RAISING EFFICIENY IN COMMERCIAL REFRIGERATION APPLIANCES, BY APPYING R290 VARIABLE SPEED COMPRESSORS
应用丙烷及变频压缩机对于轻型商用制冷设备能效的提升

SECOP

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Agenda
综述

- Possible Measures to raise Energy Efficiency

  提升能效可能的措施

- Benefits of R290 Refrigerant

  采用丙烷制冷剂的收益

- Case Studies

  应用案例

- Benefits of Variable Speed Compressors

  采用变频压缩机的收益

- Summary

  总结

Measures to raise Energy Efficiency
提升能效可能的措施

Design optimization of the refrigeration system:
Improve thermodynamics
制冷系统设计优化

Optimization on components:
其他零部件优化
- LED Lightning
- EC Fans
- Intelligent controls

采用LED照明、EC风扇、智能控制

Multiple Vacuum panes (Glass Door)
真空玻璃面板

Vacuum panels (Cabinet Body)
真空隔热板（柜身）

<u>Compressor压缩机</u>
- Conversion to Hydro Carbons
  切换至碳氢制冷剂
- Introduction of Variable Speed Compressors
  采用变频压缩机

Impact on Efficiency by Changing the Refrigerant
替代制冷剂对压缩机的影响

R134a

COP: + 20%

R290

R404A

COP: + 20%

R290

Example of a 1-Door Bottle Cooler
案例分析：单开门饮料柜

Bottle cooler 饮料柜	
Volume 容积	380 L
Capacity 容量	470 cans

Demand on Bottle cooler 市场需求
➢ Robustness & reliability 应用可靠
➢ Energy consumption reduction 更加节能 (EU – Eco Design ; USA Energy Star)
➢ F-gas regulation compliance Globally 符合法规要求

	R134a	R290	Benefit 收益
Compressor Model 压缩机型号	NL10MF	DLE7.5CN	Frame size reduction (13% of height) 高度降低13%
Power Consumption 耗电量	1.135 KWh/yr	990 KWh/yr	13% reduction in Energy Consumption 能耗降低13%

Example of a Commercial Freezer
案例分析：商用冷冻柜

Commercial Freezer 商用冷冻柜	
Volume 容积	660 L

Demand on Commercial Freezer 市场需求
➢ Robustness & reliability 应用可靠
➢ Energy consumption reduction 更加节能 (EU – Eco Design ; USA Energy Star)
➢ F-gas regulation compliance Globally 符合法规要求

	R404A	R290	Benefit 收益
Compressor Model 压缩机型号	SC12CL	NLE11CNL	Frame size reduction (3% of height) 高度降低3%
Power Consumption 耗电量	2.400 KWh/yr	2.000 KWh/yr	17% reduction in Energy Consumption 能耗降低17%

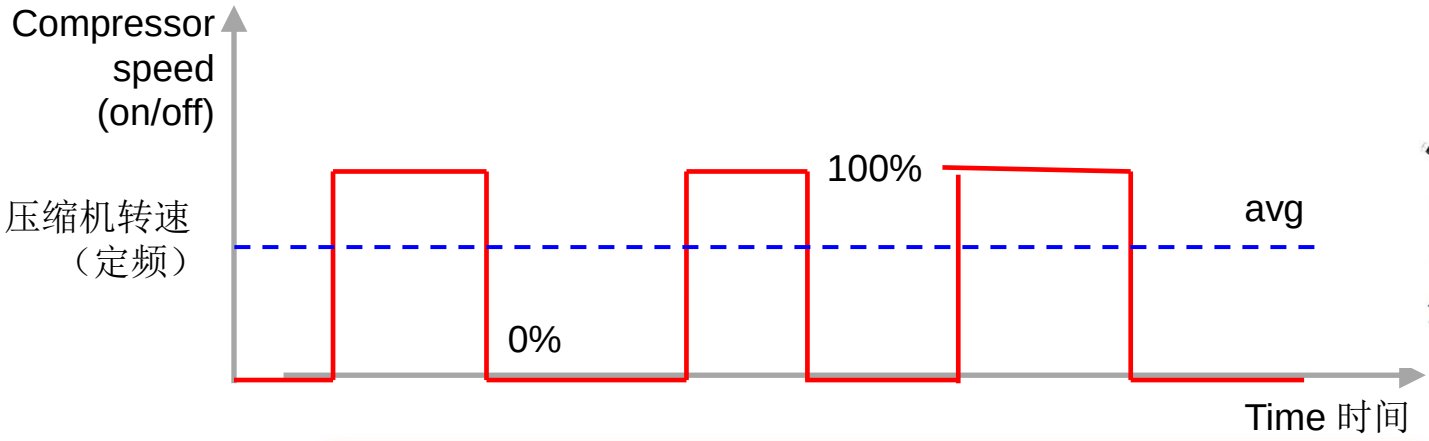
Example of a Ice Machine
案例分析：制冰机

Ice Machine 制冰机	
Production Capacity 制冰量	500-pound

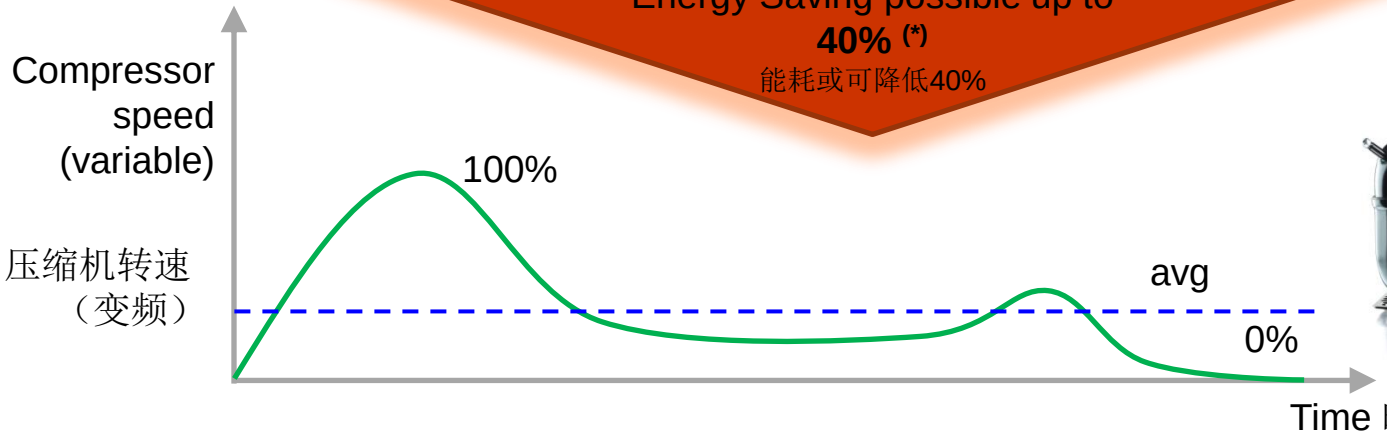
Demand on Ice Machine 市场需求
➢ Robustness & reliability 应用可靠
➢ Energy consumption reduction 更加节能 (EU – Eco Design ; USA Energy Star)
➢ F-gas regulation compliance Globally 符合法规要求

R404A → R290 Benefit 制冷剂替换的收益	
Refrigerant Charge 制冷剂充注量	< 150 gr.
Energy Saving 节能	25%

Impact of Variable Speed Compressor Solution on Energy Consumption
变频压缩机将降低制冷系统的能耗



Energy Saving possible up to **40%** (*)
能耗或可降低40%



*: not only related to the compressor

Summary
总结

Benefits of Hydro Carbon Refrigerants 采用碳氢制冷剂的优势	
Environment Friendly 环保	• Ozone Depletion Potential --> **0** 臭氧消耗潜值 (ODP)为0
	• Global Warming Potential --> **3** 全球变暖潜值 (GWP)为3
	• Meeting various Regulations in the world **already now** (EU-F Gas Regulation, USA SNAP Ruling) 符合世界各国已经推出的相关法律法规
High Cooling Capacity 高制冷量	• Low Energy consumption 低能耗
	• High COP 高COP值
	• Smaller displacements possible resulting in smaller dimensions 尺寸紧凑
	• Compact cabinets 更大的柜体空间
Costs 成本	• HC are approx. 60% cheaper compared to HFC's HC制冷剂成本降低约60%（欧洲市场价格水平）
	• HFC's price level to raise HFC制冷剂价格将提高
	• Smaller displacement result in possible cheaper compressors 可以选用排气量更小的压缩机，降低采购成本

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