

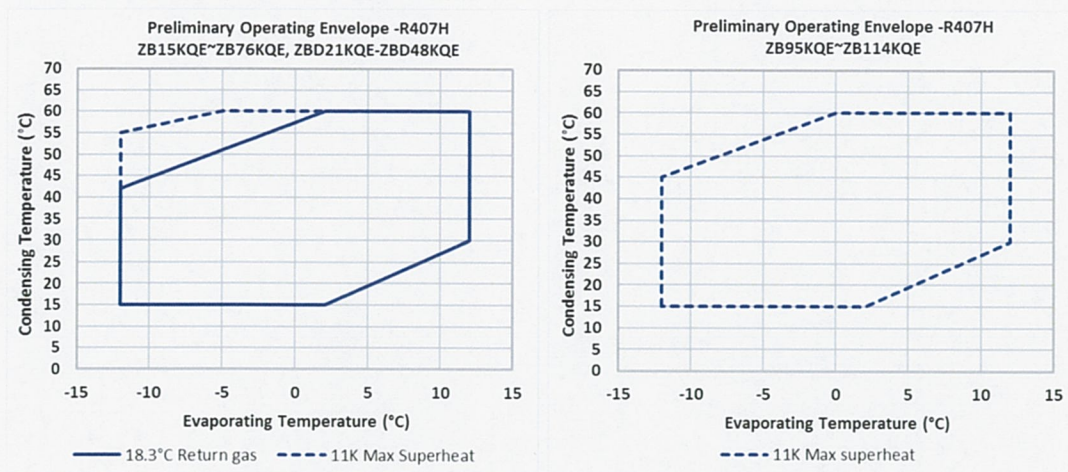
R407H APPLICATION OF MEDIUM TEMPERATURE SCROLL COMPRESSORS

At the request of Daikin Refrigeration Malaysia (DRM) to apply refrigerant R407H as a lower GWP alternative to R404A in new systems, Emerson has conducted a theoretical review and concluded that R407H can be used in the products listed hereunder:

Scroll compressor models ZB (Fixed Speed) and ZBD (Digital capacity modulation) for medium temperature applications:

- Fixed Speed models: ZB15KQE-TFD, ZB19KQE-TFD, ZB21KQE-TFD, ZB26KQE-TFD, ZB29KQE-TFD, ZB38KQE-TFD, ZB45KQE-TFD, ZB48KQE-TFD, ZB58KQE-TFD, ZB66KQE-TFD, ZB76KQE-TFD, ZB95KQE-TFD, ZB114KQE-TFD
- Digital Capacity-modulated models: ZBD21KQE-TFD, ZBD29KQE-TFD, ZBD38KQE-TFD, ZBD45KQE-TFD, ZBD48KQE-TFD

The General Application Guidelines and the preliminary operating envelopes shown in this document must be respected.



Notes: The above envelopes are based on R22/R407F but with a condensing temperature limit of 60°C.

- The discharge line temperature with R407H is expected to be higher than with commonly used lower GWP R404A replacement refrigerants like R448A/R449A.
 - It is essential for compressor reliability to avoid DLT higher than 130°C.
 - Please take appropriate system measures to ensure that the discharge temperature remains below the safe limit.
 - Ensure that the DLT sensor is well insulated to avoid error.
 - Locate the sensor within 15cm of the compressor discharge.

In case of compressor damage, Emerson reserves the right to tear down and inspect the compressor parts. The standard warranty will not be applicable for application related faults such as high discharge temperature or lubrication related issues.



Since R407H has the same molecular structure as R407A/C/F but different mix percentages and the same flammability classification (A1), no further tests will be conducted by Emerson. Please consider that Emerson has no test based knowledge about the expected service life, real performance, wear or maintenance costs. It is possible that the product may behave differently from expectations so we would encourage DRM to conduct appropriate testing and evaluation. We will be pleased to tear down any compressors used in testing and comment on their condition.

Yours faithfully,

A handwritten signature in blue ink that reads "Joe Healy." The signature is written in a cursive style with a long, sweeping tail on the letter "y".

Joe Healy

Director, Application Engineering,
Technical Support, Asia Pacific.

15 May 2018

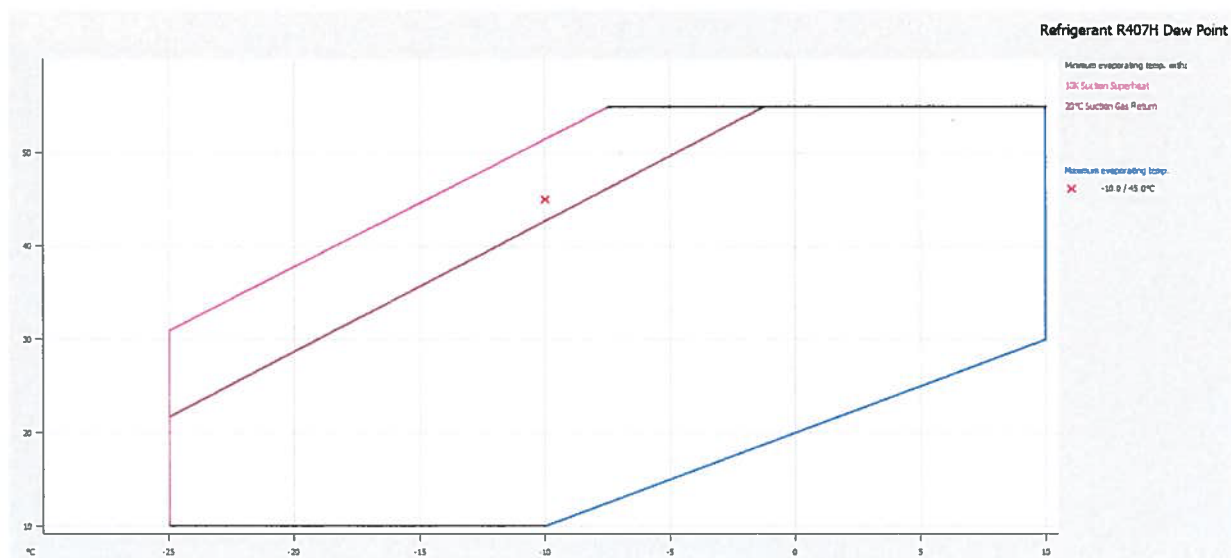
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R407H APPROVAL FOR MEDIUM TEMPERATURE SCROLL AND STREAM COMPRESSORS

Understanding the needs and requirements for new systems with lower GWP alternative refrigerants, Emerson would like to support Zanotti SpA for the new projects using refrigerant R407H. As an outcome of internal benchmarks, Emerson is approving the use of R407H refrigerant within the context of the General Application Guidelines and operating envelopes contained in this document, for the following product range:

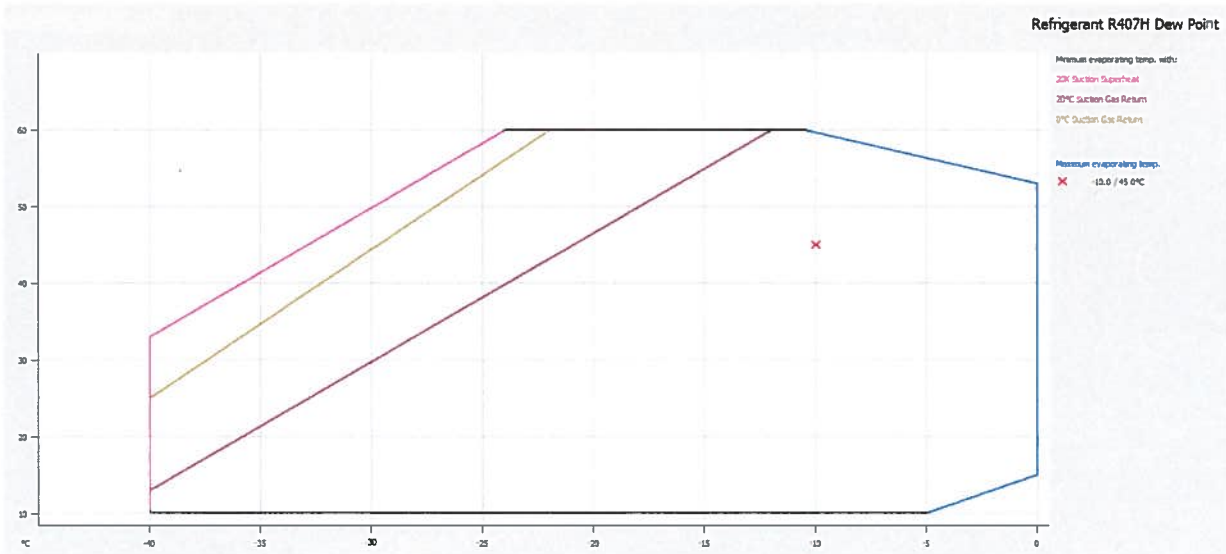
- Scroll compressor models ZB (Fixed Speed) and ZBD (Digital capacity modulation) for medium temperature applications:
 - Fixed Speed models: **ZB15KCE-TFD, ZB19KCE-TFD, ZB21KCE-TFD, ZB26KCE-TFD, ZB29KCE-TFD, ZB38KCE-TFD, ZB45KCE-TFD, ZB48KCE-TFD, ZB57KCE-TFD, ZB66K5E-TFD, ZB76K5E-TFD, ZB95K5E-TFD, ZB114K5E-TFD**
 - Digital Capacity-modulated models: **ZBD21KCE-TFD, ZBD29KCE-TFD, ZBD38KCE-TFD, ZBD45KCE-TFD, ZBD57KCE-TFD, ZBD76K5E-TFD, ZBD114K5E-TFD**

Calculated operating envelope R407H according to EN12900 MT standard conditions:



- Semi-hermetic Stream Compressor models 4M (4-cylinder) and 6M (6-cylinder) for medium temperature applications

Calculated operating envelope R407H according to EN12900 MT standard conditions:



Please note that:

- Emerson has identified higher discharge line temperatures (DLT) in applications using R407H than those with commonly used Lower-GWP R404A-like refrigerants like for example R448A/R449A.
 - It is essential for the compressor reliability to avoid DLT higher than 130°C.
 - Please take appropriate measures for your systems to keep this temperature within the safe limit (i.e. head fan or air ventilation by condenser's fan motor for Semi-hermetic compressors)
- Maximum operating discharge pressures:
 - For Scroll Compressors High side PS = 28.8 bar(g) which corresponds to 66.0°C for R407H.
 - For Semi-hermetic Compressors High side PS = 32.5 bar(g) which corresponds to 71.5°C for R407H.
 - For safety reasons, Emerson suggests not to exceed $t_{cond} \leq 60^\circ\text{C}$ (condensing temperature) for Semi-hermetic Compressors and $t_{cond} \leq 55^\circ\text{C}$ for Scroll Compressor applications.

In case of compressor damage, Emerson reserves the right to tear down and investigate the compressor parts individually. The standard warranty will not be applicable for application related fault such as exceeded maximum temperature or lubrication complications.

Due to the technical fact that R407H has the same molecular structure with different mix percentages compared to R407A/C/F and same flammability classification (A1), no further tests are needed to be executed. Therefore, please consider that Emerson has no test based knowledge about the expected service life, real performance, wear or maintenance costs and that the product may behave differently than usual or expected.

For your kind information.



i.A. Dr.-Ing. Andreas Bühring
Director Application Engineering Europe



i.A. Matthew Irons
Vice President Engineering Europe