

AU-100-9

Approval Certificates for BITZER compressors, expanders and pressure vessels

English..... 2

PDF Download // 05.2025

Subject to change

BITZER Kühlmaschinenbau GmbH
Peter-Schaufler-Platz 1 // 71065 Sindelfingen // Germany
Tel +49 7031 932-0 // Fax +49 7031 932-147
bitzer@bitzer.de // www.bitzer.de

Inhaltsverzeichnis

1 Compressor and expander selection	4
1.1 DNV•GL.....	4
1.2 RINA Type Approvals.....	5
1.3 Russian Maritime Register of shipping.....	5
2 Screw compressors	6
2.1 DNV.....	6
2.1.1 Semi-hermetic compact screw compressors	6
2.1.2 Semi-hermetic screw compressors	16
2.1.3 Open drive screw compressors	27
2.2 RINA Type Approvals.....	36
2.2.1 Semi-hermetic compact screw compressors	36
2.3 Russian Maritime Register of shipping.....	40
2.3.1 Semi-hermetic compact screw compressors	40
2.3.2 Semi-hermetic screw compressors	43
2.3.3 Open drive screw compressors	46
3 Expanders	49
3.1 DNV.....	49
3.1.1 Semi-hermetic screw expanders.....	49
3.2 RINA Type Approvals.....	52
3.2.1 Semi-hermetic screw expanders.....	52
4 Reciprocating compressors	54
4.1 DNV.....	54
4.1.1 Semi-hermetic reciprocating compressors.....	54
4.1.2 R744 semi-hermetic reciprocating compressors.....	75
4.1.3 Open drive reciprocating compressors	92
4.2 Russian Maritime Register of shipping.....	101
4.2.1 Semi-hermetic reciprocating compressors.....	101
4.2.2 Open drive reciprocating compressors	104
5 Pressure vessels	106
5.1 DNV.....	106
5.1.1 Oil separators.....	107
5.1.2 Heat exchangers.....	110
5.1.3 Liquid receivers.....	112
5.1.4 Condensers.....	115
5.2 Bureau Vertias	119
5.2.1 Condensers.....	119
5.2.2 Liquid receivers	123
5.2.3 Oil separators.....	127
5.2.4 Oil coolers	131
5.3 ABS	135
5.3.1 Heat Exchanger	135
5.4 Russian Maritime Register of shipping.....	137
5.4.1 Condensers.....	137
5.4.2 Liquid receivers	142
5.4.3 Oil separators.....	145
5.4.4 Oil coolers	148

6 Document as PDF.....	151
------------------------	-----

1 Compressor and expander selection

1.1 DNV•GL

see chapter CS.65, page 7	see chapter CS.75, page 9	see chapter CS.85, page 11	see chapter CS.95, page 13	see chapter HS.53, page 17	see chapter HS.64, page 19
see chapter HS.74, page 21	see chapter HS.85, page 23	see chapter HS.95, page 25	see chapter OS.53, page 28	see chapter OS.74, page 30	see chapter OS.85, page 32
see chapter OS.95, page 34					

Tab. 1: Compressor selection screw compressors

see chapter HSE.95, page 50					
---	--	--	--	--	--

Tab. 2: Expanders

see chapter 2KES, page 55	see chapter 2JES, page 55	see chapter 2HES, page 55	see chapter 2GES, page 55	see chapter 2FES, page 55	see chapter 2EES, page 57
see chapter 2DES, page 57	see chapter 2CES, page 57	see chapter 4FES, page 59	see chapter 4EES, page 59	see chapter 4DES, page 59	see chapter 4CES, page 59
see chapter 4VE, page 63	see chapter 4TE, page 63	see chapter 4PE, page 63	see chapter 4NE, page 63	see chapter 4JE, page 65	see chapter 4HE, page 65
see chapter 4GE, page 65	see chapter 4FE, page 65	see chapter 6JE, page 67	see chapter 6HE, page 67	see chapter 6GE, page 67	see chapter 6FE, page 67
see chapter 4N, page 69	see chapter 4T, page 71	see chapter 4P, page 71	see chapter 4V, page 73	see chapter 4Z, page 73	

Tab. 3: Compressor selection semi-hermetic reciprocating compressors

see chapter 4JTEM(U), page 78	see chapter 4HTEM(U), page 78	see chapter 4GTEM(U), page 78	see chapter 4DTEM(U), page 78	see chapter 4CTEM(U), page 78	see chapter 6FTEM(U), page 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, page 93	see chapter 2N, page 93	see chapter 4T, page 95	see chapter 4P, page 95	see chapter 4N, page 95	see chapter 4H, 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

<i>see chapter CS.65, page 36</i>	<i>see chapter CS.75, page 36</i>	<i>see chapter CS.85, page 36</i>	<i>see chapter CS.95, page 36</i>		
-----------------------------------	-----------------------------------	-----------------------------------	-----------------------------------	--	--

Tab. 6: Compressor selection screw compressors

<i>see chapter HSE.64, page 52</i>	<i>see chapter HSE.85, page 52</i>	<i>see chapter HSE.95, page 52</i>			
------------------------------------	------------------------------------	------------------------------------	--	--	--

Tab. 7: Expanders

1.3 Russian Maritime Register of shipping

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

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

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

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

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

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 documentation 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:
TAM00000W6
Revision No:
2

This is to certify:

That the Refrigerant Compressor

with type designation(s)
CS.65

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 press.: 28 bar

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**

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 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

Revision: 2021-03

www.dnv.com

Page 1 of 2



Job Id: 262.1-022526-5
 Certificate No: TAM00000W6
 Revision No: 2

Product description

Semi-Hermetic Compact Screw Compressor

CSH High condensing:

CSH6553-35
 CSH6553-50
 CSH6563-40
 CSH6563-60
 CSH6583-50
 CSH6593-60

CSW Low condensing:

CSW6583-40
 CSW6583-50
 CSW6593-50
 CSW6593-60

Casing Material:

EN-GJL-250

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://approvafinder.dnv.com>

Type Approval Certificate for CS.75

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documentation 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:
TAM00000W7
Revision No:
3

This is to certify:

That the Refrigerant Compressor

with type designation(s)
CS.75

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 press.: 28 bar

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**

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 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

Revision: 2021-03

www.dnv.com

Page 1 of 2



Job Id: 262.1-022525-6
 Certificate No: TAM00000W7
 Revision No: 3

Product description

Semi-Hermetic Compact Screw Compressor

CSH High condensing:

CSH7553-50
 CSH7553-70
 CSH7563-60
 CSH7563-80
 CSH7573-70
 CSH7573-90
 CSH7583-80
 CSH7583-90
 CSH7583-100
 CSH7593-90
 CSH7593-100
 CSH7593-110

CSW Low condensing:

CSW7573-60
 CSW7573-70
 CSW7583-70
 CSW7583-80
 CSW7593-80
 CSW7583-90

Casing Material:

Screw Rotor Material:

Oil Separator Material:

EN-GJL-250

EN-GJS-600-3, EN-GJS-500-7

EN-GJS-400-3 (only female rotor)

EN-GJS-400-18-RT

Usable Refrigerants

HFC-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>

Type Approval Certificate for CS.85

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documentation 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:
TAM00000W8
Revision No:
3

This is to certify:

That the Refrigerant Compressor

with type designation(s)
CS.85

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 press.: 28 bar

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**

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 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

Revision: 2021-03

www.dnv.com

Page 1 of 2



Job Id: 262.1-022524-6
 Certificate No: TAM00000W8
 Revision No: 3

Product description

Semi-Hermetic Compact Screw Compressor

CSH High condensing:

CSH8553-110
 CSH8553-80
 CSH8563-125
 CSH8563-90
 CSH8573-110
 CSH8573-140
 CSH8583-125
 CSH8593-140
 CSH8583-160
 CSH8593-160
 CSH8583-140
 CSH8593-180

CSW Low condensing:

CSW8573-90
 CSW8583-110
 CSW8593-125
 CSW8573-110
 CSW8583-125
 CSW8593-140

Casing Material:

Screw Rotor Material:

Oil Separator Material:

EN-GJL-250

EN-GJS-600-3, EN-GJS-500-7

EN-GJS-400-3 (only female rotor)

EN-GJS-400-18-RT

Usable Refrigerants

HFC-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>

Type Approval Certificate for CS.95

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documentation 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:
TAM00000W9
Revision No:
3

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 press.: 28 bar

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**

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 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

Revision: 2021-03

www.dnv.com

Page 1 of 3



Job Id: 262.1-022523-6
 Certificate No: TAM00000W9
 Revision No: 3

Product description

Semi-Hermetic Compact Screw Compressor

CSH High condensing:

CSH9553-180
 CSH9563-160
 CSH9563-210
 CSH9573-180
 CSH9573-240
 CSH9583-210
 CSH9583-280
 CSH9593-240
 CSH9593-300
 CSH95103-280
 CSH95103-320
 CSH95113-320

CSW Low condensing:

CSW9553-140
 CSW9563-140
 CSW9563-160
 CSW9573-160
 CSW9573-180
 CSW9583-180
 CSW9583-210
 CSW9593-210
 CSW9593-240
 CSW95103-240
 CSW95103-280
 CSW95113-280
 CSW95113-320

Casing Material:

Screw Rotor Material:

Oil Separator Material:

EN-GJL-250
 EN-GJS-600-3, EN-GJS-500-7
 EN-GJS-400-3 (only female rotor)
 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.



Job Id: 262.1-022523-6
Certificate No: TAM00000W9
Revision No: 3

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>

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 documentation 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:
TAM00000H1
Revision No:
3

This is to certify:

That the Refrigerant Compressor

with type designation(s)
HS53

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 press.: 28 bar

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**

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 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

Revision: 2021-03

www.dnv.com

Page 1 of 2



Job Id: 262.1-025034-4
 Certificate No: TAM00000H1
 Revision No: 3

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

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>

Type Approval Certificate for HS.64

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documentation 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:
TAM00000H0
Revision No:
3

This is to certify:

That the Refrigerant Compressor

with type designation(s)
HS64

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 press.: 28 bar

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**

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 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

Revision: 2021-03

www.dnv.com

Page 1 of 2



Job Id: 262.1-025033-4
 Certificate No: TAM00000H0
 Revision No: 3

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>

Type Approval Certificate for HS.74

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documentation 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:
TAM00000GZ
Revision No:
3

This is to certify:

That the Refrigerant Compressor

with type designation(s)
HS74

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 press.: 28 bar

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**

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 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

Revision: 2021-03

www.dnv.com

Page 1 of 2



Job Id: 262.1-025032-4
 Certificate No: TAM00000GZ
 Revision No: 3

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

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>

Type Approval Certificate for HS.85

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documentation 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:
TAM00000GY
Revision No:
3

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 press.: 28 bar

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**

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 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

Revision: 2021-03

www.dnv.com

Page 1 of 2



Job Id: 262.1-025031-4
 Certificate No: TAM00000GY
 Revision No: 3

Product description

Semi-Hermetic Screw Compressor HS85
Semi-Hermetic Screw Expander HS85

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.
 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>

Type Approval Certificate for HS.95

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documentation 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**

Issued to

**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.

Type	Max. working press.:	Operating media
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**

for **DNV GL**

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

www.dnvgl.com

Page 1 of 2

© DNV GL 2014. DNV GL and the Horizon Graphic are trademarks of DNV GL AS.

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.

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 documentation 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:
TAM00000GX
Revision No:
3

This is to certify:

That the Refrigerant Compressor

with type designation(s)
OS53

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 HCFC-refrigerants, HFC-single component refrigerants, HFC-refrigerant blends, HFO-refrigerants, HFO/HFC refrigerant blends, Inorganic Compound, see page 2

media

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 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

Revision: 2021-03

www.dnv.com

Page 1 of 2



Job Id: 262.1-025030-4
 Certificate No: TAM00000GX
 Revision No: 3

Product description

Open Drive Screw Compressor OS53

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>

Type Approval Certificate for OS.74

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documentation 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:
TAM00000GV
Revision No:
3

This is to certify:

That the Refrigerant Compressor

with type designation(s)
OS74

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 HCFC-refrigerants, HFC-single component refrigerants, HFC-refrigerant blends, HFO-refrigerants, HFO/HFC refrigerant blends, Inorganic Compound, see page 2

media

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 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

Revision: 2021-03

www.dnv.com

Page 1 of 2



Job Id: 262.1-025028-4
 Certificate No: TAM00000GV
 Revision No: 3

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>

Type Approval Certificate for OS.85

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documentation 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:
TAM00000GW
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 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-refrigerants, HFO/HFC refrigerant blends, Inorganic Compound, see page 2

media

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 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

Revision: 2021-03

www.dnv.com

Page 1 of 2



Job Id: 262.1-025029-5
 Certificate No: TAM00000GW
 Revision No: 4

Product description

Open Drive Screw Compressor OS85

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-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.

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>

Type Approval Certificate for OS.95

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documentation 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:
TAM00000JY
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 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-refrigerants, HFO/HFC refrigerant blends, Inorganic Compound, see page 2

media

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 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

Revision: 2021-03

www.dnv.com

Page 1 of 2



Job Id: 262.1-025999-3
 Certificate No: TAM00000JY
 Revision No: 2

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>

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 documentation 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.

<i>Description</i>	Refrigerant Compressors
<i>Type</i>	Screw compressor CSH-type
<i>Applicant</i>	BITZER Kühlmaschinenbau GmbH
	Peter-Schaufler-Platz 1
	71065 Sindelfingen
	GERMANY
<i>Manufacturer</i>	BITZER Kühlmaschinenbau GmbH
<i>Place of manufacture</i>	Peter-Schaufler-Platz 1
	71065 Sindelfingen
	GERMANY
<i>Reference standards</i>	Part C, Chapter 1, Section 13 of RINA Rules
<i>Reference documents</i>	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 through the rotor bores and across the stator windings.

Technical 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 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
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 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
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 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
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 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

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 documentation 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		Стр. 1 / 2
RUSSIAN MARITIME REGISTER OF SHIPPING		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 Code of nomenclature	12010110	
<p>На основании освидетельствования и проведенных испытаний удостоверяется, что вышеупомянутое(ые) изделие(я) удовлетворяет(ют) требованиям Российского морского регистра судоходства.</p> <p>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.</p> <p>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).</p> <p>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).</p>		
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	№ 18.40021.250
Российский морской регистр судоходства Russian Maritime Register of Shipping		Морозов В.В. / V. Morozov (фамилия, инициалы) name
		
*Дополнительную информацию см. на обороте. Additional information see overleaf.		

Стр. 2 / 2
Page.

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-A-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.

Акт № 18.60052.250 от 14.09.2018
Report No. of

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 documentation 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. 1 / 2 Page. 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	
<p>На основании освидетельствования и проведенных испытаний удостоверяется, что вышеупомянутое(ые) изделие(я) удовлетворяет(ют) требованиям Российского морского регистра судоходства.</p> <p>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.</p> <p>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).</p> <p>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).</p>		
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	№ 18.40019.250
Российский морской регистр судоходства Russian Maritime Register of Shipping		Морозов В.В. / V. Morozov (фамилия, инициалы) name
		
*Дополнительную информацию смотри на обороте. Additional information see overleaf.		

Стр. 2 / 2
Page.

Технические данные
Technical data

Холодильный агент: R 22, R134a
Теоретический объем 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-A-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.

Акт № 18.60050.250 от 14.09.2018
Report No. of

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

18.40019.250

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 documentation 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. 1 / 2 Page.
		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: OS53, OS74, OS85, OS95. Screw Refrigerant Compressors of types: OS53, OS74, OS85, OS95.	
Код номенклатуры Code of nomenclature	12010110	
<p>На основании освидетельствования и проведенных испытаний удостоверяется, что вышеупомянутое(ые) изделие(я) удовлетворяет(ют) требованиям Российского морского регистра судоходства.</p> <p>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.</p> <p>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).</p> <p>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).</p>		
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 судоходства Russian Maritime Register of Shipping		Морозов В.В. / V. Morozov (фамилия, инициалы name
*Дополнительную информацию см. на обороте. Additional information see overleaf.		

Стр. 2 / 2
Page.

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-A-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.

Акт № 18.60051.250 от 14.09.2018
Report No. of

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

18.40020.250

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 documentation 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**

Issued to

**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.

Type	Max. working press.:	Operating media
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**

for **DNV GL**

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

www.dnvgl.com

Page 1 of 2

© DNV GL 2014. DNV GL and the Horizon Graphic are trademarks of DNV GL AS.

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.

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 documentation 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.

<i>Description</i>	Screw Expanders
<i>Type</i>	HSE 64, 85 and 95
<i>Applicant</i>	BITZER Kühlmaschinenbau GmbH
	Peter-Schaufler-Platz 1
	71065 Sindelfingen
	GERMANY
<i>Manufacturer</i>	BITZER Kühlmaschinenbau GmbH
<i>Place of manufacture</i>	Peter-Schaufler-Platz 1
	71065 Sindelfingen
	GERMANY
<i>Reference standards</i>	Part C, Chapter 1, Section 3 of RINA Rules
<i>Reference documents</i>	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 - 16128 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 documentation 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:
TAM00000GU
Revision No:
1

This is to certify:

That the Refrigerant Compressor

with type designation(s)
2KES; 2JES; 2HES; 2GES; 2FES / CE1 Ecoline

Issued to

Bitzer Kühlmaschinenbau Schkeuditz GmbH
Schkeuditz, Germany

is found to comply with

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-refrigerants, HFO/HFC refrigerant blends, see page 2

Issued at **Hamburg** on **2022-09-06**

This Certificate is valid until **2027-09-05**.

DNV local station: **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.



Form code: TA 251

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:

Type	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>

Approval Certificate for CE2

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documentation 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:
TAM00000GE
Revision No:
1

This is to certify:

That the Refrigerant Compressor

with type designation(s)
2EES; 2DES; 2CES / CE2 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 press.: 32 bar

Operating media HCFC-refrigerants, HFC-single component refrigerants, HFC-refrigerant blends, HFO-refrigerants, HFO/HFC refrigerant blends, see page 2

Issued at **Hamburg** on **2022-09-06**

This Certificate is valid until **2027-09-05**.

DNV local station: **Magdeburg**

for **DNV**

Approval Engineer: **Christian Kaemmer**

Sven Klingner
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.



Form code: TA 251

Revision: 2021-03

www.dnv.com

Page 1 of 2



Job Id: 262.1-025381-2
 Certificate No: TAM00000GE
 Revision No: 1

Product description

Semi-Hermetic Reciprocating Compressor

CE2 Ecoline:

Type	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 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>

Approval Certificate for CE3

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documentation 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:
TAM00000WN
Revision No:
1

This is to certify:

That the Refrigerant Compressor

with type designation(s)
4FES; 4EES; 4DES; 4CES / CE3 Ecoline

Issued to

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.

Max. working press.: 32 bar

Operating media HCFC-refrigerants, HFC-single component refrigerants, HFC-refrigerant blends, HFO-refrigerants, HFO/HFC refrigerant blends, see page 2

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.



Form code: TA 251

Revision: 2022-12

www.dnv.com

Page 1 of 2



Job Id: 262.1-028930-2
 Certificate No: TAM00000WN
 Revision No: 1

Product description

Semi-Hermetic Refrigerant Compressor, reciprocating.

Type	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>



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, HFO-refrigerants, HFO/HFC refrigerant blends, see page 2

Issued at **Hamburg** on **2023-10-30**

This Certificate is valid until **2028-10-29**.

DNV local unit: **Hamburg – CMC North/East**

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.



Form code: TA 251

Revision: 2022-12

www.dnv.com

Page 1 of 2



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

Product description

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

Type	4BES
Displacement [m ³ /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>

Approval Certificate for CE4

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documentation 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:
TAM00000GG
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 press.: 32 bar

Operating media HCFC-refrigerants, HFC-single component refrigerants, HFC-refrigerant blends, HFO-refrigerants, HFO/HFC refrigerant blends, see page 2

Issued at **Hamburg** on **2022-09-06**

This Certificate is valid until **2027-09-05**.

DNV local station: **Magdeburg**

for DNV

Approval Engineer: **Christian Kaemmer**

Sven Klingner
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.



Form code: TA 251

Revision: 2021-03

www.dnv.com

Page 1 of 2



Job Id: 262.1-025383-2
 Certificate No: TAM00000GG
 Revision No: 1

Product description

Semi-Hermetic Reciprocating Compressor

CE4 Ecoline:

Type	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>

Approval Certificate for BE5

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documentation 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:
TAM00000WM
Revision No:
1

This is to certify:

That the Refrigerant Compressor

with type designation(s)
4JE; 4HE; 4GE; 4FE / BE5 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 press.: 32 bar

Operating media HCFC-refrigerants, HFC-single component refrigerants, HFC-refrigerant blends, HFO-refrigerants, HFO/HFC refrigerant blends, see page 2

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.



Form code: TA 251

Revision: 2022-12

www.dnv.com

Page 1 of 2



Job Id: 262.1-028927-2
 Certificate No: TAM00000WM
 Revision No: 1

Product description

Semi-Hermetic Refrigerant Compressor, reciprocating.

Type	4JE	4HE	4GE	4FE
Displacement [m ³ /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>

Approval Certificate for BE6

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documentation 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:
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 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.: 32 bar

Operating media HCFC-refrigerants, HFC-single component refrigerants, HFC-refrigerant blends, HFO-refrigerants, HFO/HFC refrigerant blends, see page 2

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.



Form code: TA 251

Revision: 2022-12

www.dnv.com

Page 1 of 2



Job Id: 262.1-028926-2
 Certificate No: TAM00000WT
 Revision No: 1

Product description

Semi-Hermetic Refrigerant Compressor, reciprocating.

Type	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

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>

Approval Certificate for B4 (4N)

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documentation 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

Issued to

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

Issued at **Hamburg** on **2020-08-11**

This Certificate is valid until **2025-08-10**.

DNV GL local station: **Magdeburg**

for **DNV GL**

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

www.dnvgl.com

Page 1 of 2

© DNV GL 2014. DNV GL and the Horizon Graphic are trademarks of DNV GL AS.

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

Product description

Refrigerant Compressor, reciprocating, semi-hermetic, belt driven

Type	4N-12.2	4N-20.2
Displacement [m ³ /h] @ 1450 [1/min]	56,1	56,1

Material:

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

Approval Certificate for B4 (4P and 4T)

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documentation 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

Issued to

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	Max. working press.:	Operating media
4T-8.2	28 bar	39,4 m3/h
4T-12.2	28 bar	39,4 m3/h
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**.

DNV GL local station: **Magdeburg**

for **DNV GL**

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

www.dnvgl.com

Page 1 of 2

© DNV GL 2014. DNV GL and the Horizon Graphic are trademarks of DNV GL AS.

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

Product description

Refrigerant Compressor, reciprocating, semi-hermetic, belt driven

Type	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:

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

Approval Certificate for B4 (4V and 4Z)

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documentation 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

Issued to

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	Max. working press.:	Operating media
4Z-5.2	28 bar	28,1
4Z-8.2	28 bar	28,1
4V-6.2	28 bar	33,1
4V-10.2	28 bar	33,1

Issued at **Hamburg** on **2020-08-11**

This Certificate is valid until **2025-08-10**.

DNV GL local station: **Magdeburg**

for **DNV GL**

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

www.dnvgl.com

Page 1 of 2

© DNV GL 2014. DNV GL and the Horizon Graphic are trademarks of DNV GL AS.

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

Product description

Refrigerant Compressor, reciprocating, semi-hermetic, belt driven

Type	4Z-5.2	4Z-8.2	4V-6.2	4V-10.2
Displacement [m ³ /h] @ 1450 [1/min]	28,1	28,1	33,1	33,1

Material:

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

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 documentation 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(+)

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 press.: 160 bar / 100 bar
Operating media: CO₂ / 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

Revision: 2023-09

www.dnv.com

Page 1 of 2



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 CO₂ applications.

CKHE3M(+)		4MTEM(U)-7(L)	4MTEM(U)-10(L)	4KTEM(U)-10(L)	4KTEM-12
Displacement [m ³ /h] @ 1450 1/min (@ 1500 1/min)	50 Hz	6,6 (6,9)	6,6 (6,9)	9,6 (9,9)	9,6
Displacement [m ³ /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 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>

Approval Certificate for CKHE4M(+)

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documentation 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.:
TAM00001C3
Revision No:
1

This is to certify:

that the Refrigerant Compressor

with type designation(s)
CKHE4M

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 press.: 160 bar / 100 bar
Operating media CO2 /R744

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**

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

Revision: 2023-09

www.dnv.com

Page 1 of 2



Job ID: 262.1-040604-2
 Certificate no.: TAM00001C3
 Revision No: 1

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)-20(L), 4FTEM(U)-30(L), 4DTEM(U)-25(L), 4CTEM(U)-30(L) for transcritical CO₂ applications.

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] @ 1450 1 /min @ 1500 1 /min	9,3 (9,7)	12,0 (12,4)	15,0 (16,0)	17,5 (18,1)	22,0 (22,7)	26,0 (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.

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>

Approval Certificate for CKHE5M(+)

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documentation 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:
TAM00001BN
Revision No:
2

This is to certify:

That the Refrigerant Compressor

with type designation(s)
CKHE5M

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 press.: 160 bar / 100 bar
Operating media CO2 / R744

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

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

Revision: 2022-12

www.dnv.com

Page 1 of 2



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 CO₂ applications.

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

Approval Certificate for CKHE7

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documentation 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.:
TAM00001DV

This is to certify:

that the Refrigerant Compressor

with type designation(s)
CKHE7

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 press.: 150 bar / 80 bar

Operating media: CO₂ / 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

Revision: 2023-09

www.dnv.com

Page 1 of 2



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 CO₂ applications.

CKHE7		8FTE-100	8FTE-140	8DTE-120	8DTE-140	8CTE-140
Displacement [m ³ /h] @ 1450 1 /min	50 Hz	69,4	69,4	82,0	82,0	99,2
Displacement [m ³ /h] @ 1750 1 /min	60 Hz	83,8	83,8	99,0	99,0	119,7

Cast 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>

Approval Certificate for CME3M

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documentation 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.:
TAM00001DT

This is to certify:

that the Refrigerant Compressor

with type designation(s)
CME3M

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 press.: 100 bar / 100 bar
Operating media: CO₂ / 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

Revision: 2023-09

www.dnv.com

Page 1 of 2



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 CO₂ applications.

CME3M		4FMEM-7	4FMEM-9	4EMEM-9	4EMEM-10	4DMEM10
Displacement [m ³ /h] @ 1450 1 /min	50 Hz	12,4	12,4	15,6	15,6	18,4
Displacement [m ³ /h] @ 1750 1 /min	60 Hz	15,0	15,0	18,8	18,8	22,3

Casting 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>

Approval Certificate for CME4M

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documentation 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.:
TAM00001BR
Revision No:
1

This is to certify:

that the Refrigerant Compressor

with type designation(s)
CME4M

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 press.: 100 bar / 100 bar
Operating media CO2 / R744

Issued at **Hamburg** on **2024-03-01**

This Certificate is valid until **2028-11-02**.

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 300,000 USD.



Form code: TA 251

Revision: 2023-09

www.dnv.com

Page 1 of 2



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 [m ³ /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>

Approval Certificate for CME5M

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documentation 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.:
TAM00001DX

This is to certify:

that the Refrigerant Compressor

with type designation(s)
CME5M

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 press.: 100 bar / 100 bar
Operating media: CO₂ / 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

Revision: 2023-09

www.dnv.com

Page 1 of 2



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 6TME5-50; 6PME5-40 and 6PME5-50 for subcritical CO₂ applications.

CME5M		6TME5-50	6PME5-40	6PME5-50
Displacement [m ³ /h] @ 1450 1 /min	50 Hz	54,6	64,9	64,9
Displacement [m ³ /h] @ 1750 1 /min	60 Hz	65,9	78,4	78,4

Casting 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>

Approval Certificate for CME7

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documentation 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.:
TAM00001DU

This is to certify:

that the Refrigerant Compressor

with type designation(s)
CME7

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 press.: 80 bar / 80 bar

Operating media: CO₂ / 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

Revision: 2023-09

www.dnv.com

Page 1 of 2



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 CO₂ applications.

CME7		8VME-100	8VME-120	8TME-100	8TME-140	8PME-140
Displacement [m ³ /h] @ 1450 1 /min	50 Hz	138,6	138,6	160,7	160,7	199,5
Displacement [m ³ /h] @ 1750 1 /min	60 Hz	167,2	167,2	194,0	194,0	240,8

Cast 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>

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 documentation 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:
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 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.: 28 bar

Operating media HCFC-refrigerants, HFC-single component refrigerants, HFC-refrigerant blends, HFO-refrigerants, HFO/HFC refrigerant blends, see page 2

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.



Form code: TA 251

Revision: 2022-12

www.dnv.com

Page 1 of 2



Job Id: 262.1-028929-3
 Certificate No: TAM00000WS
 Revision No: 2

Product description

Refrigerant Compressor, reciprocating, open type, belt driven

Type	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

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>

Approval Certificate for B04

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documentation 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:
TAM00000WJ
Revision No:
1

This is to certify:

That the Refrigerant Compressor

with type designation(s)
4T.2; 4P.2; 4N.2; / B04

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 press.: **28 bar**

Operating media **HCFC-refrigerants, HFC-single component refrigerants, HFC-refrigerant blends, HFO-refrigerants, HFO/HFC refrigerant blends, see page 2**

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.



Form code: TA 251

Revision: 2022-12

www.dnv.com

Page 1 of 2



Job Id: 262.1-028925-2
 Certificate No: TAM00000WJ
 Revision No: 1

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

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>

Approval Certificate for B05

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documentation 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:
TAM00000WR
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 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.: **28 bar**

Operating media **HCFC-refrigerants, HFC-single component refrigerants, HFC-refrigerant blends, HFO-refrigerants, HFO/HFC refrigerant blends, see page 2**

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.



Form code: TA 251

Revision: 2022-12

www.dnv.com

Page 1 of 2



Job Id: 262.1-028924-2
 Certificate No: TAM00000WR
 Revision No: 1

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

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>

Approval Certificate for B06

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documentation 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:
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 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.: **28 bar**

Operating media **HCFC-refrigerants, HFC-single component refrigerants, HFC-refrigerant blends, HFO-refrigerants, HFO/HFC refrigerant blends, see page 2**

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.



Form code: TA 251

Revision: 2022-12

www.dnv.com

Page 1 of 2



Job Id: 262.1-028928-2
 Certificate No: TAM00000WK
 Revision No: 1

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>

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 documentation 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.
		6.8.3
		
СВИДЕТЕЛЬСТВО О ТИПОВОМ ОДОБРЕНИИ TYPE APPROVAL CERTIFICATE		
Изготовитель Manufacturer	BITZER Kuhlmaschinenbau Schkeuditz GmbH (DE 8111 73074)	
Адрес Address	Industriestrasse 48, 04435 Schkeuditz, Germany	
Изделие* Product*	<p>Поршневые компрессоры холодильного агента муна: / Reciprocating Refrigerant Compressors of types:</p> <p>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).</p> <p>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).</p>	
Код номенклатуры Code of nomenclature	12010120	
<p>На основании освидетельствования и проведенных испытаний удостоверяется, что вышеупомянутое(ые) изделие(я) удовлетворяет(ют) требованиям Российского морского регистра судоходства.</p> <p>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.</p> <p>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.</p> <p>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.</p>		
<p>Настоящее Свидетельство о типовом одобрении действительно до 29.12.2022</p> <p>This Type Approval Certificate is valid until 29.12.2022</p> <p>Настоящее Свидетельство о типовом одобрении теряет силу в случаях, установленных в Правилах технического наблюдения за постройкой судов и изготовлением материалов и изделий для судов.</p> <p>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.</p>		
Дата выдачи Date of issue	29.12.2017	№ 17.00036.272
		Ягодина А.И. / A. Yagodin (фамилия, инициалы) name
<p>*Дополнительную информацию см. на обороте. Additional information see overleaf.</p>		

Стр.
Page.

Технические данные
Technical data

Поршневые компрессоры холодильного агента муна: /Reciprocating refrigerant compressors type:

B5 (4F-13.2Y, 4F-22.2Y, 4H15.2Y, 4H-25.2Y, 4G-20.2Y, 4C-30.2Y) I

BES (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 объем всасывания: до 101,8 м³/ч

Количество цилиндров: 4

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

E-Motor: Rated power up to 35 kW, 400V, 50 Hz.

Поршневые компрессоры холодильного агента муна: /Reciprocating refrigerant compressors type:

B6(6F-22.2Y, 6F-33.2Y, 6H-25.2Y, 6H-35.2Y, 6G-30.2Y, 6G-40.2Y, 6F-40.2Y, 6F-S0.2Y) I

B6E (6FE-22Y, 6FE-2S(Y), 6FE-33(Y), 6HE-2SY, 6HE-28(Y), 6HE-3S(Y), 6GE-30Y, 6GE-34(Y), 6GE-40(Y), 6FE-40Y, 6FE-44(Y), 6FE-50(Y)

Холодильный агент: R 22, R134A, R404A, R 507A

Теоретический объем 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, 50 Гц

Refrigerant: R 22, R134A, R404A, R 507A

Theoretical suction capacity: up to 151,6 m³/h

Number of cylinders: 6

Rated speed: 1450 rpm

E-Motor: Rated power up to 53,2 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 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.

Акт № 17.03233.272

от 12.09.2017

Report No.

of

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 documentation 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. 1 / 2 Page.
		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*		
<p><i>Поршневые холодильные компрессоры семейств: BO3, BO4, BO5, BO6 (типы: 2T.2, 2N.2, 4T.2, 4P.2, 4N.2, 4G.2, 4H.2, 6H.2, 6G.2, 6F.2) и семейств: BOA3, BOA4, BOA5, BOA6 (типы W2TA, W2NA, W4TA, W4PA, W4NA, W4HA, W4GA, W6HA, W6GA, W6FA).</i></p> <p><i>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).</i></p>		
Код номенклатуры Code of nomenclature 12010120		
<p>На основании освидетельствования и проведенных испытаний удостоверяется, что вышеупомянутое(ые) изделие(я) удовлетворяет(ют) требованиям Российского морского регистра судоходства.</p> <p>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.</p> <p><i>Гл. 4.1 Части XII и Гл. 5.1 Части IX Правил классификации и постройки морских судов, изд. 2021.</i> <i>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.</i></p>		
Настоящее Свидетельство о типовом одобрении действительно до This Type Approval Certificate is valid until 22.01.2026		
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		<u>Костров И.В. / I. Kostrov</u> (подпись) (фамилия, инициалы) L.S. name
*Дополнительную информацию смотри на обороте. Additional information see overleaf.		

Технические данные
Technical data

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

Семейство Family	Тип Type	Количество цилиндров Cylinder numbers	Максимальное рабочее давление (вх./вых.), МПа Max. working pressure (in/out), MPa	Производительность при частоте вращения 1450 об/мин), м³/ч 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-	6	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

Рекомендованные холодильные агенты / Recommended refrigerants:

1. Для компрессоров семейства / For compressors family BO3, BO4, BO5, BO6:

R134a, R404a, R407a, R407C, R407F, R407H, R448a, R449a, R450a, R452a, R507a, R513a, R717 (Ammonia).

2. Для компрессоров семейства / For compressors family BOA3, BOA4, BOA5, BOA6: R717 (Ammonia);

3. Использование прочих хладагентов должно быть одобрено Регистром при проектировании судовой холодильной установки для конкретного проекта судна и согласовано с изготовителем компрессоров. / Using of other refrigerants shall be approved by Register in scope of design approval of particular ship's refrigerant plant 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 PC: No. 273-381.1/G-321266 от 15.12.2020 и No. 273-381.1/G-13291 от 21.01.2021.

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.

Акт № 21.10001.273 от 22.01.2021
Report No. of

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

- С - Свидетельство (ф. 6.5.30) / Certificate (f. 6.5.30); or/или - С3 - Свидетельство (ф. 6.5.31) при наличии Свидетельства о соответствии системы контроля качества изготовителя (СКК 1) / Certificate (f. 6.5.31), if Manufacturer's Quality Control System Certificate (CKK 1) is available; or/или - МС - Документ, оформляемый изготовителем при наличии Свидетельства о соответствии 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 documentation 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

Issued to

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.

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

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

Jonathan Struwe
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.



Form code: TA 251

Revision: 2021-03

www.dnv.com

Page 1 of 3



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

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:

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



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

- f) Hydrostatic test pressure
- g) 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

5.1.2 Heat exchangers

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documentation 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:
TAP00002FH

This is to certify:

That the Heat Exchanger

with type designation(s)
Heat Exchanger D108, D159, D216, D298, D368, D500

Issued to

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.

Temperature range: -10 to 120 °C / -10 to 95 °C (Shell side/ Tube side)

Design pressure: -1 to 28 bar / 10 bar

Operating media: HFC, EN378-1 / Water Glycol

Issued at Hamburg on 2021-12-06

This Certificate is valid until 2026-12-05.

DNV local station: Augsburg

Approval Engineer: Le Loi Nguyen

for DNV

Jonathan Struwe
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.



Form code: TA 251

Revision: 2021-03

www.dnv.com

Page 1 of 2



Job Id: 262.1-036579-1
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
Etwiesenstraße 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

5.1.3 Liquid receivers

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documentation 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:
TAP00002GJ

This is to certify:

That the Pressure Vessel

with type designation(s)

Liquid receiver D500, Liquid receiver D368, Liquid receiver D298, Liquid receiver D216, Liquid receiver D159, Liquid receiver D108

Issued to

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.

Type:	Max. working temp.:	Design pressure:	Operating Medium
Liquid receiver D500	-10 to 120 °C	-1 to 28 bar	HFC, EN378-1
Liquid receiver D368	-10 to 120 °C	-1 to 28 bar	HFC, EN378-1
Liquid receiver D298	-10 to 120 °C	-1 to 28 bar	HFC, EN378-1
Liquid receiver D216	-10 to 120 °C	-1 to 28 bar	HFC, EN378-1
Liquid receiver D159	-10 to 120 °C	-1 to 28 bar	HFC, EN378-1
Liquid receiver D108	-10 to 120 °C	-1 to 28 bar	HFC, EN378-1

Issued at **Hamburg** on **2022-02-08**

This Certificate is valid until **2027-02-07**.

DNV local station: **Augsburg**

Approval Engineer: **Le Loi Nguyen**

for DNV

Jonathan Struwe
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.



Form code: TA 251

Revision: 2021-03

www.dnv.com

Page 1 of 3



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.



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

End of Certificate

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 documentation 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:
TAP00000UF
Revision No:
3

This is to certify:

That the Condenser for Refrigerating Plant

with type designation(s)
C-Plus (CPS, CDEW, CDEW-E, McDEW), CRF, CRM, CXF

Issued to

BITZER Kühlmaschinenbau GmbH
Rottenburg-Ergenzingen, Germany

is found to comply with

DNV rules for classification – Ships Pt.4 Ch.7 Pressure equipment

Application :

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

Temperature range: -10°C +120°C

Operating media:

Shell side: refrigerants R22, R134a, R404a, R407a/b/c, R410, R507.

Tube side: sea water, fresh water

Design pressure: 35 bar (only C-Plus) or 30 bar

Issued at **Hamburg** on **2022-03-14**

This Certificate is valid until **2027-03-13**.

DNV local station: **Venice**

for DNV

Approval Engineer: **Malta Frederik Niederstadt**

Jonathan Struwe
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.



Form code: TA 251

Revision: 2021-03

www.dnv.com

Page 1 of 3



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.



Job Id: 262.1-014795-7
Certificate No: TAP00000UF
Revision No: 3

Type Approval documentation

Marking of product

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

- a. Name and domicile of the manufacturer
- b. Manufacturer's type designation and serial number
- c. Year of manufacture
- d. Maximum allowable working pressure
- e. Design temperature in °C
- f. 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

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 documentation 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.

Page 1 / 3



Marine & Offshore

Certificate number: 02299/10 BV

File number: ACM 127/205/2 - 7

Product code: 6832I

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

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 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) 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.veristamb.com/veristamb/jsp/viewPublicPdfTypepec.jsp?id=b0lqwigjee>
BV Mod. Ad.E 530 June 2017

This certificate consists of 3 page(s)

THE SCHEDULE OF APPROVAL

1. PRODUCT DESCRIPTION:

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

Identification and technical data:

File number	Type	Maximum working pressure [bar]		Maximum working temperature [°C]		Maximum capacity [l]	
		Sea water side	Refrigerant side	Sea water side	Refrigerant side	Sea water side	Refrigerant 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.

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 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.

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 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

The electronic version is available at: <http://www.veristamb.com/veristamb/jsp/viewPublicPdfType.jsp?id=b0lqwigjee>

BV Mod. Ad.E 530 June 2017

This certificate consists of 3 page(s)

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 N° 02299/H2 BV issued on 13 Nov 2020 by the Society.

*** END OF CERTIFICATE ***

5.2.2 Liquid receivers

Ø108 .. Ø500 mm

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documentation 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.

Page 1 / 3



Marine & Offshore

Certificate number: 04118/H0 BV

File number: RSP 776/1-6

Product code: 6834I

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 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) 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.veristamb.com/veristamb/jsp/viewPublicPdfTypepec.jsp?id=vb7bvc4ncn>
BV Mod. Ad.E 530 June 2017

This certificate consists of 3 page(s)

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 [l]	Shell outer diameter [mm]	Shell thickness [mm]	Dished head thickness [mm]	Maximum working 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-Haillingen / GERMANY

The electronic version is available at: <http://www.veristamb.com/veristamb/jsp/viewPublicPdfType.jsp?id=vb7bvc4ncn>

BV Mod. Ad.E 530 June 2017

This certificate consists of 3 page(s)

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 N° 04118/G2 BV issued on 29 Jan 2021 by the Society.

*** END OF CERTIFICATE ***

5.2.3 Oil separators

Ø108 .. Ø500 mm

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documentation 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.

Page 1 / 3



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

www.veristar.com

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 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) 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.veristamb.com/veristamb/jsp/viewPublicPdfTypepec.jsp?id=wo2k2faes5>
BV Mod. Ad.E 530 June 2017

This certificate consists of 3 page(s)

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 [l]	Shell outer diameter [mm]	Shell thickness [mm]	Dished head thickness [mm]	Maximum working pressure [bar]
ACM 133/201/1	33 – 73	298	5	6	28
	54 – 160	368	6	6	28
	180 – 320	500	7	6	28
ACM 133/201/2	2.7	108	2.5	3	28
	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
ACM 133/201/1	200501649	00	Oil separator OA D298 DNV/RS/BV
	200502999	00	Oil separator OA D368 DNV/RS/BV
	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
ACM 133/201/2	152002-010-5	02	Olsekundärabscheider 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	Olsekundärabscheider OAS D159
	320042-010-101	01	Scheibe D159 mit Bohrung D49
	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/viewPublicPdfType.jsp?id=wo2k2faes5>

BV Mod. Ad.E 530 June 2017

This certificate consists of 3 page(s)

- 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 ***

5.2.4 Oil coolers

Series: OWD

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documentation 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.



Marine & Offshore

Certificate number: 81379/A0 BV
File number: ACM 130/2349/1
Product code: 1320I

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
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) 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: <https://www.veristarb.com/veristarb/jsp/viewPublicPdfTypepec.jsp?id=k4s7swyshd>
BV Mod. Ad.E 530 June 2017

This certificate consists of 3 page(s)

THE SCHEDULE OF APPROVAL

1. PRODUCT DESCRIPTION:

Oil cooler, type: OWD

Identification and technical data are as follows:

Type	Voulume shell side [L]	Voulume tube side [L]	Tubes [N°]	Allowed min./max. temperature [°C]		max. allowed pressure [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/viewPublicPdfTypepec.jsp?id=k4s7swyshd>

BV Mod. Ad.E 530 June 2017

This certificate consists of 3 page(s)

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/viewPublicPdfTypepec.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 documentation 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	24-0052369-PDA
EFFECTIVE DATE	24-Sep-2024
EXPIRY DATE	23-Sep-2029
ABS TECHNICAL OFFICE	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 at

**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 this 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 documentation 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. 1 / 2 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*	Водохлаждаемые 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 Code of nomenclature	12020100	
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	№ 18.40023.250
Российский морской регистр судоходства Russian Maritime Register of Shipping	 М.П. L.S. (подпись) signature	Морозов В.В. / V. Morozov (фамилия, инициалы) name
*Дополнительную информацию см. на обороте. Additional information see overleaf.		

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-A-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.

Акт № 18.60054.250 от 14.09.2018
Report No. of

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

18.40023.250

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

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documentation 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 (DE 812 161 588)	
Адрес Address	Peter-Schaufler-Platz 1, D-71065 Sindelfingen, Germany	
Изделие* Product*	Refrigerant condensers (tube and shell heat exchangers) of type: Охладители холодильного агента (кожухотрубные) типа : CXP... , CRF... , CXPM... , CRM... , McDEW... , CXF... .	
Код номенклатуры Code of nomenclature	12020100	
<p>На основании освидетельствования и проведенных испытаний удостоверяется, что выше-упомянутое(ые) изделие(я) удовлетворяет(ют) требованиям Российского морского регистра судоходства.</p> <p>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.</p> <p>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).</p> <p>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).</p>		
Настоящее Свидетельство о типовом одобрении действительно до 08.02.2026 This Type Approval Certificate is valid until		
<p>Настоящее Свидетельство о типовом одобрении теряет силу в случаях, установленных в Правилах технического наблюдения за постройкой судов и изготовлением материалов и изделий для судов.</p> <p>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.</p>		
Дата выдачи Date of issue	08.02.2021	№ 21.40003.250
Российский морской регистр судоходства Russian Maritime Register of Shipping 		Морозов В.В. / V. Morozov (фамилия, инициалы) name
*Дополнительную информацию см. на обороте Additional information see overleaf		

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°C до 120°C

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:

1. 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 of 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.

Акт № 21.60003.250 от 08.02.2021
Report No. of

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 (СМК 1)
- С - Certificate (f. 6.5.30) or
- C3 - Certificate (f. 6.5.31), if Manufacturer's Quality Control System Certificate (CCK 1) is available.




06/2015

21.40003.250

5.4.2 Liquid receivers

Series: F, FS

For application Cargo Refrigeration please contact BITZER before placing an order. An extended product documentation 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. 1 / 2 Page. 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*	Рециверы 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, YF100S, 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, XF5100, YF190S, YF240S, YFS125, F1052G, F1052K, F1052T, F1052TA, F562G, F562K, F562N, F562NA, F732N, F902N, FS562, FS562K, FS732, FS902, FS902K, YF360S, YF580S, YF581H, YF700S, F1202N, F1602G, F1602K, F1602N, F1602NA, FS1122, FS1602, FS1602K, YF1200N, F2202N, F3102N, F3102NA, FS2202, FS3102.	
Код номенклатуры Code of nomenclature	12020700	
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	№ 18.40024.250
Российский морской регистр судоходства Russian Maritime Register of Shipping		Морозов В.В. / V. Morozov (фамилия, инициалы) name
*Дополнительную информацию см. на обороте. Additional information see overleaf.		

Стр. 2 / 2
Page.

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-A-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.

Акт № 18.60055.250 от 14.09.2018
Report No. of

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 documentation 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. 1 / 2 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*	Первичные и вторичные маслоотделители типа: OA1854, OA1854A, OA1854EX, OA4088, OA4088A, OA4088EX, OA9011, OA9011A, OA9011EX, OA1954, OA1954A, OA1954EX, OA4188, OA4188A, OA4188EX, OA9111, OA9111A, OA9111EX, OAS322, OAS1055, OAS1655, OAS744, OAS3088. Primary and secondary oil separators of types: OA1854, OA1854A, OA1854EX, OA4088, OA4088A, OA4088EX, OA9011, OA9011A, OA9011EX, OA1954, OA1954A, OA1954EX, OA4188, OA4188A, OA4188EX, OA9111, OA9111A, 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 Shipboard Materials and Products.		
Дата выдачи Date of issue	14.09.2018	№ 18.40022.250
Российский морской регистр судоходства Russian Maritime Register of Shipping		Морозов В.В. / V. Morozov (фамилия, инициалы) name
		
*Дополнительную информацию см. на обороте. Additional information see overleaf.		

Стр. 2 / 2
Page.

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-A-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.

Акт № 18.60053.250 от 14.09.2018
Report No. of

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 documentation 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. 1 / 2 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 Code of nomenclature	12020000	
На основании освидетельствования и проведенных испытаний удостоверяется, что выше-упомянутое(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	№ 18.40025.250
Российский морской регистр судоходства Russian Maritime Register of Shipping		Морозов В.В. / V.Morozov (фамилия, инициалы) name
*Дополнительную информацию смотрите на обороте. Additional information see overleaf.		

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-A-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.

Акт № 18.60056.250 от 14.09.2018
Report No. of

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)