Base Load Power Hub (BLPH)

INTERNAL (indoor & outdoor) SEA FASTENING PROCEDURE

Document Number:

123A90-PML-QHSE-PRO-00127

Document Class: 2

00	03/06/2025	Issue for Review	D.Cavirani	R. Degli Esposti	W.Borghi
Rev.	Date	Description	Prepared	Reviewed	Approved

This document undergoes an issuance cycle within EDMS Fusion live". Its distribution is electronically controlled. Once printed shall be considered as "NOT CONTROLLED" copy

Revision / Change Log

Rev.	Description
00	Issue for Review (IFR)

HOLDS LIST

No.	Description
1	
2	
3	
4	

Table of contents

1 INTRODUCTION 4

1.1 Project overview 4

1.1.1 Project Location 4

1.1.2 Project Concept 5

2 DOCUMENT SCOPE 7

2.1 DEFINITIONS 7

3 ENVIRONMENTAL AND DESIGN CONDITIONS 8

3.1 Environmental Conditions 8

3.2 Transport acceleration table 8

4 MATERIALS 9

4.1 Cargo strap and rope 9

4.2 Wood support 10

5 SEA FASTENING CRITERIA 11

5.1 External 11

5.2 Typical Sea fastening 11

5.3 Alternative Sea fastening system 22

6 INTERNAL 24

List of Figures

Figure 1 HOLLANDSE KUST NOORD WIND PARK Location Map 4

Figure 2 - Wind Park Details 5

Figure 3 – BLPH Concept 5

This document undergoes an issuance cycle within EDMS Fusion live". Its distribution is electronically controlled. Once printed shall be considered as "NOT CONTROLLED" copy

1 INTRODUCTION

1.1 PROJECT OVERVIEW

Crosswind, a Shell and Eneco joint venture, was awarded the tender to develop the offshore Hollandse Kust Noord (HKN) wind farm, located 18.5km off the coast of Netherlands near the town of Egmond aan Zee. The consortium plans to have HKN operational in 2023 with an installed capacity of 759MW generating at least 3.3TWh per year. This is sufficient renewable power to supply more than 1 million Dutch households with green electricity.

Offshore wind farms produce intermittent electricity and balancing these dips and peaks and integrating this electricity into the national energy system requires new technologies. For this reason, the offshore wind farm will include several new technologies that could be implemented at full-scale in the future. The new technologies being explored include a floating solar park, a short-duration battery storage as well as long-term storage via green hydrogen produced by water electrolysis and subsequently consumed in a fuel cell. The combination of these individual measures, herein referred to as the Base Load Power Hub (BLPH) will ensure a continuous power supply regardless of the wind situation.

1.1.1 Project Location

The Hollandse Kust Noord (HKN) wind farm is located 18.5km off the coast of the Netherlands near the town of Egmond aan Zee.

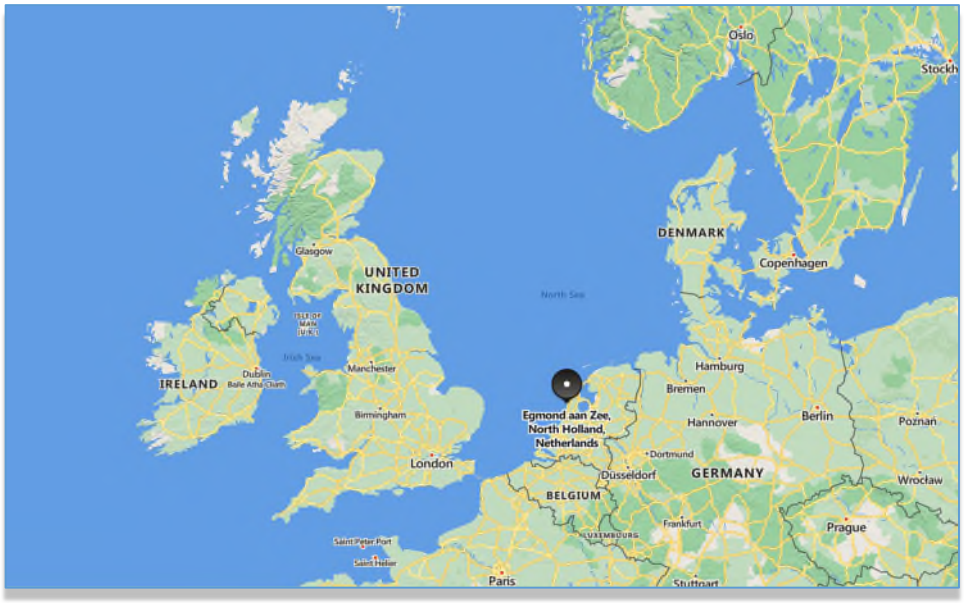


Figure 1 HOLLANDSE KUST NOORD WIND PARK Location Map

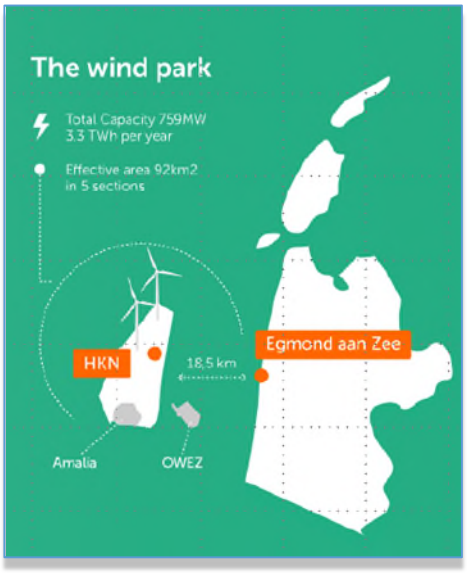


Figure 2 - Wind Park Details

The wind farm will consist of No. 69 x 11.5MW wind turbine generators each to be installed on a dedicated monopile structure. A 70th monopile located on coordinates E 590719.1, N 5841602.3 is reserved for installing the platform accommodating the BLPH. The monopile structure was designed and installed by Van Oord Offshore Wind (VooW) and therefore not part of the BLPH scope.

1.1.2 Project Concept

All components included in the BLPH will be integrated onshore on a topsides and installed in an offshore location within the boundaries of the HKN wind farm. At its simplest, the BLPH will store energy during periods of high electricity generation from renewable sources (a wind turbine generator and the floating solar PV farm) and release it during periods of low generation. In practice. It is expected that the energy stored will supplement generation from renewable sources to ensure that at least 1.0MW of power is exported to the electrical grid regardless of wind/solar availability.

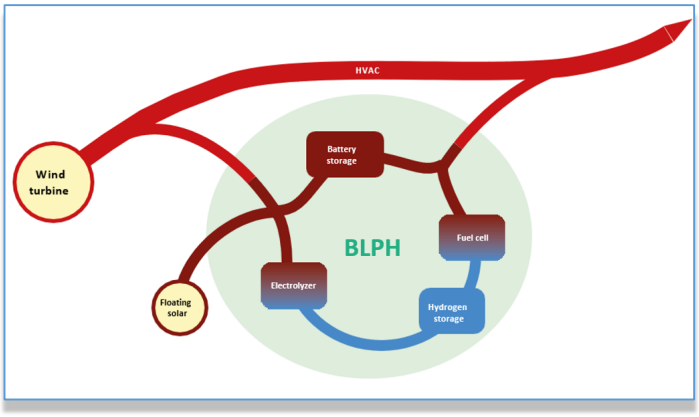


Figure 3 – BLPH Concept

Electricity in the BLPH will be stored in the form of electrons in a battery energy storage system (BESS) as well as converted into green hydrogen via water electrolysis. When the power output from the connecting wind turbine drops to below 1 MWe, the BLPH will return its stored energy to supplement the remaining power output. This will be by discharging the BESS, while stored hydrogen will be converted back into electricity using a fuel cell to extend the discharge duration.

The purpose of the BLPH s to function as a testbed for the integration of energy storage technologies with renewable generation. It is expected that equipment installed on the BLPH will operate as Normally Unmanned Installation for at least two (2) years with no or minimal maintenance and it will have its own independent control room with the ability to communicate with Crosswind's control room.

2 DOCUMENT SCOPE

During the transport phase of the modules by sea, the components (structures, pipes, equipment, etc.) are subject to stresses deriving from the accelerations generated by the oscillations of the means of transport due to wave motion. Such stresses can be of entities and of a very different nature from the operating conditions for which they were normally designed and manufactured.

It is therefore necessary to provide temporary devices to absorb these stresses and prevent damage during transport; The aim is to ensure thus the structural and functional integrity of all components.

The devices can be of the flexible type (ratchet or cargo straps, tape tensioner, steel wire, etc.) or of the rigid type (temporary supports, contrasts or retainers by means of wood or plastic elements, etc.); it is also necessary to protect the surface part from reciprocal sliding or hammering using neoprene, rubber, Teflon, etc.

The purpose of this specification is to provide instructions and recommendations to ensure an Internal Sea fastening effective against action arising from the transport of the platform from Yard Piomboni in Ravenna (Italy) to the wind park Hollandse Kust Noord (Netherlands)

2.1 DEFINITIONS

COMPANY SHELL&ENECO

CONTRACTOR ROSETTI MARINO S.P.A

The party that holds the contract to carry out all or part of the design, engineering, procurement, construction, commissioning, or management on behalf of COMPANY

3 ENVIRONMENTAL AND DESIGN CONDITIONS

3.1 ENVIRONMENTAL CONDITIONS

Sea fastening shall be designed for the following conditions:

Climate	Marine, offshore
Outside temperatures	-10°c + 22°c
Outdoor relative humidity	100% at -1°c; 80% at +22°c
Inside temperatures:	+20°c to +24 °c
Area classification:	Safe

3.2 TRANSPORT ACCELERATION TABLE

LEVEL	ACCELERATIONS	
	a_H[g]	a_V[g]
Lower Deck	±0.60	±0.5
Upper Deck	±0.70	±0.5

Where:

- aH is the horizontal acceleration
- aV is the vertical acceleration

This document undergoes an issuance cycle within EDMS Fusion live". Its distribution is electronically controlled. Once printed shall be considered as "NOT CONTROLLED" copy

4 MATERIALS

4.1 CARGO STRAP AND ROPE



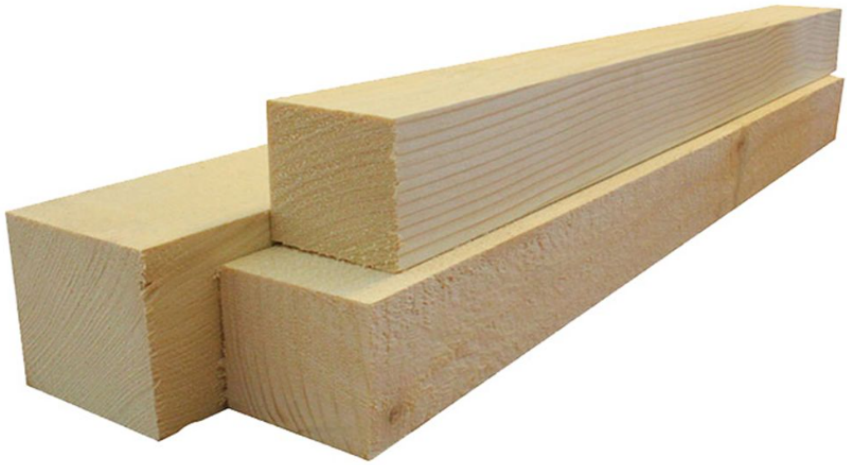




Care should be taken that the web lashing is not damaged by the sharp edges of the load on which it is used. The webbing shall be protected against friction, abrasion and damage from loads with sharp edges by using protective sleeves and or corner protectors. Web lashings shall never be used when knotted. Damage shall be prevented by keeping them away from sharp edges of the load and, if possible, from the load. A visual inspection before and after each use is recommended

4.2 WOOD SUPPORT

For elements such as cabinets, battery racks, transformers, a smooth wooden support consisting of beams, pillars and bracing should be used for the sea fastening. The support structure shall be joined by screws or bolts and the e shall prevent movement of the object. The section of the wooden supports shall be proportionate to the size and weight of the object to which the reinforcement is applied. Neoprene or similar will be inserted to protect items from sharp edge.



5 SEA FASTENING CRITERIA

5.1 EXTERNAL

To evaluate the stability and fastening of external items (lights, cameras, valves, speakers etc.) installed on posts or Øglænd supports, shake the element with hands and check that there are no significant movements of the support. If the support does not guarantee a secure fixing of the element, this shall be reinforced using ropes or cargo straps.

Temporary rigid metal fasteners are not allowed, and welding is not allowed additional to piping. Fixings with non-metallic material such as textiles, plastics, nylon, Teflon, neoprene, wood etc. in order not to superficially damage the pipes. The bands in cargo strap type nylon are the typical fastening of pipes.

5.2 TYPICAL SEA FASTENING



Secure lights with ropes or cargo strap (purple lines) and wood support to the handrail.

During preservation and sea fastening activities proper cleaning will be performed.

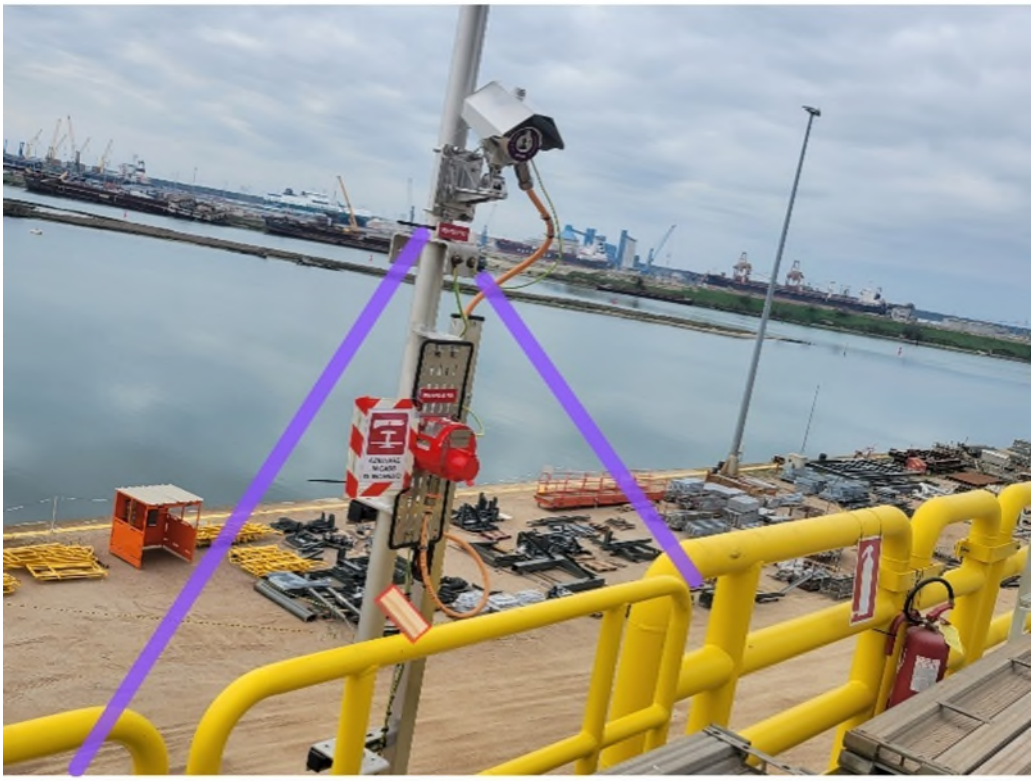




Secure valves with ropes or cargo strap (purple lines) to the structure, to the supports, to fixed point



The most unstable valve actuator (susceptible to oscillations to the effect of motion waves) must be fixed to the nearest structural parts by means of cargo straps or wooden props.



Secure flame detector and manual fire activation with wood support and cargo strap (purple lines) to the handrail



Secure crane and chain with cargo strap (red lines) to fixed point.
Locking mechanism will be engaged prior sail away



Secure crane and chain with cargo strap (red lines) to fixed point.
Locking mechanism will be engaged prior sail away

This document undergoes an issuance cycle within EDMS Fusion live". Its distribution is electronically controlled. Once printed shall be considered as "NOT CONTROLLED" copy



Secure piping with cargo strap (purple lines) to fixed point



Secure piping with cargo strap (purple lines) to fixed point



Secure gas detector with cargo strap (purple lines) to fixed point



Secure hydrogen heater assembly with cargo strap (purple lines) to fixed point



Secure hydrogen vent with cargo strap (purple lines) to fixed point

5.3 ALTERNATIVE SEA FASTENING SYSTEM



In this case it was not possible to anchor to the handrail, alternatively it is always necessary to apply it to fixed point for example supports or piping lines



In this case it was not possible to anchor to the handrail, alternatively it is always necessary to apply it to fixed point for example supports or piping lines

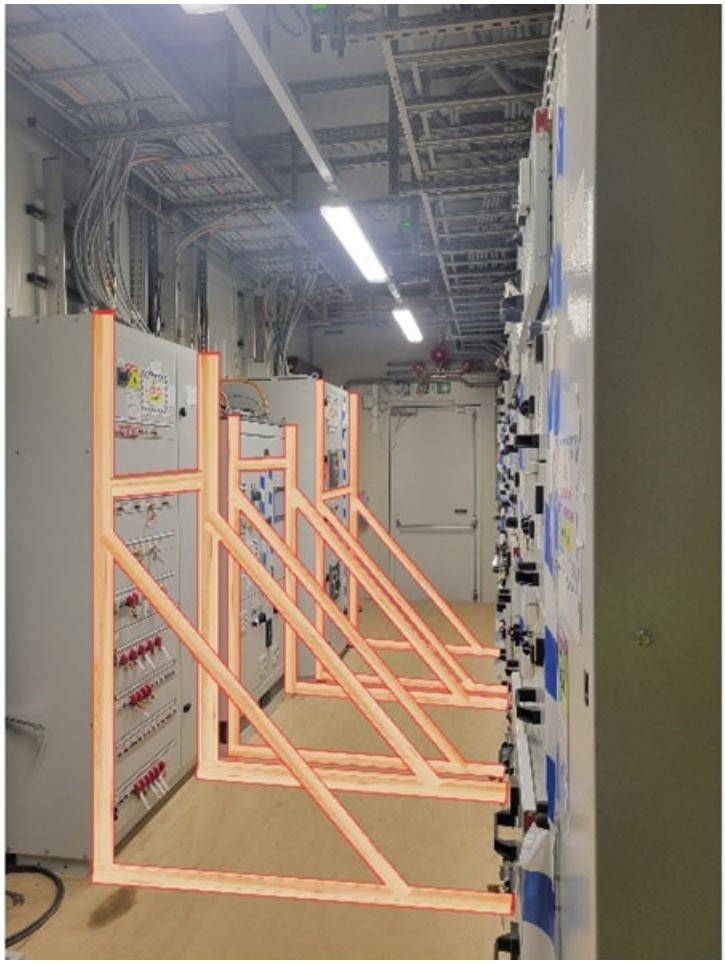
This document undergoes an issuance cycle within EDMS Fusion live". Its distribution is electronically controlled. Once printed shall be considered as "NOT CONTROLLED" copy

6 INTERNAL



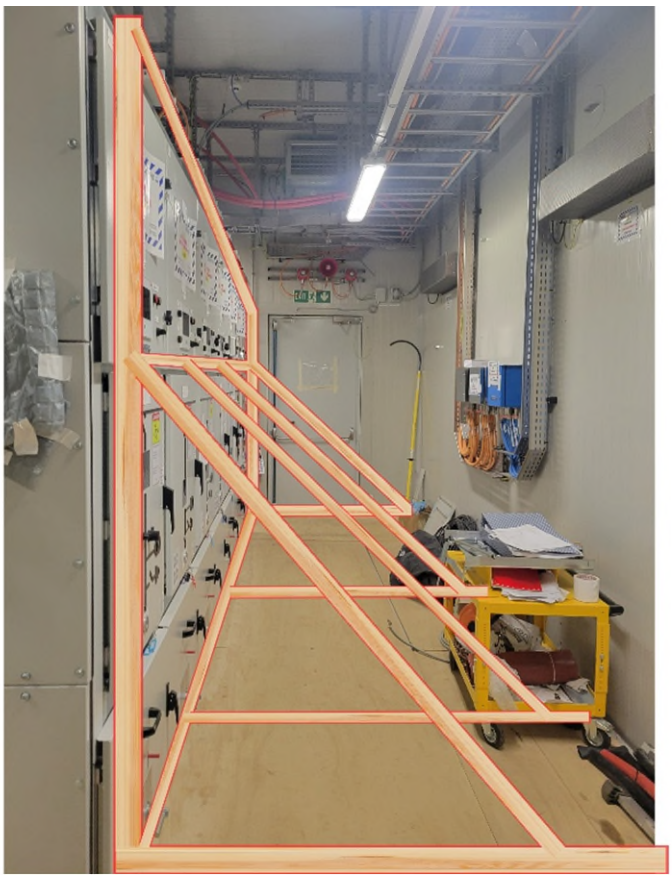
Secure battery racks with wooden bracings and posts, solution applicable for B 300 AC UPS room at lower deck.

During our sea fastening activities, if additional wood supports are required, they will be installed. Horizontal pieces will be installed on top and on bottom structure.



Secure battery racks with wooden bracings and posts, solution applicable for B 200 LV Switch room at lower deck.

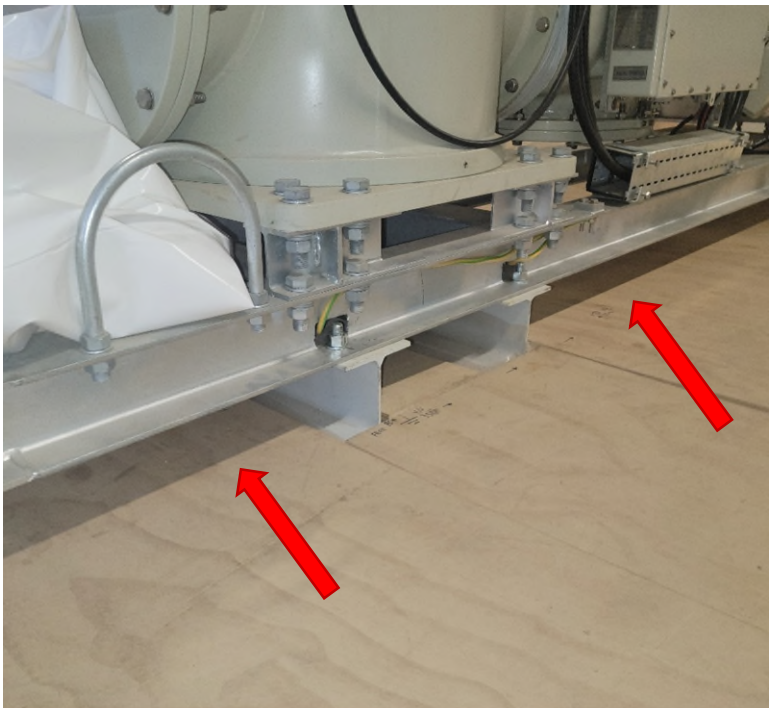
During our sea fastening activities, if additional wood supports are required, they will be installed. Horizontal pieces will be installed on top and on bottom structure.



Secure battery racks with wooden bracings and posts, solution applicable for B 100 HV Switch room at lower deck.

During our sea fastening activities, if additional wood supports are required, they will be installed. Horizontal pieces will be installed on top and on bottom structure.





The GIS, located in the lower deck of B-100, does not require the application of wooden supports as it is already securely fixed using a carbon steel support.



Secure transformer with wooden bracings and posts, solution applicable for transformers at lower deck.



Secure electrical panel with wooden bracings and posts, solution applicable for water treatment package at lower deck.