

Fluid Transport Components for R744



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Agenda

- Fluid Transport components in the system
- System leakage & detection
- Fitting requirements & results
 - Leakage
 - Package, weight
 - Service
- Charge valve & tool
- Summary

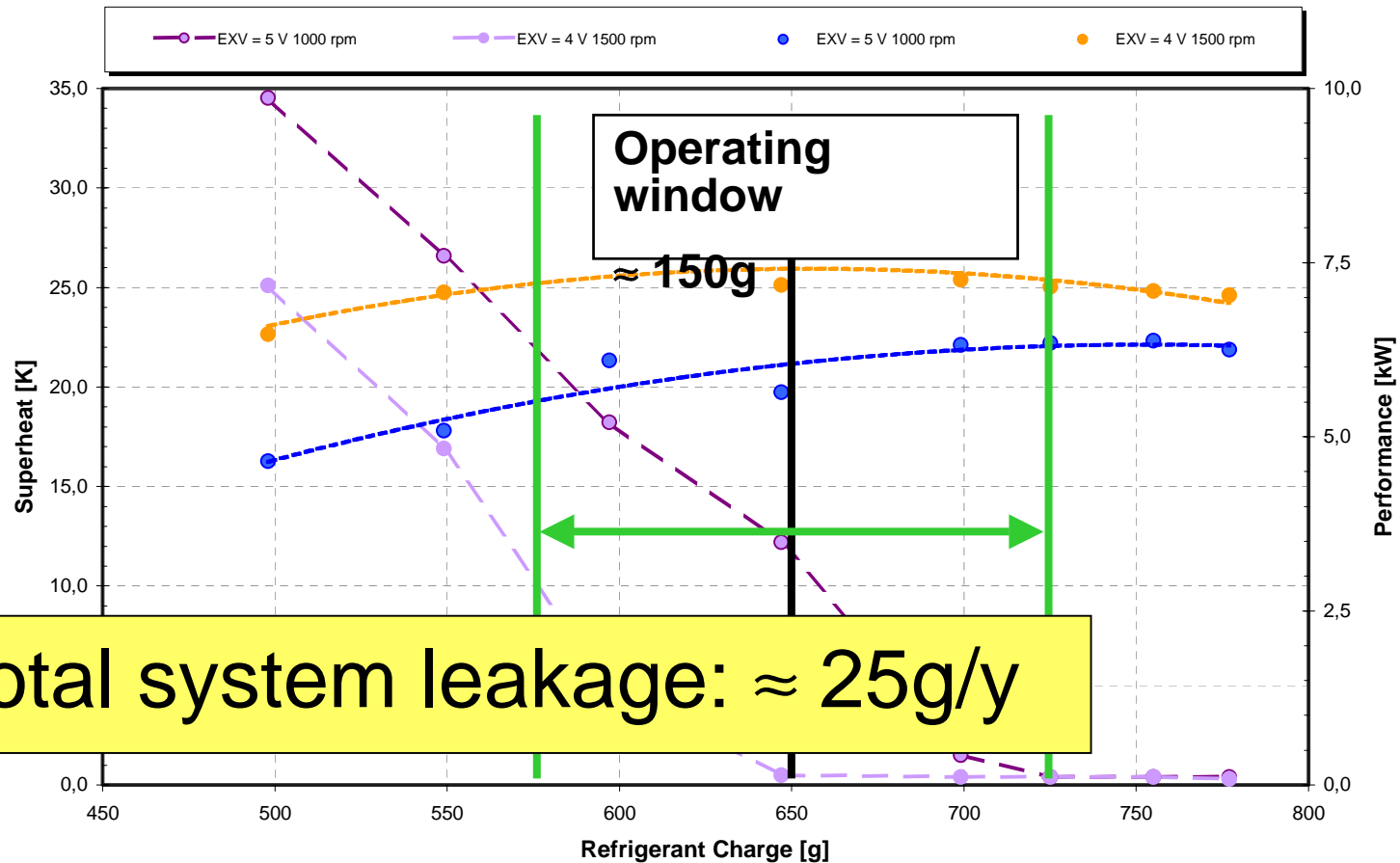
Leakage scenario - R134a

- ⇒ Average R134a charge in EU: 756g*
- ⇒ Average regular leakage: 53g/y*
- ⇒ Operating window: 456g ...656...756g
- ⇒ Operating time: 300g / 53g \approx 6 Years

* Establishing the Leakage Rates of Mobile Air Conditioners /2003 / Schwarz /
Harnisch

Leakage scenario – R744

⇒ Operating time: ≈ 6 Years



⇒ Total system leakage: $\approx 25g/y$

Leakage distribution – R744

⇒ Total system leakage: $\approx 25\text{g/y}$

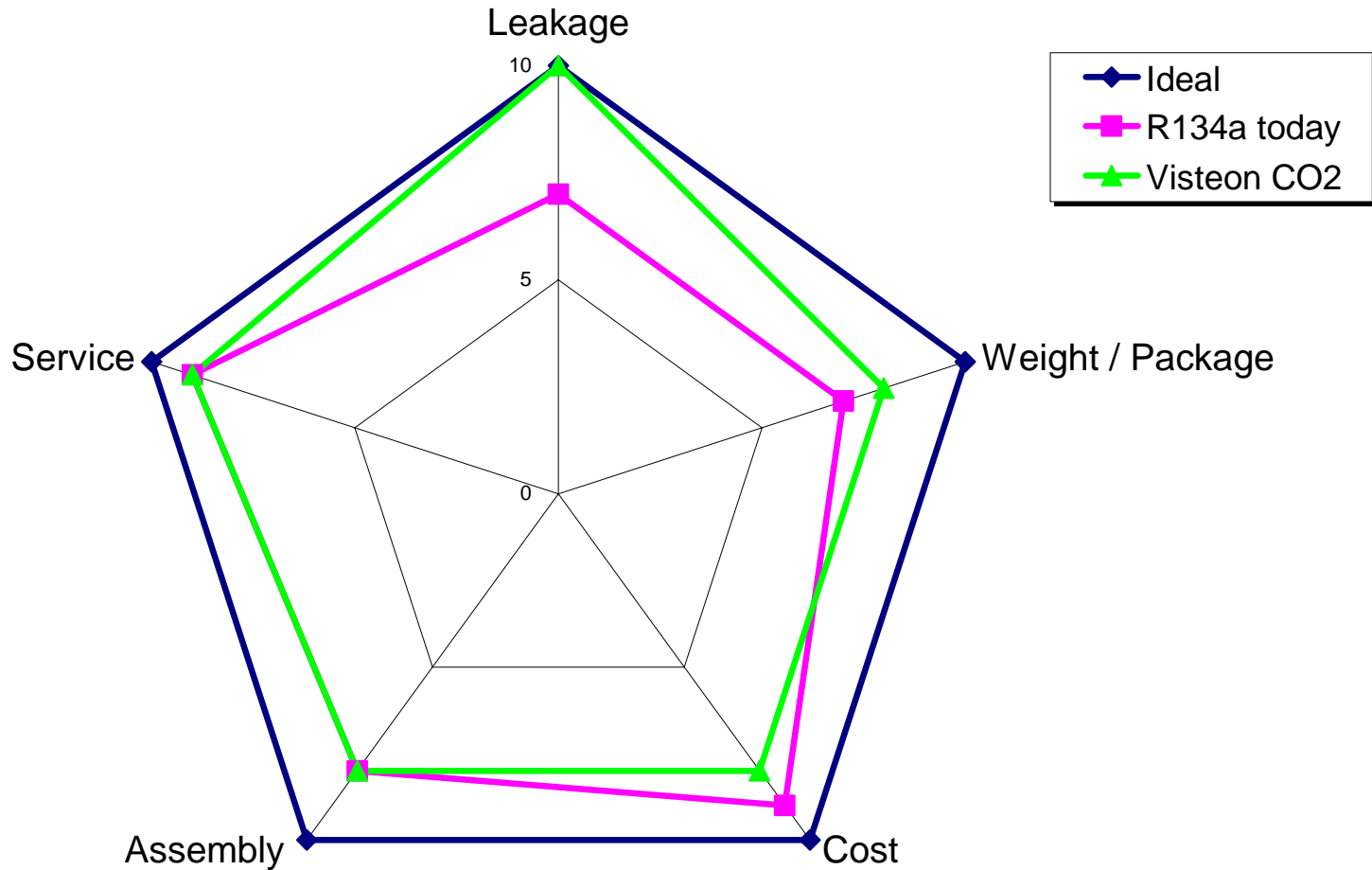
- ⇒ Compressor: 12g/y
- ⇒ Gascooler & Evaporator: 2g/y
- ⇒ Accu & IHX: $\leq 1\text{g}$
- ⇒ No. of fittings: $13+4=17 \Rightarrow \leq 1\text{g}$
- ⇒ Hoses: $\leq 1\text{g}$

Leakage detection – R744

⇒ Could a R744 leak be identified?



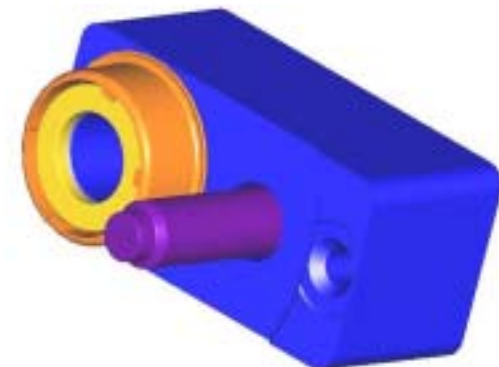
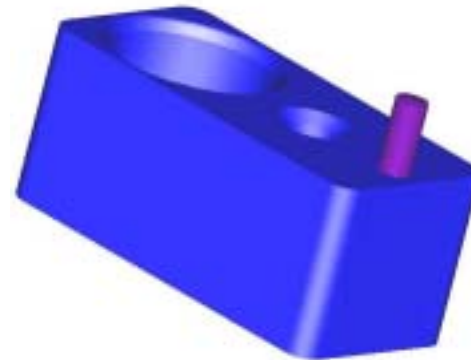
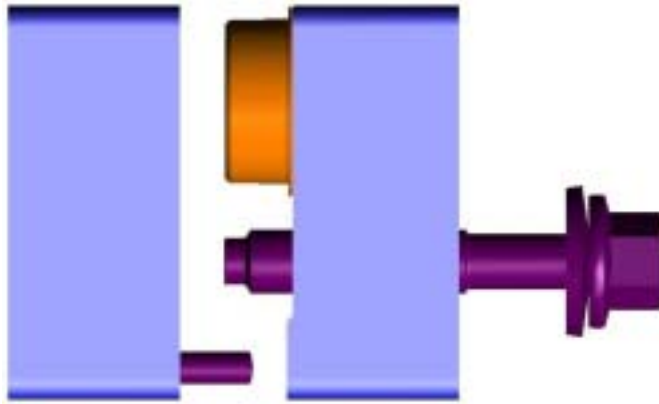
Fittings – Development goals



P-Nut Fitting

Design #2

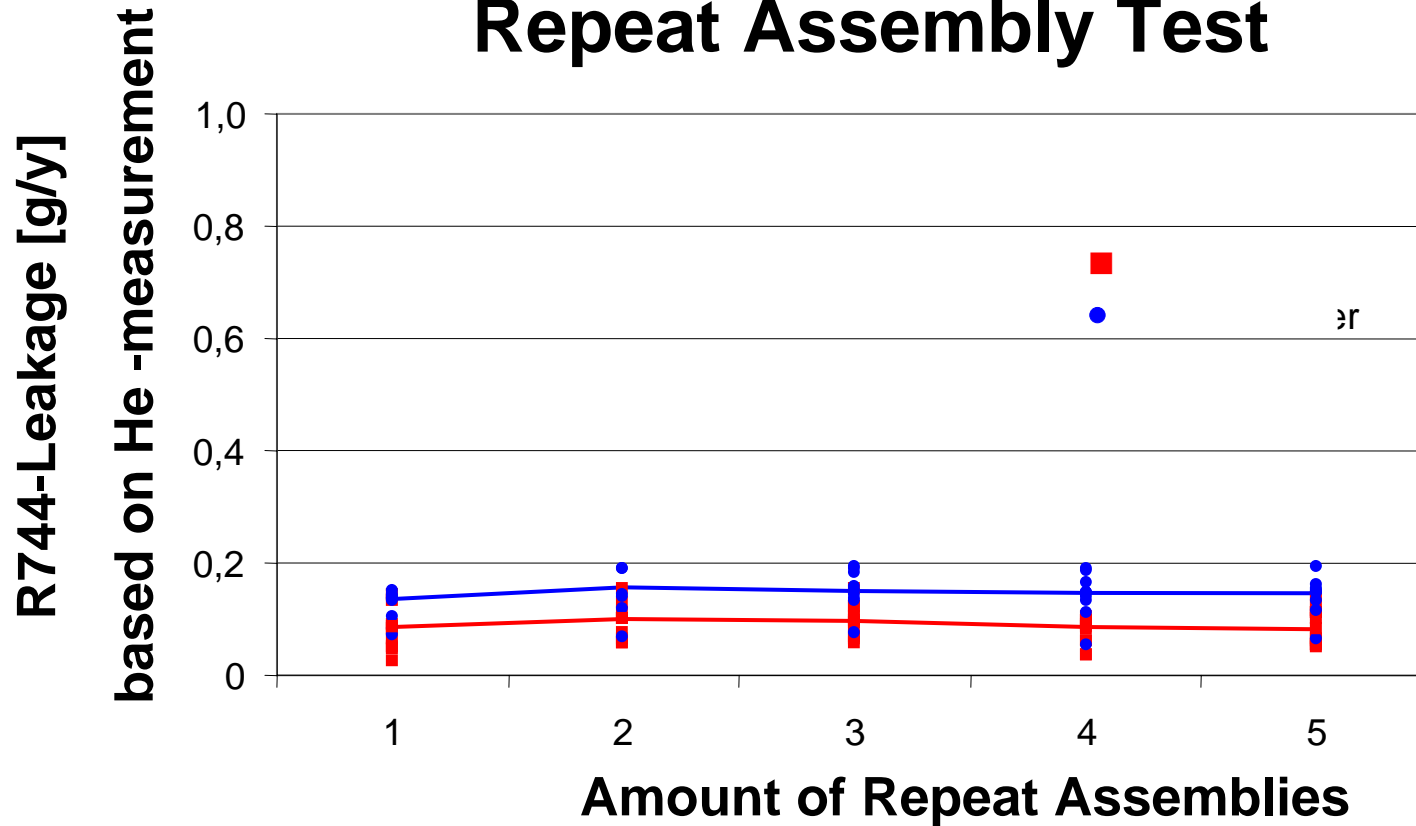
- + “Slip-In”-Assistance with Cap & Pin
- + Small male ‘overhang’ – assy ease
- + Soft sealer for high reusability
- + Cap aligns & protects sealer
- + Sealer exchangeable
- + Sealer inevitable



Leakage-Results

Design Step 2

Repeat Assembly Test



Package / Weight

R744 (Visteon)

R134a (Visteon)
HP **LP**



Weight

54g

50g

62g

Service

⇒ What happens if a fitting is opened under system pressure?

VIDEO

Charge Valve

- No elastomer seals
- Cap without sealing function
- Simplicity
- Design SAE conform
- Reusability >20



Summary

- ⇒ R744 leaks can be detected with 'normal equipment'
- ⇒ In order to match R134a operating times, the hoses and fittings need to be nearly leak free
- ⇒ Presented fitting and charge valve technology achieved development goals regarding leakage, assembly, cost and service