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Foreword

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This document was prepared by Technical Committee ISO/TC 8, *Ships and marine technology.*

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Introduction

This document describes the supervisory and control system for a number of components, functions and systems that can, but do not have to, be installed on board of a grab dredger. It does not prescribe that all described components, functions and systems need to be installed.

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Ships and marine technology — Grab dredger supervisory and control systems

1 Scope

This document specifies the components and structure, general requirements, and functional requirements of grab dredger supervisory and control systems.

It is applicable only to the installed components, functions or systems. It covers the design, manufacture and modifications.

2 Normative references

The following referenced documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 8384, *Ships and marine technology — Dredgers — Vocabulary*

3 Terms , definitions and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 8384 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1.1
grab dredger supervisory and control system
GD-SCS
system used for supervising and controlling the operations of a grab dredger

3.1.2
dredging profile monitor
DPM
system used to accurately measure and monitor the grab dredger's position and heading, and the grab bucket's position and depth, via plane view and profile view

3.1.4
opening value
value of opening of the grab bucket, expressed in percent (%), where 0 % means closed and 100 % means fully opened

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3.2 Abbreviated terms

DPM	Dredging profile monitor
GD-SCS	Grab dredger supervisory and control system
HMI	Human machine interface
SCADA	Supervisory control and data acquisition

4 Components and structure

4.1 Components

The grab dredger is a dredger that excavates the soil with a grab.

The GD-SCS is an integrated system which consists of a SCADA and a DPM.

The SCADA is used to monitor and control the dredging process with a grab.

The main functions of the DPM are to measure the position and heading of the grab dredger, and the position and depth of the grab bucket, and to provide for visualization in the plan view with a numeric window and side views.

4.2 Structure

By using either a wireless or wired network, the GD-SCS consists of a collector, a controller, monitoring stations, etc. respectively in the grab dredger's control room, the operator's cabin or elsewhere, in order to monitor the dredging and the operations of the grab dredger moving and manipulation equipment.

5 General requirements

5.1 Operating position and control mode

5.1.1 Operating position

The GD-SCS should have a local and, where deemed required, a remote operating position.

5.1.2 Control mode

The GD-SCS should have the following control modes:

a) manual: manual operation by handle/button/knob/pedal and HMI;

b) emergency: direct operation through hard wire, only for dredging equipment that affects the safety of the grab dredger.

5.2 External communication

The GD-SCS should have the following communication interfaces:

a) the position measurement system of the vessel;

b) the heading (orientation) measurement system of the vessel;

c) the tide measurement.

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5.3 Diagnostic

When the equipment start and stop controls, the operation position transfer, or the control mode shift operation fail, the GD-SCS should provide diagnostic information.

5.4 HMI graphics

5.4.1 Alarm level

In HMI graphics, the GD-SCS alarm level can be set in two colours.

EXAMPLE Red is the highest level alarm, meaning danger; yellow is the secondary level alarm, meaning warning or abnormal condition.

This principle can be applied to all graphical symbols, function-keys, and digital data.

5.4.2 Conventions on graphic colours

The HMI graphic colours can be specified as follows.

a) For HMI graphics, cold tone colours are recommended, and for non-operating graphical interfaces, warm tone colours can be adopted.

b) The colour matching of the HMI graphics should make the flow chart simple and clear with harmonious and consistent colours. It is advisable that the number of colours adopted not be excessive.

c) Colour adoption of the HMI graphics can be in accordance with the specifications in Table 1.

Table 1 — Convention on graphical adoptions

Colour	General meaning	Meaning of colour in combination with graphical symbol	Meaning of colour in combination with digital data
Red	Danger	Highest level alarm	Highest level alarm
Yellow	Warning	Abnormal condition, secondary alarm	Abnormal condition, secondary alarm
Grey	Static state	Stop, shut down, disconnection	None
Cyan	Special meaning	Remote control, etc.	None
Blue	Secondary importance	Backup equipment	Tag number
White	Safe, program in activation status	None	Measured value or status value, dynamic data
Green	Safe, program in activation status	Normal operation, working, open, shut down, graphic value	None

5.4.3 Brightness of the HMI

The brightness of the HMI graphics should match that of the environment. For screen in bridge, the HMI can have a “night” display mode, and brightness of the screen should be lowered enough not to affect the sailors lookout in the night.

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