TECHNICAL SPECIFICATION

PEDESTAL CRANES (AMENDMENTS/SUPPLEMENTS TO LLOYD'S CODE AND BS 2573)

DEP 37.92.10.31-Gen.

October 1994

DESIGN AND ENGINEERING PRACTICE

USED BY

COMPANIES OF THE ROYAL DUTCH/SHELL GROUP

PREFACE

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The objective is to set the recommended standard for good design and engineering practice applied by Group companies operating an oil refinery, gas handling installation, chemical plant, oil and gas production facility, or any other such facility, and thereby to achieve maximum technical and economic benefit from standardization.

The information set forth in these publications is provided to users for their consideration and decision to implement. This is of particular importance where DEPs may not cover every requirement or diversity of condition at each locality. The system of DEPs is expected to be sufficiently flexible to allow individual operating companies to adapt the information set forth in DEPs to their own environment and requirements.

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APPENDICES

PART I INTRODUCTION

1.1 SCOPE

This new DEP gives the minimum requirements for pedestal cranes for use on fixed offshore platforms when Lloyd's Register of Shipping "Code for Lifting Applications in a Marine Environment" and BS 2573 are specified as the applicable external standards. It is intended they shall be used together with this DEP for the design, procurement, manufacture, testing and inspection of Pedestal Cranes for offshore production and drilling platforms for Group company operations.

NOTE: The scope of this DEP does not cover cranes for floating structures nor those for handling manned submersibles in offshore conditions.

The crane shall satisfy the condition for the LRS code (as amended/supplemented by Part II of this DEP). Where steels with higher strength properties than those depicted in the LRS code are proposed by the Manufacturer, the design requirements of BS 2573 Part I (as amended/supplemented by Part III of this DEP) shall be satisfied. Mechanisms shall be designed to satisfy the conditions of BS 2573 Part 2 (as amended/supplemented by Part III of this DEP).

DEP 37.92.10.30-Gen. gives the minimum requirements for pedestal cranes when API Spec 2C is specified as the applicable external standard.

A-1 The choice of external standard shall be determined by the Principal depending upon national/local regulations and will be defined in the project specifications.

1.2 DISTRIBUTION, INTENDED USE AND REGULATORY CONSIDERATIONS

Unless otherwise authorised by SIPM, the distribution of this DEP is confined to companies forming part of the Royal Dutch/Shell Group or managed by a Group company, and to Contractors and Manufacturers/Suppliers nominated by them. (i.e. the distribution code is "F" as defined in DEP 00.00.05.05-Gen.).

This DEP is intended for use in oil and gas production facilities.

If national and/or local regulations exist in which some of the requirements are more stringent than in this DEP the Contractor shall determine by careful scrutiny which of the requirements are the more stringent and which combination of requirements will be acceptable as regards safety, environmental, economic and legal aspects. In all cases the Contractor shall inform the Principal of any deviation from the requirements of this DEP which is considered to be necessary in order to comply with national and/or local regulations. The Principal may then negotiate with the Authorities concerned with the object of obtaining agreement to follow this DEP as closely as possible.

1.3 DEFINITIONS

1.3.1 General definitions

The **Contractor** is the party which carries out all or part of the design, engineering, procurement, construction, commissioning or management of a project or operation of a facility. The Principal may undertake all or part of the duties of the Contractor.

The **Manufacturer/Supplier** is the party which manufactures or supplies equipment and services to perform the duties specified by the Contractor.

The **Principal** is the party which initiates the project and ultimately pays for its design and construction. The Principal will generally specify the technical requirements. The Principal may also include an agent or consultant authorised to act for, and on behalf of, the Principal.

The word **shall** indicates a requirement.

The word **should** indicates a recommendation.

1.3.2 Specific definitions

Certifying authority The party appointed by the Principal to ensure design authenticity, compliance with national/local regulations and that the equipment is fit for purpose.

Data/requisition sheets Except where explicitly stated otherwise, this term shall mean data/requisition sheets DEP 37.92.10.93-Gen., DEP 37.92.10.94-Gen., DEP 37.92.10.95-Gen. and DEP 37.92.10.96-Gen., as applicable for the crane in question.

Inspection authority The party appointed by the Principal to ensure that the equipment supplied conforms to the requirements of this DEP. In some instances the inspection authority may be the same as certifying authority.

Load path The area encompassing equipment and structure or parts thereof between hook and pedestal which provide the reaction to resist forces and moments generated during the operation of the crane.

Miscellaneous steel comprises all those steel parts, such as walkways, platforms, handrails, cable trays and brackets which are not primary or secondary steel.

Primary steel Any steel part or member that transmits forces or moments and is essential in maintaining the structural integrity or operational safety of the crane.

Secondary steel Any steel part or member which is not essential in maintaining the structural integrity or operational safety of the crane.

1.4 ABBREVIATIONS

MPI Magnetic particle inspection
NDT Non-destructive testing
RT Radiographic testing
SLI Safe load indicator
SWL Safe working load
UT Ultrasonic testing

1.5 CROSS-REFERENCES

Where cross-references to other parts of this DEP are made, the referenced section number is shown in brackets. Other documents referenced in this DEP are listed in (Part IV).

1.6 ORDER OF PRECEDENCE

The following descending order of precedence shall apply:

- Local regulations
- The enquiry/order document
- This DEP
- Other DEPs and standards referenced herein
- Other standards or codes as appropriate.

Any conflict between this DEP and other referenced documents shall be referred to the Principal for resolution.

PART II AMENDMENTS/SUPPLEMENTS TO LLOYD'S CODE FOR LIFTING APPLIANCES IN A MARINE ENVIRONMENT

INTRODUCTION

The numbering and headings of these amendments/supplements correspond to Lloyd's "Code for Lifting Appliances in a Marine Environment" (January 1987).

Reference is made to BS 2573 Parts 1 and 2 within these amendments/supplements for Fatigue Analysis (Chapter 3, Section 2.3), Selection of Steels (Chapter 3, Section 3.7) and on the Design Criteria for Lifting Appliance Mechanisms (Chapter 7, Section 1.2).

It is a pre-condition of the purchase order/enquiry that cranes offered by the Manufacturer and the associated equipment fitted to them, should be of proven design and usage. However, prototypes offering increased safety will be considered. Documentation/ certification shall be submitted adequate to confirm the design authenticity of the equipment offered. It is the Manufacturer's responsibility to satisfy the Certifying Authority to allow a Fitness for Purpose certificate to be issued. The Principal reserves the right to audit and review all aspects of the design and supply of equipment described within this DEP. Full access shall be afforded to the Principal.

The Manufacturer shall complete those sections of the data/requisition sheets and minimum purchase information sheets (Appendix 2) not completed by the Principal and shall return them with the Manufacturer's proposal. All provisional information shall be stated as such.

Manufacturers should comply with and be certified to ISO 9001 or equivalent standard.

Where the Manufacturer's standard practice exceeds the requirements of this DEP the Manufacturer's standard practice shall not be reduced to comply with this DEP.

CHAPTER 1 GENERAL

SECTION 1 INTRODUCTION

1.1 APPLICATION

Add to this section:

Equipment specified within this DEP conforms to lifting appliances under 1.1.5 (c).

1.3 CLASSIFICATION

Add to this section:

Equipment specified within this DEP enables a special features class notation PC from Table 1.1.1.

CHAPTER 3CRANES AND SUBMERSIBLE LIFTING APPLIANCES

SECTION 1 INTRODUCTION

1.2 CRANE TYPES

Add to this section:

The cranes specified within the enquiry documents referencing this DEP conform to 1.2.1 (f).

The crane shall be suitable to perform the duties specified by the Principal on the minimum purchase information sheets and the data/requisition sheets (DEP 37.92.10.93-Gen.).

The crane assembly type shall be as defined by the Principal on the data/requisition sheets DEP 37.92.10.94-Gen., DEP 37.92.10.95-Gen. and DEP 37.92.10.96-Gen.

SECTION 2 SHIPBOARD CRANES

NOTE: This section is referenced in Chapter 3 Section 3.1.3 of the LRS code.

2.1 GENERAL

Add new sections:

2.1.3 Critical components

The Manufacturer shall compile a list of critical components, which shall include all those mechanical, structural and rigging components whose failure would allow an uncontrolled descent of the load, or uncontrolled movement of the crane structure.

2.1.4 Failure sequence

The crane design shall demonstrate that the slew ring and its attachments would be the last to fail in the event of the crane being subjected to a gross overload situation, and the sequential failure design must ensure that the control cabin and the operator's escape route are retained to the last in the failure sequence.

The Manufacturer shall demonstrate in graphical form that the crane design satisfies these criteria.

2.2 LOAD CONSIDERATIONS

Add to 2.2.1 the clause:

Snow and ice conditions to be incorporated into the design of the crane shall be defined by the Principal in the minimum purchase information sheets.

2.3 DUTY FACTOR

Replace 2.3.3 by:

A fatigue analysis shall be carried out in accordance with BS 2573 Part I (Part III of this DEP) or other equivalent national standard.

The pedestal adapter shall have a fatigue life at least 50% more than the crane structure above the slew ring.

2.12 WIND LOADING

Add to 2.12.3:

"but not less than 1000 N".

2.25 SLEWING RING AND SLEWING RING BOLTING

Add to 2.25.3:

The design of the slew bearing assembly shall permit the inspection, removal and replacement of the bearing without dismantling major crane components. The method of achieving this, any restraints on the structure necessary, and the maximum wind speed for stability during the changeout activity shall be documented. Details of all hoists, frames, jacks etc., required for this procedure shall be included. This equipment shall be offered in the Manufacturer's proposal as an optional extra.

The fastener arrangement shall permit the use of hydraulic pre-tensioning equipment for both inner and outer tracks and shall incorporate a system of strain indication. The system shall be of a type approved by the Certifying Authority.

SECTION 3 OFFSHORE CRANES

3.2 SERVICE CATEGORY AND DUTY FACTOR

Replace 3.2.1 by:

3.2.1 The duty factor and associated service category shall be $F_d = 1.05$ for on-platform duties and $F_d = 1.2$ for supply boat duties.

3.3 DYNAMIC FORCES

Replace 3.3.2 by:

3.3.2 The hoisting factor F_h shall be calculated in accordance with 3.3.4 using the wave height and period data as specified in the minimum purchase information sheets.

A dynamic analysis, or alternative documented evidence, shall be submitted by the Manufacturer, sufficient to satisfy the Principal that the crane design offered is adequate to meet the requirements associated with the duties specified.

3.4 OFFLEAD ANGLES

Replace 3.4.1 by:

3.4.1 Offlead and sidelead forces due to non-vertical lifting from supply boats shall be calculated using Table 3.3.1 unless otherwise specified by the Principal on the minimum purchase information sheets.

3.6 SLEW RINGS

Add to this section:

3.6.9 The bearing shall have a minimum life of 30 000 hours, using the slew mechanism classification and fatigue life information specified by the Principal in the minimum purchase information sheets.

3.6.10 A means to prevent separation of the slewing structure from the pedestal mounting in the event of bearing failure shall be provided which shall be of a type approved by the Certifying Authority.

3.6.11 A minimum of 2 slew drive units shall be supplied with safe reduced operation to allow the crane to be made safe should one unit fail. The maximum slew speed for normal operation shall be between 0.5 and 1.5 r/min.

3.6.12 Adjustable slew limits shall be provided if required by the data/requisition sheets.

3.6.13 A brake to stop, hold and retard the slewing motion of the upper structure shall be provided.

3.7 MATERIALS

Add to this section :

When Steels are selected which have properties outside the limitations depicted in the LRS Code, Chapter 3, reference shall be made to Part 1, Section 4 and Appendix B of BS 2573.

Components in the load path should be fabricated from structural steel to BS 7191 as qualified by Section Four of BS 2573 Part 1. Alternative equivalent national standards may be considered.

All steels used in the manufacture and fabrication of components in the primary load path shall be produced by open hearth, electric or basic oxygen process, to fine grain practice.

The carbon content for plate material shall be maximum 0.23%, and for forgings and castings maximum 0.25%.

The carbon equivalent (Ceq) shall be less than 0.45%, established as follows:

$$Ceq = C + \frac{Mn}{6} + \frac{Cr + Mo + V}{5} + \frac{Ni + Cu}{15}$$

Standard grades of grey cast iron or malleable iron shall not be used for any application in the primary load path. The minimum grade of cast iron for these applications shall be nodular irons with certified strength and impact values.

All primary and secondary steels shall be fully traceable. An inspection certificate in accordance with ISO 10474 type 3.1.C shall be provided for primary steels, endorsed by an approved third party inspector acceptable to the Principal and the Certifying Authority. An inspection certificate in accordance with ISO 10474 type 3.1.B shall be provided for secondary steels.

The welding of primary and secondary steels shall comply with the ANSI/AWS D.1.1, or equivalent.

All lifting eye attachments shall be considered as primary structure. The area of material where such attachments are to be welded shall be tested ultrasonically to confirm the absence of laminations prior to welding.

All welds shall be 100 percent visually examined. Welds in primary steel shall be 100 percent MPI and 100 percent UT or RT. Welds in secondary steel shall be spot checked by 20 percent MPI and 20 percent UT or RT.

Acceptance levels for NDT shall meet the requirements of the following, or equivalent:

- Magnetic particle to ASME VIII Division 1 Appendix 6
- Radiographic examination to ASME VIII Division 1 Article UW 51
- Ultrasonic examination to ASME VIII Division 1 Appendix 12

A-2 Painting, surface preparation and finish shall be to DEP 30.48.00.10-Gen. The Manufacturer's offshore paint specification, if equivalent or superior, may be applied if agreed by the Principal. Finish colours and striping if required shall be defined by the Principal in the data/requisition sheets.

All carbon steel handrails, walkways and ladders shall be hot dip galvanised. All fasteners shall be corrosion resistant.

All tubular lattice or box girder constructions shall be seal welded against internal corrosion.

3.9 MOTION COMPENSATORS

Add to this section:

Slack rope prevention and wave following systems shall be proposed by the Manufacturer to minimise the effects of impact loads.

A Gross Overload Protection system shall be included in the supply. The system shall be retrievable by the operator on removal of the overload condition.

NOTE: The requirements of this section may be incorporated into one or more systems provided that there is full compliance with the requirements.

Add new sections:

3.10 POWER PACK

Cranes with the power pack mounted on the revolving structure should be provided with a machinery house. For remote mounted power packs and on smaller cranes where a machinery house would be impractical, an easily removable weather proof enclosure with suitable louvres shall be supplied.

3.11 MAINTENANCE AND ACCESS

Access shall be provided to fully maintain, service and replace the equipment on the crane.

The design shall allow sufficient space for the withdrawal of the slew bearings, splitter gear box, shafts, etc.

Withdrawal distances shall be indicated in drawings submitted with the Manufacturer's proposal.

The access ladder to the revolving upperstructure platform shall be located as near to the pedestal as possible to minimise the size of the lower platform. Ease of access and safety are of prime importance.

Booms 1500 mm in depth or greater shall be provided with a walkway, those less than 1500 mm in depth shall be fitted with a foot rail and safety harness system.

Platforms to service the slew ring assembly and collector column shall be provided by the Manufacturer.

All surfaces of the crane shall be self draining. Liquids shall be collected in bunded areas provided with drain connections.

SECTION 5 PEDESTALS AND FOUNDATIONS

5.1 GENERAL

Add new section:

5.1.6 The pedestal adaptor shall be included in the scope of supply of the Manufacturer.

The steel grade, thickness, length, diameter and the weld preparation for attachment to the main structure together with tolerances shall be subject to the approval of the Principal.

The tolerances on the slew ring mountings for flatness, taper and finish shall not exceed 75 percent of those allowed by the slew bearing Manufacturer.

The Manufacturer shall advise the maximum construction/installation tolerances for the erection of the crane, within which crane performance will be assured, the crane shall operate without loss of performance when installed about an axis which is one degree out of true in any direction.

CHAPTER 6FITTINGS, LOOSE GEAR AND ROPES

SECTION 1 GENERAL

1.2 MATERIALS AND CONSTRUCTION

Add to 1.2.8:

A complete lubrication schedule indicating type, quantity, frequency of replenishment and replacement shall be provided by the Manufacturer.

SECTION 3 BLOCKS

3.3 MATERIALS AND CONSTRUCTION

Delete remainder of section 3.3.1 from:

"for sheaves in the following circumstances unless specially agreed ....."

Replace 3.3.2 by:

Nylon sheaves shall not be used. Steel sheaves shall be used on the crane. Sheave guards shall be provided to prevent ropes jumping off of the sheaves.

3.4 BLOCKS FOR FIBRE ROPES

Delete this section (fibre ropes shall not be used).

SECTION 5 LOOSE GEAR

5.2 HOOKS

Add to 5.2.4:

All hooks shall be fitted with a safety latch. Hook size shall include for the effect of the latch on the admittance dimension.

The Manufacturer shall include details of NDT to be performed upon load hooks to ensure that they are free from material defects. The methods and acceptance criteria are subject to the approval of the Principal.

Replace 5.2.6 by:

The SWL shall include for the hoisting factor F_H from Chapter 3, 3.3.4, when considering the dynamic effect.

SECTION 6 STEEL WIRE ROPES

6.1 GENERAL

Add to 6.1.1:

Wire ropes in accordance with ISO 2408 or equivalent standard shall be supplied.

Load hoist ropes shall be of the low rotational, multi strand, dyform or compacted type. For multi layer drum spooling applications an Independent Wire Rope Core construction shall be supplied.

All wire ropes shall be of a size and type of construction readily available from the Manufacturer's standard range. Unique sizes shall not be used.

A certificate of test, fully authenticated and identifiable with each wire rope supplied with the crane, shall be provided.

6.4 SPLICING AND TERMINAL CONNECTIONS

Add to this section:

All end fittings/terminations design specifications proposed shall be submitted to the Principal. The load hoist rope(s) shall terminate at the drum(s) with a light tail rope, or rope anchor which shall be external to the drum.

SECTION 7 FIBRE ROPES

Delete this section (fibre ropes shall not be used).

CHAPTER 7 MACHINERY, ELECTRICAL INSTALLATIONS AND CONTROL ENGINEERING SYSTEMS

SECTION 1 INTRODUCTION

1.2 DESIGN CRITERIA FOR LIFTING APPLIANCE MECHANISMS

Add to 1.2.1:

The mechanisms shall be designed to meet the requirements of BS 2573 Part 2. The class of Utilization, State of Loading and Group Classification shall be as specified by the Principal in the minimum purchase information sheets.

Mechanisms shall be designed for the life of the crane.

The design of machinery in the load path shall include the hoisting and duty factors as defined in the LRS code for the SWL.

90 percent of the prime mover rated power shall be sufficient to hoist the maximum load at the maximum hoist speed and simultaneously either raise the boom at the maximum derricking speed or swing at the maximum speed, whichever condition requires the greater power.

Couplings installed between driver and driven equipment shall be of the non lubricated metallic flexible element spacer type.

Add to this section:

1.2.3 If a diesel engine is specified as the prime mover on the minimum purchase information sheets it shall be supplied in accordance with the Manufacturer's standard practice as amended by this DEP.

1.2.3.1 The engine Manufacturer shall be selected from preferred suppliers listed by the Principal. Data/Requisition DEP 31.29.80.93-Gen. sheets 1 and 2 shall be completed and returned by the Manufacturer.

1.2.3.2 The direction of rotation shall be clearly indicated and the design shall prohibit running in the reverse direction.

1.2.3.3 If hydraulic or air-start systems are proposed, air receivers, hydraulic accumulators etc. shall be fabricated and tested to a recognised standard (BS 5500, ASME VIII or equivalent). The Supplier's choice of code, NDT standards and quality assurance methods shall be fully detailed in the proposal.

1.2.3.4 Start systems shall be sized to give a minimum of 6 start attempts per system, each start attempt to consist of 7 revolutions of the crankshaft at minimum cranking speed. A suitable back up system shall be provided.

1.2.3.5 When an air-start system is specified by the Manufacturer a quick connect coupling shall be furnished on the air receiver for Principal's external air supply. The quantity, quality and supply conditions shall be stated on the data/requisition sheets by the Manufacturer in his proposal.

1.2.3.6 Cooling fans shall be of non-sparking construction and belt drives shall be anti-static and oil resistant. They shall be adequately guarded. Aluminium shall not be used for guards or fans.

1.2.3.7 A manually operated, quick action, shut off valve shall be provided in the fuel line between the day tank and the engine. It shall be located outside the machinery house (if supplied) on the driver's normal escape route from the control cabin and clearly marked "fuel-shut-off".

1.2.3.8 The diesel storage day tank shall be sized for 12 hours continuous operation of the crane. The tank shall be fitted with a drain, located to allow all of the contents of the tank to be removed. A handhole/manway shall be included to allow internal cleaning.

1.2.3.9 A "rig-saver" type air intake closure system shall be fitted, automatically activated on engine overspeed with manual reset.

1.2.3.10 Exhaust gas systems shall be fabricated from stainless steel.

Air intakes shall be provided with a drain facility to minimise the effects of condensation during crane shutdowns. Filters of the replaceable element type shall be included, suitable for the environment specified by the Principal on the minimum purchase information sheets.

1.2.3.11 Exhaust manifold shall be water jacketed if required to comply with the surface temperature limitations specified by the Principal on the minimum purchase information sheets.

1.2.3.12 Noise levels shall satisfy the following requirements:

a) The response, measured at one metre from the surface of the machinery or its enclosure, shall not exceed 88 dB(A) at full load conditions.

b) The noise level in the operator's cab shall not exceed 75 dB(A) at full load conditions.

The acoustic treatment necessary to achieve this shall be included in the Manufacturer's scope of supply.

Vibration levels shall be agreed with the Principal.

1.2.3.13 Diesel engine emissions shall comply with the legislation applicable to the location and as specified by the Principal on the minimum purchase information sheets.

2.3 MANUFACTURE OF MACHINERY

Add to this section:

2.3.2 Hydraulic transmission

Independent closed loop systems are preferred. Open loop systems, if offered, shall be subject to approval by the Principal. The systems should demonstrate adequate cooling of the hydraulic oil under all operating conditions.

There shall be no interconnection between the hydrostatic transmissions of the boom derricking, swing and load hoist systems.

Smooth operation between zero and maximum speed of each function shall be achieved.

Boom or load drop shall not be possible during either inching operation or power failure. Ram luffing cranes shall be provided with two double acting hydraulic cylinders with safeguards to prevent boom drop on hydraulic pressure failure.

Isolation valves and break flanges shall be provided for maintenance purposes.

Flexible hydraulic hoses should only be used for the following:

- to cater for movement between different elements of the crane
- to facilitate the change-out of hydraulic equipment
- to suppress the transmission of mechanical vibration and/or noise.

Pressure gauges shall be fitted in all hydraulic circuits to facilitate condition monitoring. The minimum instrumentation requirements shall be included by the Principal on the data/requisition sheets.

The hydraulic reservoir shall be fitted with an atmospheric vent complete with air filter and flame arrestor. The hydraulic tank, external pipe and fittings shall be manufactured from 316L (or equivalent) stainless steel.

SECTION 3 ELECTRICAL INSTALLATIONS

Add new sections:

3.4 GENERAL

The complete electrical installation shall be designed and manufactured in accordance with DEP 33.64.10.10-Gen.

If required, gas and smoke equipment will be supplied by the Principal. If specified by the Principal on the minimum purchase information sheets, the Manufacturer shall supply suitable fixing arrangements in the machinery house and/or control cabin.

All electrical equipment shall be suitably protected. The minimum protection degree shall be IP 56 in accordance with IEC 529 for equipment installed unprotected outdoors, and IP 41 for equipment installed such that it is protected against the weather.

The generation of radio frequency interference voltages shall not exceed the value of suppression grade "N" as defined in EN 55014, or equivalent.

The crane and its components shall satisfy the requirements of the Hazardous Area Classification, as defined by the Principal on the minimum purchase information sheets.

3.5 CABLE

Low voltage power and control cables shall have 600/1000 volt insulation. Power cables shall have stranded conductors of a minimum of 2.5 mm^2 cross section area.

Cables shall be run in heavy duty stainless steel cable trays with a minimum 25 percent spare tray capacity. Power cables shall be segregated from instrument cables to prevent electromagnetic interference. Cables shall be identified at each end with a cable number in accordance with wiring diagrams provided by the Manufacturer.

3.6 PRINCIPAL/CRANE MANUFACTURER INTERFACE

Suitable terminal boxes or termination points shall be provided for connection of external power supplies to the crane. Klippon type are preferred. Interface details shall be agreed with the Principal. The pedestal adaptor fabricator shall provide suitable entries through the wall of the adaptor for the crane power and instrument supply cables.

3.7 COLLECTOR COLUMN

For cranes with a continuous 360 degrees rotation requirement, a collector column suitable for the hazardous area classification specified shall be fitted. Where a limited degree of rotation is specified a festoon or spider arrangement is acceptable.

Collector rings shall be provided for the platform status indicator, platform public address system, radio equipment, equipotential bonding and electric motor drives, if specified on the minimum purchase information sheets. At least eight spare rings shall be installed.

Collector column rings shall be rated a minimum of 110 percent of the maximum current.

Spare rings shall be rated for 50 amperes.

3.8 LIGHTING

3.8.1 General

General lighting for walkways, access, etc. shall be not less than 150 lux in the horizontal plane. 300 lux shall be provided in the machinery house and the control cabin for use during maintenance activities.

3.8.2 Cabin lights

Operator's cabin and instrument lighting shall have adjustable intensity for night operations.

3.8.3 Emergency lighting

Emergency light fittings covering the escape routes from control cabin and machinery house shall be provided. Units shall be 40 watts twin type with integral charger and battery and of minimum 90 minutes duration. Alternatively the light fittings may be connected to a platform emergency lighting supply.

3.8.4 Aircraft warning lights

Red aircraft warning lights shall be fitted to the A-frame apex, to the boom tip and, if the boom is longer than 15 metres, at 10 metre intervals along the boom. They shall comply with the requirements of the civil aviation authority. They shall be powered from the platform uninterruptible power supply and have a minimum intensity of 10 candela. The lights shall comply with national/international regulations and standards.

3.8.5 Floodlights

Floodlights to illuminate the hook(s) in all positions, laydown areas etc. shall be fitted to the boom and main frame as specified by the Principal in the minimum purchase information sheets. They shall be self-levelling and in the 400-600 watt range.

3.9 POWER OUTLETS

Power outlet sockets as specified by the Principal on the minimum purchase information sheets shall be provided in both the machinery enclosure and operator's cabin.

SECTION 6 CONTROL AND SUPERVISION OF LIFTING APPLIANCES FOR CARGO HANDLING

6.1 GENERAL

Add to 6.1.2:

The crane controls for load movement shall be of the two lever type. They shall operate in the direction of movement required and all motions shall be smoothly controllable between zero and maximum speed.

Levers shall return to central position when released, in which position the brakes shall be automatically and progressively applied so as not to induce shock to the crane systems. The brakes shall be fail safe in operation.

The preferred orientation of the levers is:

left hand	-	crane luff and slew
right hand	-	load raise and lower.

Add to 6.1.3:

The door to the operator's control cabin shall be a minimum 750 mm wide, fitted with a window, and knock-out panel (500 mm square) for emergency exit.

The operator's cabin position relative to the boom shall be specified by the Principal on the minimum purchase information sheets.

The Manufacturer shall ensure that the operator has a clear view of the hook(s) for all operating positions of the crane.

The operator shall be able to observe, while seated, the spooling of the wire rope on the winch drums.

Access to both inside and outside of all windows shall be provided for cleaning purposes.

A minimum of 2000 mm headroom within the cabin shall be provided.

The cabin shall be sized to accommodate an instructor standing behind the operator, and the installation of the fire extinguisher and life jacket which shall be supplied by the Principal. Cabin materials shall be fire resistant and shall not release toxic fumes when subjected to flame and/or excessive heat.

The cabin shall be fitted with:

Window wash and wiper systems, de-mist and heating, an external horn for operator's use to alert rigging crew, tinted safety glass windows, sunblinds, and a fully adjustable operator's chair.

Add to 6.1.4:

This emergency stop button shall be prominently labelled, and to avoid confusion it shall be significantly different in colour from the background.

6.5 CRANES

Add to 6.5.3:

A list of instruments, alarms and trips will be given by the Principal in the data/requisition sheets. The Manufacturer shall include any additional instrumentation as required for the safe operation and maintenance of the crane. Test facilities to prove the correct operation of the systems shall be provided.

Full details of the Manufacturer's instrumentation included on the crane shall be provided in his proposal.

All instruments shall be tagged by number and service, fully certified as required to meet the duties as specified by the Principal in the data/requisition sheets.

A boom angle indicator shall be supplied, calibrated in graduations not exceeding 5 degrees.

A boom length indicator shall be supplied on all telescopic booms.

Replace the second sentence beginning "An alarm" in 6.5.4 with the following:

A visual alarm shall be activated at 90 to 95 percent of the SWL. Visual and audible alarms shall be activated when the load exceeds 100 to 110 percent of the SWL and an inhibitor shall prevent any increase in moment. This inhibitor shall have an operator over-ride facility. The visual and audible alarms shall be adjustable within the above ranges by qualified authorised personnel only. Operator selection of sea state on the SLI shall be from the cabin. Incorrect operation of the SLI shall not inhibit the use of the crane, except as defined above.

Load/radius charts, both in the cabin and in documentation (manuals etc.), shall show the SWL of the crane as rigged. The weight of the hook shall not be included in the charts. A note to this effect may be included. Rigging attached to the load shall be included in the load. The charts shall incorporate operating criteria for snow/ice loading if specified by the Principal in the minimum purchase information sheets.

A-3 A data recording system, suitable for a minimum of 2000 cycles, shall be included in the Manufacturer's proposal as an optional extra. The system shall record loads, radii, moments, crane configuration, actual load as a percentage of SWL and the date/time of the cycle, with adequate means for downloading and data processing.

All equipment proposed shall be of a type approved by the Certifying Authority.

CHAPTER 8 MATERIALS

SECTION 3 MATERIALS TO NATIONAL OR PROPRIETARY STANDARDS

3.6 INSPECTION

Replace 3.6.2 by:

NDT of materials as required by this DEP shall be carried out. (Chapter 3, 3.7).

CHAPTER 9TESTING, MARKING AND SURVEY REQUIREMENTS

1.6 CRANES

Add to 1.6.6:

A fully documented continuous endurance factory test of the crane and its equipment shall be performed for 12 hours duration. The Principal reserves the right to require the full test to be repeated should any fault develop or repair be required.

In addition to the factory test, a site test shall be performed in the module yard or offshore, with the crane mounted on its pedestal adaptor. This test shall demonstrate the satisfactory operation of the complete crane and shall include an overload test with certified weights. The test shall be performed to the satisfaction of the Certifying Authority.

For both the factory test and the site test a fully detailed procedure shall be agreed with the Principal.

CHAPTER 10 DOCUMENTATION

SECTION 1 GENERAL

1.1 PROCEDURE

Add to this section:

A-4 In addition to the documentation requirements of this chapter, the information specified in the data/requisition sheets and the requisition for engineering documents (RED Form DEP 40.10.01.93-Gen.) form included with the enquiry shall be submitted. The Manufacturer's attention is directed to the conditions listed under remarks on the red form, regarding submissions.

PART III AMENDMENTS/SUPPLEMENT TO BS 2573 PARTS 1 AND 2

INTRODUCTION

The numbering and headings of these amendments/supplements correspond in Section A to BS 2573 Rules for the design of cranes Part 1: 1983, Specification for Classification, Stress Calculations and Design Criteria for Structures and in Section B to Part 2: 1980 for Stress Calculation and Design of Mechanisms.

SECTION A BS 2573 PART 1

SECTION TWO CLASSIFICATION OF THE CRANE AS A WHOLE

2.1 GENERAL

Add to this section:

The class of utilization, state of loading, group classification, load spectrum and fatigue life shall be as defined by the Principal on the minimum purchase information sheets.

SECTION THREE LOADS AND LOAD COMBINATIONS

Add to this section:

The simple treatment for the fatigue analysis detailed in Section Eight to determine the minimum and maximum stress levels during one cycle of operation shall be used. Alternative national codes for the analysis shall be submitted to the Principal for approval. The basis for the analysis and the cycle of operation shall be agreed with the Principal.

SECTION SIX BASIC STRESSES IN CONNECTIONS

6.1 WELDS

6.1.1 General

Add to this section:

Alternative national codes may be considered.

Welding procedure specifications (including repairs) shall be qualified for all welding positions intended to be used in the fabrication.

The results of previous relevant welding procedure qualifications may be accepted at the discretion of the Principal. Full documentation sufficient to satisfy the Principal and the Certifying Authority shall be submitted.

Only welders and welding operators qualified for the work shall be employed on the fabrication.

For NDT and examination requirements refer to Part II, Chapter 3, 3.7.

SECTION EIGHT FLUCTUATING LOADS, PERMISSIBLE FATIGUE STRESSES

8.4 METHODS

Add to this section:

The simple treatment for fatigue analysis shall apply (Section A, Section 3 of this DEP).

SECTION B BS 2573 PART 2

1. SCOPE

Add to this section:

The group classification of the mechanisms for the crane equipment shall be as defined by the Principal on the minimum purchase information sheets.

The Manufacturer shall detail the basis of the design of all mechanisms on the Critical Load Path.

8. SELECTION OF COMPONENTS

8.5 ROPES AND ROPE REEVING COMPONENTS

8.5.3 Pulleys and drums

Add to this section:

The flange shall extend a minimum of 2.5 times the rope diameter over the top layer of rope at all times.

The luffing winch drum should be sized for a single layer of rope. The hoist winch drums should be sized for a maximum of three layers of rope.

All drums shall be fully grooved to facilitate spooling. Drums with no more than two layers may have helical grooves. Drums with 3 (or more) layers of rope shall have Lebus type grooves.

No less than two full wraps of rope shall remain on the luffing drum in any operating conditions. No less than three full wraps of rope shall remain on the hoist winch drums.

Hoist drum rope anchorages shall be either a light tail rope or a rope clamp. Details of all anchorages shall be subject to approval by the Principal. The break out load shall not exceed 10 percent of the breaking strength of the rope. Rope anchors shall be external to drum.

PART IV REFERENCES

Reference is made to the following publications:

NOTE: Unless specifically designated by date, the latest edition of each publication shall be used, together with any amendments/supplements/revisions thereto.

SHELL STANDARDS

Index to DEP publications and standard specifications	DEP 00.00.05.05-Gen.
Painting and coating	DEP 30.48.00.10-Gen.
Data/requisition sheet for internal combustion engines	DEP 31.29.80.93-Gen.
Electrical engineering guidelines	DEP 33.64.10.10-Gen.
Pedestal Cranes (Amendments/supplements to API Spec 2C)	DEP 37.92.10.30-Gen.
* Data/requisition sheets for pedestal cranes:	
General	DEP 37.92.10.93-Gen.
Ram derricking type	DEP 37.92.10.94-Gen.
Telescopic boom type	DEP 37.92.10.95-Gen.
A-Frame type	DEP 37.92.10.96-Gen.
* Requisition for engineering documents	DEP 40.10.01.93-Gen.

*NOTE: The latest version of data/requisition and requisition sheets can be found in the Requisitioning Binder, DEP 30.10.01.10-Gen.

AMERICAN STANDARDS

Structural welding code - steel — ANSI/AWS D1.1

Issued by:
American Welding Society
550 N.W. LeJeune Road
PO Box 351040 Miami
Florida 33135
USA.

Specification for offshore cranes — API Spec 2C

Issued by:
American Petroleum Institute
1220 L Street, Northwest
Washington DC 20005
USA.

Boiler and pressure vessel code, section VIII - rules for construction of pressure vessels — ASME VIII

Issued by:
345 East 47th Street
New York NY 10017
USA.

BRITISH STANDARDS

Rules for the design of cranes. Part 1: Specification for classification, stress calculations and design criteria for structures	BS 2573: Part 1: 1983
Rules for the design of cranes. Part 2: Specification for classification, stress calculations and design of mechanisms	BS 2573: Part 2: 1980
Unfired fusion welded pressure vessels	BS 5500
Specification for weldable structural steels for fixed offshore structures	BS 7191

Issued by:
British Standards Institution
2 Park Street
London W1A 2BS
United Kingdom.

The Institute of Petroleum, model code of safe practice in the petroleum industry; Part 15: Area classification code	IP Code Part 15

Issued by:
Institute of Petroleum
61 New Cavendish Street
London W1M 8AR
United Kingdom.

Lloyd's Code for Lifting Appliances in a Marine Environment	January 1987

Issued by:
Lloyd Register of Shipping
71 Fenchurch Street
London EC3N 4BS
United Kingdom.

EUROPEAN STANDARDS

Limits and methods of measurement of radio interference characteristics of household electrical appliances, portable tools and similar electrical apparatus	EN 55014

Issued by:
Committé Européen de Normalisation
Secrétariat Central
Rue de Stassart 36
B-1050 Brussels
Belgium.
NOTE: Copies can also be obtained from national standards organizations

INTERNATIONAL STANDARDS

Degrees of protection provided by enclosures (IP code)	IEC 529

Issued by:
International Electrotechnical Commission
3, Rue de Varembé
CH-1211 Geneva 20
Switzerland.

NOTE: Copies can also be obtained from national standards organizations

Steel wire ropes for general purposes - Characteristics	ISO 2408
Quality systems - Model for quality assurance in design/development production, installation and servicing	ISO 9001
Steel and steel products - Inspection documents	ISO 10474

Issued by:
International Organisation for Standardisation
1, Rue de Varembé
CH-1211 Geneva 20
Switzerland.

NOTE: Copies can also be obtained from national standards organizations

APPENDIX 1 ACTION ITEMS

Action Item	Place in DEP			Subject
A-1	PART I		Section 1.1	Choice of external standard
A-2	PART II	Chapter 3	Section 3.7	Paint specification
A-3		Chapter 7	Section 6.5.3	Data recording option
A-4		Chapter 10	Section 1.1	Documentation

APPENDIX 2 MINIMUM PURCHASE INFORMATION SHEETS

These sheets shall be entered by the Principal. All fields not entered by the Principal shall be entered by the Manufacturer and returned with the proposal. Provisional information shall be stated as such.

1. CRANE CONFIGURATION

Crane type	A-frame / ram luffing / telescopic / king post
Boom type	closed box / lattice boom
Boom length	m
Auxiliary hoist required	Yes/No
Prime mover	diesel / electric motor
Preferred suppliers	
Transmission	hydraulic
Rotation	continuous 360°/
Machinery house	Yes/No weather / sound proof enclosure
Control cabin / location	Yes/No crane / remote If crane : left / right side (looking towards boom tip)
Floodlights (Total number, location)	
Gas / smoke detector fixing arrangements required	Yes/No
Power outlet sockets	type: spec:
Collector rings Total number (for status lights, telephone etc.)	
Anti-condensation heaters required	Yes / No / Manufacturer to propose

2. PERFORMANCE CRITERIA (Minimum Requirements)

Structural group classification to BS 2573 Part 1.

Class of utilisation	:	/
State of loading	:	/
Duty group	:	
Fatigue life (pedestal/crane)	:	/
Load spectrum	:	/

Machinery group classification to BS 2573 Part 2.

	Main Hoist	Whip Hoist	Slew	Luff
Class of utilisation				
State of loading				
Duty group				

Max. dynamic lift (at conditions given in Appendix 2 section 3)	kg at	m. minimum working radius
Max. static lift	kg at	m. minimum working radius
Max. auxiliary lift	kg at	m. minimum working radius
Main hook speed (minimum)	m/s	
Auxiliary hook speed (minimum)	m/s	
Personnel lift required	Yes/No	kg
Installed platform design life	Years	
Total duty cycles		
Surface temperature limitation	°C	

3. ENVIRONMENTAL CRITERIA

Ambient temperature max./min.	°C/ °C
Design temperature max./min.	°C/ °C
Humidity	% relative/absolute
Atmosphere	Saline /
Location	
Surface wind maximum instantaneous gust	m/s m/s
Wave height (significant)	m
Wave period	seconds
Excessive temperature exposure	flue gas exhaust °C flare °C boom °C upperstructure °C
Snow and ice conditions Operating - thickness Stowed - thickness	Yes/No mm mm
Hazardous area classification As per IP Model Code of Safe Practice, Part 15	boom: cab: power unit: crane:
Diesel exhaust emission control standard	

4. UTILITIES AVAILABLE

Diesel fuel	Yes/No	Grade:
Electricity AC (power)	V	ϕ Hz
AC (control)	V	ϕ Hz
DC	V	A
Emergency / uninterrupted	Yes/No V	AC/DC ϕ Hz
Air supply (instrument quality)	bar (ga)	m³/min
Air supply (plant quality)	bar (ga)	m³/min
Potable water (limited to top-up use only)	Yes/No	