AS 3543—1989

Australian Standard®

Use of standard Ringelmann and Australian Standard miniature smoke charts

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Australian Chemical Industry Council

Australian Institute of Petroleum

Australian Mining Industry Council

Australian Timber Producers Council

Clean Air Society of Australia and New Zealand

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PREFACE

This Standard was prepared by Standards Australia's Committee on Methods for Examination of Air under the direction of the Chemical Standards Board at the request of State Government bodies involved in the analysis of ambient air. This Standard is technically identical to BS 2742:1969 and its Addendum No 1(1972), *Notes on the use of Ringelmann and miniature smoke charts*.

The Australian Standard miniature smoke charts referred to in this Standard are available from air pollution regulatory authorities (e.g. State Pollution Control Commission, Environmental Protection Authority) in each State.

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FOREWORD

The method of visual assessment of smoke emission by comparison of 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 last 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. In use the charts were placed at such a distance from the observer that the black lines merged into the white background and produced for each shade, apparently, a uniform grey. The numbers of the shades—the Ringelmann numbers—ranged from 0-white to 5-black, the stages being by changes of 20% 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 by various authorities from time to time.

Actually, 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 in use for many years, including those issued by the U.S. Bureau of Mines, are printed on paper with a luminance factor of about 80% with ink of luminance factor about 5%. Measurements on smoke which are accepted are derived from the use of commercially-printed Ringelmann charts, and here the Australian Standard miniature smoke chart has been so printed as to reproduce, with consistency, shades of grey which are near the average of those to which users are accustomed. For convenience in size, the Australian standard charts comprise the five shades corresponding to Nos 0 to 4 Ringelmann.

The chart will of necessity become soiled in use, and the observed Ringelmann number of the smoke will be less than the true value. It is essential, therefore, that a used chart should be discarded as soon as it becomes appreciably soiled or discoloured.

STANDARDS AUSTRALIA

Australian Standard

Use of standard Ringelmann and Australian Standard miniature smoke charts

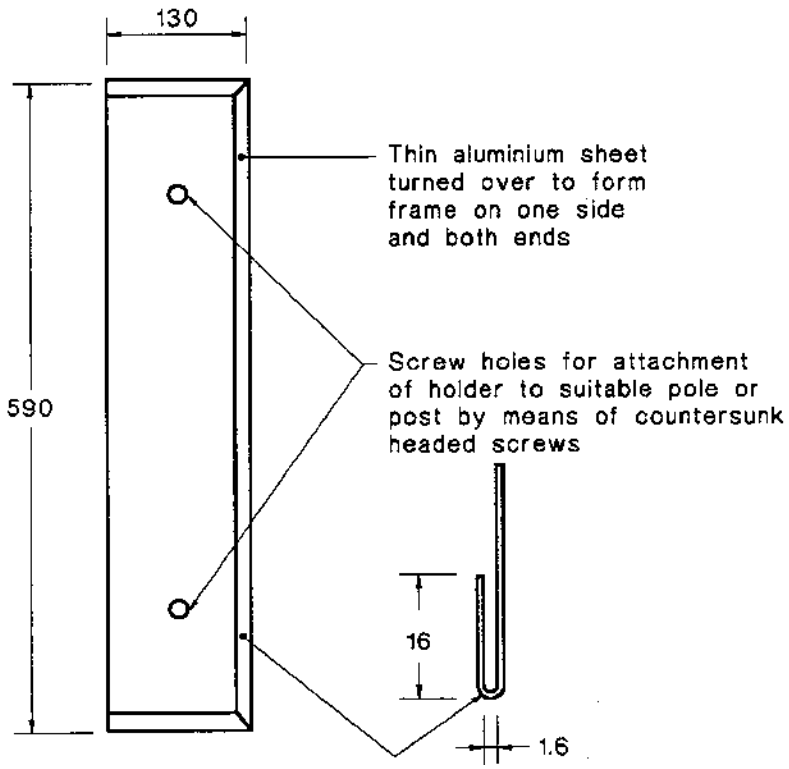
1 SCOPE. This Standard sets out procedures for the use of standard Ringelmann and Australian Standard miniature smoke charts for the estimation of the blackness of smoke using a visual blackness technique. A procedure for the calibration of instruments in Ringelmann number is also described.

2 USE OF THE STANDARD RINGELMANN CHART.

2.1 Preparation for use. The standard Ringelmann chart should be mounted so as to be held firmly without creases or bending. The portion of any holder adjoining the 'viewing edge' of the chart should be neutral in colour: aluminium is a suitable material. A suitable form of holder is shown in Figure 1. Protective coverings should not be applied to the chart in use. If the chart is attached to a board or other support, the fixing medium should not impair the luminance of the working surface of the chart.

2.2 Notes on method of use. The standard Ringelmann chart should be used under daylight conditions and held or fixed facing the observer in a vertical plane as shown in Figure 2. Where possible the chart should be in line with the top of the chimney and placed so that the chart and the smoke have a similar sky background. The chart should be at a sufficient distance from the observer for the lines to appear to merge until each square forms a uniform shade. For most observers this distance is in excess of 15 m.

Observations should be carried out as far as practicable under conditions of uniform general illumination from the sky, but if observations are made with the sun shining, or with the sky bright on one side, the bright source of illumination should be approximately at right-angles to the line of vision, and not in front of or behind the observer. The white (No 0) square provides a useful indication of the illumination and will reveal any overshadowing or uneven illumination of the chart. It also facilitates the detection of rainspotting or other soiling of the chart. Under hazy conditions, readings should not be taken at extreme distances as there will be a tendency for the readings to be low.



DIMENSIONS IN MILLIMETRES

FIGURE 1 SUITABLE HOLDER FOR THE STANDARD RINGELMANN CHART

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