



Use of standard Ringelmann and Australian Standard miniature smoke charts



This Australian Standard® was prepared by Committee EV-007, Methods for the Examination of Air. It was approved on behalf of the Council of Standards Australia on 28 March 2014. This Standard was published on 23 April 2014.

The following are represented on Committee EV-007:

- Australian Aluminium Council
 - Australian Bureau of Meteorology
 - Australian Chamber of Commerce and Industry
 - Australian Industry Group
 - Clean Air Society of Australia and New Zealand
 - CSIRO Marine and Atmospheric Research
 - Department of Environment and Conservation, WA
 - Department of Science, Information Technology, Innovation and the Arts
 - Environment Canterbury
 - Environment Protection Authority, Vic.
 - Ministry for the Environment New Zealand
 - National Association of Testing Authorities Australia
 - Office of Environment and Heritage, NSW
-

This Standard was issued in draft form for comment as DR AS 3543.

Standards Australia wishes to acknowledge the participation of the expert individuals that contributed to the development of this Standard through their representation on the Committee and through the public comment period.

Keeping Standards up-to-date

Australian Standards® are living documents that reflect progress in science, technology and systems. To maintain their currency, all Standards are periodically reviewed, and new editions are published. Between editions, amendments may be issued.

Standards may also be withdrawn. It is important that readers assure themselves they are using a current Standard, which should include any amendments that may have been published since the Standard was published.

Detailed information about Australian Standards, drafts, amendments and new projects can be found by visiting www.standards.org.au

Standards Australia welcomes suggestions for improvements, and encourages readers to notify us immediately of any apparent inaccuracies or ambiguities. Contact us via email at mail@standards.org.au, or write to Standards Australia, GPO Box 476, Sydney, NSW 2001.

Australian Standard[®]

**Use of standard Ringelmann and
Australian Standard miniature smoke
charts**

Originated as AS 3543—1989.
Second edition 2014.

COPYRIGHT

© Standards Australia Limited

All rights are reserved. No part of this work may be reproduced or copied in any form or by any means, electronic or mechanical, including photocopying, without the written permission of the publisher, unless otherwise permitted under the Copyright Act 1968.

Published by SAI Global Limited under licence from Standards Australia Limited, GPO Box 476, Sydney, NSW 2001, Australia

ISBN 978 1 74342 701 9

PREFACE

This Standard was prepared by the joint Standards Australia/Standards New Zealand Committee EV-007, Methods for Examination of Air, to supersede AS 3543—1989, which was withdrawn in August 2006. The Committee agreed that this Standard was intended solely for use in Australia.

The objective of this Standard is to set out procedures for the use of standard Ringelmann and Australian Standard miniature smoke charts for estimating the blackness of smoke using a visual technique. The objective of this revision is to make the status of the publication current, as well as to update its layout and wording.

CONTENTS

	<i>Page</i>
FOREWORD.....	4
1 SCOPE.....	5
2 STANDARD RINGELM ANN CHART.....	5
3 AUSTRALIAN STANDARD MINIATURE SMOKE CHART.....	7
4 CALIBRATION OF INSTRUMENTS IN RINGELMANN NUMBER.....	7

FOREWORD

The method of visually assessing smoke emissions by comparing the darkness of the smoke with standard shades of grey on a chart placed in a suitable position was devised by Professor Ringelmann of Paris towards the end of the 19th century. Professor Ringelmann obtained the shades of grey by cross-hatching in black on a white background so that a known percentage of the white was obscured. When used, the charts were placed at such a distance from the observer that the black lines merged into the white background, each producing an apparent uniform grey shade. The numbers of the shades, the Ringelmann numbers, ranged from 0 (white) to 5 (black), with each stage representing a 20% increase in obscuration of the background. The original charts were of large size so that the accuracy of reproduction could be obtained in a drawing office; since that time various other methods of reproduction have been tried and the size and details of the chart have been modified.

Professor Ringelmann's original chart could not have been drawn with 100% black ink on 100% white paper, since neither was obtainable. The commercially printed charts are printed on paper with a luminance factor of approximately 80% with ink with a luminance factor of approximately 5%. Acceptable smoke measurements are conducted utilizing commercially-printed Ringelmann charts. The Australian Standard miniature smoke chart consistently reproduces shades of grey that are near the average of those to which Ringelmann chart users are accustomed. For convenience in size, the Australian standard charts comprise the five shades corresponding to Ringelmann numbers 0 to 4.

STANDARDS AUSTRALIA

Australian Standard

Use of standard Ringelmann and Australian Standard miniature smoke charts

1 SCOPE

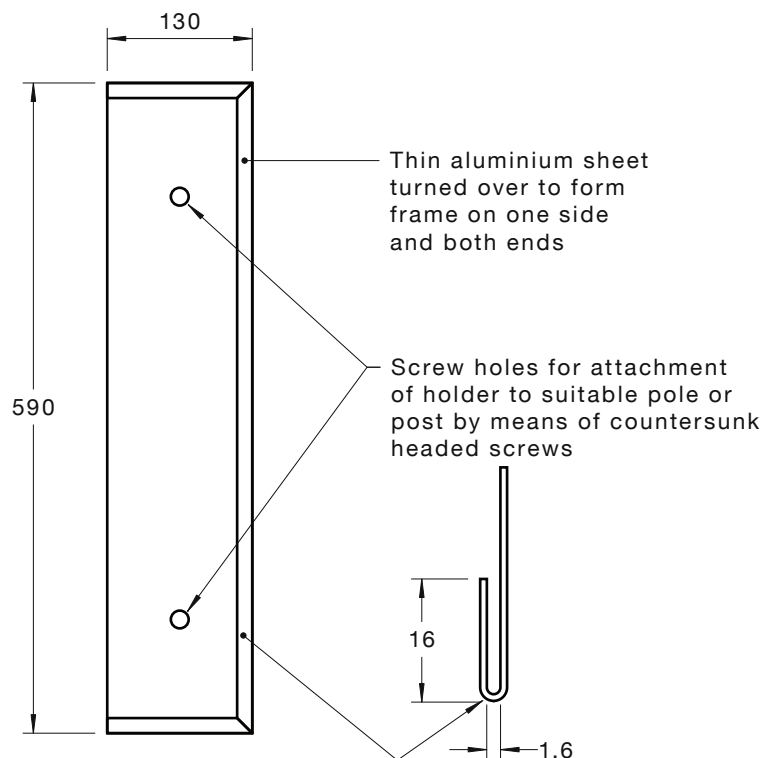
This Standard sets out procedures for the use of standard Ringelmann and Australian Standard miniature smoke charts for estimating the blackness of smoke using a visual technique. A procedure for the calibration of instruments in Ringelmann number is also described.

2 STANDARD RINGELMANN CHART

2.1 Preparation for use

The standard Ringelmann chart shall be mounted securely, without creasing or bending. The portion of any holder adjoining the 'viewing edge' of the chart shall be neutral in colour; aluminium is a suitable material. A suitable holder is shown in Figure 1. Protective coverings shall not be applied to the chart when in use. If the chart is attached to a board or other support, the fixing medium shall not impair the luminance of the working surface of the chart.

The chart will become soiled with use, resulting in the observed Ringelmann number being less than the true value. Consequently, a soiled or discoloured chart shall not be used to determine the Ringelmann number of smoke emissions.



DIMENSIONS IN MILLIMETRES

FIGURE 1 STANDARD RINGELMANN CHART HOLDER