

Testing and selection of filter media for dedusting

Part 1: Standard laboratory tests in acc. with VDI/DIN 3926

P. Gäng *

The VDI/DIN guideline 3926 „Testing of cleanable filter media“ is an important step towards improving the characterisation and assessment of cleanable filter media. Since its introduction in December 1994 and the amendment in October 2004, both the testing method as well as the test equipment are widely used throughout Europe and meanwhile also applied in Japan, China and the USA. Especially in the USA, the guideline was largely integrated into the ASTM D6830-02. The VDI/DIN guideline 3926 offers the possibility of comparative testing of cleanable filter media under exactly defined and controlled laboratory conditions. However, the results cannot be applied directly to assess a medium's suitability for a specific task or to obtain data for the design and optimisation of a filter system. The guideline does not expressly cover this either.

Therefore, in a further step, a mobile filter probe for the performance of „field tests“ was developed as a derivation of the technology applied in the laboratory. With this technology, which will be introduced further down in this essay (see part 2), it is possible to obtain data required to assess the suitability of a medium for a specific application and improve the design of a filter system or optimise plant operation.

1. Introduction

Due to its outstanding separation properties – also in the fine particulate matter range – cleanable filters are very common in almost all exhaust gas dedusting applications and for the separation of dust-like valuable materials and products obtained from gasses. Due to extensive experience in this field, it is today possible to realise economic operation of the filter systems – also in difficult cases – and sufficient filter media service lives in practice. However, extensive pilot tests or a „development on the project“ are often required.

The long-term operating behaviour of cleanable filters depends on numerous plant, operating and substance parameters. The effects of the individual influencing factors are closely linked to each other, but often hard to distinguish. In this context, some of the relevant system parameters concern the constructive design of the filter system (e.g. number of filter chambers, design of the dirty gas flow control, geometry of the filter elements), others the layout and operating mode of the cleaning system (e.g. on or offline cleaning, design of the venturi insert, high or low-pressure system). Operating conditions, e.g. filter face velocity, average temperature and temperature peaks as well as dew point

shortfalls, have a decisive influence on the filtration and cleaning behaviour. Important substance parameters in this respect are the composition of the gas to be cleaned (e.g. steam content or acidy gas component concentrations), the agglomeration properties and reactivity of the dusts to be separated and especially their particle size and particle size distribution.

The selection of the filter medium, however, takes up a special position in system planning, and is often still based on empirical criteria these days. Although the characterisation of cleanable filter media and possibility of their evaluation were improved in the meantime, this is still not sufficient. The material-specific or textile data as well as data concerning particle separation („BIA test“ resp. DIN EN 60335-2-69) usually communicated by the manufacturers and data on the pressure drop of the new filter media does not provide enough information about their long-term filtration behaviour.

The present situation is that cleanable filters have achieved a high stage of development with respect to filter technology, and can be applied for sophisticated separation tasks. However, filter media selection methods and system design have hardly evolved beyond the 'trial and error' stage, which is unsatisfactory. At present, a model-assisted design of the filters and above all of the cleaning properties, which considers the substance-specific data of the dusts (e.g. their cohesive and adhesive properties) is not yet possible. Therefore, it is still necessary to improve both the characterisation and evaluation of cleanable filter media with respect to their long-term operating behaviour as well as

the collection of data for the design of filter systems.

2. Testing of filter media in acc. with VDI/DIN 3926

2.1 Development of the test method and objective

Already at the start of the 1980s, filter media manufacturers, plant operators and constructors started demanding improved methods for the characterisation and evaluation of cleanable filter media. This demand concerns data allowing statements about the filtration properties of a medium in long-term operation, which exceeds the data supplied by filter media manufacturers about the non-dusted material. The underlying question concerns the correlation of the „textile“ and the filtration properties of a filter medium, to which there are no standard answers yet.

The VDI/DIN guideline 3926 „Testing of cleanable filter media“ in the original version /1,2/ is an important step towards improving the characterisation and rating of cleanable filter media. This is achieved by a comparative evaluation in a standard test based on the results of long-term tests including the periodical filtration and cleaning process. With this test, it is supposed to be possible to test almost all filter media qualities.

Examinations concerning the suitability of a medium for a specific task or obtaining data for the design or optimisation of a filter system are expressly not part of the guideline. This concerns e.g. measurements at changed filter surface loads and tank pressures, high temperatures (with heatable systems) and/or with special dusts (originating from

* **Dr.-Ing. Peter Gäng**
 FilTEq - Filtration Testing
 Equipment & Services GmbH
 Amthausstraße 14
 D-76227 Karlsruhe
 Tel.: (+49)-(0)721-406544
 Fax: (+49)-(0)721-406545
 p.gaeng@filteq.de
 www.filteq.de

