



Technical Challenges in Offshore HVDC Platforms

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Photo by Antony Hansen

Grid Connection - Global Scale



Internal Use

Production Line Overview



Systems of an Offshore HVDC Platform



Foundation

- The foundation consists of a jacket and piles configuration
- It must be adapted to the installation methodology of the topside
- Location depends on the seabed geology, UXO, marine life....

Foundation

Jacket characteristics		Pile characteristics	
Dimensions	43.2 m x 49.0 m	Dimensions	112.12 m / 83.20 m
Water Depth	39.6 m	Piles OD	2.591 m (102")
Lift Weight	5,997 mT	Lift Weight	500 mT / 450 mT





Internal Use

Foundation - Fabrication



Foundation - Installation



Foundation – Noise mitigation

Noise mitigation			
Systems used	DBBC + GABC		
Max. allowable limits	160 dB/190 dB		
Max. recorded SEL	158 dB		





Topside

Topside characteristics			
Dimensions	71 m x 71 m x 37 m		
Number of levels	7 Decks + Helideck		
Gross weight	18,887 mT		











Topside – Load Out



Topside – Floatover

Design considerations in HVDC rooms

- Ducts shall not have sharp edges as it may cause partial discharge
- Rectangular ducts are acceptable with round edges
- All maintainable parts (dampers, sensors...) to be installed outside the HVDC rooms
- All bolts and nuts to be of locked type
- All ducting to be earthed
- All ducting to be outside of air clearance
- Air supply from below the converters and exhaust above them

Converter



Converter



internal Use

Reactor



Internal Use









ICMS - Automation Hardware



Internal Use

FiFi - Inert Gas System

- Non-liquefied inert gas (nitrogen) reduces oxygen content in the extinguishing zone
- 8ol 3oobar bottles stored in temperature controlled room
- Bottles grouped in combinations depending on extinguishing zones sizes
- HVDC and auxiliary transformer rooms and control rooms protected
- Extinguishing zones must be air-tight
- Operated by fire alarm, manual call point, ICMS.













HVAC - Function

- dissipate the heat generated by HVDC equipment
- Ensure cooling of packages, such as ADG
- Provide fresh air for working areas
- Provide climate control for the accommodation
- React in case of fire to cut oxygen supply then flush the affected zones

HVAC - Components

- Sea water system
- Hypochlorite plant
- Fresh water cooling system
- Chilled water cooling system
- Chilled water freeze plant
- Ventilation system

HVAC - Sea Water System

- 4 lines, 2 groups
- Each line consists of 1 lift pump, 1 filter, 1 heat exchanger, and a connection to return line
- Multistage submersible Pump installed in well casing -16m MSL
- Filter is self-cleaning, removes particles bigger than 200m
- Heat exchanger is provided with provision for back flushing
- Automatic changeover happens in case of failure on one line, or if the running hours match 32 hrs or 24 hrs
- Grouping ensures symmetrical electrical load and operating hours control
- SW system supplies potable water, sewage, deck wash, and fire fighting











HVAC - Hypochlorite plant

- Sodium hypochlorite is used as anti-fouling agent for prevention and control of marine growth
- Generated in situ from sea water
- Continuous dosing of 2ppm, shock dosing of 5ppm every 8hrs
- Excess can damage the SDSS material
- Package consists of booster pumps, rectifiers, electrolyzers, storage, dosing pump
- The hypochlorite room is protected by H2 gas detection



Media links

- Jacket fabrication and load-out:
 - <u>BorWin3 jacket for Petrofac YouTube</u>
- Jacket installation:
 - <u>Borwin3 jacket installation YouTube</u>
- Topside fabrication and load out:
 - <u>BorWin Gamma Topside Fabrication | Full Documentary | DryDocks World Dubai | BizTV</u> <u>Network – YouTube</u>
- Topside installation:
 - BorWin gamma topside being installed in the German North Sea on Vimeo

