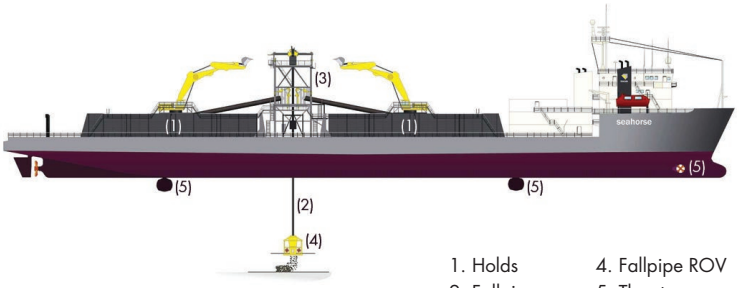
Boskalis
Dredging & Marine Experts

CAPABILITY SHEET

DYNAMICALLY POSITIONED FALLPIPE VESSEL (DPFV)
A SEAGOING SELFPROPELLED VESSEL WITH A FALLPIPE

INTRODUCTION

A Dynamically Positioned Fallpipe Vessel (DPFV) is a specialist vessel able to accurately install large quantities of rock at or near subsea pipelines or other structures at great water depths. This seagoing, self-propelled vessel is equipped with a fallpipe, designed to be lowered underneath the vessel. By means of the vessel's dynamically positioning system (DP class II) the vessel can be kept in exact position or be guided along a predefined track.
The Boskalis' fallpipe vessels are regularly inspected by classification authorities and fully meet the standards of the offshore oil and gas industry.



1. Holds
2. Fallpipe
3. Pipe tower
4. Fallpipe ROV
5. Thrusters

C

MAIN COMPONENTS OF A DPFV

- The hull (containing the main engines, crew quarters and the bridge with navigational and rock installation control);
- Station keeping system (retractable thrusters, bow thrusters, the DGPS systems and gyro compasses);
- Cargo holds to store the rock;
- Rock offloading system (excavators, conveyor belts, hoppers and rock weighing system);
- Fallpipe tower to store fallpipes and which includes the system for launch and recovery;
- Fallpipes (typically HDPE, GRP, or steel pipe sections with an approximate length of 8 m);
- Fallpipe ROV (remotely operated unit at the lower end of the fallpipe containing survey equipment and thrusters for positioning);
- Survey ROV (separate ROV, launched from the main ROV typically used for detailed seabed surveying, localization of buried objects and video inspections).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WORK METHOD

Upon completion of all engineering, procedure writing and executing the necessary risk assessments the DPFV can be mobilized for a project. Rock is typically loaded by conveyor belts directly at a quarry.
When suitable quarries are not available temporary loading bases can be set-up or rock is transshipped offshore from rock supply vessel. After loading, the vessel sets sail to the project location where the vessel switches over to Dynamic Positioning (DP) mode.

The typical working sequence is as follows:

- Launch survey equipment and perform a pre-survey to determine the conditions of the seabed, calculate the required amount of rock and provide a base line for the installation works.
- Launch fallpipe system and start rock installation. The vessel is moved along the pre-set track and rock is offloaded at a controlled rate. During the installation process sonar, cameras and online display of multibeam data are used for reference.
- Post/intermediate surveying is used to verify whether the works are completed and the final results are presented on charts to the client.

Installation through the fallpipe system makes it possible to place the rock in a controlled manner independent of the water depth or currents, with a horizontal accuracy of 1 m or better, the vertical tolerance depends to some extent on the size of the rock material, but is typically in the order of ± 20 cm.

In the event that rock installation is required at a location which cannot be reached by the fallpipe, so-called side rock installation can be applied. By means of a chute or a belt, rock can be installed directly over the side of the vessel. The accuracy of the latter installation method is determined by water depth and current, but to improve the accuracy, a fixed fallpipe can be mounted on the side of the vessel allowing the rock to be released under the waterline.

A Rockpiper working at offshore wind farm
B Seahorse installing scour protection around monopile
C DPFV Seahorse

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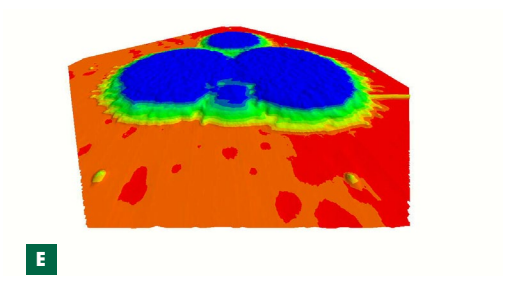
SUITABILITY

A DPFV can be used for a wide range of applications in the field of subsea pipelines and other subsea structures, like:

- Free span correction;
- Seabed leveling (flow assurance, pipe stresses);
- Pipeline/ cable crossing;
- Stabilization (floatation, upheaval buckling);
- Protection (anchors, fishing gear, erosion);
- Thermal insulation;
- Foundation for and ballasting of subsea structures;
- Scour protection around monopiles.

Some examples of offshore works executed by Boskalis' DPFV's under various conditions:

- Preparation of crossings for power cables in the Irish Sea dealing with extreme currents;
- Protection against upheaval buckling and stabilization of pipelines under the harsh conditions of the Barents Sea with low temperatures, 24/7 dark in midwinter period and logistical challenges;
- Seabed preparations (pre-lay) and pipeline stabilization and protection (post-lay) in Baltic Sea for Nord Stream pipelines. Setting up rock supply logistics, dealing with sheet ice and crossing Russian, Swedish and Baltic waters characterized the project;
- Ballasting of gravity based structures in the Southern North Sea;
- Installing scour protection around and inside gravity based structures in the North Sea making use of bow and side installation techniques;
- Thermal insulation of pipelines at water depths greater than 300m in the Norwegian Sea;
- Pipeline protection and stabilization works, IBAMA (Environmental) licensed, in Brazil.
- Installation of rock carpets for permanent and temporary structures during oil and gas field development project;
- Global rock installation works to protect subsea pipelines and cables against the impact of anchors, fishing gear and erosion;
- Ad hoc repair and stabilization works to prevent situations becoming worse or to ensure earliest start-up or resuming oil, gas or electricity production;
- Projects with specific requirements for installation tolerances and rock impact.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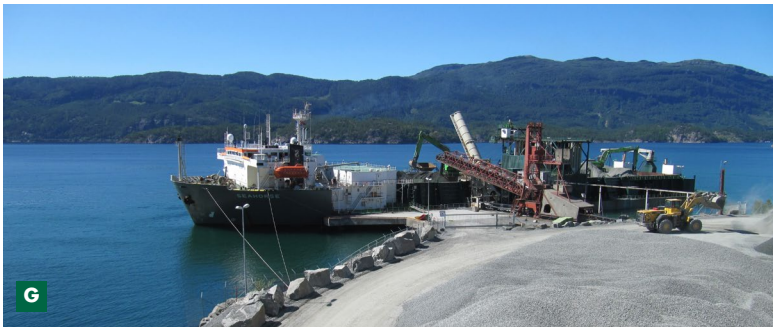
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FLEET OF BOSKALIS

The fleet of Boskalis includes two DPFV's, namely Seahorse and Rockpiper. Find the complete list of the Boskalis fleet on www.boskalis.com.

DYNAMICALLY POSITIONED FALLPIPE VESSELS

Boskalis' fleet contains 2 DPFV's

Name	Max. Cargo Capacity (tons)	Operational depth (m)
Seahorse	18,000	> 1,500
Rockpiper	24,000	> 1,500

D Rockpiper working close to platform
E Post-survey subsea rock installation
F Combined survey and rock installation ROV of Rockpiper
G Seahorse loading rock
H Seahorse working in Baltic Sea

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