

Railway Gazette

INTERNATIONAL



AUSTRALASIA

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PAGE 37



PASSENGER TRAINS

Enter the Aventra
Bombardier has developed the Aventra multiple-unit design for the UK

PAGE 50



IN FOCUS

Coach competition
Deregulation of long-distance buses in France poses a threat to rail

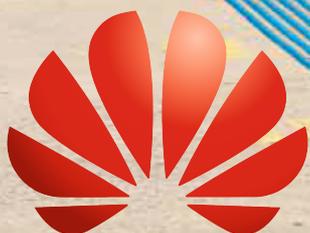
PAGE 62

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Thriving cities seek investment




HUAWEI

PASSENGER ROLLING STOCK Standards

The clean air challenge



Changing times. Much tighter standards covering fire safety, ventilation and internal hygiene apply to the ICx trainsets (left) which are now making their first test runs on the German network; Kalthoff is supplying advanced air filtration devices to lead contractor Siemens.

The need to control contradictory risk factors including gas circulation, bacterial hygiene and fire risk is driving uptake of fully-synthetic panel filters in HVAC systems for passenger trains.

AXEL VOSS
Account Manager, Air Filtration
Kalthoff Luftfilter und Filtermedien

From Hamburg to Kuala Lumpur, the provision of clean, fresh air within a passenger saloon requires an advanced understanding of the behaviour of particulate matter. In Europe, tightening standards around the EN 45545-2 Euronorm (p54) mean that a closer relationship between component specialists, systems integrators and train operators will be essential to optimise the design and maintenance of onboard ventilation systems.

The long-established practice which saw vehicle interiors subject to less stringent regulations than buildings on particles, dust and micro-organisms is no longer appropriate, and the changing regulatory framework for fire prevention of EN 45545 is likely to have implications in terms of the procurement and whole-life costs of HVAC components.

Air filtration

Today, there is a much greater awareness of 'fine-grain dust' in all aspects of life, particularly in cities and industrial areas. The health



Fig 1 shows how filter classes are applied to deal with the different sizes of airborne particle found in everyday life.

implications of increasing concentrations and air contamination are well-documented — they extend from heart and pulmonary diseases through to neurological and dermatological illnesses. As a result, producers of air-conditioning and ventilation devices have an increased responsibility to develop filters that can help to combat these harmful effects.

Over recent decades, filter pads in Class G3 have been used almost

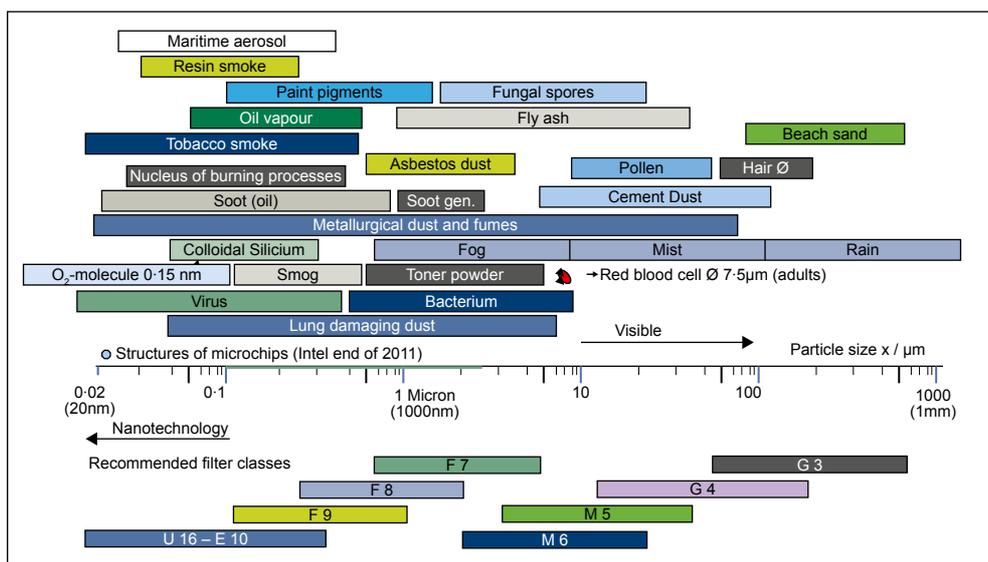
exclusively in rail vehicles. But to meet more stringent quality standards, changes will be required both to the filter medium and the filter design. Not only will products offer more effective and reliable filtration, but they will also have to meet new requirements on hygiene, fire safety and energy efficiency.

The use of panel filters in air-conditioning and ventilation equipment for rail vehicles is relatively new. These are characterised by larger filter surface areas, more effective filter media, lower pressure losses and longer service lives, as well as more malleable framing options.

Hygiene and micro-organisms

In passenger vehicles, air hygiene standards have been repeatedly updated since the initial VDI 6022 was introduced in Germany in 1998. The current standard in common use is the May 2015 update to VDI 6032. This has a particular focus on the use of inert materials to prevent metabolism through micro-organisms; use of materials such as cellulose, wood, cotton and natural resins is prohibited.

The use of cardboard frames for ventilation and air-conditioning systems in trains is no longer permitted, because of the risk that these filters could become a source of microbiological infestation and that bacteria, spores or fungi could reach the passenger saloon. One way to



Standards PASSENGER ROLLING STOCK

get around this problem is through the development of fully-synthetic panel filters, which are already widely used in buildings.

The ratification of EN 45545 in March 2013 posed further challenges to railway component suppliers. Setting pan-European standards for fire prevention, the standard assesses product requirements against different hazard levels, which are also used to classify the materials used in sub-components and assemblies. EN 45545-2 supersedes all remaining national standards in this field from March next year. Europe's principal train operators, which are part of the Eurospec industry association, have therefore agreed that procurement processes must now align with EN 45545-2. This marks a major turning point for sub-suppliers, and an opportune moment to rethink product development practices.

Design contradictions

Reflecting the increasingly international requirements of the railway market and the impending change in standards, Kalthoff began as early as 2010 to consider developing its own standard air filters for rail applications. One significant hurdle concerns the testing

procedures for filtration assemblies, which must now be undertaken with the components in their final pleated and folded state in hot-melt extruded mountings, rather than as 'lie flat' components as was permitted under earlier national standards. This approach permits a more thorough assessment of the factors affecting fire risk, heat release and flue gas development.

Compliance with EN 45545 also requires the designer to achieve a delicate balance between two contradictory objectives, a reduction in fire risk and a low flue-gas density. Low-flammability products are frequently characterised by incomplete combustion, which has a negative impact on flue-gas density. Similarly, a low heat release rate depends on incomplete combustion with increased flue-gas density. Nevertheless, Kalthoff has produced fully-synthetic panel filters which have been certified successfully.

Recent applications include the new Hamburg S-Bahn vehicles being developed by Bombardier (RG 8.13 p15) and metro cars for the MRT1 line in Kuala Lumpur (RG 10.12 p15). Kalthoff is now supplying filters to Siemens for use in the ICx trainsets being delivered to Deutsche Bahn (RG 9.14 p51). ■



An HVAC unit equipped with a Kalthoff synthetic panel filter.

Photo: Vossloh Kiepe



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