

Comparative study of AC- and HP-systems using the refrigerants R134a and R744

An investigation of R134a- and R744-systems
carried out by three car manufacturers



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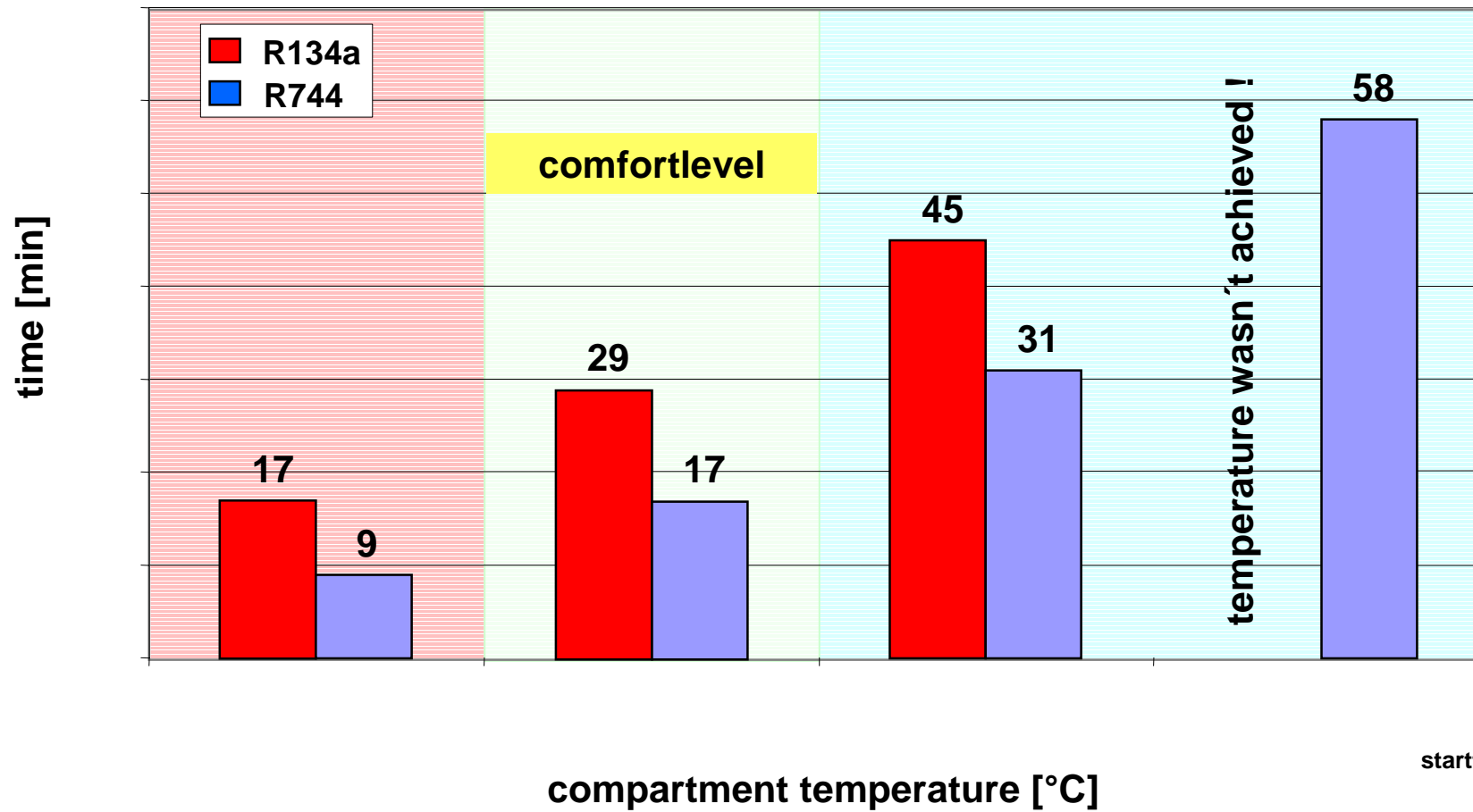


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cool down comparison of R134a and R744 BMW 3 series

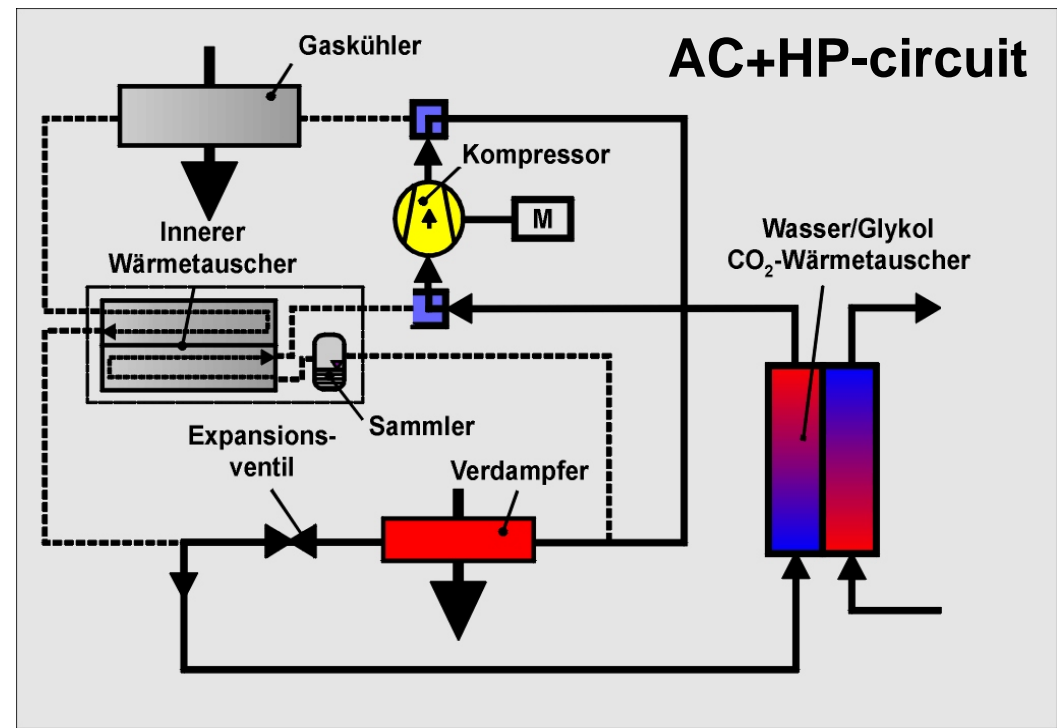
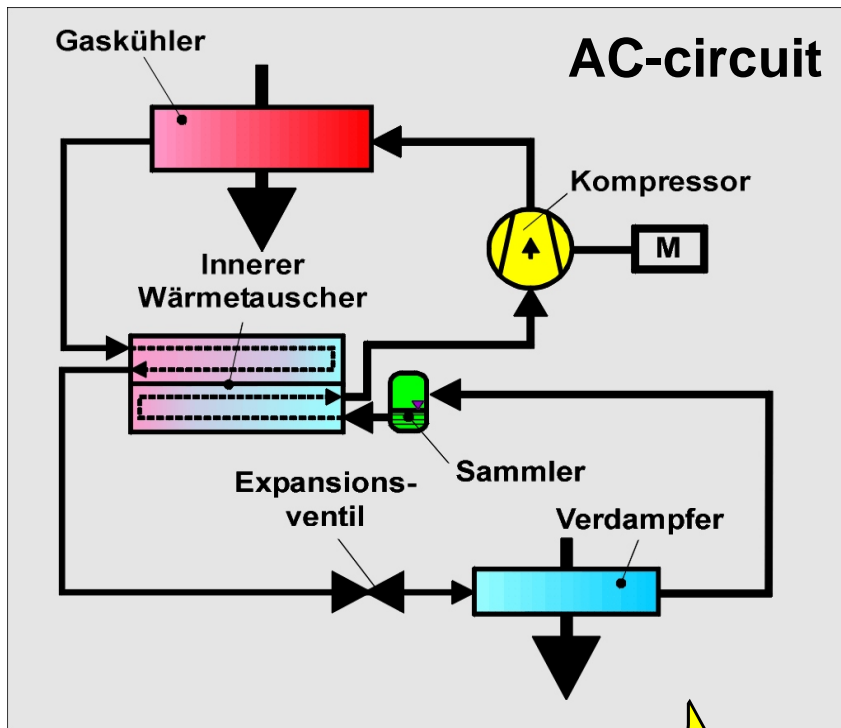


starttemp. head: 75°C
tamb.: 40°C
sunload: 1000 W/m²



combination of an AC- and HP-system using R744

HP-system instead of a conventional supplementary heater

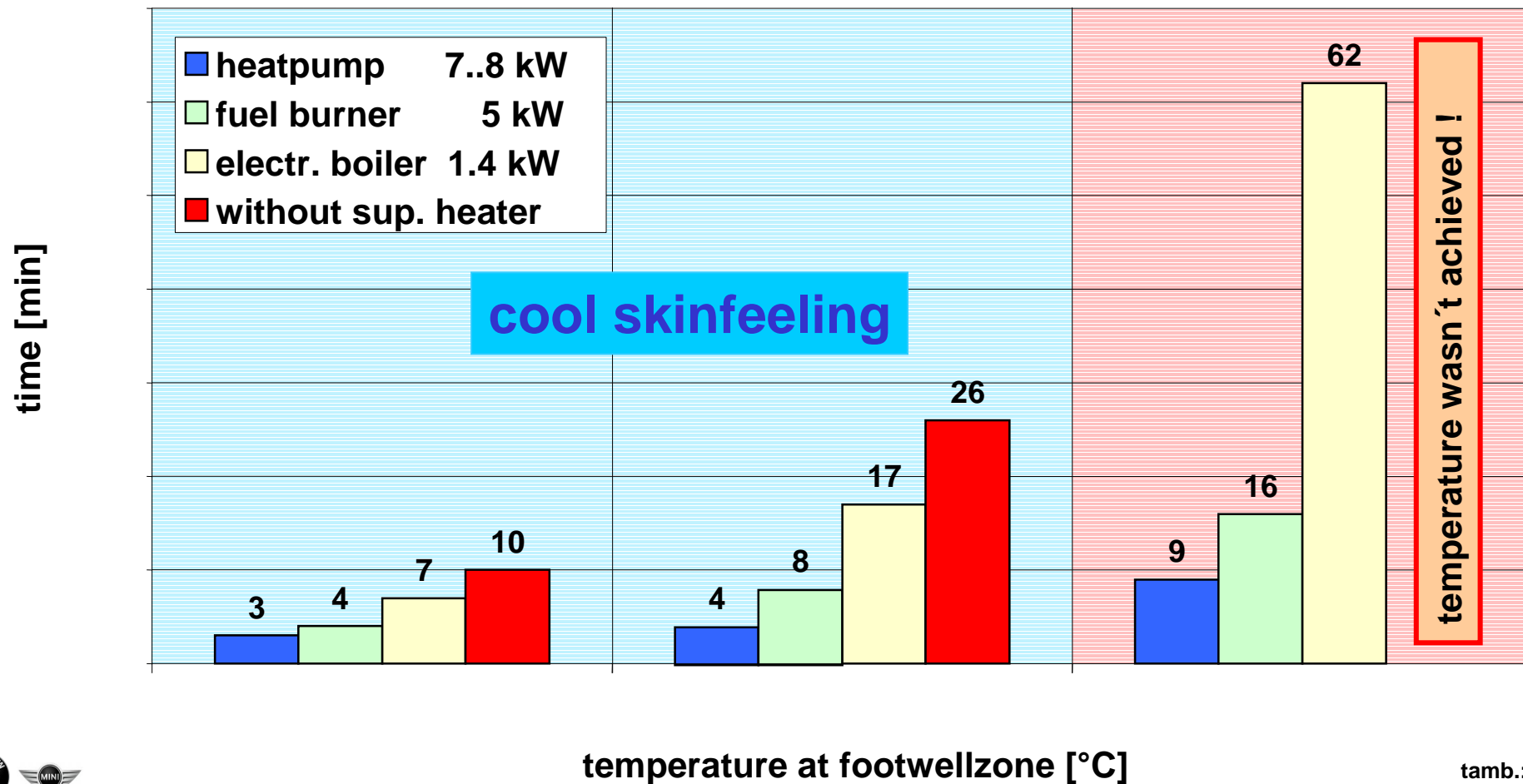


+ 2 valves

+ water/ refrigerant heat exchanger

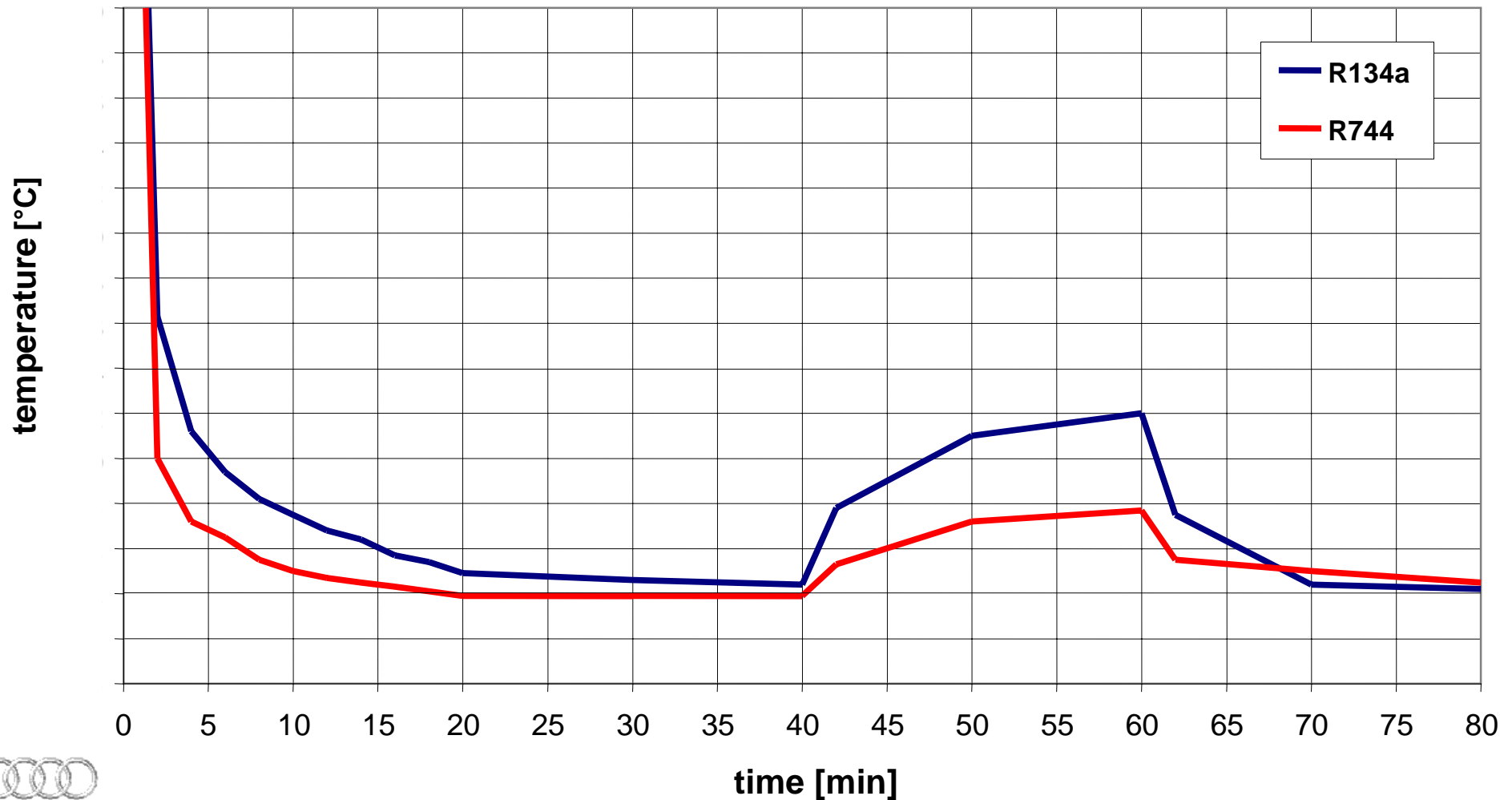
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heat up comparison of supplementary heaters at footwellzone



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comparison of average temperatures at dashboard outlets Audi A4

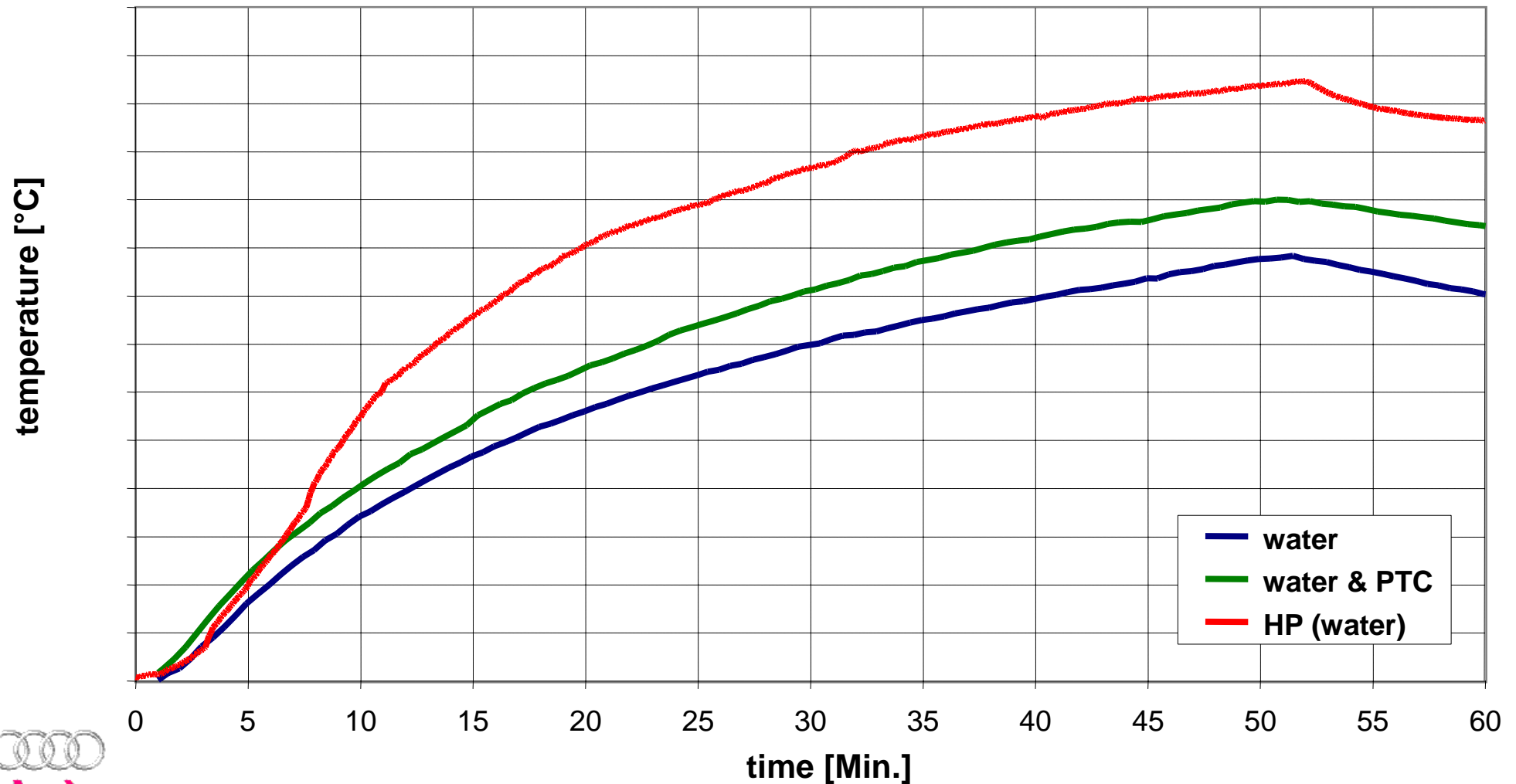


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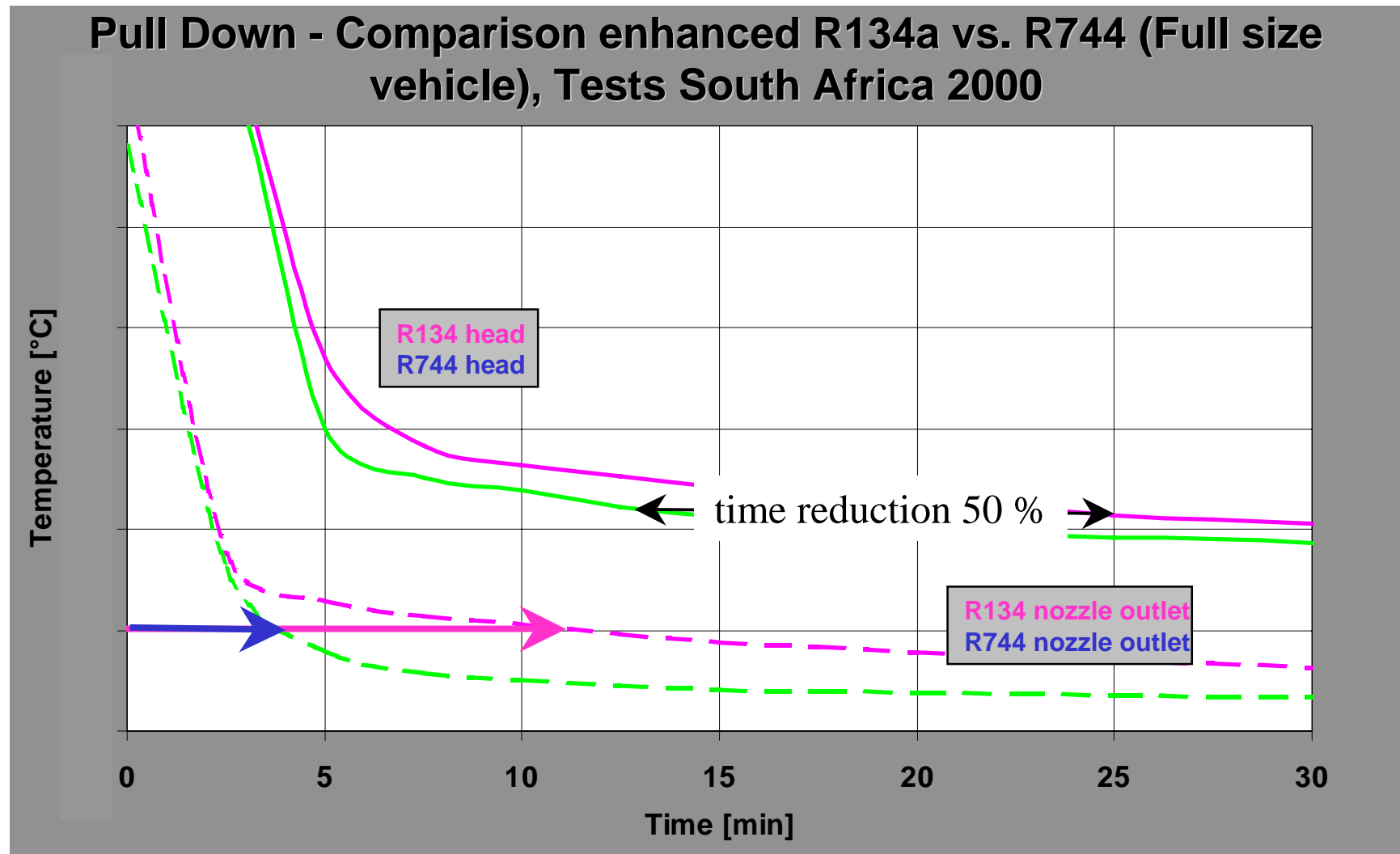


comparison of average temperatures at headzone

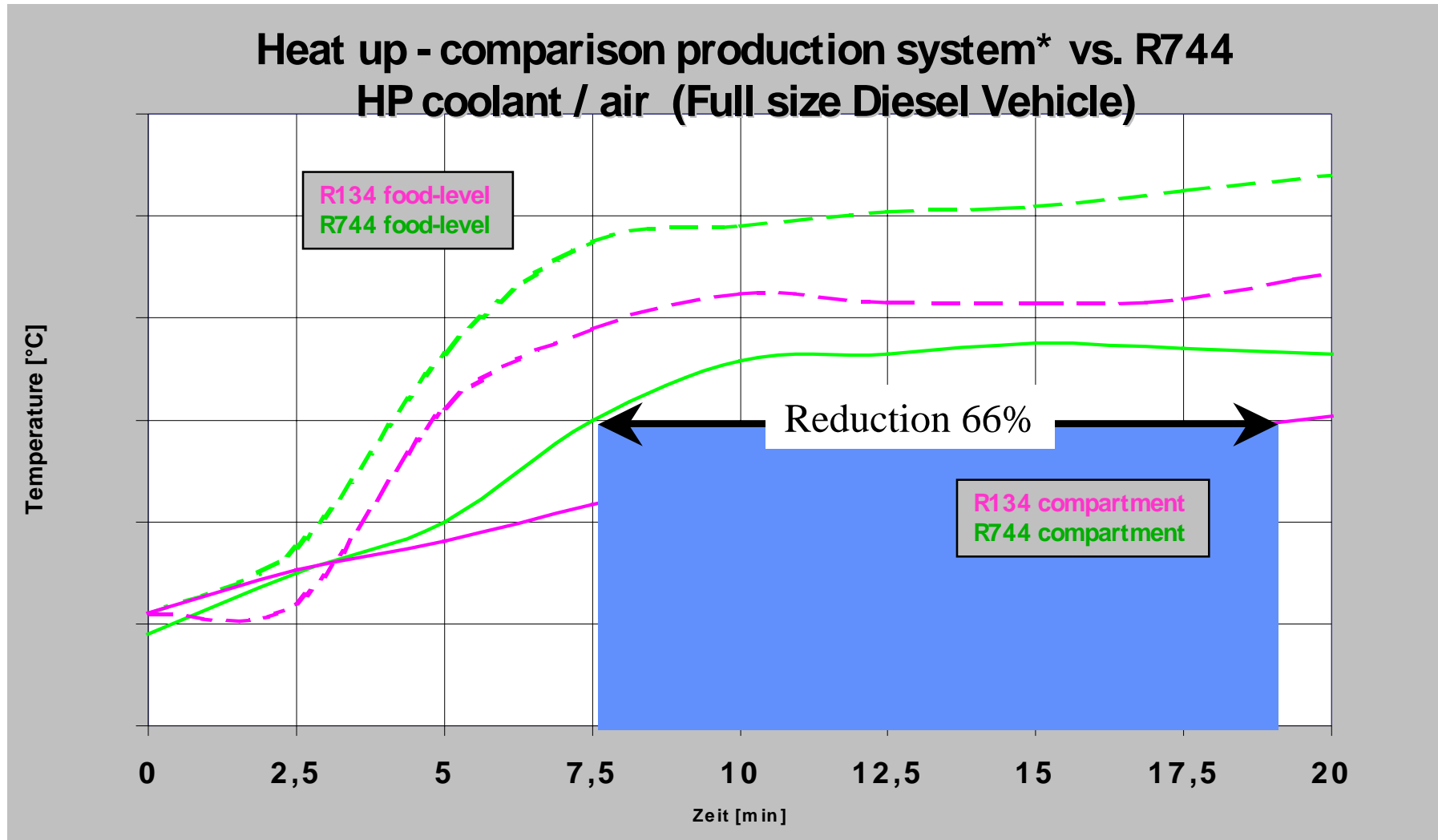
Audi A4 1.9 PD



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* 5kW fuel burner + 2kW PTC

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Summary

- the comparative investigation of R744 AC-systems shows:
 - higher performance in cool down mode vs. R134a
 - low compartment temperature and higher dynamic in cool down
 - higher potential for developing components
 - reduction of fuel consumption in AC-mode vs. R134a
- the comparative investigation of R744 HP-systems shows:
 - HP-systems just possible with R744
 - higher performance in heat up mode vs. supplm. heaters
 - reduction of fuel consumption for supplm. heating
 - high compartment temperature and dynamik
 - driving safety at better window lookout

**These results of the investigation of R134a-, R744-systems
and supplementary heaters are carried out by three car
manufacturers!**