



ENVIRONMENT-FRIENDLY HEATINGWITH R290 HEAT PUMPS

Dr. Joachim Maul - Brussels, 15th of October 2013







CONTENT





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- 2. LWD a R290 heat pump
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AIT-DEUTSCHLAND







- Company is member of NIBE
- Location: Kasendorf (Bayern, D)
- Founded 1998
- Staff: 450
- Capacity: 50.000 units p.a.

Products:

- Heat pumps in the range 3 -160kW (Air, Brine, Water)
- Sales of Heat Pumps in 21 european countries
- Chillers from 1kW 800kW
- Sales of Chiller: worldwide

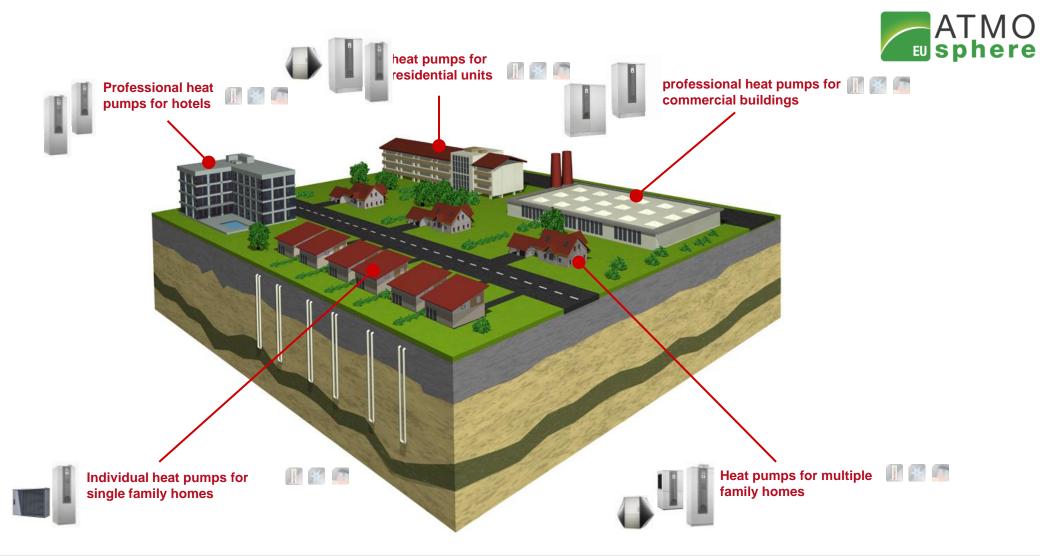






HEAT PUMPS





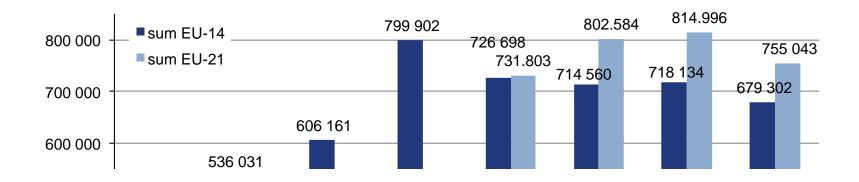






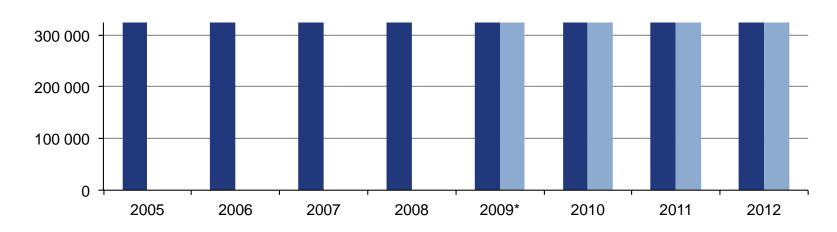
VOLUME OF THE EU-MARKET







Between 2005 and 2012 more than 5,4 Mio HP's are installed in Europe



Source: EHPA, 2013







LWD – R290 HEAT PUMP







LWD 5 – 9kW

- Decision for R290 due to possibilty to reach flow temperatures up to 70°C
- Water temperature 62°C at -20°C possible without additional electrical heater
- Long time availability and low GWP: 3
- Suitable for renovation markets



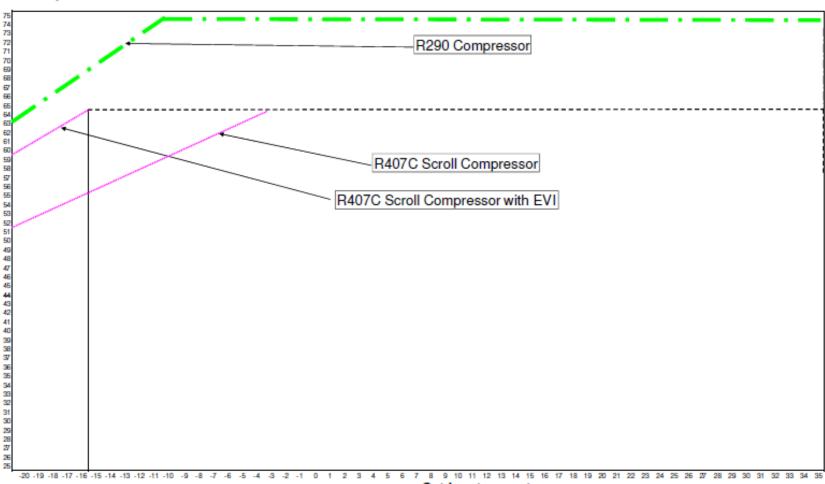




COMPARISON - R290/R407C



Flow temperature











EXPERIENCE WITH R290



VDE Prüf- und Zertifizierungsinstitut





What have we done?

 No special construction details electrical box (marginal highes

- Only R290 approved compon-

- From beginning of the project

- Safety concept was approved

 Saftey tests were performed to no propane can ignite THE Prof- und Zertifzierungsinsthut GmbH - Medanstralie 28 - D-63009 Offenbech

Alpha-InnoTec GmbH Industriestraße 3 Herrn Jesper Stannow 95359 Kasendorf

Herr Jesper

Jehre DVE

Offenbach, 2011-06-1

Unser Zeichen - bitte engeben 5008512-2600-0001/150439 FG26/rlic

Ansprechartner
Herr Richter
Tel (069) 83 06-682
Fax (069) 83 06-606
stephan.richter@vde.com

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PRÜFBERICHT zur Information des Auftraggebers

Test Report for the Information of the applicant

Produkt / Product: Wärmepumpe (Luft-Wasser Wärmepumpe zur Außenaufstellung)

Typ / Type: LWD 50/

dieser Prüfbericht enthält das Ergebnis einer einmaligen Untersuchung an dem zur Prüfung vorgelegfen Erzeugnis. Ein Muster dieses Erzeugnisses wurde geprüft, um die Übereinstimmung mit den nachfolgend aufgeführten Normen bzw. Abschritten von Normen festzustellen.

Die Prüfung wurde durchgeführt am 03.05.2011 und am 27.05.2011

Der Prüfbericht berechtigt Sie nicht zur Benutzung eines Zertifizierungszeichens des VDE und berücksichtigt ausschließlich die Anforderungen der unten genannten Regelwerke.

Wenn gegenüber Dritten auf diesen Prüfbericht Bezug genommen wird, muss dieser Prüfbericht in voller Länge an gleicher Stelle verfügbar gemacht werden.

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no additional costs)

EXPERIENCE WITH R290





Can R290 be used in a mass production?

- Yes! ©
- Additional sensor at filling station in production and test facilities
- Additional test due to pressure directive and test of tightness of electrical box
- Costs for R290 is in the range of HFC's
- Pressure in the system is in the range of other refrigerants
- But not every oil can be used









EXPERIENCE WITH R290





Experience with R290 as a refigerant

- -Training of production staff, service technicians and customers mandatory like it is for every refrigerant
- Easy to handle in production and service because it is no mixture (temperature glide)
- Refrigerant is long time available future planning reliability for manufacturer and customer
- Additional manufacturing costs compared to HFC's are low and acceptable
- Less components than compressors with EVI technology







R290 AS A REFRIGERANT FOR ALL HP





Is R290 a refrigerant for all heat pumps?

Due to its thermodynamic behaviour It is a good refrigerant for all heat pumps, but ...

- Components (like compressor) covering the complete capacity range are not available today
- Additional research/investigation for the general usage and especially safety regulations are necessary
- Following existing safety regulations it is appropriate for outdoor heat pumps







R290 AS A REFRIGERANT FOR ALL HP





Is R290 a refrigerant for all heat pumps?

- For indoor applications additional safety devices are mandatory like a gas alarm device and ventilation



Due to additional installation costs (~350 - 500€) many customers would abandon from such a solution and decide for a heat pump with HFC or other technology (e.g. gas boiler)



In that case incentives for the end customer are necessary





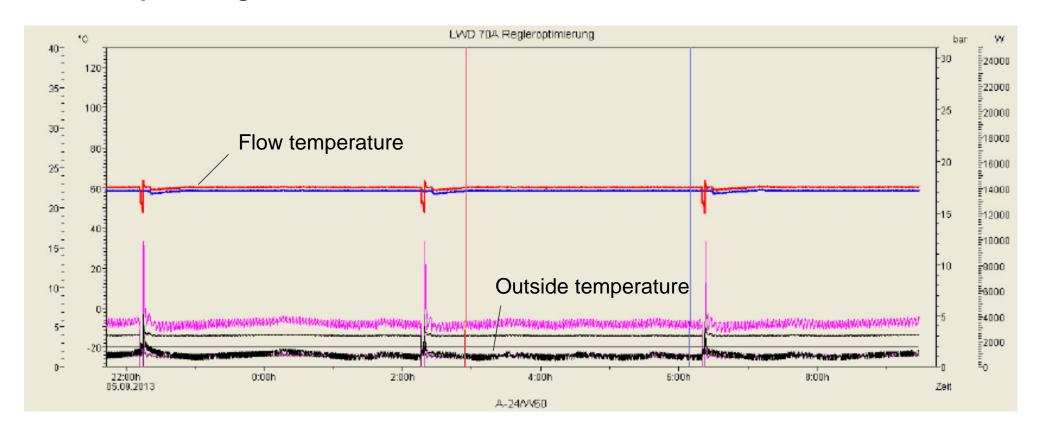


APPLICATION EXAMPLES





Heat Pump running at A-24/W60 without additional electrical heater









CONCLUSION





- R290 is a good refrigerant for outdoor Air/Water-heat pumps
- Advantages are the high temperatures at low ambient temperatures
- R 290 can be handled in a mass production with less additional effort compared to HFC's
- Due to it's low GWP and to reduce CO₂-emission R290 is a proper refrigerant for environment friendly heat pumps
- It is not a refrigerant for all heat pump, especially for indoor applications because of additional safety installation costs
- If possible we want to extend our product portfolio (availability of components, compliance with international safety regulations)









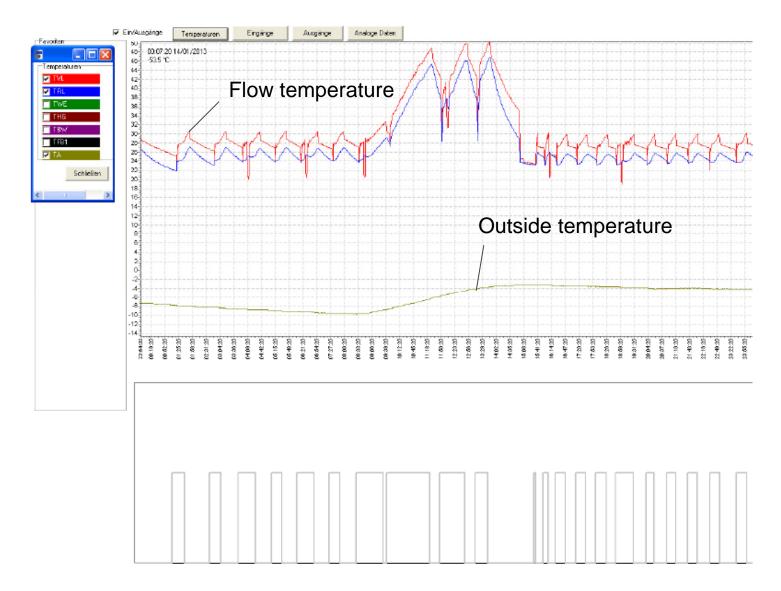
natural refrigerants

15-16 October 2013, Brussels

Let's use the best solution - R290 is one!

APPLICATION EXAMPLES







Typical winter day

 $T_{amb} = -3^{\circ}C$ to $-10^{\circ}C$





