

SCOPE OF WORK DESCRIPTION

OCEAN BASIN CURRENT SYSTEM GUIDES-VANES-SCREENS

OSC-30-H004-M-SP-00050



1107304 Ocean Space Centre

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PROSJEKT OCEAN SPACE CENTRE

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K661-02

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Table of Content

1	Introduction.....	4
1.1	Objective.....	4
1.2	Definitions and abbreviations.....	4
2	The Works.....	6
2.1	Roles and responsibilities.....	6
2.2	Participation in Joint Collaboration Phase (JCP).....	6
2.3	Engineering, manufacturing, assembly, and delivery.....	7
2.4	Documentation.....	8
2.5	On-site supervision and Installation work.....	8
2.6	Mechanical completion.....	9
2.7	Training Courses.....	9
3	Attachments.....	10
4	References.....	10

1 Introduction

1.1 Objective

The purpose of this document is to define the Scope of Work for the mechanical design, engineering, manufacturing, delivery, installation, and commissioning of the ocean basin current system flow conditioning system with required accessories (hereafter denoted as **CS Guides-Vanes-Screens**) at the hydrodynamic laboratories at Tyholt, Trondheim. The complete supply should be fit for purpose and is expected to include guides (baffle plates), vanes (honeycomb structures), screens and installation fixtures.

Installation will be performed by the Contractor or by EPC K203 (Optional, see details in Technical requirements and Price Schedule).

1.2 Definitions and abbreviations

Definitions:

Company:	Statsbygg, which is the Norwegian government's key advisor in construction and property affairs, building commissioner, property manager and property developer.
Purchaser:	Company
Contractor:	The party named as such in the Form of Agreement
Subcontractor:	Third Party who has entered into an agreement with the Contractor for the supply of goods or services in connection with the Work.
EPC K202	EPC Contractor responsible for demolition works, ground works for building B and shortening of existing towing tank.
EPC K203	EPC contractor for construction of building B of the Ocean Space Centre Project
End-user:	SINTEF Ocean and NTNU
Plant:	The machinery, apparatus, materials, articles, documentation, software and other products to be supplied by the Contractor under the Contract.
Works:	The plant, installation of the plant and any other work to be carried out by the Contractor under the contract.
Company Materials:	Equipment, systems, and/or materials supplied by Company and which are to be incorporated in the Contract Object.
Hydrodynamic design:	Complete geometric description of all wetted surfaces including shape, tolerances, required maximum surface roughness etc.
Mechanical design:	Detailed design, including calculations, selection of material, manufacturing method etc. to ensure structural integrity, including static and dynamic dimensioning, compliance with all requirements, and manufacturing engineering.

Abbreviations:

CS	-	Current System
DFO	-	Documentation for Operation
HLCC	-	Hydrodynamic Laboratory Centralized Control
JCP	-	Joint Collaboration Phase
MC	-	Mechanical completion
MDP	-	Master Document Plan
MIS	-	Main Interlocking System
NS	-	Norwegian Standard
OB	-	Ocean Basin
OSC	-	Ocean Space Centre
SMB	-	Seakeeping and Manoeuvring Basin

2 The Works

The Works consists of the following main elements:

- a) Participation in Joint Collaboration Phase (JCP)
- b) Engineering, manufacturing, assembly, delivery
- c) Documentation
- d) On-site supervision and Installation work (unless installation is transferred to EPC K203)
- e) Mechanical completion

The new CS Guides-Vanes-Screens shall fulfil the requirements described herein and in the following documents:

- OSC-30-H004-M-SP-00006 Requirements CS Guides-Vanes-Screens

2.1 Roles and responsibilities

The flow conditioning system (CS Guides-Vanes-Screens) is a key part of the Current system. The flow quality is strongly dependent on the detailed Hydrodynamic design. This will require specialized experience in theoretical, experimental and computational fluid mechanics. Accordingly, the following division of roles and responsibilities in this Contract is defined.

Scope	Responsible
Hydrodynamic design	SINTEF
Mechanical design	Contractor

The baseline design as outlined in document OSC-30-H004-M-SP-00006 Requirements CS Guides-Vanes-Screens is the basis for the Contract price. Adjustment of the Contract price will be performed on the basis of the unit prices in the Price Schedule.

2.2 Participation in Joint Collaboration Phase (JCP)

Contractor shall participate in a joint collaboration phase together with the End User and the EPC contractor for construction of building B (EPC K203) of the Ocean Space Centre Project. The JCP will be headed by Company.

The main purpose of the joint collaboration phase is to implement all requirements of the user equipment for the hydrodynamic laboratories into the design and construction of building B. The purpose is also to investigate and resolve performance issues related to interaction between other equipment systems and to clarify interfaces to End User control systems. JCP will also include final review of the project's overall logistics plan and delivery schedule. Contractor shall also expect adjustments including value engineering of user equipment design and functionality as a result of the collaboration. Such adjustments shall be listed and be the basis for determination of fixed final Contract price.

During the collaboration phase, all interfaces between the End User, each user equipment supplier and EPC K203 shall be identified and agreed. Interface agreements shall be established.

Participation in the JCP will be on a reimbursable basis. As a guidance, Contractor shall anticipate the following:

- JCP duration in total: 50 weeks. Expected to be started in April 2023
- Contractor participation period in the JCP: 36 weeks
- Expected Contractor manpower load: Two persons, two days a week
- Main collaboration tool: Teams-meetings, and occasionally physical meeting in Trondheim or Oslo. Exchange of design documentation.

2.3 Engineering, manufacturing, assembly, and delivery

The flow conditioning system (CS Guides Guides-Vanes-Screens) is part of the total Current system. The purpose of the flow conditioning system is to ensure good flow quality in the test basin. SINTEF Ocean shall be responsible for the Hydrodynamic design of the system. The Contractor shall be responsible for the Mechanical design of the system.

The engineering, manufacturing, assembly, and delivery comprise of such items as:

- Provision of own organisation including head office support services, administration and a project organisation to manage and control the execution of the Work including complying with all requirements of document, including, but not limited to OSC-30-H004-M-SP-00006 Requirements CS- Guides-Vanes-Screens and OSC-80-SB-Q-SD-00001 Administrative Procedures.
- Provision of technical experts to do mechanical design and optimisation of Contractor Material
- Provision, maintenance, operation and demobilisation of all required facilities to complete the engineering, manufacturing, assembly and delivery.
- Contractor's systems engineering and fabrication engineering
- Fabrication, manufacturing, assembly of the complete scope of CS- Guides-Vanes-Screens
- As-built drawings
- Miscellaneous

Contractor shall perform the systems engineering, fabrication engineering, design and documentation required for the manufacturing, fabrication, assembly, and completion of the Works. Contractor shall also produce all documentation required for the civil interfaces and interfaces to technical systems.

Contractor's engineering and supply shall include:

Description	Baseline dimensions
Channel dividing plates	3 x dividing plates, north side ocean basin (gross dimension 63.8 m x 16.8 m, will be delivered as smaller elements for installation), 3x dividing plates, south side ocean basin (gross dimension, 63.8m x 13.7 m, will be delivered as smaller elements for installation)
Cascade bends	120 vaned cascade bends of various dimensions (galvanized carbon steel, stainless steel, aluminium, or glass reinforced polyester (GRP) or similar)
Honeycomb	36 panels (total projected cross section area 470 m ²), honeycomb grid (galvanized carbon steel,

	stainless steel, aluminium, or glass reinforced polyester (GRP), polyethylene (PE) or similar).
Perforated plates	36 sections (total projected cross section area 470 m ²) perforated plates (galvanized carbon steel, stainless steel, aluminium or glass reinforced polyester (GRP), polyethylene (PE) or similar). <i>The hydrodynamic design phase will determine if the perforated plates will be included in the final design or not.</i>
Screens	36 sections (total projected gross section area 470 m ²) screen/mesh (galvanized carbon steel, stainless steel or polymer).
Suitable fixtures/embeddings for the above	All necessary and required parts for secure and practical fixture of the above component.

Contractor shall in good time provide drawings and descriptions showing the manner in which the Plant is to be installed, together with all information required for preparing suitable foundations, for providing access for the Plant and any necessary equipment to the Site and for making all necessary connections to the Works.

Equipment and main components shall be tagged according to requirements described in document OSC-SB-O-SD-00004, Tagging Requirements.

Inhouse testing including witness testing shall include Factory Acceptance Test (FAT) of assembled equipment. Contractor shall prepare suitable test procedures for performance of the FAT.

2.4 Documentation

Contractor shall provide all engineering and manufacturing documentation necessary to compete the Work in accordance with the requirements prescribed below:

- OSC-SB-O-SD-00003, Requirements for supplier documentation including DFO
- BIM requirements for special equipment
- SIMBA 2.0 General requirements
- Action plan for digitalization
- General attributes and properties in BIM models

The DFO shall be delivered in English and Norwegian language. The DFO shall enable the End-user to operate, calibrate, and maintain the Plant throughout its intended lifetime. The DFO shall specify in detail all maintenance activities necessary to be performed in order to fulfil the guaranteed requirements.

2.5 On-site supervision and Installation work

Contractor shall perform desktop review of steel reinforcement documentation prior to casting to avoid clashes between support bracket bolts and the reinforcement steel. Relevant documentation will be provided by Company in due time prior to casting.

Contractor shall perform installation of the Plant in the Ocean Basin (OB). Before the Work starts, Contractor shall ensure that the installation site including foundations are ready for start of the installation work.

The installation work to be performed by Contractor will include the following main activities:

- Verification of construction tolerances of foundations, support brackets etc.
- Submit all necessary static and dynamic loads expected to ensure structural integrity of all foundations and supports.
- Installation of all components in CS Guides-Vanes-Screens

Necessary cranes, lifting equipment and equipment for transport on the Site will be provided by Company. The maximum lifting capacity of the overhead crane is 10 tonnes. Temporary construction hoists will have a limit that will be clarified in the JCP. Any necessary lifts exceeding this capacity must be planned for and arranged by the Contractor.

2.6 Mechanical completion

Contractor shall perform mechanical completion activities and commissioning work according to the following requirements:

- OSC-SB-O-SD-00008, Strategy for Systematic Completion of BUT

All mechanical completion and commissioning activities shall be documented in Omega365.

The original Mechanical Completion documentation shall be filed by Contractor. All MC documentation, which also shall include MC documentation for Subcontractors, shall be compiled in MC dossiers and kept in good order until final delivery to Company. All works, inspections and tests shall be completed, and all punch items shall be identified. Any transfer of punch items to the commissioning phase must be approved by Company.

2.7 Training Courses

Contractor shall provide professional training of end-user operators and service/maintenance personnel. Each type of course shall be described, including required equipment and facilities. Training documentation shall be presented latest 4 weeks prior to the training courses will take place. Training shall be held in Norwegian or English language.

3 Attachments

List of drawings

Number	Title
6010-XX-M-724-20-001	OB, horizontal plan elevation +95.60 masl
6020-XX-M-724-40-001	OB, longitudinal section, return channel west
6020-XX-M-724-40-002	OB, cross section, pump outlet, north side
6020-XX-M-724-40-003	Typical cascade profiles
6020-XX-M-724-40-004	Sample profiles

4 References

- OSC-30-H004-M-SP-00006 Requirements CS Guides-Vanes-Screens
- OSC-80-SB-O-SD-00003 Requirements for supplier documentation including DFO
- OSC-80-SB-O-SD-00008 Strategy for Systematic Completion of BUT
- OSC-30-H004-M-LI-00001 K661-02 Equipment list from dRofus
- OSC-80-SB-Q-SD-00001 Administration Procedures Suppliers