

Low GWP Refrigerant Heat Pump Technology

Dr. Ookjoong Kim/Dr. Dongho Kim
Department of Thermal Systems
T. +82 – 42 – 868 – 7326
E. ojkim@kimm.re.kr/sch@kimm.re.kr

⇒ Heat exchanger (evaporator) design technology for low GWP refrigerant, which is the alternative refrigerant of current HFC/HCFC's for global warming prevention

Client / Market

- HVAC&R component and system business

Necessity of this Technology

- Problem of Existing Technology
 - As the time for the HCFC's refrigerant use restriction arrives, HFO's refrigerants are being developed to replace HCFC, and relevant researches on performance and cycle development of HFO's refrigerant is required.
 - Existing refrigerant are regulated for used from 2030.
- Necessity
 - System performance estimation: Companies designing/manufacturing low GWP HVAC&R system require cycle design technology and performance estimation technology.
 - Development of heat exchanger for centrifugal chiller: Accurate design/manufacturing technologies are required based on actual heat transfer coefficient.

Technical Differentiation

- Development of various refrigeration cycle performance prediction program including single/double compression cycle using low GWP refrigerant
- Development of centrifugal chiller evaporator design program
- Development of heat transfer enhanced tube for low GWP refrigerant with similar performance to those of advanced companies.

Excellence of Technology

- Development of enhanced tube for flooded evaporator for low GWP refrigerant (R-1234ze(E) and R-1233zd(E))
- Similar performance to overseas advanced product, and confirmed the quality of the mass production process.

DESIRED PARTNERSHIP

Technology Transfer

Licensing

Joint Research

Other



TECHNOLOGY READINESS LEVEL [TRL]

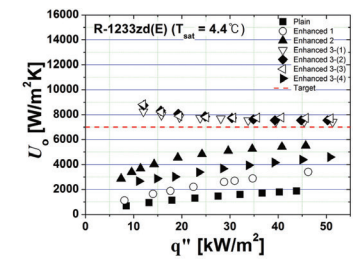
- Research, basic explanation
- Project concept or idea development
- Technology idea verification
- Prototype development
- Trial product production/evaluation in similar environment
- Pilot field demonstration
- Development and optimization of commercial model
- Commercial product demonstration
- Mass production and initial market launch

Detailed Geometry of Enhanced Tube for Centrifugal Chiller Evaporator

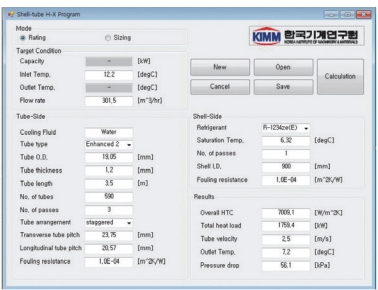
	Enhanced 3 – (1)	Enhanced 3 – (2)	Enhanced 3 – (3)	Enhanced 3 – (4)
Fin surface				
Fin cross section				

- Centrifugal chiller evaporator design technology development: The prediction of heat exchanger performance is similar to the level of advanced design program.

Heat Transfer Coefficient of Developed Tube



Heat Exchanger Design Program



Current Intellectual Property Right Status

PATENT

- Industrial Shell & Tube Heat Exchanger Design Program (KR2017-011728)
- Falling Film Type Centrifugal Chiller (KR2017-0053101)
- Falling Film Type Centrifugal Chiller (KR2017-0053100)

KNOW-HOW

- Heat exchanger performance test facility production/operation
- Refrigerant property-based thermodynamics cycle simulation