

TECHNICAL NOTE



cubigel[®]
compressors

by
HUAYI
COMPRESSOR
BARCELONA

Recommendations on Compressor's Working Conditions

This paper offers reasonable limits for the working characteristics of Household or Commercial cooling systems. Within them, there is no concern on compressor reliability or system performance.

The given limits must not always be understood as the ones for compressor reliability. In some cases these are much far but the referred ones show what "to the state of the art" represents the limit between a "well designed" (performing and reliable, compatible with cost) system and a "poor design" (that can be of low cost with reasonable reliability, but poorly performing).

Nevertheless, **Huayi Compressor Barcelona** strongly recommended respecting them.

In case system design constraints would require some characteristic working out of the indicated range, it is recommended to ask for advice from **Huayi Compressor Barcelona**.

The given limits are applicable to all refrigerants (CFC's, HCFC's, HFC's and HC's) commonly used in Household and Commercial refrigeration:

R22, R502, R134a, R404A, R507A, R600a, R290

ELECTRICAL SAFETY AND RESISTANCE TO PRESSURE

- Cubigel Compressors® are designed and tested accordingly with the European Standard EN 60335-2-34, which conforms to the International Standard IEC 60335-2-34.
- The Product, and the Production and Quality procedures fulfil the conditions required for the CE self-certification mark.
- Third Party Conformity Certificates are available.
- Appliance producers must check that the finished apparatus

are conforming to its applicable standards, i.e.: IEC 60335-2-24, IEC 60335-2-89 and others.

- The compressors produced by Huayi Compressor Barcelona are classified as no higher than Category I under Article 9 of the PED. Therefore, according to paragraph 3.6 of Article 1 of the PED they are excluded from the scope of the PED as they are covered by the Council Directive 73/23/EEC (Low Voltage Directive).

WARNING

It is absolutely forbidden to check occasional leakage from the system by charging any kind of gas (N₂ or CO₂) directly from gas containers without using pressure reducing devices. **The pressure inside the shell must never exceed 55 bars.**

MAXIMUM AMBIENT TEMPERATURE	
Subtropical compressors:	38°C
Tropical compressors:	43°C
Subtropical compressors:	38°C
Note:	Unless specific indication, all Cubigel Compressors® are tropical.

MAXIMUM WINDING TEMPERATURE	
Under rated conditions of appliance:	115°C
Under tropical conditions and extreme voltages:	135°C
Note:	Measured through winding resistance. Extreme voltages means: $0,85 \cdot (V_{rated})_{min}$ and $1,1 \cdot (V_{rated})_{max}$

MAXIMUM DISCHARGE TEMPERATURE

Measured with insulated thermocouple, brazed on the discharge tube, 5 cm from the compressor shell:

		Statically cooled	Fan cooled
Continuous running at appliance rated condition	Freezers	105°C	9°C
	Refrigerators and high back pressure cabinets	120°C	105°C
Extreme condition under the present recommendation		135°C	125°C

DISCHARGE PRESSURES (Absolute pressure in bar)

In general terms, discharge pressure at rated ambient temperature and continuous run, steady condition, should conform to the following table:

Thermal class	N (32°C)		T (43°C)	
	static	fan	static	fan
Condenser ΔT(K)	13 ÷ 21	8 ÷ 13	< 18	4 ÷ 10

Condensing Temperature °C	Pressure in bar-a						
	Refrigerant						
	R22	R502	R134a	R404a	R507	R600a	R290
35	13.54	14.90	8.87	16.08	16.60	4.64	12.18
40	15.33	16.77	10.16	18.17	18.73	5.31	13.69
45	17.49	18.80	11.60	20.47	21.08	6.04	15.34
50	19.42	21.01	13.17	22.98	23.64	6.84	17.13
55	21.74	23.41	14.91	25.73	26.44	7.72	19.07
55	24.26	26.01	16.81	28.74	29.51	8.68	21.16

Pull-down peak

R12, R134a, R502, R600a.

Not to exceed saturation pressures corresponding to: 70°C

R22, R404A, R507, R290.

Not to exceed saturation pressures corresponding to: 63°C
(for R22, S range, HMBP : 67°C)

Note: R404A is a refrigerant of quite low critical temperature and sensitive to high condensing pressures. When working with it, it is strongly recommended to keep on the lowest values of the recommended range.

Additional information

See safe operating areas in graphs of last sheet.

R404A: When evaporating between -35°C to -40°C not exceeding 20.5 bars

SUCTION PRESSURES (Absolute pressure in bar)

Suction pressure must be within the limit given by saturation temperatures of following table:

LBP -30 to -10

HMBP -25 to +10

AC -10 to +10

R134a can be extended down to -35°C and R404A down to -40°C

Condensing Temperature °C	Pressure in bar-a						
	Refrigerant						
	R22	R502	R134a	R404a	R507	R600a	R290
10	6.80	7.73	4.15	8.20	8.52	2.20	6.36
5	5.84	6.68	3.50	7.06	7.34	1.86	5.51
0	4.94	5.73	2.93	6.04	6.30	1.56	4.74
-10	3.54	4.14	2.01	4.34	4.54	1.08	3.45
-15	2.96	3.49	1.64	3.64	3.81	0.88	2.91
-20	2.45	2.91	1.33	3.03	3.18	0.72	2.44
-25	2.01	2.41	1.06	2.50	2.63	0.58	2.03
-30	1.63	1.98	0.84	2.04	2.16	0.46	1.68
-35			0.66	1.66	1.75		
-20				1.33	1.41		

The lowest values of evaporating temperatures must only be reached with low ambient temperatures (i.e. at 32°C of ambient temperature HMBP compressors should not work below -15 of evaporating temperature).

ATTENTION: Never use an LBP compressor under HMBP working condition, otherwise pull-down failures, windings overheating, OLP tripping or starting failures can be expected, specially at low voltage.

The use of HMBP compressor in LBP condition risks of winding overheating, especially S compressor range, and is to be discouraged.

SUCTION TEMPERATURE

Measured with insulated thermocouple brazed on the suction tube, approximately 25 cm from the compressor shell.

Minimum temperature:

Absolutely: At least 5K above saturation value at suction pressure.
Recommended: Above dew point of surrounding air unless suction tube is fully thermally insulated

Maximum temperature:

Temperate Tropical
LBP domestic 30°C 40°C
LBP commercial 20°C 25°C
HMBP 25°C 25°C

Suction temperature should never exceed the ambient temperature.

RUNNING TIME

At rated testing conditions:

Class N appliances (32°C) max. 80%

Class T appliances (43°C) max. 85%

In overload conditions and limited time (for example during freezing): 100%

OFF TIME FOR COMPRESSORS WITH PTC

Off time for compressors with PTC must be min. 5 minutes

STARTING FREQUENCY

Compressors without starting capacitor: max. 5/hour

Compressors with starting capacitor:

In stabilized running: max. 12/hour

In limited period: max. 20/hour

REMARK

- Avoid all working conditions to simultaneously be at a limit value.
- Only silent-blocks supplied by Huayi Compressor Barcelona should be used for fitting the compressor to the refrigerator cabinet. The use of different silent-blocks, made of rigid materials, may produce excessive noise or break of most internal components.
- The electrical components are those indicated by Huayi Compressor Barcelona. Any change, lack or addition in the electrical equipment may seriously damage the compressor.
- Compressor cooling must be as indicated in the catalogue. Different cooling can only be used after being approved by

Huayi Compressor Barcelona and may require change of overload protector.

- In order to avoid electric arc between hermetic connector pins, compressor must not start or electrical tests (e.g. dielectric strength) must not be performed while the refrigerating system is under vacuum.

To avoid damages in the compressor caused by an excessive dilution of the oil, charging of refrigerant must not be done completely in liquid state; part of it must be done in vapour phase.



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