



TYPE APPROVAL CERTIFICATE

Certificate no.:
TAA00000W5
Revision No:
6

This is to certify:

that the **Control and Monitoring System**

with type designation(s)
K-Chief, K-Safe

issued to

Kongsberg Maritime AS
Kongsberg, Norway

is found to comply with

DNV rules for classification – Ships, offshore units, and high speed and light craft
DNV rules for classification – Ships Pt.6 Ch.5 Sec.21 Cyber security

Application:

Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV.

This type approval covers security capabilities in accordance with DNV security profile 1 and IACS UR E27, subject to conditions stated in this certificate.

Location classes are listed in the certificate

Issued at **Høvik** on **2024-06-28**

for **DNV**

This Certificate is valid until **2026-06-27**.

DNV local unit: **Sandefjord**

Approval Engineer: **Knut Omberg**

This Certificate is subject to terms and conditions overleaf. Any significant change in design or construction may render this Certificate invalid. The validity date relates to the Type Approval Certificate and not to the approval of equipment/systems installed.

LEGAL DISCLAIMER: Unless otherwise stated in the applicable contract with the holder of this document, or following from mandatory law, the liability of DNV AS, its parent companies and their subsidiaries as well as their officers, directors and employees ("DNV") arising from or in connection with the services rendered for the purpose of the issuance of this document or reliance thereon, whether in contract or in tort (including negligence), shall be limited to direct losses and under any circumstance be limited to 300,000 USD.



Product description

K-Chief is designed for control, monitoring and alarm functions as described in product description 304844/C and 493992/A. These functions typically include:

- Alarm system, including watch call (alarm extension system)
- Power Management
- Machinery Control
- Cargo Control
- Ballast Control
- Vessel Performance Monitoring System
- Vessel Mode Control
- Heating, Venting and Air Conditioning Controls

K-Safe is designed for safety functions as described in product description 163875/I. These functions typically include:

- Emergency Shutdown System (ESD):
 - o K-Safe 3 (1oo2 redundancy), Dual I/O
 - o K-Safe 2 (1oo2 computer redundancy), Shared I/O
- Process Shutdown System (PSD):
 - o K-Safe 3 (1oo2 redundancy), Dual I/O
 - o K-Safe 2 (1oo2 computer redundancy), Shared I/O
 - o K-Safe 1 (single system)
- Fire and Gas Detection and Protection System (F&G):
 - o K-Safe 3 (1oo2 redundancy), Dual I/O
 - o K-Safe 2 (1oo2 computer redundancy), Shared I/O
 - o K-Safe 1 (single system)
- Alarm System

At the time of type approval, K-Chief and K-Safe utilize basic software AIM release 8.12 which is described in revision history document 110-0001444/B.

K-Chief and K-Safe consists of the following hardware components:

Type	Product Name	Product No.	Location Classes	Compass Safe Distance	DNV reference
Operator panels	COP 05 Panel Input Mk3	110-0049940	B/B/A/B/A	200 mm	
	COP 05 ALC Stand Alone	391890	B/A/B/B/IP20		
	ALC Panel	603526	B/B/A/A/*	300 mm	
	BU AUT Panel	603529	B/B/A/A/*	250 mm	
	TBP, Tracker Ball Panel, mounted in Pointer Carrier Panel, PCP (385675)	388930	B/B/A/B/*	500 mm	
	Watch Call panel, WCC600	373860	B/B/B/B/IP44	1200 mm	
Controllers	RCU602	383962	B/B/A/B/IP20	300 mm	
	RCU601	477601	B/B/A/B/IP20	300 mm	TAA00003BA
	RCU502i (K-Safe only)	421768	B/B/A/B/IP20	300 mm	
IO Units	RMP420	306712	B/B/A/B/IP20	50 mm	
	RMP420S	319824	B/B/A/B/IP20	50 mm	
	RDIOR420	306713	B/B/A/B/IP20	50 mm	
	RDIO420S	316564	B/B/A/B/IP20	1850 mm	
	RMP422i	408442	B/B/A/B/IP20	350 mm	
	RMP422Si (K-Safe only)	408406	B/B/A/B/IP20	350 mm	
	RMP200-8	603443	B/B/A/B/IP20	50 mm	
Other	RSER200-4	603444	B/B/A/B/IP20	50 mm	
	RMP201-8 Module	324400	B/B/A/B/IP20	50 mm	
	RHUB200-5	603442	B/B/A/B/IP20	50 mm	
	Earth fail indicator, EFI-16	321492	B/B/A/A/IP20	500 mm	
	GLK-300		D/B/A/B/C		TAA000010Z

Type	Product Name	Product No.	Location Classes	Compass Safe Distance	DNV reference
	Fiber optic media converter RMC-ST	321520	B/B/A/B/IP20	200 mm	
	L2C LAN to CAN converter	404654	D/B/B/B/*	100 mm	TAA0000017
	PSO-P, Power switch-over unit	8100334	B/B/B/B/*		TAA0000018
	RTL8153B-USB3.0/3.1/3.2 to 4x Gb Ethernet	446030	B/A/A/B/A	700 mm	
IO Units (C600)	RAi-16xe, Analogue Input	329714	B/B/B/B/*		TAA0000018
	RAi-10tc, Analogue Input (thermocouple)	8100161	B/B/B/B/*	50 mm	TAA0000018
	RAo-8xe, Analogue Output	333505	B/B/B/B/*		TAA0000018
	SIUxe, Sensor Interface Input Module	350928	B/B/B/B/*	200 mm	TAA0000018
	RDI-32xe, Digital Input	333523	B/B/B/B/*		TAA0000018
	RDI-32Axe, Digital Input	333824	B/B/B/B/*		TAA0000018
	RDo-16xe, Digital Output	329699	B/B/B/B/*		TAA0000018
Controllers (C600)	SCU, Segment Control Unit	329785	B/B/B/B/*		TAA0000018
	PSS, Process Segment Starcoupler	8100184	B/B/B/B/*		TAA0000018
	C2xe, Combi Module 2 for control applications	333346	B/B/B/B/*		TAA0000018
	C3xe, Combi Module 3 for Generator Protection	334893	B/B/B/B/*	90 mm	TAA0000018
	C4xe, Combi Module 4 for Generator Control	334894	B/B/B/B/*	100 mm	TAA0000018
Operator Stations	MC340 i3 GPU	110-0028204	D/B/A/B/A	150 mm	TAA00002ZN
	MC340 i7 GPU	477554	D/B/A/B/A		TAA00002ZN
	MC360 i3 LAN	110-0016256	D/B/A/B/A		TAA000038U
	MC360 i5 GPU	110-0016258	D/B/A/B/A		TAA000038U
	MC360 i7 LAN	110-0016259	D/B/A/B/A		TAA000038U
Network devices	Cisco C1000-24T-4X-L		D/B/A/B/A		TAA000035N
	Cisco C1000-24FP-4G-L		D/B/A/B/A		TAA000035N
	Cisco C1000-24T-4G-L		D/B/A/B/A		TAA000035N
	Cisco C1000-24P-4G-L		D/B/A/B/A		TAA000035N
	Moxa IKS-6728A		D/B/A/B/*		TAA0000043
	Moxa EDS-408A-MM-SC		D/B/A/B/*		TAA000006N
	Moxa EDS-408A-3M-SC		D/B/A/B/*		TAA000006N
	Fortinet FGR-60F		D/B/A/B/A		TAA000035M

Location classes in the table above are denoted in the following sequence:
 Temperature / Humidity / Vibration / EMC / Enclosure class

Where enclosure class is denoted as "**", required enclosure protection according to the rules to be provided upon installation onboard.

Components marked with "***" are cabinets, tested for shock and vibration.

Printers, (marked with "****"), are tested for radiated disturbance/emissions only.

Where compass safe distance is not listed, a minimum distance of 5 meters shall be applied according to section 6.3 in ISO 694:2000

Approval conditions

Product certificate

Each delivery of the type approved system is to be certified according to DNV Pt 4. Ch 9 Sec.1. Project-specific documentation shall be submitted for approval as per the table below and a certification test shall be performed at the manufacturer of the application system before the system is shipped to the yard.

Clause for application software control

All changes in software are to be recorded as long as the system is in use on board. Records of major changes are to be forwarded to DNV for evaluation and approval and shall be approved before implemented on board.

Major changes to the type approved system affecting future deliveries shall be informed to DNV. If the changes are considered to affect functionality for which rule requirements apply, a new functional type test may be required, and the certificate may have to be renewed to identify the new version. Minor changes are covered by this type approval.

This type approval certificate confirms compliance with requirements as specified in the table below.

This TA certificate covers:	For each delivery of the type approved system(s), the following documents shall be submitted:
Type approval of hardware components in accordance with: DNV-RU-SHIP Pt.4 Ch.9 Sec.5	<ul style="list-style-type: none"> – Functional description (I020). – System topology (F030/I030), demonstrating system architecture and interfaces with other systems and equipment as per Topology diagram 110-0066093.
Type approval of capabilities for control, monitoring, alarm, and safety functions in accordance with: DNV-RU-SHIP Pt.4 Ch.9 DNV-RU-SHIP Pt.6 Ch.2 Sec.2 DNV-OS-D202	<ul style="list-style-type: none"> – Inventory/equipment list (F071/Z090), demonstrating consistency with asset inventory 110-0066104. – List of control and monitored points (I110), including data transferred on communication links). – Functional failure analysis (Z070), documenting compliance with requirements for redundancy, segregation, and effect of single failures in the system. – Test program for product certification (Z252). Type approved security capabilities are exempted from certification test.
Type approval of cyber security capabilities and system architecture in accordance with security profile 1 (SP1): DNV-RU-SHIP Pt.6 Ch.5 Sec.21	<ul style="list-style-type: none"> – Power supply arrangement (I050) may be included in document I030. – Test report (F262) demonstrating configuration of security capabilities as per document 110-0078720.
In addition to the documents above, any modifications in the delivered system compared with the type approved system shall be documented and submitted for approval. For further description of document content, see DNV-CG-0550	

For newbuilding projects, identical deliveries to sister vessels with the same DNV project ID are to be documented and submitted in one common transmittal.

Application/Limitation

K-Chief may be integrated with other systems and equipment as per below:

- Kongsberg systems in the same security zone may connect directly to the K-Chief Process network A and B.
- Kongsberg systems in other security zones may connect to the K-Chief Process network A and B via the K-Chief firewalls.
- Third party systems, sensors and actuators may connect to K-Chief Fieldnet via the K-Chief firewalls, alternatively via hardwired signals or serial communication directly to the K-Chief controllers.

K-Safe may be integrated with other systems and equipment as per below:

- Kongsberg safety systems in the same security zone may connect directly to the K-Safe Process network A and B.
- Kongsberg systems in other security zones may connect to the K-Safe Process network A and B via the K-Safe firewalls.
- Third party safety systems, sensors and actuators may connect to K-Safe Fieldnet via the K-Safe firewalls, alternatively via hardwired signals or serial communication directly to the K-Safe controllers.

All the above connected systems and equipment shall be allocated to a security zone on board.

K-Chief and K-Safe may also be integrated with the below systems and equipment:

- Kongsberg Remote Services may connect to K-Chief/K-Safe firewall(s) as per type approval TAA00003F4
- Kongsberg Information Management System (K-IMS) may connect to K-Chief/K-Safe firewall(s) as per type approval TAA00003F4 and TAA00003F5 .
- Third party remote access or information management solutions may connect to K-GSN firewall as per type approval TAA00003F4.

Connected systems and equipment shall be described and illustrated in the System topology (F030/I030) and the integration is subject to testing on board in accordance with applicable requirements in DNV rules.

Type Approval documentation

Product Description, KONGSBERG – K-Chief 700, doc.no. 304844/D
Product Description KONGSBERG – K-Chief doc.no. 493992/A
Operator Manual, KONGSBERG K-Chief 700, doc. no. 338309/A
Product Description, KONGSBERG – K-Safe, doc.no. 163875/I
Operator Manual, KONGSBERG K-Safe, doc. no. 343964/A

Test reports:

DANAK-193886 K 250600-3, WBU, WCU and OCP, 1998-06-08
DANAK-197537 E 502029-3, WBU, WCU and OCP, 2004-07-06
DANAK-198195 A503298-1 Rev.1, KM Common Operator Panels 2005 2007-06-15
DANAK-198508 A503547-1, RIO New HW Line modules RCU501, RSER200-4, RHUB200-5, RMP200-8, 2006-10-17
DANAK-198575 DELTA-A504273-3, Vibration testing of KM05 Deep line console with PC (MP7600) on wire isolators (KM kit 603185), for marine applications, 2006-12-04
DANAK-198577 DELTA-A504327-2, Vibration testing of KM05 Deep line console with PC (MP7600) on rubber isolators, (MS2040+305083), for marine applications, 2006-12-04
DANAK-198637 DELTA-A504352-1, IP22 test of KM-05 Deepline and Slimline operator stations, 2007-01-30
DANAK-198696 A504446-1, RMP420, RMP420S and RDIOR420, 2007-03-15
DANAK-1910121 A505138, RDIO401S and RDIO420S, 2008-03-27
DANAK-1910264 A505037EFI, 2008-09-01
DANAK-1910280 A505687, RMC-ST, 2008-09-19
DANAK-1910281 A505749 Rev.1, EFI-16, 2008-10-14
DANAK-1910541 A506114, RCU501, RHUB200-5, RMP420 & RSER200-4 according to IEC 62061, 2009-06-11
DANAK-1910830 A506580, TB420, 2010-03-19
DANAK-1910979 A506924-1, Input Panel Mk2 COP 05, 2010-07-13
DANAK-1911523 A507567RCU502 2012-10-26
Nemko-E15165.01, RCU602/RMC-ST, 2017-04-28
DANAK-19/12618 T202566, EAP, 2012-11-21
Nemko-E14200.00, Lexmark, Single-Function Color Laser Printer, 2014-08-13
Nemko 69187, Common Operator Panel, 2006-08-31
Nemko_39760, OKI ML 280 Elite, 2005-02-25
Nemko_E13012.00, HP LaserJet Pro M401dn, 2013-01-25
Nemko_E19144.00, OKI ML 1190, 2019-08-19
Nemko_E19238.00, Canon LBP623Cdw, 2019-12-18
DANAK-1912904, WatchCall panel, WCC 600, 2013-09-05

NEMKO-E14127.00, WatchCall panel, WCC 600, 2014-05-21
TI-3010-13-014234, WatchCall panel, WCC 600, 2013-10-17
DANAK-1911658 Rev.1, RMP420, 2011-12-08
NEMKO-E13144.02, RMP422S and RMP422, 2015-03-11
NEMKO-E13144.03, RMP422i and RMP422Si, 2017-08-17
NEMKO-E18081.00, RCU 502i DS, 2018-04-23
NEMKO-E21088.03, Kongsberg Maritime Modules, 2021-10-28
NEMKO-E22067.01, RBUS Communication HUB & RBUS fibre optic converter, 2022-04-20
DANAK-198195, Test report DELTA EMC and Envir., KM Operator panels, 2022-08-19
2022-08-11 K-Chief IAT/FAT test. Details is found in survey report J-198 (262.1-007619)

AIM revision history K-Chief and K-Safe, doc.no. 110-0001444/B
System Topology, doc.no. 110-0066093/C
Asset Inventory K-Chief and K-Safe, doc.no. 110-0066104/C
Description of security Capabilities, doc.no. 110-0066099/C
IACS E27 Test Procedure for K-Chief & K-Safe, doc.no. 110-0066078/C
K-Chief and K-Safe System Operator Manual, doc.no. 493996/E
Change management, doc.no. KM-PROC-0080/A
Configuration Management Procedure, doc.no. KM-PRO-0120/A
Guideline for Secure Development Lifecycle (SDLC), doc.no. KM-GUI-0118/A
Security Configuration Guideline IACS E27 K-Chief and K-Safe, doc.no. 110-0078720/A

Tests carried out

- Applicable tests according to Standard for Certification 2.4 (April 2006), and DNV-CG-0339 (2021-09) as documented in the various test reports submitted.
- IAT/FAT procedure for K-Chief doc 496335 rev. D
- Test of cyber security capabilities in as per document 110-0066078/C

Place of manufacture

- Kongsberg Maritime Kirkegårdsveien 45, 3616 Kongsberg, Norway
- Kongsberg Maritime AS Bekkajordet 8A 3189 Horten, Norway
- Kongsberg Maritime 9-7, Sandan 3-ro, Jeonggwan-Eup, Gijang-gun, 46027, Busan, Korea
- Kongsberg Maritime China Ltd., No. 136 North Fute Road, China (Shanghai), Pilot Free Trade Zone, 200131, China

Marking of product

- Components are marked with product name and product number as listed in the table above.
- Basic software version is displayed in the system graphical user interface.
- Each project application configuration is documented in a dedicated version log file which is specific for each vessel.

Periodical assessment

The scope of the periodical assessment is to verify that the conditions stipulated for the type are complied with, and that no alterations are made to the product design or choice of systems, software versions, components and/or materials.

The main elements of the assessment are:

- Ensure that type approved documentation is available
- Inspection of factory samples, selected at random from the production line (where practicable)
- Review of production and inspection routines, including test records from product sample tests and control routines
- Ensuring that systems, software versions, components and/or materials used comply with type approved documents and/or referenced system, software, component and material specifications
- Review of possible changes in design of systems, software versions, components, materials and/or performance, and make sure that such changes do not affect the type approval given
- Ensuring traceability between manufacturer's product type marking and the type approval certificate
- Review documented evidence of adherence to Secure Development Lifecycle processes

Periodical assessment is to be performed at renewal of this certificate.

END OF CERTIFICATE