SP5 FILTRATION PERFORMANCE OF NEEDLED FELT FILTER MEDIA UNDER REVERSE PULSED FLOW CLEANING

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The effects of packing density and surface treatment on the pressure drop and collection efficiency of needled felt media under reverse pulsed-flow cleaning for media regeneration were studied. Three needled felt filter media, composed of polyester fibers of 14.3 □m median diameter, were selected. The packing density of three studied media were 0.1832 (media A), 0.1899 (media B) and 0.2120 (media C). The surfaces of media A were thermos-bonded. Media C has a layer of fine fibers with diameter of 10.7 μm under its surfaces. The experimental setup consisted of a filter media holder, reverse pulse jet device and particle collection device collecting the penetrable particles. It was found that, for clean needled felt media, the initial pressure drop and collection efficiency increased with the increase of packing density while the quality factor of filter media decreased. However, the presence of fine fiber layer could increase the collection efficiency and decrease the media pressure drop, resulting in the improvement of the filter quality factor. When focusing on the cleaning cycles, it was found that filter media with low packing density had lower initial residual pressure drop and more significant increment increase of residual pressure drop compared with those with high packing density. As a result, the time between two adjacent pulsed cleaning for filter media with low packing density was dramatically decreased compared to that for media with high packing density. However, the particle collection efficiencies (in the final stage of filter lifetime) were close for all filter media with different packing densities. It is because the particle collection at the final stage of filter media is by dendrite structures built with residual particles in filter media. More, filter media with either thermos-bonded surfaces or fine fiber layer could better resist collecting particles inside media compared to those with only physical surface treatment, resulting in slow increase in media pressure drop and long period between two adjacent pulsed cleaning.