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Automation - Functional Safety

**Report about the evaluation of the K-Safe System
of Kongsberg Maritime**

**Report-No.: 968/EL 161.17/19
Date: 2019-01-18**

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Date:	2019-01-18
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Product / Project:	K-Safe System
Customer / Manufacturer:	KONGSBERG MARITIME AS Kirkegardsveien 45, Carpus P.O. Box 483 3616 Kongsberg Norway
Customer-Order-No. / Date:	001-45033 dated 2017-08-21
Certification Body:	TÜV Rheinland Industrie Service GmbH Automation - Functional Safety (A-FS) Am Grauen Stein 51105 Köln Germany
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Assessor / Expert:	Merlin Hilger, M.Sc.
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The results are exclusively related to the product/project.

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Contents	Page
1. Scope	4
2. Standards forming the basis for the requirements	4
3. Identification of the product / project under assessment	4
3.1. Description of the product / project	4
3.2. Previous reports and certificates	4
3.3. Documents compiled by TÜV Rheinland	5
4. Objectives and results of the assessment	5
4.1. Evaluation procedure	5
4.2. Results of the assessment of the individual objects	5
4.2.1. Results of the assessment	5
4.3. Assessment of the changes in the relevant standards forming the basis for the requirements	5
4.4. Application standards	6
5. Summary	6

1. Scope

This report summarises the evaluation activities covered in the previous reports. This report serves as the basis for the reissue of the certificate.

2. Standards forming the basis for the requirements

[N1] IEC 61508:2010, Part 1 to 7
Functional safety of electrical/electronic/programmable electronic safety-related systems

The requirements of the listed standards were forming the basis for the assessment documented in this report so far relevant and to the extent applicable.

Statements are further given about a possible use of the product in applications in accordance with the standards listed as follows:

[N2] IEC 61511-1:2016 + Corr.1:2016 + AMD1:2017 (for the application of the system)
Functional safety - Safety instrumented systems for the process industry sector

[N3] EN 54-2:1997 + AC:1999 + A1:2006 (as far as applicable)
Fire detection and fire alarm systems - Part 2: Control and indicating equipment

[N4] NFPA 72:2016 (as far as applicable)
National Fire Alarm and Signaling Code Handbook

[N5] EN 60945:2002 + Corr. 1:2008
Maritime navigation and radiocommunication equipment and systems - General requirements Methods of testing and required test results

3. Identification of the product / project under assessment

3.1. Description of the product / project

The K-Safe System (former AIM System) of Kongsberg Maritime safety product range is a safety related controller system consisting of several hardware and software components. See revision list [T1] for details.

3.2. Previous reports and certificates

	Report-No.	Date	Certificate	Date
[R1]	968/EL 161.00/02	2002-01-31	968/EL 161.00/02	2002-01-31
[R2]	968/EL 161.01/04	2004-12-01	968/EL 161.00/02	2004-12-01
[R3]	968/EL 161.02/08	2008-07-08	968/EL 161.02/08	2008-07-08
[R4]	968/EL 161.03/10	2010-02-09	968/EL 161.03/10	2010-02-09
[R5]	968/EL 161.04/10	2010-04-09	968/EL 161.04/10	2010-04-09
[R6]	968/EL 161.05/14	2014-01-27	968/EL 161.05/14	2014-01-27
[R7]	968/EL 161.06/18	2018-02-13	-/-	-/-
[R8]	968/EL 161.07/18	2018-02-22	-/-	-/-
[R9]	968/EL 161.08/18	2018-03-27	-/-	-/-
[R10]	968/EL 161.09/18	2018-04-11	-/-	-/-
[R11]	968/EL 161.10/18	2018-04-12	-/-	-/-
[R12]	968/EL 161.11/18	2018-04-30	-/-	-/-
[R13]	968/EL 161.12/18	2018-09-25	-/-	-/-
[R14]	968/EL 161.13/18	2018-11-16	-/-	-/-

	Report-No.	Date	Certificate	Date
[R15]	968/EL 161.14/18	2018-11-23	-/-	-/-
[R16]	968/EL 161.15/19	2019-01-14	-/-	-/-
[R17]	968/EL 161.16/19	2019-01-18	-/-	-/-

3.3. Documents compiled by TÜV Rheinland

	Document name	Rev.	Date
[T1]	Revision List File: EL_161_17_19_RL_2019_01_18.docx	2.0	2019-01-18

4. Objectives and results of the assessment

4.1. Evaluation procedure

The evaluation procedures were planned individual for each of the already performed evaluation. For details see the reports [R7] - [R17].

4.2. Results of the assessment of the individual objects

4.2.1. Results of the assessment

The results of the individual assessments are documented in the reports [R7] - [R17].

4.3. Assessment of the changes in the relevant standards forming the basis for the requirements

For the components AIM, RBUS, NetIOSafe, ProfiBus, ProfiBusSlaveRedundancy, RDIO 420S (Firmware) and RCU502 the effect of the modification of the standards on the objects of evaluation was dealt with in the individual reports (see [R7] - [R17]).

The components KSFC, K-Safe Builder, RCU502i and RMP422S(i) were new developments, that were evaluated according to the latest standards and therefore do not require an impact analysis.

The components RCU501, AIM 8.6.0, RDIO 420S (Hardware) and RMP420S were not changed since the last approval [R6]. The assessment of the effect of the modification of the standards on these objects of evaluation is displayed in Table 1.

Table 1: Overview changes in relevant standards

	Actual standard	Standards applied at the latest inspection	Essential relevant changes	Assessment
[N1]	IEC 61508:2010, Part 1 to 7	IEC 61508:2010 Part 1 to 7	--	fulfilled
[N2]	IEC 61511-1:2016+ Corr. 1:2016 + AMD1: 2017	IEC 61511:2004, Part 1 to 3	No relevant changes	fulfilled
[N3]	EN 54-2:1997 + AC:1999 + A1:2006	EN 54-2:1997 + AC:1999 + A1:2006	--	fulfilled
[N4]	NFPA 72:2016	NFPA 72:2013	No relevant changes	fulfilled
[N5]	EN 60945:2002 + Corr. 1:2008	EN 60945:2002	No relevant changes	fulfilled

4.4. Application standards

The K-Safe System complies with the relevant requirements of EN 54-2 and can be used within fire detection and fire alarm systems if used in accordance with the application requirements described in EN 54-2.

The K-Safe System also complies with the relevant requirements of NFPA 72 and can be used within fire alarm and emergency communication systems if used in accordance with the application requirements described in NFPA 72.

The K-Safe System fulfils the requirements for SC 3 and SIL 3 in accordance with IEC 61508 and therefore can be used within the scope of this standard if used in accordance with the application requirements described in IEC 61511-1.

5. Summary

The re-assessment of the K-Safe System of customer Kongsberg Maritime AS came to the result, that the requirements of the applicable standards as listed in chapter 2 are met.

The product complies with the requirements of the relevant standards (SIL 3 / SC 3 acc. to IEC 61508 and IEC 61511-1) and can be used in applications up to SIL 3 acc. to IEC 61508 and IEC 61511-1.

The restrictions and conditions of the previous approvals apply. In particular, for all applications a safe state must exist and the demand to trip must be defined. The frequency of demands must be low (low demand mode of operation according to the IEC 61508). The user has to ensure that the complete safety function for his application conforms to the required Safety Integrity Level.

The renewal of the certificate is recommended.

Cologne, 2019-01-18
TIS/A-FS/Kst. 962 Hi-nie

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