中国船级社
CHINA CLASSIFICATION SOCIETY

证书编号/Certificate No.
BG26PTB00010

型式认可证书
CERTIFICATE OF TYPE APPROVAL

兹证明本证书所述制造厂具备按照下列标准的要求生产本证书所列产品的能力和条件。
This is to certify that the manufacturer stated in the certificate meets the requirements of the standards listed below and is available with the ability and conditions to produce the products described in the certificate.

制造厂/Manufacturer

Kongsberg Maritime AS(Trondheim)

地址/Address

Skonnertvegen 1, N-7053 Ranheim, Norway

产品名称/Product

压力、温度、液位测量报警系统
Pressure, Temperature, Level Measuring Alarm System

认可标准/Approval Standard

1. 中国船级社《散装运输液化气体船舶构造和设备规范》第三篇 第10, 13章及其变更通告
Chapter 10,13 Part There of CCS Rules for Construction and Equipment of Ships Carrying Liquefied Gases in Bulk
2. 国际海事组织《国际散装运输液化气体船舶构造和设备规则》第10, 13章
Chapter 10,13 of IMO "International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk"
3. 中国船级社《船舶网络安全指南》（2025）
China Classification Society Guidelines for Ship Cyber Security 2025
4. IACS UR E27(Rev .1)

用于/Intended for

船舶/Ships

证书有效期至/This Certificate is valid until **2028年11月13日/ Nov. 13,2028**

发证机构 中国船级社挪威根办事处
Issued by CCS Bergen Office

签发日期 2026年06月17日
Date Jun. 17,2026

产品明细/Product Description

压力、温度、液位测量报警系统/Pressure, Temperature, Level Measuring Alarm System(M0001)

名称/Name	属性（值）/Value	单位/Unit
型号/Type	K-Gauge GAS , K-Gauge CTS, K-Gauge TOP	
探测范围/Range of Detection	Refer to addtional pages for details	
外壳防护等级/Degree of Protection of Enclosure	Refer to addtional pages for details	
软件版本号/Software Version	AIM basis software release:8.5,8.6,8.7,8.8,8.10,8.12 and 8.13	
网络安全等级/Cyber Security Level	SL0	

批准的图纸/Approved Drawings

图纸批准号/ Drawings Approval No.: BG20PPP20001;NP21PPP01091;NP26PPP02836

产品认可试验报告/ Approval Test Report

试验报告编号/ Test Report No.： DANAK-198696
试验报告日期/ Test Report Date： 2007-03-15
试验单位/ Laboratory: DELTA
试验单位地址/ Test Address: Denmark

试验报告编号/ Test Report No.： E09680.00
试验报告日期/ Test Report Date： 2009-06-24
试验单位/ Laboratory: Nemko AS
试验单位地址/ Test Address: Norway

试验报告编号/ Test Report No.： 209536
试验报告日期/ Test Report Date： 2012-08-21
试验单位/ Laboratory: Nemko AS
试验单位地址/ Test Address: Norway

试验报告编号/ Test Report No.： DANAK-1911523 Revision 1
试验报告日期/ Test Report Date： 2012-10-26
试验单位/ Laboratory: DELTA
试验单位地址/ Test Address: Denmark

试验报告编号/ Test Report No.： E13227.00
试验报告日期/ Test Report Date： 2013-10-02
试验单位/ Laboratory: Nemko AS
试验单位地址/ Test Address: Norway

试验报告编号/ Test Report No.： P-TA-GAS/XE Rev.B
试验报告日期/ Test Report Date： 2014-01-23
试验单位/ Laboratory: Kongsberg Maritime AS
试验单位地址/ Test Address: Trondheim,Norway

试验报告编号/ Test Report No.： E15165.00
试验报告日期/ Test Report Date： 2015-09-18
试验单位/ Laboratory: Nemko AS
试验单位地址/ Test Address: Norway

试验报告编号/ Test Report No.： E16236.00
试验报告日期/ Test Report Date： 2016-11-14
试验单位/ Laboratory: Nemko AS
试验单位地址/ Test Address: Norway

试验报告编号/ Test Report No.： E17118.00
试验报告日期/ Test Report Date： 2017-09-22
试验单位/ Laboratory: Nemko AS
试验单位地址/ Test Address: Norway

试验报告编号/ Test Report No.： E18081.00

试验报告日期/ Test Report Date： 2018-04-23
试验单位/ Laboratory: Nemko AS
试验单位地址/ Test Address: Norway

试验报告编号/ Test Report No.： Sira 14ATEX2056X
试验报告日期/ Test Report Date： 2020-10-23
试验单位/ Laboratory: Sira Certification Service
试验单位地址/ Test Address: U.K.

试验报告编号/ Test Report No.： Sira 14ATEX2054X
试验报告日期/ Test Report Date： 2020-10-23
试验单位/ Laboratory: Sira Certification Service
试验单位地址/ Test Address: U.K.

试验报告编号/ Test Report No.： 14 ATEX 5412X
试验报告日期/ Test Report Date： 2020-11-18
试验单位/ Laboratory: DNV GL Nemko Presafe AS
试验单位地址/ Test Address: Norway

试验报告编号/ Test Report No.： E15308.02
试验报告日期/ Test Report Date： 2016-07-25
试验单位/ Laboratory: Nemko
试验单位地址/ Test Address: Norway

试验报告编号/ Test Report No.： Presafe 14 ATEX 4368 Issue 4
试验报告日期/ Test Report Date： 1899-12-26
试验单位/ Laboratory: DNV-GL
试验单位地址/ Test Address: Norway

试验报告编号/ Test Report No.： E21214.00
试验报告日期/ Test Report Date： 2021-11-01
试验单位/ Laboratory: Nemko
试验单位地址/ Test Address: Oslo Norway

试验报告编号/ Test Report No.： BAS01ATEX7005 Issue 10
试验报告日期/ Test Report Date： 2018-10-29
试验单位/ Laboratory: SGS
试验单位地址/ Test Address: UK

试验报告编号/ Test Report No.： 06ATEX0092X-Issue 4
试验报告日期/ Test Report Date： 2025-03-31
试验单位/ Laboratory: SGS
试验单位地址/ Test Address: UK

试验报告编号/ Test Report No.： IECExBAS 04.0025
试验报告日期/ Test Report Date： 2005-04-04
试验单位/ Laboratory: Baseefa
试验单位地址/ Test Address: UK

试验报告编号/ Test Report No.： DNV 22 ATEX 82891X Issue 1
试验报告日期/ Test Report Date： 2025-02-24
试验单位/ Laboratory: DNV
试验单位地址/ Test Address: Norway

试验报告编号/ Test Report No.： REP007416B
试验报告日期/ Test Report Date： 2025-01-17
试验单位/ Laboratory: Nemko
试验单位地址/ Test Address: Norway

认可后的产品检验方式/ Method of Product Inspection after Approval

按规范认可后应进行产品检验的产品/The product should be inspected in term of the rules：
认可后的产品检验应由本社验船师根据本社规范规定按批准的产品检验计划进行检验，经检验合格后由本社颁发船用产品证书。
After approval, product inspection should be carried out by the Surveyor of the Society in accordance with the approved product inspection scheme, and the Marine Product Certificate will be issued by the Society upon satisfactory inspection.

认可保持条件/ Maintenance Requirements of Approval

1.型式认可后，如果产品及其重要零部件的设计、所用材料或制造方法有所改变，且影响到产品的主要特性、特征；或产品的性能指标有所更改，且超过认可的范围，则有关图纸和文件应经检验机构审批。并在检验机构认为必要时，经本社检验人员见证有关试验和进行检查，其结果应能证实仍符合认可条件。
After type approval, if there are changes to the design, materials used or manufacturing method of the product and important components and such changes affect major characteristics and properties of the product, or property indexes of the product are changed and exceed the scope of approval, related drawings and documents are to be examined and approved by the concerned survey office. Where deemed necessary by the survey office, the surveyor to the Society will go to witness relevant tests and conduct inspection and the results should be able to demonstrate compliance with the approval conditions.
2.工厂的质量管理体系应保持有效运行，并且与认可时一致。如果质量管理体系发生改变，应经原体系认证机构审核并报本社批准。
The quality management system of the factory shall be ensure effective operation, and shall be the same as the situation of approval. If there are any changes to the quality management system, auditing of the original certification organization for quality management system and the society's approval shall be obtained.
3.认可证书有效期内，如果出现可能导致本社取消认可的情况，工厂应及时采取有效的纠正措施。
Within the validity of the approval certificate, if cases occur that may cause the Society to withdraw the approval, the manufacturer should take corrective actions in a prompt and effective manner.
4.在认可证书有效期内，本社检验人员可在未经事先通知的情况下对工厂的产品制造过程进行审核，以验证产品的生产是否符合业经本社批准的图纸和文件。工厂应予以配合。
Within the validity of the approval certificate, the surveyor to the Society may pay unannounced audit to the manufacturing process of the product in order to confirm whether it is in compliance with the drawings and documents approved by the Society. The factory should provide an active cooperation and necessary for the surveyor.

备注/Remarks

a) 本产品不支持直接与不可信网络连接，不支持无线访问，本系统硬件以及访问界面应设置在受控物理区域/
This product does not support direct connection to untrusted networks and does not support wireless access. all hardware devices and accessible interfaces in the CBS shall be installed in areas with physical access restrictions.

b) 如实际产品交付时重大变化（含硬件及软件）应通知CCS，若变化明显影响本社相关要求时，可能需要进行型式试验，签发新的认可证书。/Major changes of the type approved system affecting future deliveries shall be informed to CCS. 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.

c) 工厂应确保产品的开发遵循安全开发生命周期中各阶段的网络安全要求，编制相应的程序和安全更新文件应持续有效，并符合本社《船舶网络安全指南》及IACS UR E27 要求。/The manufacturer shall ensure that the development of products meets the cyber security requirements at each stage of Secure Development Lifecycle, and develop corresponding procedures and security update documents that are continuously effective and comply with CCS "Guidelines for Ship Cyber Security" and IACS UR E27 requirements.

d) 结合具体项目申请本社检验时，以下文件应提交批准：CBS 资产清单、网络系统拓扑图、配置核查报告/The following documentation of the specific base individual application is to be submitted for approval in each case:
- CBS asset inventory
- Topology diagrams
- Test report for configuration of security capabilities.

e) The system menitoned in this certifcate can be produced by following company:
Chinese Name: 康士伯企业管理（上海）有限公司
Chinese Address: 中国（上海）自由贸易试验区富特北路136 号，邮编：200131
English Name: Kongsberg Maritime China Ltd.
English Address: No. 136 North Fute Road, China (Shanghai) Pilot Free Trade Zone, 200131, China

f) For each designed vessel, the drawings of the K-Gauge Cargo monitoring system should be submitted for approval to the Society Plan Approval Center.

g) The Ex-Proof parameters of the approved products originate from Ex-Certificate received from manufacturer, not approved by CCS. This Type Approval Certification will be invalid if the approved products do not hold valid Ex-Certificate.

h）本社已审核了产品厂无石棉声明，但本社的审核不免除产品厂按照合同关系向订货方保证产品无石棉的责任。
The declaration of asbestos-free submitted by manufacturer has been reviewed by the Society. However, liability of the manufacturer to guarantee the products are asbestos-free to purchaser under contract will not be exempted.

i）本证书由原型式认可证书（No. BG23PTB00013_02）变更并替代原证书。
This Certificate is modified from and supersedes the previous Type Approval Certificate No. BG23PTB00013_02.

中国船级社卑尔根办事处
CCS Bergen Office

注：本证书含有附页，共4页
Note: The certificate is attached with additional 4 page(s)

1. K-Gauge GAS/TOP/CTS System consists of：

1) GLA-310/5 Radar Tank Gauge (RTG)
Meas. range: 0 ~ 55m
Frequency: X-band(10GHz)
Material: AISI 316L and PTFE/PEEK
Degree of protection: IP66/67
Ex-Proof Grade: II 1 G Ex ia IIC T4 Ga Ta = -45℃ to +85℃ Ta = -45℃ to +80℃ (when fitted with the GLH-320)
Ex-Certificate No.: Sira 14ATEX 2056X,
Issuing Body: Sira Certification Service,
Standards for Ex-Proof : 2014/34/EU, EN 60079-0:2012, EN 60079-11:2012

2) GC-306 Cargo Temperature Unit (CTU)
Output signal: HART
Meas. range: -200℃ ~ 50℃
Number of sensors: Max.6 temperature sensors
Material: Polystyrene plastic
Ambient temperature: -45℃ ~ 85℃
Degree of protection: IP20
Ex-Proof Grade: II 1 G Ex ia IIC T4 Ga Ta = -45℃ to +85℃
Ex-Certificate No.: Sira 14ATEX 2054X,
Issuing Body: Sira Certification Service,
Standards for Ex-Proof : 2014/34/EU, EN 60079-0:2012, EN60079-11:2012, EN 60079-26:2006

3) GLK-300 Signal Processing Unit (SPU)
Power supply: 24 VDC (18 ~ 32V)
Power consumption: 8 W typical
Communication: Dual Ethernet
Input/Output: 1 radar input, 1 HART input
Ex-Proof Grade: II (1) G [Ex ia Ga] IIB/IIC Ta: -15℃ to +70℃
Ex-Certificate No.: Presafe 14ATEX5412X,
Issuing Body: DNV GL Nemko Presafe AS,
Standards for Ex-Proof : 2014/34/EU, EN 60079-0:2012/A11:2013, EN 60079-11

4) RMP420 Remote Multipurpose I/O
Power Supply: 24 VDC
Power consumption: 10 W Typical (dissipated)
I/O: 32 Channels,Multipurpose,AI/AO/DI/DO

5) RDIOR420 Remote Digital I/O and Relay
Power Supply: 24 VDC
Power consumption: 8 W Typical (dissipated)
I/O: total 32 Channels (16 DI/DO,16 relay)

6)RCU602 Remote Controller Unit
Power Supply: 24 VDC
Power consumption: Max.20 W
Degree of protection: IP20
I/O: 4 x opto-isolated inputs,4 x opto-isolated outputs Max. 30mA / 1 x opto-isolated watchdog (for external interface) Max. 30Ma

7) RCM-300 Radar Communication Module
Power supply: 24 VDC (18 ~ 32V)
Power consumption: 5.5 W typical
Communication: 2 x RS485 din rail
Input/Output: 1 RS485 radar input, 1 HART input
Ex-Proof Grade: II (1) G [Ex ia Ga]II C
Ex-Certificate No.: DNV 22 ATEX 82891X Issue 1
Issuing Body: DNV
Standards for Ex-Proof : ATEX Directive 2014/34/EU

8) HCM-300 HART Communication Module
Power supply: 24 VDC (18 ~ 32V)
Power consumption: 1.2 W typical
Communication: 2 x RS485 din rail
Input/Output: 2 x HART input
Ex-Proof Grade: II (1) G [Ex ia Ga]II C
Ex-Certificate No.: DNV 22 ATEX 82891X Issue 1
Issuing Body: DNV
Standards for Ex-Proof : ATEX Directive 2014/34/EU

9)TCU-300 Tank Controller Unit
Power supply: 24 VDC nom. (18 to 32 V)
Power consumption: 1.5 W typical
Communication: 2 x RS485 DIN rail
Input/output: RS485 Ethernet

10)Barrier Unit
Name : KCD2-SR-Ex*.*
Ex-Proof Grade: II 3 (1) G Ex ec nC [ia Ga] IIC T4 Gc, II (1) D [Ex ia Da] IIIC and I (M1) [Ex ia Ma] I
Ex-Certificate No.: Baseefa06ATEX0092X-Issue 4
Issuing Body: SGS
Standards for Ex-Proof : EN IEC 60079-0:2018 + AC2020 EN 60079-7:2015 + A1:2018 EN 60079-11:2012 EN IEC 60079-15:2019

Name :DZ-110/U
Ex-Proof Grade: II (1) G [Ex ia Ga] IIC
Ex-Certificate No.: Presafe 14 ATEX 4368 issue 4
Issuing Body: DNV.GL
Standards for Ex-Proof : ATEX Directive 2014/34/EU

Name :MLT 7700 Series
Ex-Proof Grade: II (1) G [Ex ia Ga] IIC
Ex-Certificate No.: IECExBAS 04.0025
Issuing Body: Baseefa
Standards for Ex-Proof : EN IEC 60079-0: 2018 EN 60079-11: 2012

Name:Z-Series Shunt Zener Diode Safety Barriers
Ex-Proof Grade: II (1) GD [Ex ia Ga]II C,[Ex ia Da]III C and I M1 [Ex ia Ma] I
Ex-Certificate No.: BAS01ATEX7005 - Issue 10
Issuing Body: SGS
Standards for Ex-Proof : EN IEC 60079-0: 2018 EN 60079-11: 2012

11)Network devices for K-Gauge GAS/TOP/CTS
Cisco Catalyst1000 Series
Moxa IKS-6700Series
Fortinet FGR-60F
Fortinet FS-124F
Moxa EDR-8010-2GSFP
Moxa EDS-408A Seires
Moxa EDS-518E Seires

12) Operator Station (OS) for K-Gauge GAS/TOP/CTS
MC340 i3 GPU(Based on Windows10)
MC340 i7 GPU(Based on Windows10)
MC360 i3 LAN(Based on Windows10)
MC360 i5 GPU(Based on Windows10)
MC360 i7 LAN(Based on Windows10)
MC380 u5 Basic(Based on Windows11)
MC380 u5 LAN(Based on Windows11)
MC380 u5 Basic Extra(Based on Windows11)
MC380 u7 LAN(Based on Windows11)
MC380 u7 LAN Extra(Based on Windows11)
MC380 Ultra u7 (Based on Windows11)

13). GLA-310/5-FUEL Radar Tank Gauge For LNG Fuel Tank

14). GLA-310/5-NH3 Radar Tank Gauge For Liquefied Ammonia (NH3)

15). GLA-310/5 DUAL Radar Tank Gauge For Gas Carriers

16).GLA-310/5-LH2 Radar Tank Gauge for Liquified Hydrogen

17).K-Gauge GL-300 based multifunction system with dual radar

2.Listing of the K-Gauge GAS/TOP/CTS system components:

--Main cabinet
--Radar Tank Gauge (RTG)
--Cargo temperature unit (CTU)
--Signal processing unit
--Tank pressure transmitters
--Cargo temperature sensors
--Operation stations and panels
--Zener barriers
--Remote controller unit RCU602
--Remote I/O unit RMP420, RDIOR420
--Other units RSER200-4, RHUB200-5

3.Description of the K-Gauge GAS/TOP/CTS system

--K-Gauge CTS is tank monitoring and custody transfer measurement system.
--K-Gauge GAS is tank monitoring system for gas carriers.
--K-Gauge TOP is independent high level and overfill alarm system. The K-Gauge TOP mentioned in this certificate is the system with radar sensor, and is intended to be used for gas carriers and for vessels using liquefied gases as fuel.
--The K-Gauge GAS/TOP/CTS system utilizes K-Chief as its tank monitoring and control platform ,the asset inventory documents 110-0066104 Asset Inventory K-Chief K-Safe is applicable for K-Gauge GAS/TOP/CTS.