


## Type Approval Certificate Extension

*This is to certify that Certificate No. 98/20023 (E2) for the undemoted products is extended and renumbered as shown.*

This certificate is issued to:

<b>PRODUCER</b>	KME Germany AG & Co. KG Klosterstraße 29 49074 Osnabrück Germany
<b>DESCRIPTION</b>	Tubes with plastic sheath and tube bundles. Tube material from either copper, copper-nickel or stainless steel, jacket material from either KME type OSNA 2000 Type 1, PE-LD, OSNA PE HM2 or OSNA TPU. Insulated tubes and traced tube bundles with electric heaters or steam tracing. OSNALINE® Protection tube with crude oil resistant and antistatic outer jacket for cargo tanks
<b>TYPE</b>	OSNALINE® Tubes and Tube Bundles, Multitubing, Multicore, OSNALINE® Protection
<b>APPLICATION</b>	Hydraulic and pneumatic control lines on ships, offshore installations and in chemical and petrochemical industries classed or intended for Classification with Lloyd's Register.
<b>STANDARD</b>	ASTM B 68, B 75, DIN EN 13600, 12449, 12451, 1127, 10216-5, 10217-7, DIN 8905, VDE 0207 T 3, 5 and 24, IEC 332-1 Part 1, IEC 332 - 1 Part 3 Category A/F, AD 2000 Merkblatt W2
<b>Certificate No.</b>	98/20023 (E3)
<b>Issue Date</b>	25 April 2013
<b>Expiry Date</b>	28 February 2018
<b>Sheet</b>	1 of 3

  
**Olaf Schmidt**  
Hamburg Design Support Office  
Lloyd's Register EMEA

*Lloyd's Register EMEA  
71 Fenchurch Street, London EC3M 4BS*

## RATINGS

## M.A.W.P. (bar) of metallic tubes.

Tube size (mm)		Tube Materials														
		Copper		CuNi		Stainless steel										
		CW024A		CW352H		1.4571/AISI316Ti		1.4301/AISI304			1.4404/AISI316L, 1.4435/AISI316L (min. 2.5% Mo)					
Tubes per bundle		Working temperature °C														
		50	100	50	100	welded	seamless	20	50	100	20	50	100	20	50	100
6 x 0,5	1 to 19	-	-	-	-	•	-	189	182	167	-	-	-	-	-	-
6 x 1,0	1 to 19	145	141	-	-	•	•	412	396	363	-	-	-	-	-	-
8 x 0,5	1 to 19	-	-	-	-	•	-	139	134	123	129	117	104	-	-	-
8 x 1,0	1 to 19	104	101	172	170	•	•	296	285	261	275	249	221	268	256	234
10 x 0,8	1 to 19	64	62	-	-	•	-	181	174	159	168	153	135	164	157	143
10 x 1,0	1 to 19	81	79	135	133	•	•	231	222	203	214	195	173	209	200	182
10 x 1,2	1 to 19	-	-	165	162	-	-	283	272	249	-	-	-	-	-	-
10 x 1,5	1 to 19	-	-	212	209	-	•	364	350	321	338	307	272	329	316	288
12 x 1,0	1 to 10	66	65	110	109	•	•	189	182	167	176	159	141	171	164	150
12 x 1,5	1 to 10	104	101	172	170	•	•	296	285	261	275	249	221	268	256	234
Tube size (inch)																
1/4" x 0,035"	1 to 19	118	115	-	-	•	•	336	324	296	-	-	-	304	292	266
1/4" x 0,040"	1 to 19	-	-	-	-	-	•	-	-	-	-	-	-	355	340	310
1/4" x 0,049"	1 to 19	121	118	-	-	-	•	-	-	-	-	-	-	450	431	393
3/8" x 0,035"	1 to 19	-	-	-	-	•	•	214	206	189	-	-	-	194	182	169
3/8" x 0,040"	1 to 19	87	84	144	141	-	-	-	-	-	-	-	-	-	-	-
3/8" x 0,049"	1 to 19	-	-	181	178	•	•	311	298	274	-	-	-	280	269	245
3/8" x 0,062"	1 to 19	-	-	-	-	-	•	-	-	-	-	-	-	368	352	321
1/2" x 0,035"	1 to 10	55	54	-	-	•	•	157	151	138	-	-	-	142	136	124
1/2" x 0,040"	1 to 10	63	62	105	103	-	-	-	-	-	-	-	-	-	-	-
1/2" x 0,062"	1 to 10	-	-	-	-	-	•	292	281	257	-	-	-	265	254	232

Certificate No.

98/20023 (E3)

Issue Date

25 April 2013

Expiry Date

28 February 2018

Sheet

2 of 3

  
Olaf Schmidt  
Hamburg Design Support Office  
Lloyd's Register EMEA

Lloyd's Register EMEA  
71 Fenchurch Street, London EC3M 4BS

Lloyd's Register Group Limited, its affiliates and subsidiaries and their respective officers, employees or agents are, individually and collectively, referred to in this clause as the 'Lloyd's Register'. Lloyd's Register assumes no responsibility and shall not be liable to any person for any loss, damage or expense caused by reliance on the information or advice in this document or howsoever provided, unless that person has signed a contract with the relevant Lloyd's Register entity for the provision of this information or advice and in that case any responsibility or liability is exclusively on the terms and conditions set out in that contract.

**RATINGS, CONT:**

**Temperature limits for plastic jackets**

KME Type	during assembly		before and after assembly	
	[°C]		[°C]	
	min.	max.	min.	max.
OSNA 2000 Type 1	-5	+50	-40	+80
PE-LD	-20	+50	-60	+70
OSNA PE HM2	-15	+50	-25	+80
OSNA TPU	-40	+50	-60	+120
OSNA Protection	-20	+50	-20	+100

**Minimum bending radius**

Tube bundles copper : 8 x dia.  
 Tube bundles st. steel and CuNi : 10 x dia.  
 Single tubes : 6 x dia.

**TEST CONDITIONS**

Pressure test to 1.5 times the M.A.W.P. All tubes to be checked after coiled around drums by ball test in order to ensure the roundness of the tubes.

**OTHER CONDITIONS**

Tube ends to be protected by shrink caps.

*"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."*

*The attached Design Appraisal Document No. HMD 10868-03, Issue No. 2, dated 25.04.2013 and its supplementary Type Approval Terms and Conditions form part of this Certificate.*

All other details remain as the previous Certificate No. 98/20023 (E2) to which this extension should be attached.

**Certificate No.** 98/20023 (E3)  
**Issue Date** 25 April 2013  
**Expiry Date** 28 February 2018  
**Sheet** 3 of 3



**Olaf Schmidt**  
 Hamburg Design Support Office  
 Lloyd's Register EMEA

Lloyd's Register EMEA  
 71 Fenchurch Street, London EC3M 4BS



# Marine Design Appraisal Document

Lloyd's Register EMEA  
Hamburg Design Support Office  
Am Sandtorkai 41  
20457 Hamburg  
Telephone +49 (0)40 328107 - 0 Fax +49 (0)40 328107 - 480  
Email: hamburg-design-support@lr.org

Date  
25 April 2013

Please quote this reference number on all future communications  
HPC 0810189/29181-13/OS/HR

**THE LLOYD'S REGISTER'S TYPE APPROVAL SYSTEM, 2002  
ISSUED TO: KME GERMANY AG & CO. KG  
FOR:  
OSNALINE® TUBES AND TUBE BUNDLES, MULTITUBING,  
MULTICORE, OSNALINE® PROTECTION**

**TYPE APPROVAL CERTIFICATE NO. 98/20023 (E3)**

**This Marine Design Appraisal Document supersedes and cancels  
document number HMD 10868-03, Issue No. 1, dated 27.02.2009**

The undernoted documents have been reviewed for compliance with the requirements of the Lloyd's Register's Type Approval System, 2002, and this Design Appraisal Document forms part of the Certificate.

## COMMENTS

1. Hydraulic tests before installation on board in compliance with Part 5, Chapter 12, Section 8 of the Rules have to be carried out to the attending surveyors' satisfaction.

Olaf Schmidt  
Senior Surveyor  
Engineering Systems  
Hamburg Design Support Office  
Lloyd's Register EMEA  
T +49 (0)40 328107-460  
E olaf.schmidt@lr.org

FINAL ACCEPTANCE OF ACTUAL ITEM(S) DEPEND(S) ON SATISFACTORY SURVEY AND TESTING

Lloyd's Register EMEA  
Is a subsidiary of Lloyd's Register Group Limited

Lloyd's Register Group Limited, its affiliates and subsidiaries and their respective officers, employees or agents are, individually and collectively, referred to in this clause as 'Lloyd's Register'. Lloyd's Register assumes no responsibility and shall not be liable to any person for any loss, damage or expense caused by reliance on the information or advice in this document or howsoever provided, unless that person has signed a contract with the relevant Lloyd's Register entity for the provision of this information or advice and in that case any responsibility or liability is exclusively on the terms and conditions set out in that contract.

Lloyd's Register EMEA  
Hamburg Design Support Office  
Am Sandtorkai 41  
20457 Hamburg  
Telephone +49 (0)40 328107 - 0 Fax +49 (0)40 328107 - 480  
Email: hamburg-design-support@lr.org

Date  
25 April 2013

Please quote this reference number on all future communications  
HPC 0810189/29181-13/OS/HR

## APPROVAL DOCUMENTATION

Form LR2571	Application for Type Approval and/or MED	24.04.2013
78M RB Rev 3	Product Specification	16.04.2013
78M P Rev 0	Product Specification	03/2013
HMD 9800041 T	Design Appraisal Document	24.02.1998

## TEST REPORTS

HPC0810189	Visit Report	18.03.2013
03/101	IEC 60332-3-22, Cat. A/F Pipe bundle OSNA TPU	03.06.2003
08/0543e	IEC 60332-3-21-2000, Cat. A/F PVC Outer Sheet OSNA 2000 Pb free	24.06.2008
07/117e	IEC 60332-3-22, Cat. A/F Pipe bundle OSNA PE HM2	13.02.2007
VN00.1.1	IEC 332-1-1 PCV YM3 – Tube 1x12x1/1.4571	28.06.2000
VN00.1.2	IEC 332-1-1 PCV YM3 – Tube bundle 2x8x1/1.4571	28.06.2000
VN00.1.3	IEC 332-1-1 PCV YM3 – Tube bundle 4x10x1/1.4571	28.06.2000
VN00.1.4	IEC 332-1-1 PCV YM3 – Tube bundle 10x8x1/1.4571	28.06.2000
VN00.1.5	IEC 332-1-1 PCV YM3 – Tube bundle 19x9.52x1.25/1.4571	28.06.2000

## Supplementary Type Approval Terms and Conditions

*Type Approval certifies that a representative sample of the product(s) referred to herein has/have been found to meet the applicable design criteria for the use specified herein. It does not mean or imply approval for any other use, nor approval of any product(s) designed or manufactured otherwise than in strict conformity with the said representative sample.*

*Type Approval is based on the understanding that the manufacturer's recommendations and instructions and any relevant requirements of the Rules and Regulations are complied with.*

*Type Approval does not eliminate the need for normal inspection and survey procedures required by the Rules and Regulations.*

*Lloyd's Register EMEA reserves the right to cancel or withdraw this Type Approval Certificate in accordance with the LR Type Approval System Procedure.*

FINAL ACCEPTANCE OF ACTUAL ITEM(S) DEPEND(S) ON SATISFACTORY SURVEY AND TESTING

Lloyd's Register EMEA  
Is a subsidiary of Lloyd's Register Group Limited

Lloyd's Register Group Limited, its affiliates and subsidiaries and their respective officers, employees or agents are, individually and collectively, referred to in this clause as 'Lloyd's Register'. Lloyd's Register assumes no responsibility and shall not be liable to any person for any loss, damage or expense caused by reliance on the information or advice in this document or howsoever provided, unless that person has signed a contract with the relevant Lloyd's Register entity for the provision of this information or advice and in that case any responsibility or liability is exclusively on the terms and conditions set out in that contract.

**Part 1A**  
**Subject: Pipe and Pipe Couplings**  
**Product: Tube and Tube Bundles (Part 1A)**

Producer/Licence No.		Description of Product		Cert. No.																																	
Type	Details of Approval	Application	Remarks																																		
OSNALINE® Tubes and Tube Bundles, Multitubing Multicore, OSNALINE® Protection	<p>Tubes with plastic sheath and tube bundles. Tube material from either copper, copper-nickel or stainless steel, jacket material from either KME type OSNA 2000 Type 1, PE-LD, OSNA PE HM2 or OSNA TPU. Insulated tubes and traced tube bundles with electric heaters or steam tracing. OSNALINE® Protection tube with crude oil resistant and anti-static outer jacket for cargo tanks</p> <p>Ratings: Temperature limits for plastic jackets</p> <table border="1"> <thead> <tr> <th rowspan="2">KME Type</th> <th colspan="2">during assembly [°C]</th> <th colspan="2">before and after assembly [°C]</th> </tr> <tr> <th>min.</th> <th>max.</th> <th>min.</th> <th>max.</th> </tr> </thead> <tbody> <tr> <td>OSNA 2000 Type 1</td> <td>-5</td> <td>+50</td> <td>-40</td> <td>+80</td> </tr> <tr> <td>PE-LD</td> <td>-20</td> <td>+50</td> <td>-60</td> <td>+70</td> </tr> <tr> <td>OSNA PE HM2</td> <td>-15</td> <td>+50</td> <td>-25</td> <td>+80</td> </tr> <tr> <td>OSNA TPU</td> <td>-40</td> <td>+50</td> <td>-60</td> <td>+120</td> </tr> <tr> <td>OSNA Protection</td> <td>-20</td> <td>+50</td> <td>-20</td> <td>+100</td> </tr> </tbody> </table> <p><u>Minimum bending radius</u>            Tube bundles copper : 8 x dia.            Tube bundles st. steel and CuNi : 10 x dia.            Single tubes : 6 x dia.</p>	KME Type	during assembly [°C]		before and after assembly [°C]		min.	max.	min.	max.	OSNA 2000 Type 1	-5	+50	-40	+80	PE-LD	-20	+50	-60	+70	OSNA PE HM2	-15	+50	-25	+80	OSNA TPU	-40	+50	-60	+120	OSNA Protection	-20	+50	-20	+100	Hydraulic and pneumatic control lines on ships, offshore installations and in chemical and petrochemical industries classed or intended for Classification with Lloyd's Register	Expires: 28 February 2018
KME Type	during assembly [°C]		before and after assembly [°C]																																		
	min.	max.	min.	max.																																	
OSNA 2000 Type 1	-5	+50	-40	+80																																	
PE-LD	-20	+50	-60	+70																																	
OSNA PE HM2	-15	+50	-25	+80																																	
OSNA TPU	-40	+50	-60	+120																																	
OSNA Protection	-20	+50	-20	+100																																	
KME Germany AG & Co KG, Klosterstraße 29, 49074 Osnabrück, Germany.				98/20023(ES)																																	

**Part 1A**  
**Subject: Pipe and Pipe Couplings**  
**Product: Tube and Tube Bundles (Part 1A)**

Producer/Licence No.	Description of Product					Cert. No.																																																																																									
	Type	Details of Approval	Application	Remarks																																																																																											
		<p><u>Ratings. cont.</u>  <u>M.A.W.P. (bar) of metallic tubes</u></p> <table border="1"> <thead> <tr> <th>Tube size (mm)</th> <th>Tubes per bundle</th> <th>Copper CW024A Working temperature °C</th> <th>Tube Materials CuNi CW352H Working temperature °C</th> <th></th> <th></th> </tr> </thead> <tbody> <tr> <td>6 x 1,0</td> <td>1 to 19</td> <td>50 100 145</td> <td>50 141</td> <td>100</td> <td>-</td> </tr> <tr> <td>8 x 1,0</td> <td>1 to 19</td> <td>104</td> <td>101</td> <td>172</td> <td>170</td> </tr> <tr> <td>10 x 0,8</td> <td>1 to 19</td> <td>64</td> <td>62</td> <td>-</td> <td>-</td> </tr> <tr> <td>10 x 1,0</td> <td>1 to 19</td> <td>81</td> <td>79</td> <td>135</td> <td>133</td> </tr> <tr> <td>10 x 1,2</td> <td>1 to 19</td> <td>-</td> <td>-</td> <td>165</td> <td>162</td> </tr> <tr> <td>10 x 1,5</td> <td>1 to 19</td> <td>-</td> <td>-</td> <td>219</td> <td>209</td> </tr> <tr> <td>12 x 1,0</td> <td>1 to 10</td> <td>66</td> <td>65</td> <td>110</td> <td>109</td> </tr> <tr> <td>12 x 1,5</td> <td>1 to 10</td> <td>104</td> <td>101</td> <td>172</td> <td>170</td> </tr> <tr> <td>1/4" x0,035"</td> <td>1 to 19</td> <td>118</td> <td>115</td> <td>-</td> <td>-</td> </tr> <tr> <td>1/4" x0,049"</td> <td>1 to 19</td> <td>121</td> <td>118</td> <td>-</td> <td>-</td> </tr> <tr> <td>3/8" x0,040"</td> <td>1 to 19</td> <td>87</td> <td>84</td> <td>144</td> <td>141</td> </tr> <tr> <td>3/8" x0,049"</td> <td>1 to 19</td> <td>-</td> <td>-</td> <td>181</td> <td>178</td> </tr> <tr> <td>1/2" x0,035"</td> <td>1 to 10</td> <td>55</td> <td>54</td> <td>-</td> <td>-</td> </tr> <tr> <td>1/2" x0,040"</td> <td>1 to 10</td> <td>63</td> <td>62</td> <td>105</td> <td>103</td> </tr> </tbody> </table>	Tube size (mm)	Tubes per bundle	Copper CW024A Working temperature °C	Tube Materials CuNi CW352H Working temperature °C			6 x 1,0	1 to 19	50 100 145	50 141	100	-	8 x 1,0	1 to 19	104	101	172	170	10 x 0,8	1 to 19	64	62	-	-	10 x 1,0	1 to 19	81	79	135	133	10 x 1,2	1 to 19	-	-	165	162	10 x 1,5	1 to 19	-	-	219	209	12 x 1,0	1 to 10	66	65	110	109	12 x 1,5	1 to 10	104	101	172	170	1/4" x0,035"	1 to 19	118	115	-	-	1/4" x0,049"	1 to 19	121	118	-	-	3/8" x0,040"	1 to 19	87	84	144	141	3/8" x0,049"	1 to 19	-	-	181	178	1/2" x0,035"	1 to 10	55	54	-	-	1/2" x0,040"	1 to 10	63	62	105	103			
Tube size (mm)	Tubes per bundle	Copper CW024A Working temperature °C	Tube Materials CuNi CW352H Working temperature °C																																																																																												
6 x 1,0	1 to 19	50 100 145	50 141	100	-																																																																																										
8 x 1,0	1 to 19	104	101	172	170																																																																																										
10 x 0,8	1 to 19	64	62	-	-																																																																																										
10 x 1,0	1 to 19	81	79	135	133																																																																																										
10 x 1,2	1 to 19	-	-	165	162																																																																																										
10 x 1,5	1 to 19	-	-	219	209																																																																																										
12 x 1,0	1 to 10	66	65	110	109																																																																																										
12 x 1,5	1 to 10	104	101	172	170																																																																																										
1/4" x0,035"	1 to 19	118	115	-	-																																																																																										
1/4" x0,049"	1 to 19	121	118	-	-																																																																																										
3/8" x0,040"	1 to 19	87	84	144	141																																																																																										
3/8" x0,049"	1 to 19	-	-	181	178																																																																																										
1/2" x0,035"	1 to 10	55	54	-	-																																																																																										
1/2" x0,040"	1 to 10	63	62	105	103																																																																																										

**Part 1A**  
**Subject: Pipe and Pipe Couplings**  
**Product: Tube and Tube Bundles (Part 1A)**

Producer/Licence No.	Description of Product										Cert. No.
	Type	Ratings, cont.			Details of Approval			Application			
		M.A.W.P. (bar) of metallic tubes. Tube Materials Stainless steel									
		1.4571/AISI316Ti			1.4301/AISI304			1.4404/AISI316L, 1.4435/AISI316L (min. 2.5%Mo)			
	Tube size (mm)	20	50	100	20	50	100	20	50	100	
	Tubes per bundle	189	182	167	-	-	-	-	-	-	
	6 x 0,5	412	396	363	-	-	-	-	-	-	
	6 x 1,0	139	134	123	129	117	104	-	-	-	
	8 x 0,5	296	285	261	275	249	221	268	256	234	
	8 x 1,0	181	174	159	168	153	135	164	157	143	
	10 x 0,8	231	222	203	214	195	173	209	200	182	
	10 x 1,0	283	272	249	-	-	-	-	-	-	
	10 x 1,2	364	350	321	338	307	272	329	316	288	
	10 x 1,5	189	182	167	176	159	141	171	164	150	
	12 x 1,0	296	285	261	275	249	221	268	256	234	
	12 x 1,5	336	324	296	-	-	-	304	292	266	
	1/4" x 0,035"	-	-	-	-	-	-	355	340	310	
	1/4" x 0,040"	-	-	-	-	-	-	450	431	393	
	1/4" x 0,049"	214	206	189	-	-	-	194	182	169	
	3/8" x 0,035"	311	298	274	-	-	-	280	269	245	
	3/8" x 0,049"	-	-	-	-	-	-	368	352	321	
	1/2" x 0,035"	157	151	138	-	-	-	142	136	124	
	1/2" x 0,062"	292	281	257	-	-	-	265	254	232	