MEASURING THE MAXIMUM PORE SIZE OF SAND SCREENS, CHOOSING THE MOST STATISTICALLY ROBUST PARAMETER

Graham Rideal[1], K.G. Brocklehurst[1]
[1]Whitehouse Scientific

Background

Bubble Point is often used to measure the largest opening in a filter medium, but it can give variable results, partly because the area of the sample required is infinitesimally small compared to the area of mesh on a roll, and partly because of the uncertainty of converting bubble point to a maximum pore size/Maximum Penetrating Particle (MPP).

Aim

An alternative method is Challenge Testing, where particles are presented to the filter and those passing measured. Ideally, spherical glass beads should be used in Challenge Testing in order to accurately measure the Geometric Pore Size although, because they are produced from a melt process, they are not always totally spherical and any misshapes will have a profound effect on the Maximum Penetrating Particle.

Method

The PoreSizerTM Image analyser in conjunction with a glass bead Challenge Test has been used because of its ability to electronically remove any non-spherical beads and thereby reduce the measurement uncertainty. The advantage of the PoreSizerTM is that, unlike other methods of pore size determination, the results are directly traceable to the International Standard Metre via a NIST graticule.

Results

This work examined several sand screens and measured over 140,000 spherical beads passing through 6 specimens of the same mesh in search of the MPP. The variation between the samples was up to 47%, making comparisons impossible. However, when specifying the ‘maximum’ aperture as d99.5 rather than the absolute maximum (d100), the uncertainty dropped to below 7.5% and in one case, to below 2% making it a much more reliable parameter than the MPP for comparing meshes.

Key Words

Filter Pore Size, Filter Test, Particle Shape, Cut Point, Image Analysis, Quality Control