



Product Data Sheet

OC4475KSCE-(32-165)-(50-19)(32)(20-50)(165-3000)

RIG/PLANT		
ADDITIONAL CODE	SDRL CODE	TOTAL PGS 23
REMARKS		
MAIN TAG NUMBER	DISCIPLINE	
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REFERENCE iQ0425485	REFERENCE DESCRIPTION OC4475K	
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1. TECHNICAL DATA

1.1. Crane data

Type of lifts	Lifting data			Dynamic data					Comments
	Hook load SWL	Load radii	Wire falls	Wave height	Dyna-mic factor	Heel + Trim	Off + Side lead	Wind speed	
	t	m	pc	Hs, m		dgr	dgr	m/sec	
MW Internal on deck	32 125 165	50 24 19	1	NA	1,3	5+2	NA	25	See load chart for intermediate lifting capacities below
MW Subsea lift	30 125 165	50 22 17	1	NA	1,3	5+2	0	25	See below table for subsea lifts as a function of the depth
MW Supply boat lift	31 125 165	50 21 17	1	NA	1,3	5+2	0	25	
AW Internal/ Supply boat lift	20	50	1	NA	1,6	5+2	0	25	See below table for subsea lifts as a function of the depth
AW Subsea lift	20	50	1	NA	1,6	5+2	0	25	See below table for subsea lifts as a function of the depth
AW Personnel lift	1	50	1	NA	2	*	*	*	*Operators responsibility to ensure safe operation.
22" Gripper Yoke	5* 10**	50	-	NA	1,3	5+2	0	25	*using gripper **using lifting lugs
75' Riser Yoke	13 40	50 40	-	NA	1,3	5+2	0	25	

1.2. Winch capacity (SWL)

1.2.1. Main winch, single fall : 165t (At outer layer)

1.2.2. Auxiliary winch, single fall : 20t (At outer layer)

1.3. Working radii

1.3.1. Main winch, maximum : 50 m

1.3.2. Main winch, minimum : 8,0 m

1.3.3. Auxiliary winch, maximum : 50 m

1.3.4. Auxiliary winch, minimum : 8,0 m

1.4. Main winch Subsea load chart

For main winch capacity ref. doc. Xxxxx-Z-RD-004A in user manual

1.5. Crane data, Active Heave Compensation

1.5.1. Accuracy AHC : $\pm 5\text{cm}$ (When boom tip motion $\geq \pm 1\text{m}$)

1.6. Main winch AHC load chart

For main winch capacity ref. doc. Xxxxx-Z-RD-004A in user manual

1.7. Heave Compensation Data, max. values:

AHC Load Load in boom tip (included wire) (ton)	Water dept Max/ Wire layer (m)	AHC/CT Normal mode Heave Compensating Speed (m/min)	AHC/CT High speed mode Heave Compensating Speed (m/min)	Max Compensation height (m)
112 (max in high speed mode)	3000/1	60	70	6.8 (+/- 3.4)
165 (max in Normal mode)			NA	4.6 (+/- 2.3)
102 (max in high speed mode)	2461/4	60	77	7.4 (+/- 3.7)
165 (max in Normal mode)			NA	4.6 (+/-2.3)
92 (max in high speed mode)	1789/7	60	85	8.2 (+/- 4.1)
165 (max in Normal mode)			NA	4.6 (+/- 2.3)
40	1288/9	60	90	18.2 (+/- 9.1)
87 (max in high speed mode)				8.6 (+/- 4.3)
165 (max in Normal mode)			NA	4.6 (+/- 2.3)
40	455/12	60	97	18.2 (+/- 9.1)
82 (max in high speed mode)				9.2 (+/- 4.6)
155 (max in Normal mode)			NA	5 (+/- 2.5)

AHC Load Load in boom tip (included wire) (ton)	Water dept Max/ Wire layer (m)	AHC/CT Normal mode Heave Compensating Speed (m/min)	AHC/CT High speed mode Heave Compensating Speed (m/min)	Max Compensation height (m)
40	156/13	60	100	18.2 (+/- 9.1)
80 (max in high speed mode)				9.4 (+/- 4.7)
147 (max in Normal mode)			NA	5.2 (+/- 2.6)

1.8. Aux. winch Subsea and AHC load chart

For aux winch capacity ref. doc. Xxxxx-Z-RD-004B in user manual

1.9. Hoisting speed/ hoisting height

Winch	Winch Load	Wire falls	Hoisting height	Hoisting speed ^{Note 1}	
				SWL	Reduced load
				t	Pc
Main winch, normal mode	165	1	3000	15	60
	25			60	60
Main winch, boost mode	165	1	3000	25	60
	50			60	60
Main winch, AHC mode	165	1	3000	60	60
Aux. winch, Normal mode	20	1	3000	60	100
Aux. winch, AHC mode	20	1	3000	100	-
Tugger winch	10	1	100	50	50

1.10. Luffing time^{Note 1}

1.10.1. From maximum to minimum radius and vice versa: 100 sec
(at max./no load) Theoretical time at continuous full speed

1.11. Knuckle boom folding time^{Note 1}

1.11.1. From retracted to extended and vice versa: 100 sec
(at max./no load) Theoretical time at continuous full speed

1.12. Main boom angle (measured between level and top plate of main boom)

1.12.1. Minimum: 0.0°

1.12.2. Maximum: 84.5°

1.13. Knuckle boom angle (measured between top plate of main boom and bottom plate of knuckle boom – when folded)

1.13.1. Minimum: 5.4°

1.13.2. Maximum: 125.6°

1.14. Slewing

1.14.1. Slewing range : 360 dgr

1.14.2. Slewing speed^{Note 1} : 0,7 rpm unlimited slew

NOTE 1! Guaranteed performance.

The above speeds are based on average volumetric efficiencies provided by our suppliers of hydraulic components. A speed tolerance of +10 to -5% is within the accepted range and should be taken into consideration.

1.12. Loading on top of pedestal (preliminary values)

1.12.1. Dynamic overturning moment : 7898 tm

1.12.2. Slew brake moment : 485 tm

1.12.3. Dynamic vertical force : 735 t

NOTE!

The loading forces to the top of the pedestal take into consideration the load factors stated under point No. 1.1., Crane data.

1.13. Weight

1.16.1. Estimated dry crane weight : 485 t

1.16.2. Pedestal weight : 23 t

1.16.3. Oil weight : 5 t

1.16.4. TOTAL WEIGHT : 513 t

2. INTERFACE / POWER SUPPLY

POWER SECTION						
Item No.	Description	Voltage (AC)	Power kW	No. of rings	Ex/Non-Ex slip rings	Comments
1.	Main power consumption , motor no.1&2	690 V / 60 Hz	2x1050 (S6-40%) 2x820 (S1-100%)	6	Non-Ex	For redundancy we recommend power supply from separate switch boards.
1a.	Regenerated Power Note 1	690 V / 60 Hz	2x250			Main Winch down@max speed/load
2.	Oil circulation / feed pump and auxiliary power	690 V / 60 Hz	120	3	Non-Ex	
3.	Aviation Light (UPS)	230 V / 60 Hz /	0,7	2	Ex de	
4.	Control System (UPS)	230 V / 60 Hz /	1,5	2	Non-Ex	
5.	PE (Earth Connection)			1	Non-Ex	
SIGNAL SECTION						
Item No.	Description	Voltage		No. of rings	Ex/Non-Ex slip rings	Comments
6.	PA/GA speaker system	100 V		6	Ex de	
7.	MRU	24 Vdc		14	Non-Ex	
8.	Telephone system			3	Ex de	
9.	E-Hawke to LIR	24 Vdc		3	Non-Ex	
10.	Smoke/Heat detectors	10-27 Vdc		6	Ex i	
11.	Gas detectors	24 Vdc		5	Ex de	
12.	Spare for ROV Monitor			5	Non-Ex	
13.	Crane Not Running	24 Vdc		3	Non-Ex	
14.	UPS Alarm	24 Vdc		3	Non-Ex	
15.	Gas Alarm Panel	24 Vdc		5	Ex de	
16.	Talk back system	24 Vdc		5	Non-Ex	

Note 1:

Max regenerated power: Approx. 250kW for each main pump motor.

The regenerated power is transferred back to the vessel and used by other consumers.

3. DESIGN CODES

3.1. Classification rules

3.1.1. Det Norske Veritas (DNV).

“Standard for Certification No. 2.22, Lifting Appliance, June 2013”.

3.2. Customer specifications / enquiries

TS-D-361-02 – Technical specification of 165mt active heave compensated knuckle boom crane

Customer's requirements are reflected in this document. Variances between customer's specification and NOV product data sheet are stated in deviation list.

3.3. Standards

- 3.3.1. Federation Europeenne de la Manutention (FEM).
“Rules for the design of Hoisting Appliances” (1.001 3rd Edition 1998, 10.01.).
- 3.3.2. Quality System Standard NS-EN ISO 9001, 1994 certified by DNV.
- 3.3.3. Electrical Classification to IEC/CENELEC (specific norms).
- 3.3.4. NOV Specification for Electrical and Instrument installation 260-E-SA-001.
- 3.3.5. HLA-4A, Rev.: 9, Technical Specification for Fabrication, Assembly & Completion of Equipment Packages.
- 3.3.6. Aviation Lights – as per CAP 437 7th Edition requirements.
- 3.3.7. IEC Ex.
- 3.3.8. USCG Regulations for Foreign Flag Vessels calling at U.S. ports.
- 3.3.9. DNV-OS-A101.

4. CERTIFICATES

4.1. Third party certification

Classification society: DNV

- 4.2. Product certificate by DNV
- 4.3. DNV Crane notation
- 4.4. Design review.
- 4.5. Production supervision.

5. ENVIRONMENTAL CONDITIONS

5.1. Zone classification

- 5.1.1. Pedestal : Safe zone
- 5.1.2. Rotating column : Safe zone
- 5.1.3. Knuckle Jib & Hooks : Hazardous zone 2
- 5.1.4. Main boom outer half : Hazardous zone 2
- 5.1.5. Pipe Gripper : ref. Xxxxxx-Z-DS-001

5.2. Temperature

- 5.2.1. Minimum design temperature steel : -10 °C
5.2.2. Design temperature electrical : -25 ÷ +45 °C
5.2.3. Ambient temperature : 0 ÷ +38 °C
5.2.4. Atmosphere : High in salinity

5.3. Maximum wind exposure

- 5.3.1. In operation : 25 m/sec
5.3.2. In stowed position : 55 m/sec

6. DESIGN CRITERIA

To meet standard specification No.:		FEM 1.001				
1.	Lifting appliance	Entire crane				
	Appliance Group	A3				
	Class of Utilisation	U4				
	Load Spectrum Class	Q1				
2.	Machinery	Type of Mechanism				
		Hoisting	Knuckle	Luffing	Slewing	Auxiliary winch
	Mechanism Group	M5	M5	M5	M5	M5
	Class of Utilisation	T5	T5	T5	T5	T5
	Load Spectrum Class	L2	L2	L2	L2	L2

7. STEEL STRUCTURES

7.1. General

- 7.1.1. Primary structures of material quality according to DNV
7.1.2. All primary steel materials are fully traceable.

7.2. Pedestal

- 7.2.1. Lower end of pedestal prepared for welding to deck.
Note: After welding the pedestal adapter to deck pedestal it is the contractor's responsibility to check the flatness of the flange and machine it if required.

7.2.2. Pedestal circumference platform

7.2.3. Inside floor/ grating.

7.2.4. Access door at platform level.

7.3. Rotating column (king)

7.3.1. Operator cabin.

7.3.2. Machine room with hydraulic power unit.

7.3.3. Hydraulic oil tank as integrated part of steel structure

7.3.4. Active Heave Compensated winch

7.3.5. PVU bottles and compensator cylinder.

7.4. Main box boom

7.4.1. Welded steel structure.

7.4.2. Replaceable bushings.

7.4.3. Walkway on top of main boom.

7.4.4. Maintenance free boom and cylinder bearings.

7.4.4.1. Cylinder and boom / knuckle jib pivot pins will be provided in stainless steel 316L or with a stainless steel 316L cladding material on the bearing surface. The composite bearing will be sealed with V-rings.

7.4.4.2. NOV signs on foil.

7.5. Knuckle jib

7.5.1. Welded steel structure.

7.5.2. Replaceable bushings.

7.5.3. Maintenance free boom and cylinder bearings.

7.5.3.1. Cylinder and boom/ knuckle jib pivot pins will be provided in stainless steel 316L or with a stainless steel 316L cladding material on the bearing surface. The composite bearing will be sealed with V-rings.

7.5.4. Prepared for handling of gripper and riser yokes.

8. SURFACE TREATMENT

8.1. Outside according to NOV system No. 1

Blast Cleaning	: SA 2 ½ (ISO 8501-1)	
Roughness	: Grade medium G,	50-85µm (ISO 8503)
Then Apply	: 1 layer Jotun Barrier	75 µm DFT
	1 layer Jotun Jotacote Universal	155 µm DFT
	1 layer Jotun Hardtop AS	50 µm DFT
	Total Dry Film Thickness (DFT)	280 µm DFT

8.2. Inside pedestal adapter/ machine room according to NOV system No. 4

Blast Cleaning	: SA 2 ½ (ISO 8501-1).	
Roughness	: Grade medium G,	50-85µm (ISO 8503)
Then Apply	: 1 layer Jotun Jotacote Universal (RAL 9002)	150 µm DFT
	Total Dry Film Thickness (DFT)	150 µm DFT

8.3. Inside hydraulic oil tanks according to NOV system No. 5

Blast Cleaning	: SA 2 ½ (ISO 8501-1).	
Roughness	: Grade medium G,	50-85µm (ISO 8503)
Then Apply	: 1 layer Jotun Barrier	40 µm DFT
	Total Dry Film Thickness (DFT)	40 µm DFT

8.4. Outer surface

External Crane: RAL 9016 (White)
Operators Cabin: RAL 9016 (White)
Inside Crane: RAL 9002 (Grey-White)
Hook /Block: highlighted with Yellow and Black Stripes
Wire sheaves: RAL 7038 (Agate Grey)
Knuckle Boom tip and two stripes: RAL 3020 (red)
Boom Cradle: RAL 7040 (Window Gray)
Pedestal, Platform Frames and Stair Frame: RAL 7040 (Window Gray)
Pedestal Platform Handrails: RAL 1021 Yellow. Anti-skid walkway on top of main boom,

9. MAIN MECHANICAL COMPONENTS

9.1. Slew bearing

- 9.1.1. Make IMO.
- 9.1.2. Roller bearing.
- 9.1.3. Bolt quality 10.9 DIN 912.

9.2. Slew gear

- 9.2.1. Quantity = 6 pcs.
- 9.2.2. Internal pinion drive.

9.3. Luffing cylinder

- 9.3.1. Quantity = 2 pcs.
- 9.3.2. Piston rod protection.
 - 9.3.2.1. 2 layers of Chrome, (40 + 40 my) with Stainless Steel sleeve from outer end and minimum 300 mm, passed the 1st rod seal.
 - 9.3.2.2. Locking valve(s) are mounted directly on the cylinder bottom.

9.4. Folding cylinder

- 9.4.1. Quantity = 2 pcs.
- 9.4.2. Piston rod protection.
 - 9.4.2.1. 2 layers of Chrome, (40 + 40 my) with Stainless Steel sleeve from outer end and minimum 300 mm, passed the 1st rod seal.
- 9.4.3. Locking valve(s) are mounted directly on bottom and top of the cylinder
- 9.4.4. Jib tip prepared for gripper and riser yokes handling.

9.5. Main winch

- 9.5.1. Winch to be used both as a “normal winch”, Constant tension winch and AHC winch.
- 9.5.2. Grooved wire drum. (LEBUS)
- 9.5.3. Load dependent hoisting speed.
- 9.5.4. 3120 m, $\phi 76$ mm, galvanized wire rope of non-rotating type (Bridon).
- 9.5.5. Hook with swivel and safety lock for single wire fall.
Suitable for sub-sea use.
- 9.5.6. Active heave compensation system (AHC)
 - 9.5.6.1. Passive and active part
The passive part to balance the load, the active part to compensate the wave motions.
 - 9.5.6.2. N₂ bottles (PVU). (supplied with Nitrogen)
 - 9.5.6.3. Compensator cylinder.
- 9.5.7. Active heave compensation system by winch solution which has the following advantages compare to cylinder solution:
 - 9.5.7.1. Constant N₂ / air pressure, which means no need of compressor, i.e. time saving.
Automatic adjustment pressure/load.
The system requires no pre-charging/ calculation of AHC load.
 - 9.5.7.2. Possible extension of both heave amplitude and wave period.
(No fixed cylinder stroke limitation)
Reduced load gives extended stroke.
 - 9.5.7.3. Active constant tension system with very low hysteresis.
- 9.5.8. Active Heave Compensation modes:
(Subsea mode)
 - 9.5.8.1. Normal winch mode to AHC mode.
 - 9.5.8.2. Normal winch mode to AHC empty hook.
 - 9.5.8.3. AHC mode to active constant tension mode.
 - 9.5.8.4. AHC empty hook to active constant tension.
 - 9.5.8.5. Variable active constant tension.
(For penetrating loads)
 - 9.5.8.6. Semi-automatic lift off / hook up / hook release.

- 9.5.8.7. Winch to be able to lower simultaneously when working at max. power in AHC mode.
- 9.5.9. Splash Zone Mode
 - 9.5.9.1. Mode to reduce crane loading when load passes through the splash, maximum load in this mode will be 130t
- 9.5.10. Automatic adjustment of the sinus curves when operation above the AHC capacity.
- 9.5.11. Manual emergency release. (MOPS)
- 9.5.12. Automatic Sub-Sea Overload Protection System. (ASOPS)
Automatic system for releasing the wire/ winch to pay out in an overload/ emergency situation when working in AHC or -ACT mode.
- 9.5.13. CCTV camera with monitor in the operators' cabin for winch drum inspection (Ex-proof for Zone 2 IIC T3).
- 9.5.14. Mechanical slack wire detection device.

9.6. Auxiliary winch

- 9.6.1. Winch to be used as an “normal winch”, constant tension winch and AHC winch .
- 9.6.2. Grooved wire drum. (LEBUS)
- 9.6.3. Load dependent hoisting speed.
- 9.6.4. 3090 m, ø34 mm, galvanized wire rope of non-rotating type (Bridon).
- 9.6.5. Hook with swivel and safety lock for single wire fall.
Suitable for sub-sea use.
- 9.6.6. Active heave compensation system (AHC).
- 9.6.7. Constant tension system
- 9.6.8. Active Heave Compensation modes:
(Subsea mode)
 - 9.6.8.1. Normal winch mode to AHC mode.
 - 9.6.8.2. Normal winch mode to AHC empty hook.
 - 9.6.8.3. AHC mode to constant tension mode.
 - 9.6.8.4. AHC empty hook to constant tension.
 - 9.6.8.5. Variable constant tension.
(For penetrating loads)
 - 9.6.8.6. Semi-automatic lift off / hook up / hook release.
- 9.6.9. Manual Overload Protection System (MOPS)
- 9.6.10. Automatic overload protection system (AOPS)
- 9.6.11. CCTV camera with monitor in the operators' cabin for winch drum inspection (Ex-proof for Zone 2 IIC T3).
- 9.6.12. Designed for personnel transfer.
- 9.6.13. Mechanical slack wire detection device.

9.7. Tugger winches

- 9.7.1. Two tugger winches each of 10 t pulling capacity with 120 m, ø20 mm, non rotating galvanized rope.
- 9.7.2. Rotatable wire guide sheave mounted on lower part of king allowing spooling angles of $\pm 20^\circ$ sideways.
- 9.7.3. Stick control of in/ out function and constant tension from cabin.
- 9.7.4. Swivels and hooks not included.

9.8. Wire sheaves

- 9.8.1. Accessible wire sheave bracket.
- 9.8.2. Fixed wire sheave bracket.
- 9.8.3. Wire sheaves with roller bearings.

9.9. Miscellaneous

- 9.9.1. Nuts and bolts for installation of components;
 - <12mm in stainless steel material.
 - ≥12mm galvanized material.
- 9.9.2. MRU (Motion Reference Unit mounted in pedestal)
- 9.9.3. All lubrications points to be available from an accessible place.
- 9.9.4. Transport frames. (to be returned to NOV-Korea after installation of crane)
- 9.9.5. Crane prepared for operation of gripper and riser yokes, crane delivered with load pins and stabs to accept standard yokes.
- 9.9.6. Boom cradle (top part of boom rest) designed and produced by NOV.
- 9.9.7. Illuminated windsock.

10. HYDRAULIC ARRANGEMENTS

10.1. HPU

The hydraulic power unit (HPU) will use two main electric motors as main power supply. The pumps are axial variable over center piston pumps.

- 10.1.1. Normal crane mode
 - 10.1.1.1. One oil feed for a closed loop main winch systems
 - 10.1.1.2. One oil feed for an open loop system for other crane operations.
- 10.1.2. Main winch boost mode
 - 10.1.2.1. Both oil feed directed to main hoist.
- 10.1.3. Active Heave Compensated mode
 - 10.1.3.1. One oil feed is directed to the active system of the main winch.
 - 10.1.3.2. One system is directed to the passive system (to compensate for drain and hoisting of load in AHC mode)
- 10.1.4. Aux. Hydraulic power unit to be dedicated for oil circulating.
 - 10.1.4.1. To be used for oil feeding transmission pumps.
 - 10.1.4.2. To be used for oil filtration.
 - 10.1.4.3. To be used for oil heating.
 - 10.1.4.4. To be used for oil cooling.
- 10.1.5. Gate valve blocks for routing the oil flow.

10.2. Hydraulic oil tank

- 10.2.1. Oil tanks integrated in the rotating king as part of the steel structure.
- 10.2.2. Hatch for inspection and cleaning.

- 10.2.3. Drain point.
- 10.2.4. Filter, with status indicator, on return line.
- 10.2.5. CJC offline filtration system.
- 10.2.6. Filling system through return filter.
- 10.2.7. Visual glass oil level indicator.
- 10.2.8. Temperature gauge.
- 10.2.9. Alarm / Indicator for low oil level.
- 10.2.10. Electric indicator for hydraulic oil filters.
- 10.2.11. Initial oil fill is included but will be finally filled at yard.

10.3. Hydraulic lines

- 10.3.1. Internal mounted hydraulic lines 60mm outside diameter and below are made of chromated carbon steel. Pipes above 60mm outside diameter are made of ST52 steel and painted. Nuts on pipes in chromated carbon steel. Pipe fittings are Walform S-type or similar with body in chromated carbon steel. Hose couplings and -nipples are of chromated carbon steel.
- 10.3.2. External mounted hydraulic lines 60mm outside diameter and below are made of stainless steel 316L. Pipes above 60mm outside diameter are made of ST52 steel and painted. Nuts on pipes in stainless steel. Pipe fittings are Walform S-type (or similar) with body in chromated carbon steel.
Hose couplings and nipples are of chromated carbon steel.
Flanges are hot dip galvanized (GS-Hydro or similar).
Insert cone, retain ring and bounded seal: Stainless steel (GS-Hydro or similar)
All chromated steel is protected by anti-corrosive “Denso” tape.

10.4. Temperature control

- 10.4.1. Oil heating/ Oil circulation system when crane is not in operation.
- 10.4.2. Oil cooling system.
Two Oil/ air cooler in the circulation loops to secure the correct hydraulic oil temperature during continuous crane operation.

11. ELECTRIC ARRANGEMENTS

11.1. Power supply

- 11.1.1. Power supply to crane, ref. point No. 2, Interface / Power supply.
- 11.1.2. Interface point NOV/Customer at slip ring unit.
- 11.1.3. Power supply to crane’s rotating section using a slip ring unit.
- 11.1.4. All external cable trays in stainless steel.
- 11.1.5. Electrical cable glands made of marine brass
- 11.1.6. Electric cable of offshore type:
- 11.1.7. UPS for crane control system from the ship

11.2. Electric motor starters

- 11.2.1. Soft starters for 2 main motors, starters to be mounted in the upper part of the pedestal – hanging under the king floor.

11.3. Lighting

All lighting shall be of LED type regardless of location.

- 11.3.1. 2 pcs self-leveling flood light, each of 400 W, on knuckle jib (Ex-rated).
- 11.3.2. 4 pcs self-leveling flood light, of 400 W, on main boom (Ex-rated).
- 11.3.3. 1 pcs fixed flood light, of 400 W, underneath operator cabin (Ex-rated).
- 11.3.4. 7 pcs. Aviation red warning lights (UPS, Ex-proof for Zone 2 IIC T3).
- 11.3.5. 6 pcs. Down lights inside operator cabin.
- 11.3.6. 2 pcs. Light inside machine room.
- 11.3.7. 2 pcs. Light inside pedestal.
- 11.3.8. 1 pcs. Light for access routes.
Located outside operators cabin with emergency battery backup light.
- 11.3.9. 1 pcs. Light at N₂ bottles.
- 11.3.10. 1pc. Light at MW camera
- 11.3.11. 1pc light at AW camera
- 11.3.12. 1pc Light at MW gear side.
- 11.3.13. 1pc Light at windsock.

11.4. All electrical junction boxes and lightings in open areas shall be rated for minimum Zone II operation.

11.5. All alarms on system functioning and monitoring shall be Siemens Profibus.

12. OPERATOR CABIN

12.1. Cabin to be mounted on the right hand side of the crane

12.2. Control panel with crane safety information.

12.3. Spring centered joy-stick controls for full crane operation.

12.4. Properly insulated cabin.
Maximum average noise level inside cabin =75 dbA.

12.5. Instruction and name plates in English.

12.6. Selector switch for crane modus on operator display

- 12.6.1. Normal crane operation.
- 12.6.2. Winch selection.
(Main winch or aux. winch or both)
- 12.6.3. Main winch
 - 12.6.3.1. Normal winch operation.
 - 12.6.3.2. Subsea mode
 - 12.6.3.3. Splash zone mode.
 - 12.6.3.4. AHC operation.

13. SAFETY SYSTEMS

- 13.1. Crane control system by Siemens PLC.
- 13.2. Emergency stop of crane.
- 13.3. On/off joy-stick switch mounted beside the operators' chair.
- 13.4. Constant moment control system with overload alarms and crane stop functions.
- 13.5. Derating tables for ship to ship lift.
- 13.6. Load indication system.
 - 13.6.1. Main winch and auxiliary winch.
 - 13.6.2. Actual load, permitted load, and percent of permitted load.
- 13.7. Radius indicator.
- 13.8. Hook stop in both upper and lower positions.
- 13.9. Mechanical anti 2-block system.
- 13.10. Indicator for wire length pay out.
 - 13.10.1. Main winch.
 - 13.10.2. Auxiliary winch.
- 13.11. Slew stop system.
 - 13.11.1. Tacho for slew angle detection.
 - 13.11.2. Slew stop system in a 3D envelope.
- 13.12. Slack wire detection, both mechanical and by camera.
- 13.13. Fail safe multi-disc brakes on both winch and slew gears.
- 13.14. Lift logging system according to NOV specification; 600STD-Liftlog-001.
- 13.15. Emergency stops:
 - 13.15.1. In drivers cabin,
 - 13.15.2. Inside King,
 - 13.15.3. Inside foundation, below king.
- 13.16. Anti-collision system between crane and ship structure.
- 13.17. Emergency System by Gravity (ESG-m).
 - 13.17.1. Winch by gravity.

Brakes to be released by hydraulic hand pump system.
 - 13.17.2. Main boom lowering by gravity.

Brakes to be released by hydraulic hand pump system.

13.17.3. Knuckle boom lowering to vertical position by gravity.

Brakes to be released by hydraulic hand pump system.

13.17.4. Emergency release of slew brakes.

Note! Emergency turning equipment is not included. Brakes to be released by hydraulic hand pump system

13.18. Emergency Operation System (EOS)

13.18.1. Applicable when failures in one pump/ pump unit/ power failure.

13.18.2. Various duplicated functions (redundancy) - reference below.

13.18.3. EOS in order to avoid full stop in the crane operation. This system gives the crane operator the possibility to recover the crane operation in normal mode (Not in AHC/ ACT) with full load and reduced speed.

13.18.4. The crane to be supplied from two independent power supplies. Reference this specification, item 2.

13.18.5. Redundant 24V power supply.

13.18.6. Operation

13.18.6.1. EOS to be selected from operator's panel.

13.18.6.2. El motor/ pump tower out of function to be isolated (remotely) from the operator's panel.

13.18.6.3. If by a failure wrong electric motor is disabled (by the operator), build in safety in isolation valve blocks will prevented over pressure.

13.18.6.4. Description/procedure when operating in this emergency mode.

13.18.7. Special slip ring coupling

13.18.7.1. Main supplies (slip rings) to be isolated in order to secure remaining power supplies to the crane if failure on one or several rings.

13.18.8. Redundant bus system

13.18.8.1. All distributed I/O modules have double bus communication, i.e. double set of cables and connections. In case of failure in one of the bus, the other will take over without interruption.

13.18.9. Hydraulic joy-stick for boom and slew motion as a backup.

13.18.9.1. Located inside crane king.

13.18.10. Various duplicated hydraulic valves/ special functions.

13.18.11. All relevant valves and sensors in the system are possible to disable from the operators panel.

13.18.12. Motor starters.

13.18.12.1. One starter/ motor, with independent power/ control supplies.

14. PRIME MOVER

Electric motor No. 1 & 2

14.1. Voltage, main motor	: 690 / 60 Hz / 3 ph
Standstill heating	: 230V / 60 Hz / 1 ph
14.2. Power consumption, main motor	: 1050 kW (S6-40%), 820 kW (S1-100%)
Standstill heating	: 2x65 W
14.3. Motor rating, S6-40 % ID	: 1000 kW
S1-100% CD	: 780 kW
14.4. Protection class	: IP 55
14.5. Insulation class	: F
14.6. Temperature rise class	: F

Electric motor No. 3

14.7. Voltage, motor	: 690 / 60 Hz / 3 ph
Standstill heating	: 230V / 60 Hz / 1 ph
14.8. Power consumption, motor	: 65 kW
14.9. Motor rating	: 62 kW
14.10. Protection class	: IP 55
14.11. Insulation class	: F
14.12. Temperature rise class	: F

15. COMMUNICATION SYSTEMS

15.1. VHF/ UHF with gooseneck microphone and foot pedal.

15.2. Talkback station (Customer supply).

Installed by customer. NOV to provide cable from slip ring to operator's cabin.

15.3. PA/GA speaker system (Customer supply).

Installed by customer. NOV to provide cable from slip ring to operator's cabin.

15.4. Loud-hailer system

15.4.1. Alarm horn

16. FIRE AND GAS SYSTEM

- 16.1. 1 pc Detector for smoke/heat to be located in crane machine room (Customer supply)
Installed by customer. NOV to provide cable from slip ring to crane machine room.
- 16.2. 1 pc Detector for smoke/ heat to be located in the operator's cabin (Customer supply)
Installed by customer. NOV to provide cable from slip ring to operator's cabin.
- 16.3. 1 pc Gas Detector located at the air inlet for the cabin (Customer supply).
Installed by customer. NOV to provide cable from slip ring to operator's cabin.
- 16.4. 2 pc Gas Detectors located by air inlets in the pedestal hatches (Customer supply).
Installed by customer. NOV to provide cable from slip ring to operator's cabin.

17. DOCUMENTATION

- 17.1. Language
 - 17.1.1. English
 - 17.1.2. Language for instruction markings
 - 17.1.3. Language for safety markings
- 17.2. Final documentation.
 - 17.2.1. User manual and MRB.
- 17.3. Documentation in accordance to CMDL.
 - 17.3.1. Boom rest interface
 - 17.3.1.1. Boom forces for boom rest design.
 - 17.3.1.2. Boom cradle (top part of boom rest) designed and delivered by NOV.
- 17.4. User's manual crane.
 - 17.4.1. Contains; Introduction, Main data, Technical description, Preparation, Operating instructions, Maintenance, Safety and Service Bulletins, Spare part list, Data sheets, Drawings and Part Lists, Standard Documentation.
- 17.5. Manufacture Record Book. (MRB)
 - 17.5.1. Retained by NOV.
- 17.6. Tagging
 - 17.6.1. According to NOV standard / Based on IEC 61346-2
- 17.7. Load charts
 - 17.7.1. Load chart(s) / derating table(s) included and presented on the cranes operator display.
 - 17.7.2. Load chart(s) / derating table(s) in paper format located at operators station.
 - 17.7.3. Interactive load chart
 - 17.7.3.1. For planning/ analysing the sub-sea work.

18. TESTING

- 18.1.** Function tests at factory.
- 18.2.** Full load test at factory
- 18.3.** Speed tests all crane motions.
- 18.4.** Factory Acceptance Test (FAT).
- 18.5.** Active heave compensation system to be tested by simulation.

19. SPARE PARTS

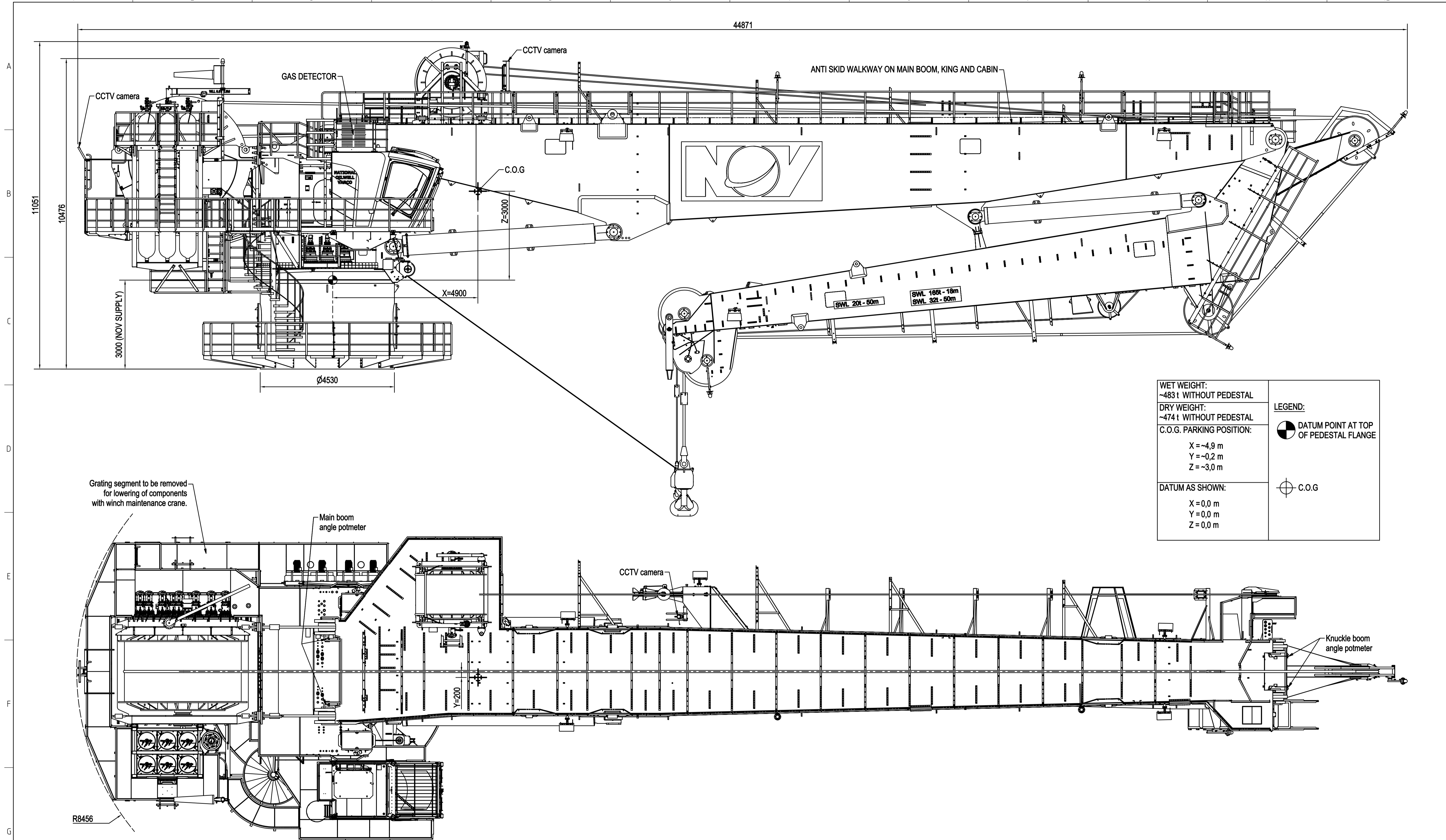
- 19.1.** Commissioning spares.
- 19.2.** Spare part list for 2 years of operation.


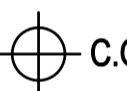
20. SPECIAL TOOLS

- 20.1.** Hydraulic tension tool for slew bearing bolt connection with air driven power unit.
Common for all four cranes.
- 20.2.** Maintenance crane permanently mounted on Main Winch
(For service/ handling parts)
- 20.3.** No lifting equipment included
- 20.4.** Axis control system (X-Y-Z)
 - 20.4.1.** Automatic boom tip positioning.
 - 20.4.1.1.** Radius (X,Y)
Boom tip to be kept in same height during increase/ reduce of working radii.
Estimated tolerance = ± 25 cm
 - 20.4.1.2.** Height (Z)
Boom tip to be kept at the same working radius when hoisting/ lowering the boom tip.
Estimated tolerance = ± 25 cm
 - 20.4.1.3.** Slewing (X,Y,Z)
Working radii will follow a straight path when slewing within a variable sector depending upon actual working radius.

21. NOT INCLUDED IN NOV SCOPE OF SUPPLY

- 21.1.** Any lifting yokes.
- 21.2.** Boom rest interface.
- 21.3.** Pedestal platform interface.



WET WEIGHT: ~483 t WITHOUT PEDESTAL DRY WEIGHT: ~474 t WITHOUT PEDESTAL C.O.G. PARKING POSITION: X = -4,9 m Y = -0,2 m Z = -3,0 m	LEGEND:  DATUM POINT AT TOP OF PEDESTAL FLANGE  C.O.G.
DATUM AS SHOWN: X = 0,0 m Y = 0,0 m Z = 0,0 m	

EX RATED EQUIPMENT:
EXTERNAL LAMPS AND JUNCTION BOXES

MIN. MAIN BOOM ANGLE*: 0,1°
 MAX MAIN BOOM ANGLE*: 84,5°
 MIN KNUCKLE BOOM ANGLE**: 5,4°
 MAX KNUCKLE BOOM ANGLE**: 125,6°

 * MEASURED BETWEEN LEVEL AND TOP PLATE OF MAIN BOOM
 ** MEASURED BETWEEN TOP PLATE OF MAIN BOOM AND BOTTOM PLATE OF KNUCKLE BOOM (WHEN FOLDED)

01	25-Apr-2017	Issued for Bid	JAN	ROM	ROM
Rev:	Date	Description	Made	Checked	Appr.
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Scale:	1:60	Projection:	Size:	A1	Main Part:
Drawing Number:	IQ0425485-G0001		Sheet:	1/1	Revision:
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