NOVEL PLEATABLE, FULL SYNTHETIC FILTER MEDIA FOR HVAC AND FURNACE FILTERS

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Nowadays glass media are the standard for high efficiency pleatable filter media in HVAC applications. However, synthetic media are gaining importance because of their improved tear resistance and performance in humid environments. In the recent past, several synthetic nonwoven based solutions have been developed all aiming to maximize filtration efficiency and dust loading at the same time. A low initial pressure drop is key for that goal.

Because of these developments, Air / Furnace filter manufacturers can choose from a range of sources to make filters that meet the required MERV ratings. The lower ranges are often covered by single layer media, but for the higher ratings multi-layer gradient systems are applied.

Those filter media however are often not self-pleatable. This drives the need for polymeric or metal mesh nettings to enable pleat formation and to keep the pleats in shape when the filter is in use.

Though using these pleat supports are common practice, especially in the US, they do introduce some issues. The glue used to bond polymeric nettings to the filter medium introduce VOCs – and potentially increase flammability - and metal nettings form an unwanted residue of the disposed filter after incineration.

These issues drive research towards self-pleatable, multi-layer full synthetic media, preferably with low VOC contribution = glue free. The world of fibrous nonwovens technologies offers end-less possibilities to develop the filtration layer, the challenge lies on how to combine the synthetic support medium with this filter efficiency layer. Several solutions are available to the industry like heat bonding or needling. It is obvious that all these solutions have their pro's and con's and will deliver a trade-off between low pressure drop / resistance, target MERV rating and long filter life.

Building on this landscape of opportunities this paper presents a study where a new type of pleatable media was developed for HVAC and Furnace filters. In previous studies it was concluded that sheath-core bico structures present a good alternative to common wet laid or spunbond support media.

Results presented in this new study demonstrate the advantage of these support media when used in a multi-layer composite with a spunbond nonwoven. The resulting filter medium demonstrates some remarkable improvements with respect filtration efficiency, low initial pressure drop and dust loading capacity. With these attributes a very promising alternative is presented to replace metal or polymer mesh based filter media.