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Jawaharlal Nehru  
"Step Out From the Old to the New"

Indian Standard
DATA SHEET FOR SELECTION OF MARINE LOADING ARMS
(First Revision)

ICS 23.020.30; 75.160.30

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

December 2006
FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Material Handling Systems and Equipment Sectional Committee had been approved by the Mechanical Engineering Division Council.

This standard was first published in 1983. The experience gained in the implementation of the standard has necessitated this revision.

The present revision has been formulated with the view to cover all the necessary details required for the marine loading arm. This revision includes the data for arm operating, base riser flange, control system, hydraulics and site.

The composition of the Committee responsible for the formulation of this standard is given at Annex A.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2:1960 'Rules for rounding off numerical values (revised)'. The number of significant places retained in the rounded off value should be same as that of the specified value in this standard.
Indian Standard
DATA SHEET FOR SELECTION OF MARINE LOADING ARMS
(First Revision)

1 SCOPE
This standard lays down the data required for the selection of the marine loading arms used in ports and applicable for handling liquids for loading and unloading.

2 REFERENCES
The following standard contains provisions which, through reference in this text, constitutes provision of this standard. At the time of publication, the edition indicated was valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent edition of the standard indicated below:

<table>
<thead>
<tr>
<th>IS No.</th>
<th>Title</th>
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</thead>
<tbody>
<tr>
<td>1893 (Part 4)</td>
<td>Criteria for earthquake resistant design of structures: Part 4 Industrial structures including stack-like structures</td>
</tr>
</tbody>
</table>

3 GENERAL INFORMATION
Project: Client: Quantity: Location:
Service: Duty:
Purpose: Area classification:

4 CARGO DATA

<table>
<thead>
<tr>
<th>Sl No.</th>
<th>Product Data</th>
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<tbody>
<tr>
<td>i)</td>
<td>Type of product handled</td>
</tr>
<tr>
<td>ii)</td>
<td>Maximum flow rate, m³/h</td>
</tr>
<tr>
<td>iii)</td>
<td>Density at operating temperature, kg/m³</td>
</tr>
<tr>
<td>iv)</td>
<td>Viscosity (CP) at operating temperature</td>
</tr>
<tr>
<td>v)</td>
<td>Operating temperature, °C</td>
</tr>
<tr>
<td>vi)</td>
<td>Design temperature, °C</td>
</tr>
<tr>
<td>vii)</td>
<td>Operating pressure, kg/cm²</td>
</tr>
<tr>
<td>viii)</td>
<td>Design pressure, kg/cm²</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sl No.</th>
<th>Product Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>ix)</td>
<td>Maximum allowable pressure drop in marine unloading arm, kg/cm²</td>
</tr>
<tr>
<td>x)</td>
<td>Corrosion allowance, mm</td>
</tr>
<tr>
<td>xi)</td>
<td>Arm size</td>
</tr>
<tr>
<td>xii)</td>
<td>Material of construction of marine loading arm</td>
</tr>
<tr>
<td>xiii)</td>
<td>Loading arm No.</td>
</tr>
<tr>
<td>xiv)</td>
<td>Tanker capacity (DWT)</td>
</tr>
</tbody>
</table>

NOTES
1 Vendor to furnish pressure drop vis-a-vis flow rate data for arms.
2 All unloading arms are to be designed to permit reverse flow.
3 Each loading arm shall be provided with an accumulator for emergency release coupling (ERC).

5 ENVIRONMENTAL DATA
5.1 Wind Speed to be Considered
   a) Arm in stored condition, kmph:
   b) Arm in operating condition:

5.2 Ambient Temperature, °C
   a) Minimum:
   b) Maximum:
   c) Design:

5.3 Seismic Data as per IS 1893 (Part 4)

5.4 Water Levels (Refer from Chart Datum)
   a) Highest high water level:
   b) Mean sea level:
   c) Lowest low water level:

5.5 Icing Load for Cryogenic Liquid

6 ARM OPERATING DATA
6.1 Drives : Manual Hydraulic Slewing :
   Inboard arm :
   Outboard arm :

6.2 Quick Connect/Disconnect Coupler (QCDC)
   a) Manual:
   b) Hydraulic:
6.3 Design of Counter Balance: By vendor
6.4 Emergency Release Coupling: Yes No
6.5 Vacuum Breaker at Apex: Yes No
6.6 Insulation: Required Not required
6.7 Heat Tracing: Read Not read

NOTES
1 Purging system at Apex.
2 Ladders and platform shall be provided for access to the turning apex swivel.
3 Adjustable jack at outboard swivel required.

7 BASE RISER FLANGE
7.1 Base Riser Flange Size and Rating
7.2 Maximum Piping Loads on Loading Arm Base Riser Flange

8 CONTROL SYSTEM
   a) Jetty control: (Console located at jetty)
   b) Radio remote control for operation of loading arms:
      NOTE — At a time only one shall be operable.

9 CONSTRUCTION FEATURES
   a) Make:
   b) Model No.:

<table>
<thead>
<tr>
<th>S/No.</th>
<th>Construction Features</th>
<th>Marine Loading Arm</th>
</tr>
</thead>
<tbody>
<tr>
<td>i</td>
<td>Length of inboard arm</td>
<td>No. 1 No. 2</td>
</tr>
<tr>
<td>ii</td>
<td>Length of outboard arm</td>
<td></td>
</tr>
<tr>
<td>iii</td>
<td>Height of base/riser</td>
<td></td>
</tr>
<tr>
<td>iv</td>
<td>Length of counterweight boom</td>
<td></td>
</tr>
</tbody>
</table>

NOTE — The above data to be filled up for each type of loading arm.

10 MATERIALS OF CONSTRUCTION
   a) Piping : k) Structural : m) Valve materials :
   b) Flanges :
   c) Fittings :
   d) Fasteners :
   e) Swivel joints :
   f) Ball and ball races of swivel :
   g) Seal of swivel :
   h) O-ring of swivel :
   i) Pantograph cable :

11 HYDRAULICS
11.1 Power Pack (Hydraulic)
   a) No. of units working:
   b) No. of units standby:

11.2 System Pressure (Hydraulic Oil)
   a) Operating:
   b) Design:

11.3 Material of Piping and Hydraulic Oil Tank: Stainless steel
11.4 Material of Fittings: Stainless steel
11.5 Number of Motor: Working Standby
11.6 Pump Capacity:
11.7 No. of Pumps:
11.8 Motor, kW:
11.9 Reservoir Capacity:
11.10 Pressure Relief Valve:
11.11 First Fill of Oil:

NOTES
1 Each marine loading arm shall be provided with an accumulator for emergency release coupling (ERC) operation.
2 Power supply: Voltage..............V
   Phase ..................
   Frequency
3 Control power:

12 TANKER AND BERTH DATA (see Fig. 1)
   12.1 Height of Manifold Centre Line Above Ship Tanker Deck
   12.2 Distance of Manifold Flange from Ship's Side
   12.3 Top of Working Platform of MLA to Tanker Manifold (Smallest Full Tanker at Low Tide)
   12.4 Top of Working Platform of MLA to Tanker Manifold (Largest Empty Tanker at High Tide)
   12.5 Maximum Variation in Water Level
   12.6 Top of Working Platform of MLA to Base Riser End
FIG. 1 MARINE LOADING ARM
<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.7</td>
<td>Total Fore and Aft Drift</td>
</tr>
<tr>
<td>12.8</td>
<td>Drift Away from Jetty</td>
</tr>
<tr>
<td>12.9</td>
<td>Fender Thickness</td>
</tr>
<tr>
<td>12.10</td>
<td>Centre Line of Base Riser to Edge of Jetty</td>
</tr>
<tr>
<td>12.11</td>
<td>Top of Working Platform to Lowest Low Water</td>
</tr>
<tr>
<td>12.12</td>
<td>Spacing of Ship’s Manifold Flange Centres</td>
</tr>
<tr>
<td>12.13</td>
<td>Top of Motor Operated Valve (MOV) from Jetty</td>
</tr>
<tr>
<td>12.14</td>
<td>Distance Between Adjacent Marine Loading Arms</td>
</tr>
</tbody>
</table>

### SITE DATA

- **G**
- **H** Pier upper deck elevation: from chart datum
- **K**
- **L**
- **O**
- **M**
- **N**
- **PQ**

### SIZE OF EQUIPMENT

14.1 Base plate size of each marine loading arm base jetty 

$$l \times b$$

14.2 Size of each hydraulic power pack 

$$l \times b$$

14.3 Size of control panel on jetty 

$$l \times b \times h$$

where

- **l** = length
- **b** = breadth
- **h** = height
## ANNEX A

*(Foreword)*

**COMMITTEE COMPOSITION**

Material Handling Systems and Equipment Sectional Committee, ME 07

<table>
<thead>
<tr>
<th>Organization</th>
<th>Representative(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bharat Earth Movers Ltd, Mysore</td>
<td>SHRI K. V. KRISHNAMURTHY <em>(Chairman)</em></td>
</tr>
<tr>
<td>AGROMEC, Meerut</td>
<td>SHRI C. V. SHIVARAMAIAH <em>(Alternate)</em></td>
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<tr>
<td>Airport Authority of India, New Delhi</td>
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<td>Bharat Heavy Electricals Ltd, New Delhi</td>
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<td>Cement Corporation of India, New Delhi</td>
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</tr>
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<td>Directorate General of Mines Safety, Dhanbad</td>
<td>SHRI G. KANNAN</td>
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<td>Directorate General Factory Advice Service and Labour Institute, Mumbai</td>
<td>SHRI N. SEKAR <em>(Alternate)</em></td>
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<td>Directorate General of Supplies and Disposals, New Delhi</td>
<td>SHRI N. P. DIXIT</td>
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<tr>
<td>Elecon Engineering Co Ltd, Vallabh Vidyaganagar</td>
<td>SHRI R. K. SRIVASTAVA <em>(Alternate)</em></td>
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<tr>
<td>Engineers India Ltd, New Delhi</td>
<td>SHRI HARISH K. GUPTA</td>
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<tr>
<td>Fact Engineering and Design Organization, Udyogmandala</td>
<td>SHRI D. SABH</td>
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<tr>
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<td>SHRI B. N. JHA <em>(Alternate)</em></td>
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<td>SHRI M. GANGA RAJU</td>
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<tr>
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<td>Indian Airlines Ltd, New Delhi</td>
<td>SHRI P. B. PATEL</td>
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<tr>
<td>Indian Bureau of Mines, Nagpur</td>
<td>SHRI C. S. SHAH <em>(Alternate)</em></td>
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<td>Indian Institute of Technology, New Delhi</td>
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<td>Jawaharlal Nehru Port Trust, Navi Mumbai</td>
<td>SHRI A. PRASAD <em>(Alternate)</em></td>
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<td>SHRI B. K. GUPTA</td>
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<td>L &amp; T Komatsu Limited, Bangalore</td>
<td>SHRI A. K. MITTAL</td>
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<td>SHRI MANSU KUMAR KAKAR <em>(Alternate)</em></td>
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<td>SHRI G. S. NARAYANA</td>
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<tr>
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<td>SHRI H. S. HANDE <em>(Alternate)</em></td>
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Organization

Mcnally Bharat Engineering Co Ltd,
Metallurgical and Engineering Consultants Ltd, Ranchi
Ministry of Agriculture, New Delhi
Ministry of Defence, Directorate of Quality Assurance, New Delhi
Ministry of Labour, Dhanbad
Ministry of Surface Transport, New Delhi
Mumbai Port Trust, Mumbai
National Mineral Development Corporation Ltd, Hyderabad
National Thermal Power Corporation Ltd, New Delhi
Neyveli Lignite Corporation Ltd, Neyveli
Office of the Development Commissioner, Small Scale Industries, New Delhi
Projects and Development India Ltd, Noida
RDSO, Lucknow
Rexello Castors Pvt Ltd, Mumbai
Tata Consulting Engineers, Bangalore
Tecon Industrial Projects Pvt Ltd, New Delhi
TRF Limited, Jamshedpur
Volts Limited, Thane
BIS Directorate General

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SIRI SHYAMAL KUMAR DAS (Alternate)
SIRI JAIPAL SINGH
SIRI S. BALARAMAN
SIRI K. PARTHASARATHY (Alternate)
LT COL D. S. DARSHA
SIRI N. G. JAGARWAL (Alternate)
SIRI D. SAHA
SIRI D. PANDE (Alternate)
SIRI G. P. ROY
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SIRI D. K. PRASHAR
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[Representing Director General (Ex-officio)]

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Assistant Director (MED), BIS
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BUREAU OF INDIAN STANDARDS

Headquarters:
Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002
Telephones: 2323 0131, 2323 3375, 2323 9402 website: www.bis.org.in

Regional Offices: Telephones

Central : Manak Bhavan, 9 Bahadur Shah Zafar Marg
          NEW DELHI 110002
          2323 7617, 2323 3841

Eastern : 1/14 C.I.T. Scheme VII M, V.I.P. Road, Kankurgachi
          KOLKATA 700054
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Northern : SCO 335-336, Sector 34-A, CHANDIGARH 160022
           260 3843
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Southern : C.I.T. Campus, IV Cross Road, CHENNAI 600113
           2254 1216, 2254 1442
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