



COMMISSION INTERNATIONALE DE L'ECLAIRAGE
INTERNATIONAL COMMISSION ON ILLUMINATION
INTERNATIONALE BELEUCHTUNGSKOMMISSION

MINUTES OF THE 1st MEETING (McFadden TERM)

DIVISION 1: VISION AND COLOUR

Thursday 10 June 2004
Tokyo, Japan

Web site: <http://nml.csiir.co.za/~cie1>

ATTENDANCE*

Officers

S McFadden	Director	Canada
F Viénot	Associate Director	France
M Pointer	Associate Director	Great Britain
E Carter	Editor	United States of America
Y Nakano	Secretary	Japan

Country representatives

*	S McFadden		Canada
	L Halonen	(nominated representative)	Finland
*	F Viénot	(nominated representative)	France
*	M Pointer		Great Britain
	J Schanda	(nominated representative)	Hungary
	O Da Pos		Italy
*	Y Nakano		Japan
	C Kim		Korea
*	E Carter	(nominated representative)	United States of America

Countries represented at the meeting: 9

Technical Committee Chairpersons

*	Y Nakano	TC1-30, TC1-46	Japan
*	F Viénot	TC1-36	France
	K Sagawa	TC1-37, TC1-54	Japan
	M Ayama	TC1-42	Japan
*	J Schanda	TC1-48, TC1-59	Hungary
	A Robertson	TC1-57	Canada
*	L Halonen	TC1-58	Finland
*	P Bodrogi	TC1-62	Hungary
*	S McFadden	TC1-64	Canada
*	M Pointer	TC1-65	Great Britain

Reporters

*	J Schanda	R1-34	Hungary
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Guests Some guests are members of TCs

M Eloholma	TC Member	Finland
M Ikeda	TC Member	Japan
N Itoh	New Reporter	Japan
N Johnson		United States of America
M Nicholson	New Liaison	Great Britain
H Ujike		Japan

* Asterisks before names represent duplication elsewhere in the list.

Apologies (country representatives, TC chairs, or reporters indicated)

K Wenzel (Hungary), G Drefeldt (Sweden), P Alessi (USA), R Ünver (Turkey), A Chalmers (New Zealand), J Campos Acosta (Spain), M Vik (Czech Republic), P McGinley (Australia), J van Kemenade (The Netherlands), R Séve (France), R Luo (TC chair), E Martínez-Uriegas (TC chair), M Brill (TC chair), R Hirschler (TC chair), T Ishida (TC chair), J Nobbs (TC chair), C Richter (TC chair), P Trezona (Reporter).

Total attendance: 19

1. **WELCOME**

The Division Director, Mrs. McFadden, welcomed all present.

2. **ANNOUNCEMENTS**

There was nothing to announce.

3. **ATTENDANCE**

9 countries were officially represented.

4. **MEMBERSHIP**

The following changes in Division 1 membership occurred during the past year: Mrs. Clausen was appointed representative for Denmark. Dr. Michal was appointed representative for Czech Republic. Dr. Guanrong was appointed representative for China. Instrument Systems was appointed as supportive member (contact person: Mr. Richard Distl, Germany). Schreder Group was appointed as supportive member (contact person: Mr. Marc Gillet, Belgium).

5. **DISCUSSION AND CONFIRMATION OF AGENDA**

The agenda was confirmed as in Appendix I.

6. **APPROVAL OF MINUTES OF THE SEVENTH MEETING OF THE SAGAWA TERM**

The minutes of the 2003 meeting held in San Diego, USA, were approved. They appear on the Division 1 web site.

7. **MATTERS ARISING FROM THESE MINUTES**

None.

8. **DIRECTOR'S REPORT, INCLUDING REPORT FROM BOARD OF ADMINISTRATION (Mrs. McFadden)**

Division 1 Specific

The Division Director gave an overview of the work of Division 1. A technical report "A review of chromatic adaptation transforms" by TC1-52 will soon be published. A draft standard "Standard method of assessing the spectral quality of daylight simulators for visual appraisal and measurement of colour" by TC1-53 is now on NC ballot. A technical report "CIE 10 degree photopic photometric observer" by TC1-59 is now on Division ballot.

Board of Administration

The Division Director reported the decisions made by the BA:

Concerning the revision of the International Lighting Vocabulary, Divisions 1 and 2 are gaining some progress, but other divisions are not very active. It is planned to publish the revised ILV as a single

document. After that, each Division will be able to publish further revisions separately as technical reports..

Next CIE Midterm meeting will be held on May 12-20, 2005 in Leon, Spain, in conjunction with the AIC Congress to be held in Granada, Spain, on May 8-13, 2005.

Next CIE quadrennial meeting will be held from June 26 to July 4, 2007 in Beijing, China.

9. **REPORTS FROM EDITOR AND SECRETARY**

Dr. Carter reported that she had edited several documents before balloting.

Dr. Nakano reported that web server for Division 1 had been moved from South Africa to Japan because of some security problem.

10. **VISION** **(Associate Director: Dr. Viénot)**

Dr. Viénot chaired this session.

TC1-30: Luminous Efficiency Functions (Y Nakano)

Dr. Nakano reported that the interpolation issue had been solved by the report of TC1-38 and that the notation for maximum efficacy was agreed on with TC1-59. By taking all these things into account, the final draft should be prepared as soon as possible.

TC1-36: Fundamental Chromaticity Diagram with Physiologically Significant Axes (F Viénot)

Dr. Viénot reported that the committee was trying to achieve consensus among TC members by voting chapter by chapter. So far, the consensus was achieved for chapters 2, 3, 4 and 9. The TC continues to try to achieve consensus in the remaining chapters.

TC1-37: Supplementary Systems of Photometry (K Sagawa)

Dr. Sagawa reported that the TC has developed a model based on the results of TC1-21 that includes a photopic luminance channel, a scotopic luminance channel, and a chromatic channel. It was discussed about the reason why the data and the model prediction deviate in short wavelength region. He will start drafting a report in that he will describe the concept of photometry based on brightness perception, scheme of the photometric system and a comparison between experimental data and the model.

TC1-41: Extension of $V_m(\lambda)$ beyond 830 nm (P Walraven)

Dr. Viénot reported that she got a report from the chairman. He is now waiting for the report from TC1-36 because it contains useful information for this TC.

TC1-42: Colour Appearance in Peripheral Vision (M Ayama)

Dr. Ayama reported that Dr. Pointer had joined as a new member. She showed latest color zone map data. Data collection was almost completed, and she will start drafting a report. The contents of the report and how it will be prepared were discussed.

TC1-46: Concept and Application of Equivalent Luminance (Y Nakano)

Dr. Nakano reported that it was difficult to use the concept of equivalent luminance in a practical situation such as mesopic photometry. To determine the equivalent luminance in the mesopic region, one should assume that adaptation level is determined by a target stimulus itself, but most people think that the surrounding area determines it. This will cause a misunderstanding. The report will describe such examples to prevent the misunderstanding.

TC1-51: Visual Acuity (H J Schmidt Clausen)

This TC was reopened at Vésprem meeting. The chairman, however, formally resigned this time, and the Division approved to disband this TC unanimously.

TC1-54: Age-Related Change of Visual Responses (K Sagawa)

Dr. Sagawa reported. He showed experimental data revealing aging effects on luminous efficiency functions (by heterochromatic flicker photometry and by heterochromatic brightness matching), and on contrast sensitivity functions, and showed some applications of these data. He will start to draft a report.

TC1-58: Visual Performance in the Mesopic Range (J Taylor)

Dr. Halonen reported that the terms of reference had been changed as follows:

(Old)

To define visual performance and related terms.

To investigate performance based photometry and colorimetry in the low photopic to scotopic region.

To investigate and establish a relationship between performance and equivalent luminance.

(New)

To define mesopic visual performance and related terms.

To investigate performance based photometry in the luminance region below approximately 10 cd/m².

To propose a model for the basis of performance based mesopic photometry.

The Division approved the change of the terms of reference unanimously. The chair is hoping to finish this TC within 4 years.

TC1-59: Standard Photometric 10° Observer (J Schanda)

Dr. Schanda reported that the draft 8 of the technical report would be sent to TC members for vote, and then Division ballot would follow.

TC1-60: Contrast Sensitivity Function (CSF) for Detection and Discrimination (E Martinez-Uriegas)

This TC is now collecting the data for chromatic contrast sensitivity function as well as achromatic contrast sensitivity function, and making a model that fits to the data. The TC hopes to establish standard for these CSFs that can be referred technically, but not as the CIE standard.

R1-16: Visual Adaptation to Complex Luminance Distribution (H Shinoda)

Dr. Viénot reported that no progress was achieved since the report was published as CIE collection in 1999. We will ask the reporter if he is going to establish a new TC on this topic.

R1-19: Specification on Individual Variation in Heterochromatic Matching (H Yaguchi)

No report was received. We will ask a report from the reporter in this meeting because he will be here.

R1-23: Guidelines on Planning a Mesopic Photometry Investigation (P Trezona)

Dr. Viénot reported that the report would be published as a CIE collection.

R1-27: Measurement of Pupil Diameter (P Trezona)

Dr. Viénot reported that there was no progress since last year and no activity would be expected in the future because of the reporter's physical condition. The Division approved to close this reportership unanimously.

11. **COLOUR** **(Associate Director: Dr. Pointer)**

Dr. Pointer chaired this session.

TC1-27: Specification of Colour Appearance for Reflective Media and Self-Luminous Display Comparison (P J Alessi)

Dr. Pointer reported that the task of this TC had been completed 5 years ago and now we were waiting for the report. We hope it will be published since the knowledge obtained in this TC will be useful for imaging technology dealt with in Division 8.

TC1-38: Compatibility of Tabular Data for Computational Purposes (C McCamy)

Dr. Pointer reported that the draft 8 of the technical report was circulated to the TC members for comments, and the final draft will be soon ready for the Division ballot.

TC1-44: Practical Daylight Sources for Colorimetry (R Hirschler)

Dr. Pointer reported that he received an extensive report from the chair. Data collection is almost completed and the chair will start to draft a report.

TC1-48: Revision of CIE Document 15.2 Colorimetry (J Schanda)

Dr. Schanda reported that the final draft of the technical report is now going to Division ballot. A possibility that we should provide the contents in more readable form such as a book was discussed. A CD version of the report will be available that contains Sprague interpolation method program.

TC1-52: Chromatic Adaptation Transform (M R Luo)

Dr. Pointer reported that CB approved the final draft of the technical report except for editorial matters. This TC will be closed in the next meeting.

TC1-53: A Standard Method of Assessing the Quality of Daylight Simulators (M Pointer)

Dr. Pointer reported that since he succeeded as chair from Mr. McCamy, he asked Dr. Zwinkel and Dr. Hirschler to comment on the latest draft. By taking their comments into account, he prepared the final draft and it is now going for NC ballot. It is going to be a CIE standard, and then be an ISO/CIE standard.

TC1-55: Uniform Colour Space for Industrial Colour Difference Evaluation (J Nobbs)

Dr. Pointer reported that this TC met in San Diego, and that the committee was trying to construct a new uniform colour space by reformulating CIELAB or by using a colour appearance model. Several research papers were published on this topic. It was pointed out that there were no member listed on the Activity Report for this TC, and the associate director would ask the chair about it later.

TC1-56: Improved Colour Matching Functions (M Brill)

Dr. Pointer reported that the chair was monitoring related researches by Dr. Fairchild, Dr. Luo and Granada group in Spain.

TC1-57: Standards in Colorimetry (A Robertson)

Dr. Robertson reported that he appointed liaison people for several ISO TCs to get comments from them. The first standard (CIELAB) is almost completed and he hopes to complete some other standards by the next meeting.

TC1-61: Categorical Colour Identification (T Ishida)

Dr. Pointer reported that he got a report from the chair saying nothing to report. Mrs. McFadden offered that she could help on the application side of this TC, and she was going to be a member of this committee.

TC1-62 Colour rendering of LED light sources: (P Bodrogi)

Dr. Bodrogi reported that the TC was going to prove that the current CRI does not work well for white LED light sources by collecting experimental data. The TC decided to propose a new TC to define a new colour rendering related index to supplement the current CRI after publishing the technical report.

TC1-63 Validity of the range of CIEDE2000: (K Richter)

Dr. Pointer reported that the chair provided a comprehensive report as shown in the Activity Report 2004, and there was nothing further to report here.

TC1-64 Terminology for vision, colour and appearance: (S McFadden)

Mrs. McFadden reported that new terms were proposed by Divisions 1, 2 and 8, and we were going to discuss them in the TC meeting tomorrow. There was an issue about the form of the publication. Dr. Schanda suggested as a secretary of the board that those Divisions who were ready to publish their revision could publish their parts as technical reports to supplement the main ILV(17.4).

TC1-65 Visual appearance measurement: (M Pointer)

Dr. Pointer reported that there were now 16 members, 2 corresponding members (one is from industry and the other is from Division 3 and 1 liaison member who is working with ISO technical committee (measuring a gloss of printing paper). The working program of this TC will be discussed in the TC meeting tomorrow.

R1-11 Cognitive Aspects of Colour: (G Derefeldt)

Dr. Pointer reported that the reporter had produced a paper in Color Research and Application and it had been reviewed to publish it as a CIE collection. She and co-authors are now revising their paper according to the comments from one referee. After publication of the paper, this reportership will be closed.

R1-32 Emotional aspects of colour and light: (G Derefeldt)

No report.

R1-33 Colour difference evaluation: (R Luo)

Dr. Pointer reported that the reporter was collecting experimental data comparing CIEDE2000 and CMC, and found that CIEDE200 showed similar performance to CMC. See Appendix II.

R1-34 Indoor daylight: (J Schanda)

Dr. Schanda reported that there was much interest by some ISO committees who are still using CIE illuminant C for indoor illuminant. He suggested setting up a new TC to define indoor daylight. The Division approved to close this reporter unanimously. See Appendix III.

12. **DISCUSSION ON NEW WORK ITEM PROPOSALS**

Indoor Daylight Illuminant

Terms of reference:

To prepare a CIE recommendation on an Indoor Daylight Illuminant and a corresponding Indoor Daylight Source, considering the needs of the partner international standards organizations.

Chairman: Janos Schanda HU

Members: Byron Jordan CA, Tony Bristow SE, Peter Clarke GB.

The Division unanimously approved the establishment of this TC.

Committee number: TC1-66 (Colour section)

Irregularities in $\bar{y}_{10}(\lambda)$

Terms of reference:

To document the irregularities in $\bar{y}_{10}(\lambda)$ and, if necessary, to recommend the formation of a Technical Committee to consider possible modifications.

Reporter: Pieter Walraven NL

The Division unanimously approved the establishment of this Reportership.

Reporter number: R1-35 (Vision section)

Action Spectra for Discomfort Glare

Terms of reference:

To summarize the literature on the subject and make a recommendation for the terms of reference of a Technical Committee.

Reporter: Judit Fekete HU

The Division unanimously approved the establishment of this Reportership.

Reporter number: R1-36 (Vision section)

Definition of the Visual Field for Conspicuity

Terms of reference:

To summarize the literature on the visual field for conspicuity and make a recommendation for terms of reference for a Technical Committee.

Reporter: Nana Itoh JP

The Division unanimously approved the establishment of this Reportership.

Reporter number: R1-37 (Vision section)

13. **LIAISON**

SCIT: Standing Committee on Image Technology

It was suggested that this liaison should be moved to Division 8 because this organization was more relevant to Division 8 than Division 1. The Division unanimously approved to move this liaison to Division 8.

IALA: International Association of Lighthouse Authorities

This organization is interested in conspicuity of blue light for marine signals, equivalent luminance of flashing light, LEDs, etc. Dr. Pointer suggested establishing a liaison with this organization. The Division unanimously approved the establishment of this liaison. Mr. Malcolm Nicholson will be a liaison member.

For other liaisons than above, please refer to the Activity Report 2004, because there is no further report since then.

14. **NEXT MEETING**

Spanish National Committee invited us to hold our 2005 annual meeting in Leon in conjunction with the 2005 midterm meeting. TC meetings and Division meeting will be held on 16-17 June 2005. The Division unanimously accepted the invitation.

For the meeting in 2006, ISCC and Canadian National Committee would like to invite us to hold a Division meeting in either Toronto or Ottawa probably in May 2006 in conjunction with the annual meeting of ISCC and the Symposium on 75th anniversary of CIE standard observer.

15. **OTHER MATTERS**

None.

CLOSE

After thanking all members and guests for attending, Mrs. McFadden formally closed the meeting.

CIE DIVISION 1 "VISION AND COLOUR"

First Meeting of the McFadden Term

Thursday 10 June 2004

AGENDA

Thursday 10 June

9:00 – 10:15 **General Opening Session**

1. Opening and welcome by Director, Ms. Sharon McFadden
2. Announcements
3. Attendance
4. Membership
5. Discussion and confirmation of agenda
6. Approval of the minutes of the 8th meeting of the Sagawa term
7. Matters arising from these minutes
8. Director's report, including report from CIE Board of Administration
9. Reports from Editor and Secretary, E. Carter and Y. Nakano

10:15 – 10:30 Break

10:30 – 17:00 **CIE Division 1 Business Session**

10:30 – 12:30 10. Report of Vision Section and Discussion
Dr. Françoise Viénot

12:30 – 13:30 Lunch

13:30 – 15:30 11. Report of Color Section and Discussion
Dr. Mike Pointer

15:30 – 15:45 Break

15:45 – 16:30 12. Discussion on new work item proposals
- new TCs and Reporters

16:30 – 16:40 13. Liaison

16:40 – 16:50 14. Next meeting

16:50 – 17:00 15. Any other business

17:00 Close

A summary report on the field trials of CIEDE2000 formula

R1-33 Reporter: M. Ronnier Luo
May 2004

This report, CIE R1-33, was established in the 25th Session of the CIE, 2003. The aim was to keep a track on the research in colour differences. This report summarises three recent studies, which are focused on the evaluation of CIEDE2000.

Gay and Hirschler [1] compared the performance of the CIEDE2000 and CMC using a textile data set including 3350 pairs assessed by large panels of colourists across 7 different companies in Brazil. The results show that the CIEDE2000(2:1:1) gave a similar performance as CMC(2:1). However, it did slightly outperform CMC for sample pairs divided according to different hue and chroma regions. They criticized that this small or almost no improvement does not justify a change of standard by replacing the current ISO standard, CMC by CIEDE2000.

Noor *et al* also conducted a study with a close association of the RA36 Colour Measurement Committee, American Association of Textile Chemists and Colorists (AATCC). 17 pairs of samples were prepared surrounding 5 colour centres. Each pair was assessed by 31 observers using a 3-categorical point method: pass, marginal and fail. The results showed no significant improvement over the current ISO AATCC standard, CMC. A new research project funded by the AATCC will be started for comparing the performance of different colour difference equation led by Prof. Kuehni and Dr. Hink at the North Carolina State University, USA.

Minchew *et al* conducted a study to establish the industrial colour difference tolerances for two paint companies. 60 pairs surrounding 10 colour centres were prepared. Each pair was assessed by 10 observers from 2 companies, 5 each. The results showed that a typical disagreement of visual data is about 30% between observers in each lab and between two companies. The results also showed that the CIEDE2000 formula slightly outperformed CMC.

Overall, the three studies are all based upon the industrial data (based upon pass/fail criteria). The results clearly showed that CIEDE2000 performed equal or better than the other CIELAB based versions. However, this is expected because the largest differences between the CIEDE2000 and the other formulae are in the saturated blue and neutral region. The debate should be whether we should adopt a formula knowing consistently to give wrong predictions in these areas.

Reference

1. Gay, J and R. Hirschler, Field trials for CIEDE2000 –Correlation of visual and instrumental pass/fail decisions in industry, Proceedings of the 25th Session of the CIE, D1-38-41.
2. Noor K, Hinks D., Laidlaw A, Treadaway G. and R. Harold, Towards an improved colour difference formula, AATCC Color Science Symposium, College of textiles, NCSU, North Carolina, USA, March 9-10, 2004.
3. Minchew C., Kenyon P., Cui G. H. and Luo M. R., Verification of CIEDE2000 using industrial data, accepted for a presentation at AIC 2004, Brazil.

Report on**R 1-34, Indoor daylight (illuminant)**

by
J Schanda

2004-05-29

CIE Division 1 decided at its San Diego meeting in 2003 to set up a Reportership with the following Terms of Reference:

"To investigate the need for an indoor daylight source and/or illuminant."

This report covers the findings of the reporter.

Antecedents

During the elaboration of the new edition of CIE Publ. 15, Colorimetry an ISO Committee brought to the attention of the CIE that several ISO standards still prescribe CIE Illuminant C, which has been termed as "obsolete" in the draft report. The pulp and paper industry needs a standard indoor daylight illuminant, and the best available spectral power distribution for this was – according to their view – CIE Illuminant C.

The question of an indoor daylight illuminant standard is as old as the recommendation for CIE D65 as a primary standard illuminant for daylight applications (see e.g.1). Despite the fact that recommendations were presented to use either CIE illuminant C or a window glass attenuated form of CIE Standard illuminant D65 2'3 as an indoor daylight illuminant, no action was taken by the CIE on this subject.

Standards using CIE Daylight illuminants

Several ISO Standards specifically mention "indoor illumination"⁴, or "outdoor daylighting"⁵ conditions. The former one specifies CIE illuminant C as reference illuminant. TAPPI dealt with the question too⁶. Other ISO standards distinguish between "ISO brightness", referred to CIE illuminant C illumination and "D65 brightness", when a D65 simulator is used for irradiation⁷.

An other standard refer in case of office applications to D65 illuminant⁸, while the ISO Graphic Arts standards recommend D50 as reference standard.

R 1-34 activity

After the San Diego meeting the reporter requested the CIE Sounding Board manager to post a request to get information on indoor daylight applications. The text of this request is reproduced here:

"At the CIE Session in San Diego Division 1 discussed the question of CIE illuminants. The two Standard illuminants (A and D65) are well established and used widely. Since the introduction of CIE D65 as best outdoor daylight illuminant it has been realized that in indoor situations an illuminant would be needed with less UV content. Several trials have been described in the literature during the past decades, but none of them got wider acceptance.

CIE Division 1 decided to establish a Reportership: R1-34 "Indoor daylight", with the following Terms of Reference: "To investigate the need for an indoor daylight source and or illuminant." I was asked to take care of this new task.

To be able to prepare an overview on above question I would like to ask the help of the community of illuminating engineering on the following questions:

- 1.) Bibliographic reference and if possible copy of any material that deals with indoor daylight.
- 2.) Reference, and if possible copy of any international standard referring to the use of indoor

daylight.

3.) Bibliographic information, and if possible tabulated spectra of measured indoor daylight SPD.

Any further comment is also most welcome. My intention is to collect material for the next three months, and prepare a summary report still before the end of the year. In responding to this request do not respond to one of the Reflectors where this request gets posted, but direct all correspondence to my following e-mail address:

kntsj@almos.vein.hu

please put into the Subject line: CIE R1-34 Daylight or send me a letter by mail to:

Dr. Janos Schanda

Nador u. 25.

H-1029 Budapest - Remetekertvaros

Hungary

Looking forward to any comment on the subject.”

Several colleagues responded to above letter and have sent comments and bibliographic references^{9,10,11,12,13}. Among these there are a number of relatively new references showing that the question is very relevant. The responses have been collected, but due to the heavy load of the reporter on other items (among others also CIE Chairmanship of TC 1-48 and 1-59), the finalization of the report had to wait till now.

The opinions sent in the different comments differ considerably. Some prefer CIE illuminant C, others think that this illuminant is not suited for representing daylight in interiors, and suggest instead D65 filtered according to average window glass transmission or would favour a lower correlated colour temperature daylight illuminant, as e.g. D50 (preferred illuminant in graphic arts).

Several comments warned that one should not recommend a further illuminant without recommending also a suitable source. On this subject the opinion of the reporter is that recent progress in LED based reference sources give hope that Daylight Simulators with much improved spectral distribution might soon become available^{14,15}, thus CIE should select the most appropriate illuminant for the purpose.

It has been pointed out that the title of the Report is misleading. The Division called the Report only *Indoor Daylight*. In the title of the present report I included, in brackets, the word *illuminant*, because indoor daylight in itself does mean for an architect the light coming in into the room, and not the spectral distribution we would like to standardize.

Recommendation

The work conducted during the past year showed that in several industrial areas the need for an indoor daylight illuminant exists. Main users of such an illuminant are the pulp and paper industry and those who use paper. This is due to the fact that for many applications paper with optical brightener is used and the brightness/whiteness of such paper will be different if viewed outdoors (D65 simulation) or indoors. This is partly also true for many other office applications, because colour-printing substances might contain fluorescent materials too. From the many investigations performed, one has to conclude that a D65 simulator is not suitable for such investigations. Opinion of CIE Div. 2 experts is (communication by D. Rich) that CIE illuminant C is not representative for average indoor daylight spectral distribution.

Based on above the reporter recommends to set up a CIE Technical Committee with the task to work out a recommendation for a CIE Interior Daylight Illuminant and Reference Source.

Division 1 should give guidance for this TC to start work along one of the following routes:

- Collect indoor daylight spectral power distribution data globally and base a new recommendation according to those results, comparing them with existing CIE daylight spectral

- Collect window glass transmission spectra and construct an indoor daylight spectral curve based on these measurement results.

Respectfully,

J Schanda, Reporter

References

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- 1 Clarke FJJ (1975) Problems of spectrofluorimetric standards for reflection and colorimetric use. *NPL Report MOM 12* 1-34.
 - 2 Clarke FJJ (1980) Practical standard illuminant representative of interior daylight. *Proc. 19th Session of the CIE, Kyoto*. Publ. **CIE 50** P-79-09 73-78.
 - 3 Clarke FJJ, McKinnon RA (1982) Interior and exterior daylight illuminants for the colorimetry of fluorescent materials. *COLOR Res. & Appl.* **7** 257-263.
 - 4 ISO: Paper and board - Determination of CIE whiteness, C/2° (indoor illumination conditions). ISO 11476:2000.
 - 5 ISO 11475 Paper and board - Determination of CIE whiteness, D65/10° (outdoor daylight).
 - 6 Bristow JA (1999) ISO Brightness - A more Complete Definition. *TAPPI Journal* **82/10** 54-56.
 - 7 ISO: Paper, board and pulps — Measurement of diffuse blue reflectance factor (ISO brightness). ISO 2470:1999.
 - 8 ISO/IEC: Information Technology - Office machines - Method of specifying image reproduction of colour copying machines by analogue test charts - Realisation and Application. ISO/IEC 15775:1999.
 - 9 Jordan DB, O'Neill MA (1991) "The whiteness of paper - colorimetry and visual ranking", *Tappi* **7465** 93-101.
 - 10 Bristow JA, Karipidis C (1999) ISO brightness of fluorescent papers and indoor whiteness -- proposal for an illuminant. *Tappi* **82/1** 183-193.
 - 11 Bristow JA (2001) Indoor whiteness: A new internationally standardized concept. *Solutions!* October 2001 45-46.
 - 12 Jordan B, Zwinkels J, McGarry P (2003) ,The influence of the illuminant on the luminescent radiance factor spectrum of a reference fluorescent paper. *TAGA Proceedings*, 2003, Montreal, April 2003. Technical Association of the Graphic Arts. Rochester N.Y.
 - 13 Jordan B. (2003) Accurate colorimetry of fluorescent papers. *Proc. 25th Session of the CIE*, Bureau Central de la CIE, Vienna .
 - 14 Kranicz B. (2001) PhD Thesis internal report, University of Veszprém, Hungary.
 - 15 Eppeldauer G (2004) Development and application issues of a spectrally tunable LED source. CIE Expert Symp. On LED light sources, Tokyo.