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Evaluation of air filters

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Publisher's version / Version de l'éditeur:

<https://doi.org/10.4224/20338356>

Technical Note (National Research Council of Canada. Division of Building Research); no. TN-257, 1958-07-01

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NATIONAL RESEARCH COUNCIL OF CANADA

DIVISION OF BUILDING RESEARCH

No.

257

TECHNICAL NOTE

NOT FOR PUBLICATION

FOR INTERNAL USE

PREPARED BY N.B. Hutcheon

CHECKED BY

APPROVED BY

PREPARED FOR General Distribution

DATE July 1958

SUBJECT Evaluation of Air Filters

The evaluation of air filter devices, though nominally straightforward, turns out in practice to be particularly difficult. These difficulties arise over selection of the test dust to be used, the means to be provided for the dispersal and introduction of the test dust, the general form of the test apparatus, the means by which measurements of dust concentrations before and after the filters under test are made and, finally, the determination of a rating based upon the test results. The many difficulties involved in these several aspects of air filter evaluation have led to a great deal of controversy over the merits of various methods which have been proposed for the last 20 years or more. Many such discussions have been carried on, particularly over the last 10 years, in connection with the work of the American Society of Heating and Air Conditioning Engineers, both at general technical meetings as well as at meetings of Technical Advisory Committees of ASHAE.

The Transactions of ASHAE contain many useful references to various aspects of air cleaning and air filter evaluation. In particular two papers presented in support of the technical merits of self-charging plastic air filters led to extensive and heated discussion indicative of the controversy which has existed in connection with the evaluation of air filters in general. The extensive discussions of these papers, which are now printed in the Transactions, form an excellent record of the problems involved in air filter evaluation and of some of the conflicting points of view which exist in this field. These papers are:

"Self-charging electro-static air filters" by
W.T. Van Orman and H.A. Endres, ASHAE Transactions, v. 58, 1952, p.53.

"Evaluation of panel-type air cleaners by means
of atmospheric dust" by H.A. Endres, W.T. Van
Orman and R.P. Carter Jr., ASHAE Transactions,
v. 61, 1955, p.51.

About 1954 a new test code sponsored by the Air Filter Institute (AFI) was submitted to the Society for discussion and possible acceptance as an ASHAE Test Code. The discussions in

this connection were again extensive and heated with many conflicting points of view being expressed, much of this disagreement existing within the Technical Advisory Committee on Air Cleaning itself. As a result of this it was finally agreed that the work of ASHAE, and of the Technical Advisory Committee in particular, should be directed toward the development of more factual and basic information about the several matters involved in air filter evaluation. This has been done mainly through the sponsorship of an extensive series of tests which have been carried out at the University of Minnesota. This most successful program has led to a series of papers by Dr. K.T. Whitby, Professor A.B. Algren and others. The work is now drawing to a close and the final papers describing a proposed new method for evaluation of air cleaners are being prepared. The first of these, describing the apparatus, was presented at the Semi-Annual meeting of ASHAE in June 1958. In addition, a number of other papers dealing with various aspects of the evaluation problem have been published. These are:

"A rapid general purpose centrifuge sedimentation method for measurement of size distribution of small particles, Part I - Apparatus and Method" by K.T. Whitby. ASHAE Transactions, Vol. 61, 1955, p.33-47.

"A rapid general purpose centrifuge sedimentation method for measurement of size distribution of small particles, Part II - Procedures and Applications" by K.T. Whitby. ASHAE Transactions, Vol. 61, 1955, p. 449-462.

"Size distribution and concentration of airborne dust" by K.T. Whitby, A.B. Algren and R.C. Jordan. ASHAE Transactions, Vol. 61, 1955, p.463-492.

"The dust spot method for evaluating air cleaners" by K.T. Whitby, A.B. Algren and R.C. Jordan. ASHAE Transactions, Vol. 63, 1957, p. 171-184.

"The ASHAE airborne dust survey" by K.T. Whitby, A.B. Algren, R.C. Jordan and J.C. Annis, ASHAE Journal Section, Heating Piping and Air Conditioning, November 1957, p. 185.

"Evaluation of air cleaners for air conditioning and ventilation" by K.T. Whitby, A.B. Algren, R.C. Jordan and J.C. Annis. ASHAE Journal Section, Heating Piping and Air Conditioning, May 1958, p. 171.

While it is too early to say whether the proposals resulting from the work at the University of Minnesota will lead to the development of a generally acceptable test method, there is every likelihood that this will be so and that much of the

controversy which has existed in this most difficult field will be avoided in future. In the meantime any attempt to evaluate air cleaners on any other basis can be expected to give rise to disagreement and to conflicting views as to interpretation as has been the case in the past. It is hoped, therefore, that this new method will shortly be available and that it will live up to the hopes held out for it.