Chiller

Letter of compliance - ECO-design

Addendum to the operating instructions

L_301611_2

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Requirements acc. Directive 2009/125/EC

Manufacturer: GEA Refrigeration Germany GmbH
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We hereby declare that our Process-Chiller are within the scope of eco-design requirements, implemented according to EU-commission regulation 2015/1095 for low (-25 °C) and medium (-8 °C) temperatures and EU-commission regulation 2016/2281 for high (7 °C) temperatures. If applicable the harmonized standards EN 14511 series and EN 14825 have been considered. Value **tolerances** for selection tools comply with EN 12900.

Pre-conditions:

1. EER calculations are on base of our RT select calculation/sales tool - currently valid version.
2. SEPR calculations are made in a spreadsheet tool, version 1.5.3, dated 2013-09-01.
   Results are opposed to the limits specified in commission regulation 2015/1095 Annex VII and 2016/2281 Annex II. See data and calculation on following pages.
3. Screw compressors without performance-increasing system (economizer).
4. Secondary refrigerant: Ethylene glycol for (-8 °C) and (-25 °C) and water (7 °C).
5. Suction and discharge pressure drops included.
6. Electric power of brine/ water pumps (cold/ hot side) included as calculated values (based on EN 14511-3). Physical pumps not part of scope of supply.
7. Electric motor efficiency considered and included.
8. Chiller includes evaporator (brine/water) and condenser (water or air).

Legal limits of 2015/1095 - minimum SEPR (TIER2) **Refrigerant: Ammonia (GWP< 150)**				
	Medium temperature (-8 °C)		Low temperature (-25 °C)	
	< 300 kW	> 300 kW	< 200 kW	> 200 kW
Water cooled	2.96	3.93	1.88	2.17
Air cooled	2.32	2.89	1.53	1.65

Legal limits of 2016/2281 - minimum SEPR (TIER1) **Refrigerant: Ammonia (GWP < 150)** **Capacity control: variable** **De-gradation: 0.9**			
	High temperature (7 °C)		
	< 400 kW	>400 kW / <1500 kW	> 1500 kW
Water cooled	6.50	7.50	8.00
Air cooled	4.50	5.00	

Our company, GEA Refrigeration Germany GmbH declares in sole responsibility that the above mentioned products to which this declaration relates are in conformity with Directive 2009/125/EC and were subjected to the following conformity assessment procedures:

- ISO 9001-2008, Certificate No.: 01 100 80114/01
- Authorized company acc. to Water Resources Law, Certificate No.: Z10677466, valid until 2018, March
- Energy management acc. to ISO 50001: 2011, Certificate No.: 01 407 1500981, valid until 2018, Dec. 17
- Compliance to 31.BImschV (Germany), especially VOC-Balance with documentation of compliance regarding emissions of solvents

Wolfgang Dietrich
Product Manager (Chillers)

Berlin, 22 August 2018

Model: screw, < 300 kW Type of condensing: water-cooled Refrigerant: Ammonia			GEA Grasso FX PP 300			
Operating conditions:	***low (-25 °C)***			***medium (-8 °C)***		
SEPR			**2.75**			**4.18**
Conditions	Q	Pe	EER	Q	Pe	EER
A	160.00	94.50	1.69	215.00	78.78	2.73
B	148.80	68.40	2.18	199.95	56.58	3.53
C	139.20	52.80	2.64	187.05	44.58	4.20
D	128.00	40.40	3.17	172.00	35.58	4.83
Capacity control		variable				

Model: screw, < 300 kW Type of condensing: water-cooled Refrigerant: Ammonia				GEA BluAstrum		
Operating conditions:				***medium (-8 °C)***		
SEPR						**5.34**
Conditions				Q	Pe	EER
A				235.00	86.33	2.72
B				218.55	55.63	3.93
C				204.45	40.83	5.01
D				180.00	28.83	6.52
Capacity control					variable	

Model: screw, < 300 kW Type of condensing: air-cooled Refrigerant: Ammonia				GEA BluAir		
Operating conditions:				***medium (-8 °C)***		
SEPR						**4.08**
Conditions				Q	Pe	EER
A				225.00	109.16	2.06
B				209.00	72.26	2.90
C				196.00	50.76	3.86
D				180.00	35.66	5.05
Capacity control					variable	

Model: reciprocating, < 300 kW Type of condensing: water-cooled Refrigerant: Ammonia				GEA BluGenium		
Operating conditions:				***medium (-8 °C)***		
SEPR						**5.49**
Conditions				Q	Pe	EER
A				200.00	59.37	3.37
B				186.00	45.47	4.09
C				174.00	34.17	5.11
D				160.00	23.97	6.68
Capacity control					variable	

Model: reciprocating, < 300 kW Type of condensing: water-cooled Refrigerant: Ammonia				GEA Grasso FX GC		
Operating conditions:				***medium (-8 °C)***		
SEPR						**5.37**
Conditions				Q	Pe	EER
A				150.00	47.24	3.17
B				139.50	34.64	4.03
C				130.50	26.04	5.01
D				120.00	18.44	6.51
Capacity control					variable	

Model: screw, > 300 kW Type of condensing: water-cooled Refrigerant: Ammonia	GEA Grasso FX PP 1500			GEA Grasso FX PP 650		
Operating conditions:	***low (-25 °C)***			***medium (-8 °C)***		
SEPR			**2.93**			**5.37**
Conditions	Q	Pe	EER	Q	Pe	EER
A	510.00	279.10	1.83	520.00	170.47	3.05
B	474.30	202.80	2.34	483.60	120.07	4.03
C	443.70	156.20	2.84	452.40	88.67	5.10
D	408.00	119.30	3.42	416.00	65.07	6.39
Capacity control		variable				

Model: screw, > 300 kW Type of condensing: water-cooled Refrigerant: Ammonia				GEA BluAstrum		
Operating conditions:				***medium (-8 °C)***		
SEPR						**5.75**
Conditions				Q	Pe	EER
A				690.00	208.00	3.30
B				641.70	148.66	4.32
C				600.30	111.86	5.37
D				552.00	79.16	6.97
Capacity control					variable	

Model: screw, > 300 kW Type of condensing: air-cooled Refrigerant: Ammonia				GEA BluAir		
Operating conditions:				***medium (-8 °C)***		
SEPR						**4.16**
Conditions				Q	Pe	EER
A				800.00	352.52	2.27
B				744.00	250.32	2.97
C				696.00	167.62	4.15
D				640.00	128.92	4.96
Capacity control					variable	

Model: reciprocating, > 300 kW Type of condensing: water-cooled Refrigerant: Ammonia				GEA BluGenium		
Operating conditions:				***medium (-8 °C)***		
SEPR						**5.49**
Conditions				Q	Pe	EER
A				315.00	92.50	3.41
B				292.95	70.90	4.13
C				274.05	52.80	5.19
D				252.00	37.20	6.77
Capacity control					variable	

Model: reciprocating, > 300 kW Type of condensing: water-cooled Refrigerant: Ammonia				GEA Grasso FX GC		
Operating conditions:				***medium (-8 °C)***		
SEPR						**5.69**
Conditions				Q	Pe	EER
A				855.00	259.50	3.29
B				795.15	188.90	4.21
C				743.85	140.40	5.30
D				684.00	98.30	6.96
Capacity control					variable	

Model: screw. < 400 kW Type of condensing: water-cooled Refrigerant: Ammonia		GEA Grasso FX PP 200	
Operating conditions:	***high (7 °C)***		
SEPR			**9.27**
Conditions	Q	Pe	EER
A	360.00	76.78	4.69
B	335.00	51.58	6.49
C	313.00	36.38	8.61
D	288.00	24.58	11.72
Capacity control		variable	

Model: screw, < 400 kW Type of condensing: water-cooled Refrigerant: Ammonia		GEA BluAstrum 400	
Operating conditions:	***high (7 °C)***		
SEPR			**10.44**
Conditions	Q	Pe	EER
A	390.00	86.44	4.51
B	362.70	52.44	6.92
C	339.30	35.24	9.63
D	312.00	22.64	13.78
Capacity control		variable	

Model: reciprocating, < 400 kW Type of condensing: water-cooled Refrigerant: Ammonia	GEA Grasso FX GC PP 260		
Operating conditions:	***high (7 °C)***		
SEPR			**10.40**
Conditions	Q	Pe	EER
A	295.00	56.68	5.20
B	274.35	38.58	7.11
C	256.65	26.78	9.58
D	236.00	17.58	13.42
Capacity control		variable	

Model: reciprocating, < 400 kW Type of condensing: water-cooled Refrigerant: Ammonia	GEA BluGenium 300		
Operating conditions:	***high (7 °C)***		
SEPR			**10.98**
Conditions	Q	Pe	EER
A	300.00	58.37	5.14
B	279.00	34.77	8.02
C	261.00	26.28	9.94
D	240.00	16.98	14.14
Capacity control		variable	

Model: screw, < 400 kW Type of condensing: air-cooled Refrigerant: Ammonia	GEA BluAir 400		
Operating conditions:	***high (7 °C)***		
SEPR			**7.17**
Conditions	Q	Pe	EER
A	380.00	123.22	3.08
B	353.40	70.82	4.99
C	330.60	47.22	7.00
D	304.00	34.92	8.71
Capacity control		variable	

Model: screw, > 400 kW / < 1500 kW Type of condensing: water-cooled Refrigerant: Ammonia	GEA Grasso FX PP 900		
Operating conditions:	***high (7 °C)***		
SEPR			**10.23**
Conditions	Q	Pe	EER
A	1450.00	283.88	5.11
B	1348.50	189.18	7.13
C	1261.50	132.58	9.51
D	1160.00	89.18	13.01
Capacity control		variable	

Model: screw, > 400 kW / < 1500 kW Type of condensing: water-cooled Refrigerant: Ammonia	GEA BluAstrum 900		
Operating conditions:	***high (7 °C)***		
SEPR			**10.88**
Conditions	Q	Pe	EER
A	925.00	179.98	5.14
B	860.25	119.68	7.19
C	804.75	79.88	10.07
D	740.00	52.08	14.21
Capacity control		variable	

Model: reciprocating, > 400 kW / < 1500 kW Type of condensing: water-cooled Refrigerant: Ammonia	GEA Grasso FX GC PP 600		
Operating conditions:	***high (7 °C)***		
SEPR			**11.66**
Conditions	Q	Pe	EER
A	835.00	157.38	5.31
B	776.55	103.28	7.52
C	726.45	70.08	10.37
D	668.00	41.48	16.10
Capacity control		variable	

Model: reciprocating, > 400 kW / < 1500 kW Type of condensing: water-cooled Refrigerant: Ammonia	GEA BluGenium 1200		
Operating conditions:	***high (7 °C)***		
SEPR			**12.09**
Conditions	Q	Pe	EER
A	1130.00	203.22	5.56
B	1050.90	136.42	7.70
C	983.10	92.02	10.68
D	904.00	53.52	16.89
Capacity control		variable	

Model: screw, > 400 kW Type of condensing: air-cooled Refrigerant: Ammonia	GEA BluAir 800		
Operating conditions:	***high (7 °C)***		
SEPR			**7.58**
Conditions	Q	Pe	EER
A	740.00	233.42	3.17
B	688.20	133.02	5.17
C	643.80	87.62	7.35
D	592.00	62.72	9.44
Capacity control		variable	

Model: screw, > 1500 kW Type of condensing: water-cooled Refrigerant: Ammonia	GEA Grasso FX PP 1500		
Operating conditions:	***high (7 °C)***		
SEPR			**10.34**
Conditions	Q	Pe	EER
A	1940.00	362.69	5.35
B	1804.00	248.19	7.27
C	1688.00	175.89	9.60
D	1552.00	119.29	13.01
Capacity control		variable	

Model: screw, > 1500 kW Type of condensing: water-cooled Refrigerant: Ammonia	GEA BluAstrum 1800		
Operating conditions:	***high (7 °C)***		
SEPR			**10.34**
Conditions	Q	Pe	EER
A	1750.00	327.65	5.34
B	1627.50	224.65	7.24
C	1522.50	157.75	9.65
D	1400.00	107.85	12.98
Capacity control		variable	

Model: reciprocating, > 1500 kW Type of condensing: water-cooled Refrigerant: Ammonia	GEA Grasso FX GC PP 1250		
Operating conditions:	***high (7 °C)***		
SEPR			**11.50**
Conditions	Q	Pe	EER
A	1675.00	299.25	5.60
B	1557.75	208.35	7.46
C	1457.25	142.65	10.22
D	1340.00	85.05	15.75
Capacity control		variable	

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