

# SCOPE OF WORK DESCRIPTION MOVABLE FLOOR SYSTEMS OB AND SMB K664-01

OSC-30-H004-M-SP-00048



## 1107305 OCEAN SPACE CENTRE

Project	Ocean Space Centre
Contract	K664-01
Company	Statsbygg
Issued by	Multiconsult
Date of print	16.09.2022
Last revision	16.09.2022
Enquiries can be directed to	Statsbygg Postboks 232 Sentrum, 0103 Oslo Telefon: 22 95 40 00 Epost: <a href="mailto:postmottak@statsbygg.no">postmottak@statsbygg.no</a> Internett: <a href="http://www.statsbygg.no">http://www.statsbygg.no</a>

# PROJECT OCEAN SPACE CENTRE

## SCOPE OF WORK DESCRIPTION

### MOVABLE FLOOR SYSTEMS OB AND SMB

02	16.09.2022	Issued for enquiry		IS	AB	OJH
01	08.07.2022	Issued for review		IS	AB	OJH
Version	Date	Text		Prep by	Checked by	Approved by
<b>Project number:</b> <b>1107305</b>	<b>Issued by:</b> IS	<b>Project name</b> Ocean Space Centre	<b>Code:</b> O	<b>Document type:</b> Governing document	<b>Document code:</b> OSC-30-H004-M-SP-00048	<b>Version:</b> 02

---

## Table of Content

1	Introduction.....	4
1.1	Objective.....	4
1.2	Description of Delivery.....	4
1.3	Definitions and abbreviations.....	4
2	The Works.....	6
2.1	Participation in Joint Collaboration Phase (JCP).....	6
2.2	Engineering, manufacturing, assembly and delivery.....	7
2.3	Documentation.....	7
2.4	Logistics and Transportation.....	8
2.5	On-site supervision and Installation work.....	8
2.6	Mechanical Completion and Commissioning work.....	9
2.7	On-site System Acceptance Test.....	9
2.8	Training Courses.....	9
3	References.....	10

## 1 Introduction

### 1.1 Objective

The purpose of this document is to define the Scope of Work for the design, engineering, construction delivery, installation and commissioning of Movable Floor systems to the Ocean Basin (OB) and Seakeeping and Manoeuvring Basin (SMB) at the new hydrotechnical laboratories at Tyholt, Trondheim.

The Movable Floor System shall be delivered mechanical completed and ready for operation, with structures, motor drive systems, electrical cabling including connection to power supply, automation, and control systems.

### 1.2 Description of Delivery

The Ocean Basin (50 x 60 m) and the Seakeeping and Manoeuvring Basin (180 x 40 m) shall both be equipped with movable floors that can be submerged into the water and fixed at any elevation between; 0-12 m for the OB and 0-6 m for the SMB. The structural stiffness, strict dimensional tolerances and the accurate positioning of the entire floor surface are of outmost importance to achieve good test results, especially for hybrid testing.

The centrally located OB movable floor (50 x 50 m) shall cover most of the basin, with adjustable flaps extending towards the incoming current and wavemakers, and the outlet and wave absorbing beaches at the other end. The steel structural framework of beams shall rest on several supporting columns that goes into dedicated wells/shafts. Inside and above the matrix (5 x 5 m) horizontal beams, about 200 removable sections makes up the upper surface of the floor and the required buoyancy. The dry weight of these 2.5 x 5 m sections is estimated to 1300 kg, and the complete OB floor system to about 700 – 800 metric tonnes.

This basin shall also have a central pit of 7.5 x 7.5 m going further down to 30 meter water depth, with a rigid steel framework structure that can be guided up and down along the pit walls and fixed at any level from bottom to the water surface.

The movable floor in the SMB shall cover a part of the basin length (50 m), and the entire width of 40 m. The floor structure and the supporting columns for this floor have a similar design as for the OB, but as this basin has no current flow nor a central pit, it is less complex. This floor has about 160 removable sections of 1300 kg, and the total estimated weigh is about 500 tonnes.

Due to the considerable size of the two floors, a lot of the assembly work has to be performed at site, including welding and surface treatment.

### 1.3 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 responsible for construction of building B
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.

**Abbreviations:**

DFO	-	Documentation for Operation
HLCC	-	Hydro 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) including design and Value Engineering
- b) Detail engineering, procurement, manufacturing/fabrication, assembly, delivery
- c) Documentation
- d) Transportation and Logistics
- e) On-site supervision and Installation work
- f) Mechanical completion and Commissioning work
- g) On-site system acceptance test
- h) Training Courses

The Movable Floor System shall fulfil the requirements described herein and in the following documents:

- |                          |   |
|--------------------------|---|
| • OSC-30-H004-M-SP-00018 | Requirements for Movable Floor System                   |
| • OSC-30-H004-T-RA-00001 | Requirements for Automation control- and safety systems |
| • OSC-80-SB-O-DB-00001   | Technical Design Basis                                  |
| • OSC-30-H004-Z-RA-00004 | Material Specification                                  |
| • OSC-30-H004-Z-RA-00002 | Requirements for Corrosion Protective Coatings          |
| • OSC-80-SB -O-SD-00001  | Requirements for supplier documentation including DFO   |
| • OSC-80-SB-O-SD-00008   | Strategy for Systematic Completion of BUT               |
| • OSC-80-SB-O-SD-00003   | Tagging requirements                                    |
| • OSC-30-SB-Y-SP-00003   | Special requirements for HSWE and seriousness           |

### 2.1 Participation in Joint Collaboration Phase (JCP)

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

The main purpose of the joint collaboration phase is to implement all requirements of the user equipment for the wet 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 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 January/February 2023
- Contractor participation period in the JCP: 36 weeks
- Expected Contractor manpower load: Two persons, three days a week
- Main collaboration tool: Teams-meetings, and occasionally physical meeting in Trondheim or Oslo. Exchange of design documentation.

## 2.2 Engineering, manufacturing, assembly and delivery

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 OSC-80-SB-Q-SD-00001 Administrative Procedures.
- Provision, maintenance, operation and demobilisation of all required facilities to complete the engineering, manufacturing, assembly and delivery.
- Contractor's system engineering and fabrication engineering
- Provision of materials for fabrication, manufacturing and assembly
- Fabrication, manufacturing, assembly of the Movable Floor System and electrical drives/control cabinets
- Programming
- Inhouse testing including witness tests
- Documentation of own equipment and functions
- Miscellaneous

Contractor shall perform the system 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 shall include such as:

- System documentation and calculations for Movable Floor system
- Exchange of engineering data
- Engineering documentation
- Coordination of subcontractors and sub suppliers
- Tag numbering
- Identify necessary civil works, or any works by others required for the Movable Floor system.

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. Contractor shall specify in detail requirements regarding electrical supply and communication network interfaces.

Equipment and main components shall be tagged according to requirements described in document OSC-80-SB-O-SD-00003, Tagging Requirements.

Inhouse testing including witness testing shall include Factory Acceptance Test (FAT) of assembled equipment, units and systems. Contractor shall prepare suitable test procedures for performance of the FAT. FAT shall contain a complete test of as many functions and signals as practical possible according to OSC-80-SB-O-SD-00008 Strategy for Systematic Completion of BUT.

## 2.3 Documentation

Contractor shall provide all engineering and manufacturing documentation, including documentation provided by subcontractors, that are necessary to complete the Work in accordance with the requirements prescribed below:

- OSC-80-SB-O-SD-00001 Requirements for supplier documentation including DFO

- OSC-80-SB-Å-SD-00002 BIM requirements for special equipment
- OSC-80-SB-Å-SD-00003 SIMBA 2.0 General requirements
- OSC-SB-O-SD-00012 Action Plan for Digitization
- OSC-80-SB-Å-SD-00001 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 Movable Floor System throughout its intended lifetime. The DFO shall specify in detail all maintenance activities necessary to be performed in order to fulfil the guarantee requirements.

## 2.4 Logistics and Transportation

The Movable Floor systems shall be fabricated in suitable sections that can be transported into the basins for assembly and further installation. The Contractor is responsible for transportation and shall perform transportation to the construction site.

The details of the optimisation of transportation, logistics and installation is to be shown in a separate schedule for size of objects, travel distances, installation needs etc.

## 2.5 On-site supervision and Installation work

Contractor shall perform desktop review of steel reinforcement bar documentation prior to concrete casting to avoid clashes to the Movable Floor system. Relevant documentation will be provided by Company in due time prior to casting.

Contractor shall perform installation of the complete Movable Floor system and Foundation System in pit, including cabling work between the floor and the motor drive/control cabinets as well as all hydraulic tubing installation.

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
- Installation of all structure – build in place
- Installation of arrangement of movement and fixation
- Installation of arrangement for water hydraulic
- Installation of electrical drive control panel(s)
- Electrical wiring between the movable floor and electrical drive control panel(s)

It is the Contractors responsibility to design, prefabricate, transport, and install the equipment in a way that the intended service life of the structures is achieved. Field welds and surface protection applied at site shall be executed, controlled, and verified in the same way as for prefabricated structures.

The coating procedure shall include information on surface preparation, coating application and quality control of field welds. Further requirements to the coating procedure are given in OSC-30-H004-Z-RA-00002 clause 7.4.

**The requirement to flatness of the upper surface is highly important for quality of the marine testing and the Contractor shall include in his bid a design, production, and installation procedure to demonstrate how the strict tolerances can be achieved.**



Necessary cranes, lifting equipment and equipment for transport on the Site will be provided by Company.

Company will provide the following:

- Cable supports, cabling and termination of electrical supply to the electrical drive control panel(s) from existing electrical local distribution board.
- Cabling and communication between HLCC, MCC(s) and Main Interlocking System (MIS). The fiber communication interface shall be located in a junction box at a suitable location for interfacing the equipment.

## 2.6 Mechanical Completion and Commissioning work

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

- OSC-80-SB-O-SD-00008, Strategy for Systematic Completion of BUT

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

The original Systematic Completion documentation shall be filed by Contractor. All documentation, which also shall include systematic completion documentation for Subcontractors, shall be compiled in systematic completion dossiers, kept in good order, continuously updated in Omega365 and available for Company before the activity take place. All works, inspections and tests shall be completed, and all punch items shall be identified and registered in Omega365. Any transfer of A-punch items at a phase transition must be approved by Company.

Contractor shall perform all commissioning of the Contract Object, including the provision of procedures, special tools, commissioning spares etc.

## 2.7 On-site System Acceptance Test

Based on input from end-user, Contractor shall prepare acceptance criteria for the Movable Floor system in the new OB and SMB.

Contractor shall prepare a detailed on-site acceptance test procedure, as well as a test schedule. The on-site acceptance test procedure shall be submitted to Company for approval.

Contractor shall perform the on-site acceptance test including interface to end-user's HLCC system. The on-site acceptance test shall be witnessed by representatives from Company and end-user. Contractor shall specify in writing his requirements concerning performance of the on-site acceptance test including any assistance needed at the latest one month prior to agreed date for starting the acceptance test.

## 2.8 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 References

- OSC-30-H004-M-SP-00048 Requirements for Movable Floor System
- OSC-30-H004-S-SP-00001 Requirements for Automation Control – and Safety System
- B-01-M-664-60-001 System diagram, Movable Floor System OB
- B-01-M-664-60-002 System diagram, Movable Floor System SMB
- OSC-80-SB-O-DB-00001 Technical Design Basis
- OSC-80-SB -O-SD-00001 Requirements for supplier documentation including DFO
- OSC-80-SB-O-SD-00003 Tagging requirements
- OSC-80-SB-O-SD-00002 TFM-Amendment TFM-tagging of User Equipment
- OSC-30-H004-M-LI-00009 K664-01 Equipment list from dRofus
- OSC-80-SB-O-SD-00008 Strategy for Systematic Completion of BUT
- OSC-80-SB-Q-SD--00004 Quality Plan
- OSC-30-SB-O-SD-00008 Interface description
- OSC-30-H004-Z-RA-00004 Material selection report
- OSC-30-H004-Z-RA-00002 Requirements for Corrosion Protective Coatings
- OSC-30-SB-O-PL-00001 Project overall progress plan
- OSC-30-SB-O-PL-00012 K664-01 Timeline
- OSC-80-SB-Q-SD-00001 Administrative Procedures
- OSC-30-SBY-MA-00005 Statsbygg OSC HSWE Plan
- OSC-30-SB-Y-SP-00003 Special requirements for HSWE and seriousness
- OSC-80-SB-Å-SD-00002 BIM requirements for special equipment
- OSC-80-SB-Å-SD-00003 SIMBA 2.0 General requirements
- OSC-SB-O-SD-00012 Digitalization Action Plan
- OSC-80-SB-Å-SD-00001 General Attributes and properties in BIM models