Requirements Specification

**Multibeam sonar for**

**LAUGE KOCH**

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# General

## Background and scope

This specification concerns a contract regarding the acquisition of a multibeam sonar system that can obtain hydrographic data for the Danish Navy.

The system is a shallow water system intended to be used in the range of 1-500 meter+. The Royal Danish Navy performs surveying in two areas:

* National Danish waters which primarily can be considered as shallow waters.
* Greenland waters where the variation is from deep water to shallow water.

## Concept

In order to improve data quality during hydrographic surveys in shallow areas the Royal Danish Navy is looking for a high resolution multibeam system.

DALO will buy one (1) multibeam system.

## System description

The multibeam system shall as a minimum consist of:

* Supply of Shallow Water Multibeam System complete including product description, transducers, cabling, topside equipment, operating software, and precision engineered mounting brackets.
* The system shall be able to interface to EIVA NaviScan software for data collection.

The system is intended mounted on a hoist system. The diameter of the wet end equipment shall be able to fit into a sonar-well with a diameter of 850mm.

## Relations to other material

The vessel will supply 230VAC 60 Hz power for the multibeam system.

The hoist system will be supplied by DALO.

If no special computers are required, DALO will supply the computer that will control the sonar, and pass the data to the data collection software.

## Definitions and abbreviations

Classification

The following categories are valid for the ’Classification’ column.

| Classification  ID | Description |
| --- | --- |
| M | Mandatory Requirement  A Mandatory Requirement shall be fulfilled by the tenderer. If a mandatory requirement is not fulfilled, the tender will be excluded from further evaluation |
| R | Conditional Requirement  The Conditional Requirements will be evaluated by DALO.  The requirements are awarded between 1 and 5 points for each requirement, depending on to which the degree the offer fulfils the requirement; 1 point if not fulfilled, 5 points if fulfilled to the highest degree, and between 1 and 5 points if partially fulfilled. The points awarded for each Conditional Requirement are then multiplied by the weight of the requirement. The results for each Conditional Requirement are summed up to a total score |

Documentation

For each requirement, it is indicated in a separate column how the tenderer is to describe or document how the requirement is fulfilled. The following categories apply to the documentation requirements.

| Documentation  ID | Description |
| --- | --- |
| Y/N | Tenderer must answer Y (yes) or N (no).  Please note that if it is a Mandatory Requirement answering ‘No’ results in an unconditional offer |
| D | The description can be given in the most right column (“Tender description”) or/and in Annex C |

2. System requirements

| **ID. No.** | **Requirement description** | Classification | Documen-tation | Requirement compliance | **Evaluation** | **Tender description** |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Depth/Range**  The multibeam system shall be able to obtain bathymetric data in the range of 1 to 500 meter+ | **M** | Y/N |  |  |  |
|  | **Swath Coverage**  The sonar system shall have a coverage of:  - Minimum 140 deg in equi distance mode  - Minimum 150 deg in equi angle mode. | **M** | Y/N |  |  |  |
|  | **Depth Resolution**  The sonar system shall have a range resolution of minium:  - Better than 0,01 meter in water depth between 1-100 meter  - Better than 0,10 meter in water depth between 100-300 meter  - Better than 1,00 meter in water depth between 300-500+ meter | **M** | Y/N |  |  |  |
|  | **Depth Accuracy** (very shallow water)  The sonar system shall be capable of achieving IHO S44 (5th edition) special order data down to 30 meter within a swath width of ±50 deg | **M** | Y/N |  |  |  |
|  | **Depth Accuracy** (shallow water)  The sonar system shall be capable of achieving IHO S44 (5th edition) 1. order data down to 100 meter within a swath width of ±60 deg | **M** | Y/N |  |  |  |
|  | **Number of beams**  The number of beams shall be at least 256, per ping | **M** | Y/N |  |  |  |
|  | **Number of beams**  State the number of beams, per ping | **R** | D |  | Weight: 20%  5 points: more than 512 beams  4 points: 512 beams  3 points: 411 - 511 beams  2 points: 257-410 beams  1 point: 256 beams |  |
|  | **Beam resolution**  The beam resolution shall be equal to or better than:  - Cross Track 0,5 deg from 1 to 100 meter  - Along Track 1,0 deg from 1 to 100 meter  - Cross Track 1,0 deg from 100 to 500 meter  - Along Track 2,0 deg from 100 to 500 meter | **M** | Y/N |  |  |  |
|  | **Pulse form**  The sonar system shall be able to transmit CW and FM pulse forms. | **M** | Y/N |  |  |  |
|  | **Seafloor coverage and speed**  Considering no movement and a water depth deeper that 5 meter below the transducer - It must be possible to obtain bathymetric data with full seafloor coverage at a survey speed of no less than 7 knots. | **M** | Y/N |  |  |  |
|  | **Selectable swath width**  It shall be possible to select a reduced swath width with the same minimum number of beams as described in pt. 7. | **M** | Y/N |  |  |  |
|  | **Selectable swath width**  State the minimum selectable swath width. | **R** | D |  | Weight: 10%  5 points: ±30 or less  4 points: ±40-±31  3 points: ±45-±41  2 points: ±50-±46  1 point: ±60-±51 |  |
|  | **Stabilization**  If roll, pitch, and yaw stabilization is an option. It shall be possible to be switched of the stabilization. | **M** | Y/N |  |  |  |
|  | **Water column data**  The multibeam system shall be able to deliver water column data | **M** | Y/N |  |  |  |
|  | **Backscatter data**  The system shall be able to deliver sidescan sonar and/or snippet data | **M** | D |  |  |  |
|  | **Equiangular/equidistant modes**  The system shall have both equiangular and equidistant modes.  It shall be possible to switch between equiangular and equidistant modes while the system is running. | **M** | Y/N |  |  |  |
|  | **On-line sound velocity**  It shall be possible to interface an on-line sound velocity probe to the system. | **M** | Y/N |  |  |  |
|  | **Time Synchronization**  The data shall be time-tagged on reception. The system shall be able to interface to time synchronization using a PPS pulse and UTC/ZDA time stamp. | **M** | Y/N |  |  |  |
|  | **Automatic adjustment**  State which parameters the system automatically will adjust while running in some kind of automation mode. | **R** | D |  | Weight: 20%  1 point for each bullet:  - auto range  - auto gain  - auto pulse length  - auto ping rate  - auto power |  |
|  | **Extra detections**  Multiple detection – state the number of detections within a single beam. | **R** | D |  | Weight: 20%  5 points: 5+ detects each beam  4 points: 4 detects each beam  3 points: 3 detects each beam  2 points: 2 detects each beam  1 point: 1 detect each beam |  |
|  | **Software**  Any software shall be able to run on MS windows 7/64bit operating system | **M** | Y/N |  |  |  |
|  | **Temperature – Operational**  The sonar system shall be able to operate within the temperature range from -2 to +40 Degree Celsius | **M** | Y/N |  |  |  |
|  | **Temperature – Storages**  The sonar system shall be able to be stored in a temperature range from -10 to +50 Degree Celsius | **M** | Y/N |  |  |  |

# 3. Hardware requirements

| **Id. No.** | **Requirement description** | Classification | Documen-tation | Requirement compliance | **Evaluation** | **Tender description** |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Galvanic corrosion**  Components exposed to seawater shall be made of low corrosion (salt water resistant) materials such as, plastic, brass, stainless steel or titanium. | **M** | Y/N |  |  |  |
|  | **Mounting/dismounting of wet end equipment**  The system shall be mountable/dismountable while submerged in water. | **M** | Y/N |  |  |  |
|  | **Transmitters/receivers**  The complete wet end including projector, receiver and mounting brackets shall be able to fit into the sonar-well with a diameter of 850 mm and a height of 800 mm. | **M** | Y/N |  |  |  |
|  | **Rackmounts**  Preferably all dry end equipment can be mounted in 19” racks. | **R** | D |  | Weight: 5%  3 points: True rack mounted  2 points: Semi rack mounted  1 point: Non rack mounted |  |
|  | **Data transfer**  The multibeam system shall be capable of using Ethernet connection for data transfer to the data collection software. | **M** | Y/N |  |  |  |
|  | **Transducer cable** - bending  Transducer cable shall not have a bending diameter exceeding 300 mm | **M** | Y/N |  |  |  |
|  | **Transducer cable** – length  Due to the size of the vessel the delivered cable(s) between the wet end- and the dry end equipments shall be a least 50 meters long. | **M** | Y/N |  |  |  |
|  | **Sub water connections**  The wet end transducers shall be fitted with a sub water connector (integrated cables are not acceptable) | **M** | Y/N |  |  |  |

# 4. Other requirements

| **Id. No.** | **Requirement description** | Classification | Documen-tation | Requirement compliance | **Evaluation** | **Tender description** |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Warranty**  Long warranty without extra cost is preferable. State the warranty period | **R** | D |  | Weight: 25%  5 points: 4 years and more  4 points: 3 years  2 points: 2 years  1 point: 1 year |  |
|  | **Delivery**  The sonar system must be delivered (FCA) no later than 20th May 2016, depending on that the contract is awarded no later than the 23th March 2016. | **M** | Y/N |  |  |  |
|  | **Documentation**  DALO shall be entitled to require the submission, free of charge, of copies of all received documentation. In addition DALO shall have the right to reproduce, distribute and handle documentation within the Danish armed forces for defence purposes, for as long as the product is in service. | **M** | Y/N |  |  |  |