

ServiceReferenceSheet

Comprehensive Installation Engineering Solutions

1.0 Related Services

Pre-Construction Engineering, Project & QHSE Management, Offshore Construction Support, Client Representation, Operations & Maintenance and Innovation Development.

2.0 Introduction

Primo Marine has extensive expertise, in-depth knowledge and experience to provide independent Engineering solutions tailored for the requirements of the offshore Dredging, Oil and Gas, Renewable Energy and Power sectors. Solutions designed to ensure the reduction of risk and cost during the Installation Phase.

3.0 Scopes

Primo Marine has provided independent engineering expertise into many of Europe's largest installation projects, from interconnectors i.e. BritNed, NordLink, NorNed, to export cables i.e. DolWin, HelWin to Offshore Wind Farms i.e. Amrumbank, Butendiek and Thornton Bank.

Primo Marine adopts the role of "Owner's Engineer" and considers this as a core differentiator in regard to the engineering scopes being offered. Providing complete independent in-depth technical knowledge to ensure adherence to all corporate, project, financial and legislative specifications for the benefit of the project and all the respective stakeholders.

4.0 Comprehensive Packages

Primo Marine offers Engineering expertise as part of an overall "comprehensive service package", in combination with Project & QHSE Management, Offshore Construction Support, Operations & Maintenance, Tendering and Innovation Design or as bespoke packages related to the pre-construction (installation preparation) and installation phases.

5.0 Engineering Installation Phase

Primo Marine provides Engineering solutions, incorporating experience of all lessons learned during the pre-construction (installation preparation) phase, from its extensive track record, amongst others NorNed, BritNed, NordBalt, IFA2 and NordLink. The solutions have been designed to focus firmly on providing a more realistic CAPEX/OPEX balance for installation projects, especially in terms of ensuring protection to cable by burial throughout the cable's lifetime.

Primo Marine provides combined engineering and technical solutions based on three core principles:

- A solid theoretical background, (in-depth technical knowledge and expertise).
- Application and flexible deployment of resources.
- Practical experience of all the lessons learned from all projects completed (incorporating real offshore installation experience into engineered and technical solutions).

Primo Marine provides the following Installation phase services:

6.0 Installation Engineering : Seabed Preparation

Primo Marine offers a comprehensive capability for Seabed Preparation, based on incorporating extensive theoretical and practical experience. Incorporated within the Seabed Preparation Capabilities is:

- Recommendation as to levelling or pre-sweeping of areas with mobile seabed's and undulations, in order to reduce risks to cable installation and achieved burial depth of time.
- Pre-Sweeping of mobile seabed's including sand-waves, in line with permitting requirements for maximum dredging and volume constraints, by completing migration analysis in 3D to reroute cables.
- Assessing cable routes in order to compare the costs of seabed preparation by dredging or/and deeper initial installation, against the cost of burial maintenance over the lifetime of cables.
- Route preparation – including PLGR, route clearance and seabed intervention.
- Recommendation in regard to installation in mobile seabeds.

7.0 Installation Engineering : Trenching

Primo Marine offers a comprehensive capability for trenching, based on incorporating extensive theoretical and practical experience. Incorporated within the Trenching Capabilities is:

- Complete onshore and offshore support. Including the management of packages with provisional sum operations.
- Expertise designed to reduce the risk of not achieving burial depth and avoiding higher maintenance costs.
- Knowledge of all soil types requiring different capabilities of cable trenchers (Trencher selection and verification).
- Recommendation of trencher related achievable soil penetration operations, such as simultaneous or post lay burial and/or additional passes.
- Providing pro-active support to the consequences and difficulties arising out of not meeting permit requirements, such as cost and time through increased operations and maintenance.
- Reviewing of methodologies, procedures and providing confidence in the documentation.
- Studies and recommendations for trenching and erosion control i.e. plough forces.
- Also see Innovation Development.

8.0 Installation Engineering : Dredging

Primo Marine based on extensive onshore and offshore experience offers a comprehensive capability for dredging. Incorporated within the Dredging Capabilities is:

- Complete onshore and offshore support. Including the management of packages with provisional sum operations.
- Reviewing methodologies, procedure and providing confidence in the documentation.
- Designs and review of dredging works.
- Designs including the calculation of volumes.
- Providing pro-active support to the consequences and difficulties arising out of not meeting permit requirements, such as cost and time through increased operations and maintenance.
- Combined with Seabed Preparation, ensuring the meeting of permit requirements in regard to dredging volumes and constraints.
- Also see Innovation Development.

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9.0 Installation Engineering : Cable Installation

Primo Marine offers a comprehensive capability for installation engineering, based on incorporating extensive theoretical and practical experience.

Incorporated within the Installation Engineering Capabilities is:

- Complete onshore and offshore support for product lay, installation and burial. Including the management of packages with provisional sum operations.
- Reviewing methodologies, procedure and providing confidence in the documentation.
- Analysis and review of all documentation – including method statements, procedures covering risk mitigation, contingencies, cable integrity, pull-in analysis, cable rerouting and pull in forces.
- Reviewing methodologies, procedures for diverse activities such as crossings, permits, HDD entry and exit points.
- Recommending cable protection and seabed intervention methodologies – including remedial risk mitigation solutions.

10.0 Installation Engineering : Subject Matter Expertise

Primo Marine offers a comprehensive capability in regard to the provision of subject matter expertise, covering pro-active problem solving of events, challenges and issues (including the arranging and management of third parties). In summary:

- Complete onshore and offshore support. Including the management of packages with provisional sum operations.
- The management of survey campaigns, including hydrographic, geophysical and geotechnical disciplines, designed to monitor the seabed, including specialist packages such as UXO (incorporating UXO desk top studies).
- The interfacing with all significant parties to provide technical solutions.
- The license management and supporting of licences.
- Advising with all project documentation and the management thereof.
- Translation of technical issues into contract and permit requirements.
- Recommendation on crossings, of 3rd party assets and large obstacles including rock replacement solutions.