counterweight) Marine Loading Arms (With Vapor Recovery Hydraulically operated)

- (1) Apex Swivel Joint
- (2) Inboard Arm
- (3) Inboard Arm Support
- (4) Removable Elbow
- (5) Inboard Arm Drive
- (6) Counterweight
- (7) Outboard Arm Drive
- (8) Cable Sheave
- (9) Locking Device
- (10) Connection Flange
- (11) Drain Nozzle
- (12) Base Plate
- (13) Riser
- (14) Slewing Drive
- (15) Triple Swivel Assembly
- (16) Outboard Arm
- (17) Vapor Recovery Line
- (18) Outboard Arm Support
- (19) Apex Sheave
- (20) ERC
- (21) Manual QC/DC



Cryogenic Marine Loading Arms



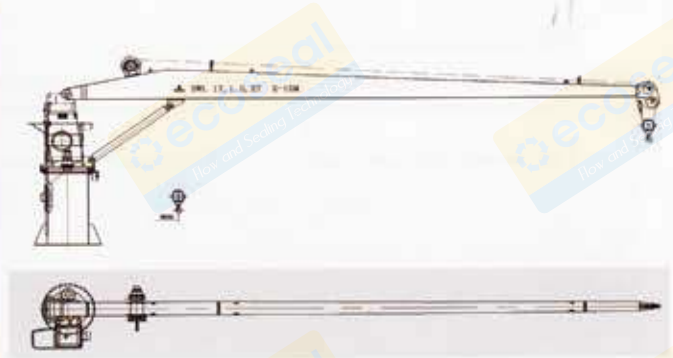
Cryogenic loading arm is used for conveying cryogenic media such as LNG, ethylene. The supporting structure of the arm is specially designed to prevent it contacting directly from the cryogenic pipeline, and to avoid the material performance changing in the condition of cryogenic temperature, such as cold shortness. The swivel joint is also specially designed to make the whole six pieces of swivel joint can be circulated by Nitrogen gas. In the case, it can put the vapor out of the swivel joint to avoid icing in the race way of swivel joint and protect the race way from being damaged.

Arm on Vehicle



This type loading arm consists of two parts: the marine loading arm connected to vessel and the land loading arm connected to the local pipeline. It can make the loading work movably, to ensure all loading vessel leaving the site timely for saving enough space to so some other work; all the power to operate the loading arm is supplied by the vehicle motor, the operator only need to start-up the motor of the vehicle, then the loading arm can be operated with a remote controller, so it can be connected or disconnected with vessel or site pipeline easily.

Hose Crane



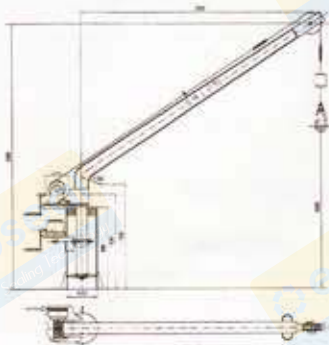
Hose crane is a lifting equipment to make the loading hose connect with the vessel, it can be designed and manufactured according to the site envelope to meet the requirements of different vessel size with the flexible hose. The main type of hose crane manufactured by us is manual and electro-hydraulic control operating, the detail type and data lists as follow:

Electro-hydraulic control

MAIN TECHNICAL PARAMETERS

NO.	MODEL	SWL	WORKING AREA	HOISTING SPEED	LUFFING ANGLE	SLEWING ANGLE
1	RGD10	1T	2 ~ 15m	30m/min	0 ~ 45°	360°
2	RGD15	1.5T	2 ~ 15m	30m/min	0 ~ 45°	360°
3	RGD20	2T	2 ~ 15m	30m/min	0 ~ 45°	360°

Manual Operating



MAIN TECHNICAL PARAMETERS

NO.	MODEL	SWL	SPAN	HOISTING SPEED	LUFFING ANGLE	SLEWING ANGLE
1	RGD03H	0.3T	0 ~ 2.5m	13m/min	0 ~ 3m	360°
2	RGD05H	0.5T	0 ~ 2.5m	13m/min	0 ~ 3m	360°

Design Information

Customer _____

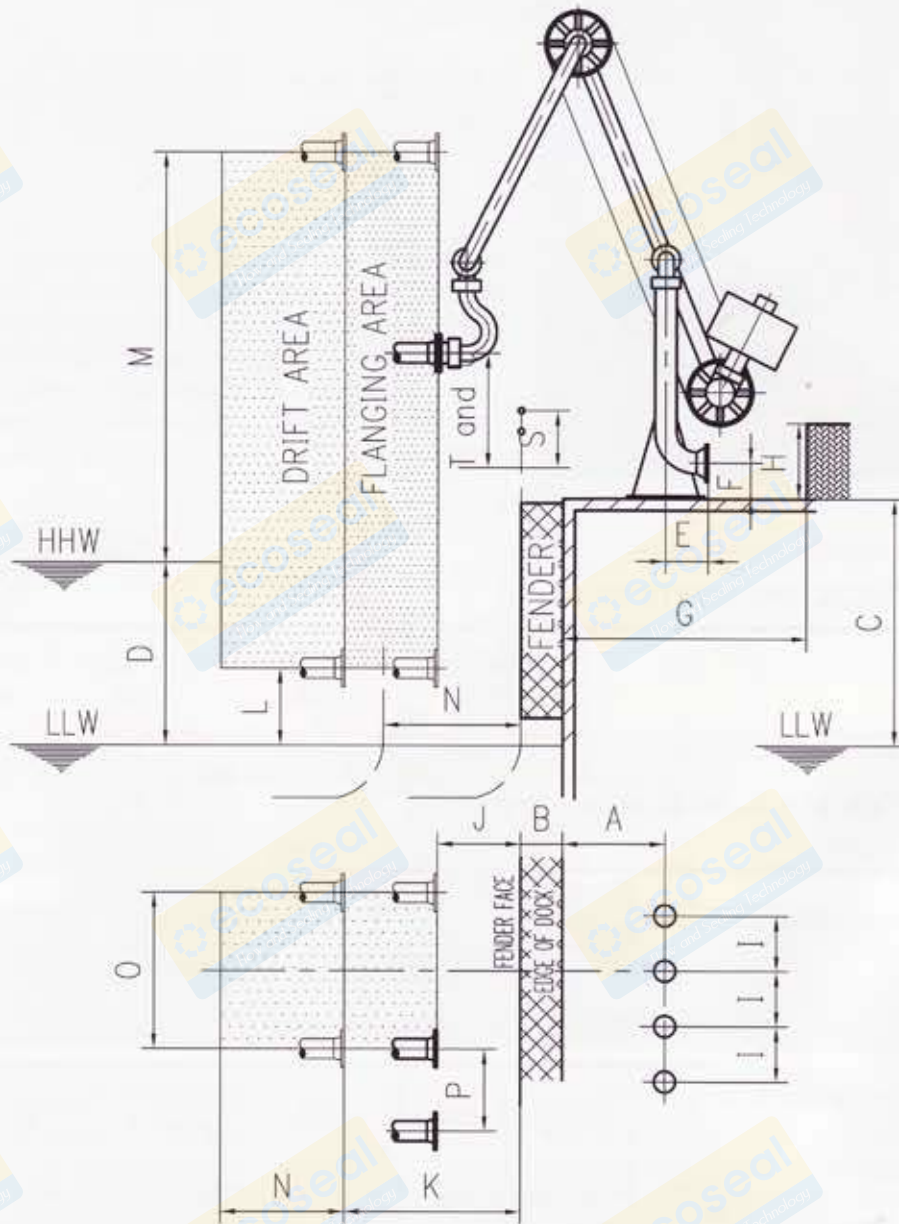
Ref _____

Sign _____ Dep _____

Post code _____

Tel _____ Fax _____

E-mail _____



The form is used for inquiry, design and as order's attachments of the loading arm, filled in by customer or with our engineer's assistance

1. Loading Arm Parameters

	1	2	3	4
Model				
Nominal bore				mm
Working pressure				MPa
Working temperature				°C
Pipe material				
Inlet flange code				
Outlet flange code				
Cargo				
Mode of operation	Manual		Hydraulically	

2. Dock Parameters

A	Distance of riser to jetty edge	m
B	Max / Min. cushion width	m
C	The lowest low water level	m
D	The highest high water level	m
E	Distance from centricity of the riser to inlet flange	m
F	Height from the flange centre to jetty face	m
G	Distance from the edge of the nearest obstacle to jetty edge	m
H	Height from the edge of the nearest obstacle to jetty face	m
I	Center distance of the neighboring riser	m

3. Environmental Parameters

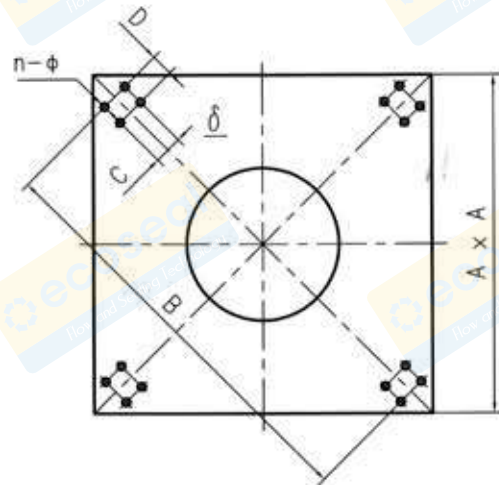
Max. wind speed	m/s
Max / Min. ambient temperature	+ / - °C
Earthquake	Grade

4. Ship Parameters

J	Min. distance from manifold to ship's side		m
K	Max. distance from manifold to ship's side		m
L	Min. height manifold above water(smallest laden) level		m
M	Max. height manifold above water(largest empty) level		m
N	Transverse drift(perpendicular to dock)		m
O	Total forward and afterward drift(parallel to dock)		m
P	Max / Min. manifold spacing on ship	/	m
S	Height of large ship's rail		m
T	Height of large ship's manifold above deck		m
U	Height of small ship's manifold above deck		m

5. Equipped Selection

	Vacuum breaker		
	Drain connector	Land side	Ship side
	Purge system		
	Rest position locker		
	Safety ladders		
	Adjustable support jack		
	Shut-off valve		
	Electrostatic protection		
	Electrical protection		
	Insulation flange		
	Range limit system		
	Electrical—Hydraulic drive system		
	Emergency release coupler(ERC)		
	Others		



Base of loading arm/ standard base plate to see the table and drawing

Dimension Table

	A×A (mm)	B	C	D	hole n-φ	thickness δ (mm)	anchor bolt
1#	1000×1000	1075	170		8- φ 42	30	M42
2#	1200×1200	1350	170		8- φ 42	30	M42
3#	1400×1400	1640	170		8- φ 42	40	M42
4#	1600×1600	1900	170	130	16- φ 42	40	M42
5#	1800×1800	2200	170	130	16- φ 42	40	M42
6#	2000×2000	2400	170	130	16- φ 42	50	M42
7#	2400×2400	2800	170	130	16- φ 55	50	M50

Recommendation Base Plate Dimension As Follow

base number Arm size	1 #	2 #	3 #	4 #	5 #	6 #	7 #
DN150	✓	✓					
DN200		✓	✓				
DN250				✓			
DN300					✓		
DN350					✓	✓	
DN400					✓	✓	
DN500							✓

Note: for special base plate dimensions can be designed in line with the owner's requirement.

Swivel Joint



SF single flange



DF double flange



DF—C cryogenic

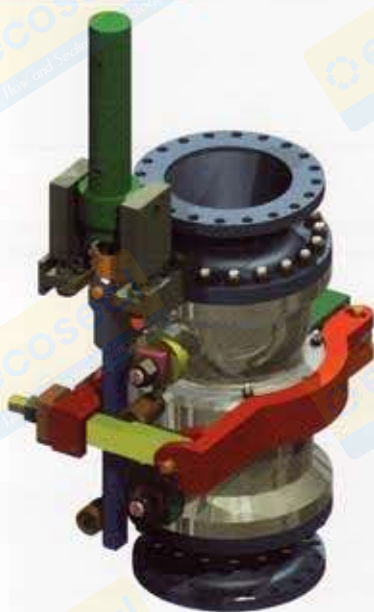
Normally MODEL—SF, DF, DF—C swivel joints are used for marine loading arms. The technical data is as follow:

Nominal Diameter : DN100 – DN600 (4 " – 24 ")

Design Pressure: -0.06 Mpa – +10 MPa

Design temperature: -196℃- +250℃

Options Double Ball Valve / Emergency Release Coupler (DBV/ERC)



ERC fixed on the vertical parts of the triple swivel joints, to disconnect the loading arm from the vessel in emergency case while operating:

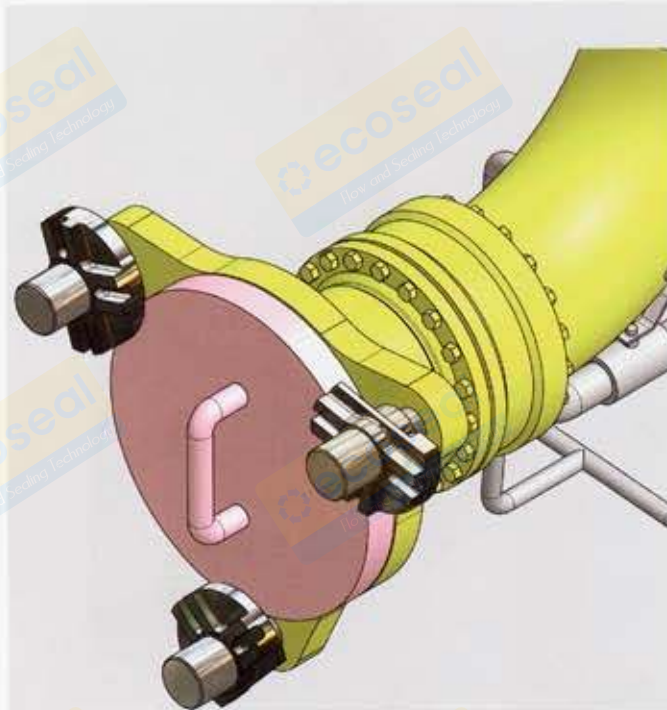
- (1) when it is fire at site, the operator can not close to the loading system;
- (2) when it is typhoon at site, the operator can not close to the loading system;
- (3) Tide difference at site or other cause, the operator is not at site.

If the loading arm is fixed with this device, it can prevent the equipment from being destroyed, to keep person to avoid the environment being polluted. ➡



Double Disk Valve/Emergency Release coupler operation principle is similar with DBV ➡

Quick Connect/ Disconnect Coupler (QC/DC)



The manual quick coupler attached to a front flanged of loading arm end provides a fast and simple way to make connections to vessel flange.

The rugged and safe coupler makes up flange connections in seconds without any special tools, bolts or gaskets significantly saving manpower and unproductive hook up time. Also fast for securing blind flange.

A standard quick coupler consists of one adapting plate and three to eight standard hook assemblies depending upon size and pressure rating of flange. To make an installation the adapter plate contains O — Ring Seals on sides (Seal materials according to requirement) .

Electric-hydraulic Control QC/DC

The QC/DC (quick connect/disconnect coupler) is usually installed on the end of the loading arm connected to the manifold flange of the vessel.

- Quick connect and disconnect automatically without any leakage.
- Connecting directly to different size of flanges without any adaptor.
- The QC/DC is operated by remote controller or the controller located on the controlling cabinet.
- The QC/DC is also operated by manual in case the electro-hydraulic controlling system is damaged.



Adjustable Support Jack



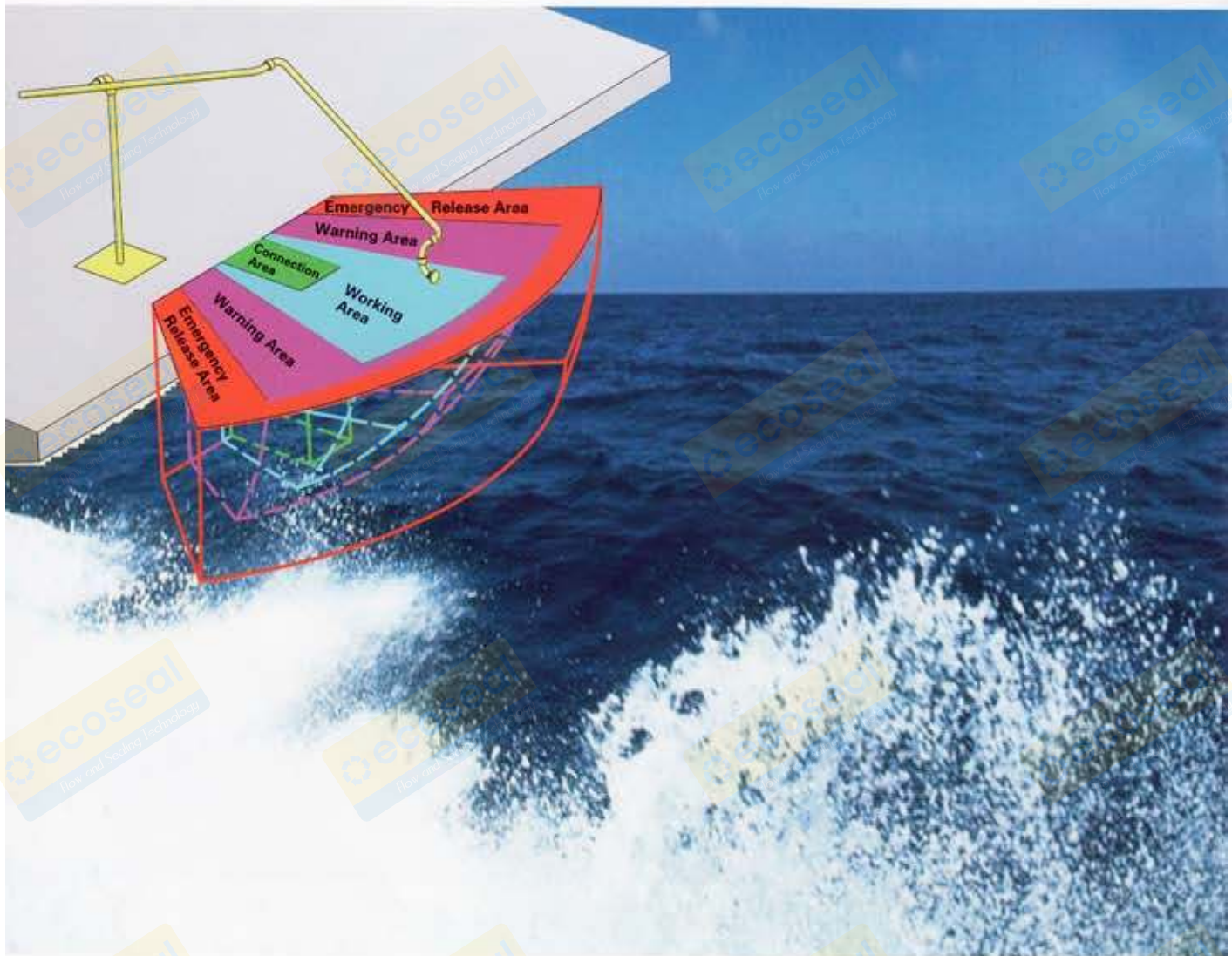
The support jack is mounted to the triple swivel assembly, so it is free to move following the drift of the vessel. The two columns are lowered to the ship's deck by opening the column Clamps after the loading arm is connected to ship's manifold. When the feet touch the deck the column clamps are tightened. So the jack transfers loading arm load to the deck of the vessel thus reducing manifold stress.

Removable Elbow



There is a removable elbow separately at the apex and the middle of loading arm, it will be used to change the main seal parts of the swivel joint easily.

Marine Loading Arms Envelope



Connection Area

The connection area is that volume in 3D space in which the loading arm should be connected to the ship's flange. The volume of the space should be defined by the min/max. manifold setback and sized of vessel (full/no payload) at low or high tide.

Warning Area

The limit system should be opened in this area, operating personnel will be warned by audio / visual alarms. Product valves on the land and ship side should be closed to stop product transfer.

Working Area

In the area the ship's flange connection can move freely and without danger during loading/unloading.

Emergency Release Area

The emergency release area is required to activate and disconnect the arm from the tanker manifold at once.

Electro-hydraulic Control System



ExDK (-ERS) -a K n is special designed for controlling marine loading arm, it synthesizes some overseas craft brother's advantage, and apply PLC into the system to make the system with advanced technology, maintenance conveniently, update momentarily. One system can control several pieces of loading arm, it consists of hydraulic system, electric system and some other execute components.

Electric system consists of: anti-explosion cabinet console, wireless remote controller, audio-visual alarm system, collocating with displaying interface, in this case, it can display the operation case, system state, fault and alarm information timely. The wireless remote controller can operate the loading arm on dock or deck within the radius of 100 meters. It is also remain distance inlet to connect with the top control system to meet the requirement of long-distance supervising and controlling.



Hydraulic control system consists of: anti-explosion unit, sub-unit, and supplying manual pump to be used in the case of emergency, the material of cabinet is stainless steel which can be used in erosion environment.

Reference

Marine Loading Arms



1	2	3
	4	5

- 1. Loading arms for Sinopec
- 2. Loading arms for Alpha
- 3. Loading arms for BASF

- 4. Loading arms with ERC for LG
- 5. Loading arms for Sudan

