

Schriftenreihe der

Haushaltstechnik Bonn

Herausgeber: Prof. Dr. R. Stamminger

Arno Knieschewski

**Energy efficiency rating of
cooking fume extractors based
on captured and filtered oil mist**

Schriftenreihe der Haushaltstechnik Bonn

Band 2/2020

Arno Knieschewski

**Energy efficiency rating of cooking fume extractors
based on captured and filtered oil mist**

D 98 (Diss. Universität Bonn)

Shaker Verlag
Düren 2020

Bibliographic information published by the Deutsche Nationalbibliothek

The Deutsche Nationalbibliothek lists this publication in the Deutsche Nationalbibliografie; detailed bibliographic data are available in the Internet at <http://dnb.d-nb.de>.

Zugl.: Bonn, Univ., Diss., 2020

Copyright Shaker Verlag 2020

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without the prior permission of the publishers.

Printed in Germany.

ISBN 978-3-8440-7498-7

ISSN 1863-320X

Shaker Verlag GmbH • Am Langen Graben 15a • 52353 Düren

Phone: 0049/2421/99011-0 • Telefax: 0049/2421/99011-9

Internet: www.shaker.de • e-mail: info@shaker.de

The energy efficiency rating on the European Union energy label for cooking fume extractors is based on measurements of the flow rate and static pressure difference within the duct behind the cooking fume extractor according to standard EN 61591:1997/A12:2015 and regulation (EU) No 65/2014. These measurements do not enable a definite conclusion about the cooking fume extractor's air purification performance. Measurements which evaluate the air purification performance directly would be more valuable for consumers.

In this thesis, a test method was developed that enables the energy efficiency rating of cooking fume extractors based on a direct measurement of the air purification by measuring the captured and filtered oil mist. The test method also enables the rating of cooking fume extractors that operate in recirculation mode, which is not possible using the current standard EN 61591:1997/A12:2015.

The performance rating based on removed oil mist requires a reproducible generation of oil mist. Furthermore, the generated oil mist should resemble the oil mist from common cooking scenarios to give meaningful performance ratings. The oil mist from the grease absorption test according to standard EN 61591:1997/A12:2015 was taken as a reference oil mist for common cooking scenarios. A round robin test revealed that the oil mist generation with the grease absorption test from the standard is not reproducible enough for performance tests. The oil mist generation with atomizer nozzles was found more suitable for the reproducible generation of an oil mist.

Two different atomizers were analyzed by measuring the properties of generated oil mist and by applying them in performance tests on cooking fume extractors. One "mantled atomizer" was bought from the market and one "open atomizer" was developed specifically for the test of cooking fume extractors.

It was found that an oil mist with similar properties compared to the reference oil mist can be generated with the design of the open atomizer. The proposed test method using the open atomizer led to a better repeatability compared to the grease absorption tests according to the current standard and has the potential to improve the reproducibility. The results suggest that the proposed test method could be used for standardized testing which would enable more meaningful energy efficiency ratings and the rating of cooking fume extractors that operate in recirculation mode.