

APPLICATION STUDY: KLF AND COOL DRINKS

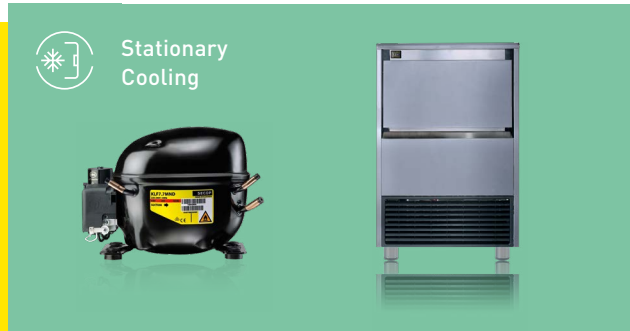


Date: May 2024

SUMMARY

Project: KLF7.7CNDS in ice cube makers
MBP food service application

Task: Keep the refrigeration circuit robust against damage caused by fast liquid return, reducing application complexity (no liquid separator), and keeping performance and efficiency.



STORY

Background

Some commercial freezers or ice maker applications with a hot gas defrost function are more susceptible to fast load liquid refrigerant entering into the suction line, which generates high pressure peaks and poses a higher risk of damage (liquid hammer).

Challenges

To extend the cabinet and compressor lifetime under fast liquid return conditions, one solution is to use a more robust compressor, which would increase cost or need to compromise on efficiency and noise levels. Another solution is to install a liquid separator in the suction line, which will both increase cost and also bring with it additional complexities in the manufacturing process and supply chain, etc.

Cabinet type: Ice cube maker (35–40 kg/day, air cooling)

Input voltage: 230 V/50 Hz

Dimensions: 465 mm × 595 mm × 795 mm

Compressor Configuration	Original Compressor	Secop Compressor KLF7.7CNDS
Refrigerant	R290	
Displacement (cc)	7.3	7.7
Application conditions	MBP	L/MBP
Cooling capacity ASHRAE MBP (W)	599	663
COP ASHRAE MBP (W)	1.90	1.95
Height (mm)	188	175
Weight (kg)	10.3	9.6

OUTCOME

SOLUTION: Substitute the original compressor with the new KLF-CNDS compressor to significantly reduce liquid return into the compressor pump system and eliminate the use of a liquid separator.

The test simulated in an ice cube maker with the worst possible liquid hammer conditions: operation with low temperature water inlet, characterized by lower cooling demand and a consistently high ratio of liquid refrigerant inside the evaporator. Under these conditions, the system exhibits low superheating, which generates a large amount of liquid backflow into the compressor.

Standard Secop KL-Series can handle hot gas defrost, however, extreme fast liquid return generates harsh conditions, thus reducing the compressor lifetime. To minimize the risk of liquid hammer and reduce customer total cost of ownership, Secop developed a dedicated new series (CNDS for 220V/50Hz and CNHS for 115V/60Hz) under extreme liquid return conditions. It contains an optimized suction muffler system that significantly reduces liquid return and eliminates the use of a liquid separator.

RESULTS: the new KLF-CNDS compared to the original compressor

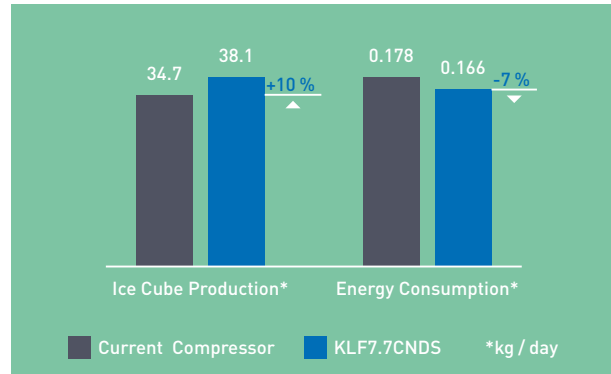
-6.7%
Energy consumption

-9.8%
Pull-down time

THE NUMBERS

Model	Original Compressor	Secop KLF7.7CNDS
R290 refrigerant charge (g)	110	110

Cabinet Performance	Start	Result
24h energy consumption (kWh/d)	0.178	0.166
Ice cube production (kg/24h)	34.7	38.1



THE BENEFITS



TAKE-AWAYS

- Premium robustness**
 The KL-CNDS/CNHS features the trusted quality of our KL-Series optimized for applications with fast liquid intake due to hot gas defrost or other applications with heavy fast load changes.
- Easier application assembly**
 No need of additional components for robustness, new terminal board design for additional interconnections.
- Superior efficiency**
 High COP and top efficiency for light commercial applications with low GWP refrigerant R290.
- Innovative solution for refrigerant R290**
 Patented new hermetic terminal plug, enhanced protection against potential contact with contaminants, thereby reducing the risk of connection damage.
- Learn more about the KLF7.7CNDS here: <https://lmy.de/OWZNCDKZ>



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ABOUT SECOP

Secop is the expert for advanced hermetic compressor technologies and cooling solutions in commercial refrigeration.