A NOVEL NYLON NANOFIBER MEDIA TECHNOLOGY FOR HYDRAULIC FILTRATION

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Hydraulic systems have dramatically changed over the past 30 years. Beta Ratio requirements that were x = 2 to x = 75, are now often x = 1000. Filter media has evolved from micro-glass and cellulose blended media to 100% micro-glass-based media, to achieve these higher efficiency requirements. For years the industry has used micro-glass for most of its hydraulic filtration products. Cummins Filtration is now integrating sub-micron Nylon fiber technology (branded as NanoNet®) into a new hydraulic filter element product line. This unique media utilizes a proprietary Nylon fiber forming technology coupled with melt blown technology to produce a 100 percent polymeric gradient property hydraulic media. This new media has been designed to not only have high beta Ratio, but it can also retain captured contaminant and keep it from being released downstream under both normal and extreme operating conditions.

During a multipass test that simulates filter life contaminant was collected within the media. As contaminant loads the media, differential pressure increases. At approximately 60 to 70 percent of estimated filter service life, typical micro-glass fiber media reaches a point at which the beta ratio progressively falls. The drop in beta ratio is due to micro-structural breach of the glass fiber media, as evidenced by all sizes of particles, 4 μm(c) to 20 μm(c) migrating downstream. In a real hydraulic circuit, such micro-breaches represent a risk to unprotected downstream components.

Under the same multipass test conditions, sub-micron Nylon fiber elements maintained beta ratio throughout the testing. There was the typical beta ratio decline and recovery at beginning of the test, but unlike traditional filters, they maintain high beta ratio for the duration of use up to terminal pressure drop.

While sub-micron Nylon fiber technology media provides excellent beta ratio (efficiency), contaminant removal and retention properties, it's gradient layers were also designed to have low differential pressure. Three filters were evaluated, filters "A" and "B" use micro-glass media. Differential pressure verses flow rate tests were performed on three identically sized OEM hydraulic filter elements. The differential pressure of the filter with sub-micron Nylon fiber technology media was approximately 20 percent lower than filter "A" and 37 percent lower than filter "B", at a flow rate of 30 liters/minute.

Cummins Filtration's sub-micron Nylon fiber technology hydraulic media has excellent beta ratio (efficiency), particle retention and differential pressure performance. These performance properties provide end users with the highest quality of system protection.