MATERIAL AND EQUIPMENT STANDARD

FOR

OFFSHORE CRANES

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APPENDICES:

0. INTRODUCTION

This Specification gives the amendment and supplement to API Specification 2C (Spec 2C) Fourth Edition, March 1, 1988 "Offshore Cranes".

For ease of reference, The clause (or paragraph) numbering of API Specification 2C has been used throughout of this specification. Clauses in API Spec 2C not mentioned remain unaltered.

For the purpose of this specification the following definitions shall hold:

Sub. (substitution):	The API Spec. clause is deleted and replaced by the new clause.
Del. (Deletion):	The API Spec. clause is deleted without any replacement.
Add. (Addition):	A new clause with a new number is added.
Mod. (Modification):	Part of the API Spec. clause is modified and/or a new statement or comment is added to that clause.

SECTION 1

1. SCOPE

1.1 Coverage

This Specification contains the minimum requirements for offshore cranes to be used in, production, drilling and exploration facilities and new ventures, wherever applicable.

No deviation from this specification is permitted without explicit approval of the Company.

The intended deviations shall be clearly indicated and separately listed in the vendor's proposal.

Compliance with the requirements of this specification does not relieve the Vendor of the responsibility for furnishing a unit of proper design, strength, workmanship and materials to suit the specified operating conditions. (Mod.)

1.2 Conflicting Requirements

In case of conflict between this specification and inquiry or order following priority of documents shall apply:

First Priority: Purchase order and variations thereto
Second Priority: Data-requisition sheets
Third Priority: This specification
(Add.)

1.3 References

Following standard to the extent specified herein form part of this Specification.

IPS (IRANIAN PETROLEUM STANDARDS)

M-PM-290 "Internal Combustion Reciprocating Engines"

IEC (INTERNATIONAL ELECTROTECHNICAL COMMITTEE)

(Add.)

1.4 Site Location and Conditions

Site location and conditions shall be specified by the Purchaser complying the requirements of Appendix C.(Add.)

1.5 Scope of Supply

Vendors scope of supply as a minimum shall include following items:

a) The primer mover and its related accessories.

b) Complete booms, hoist unit, hoist gearbox, hoistbrake and limit switches.

c) Complete pedestal system with controls and stoppers.

d) Emergency stop system.

e) Air craft hazard warning lights.

f) Flood and spot lights for night time lifting illumination.

g) All access platforms and ladders from the pedstal adaptor and upwards.

h) Radio communication equipment.

i) All hoses for connection to the platform utilities at the pedestal adaptor, and terminated with quick connect couplings.

j) All internal and external surface preparation, coating and preservations suitable for offshore condition.

k) Inspection and witnessed testing certificates.

l) All design drawings and documentations necessary for the installation of the crane.

m) Pedestal adaptor piece or king post prepared ready for welding to the platform pedestal.

n) Slew ring bearing and full set of bolting. (Add).

2. CRANE RATING

2.1 Rated Load

Crane ratings shall not exceed limits of vendor's design, but shall be well within the range of the manufacturer's actual experience. Only cranes which have proven their reliability in service are acceptable. (Mod.)

2.4 Main power hoist and its related accessories, boom hoist and swing shall be designed for simultaneous full-load operation on the three motions, (luffing, booming and slewing). (Add.)

3. STRUCTURAL COMPETENCE ESTABLISHED BY STRESS ANALYSIS

3.1 Analysis

3.1.2.2 Category 2 design load

a) The manufacturer shall specify the wind speeds used in design and:

- The crane shall be fitted with an anemometer.

- The operating instruction for the crane shall state that the crane shall not be operated in wind speeds in excess of those specified and shall specify the conditions in which a crane should be left when out-of-service. (Mod.)

4. DESIGN AUTHENTICATION AND TESTING

4.3 Tests Responsibility

The tests shall be the responsibility of the manufacturer and shall be carried out at the manufacturer's works or at a place to be agreed between the purchaser and the manufacturer. Additional tests may be carried out subject to agreement between the manufacturer and purchaser. The manufacturer shall clearly indicate whether or not the hook block is to be considered as part of the test load. The weight of slings, equalizing beams and other similar devices for handling test loads shall be taken as part of the test load. (Add.)

4.4 Functional Test

The operational functions of the complete crane shall be tested with no load to demonstrate the satisfactory operation of each control device and, where fitted, each cut-out device for overhoisting, overlowering, overslewing and overderricking. (Add.)

4.5 Stability Test Criteria

Stability tests using test loads shall be considered to be successful if the load remains static at 200 mm above the ground for at least 10 min. (Add.)

4.6 Mechanical Test

Vendor shall demonstrate to inspector that the complete crane is constructed to the specification and data requirements and is ready for operation. Tests shall be carried out to prove the following:

a) Overload test

The crane shall be tested to lift and sustain a minimum test load of 125 percent of the safe working load at fully extended boom position and shall be witnessed by third party inspection and/or purchaser's representative.

b) Motion test

During the overload test, each motion in turn shall be maneuvered in both directions and the crane shall sustain the load under full control. The crane shall prove itself capable of dealing with the overload and specified speed without difficulty. (Add.)

4.7 Telescoping

For cranes fitted with telescopic jibs, the telescoping motion shall be tested through the range of applicable duties. (Add.)

5. WIRE ROPE, SHEAVES, AND DRUMS

5.1 General

Where two or more ropes are used in a system, means shall be provided for ensuring that tensile forces in the ropes are distributed in the designed proportions. Arrangements entailing reverse bends shall be avoided as far as possible. A rope reeving diagram shall be provided. (Mod.)

5.8 Load Hook, Ball Assemblies and Load Blocks

Swiveling hooks shall be mounted on anti-friction bearings suitable for the purpose. If required, a locking device shall be fitted to prevent rotation of the hook. (Mod.)

5.9 Fly Jib Pendant Ropes

Where ropes are used to support a fixed offset fly jib, the distances between the support point centers shall be specified by the manufacturer to enable the fly jib offset to be correctly set under working conditions. (Add.)

6. BOOM HOIST, LOAD HOIST AND TELESCOPING BOOM MECHANISMS

6.1 Hoists

6.1.1 Brakes

6.1.1.1 Brakes and clutches

Springs for applying brakes shall be of the compression type and shall not be stressed in excess of 80% of the torsional elastic limit of the material. Clutches shall be designed to transmit the maximum torque for the motion for all conditions of usage.

Dry friction clutches shall be protected against rain and other liquids such as oil and lubricants. Braking means, whether functioning mechanically, hydraulically, or electrically, shall have heat dissipation capability consistent with service needs.

Brakes shall be protected from the weather and from lubricants, hydraulic fluid, or other such liquids, and dirt. (Mod.)

6.1.1.3 Static brakes

The wearing surfaces of all brake drums or plates shall be machined and shall be smooth and homogeneous. (Mod.)

6.1.5 Lubrication and cooling

Add to this clause:

d) All bearings shall be adequately lubricated. Plain bearings or their shafts shall have oil or grease grooves. All lubrication nipples should be of similar size and type and shall be readily accessible. Where access for lubrication is difficult, bearings shall be such that lubrication is required as infrequently as possible or facilities for lubrication from a remote position shall be provided. A lubrication diagram shall be provided. (Mod.)

6.2 Boom Hoist

6.2.2 Auxiliary holding device

b) The hydraulic system shall be provided with pressure gage(s) and overpressure relief valve(s). (Mod.)

6.3 Telescoping Boom Mechanisms

c) Ropes, when used for, or in conjunction with telescoping, shall have a nominal breaking strength not less than three and one half times the load applied to the rope. Means shall be provided to minimize the possibility of the crane jamming during raising and lowering or to protect the rope from being excessively loaded.

d) For cranes with lifting capacity less than 5 ton and, whenever installation of latice boom is not practicable, telescopic boom shall be used to improve the crane maneuver. (Mod.)

7. SWING MECHANISM

7.1 Swing Mechanism

In the case of proprietary slewing rings, it is particularly important that the manufacturer is consulted and given full details of the loads and duty involved. Attention shall be given to the method of mounting and the bolting requirements for which the manufacturer's recommendations shall be taken into account. (Mod.)

8. POWER PLANT

8.1 General

Add following to this Clause:

c) Electric Motors as the prime mover shall comply with the requirements of IEC.

d) Internal combustion engines shall comply with the requirements of IPS-M-PM-290 and a silencer shall be fitted to the exhaust.

e) The sump and lubricating system of the engine shall be so arranged that efficient lubrication is maintained in all planes of operation covered by the specification.

f) Provision shall be made where necessary for draining the water circulating system, the drain cocks being fitted in accessible positions. The arrangement shall be such that it is not possible to leave pockets of water in either the system or the pump casing. (Mod.)

8.2 Exhaust Systems (Internal Combustion Prime Movers)

b) When practicable the exhaust from an engine should be discharged vertically as high as possible, and it is recommended that means should be provided to prevent the ingress of water into the exhaust system. (Mod.)

8.3 Fuel Tanks

a) Fuel tank capacity shall be sufficient for at least 8 hours running on normal crane duty, and means shall be provided for ascertaining the quantity of fuel contained in the tank. (Mod.)

8.4 Hazardous Area Classifications

For cranes which are to be permanently installed, the hazard of earthquake effects appropriate to the site or zone should be considered. (Mod.)

9. CONTROLS

9.1 General

b) Delete "when applicable" and add "unless intentionally restrained for functional purposes". (Mod.)

9.8 Control Equipment

Circuit-breakers, contactors, relays and similar control equipment shall be of sound construction, adequate for the duty concerned. Electrical, and where practical mechanical, interlocking shall be incorporated to prevent closure of the main circuit-breaker or contactor unless the control gear for all individual subsidiary circuits is in the "open" or neutral position. A push-button emergency stop or stops, placed readily available for prompt use by the operator in emergency, shall be connected either in the operating coil-circuit of the main contactor or in the under-voltage release circuit of the main circuit-breaker, as appropriate. All fuses, except for local low current control circuits, shall be of HR cartridge type. (Add.)

10. CABS AND ENCLOSURES

10.1 General

Cab lighting, either natural or artificial, shall provide a level of illumination that enables the operator to observe the operating controls. The operator’s cab shall be mounted on the rotating portion of the crane and have safe access to the driver’s cabin.

Cab shall be self ventilated by means of adjustable opening and in case of special environmental condition shall be equipped with heating and/or Cooling System. Free height inside cab shall not be less than 2 meters. Cab shall be provided with door lockable from outside and with emergency escape opening. (Mod.)

10.2 Windows

A windshield wiper should be provided on the front window. Means shall be provided for cleaning windows from inside the cab unless exterior platforms are provided. (Mod.)

10.8 Seat

An adjustable operator’s seat with backrest shall be provided. The seat should be arranged and constructed to minimize operator fatigue, and shall have means for ventilation. (Add.)

10.9 Radio Communications

Operator cab shall be equipped with radio communication facilities to enable the operator to contact the vessle and control board intermediatly. (Add.)

10.10 Safe Load Indicator

a) A safe load indicator shall be supplied for hoist services, and shall be located in the operator's cabin so as to give unimpaired vision of the load line.

b) The indicator shall display the safe working load at any radius relative to see state, the weight on the hook, the operating radius, and the actual load expressed as a percentage of the rated load at that radius.

c) A visual alarm shall warn when the percentage rated load exceeds 95 percent, and audible alarm shall warn when the rated load reaches 110 percent.

d) The audible alarm shall be located outside the driver's compartment and shall be powerful enough to be heard at a distance of 100 meters in the most adverse crane operating conditions.

e) The safe load indicator shall be calibrated to show the platform lifting duty, and for the duty when lifting from supply vessel. Vendor should state load indicator weight accuracy, which shall be within ±5 percent. (Add.)

11. MISCELLANEOUS REQUIREMENTS & EQUIPMENT

11.1 Boom Equipment

h) The connections between the sections of lattice strut jibs and sections of fly jibs shall be designed so that they can only be disconnected by an operator standing out from under the section. This may be achieved by the use of pins which can only be inserted from inside the jib so that an operator must stand outside of the jib to drive them out. (Mod.)

11.3 Clutch and Brake Protection

Clutches shall be arranged to permit adjustments where necessary to compensate for wear. (Mod.)

11.8 Miscellaneous Equipment

a) A metal receptacle should be provided for the storage of small hand tools and lubricating equipment. It should be secured in the cab or on the machinery platform.

b) Relief valves shall be provided in hydraulic and pneumatic circuits carrying fluid pressurized by a power driven pump in order to limit the maximum pressure in the circuit. The magnitude of the relief settings shall permit operation under rated load conditions, and means shall be provided to prevent unauthorized adjustment or tampering. A hydraulic circuit diagram shall be provided in the manufacturer's handbook.

d) Delete, "when specified by the purchaser". Add following Paragraphs to this Clause.

f) A class ABC portable fire extinguisher shall be provided in the cab, or at the machinery housing.

g) A cooler shall be fitted, if required, to keep the temperature of the fluid within the limits specified by the fluid supplier.

h) A wind velocity indicating device shall be mounted at or near the top of the crane.

A velocity read-out shall be provided at the operator's station in the cab, and a visible or audible alarm shall be triggered in the cab and at remote control stations when a preset wind velocity has been exceeded.

i) The weight of the hook(s) / block(s) shall be clearly and durably marked on them.

j) Fuel tank filler pipes shall be located and or protected so as not to allow spillage or overflow to run onto the engine, exhaust, or electrical equipment of the machine being fueled.

k) The crans shall be supplied with all necessary lightings both inside driver's cab and outside, to allow the operation of the crane even during night time. Furthermore, lamps shall be provided to allow good illumination during inspection and maintenance works. (Mod.)

11.9 Painting and Protective Coating

The unit shall be coated in accordance with manufacturer's standard practice, subject to review by Purchaser. The final color of supplied equipment shall be agreed mutually upon by the Purchaser and the Vendor. (Add.)

15. MARKING

15.1 Nameplate

Following information shall be included in Nameplate:

- Crane classification .....
- Order No. .....
- Order placed by .....
- Loading capacity .....
- Weight of complete crane .....
- Heaviest removeable part for overhaul. .....

(Mod.)

16. DOCUMENTATION (Add.)

16.1 Each crane shall be provided with informational literature written in English including, but not limited to the following.

a) Installation preparation instructions which should provide:

1) Vertical and horizontal forces and torsional and overturning moments applicable to each recommended configuration. The data should indicate whether governing forces are due to in-service or out-of-service winds, the applicable wind velocity, and whether the wind has been taken perpendicular or diagonal to the crane boom head.

2) Data, or boom height limitations based on several wind velocity levels for out-of-service conditions.

3) Anchorage arrangements.

4) Crane dimensional data.

b) Erection and dismantling instructions which should provide:

1) Weight and dimensions for components and subassemblies.

2) Recommended lifting attachment points.

3) Center of gravity location for nonuniform components and subassemblies.

4) The method and recommended sequence of assembly and disassembly of components and subassemblies. Warnings should be given alerting erection personnel when member strength or stability requires particular methods or sequencing.

5) Details, including diagrams where necessary, of critical component connections describing and identifying bolts, pins, and other parts needed, the method of assembling the joint, the torque or tension to be applied to prestressed (traction) bolts, the point in time of the erection process for applying torque or tension, and the means for retaining pins, and etc.

c) Operating instructions, limitations, and precautions.

d) Maintenance requirements and recommendations including identification of those members or locations that should be periodically observed, or tested, for the purpose of detecting the onset of metal fatigue, the loosening of prestressed (traction) bolts, or wear affecting the ability of the crane to support rated loads.

e) Repair recommendations including advice on welding procedures. The type of metal used for load sustaining members shall be identified (see Section 13).

f) Design characteristics affecting safety, such as:

1) Location, proper settings and adjustments, and functioning of limiting and indicating devices.

2) Permitted variations in electrical supply and circuit parameters.

3) Location and required settings of hydraulic or pneumatic pressure relief valves and locations of points where circuit pressures can be checked.

4) Limitations on service life of load bearing members or mechanisms including manufacturer's recommendations of frequency of inspection as a function of severity of service.

g) Lifting speeds, and operating speeds for all motions, stated for all conditions and configurations.

h) Full specification of transmission systems and controls including actuating medium, e.g., air, hydraulic, hydrostatic, electric, mechanical, etc.

i) Specification of brakes and clutches, torque converters, hydraulic pumps, rams, etc.

j) Any unusual maintenance or servicing procedure unique to the crane.
(Add.)

16.2 Erection and Maintenance Instructions

The manufacturer shall supply full operational instructions, erection and dismantling instructions, maintenance instructions, aparts manual and, where appropriate, a workshop manual. (Add.)

16.3 Spare Parts

Recommended spare parts identified by Part No's for two years of continuous operation, including price list shall be submitted in vendor proposals. Vendor proposal for spare parts shall include proposed method of protection from corrosion during shipment and subsequent storage. Recommended spare parts for commissioning shall also be submitted. (Add.)

17. PREPARATION FOR SHIPMENT (Add.)

17.1 Equipment shall be suitably prepared for the type of shipment specified. The preparation shall be mutually agreed upon and unless otherwise specified, shall make the equipment suitable for 12 months of outdoor storage from the time of shipment. (Add.)

17.2 The Vendor shall provide the Purchaser with the instructions necessary to preserve the integrity of the storage preparation after the equipment arrives at the job site and before start-up. (Add.)

17.3 One copy of the manufacturer's standard installation instructions shall be packed and shipped with the equipment. (Add.)

18. GUARANTEE AND WARRANTY (Add.)

Unless exception is recorded by the Vendor in his proposal, it shall be understood that the vendor agrees to the following guarantees and warranties:

- During a period of 12 months after the date of commissioning, The vendor shall, with all possible speed and without cost to the purchaser, replace or repair the goods or any part there of found to be defective due to faulty material, workmanship or to any act or omission of the Vendor.

- In the particular the Vendor shall reimburse any transportation and other charges incurred by the Purchaser in effecting such replacement or repair at the point of use. (Add.)

APPENDICES
APPENDIX E - DATA SHEET (Add.)

	DATA SHEET: OFFSHORE CRANE								PROJECT No.:			ORDER No.:	
1	REV	SERVICE										ITEM	
2		No. REQ'D	TYPE									Add	
3		MODEL						MANUFACTURER					
4													
5		ENVIRONMENTAL DATA							OPERATING DATA				
6													
7		OPERATING TEMP.							TYPE				
8		MAX. EXPOSED SURFACE TEMP.											
9									LIFTING CAPACITY:				
10		MAX. WIND SPEED: OPERATING											
11		STOWED							RADIUS (m)	No. OF FALLS	LOAD (kg)		
12		WIND PRESSURE:											
13													
14													
15													
16													
17													
18		WAVE HEIGHT:											
19													
20		WAVE PERIOD:											
21									LIFTING HEIGHT:				
22													
23		AREA CLASSIFICATION:							ELEVATION OF BOOM FOOT PIN				
24		BOOM											
25		DRIVER'S CABIN							OPERATING SPEEDS:				
26		PEDESTAL							LIFTING				
27		ELECTRICAL SUPT							SLEWING				
28									LUFFING				
29													
30									SLEWING ANGLE:				
31									LUFFING ANGLE:				
32									LUFFING Max. INCLINATION:				
33													
34		CONSTRUCTION DATA											
35													
36		DESIGN CODES:											
37													
38		PRIME MOVER TYPE:							MOTOR POWER:				
39													
40		BOOM TYPE:							BOOM LENGTH:				
41		TIP LENGTH:											
42		LIFTING RADIUS: MIN.:											
43			MAX.:										
44													
45		OVERTURNING MOMENT:											
46													
47		HOOK TYPE:					MATERIAL				SAFETY LATCH:		
48													
49													
50		NOTES:											
51													
52													
53													
54													
55													

	REV		DESCRIPTION	DATE	DWN	CKD	APP	REV	DESCRIPTION	DATE	PRD	CKD

13

(to be continued)

APPENDIX E - (continued)

	DATA SHEET: OFFSHORE CRANE	PROJECT No.:	ORDER No.:
1			
2	DRUM/ROPE	BOOM HOIST	MAIN HOIST	AUXILIARY HOIST
3				
4	TYPE:			
5	DIAMETER			
6	LENGTH			
7	MATERIAL			
8	PITCH/ROPE DIA.RATIO			
9	ROPE WRAPS			
10	GUIDING DEVICE			
11	ROPE SPOOLING DEVICE			
12	GROOVE RADIUS			
13	HEIGHT			
14	PITCH			
15	DRUM THICKNESS			
16	ROPE MFR.			
17	NOMINAL DIA.			
18	TYPE N° OF STRANDS			
19	CORE TYPE			
20	ELEMENTARY WIRE N° DIA.			
21	BREAKING LOAD			
22	SAFETY FACTOR			
23				
24				
25	HYDRAULIC UNIT:			
26	TANK CAPACITY			
27	PUMPS N° TYPE			
28	MOTOR POWER			
29	OPERATING/DESIGN PRESSURE			
30	ACCUMULATOR N°/VOLUME/PRESSURE			
31	HAND PUMP			
32				
33				
34	DRIVER'S CABIN			
35				
36				
37	ACCESSORIES			
38				
39	ANTICOLLISION DEVICE			
40	TYPE			
41	LOCATION			
42	CENTRALIZED LUBRICATON SYSTEM			
43	WALKWAYS/LADDERS/RAILS			
44	MATERIAL			
45	AIRCRAFT SAFETY LIGHTS			
46	TELECOM SYSTEM			
47	FIRE EXTINGUISHERS			
48	N°/TYPE			
49	OVERLOAD WARNING DEVICE			
50				
51	NOTES			
52				
53				
54				
55				

	REV	DESCRIPTION	DATE	PRD	CKD	APP	REV	DESCRIPTION	DATE	PRD	CKD	APP

(to be continued)

APPENDIX E - (continued)

		DATA SHEET: OFFSHORE CRANE	PROJECT No.:	ORDER No.:
1		SHEAVES:		
2		DIAMETER		
3		MATERIAL		
4		BEARING TYPE		
5		LUBRICATION		
6		SHEAVE GUARDS		
7				
8				
9		BRAKES:		
10		TYPE		
11		HOLDING TORQUE		
12				
13				
14		BOOM HOIST:		
15		TYPE		
16		HOISTING CAPACITY		
17		CPX (S)		
18		CPX (D)		
19		CPX (S)		
20		CPX ACTUAL		
21		GEARS DIN CLASS		
22		BOOM HOLDING DEVICE TYPE		
23				
24				
25		SWING MECHANISM:		
26		BRAKE TYPE		
27		SWING LOCK		
28		BEARING TYPE		
29		SWING CIRCLE ASSEMBLY RETAINER		
30				
31				
32		MAIN HOIST:		
33		GEARING TYPE/MATERIAL		
34		TRANSMISSION RATIO		
35		DESIGN CODE/SERVICE FACTOR		
36		LUBRICATION SYSTEM		
37				
38				
39		AUXILIARY HOIST:		
40		GEARING TYPE/MATERIAL		
41		TRANSMISSION RATIO		
42		DESIGN CODE/SERVICE FACTOR		
43		LUBRICATION SYSTEM		
44				
45				
46				
47		NOTES:		
48				
49				
50				
51				
52				
53				
54				
55				

	REV	DESCRIPTION	DATE	PRD	CKD	APP	REV	DESCRIPTION	DATE	PRD	CKD	APP

APPENDIX E - (continued)

	DATA SHEET: INTERNAL COMBUSTION ENGINE							PROJECT No.				ORDER No.			
1	SERVICE:							No. REQ'D				ITEM			
2	MANUFACTURER:							TYPE:				MK			
3	RATED kW AT SITE CONDITIONS:							rpm:				SERIAL No.			
4															
5		OPERATING DATA						CONSTRUCTION DATA							
6		STROKE: CYCLE.						CYLINDER: No. ARRANGEMENT:							
7		rpm: DESIGN/MAX/MIN / /						PISTON: STROKE mm BORE mm							
8		MAX. CONTINUOUS kW (STD COND'S):						No. OF RINGS							
9		RATED kW (NET AT SITE COND.): RATED rpm.						TOTAL DISPLACEMENT: cm³							
10		PMEP AT WORKING CONDITIONS: kg/cm²						VALVES, TYPE. No.							
11		FUEL TYPE						MAIN BEARING: TYPE No.							
12		FUEL CONSUMPTION: kg/kWh AT FULL LOAD						LENGTH DIAM.							
13		kg/kWh AT % LOAD						INJECTION SYSTEM:							
14		kg/kWh AT % LOAD						SUPERCHARGING SYSTEM							
15								STARTING TORQUE AVAIL. kg.m							
16		DRIVEN MACHINE: ITEM:						ROTATION (FROM COUPL. END):							
17		TYPE						SPEED GOVERNOR:							
18		BHP DESIGN: kW MAX. kW						TRANSMISSION:							
19		rpm													
20		ROTATION (FACING COUPLING END)						ACCESSORIES							
21								AIR INLET FILTER: MAKE TYPE No.							
22		SITE DATA AND UTILITIES						FUEL FILTER: MAKE TYPE No.							
23		INSTALLATION						EXHAUST SILENCER PIPE DIA							
24		ALTITUDE: m BAROMETER kg/cm²						BATTERY TYPE CAPACITY Ah							
25		TEMPERATURE: SUMMER WINTER						BATTERY CHARGER							
26		WET HUMIDITY						BASEPLATE							
27		DESIGN CONDITION:						FUEL TRANSFER PUMP							
28								MAINTENANCE TOOLS:							
29		NL POWER						CONTROL PANEL:							
30								FUEL TANK: lt							
31		COOLING SYSTEM TYPE						INSTRUMENTS							
32		SW/C WATER PUMP						PRESS. GAGES OIL WATER.							
33		WATER COOLER						TEM GAGES OIL WATER.							
34		ACCESSORIES:						FUEL LEVEL INDICATOR:							
35								TACHOMETER:							
36		LUBRICATION SYSTEM, TYPE						ALARMS AND SHUTDOWNS.							
37		MAIN PUMPS DRIVEN BY.						LOW OIL PRESS: HIGH OIL TEMP.							
38		AUX. PUMP: DRIVEN BY:						HIGH WATER TEMP.: OVER SPEED:							
39		FILTER.						LOW FUEL LEVEL LOW TENSION BATT.:							
40		OIL COOLER:													
41		OIL TYPE:						BHP TEST:							
42		OIL CONSUMPTION.							REQUIRED	OBSERVED	WITNESS				
43		STARTING SYSTEM, TYPE.						MFR STD BHP TEST							
44								PERFOR. MANUF. TEST							
45		No. CONSECUTIVE STARTS						NL LOAD TEST							
46															
47		MATERIALS						WEIGHTS MOTOR kg ACC kg TOTAL kg							
48		FRAME: VALVES: PISTON RINGS													
49		CYLINDERS CYLINDER HEAD: VALVE STEMS.													
50		PISTONS: CYLINER LINERS:													
51		NOTES.													
52															
53															
54															
55															
	REV	DESCRIPTION	DATE	PRD	CKD	APP	REV	DESCRIPTION	DATE	PRD	CKD	APP			