Singapore Standards Council

SS 531 : Part 1 : 2006 (2013)

(ICS 13.180; 91.160.10)

SINGAPORE STANDARD

Code of practice for lighting of work places

– Part 1 : Indoor

Confirmed 2013

Published by

Enterprise Singapore

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This Singapore Standard was approved by the Electrical and Electronic Standards Committee on behalf of the Standards Council of Singapore on 7 December 2006.

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The Electrical and Electronic Standards Committee appointed by the Standards Council consists of the following members:

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		Prof Yeo Tat Soon	*National University of Singapore*
Co-opted Member	:	Er. Ng Eng Kiong	*Individual Capacity*

The Technical Committee on Lamps and Related Equipment appointed by the Electrical and Electronic Standards Committee and responsible for the preparation of this standard consists of representatives from the following organisations:

		Name	Capacity
Chairman	:	Mr K Seshadri	*Member, Electrical and Electronic Standards Committee*
Deputy Chairman	:	Mr Tan Heng Khoon	*TÜV SÜD PSB Corporation Pte Ltd*
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		Mr Tay Hooi Seng	*Singapore Manufacturers' Federation*
		Mr Teo Yong Choon	*Land Transport Authority*
		Mr Jimi Wong Yick Chee	*Singapore Electrical Trades Association*

The Working Group appointed by the Technical Committee to assist in the preparation of this standard comprises the following experts who contribute in their *individual capacity*:

		Name
Convenors	:	Er. Ong Ser Huan
		Mr Tay Hooi Seng
Members	:	Mr Chan Hong Meng (till 30 Apr 06)
		Mr Adrian Cheong Wah Onn
		Ms Goh Siam Imm
		Er. John Gui Cheng Siong
		Mr Jeremy Kwok Chim Min
		Mr Muhammad Rithaudin
		Mr Ng Kok Liang
		Mr Wong Lee Yit
		Mr Jimi Wong Yick Chee

The organisations in which the experts of the Working Group are involved are:

Association of Consulting Engineers Singapore
Building and Construction Authority
Enkon International Consulting Engineers Pte Ltd
Land Transport Authority
Maxspid Enterprise Pte Ltd
Ministry of Manpower
National Parks Board
Ngee Ann Polytechnic
Philips Electronics Singapore Pte Ltd
Singapore Civil Defence Force
Singapore Institute of Architects

National Foreword

This Singapore Standard was prepared by the Technical Committee on Lamps and Related Equipment, under the purview of the Electrical and Electronic Standards Committee. This standard is a modified adoption of the first edition of ISO 8995 : 2002, Lighting of Work Places – Part 1 : Indoor, incorporating the changes in title and reference number in Technical corrigendum 1 published in September 2005. The SS 531 series of standards replaces SS CP 38 : 1999 and SS CP 87 : 2001.

ISO 8995-1 : 2002 also numbered CIE S 008/E-2001 is a joint edition published by the International Organisation for Standardisation and the International Commission on Illumination.

The following deviation applies. A left marginal bar adjacent to the text to be changed indicates the deviation.

Clause

5 **Schedule of lighting requirements**

Type of interior, task or activity, item 28 Educational buildings

– Classrooms, tutorial rooms, under Maintained Illuminance, column Em lux,
replace 300 by 500. Under 'Remarks', delete 'Lighting should be controllable.'

– Black board to read as White board. Under Maintained Illuminance, column Em lux,
replace 500 by 300.

– Teachers rooms, under Maintained Illuminance, column Em lux,
replace 300 by 500.

Explanation: This national standard modifies the lighting level for classrooms and tutorial rooms, black board, teachers' rooms for the following reasons:

1. to be in line with the minimum illuminance stipulated in Handbook (2000) – 9th Edition of the Illuminating Society of North America (IESNA) in their Lighting Design Guide on Interiors (for educational facilities);
2. to maintain the existing illuminance guidelines used by local stakeholders (of schools) since 2001;
3. to facilitate the visual comfort and performance of students in classrooms and
4. to align illuminance level of teachers' rooms to that of classrooms and tutorial rooms.

Attention is drawn to the following:

The comma has been used throughout as a decimal marker in ISO 8995-1 whereas in Singapore Standards it is a practice to use a full-point on the baseline as the decimal marker

Attention is drawn to the possibility that some of the elements of this Singapore Standard may be the subject of patent rights. Enterprise Singapore shall not be held responsible for identifying any or all of such patent rights.

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.ch
Web www.iso.ch
Printed in Switzerland

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standard ISO 8995 was prepared as Standard CIE S 008/E by the International Commission on Illumination, which has been recognized by the ISO Council as an international standardizing body. It was adopted by ISO under a special procedure which requires approval by at least 75 % of the member bodies casting a vote, and is published as a joint ISO/CIE edition.

The International Commission on Illumination (abbreviated as CIE from its French title) is an organization devoted to international cooperation and exchange of information among its member countries on all matters relating to the science and art of lighting.

Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 8995-1 was prepared jointly by CIE TC 3-21 and ISO/TC 159, *Ergonomics*, Subcommittee SC 5, *Ergonomics of the physical environment*.

This second edition cancels and replaces ISO 8995:1989, of which it constitutes a technical revision.

CIE Central Bureau
Kegelgasse 27
A-1030 Vienna
Austria
Tel.: +43 1 714 3187 0
Fax: +43 1 713 0838 18
e-mail: ciecb@ping.at
Web: www.cie.co.at/cie

Foreword

Standards produced by the Commission Internationale de l'Éclairage (CIE) are a concise documentation of data defining aspects of light and lighting, for which international harmony requires such unique definition. CIE Standards are therefore a primary source of internationally accepted and agreed data, which can be taken, essentially unaltered, into universal standard systems.

This International Standard has been prepared by joint CIE/ISO Technical Committee CIE-TC 3-21 and ISO/TC 159/SC5 WG2. It replaces publication CIE 29.2-1986 and deals with Lighting Requirements for Indoor Work Places.

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LIGHTING OF INDOOR WORK PLACES

Introduction

Good lighting will create a visual environment that enables people to see, to move about safely and to perform visual tasks efficiently, accurately and safely without causing undue visual fatigue and discomfort. The illumination may be daylight, electric light or combination of both.

Good lighting requires equal attention to the quantity and quality of the lighting. While the provision of sufficient illuminance on the task is necessary, in many instances the visibility depends on the way in which the light is delivered, the colour characteristics of the light source and surfaces together with the level of glare from the system. In this standard opportunity was taken to specify for various work places and task types not just the illuminance but also the limiting discomfort glare and minimum colour rendering index of the source. Parameters to create comfortable visual conditions are proposed in the body of this standard. The recommended values are considered to represent a reasonable balance, having regard to the requirements for safe, healthy and efficient work performance. The values can be achieved with practical energy efficient solutions.

There are also visual ergonomic parameters such as perceptual ability and the characteristics and attributes of the task, which determine the quality of the operator's visual skills, and hence performance levels. In some cases enhancement of these influencing factors can improve performance without the need to raise illuminance. For example by improving the contrast of the task attributes, enlarging the task by the use of up to date visual aids (glasses) and by the provision of special lighting systems with local directional lighting capability.

1. Scope

This standard specifies lighting requirements for indoor work places and for people to perform the visual tasks efficiently, in comfort and safety throughout the whole work period.

This standard does not explain how lighting systems or techniques should be designed to optimise solutions for specific work places. These may be found in the relevant CIE guides and reports.

2. Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this Standard are encouraged to investigate the possibility of applying most recent editions of the standards indicated below. Members of CIE, the International Electrotechnical Commission (IEC) and the International Organization for Standardization (ISO) maintain registers of currently valid international standards.

ISO 3864	Safety colours and safety signs
ISO 6309	Fire protection - safety signs
ISO 6385	Ergonomic principles in the design of work systems
ISO 9241 Parts 6/7/8	Ergonomic requirements for office work with visual display terminals
CIE 13.3 - 1995	Method of measuring and specifying colour rendering of light sources
CIE 16 - 1970	Daylight
CIE 17.4 - 1987	International lighting vocabulary 4th ed. – equivalent to IEC 50(845)
CIE 19.2 - 1981	An analytic model for describing the influence of lighting parameters upon visual performance
CIE 40 - 1978	Calculations for interior lighting - basic method
CIE 58 - 1983	Lighting for sports halls

CIE 60 - 1984	Vision and the visual display unit work station
CIE 62 - 1984	Lighting for swimming pools
CIE 96 - 1992	Electric light sources. State of the art - 1991
CIE 97 - 1992	Maintenance of indoor electric lighting systems
CIE 103/5 - 1993	The economics of interior lighting maintenance
CIE 117 - 1995	Discomfort glare in interior lighting
CIE 129 - 1998	Guide for lighting of exterior work areas