

HEPA FILTER MATERIAL LOAD DETECTION USING A MICROWAVE CAVITY SENSOR

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Abstract- This paper presents a novel microwave cavity sensor application for the detection of HEPA filter particulate loading. The sensor resonates at 3.435GHz and 8.570GHz when empty, where the TM₀₁₀ and TM₀₂₀ modes dominate respectively. Experimental results show that the resonant frequency of the sensor shifts significantly when filters of different particulate loadings are presented to it. This is a significant finding, and means that the sensor could present an effective solution for determining the loading of periodic use HEPA filters (e.g. those used in personal respirators), which are often disposed of unnecessarily.

Index terms: HEPA filter, filter load, filter ageing, filter sensor, microwave cavity, microwave sensor.