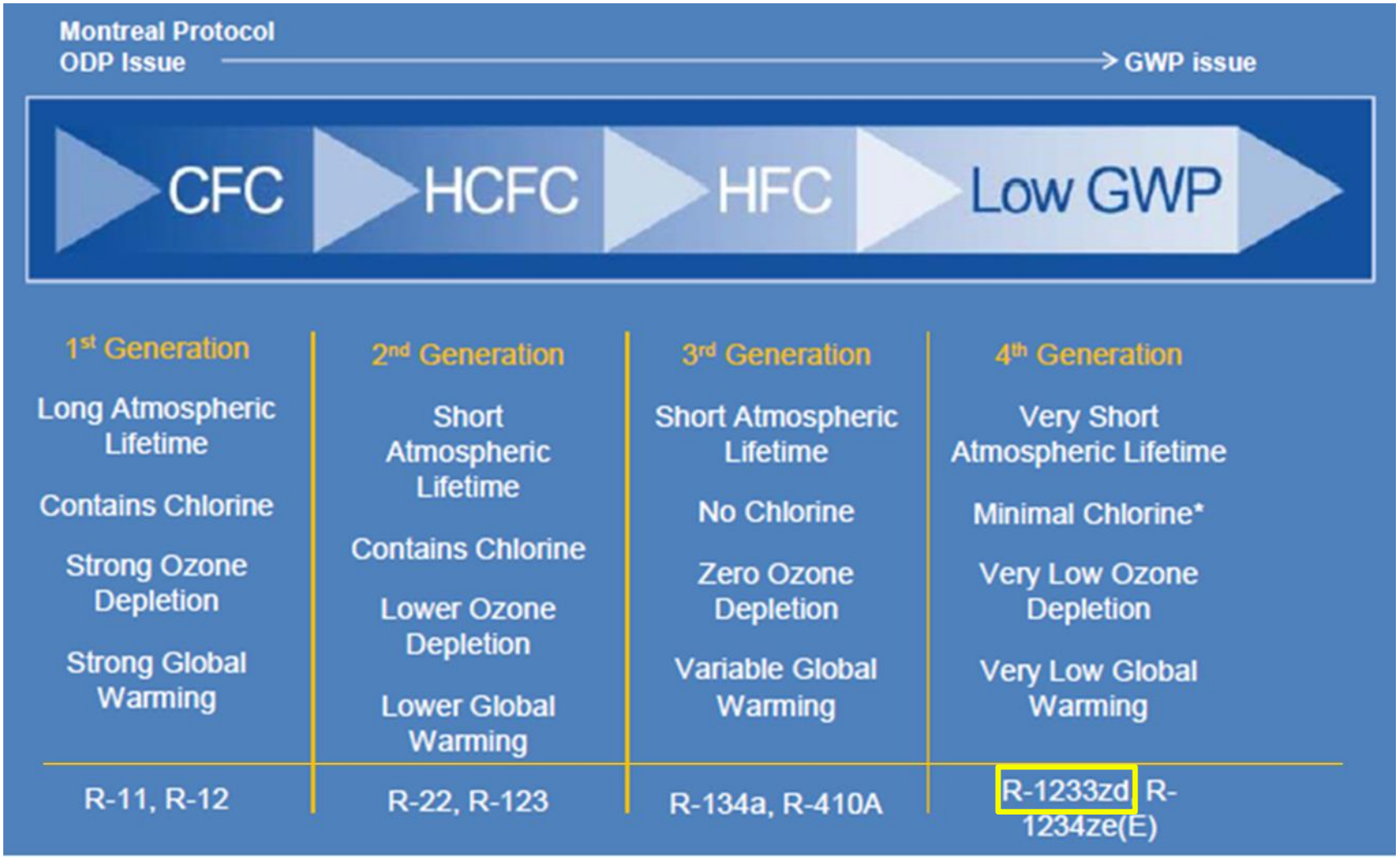
REFRIGERANT DEVELOPMENT

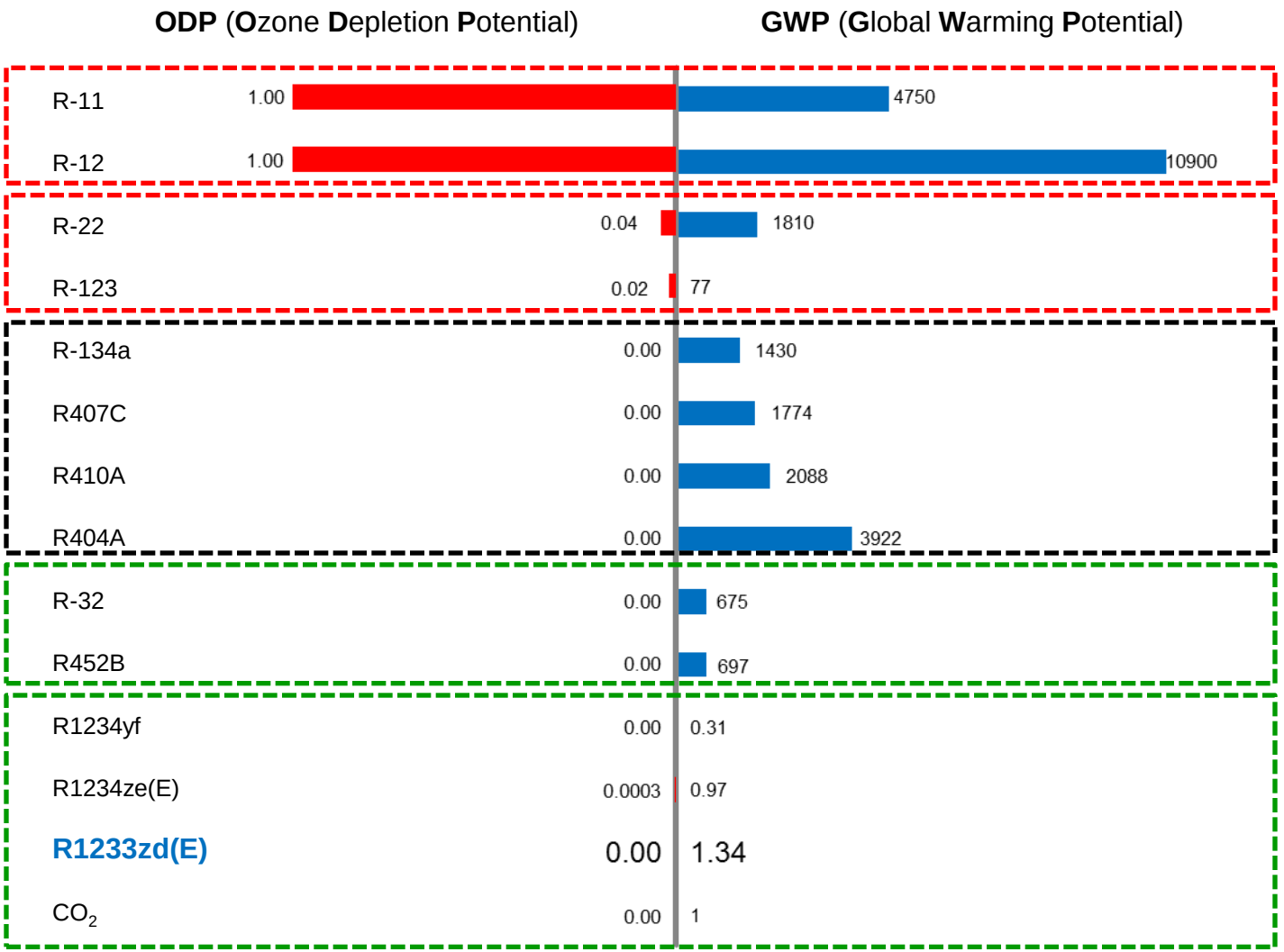


*Some HFO's such as R-1233zd contain a chlorine atom, but have a very short atmospheric life, never making it to the upper atmosphere.

Carrier Confidential and Proprietary

REFRIGERANT CLASSIFICATION

ODP / GWP



Carrier Confidential and Proprietary

REFRIGERANT CLASSIFICATION

Flammability / Toxicity

- In the past and currently most products use non-flammable, non toxic refrigerants(A1)
- High GWP phase-down likely will require in many HVAC&R applications the use of semi-flammable and flammable refrigerants
- This has resulted in the creation of a new semi-flammable 2L category
- It has also resulted in work to modify safety standards and building code developed for the application

ASHRAE 34 and EN378

	Lower Toxicity (OEL of 400ppm or greater)	**Higher Toxicity** (OEL of less than 400ppm)
Higher Flammability	**A3** R-429A, R-430A, R-435A Propane, Butane, Butene, Butvne	**B3**
Lower Flammability	**A2** R-153a, R-413A, R439A, R-440A	**B2**
Lower Flammability	Maximum burning velocity of ≤10m/s **A2L** R-1234yf, R-1234ze(E), R-32, R-452B New	**B2L** R717 (Ammonia)
No Flam Prorogation	**A1** R-22, R-410A, R-407C, R-404A, R-134a, **R-1233zd(E)**, R-448A, R-450A	**B1** R123

OEL: Occupational exposure limit
A/B indicates toxicity level and 1/2/2L indicates flammability level

Carrier Confidential and Proprietary

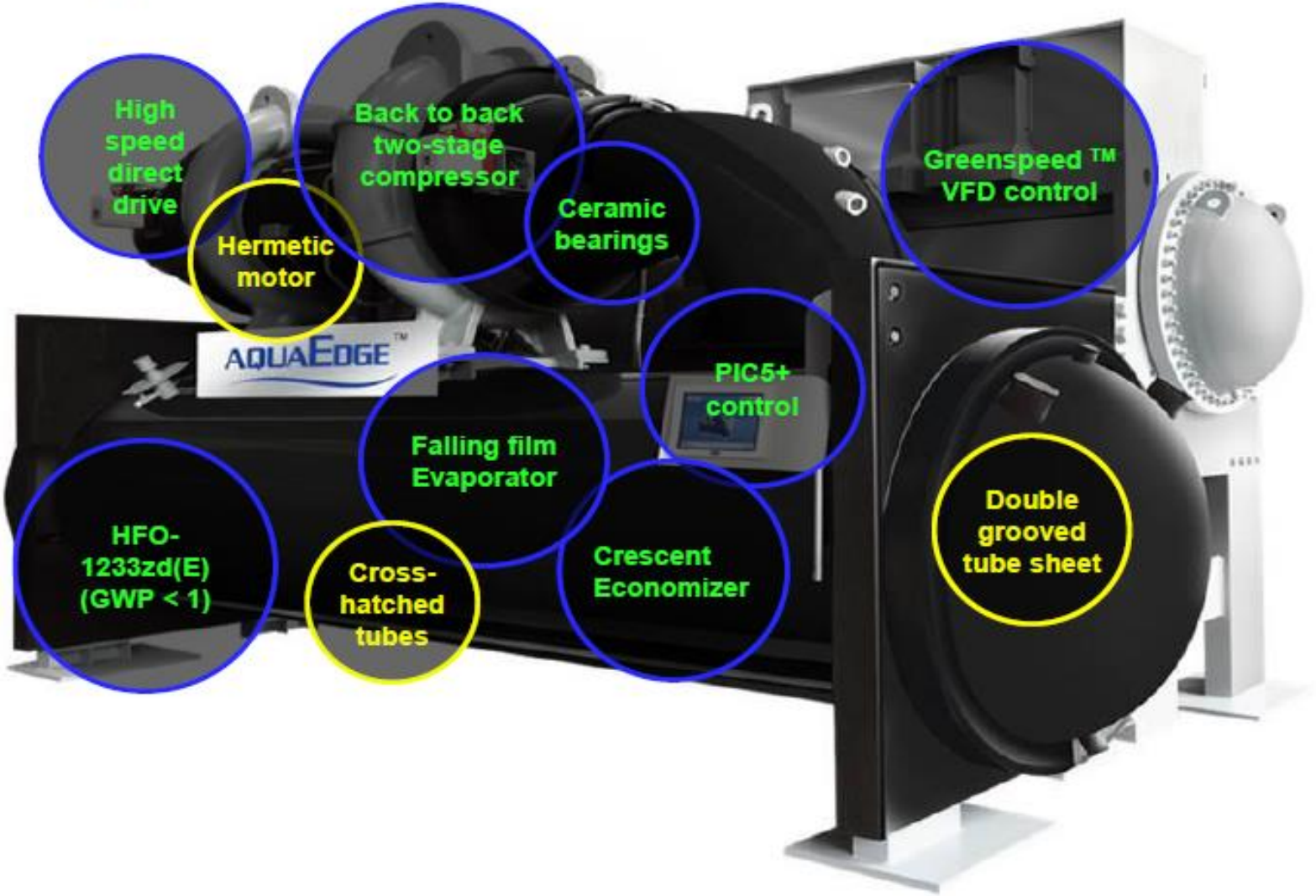
19DV 2-STAGE CENTRIFUGAL CHILLER

- Capacity from 600RT – 800RT
- Green gas R1233zd
(ODP ~ 0 and low GWP @ 1)
- 2 stage centrifugal compression
- Refrigerant lubricated ceramic bearing
- Full load (0.49 ikW/RT) and NPLV (0.52 ikW/RT) @ AHRI Conditions
- Rapid Restart
- Low pressure refrigerant



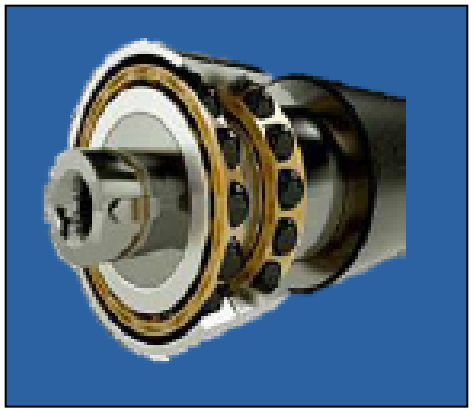
19DV 2-STAGE CENTRIFUGAL CHILLER

Leading technologies

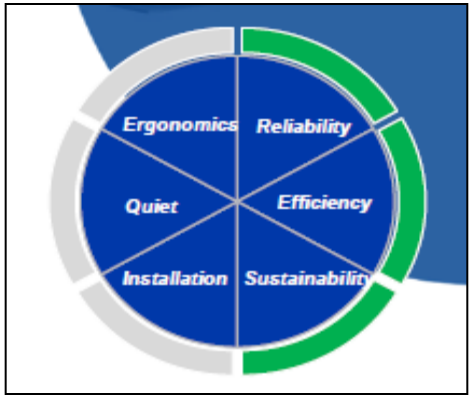


CERAMIC BEARING

FEATURES



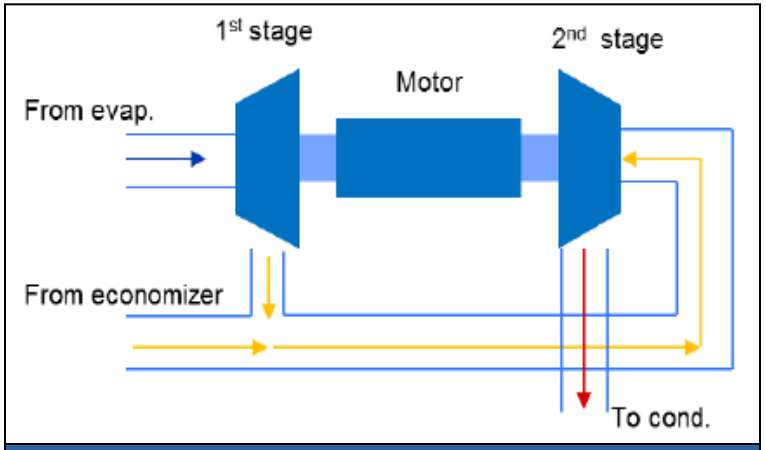
- Silicon nitride (Si3N4) rolling elements
- Refrigerant lubricated bearing
- Simpler bearing
- Less mechanical loss
- Fewer modes of failure than other types of bearings
- Extended bearing service life

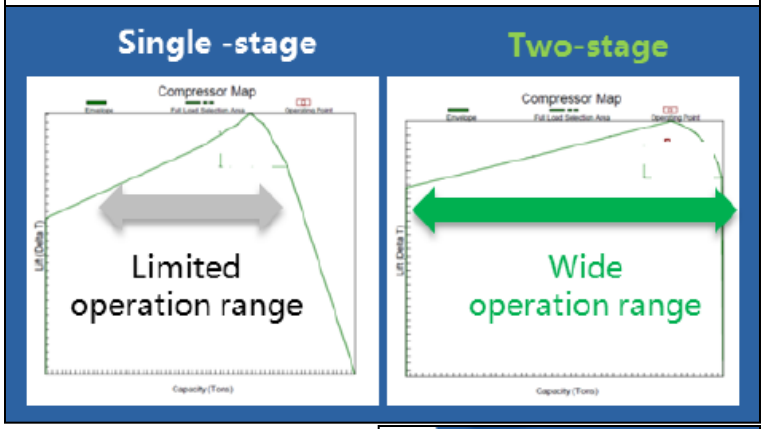


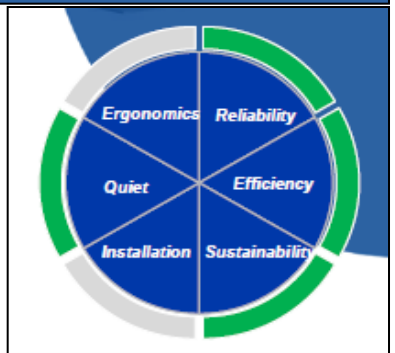
BACK TO BACK 2 STAGE COMPRESSOR

FEATURES

- Direct drive system
- Less rotating parts
- Back-to-back for balance axial thrust
- Optimised aero design
- Dual guide vanes
- Shrouded impellers
- Lower sound
- Improved part load efficiency
- Broader operation range

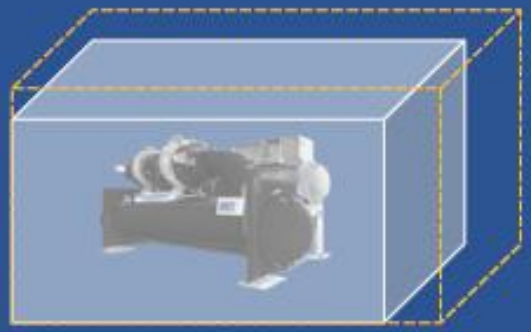






FOOTPRINT OPTIMISATION

- **Designed for low pressure system**
  Smaller volume inflation than negative pressure system
- **Optimized system layout**
  Leverage the space between evaporator and condenser
- **Crescent economizer**
  Special shape design for narrow space







TOUCH SCREEN CONTROL PANEL





WHAT @features

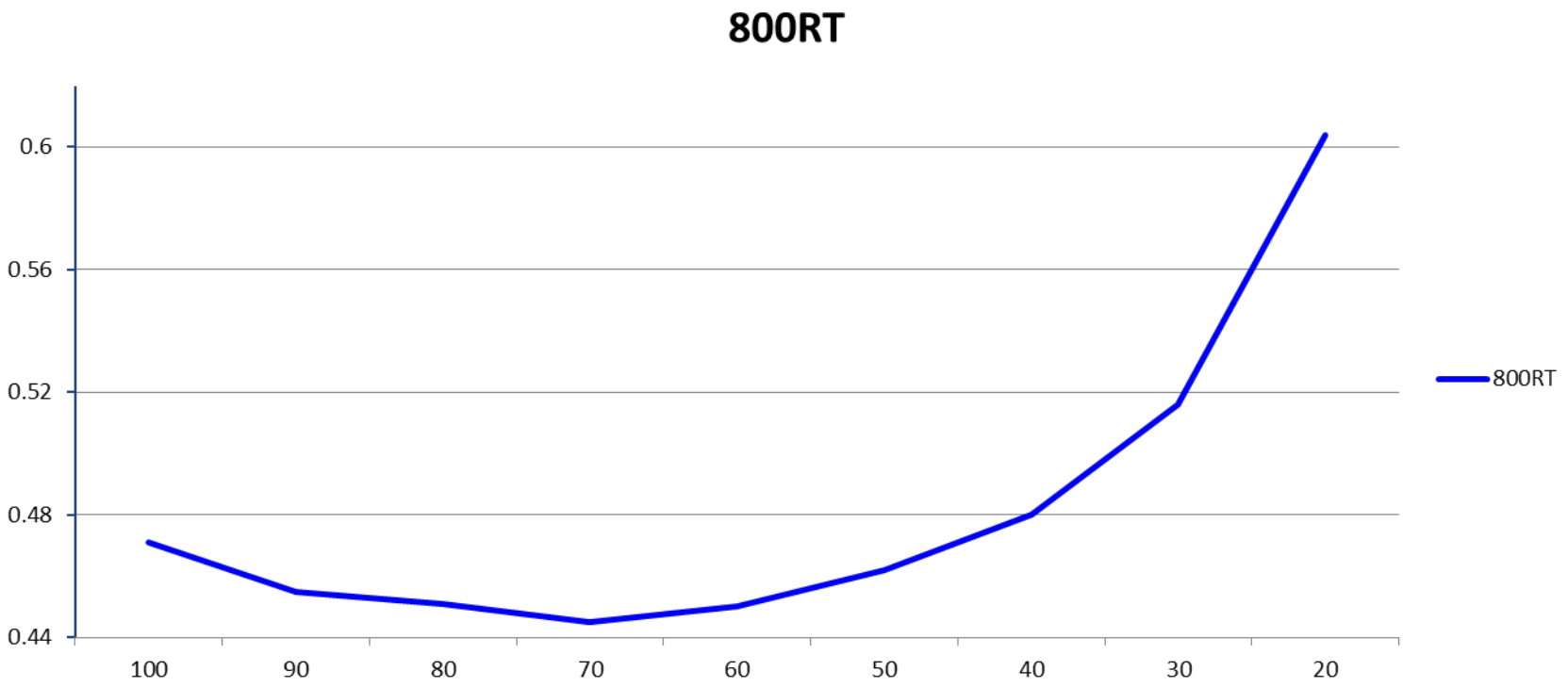
- 10.5” color touch and graphic display
- Flexible installation on four corners
- Integrated Greenspeed™ variable speed control
- Intelligent control for hydronic system
- Envelope stability control
- Improved swift restart for data center application
- Prognostic and black box functions
- Smart APP for remote access
- Lifecycle data management system

WHY @benefit

- Excellent user experience in chiller management
- High reliability and prevent unexpected shut down
- Adaptive to different chiller plant conditions
- System solution with improved chiller/pumping efficiency
- Customer value add and service opportunity

19DV Part Load Performance (800RT)

CHW temperature**: 8/15 deg**, CW temperature: **29.5/34.5** deg
60% variable CHW flow, **80%** variable CW flow

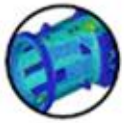


Full Load %	100	90	80	70	60	50	40	30	20
Efficiency (ikW/ton)	0.471	0.455	0.451	0.445	0.45	0.462	0.48	0.516	0.604

SUMMARY

Reliability

- Refrigerant lubricated system – ceramic bearings
- Back to back 2-stage compressor
- Hermetic motor cooled by refrigerant

Efficiency

- No oil recovery system
- Intelligent direct drive: mechanical loss -75%
- Falling film evaporator: IPLV +5%





Sustainability

- Designed for low GWP refrigerant w/o flammability
- Energy saving reduces CO_2 emission

HFO-1233zd(E)
(GWP < 1)




Non-toxicity

Installation

- Compact design: -15% footprint saving vs. R123
- Bolted together module design
- Patented re-locatable control panel
- Marine box (option)





Quiet

- Optimized aero design with CFD
- Hermetic motor w/o gear transmission
- PIC5+ VFD control





Ergonomics

- Easy operation by user-friendly interface
- Versatile data tracking functions
- Remote control connectivity
- System extension to pumping and others



