



Delivering value for brake systems in Arnitel®

As the automotive industry works to improve pollutant emissions to comply with more stringent legislation such as Euro 6, fuel economy becomes an increasingly important factor. The main trends in the automotive industry include downsizing of engines and weight saving throughout the entire vehicle. Two primary consequences of downsizing are that engines have less mounting space available and temperatures increase significantly.

For trucks and light vehicles, DSM's Arnitel® thermoplastic copolyester (TPC) provides significant benefits for the production of tubes and hoses, including its unsurpassed high heat performance and inherent flexibility. Working under the toughest conditions, Arnitel is the future-proof alternative to metals, alternative plastics and rubbers for vacuum brake tubes and air brake tubes.

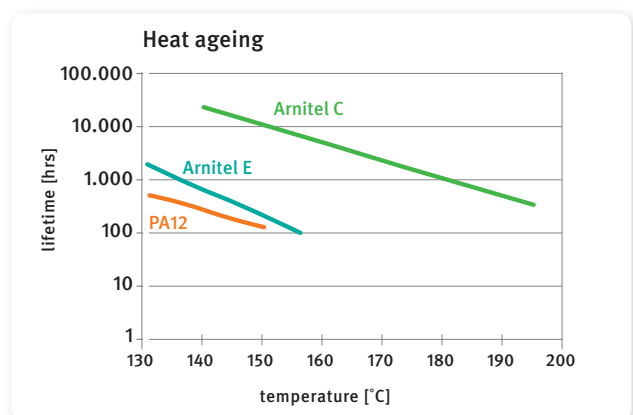
Vacuum brake tubes

In cold temperatures, vacuum brake tubes require extremely good retention of fitting and flexibility. Ozone and peak temperature resistance are also key since the vacuum created from the engine is needed to multiply the braking force.



Arnitel® E and Arnitel® C have gained recognition in the industry as the materials of choice for vacuum brake tubes. With the best high-heat performance of any TPC, Arnitel delivers significant benefits over metal, plasticized polyamide (PA) and rubber.

Arnitel E operates at temperatures ranging from -40°C to 110°C,. It offers excellent heat-aging behavior, with high mechanical strength and elongation at break. Arnitel EM630-H is the best-performing material at low temperatures, maintaining its flexibility and strength better than polyamide 12 (PA12) which tends to embrittle under these conditions.



Arnitel C stands out due to its successful testing at a continuous use temperature of 175°C for 3,000 hours, all while maintaining its flexibility and strength better than polyamide 12 (PA12) which tends to embrittle under these conditions.

Arnitel C outperforms rubber, remaining flexible throughout its lifetime, contributing to weight savings to provide greater design freedom, and with full recyclability.

Both Arnitel E and Arnitel C offer significant cost reductions compared with both PA12 and rubber, since there is a high chance no heat shield is required. They also provide greater design flexibility and safety, being completely plasticizer-free. Arnitel TPC is a completely recyclable plastic.

Air brake tubes

Ensuring high performance throughout the lifecycle of air brake tubes is essential. This translates into demanding requirements for the materials used in this application, including high temperature resistance, minimal creep and good chemical resistance. Arnitel E and Arnitel C are recognized in the industry as the materials of choice for tube and hose applications that are close to the engine or other heat sources. With the best high heat performance of any TPC, Arnitel outperforms metal, plasticized polyamide (PA) and rubber.

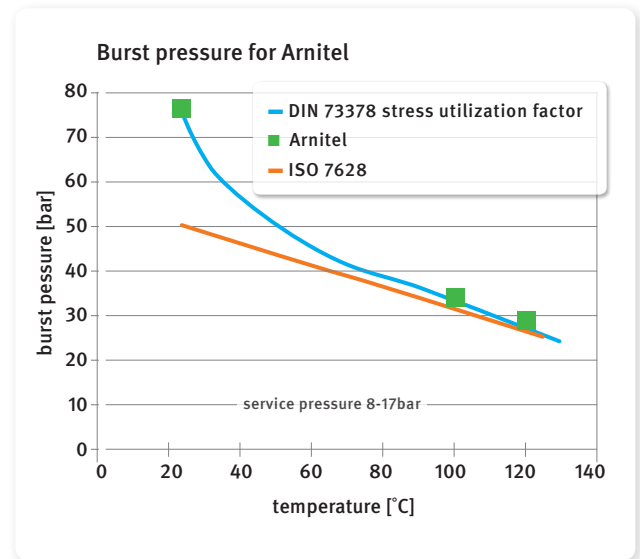


Plasticizer-free Arnitel C, both in mono- and multi-layer tubes, delivers an impressive range of benefits over plasticized PA, including unmatched mechanical properties, and higher peak and continuous use temperatures that enable closer placement to the heat source without the heat shielding or packaging that PA12 requires.

The Euro 6 legislation, already implemented for trucks and coming soon for light vehicles, places greater requirements on the materials used in automotive applications. Arnitel C has established itself as the answer to the increasing temperature resistance required, and Arnitel products comply with the global requirements DIN 73378, ISO 7628 and FMVSS 49 CFR 571.106.

High-temperature airbrake tubes: EURO 6			
Category	Max. working pressure [kPa]	Minimum temp. [°C]	Maximum temp. [°C]
0	1000	-40	80
1	1000	-40	100
2	1250	-40	100
3*	1250	-40	125

*For use in the engine compartment (ISO 7628)



- Arnitel meets DIN 73378 burst pressure
- High Tm of Arnitel > high burst pressure at elevated temperatures (most important condition)

Arnitel is also suitable for use in multi-layer PA systems with the development of a special adhesion grade that provides high reactivity with polyamides. In hydraulic hoses, the good chemical resistance of PA11 or PA12 can be combined with the high temperature resistance and intrinsic flexibility of Arnitel. This multi-layer approach offers a number of benefits, including lower system costs over a mono-layer rubber solution, reduced release of plasticizers into the production system and the environment, and improved chemical, mechanical and thermal resistance for demanding applications.

DSM has a strong track record of co-developing new applications – and the company works with many leading producers to introduce new and breakthrough applications in a large number of industries around the world. With extensive application know-how and an excellent understanding of industry needs, DSM has the facilities to innovate and adapt materials and applications.

DSM Engineering Plastics

For further information, please see:
www.dsm.com or contact:

Europe

Tel +31 46 47 73796
Info-Europe.DEP@dsm.com

Americas

Tel +1 800 333 4237
Info-Americas.DEP@dsm.com

Asia Pacific

Tel +86 21 6141 8188
Info-Asia.DEP@dsm.com

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