EXECUTION PLAN

A	First Issue	05-12-19	PS4	KSG	KRR
Revision	Description	Date	VO Originator	VO Checked	VO Approved

Revision record

Revision Number	Description	Date
A	First Issue for review	05-12-2019

External referenced documents

Supporting documents

Document Number	Document Name
VOMS-PR1.02-OD-01	Van Oord Management System
QHSE-MAR-PU-300	Risk Assessment Tool (RAT) Marine Floating Equipment
TBC	Quality Plan
TBC	Health Safety and Security Management Plan
TBC	Environmental Management Plan
TBC	Risk Assessment
TBC	Bridging Document
TBC	Management Plan
TBC	Construction Data Sheet
TBC	Survey Plan

Distribution list

Project Manager Van Oord Offshore
Vessel Master
Vessel Offshore Construction Manager
Project Manager Mutual Energy

Contents

Abbreviations and definitions

Abbreviations

EMP	Environmental Management Plan
FFP	Flexible Fallpipe
FFPV	FFPV
FP	Fallpipe
HSE	Health, Safety and Environment
HSSMP	Health, Safety, Security Management Plan
ITP	Inspection and Test Plan
ITR	Inspection and Test Record
JSA	Job Safety Analysis
LMRA	Last Minute Risk Assessment
MS	Method Statement
PPE	Personal Protective Equipment
PQP	Project Quality Plan
PRADA	Project Risk Assessment Database
PTW	Permit to Work
QA/QC	Quality Assurance / Quality Control
RA	Risk Assessment
RAT	Risk Assessment Tool
ROV	Remotely Operated Vehicle
SOC	Safety Observation Card
SRI	Subsea Rock Installation
SWP	Safe Work Practice
VOMS	Van Oord Management System

Definitions

Contractor	Mutual Energy
SRI Contractor	Van Oord UK Ltd.

1. Introduction

This execution plan is set up by Van Oord to describe subsea rock installation and related matters for project Gas Interconnector Scotland – Northern Ireland.

1.1 Scope

The scope of this execution plan is to provide information to all parties on how Van Oord deals with subsea rock installations using a FFPV.

2. SRI Resources

2.1 Marine equipment

The following marine equipment (or similar) are scheduled to be used during the realisation of the works.

Name	Description marine equipment	Details
BRAVENES	The Bravenes is a vessel with Flexible Fall Pipe system or tremie pipe system for subsea rock installation able to place rock with a high precision on every water depth between 15 and 1500 meters. The vessel is operated with a Dynamic Positioning (DP) system. The rock is transported from the holds to the start of the Fall pipe or Tremmie pipe buy the means of crane. At the end of the Fall pipe a Remote Operated Vehicle (FPROV) is in place to control the direction of the rock flow. For more specific information on the Bravenes and its equipment, reference is made to the 'Technical Details Equipment' Appendix 1	[Redacted]
NORDNES	The Nordnes is a converted bulk carrier equipped with a Flexible Fall Pipe system for subsea rock installation able to place rock with a high precision on every water depth between 15 and 1500 meters. The vessel is operated with a Dynamic Positioning (DP) system. The rock is transported from the hold to the start of the Fall pipe with an Hold conveyer belt system. At the end of the Fall pipe a Remote Operated Vehicle (FPROV) is in place to control the direction of the rock flow For more specific information on the Nordnes and its equipment, reference is made to the 'Technical Details Equipment' Appendix 2	
STORNES	The Stornes is a converted bulk carrier equipped with a Flexible Fall Pipe system for subsea rock installation able to place rock with a high precision on every water depth between 15 and 1500 meters. The vessel is operated with a Dynamic Positioning (DP) system. The rock is transported from the hold to the start of the Fall pipe with an Hold conveyer belt system. At the end of the Fall pipe a Remote Operated Vehicle (FPROV) is in place to control the direction of the rock flow For more specific information on the Stornes and its equipment, reference is made to the 'Technical Details Equipment' Appendix 3	

Marine equipment employed will hold the necessary certification as per legal and Van Oord requirements.

3. Subsea Rock Installation with a FFPV basics

This first section touches on the basics of subsea rock installation with a FFPV and following sections elaborates on our more detailed approach to the preparation and execution of subsea rock installation projects with a FFPV.

3.1 Context

A FFPV is a self-propelled dynamically-positioned vessel that is used to install rock on the seabed. Its FFP consists of bottomless buckets connected by chains and that are lowered below the vessel.
A remotely operated vehicle (ROV) is located at the bottom of the FP and is used to position the lower end approximately 5m above the seabed.
A FFPV can install various grades of crushed rock with a very high accuracy in water depths between 20m and 1,500m (see Figure 1).

Rock material can need to be installed for many reasons. These include impact protection on pipelines and cables, upheaval buckling mitigation on pipelines, protection at pipeline or umbilical crossings, and scour protection around subsea structures or foundations of wind turbines.

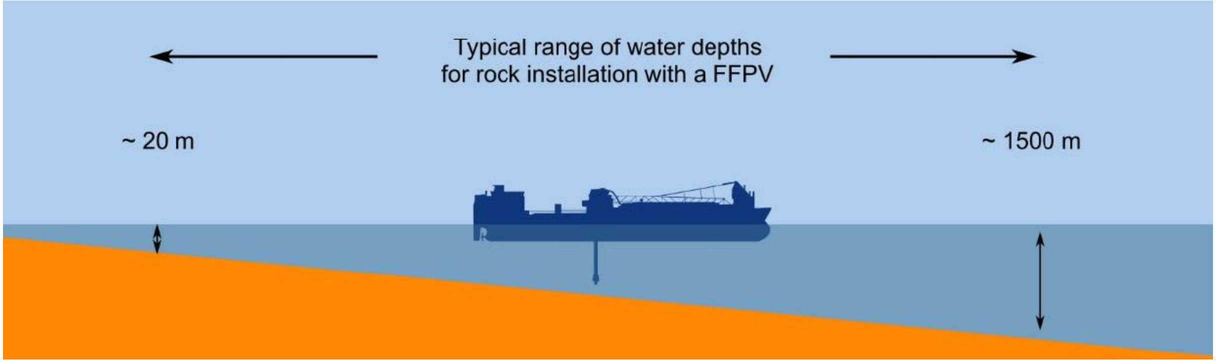


Figure 1 Rock installation water depths for a FFPV

3.2 Subsea rock installation with a FFPV in a nutshell

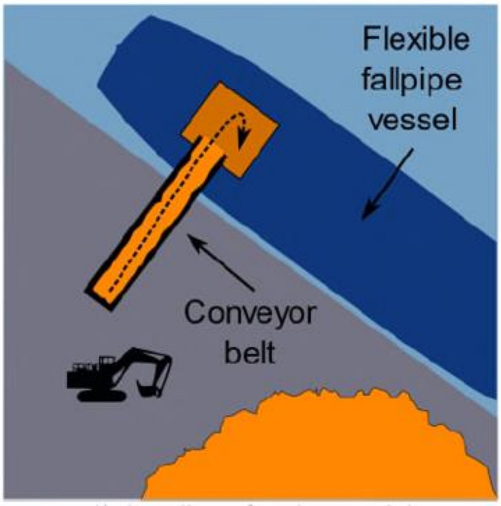


Figure 2 loading rock material

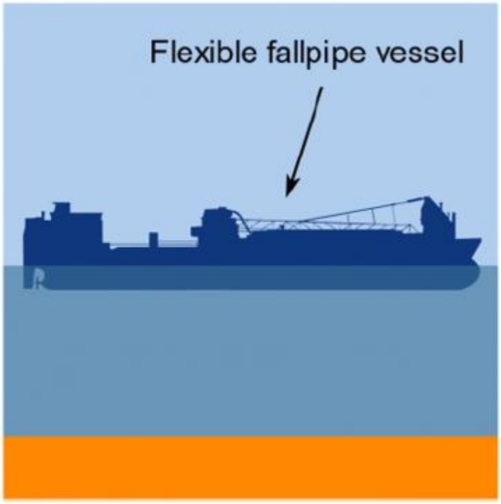


Figure 3 transit to installation site

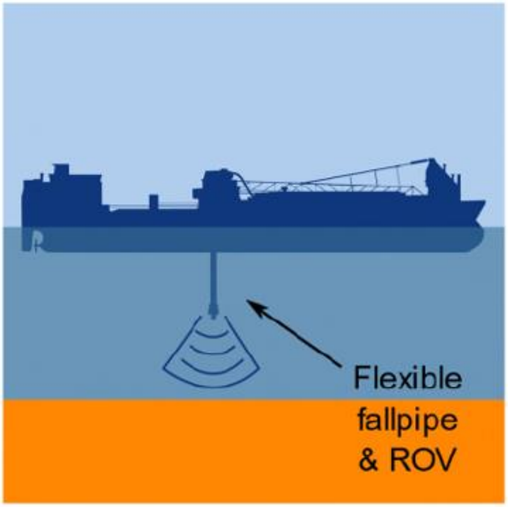


Figure 4 pre-survey

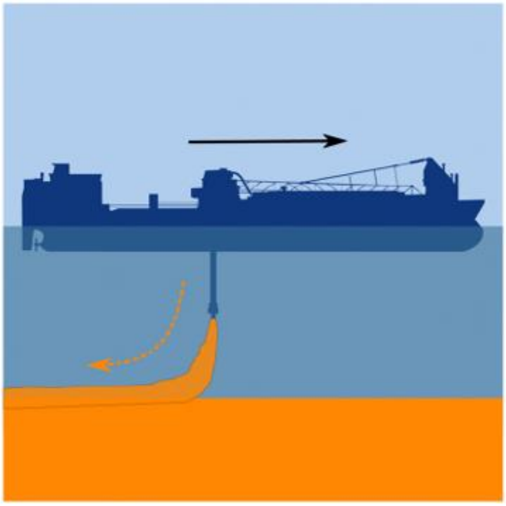


Figure 5 rock installation

Figure 6 post-survey

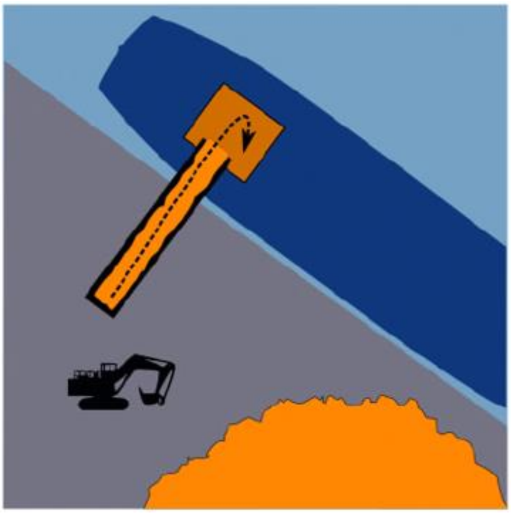


Figure 7 re-loading (if applicable) & demobilisation

3.3 Result for the client

At the conclusion of a project executed using a FFPV, the result for the client will be a completed subsea rock installation which is installed according to the specified conditions and client requirements, and within the agreed upon time and costs.
Subsea rock installation with a dynamically positioned flexible fall pipe vessel can provide a very economical solution for complex subsea installation requirements with respect to protection, stabilisation or ballasting subsea assets.
Van Oord has an extensive track record of over 30 years of tailor-made solutions for clients on various offshore oil and gas projects and offshore wind projects world-wide.

3.4 Equipment summary

The main equipment required for subsea rock installation with a FFPV is the following:

- FFPV (FFPV)
    - Flexible fallpipe system
    - Dynamic positioning system (DP class 2 or DP class 3)
    - Remote operated vehicle(s) (ROV)
    - Multiple cargo holds for rock material

3.5 Success factors for subsea rock installation with a FFPV

Typical factors and conditions which contribute to the success of a subsea rock installation with a FFPV project are:

- State-of-the-art FFPVs with in-house designed subsea rock installation systems.
- A FFP system capable of working in high currents and deep water.
- Vessels that are prepared for additional equipment such as “free flying” ROVs, cameras and cable-tracker systems.
- Extensive automation of rock dumping processes for specific rock berm designs.
- Qualified and in-house trained personnel.
- An organisation with a strong focus on high quality results, long-term client relations and a problem-solving approach.
- Early involvement of Van Oord in the subsea rock installation design process to get the best solution.

Van Oord is confident that, with its marine ingenuity and over 30 years’ experience in subsea rock installations, it will complete every project successfully no matter the size or complexity. However, in case the typical success factors stated above do not apply for a certain project, Van Oord is open to discussing the absence of certain information and/or factors and to finding suitable solutions to cover all aspects.

4. Subsea Rock Installation project engineering

4.1 Preparation

4.1.1 Project engineering and design

The overall project planning and engineering will be executed prior to the commencement of the marine operations and will, at a minimum, consist of the following items:

- Overall project management and planning, set up of the project team
- Operational engineering and procurement of rock material
- Preparation of project specific plans, procedures and method statements
- Determining required preparatory works
- High level and detailed risk assessments with the client
- Preparation of datasheets and construction drawings (if applicable)

4.1.2 Procurement of materials

To ensure that the works can be executed without any delays, it is necessary to procure the required rock material for a project prior to the commencement of a subsea rock installation. The rock material required for subsea rock installations will be obtained from qualified quarries or suppliers. Depending on the required rock grade, technical specifications, delivery schedule and project location, the most suitable supplier will be selected. Van Oord will follow up on production and quality control at the quarry to ensure a timely delivery of high quality material.

To ensure that there is a sufficient amount of rocks available, a stockpile method may be applied. The stockpile method secures a pre-determined minimum amount of rocks prior to operations. The stockpile will be used to load the vessel, whereas it will be fed with extracted rock from the quarry during the operation to maintain a minimum required amount of rock available.

For each project, the size limits of the required rock grade will be prescribed. This can be done using an internationally accepted standard (NEN-EN, ASTM, etc.) or by defining a project specific “declared grade”. Van Oord has defined requirements for a number of commonly used grades in the offshore industry. Prior to delivery, the material will be tested according to the project requirements and the applicable international or industry standards.

For subsea rock installation projects in the North Sea area, Van Oord has agreements with several Norwegian suppliers for the supply of the most common rock grades used in the offshore and offshore wind industry. These suppliers are subject to Van Oord audits on a regular basis and have a track record of supplying rock for Van Oord projects. For cases where a project is located in a different area, quarries will be visited and audited prior to the start of rock production. During rock production, a representative of Van Oord will regularly inspect the production process in the quarry to assure the project specifications and production schedules are met.

4.1.3 Mobilisation of equipment

Prior to the commencement of the subsea rock installation, all vessels and equipment will be mobilised at a designated port or other location, typically at the port of loading. In cases where the port of mobilisation is not the port of loading, the main vessels will then transit to the port where the loading operations will be executed.

The main equipment used for this type of project is, of course, a FFPV.

Prior to the commencement of work, all positioning and survey equipment will be calibrated and tested. Furthermore, system checks of all rock installation equipment will be performed.

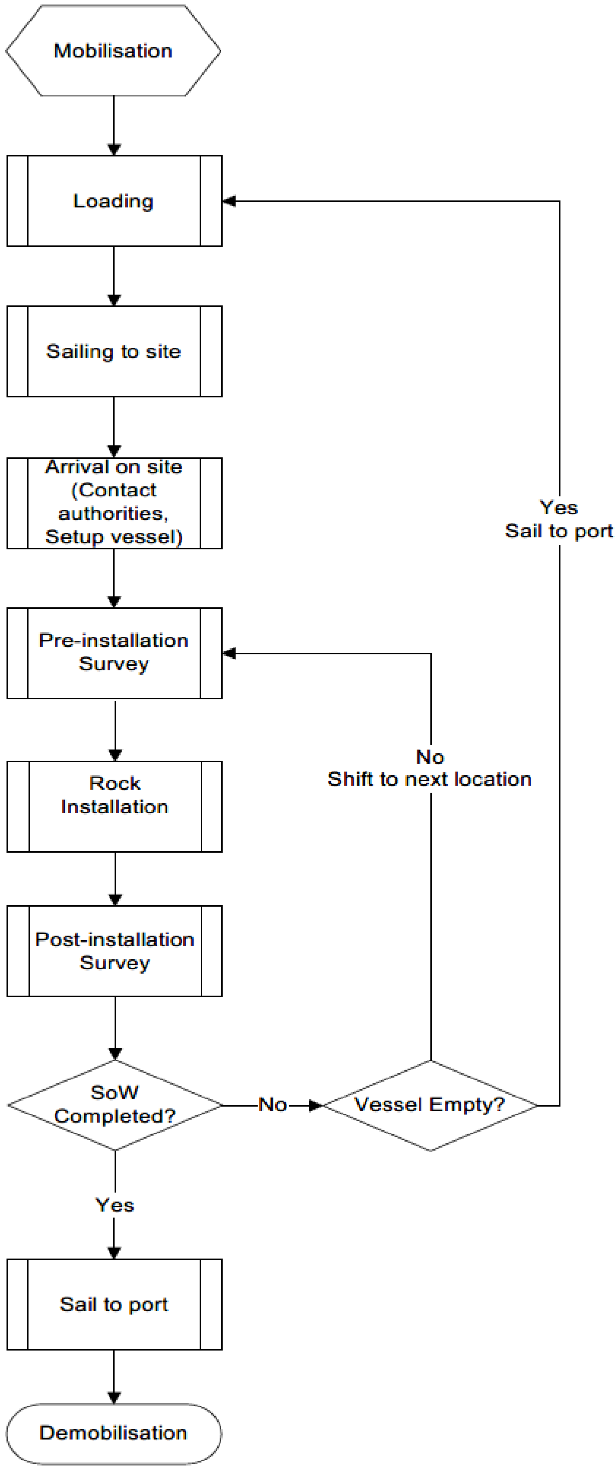
Once the vessel has been mobilised, activities such as the following may take place:

- Project kick off meetings, project inductions and risk assessments
- Crew changes, arrival of project staff and client representatives
- Stores, bunkers and delivery of spare-parts
- Mobilisation of project specific modifications or additional equipment

4.2 Execution

4.2.1 Sequence of work

Subsea rock installations using a FFPV will, in general, include the following main activities:



4.2.2 Loading operations

Before loading operations begin, a loading plan will be drawn up. This plan will include the type and amount of rock that will be loaded, and the timings and simultaneous operations that may be scheduled (e.g. bunkering, taking provisions, repairs, crew changing etc.). Since most FFPV have multiple cargo-holds, several different rock grades can be carried in one trip.

A port, anchorage or sheltered area nearby the installation area will be used as a storage area, for supplies of food, fuel, water, spare parts, rock, etc.
The location where the FFPV will be loaded with rock material will depend on factors such as the following:

- Planning and costs, cycle times of the vessel and its specifications
- Nearby available quarries with the correct specifications for the rock required
- The amount of rock needing to be installed

Figure 8 typical example of a FFPV loading rock at a quarry

4.2.2.1 Loading a FFPV using a conveyor belt

The FFPV will travel to the quarry or loading port and be loaded with rock using excavators / front wheel loaders and a conveyor belt system. The excavators will place rock onto the Ship-loader conveyor belt(s), which will then transport the rock onto the vessel and dump it into the cargo holds.

The type of ship-loader may vary (movable, multiple loading-belts, etc.). This requires that the vessel crew and shore teams liaise closely on the exact loading sequence and speed. The aim is to execute loading operations in the most safe and economical manner at all times.

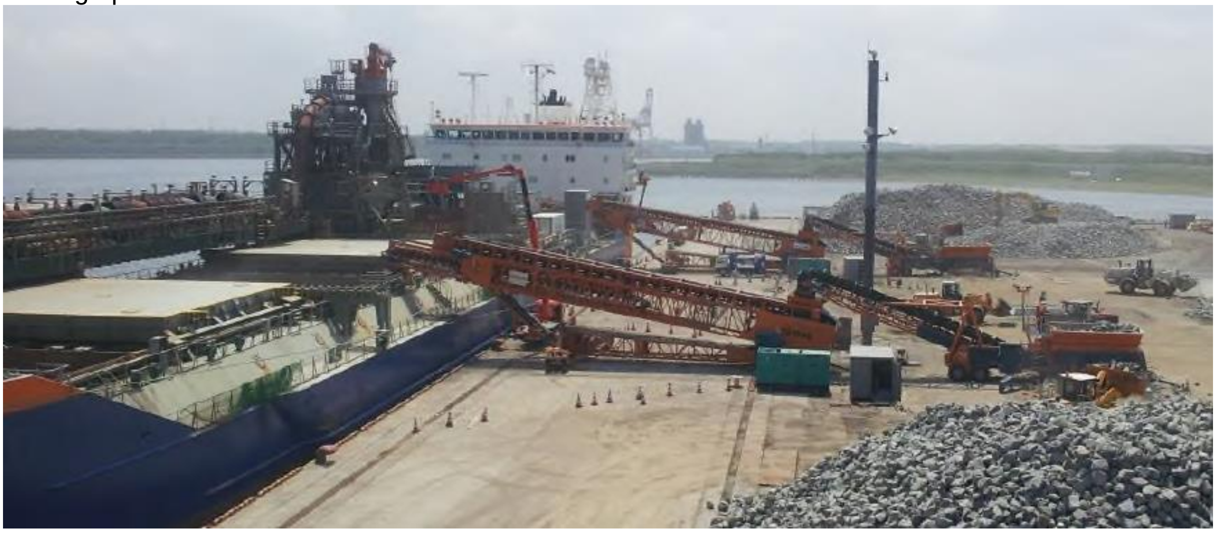


Figure 9 loading a FFPV via conveyor belts

4.2.3 Arrival on site

The following main activities will be carried out upon arrival on location:

- Contact authorities;
- Navigation comparison checks;
- DP set-up;
- Deck and pre-dive checks;
- Launching of Fall Pipe Remotely Operated Vehicle (FPROV) minimum 75 meter away from any underwater structure, pipeline, cable or safety zone;
- Launch of the Flexible Fall Pipe (FFP) may take place during survey operations.

4.2.4 Pre-installation surveys

After arrival at the site, the FFPV will be set up on dynamic positioning (DP) and the FFP and remotely operated vehicle (ROV) will be deployed so that a pre-installation survey
can be executed. The ROV, which is attached to the lower end of the fall pipe, will be used for all survey activities.

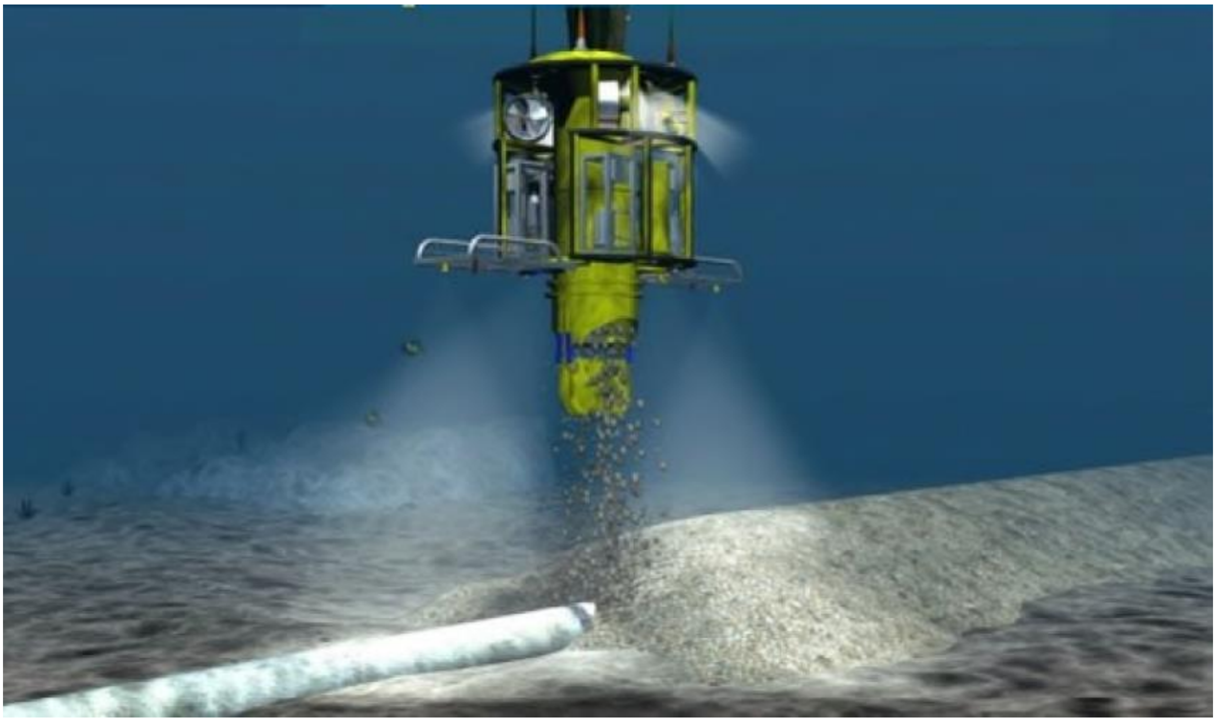


Figure 10 Example of a FFP ROV

The survey is done while the vessel together with the FPROV tracks at a constant speed along a defined survey line. The subsea asset will be located with MBE's and if necessary the cameras will be deployed for visualization. Profiles can be printed on-line and raw profile data can be made available instantly.

Position check may be executed on a distinct feature on the seabed with known co-ordinates. By deriving the feature position from the pre-survey data, a comparison can be made. Another possibility is a static position check by positioning the FPROV over the feature and collecting positioning data. To evaluate the performance of the DGPS system and to maintain quality of the data, a continual comparison will be carried out with the secondary navigation system.

A pre-installation survey will be executed over the area where the installation of rock materials is planned, and its objectives are as follows:

- Inspection of the seabed in the installation area and its direct surroundings
- Confirmation of the position of the installation area
- Recording of the pre-installation cross profiles, including reference areas
- Confirmation of water depths and overall position of the products, if applicable
- Verification of contractor supplied survey data (position of products, burial depths and bathymetric data)

The pre-installation survey will provide the exact coordinates and profile of the installation area. This survey will also be used as the basis for the acceptance of the rock installation results. Upon the completion of the pre-installation survey, a rock installation plan will be prepared and actual rock installation can commence.

4.2.5 SRI operations

Subsea rock installation will generally be performed while the FFPV is travelling at a constant speed in auto track mode. During installation, rocks will move from the cargo hold / hopper to the flexible fall pipe, by means of either a conveyor belt (or on the Bravenes, partly by excavators).
Rocks will then fall down through the fall pipe towards the seabed.

The remotely operated vehicle (ROV) that is placed at the end of the fall pipe will be positioned along the rock installation route, and thereby also correctly align the fall pipe. During the procedure, the pilot of the ROV can make small lateral corrections to keep the ROV above its intended track. The typical height of the ROV during installation operations is 4-10 metres above the seabed, depending on the rock berm profile to be installed.

The FFP ROV is equipped with positioning equipment and multibeam profilers that provide real-time information on the position of the FFP and ROV. Based on this information, the vessel's route, ROV-offset and rock output will be adjusted in order to achieve the required rock profile.

During rock installation operations, information about the installed rock berm profiles will be obtained by the ROV. The actual installed profile will be checked against the required profile and, if there is any discrepancy, corrective actions will be taken by changing the feeder output or the tracking speed of the vessel. In this way, the rock can be accurately installed.

There are several different possible SRI methodologies for constructing a subsea rock installation rock berm. The methods are variable and can depend on factors such as the dimensions of the rock berm to be installed and environmental conditions.

The four SRI methodologies are:

- Line dumping method
- Spiral dumping method
- Box dumping method
- Spot dumping method

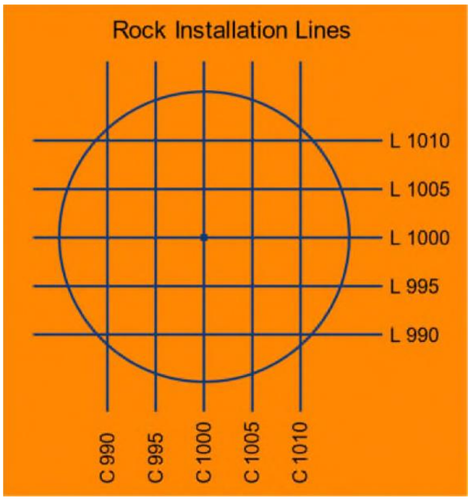


Figure 11 typical example of grid lines for subsea rock installation

Whether to use a specific methodology will be decided based on the evaluation of the pre-survey, together with the required berm dimensions.

During installation, additional "check surveys" might be performed, but these are only used to verify the build-up of the rock layers and are not part of the acceptance process.
The results of the intermediate and/or post-survey also might require an adjustment to the chosen methodology.

4.2.6 Post-installation surveys

After the completion of a rock installation at any location, a post survey will be performed.
The objectives of this survey are:

- Verification of the achieved rock berm heights and profiles
- Inspection of the rock berm profile
- Recording of the post-installation profiles

A comparison of the pre-installation and post-installation profiles will provide the necessary information to determine if the rock installation requirements have been met.

Pre- and post-survey results will be provided in the agreed upon format on the "as-built" charts. In the charts, the results will be provided as plan views (depth charts, differential charts) and long- and cross-profiles, or in other presentations if required. Survey-data will be provided in the agreed upon raw or processed format.

4.2.7 Demobilisation

After the SRI with a FFPV for the project is completed to the client/contractor satisfaction and requirements, Van Oord will demobilize the vessel(s), people and equipment involved in the project.
Since the project can consist of several separate phases, interim (de)mobilization may also be the case. Van Oord has a dedicated transport department which handles all of the (de)mobilization activities.

5. Subsea Rock Installation per activity

The Work to be performed by Van Oord comprises the performance of all activities necessary to complete Subsea Rock Installation.

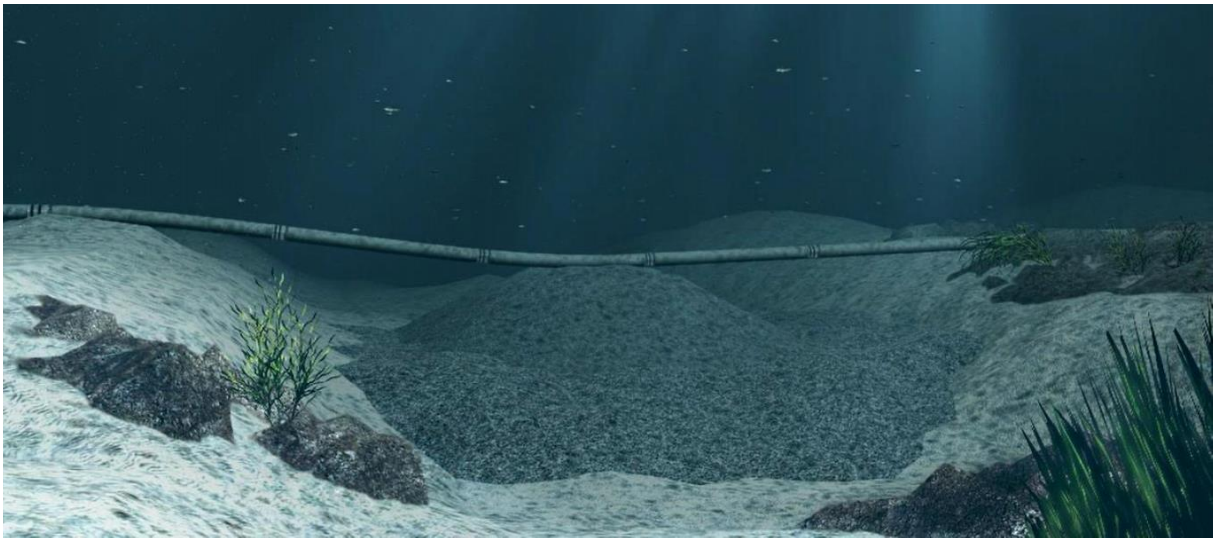
The projects can contain one or more typical activities of the following services:

- Axial locking
- Free span mitigation
- Pipeline Crossing
- Pipeline Protection – Jetted Trench
- Pipeline Protection, pipeline on seabed
- Pipeline Protection – Ploughed Trench
- Rock Carpet
- Uplift prevention
- Rock foundation / erosion control
- GRP cover stabilisation
- Special Tolerances

Various Subsea rock installation methodologies can be applied depending on the specific geometry of the rock berm to be installed, site specific constraints and other Contractor specific requirements (installation tolerances, sequencing of the rock installation with respect to counterfills, etc.).

In the sections below the rock installation activities for this specific project are explained in more detail.

5.1 Construction Post-lay freespan supports



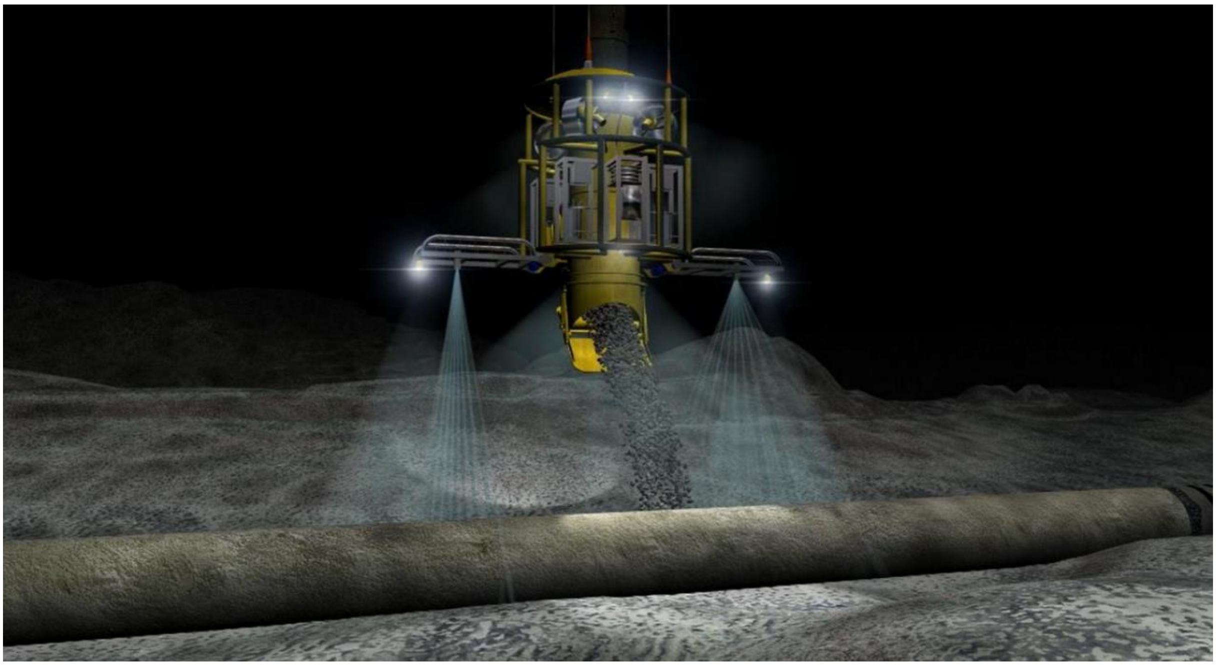
5.1.1 Main Fill

Different methods for the construction of Post-lay Rock Supports can be used. The method to be used depends on the height of the Freespan correction and the size of the Rock Support. For detailed information of the specific Rock Support reference is made to the applicable Datasheet. The method to be used is decided upon the results of the Pre-Rock Installation survey. The following construction methods for the main fill can be applied.

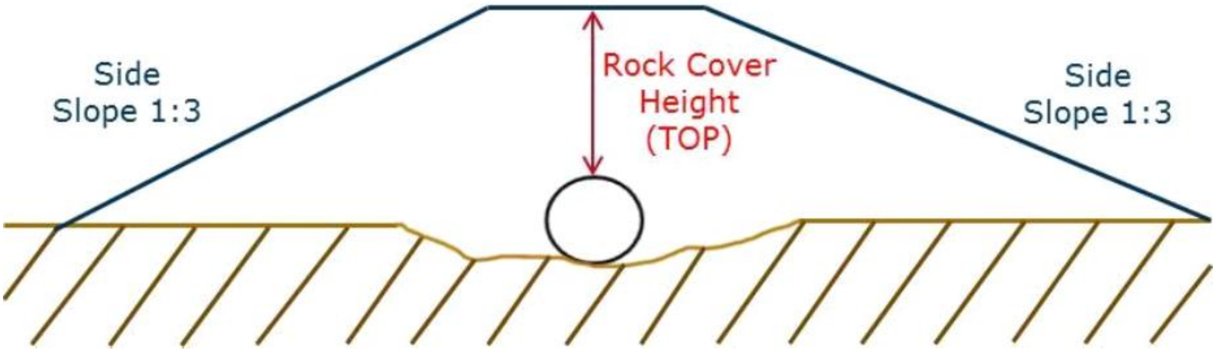
Spot installation method
The Spot installation method might be used when the height of the Freespan correction is minimal and the size of the Rock Support is not sufficient for Rock Installation repetitive berms.

Multiple Layer method
The Multiple Layer method might be applicable when the size of the Rock Support is of a significant size.

5.2 Pipeline or Cable covering / Uplift prevention



Pipeline covering could also be installed in freespan locations for uplift prevention. In case it is needed, different construction methods are possible depending on the height and size of the area to be rock installed. The use of the Single Pass Method or Multiple Pass Method is decided upon the results of the pre-survey.



6. SRI inside Surface Safety Zone

The scope of this chapter is to define the necessary precautions to be taken when working close to a Structure. FFP Vessel carries out the SRI operations close to structures always in DP 2/3(Bravenes) mode.

For the SoW inside a Safety Zone (SZ) the following additional preparations are required in order to allow the SRI vessel to enter the SZ:

- Review, discuss the SOW inside the SZ and agree the workable limits during the HAZOP with the Contractor.
- Familiarise the crew of the SRI vessel with the SOW and review the potential risks during the Kick Off meeting on board before the execution of the project.

The following sea state and weather criteria influence the vessel performance within the safety zone of any Offshore Installation.

- Wind directions and force
- Current direction and force (generated by tide and/or wind)
- Wave/ swell conditions

The Vessel Master follows practical guidelines to evaluate the local conditions prior to initiating the drift trial or entering the safety zone.

Wind / Current

In most cases the effect of the wind force means the vessel can only operate at the down-wind side of the platform. Obvious conditions may occur during operations causing the current or wind force to have a neutralising effect on each other. Current force/ direction is measured by means of Doppler device in relation to dumping operations.

Reference System

For the applicable reference systems available for the project, reference is made to the applicable construction data sheet document.

6.1 Arrival / Approaching the Safety Zone (SZ)

The following steps shall be completed prior to entering the Safety Zone:

When the vessel is underway the ETA will be send to the Platform or similar with 1 hour notice.

- Vessel Master to contact Offshore Installation Manager (OIM) or Control room
    - Vessel name/ call sign
    - ETA in the Safety Zone
    - Type of operation to be carried out
- Set up on DP outside the SZ and clear of any subsea assets
- Launch the fall pipe spread
- Perform drift test to show the result of the environmental conditions (drift on /- off)
- Make a Capability Plot (to show the thruster power consumption)
- The prints of the drift test and capability plot will be handed over to OIM/Contractor representative
- Verify environmental conditions with OIM/Contractor representative
- Ensure Permit to Work (PTW) system and approval from OIM in place

6.2 Working within the Safety Zone (SZ)

Subsea rock installation and survey operations conducted shall be monitored closely as follows:

- Vessel Master to inform all personnel the vessel is about to enter the Safety Zone
- All hot work/smoking on board strictly forbidden
- Inside the SZ a HIPAP transponder might be installed on the seabed which will act as a non GPS based position reference sensor (to be agreed during the HAZOP with Company)
- If the SOW is close to a structure the lay out of the structure will be displayed in the Navigation screen. (including no go zones if necessary and as agreed during the HAZOP with the Client)
- If the SOW is close to a structure another non GPS position sensor (eg Radius) might be used (to be agreed during the HAZOP with Company)
-
- Vessel master brings the vessel to work location
- Vessel Master maintains communication with OIM / Control room during the operations
- Vessel Master and/or Chief Officer are on standby on bridge / deck
- Proper navigation lights/ water tight doors closed / all generators running
- After completion of the SOW the SRI vessel will track out of the SZ. During this move the HIPAP transponder will be recovered if applicable
- After the SoW is completed and the FFP vessel is clear of the SZ, the radio room will be informed and the fall pipe spread will be recovered clear of any subsea asset.

6.3 Additional limitations

During the execution of the works the following limitations might be in place:

- The FFP vessel is not allowed to use a heading with her bow or stern towards a structure
- When working close to a structure the most efficient heading with respect to the environmental conditions cannot be achieved
- Tracking to execute the surveys, installations shall be executed with reduced speed in order to reduce the risk of “overshoot”
  The environmental conditions might result in a situation that the full SOW cannot be achieved. This can happen when a location is very close to a structure

7. Monitoring and Control

7.1 Survey

All installation processes will be monitored by performing check surveys during installation operations.

7.2 Quantity Measurement

To measure and quantify the practical material quantity installed the following three methods shall be used on board the vessel:

7.2.1 Draft survey before and after a trip

The Chief Officer shall execute draft surveys before and after loading to calculate the exact quantity of rock material loaded.

When a trip is completed, whether before a reload or before demobilization, the Chief Officer will execute an end of trip draft survey to calculate the exact installed quantity of rock material.

When the vessel is empty upon completion of the trip the installed tonnes are equal to the loaded tonnes.

7.2.2 Measurement of installed quantities on board by using the belt's weighing device

Measurements to quantify the quantity of rock material used during the project shall be compiled by reading the belt's weighing device (Ramsey) continuously. This instrument shall record constantly the quantity of rock installed.

In the Daily Progress Report the weighed quantity of installed rock material will be noted for each location as estimated tonnes.

After the end of trip survey, the estimated quantity can be corrected to the actual quantity if the tonnes displayed on the weighing device (an indication) are not equal to the actual loaded tonnes as calculated by the draft surveys.

In this manner the measured tonnes on board are corrected linear to the actual tonnes for each location and so noted in the Daily Progress Report as actual tonnes.

The Ramsey belt's weighing device consists of a load sensor device integrated into the frame of the belt conveyor and a processor/display unit. The technology is based on a belt speed sensor, a load cell and a microprocessor. The Ramsey belt's weighing device accuracy is verified periodically.

8. Weather Limitations

For the rock installation with the Flexible Fall Pipe the weather limitation is always subject to captains discretion.

Limitation for Significant wave height is shown in below table.

Table 1 weather limitations

FFP Vessel	Deep water (WD>40m)	Shallow water (WD<40m)	Very Shallow water (WD<20m)
Bravenes	4.5m	3.0m	On captains discretion.
Nordnes	4.5m	3.0m	On captains discretion.
Stornes	4.5m	3.0m	On captains discretion.

Values shown in Table 1 are approximate values and not hard restrictions, it will always be on captains discretion if the work should be stopped.

9. Material Testing

For the material testing and grading requirements reference is made to the Van Oord Offshore QA/QC Instructions "Instruction Specified Rock Grades for Subsea Installation" (OFF-QHSE-IN-06) and "Instruction for Supply of SRI Materials" (OFF-QHSE-IN-08).

9.1 Rock testing procedures, Verification test prior to loading

9.1.1 Grading curve

The verification tests will be performed by an independent laboratory at least once per delivery.

The grain size distribution is tested prior to the loading operations at the source of the rock material by the quarry. At least one representative sample will be taken from the stockpile before loading of the vessel.

The grain size analysis will be done as follows. Sample will be taken with a weight of a couple of hundred kilograms. The grading of the rock will be determined by weighing the amounts of rock that are retained on the different sieves. The cumulative percentages of material passing the different sieves are calculated and plotted. If the actual grading curve lies within the specified envelope the test has passed.

The grading curve will be made available to Van Oord, Client and the vessel prior to loading. Copies of the grading curves will be incorporated in the As-Built Report.

9.1.2 Specific gravity

The grain specific gravity is determined using standard tests which measure weight and volume of individual stones.

9.2 Inspection during production

It is specified that the grain size distribution shall be tested at regular intervals during the material production, with a minimum of one sample every ten thousand (10,000) tonnes.

This testing will be done by the supplier as part of the production control. At least every 10,000 tonnes a sample will be taken from the production line with a weight of a couple of hundred kilograms.

The test results (grading curves) obtained during production of the rock material will be sent to Van Oord for internal quality control.

10. Inspection and Test Plan

The Inspection and Test Plan details the actions taken to ensure compliance with the key activities within the project activities.

The purpose of the Inspection & Test Plan is to ensure that all personnel are aware of:

- the inspection(s) that shall be carried out;
- the procedure(s) documenting or referencing the manner in which the inspections shall be undertaken;
- the person(s) responsible for ensuring that the inspections are carried out and for authorizing the QC record;
- the Quality Control (QC) activity required to confirm that the activity has been correctly performed;
- the document/record verifying the test/inspection/verification.

Project Inspection and Test Plan can be found in Appendix 4.

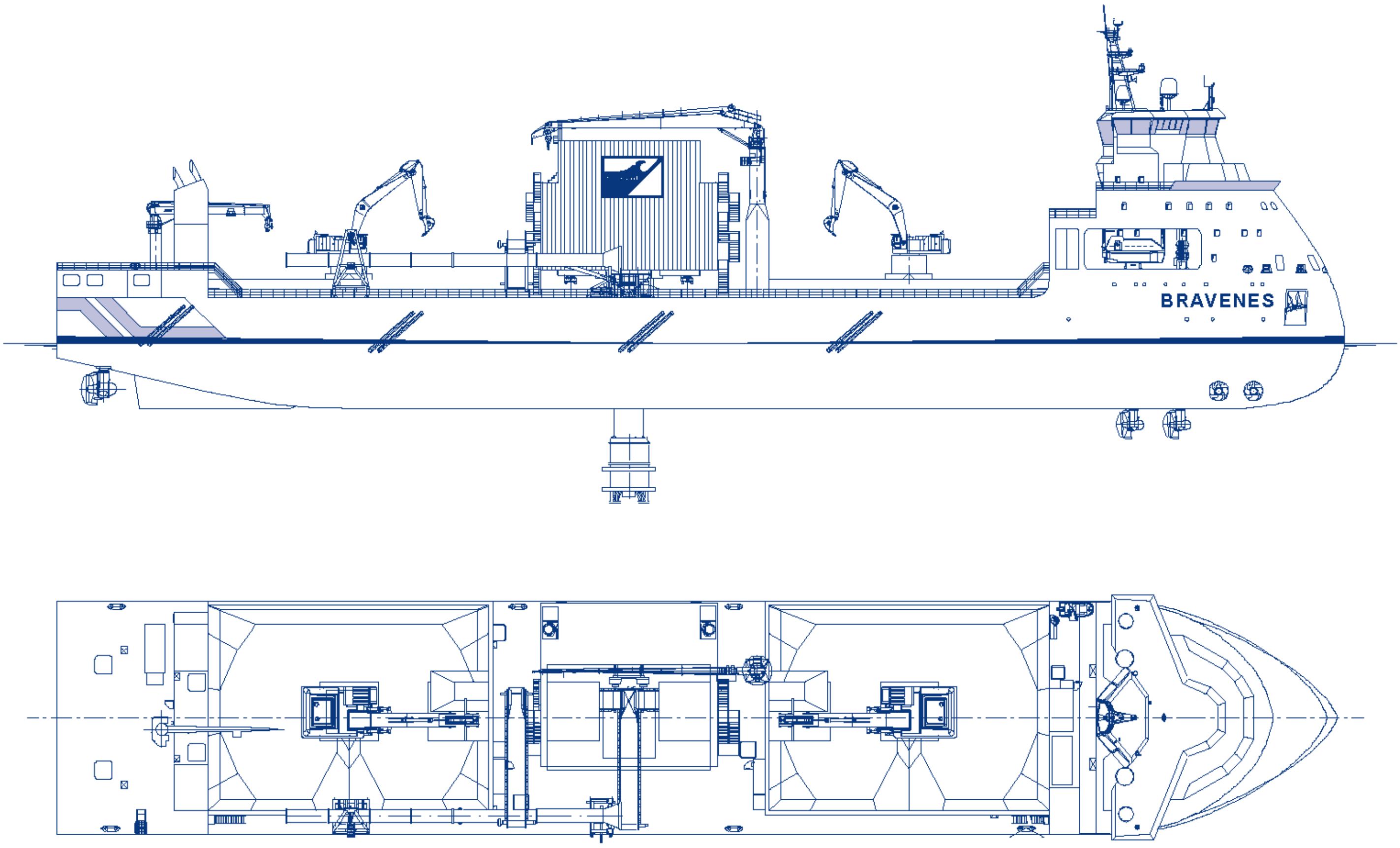
Appendix 1 FFPV Bravenes leaflet

Van Oord
Marine ingenuity

Equipment

Subsea Rock Installation vessel Bravenes

Van Oord
Marine ingenuity



Bravenes

Name	Bravenes
Type	Subsea Rock Installation vessel
Classification	Bureau Veritas, I ✠ HULL ✠ MACH ✠ AUT-UMS ✠ SYS-NEQ-1 ✠ DYNAPOS - AM/AT-RS - SP60, Special Service, Rock Installation Ship, Green passport, Inwatersurvey, Cleanship BWT, Ice Class 1A, Cold DI, Polar Class 7, Unrestricted navigation
Year of construction	2017
Dimensions	Length overall 154.40 m Breadth moulded 28.00 m Moulded depth 13.30 m Draught 8.00 m
Deadweight	15,500 tons
Speed loaded	12 kn
Propulsion	6,200 kW
Bow thrusters	2 x 1,500 kW
Retractable thrusters	2 x 2,000 kW
Total power installed	16,394 kW
Dynamic positioning	DP Class 3
Accommodation	60 persons
Bunkers	Heavy fuel oil 1,500 m^3 Marine gas oil 500 m^3 Fresh water 170 m^3
Flexible fallpipe	ø 1.5 m
Remotely Operated Vehicle ROV	at the end of the fallpipe 6 x 75 kW
Installation modus	fallpipe throuh moonpool, fallpipe over the side, tremie pipe over the side
Installation depth	up to 1,000 m
Installation capacity	up to 2,000 t/h
Handling large rock	up to 500 kilogrammes

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August 2016

Appendix 2 FFPV Nordnes leaflet

Van Oord

Marine ingenuity

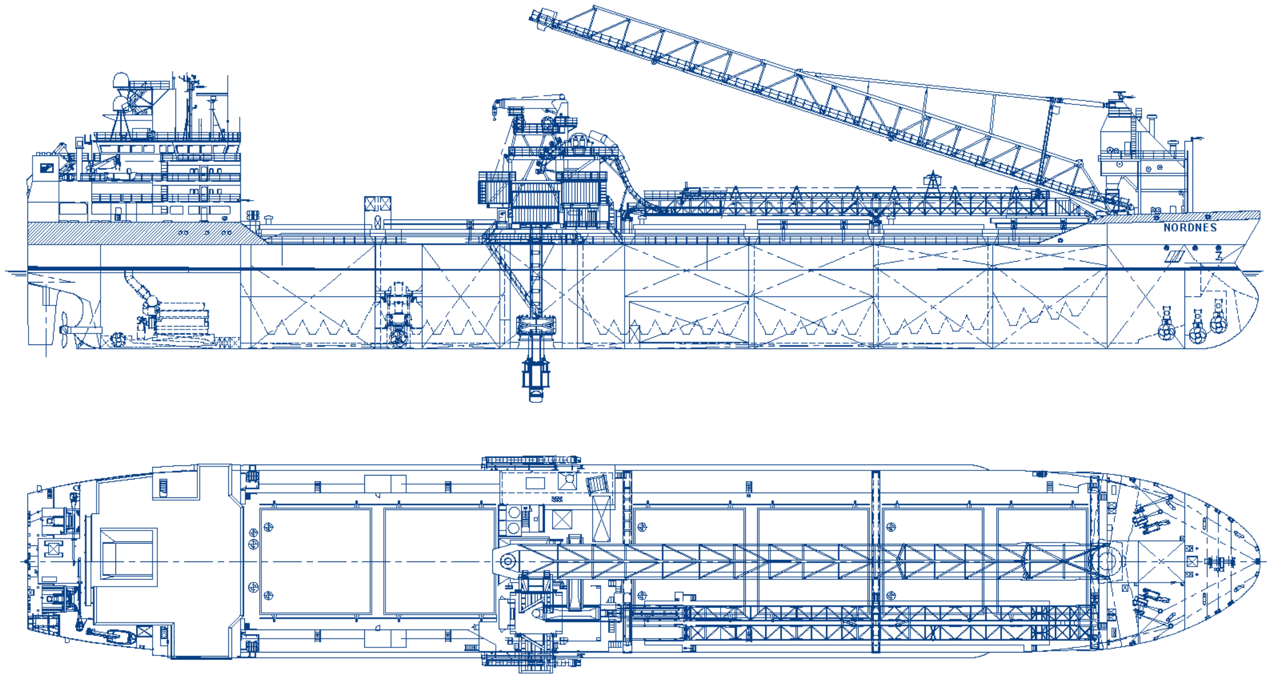
Equipment

Flexible fallpipe vessel
Nordnes

Dredging and Marine Contractors

Van Oord

Marine ingenuity



Nordnes

Name	Nordnes		
Type	Flexible fallpipe vessel		
Classification	Bureau Veritas, I ✠ HULL ✠ MACH ✠ AUT-UMS ✠ DYNAPOS - AM/AT-R-INWATERSURVEY, SDS, MON-SHAFT, Bulk Carrier ESP, Nonhomload (holds 3 and 5 may be empty), Special service - Offshore Supply Vessel, Unrestricted navigation		
Year of construction	2001 - upgrade 2003 and 2005		
Dimensions	Length overall	166.70 m	
	Breadth overall	26.23 m	
	Moulded depth	14.00 m	
	Draught	10.51 m	
Deadweight	26,045 tons		
Speed loaded	14 kn		
Propulsion	7,300 kW		
Bow thrusters	2 x 1,200 kW + 1 x 1,500 kW		
Retractable thrusters	2 x 1,700 kW		
Stern thrusters	1 x 1,000 kW		
Total power installed	17,636 kW		

Dynamic positioning	DP Class 2	
Accommodation	54 persons	
Bunkers	Heavy fuel oil	982 m³
	Marine gas oil	518 m³
	Fresh water	418 m³
Flexible fallpipe	ø 1.1 m	
Remotely Operated Vehicle ROV	at the end of the fallpipe 4 x 75 kW	
Installation modus	fallpipe throuh moonpool	
Installation depth	up to 1,200 m	
Installation capacity	up to 2,000 t/h	

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August 2016

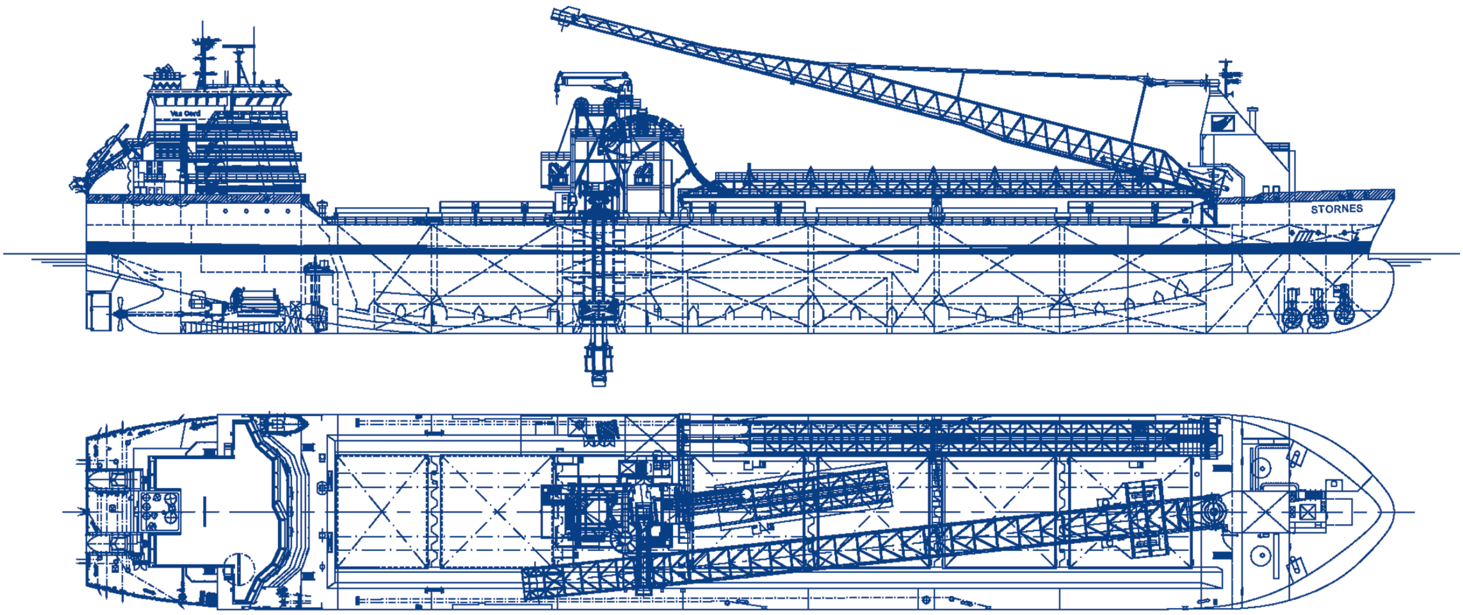
Appendix 3 FFPV Stornes leaflet

Van Oord
Marine ingenuity

Equipment

Flexible fallpipe vessel
Stornes

Van Oord
Marine ingenuity



Stornes

Name	Stornes
Type	Flexible fallpipe vessel/bulk carrier
Classification	Bureau Veritas, I ✠ HULL ✠ MACH ✠ AUT-UMS ✠ DYNAPOS - AM/AT-R-INWATERSURVEY, MON-SHAFT, Bulk Carrier BC-B ESP, Unrestricted navigation
Year of construction	2011
Dimensions	Length overall 175.00 m
	Breadth moulded 26.24 m
	Depth moulded 14.50 m
	Draught 10.57 m
Deadweight	26,648 tons
Speed loaded	14.0 kn
Propulsion	8,000 kW
Bow thrusters	3 x 1,500 kW
Retractable thrusters	2 x 2,200 kW
Total power installed	16,572 kW
Dynamic positioning	DP Class 2

Accommodation	51 persons
Bunkers	Heavy fuel oil 1,012 m³
	Marine gas oil 551 m³
	Fresh water 389 m³
Flexible fallpipe	ø 1.1 m
Remotely Operated Vehicle ROV	at the end of the fallpipe 4 x 75 kW
Installation modus	fallpipe throuh moonpool
Installation depth	up to 1,350 m, expandable to 1,800 m
Installation capacity	up to 2,000 t/h

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August 2016

Appendix 4 SRI Inspection and Test Plan

Inspection and Test Plan (ITP)
Subsea Rock Installation

*** Verification By**

MV - Master of Vessel	PM - Project Manager
OCM - Offshore Construction Manager	TS- Technical Superintendent
CS - Chief Surveyor	PE - Project Engineer
CR - Contractor Review	ICB - Independent Certifying Body

Legend

H - Hold point	M - Monitor
W - Witness point	V - Visual Inspection
R - Review point	A - Approval

No.	Activity / Description	Inspection Method / Standard	Acceptance Criteria	Frequency	Verification by*	Records	Inspection by		
							VOOF (SRI Contractor)	Contractor	ICB
	FFPV (Bravenes, Nordnes, Bravenes)								
1	Company HSEQ vessel audits	Company requirements	Closure of items raised	Once	MV	Inspection report	H	R	
2	OVID Inspection	Desktop audit/vessel inspection	Closure of items raised	Once	MV	Inspection report	H	R	
3	Vessel Assurance	Desktop audit/vessel inspection	Closure of items raised	Once	CR	Correspondence / MoM	R	R/A	
4	Conduct project risk assessment	SRI FFPV RA Worksheet (Doc name TBC)	Items raised are closed prior to activity commencing	Once	PM	Risk Assessment Report	H	R/A	
5	Rock material within specifications	1. Quarry grading curves 2. 3rd Party test	1.Grading within grading envelope 2.Rock material specifications are met	1.Every 10,000 Te during production 2.3rd party test prior to loading	PM / OCM	Test reports	H/R	R/A	
6	DP trials	3rd party inspection and report	Verification of certification	Prior to commencement	MV	Trials report	R	R	
7	Surface positioning equipment calibration	By Manufacturer	Valid calibration	According manufacturers specifications	CS	Calibration report	R	R	
8	Subsurface calibrations	By Manufacturer	Valid calibration	According manufacturers specifications	CS	Calibration report	R	R	
9	Approval of installation procedure	Execution Plan (Doc name TBC)	Document approved	Once	CR	Transmittal	R	R/A	
10	Approval of survey procedure	Survey Plan (Doc name TBC)	Document approved	Once	CR	Transmittal	R	R/A	
11	Quantity rock material loaded	Cargo Loading Sheet	Vessel Draft -Loading Charts-Stability calculations	At the end of each Load	MV	Signed report	R/A	R	
12	Mobilisation to worksite	Construction Data Sheet (Doc name TBC)	Document approved	Once	MV	Transmittal	R	M	
13	Verify communications systems & process	On board check	Positive verification of contact details	During mobilisation	MV	MOM	R	M	
14	Work plan per trip	Trip Program of Work	Review	Per trip	OCM	Trip Program of Work	R	R	
15	Storage and back- up checks for survey data	Survey Records	Successful back up	Per trip	CS	Log	W	R	
16	Conduct Pre-installation Survey	Survey Plan (Doc name TBC)	DTM data / Work Charts	Immediately prior to commencement of material installation	CS	Survey Data	R	H	
17	Subsea rock installation	Survey Plan (Doc name TBC)	DTM data / Work Charts	All SRI locations	CR	Survey Data	R	M/W	
18	Intermediate Survey (if applicable)	Survey Plan (Doc name TBC)	DTM data / Work Charts	All SRI locations	CS	Survey Data	R	R	
19	Post SRI Survey	Survey Plan (Doc name TBC)	DTM data / Work Charts	All SRI locations	CS	Survey Data	R	M/R	
20	Acceptance onboard vessel	Survey Plan (Doc name TBC)	DTM data / Work Charts	On completion of each location	CR	Daily Progress Report	R	A	

H HOLD, Client/Company to be formally notified of upcoming Hold points. Work shall stop until Client/Company is present to monitor & observe activity or point is waived in writing

W WITNESS, Client/Company to be formally notified of upcoming Witness points. Should Client/Company fail to attend at appointed time, work may proceed at VO discretion

R REVIEW, verify conformity of documentation/ report / certification

M MONITOR, (periodic) verification of activity

V VISUAL INSPECTION, required

A APPROVAL, activity shall be approved