

STANDARDS AUSTRALIA/STANDARDS NEW ZEALAND

RECONFIRMATION
OF
AS/NZS 1580.601.5:1994
Paints and related materials—Methods of test
Method 601.5: Colour—Calculation of small colour differences using the CMC
equation

RECONFIRMATION NOTICE

Technical Committee CH-003 has reviewed the content of this publication and in accordance with Standards Australia procedures for reconfirmation, it has been determined that the publication is still valid and does not require change.

Certain documents referenced in the publication may have been amended since the original date of publication. Users are advised to ensure that they are using the latest versions of such documents as appropriate, unless advised otherwise in this Reconfirmation Notice.

Approved for reconfirmation in accordance with Standards Australia procedures for reconfirmation on 30 May 2013.

Approved for reconfirmation in New Zealand on behalf of the Standards Council of New Zealand on 26 August 2013.

The following are represented on Technical Committee CH-003:

Australasian Corrosion Association
Australian Paint Approval Scheme
Australian Paint Manufacturers' Federation
Australian Pipeline Industry Association
Institution of Professional Engineers New Zealand
Master Painters New Zealand Association
Water Corporation Western Australia

NOTES

Australian/New Zealand Standard®

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PREFACE

This Standard has been prepared by the Joint Australia/ New Zealand Standards Committee CH/3 on Paints and Related Materials under the direction of the Multitechnics Standards Policy Board, to provide a method of assessing small colour differences.

This Standard is identical with and has been reproduced from BS 6923:1988, *Method for calculation of small colour differences*.

For the purpose of this Australian/New Zealand Standard the text of BS 6923 should be modified as follows:

- (a) Delete Note 2 of Clause 1.
- (b) The following document is referred to:

K MCLAREN and P F TAYLOR, The derivation of hue-difference terms from CIELAB coordinates, *Colour Research and Application*, 1981, No. 6, No. 76.

The Standard is complemented by the following documents:

AS/NZS	
1580	<i>Paints and related materials — Methods of test</i>
1580.601.1	Method 601.1: <i>Colour — Visual comparison</i>
1580.601.4	Method 601.4: <i>Colour — Calculation of colour differences</i>

CIE

Publication 15.2 *Colorimetry*

F J J CLARKE, R MCDONALD and B RIGG, Modification to the JPC79 colour difference formula, *Journal of the Society of Dyers and Colourists*, 1984, No. 100, pp 128-132 and 281-282.

In 1976, the Commission Internationale d'Eclairage (CIE) published a colour difference formula known as CIELAB (currently given in CIE Publication No.15.2) which has since become widely used internationally for quantifying the perceived colour difference between surface colours.

For industry and commerce, however, this formula has a major weakness. Over 50 000 assessments, made by 44 professional shade passers in textile and paint industries against reference specimens of 262 different colours, were analyzed. It was found that if the decisions had been made using the optimum CIELAB ΔE^* value of the pass/fail boundary for each of the four data sets, the number of wrong decisions would have been significantly greater than the average number of wrong decisions made by the assessors.

This weakness has been overcome by dividing CIELAB colour space into an infinite number of ellipsoidal micro-spaces defined by semi-axes oriented in the directions of lightness, chroma and hue scaled so as to correlate with visual assessment. The relative importance of lightness and chroma differences compared with difference in hue varies in different industries, and to allow for this relative tolerances l and c are included in the formula. When $l = c = 1$ the formula quantifies the perceptibility (magnitude) of the colour difference. Different values of l or c , or both, allow for variations in the relative importance of lightness and chroma differences, and when these are used the formula quantifies the acceptability of the colour difference.

This formula was devised by the Colour Measurement Committee of the Society of Dyers and Colourists and is known as $CMC(l:c)$. The ideas and reasoning behind the modifications made to the JPC79 colour difference formula in developing it into the CMC equation are given by F J J Clarke, R McDonald and B Rigg in 'Modification to the JPC79 colour difference formula', *Journal of the Society of Dyers and Colourists*, 1984, No. 100, pp 128-132 and 281-282. Applying $CMC(2:1)$ to the four data sets already mentioned gives fewer wrong decisions than would be made by the average observer, and in the only data set giving individual assessments (8 observers), the number of wrong decisions was no greater than that made by the most reliable assessor.

Currently, optimum values of l and c have only been determined for the textile industry. However, work is proceeding on determining optimum values for l and c for other industries, e.g. ceramics, leather, paper, paint and plastics.

Some test data are given in Appendix A and an example of a simple computer program is given in Appendix B.