

Modern cars need modern hoses

To ensure that hoses perform to the required specifications, vehicle manufacturers' OEM standards as well as legislation (especially with regards to the environment), it is essential that hose manufacturers adopt an innovative approach to the development of hoses.



There is an ever increasing demand for high performance automotive hoses

A hose is not just a flexible connection from point A to point B in a generic car; today hoses are manufactured for special applications, and are required to perform to very high standards in extreme environments.

For example: low permeability of gas and liquids, chemical resistance to the media and resistance to cold climate as well as high temperatures, resistance to both static and dynamic pressures in the system, vibration and noise damping and so much more.

There is an increasing demand for hoses to perform to an ever higher standard, and an innovative approach to new materials and designs is essential in order to be able to meet those new requirements.

To illustrate the point, let us take a look at this example:

Before the year 2000, hoses used in vehicle air conditioning (AC) systems were made from pure rubber, for example nitrile-butadiene rubber (NBR) inside and chloroprene (CR) outside. At this time the refrigerant in the AC system was typically R-12 (Dichlorodifluoromethane), temperature requirement -29 °C to +120 °C,

and permeability was no issue as demand was max. 97-150 kg/m²/year! However, the issue of the degradation of the ozone layer resulted in new legislation on the hose permeability as well as other restrictions.

Thus, the R12 was abandoned and changed to R134a (1,1,1,2- tetrafluoroethane). Because

there was no chlorine present in the new refrigerant, it had also no impact on the degradation of the ozone layer (ODP=0), and at the same time the global warming potential (GWP) was reduced from R12=7100 to R134a=1200*. And because the hose was developed even further, having previously being manufactured from pure rubber, the introduction of the hybrid

Refrigerant loss vs temperature

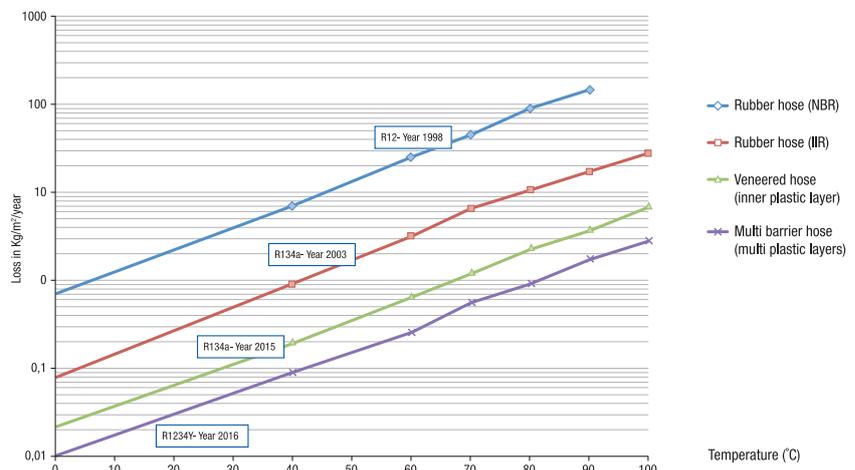


FIGURE 1: Loss of refrigerant in relation to temperature



Permeability is equally important as the working temperature

A/C Reduced Barrier
Hose with low permeation.
The inside tube is made with high quality EPDM.



hose technology (hoses based on rubber with plastic barrier layers), the permeability was reduced from 97-150 kg/m²/year to <5 kg/m²/year. This resulted in an even further reduction of the impact on the environment.

Today, the restrictions on permeability are in some cases even less than 2 kg/m² annually.

As a result of recent investments in new production facilities and development of more efficient processes, using multi-barrier technology, Codan Lingyun produce hoses with permeability levels less than 1 kg/m²/year. In order to reduce the permeability further new multi barrier designs are developed and used as new product designs.

The demand for better performance has resulted in the temperature specifications being changed to -40 °C to +160 °C, which is more than a 30 % increase in performance. This, of course, makes it necessary to use much more sophisticated materials compared with the 'good old days'.

To lower the GWP even further, car manufacturers are currently changing from R134a to the new refrigerant R1234YF. The change is fuelling the pressure on hose manufacturers to ensure compatibility with, not only, this new refrigerant, but also the oils which is being used to lubricate the compressor in the system.

It has been predicted that the ideal cooling gas for air conditioning is CO₂, and hose manufacturers, compressor producers, as well as system designers have worked hard towards developing new products for this gas, which have no negative impact to the ozone layer and global warming. But because the optimal solution has not yet been found, R1234YF will be used as a compromise until that day arrives.

Permeability is important as well as working temperature, but revisions of other characteristics of the hose have also been necessary in order to accommodate the increasing demand for a better performance from car manufacturers.

As cars become more efficient and the ride quieter, there is a growing demand on noise damping. Thus, the issue of noise has driven the development of softer and more flexible hoses to secure better NVH performance (noise and vibration damping).

Codan Lingyun has developed a new hose with excellent noise damping properties and compatibility to R1234YF and the new compressor oils, as well as a very low permeability.

The hose technology has witnessed an extensive development over the last 20 years, and it will not stop here; the demand for more environmentally friendly components is the im-

petus that will continue the evolution of high performance automotive hoses.

The next generation of cars, be it hybrid- or electric cars, will all require unique hoses, thus Codan is continually developing new hose technologies in tandem with the automotive industry to ensure that the hose performance is equal to the application.

* R-12 Dichlorodifluoromethane
R-134a Tetrafluoroethane

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Rigorous testing ensures very high quality standards