

# DCV "Balder"

## 3,000 and 4,000 tons



<b>Owner</b>	Heerema Marine Contractors
<b>Builder</b>	Mitsui
<b>Delivered</b>	1978

### Description

#### **2,000 and 3,000 tons, upgraded to 3,000 and 4,000 tons**

The Deepwater Crane Vessel "Balder" and her sister ship "Hermod" of Heerema Marine Contractors B.V. became operational in 1978. They were the first of its kind in the offshore industry. Originally each vessel was equipped with a 3,000 short ton revolving crane, mounted on the aft starboard, and a 2,000 short ton revolving crane on aft portside. In the early 1980's these cranes performed several world record offshore lifts in the harsh environment of the North Sea.

Both cranes are designed and engineered by GustoMSC and built by Sumitomo Heavy Industries in Japan. In view of the semi-submersible design of the crane vessel one of the prime design criteria for each crane is a minimum weight. On the 3,000 short ton crane bogie hook rollers together with a mere 1,000 metric tons of counterweight take the load moment. The 2,000 short ton crane was designed without any counterweight.

The wide-base crane booms are constructed in high strength steel tubulars and a steel-plated box girder type jib, providing the suspension points for the main-, auxiliary- and whip hoisting tackles.

On the 3,000 short ton crane four hooks were provided for respectively 3,000, 1,000, 500 and 80 short tons S.W.L. The 2,000 short ton crane had three hooks for 2,000, 500 and 80 short tons S.W.L.

The winch drums each have floating gearboxes at either side to minimize any effects from crane and/or vessel deflection. The specified hoisting speeds require a substantial winch power.

The 3,000 short ton crane had a central hoist winch train with five independently supported drums, nine floating gearboxes and four DC motors of 710 kW. With a total length of nearly 30 meters the winch renders an imposing sight. To keep the tail swing as small as possible, the boom hoist winch is situated one floor up.

The 2,000 short ton crane had a central hoist winch train with four independently supported drums, seven floating gearboxes and four DC motors of 500 kW.

The slewing motion is DC driven through gearboxes and pinions engaged with a toothed rack, which is attached to the top of the tub collar.

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The power generators of the vessel supply 3.3 kV AC power through sliprings fitted on the kingpin of the cranes. Static AC/DC converters are positioned in the crane winch houses.

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In 1984 GustoMSC upgraded the lifting capacity of the Balder cranes. Next to an increase in load capacity the upgrade also consists of a conversion that allows the revolving mode of both cranes to be converted into a fixed position. This is achieved through disconnecting a portion of the boom hoist tackles and tying these back to the foreside of the main deck of the vessel. In this fixed mode, where minor slewing motions up to 4° are still possible, the hoisting capacity of the starboard crane is increased from 3,000 to 4,000 short tons and for the portside crane from 2,000 to 3,000 short tons.

The upgrade also enables an increase of lifting capacity in the revolving mode of both cranes to respectively 3,300 short tons and 2,200 short tons. With the upgrade it became a requirement to increase the installed power of the central winches. The installed power on the central winch of the 4,000 short tons crane is increased to 4 x 910 kW and for the 3,000 short tons crane to 4 x 710 kW.

The capacity of the whiphoist and the (second) auxiliary hoist was upgraded as well.

In 2001 the Balder vessel was provided with additional J-Iay capabilities for deepwater subsea pipelines. To enable the positioning of special spool pieces in the 98 meters tall J-Iay tower (while maintaining pipeline tension) a new articulated fly-jib arrangement was designed to replace the original box girder type jib of the port side crane.

The 500 short tons auxiliary hoist was re-integrated into the fly-jib and the capacity increased to 1,000 metric tons. An additional derrick winch was installed in the A-frame to enable the adjustment of the angular position of the fly-jib.

### Design criteria Balder 3,000 tons

#### Original 2,000 sht crane

Load sht	Speed in m/min
2,000	4.8
500	6.7
80	92.5

#### Upgraded crane 2,200 sht revolving / 3,000 sht fixed

Load sht	Speed in m/min
3,000	4.4
2,200	6.7
660	28.0
with fly-jib 1,000 mt	
80	92.5
250 with increased reeving	

- Slewing speed 0.3 rpm with 2,200 sht at 30.5 m
- Boom hoist speed:
  - with 1,400 sht load from radius 45 m to 26 m: 3 min
- Without load from boom rest to minimum radius: 10 min
- Roll: 2° amplitude, 16 s
- Pitch: 2° amplitude, 16 s
- Static loading in plane of boom 2°
- Static loading perpendicular to plane of boom 2°
- Calculated wind thrust forces equal to Beaufort 9
- All environmental loads simultaneous for lifts up to 2,200 short tons fully revolving
- At reduced environmental conditions and fixed crane position, the lifting capacity is increased to 3,000 short tons
- The crane is designed according Lloyd's Register Code for Lifting Appliances in a Marine Environment and carries the appropriate certificate

### Design criteria Balder 4,000 tons

#### Original 3,000 sht crane

Load sht	Speed in m/min
3,000	4.6
1,000	9.8
500	20.0
80	81.5

#### Upgraded crane 3,300 sht revolving / 4,000 sht fixed

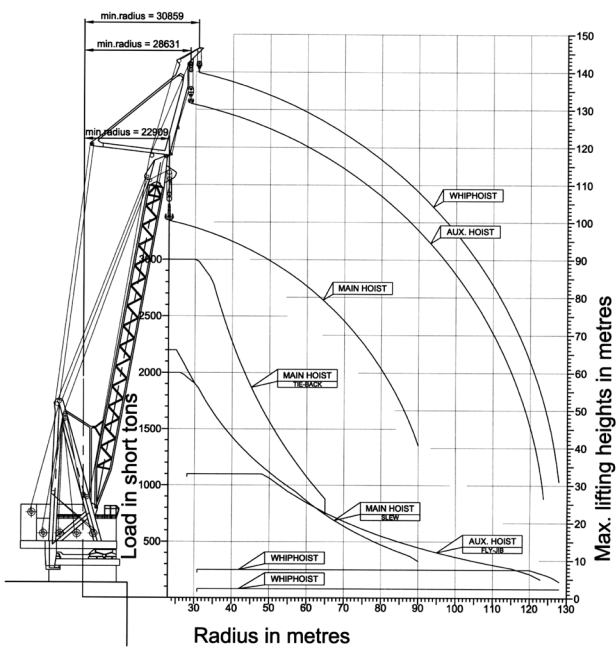
Load sht	Speed in m/min
4,000	4.4
3,300	6.0
1,000	14.0
660	28.0
80	92.5
250 with increased reeving	

Slewing speed 0.3 rpm with 3,300 sht at 38.1 m

- Boom hoist speed: with 3,300 sht load from radius 38.1 m to 24 m: 4 min
- Without load from boom rest to minimum radius: 15 min
- Roll: 1° amplitude, 16 s
- Pitch: 2° amplitude, 16 s
- Static loading in plane of boom 4°
- Static loading perpendicular to plane of boom 2°
- Calculated wind thrust forces equal to Beaufort 9
- All environmental loads simultaneous for lifts up to 3,300 short tons fully revolving
- At reduced environmental conditions and fixed crane position, the lifting capacity is increased to 4,000 short tons
- The crane is designed according Lloyd's Register Code for Lifting Appliances in a Marine Environment and carries the appropriate certificate.

Data presented in this product sheet is for information only. Unit specific specifications as provided by the Owner shall prevail.

**Balder 3,000 tons**



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