Type Approval Certificate

This is to certify that the undernoted product(s) has/have been tested with satisfactory results in accordance with the relevant requirements of the Lloyd's Register Type Approval System.

Manufacturer	**Kongsberg Maritime AS**
Address	Kirkegårdsveien 45, Kongsberg, 3616, Norway
Place of Production	Kongsberg Maritime Korea Ltd
	9-7, Sandan 3-ro, Jeonggwan-eup, Gijang-gun, Busan, 46027, South Korea
Place of Production	Kongsberg Maritime AS
	Kirkegårdsveien 45, Kongsberg, 3616, Norway
Place of Production	Kongsberg Maritime AS
	Bekkajordet 8a, Horten, 3194, Norway
Place of Production	Kongsberg Maritime China Ltd.
	No. 136 North Fute Road, Pilot Free Trade Zone, Shanghai, 200131, China
Type	Control Systems
Description	Alarm, Monitoring and Control System K-Chief Alarm Management System K-Safe
	For detailed product description, please refer to appendix.
Trade Name	K-Chief and K-Safe

Thomas Milow

Electrical & Control - Senior Specialist to Lloyd's Register EMEA
A member of the Lloyd's Register group

71 Fenchurch Street, London, EC3M 4BS, United Kingdom

TA01 2.0

Type Approval Certificate

Application

Marine and Offshore applications for use in environmental categories ENV1, ENV2 and ENV3 (EAP200 excluded), as defined in Lloyd's Register Type Approval System, Test Specification Number 1 – December 2021.
Equipment marked with (1) in the appendix can only be installed in general power distribution zones.

Specified Standard

Manufacturer's specification
IACS UR E10 Rev. 8 / 2021
IACS UR E27 Rev. 1 / 2023 and Part 6, Chapter 1, Section 2.16 Rules and Regulations (July 2024)

Ratings

AIM Basis Software for Operator Station, I/O drivers and common software functions in the RCU: V8.3, V8.5, V8.6, V8.7, V8.8, V8.10 and V8.12

Additional Tests

Low temperature test (-15 °C / 16 h)
Ingress protection (IP2x, IP22, IP44)
Acoustic level
Compass safe distance

For detailed test description, please refer to appendix.

Other Conditions

For systems consisting of the listed components the final functional arrangement and application software are to comply with appropriate Lloyd's Register Rules and Regulations and shall be subject to project related Plan Approval Process, when installed on LR classed vessels. Documents and drawings for the actual application are to be provided according relevant LR Rules and Regulations.

The K-Chief and K-Safe system, which implements emergency stop or safety critical functions, have satisfied the requirements of the LR Software Conformity Assessment and can be used without an independent hardwired backup or redundancy within design.

71 Fenchurch Street, London, EC3M 4BS, United Kingdom

TA01 2.0

Type Approval Certificate

The software development and quality assurance processes of Kongsberg are covered by the Software Conformity Assessment (SCA) Certificate No. LR22422163SS.

The AIM Safe System Software versions 8.3.4 up to 9.0.3 has been evaluated by TÜV Rheinland for compliance with IEC 61508 up to safety integrity level SIL3. Refer to Safety Configuration Manual No. 378006(TC).

The K-Chief Hardware components which are common for the C600 platform are listed in the LR Type Approval Certificate no. LR21457899TA for K-Chief, K-Chief 500 & 600, AutoChief C20 & C600, K-Thrust 600, K-Steering 600, Lever K-Thrust, Command Panel, WCC 600.

Hardware components which are specific for the K-Chief and K-Safe systems are listed in the current Type Approval Certificate - Appendix.

A net filter similar to "Schaffner Type FN2080-16-06" must be used for the RIO new hardware line (RCU 501, RSER 200-4, RMP 201-8).

Specific Conditions of Use as stated in applicable Ex-certificates and the conditions of the LR Rules & Regulations for the Classification of Ships, Part 6, Chapter 2 shall be observed when installed in hazardous areas.

The Ex-certification does not form part of this certificate.

Type Approval does not eliminate the need for any survey, required by the Rules and Regulations.

If the specified standards are amended during the validity of this certificate, the product is to be re-approved prior to it being supplied to vessels to which the amended standards apply.

71 Fenchurch Street, London, EC3M 4BS, United Kingdom

Type Approval Certificate

<u>Compliance with IACS UR E27 Rev. 1/ 2023 and/or Part 6, Chapter 1, Section 2.16 Rules and Regulations (July 2024):</u>

- The compliance with the requirments above is issued with the limitation that the directly connected networks are "trust networks" (according to the definition IEC 62443-3-3 Item 3.1.45).

- It is further issued on the understanding that all connections are wired. Any radiocommunication (e.g. Bluetooth, WiFi etc.) are excluded.

This certificate is not valid for equipment, the design, ratings or operating parameters of which have been varied from the specimen tested. The manufacturer should notify Lloyd's Register EMEA of any modification or changes to the equipment in order to obtain a valid Certificate.

Previous Version: 18-20018-02

The Design Appraisal Document TSO/24-015436_B and its supplementary Type Approval Terms and Conditions form part of this Certificate.

71 Fenchurch Street, London, EC3M 4BS, United Kingdom

Appendix

Module	Description	Additional Test	Compass Safe Distance	
			Standard	Steering
ALC Panel	Alarm and Command panel	75 to 85 dB[1]	35 cm	20 cm
ALC Panel (stand alone)	Alarm and Command panel	-	-	-
BU AUT	Configurable input panel	-	35 cm	20 cm
Input Panel (Mk2)	Button keypad with trackball	IP2X	35 cm	20 cm
EFI (16)	Earth Fault Indicator	IP2X	50cm	40cm
WCC 600	Watch Calling C600 panel	IP44/81 to 85 dB[1]	120cm	65cm
RCU 502i	Remote Controller Unit	IP2X	29 cm	14 cm
RCU 601	Remote Controller Unit			
RCU 602	Remote Controller Unit	IP2X	30 cm	15 cm
RDIO 420S	Remote Digital I/O module	IP2X	185 cm	105cm
RDIOR 420	Remote Digital I/O module and Relay channels	IP2X	5 cm	5 cm
RMP 420	Remote Multipurpose I/O module	IP2X	5 cm	5 cm
RPM 422i	Remote Multipurpose I/O module	-	-	-
RMP 420S	Remote Multipurpose I/O module	IP2X	5 cm	5 cm
RMP 422Si	Remote Multipurpose I/O module	IP2X	30 cm	15 cm
RPM 201-8	Remote multipurpose I/O module	IP2X	5 cm	5 cm
RSER 200-4	Serial line communication interface	IP2X	5 cm	5 cm
RMC-ST	Remote media converter	IP2X	20 cm	10 cm
RHUB200-5	Communication Hub and Repeater	IP2X	5 cm	5 cm
RIO-C2xe	Distributed Processing Units	-	-	-
L2C	LAN to CAN module	IP2x /-25°C[3]	10 cm	-
RTL8153B	Network component	-	-	-
Panel Input Mk3 COP 05	Operator Control Panels	-	-	-
PSS	Distributed Processing Units	-	-	-
RAo-8xe	Remote Analog Input 16Ch	-15°C[3]	30 cm	-
RDi-32Axe	Remote Digital Input 32Ch	-15°C[3]	25 cm	-
RDi-32xe	Remote Digital Input 32Ch	-15°C[3]	10 cm	-
RDo-16xe	Remote Digital Output 16Ch	-15°C[3]	10 cm	-
RAi-16xe	Remote Analog Input 16Ch	-15°C[3]	10 cm	-
TBP	Tracker Ball Panel	IP2X /-15°C[3]	50 cm	-
RTL8153B	USB3.0/3.1/3.2 to 4x Gb Ethernet	IP2X/-15°C [3]	70cm	40cm

1) Acoustic level

2) Suitable only for general power distribution zone.

3) Low Temperature Test

Software Version   AIM Basis Software 8.3, 8.5, 8.6, 8.7, 8.8, 8.10 and 8.12