

AU-100-9

Approval Certificates for BITZER compressors, expanders and pressure vessels	
English	2

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Subject to change



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1 Compressor and expander selection

1.1 DNV•GL

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4JTEM(U), page	4HTEM(U), page	4GTEM(U), page	4DTEM(U), page	4CTEM(U), page	6FTEM(U), page
78	78	78	78	78	80
see chapter 6DTEM(U), page 80	see chapter 6CTEM(U), page 80	see chapter 4TMEM, page 86	see chapter 4PMEM, page 86		

Tab. 4: Compressor selection DNV-GL semi-hermetic reciprocating compressors for applications with R744

see chapter 2T,	see chapter 2N,	see chapter 4T,	see chapter 4P,	see chapter 4N,	see chapter 4H,
page 93	page 93	page 95	page 95	page 95	page 97
see chapter 4G, page 97	see chapter 6F, page 99	see chapter 6G, page 99	see chapter 6H, page 99		

Tab. 5: Compressor selection open drive reciprocating compressors



1.2 RINA Type Approvals

see cha	<u>oter</u>	see chapter	see chapter	see chapter
CS.65, p	age 36	CS.75, page 36	CS.85, page 36	CS.95, page 36

Tab. 6: Compressor selection screw compressors

see chapter HSE.64, page	<u>see chapter</u> HSE.85, page	<u>see chapter</u> HSE.95, page
<u>age</u>	<u>HSE.85, page</u>	<u>HSE.95, page</u>
<u>52</u>	<u>52</u>	<u>52</u>

Tab. 7: Expanders

1.3 Russian Maritime Register of shipping

see chapter CSH65, page 41	see chapter CSH75, page 41	see chapter CSH85, page 41	see chapter CSH95, page 41
see chapter HS53, page 44	see chapter HS64, page 44	see chapter HS74, page 44	see chapter HS85, page 44
see chapter OS53, page 47	see chapter OS74, page 47	see chapter OS85, page 47	see chapter OS95, page 47

Tab. 8: Compressor selection screw compressors (Russian Maritime Register of shipping)

see chapter 4J,	see chapter 4H,	see chapter 4G,	see chapter 4F,	see chapter 6J,	see chapter 6H,
page 102	page 102	page 102	page 102	page 102	page 102
see chapter 6G, page 102	see chapter 6F, page 102				
see chapter 4JE,	see chapter 4HE,	<u>see chapter</u>	see chapter 4FE,	see chapter 6JE,	see chapter 6HE,
page 102	page 102	4GE, page 102	page 102	page 102	page 102
see chapter 6GE, page 102	see chapter 6FE, page 102				

Tab. 9: Compressor selection semi-hermetic reciprocating compressors (Russian Maritime Register of shipping)

see chapter 2T,	see chapter 2N,	see chapter 4T,	see chapter 4P,	see chapter 4N,	see chapter 4G,
page 104	page 104	page 104	page 104	page 104	page 104
see chapter 4H, page 104	see chapter 6H, page 104	see chapter 6G, page 104	see chapter 6F, page 104		
<u>see chapter</u>	<u>see chapter</u>	see chapter	see chapter	see chapter	<u>see chapter</u>
<u>W2TA, page 104</u>	<u>W2NA, page 104</u>	W4TA, page 104	W4PA, page 104	W4NA, page 104	<u>W4HA, page 104</u>
<u>see chapter</u> <u>W4GA, page 104</u>	<u>see chapter</u> <u>W6HA, page 104</u>	<u>see chapter</u> <u>W6GA, page 104</u>	see chapter W6FA, page 104		

Tab. 10: Compressor selection open drive reciprocating compressors (Russian Maritime Register of shipping)



- 2 Screw compressors
- 2.1 DNV
- 2.1.1 Semi-hermetic compact screw compressors



Type Approval Certificate for CS.65

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documention is required. For supplied compressors it is not possible to deliver the required extended product documentation subsequently. Additional costs for extended product documentation will be charged.

DNV			
		Contificate N	la.
TYPE APPROVAL (CERTIFICATE	Certificate N TAM0000N Revision No 2	N 6
This is to certify:			
That the Refrigerant Compressor			
with type designation(s) CS.65			
Issued to BITZER Kühlmaschine Sindelfingen, Germany	nbau GmbH		
is found to comply with DNV rules for classification – Ship	os Pt.4 Ch.5 Rotating machi	nery – driven units	
Application :			
Products approved by this certificate Max. working 28 bar	te are accepted for installa	tion on all vessels classed by DNV.	
	ants, HFC-single-componen FO/HFC refrigerant blends,	t refrigerants, HFC-refrigerant blends, see page 2	HFO-
Issued at Hamburg on 2022-07-28			
This Certificate is valid until 2027-07-2 DNV local station: Augsburg	27.	for DNV	
A) (2005) 12 (2007) 13 (2007)	ner		
Approval Engineer: Christian Kaemm	ner	Olaf Drews	
A) (2005) 12 (2007) 13 (2007)	ner	Olaf Drews Head of Section	
A) (2005) 12 (2007) 13 (2007)	ner		
A) (2005) 12 (2007) 13 (2007)	ner		
A) (2005) 12 (2007) 13 (2007)	ner		
A) (2005) 12 (2007) 13 (2007)	ner		
A) (2005) 12 (2007) 13 (2007)	ner		
A) (2005) 12 (2007) 13 (2007)	ner		
A) (2005) 12 (2007) 13 (2007)	ner		
A) (2005) 12 (2007) 13 (2007)	ner		
A) (2005) 12 (2007) 13 (2007)	ner		
A) (2005) 12 (2007) 13 (2007)	erleaf. Any significant change in design	Head of Section	
Approval Engineer: Christian Kaemm This Certificate is subject to terms and conditions ow The validity date relates to the Type Approval Certific LEGAL DISCLAIMER: Unless otherwise stated in the parent companies and their subsidiaries as well as th purpose of the issuance of this document or reliance	erleaf. Any significant change in design cate and not to the approval of equipmer e applicable contract with the holder of their officers, directors and employees ("	Head of Section	ered for the
Approval Engineer: Christian Kaemm This Certificate is subject to terms and conditions ow The validity date relates to the Type Approval Certific LEGAL DISCLAIMER: Unless otherwise stated in the parent companies and their subsidiaries as well as the purpose of the issuance of this document or reliance circumstance be limited to 300,000 USD.	erleaf. Any significant change in design cate and not to the approval of equipmer e applicable contract with the holder of their officers, directors and employees ("	r construction may render this Certificate invalid. **Disystems installed.** **Is document, or following from mandatory law, the liability box on the content of the cont	ered for the
Approval Engineer: Christian Kaemm This Certificate is subject to terms and conditions ow The validity date relates to the Type Approval Certific LEGAL DISCLAIMER: Unless otherwise stated in the parent companies and their subsidiaries as well as th purpose of the issuance of this document or reliance	erleaf. Any significant change in design cate and not to the approval of equipmere applicable contract with the holder of their officers, directors and employees ("I thereon, whether in contract or in tort (ii	reconstruction may render this Certificate invalid. It systems installed. It is document, or following from mandatory law, the liability NV') arising from or in connection with the services rende including negligence), shall be limited to direct losses and to	ered for the under any





Job Id: 262.1-022526-5 TAM00000W6 Certificate No:

Revision No:

Product description

Semi-Hermetic Compact Screw Compressor

CSH High condensing: CSW Low condensing:

CSH6553-35 CSH6553-50 CSW6583-40 CSW6583-50 CSH6563-40 CSW6593-50 CSH6563-60 CSW6593-60

CSH6583-50 CSH6593-60

Casing Material: EN-GJL-250

EN-GJS-600-3, EN-GJS-500-7 EN-GJS-400-3 (only female rotor) Screw Rotor Material:

Oil Separator Material: EN-GJS-400-18-RT

Usable Refrigerants

HCFC-refrigerants of the safety group A1 and Fluid Group 2 PED

HFC-single-component refrigerants of the safety group A1 and Fluid Group 2 PED

HFC-refrigerant blends of the safety group A1 and Fluid Group 2 PED HFO-refrigerant of safety group A2L and Fluid Group 1

HFO-refrigerant of safety group A2L and Fluid Group 2 HFO/HFC refrigerant blends of safety group A1 and PED fluid group 2

Note: Fluid Groups acc. to PED = Pressure equipment directive 2014/68/EU Safety Groups acc. to EN DIN 378-1:2017-03

Application

Air Conditioning, Provision Cooling, Cargo Refrigeration.

Production place

BITZER Kühlmaschinenbau GmbH, Werk Rottenburg, D-72108 Rottenburg/Ergenzingen // Germany

Tests to be carried out

Compressors are subject to a performance test at the manufacturer's works under supervision of DNV and are to be presented for final inspection.

Type Approval documentation

Marking of product

The product shall be marked with manufacturer's name, year of construction, effective suction rate [m3/h], discharge pressure [bar], speed [rpm], shaft power [kW], serial number.

Periodical assessment

For retention of the Type Approval, a DNV Surveyor shall perform periodical assessment to verify that the conditions for the Type Approval are complied with. Refer to the Class Programme DNV-CP-0338, Sec.4.

To check the validity of this certificate, please look it up in https://approvalfinder.dnv.com

Form code: TA 251 Revision: 2021-03 www.dnv.com Page 2 of 2



Type Approval Certificate for CS.75

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documention is required. For supplied compressors it is not possible to deliver the required extended product documentation subsequently. Additional costs for extended product documentation will be charged.

DN	17				
	- 1-			Certificate No:	
TYPE APF	PROVAL CE	RTIFICATI	E	TAM00000W7 Revision No:	
This is to certif	-				
That the Refrigera					
with type designatio CS.75	on(s)				
BITZER Küh Sindelfingen, G	nlmaschinenb ^{Germany}	au GmbH			
is found to comply v		t.4 Ch.5 Rotating ma	chinery – driven units		
Application :					
Max. working	d by this certificate a 28 bar	re accepted for insta	allation on all vessels classe	ed by DNV.	
press.: Operating media		, HFC-single-compo HFC refrigerant blen	nent refrigerants, HFC-refrig ds, see page 2	gerant blends, HFC	0-
Issued at Hamburg	on 2022-07-28				
	alid until 2027-07-27 .		for DN	NV.	
	Christian Kaemmer				
			Olaf Dr		
			Head of S	ection	
This Certificate is subject to The validity date relates to the subject to the validity date relates the validity date	o terms and conditions overleaf the Type Approval Certificate a	. Any significant change in dea	sign or construction may render this Certif pment/systems installed.	ficate invalid.	
The validity date relates to the LEGAL DISCLAIMER: Unler parent companies and their purpose of the issuance of circumstance be limited to 3.	the Type Approval Certificate a ess otherwise stated in the appl r subsidiaries as well as their of this document or reliance there 300,000 USD.	and not to the approval of equipolicable contract with the holder fficers, directors and employee	sign or construction may render this Certif pment/systems installed. r of this document, or following from mand as ("DNV") arising from or in connection w ort (including negligence), shall be limited	datory law, the liability of D	for the
The validity date relates to the LEGAL DISCLAIMER: Unlet parent companies and their purpose of the issuance of the purpose of purpose of purpose purpos	the Type Approval Certificate a ess otherwise stated in the appl r subsidiaries as well as their of this document or reliance there 300,000 USD.	and not to the approval of equipolicable contract with the holder fficers, directors and employee	pment/systems installed. r of this document, or following from mand ss ("DNV") arising from or in connection w	datory law, the liability of D rith the services rendered f to direct losses and under	for the
The validity date relates to the LEGAL DISCLAIMER: Unler parent companies and their purpose of the issuance of circumstance be limited to 3.	the Type Approval Certificate a ess otherwise stated in the appl r subsidiaries as well as their of this document or reliance there 300,000 USD.	and not to the approval of equip licable contract with the holder fficers, directors and employee on, whether in contract or in to	pment/systems installed. r of this document, or following from mand ss ("DNV") arising from or in connection w ort (including negligence), shall be limited	datory law, the liability of D rith the services rendered f to direct losses and under	for the r any





Job Id: 262.1-022525-6 TAM00000W7 Certificate No:

Revision No:

Product description

Semi-Hermetic Compact Screw Compressor

CSH High condensing: CSW Low condensing:

CSH7553-50 CSH7553-70 CSW7573-60 CSW7573-70 CSH7563-60 CSW7583-70 CSH7563-80 CSW7583-80 CSH7573-70 CSW7593-80 CSH7573-90 CSW7583-90 CSH7583-80

CSH7583-90 CSH7583-100 CSH7593-90 CSH7593-100 CSH7593-110

EN-GJL-250

Casing Material: Screw Rotor Material: EN-GJS-600-3, EN-GJS-500-7 EN-GJS-400-3 (only female rotor)

Oil Separator Material: EN-GJS-400-18-RT

Usable Refrigerants

HCFC-refrigerants of the safety group A1 and Fluid Group 2 PED HFC-single-component refrigerants of the safety group A1 and Fluid Group 2 PED HFC-refrigerant blends of the safety group A1 and Fluid Group 2 PED HFO-refrigerant of safety group A2L and Fluid Group 1 HFO-refrigerant of safety group A2L and Fluid Group 2 HFO/HFC refrigerant blends of safety group A1 and PED fluid group 2

Note: Fluid Groups acc. to PED = Pressure equipment directive 2014/68/EU Safety Groups acc. to EN DIN 378-1:2017-03

Application

Air Conditioning, Provision Cooling, Cargo Refrigeration.

Production place

BITZER Kühlmaschinenbau GmbH, Werk Rottenburg, D-72108 Rottenburg/Ergenzingen // Germany

Tests to be carried out

Compressors are subject to a performance test at the manufacturer's works under supervision of DNV and are to be presented for final inspection.

Type Approval documentation

Marking of product

The product shall be marked with manufacturer's name, year of construction, effective suction rate [m3/h], discharge pressure [bar], speed [rpm], shaft power [kW], serial number.

Periodical assessment

For retention of the Type Approval, a DNV Surveyor shall perform periodical assessment to verify that the conditions for the Type Approval are complied with. Refer to the Class Programme DNV-CP-0338, Sec.4.

To check the validity of this certificate, please look it up in https://approvalfinder.dnv.com

Form code: TA 251 Revision: 2021-03 www.dnv.com Page 2 of 2



Type Approval Certificate for CS.85

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documention is required. For supplied compressors it is not possible to deliver the required extended product documentation subsequently. Additional costs for extended product documentation will be charged.

	_			
DN	11			
TYPE APF	ROVAL CERTII	FICATE	Certificate N TAM00000V Revision No 3	V 8
This is to certify				
That the Refrigerar				
with type designation CS.85	n(s)			
BITZER Küh Sindelfingen, G	ılmaschinenbau Gı ermany	mbH		
is found to comply w DNV rules for class	vith ssification – Ships Pt.4 Ch.5	Rotating machinery – dri	ven units	
Application :				
Products approved Max. working	by this certificate are accep 28 bar	ted for installation on all	vessels classed by DNV.	
press.: Operating media	HCFC-refrigerants, HFC-sir refrigerants, HFO/HFC refri		nts, HFC-refrigerant blends, F 2	HFO-
Issued at Hamburg	on 2022-07-28			
This Certificate is va			for DNV	
	20.0.0.0			
Approval Engineer:	Christian Kaemmer			
Approval Engineer:	Christian Kaemmer		Olaf Drews Head of Section	
Approval Engineer:	Christian Kaemmer			
Approval Engineer:	Christian Kaemmer			
Approval Engineer:	Christian Kaemmer			
Approval Engineer:	Christian Kaemmer			
Approval Engineer:	Christian Kaemmer			
Approval Engineer:	Christian Kaemmer			
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Approval Engineer:	Christian Kaemmer			
This Certificate is subject to	terms and conditions overleaf. Any signific he Type Approval Certificate and not to the	ant change in design or construction e approval of equipment/systems inst	Head of Section	
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This Certificate is subject to The validity date relates to ti	terms and conditions overleaf. Any signific he Type Approval Certificate and not to the ss otherwise stated in the applicable contra subsidiaries as well as their officers, clirect his document or reliance thereon, whether 100,000 USD.	e approval of equipment/systems inst act with the holder of this document, ors and employees ("DNV") arising fi in contract or in tort (including neglig	may render this Certificate invalid. alled. or following from mandatory law, the liability on or in connection with the services render	red for the
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Job Id: 262.1-022524-6 TAM00000W8 Certificate No:

Revision No:

Product description

Semi-Hermetic Compact Screw Compressor

CSH High condensing: CSW Low condensing:

CSH8553-110 CSH8553-80 CSW8573-90 CSW8583-110 CSH8563-125 CSW8593-125 CSH8563-90 CSW8573-110 CSH8573-110 CSW8583-125 CSH8573-140 CSH8583-125 CSW8593-140

CSH8593-140 CSH8583-160 CSH8593-160 CSH8583-140 CSH8593-180

EN-GJL-250

Casing Material: Screw Rotor Material: EN-GJS-600-3, EN-GJS-500-7 EN-GJS-400-3 (only female rotor)

Oil Separator Material: EN-GJS-400-18-RT

Usable Refrigerants

HCFC-refrigerants of the safety group A1 and Fluid Group 2 PED

HFC-single-component refrigerants of the safety group A1 and Fluid Group 2 PED HFC-refrigerant blends of the safety group A1 and Fluid Group 2 PED

HFO-refrigerant of safety group A2L and Fluid Group 1

HFO-refrigerant of safety group A2L and Fluid Group 2 HFO/HFC refrigerant blends of safety group A1 and PED fluid group 2

Note: Fluid Groups acc. to PED = Pressure equipment directive 2014/68/EU Safety Groups acc. to EN DIN 378-1:2017-03

Application

Air Conditioning, Provision Cooling, Cargo Refrigeration.

Production place

BITZER Kühlmaschinenbau GmbH, Werk Rottenburg, D-72108 Rottenburg/Ergenzingen // Germany

Tests to be carried out

Compressors are subject to a performance test at the manufacturer's works under supervision of DNV and are to be presented for final inspection.

Type Approval documentation

Marking of product

The product shall be marked with manufacturer's name, year of construction, effective suction rate [m3/h], discharge pressure [bar], speed [rpm], shaft power [kW], serial number.

Periodical assessment

For retention of the Type Approval, a DNV Surveyor shall perform periodical assessment to verify that the conditions for the Type Approval are complied with. Refer to the Class Programme DNV-CP-0338, Sec.4.

To check the validity of this certificate, please look it up in https://approvalfinder.dnv.com

Form code: TA 251 Revision: 2021-03 www.dnv.com Page 2 of 2



Type Approval Certificate for CS.95

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documention is required. For supplied compressors it is not possible to deliver the required extended product documentation subsequently. Additional costs for extended product documentation will be charged.

TYPE APPROVAL CERTIFICATE This is to certify: That the Refrigerant Compressor with type designation(s) CS.98 Issued to BITZER Kühlmaschinenbau GmbH Sindelfingen, Germany is found to comply with DNV rules for classification – Ships Pt.4 Ch.5 Rotating machinery – driven units Application: Products approved by this certificate are accepted for installation on all vessels classed by DNV. Max. working 2 bar press.: Operating media HCFC-refrigerants, HFC-single-component refrigerants, HFC-refrigerant blends, HFO- refrigerants, HFO-HFC refrigerant blends, see page 2 Issued at Hamburg on 2022-07-28 This Certificate is valid until 2027-07-27. DNV local station: Augsburg Approval Engineer: Christian Kaemmer Olaf Drews Head of Section The widely sale refuses to the Type Approval Christians and not for the approved of equipment/systems relative. LEGAL, DICAL/EMELT. Uses a chrewe used in the applicate or of equipment/systems relative.
Trips approved to terms and conditions overleaf. Any significant change in design or construction may render this Certificate invalid. This Certificate is subject to terms and conditions overleaf. Any significant change in design or construction may render this Certificate invalid. The Certificate is subject to terms and conditions overleaf. Any significant change in design or construction may render this Certificate invalid. The certificate is subject to terms and conditions overleaf. Any significant change in design or construction may render this Certificate invalid. The visitify and the certificate is a subject to terms and conditions overleaf. Any significant change in design or construction may render this Certificate invalid. The visitify size relates to the Type Approval Certificate are not to the approval of equipmentifysteries installed. The visitify are relates to the Type Approval Certificate are not to the approval of equipmentifysteries installed. The visitify are relates to the Type Approval Certificate and not to the approval of equipmentifysteries installed. The visitify are relates to the Type Approval Certificate and not to the approval of equipmentifysteries installed. The visitify are relates to the Type Approval Certificate and not to the approval of equipmentifysteries installed. The visitify are relates to the Type Approval Certificate and not to the approval of equipmentifysteries installed. The visitify are relates to the Type Approval Certificate and not to the approval of equipmentifysteries installed.
TYPE APPROVAL CERTIFICATE This is to certify: That the Refrigerant Compressor with type designation(s) CS.95 Issued to BITZER Kühlmaschinenbau GmbH Sindelfingen, Germany Is found to comply with DNV rules for classification – Ships Pt.4 Ch.5 Rotating machinery – driven units Application: Products approved by this certificate are accepted for installation on all vessels classed by DNV. Max. working 28 bar press.: Operating media HCFC-refrigerants, HFC-single-component refrigerants, HFC-refrigerant blends, HFO-refrigerants, HFO-refrigerant blends, see page 2 Issued at Hamburg on 2022-07-28 This Certificate is valid until 2027-07-27. DNV local station: Augsburg Approval Engineer: Christian Kaemmer Olaf Drews Head of Section
TYPE APPROVAL CERTIFICATE This is to certify: That the Refrigerant Compressor with type designation(s) CS.95 Issued to BITZER Kühlmaschinenbau GmbH Sindelfingen, Germany Is found to comply with DNV rules for classification – Ships Pt.4 Ch.5 Rotating machinery – driven units Application: Products approved by this certificate are accepted for installation on all vessels classed by DNV. Max. working 28 bar press.: Operating media HCFC-refrigerants, HFC-single-component refrigerants, HFC-refrigerant blends, HFO-refrigerants, HFO-refrigerant blends, see page 2 Issued at Hamburg on 2022-07-28 This Certificate is valid until 2027-07-27. DNV local station: Augsburg Approval Engineer: Christian Kaemmer Olaf Drews Head of Section
TYPE APPROVAL CERTIFICATE This is to certify: That the Refrigerant Compressor with type designation(s) CS.95 Issued to BITZER Kühlmaschinenbau GmbH Sindelfingen, Germany Is found to comply with DNV rules for classification – Ships Pt.4 Ch.5 Rotating machinery – driven units Application: Products approved by this certificate are accepted for installation on all vessels classed by DNV. Max. working 28 bar press.: Operating media HCFC-refrigerants, HFC-single-component refrigerants, HFC-refrigerant blends, HFO-refrigerants, HFO-refrigerant blends, see page 2 Issued at Hamburg on 2022-07-28 This Certificate is valid until 2027-07-27. DNV local station: Augsburg Approval Engineer: Christian Kaemmer Olaf Drews Head of Section
This is to certify: That the Refrigerant Compressor with type designation(s) CS.95 Issued to BITZER Kühlmaschinenbau GmbH Sindelfingen, Germany is found to comply with DNV rules for classification – Ships Pt.4 Ch.5 Rotating machinery – driven units Application: Products approved by this certificate are accepted for installation on all vessels classed by DNV. Max. working 28 bar press.: Operating media HCFC-refrigerants, HFC-single-component refrigerants, HFC-refrigerant blends, HFC-refrigerant blends, see page 2 Issued at Hamburg on 2022-07-28 This Certificate is valid until 2027-07-27. ToNV local station: Augsburg Approval Engineer: Christian Kaemmer The validation: Augsburg Approval Engineer is the time and conditions overleaf. Any applicant change in design or construction may render this Certificate invalid. The validity date relates to the Type Approval Certificate are not to the approval of equipment/yeapser installed. LEGAL DISCLAMEE Unless derives taked in the application contrast with the hold for this document, when the substitutions as well as their effores, directors and employees (This V) principle from rendatory law, the liability of the substitutions as well as their effores, directors and employees (This V) principle from rendatory law, the liability of the substitutions as well as their effores, directors and employees (This V) principle from rendatory law, the liability of the substitutions as well as their effores, directors and employees (This V) principle from rendatory law, the liability of the substitutions as well as their effores, directors and employees (This V) principle from rendatory law, the liability of the refusion from rendatory, that he terrified refresher her orditated are fine document, which is not refused to a foreship of the document, which is not refused to the condition of the document, which is not refused to the condition of the document, which is not refused to the condition, which is not refused to the condition, which is not refused to the condition, which is n
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This Certificate is valid until 2027-07-27. DNV local station: Augsburg Approval Engineer: Christian Kaemmer Olaf Drews Head of Section 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 (CNV)? 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 tot (including negligence), shall be limited to direct losses and under any circumstance be limited to 300,000 USD.
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circumstance be limited to 300,000 USD.
Form code: TA 251 Revision: 2021-03 www.dnv.com Page 1 of 3





Job Id: 262.1-022523-6 TAM00000W9 Certificate No:

Revision No:

Product description

Semi-Hermetic Compact Screw Compressor

CSH High condensing: CSW Low condensing:

CSH9553-180 CSH9563-160 CSW9553-140 CSW9563-140 CSH9563-210 CSW9563-160 CSH9573-180 CSW9573-160 CSH9573-240 CSW9573-180 CSH9583-210 CSH9583-280 CSW9583-180 CSW9583-210 CSH9593-240 CSW9593-210 CSH9593-300 CSW9593-240 CSH95103-280 CSW95103-240 CSH95103-320 CSH95113-320 CSW95103-280 CSW95113-280 CSW95113-320

Casing Material: EN-GJL-250

EN-GJS-600-3, EN-GJS-500-7 EN-GJS-400-3 (only female rotor) EN-GJS-400-18-RT Screw Rotor Material:

Oil Separator Material:

Usable Refrigerants

HCFC-refrigerants of the safety group A1 and Fluid Group 2 PED

HFC-single-component refrigerants of the safety group A1 and Fluid Group 2 PED

HFC-refrigerant blends of the safety group A1 and Fluid Group 2 PED

HFO-refrigerant of safety group A2L and Fluid Group 1
HFO-refrigerant of safety group A2L and Fluid Group 2
HFO/HFC refrigerant blends of safety group A1 and PED fluid group 2

Note: Fluid Groups acc. to PED = Pressure equipment directive 2014/68/EU Safety Groups acc. to EN DIN 378-1:2017-03

Application

Air Conditioning, Provision Cooling, Cargo Refrigeration.

Production place

BITZER Kühlmaschinenbau GmbH, Werk Rottenburg, D-72108 Rottenburg/Ergenzingen // Germany

Tests to be carried out

Compressors are subject to a performance test at the manufacturer's works under supervision of DNV and are to be presented for final inspection.

Form code: TA 251 Revision: 2021-03 www.dnv.com Page 2 of 3





Job Id: Certificate No: Revision No: 262.1-022523-6 TAM00000W9

Type Approval documentation

Marking of productThe product shall be marked with manufacturer's name, year of construction, effective suction rate [m3/h], discharge pressure [bar], speed [rpm], shaft power [kW], serial number.

Periodical assessment

For retention of the Type Approval, a DNV Surveyor shall perform periodical assessment to verify that the conditions for the Type Approval are complied with. Refer to the Class Programme DNV-CP-0338, Sec.4.

To check the validity of this certificate, please look it up in https://approvalfinder.dnv.com

Form code: TA 251 Revision: 2021-03 www.dnv.com Page 3 of 3



2.1.2 Semi-hermetic screw compressors



Type Approval Certificate for HS.53

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documention is required. For supplied compressors it is not possible to deliver the required extended product documentation subsequently. Additional costs for extended product documentation will be charged.

DNIV	
DNV	
TYPE APPROVAL CERTIFICATE	Certificate No: TAM00000H1 Revision No: 3
This is to certify: That the Refrigerant Compressor	
with type designation(s)	
Issued to BITZER Kühlmaschinenbau GmbH	
Sindelfingen, Germany	
is found to comply with DNV rules for classification – Ships Pt.4 Ch.5 Rotating machi	nery – driven units
Application :	
Products approved by this certificate are accepted for installat Max. working 28 bar	tion on all vessels classed by DNV.
press.: Operating media HCFC-refrigerants, HFC-single componen refrigerants, HFO/HFC refrigerant blends,	t refrigerants, HFC-refrigerant blends, HFO- see page 2
Issued at Hamburg on 2022-07-28	
This Certificate is valid until 2027-07-27. DNV local station: Augsburg	for DNV
Approval Engineer: Christian Kaemmer	
	Olaf Drews Head of Section
This Certificate is subject to terms and conditions overleaf. Any significant change in design of The validity date relates to the Type Approval Certificate and not to the approval of equipmen	or construction may render this Certificate invalid. 1/5ystems installed.
The validity date relates to the Type Approval Certificate and not to the approval of equipmen LEGAL DISCLAIMER: Unless otherwise stated in the applicable contract with the holder of the parent companies and their subsidiaries as well as their officers, directors and employees (C) purpose of the issuance of this document or reliance thereon, whether in contract or in tort (in	nt/systems installed. his document, or following from mandatory law, the liability of DNV AS, its DNV') arising from or in connection with the services rendered for the
This Certificate is subject to terms and conditions overleaf. Any significant change in design of The validity date relates to the Type Approval Certificate and not to the approval of equipment LEGAL DISCLAIMER: Unless otherwise stated in the applicable contract with the holder of the parent companies and their subsidiaries as well as their officers, directors and employees ("Europes of the issuance of this document or reliance thereon, whether in contract or in tort (in circumstance be limited to 300,000 USD. Form code: TA 251 Revision: 2021-03	nt/systems installed. his document, or following from mandatory law, the liability of DNV AS, its DNV') arising from or in connection with the services rendered for the





Job Id: Certificate No: 262.1-025034-4 TAM00000H1

Revision No:

Product description

Semi-Hermetic Screw Compressor HS53

Casing Material: EN-GJL-250

Screw Rotor Material: EN-GJS-600-3, EN-GJS-500-7 EN-GJS-400-3 (only female rotor)

Usable Refrigerants

HCFC-refrigerants of the safety group A1 and Fluid Group 2 PED
HFC-single-component refrigerant of the safety group A1 and Fluid Group 2 PED
HFC-refrigerant blends of the safety group A1 and Fluid Group 2 PED
HFO-refrigerant of safety group A2L and Fluid Group 1 PED

HFO-refrigerant of safety group A2L and Fluid Group 2 PED HFO/HFC refrigerant blends of safety group A1 and Fluid Group 2 PED

Note: Fluid Groups acc. to PED = Pressure equipment directive 2014/68/EU Safety Groups acc. to EN DIN 378-1:2017-03

ApplicationAir Conditioning, Provision Cooling, Cargo Refrigeration.

Production place

BITZER Kühlmaschinenbau GmbH, Werk Rottenburg, D-72108 Rottenburg/Ergenzingen // Germany

Tests to be carried out

Compressors are subject to a performance test at the manufacturer's works under supervision of DNV and are to be presented for final inspection.

Type Approval documentation

Marking of product

The product shall be marked with manufacturer's name, year of construction, effective suction rate [m3/h], discharge pressure [bar], speed [rpm], shaft power [kW], serial number.

Periodical assessment

For retention of the Type Approval, a DNV Surveyor shall perform periodical assessment to verify that the conditions for the Type Approval are complied with. Refer to the Class Programme DNV-CP-0338, Sec.4.

To check the validity of this certificate, please look it up in https://approvalfinder.dnv.com

Form code: TA 251 Revision: 2021-03 www.dnv.com Page 2 of 2



Type Approval Certificate for HS.64

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documention is required. For supplied compressors it is not possible to deliver the required extended product documentation subsequently. Additional costs for extended product documentation will be charged.

DNV	
TYPE APPROVAL CERTIFICATE	Certificate No: TAM00000H0 Revision No: 3
This is to certify: That the Refrigerant Compressor	
with type designation(s)	
Issued to BITZER Kühlmaschinenbau GmbH Sindelfingen, Germany	
is found to comply with DNV rules for classification – Ships Pt.4 Ch.5 Rotating mac	hinery – driven units
Application :	
Products approved by this certificate are accepted for instal Max. working 28 bar press.:	
Operating media HCFC-refrigerants, HFC-single components, HFO/HFC refrigerant blend	ent refrigerants, HFC-refrigerant blends, HFO- s, see page 2
Issued at Hamburg on 2022-07-28	
This Certificate is valid until 2027-07-27. DNV local station: Augsburg	for DNV
Approval Engineer: Christian Kaemmer	
	Olaf Drews Head of Section
This Certificate is subject to terms and conditions overleaf. Any significant change in design The validity date relates to the Type Approval Certificate and not to the approval of equiproval.	n or construction may render this Certificate invalid. nent/systems installed.
LEGAL DISCLAIMER: Unless otherwise stated in the applicable contract with the holder parent companies and their subsidiaries as well as their officers, directors and employees purpose of the issuance of this document or reliance thereon, whether in contract or the	of this document, or following from mandatory law, the liability of DNV AS, its ("DNV") arising from or in connection with the services rendered for the
circumstance be limited to 300,000 USD. Form code: TA 251 Revision: 2021-03	www.dnv.com Page 1 of 2





Job Id: Certificate No: 262.1-025033-4 TAM00000H0

Revision No:

Product description

Semi-Hermetic Screw Compressor HS64

Casing Material: EN-GJL-250

Screw Rotor Material: EN-GJS-600-3, EN-GJS-500-7 EN-GJS-400-3 (only female rotor)

Usable Refrigerants

HCFC-refrigerants of the safety group A1 and Fluid Group 2 PED
HFC-single-component refrigerant of the safety group A1 and Fluid Group 2 PED
HFC-refrigerant blends of the safety group A1 and Fluid Group 2 PED
HFO-refrigerant of safety group A2L and Fluid Group 1 PED

HFO-refrigerant of safety group A2L and Fluid Group 2 PED HFO/HFC refrigerant blends of safety group A1 and Fluid Group 2 PED

Note: Fluid Groups acc. to PED = Pressure equipment directive 2014/68/EU Safety Groups acc. to EN DIN 378-1:2017-03

Application

Air Conditioning, Provision Cooling, Cargo Refrigeration.

Production place

BITZER Kühlmaschinenbau GmbH, Werk Rottenburg, D-72108 Rottenburg/Ergenzingen // Germany

Tests to be carried out

Compressors are subject to a performance test at the manufacturer's works under supervision of DNV and are to be presented for final inspection.

Type Approval documentation

Marking of product

The product shall be marked with manufacturer's name, year of construction, effective suction rate [m3/h], discharge pressure [bar], speed [rpm], shaft power [kW], serial number.

Periodical assessment

For retention of the Type Approval, a DNV Surveyor shall perform periodical assessment to verify that the conditions for the Type Approval are complied with. Refer to the Class Programme DNV-CP-0338, Sec.4.

To check the validity of this certificate, please look it up in https://approvalfinder.dnv.com

Form code: TA 251 Revision: 2021-03 www.dnv.com Page 2 of 2



Type Approval Certificate for HS.74

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documention is required. For supplied compressors it is not possible to deliver the required extended product documentation subsequently. Additional costs for extended product documentation will be charged.

DNV			
		Contification	Na.
TYPE APPROVAL	CERTIFICATE	Certificate I TAM00000 Revision No 3	GZ
This is to certify:			
That the Refrigerant Compressor			
with type designation(s) HS74			
BITZER Kühlmaschine Sindelfingen, Germany	enbau GmbH		
is found to comply with DNV rules for classification – Shi	ips Pt.4 Ch.5 Rotating machi	nery – driven units	
Application :			
Products approved by this certific Max. working 28 bar press.:	cate are accepted for installat	ion on all vessels classed by DNV.	
Operating media HCFC-refriger	rants, HFC-single componen HFO/HFC refrigerant blends,	t refrigerants, HFC-refrigerant blends, see page 2	HFO-
Issued at Hamburg on 2022-07-28			
This Certificate is valid until 2027-07 DNV local station: Augsburg	'-27 .	for DNV	
Approval Engineer: Christian Kaem	mer		
Approval Engineer: Christian Kaem	mer	Olaf Drews	
Approval Engineer: Christian Kaem	mer	Olaf Drews Head of Section	
Approval Engineer: Christian Kaem	mer		
Approval Engineer: Christian Kaem	imer		
Approval Engineer: Christian Kaem	imer		
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This Certificate is subject to terms and conditions of the validity date relates to the Type Approval Cert LEGAL DISCLAIMER: Unless otherwise stated in a parent companies and their subsidiaries as well as purpose of the issuance of this document or reliance circumstance be limited to 300,000 USD.	overleaf. Any significant change in design of ifficate and not to the approval of equipmer the applicable contract with the holder of the their officers, directors and employees C	Head of Section or construction may render this Certificate invalid. Usystems installed. Is document, or following from mandatory law, the liabilit NV) arising from or in connection with the services rend	ered for the
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Job Id: Certificate No: 262.1-025032-4 TAM0000GZ

Revision No:

Product description

Semi-Hermetic Screw Compressor HS74

Casing Material: EN-GJL-250

Screw Rotor Material: EN-GJS-600-3, EN-GJS-500-7 EN-GJS-400-3 (only female rotor)

Usable Refrigerants

HCFC-refrigerants of the safety group A1 and Fluid Group 2 PED
HFC-single-component refrigerant of the safety group A1 and Fluid Group 2 PED
HFC-refrigerant blends of the safety group A1 and Fluid Group 2 PED
HFO-refrigerant of safety group A2L and Fluid Group 1 PED

HFO-refrigerant of safety group A2L and Fluid Group 2 PED HFO/HFC refrigerant blends of safety group A1 and Fluid Group 2 PED

Note: Fluid Groups acc. to PED = Pressure equipment directive 2014/68/EU Safety Groups acc. to EN DIN 378-1:2017-03

ApplicationAir Conditioning, Provision Cooling, Cargo Refrigeration.

Production place

BITZER Kühlmaschinenbau GmbH, Werk Rottenburg, D-72108 Rottenburg/Ergenzingen // Germany

Tests to be carried out

Compressors are subject to a performance test at the manufacturer's works under supervision of DNV and are to be presented for final inspection.

Type Approval documentation

Marking of product

The product shall be marked with manufacturer's name, year of construction, effective suction rate [m3/h], discharge pressure [bar], speed [rpm], shaft power [kW], serial number.

Periodical assessment

For retention of the Type Approval, a DNV Surveyor shall perform periodical assessment to verify that the conditions for the Type Approval are complied with. Refer to the Class Programme DNV-CP-0338, Sec.4.

To check the validity of this certificate, please look it up in https://approvalfinder.dnv.com

Form code: TA 251 Revision: 2021-03 www.dnv.com Page 2 of 2



Type Approval Certificate for HS.85

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documention is required. For supplied compressors it is not possible to deliver the required extended product documentation subsequently. Additional costs for extended product documentation will be charged.

TYPE APPROVAL CERTIFICATE This is to certify: That the Air/Exhaust Blower with type designation(s) HS89 Issued to BITZER Kühlmaschinenbau GmbH Sindelfingen, Germany is found to comply with DNV rules for classification – Ships Pt.4 Ch.5 Rotating machinery – driven units Application: Products approved by this certificate are accepted for installation on all vessels classed by DNV. Max. working 28 bar press.: Operating media HCFC-refrigerants, HFC-single component refrigerants, HFC-refrigerant blends, HFO-refrigerants, HFO-refrigerant blends, see page 2 Issued at Hamburg on 2022-07-28 This Certificate is valid until 2027-07-27. DNV local station: Augsburg Approval Engineer: Christian Kaemmer			
TYPE APPROVAL CERTIFICATE This is to certify: That the Air/Exhaust Blower with type designation(s) HS85 Issued to BITZER Kühlmaschinenbau GmbH Sindelfingen, Germany is found to comply with DNV rules for classification – Ships Pt.4 Ch.5 Rotating machinery – driven units Application: Products approved by this certificate are accepted for installation on all vessels classed by DNV. Max. working 28 bar press.: Operating media HCFC-refrigerants, HFC-single component refrigerants, HFC-refrigerant blends, HFO-refrigerants, HFO/HFC refrigerant blends, see page 2 Issued at Hamburg on 2022-07-28 This Certificate is valid until 2027-07-27. DNV local station: Augsburg Approval Engineer: Christian Kaemmer			
TYPE APPROVAL CERTIFICATE This is to certify: That the Air/Exhaust Blower with type designation(s) HS85 Issued to BITZER Kühlmaschinenbau GmbH Sindelfingen, Germany is found to comply with DNV rules for classification – Ships Pt.4 Ch.5 Rotating machinery – driven units Application: Products approved by this certificate are accepted for installation on all vessels classed by DNV. Max. working 28 bar press.: Operating media HCFC-refrigerants, HFC-single component refrigerants, HFC-refrigerant blends, HFO- refrigerants, HFO/HFC refrigerant blends, see page 2 Issued at Hamburg on 2022-07-28 This Certificate is valid until 2027-07-27. DNV local station: Augsburg Approval Engineer: Christian Kaemmer			
TYPE APPROVAL CERTIFICATE This is to certify: That the Air/Exhaust Blower with type designation(s) HS85 Issued to BITZER Kühlmaschinenbau GmbH Sindelfingen, Germany is found to comply with DNV rules for classification – Ships Pt.4 Ch.5 Rotating machinery – driven units Application: Products approved by this certificate are accepted for installation on all vessels classed by DNV. Max. working 28 bar press.: Operating media HCFC-refrigerants, HFC-single component refrigerants, HFC-refrigerant blends, HFO-refrigerants, HFO/HFC refrigerant blends, see page 2 Issued at Hamburg on 2022-07-28 This Certificate is valid until 2027-07-27. DNV local station: Augsburg Approval Engineer: Christian Kaemmer	DNV		
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Olaf Drews		for DNV	
	val Engineer: Christian Kaemmer	Olef Desire	
This Certificate is subject to terms and conditions overleaf. Any significant change in design or construction may render this Certificate invalid.	tificate is subject to terms and conditions overleaf. Any significant change in des	ign 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	inty date relates to the Type Approval Certificate and not to the approval of equip	of this document, or following from mandatory law, the liability of DNV AS, its s ("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. Form code: TA 251 Revision: 2021-03 www.dnv.com Page 1 of 2	ompanies and their subsidiaries as well as their officers, directors and employees	A PERSON AND A PER	
	ompanies and their subsidiaries as well as their officers, directors and employees of the issuance of this document or reliance thereon, whether in contract or in to ance be limited to 300,000 USD.	**************************************	





Job Id: 262.1-025031-4 TAM00000GY Certificate No:

Revision No:

Product description

Semi-Hermetic Screw Compressor HS85 Semi-Hermetic Screw Expander

Casing Material: EN-GJL-250

EN-GJS-600-3, EN-GJS-500-7 EN-GJS-400-3 (only female rotor) Screw Rotor Material:

Usable Refrigerants

HCFC-refrigerants of the safety group A1 and Fluid Group 2 PED

HFC-single-component refrigerant of the safety group A1 and Fluid Group 2 PED

HFC-refrigerant blends of the safety group A1 and Fluid Group 2 PED HFO-refrigerant of safety group A2L and Fluid Group 1 PED HFO-refrigerant of safety group A2L and Fluid Group 2 PED

HFO/HFC refrigerant blends of safety group A1 and Fluid Group 2 PED

Fluid Groups acc. to PED = Pressure equipment directive 2014/68/EU

Safety Groups acc. to EN DIN 378-1:2017-03

Air Conditioning, Provision Cooling, Cargo Refrigeration. Expander-Version to be used for Waste Heat Recovery.

Production place

BITZER Kühlmaschinenbau GmbH, Werk Rottenburg, D-72108 Rottenburg/Ergenzingen // Germany

Tests to be carried out

Compressors are subject to a performance test at the manufacturer's works under supervision of DNV and are to be presented for final inspection.

Type Approval documentation

Marking of product

The product shall be marked with manufacturer's name, year of construction, effective suction rate [m3/h], discharge pressure [bar], speed [rpm], shaft power [kW], serial number.

Periodical assessment

For retention of the Type Approval, a DNV Surveyor shall perform periodical assessment to verify that the conditions for the Type Approval are complied with. Refer to the Class Programme DNV-CP-0338, Sec.4.

To check the validity of this certificate, please look it up in https://approvalfinder.dnv.com

Form code: TA 251 Revision: 2021-03 www.dnv.com Page 2 of 2



Type Approval Certificate for HS.95

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documention is required. For supplied compressors it is not possible to deliver the required extended product documentation subsequently. Additional costs for extended product documentation will be charged.

DNV-GL

Certificate No: TAM000014V

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Refrigerant Compressor & Expander

with type designation(s) **HS95 HSE95**

BITZER Kühlmaschinenbau GmbH

Sindelfingen, Germany

is found to comply with

DNV GL rules for classification - Ships Pt.4 Ch.5 Rotating machinery - driven units

Application:

Products approved by this certificate are accepted for installation on all vessels classed by

DNV GL.

Max. working press.: Operating media Type

HS95 32 bar HCFC-refrigerants, HFC-single component refrigerants,

HSE95 HFC-refrigerant blends, HFO-refrigerants,

HFO / HFC-refrigerant blends, Inorganic Compound,

see page 2

Issued at Hamburg on 2020-12-14 This Certificate is valid until 2025-12-13.

for DNV GL

DNV GL local station: Augsburg

Approval Engineer: Christian Kaemmer

Olaf Drews Head of Section

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.

Form code: TA 251

Revision: 2016-12

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Page 1 of 2

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Job Id: **262.1-032635-1**Certificate No: **TAM000014V**

Product description

Semi-Hermetic Screw Compressor HS95 Semi-Hermetic Screw Expander HSE95

Casing Material:EN-GJL-250 Spheroidal GraphiteScrew Rotor Material:EN-GJS-600-3, EN-GJS-500-7EN-GJS-400-3 (only female rotor)

Usable Refrigerants

HCFC-refrigerants of the safety group A1 and Fluid Group 2 PED
HFC-single-component refrigerant of the safety group A1 and Fluid Group 2 PED
HFC-single-component refrigerant of the safety group B1 and Fluid Group 2 PED
HFC-refrigerant blends of the safety group A1 and Fluid Group 2 PED
HFC-refrigerant of safety group A2L and Fluid Group 1 PED
HFO-refrigerant of safety group A2L and Fluid Group 2 PED
HFO/HFC refrigerant blends of safety group A1 and Fluid Group 2 PED
Inorganic Compound: R717 / Ammonia, safety group B2L and Fluid Group 1 PED

Note: Fluid Groups acc. to PED = Pressure equipment directive 2014/68/EU Safety Groups acc. to EN DIN 378-1:2017-03

Application

Air Conditioning, Provision Cooling, Cargo Refrigeration. Expander version to be used for waste heat recovery.

Tests to be carried out

Compressors are subject to a performance test at the manufacturer's works under supervision of DNVGL and are to be presented for final inspection.

Type Approval documentation

Marking of product

The product shall be marked with manufacturer's name, effective suction rate [m3/h], discharge pressure [bar], speed [rpm], serial number.

Periodical assessment

For retention of the Type Approval, a DNV GL Surveyor shall perform periodical assessment after two years (+/- 90 days) and after 3.5 years (+/- 90 days) to verify that the conditions for the Type Approval are complied with. Refer to the Class Programme DNVGL-CP-0338, Sec.4.

Form code: TA 251 Revision: 2016-12 www.dnvgl.com Page 2 of 2



2.1.3 Open drive screw compressors



Type Approval Certificate for OS.53

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documention is required. For supplied compressors it is not possible to deliver the required extended product documentation subsequently. Additional costs for extended product documentation will be charged.

This is to certify: That the Refrigerant Compressor with type designation(s) DS53 ssued to BITZER Kühlmaschinenbau GmbH Sindelfingen, Germany s found to comply with DNV rules for classification – Ships Pt.4 Ch.5 Rotating machinery – driven units Application: Products approved by this certificate are accepted for installation on all vessels classed by DNV. Max. working 28 bar press.: Operating HCFC-refrigerants, HFC-single component refrigerants, HFC-refrigerant blends, HFO-media refrigerants, HFO-HFC refrigerant blends, Inorganic Compound, see page 2 Ssued at Hamburg on 2022-07-28 This Certificate is valid until 2027-07-27. for DNV DNV local station: Augsburg	TYPE APPROVAL CERTIFICA	Certificate No: TAM0000GX Revision No:
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BITZER Kühlmaschinenbau GmbH Sindelfingen, Germany is found to comply with DNV rules for classification – Ships Pt.4 Ch.5 Rotating machinery – driven units Application: Products approved by this certificate are accepted for installation on all vessels classed by DNV. Max. working 28 bar press: Operating HCFC-refrigerants, HFC-single component refrigerants, HFC-refrigerant blends, HFO- media HCFC-refrigerant blends, Inorganic Compound, see page 2 Issued at Hamburg on 2022-07-28 This Certificate is valid until 2027-07-27. for DNV DNV local station: Augsburg Approval Engineer: Christian Kaemmer Olaf Drews	with type designation(s) OS53	
press.: Operating media HCFC-refrigerants, HFC-single component refrigerants, HFC-refrigerant blends, HFO-refrigerants, HFO/HFC refrigerant blends, Inorganic Compound, see page 2 Issued at Hamburg on 2022-07-28 This Certificate is valid until 2027-07-27. for DNV DNV local station: Augsburg Approval Engineer: Christian Kaemmer Olaf Drews	Application : Products approved by this certificate are accepted for in	
This Certificate is valid until 2027-07-27. for DNV DNV local station: Augsburg Approval Engineer: Christian Kaemmer Olaf Drews	press.: Operating HCFC-refrigerants, HFC-single comp	
Olaf Drews	Issued at Hamburg on 2022-07-28 This Certificate is valid until 2027-07-27 . DNV local station: Augsburg	for DNV
	Approval Engineer: Christian Kaemmer	

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.



Revision: 2021-03

www.dnv.com

Page 1 of 2





Job Id: Certificate No: 262.1-025030-4 TAM00000GX

Revision No:

Product description

Open Drive Screw Compressor OS53

Casing Material: EN-GJL-250

EN-GJS-600-3, EN-GJS-500-7 EN-GJS-400-3 (only female rotor) Screw Rotor Material:

Usable Refrigerants

HCFC-refrigerants of the safety group A1 and Fluid Group 2 PED

HFC-single-component refrigerant of the safety group A1 and Fluid Group 2 PED

HFC-refrigerant blends of the safety group A1 and Fluid Group 2 PED
HFO/HFC refrigerant of safety group A1 and Fluid Group 2 PED
Inorganic Compound: R717 / Ammonia, safety group B2L and Fluid Group 1 PED

Note: Fluid Groups acc. to PED = Pressure equipment directive 2014/68/EU Safety Groups acc. to EN DIN 378-1:2017-03

Application

Air Conditioning, Provision Cooling, Cargo Refrigeration.

Production place

BITZER Kühlmaschinenbau GmbH, Werk Rottenburg, D-72108 Rottenburg/Ergenzingen // Germany

Tests to be carried out

Compressors are subject to a performance test at the manufacturer's works under supervision of DNV and are to be presented for final inspection.

Type Approval documentation

Marking of product
The product shall be marked with manufacturer's name, year of construction, effective suction rate [m3/h], discharge pressure [bar], speed [rpm], shaft power [kW], serial number.

Periodical assessment

For retention of the Type Approval, a DNV Surveyor shall perform periodical assessment to verify that the conditions for the Type Approval are complied with. Refer to the Class Programme DNV-CP-0338, Sec.4.

To check the validity of this certificate, please look it up in https://approvalfinder.dnv.com

Form code: TA 251 Revision: 2021-03 www.dnv.com Page 2 of 2



Type Approval Certificate for OS.74

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documention is required. For supplied compressors it is not possible to deliver the required extended product documentation subsequently. Additional costs for extended product documentation will be charged.

This is to certify: That the Refrigerant Compressor with type designation(s) DS74 ssued to BITZER Kühlmaschinenbau GmbH Sindelfingen, Germany s found to comply with DNV rules for classification – Ships Pt.4 Ch.5 Rotating machinery – driven units Application: Products approved by this certificate are accepted for installation on all vessels classed by DNV. Max. working 28 bar press.: Operating HCFC-refrigerants, HFC-single component refrigerants, HFC-refrigerant blends, HFO-media refrigerants, HFC-refrigerant blends, Inorganic Compound, see page 2	his is to certify: nat the Refrigerant Compressor th type designation(s) S74 sued to BITZER Kühlmaschinenbau GmbH indelfingen, Germany found to comply with DNV rules for classification – Ships Pt.4 Ch.5 Rotating machinery – driven units pplication: roducts approved by this certificate are accepted for installation on all vessels classed by DNV. Max. working 28 bar press.: Deparating HCFC-refrigerants, HFC-single component refrigerants, HFC-refrigerant blends, HFO- media refrigerants, HFO/HFC refrigerant blends, Inorganic Compound, see page 2 sued at Hamburg on 2022-07-28 his Certificate is valid until 2027-07-27. for DNV NV local station: Augsburg proval Engineer: Christian Kaemmer	tis is to certify: at the Refrigerant Compressor th type designation(s) tital	TYPE APPROVAL CERTIFICATE	Certificate No: TAM0000GV Revision No:
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Olaf Drews	Olaf Drews	Olaf Drews	3 000 d 400 0 00	
Head of Section	Head of Section	Head of Section	Approval Engineer: Christian Kaemmer	Olaf Drews
				Head of Section

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.



Revision: 2021-03

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Page 1 of 2





Job Id: Certificate No: 262.1-025028-4 TAM00000GV

Revision No:

Product description

Open Drive Screw Compressor OS74

Casing Material: EN-GJL-250

Screw Rotor Material: EN-GJS-600-3, EN-GJS-500-7 EN-GJS-400-3 (only female rotor)

Usable Refrigerants

HCFC-refrigerants of the safety group A1 and Fluid Group 2 PED
HFC-single-component refrigerant of the safety group A1 and Fluid Group 2 PED
HFC-refrigerant blends of the safety group A1 and Fluid Group 2 PED
HFO/HFC refrigerant of safety group A1 and Fluid Group 2 PED

Inorganic Compound: R717 / Ammonia, safety group B2L and Fluid Group 1 PED

Note: Fluid Groups acc. to PED = Pressure equipment directive 2014/68/EU Safety Groups acc. to EN DIN 378-1:2017-03

Application

Air Conditioning, Provision Cooling, Cargo Refrigeration.

Production place BITZER Kühlmaschinenbau GmbH, Werk Rottenburg, D-72108 Rottenburg/Ergenzingen // Germany

Tests to be carried out

Compressors are subject to a performance test at the manufacturer's works under supervision of DNV and are to be presented for final inspection.

Type Approval documentation

Marking of product

The product shall be marked with manufacturer's name, year of construction, effective suction rate [m3/h], discharge pressure [bar], speed [rpm], shaft power [kW], serial number.

Periodical assessment

For retention of the Type Approval, a DNV Surveyor shall perform periodical assessment to verify that the conditions for the Type Approval are complied with. Refer to the Class Programme DNV-CP-0338, Sec.4.

To check the validity of this certificate, please look it up in https://approvalfinder.dnv.com

Form code: TA 251 Revision: 2021-03 www.dnv.com Page 2 of 2



Type Approval Certificate for OS.85

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documention is required. For supplied compressors it is not possible to deliver the required extended product documentation subsequently. Additional costs for extended product documentation will be charged.

DNV	Certificate No:
TYPE APPROVAL CERTIFICATE	TAM0000GW Revision No: 4
This is to certify:	
That the Refrigerant Compressor	
with type designation(s) OS85	
Issued to BITZER Kühlmaschinenbau GmbH	
Sindelfingen, Germany	
is found to comply with DNV rules for classification – Ships Pt.4 Ch.5 Rotating machine.	nery – driven units
Application :	
Products approved by this certificate are accepted for installat Max. working 28 bar	ion on all vessels classed by DNV.
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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.



Revision: 2021-03

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262.1-025029-5 TAM00000GW Job Id: Certificate No:

Revision No:

Product description

Open Drive Screw Compressor OS85

Casing Material: EN-GJL-250 Spheroidal Graphite EN-GJS-600-3, EN-GJS-500-7 EN-GJS-400-3 (only female rotor) Screw Rotor Material:

Usable Refrigerants

HCFC-refrigerants of the safety group A1 and Fluid Group 2 PED

HFC-single-component refrigerant of the safety group A1 and Fluid Group 2 PED

HFC-refrigerant blends of the safety group A1 and Fluid Group 2 PED
HFO/HFC refrigerant of safety group A1 and Fluid Group 2 PED
Inorganic Compound: R717 / Ammonia, safety group B2L and Fluid Group 1 PED

Fluid Groups acc. to PED = Pressure equipment directive 2014/68/EU Safety Groups acc. to EN DIN 378-1:2017-03

Application

Note:

Air Conditioning, Provision Cooling, Cargo Refrigeration.

Tests to be carried out

Type Approval documentation

Marking of product

The product shall be marked with manufacturer's name, year of construction, effective suction rate [m3/h], discharge pressure [bar], speed [rpm], shaft power [kW], serial number.

Periodical assessment

For retention of the Type Approval, a DNV Surveyor shall perform periodical assessment to verify that the conditions for the Type Approval are complied with. Refer to the Class Programme DNV-CP-0338, Sec.4.

To check the validity of this certificate, please look it up in https://approvalfinder.dnv.com

Form code: TA 251 Revision: 2021-03 www.dnv.com Page 2 of 2



Type Approval Certificate for OS.95

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documention is required. For supplied compressors it is not possible to deliver the required extended product documentation subsequently. Additional costs for extended product documentation will be charged.

TYPE APPROVAL CERTIFICATE	Certificate No: TAM0000JY Revision No: 2
This is to certify:	
That the Refrigerant Compressor	
with type designation(s) OS95	
Issued to BITZER Kühlmaschinenbau GmbH Sindelfingen, Germany	
is found to comply with DNV rules for classification – Ships Pt.4 Ch.5 Rotating machine	ery – driven units
Application :	
Products approved by this certificate are accepted for installation Max. working 28 bar press.: Operating HCFC-refrigerants, HFC-single component refrigerants, HFO/HFC refrigerant blends, Inc.	efrigerants, HFC-refrigerant blends, HFO-
Issued at Hamburg on 2022-07-28	
This Certificate is valid until 2027-07-27 . DNV local station: Augsburg	for DNV
Approval Engineer: Christian Kaemmer	01.42
	Olaf Drews Head of Section

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.



Revision: 2021-03

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Job Id: Certificate No: 262.1-025999-3 TAM00000JY

Revision No:

Product description

Open Drive Screw Compressor OS95

Casing Material: EN-GJL-250

Screw Rotor Material: EN-GJS-600-3, EN-GJS-500-7 EN-GJS-400-3 (only female rotor)

Usable Refrigerants

HCFC-refrigerants of the safety group A1 and Fluid Group 2 PED
HFC-single-component refrigerant of the safety group A1 and Fluid Group 2 PED
HFC-refrigerant blends of the safety group A1 and Fluid Group 2 PED
HFO/HFC refrigerant of safety group A1 and Fluid Group 2 PED

Inorganic Compound: R717 / Ammonia, safety group B2L and Fluid Group 1 PED

Note: Fluid Groups acc. to PED = Pressure equipment directive 2014/68/EU Safety Groups acc. to EN DIN 378-1:2017-03

Application

Air Conditioning, Provision Cooling, Cargo Refrigeration.

Production place BITZER Kühlmaschinenbau GmbH, Werk Rottenburg, D-72108 Rottenburg/Ergenzingen // Germany

Tests to be carried out

Compressors are subject to a performance test at the manufacturer's works under supervision of DNV and are to be presented for final inspection.

Type Approval documentation

Marking of product

The product shall be marked with manufacturer's name, year of construction, effective suction rate [m3/h], discharge pressure [bar], speed [rpm], shaft power [kW], serial number.

Periodical assessment

For retention of the Type Approval, a DNV Surveyor shall perform periodical assessment to verify that the conditions for the Type Approval are complied with. Refer to the Class Programme DNV-CP-0338, Sec.4.

To check the validity of this certificate, please look it up in https://approvalfinder.dnv.com

Form code: TA 251 Revision: 2021-03 www.dnv.com Page 2 of 2



2.2 RINA Type Approvals

2.2.1 Semi-hermetic compact screw compressors

Type Approval Certificate for CS.65, CS.75, CS.85, CS.95

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documention is required. For supplied compressors it is not possible to deliver the required extended product documentation subsequently. Additional costs for extended product documentation will be charged.





TYPE APPROVAL CERTIFICATE No. MAC257722XG

This is to certify that the product identified below is in compliance with the regulations herewith specified.

Description Refrigerant Compressors

Type Screw compressor CSH-type

Applicant BITZER Kühlmaschinenbau GmbH

Peter-Schaufler-Platz 1 71065 Sindelfingen

GERMANY

Manufacturer BITZER Kühlmaschinenbau GmbH

Place of manufacture Peter-Schaufler-Platz 1

71065 Sindelfingen

GERMANY

Reference standards Part C, Chapter 1, Section 13 of RINA Rules

Reference documents RINA TYPE APPROVAL SYSTEM

Issued in Hamburg on November 30, 2022. This Certificate is valid until November 29, 2027

RINA Services S.p.A. Giuseppe Russo

This certificate consists of this page and 1 enclosure

RINA Services S.p.A. Via Corsica, 12 - 16128 Genova Tel +39 010 53851 Fax +39 010 5351000



TYPE APPROVAL CERTIFICATE No. MAC257722XG Enclosure - Page 1 of 2 Screw compressor CSH-type

Reference Documents:

- Application manual: SH- 170
- Marine Application booklet A 270

Product Description:

Bitzer CSH Compressors are of two shaft rotary displacement design. The main parts are the two rotors fitted in a closed housing. The compressor is driven by a three phase asynchronous motor built in the housing. Cooling is achieved by suction gas flowing trough the rotor bores and across the stator widings.

Technical Characteristics:

echinic	cai Characteristics	•	
TYPE	Working pressure (bar)	Capacity min/max m³/h	Usable Refrigerants
CS 65	28	137 264	HCFC-refrigerants of the safety group A1 and Fluid Group 2 PED HFC-single-component refrigerants of the safety group A1 and Fluid Group 2 PED HFC-refrigerant blends of the safety group A1 and Fluid Group 2 PED HFC-refrigerant of safety group A2L and Fluid Group 1 HFC-refrigerant of safety group A2L and Fluid Group 2 HFO/HFC refrigerant blends of safety group A1 and PED fluid group 2
CS 75	28	197 406	HCFC-refrigerants of the safety group A1 and Fluid Group 2 PED HFC-single-component refrigerants of the safety group A1 and Fluid Group 2 PED HFC-refrigerant blends of the safety group A1 and Fluid Group 2 PED HFC-refrigerant of safety group A2L and Fluid Group 1 HFO-refrigerant of safety group A2L and Fluid Group 2 HFO/HFC refrigerant blends of safety group A1 and PED fluid group 2
CS 85	28	315 646	HCFC-refrigerants of the safety group A1 and Fluid Group 2 PED HFC-single-component refrigerants of the safety group A1 and Fluid Group 2 PED HFC-refrigerant blends of the safety group A1 and Fluid Group 2 PED HFC-refrigerant of safety group A2L and Fluid Group 1 HFO-refrigerant of safety group A2L and Fluid Group 2 HFO/HFC refrigerant blends of safety group A1 and PED fluid group 2
CS 95	28	535 1351	HCFC-refrigerants of the safety group A1 and Fluid Group 2 PED HFC-single-component refrigerants of the safety group A1 and Fluid Group 2 PED HFC-refrigerant blends of the safety group A1 and Fluid Group 2 PED HFC-refrigerant of safety group A2L and Fluid Group 1 HFC-refrigerant of safety group A2L and Fluid Group 2 HFC-refrigerant of safety group A2L and Fluid Group 2 HFC-refrigerant of safety group A2L and Fluid Group 2 HFC-refrigerant blends of safety group A1 and PED fluid group 2

On

RINA Services S.p.A. Via Corsica, 12 - 16128 Genova Tel +39 010 53851 Fax +39 010 5351000



TYPE APPROVAL CERTIFICATE No. MAC257722XG Enclosure - page 2 of 2 Screw Compressor CSH-type

Field of Application:

This product is intended for Air Conditioning, Provision Cooling, Cargo Refrigeration and Process cooling being applied on ships and other units certified by RINA.

Acceptance Conditions:

- 1. The acceptance of this product is subject to the satisfactory outcome of testing as per RINA Rules Part C, Chapter 1, Section 10, Article 21.4.5.
- 2. All refrigerant compressors are to be satisfactory tested as per RINA Rules Part C, Chapter 1, Section 13.
- 3. This product is to be equipped with a type approved electrical equipment (sensors, cables, devices etc.) for control and monitoring as per RINA Rules Part C, Chapter 2, Section 15, Article 2.

Remarks:

1. This product is to be delivered with the relevant documentation for its maintenance and operation.

Hamburg November 30, 2022

RINA Services S.p.A. Via Corsica, 12 - 16128 Genova Tel +39 010 53851 Fax +39 010 5351000



- 2.3 Russian Maritime Register of shipping
- 2.3.1 Semi-hermetic compact screw compressors



Type Approval Certificate for CSH65 .. CSH95

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documention is required. For supplied compressors it is not possible to deliver the required extended product documentation subsequently. Additional costs for extended product documentation will be charged.

POCCUЙСКИЙ MOPCKOЙ PEГИСТР СУДОХОДСТВА RUSSIAN MARITIME REGISTER OF SHIPPING

Crp. 1/2

6.8.3



СВИДЕТЕЛЬСТВО О ТИПОВОМ ОДОБРЕНИИ TYPE APPROVAL CERTIFICATE

Изготовитель Manufacturer

BITZER Kühlmaschinenbau GmbH

Адрес Address

Eschenbrünnlestrasse 15, 71065 Sindelfingen, Germany.

(DE 812 161 588)

Изделие* Product*

Винтовые компрессоры холодильного агента типа: CSH65, CSH75, CSH85, CSH95.

Screw Refrigerant Compressors of types: CSH65, CSH75, CSH85, CSH95.

Код номенклатуры 12010110 Code of nomenclature

На основании освидетельствования и проведенных испытаний удостоверяется, что вышеупомянутое(ые) изделие(я) удовлетворяет(ют) требованиям Российского морского регистра судоходства.

This is to certify that on the basis of the survey and tests carried out the above mentioned item(s) complies(ly) with the requirements of Russian Maritime Register of Shipping.

Часть XII "Холодильные установки "Правил классификации и постройки морских судов" (2018); Раздел 11 Части IV "Правил технического наблюдения за постройкой судов и изготовлением материалов и изделий для судов" (2018).

Part XII "Refrigerating plants" of "Rules for the Classification and construction of Sea-Going Ships" (2018); Section 11 of part IV of the "Rules for technical supervision during construction of ships and manufacture of materials and products for ships" (2018).

Настоящее Свидетельство о типовом одобрении действительно до 14.09.2023 This Type Approval Certificate is valid until

Настоящее Свидетельство о типовом одобрении теряет силу в случаях, установленных в Правилах технического наблюдения за постройкой судов и изготовлением материалов и изделий для судов.

This Type Approval Certificate becomes invalid in cases stipulated in Rules for the Technical Supervision during Construction of Ships and Manufacture of Ships and Materials and Products.

Дата выдачи Date of issue

14.09.2018

№ 18.40021.250

Российский морской регистр судоходств Russian Maritime Register of Shipping

подпись

Морозов В.В. / V.Morozov

(фамилия, инициалы) name

^{*}Дополнительную информацию смотри на оборе Additional information see overleaf.



Стр. Page. 2/2

Технические данные Technical data

Холодильный агент: R 22, R134a Теоретический объём всасывания: до 1351 м3/ч Ном. скорость вращения: 2900/3500 1/мин Эл. двигатель: ном. мощность до 350 кВт, 400/460 В, 50/60Гц

Refrigerant: R 22, R134a Displacement: up to 1351 m3/h Nom. speed: 2900/3500 1/min E-Motor: nominal power up to 350 kW, 400/460 V, 50/60Hz.

Техническая документация и дата ее одобрения Российским морским регистром судоходства Technical documentation and the date of its approval by Russian Maritime Register of Shipping Техническая документация одобрена письмом № 250-А-400-253046 от 14.09.2018.

Technical documentation was approved by RS letter No. 250-A-400-253046 of 14.09.2018.

Образец изделия испытан под техническим наблюдением Российского морского регистра судоходства. Product's specimen has been tested under the technical supervision of Russian Maritime Register of Shipping. - or of 14.09.2018

AKT № 18.60052.250 Report No.

Область применения и ограничения Application and limitations Для судовых холодильных установок.

For ship's refrigerating plants.

Вид документа, выдаваемого на изделие Type of document issued for product Изделие должно поставляться со Свидетельством Российского морского регистра судоходства по форме 6.5.30 или 6.5.31.

The product shall be delivered with Russian Maritime Register of Shipping Certificate in accordance with form 6.5.30 or 6.5.31.



06/2015

18.40021.250



2.3.2 Semi-hermetic screw compressors



Type Approval Certificate for HS53 .. HS85

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documention is required. For supplied compressors it is not possible to deliver the required extended product documentation subsequently. Additional costs for extended product documentation will be charged.

POCCUЙСКИЙ MOPCKOЙ PEГИСТР СУДОХОДСТВА RUSSIAN MARITIME REGISTER OF SHIPPING

Crp. 1/2

6.8.3



СВИДЕТЕЛЬСТВО О ТИПОВОМ ОДОБРЕНИИ TYPE APPROVAL CERTIFICATE

Изготовитель Manufacturer

BITZER Kühlmaschinenbau GmbH

Адрес Address

Eschenbrünnlestrasse 15, 71065 Sindelfingen, Germany.

(DE 812 161 588)

Изделие*
Product*

Винтовые компрессоры холодильного агента типа: HS53, HS64, HS74, HS85.

Screw Refrigerant Compressors of types: HS53, HS64, HS74, HS85.

Код номенклатуры Code of nomenclature 12010110

На основании освидетельствования и проведенных испытаний удостоверяется, что вышеупомянутое(ые) изделие(я) удовлетворяет(ют) требованиям Российского морского регистра судоходства.

This is to certify that on the basis of the survey and tests carried out the above mentioned item(s) complies(ly) with the requirements of Russian Maritime Register of Shipping.

Часть XII "Холодильные установки "Правил классификации и постройки морских судов" (2018); Раздел 11 Части IV "Правил технического наблюдения за постройкой судов и изготовлением материалов и изделий для судов" (2018).

Part XII "Refrigerating plants" of "Rules for the Classification and construction of Sea-Going Ships" (2018); Section 11 of part IV of the "Rules for technical supervision during construction of ships and manufacture of materials and products for ships" (2018).

Настоящее Свидетельство о типовом одобрении действительно до 14.09.2023 This Type Approval Certificate is valid until

Настоящее Свидетельство о типовом одобрении теряет силу в случаях, установленных в Правилах технического наблюдения за постройкой судов и изготовлением материалов и изделий для судов.

This Type Approval Certificate becomes invalid in cases stipulated in Rules for the Technical Supervision during Construction of Ships and Manufacture of Ships and Products.

Дата выдачи Date of issue

14.09.2018

№ 18.40019.250

Российский морской регистр судоходства Russian Maritime Register of Shipping

Морозов В.В. / V.Morozov

(фамилия, инициалы)

*Дополнительную информацию смотои на Additional information see overleaf.

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Стр. Раде. 2 / 2

Технические данные Technical data

Холодильный агент: R 22, R134a Теоретический объём всасывания: до 535 м3/ч Ном. скорость вращения: 2900 1/мин Эл. двигатель: ном. мощность до 150 кВт, 400 В, 50Гц

Refrigerant: R 22, R134a Displacement: up to 535 m3/h Nom. speed: 2900 1/min E-Motor: nominal power up to 150 kW, 400V, 50Hz.

Техническая документация и дата ее одобрения Российским морским регистром судоходства Technical documentation and the date of its approval by Russian Maritime Register of Shipping Техническая документация одобрена письмом № 250-А-400-253046 от 14.09.2018.

Technical documentation was approved by RS letter No. 250-A-400-253046 of 14.09.2018.

Образец изделия испытан под техническим наблюдением Российского морского регистра судоходства. Product's specimen has been tested under the technical supervision of Russian Maritime Register of Shipping.

AKT № 18.60050.250

от 14.09.2018

Report No.

Область применения и ограничения Application and limitations Для судовых холодильных установок.

For ship's refrigerating plants.

Вид документа, выдаваемого на изделие Type of document issued for product Изделие должно поставляться со Свидетельством Российского морского регистра судоходства по форме 6.5.30 или 6.5.31.

The product shall be delivered with Russian Maritime Register of Shipping Certificate in accordance with form 6.5.30 or 6.5.31.



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18.40019.250

AU-100-9 // PDF Download

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2.3.3 Open drive screw compressors



Type Approval Certificate for OS53 .. OS95

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documention is required. For supplied compressors it is not possible to deliver the required extended product documentation subsequently. Additional costs for extended product documentation will be charged.

РОССИЙСКИЙ МОРСКОЙ РЕГИСТР СУДОХОДСТВА **RUSSIAN MARITIME REGISTER OF SHIPPING**

Стр. Page. 1/2

6.8.3



СВИДЕТЕЛЬСТВО О ТИПОВОМ ОДОБРЕНИИ TYPE APPROVAL CERTIFICATE

Изготовитель Manufacturer

BITZER Kühlmaschinenbau GmbH

Адрес Address

Eschenbrünnlestrasse 15, 71065 Sindelfingen, Germany.

(DE 812 161 588)

Изделие'

Винтовые компрессоры холодильного агента типа: OS53, OS74, OS85, OS95.

Screw Refrigerant Compressors of types: OS53, OS74, OS85, OS95.

Код номенклатуры 12010110 Code of nomenclature

На основании освидетельствования и проведенных испытаний удостоверяется, что вышеупомянутое(ые) изделие(я) удовлетворяет(ют) требованиям Российского морского регистра судоходства.

This is to certify that on the basis of the survey and tests carried out the above mentioned item(s) complies(ly) with the requirements of Russian Maritime Register of Shipping.

Часть XII "Холодильные установки "Правил классификации и постройки морских судов" (2018); Раздел 11 Части IV "Правил технического наблюдения за постройкой судов и изготовлением материалов и изделий для судов" (2018).

Part XII "Refrigerating plants" of "Rules for the Classification and construction of Sea-Going Ships" (2018); Section 11 of part IV of the "Rules for technical supervision during construction of ships and manufacture of materials and products for ships" (2018).

Настоящее Свидетельство о типовом одобрении действительно до 14.09.2023 This Type Approval Certificate is valid until

Настоящее Свидетельство о типовом одобрении теряет силу в случаях, установленных в Правилах

технического наблюдения за постройкой судов и изготовлением материалов и изделий для судов.

This Type Approval Certificate becomes invalid in cases stipulated in Rules for the Technical Supervision during Construction of Ships and Manufacture of Shipboard Materials and Products.

Дата выдачи Date of issue

14.09.2018

№ 18.40020.250

Российский морской регистр Russian Maritime Register of Shipping Морозов В.В. / V.Morozov фамилия, инициалы

*Дополнительную информаци Additional information see overlea



Стр. Page. 2/2

Технические данные Technical data

Холодильный агент: R 22, R134a, R717/NH3 Теоретический объём всасывания: до 535 м3/ч Ном. скорость вращения: 2900 1/мин Эл. двигатель: ном. мощность до 150 кВт, 400 В, 50Гц

Refrigerant: R 22, R134a, R717/NH3 Displacement: up to 535 m3/h Nom. speed: 2900 1/min E-Motor: nominal power up to 150 kW, 400V, 50Hz.

Техническая документация и дата ее одобрения Российским морским регистром судоходства Technical documentation and the date of its approval by Russian Maritime Register of Shipping Техническая документация одобрена письмом № 250-А-400-253046 от 14.09.2018.

Technical documentation was approved by RS letter No. 250-A-400-253046 of 14.09.2018.

Образец изделия испытан под техническим наблюдением Российского морского регистра судоходства. Product's specimen has been tested under the technical supervision of Russian Maritime Register of Shipping.

AKT № 18.60051.250

Report No.

от 14.09.2018

Область применения и ограничения Application and limitations Для судовых холодильных установок.

For ship's refrigerating plants.

Вид документа, выдаваемого на изделие Туре of document issued for product Изделие должно поставляться со Свидетельством Российского морского регистра судоходства по форме 6.5.30 или 6.5.31.

The product shall be delivered with Russian Maritime Register of Shipping Certificate in accordance with form 6.5.30 or 6.5.31.



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- 3 Expanders
- 3.1 DNV
- 3.1.1 Semi-hermetic screw expanders



Type Approval Certificate for HSE.95

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documention is required. For supplied compressors it is not possible to deliver the required extended product documentation subsequently. Additional costs for extended product documentation will be charged.

DNV-GL

Certificate No: TAM000014V

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Refrigerant Compressor & Expander

with type designation(s) **HS95 HSE95**

BITZER Kühlmaschinenbau GmbH

Sindelfingen, Germany

is found to comply with

DNV GL rules for classification - Ships Pt.4 Ch.5 Rotating machinery - driven units

Application:

Products approved by this certificate are accepted for installation on all vessels classed by

DNV GL.

Max. working press.: Operating media Type

HS95 32 bar HCFC-refrigerants, HFC-single component refrigerants,

HSE95 HFC-refrigerant blends, HFO-refrigerants,

HFO / HFC-refrigerant blends, Inorganic Compound,

see page 2

Issued at Hamburg on 2020-12-14 This Certificate is valid until 2025-12-13. DNV GL local station: Augsburg

Approval Engineer: Christian Kaemmer

for DNV GL

Olaf Drews Head of Section

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.

Form code: TA 251

Revision: 2016-12

www.dnval.com

Page 1 of 2

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Job Id: 262.1-032635-1 Certificate No: TAM000014V

Product description

Semi-Hermetic Screw Compressor HS95 Semi-Hermetic Screw Expander HSE95

Casing Material: EN-GJL-250 Spheroidal Graphite Screw Rotor Material: EN-GJS-600-3, EN-GJS-500-7 EN-GJS-400-3 (only female rotor)

Usable Refrigerants

HCFC-refrigerants of the safety group A1 and Fluid Group 2 PED HFC-single-component refrigerant of the safety group A1 and Fluid Group 2 PED HFC-single-component refrigerant of the safety group B1 and Fluid Group 2 PED HFC-refrigerant blends of the safety group A1 and Fluid Group 2 PED HFO-refrigerant of safety group A2L and Fluid Group 1 PED HFO-refrigerant of safety group A2L and Fluid Group 2 PED HFO/HFC refrigerant blends of safety group A1 and Fluid Group 2 PED Inorganic Compound: R717 / Ammonia, safety group B2L and Fluid Group 1 PED

Note: Fluid Groups acc. to PED = Pressure equipment directive 2014/68/EU Safety Groups acc. to EN DIN 378-1:2017-03

Application

Air Conditioning, Provision Cooling, Cargo Refrigeration. Expander version to be used for waste heat recovery.

Tests to be carried out

Compressors are subject to a performance test at the manufacturer's works under supervision of DNVGL and are to be presented for final inspection.

Type Approval documentation

Marking of product

The product shall be marked with manufacturer's name, effective suction rate [m3/h], discharge pressure [bar], speed [rpm], serial number.

Periodical assessment

For retention of the Type Approval, a DNV GL Surveyor shall perform periodical assessment after two years (+/- 90 days) and after 3.5 years (+/- 90 days) to verify that the conditions for the Type Approval are complied with. Refer to the Class Programme DNVGL-CP-0338, Sec.4.

Form code: TA 251 Revision: 2016-12 www.dnvgl.com Page 2 of 2



3.2 RINA Type Approvals

3.2.1 Semi-hermetic screw expanders

Type Approval Certificate for HSE.64, HSE.85, HSE.95

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documention is required. For supplied compressors it is not possible to deliver the required extended product documentation subsequently. Additional costs for extended product documentation will be charged.





TYPE APPROVAL CERTIFICATE No. MAC072223XG

This is to certify that the product identified below is in compliance with the regulations herewith specified.

Description Screw Expanders
Type HSE 64, 85 and 95

Applicant BITZER Kühlmaschinenbau GmbH

Peter-Schaufler-Platz 1 71065 Sindelfingen GERMANY

Manufacturer BITZER Kühlmaschinenbau GmbH

Place of manufacture Peter-Schaufler-Platz 1

71065 Sindelfingen

Reference standards
Reference documents
Reference documents
RINA TYPE APPROVAL SYSTEM

Issued in Hamburg on March 10, 2023. This Certificate is valid until March 23, 2028

RINA Services S.p.A.

This certificate consists of this page and 1 enclosure

RINA Services S.p.A. Via Corsica, 12 - 18128 Genova Tel +39 010 53851 Fax +39 010 5351000



- 4 Reciprocating compressors
- 4.1 DNV
- 4.1.1 Semi-hermetic reciprocating compressors



Approval Certificate for CE1

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documention is required. For supplied compressors it is not possible to deliver the required extended product documentation subsequently. Additional costs for extended product documentation will be charged.

DNV	Certificate No:
TYPE APPROVAL CERTIFICA	Revision No:
This is to certify:	
Fhat the Refrigerant Compressor	
with type designation(s) IKES; 2JES; 2HES; 2GES; 2FES / CE1 Ecoline ssued to	
ssueu to Bitzer Kühlmaschinenbau Schkeudit Schkeuditz, Germany	tz GmbH
s found to comply with	
Application :	
Products approved by this certificate are accepted for in Max. working 32 bar	nstallation on all vessels classed by DNV.
press.: Operating media HCFC-refrigerants, HFC-single com refrigerants, HFO/HFC refrigerant bl	ponent refrigerants, HFC-refrigerant blends, HFO- lends, see page 2
Operating media HCFC-refrigerants, HFC-single com- refrigerants, HFO/HFC refrigerant bl	ponent refrigerants, HFC-refrigerant blends, HFO- lends, see page 2
Operating media HCFC-refrigerants, HFC-single com	ponent refrigerants, HFC-refrigerant blends, HFO- lends, see page 2 for DNV
Operating media HCFC-refrigerants, HFC-single com- refrigerants, HFO/HFC refrigerant bl ssued at Hamburg on 2022-09-06 This Certificate is valid until 2027-09-05.	lends, see page 2
Operating media HCFC-refrigerants, HFC-single com- refrigerants, HFO/HFC refrigerant bl ssued at Hamburg on 2022-09-06 This Certificate is valid until 2027-09-05. DNV local station: Magdeburg	lends, see page 2
Operating media HCFC-refrigerants, HFC-single com- refrigerants, HFO/HFC refrigerant bl ssued at Hamburg on 2022-09-06 This Certificate is valid until 2027-09-05. DNV local station: Magdeburg	for DNV Sven Klinger
Operating media HCFC-refrigerants, HFC-single com- refrigerants, HFO/HFC refrigerant bl ssued at Hamburg on 2022-09-06 This Certificate is valid until 2027-09-05. DNV local station: Magdeburg	for DNV Sven Klinger
Operating media HCFC-refrigerants, HFC-single com- refrigerants, HFO/HFC refrigerant bl ssued at Hamburg on 2022-09-06 This Certificate is valid until 2027-09-05. DNV local station: Magdeburg	for DNV Sven Klinger
Operating media HCFC-refrigerants, HFC-single com- refrigerants, HFO/HFC refrigerant bl ssued at Hamburg on 2022-09-06 This Certificate is valid until 2027-09-05. DNV local station: Magdeburg	for DNV Sven Klinger
Operating media HCFC-refrigerants, HFC-single com- refrigerants, HFO/HFC refrigerant bl ssued at Hamburg on 2022-09-06 This Certificate is valid until 2027-09-05. DNV local station: Magdeburg	for DNV Sven Klinger
Operating media HCFC-refrigerants, HFC-single com- refrigerants, HFO/HFC refrigerant bl ssued at Hamburg on 2022-09-06 This Certificate is valid until 2027-09-05. DNV local station: Magdeburg	for DNV Sven Klinger
Operating media HCFC-refrigerants, HFC-single com- refrigerants, HFO/HFC refrigerant bl ssued at Hamburg on 2022-09-06 This Certificate is valid until 2027-09-05. DNV local station: Magdeburg	for DNV Sven Klinger
Operating media HCFC-refrigerants, HFC-single com- refrigerants, HFO/HFC refrigerant bl ssued at Hamburg on 2022-09-06 This Certificate is valid until 2027-09-05. DNV local station: Magdeburg	for DNV Sven Klinger
Operating media HCFC-refrigerants, HFC-single com- refrigerants, HFO/HFC refrigerant bl ssued at Hamburg on 2022-09-06 This Certificate is valid until 2027-09-05. DNV local station: Magdeburg	for DNV Sven Klinger

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.



Revision: 2021-03

www.dnv.com

Page 1 of 2





Job Id: 262.1-025382-2 Certificate No: TAM00000GU

Revision No: 1

Product description

Semi-Hermetic Reciprocating Compressor

CE1 Ecoline:

Туре	2KES	2JES	2HES	2GES	2FES
Displacement @ 1450 1/min@ 50 Hz [m3/h]	4,06	5,21	6,51	7,58	9,54

Casing Material:

Cast Iron EN-GJL-250 Lamellar Graphite.

Usable Refrigerants

HCFC-refrigerants of the safety group A1 and Fluid Group 2 PED
HFC-single-component refrigerant of the safety group A1 and Fluid Group 2 PED
HFC-refrigerant blends of the safety group A1 and Fluid Group 2 PED
HFO-refrigerant of safety group A2L and Fluid Group 1 PED
HFO-refrigerant of safety group A2L and Fluid Group 2 PED
HFO/HFC refrigerant blends of safety group A1 and Fluid Group 2 PED

Note: Fluid Groups acc. to PED = Pressure equipment directive 2014/68/EU Safety Groups acc. to EN DIN 378-1:2017-03

Application

Air Conditioning, Provision Cooling, Cargo Refrigeration.

Tests to be carried out

Compressors are subject to a performance test at the manufacturer's works under supervision of DNV and are to be presented for final inspection.

Type Approval documentation

Marking of product

The product shall be marked with manufacturer's name, year of construction, effective suction rate [m3/h], discharge pressure [bar], speed [rpm], shaft power [kW], serial number.

Periodical assessment

For retention of the Type Approval, a DNV Surveyor shall perform periodical assessment to verify that the conditions for the Type Approval are complied with. Refer to the Class Programme DNV-CP-0338, Sec.4.

To check the validity of this certificate, please look it up in https://approvalfinder.dnv.com

 Form code: TA 251
 Revision: 2021-03
 www.dnv.com
 Page 2 of 2



Approval Certificate for CE2

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documention is required. For supplied compressors it is not possible to deliver the required extended product documentation subsequently. Additional costs for extended product documentation will be charged.

DNV		
TYPE APPROVAL CERTIFICA	Certificate No: TAM00000GE Revision No: 1	
This is to certify:		
That the Refrigerant Compressor		
with type designation(s) 2EES; 2DES; 2CES / CE2 Ecoline		
Bitzer Kühlmaschinenbau Schkeudit Schkeuditz, Germany	tz GmbH	
is found to comply with DNV rules for classification – Ships Pt.4 Ch.5 Rotating I	machinery – driven units	
Application :		
Products approved by this certificate are accepted for in Max. working 32 bar press.: Operating media HCFC-refrigerants, HFC-single comprefrigerants, HFO/HFC refrigerant ble	ponent refrigerants, HFC-refrigerant blends, HFO-	
Issued at Hamburg on 2022-09-06		
	for DNV	
This Certificate is valid until 2027-09-05. DNV local station: Magdeburg		
DNV local station: Magdeburg	Sven Klinger Head of Section	
DNV local station: Magdeburg	Sven Klinger Head of Section	
DNV local station: Magdeburg		
DNV local station: Magdeburg	Head of Section	
Approval Engineer: Christian Kaemmer This Certificate is subject to terms and conditions overleaf. Any significant change in	Head of Section In design or construction may render this Certificate invalid. Equipment/systems installed. Judger of this document, or following from mandatory law, the liability of DNV AS, its oveses ("DNV") arising from or in connection with the services rendered for the	





262.1-025381-2 TAM00000GE Job Id: Certificate No:

Revision No:

Product description

Semi-Hermetic Reciprocating Compressor

CE2 Ecoline:

Туре	2EES	2DES	2CES
Displacement @ 1450 1/min@ 50 Hz [m3/h]	11,4	13,4	16,2

Casing Material:

Cast Iron Graphite EN-GJL-250 Lamellar Graphite.

Usable Refrigerants

HCFC-refrigerants of the safety group A1 and Fluid Group 2 PED	
HFC-single-component refrigerant of the safety group A1 and Fluid Group 2 PED	
HFC-refrigerant blends of the safety group A1 and Fluid Group 2 PED	
HFO-refrigerant of safety group A2L and Fluid Group 1 PED	
HFO-refrigerant of safety group A2L and Fluid Group 2 PED	
HFO/HFC refrigerant blends of safety group A1 and Fluid Group 2 PED	

Note: Fluid Groups acc. to PED = Pressure equipment directive 2014/68/EU Safety Groups acc. to EN DIN 378-1:2017-03

Air Conditioning, Provision Cooling, Cargo Refrigeration.

Tests to be carried out

Compressors are subject to a performance test at the manufacturer's works under supervision of DNV and are to be presented for final inspection.

Type Approval documentation

Marking of productThe product shall be marked with manufacturer's name, year of construction, effective suction rate [m3/h], discharge pressure [bar], speed [rpm], shaft power [kW], serial number.

Periodical assessment

For retention of the Type Approval, a DNV Surveyor shall perform periodical assessment to verify that the conditions for the Type Approval are complied with. Refer to the Class Programme DNV-CP-0338, Sec.4.

To check the validity of this certificate, please look it up in https://approvalfinder.dnv.com

Page 2 of 2 Form code: TA 251 Revision: 2021-03 www.dnv.com



Approval Certificate for CE3

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documention is required. For supplied compressors it is not possible to deliver the required extended product documentation subsequently. Additional costs for extended product documentation will be charged.

DNV	
DIV	
	Certificate No: TAM00000WN
TYPE APPROVAL CERTIFICATE	Revision No:
This is to certify:	
That the Refrigerant Compressor	
with type designation(s) 4FES; 4EES; 4DES; 4CES / CE3 Ecoline	
Issued to	
Bitzer Kühlmaschinenbau Schkeuditz Schkeuditz, Germany	GmbH
is found to comply with	
DNV GL rules for classification – Ships Pt.4 Ch.5 Rotating	machinery – driven units
A south and the second	
Application : Products approved by this certificate are accepted for insta	liation on all vessels classed by DNV.
Max. working 32 bar press.:	
Operating media HCFC-refrigerants, HFC-single compon	
refrigerants, HFO/HFC refrigerant blend	is, see page 2
Issued at Hamburg on 2023-07-07 This Certificate is valid until 2028-07-06.	for DNV
DNV local unit: Magdeburg	TOF DNV
Approval Engineer: Christian Kaemmer	
, pprovide English Comments	Sven Klinger
	Head of Section
	ign or construction may render this Certificate invalid.
This Certificate is subject to terms and conditions overleaf. Any significant change in desi The validity date relates to the Type Approval Certificate and not to the approval of equip	ment/systems installed.
The validity date relates to the Type Approval Certificate and not to the approval of equip LEGAL DISCLAIMER: Unless otherwise stated in the applicable contract with the holder parent companies and their subsidaries as well as their officers, directors and employee purpose of the issuance of this document or reliance thereon, whether in contract or in to	of this document, or following from mandatory law, the liability of DNV AS, its s ("DNV") arising from or in connection with the services rendered for the
The validity date relates to the Type Approval Certificate and not to the approval of equip LEGAL DISCLAIMER: Unless otherwise stated in the applicable contract with the holder parent companies and their subsidiaries as well as their officers, directors and employee:	of this document, or following from mandatory law, the liability of DNV AS, its s ("DNV") arising from or in connection with the services rendered for the





Job Id: 262.1-028930-2 Certificate No: TAM00000WN

Revision No: 1

Product description

Semi-Hermetic Refrigerant Compressor, reciprocating.

Туре	4FES	4EES	4DES	4CES
Displacement [m³/h] @ 1450 1 /min	18,1	22,7	26,8	32,5

Casing Material:

Cast Iron with Flake Graphite EN-GJL-250

Usable Refrigerants

HCFC-refrigerants of the safety group A1 and Fluid Group 2 PED	
HFC-single-component refrigerant of the safety group A1 and Fluid Group 2 PED	
HFC-refrigerant blends of the safety group A1 and Fluid Group 2 PED	
HFO-refrigerant of safety group A2L and Fluid Group 1 PED	
HFO-refrigerant of safety group A2L and Fluid Group 2 PED	
HFO/HFC refrigerant blends of safety group A1 and Fluid Group 2 PED	

Note: Fluid Groups acc. to PED = Pressure equipment directive 2014/68/EU Safety Groups acc. to EN DIN 378-1:2017-03

Production place

Bitzer Kühlmaschinenbau Schkeuditz GmbH, Industriestr. 48, 04435 Schkeuditz / Germany.

Application

Air Conditioning, Provision Cooling, Cargo Refrigeration.

Tests to be carried out

Compressors for cargo refrigeration are subject to a performance test at the manufacturer's works under supervision of DNV and are to be presented for final inspection.

Type Approval documentation

Marking of product

The product shall be marked with manufacturer's name, year of construction, effective suction rate [m3/h], discharge pressure [bar], speed [rpm], shaft power [kW], serial number.

Periodical assessment

For retention of the Type Approval, a DNV Surveyor shall perform periodical assessment to verify that the conditions for the Type Approval are complied with. Refer to the Class Programme DNV-CP-0338, Sec.4.

To check the validity of this certificate, please look it up in https://approvalfinder.dnv.com

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TYPE APPROVAL CERTIFICATE

Certificate No: TAM00001BG

This is to certify: That the Refrigerant Compressor with type designation(s) 4BES Issued to Bitzer Kühlmaschinenbau Schkeuditz GmbH Schkeuditz, Germany is found to comply with DNV rules for classification - Ships Pt.4 Ch.5 Rotating machinery - driven units Application: Products approved by this certificate are accepted for installation on all vessels classed by DNV. Max. working 32 bar press.: Operating media HCFC-refrigerants, HFC-single component refrigerants, HFC-refrigerant blends, HFOrefrigerants, HFO/HFC refrigerant blends, see page 2 Issued at Hamburg on 2023-10-30 This Certificate is valid until 2028-10-29. for **DNV** DNV local unit: Hamburg - CMC North/East Approval Engineer: Christian Kaemmer Sven Klinger

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.

Form code: TA 251

code: TA 251 Revision: 20

-12 www

Head of Section

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Job Id: 262.1-039518-1 Certificate No: TAM00001BG

Product description

Semi-Hermetic Refrigerant Compressor, reciprocating, with 4 cylinders.

Туре	4BES
Displacement [m³/h] @ 1450 1 /min	36,1

Casing Material: Cast Iron with Flake Graphite EN-GJL-250

Usable Refrigerants

HCFC-refrigerants of the safety group A1 and Fluid Group 2 PED
HFC-single-component refrigerant of the safety group A1 and Fluid Group 2 PED
HFC-refrigerant blends of the safety group A1 and Fluid Group 2 PED
HFO-refrigerant of safety group A2L and Fluid Group 1 PED
HFO-refrigerant of safety group A2L and Fluid Group 2 PED
HFO/HFC refrigerant blends of safety group A1 and Fluid Group 2 PED

Note: Fluid Groups acc. to PED = Pressure equipment directive 2014/68/EU Safety Groups acc. to EN DIN 378-1:2017-03

Production place

Bitzer Kühlmaschinenbau Schkeuditz GmbH, Industriestr. 48, 04435 Schkeuditz / Germany.

Application

Air Conditioning, Provision Cooling, Cargo Refrigeration.

Tests to be carried out

Compressors for cargo refrigeration are subject to a performance test at the manufacturer's works under supervision of DNV and are to be presented for final inspection.

Type Approval documentation

Marking of product

The product shall be marked with manufacturer's name, year of construction, effective suction rate [m3/h], discharge pressure [bar], speed [rpm], shaft power [kW], serial number.

Periodical assessment

For retention of the Type Approval, a DNV Surveyor shall perform periodical assessment to verify that the conditions for the Type Approval are complied with. Refer to the Class Programme DNV-CP-0338, Sec.4.

To check the validity of this certificate, please look it up in https://approvalfinder.dnv.com

Form code: TA 251 Revision: 2022-12 www.dnv.com Page 2 of 2



Approval Certificate for CE4

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documention is required. For supplied compressors it is not possible to deliver the required extended product documentation subsequently. Additional costs for extended product documentation will be charged.

DNV				
TYPE APPRO	VAL CERTIFICAT	E	TAM00000GG Revision No:	
This is to certify:	orace or			
	JI 63301			
4VE; 4TE; 4PE; 4NE / C	E4 Ecoline			
Bitzer Kühlmasc		GmbH		
is found to comply with		achinery – driven units		
Application:				
Products approved by this		allation on all vessels classed b	y DNV.	
press.:		nent refrigerants. HFC-refrigera	nt blends. HFO-	
			•	
Issued at Hamburg on 202	2.09.06			
Issued at Hamburg on 202 This Certificate is valid until	2027-09-05.	for DNV		
This Certificate is valid until DNV local station: Magdebu	2027-09-05. urg	for DNV		
This Certificate is valid until	2027-09-05. urg	for DNV Sven Klinge	er	
This Certificate is valid until DNV local station: Magdebu	2027-09-05. urg			
This Certificate is valid until DNV local station: Magdebu	2027-09-05. urg	Sven Klinge		
This Certificate is valid until DNV local station: Magdebu	2027-09-05. urg	Sven Klinge		
This Certificate is valid until DNV local station: Magdebu	2027-09-05. urg	Sven Klinge		
This Certificate is valid until DNV local station: Magdebu	2027-09-05. urg	Sven Klinge		
This Certificate is valid until DNV local station: Magdebu	2027-09-05. urg	Sven Klinge		
This Certificate is valid until DNV local station: Magdebu	2027-09-05. urg	Sven Klinge		
This Certificate is valid until DNV local station: Magdebu	2027-09-05. urg	Sven Klinge		
This Certificate is valid until DNV local station: Magdebu	2027-09-05. urg	Sven Klinge		
This Certificate is valid until DNV local station: Magdebu Approval Engineer: Christia	2027-09-05. an Kaemmer conditions overleaf. Any significant change in de	Sven Klinge Head of Secti	ion	
This Certificate is valid until DNV local station: Magdebu Approval Engineer: Christia This Certificate is subject to terms and The validity date relates to the Type Ag LEGAL DISCLAIMER: Unless otherwis parent companies and their subsidiaries acrosses of the subsuance of the s	2027-09-05. an Kaemmer conditions overleaf. Any significant change in de portoval Certificate and not to the approval of eque se stated in the applicable contract with the holds as as well as their officers, directors and employed or or reliance thereon, whether in contract or in	Sven Klinge Head of Secti Head of Secti sign or construction may render this Certificate ipment/systems installed. er of this document, or following from mandatory see ('DNV') arising from or in connection with the	invalid. Law, the liability of DNV AS, its eservices rendered for the	
This Certificate is valid until DNV local station: Magdebu Approval Engineer: Christia Approval Engineer: Christia This Certificate is subject to terms and The validity date relates to the Type Apple LEGAL DISCLAIMER: Unless others under subsidiarie and their subsidiaries and their subsidiaries.	2027-09-05. an Kaemmer conditions overleaf. Any significant change in de portoval Certificate and not to the approval of eque se stated in the applicable contract with the holds as as well as their officers, directors and employed or or reliance thereon, whether in contract or in	Sven Klinge Head of Secti Head of Secti sign or construction may render this Certificate ipment/systems installed. er of this document, or following from mandatory see ('DNV') arising from or in connection with the	invalid. Law, the liability of DNV AS, its e services rendered for the rect losses and under any	
	This is to certify: That the Refrigerant Comp with type designation(s) 4VE; 4TE; 4PE; 4NE / C Issued to Bitzer Kühlmasc Schkeuditz, Germany is found to comply with DNV rules for classificati Application: Products approved by this Max. working 32 ba press.: Operating media HCFC	TYPE APPROVAL CERTIFICAT This is to certify: That the Refrigerant Compressor with type designation(s) 4VE; 4TE; 4PE; 4NE / CE4 Ecoline Issued to Bitzer Kühlmaschinenbau Schkeuditz Schkeuditz, Germany is found to comply with DNV rules for classification – Ships Pt.4 Ch.5 Rotating materials Application: Products approved by this certificate are accepted for inst Max. working 32 bar press.: Operating media HCFC-refrigerants, HFC-single compo	TYPE APPROVAL CERTIFICATE This is to certify: That the Refrigerant Compressor with type designation(s) 4VE; 4TE; 4PE; 4NE / CE4 Ecoline Issued to Bitzer Kühlmaschinenbau Schkeuditz GmbH Schkeuditz, Germany is found to comply with DNV rules for classification – Ships Pt.4 Ch.5 Rotating machinery – driven units Application: Products approved by this certificate are accepted for installation on all vessels classed b Max. working 32 bar press.:	TYPE APPROVAL CERTIFICATE Certificate No: TAM000000GG Revision No: 1 This is to certify: That the Refrigerant Compressor with type designation(s) 4VE; 4TE; 4PE; 4NE / CE4 Ecoline Issued to Bitzer Kühlmaschinenbau Schkeuditz GmbH Schkeuditz, Germany is found to comply with DNV rules for classification – Ships Pt.4 Ch.5 Rotating machinery – driven units Application: Products approved by this certificate are accepted for installation on all vessels classed by DNV. Max. working 32 bar press.: Operating media HCFC-refrigerants, HFC-single component refrigerants, HFC-refrigerant blends, HFO-





262.1-025383-2 TAM00000GG Job Id: Certificate No:

Revision No:

Product description

Semi-Hermetic Reciprocating Compressor

CE4 Ecoline:

Туре	4VE	4TE	4PE	4NE
Displacement @ 1450 1/min@ 50 Hz [m3/h]	34,7	41,3	48,5	56,2

Casing Material:

Cast Iron EN-GJL-250 Lamellar Graphite.

Usable Refrigerants

HCFC-refrigerants of the safety group A1 and Fluid Group 2 PED	
HFC-single-component refrigerant of the safety group A1 and Fluid Group 2 PED	
HFC-refrigerant blends of the safety group A1 and Fluid Group 2 PED	
HFO-refrigerant of safety group A2L and Fluid Group 1 PED	
HFO-refrigerant of safety group A2L and Fluid Group 2 PED	
HFO/HFC refrigerant blends of safety group A1 and Fluid Group 2 PED	

Note: Fluid Groups acc. to PED = Pressure equipment directive 2014/68/EU Safety Groups acc. to EN DIN 378-1:2017-03

Application

Air Conditioning, Provision Cooling, Cargo Refrigeration.

Tests to be carried out

Compressors are subject to a performance test at the manufacturer's works under supervision of DNV and are to be presented for final inspection.

Type Approval documentation

Marking of product

The product shall be marked with manufacturer's name, year of construction, effective suction rate [m3/h], discharge pressure [bar], speed [rpm], shaft power [kW], serial number.

Periodical assessment

For retention of the Type Approval, a DNV Surveyor shall perform periodical assessment to verify that the conditions for the Type Approval are complied with. Refer to the Class Programme DNV-CP-0338, Sec.4.

To check the validity of this certificate, please look it up in https://approvalfinder.dnv.com

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Approval Certificate for BE5

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documention is required. For supplied compressors it is not possible to deliver the required extended product documentation subsequently. Additional costs for extended product documentation will be charged.

_	DAU					
	DN	V				
				_	Certificate No: TAM00000WN	
TY	PE APPR	OVAL CE	RTIFICATI		Revision No: 1	
	s is to certify:					
	the Refrigerant C					
with t 4JE;	type designation(s 4HE; 4GE; 4FE	/ BE5 Ecoline				
			ı Schkeuditz	GmbH		
	und to comply with V rules for classit	ication – Ships Pt	t.4 Ch.5 Rotating ma	chinery – driven units		
Арр	lication :					
Prod Max	lucts approved by x. working 3	this certificate a	re accepted for insta	llation on all vessels classe	d by DNV.	
pre: Ope	erating media H		HFC-single compor HFC refrigerant blend	nent refrigerants, HFC-refrig ds, see page 2	erant blends, HF	·O-
	ed at Hamburg or Certificate is valid			for DN	IV.	
	local unit: Magdel			IOI DI	•	
Appro	oval Engineer: Ch	ristian Kaemmer				
				Sven Kli		
				Head of So	ection	
			Any significant change in des	ign or construction may render this Certifi	icate invalid.	
LEGAL parent	DISCLAIMER: Unless of companies and their sub-	herwise stated in the appl	icable contract with the holder	of this document, or following from mand, is ("DNV") arising from or in connection wind including negligence), shall be limited	ith the services rendered	d for the
circums	stance be limited to 300,0	00 USD.				13
circums	stance be limited to 300,0	00 USD.	Revision: 2022-12	www.dn		Page 1 of 2





Job Id: 262.1-028927-2 Certificate No: TAM00000WM

Revision No: 1

Product description

Semi-Hermetic Refrigerant Compressor, reciprocating.

Туре	4JE	4HE	4GE	4FE
Displacement [m³/h] @ 1450 1 /min	63,5	73,7	84,6	101,8

Casing Material: Cast Iron with Flake Graphite EN-GJL-250

Usable Refrigerants

HCFC-refrigerants of the safety group A1 and Fluid Group 2 PED	
HFC-single-component refrigerant of the safety group A1 and Fluid Group 2 PED	
HFC-refrigerant blends of the safety group A1 and Fluid Group 2 PED	
HFO-refrigerant of safety group A2L and Fluid Group 1 PED	
HFO-refrigerant of safety group A2L and Fluid Group 2 PED	
HFO/HFC refrigerant blends of safety group A1 and Fluid Group 2 PED	

Note: Fluid Groups acc. to PED = Pressure equipment directive 2014/68/EU Safety Groups acc. to EN DIN 378-1:2017-03

Production place

Bitzer Kühlmaschinenbau Schkeuditz GmbH, Industriestr. 48, 04435 Schkeuditz / Germany.

Application

Air Conditioning, Provision Cooling, Cargo Refrigeration.

Tests to be carried out

Compressors for cargo refrigeration are subject to a performance test at the manufacturer's works under supervision of DNV and are to be presented for final inspection.

Type Approval documentation

Marking of product

The product shall be marked with manufacturer's name, year of construction, effective suction rate [m3/h], discharge pressure [bar], speed [rpm], shaft power [kW], serial number.

Periodical assessment

For retention of the Type Approval, a DNV Surveyor shall perform periodical assessment to verify that the conditions for the Type Approval are complied with. Refer to the Class Programme DNV-CP-0338, Sec.4.

To check the validity of this certificate, please look it up in https://approvalfinder.dnv.com

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Approval Certificate for BE6

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documention is required. For supplied compressors it is not possible to deliver the required extended product documentation subsequently. Additional costs for extended product documentation will be charged.

TYPE APPROVAL CERTIFICATE	TAM00000WT Revision No: 1
This is to certify: That the Refrigerant Compressor	
with type designation(s) 6JE; 6HE; 6GE; 6FE; / BE6 Ecoline	
Issued to Bitzer Kühlmaschinenbau Schkeuditz C Schkeuditz, Germany	GmbH
is found to comply with DNV rules for classification – Ships Pt.4 Ch.5 Rotating mac	hinery – driven units
Application: Products approved by this certificate are accepted for install Max. working 32 bar press.: Operating media HCFC-refrigerants, HFC-single componer refrigerants, HFO/HFC refrigerant blends	ent refrigerants, HFC-refrigerant blends, HFO-
Issued at Hamburg on 2023-07-07 This Certificate is valid until 2028-07-06 . DNV local unit: Magdeburg	for DNV
Approval Engineer: Christian Kaemmer	Sven Klinger Head of Section

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.



Revision: 2022-12

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262.1-028926-2 Job Id: Certificate No: TM00000WT

Revision No:

Product description

Semi-Hermetic Refrigerant Compressor, reciprocating.

Туре	6JE	6HE	6GE	6FE
Displacement [m³/h] @ 1450 1 /min	95,3	110,5	126,8	151,6

Casing Material: Cast Iron with Flake Graphite EN-GJL-250

Usable Refrigerants

HCFC-refrigerants of the safety group A1 and Fluid Group 2 PED	
HFC-single-component refrigerant of the safety group A1 and Fluid Group 2 PED	
HFC-refrigerant blends of the safety group A1 and Fluid Group 2 PED	
HFO-refrigerant of safety group A2L and Fluid Group 1 PED	
HFO-refrigerant of safety group A2L and Fluid Group 2 PED	
HFO/HFC refrigerant blends of safety group A1 and Fluid Group 2 PED	

Fluid Groups acc. to PED = Pressure equipment directive 2014/68/EU Note: Safety Groups acc. to EN DIN 378-1:2017-03

Production place

Bitzer Kühlmaschinenbau Schkeuditz GmbH, Industriestr. 48, 04435 Schkeuditz / Germany.

Application

Air Conditioning, Provision Cooling, Cargo Refrigeration.

Tests to be carried out

Compressors for cargo refrigeration are subject to a performance test at the manufacturer's works under supervision of DNV and are to be presented for final inspection.

Type Approval documentation

Marking of productThe product shall be marked with manufacturer's name, year of construction, effective suction rate [m3/h], discharge pressure [bar], speed [rpm], shaft power [kW], serial number.

Periodical assessment

For retention of the Type Approval, a DNV Surveyor shall perform periodical assessment to verify that the conditions for the Type Approval are complied with. Refer to the Class Programme DNV-CP-0338, Sec.4.

To check the validity of this certificate, please look it up in https://approvalfinder.dnv.com

Form code: TA 251 Revision: 2022-12 www.dnv.com Page 2 of 2



Approval Certificate for B4 (4N)

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documention is required. For supplied compressors it is not possible to deliver the required extended product documentation subsequently. Additional costs for extended product documentation will be charged.

DNV-GL

Certificate No: TAM000015F

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Refrigerant Compressor

with type designation(s) 4N-12.2, 4N-20.2

Bitzer Kühlmaschinenbau Schkeuditz GmbH Schkeuditz, Germany

is found to comply with

DNV GL rules for classification - Ships Pt.4 Ch.5 Rotating machinery - driven units

Application:

Products approved by this certificate are accepted for installation on all vessels classed by

DNV GL.

Type 4N-12.2 Max. working press.: Operating media 4N-12.2 28 bar 4N-20.2 28 bar 56.1 bar 56,1 bar

Issued at Hamburg on 2020-08-11

This Certificate is valid until 2025-08-10. for DNV GL

DNV GL local station: Magdeburg

Approval Engineer: Christian Kaemmer

Olaf Drews Head of Section

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.

Form code: TA 251

Revision: 2016-12

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Job Id: 262.1-033153-1 Certificate No: TAM000015F

Product description

Refrigerant Compressor, reciprocating, semi-hermetic, belt driven

Туре	4N-12.2	4N-20.2
Displacement [m³/h] @ 1450 [1/min]	56,1	56,1

Material:

Cast Iron with Flake Graphite EN-GJL-250

Casing: Screw Rotor: Cast Iron with Spheroidal Graphite EN-GJS-600-3 / EN-GJS-700-2

Usable Refrigerants

HCFC-refrigerants of the safety group A1 and Fluid Group 2 PED
HFC-single-component refrigerant of the safety group A1 and Fluid Group 2 PED
HFC-refrigerant blends of the safety group A1 and Fluid Group 2 PED
HFO-refrigerant of safety group A2L and Fluid Group 1 PED
HFO-refrigerant of safety group A2L and Fluid Group 2 PED
HFO/HFC refrigerant blends of safety group A1 and Fluid Group 2 PED

Note: Fluid Groups acc. to PED = Pressure equipment directive 2014/68/EU

Safety Groups acc. to EN DIN 378-1:2017-03

Production place

BITZER Kühlmaschinenbau Schkeuditz GmbH, Industriestr. 48, 04435 Schkeuditz/Germany.

Application

Air Conditioning, Provision Cooling, Cargo Refrigeration.

Tests to be carried out

Compressors for cargo refrigeration are subject to a performance test at the manufacturer's works under supervision of DNVGL and are to be presented for final inspection.

Type Approval documentation

Marking of product
The product shall be marked with manufacturer's name, year of construction, effective suction rate [m3/h], discharge pressure [bar], speed [rpm], shaft power [kW], serial number.

For retention of the Type Approval, a DNV GL Surveyor shall perform periodical assessment after two years (+/- 90 days) and after 3.5 years (+/- 90 days) to verify that the conditions for the Type Approval are complied with. Refer to the Class Programme DNVGL-CP-0338, Sec.4.

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Approval Certificate for B4 (4P and 4T)

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documention is required. For supplied compressors it is not possible to deliver the required extended product documentation subsequently. Additional costs for extended product documentation will be charged.

> **DNV-GL** Certificate No: TAM000015E TYPE APPROVAL CERTIFICATE This is to certify: That the Refrigerant Compressor with type designation(s) 4T-8.2, 4T-12.2, 4P-10.2, 4P-15.2 Bitzer Kühlmaschinenbau Schkeuditz GmbH Schkeuditz, Germany is found to comply with DNV GL rules for classification - Ships Pt.4 Ch.5 Rotating machinery - driven units Application: Products approved by this certificate are accepted for installation on all vessels classed by DNV GL. Type 4T-8.2 Max. working press.: Operating media 39,4 m3/h 39,4 m3/h 28 bar 4T-12.2 28 bar 4P-10.2 28 bar 47,1 m3/h 4P-15.2 28 bar 47,1 m3/h Issued at Hamburg on 2020-08-11 This Certificate is valid until 2025-08-10. for DNV GL DNV GL local station: Magdeburg Approval Engineer: Christian Kaemmer **Olaf Drews Head of Section**

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.

Form code: TA 251

Revision: 2016-12

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Job Id: 262.1-033152-1 Certificate No: TAM000015E

Product description

Refrigerant Compressor, reciprocating, semi-hermetic, belt driven

Туре	4T-8.2	4T-12.2	4P-10.2	4PV-15.2
Displacement [m ³ /h] @ 1450 [1/min]	39,4	39,4	47,1	47,1

Material:

Cast Iron with Flake Graphite EN-GJL-250

Casing: Screw Rotor: Cast Iron with Spheroidal Graphite EN-GJS-600-3 / EN-GJS-700-2

Usable Refrigerants

HCFC-refrigerants of the safety group A1 and Fluid Group 2 PED	
HFC-single-component refrigerant of the safety group A1 and Fluid Group 2 PED	
HFC-refrigerant blends of the safety group A1 and Fluid Group 2 PED	
HFO-refrigerant of safety group A2L and Fluid Group 1 PED	
HFO-refrigerant of safety group A2L and Fluid Group 2 PED	
HFO/HFC refrigerant blends of safety group A1 and Fluid Group 2 PED	

Note: Fluid Groups acc. to PED = Pressure equipment directive 2014/68/EU Safety Groups acc. to EN DIN 378-1:2017-03

Production place

BITZER Kühlmaschinenbau Schkeuditz GmbH, Industriestr. 48, 04435 Schkeuditz/Germany.

Application

Air Conditioning, Provision Cooling, Cargo Refrigeration.

Tests to be carried out

Compressors for cargo refrigeration are subject to a performance test at the manufacturer's works under supervision of DNVGL and are to be presented for final inspection.

Type Approval documentation

Marking of product

The product shall be marked with manufacturer's name, year of construction, effective suction rate [m3/h], discharge pressure [bar], speed [rpm], shaft power [kW], serial number.

Periodical assessment

For retention of the Type Approval, a DNV GL Surveyor shall perform periodical assessment after two years (+/- 90 days) and after 3.5 years (+/- 90 days) to verify that the conditions for the Type Approval are complied with. Refer to the Class Programme DNVGL-CP-0338, Sec.4.

Form code: TA 251 Revision: 2016-12 www.dnvgl.com Page 2 of 2



Approval Certificate for B4 (4V and 4Z)

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documention is required. For supplied compressors it is not possible to deliver the required extended product documentation subsequently. Additional costs for extended product documentation will be charged.

> **DNV-GL** Certificate No: TAM000015D

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Refrigerant Compressor

with type designation(s) 4Z-5.2, 4Z-8.2, 4V-6.2, 4V-10.2

Bitzer Kühlmaschinenbau Schkeuditz GmbH Schkeuditz, Germany

is found to comply with

DNV GL rules for classification - Ships Pt.4 Ch.5 Rotating machinery - driven units

Application:

Products approved by this certificate are accepted for installation on all vessels classed by DNV GL.

Type 4Z-5.2 Max. working press.: Operating media 28 bar 28.1

4Z-8.2 28 bar 28,1 4V-6.2 28 bar 33,1 4V-10.2 28 bar

Issued at Hamburg on 2020-08-11

This Certificate is valid until 2025-08-10. for DNV GL

DNV GL local station: Magdeburg

Approval Engineer: Christian Kaemmer

Olaf Drews Head of Section

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.

Form code: TA 251

Revision: 2016-12

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Job Id: 262.1-033151-1 Certificate No: TAM000015D

Product description

Refrigerant Compressor, reciprocating, semi-hermetic, belt driven

Туре	4Z-5.2	4Z-8.2	4V-6.2	4V-10.2
Displacement [m³/h] @ 1450 [1/min]	28,1	28,1	33,1	33,1

Material:

Casing: Screw Rotor: Cast Iron with Flake Graphite EN-GJL-250

Cast Iron with Spheroidal Graphite EN-GJS-600-3 / EN-GJS-700-2

Usable Refrigerants

HCFC-refrigerants of the safety group A1 and Fluid Group 2 PED	
HFC-single-component refrigerant of the safety group A1 and Fluid Group 2 PED	
HFC-refrigerant blends of the safety group A1 and Fluid Group 2 PED	
HFO-refrigerant of safety group A2L and Fluid Group 1 PED	
HFO-refrigerant of safety group A2L and Fluid Group 2 PED	
HFO/HFC refrigerant blends of safety group A1 and Fluid Group 2 PED	

Note: Fluid Groups acc. to PED = Pressure equipment directive 2014/68/EU Safety Groups acc. to EN DIN 378-1:2017-03

Production place

BITZER Kühlmaschinenbau Schkeuditz GmbH, Industriestr. 48, 04435 Schkeuditz/Germany.

Application

Air Conditioning, Provision Cooling, Cargo Refrigeration.

Tests to be carried out

Compressors for cargo refrigeration are subject to a performance test at the manufacturer's works under supervision of DNVGL and are to be presented for final inspection.

Type Approval documentation

Marking of product

The product shall be marked with manufacturer's name, year of construction, effective suction rate [m3/h], discharge pressure [bar], speed [rpm], shaft power [kW], serial number.

Periodical assessment

For retention of the Type Approval, a DNV GL Surveyor shall perform periodical assessment after two years (+/- 90 days) and after 3.5 years (+/- 90 days) to verify that the conditions for the Type Approval are complied with. Refer to the Class Programme DNVGL-CP-0338, Sec.4.

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4.1.2 R744 semi-hermetic reciprocating compressors

Approval Certificate for CKHE3M(+)

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documention is required. For supplied compressors it is not possible to deliver the required extended product documentation subsequently. Additional costs for extended product documentation will be charged.





TYPE APPROVAL CERTIFICATE

Certificate no TAM00001DW

This is to certify:

that the Refrigerant Compressor

with type designation(s) CKHE3M(+)

BITZER Kühlmaschinenbau Schkeuditz GmbH

Schkeuditz, Germany

is found to comply with

DNV rules for classification - Ships Pt.4 Ch.5 Rotating machinery - driven units

Application:

Products approved by this certificate are accepted for installation on all vessels classed by DNV. Max. working press.: 160 bar / 100 bar Operating media: CO_2 / R744

Issued at Hamburg on 2024-12-18 This Certificate is valid until 2029-12-17. DNV local unit: Hamburg - CMC North/East

for **DNV**

Approval Engineer: Christian Kaemmer

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 USD 300 000.

Form code: TA 251





Job ID: 262.1-042079-1 Certificate no.: TAM00001DW

Product description

Semi-Hermetic Refrigerant Compressor with 4 cylinders, reciprocating.

Compressor series CKHE3M(+) consisting of 4 compressor types 4MTEM(U)-7(L), 4MTEM(U)-10(L), 4KTEM(U)-10(L) and 4KTEM-12 for transcritical CO_2 applications.

CKHE3M(+)		4MTEM(U)-7(L)	4MTEM(U)-10(L)	4KTEM(U)-10(L)	4KTEM-12
Displacement [m³/h] @ 1450 1 /min (@ 1500 1 /min)	50 Hz	6,6 (6,9)	6,6 (6,9)	9,6 (9,9)	9,6
Displacement [m³/h] @ 1750 1 /min (@ 1800 1 /min)	60 Hz	8,0 (8,2)	8,0 (8,2)	11,5 (11,9)	11,5

Casing Material:

Cast Iron with Nodular Graphite EN-GJS-600 / EN-GJS-400

Usable Refrigerants

R744 / CO₂

Production place

Bitzer Kühlmaschinenbau Schkeuditz GmbH, Industriestr. 48, 04435 Schkeuditz / Germany.

Application

Air Conditioning, Provision Cooling, Cargo Refrigeration, Heatpump.

Tests to be carried out

Compressors for cargo refrigeration are subject to a performance test at the manufacturer's works under supervision of DNV and are to be presented for final inspection.

Type Approval documentation

Marking of productThe product shall be marked with manufacturer's name, year of construction, effective suction rate [m3/h], discharge pressure [bar], speed [rpm], shaft power [kW], serial number.

Periodical assessment

For retention of the Type Approval, a DNV Surveyor shall perform periodical assessment to verify that the conditions for the Type Approval are complied with. Refer to the Class Programme DNV-CP-0338, Sec.4.

To check the validity of this certificate, please look it up in https://approvalfinder.dnv.com

Form code: TA 251 Revision: 2023-09 www.dnv.com Page 2 of 2



Approval Certificate for CKHE4M(+)

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documention is required. For supplied compressors it is not possible to deliver the required extended product documentation subsequently. Additional costs for extended product documentation will be charged.



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.



Revision: 2023-09

www.dnv.com





262.1-040604-2 Job ID: Certificate no.: TAM00001C3

Revision No:

Product description

Semi-Hermetic Refrigerant Compressor with 4 cylinders, reciprocating.

Compressor series CKHE4M consisting of 10 compressor types: $4JTEM(U)-10(L),\ 4JTEM(U)-15(L),\ 4HTEM(U)-15(L),\ 4HTEM(U)-20(L),\ 4GTEM(U)-20(L),\ 4GTEM(U)-30(L),\ 4FTEM(U)-30(L),\ 4FTEM(U)-30$

CKHE4M(+)	4JTEM(U)- 10(L), 4JTEM(U)- 15(L)	4HTEM(U)- 15(L), 4HTEM(U)- 20(L)	4GTEM(U)- 20(L), 4GTEM(U)- 30(L)	4FTEM(U)- 20(L), 4FTEM(U)- 30(L)	4DTEM(U)- 25(L)	4CTEM(U)- 30(L)
Displacement [m ³ /h]	227-27-					
@ 1450 1 /min	9,3	12,0	15,0	17,5	22,0	26,0
@ 1500 1 /min	(9,7)	(12,4)	(16,0)	(18,1)	(22,7)	(26,9)

Casing Material:

Cast Iron with Nodular Graphite EN-GJS-600 / EN-GJS-400

Usable Refrigerants

R744 / CO₂

Production place

Bitzer Kühlmaschinenbau Schkeuditz GmbH, Industriestr. 48, 04435 Schkeuditz / Germany.

Air Conditioning, Provision Cooling, Cargo Refrigeration, Heatpump.

Tests to be carried out

Compressors for cargo refrigeration are subject to a performance test at the manufacturer's works under supervision of DNV and are to be presented for final inspection.

Type Approval documentation

Marking of product
The product shall be marked with manufacturer's name, year of construction, effective suction rate [m3/h], discharge pressure [bar], speed [rpm], shaft power [kW], serial number.

Periodical assessment

For retention of the Type Approval, a DNV Surveyor shall perform periodical assessment to verify that the conditions for the Type Approval are complied with. Refer to the Class Programme DNV-CP-0338, Sec.4.

To check the validity of this certificate, please look it up in https://approvalfinder.dnv.com

Form code: TA 251 Revision: 2023-09 www.dnv.com Page 2 of 2



Approval Certificate for CKHE5M(+)

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documention is required. For supplied compressors it is not possible to deliver the required extended product documentation subsequently. Additional costs for extended product documentation will be charged.

DNV	
TYPE APPROVAL CERTIFICATE	Certificate No: TAM00001BN Revision No: 2
This is to certify: That the Refrigerant Compressor	
with type designation(s) CKHE5M	
Issued to Bitzer Kühlmaschinenbau Schkeuditz (Schkeuditz, Germany	GmbH
is found to comply with DNV rules for classification – Ships Pt.4 Ch.5 Rotating mac	hinery – driven units
Application: Products approved by this certificate are accepted for instal Max. working press.: 160 bar / 100 bar Operating media CO2 / R744	lation on all vessels classed by DNV.
Issued at Hamburg on 2024-03-01	
This Certificate is valid until 2028-11-07. DNV local unit: Hamburg – CMC North/East	for DNV
Approval Engineer: Christian Kaemmer	
	Sven Klinger Head of Section
<u> </u>	gn or construction may render this Certificate invalid.
This Certificate is subject to terms and conditions overleaf. Any significant change in design the validity date relates to the Type Approval Certificate and not to the approval of equipment of the Approval Certificate and not to the approval of equipment of the Approval Certificate and not to the approval of equipment of the Approval Certificate and not to the approval of equipment of the Approval Certificate and not to the approval of equipment of the Approval Certificate and not to the Approval of Equipment of the Approval Certificate and not to the Approval of Equipment of the Approval Certificate and not to the Approval of Equipment of the Approval Certificate and not to the Approval of Equipment of the Approval Certificate and not to the Approval of Equipment of the Approval Certificate and not to the Approval of Equipment of the Approval Certificate and not to the Approval Office and the Approval Certificate and not to the Approval Certificate a	menusystems installed.
This Certificate is subject to terms and conditions overleaf. Any significant change in design the validity date relates to the Type Approval Certificate and not to the approval of equipmed to DISCLAIMER: Unless otherwise stated in the applicable contract with the holder of parent companies and their subsidiaries as well as their officers, directors and employees purpose of the issuance of this document or reliance thereon, whether in contract or in tor circumstance be limited to 300,000 USD.	of this document, or following from mandatory law, the liability of DNV AS, its ("DNV") arising from or in connection with the services rendered for the





Job Id: 262.1-040122-3 Certificate No: TAM00001BN

Revision No: 2

Product description

Semi-Hermetic Refrigerant Compressor with 6 cylinders, reciprocating.

Compressor series CKHE5M consisting of 4 compressor types 6FTEM(U)-50(L), 6DTEM(U)-40(L), 6DTEM(U)-50(L) and 6CTEM(U)-50(L) for transcritical CO_2 applications.

CKHE5M(+)	6FTEM(U)-50(L)	6DTEM(U)-40(L), 6DTEM(U)-50(L)	6CTEM(U)-50(L)
Displacement [m3/h]			
@ 1450 1 /min	26,0	30,3	38,2
@ 1500 1 /min	(26,9)	(31,4)	(39,5)

Casing Material:

Cast Iron with Nodular Graphite EN-GJS-600 / EN-GJS-400

Usable Refrigerants

R744 / CO₂

Production place

Bitzer Kühlmaschinenbau Schkeuditz GmbH, Industriestr. 48, 04435 Schkeuditz / Germany.

Application

Air Conditioning, Provision Cooling, Cargo Refrigeration, Heatpump.

Tests to be carried out

Compressors for cargo refrigeration are subject to a performance test at the manufacturer's works under supervision of DNV and are to be presented for final inspection.

Type Approval documentation

Marking of product

The product shall be marked with manufacturer's name, year of construction, effective suction rate [m3/h], discharge pressure [bar], speed [rpm], shaft power [kW], serial number.

Periodical assessment

For retention of the Type Approval, a DNV Surveyor shall perform periodical assessment to verify that the conditions for the Type Approval are complied with. Refer to the Class Programme DNV-CP-0338, Sec.4.

To check the validity of this certificate, please look it up in https://approvalfinder.dnv.com

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Approval Certificate for CKHE7

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documention is required. For supplied compressors it is not possible to deliver the required extended product documentation subsequently. Additional costs for extended product documentation will be charged.



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 USD 300 000.



Revision: 2023-09

www.dnv.com





Job ID: 262.1-042081-1 Certificate no.: TAM00001DV

Product description

Semi-Hermetic Refrigerant Compressor with 8 cylinders, reciprocating.

Compressor series CKHE7 consisting of 5 compressor types 8FTE-100, 8FTE-140, 8DTE-120, 8DTE-140 and 8CTE-140 for transcritical CO_2 applications.

CKHE7		8FTE-100	8FTE-140	8DTE-120	8DTE-140	8CTE-140
Displacement [m³/h] @ 1450 1 /min	50 Hz	69,4	69,4	82,0	82,0	99,2
Displacement [m³/h] @ 1750 1 /min	60 Hz	83,8	83,8	99,0	99,0	119,7

Casing Material:

Cast Iron with Nodular Graphite EN-GJS-600 / EN-GJS-400

Usable Refrigerants

R744 / CO₂

Production place

Bitzer Kühlmaschinenbau Schkeuditz GmbH, Industriestr. 48, 04435 Schkeuditz / Germany.

Application

Air Conditioning, Provision Cooling, Cargo Refrigeration, Heatpump.

Tests to be carried out

Compressors for cargo refrigeration are subject to a performance test at the manufacturer's works under supervision of DNV and are to be presented for final inspection.

Type Approval documentation

Marking of product

The product shall be marked with manufacturer's name, year of construction, effective suction rate [m3/h], discharge pressure [bar], speed [rpm], shaft power [kW], serial number.

Periodical assessment

For retention of the Type Approval, a DNV Surveyor shall perform periodical assessment to verify that the conditions for the Type Approval are complied with. Refer to the Class Programme DNV-CP-0338, Sec.4.

To check the validity of this certificate, please look it up in https://approvalfinder.dnv.com

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Approval Certificate for CME3M

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documention is required. For supplied compressors it is not possible to deliver the required extended product documentation subsequently. Additional costs for extended product documentation will be charged.



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.

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Revision: 2023-09

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Job ID: **262.1-042013-1** Certificate no.: **TAM00001DT**

Product description

Semi-Hermetic Refrigerant Compressor with 4 cylinders, reciprocating.

Compressor series CME3M consisting of 5 compressor types 4FMEM-7, 4FMEM-9, 4EMEM-9, 4EMEM-10 and 4DMEM-10 for subcritical CO_2 applications.

СМЕЗМ		4FMEM-7	4FMEM-9	4EMEM-9	4EMEM-10	4DMEM10
Displacement [m³/h] @ 1450 1 /min	50 Hz	12,4	12,4	15,6	15,6	18,4
Displacement [m³/h] @ 1750 1 /min	60 Hz	15,0	15,0	18,8	18,8	22,3

Casing Material:

Cast Iron with Nodular Graphite EN-GJS-600 / EN-GJS-400

Usable Refrigerant

R744 / CO₂

Production place

Bitzer Kühlmaschinenbau Schkeuditz GmbH, Industriestr. 48, 04435 Schkeuditz / Germany.

Application

Air Conditioning, Provision Cooling, Cargo Refrigeration.

Tests to be carried out

Compressors for cargo refrigeration are subject to a performance test at the manufacturer's works under supervision of DNV and are to be presented for final inspection.

Type Approval documentation

Marking of product

The product shall be marked with manufacturer's name, year of construction, effective suction rate [m3/h], discharge pressure [bar], speed [rpm], shaft power [kW], serial number.

Periodical assessment

For retention of the Type Approval, a DNV Surveyor shall perform periodical assessment to verify that the conditions for the Type Approval are complied with. Refer to the Class Programme DNV-CP-0338, Sec.4.

To check the validity of this certificate, please look it up in https://approvalfinder.dnv.com

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Approval Certificate for CME4M

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documention is required. For supplied compressors it is not possible to deliver the required extended product documentation subsequently. Additional costs for extended product documentation will be charged.



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.

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Form code: TA 251

Revision: 2023-09

www.dnv.com





Job ID: 262.1-040122-3 Certificate no.: TAM00001BR

Revision No: 1

Product description

Semi-Hermetic Refrigerant Compressor with 4 cylinders, reciprocating.

Compressor series CME4M consisting of 3 compressor types 4TMEM-20, 4TMEM-30 and 4PMEM-25 for subcritical CO₂ applications.

CME4M	4TMEM-20 4TMEM-30	4PMEM-25
Displacement [m³/h] @ 1450 1 /min	34,73	41,33

Casing Material:

Cast Iron with Nodular Graphite EN-GJS-600 / EN-GJS-400

Usable Refrigerants

R744 / CO₂

Production place

Bitzer Kühlmaschinenbau Schkeuditz GmbH, Industriestr. 48, 04435 Schkeuditz / Germany.

Application

Air Conditioning, Provision Cooling, Cargo Refrigeration.

Tests to be carried out

Compressors for cargo refrigeration are subject to a performance test at the manufacturer's works under supervision of DNV and are to be presented for final inspection.

Type Approval documentation

Marking of product

The product shall be marked with manufacturer's name, year of construction, effective suction rate [m3/h], discharge pressure [bar], speed [rpm], shaft power [kW], serial number.

Periodical assessment

For retention of the Type Approval, a DNV Surveyor shall perform periodical assessment to verify that the conditions for the Type Approval are complied with. Refer to the Class Programme DNV-CP-0338, Sec.4.

To check the validity of this certificate, please look it up in https://approvalfinder.dnv.com

Form code: TA 251 Revision: 2023-09 www.dnv.com Page 2 of 2



Approval Certificate for CME5M

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documention is required. For supplied compressors it is not possible to deliver the required extended product documentation subsequently. Additional costs for extended product documentation will be charged.



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 USD 300 000.



Revision: 2023-09

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Job ID: **262.1-042202-1** Certificate no.: **TAM00001DX**

Product description

Semi-Hermetic Refrigerant Compressor with 6 cylinders, reciprocating.

Compressor series CME5M consisting of 3 compressor types 6TMEM-50; 6PMEM-40 and 6PMEM-50 for subcritical CO_2 applications.

СМЕ5М		6TMEM-50	6PMEM-40	6PMEM-50
Displacement [m³/h] @ 1450 1 /min	50 Hz	54,6	64,9	64,9
Displacement [m³/h] @ 1750 1 /min	60 Hz	65,9	78,4	78,4

Casing Material:

Cast Iron with Nodular Graphite EN-GJS-600 / EN-GJS-400

Usable Refrigerants

R744 / CO₂

Production place

Bitzer Kühlmaschinenbau Schkeuditz GmbH, Industriestr. 48, 04435 Schkeuditz / Germany.

Application

Air Conditioning, Provision Cooling, Cargo Refrigeration.

Tests to be carried out

Compressors for cargo refrigeration are subject to a performance test at the manufacturer's works under supervision of DNV and are to be presented for final inspection.

Type Approval documentation

Marking of product

The product shall be marked with manufacturer's name, year of construction, effective suction rate [m3/h], discharge pressure [bar], speed [rpm], shaft power [kW], serial number.

Periodical assessment

For retention of the Type Approval, a DNV Surveyor shall perform periodical assessment to verify that the conditions for the Type Approval are complied with. Refer to the Class Programme DNV-CP-0338, Sec.4.

To check the validity of this certificate, please look it up in https://approvalfinder.dnv.com

Form code: TA 251 Revision: 2023-09 www.dnv.com Page 2 of 2



Approval Certificate for CME7

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documention is required. For supplied compressors it is not possible to deliver the required extended product documentation subsequently. Additional costs for extended product documentation will be charged.



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 USD 300 000.



Revision: 2023-09

www.dnv.com





Job ID: 262.1-042080-1 Certificate no.: TAM00001DU

Product description

Semi-Hermetic Refrigerant Compressor with 8 cylinders, reciprocating.

Compressor series CME7 consisting of 5 compressor types 8VME-100, 8VME-120, 8TME-100, 8TME-140 and 8PME-140 for subcritical $\rm CO_2$ applications.

CME7		8VME-100	8VME-120	8TME-100	8TME-140	8PME-140
Displacement [m³/h] @ 1450 1 /min	50 Hz	138,6	138,6	160,7	160,7	199,5
Displacement [m³/h] @ 1750 1 /min	60 Hz	167,2	167,2	194,0	194,0	240,8

Casing Material:

Cast Iron with Nodular Graphite EN-GJS-600 / EN-GJS-400

Usable Refrigerants

R744 / CO₂

Production place

Bitzer Kühlmaschinenbau Schkeuditz GmbH, Industriestr. 48, 04435 Schkeuditz / Germany.

Application

Air Conditioning, Provision Cooling, Cargo Refrigeration.

Tests to be carried out

Compressors for cargo refrigeration are subject to a performance test at the manufacturer's works under supervision of DNV and are to be presented for final inspection.

Type Approval documentation

Marking of product

The product shall be marked with manufacturer's name, year of construction, effective suction rate [m3/h], discharge pressure [bar], speed [rpm], shaft power [kW], serial number.

Periodical assessment

For retention of the Type Approval, a DNV Surveyor shall perform periodical assessment to verify that the conditions for the Type Approval are complied with. Refer to the Class Programme DNV-CP-0338, Sec.4.

To check the validity of this certificate, please look it up in https://approvalfinder.dnv.com

Form code: TA 251 Revision: 2023-09 www.dnv.com Page 2 of 2



4.1.3 Open drive reciprocating compressors



Approval Certificate for B03

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documention is required. For supplied compressors it is not possible to deliver the required extended product documentation subsequently. Additional costs for extended product documentation will be charged.

DNV		
DIVA		
TYPE APPROVAL CERTIFICATE	Certificate No: TAM00000WS Revision No: 2	
This is to certify:		
That the Refrigerant Compressor		
with type designation(s) 2T.2; 2N.2 / B03		
Issued to Bitzer Kühlmaschinenbau Schkeuditz Gmbł Schkeuditz, Germany	1	
is found to comply with DNV rules for classification – Ships Pt.4 Ch.5 Rotating machinery -	- driven units	
Application :		
Products approved by this certificate are accepted for installation of Max. working 28 bar press.: Operating media HCFC-refrigerants, HFC-single component refrirefrigerants, HFO/HFC refrigerant blends, see p	gerants, HFC-refrigerant blends, HFO-	
Issued at Hamburg on 2023-07-07		
This Certificate is valid until 2028-07-06 . DNV local unit: Magdeburg	for DNV	
Approval Engineer: Christian Kaemmer		
	Sven Klinger Head of Section	
This Certificate is subject to terms and conditions overleaf. Any significant change in design or constr. The validity date relates to the Type Approval Certificate and not to the approval of equipment/system.		
	ns installed. ment, or following from mandatory law, the liability of DNV AS, its ising from or in connection with the services rendered for the	





262.1-028929-3 Job Id: Certificate No: TAM00000WS

Revision No:

Product description

Refrigerant Compressor, reciprocating, open type, belt driven

Туре	2T.2	2N.2
Displacement [m³/h] @ 1450 1 /min	19,7	28,0

Casing Material: Cast Iron with Flake Graphite EN-GJL-250

Usable Refrigerants

HCFC-refrigerants of the safety group A1 and Fluid Group 2 PED
HFC-single-component refrigerant of the safety group A1 and Fluid Group 2 PED
HFC-refrigerant blends of the safety group A1 and Fluid Group 2 PED
HFO-refrigerant of safety group A2L and Fluid Group 1 PED
HFO-refrigerant of safety group A2L and Fluid Group 2 PED
HFO/HFC refrigerant blends of safety group A1 and Fluid Group 2 PED

Fluid Groups acc. to PED = Pressure equipment directive 2014/68/EU Note: Safety Groups acc. to EN DIN 378-1:2017-03

Production place

Bitzer Kühlmaschinenbau Schkeuditz GmbH, Industriestr. 48, 04435 Schkeuditz / Germany.

Application

Air Conditioning, Provision Cooling, Cargo Refrigeration.

Tests to be carried out

Compressors for cargo refrigeration are subject to a performance test at the manufacturer's works under supervision of DNV and are to be presented for final inspection.

Type Approval documentation

Marking of productThe product shall be marked with manufacturer's name, year of construction, effective suction rate [m3/h], discharge pressure [bar], speed [rpm], shaft power [kW], serial number.

Periodical assessment

For retention of the Type Approval, a DNV Surveyor shall perform periodical assessment to verify that the conditions for the Type Approval are complied with. Refer to the Class Programme DNV-CP-0338, Sec.4.

To check the validity of this certificate, please look it up in https://approvalfinder.dnv.com

Form code: TA 251 Revision: 2022-12 www.dnv.com Page 2 of 2



Approval Certificate for B04

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documention is required. For supplied compressors it is not possible to deliver the required extended product documentation subsequently. Additional costs for extended product documentation will be charged.

DNV		
	Certificate No:	
TYPE APPROVAL CERTIFICATE	ΤΔ ΜΟΟΟΟΝΑ/. Ι	
TTPL APPROVAL CERTIFICATE	1	
This is to certify: That the Refrigerant Compressor		
with type designation(s)		
4T.2; 4P.2; 4N.2; / B04		
Issued to	Smalall	
Bitzer Kühlmaschinenbau Schkeuditz (Schkeuditz, Germany	amon .	
is found to comply with		
DNV rules for classification – Ships Pt.4 Ch.5 Rotating mac	hinery – driven units	
A mulication .		
Application: Products approved by this certificate are accepted for install	ation on all vessels classed by DNV.	
Max. working 28 bar press.:	·	
Operating media HCFC-refrigerants, HFC-single components, HFO/HFC refrigerant blends		
	.,	
Issued at Hamburg on 2023-07-07		
This Certificate is valid until 2028-07-06.	for DNV	
DNV local unit: Magdeburg		
Approval Engineer: Christian Kaemmer	0	
	Sven Klinger Head of Section	
This Certificate is subject to terms and conditions overleaf. Any significant change in desig The validity date relates to the Type Approval Certificate and not to the approval of equipn	in or construction may render this Certificate invalid. nent/systems installed.	
The validity date relates to the Type Approval Certificate and not to the approval of equipment of the approval	nent/systems installed.	
The validity date relates to the Type Approval Certificate and not to the approval of equipn LEGAL DISCLAIMER: Unless otherwise stated in the applicable contract with the holder o parent companies and their subsidiaries as well as their officers, directors and employees purpose of the issuance of this document or reliance thereon, whether in contract or in torl circumstance be limited to 300,000 USD.	nent/systems installed. If this document, or following from mandatory law, the liability of DNV AS, its ("DNV") arising from or in connection with the services rendered for the	
The validity date relates to the Type Approval Certificate and not to the approval of equipn LEGAL DISCLAIMER: Unless otherwise stated in the applicable contract with the holder o parent companies and their subsidiaries as well as their officers, directors and employees purpose of the issuance of this document or reliance thereon, whether in contract or in tort	nent/systems installed. If this document, or following from mandatory law, the liability of DNV AS, its ("DNV") arising from or in connection with the services rendered for the	





262.1-028925-2 Job Id: Certificate No: TAM00000WJ

Revision No:

Product description

Refrigerant Compressor, reciprocating, open type, belt driven

Type	4T.2	4P.2	4N.2
Displacement [m³/h] @ 1450 1 /min	39,4	47,1	56,1

Casing Material: Cast Iron with Flake Graphite EN-GJL-250

Usable Refrigerants

HCFC-refrigerants of the safety group A1 and Fluid Group 2 PED
HFC-single-component refrigerant of the safety group A1 and Fluid Group 2 PED
HFC-refrigerant blends of the safety group A1 and Fluid Group 2 PED
HFO-refrigerant of safety group A2L and Fluid Group 1 PED
HFO-refrigerant of safety group A2L and Fluid Group 2 PED
HFO/HFC refrigerant blends of safety group A1 and Fluid Group 2 PED

Fluid Groups acc. to PED = Pressure equipment directive 2014/68/EU Safety Groups acc. to EN DIN 378-1:2017-03

Production place

Bitzer Kühlmaschinenbau Schkeuditz GmbH, Industriestr. 48, 04435 Schkeuditz / Germany.

Application

Air Conditioning, Provision Cooling, Cargo Refrigeration.

Tests to be carried out

Compressors for cargo refrigeration are subject to a performance test at the manufacturer's works under supervision of DNV and are to be presented for final inspection.

Type Approval documentation

Marking of product
The product shall be marked with manufacturer's name, year of construction, effective suction rate [m3/h], discharge pressure [bar], speed [rpm], shaft power [kW], serial number.

Periodical assessment

For retention of the Type Approval, a DNV Surveyor shall perform periodical assessment to verify that the conditions for the Type Approval are complied with. Refer to the Class Programme DNV-CP-0338, Sec.4.

To check the validity of this certificate, please look it up in https://approvalfinder.dnv.com

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Approval Certificate for B05

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documention is required. For supplied compressors it is not possible to deliver the required extended product documentation subsequently. Additional costs for extended product documentation will be charged.

DNV		
2	Certificate No:	
TYPE APPROVAL CERTIFICATE	TAM0000WR Revision No: 1	
This is to certify: That the Refrigerant Compressor		
with type designation(s) 4H.2; 4G.2 / B05		
Issued to		
Bitzer Kühlmaschinenbau Schkeuditz Gmb Schkeuditz, Germany	ρΗ	
is found to comply with		
DNV rules for classification – Ships Pt.4 Ch.5 Rotating machiner	/ – driven units	
Application :		
Products approved by this certificate are accepted for installation Max. working 28 bar press.:	on all vessels classed by DNV.	
Operating media HCFC-refrigerants, HFC-single component rerefrigerants, HFO/HFC refrigerant blends, see		
, , , , , , , , , , , , , , , , , , , ,		
Issued at Hamburg on 2023-07-07	(-) DNV	
This Certificate is valid until 2028-07-06 . DNV local unit: Magdeburg	for DNV	
Approval Engineer: Christian Kaemmer		
	Sven Klinger Head of Section	
This Certificate is subject to terms and conditions overleaf. Any significant change in design or cor The validity date relates to the Type Approval Certificate and not to the approval of equipment/sys	struction may render this Certificate invalid. ems installed.	
LEGAL DISCLAIMER: Unless otherwise stated in the applicable contract with the holder of this do parent companies and their subsidiaries as well as their officers, directors and employees ("DNV") purpose of the issuance of this document or reliance thereon, whether in contract or in tort (includi circumstance be limited to 300,000 USD.	arising from or in connection with the services rendered for the	
Entransiance be immed to 300,000 OSD.		





262.1-028924-2 Job Id: Certificate No: TAM00000WR Revision No:

Product description

Refrigerant Compressor, reciprocating, open type, belt driven

Type	4H.2	4G.2
Displacement [m³/h] @ 1450 1 /min	73,7	84,6

Casing Material: Cast Iron with Flake Graphite EN-GJL-250

Usable Refrigerants

HCFC-refrigerants of the safety group A1 and Fluid Group 2 PED
HFC-single-component refrigerant of the safety group A1 and Fluid Group 2 PED
HFC-refrigerant blends of the safety group A1 and Fluid Group 2 PED
HFO-refrigerant of safety group A2L and Fluid Group 1 PED
HFO-refrigerant of safety group A2L and Fluid Group 2 PED
HFO/HFC refrigerant blends of safety group A1 and Fluid Group 2 PED

Fluid Groups acc. to PED = Pressure equipment directive 2014/68/EU Note: Safety Groups acc. to EN DIN 378-1:2017-03

Production place

Bitzer Kühlmaschinenbau Schkeuditz GmbH, Industriestr. 48, 04435 Schkeuditz / Germany.

Application

Air Conditioning, Provision Cooling, Cargo Refrigeration.

Tests to be carried out

Compressors for cargo refrigeration are subject to a performance test at the manufacturer's works under supervision of DNV and are to be presented for final inspection.

Type Approval documentation

Marking of product
The product shall be marked with manufacturer's name, year of construction, effective suction rate [m3/h], discharge pressure [bar], speed [rpm], shaft power [kW], serial number.

Periodical assessment

For retention of the Type Approval, a DNV Surveyor shall perform periodical assessment to verify that the conditions for the Type Approval are complied with. Refer to the Class Programme DNV-CP-0338, Sec.4.

To check the validity of this certificate, please look it up in https://approvalfinder.dnv.com

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Approval Certificate for B06

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documention is required. For supplied compressors it is not possible to deliver the required extended product documentation subsequently. Additional costs for extended product documentation will be charged.

DNIV/	
DNV	
TYPE APPROVAL CERTIFICA	Certificate No: TAM00000WK Revision No: 1
This is to certify: That the Refrigerant Compressor	
with type designation(s) 6F.2; 6G.2; 6H.2 / B06	
Issued to Bitzer Kühlmaschinenbau Schkeud Schkeuditz, Germany	litz GmbH
is found to comply with DNV rules for classification – Ships Pt.4 Ch.5 Rotatin	g machinery – driven units
Application :	
Products approved by this certificate are accepted for Max. working 28 bar	installation on all vessels classed by DNV.
press.: Operating media HCFC-refrigerants, HFC-single co refrigerants, HFO/HFC refrigerant	
Issued at Hamburg on 2023-07-07 This Certificate is valid until 2028-07-06 . DNV local unit: Magdeburg	for DNV
Approval Engineer: Christian Kaemmer	
	Sven Klinger Head of Section
This Certificate is subject to terms and conditions overleaf. Any significant chang	e in design or construction may render this Certificate invalid. of equipment/systems installed.
The validity date relates to the Type Approval Certificate and not to the approval	
The validity date relates to the Type Approval Certificate and not to the approval	e holder of this document, or following from mandatory law, the liability of DNV AS, its mployees ("DNV") arising from or in connection with the services rendered for the





Job Id: Certificate No: Revision No:

262.1-028928-2 TAM00000WK

Product description

Refrigerant Compressor, reciprocating, open type, belt driven

Type	6F.2	6G.2	6H.2
Displacement [m³/h] @ 1450 1 /min	151,6	126,8	110,5

Casing Material: Cast Iron with Flake Graphite EN-GJL-250

Usable Refrigerants

HCFC-refrigerants of the safety group A1 and Fluid Group 2 PED
HFC-single-component refrigerant of the safety group A1 and Fluid Group 2 PED
HFC-refrigerant blends of the safety group A1 and Fluid Group 2 PED
HFO-refrigerant of safety group A2L and Fluid Group 1 PED
HFO-refrigerant of safety group A2L and Fluid Group 2 PED
HFO/HFC refrigerant blends of safety group A1 and Fluid Group 2 PED

Note: Fluid Groups acc. to PED = Pressure equipment directive 2014/68/EU Safety Groups acc. to EN DIN 378-1:2017-03

Production place

Bitzer Kühlmaschinenbau Schkeuditz GmbH, Industriestr. 48, 04435 Schkeuditz / Germany.

Application

Air Conditioning, Provision Cooling, Cargo Refrigeration.

Tests to be carried out

Compressors for cargo refrigeration are subject to a performance test at the manufacturer's works under supervision of DNV and are to be presented for final inspection.

Type Approval documentation

Marking of product

The product shall be marked with manufacturer's name, year of construction, effective suction rate [m3/h], discharge pressure [bar], speed [rpm], shaft power [kW], serial number.

Periodical assessment

For retention of the Type Approval, a DNV Surveyor shall perform periodical assessment to verify that the conditions for the Type Approval are complied with. Refer to the Class Programme DNV-CP-0338, Sec.4.

To check the validity of this certificate, please look it up in https://approvalfinder.dnv.com

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 Revision: 2022-12
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- 4.2 Russian Maritime Register of shipping
- 4.2.1 Semi-hermetic reciprocating compressors



B(E)5 and B(E)6-Type approval Certificate

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documention is required. For supplied compressors it is not possible to deliver the required extended product documentation subsequently. Additional costs for extended product documentation will be charged.

РОССИЙСКИЙ МОРСКОЙ РЕГИСТР СУДОХОДСТВА RUSSIAN MARITIME REGISTER OF SHIPPING 6.8.3 СВИДЕТЕЛЬСТВО О ТИПОВОМ ОДОБРЕНИИ TYPE APPROVAL CERTIFICATE Изготовитель BITZER Kuhlmaschinenbau Schkeuditz GmbH (DE 8111 73074) Address Industriestrasse 48, 04435 Schkeuditz, Germany Изпелие* Product* Поршневые компрессоры холодильного агента muna: / Reciprocating Refrigerant Compressors of types: B5 (4J-13.2Y, 4J-22.2Y, 4H-15.2Y, 4H-25.2Y, 4G-20.2Y, 4G-30.2Y) I, BE5 (4JE-13Y, 4JE-15(Y), 4JE-22(Y), 4HE-15, 4HE-18(Y), 4HE-25(Y), 4GE-20Y, 4GE-23(Y), 4GE-30(Y), 4FE-25Y,4FE-28(Y), 4FE-35(Y). B6(6J-22.2Y, 6J-33.2Y, 6H-25.2Y, 6H-35.2Y, 6G-30.2Y, 6G-40.2Y, 6F-40.2Y, 6F-50.2Y) I, BE6 (6JE-22Y, 6JE-25(Y), 6JE-33(Y), 6HE-25Y, 6HE-28(Y), 6HE-35(Y), 6GE-30Y, 6GE-34(Y), 6GE-40(Y), 6FE-40Y, 6FE-44(Y), 6FE-50(Y). Код номенклатуры 12010120 Code of nomenclature На основании освидетельствования и проведенных испытаний удостоверяется, что вышеупомянутое(ые) изделие(я) удовлетворяет(ют) требованиям Российского морского регистра судоходства. This is to certify that on the basis of the survey and tests carried out the above mentioned item(s) complies(ly) with the requirements of Russian Maritime Register of Shipping. Части XII "Холодильные установки " Правил классификации и постройки морских судов, 2017 г. издания. Part XII "Refrigerating plants" of Rules for the classification and construction of sea-going ships, edition 2017. ч. IV "Правил технического наблюдения за постройкой судов и изготовлением материалов и изделий для судов",изд.2017. part IV "Rules for technical supervision during construction of ships and manufacture of materials and products for ships", edition 2017. Настоящее Свидетельство о типовом одобрении действительно до 29.12.2022 This Type Approval Certificate is valid until Настоящее Свидетельство о типовом одобрении теряет силу в случаях, установленных в Правилах технического наблюдения за постройкой судов и изготовлением материалов и изделий для судов. This Type Approval Certificate becomes invalid in cases stipulated in Rules for the Technical Supervision during Construction of Ships and Manufacture of Shipboard Materials and Products. 17.00036.272 Дата выдачи 29.12.2017 Date of issue Российский морской регистр су Ягодин А.И. / A. Yagodin Russian Maritime Register of Ship *Дополнительную информацию см

AU-100-9 // PDF Download 102

Additional information see overleaf.



Стр. Page. Технические данные Technical data Поршневые компрессоры холодильного arenma muna: /Reciprocating refrigerant compressors type: B5 (4J-13.2Y, 4J-22.2Y, 4H15.2Y, 4H-25.2Y, 4G-20.2Y, 4C-30.2Y) I BE5 (4JE-13Y, 4JE-15(Y), 4JE-22(Y), 4HE-15, 4HE-18(Y), 4HE-2S(Y), 4GE-20Y, 4GE-23(Y), 4GE-30(Y), 4FE-25Y, 4FE-28(Y), 4FE-35(Y). Холодильный агент: R 22, R134A, R404A, R 507A Теоретический объём всасывания: до 101,8 м3/ч Георетическию очовет выпольных количество (количество цидлия)ров. 1 Номинальная частота вращения: 1450 об/мин Эл.двигатель: номинальная мощность до 35 кВт, 400 В, 50 Гц Refrigerant: R 22, R134a, R404A, R 507A Theoretical suction capacity: up to 101,8 m3/h Number of cylinders: 4 Rated speed: 1450 rpm Number of extensions.

Rated speed: 1450 rpm

E-Motor: Rated power up to 35 kW, 400V, 50 Hz. Пориниевые компрессоры холодильного azeнтa muna: /Reciprocating refrigerant compressors type: B6(6J-22.2Y, 6J-33.2Y, 6H-2S.2Y, 6H-3S.2Y, 6G-30.2Y, 6G-40.2Y, 6F-40.2Y, 6F-80.2Y) I BE6 (6IE-22Y, 6JE-2S(Y), 6JE-33(Y), 6HE-2SY, 6HE-2S(Y), 6HE-3S(Y), 6GE-30Y, 6GE-34(Y), 6GE-40(Y), 6FE-40(Y), 6FE-40(Y Холодильный агент: R 22, R134A, R404A, R 507A Теоретический объём всасывания: до 151,6 м3/ч Количество цилиндров: 6 Номинальная частота вращения: 1450 об/мин Эл.двигатель: номинальная мощность до 53,2 кВт, 400 В, 50Гц Refrigerant: R 22,R134A, R404A, R 507A Number of cylinders: 6
Rated speed: 1450 rpm
E-Motor: Rated power up to 53,2 kW, 400V, 5OHz. Техническая документация и дата ее одобрения Российским морским регистром судоходства Technical documentation and the date of its approval by Russian Maritime Register of Shipping Техническая документация одобрена письмом No272-313-7-250338 от 12.09.2017 Technical documentation were approved by RS letter No.: 272-313-7-250338 dd 12.09.2017 Образец изделия испытан под техническим наблюдением Российского морского регистра судоходства. Product's specimen has been tested under the technical supervision of Russian Maritime Register of Shipping. AKT № 17.03233.272 от 12.09.2017 Report No. Область применения и ограничения Application and limitations Для судовых холодильных установок. For ship's refrigerating plants. Вид документа, выдаваемого на изделие Type of document issued for product Свидетельство Российского морского регистра судоходства по форме 6.5.30 или 6.5.31. Certificate of Russian Maritime Register of Shipping in accordance with form 6.5.30 or 6.5.31

06/2015

17,00036,272



4.2.2 Open drive reciprocating compressors

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documention is required. For supplied compressors it is not possible to deliver the required extended product documentation subsequently. Additional costs for extended product documentation will be charged.

POCCHЙСКИЙ MOPCKOЙ PEГИСТР СУДОХОДСТВА RUSSIAN MARITIME REGISTER OF SHIPPING

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6.8.3



СВИДЕТЕЛЬСТВО О ТИПОВОМ ОДОБРЕНИИ TYPE APPROVAL CERTIFICATE

Изготовитель

Manufacturer BITZER Kuhlmaschinenbau Schkeuditz GmbH (DE 811173074)

Адрес

Address Industriestrasse 48, 04435 Schkeuditz, Germany / Германия

Изделие* Product*

Поршневые холодильные компрессоры семейств: ВОЗ, ВО4, ВО5, ВО6 (типы: 2Т.2, 2N.2, 4Т.2, 4Р.2, 4N.2, 4G.2, 4H.2, 6H.2, 6G.2, 6F.2) и семейств: ВОАЗ, ВОА4, ВОА5, ВОА6 (типы W2TA, W2NA, W4TA, W4PA, W4NA, W4HA, W4GA, W6HA, W6GA, W6FA).

Reciprocating refrigerant compressors of family: BO3, BO4, BO5, BO6 (types: 2T.2, 2N.2, 4T.2, 4P.2, 4N.2, 4G.2, 4H.2, 6H.2, 6G.2, 6F.2) and family: BOA3, BOA4, BOA5, BOA6 (types: W2TA, W2NA, W4TA, W4PA, W4NA, W4HA, W4GA, W6HA, W6GA, W6FA).

Код номенклатуры Code of nomenclature 12010120

На основании освидетельствования и проведенных испытаний удостоверяется, что вышеупомянутое(ые) изделие(я) удовлетворяет(ют) требованиям Российского морского регистра судоходства.

This is to certify that on the basis of the survey and tests carried out the above mentioned item(s) complies(ly) with the requirements of Russian Maritime Register of Shipping.

Гл. 4.1 Части XII и Гл. 5.1 Части IX Правил классификации и постройки морских судов, изд. 2021. Ch. 4.1 of Part XII and Ch.5.1 of Part IX of the Rules for the Classification and Construction of Sea-Going Ships, edition 2021.

Настоящее Свидетельство о типовом одобрении действительно до This Type Approval Certificate is valid until

Настоящее Свидетельство о типовом одобрении теряет силу в случаях, установленных в Правилах технического наблюдения за постройкой судов и изготовлением материалов и изделий для судов.

This Type Approval Certificate becomes invalid in cases stipulated in Rules for the Technical Supervision during Construction of Ships and Manufacture of Shipboard Materials and Products.

Дата выдачи Date of issue 22.01.2021 № 21.10002.273

Российский морской регистр судоходства Russian Maritime Register of Shipping

 Костров И.В. / І. Козtrov

 М.П.
 (подпись signature)
 (фамилия, инициалы name)

 I. S.
 (подпись signature)
 (подпись name)

*Дополнительную информацию смотри на обороте.

Additional information see overleaf.



Стр. Page. 2 / 2

Технические данные

Technical data

Поршневые холодильные компрессоры с открытым приводом: Reciprocating refrigerant compressors with open drive:

Семейство	Tun	Количество цилиндров	Максимальное рабочее давление (вх./вых.), МПа	Производительность при частоте вращения 1450 об/мин), м ³ /ч
Family	Type	Cylinder numbers	Max. working pressure (in/out), MPa	Capacity range (at rotation speed 1450 rpm), m3/h
BO3	2T.2Y-	2	1.9 / 2.5	19.6
BOA3	W2TA-	2	1.9 / 2.5	19.6
BO3	2N.2Y-	2	1.9 / 2.5	28.0
BOA3	W2NA	- 2	1.9 / 2.5	28.0
BO4	4T.2Y-	4	1.9 / 2.5	39.3
BOA4	W4TA	4	1.9 / 2.5	39.3
BO4	4P.2Y-	4	1.9 / 2.5	47.1
BOA4	W4PA-	4	1.9 / 2.5	47.1
BO4	4N.2Y-	4	1.9 / 2.5	56.1
BOA4	W4NA-	4	1.9 / 2.5	56.1
BO5	4H.2Y-	4	1.9 / 2.5	73.6
BOA5	W4HA-	4	1.9 / 2.5	73.6
BO5	4G.2Y-	4	1.9 / 2.5	84.5
BOA5	W4GA-	4	1.9 / 2.5	84.5
BO6	6H.2Y-	6	1.9 / 2.5	110.5
BOA6	W6HA-	6	1.9 / 2.5	110.5
BO6	6G.2Y-	6	1.9 / 2.5	126.8
BOA6	W6GA-		1.9 / 2.5	126.8
BO6	6F.2Y-	6	1.9 / 2.5	151.6
BOA6	W6FA-	6	1.9 / 2.5	151.6

- Рекомендованые холодильные areнmы / Recommended refrigerants: 1. Для компрессоров семейства / For compressors family BO3, BO4, BO5, BO6:

- and agreed with compressor manufacturer.

Техническая документация и дата ее одобрения Российским морским регистром судоходства Technical documentation and the date of its approval by Russian Maritime Register of Shipping

Техническая документация одобрена письмами РС: No. 273-381.1/G-321266 от 15.12.2020 и No. 273-381.1/G-13291 от

Technical documentation approved by RS letters No. 273-381.1/G-321266 of 15.12.2020 and No.273-381.1G-13291 of 21.01.2021.

Образец изделия испытан под техническим наблюдением Российского морского регистра судоходства. Product's specimen has been tested under the technical supervision of Russian Maritime Register of Shipping.

21.10001.273 Report No.

Область применения и ограничения Application and limitations

в судовых холодильных установках in ship`s refrigerant plants

Вид документа, выдаваемого на изделие

Type of document issued for product

- C - C видетельство (ф. 6.5.30) / Certificate (f. 6.5.30); ог/или - C3 - C видетельство (ф. 6.5.31) при наличии C видетельства oсоответствии системы контроля качества изготовителя (СКК 1) / Certificate (f. 6.5.31), if Manufacturer's Quality Control System Certificate (CKK 1) is available; or/или - MC – Документ, оформляемый изготовителем при наличии Свидетельства о coomветствии системы контроля качества изготовителя (СКК 2) / The document drawn up by the Manufacturer, if $Manufacturer's\ Quality\ Control\ System\ Certificate\ (CKK\ 2)\ is\ available.$



06/2015

21.10002.273



5 Pressure vessels

5.1 DNV



5.1.1 Oil separators

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documention is required. For supplied compressors it is not possible to deliver the required extended product documentation subsequently. Additional costs for extended product documentation will be charged.



TYPE APPROVAL CERTIFICATE

Certificate No: TAP00002J3

This is to certify:

That the Oil/Water Separator

with type designation(s)
Oil separator OA D500, Oil separator OA D368, Oil separator OA D298

BITZER Kühlmaschinenbau GmbH

Sindelfingen, Germany

is found to comply with DNV rules for classification – Ships Pt.4 Ch.7 Pressure equipment

Application:

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

Max. working temp.: Working media: Type: Design pressure: Oil separator OA D500 -10 / 120 °C
Oil separator OA D368 -10 / 120 °C Refrigerant Group 1 -1 / 28 bar Refrigerant Group 1 -1 / 28 bar Oil separator OA D298 Refrigerant Group 1 -1 / 28 bar

Issued at Hamburg on 2022-05-12

This Certificate is valid until 2027-05-11. DNV local station: Augsburg

Approval Engineer: Le Loi Nguyen

for DNV

DNV

Digitally Signed By: Struwe, Jonathan Location: DNV GL SE Hamburg, Germany Signing Date: 23.05.2022

Jonathan Struwe **Head of Section**

Form code: TA 251

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.





Job Id: 262.1-037665-1 TAP00002J3 Certificate No:

Product description

See approved drawings ("Type Approval documentation") for details (e.g. design data, materials, dimensions and media HFC and EN378-1*)

Application/Limitation

- Applied Rules

 DNV-RU-SHIP Pt.4 Ch.7 'Pressure Equipment' (Edition July 2021)
 - DNV-RU-NAVAL Pt.3 Ch.5 Sec.16 (Edition December 2015)

The oil separators are graded as pressure equipment class II (Pt.4 Ch.7 Sec.1 table 2). The joint efficiency is v=0.85, the corrosion allowance is 0 mm.

Materials

All material used for pressurized parts shall be delivered with material certificates according to DNV-RU-SHIP Pt.4 Ch.7 Sec.1 Tab.6. The material shall be delivered by a manufacturer holding a valid certificate according to DNV GL CP-0346 'DNV approval of manufacturing scheme'.

The materials used for pressurized parts shall conform DNV-RU-SHIP Pt.2 Ch.2 Sec.3. Manufacturing, workmanship and testing shall be done according to DNV-RU-SHIP Pt.4 Ch.7 Sec.7.

Manufacturers of welded pressure equipment of pressure equipment class II shall hold a valid approval in accordance with DNV Class Programme CP-0261 and CP-0352.

Each oil separator manufactured to this type approval is to be:

- Constructionally checked and hydraulic pressure tested 1.5 x design pressure,
 Certified by DNV and delivered with a product certificate.

Remarks

Type Approval documentation

Place of production

Bitzer Kühlmaschinenbau GmbH Sindelfingen, Germany

Marking of product

For traceability to this type approval the products are at least to be marked with:

- Name and domicile of the manufacturer
- Manufacturer's type designation and serial number
- Year of manufacture c)
- Maximum allowable working pressure Design temperature in °C

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262.1-037665-1 TAP00002J3 Job Id: Certificate No:

- Hydrostatic test pressure
- DNV's identifying mark

Periodical assessment

The objective of periodical assessments is to verify that the conditions for the type approval (TA) have not been altered. The main scope of the periodical assessment will normally include:

- Verification of the TA applicant's production and quality system with relation to ensuring continue consistent production of the type approved products at the TA applicant's own premises and at other companies that are given the responsibility for manufacturing of the products,
- Review of the TA documentation and that this is still used as basis for the production, Review of possible changes to the design, the material and the performance of the product, Verification of the product marking.

Periodical assessments for type approvals with a validity period of five years will be required after two years (+/- 90 days) and after 3.5 years (+/- 90 days).

Unscheduled assessments for retention of the type approval may be carried out when there is reason to believe that the TA applicant has not adhered to the obligations stipulated in the TA certificate or in the applicable requirements.

END OF CERTIFICATE

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5.1.2 Heat exchangers

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documention is required. For supplied compressors it is not possible to deliver the required extended product documentation subsequently. Additional costs for extended product documentation will be charged.

DNV			
TYPE APPROVAL C	CERTIFICATE	Certificate TAP0000	
This is to certify:			
That the Heat Exchanger			
with type designation(s) Heat Exchanger D108, D159, D216, D	298, D368, D500		
Issued to BITZER Kühlmaschinen Sindelfingen, Germany	nbau GmbH		
is found to comply with DNV rules for classification – Ships	Pt.4 Ch.7 Pressure equipmen	nt	
Application: Product(s) approved by this certifica Temperature range: -10 to 120 °C Design pressure: -1 to 28 bar / Operating media: HFC, EN378-	/ -10 to 95 °C (Shell side/ Tub		J.
Issued at Hamburg on 2021-12-06			
This Certificate is valid until 2026-12-05 DNV local station: Augsburg	5.	for DNV	
Approval Engineer: Le Loi Nguyen	************		
		Jonathan Struwe Head of Section	
This Certificate is subject to terms and conditions over The validity date relates to the Type Approval Certifica			
	ite and not to the approval of equipment/sys applicable contract with the holder of this do ir officers, directors and employees ("DNV")	tems installed. cument, or following from mandatory law, the liabi arising from or in connection with the services rer	dered for the





262.1-036579-1 Job Id: Certificate No: TAP00002FH

Product description

See approved drawing ("Type Approval documentation") for details (e.g. design data, materials, dimensions and media HFC and EN378-1*)

Application/Limitation

The Heat Exchangers are approved according to DNVGL-RU-SHIP Pt.4 Ch.7 'Pressure Equipment' (Edition July 2020), They are graded as pressure equipment class II and III (Pt.4 Ch.7 Sec.1 table 2). The joint efficiency is v=0.85, the corrosion allowance is 0 mm.

All material used for pressurized parts shall be delivered with material certificates according to DNVGL-RU-SHIP Pt.4 Ch.7 Sec.1 Tab.6 and Tab.7. The material shall be delivered by a manufacturer holding a valid certificate according to DNV GL CP-0346 'DNV GL approval of manufacturing scheme'

The materials used for pressurized parts shall conform DNV GL Rules Pt.2 Ch.2 Sec.3. Manufacturing, workmanship and testing shall be done according to DNV GL Rules Pt.4 Ch.7 Sec.7.

Manufacturers of welded pressure equipment of pressure equipment class II shall hold a valid approval in accordance with DNVGL Class Programme CP-0261 and CP-0352.

Each pressure vessels manufactured to this type approval is to be:

- Constructionally checked and hydraulic pressure tested 1.5 x design pressure,
 Certified by DNV GL and delivered with a product certificate.

Type Approval documentation

Place of Production

BITZER Kühlmaschinenbau GmbH Etzwiesenstraße 42-44, 72108 Rottenburg-Hailfingen, Germany

Marking of product

For traceability to this type approval the products are at least to be marked with:

- the name and domicile of the manufacturer.
- the manufacturer's type designation and serial number,
- the year of manufacture,
- the design pressure,
- the design temperature in °C,
- the hydraulic test pressure, and
- DNV 's identifying mark.

Periodical assessment

The objective of the periodical assessment is to verify that the conditions for the type approval (TA) have not been altered.

The main scope of the periodical assessment will normally include:

- verification of the TA applicant's production and quality system w.r.t. ensuring continued consistent production of the TA products at the TA applicant's own premises and at other companies that are given the responsibility for manufacturing of the products,
- review of TA documentation and that this is still used as basis for the production,
- review of possible changes in the design, the materials and the performance of the product, and
- verification of the product marking.

Periodical assessment is to be performed after 2 years and after 3.5 years. A renewal assessment will be performed at renewal of the certificate

Unscheduled assessments for retention of the certificate may be carried out when there is reason to believe that the type approval applicant has not adhered to the obligations stipulated in the type approval certificate.

End of Certificate

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5.1.3 Liquid recievers

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documention is required. For supplied compressors it is not possible to deliver the required extended product documentation subsequently. Additional costs for extended product documentation will be charged.



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.

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Nevision, 2021-03

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Job Id: 262.1-037067-1 Certificate No: TAP00002GJ

Product description

See approved drawing ("Type Approval documentation") for details (e.g. design data, materials, dimensions and media HFC and EN378-1*)

Application/Limitation

The liquid receivers are approved according to DNV-RU-SHIP Pt.4 Ch.7 'Pressure Equipment' (Edition July 2021), They are graded as pressure equipment class II (Pt.4 Ch.7 Sec.1 table 2). The joint efficiency is v=0.85, the corrosion allowance is 0 mm.

All material used for pressurized parts shall be delivered with material certificates according to DNV-RU-SHIP Pt.4 Ch.7 Sec.1 Tab.6. The material shall be delivered by a manufacturer holding a valid certificate according to DNV CP-0346 'DNV approval of manufacturing scheme'

The materials used for pressurized parts shall conform DNV-RU-SHIP Pt.2 Ch.2 Sec.3. Manufacturing, workmanship and testing shall be done according to DNV-RU-SHIP Pt.4 Ch.7 Sec.7.

The welding work for pressure equipment graded as PEC II shall be carried out by a welding workshop holding a valid certificate acc. to following DNV class programmes:

- DNV-CP-0261 'Approval of manufacturers Pressure equipment' and
- DNV-CP-0352 'Approval of manufacturers Manufacture of welded products Welding workshop'.

Each pressure vessels manufactured to this type approval is to be:

- Constructionally checked and hydraulic pressure tested 1.5 x design pressure,
 Certified by DNV and delivered with a product certificate.

Type Approval documentation

Place of Production

BITZER Kühlmaschinenbau GmbH Etzwiesenstraße 42-44, 72108 Rottenburg-Hailfingen, Germany

Marking of product

For traceability to this type approval the products are at least to be marked with:

- the name and domicile of the manufacturer,
- the manufacturer's type designation and serial number,
 - the year of manufacture,
- the design pressure.
- the design temperature in °C,
- the hydraulic test pressure, and
- DNV 's identifying mark.

Periodical assessment

The objective of the periodical assessment is to verify that the conditions for the type approval (TA) have not been altered.

The main scope of the periodical assessment will normally include:

- verification of the TA applicant's production and quality system w.r.t. ensuring continued consistent production of the TA products at the TA applicant's own premises and at other companies that are given the responsibility for manufacturing of the products,
- review of TA documentation and that this is still used as basis for the production,
- review of possible changes in the design, the materials and the performance of the product, and
- verification of the product marking.

Periodical assessment is to be performed after 2 years and after 3.5 years. A renewal assessment will be performed at renewal of the certificate.

Unscheduled assessments for retention of the certificate may be carried out when there is reason to believe that the type approval applicant has not adhered to the obligations stipulated in the type approval certificate.

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Job Id: 262.1-037067-1 Certificate No: TAP00002GJ

End of Certificate

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5.1.4 Condensers



Series: C-Plus (CPS, CDEW, CDEW-E, McDEW), CRF, CRM, CXF

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documention is required. For supplied compressors it is not possible to deliver the required extended product documentation subsequently. Additional costs for extended product documentation will be charged.







Job Id: 262.1-014795-7 Certificate No: TAP00000UF

Revision No: 3

Product description

Shell and tube heat exchanger with types C-Plus, CRF, CRM and CXF, sizes 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 and 11 according to approved drawings in Type Approval documentation.

Place of production

BITZER Kühlmaschinenbau GmbH Etzwiesenstraße 42-44, 72108 Rottenburg Hailfingen, Germany

Application/Limitation

Applied Rules and Design Codes

- DNV-RU-SHIP Pt.4 Ch.7 'Pressure Equipment' (Edition July 2021)
- DNV-RU-SHIP Pt.4 Ch.6 Sec. 6 'Refrigeration Systems' (Edition July 2021)
- EN 13445-3

Both sides of the heat exchanger shall be classified in pressure equipment classes acc. to DNV-RU-SHIP Pt.4 Ch.7 Sec.1 Table 2, here class II or III, respectively.

Materials

The materials of pressurized by pressure equipment classes II shall be delivered by a material manufacturer holding a valid certificate acc. to:

DNV-CP-0346 'DNV approval of manufacturer scheme'.

Steel materials used shall conform DNV-RU-SHIP Pt.2 Ch.2 Sec.3, e.g. test temperature of impact testing according to the minimum design temperature. All used material shall be delivered with material certificates acc. to DNV-RU-SHIP Pt.4 Ch.7 Sec.1 Table 6 or 7, respectively.

The materials used for the design and fabrication of the heat exchangers shall be suitable for the environmental and specific service conditions (e.g. the applicable service temperature), the applicable fluids and shall be resistant to corrosion and wear during the intended service lifetime. Corrosion allowance tube side is 0mm / shell side is 1mm.

Welding

The welding work for pressure equipment graded as class II shall be carried out by a welding workshop holding a valid certificate acc. to following DNV class programmes:

- DNV-CP-0261 'Approval of manufacturers Pressure equipment' and
- DNV-CP-0352 'Approval of manufacturers Manufacture of welded products Welding workshop'.

Areas of flat plates which are additionally loaded by residual welding stresses perpendicular to the plate shall be ultrasonically tested for the absence of laminar imperfections before welding.

Remarks

Manufacturing, workmanship and testing shall be done according to DNV-RU-SHIP Pt.4 Ch.7 Sec.7.

In case of condenser types CRF, CRM and CXF the use of the refrigerant R410A is excluded, as the required design pressure of the high-pressure side is 34 bar (DNV-RU-SHIP Pt.4 Ch.6 Sec.6 Table 3). For all other refrigerants not mentioned on the first page of this certificate, an individual approval in each individual case is necessary.

Walls in the region of supports or brackets shall be fitted with doubling plates, following DNV-RU-SHIP Pt.4 Ch.7 Sec.4 [2.3.2]. This applies also to the lifting lugs (Pos.27).

Each cooler is to be:

- Hydraulic pressure tested to 1.5 x design pressure acc. to the "Type Approval documentation",
- Certified by DNV and delivered with a product certificate when required by DNV Rules or by the purchaser.

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Job Id: Certificate No: 262.1-014795-7 TAP00000UF

Revision No:

Type Approval documentation

Marking of product

For traceability to this type approval (TA) the products are at least to be marked with:

- Name and domicile of the manufacturer
- Manufacturer's type designation and serial number Year of manufacture
- Maximum allowable working pressure
- Design temperature in °C
- Hydrostatic test pressure
- g. DNV's identifying mark

Periodical assessment

The objective of periodical assessments is to verify that the conditions for the TA have not been altered. The main scope of the periodical assessment will normally include:

- Verification of the TA applicant's production and quality system with relation to ensuring continue consistent production of the type approved products at the TA applicant's own premises and at other companies that are given the responsibility for manufacturing of the products,
- Review of the TA documentation and that this is still used as basis for the production, Review of possible changes to the design, the material and the performance of the product,
- Verification of the product marking.

Periodical assessments for TA with a validity period of five years will be required after two years (+/- 90 days) and after 3.5 years (+/- 90 days).

Unscheduled assessments for retention of the TA may be carried out when there is reason to believe that the TA applicant has not adhered to the obligations stipulated in the TA certificate or in the applicable requirements.

END OF CERTIFICATE

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5.2 Bureau Vertias

5.2.1 Condensers



Ø108 .. Ø500 mm

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documention is required. For supplied compressors it is not possible to deliver the required extended product documentation subsequently. Additional costs for extended product documentation will be charged.

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Marine & Offshore

Certificate number: 02299/I0 BV File number: ACM 127/205/2 - 7 Product code: 68321

This certificate is not valid when presented without the full attached schedule composed of 7 sections

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TYPE APPROVAL CERTIFICATE

This certificate is issued to

BITZER Kühlmaschinenbau GmbH

Sindelfingen - GERMANY

for the type of product

WATER-CONDENSERS FOR REFRIGERATING PLANTS

Liquid cooled refrigerant condensers for refrigerating systems; type: D108 to D500

Requirements: BUREAU VERITAS Rules for the Classification of Steel Ships BUREAU VERITAS Rules for the Classification of Naval Ships

This certificate is issued to attest that Bureau Veritas Marine & Offshore did undertake the relevant approval procedures for the product identified above which was found to comply with the relevant requirements mentioned above.

This certificate will expire on: 13 Dec 2029

For Bureau Veritas Marine & Offshore, At BV HAMBURG, on 13 Dec 2024, Heiko Lange

This certificate was created electronically and is valid without



This certificate remains valid until the date stated above, unless cancelled or revoked, provided the conditions indicated in the subsequent page(s) are complied with and the product remains satisfactory in service. This certificate will not be valid if the applicant makes any changes or modifications to the approved product, which have not been notified to, and agreed in writing with Bureau Veritas Marine & Offshore. Should the specified regulations or standards be amended during the validity of this certificate; the product(s) is/are to be re-approved prior to it/they being placed on board vessels to which the amended regulations or standards apply. This certificate is issued within the scope of the General Conditions of Bureau Veritas Marine & Offshore available on the internet site www.veristar.com. Any Person not a party to the contract pursuant to which this document is delivered may not assert a claim against Bureau Veritas Marine & Offshore for any liability arising out of errors or omissions which may be contained in said document, or for errors of judgement, fault or negligence committed by personnel of the Society or of its Agents in establishment or issuance of this document, and in connection with any activities for which it may provide.

The electronic version is available at: http://www.veristarnb.com/veristarnb/jsp/viewPublicPdfTypec.jsp?id=b0iqwigjee
BV Mod. Ad.E 530 June 2017
This certificate consists of 3 page(s)



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Certificate number: 02299/I0 BV

THE SCHEDULE OF APPROVAL

1. PRODUCT DESCRIPTION:

Liquid cooled refrigerant condensers for refrigerating systems; type: D108 to D500

Identification and technical data:

definition and technical data.							
File number	Type	Maximum wor	king pressure	Maximum working		Maximum capacity	
		[bar]		temperature [°C]		[1]	
		Sea water	Refrigerant	Sea water	Refrigerant	Sea water	Refrigerant
		side	side	side	side	side	side
ACM 127/205/2	D108	10	28	95	120	0.9	5.2
ACM 127/205/3	D159	10	28	95	120	5	24
ACM 127/205/4	D216	10	28	95	120	12	44
ACM 127/205/5	D298	10	28	95	120	25	76
ACM 127/205/6	D368	10	28	95	120	57	154
ACM 127/205/7	D500	10	28	95	120	92	201

2. DOCUMENTS AND DRAWINGS:

According to the following drawings:

File number	Type	Designation	Drawing number	Version
ACM 127/205/2	D108	Heat exchanger D108	200420594	00
ACM 127/205/3	D159	Heat exchanger D159	200419101	00
ACM 127/205/4	D216	Heat exchanger D216	200410903	00
ACM 127/205/5	D298	Heat exchanger D298	200408192	00
ACM 127/205/6	D368	Heat exchanger D368	200404215	00
ACM 127/205/7	D500	Heat exchanger D500	200358024	01

3. TEST REPORTS:

Not applicable.

$\underline{\textbf{4. APPLICATION} / \textbf{LIMITATION:}}$

- 4.1 Refrigerants according to EN 378-1 table E.1, but not Methyl chloride (R 40), Trichlorofluoromethane (R 11), Ethane (R 170), Ethylene (R 1150), Ammonia (R 717) and also not other substances with lower explosion limit in air of less than 3.5%.
- 4.2 The refrigerant condensers are classed as per BUREAU VERITAS Rules.
- 4.3 The nature of materials, joints included, is to be selected according to the fluid to be conveyed.
- 4.4 On board installation and maintenance requirements have to be in accordance with the BUREAU VERITAS Rules requirements and the manufacturer's recommendations.

$\underline{\textbf{5. PRODUCTION SURVEY REQUIREMENTS:}}$

- 5.1 The refrigerant condensers are to be supplied by **Bitzer Kühlmaschinenbau GmbH** in compliance with the type and the requirements described in this certificate.
- $5.2 \quad \text{This type of product is within the category IBV of BUREAU VERITAS Rule Note NR 320}.$
- 5.3 BUREAU VERITAS product certificate is required.
- 5.4 For information, Bitzer Kühlmaschinenbau GmbH has declared to BUREAU VERITAS the following production site: Bitzer Kühlmaschinenbau GmbH, Rottenburg-Hailfingen / GERMANY

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This certificate consists of 3 page(s)



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Certificate number: 02299/I0 BV

- 5.5 Inspection requirements as per BUREAU VERITAS Rules.
- 5.6 Each refrigerant condenser is to be hydraulic pressure tested to 1.5 times the maximum design pressure under witnessing of a Society's Surveyor.

6. MARKING OF PRODUCT:

Each refrigerant condenser should be marked with:
- Manufacturer's name or logo

- Type designation Volume
- Design pressure

- Test pressure
 Design temperature
 Nature of refrigerating fluid to be conveyed
 BUREAU VERITAS's marks

7. OTHERS:

- 7.1 It is Bitzer Kühlmaschinenbau GmbH's responsibility to inform shipbuilders or their sub-contractors of the proper methods of fitting, use and general maintenance of the approved equipment and the conditions of this approval.
- 7.2 This certificate supersedes the Type Approval Certificate No 02299/H2 BV issued on 13 Nov 2020 by the Society.

*** END OF CERTIFICATE ***

The electronic version is available at: http://www.veristarnb.com/veristarnb/jsp/viewPublicPdfTypec.jsp?id=b0iqwigjee BV Mod. Ad.E 530 June 2017 This certificate consists of 3 page(s)



5.2.2 Liquid recievers



Ø108 .. Ø500 mm

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documention is required. For supplied compressors it is not possible to deliver the required extended product documentation subsequently. Additional costs for extended product documentation will be charged.

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Marine & Offshore

Certificate number: 04118/H0 BV File number: RSP 776/1-6 Product code: 68341

This certificate is not valid when presented without the full attached schedule composed of 7 sections

www.veristar.com

TYPE APPROVAL CERTIFICATE

This certificate is issued to

BITZER Kühlmaschinenbau GmbH

Sindelfingen - GERMANY

for the type of product

RECEIVERS FOR REFRIGERATING PLANTS

Liquid receivers for refrigerating systems: Ø 108 to 500 mm

Requirements: BUREAU VERITAS Rules for the Classification of Steel Ships BUREAU VERITAS Rules for the Classification of Naval Ships

This certificate is issued to attest that Bureau Veritas Marine & Offshore did undertake the relevant approval procedures for the product identified above which was found to comply with the relevant requirements mentioned above.

This certificate will expire on: 13 Dec 2029

For Bureau Veritas Marine & Offshore, At BV HAMBURG, on 13 Dec 2024, Heiko Lange

This certificate was created electronically and is valid without



This certificate remains valid until the date stated above, unless cancelled or revoked, provided the conditions indicated in the subsequent page(s) are complied with and the product remains satisfactory in service. This certificate will not be valid if the applicant makes any changes or modifications to the approved product, which have not been notified to, and agreed in writing with Bureau Veritas Marine & Offshore. Should the specified regulations or standards be amended during the validity of this certificate; the product(s) is/are to be re-approved prior to it/they being placed on board vessels to which the amended regulations or standards apply. This certificate is issued within the scope of the General Conditions of Bureau Veritas Marine & Offshore available on the internet site www.veristar.com. Any Person not a party to the contract pursuant to which this document is delivered may not assert a claim against Bureau Veritas Marine & Offshore for any liability arising out of errors or omissions which may be contained in said document, or for errors of judgement, fault or negligence committed by personnel of the Society or of its Agents in establishment or issuance of this document, and in connection with any activities for which it may provide.

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BV Mod. Ad.E 530 June 2017
This certificate consists of 3 page(s)



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Certificate number: 04118/H0 BV

THE SCHEDULE OF APPROVAL

1. PRODUCT DESCRIPTION:

Liquid receivers for refrigerating systems: Ø 108 to 500 mm

Identification and technical data are as follows:

File number	Capacity	Shell outer	Shell thickness	Dished head	Maximum working
rue number	[1]	diameter [mm]	[mm]	thickness [mm]	pressure [bar]
RSP 776/1	1.8 – 6.8	108	2.5	2.5	28
RSP 776/2	3.8 - 20	159	3	3	28
RSP 776/3	13 – 54	216	3.5	4	28
RSP 776/4	21 - 105	298	5	5	28
RSP 776/5	max. 160	368	6	6	28
RSP 776/6	max. 320	500	7	6	28

Working temperature: -10 °C up to +120 °C

2. DOCUMENTS AND DRAWINGS:

According to the following drawings:

File number	Designation	Drawing number	Rev.
RSP 776/1	Liquid receiver D108	200441695	00
RSP 776/2	Liquid receiver D159	200444990	00
RSP 776/3	Liquid receiver D216	200445207	00
RSP 776/4	Liquid receiver D298	200446072	00
RSP 776/5	Liquid receiver D368	200448128	00
RSP 776/6	Liquid receiver D500	200455619	00

3. TEST REPORTS:

Not applicable.

4. APPLICATION / LIMITATION:

- 4.1 Refrigerants according to EN 378-1 table E.1, but not Methyl chloride (R 40), Trichlorofluoromethane (R 11), Ethane (R 170), Ethylene (R 1150), Ammonia (R 717) and also not other substances with lower explosion limit in air of less than 3.5%.
- 4.2 The liquid receivers for refrigerating systems are classed as per BUREAU VERITAS Rules.
- 4.3 The nature of materials, joints included, is to be selected according to the fluid to be conveyed.
- 4.4 On board installation and maintenance requirements have to be in accordance with the BUREAU VERITAS Rules requirements and the manufacturer's recommendations.

5. PRODUCTION SURVEY REQUIREMENTS:

- 5.1 The liquid receivers are to be supplied by **Bitzer Kühlmaschinenbau GmbH** in compliance with the type and the requirements described in this certificate.
- 5.2 This type of product is within the category IBV of BUREAU VERITAS Rule Note NR320.
- 5.3 BUREAU VERITAS product certificate is required.
- 5.4 For information, Bitzer Kühlmaschinenbau GmbH has declared to BUREAU VERITAS the following production site: Bitzer Kühlmaschinenbau GmbH, Rottenburg-Hailfingen / GERMANY

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This certificate consists of 3 page(s)



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Certificate number: 04118/H0 BV

- 5.5 Inspection requirements as per BUREAU VERITAS Rules.
- 5.6 Each liquid receiver is to be hydraulic pressure tested to 1.5 times the maximum design pressure under witnessing of a Society's Surveyor.

6. MARKING OF PRODUCT:

Each liquid receiver should be marked with:
- Manufacturer's name or logo

- Type designation Volume
- Design pressure

- Test pressure
 Design temperature
 Nature of refrigerating fluid to be conveyed
 BUREAU VERITAS's marks

7. OTHERS:

- 7.1 It is Bitzer Kühlmaschinenbau GmbH's responsibility to inform shipbuilders or their sub-contractors of the proper methods of fitting, use and general maintenance of the approved equipment and the conditions of this approval.
- 7.2 This certificate supersedes the Type Approval Certificate No 04118/G2 BV issued on 29 Jan 2021 by the Society.

*** END OF CERTIFICATE ***

The electronic version is available at: http://www.veristamb.com/veristamb/jsp/viewPublicPdfTypec.jsp?id=vb7bvc4ncn BV Mod. Ad.E 530 June 2017 This certificate consists of 3 page(s)



5.2.3 Oil separators



Ø108 .. Ø500 mm

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documention is required. For supplied compressors it is not possible to deliver the required extended product documentation subsequently. Additional costs for extended product documentation will be charged.

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Marine & Offshore

Certificate number: 04119/H0 BV File number: ACM 133/201/1-2 Product code: 6833I

This certificate is not valid when presented without the full attached schedule composed of 7 sections

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TYPE APPROVAL CERTIFICATE

This certificate is issued to

BITZER Kühlmaschinenbau GmbH

Sindelfingen - GERMANY

for the type of product

LIQUID SEPARATORS FOR REFRIGERATING PLANTS

Oil separators for refrigerating systems: Ø 108 mm to 500 mm

Requirements: BUREAU VERITAS Rules for the Classification of Steel Ships BUREAU VERITAS Rules for the Classification of Naval Ships

This certificate is issued to attest that Bureau Veritas Marine & Offshore did undertake the relevant approval procedures for the product identified above which was found to comply with the relevant requirements mentioned above.

This certificate will expire on: 13 Dec 2029

For Bureau Veritas Marine & Offshore, At BV HAMBURG, on 13 Dec 2024, Heiko Lange

This certificate was created electronically and is valid without



This certificate remains valid until the date stated above, unless cancelled or revoked, provided the conditions indicated in the subsequent page(s) are complied with and the product remains satisfactory in service. This certificate will not be valid if the applicant makes any changes or modifications to the approved product, which have not been notified to, and agreed in writing with Bureau Veritas Marine & Offshore. Should the specified regulations or standards be amended during the validity of this certificate; the product(s) is/are to be re-approved prior to it/they being placed on board vessels to which the amended regulations or standards apply. This certificate is issued within the scope of the General Conditions of Bureau Veritas Marine & Offshore available on the internet site www.veristar.com. Any Person not a party to the contract pursuant to which this document is delivered may not assert a claim against Bureau Veritas Marine & Offshore for any liability arising out of errors or omissions which may be contained in said document, or for errors of judgement, fault or negligence committed by personnel of the Society or of its Agents in establishment or issuance of this document, and in connection with any activities for which it may provide.

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BV Mod. Ad.E 530 June 2017
This certificate consists of 3 page(s)



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Certificate number: 04119/H0 BV

THE SCHEDULE OF APPROVAL

1. PRODUCT DESCRIPTION:

Oil separators for refrigerating systems: Ø 108 mm to 500 mm

Identification and technical data are as follows:

File number	Capacity	Shell outer	Shell thickness	Dished head	Maximum working
	[1]	diameter [mm]	[mm]	thickness [mm]	pressure [bar]
	33 – 73	298	5	6	28
ACM 133/201/1	54 – 160	368	6	6	28
	180 - 320	500	7	6	28
	2.7	108	2.5	3	28
ACM 133/201/2	7 – 16	159	3	-	28
	30	216	3.5	-	28

Working temperature: -10 °C up to +120 °C

2. DOCUMENTS AND DRAWINGS:

According to the following drawings:

File number	Drawing number	Rev.	Designation
	200501649	00	Oil separator OA D298 DNV/RS/BV
	200502999	00	Oil separator OA D368 DNV/RS/BV
ACM 133/201/1	200503303	00	Oil separator OA D500 DNV/RS/BV
	361825-010-0	05	Schauglas komplett D27
	200025517	00	Schauglas komplett D36
	361809-020-0	02	Schauglas komplett D88

File number	Drawing number	Rev.	Designation
	152002-010-5	02	Ölsekundärabscheider OAS D108
	320512-020-101	02	Scheibe mit Bohrung D16.3
	367252-010-101	01	Flansch OAS 322
	372303-100-101	00	Dichtung OAS ø 159
	152012-010-5	03	Ölsekundärabscheider OAS D159
	320042-010-101	01	Scheibe D159 mit Bohrung D49
ACM 133/201/2	320512-010-101	02	Scheibe mit Bohrung D57.5
	320512-020-101	02	Scheibe mit Bohrung D16.3
	367250-010-101	02	Flansch OAS 744/1055/1655
	152022-010-5	03	Olsekundärabscheider OAS D216
	320513-010-101	02	Scheibe mit Bohrung D83
	320513-020-101	02	Scheibe mit Bohrung D16.3
	367251-010-101	01	Flansch ø 216 Typ OAS 3088
	372303-110-101	00	Dichtung OAS ø 216

3. TEST REPORTS:

Not applicable.

4. APPLICATION / LIMITATION:

- 4.1 Refrigerants according to EN 378-1 table E.1, but not Methyl chloride (R 40), Trichlorofluoromethane (R 11), Ethane (R 170), Ethylene (R 1150), Ammonia (R 717) and also not other substances with lower explosion limit in air of less than 3.5%.
- 4.2 The oil separators for refrigerating systems are classed as per BUREAU VERITAS Rules.
- 4.3 The nature of materials, joints included, is to be selected according to the fluid to be conveyed.

The electronic version is available at: http://www.veristamb.com/veristamb/jsp/viewPublicPdfTypec.jsp?id=wo2k2faes5

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This certificate consists of 3 page(s)



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Certificate number: 04119/H0 BV

4.4 On board installation and maintenance requirements have to be in accordance with the BUREAU VERITAS Rules requirements and the manufacturer's recommendations.

5. PRODUCTION SURVEY REQUIREMENTS:

- 5.1 The oil separators are to be supplied by **Bitzer Kühlmaschinenbau GmbH** in compliance with the type and the requirements described in this certificate.
- 5.2 This type of product is within the category IBV of BUREAU VERITAS Rule Note NR320.
- 5.3 BUREAU VERITAS product certificate is required.
- 5.4 For information, Bitzer Kühlmaschinenbau GmbH has declared to BUREAU VERITAS the following production sites: Bitzer Kühlmaschinenbau GmbH, Rottenburg-Hailfingen / GERMANY
- 5.5 Inspection requirements as per BUREAU VERITAS Rules.
- 5.6 Each oil separator is to be hydraulic pressure tested to 1.5 times the maximum design pressure under witnessing of a Society's Surveyor.

6. MARKING OF PRODUCT:

Each oil separator should be marked with:

- Manufacturer's name or logo
- Type designation
- Volume
- Design pressure Test pressure
- Design temperature
- Nature of refrigerating fluid to be conveyed BUREAU VERITAS's marks

7. OTHERS:

- 7.1 It is **Bitzer Kühlmaschinenbau GmbH**'s responsibility to inform shipbuilders or their sub-contractors of the proper methods of fitting, use and general maintenance of the approved equipment and the conditions of this approval.
- 7.2 This certificate supersedes the Type Approval Certificate N° 04119/G1 BV issued on 18 Mar 2020 by the Society.

*** END OF CERTIFICATE ***

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5.2.4 Oil coolers

Series: OWD

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documention is required. For supplied compressors it is not possible to deliver the required extended product documentation subsequently. Additional costs for extended product documentation will be charged.



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Marine & Offshore

Certificate number: 81379/A0 BV File number: ACM 130/2349/1 Product code: 13201

This certificate is not valid when presented without the full attached schedule composed of 7 sections

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TYPE APPROVAL CERTIFICATE

This certificate is issued to

BITZER Kühlmaschinenbau GmbH

Sindelfingen - GERMANY

for the type of product TUBE HEAT EXCHANGERS

OIL COOLER, type: OWD

Requirements:

BUREAU VERITAS Rules for the Classification of Steel Ships BUREAU VERITAS Rules for the Classification of Naval Ships

This certificate is issued to attest that Bureau Veritas Marine & Offshore did undertake the relevant approval procedures for the product identified above which was found to comply with the relevant requirements mentioned above.

This certificate will expire on: 26 May 2030

For Bureau Veritas Marine & Offshore, At BV HAMBURG, on 26 May 2025, Heiko Lange

This certificate was created electronically and is valid without signature



This certificate remains valid until the date stated above, unless cancelled or revoked, provided the conditions indicated in the subsequent page(s) are complied with and the product remains satisfactory in service. This certificate will not be valid if the applicant makes any changes or modifications to the approved product, which have not been notified to, and agreed in writing with Bureau Veritas Marine & Offshore. Should the specified regulations or standards be amended during the validity of this certificate, the product(s) si/are to be re-approved prior to it/they being placed on board vessels to which the amended regulations or standards apply. This certificate is issued within the scope of the General Conditions of Bureau Veritas Marine & Offshore available on the internet site www.veristar.com. Any Person not a party to the contract pursuant to which this document is delivered may not assert a claim against Bureau Veritas Marine & Offshore for any liability arising out of errors or omissions which may be contained in said document, or for errors of judgement, fault or negligence committed by personnel of the Society or of its Agents in establishment or issuance of this document, and in connection with any activities for which it may provide.

The electronic version is available at: https://www.veristarnb.com/veristarnb/jsp/viewPublicPdfTypec.jsp?id=k4s7swyshd BV Mod. Ad.E 530 June 2017

This certificate consists of 3 page(s)



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Certificate number: 81379/A0 BV

THE SCHEDULE OF APPROVAL

1. PRODUCT DESCRIPTION:

Oil cooler, type: OWD

Identification and technical data are as follows:

	Voulume	Voulume	Tubes	Allowed	min./max.	max. a	llowed
Type	shell side	tube side	[N°]	tempe	rature	pressure	
	[L]	[L]	[IM*]	[0	CJ	[bar]	
				Shell	Tube	Shell	Tube
OWD1307-1-xx	7.0	2.7	32	-20 / +150	-20 / +95	-1 / 32	10
OWD1307-2-xx	6.3	3.2	40	-20 / +150	-20 / +95	-1 / 32	10
OWD1310-xx	8.4	4.1	40	-20 / +150	-20 / +95	-1/32	10
OWD1607-xx	8.5	5.6	68	-20 / +150	-20 / +95	-1/32	10
OWD1610-xx	11.4	7.1	68	-20 / +150	-20 / +95	-1 / 32	10
OWD1612-xx	14.5	8.5	30	-20 / +150	-20 / +95	-1/32	10
OWD1615-xx	18.2	10.4	30	-20 / +150	-20 / +95	-1 / 32	10
OWD1618-xx	22.0	12.2	30	-20 / +150	-20 / +95	-1/32	10
OWD2112-xx	23.6	16.3	53	-20 / +150	-20 / +95	-1 / 32	10
OWD2115-xx	29.7	19.8	53	-20 / +150	-20 / +95	-1 / 32	10
OWD2118-xx	35.8	23.3	53	-20 / +150	-20 / +95	-1/32	10
OWD2712-xx	34.5	28.3	87	-20 / +150	-20 / +95	-1/32	10
OWD2715-xx	43.4	34.1	87	-20 / +150	-20 / +95	-1/32	10
OWD2718-xx	52.3	39.8	87	-20 / +150	-20 / +95	-1 / 32	10
OWD3212-xx	48.2	40.4	126	-20 / +150	-20 / +95	-1/32	10
OWD3215-xx	60.7	48.7	126	-20 / +150	-20 / +95	-1 / 32	10
OWD 3218-xx	73.1	57.1	126	-20 / +150	-20 / +95	-1 / 32	10

2. DOCUMENTS AND DRAWINGS:

According to the following drawings:

Drawing number	Rev.	Designation
200781463	00	Oil cooler OWD – Approval drawing_BV_DNV
200058295	02	Welding nipple
200022465	01	Welding nipple
200617528	00	Connecting flange
200622054	00	Connecting flange
200628654	00	Connecting flange
200628688	00	Connecting flange
200271825	01	Water end cover
200272471	00	Gasket
200272472	00	Gasket
200318828	00	Water end cover
200261158	00	Water end cover
200261694	00	Gasket
200262555	00	Water end cover
200271755	01	Water end cover
200271829	00	Gasket
200272489	00	Gasket
200289677	00	Water end cover
200289901	00	Water end cover
200289699	00	Water end cover
200289842	00	Water end cover
200289735	00	Water end cover
200289761	00	Water end cover

The electronic version is available at: https://www.veristarnb.com/veristarnb/jsp/viewPublicPdfTypec.jsp?id=k4s7swyshd

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This certificate consists of 3 page(s)



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Certificate number: 81379/A0 BV

3. TEST REPORTS:

Not applicable.

4. APPLICATION / LIMITATION:

- 4.1 These heat exchangers are intended as oil coolers of refrigerating machines.
- 4.2 The heat exchangers are classed as per BUREAU VERITAS Rules.
- 4.3 The nature of materials, joints included, should be suitable for the intended service
- 4.4 On board installation and maintenance requirements have to be in accordance with the BUREAU VERITAS Rules requirements and the manufacturer's recommendations.

5. PRODUCTION SURVEY REQUIREMENTS:

- 5.1 The heat exchanger are to be supplied by Bitzer Kühlmaschinenbau GmbH in compliance with the type and the requirements described in this certificate.
- 5.2 This type of product is within the category IBV of BUREAU VERITAS Rule Note NR320.
- 5.3 BUREAU VERITAS product certificate is required.
- 5.4 For information, Bitzer Kühlmaschinenbau GmbH has declared to BUREAU VERITAS the following production site: Bitzer Kühlmaschinenbau GmbH, Sindelfingen / GERMANY
- 5.5 Material certificates as per BUREAU VERITAS Rules.
- 5.6 Each heat exchanger is to be hydraulic pressure tested to 1.5 times the maximum design pressure under witnessing of a Society's Surveyor.

6. MARKING OF PRODUCT:

Each heat exchanger should be marked with:

- Manufacturer's name or logo
- Type designation
- Maximum working pressure (shell side and tube side)
- Test pressure (shell side and tube side)
- Working temperature (max/min) (shell side and tube side)
- Nature of fluid to be conveyed
- BUREAU VERITAS's marks

7. OTHERS:

7.1 It is Bitzer Kühlmaschinenbau GmbH's responsibility to inform shipbuilders or their sub-contractors of the proper methods of fitting, use and general maintenance of the approved equipment and the conditions of this approval.

*** END OF CERTIFICATE ***

The electronic version is available at: https://www.veristarnb.com/veristarnb/jsp/viewPublicPdfTypec.jsp?id=k4s7swyshd

BV Mod. Ad.E 530 June 2017

This certificate consists of 3 page(s)



5.3 ABS

5.3.1 Heat Exchanger

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documention is required. For supplied compressors it is not possible to deliver the required extended product documentation subsequently. Additional costs for extended product documentation will be charged.



See ABS Genoa Letter ref WO0052369 dated 26-Sep-2024



CERTIFICATE NUMBER EFFECTIVE DATE EXPIRY DATE ABS TECHNICAL OFFICE 24-0052369-PDA 24-Sep-2024 23-Sep-2029 Genoa Engineering Department

CERTIFICATE OF

Product Design Assessment

This is to certify that a representative of this Bureau did, at the request of

BITZER KUEHLMASCHINENBAU GMBH

located a

PETER-SCHAUFLER-PLATZ 1, , DE-71065 SINDELFINGEN,

Germany

assess design plans and data for the below listed product. This assessment is a representation by the Bureau as to the degree of compliance the design exhibits with applicable sections of the Rules. This assessment does not waive unit certification or classification procedures required by ABS Rules for products to be installed in ABS classed vessels or facilities. This certificate, by itself, does not reflect that the product is Type Approved. The scope and limitations of this assessment are detailed on the pages attached to this certificate.

Product: Heat Exchanger

Model: C-PLUS (CDEW - CPS - McDEW - CDEW-E)

CRF 16X, CRF 21X, CRF 27X, CRF 32X, CRF 40X, CRF 45X CRM 16X, CRM 21X, CRM 27X, CRM 32X, CRM 40X, CRM 45X

Endorsements:

Tier: 5 - Unit Certification Required

This Product Design Assessment (PDA) Certificate remains valid until 23/Sep/2029 or until the Rules and/or Standards used in the assessment are revised or until there is a design modification warranting design reassessment (whichever occurs first).

Acceptance of product is limited to the "Intended Service" details prescribed in the certificate and as per applicable Rules and Standards.

This Certificate is valid for installation of the listed product on ABS units which exist or are under contract for construction on or previous to the effective date of the ABS Rules and standards applied at the time of PDA issuance. Use of the Product for non-ABS units is subject to agreement between the manufacturer and intended client.

American Bureau Of Shipping

Silvio Paltrinieri, Engineer/Consultant

NOTE: This certificate evidences compliance with one or more of the Rules, Guides, standards or other criteria of ABS or a statutory, industrial or manufacturer's standards. It is issued solely for the use of ABS, its committees, its clients or other authorized entities. Any significant changes to the aforementioned product without approval from ABS will result in the certificate becoming null and void. This certificate is governed by ABS Rules 1-1-A3/5.9 Terms and Conditions of the Request for Product Type Approval and Agreement (2010)

Certificate of Product Design Assessment Rev.3 of 1

Page 1

Sensitivity: Internal & Restricted



5.4 Russian Maritime Register of shipping

5.4.1 Condensers



Series: K, CK, CN series

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documention is required. For supplied compressors it is not possible to deliver the required extended product documentation subsequently. Additional costs for extended product documentation will be charged.

РОССИЙСКИЙ МОРСКОЙ РЕГИСТР СУДОХОДСТВА RUSSIAN MARITIME REGISTER OF SHIPPING

Стр. Page. 1/2

6.8.3



СВИДЕТЕЛЬСТВО О ТИПОВОМ ОДОБРЕНИИ TYPE APPROVAL CERTIFICATE

Изготовитель Manufacturer

BITZER Kühlmaschinenbau GmbH

Адрес Address

Eschenbrünnlestrasse 15, 71065 Sindelfingen, Germany. (DE 812 161 588)

Изделие* Product*

> Водоохлаждаемые конденсаторы / охладители холодильного агента типа: Water-cooled refrigerant condensers / desuperheaters of types:

CK110805, K033N, K033NB, K073H, K073HB, K123H, K123HB, CK160911, CK160912, CK161115, CN160911, CN160912, CN161115, K203H, K203HB, K283H, K283HB, K373H, K373HB, K1053H, K1053HB, K1353T, K1353TB, K573H, K573HB, K813H, K813HB, K1973T, K1973TB, K2923T, K2923TB, K3803T, K3803TB, K4803T, K4803TB, K4803TBX1.

Код номенклатуры 12020100 Code of nomenclature

На основании освидетельствования и проведенных испытаний удостоверяется, что вышеупомянутое(ые) изделие(я) удовлетворяет(ют) требованиям Российского морского регистра судоходства. This is to certify that on the basis of the survey and tests carried out the above mentioned item(s) complies(ly) with the

requirements of Russian Maritime Register of Shipping. Часть XII "Холодильные установки "Правил классификации и постройки морских судов" (2018); Раздел 11 Части IV "Правил технического наблюдения за постройкой судов и изготовлением материалов и изделий для судов" (2018).

Part XII "Refrigerating plants" of "Rules for the Classification and construction of Sea-Going Ships" (2018); Section 11 of part IV of the "Rules for technical supervision during construction of ships and manufacture of materials and products for ships" (2018).

Настоящее Свидетельство о типовом одобрении действительно до 14.09.2023 This Type Approval Certificate is valid until

Настоящее Свидетельство о типовом одобрении теряет силу в случаях, установленных в Правилах технического наблюдения за постройкой судов и изготовлением материалов и изделий для судов.

This Type Approval Certificate becomes invalid in cases stipulated in Rules for the Technical Supervision during Construction of Ships and Manufacture rd Materials and Products.

14.09.2018 Date of issue

Дата выдачи

№ 18.40023.250

Российский морской регистр суд Russian Maritime Register of

Морозов В.В. / V.Morozov фамилия, инициалы

*Дополнительную информацин Additional information see overlea



Стр. Раде. 2/2

Технические данные Technical data

Холодильный агент: R 22, R134a Ном. давление (сторона холодильного агента): 28 бар Ном. давление (сторона воды): 10 бар Температура (сторона холодильного агента): от −10°C до 120°C Температура (сторона воды): от −10°C до 95°C

Refrigerant: R 22, R134a Nom. pressure (refrigerant side): 28 bar Nom. pressure (water side): 10 bar Temperature (refrigerant side): up -10°C to 120°C Temperature (water side): up -10°C to 95°C

Техническая документация и дата ее одобрения Российским морским регистром судоходства Technical documentation and the date of its approval by Russian Maritime Register of Shipping Техническая документация одобрена письмом № 250-А-400-253046 от 14.09.2018.

Technical documentation was approved by RS letter No. 250-A-400-253046 of 14.09.2018.

Образец изделия испытан под техническим наблюдением Российского морского регистра судоходства. Product's specimen has been tested under the technical supervision of Russian Maritime Register of Shipping.

 A_{KT} No. 18.60054.250 and the technical supervision of Russian M Report No. of $\frac{14.09.2018}{0}$

Область применения и ограничения Application and limitations Для судовых холодильных установок.

For ship's refrigerating plants.

Вид документа, выдаваемого на изделие Туре of document issued for product Изделие должно поставляться со Свидетельством Российского морского регистра судоходства по форме 6.5.30 или 6.5.31.



The product shall be delivered with Russian Maritime Register of Shipping Certificate in accordance with form 6.5.30 or 6.5.31.

06/2015

18.40023.250



Series: CXP, CRF, CXPM, CRM, McDEW, CXF

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documention is required. For supplied compressors it is not possible to deliver the required extended product documentation subsequently. Additional costs for extended product documentation will be charged.

РОССИЙСКИЙ МОРСКОЙ РЕГИСТР СУДОХОДСТВА RUSSIAN MARITIME REGISTER OF SHIPPING

1/2

6.8.3



СВИДЕТЕЛЬСТВО О ТИПОВОМ ОДОБРЕНИИ TYPE APPROVAL CERTIFICATE

Manufacturer

BITZER Kühlmaschinenbau GmbH (DE 812 161 588)

Адрес

Peter-Schaufler-Platz 1, D-71065 Sindelfingen, Germany

Излепие* Product*

> Refrigerant condensers (tube and shell heat exchangers) of type: Охладители холодильного агента (кожухотрубные) типа: CXP..., CRF..., CXPM..., CRM..., McDEW..., CXF....

Код номенклатуры 12020100 Code of nomenclature

На основании освидетельствования и проведенных испытаний удостоверяется, что вышеупомянутое(ые) изделие(я) удовлетворяет(ют) требованиям Российского морского регистра судоходства.

This is to certify that on the basis of the survey and tests carried out the above mentioned item(s) complies(ly) with the requirements of Russian Maritime Register of Shipping.

Часть XII "Холодильные установки "Правил классификации и постройки морских судов" (2021); Раздел 11 Части IV "Правил технического наблюдения за постройкой судов и изготовлением материалов и изделий для судов" (2021).
Part XII "Refrigerating plants" of "Rules for the Classification and Construction of Sea-Going Ships" (2021); Section 11 of Part IV of the "Rules for Technical Supervision during Construction of Ships and Manufacture of Materials and Products for Ships" (2021).

Настоящее Свидетельство о типовом одобрении действительно до 08.02.2026 This Type Approval Certificate is valid until

Настоящее Свидетельство о типовом одобрении теряет силу в случаях, установленных в Правилах технического наблюдения за постройкой судов и изготовлением материалов и изделий для судов.

This Type Approval Certificate becomes invalid in cases stipulated in Rules for the Technical Supervision during Construction of Ships and Manufacture of Shipboard Materials and Products.

Дата выдачи 08.02.2021 Date of issue

Российский морской регистр Russian Maritime Register of

Морозов В.В. / V.Morozov фамилия, инициалы)

*Дополнительную информ

No 21,40003,250



Стр. Page. 2/2

Технические данные

Technical data

Номинал. давление (сторона холодильного агента): до 3 МПа

Номинал. давление (сторона воды): до 1 МПа

Температура (сторона холодильного агента): от -10°C до 120°C

Температура (сторона воды): от -10°С до 120°С

Nominal pressure (refrigerant side): up to 3 MPa Nominal pressure (water side): up to 1 MPa Temperature (refrigerant side): from -10°C to 120°C Temperature (water side): from -10°C to 120°C

Холодильный агент:

Группа I - R134A, R404A, R407A, R407C, R407F, R410A, R448A, R449A, R450A, R452A, R507, R513A, R515B.
 Группа II - R717.

2. Группа II - R1234ze, R1234yf, R32, R452B, R454B, R454C, R455A - применение в судовых холодильных установках возможно только после специального согласования.

Refrigerant

1. Group I - R134A, R404A, R407A, R407C, R407F, R410A, R448A, R449A, R450A, R452A, R507, R513A, R515B. Group II - R717.

2. Group II - R1234ze, R1234yf, R32, R452B, R454B, R454C, R455A - apply in marine refrigeration units are possible only after special review.

Техническая документация и дата ее одобрения Российским морским регистром судоходства Technical documentation and the date of its approval by Russian Maritime Register of Shipping Техническая документация одобрена письмом № 250-A-400-446 от 05.01.2021.

Technical documentation was approved by RS letter No. 250-A-400-446 оf 05.01.2021.

Образец изделия испытан под техническим наблюдением Российского морского регистра судоходства. Product's specimen has been tested under the technical supervision of Russian Maritime Register of Shipping.

AKT № 21.60003.250

Report No.

от 08.02.2021

Область применения и ограничения

Application and limitations

Для судовых холодильных установок.

For ship's refrigerating plants.

Вид документа, выдаваемого на изделие

Type of document issued for product

- С Свидетельство (ф. 6.5.30) или
 СЗ Свидетельство (ф. 6.5.31) при наличии Свидетельства о соответствии системы контроля качества изготовителя (СКК 1)
- C Certificate (f. 6.5.30) or
- C3 Certificate (f. 6.5.31), if Manufacturer's Quality Control System Certificate (CKK 1) is available.



06/2015

21.40003.250



5.4.2 Liquid recievers



Series: F, FS

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documention is required. For supplied compressors it is not possible to deliver the required extended product documentation subsequently. Additional costs for extended product documentation will be charged.

РОССИЙСКИЙ МОРСКОЙ РЕГИСТР СУДОХОДСТВА RUSSIAN MARITIME REGISTER OF SHIPPING

1/2

6.8.3



СВИДЕТЕЛЬСТВО О ТИПОВОМ ОДОБРЕНИИ TYPE APPROVAL CERTIFICATE

Изготовитель Manufacturer

BITZER Kühlmaschinenbau GmbH

Адрес Address

Eschenbrünnlestrasse 15, 71065 Sindelfingen, Germany. (DE 812 161 588)

Излелие* Product*

Ресиверы холодильного агента типа: / Refrigerant receivers of types: F062H, FS32, FS33, FS35, FS3, GVT7209019, 3EGM060667R1, 3EGM065326, F102H, F152H, F182,F192T, FS102, FS152, FS48, FS52, FS53,

FS55, FS56, FS56Y, FS68, FS75, FS76, FS76Y, FS78, FS82, FS83, GVT1000692 R0002, GVT1900150, GVT1900165, YF1005, YF152H, YFS55, YFS75, F202H, F202HA, F252H, F302G, F302H, F302K, F312, F392T, F402H, F402HA, F552T, FS125, FS126, FS126Y, FS128, FS188, FS202, FS252, FS302, FS302K, FS402, GVT7109034, KS-20/216-630-V, R202, XFS100, YF190S, YF240S, YFS125, F1052G, F1052K, F1052T, F1052TA, F562G, F562K, F562N, F562NA, F732N, F902N, FS562, FS562K, FS732, FS902, FS902K, YF360S, YF581H, YF700S, F1202N, F1602G, F1602K, F1602N, F1602NA, FS1122, FS1602, FS1602K, YF1200N, F2202N, F3102N, F3102NA, FS2202, FS3102.

Код номенклатуры 12020700 Code of nomenclature

На основании освидетельствования и проведенных испытаний удостоверяется, что вышеупомянутое(ые) изделие(я) удовлетворяет(ют) требованиям Российского морского регистра судоходства. This is to certify that on the basis of the survey and tests carried out the above mentioned item(s) complies(ly) with the requirements of Russian Maritime Register of Shipping.

Часть XII "Холодильные установки "Правил классификации и постройки морских судов" (2018); Раздел 11 Части IV "Правил технического наблюдения за постройкой судов и изготовлением материалов и изделий для судов" (2018)

Part XII "Refrigerating plants" of "Rules for the Classification and construction of Sea-Going Ships" (2018); Section 11 of part IV of the "Rules for technical supervision during construction of ships and manufacture of materials and products for ships" (2018).

Настоящее Свидетельство о типовом одобрении действительно до 14.09.2023 This Type Approval Certificate is valid until

Настоящее Свидетельство о типовом одобрении теряет силу в случаях, установленных в Правилах технического наблюдения за постройкой судов и изготовлением материалов и изделий для судов.

This Type Approval Certificate becomes invalid in cases stipulated in Rules for the Technical Supervision during Construction of Ships and Manufacture of Sl ard Materials and Products.

Дата выдачи 14.09.2018 Date of issue Российский морской регистр

Russian Maritime Register of S

№ 18.40024.250

Морозов В.В. / V.Morozov фамилия, инициалы

*Дополнительную информаці

Additional information see overlead



Стр. Page. 2 / 2

Технические данные Technical data

Холодильный агент: R 22, R134a Макс. давление: 28 бар Макс. температура: 120°C

Refrigerant: R 22, R134a Max. pressure: 28 bar Max. temperature: 120°C

Техническая документация и дата ее одобрения Российским морским регистром судоходства Technical documentation and the date of its approval by Russian Maritime Register of Shipping Техническая документация одобрена письмом № 250-А-400-253046 от 14.09.2018.

 $Technical\ documentation\ was\ approved\ by\ RS\ letter\ No.\ 250-A-400-253046\ of\ 14.09.2018.$

Образец изделия испытан под техническим наблюдением Российского морского регистра судоходства. Product's specimen has been tested under the technical supervision of Russian Maritime Register of Shipping.

Art No. 18.60055.250 rested under the technical supervision of Russian M Report No. or $\frac{14.09.2018}{0}$

Область применения и ограничения Application and limitations Для судовых холодильных установок.

For ship's refrigerating plants.

Вид документа, выдаваемого на изделие

Type of document issued for product

Изделие должно поставляться со Свидетельством Российского морского регистра судоходства по форме 6.5.30 или 6.5.31.

The product shall be delivered with Russian Maritime Register of Shipping Certificate in accordance with form 6.5.30 or 6.5.31.



06/2015

18.40024.250



5.4.3 Oil separators



Series: OA(S)

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documention is required. For supplied compressors it is not possible to deliver the required extended product documentation subsequently. Additional costs for extended product documentation will be charged.

POCCUЙСКИЙ MOPCKOЙ PEГИСТР СУДОХОДСТВА RUSSIAN MARITIME REGISTER OF SHIPPING

Стр. 1/2

6.8.3



СВИДЕТЕЛЬСТВО О ТИПОВОМ ОДОБРЕНИИ TYPE APPROVAL CERTIFICATE

Изготовитель Manufacturer

BITZER Kühlmaschinenbau GmbH

Адрес Address

Eschenbrünnlestrasse 15, 71065 Sindelfingen, Germany. (DE 812 161 588)

Изделие*
Product*

Первичные и вторичные маслоотделители типа: OA1854,OA1854A, OA1854EX, OA4088, OA4088A, OA4088EX, OA9011, OA9011A, OA9011EX, OA1954, OA1954A, OA1954EX, OA4188, OA4188A, OA4188EX, OA9111, OA9111EX, OAS322, OAS1055, OAS1655, OAS744, OAS3088.

Primary and secondary oil separators of types: OA1854A, OA1854EX, OA4088, OA4088A, OA4088EX, OA9011, OA9011A, OA9011EX, OA1954, OA1954A, OA1954EX, OA4188A, OA4188EX, OA9111, OA9111EX, OAS322, OAS1055, OAS1655, OAS744, OAS3088.

Код номенклатуры Code of nomenclature 12020600

На основании освидетельствования и проведенных испытаний удостоверяется, что вышеупомянутое(ые) изделие(я) удовлетворяет(ют) требованиям Российского морского регистра судоходства. This is to certify that on the basis of the survey and tests carried out the above mentioned item(s) complies(ly) with the requirements of Russian Maritime Register of Shipping.

Часть XII "Холодильные установки "Правил классификации и постройки морских судов" (2018); Раздел 11 Части IV "Правил технического наблюдения за постройкой судов и изготовлением материалов и изделий для судов" (2018).

Part XII "Refrigerating plants" of "Rules for the Classification and construction of Sea-Going Ships" (2018); Section 11 of part IV of the "Rules for technical supervision during construction of ships and manufacture of materials and products for ships" (2018).

Настоящее Свидетельство о типовом одобрении действительно до 14.09.2023 This Type Approval Certificate is valid until

Настоящее Свидетельство о типовом одобрении теряет силу в случаях, установленных в Правилах технического наблюдения за постройкой судов и изготовлением материалов и изделий для судов.

This Type Approval Certificate becomes invalid in cases stipulated in Rules for the Technical Supervision during Construction of Ships and Manufacture of Ships and Products.

Дата выдачи Date of issue

14.09.2018

№ 18.40022.250

Российский морской регистр судоходства Russian Maritime Register of Shinning

Морозов В.В. / V.Morozov

пате (фамилия, инициал пате

*Дополнительную информацию смо Additional information see overleaf.



Стр. Page. 2/2

Технические данные Technical data

Холодильный агент: R 22, R134a Ном. давление: 28 бар Температура: до 120°C

Refrigerant: R 22, R134a Nom. pressure: 28 bar Temperature: up to 120°C

Техническая документация и дата ее одобрения Российским морским регистром судоходства Technical documentation and the date of its approval by Russian Maritime Register of Shipping Техническая документация одобрена письмом № 250-А-400-253046 от 14.09.2018.

Technical documentation was approved by RS letter No. 250-A-400-253046 of 14.09.2018.

Образец изделия испытан под техническим наблюдением Российского морского регистра судоходства. Product's specimen has been tested under the technical supervision of Russian Maritime Register of Shipping. of 14.09.2018

AKT № 18.60053.250

Report No.

Область применения и ограничения Application and limitations
Для судовых холодильных установок.

For ship's refrigerating plants.

Вид документа, выдаваемого на изделие Type of document issued for product

Изделие должно поставляться со Свидетельством Российского морского регистра судоходства по форме 6.5.30 или 6.5.31.

The product shall be delivered with Russian Maritime Register of Shipping Certificate in accordance with form 6.5.30 or 6.5.31.



06/2015

18.40022.250



5.4.4 Oil coolers



Series: OW

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documention is required. For supplied compressors it is not possible to deliver the required extended product documentation subsequently. Additional costs for extended product documentation will be charged.

POCCUЙСКИЙ MOPCKOЙ PEГИСТР СУДОХОДСТВА RUSSIAN MARITIME REGISTER OF SHIPPING

Стр. Page. 1/2

6.8.3



СВИДЕТЕЛЬСТВО О ТИПОВОМ ОДОБРЕНИИ TYPE APPROVAL CERTIFICATE

Изготовитель Manufacturer

BITZER Kühlmaschinenbau GmbH

Адрес Address

Eschenbrünnlestrasse 15, 71065 Sindelfingen, Germany. (DE 812 161 588)

Изделие* Product*

> Водоохлаждаемые маслоохладители типа: OW401, OW401B, OW501, OW501B, OW781, OW781B, OW941, OW941B.

> Water cooled oil coolers of types: OW401, OW401B, OW501, OW501B, OW781, OW781B, OW941, OW941B.

Код номенклатуры 12020000 Code of nomenclature

На основании освидетельствования и проведенных испытаний удостоверяется, что вышеупомянутое(ые) изделие(я) удовлетворяет(ют) требованиям Российского морского регистра судоходства. This is to certify that on the basis of the survey and tests carried out the above mentioned item(s) complies(ly) with the requirements of Russian Maritime Register of Shipping.

Часть XII "Холодильные установки "Правил классификации и постройки морских судов" (2018); Раздел 11 Части IV "Правил технического наблюдения за постройкой судов и изготовлением материалов и изделий для судов" (2018).

Part XII "Refrigerating plants" of "Rules for the Classification and construction of Sea-Going Ships" (2018); Section 11 of part IV of the "Rules for technical supervision during construction of ships and manufacture of materials and products for ships" (2018).

Настоящее Свидетельство о типовом одобрении действительно до 14.09.2023 This Type Approval Certificate is valid until

Настоящее Свидетельство о типовом одобрении теряет силу в случаях, установленных в Правилах технического наблюдения за постройкой судов и изготовлением материалов и изделий для судов.

This Type Approval Certificate becomes invalid in cases stipulated in Rules for the Technical Supervision during Construction of Ships and Manufacture of Ships and Products.

Дата выдачи Date of issue

14.09.2018

№ 18.40025.250

Российский морской регистр судоходства Russian Maritime Register of Shipping 50

Морозов В.В. / V.Могоzov

*Дополнительную информацию смотры на обороте.
Additional information see overleaf.

aritime Register of Shipping (фамилия, инициалы) (м. Н. Себрицев) (фамилия, инициалы) пате



Стр. Page. 2/2

Технические данные Technical data

Макс. давление (сторона масла): 28 бар Макс. давление (сторона воды): 10 бар Макс. температура (сторона масла): до 120°C Макс. температура (сторона воды): до 95°C

Max. pressure (oil side): 28 bar Max. pressure (water side): 10 bar Max. temperature (oil side): up to 120°C Max.temperature (water side): up to 95°C

Техническая документация и дата ее одобрения Российским морским регистром судоходства Technical documentation and the date of its approval by Russian Maritime Register of Shipping Техническая документация одобрена письмом № 250-А-400-253046 от 14.09.2018.

Technical documentation was approved by RS letter No. 250-A-400-253046 of 14.09.2018.

Образец изделия испытан под техническим наблюдением Российского морского регистра судоходства. Product's specimen has been tested under the technical supervision of Russian Maritime Register of Shipping.

Art No. 18.60056.250 and of Russian M Report No. of $\frac{14.09.2018}{16.00056.250}$

Область применения и ограничения Application and limitations Для судовых холодильных установок.

For ship's refrigerating plants.

Вид документа, выдаваемого на изделие

Type of document issued for product

Изделие должно поставляться со Свидетельством Российского морского регистра судоходства по форме 6.5.30 или 6.5.31.

The product shall be delivered with Russian Maritime Register of Shipping Certificate in accordance with form 6.5.30 or 6.5.31.



06/2015

18.40025.250



6 Document as PDF

Related documents

AU-100-8.pdf (Resources/pdf/72057594357900811.pdf)