Minutes of the Division 3 meeting held

in Burggrafenstrasse 6, Berlin, September 23, 2005

1. OPENING OF THE MEETING

Michael Seidl welcomed the division to the DIN offices. The DD thanked Michael Seidel for his hospitality in hosting the Division 3 meetings. The DD then went on to open the meeting and welcome all the attendees.

2. APPROVAL OF AGENDA

The DD presented the agenda of the meeting which was approved by the attendees.

3. ATTENDANCE

The following were in attendance:

Marc Fontoynont	Division Director, ENTPE (France)
Dominique Dumortier	Associate Director Natural Lighting, ENTPE (France)
Yoshiki Nakamura	Associate Director Artificial Lighting, Tokyo Institute of Technology (Japan)
Geoff Cook	Division Secretary (UK)
Lou Bedocs	Chairman TC3-40, R3-21, Thorn Lighting Holdings Ltd (UK)
Grega Bizjak	Division 3 representative (Slovenia)
Gisela Cakir	Division 3 representative (Germany)
David Carter	Chair TC3-31, Chair TC3-38 (UK)
Stanislav Darula	Division 3 representative (Bratislava)
Peter Dehoff	Division 3 representative (Austria)
Leyla Dokuzer Ozturk	Yildiz Technical University (Turkey, Observer)
Dilek Enarun	Division 3 representative (Turkey)
J.J Ezrati	C2RMF, Ministère de la culture (France)
Hans Jorgen Jacobsen	Division 3 representative (Denmark)
Harry Kambezidis	Division 3 representative (Greece)
Hyman Kaplan	USA Alternate Division 3 representative & IALD Liaison
Richard Kittler	Division 3 representative (Slovakia)

Matej Kobav	University of Ljubljana (Slovenia)
Yasuko Koga	Division 3 representative (Japan)
Eliyahu Ne'eman	Division 3 representative (Israel)
Zeynep Ozver Krochmann	PRC Krochmann Gmbh (Germany)
Werner Osterhaus	Division 3 representative (New Zealand)
Anna Pellegrino	Division 3 representative (Italy), Politecnico de Torino (Italy)
Pisto Pracki	Division 3 representative (Poland)
Jan Petter Skar	Division 3 representative (Norway)
Alexander Rosemann	University of British Columbia (Canada)
Axel Stockmar	President of National Committee (Germany)
Peter Thorns	UK observer
Liisa Halonen	Division 3 representative (Finland)

Apologies for absence were received from:

Jennifer Veitch
Terry McGowan
Lorne Whitehead
Julian Aizenberg
Hayden Willey
Derrick Kendrick

4. APPROVAL OF DUBLIN MINUTES

The minutes of the previous meeting in Dublin were approved, subject to modifications to the CEN liaison TC numbers, see later for the correct alpha- numeric identifier. Dominique Dumortier was thanked by the DS for his work as secretary to the Dublin meeting.

5. DIVISION MEMBERSHIP CHANGES - WELCOME NEW MEMBERS

The division has received confirmation of the appointment of new division representatives: for Denmark: Hans Jorgen Jacobsen; for Tunisia: Neji Ben Ali; and for Germany: Gisela Cakir. Jennifer Veitch has been appointed as the Canadian Division member after the resignation of Ivan Pasini. CIE National Committees of Argentina and Iceland have been expelled from the Division.

6. DIVISION DIRECTOR AND ASSOCIATE DIRECTORS REPORTS

<u>The Division Director Report</u>
The DD gave an oral report which was an overview of the work of the division. Hollow light guides, lighting in real spaces, overhead glare, energy efficiency, and lighting and health were

highlighted. The volunteer basis of the work of the Division was re-stated and the DD encouraged members to seek funding in order to support the work of the Division. The IEA was cited as a current source of funding, which has the potential to support some of the work of the Division over the next three years.
The DD reported that the Division remained one of the most active within CIE, with a significant number of publications being produced each year.

The Associate Director for Artificial Lighting Report
The ADAL gave a brief oral report, which emphasized the need for Division activityies in the field of overhead glare, lighting and health and energy efficiency. This confirmed and re-stated some of the key points in the DD report.

The Associate Director for Natural Lighting Report
The ADNL gave an oral report that described the ongoing work concerning the general sky standard and cited Prof. Kittler as making a significant contribution to this work. It was confirmed that the work of TC3.36 is to be supported by the IEA, although a confirmation meeting is scheduled for autumn 2005.

7. TC CHAIRMEN REPORTS

7.1 TC3-11 Daylight calculation methods - Chairman: M.Navaab

It was agreed to close this TC due to a failure to meet agreed deadlines. The DS to write to the TC chairman obtain the archived data and forward to CIE HQ.

7.2 TC3-19 Scale model photometry for interior lighting – Chairman: M. Navaab

It was agreed to close this TC due to a failure to meet agreed deadlines. The DS to write to the TC chairman obtain the archived data and forward to CIE HQ.

7.3 TC3-20 Lighting and architecture – Chairman: H. Kramer

The DD is to contact the TC Chairman to obtain the archive of the TC. This to be held at CIE HQ. The possibility of CIE scanning the extensive range of photographs in order to produce a CD ROM is to be explored. Lou Bedocs offered to assist in the scanning of the photos.

7.4 TC3-25 Co-ordination of the IDMP and its data – Chairman: D. Dumortier.

There was a meeting of this TC right after the TC 3-37 meeting. The web site describing the IDMP stations is still operating, however the information is outdated. The Chairman indicates that updating the server is a time consuming task. He proposes to produce a list of currently running IDMP stations along with the person responsible for it. It is agreed to start a new cross calibration campaign at least for the global horizontal illuminance parameter. The chairman will calibrate a Licor sensor and send it to the Bratislava station. From there, it will be sent to the Athens stations. It was also mentioned by the participants to the TC meeting that an official letter from CIE stressing the importance of the IDMP measurements would help in getting the funds required to run the stations.

7.5 TC3-30 Hollow light guides – Chairman: L. Whitehead

The final report of the work of this TC has been voted and approved and is ready for CIE publication.

7.6 TC3-31 Lighting for real spaces – Chairman: D. Carter

The final report is now available as TC Publication 161: 2004. The TC is now closed.

7.7 TC3-33 Test cases for the assessment of accuracy of lighting computer programs – Chairman: F. Maamari

The final report of the TC is available for Division voting closing date 23 September 2005.

7.8 TC3-34 Protocols for describing lighting - Chairwoman: J. Veitch

Although work is progressing, the final report is now due at the CIE quadrennial meeting in Bejing, in 2007. The Division noted that the TC Chairman was due to become a mother at any time. The DS was asked to send a congratulatory note to the TC Chairman at an appropriate time. This has subsequently, and with much pleasure, been acted.

7.9 TC3-36 Use of satellite images to derive daylight data – Chairman: D. Dumortier

The IEA task 36 to support this work has been approved and began officially in June 2005. The first meeting of the task has been scheduled for November 2005, at the German Aerospace Center, in OberpfaffenHoffen (near Münich). Although solar radiation information is the main thrust of the work funded by the IEA, the TC will be developing the daylighting component of this work. It is anticipated that this work will run for three years.

7.10 TC3-37 Guide for the application of the CIE general sky –Chairman: D. Kendrick

Derrick Kendrick has been chairman of this TC for a year. The TC met in Berlin with Harry Kambezidis as chairman for the meeting. The work has progressed quite well; a draft of the report has been produced and discussed during the TC meeting. It is anticipated that the final report could be available for the next division meeting in 2006.

7.11 TC3-38 Tubular daylight guidance systems – Chairman: D. Carter

The final report is finished and the TC voting complete. Minor alterations are being made and this will allow the report to be sent to CIE HQ to enable Division voting in the autumn of 2005. The commercial contribution to the work of this TC will enable a comprehensive document to be produced and discussions regarding the strategy for dissemination are ongoing.

7.12 TC3-39 Discomfort glare from daylight in buildings - Chairman:W. Osterhaus

The TC chairman gave a summary report, confirming that the TC had met in London in December 2004 and that the work is progressing. The DD emphasized the need for this work and reminded the chairman that the final report was due in time for the CIE quadrennial meeting in 2007. The TC is working towards the production of an interim report at the next Division meeting in 2006. Prof Kittler explained that the daylight data is now available in absolute terms and that there is a possibility of providing this information from the available measured data.

7.13 TC3-40 Maintenance of indoor lighting systems update - Chairman: L. Bedocs

This TC has 14 members and is on coarse to complete it's objective. The second meeting of the TC was held in Lyon, France in December 2005 at which the 5th version of the CIE 97 revision was reviewed. The draft introduced a new method for estimating Room surface maintenance factor, new sections on sustainability, lighting controls and maintenance program, and revised the tables of luminaires and lamps data. The emphasis remains on the use of data for the actual products and installation. The final draft (7th version) has been voted on July 29, 2005. A copy has been sent to the Central Bureau for Board and Division votes. The publication will be known as CIE 97:2005.

The TC also prepared a paper for presentation at the 10th LuxEuropa Congress.

7.14 TC3-41 Visual quality of displays in museums – Chairman: E. Ne'eman

The chairman gave a summary report. The damage to sensitive objects/materials can be reduced by reducing the UV component in the lighting as described in CIE publication 157, published in 2004. The TC is making progress with an interim report due for the CIE quadrennial meeting in 2007. The International Council of Museums is linked to the work of this TC through the dual membership of several of the TC members. The spectral response of UV was raised as an issue that may need to be considered in relation to a revision of the terms of reference of the TC. It was proposed that new terms of reference be produced by the TC and that this would be voted on by the division when required.

8. DIVISION REPORTERS REPORTS

8.1 R3-13 Lighting vocabulary – Y. Koga

The reporter was thanked by the DD for the work in managing the revision of the lighting vocabulary for division 3. He was asked to send the final list of terms with the proposed changes to all division members. The reporter indicates that there are some conflicts in terms and definitions presented from divisions 3, 4 and 5. So there is still work to do for harmonization. This will be done by the reporter and the persons in charge of the ILV in the two other divisions under the control of the chairman of the CIE Interdivisional Harmonising Committee (Jean Bastie).

As the vocabulary is due to be produced in English, the Division encourages all National Committees to produce alternative language versions.

8.2 R3-15 Lighting standards and recommendations – S. Simos

The DS to request archive material from the reporter and send to CIE HQ.

8.3 R3-17 Calculation of utilization factors – R. Topalova

The DS to request archive material from the reporter and send to CIE HQ. A discussion concerning the need to carry this work forward made reference to the need for CIE and CEN documents to be aligned. A publication is urgently needed.

8.4 R3-18 Thermal environment, climate and visual references – C. Laurentin

8.5 R3-19 Glare from windows – M. Velds

8.6 R3-20 Use of satellite images – Y.Koga

These three reports which have been produced since 2001 need to be recirculated within the division, then included in the CIE collection.

Copies of the reports from these three reporters were circulated at the Mid-Sessional Meeting in Iceland in 2001. It was agreed that the DS was to send copies of these reports to CIE HQ to archive. No Divisional vote is required prior to these reports entering the CIE archive.

8.7 R3-21 Determination of discomfort glare - L. Bedocs

Lou Bedocs made a summary of his written report. It is provided as Appendix A of the minutes. He stresses the fact that UGR limits have only been validated for certain positions. His proposal is to develop tables based on SHR of 1:1 rather than the 0.25:1, the division agreed with that. It was suggested that an addendum to the standard for indoor workplace lighting to cover the glare issues, was a useful and effective way of updating the standard. The Reporter also gave a review of the CIE/ISO/CEN voting procedure, with a 75% vote positive being sufficient for CEN standards adoption.

8.8 R3-22 Design guidance, review of publication 29.2 - H. Kaplan

The reporter gave a written and oral report at the division meeting. Reportership, R3-22 was established in July 2003 to compare CIE S 008/E-2001 and CIE Publication 29.2 with regard to the Application of the Indoor Work place technology.

Unfortunately, it took a while to obtain a copy of the CIE publication 29.2 which was out of print and there was not an electronic version. The Reporter was able to scan the Application portion and part of the Design portion and thus reviewed them to see if they could make a separate document. The Design and Application sections with a brief Introduction were sent to 2 CIE Division 3 members, 2 IALD members and a private Lighting consultant for their input. Feed back was received and the comments have been addressed.

This Reporter feels that an Application Document, using the original text as a Draft starting point, can be produced as a stand alone document, referencing material from CIE S 008. The reporter recommends that a Technical Committee be established to work on the document and that the make-up of the Committee be a combination of CIE and IALD persons.

Peter Dehoff provided the Reporter with a relevant German application booklet, to assist with the work.

8.9 R3-23 Lighting control and energy efficiency - P. Dehoff

The reporter provided a written and oral report at the division meeting. The written report is provided as appendix B of the minutes. At the last division 3 meeting in Dublin, it had been decided to reduce the scope of the report to the potential actions that the division could take regarding lighting controls and energy efficiency.

In order to produce something useful in the near future it was agreed that a CIE positional statement could be developed as a 1 page summary. This positional paper would include:

1. Energy aspects.
2. Preservation/conservation of things and not overheating people or objects.
3. Lighting to induce emotion and take into account relevant health aspects.

It was agreed that the Reporter would produce the 1 page positional statement with all speed. Then, it would be submitted to the division for approval.

8.10 R3-24 Overhead glare - T. Mc Gowan

Hyman Kaplan reported on the work of this reportership, for Terry McGowan. Evidence shows that a problem exists from glare when luminaries are above our heads. There is, therefore, a need for a summary document describing the issues affecting OH Glare. It was proposed that a TC be established, to harness those who have already expressed an interest to the DD to become involved in this work. The DD has a list of potential members. Lou Bedocs suggested that the problem was associated with a lumen pressure point or the presence of irritant light on a person when directly underneath, mainly, downlight luminaries. In the way that has been proposed for R3-23 a one page summary of the problem could be developed as a position statement from CIE Division 3. It was agreed that the DD was to contact the Reporter to establish if he could produce this summary.

8.11 R3-25 Lighting and Health – Chairman to be designated

In a wider discussion, the DD summarized the content of the CIE Symposium on light and health that took place in Vienna, in September 2004. The DD is arranging a Lighting and Health workshop in Ottawa in September 2006, this to precede a meeting of the Division. Axel Stockmar reminded the Division of the role that the Society of Light Therapy and Biological Rhythm is making in terms of high quality scientific thinking on this subject. Division members are encouraged to consult their publications (www.sltbr.org), since it appears to question much of the work included in the Lighting and Health Symposium.

9. LIAISON OFFICERS REPORTS

9.1 CEC JOULE Projects - M. Fontoynont

The framework programme 6 from the EC did not offer opportunities to launch international research programmes in lighting technologies at the European level (a proposal was set up and rejected). Potential funding may exist in the seventh framework programme.

9.2 CEN/TC169 Lighting Applications - L. Bedocs

CEN/TC169 - Light and Lighting
There are 8 active working groups with expected outputs -
WG2, Lighting of outdoor workplaces. (CIE S 015)
WG3, Photometric data for emergency lighting, awaiting document
WG4, Lighting for sports to include obtrusive light limits
WG6, Emergency lighting in tunnels
WG7, Looking at illuminance and luminance meters under new convener (G Vandermeersch)
WG8, Limits on Non visual radiations
WG9, Energy performance of building, prEN 15193, document produced for enquiry
TC169 Plenary meeting is next year in September in Bern with LiTG conference

9.3 International Association of Lighting Designers - H. Kramer

Hyman Kaplan is now the IALD liaison officer.

9.4 International Energy Agency - M. Fontoynont

This work is ongoing.

9.5 ISO/TC159/SC4 Ergonomics of human – System Interactions - L. Bedocs

Work is progressing.

9.6 ISO/TC159/SC5 Ergonomics of the Physical Environment – L. Bedocs

The convener of WG2 Lighting of Physical Environment reported good progress 015

9.7 World Meteorological Organization (WMO)

There is no liaison contact that has been established to date.

9.8 IESNA - I. Pasini

It was agreed that the DS contact Rita Harrold to establish if Jennifer Veitch, Terry McGowan or Hyman Kaplan could be the IESNA liaison officer.

9.10 SLL - Lighting for Age and Sensory Impairment - G. Cook

The liaison officer reported that the SLL have produced Factfile 8 Lighting for people who are visually impaired. BS 8300: 2001 Access to buildings and their environments for disabled people, (Code of Practice) received its first amendment in June 2005. No changes to the general lighting recommendations were made although the references to contrast between major surfaces was amended to an LRV Difference of 30 points (preferred) and between 20 and 30 points in non-critical areas. No values were to be less than 20 points. Whilst the amendment does not state the link, this amendment has implications for lighting provision. The SLL Code for lighting is due to be revised in 2006 and the opportunity to include design guidance for VIP's will be taken.
Following some discussion it was agreed to review the CIE low vision lighting publication 123: 1997 and this to be carried on by the DS. A 1 page summary report to be tabled at the Division meeting next year.

Further Liaisons

The Division would welcome a liaison with the **Dark Sky Association** (www.darksky.org).

In a general discussion the **International Lighting Detectives** (ILD) organization was mentioned (see www.lightingdetectives.org). The Lighting Detectives is a non-profit group dedicated to the study of lighting culture through practical methods, mainly by engaging in fieldwork. Werner Osterhaus was a member of this organization and it was agreed that he would act as liaison officer, subject to ILD confirmation.

10. FUTURE WORK

New Technical Committees

The extension of R3-22: Review of publication 29.2, will become **TC3-42 Lighting Design Applications.** The reporter (H. Kaplan) will have to convene a TC membership, clarify the terms of reference and develop a work programme. This should be sent to the DS. The Division was minded to allow this work to proceed due to the clearly defined terms of reference of the Reportership R2-22.

Report R3-25 will become **TC3-43 Light and Health**. The chairmanship, the detailed terms of reference and membership will be decided at the next division meeting on the basis of the second CIE workshop related to the subject.

The energy issue is relevant for CIE, however CIE needs to defend the quality of light to be provided in interiors. The influence of energy is more complex in lighting terms with the reduction of waste being a key element here. The energy efficiency lobby is powerful and may dominate the quality issues associated with lighting. An EU Directive/Standard is coming that will set the energy levels for different buildings. CIE Division 3 needs to reconfirm the need for the lighting parameters that are currently in the CIE and ISO Standards. The importance of light is such that CIE cannot abandon the quality issues without severe problems. The UK Energy Code as embodied in the Building Regulations sets standards for energy efficiency. Part L of the Building Regulations is concerned with energy efficiency and sets standards for new buildings. In view of the importance of this subject, the

Division will monitor developments, particularly through the relevant liaison officers and TC Chairmen, with the possibility of a new TC emerging in 2006.

The division is keen to make reference to some measurable means of assessing lighting quality. No firm proposals were developed, but the item should be raised at the next meeting.

New Reporterships

A new reportership R 3-26 has been proposed by John Mardaljevic, it is called "Climate Based Daylighting Analysis". This reportership has been motivated by a commercial demand for high precision daylighting design information and the need for consolidating the fragmented academic understanding on the subject. The tasks of the reportership will be:

1. to collect the evidence which supports the commercial demand,
2. to consolidate state of the art publications and reports concerning the subject,
3. to prepare a programme of work to develop a CIE publication to address identified issues: quantification of solar access in urban environments, evaluation of electrochromic glazing, annualized glare metrics…

This proposal was accepted by the division. J. Mardaljevic will be the reporter. D. Dumortier (the ADNL), M. Kobav (Slovenia) and Y. Koga (Japan) offered their assistance by contributing to the report. Based on the reportership, a TC could be created in 2007.

11. NEXT MEETING

The next meeting of the division will be held on Saturday September 9 in Ottawa just after the 2nd CIE Symposium on Lighting and Health. The TC meetings will be held on Wednesday September 6.

12. OTHER BUSINESS

Division members were reminded of the need to consider, for constitutional reasons, the appointment of a new DD at the CIE quadrennial meeting in 2007. There are also opportunities to appoint new ADAL, ADNL, Secretary, Webmaster and other Division officers.

The DD thanked all of those who attended for their contribution to the meeting and thanked Michael Seidl again for hosting the meeting in the DIN Offices.

Appendix A

Report R3-21 Determination of discomfort glare - L. Bedocs

Objectives

To review the differences in the approach to the determination of discomfort glare as shown in CIE Publication 117 and the UGR method specified for use in the ISO 8995-1E: 2002/CIE S 008E: 2001 standard.

Introduction

Freedom from discomfort glare is an important criterion of lighting quality. The sensation of glare experienced by people in an illuminated interior in the form of discomfort, annoyance and irritations has a complex relationship with the lighting installation and the occupants. The function is related to imbalance within the luminance pattern experienced by the visual mechanism with the glare sources lying above the range that the eye has adapted to at the time.

Experimental evidence showed that the main factors influencing discomfort glare are: the luminance of the source and their apparent size, their position in the field of view and the adaptation luminance of the surrounding area. These factors have been combined in a formula and used to determine the degree of discomfort glare, known as the CIE Unified Glare Rating (UGR) system, in indoor lighting installations.

The derivation of the formula and its use in indoor lighting installations is the subject of publication CIE 117. This publication gives calculations methods for direct use of the formula in lighting installations, tabular method for arrays of luminaires at 0.25:1 spacing to height ratio (SHR) in installations and UGR luminance curves of the luminaires. It, however, does not provide recommended limiting UGR values for use in any type of lighting installations. The reason for the tabular method of 0.25:1 SHR is unclear and not justified.

The lighting schedule of ISO 8995-1: 2002/CIE S 008:2001 standard gives recommended limiting UGR values for each activity area and recommends that the verification shall be made by the use of the tabular method but with luminaire data computed for arrays at 1:1 spacing to height ratio. The limiting UGR values have been extracted from National Lighting Guides where these have been in use for many decades. The 1:1 SHR verification process was specified after several member countries reported major difficulties in complying with the UGR limits when calculating the tables according to CIE 117. They found that when UGR values are calculated at 0.25:1 SHR, a large number of luminaires that have been used with great satisfaction for many years and previously met the UGR limits, gave values which were increased by more than 3 units and no longer complied with the limiting UGR.

Justification for the standard

The limiting UGR values used in the ISO/CIE standard have been taken from National Guides/Codes. These limits have been devised, validated for a standard observer position and have been in use with satisfaction for over 40 years. The original validations were made in real lighting installations. The observers estimated UGR values for a very large number of

lighting installations, that were compared to values obtained from pre-calculated UGR tables, for the luminaires in the scheme and with this process the UGR limits were calibrated. These UGR tables were calculated for the standard observer conditions with array of luminaires at 1:1 spacing to height ratio. Subsequently several researchers, around the world, have repeated a similar validation and confirmed the limits and verification process for actual lighting installations. This process, therefore, has become a closed loop system where the specified UGR limits can only be verified reliably by the UGR tabular method with luminaires data produced for 1:1 spacing in static standard observer positions. Currently there are no validated UGR limits for random observer points in an indoor lighting installation or for dynamic (moving eye) observer.

Therefore, the results of computation of UGR at a point, until validated in real schemes, have only an indicative status. Furthermore, the discomfort experienced from luminaires or lamps directly above the head and out of field of view cannot be explained by UGR. This so-called "down-light or nose glare" discomfort needs to be investigated.

Recommendations

1, that CIE Division 3 should publish an addendum "UGR verification" (as Annex) to ISO 8995-1:2002/CIE S 008:2001 standard giving the method for the preparation of tables of UGR data to be published by manufacturers for specific luminaires and used for the verification of conformity with the limiting UGR values specified in the schedule of the standard.

2, that CIE Division 3 should revise publication CIE 117 and replace the 0.25:1 SHR tabular procedure with 1:1 SHR standard conditions. This section should make use of the new CIE standard UF calculation method and be the same document as 1 above.

3, that CIE Division 3 should instigate studies to quantify and produce limits of UGR in meaningful units of the discomfort glare experienced by observers at a point.

4, that CIE Division 3 should consider the content of the addendum as proposed below;
Use the UGR formula for an array of luminaires in standard conditions. The standard conditions should be defined with precision and followed for UGR table production.

1. A diagram to show an array of luminaires encompassing all room sizes and spaced at 2m centres be generated.
2. An observer is located at the mid-point of the wall and has horizontal line of sight towards the centre of the opposite wall.
3. Room dimensions X and Y to be expressed in terms of the mounting height H, with X being the side perpendicular to the line of sight and Y being the side parallel to the line of sight.
4. The luminous Flux in luminaires normalised to 1000 lm total bare lamp flux. That is Flux output of a lamp x Number of lamps = 1000 lumens.
5. Formula and table of correction terms to be provided for actual lamp flux corrections.
6. Adopting the convention with regards to height and spacing
   Height of luminaire (H) above observer's eye = 2m
   Height of walls (H) = 2m
   Height of eye and horizontal reference plane above floor = 1.2m

Spacing to Height Ratio (SHR) = 1

7. A standard format for the presentation of UGR table be shown
8. Show an example of UGR table production by manual method. This could be used to check and verify the accuracy of UGR calculating lighting software.
9. Produce a step-by-step usage of the data showing interpolations of the table of values and lamp flux corrections.

Appendix B

Report R3-23 Lighting control and energy efficiency - P. Dehoff

Progress on the development of lighting controls is fast. Up-to-date technology is described in the literature (R.S. Simpson: Lighting Control, 2003). So probably it is better for the division to cover general aspects.

Energy efficiency of indoor lighting in combination with daylighting is one big issue in European Standardisation (see TC 169 WG 2: Lighting Energy Estimation). Controls involve daylight control and presence control. Also there is a strong relation with IEA Task 45 "Future energy efficient electric lighting".

Light and Health is another key issue involving lighting controls. The CIE symposia on Light and Health (Vienna 2004, Ottawa 2006) gave a focus on that.

Therefore the following potential actions could be taken by CIE:

1. General aspects of lighting control according to daylight
   - detecting daylight availability
   - efficient electric lighting layouts
   - efficient blinds
   - review calculation methods for energy savings
2. Aspects of dynamic lighting at workplaces
   - change of illuminance at working tasks
   - change of luminance distribution in a room
   - change of colour temperature
   - strategies for changes
   - evaluation of lighting criteria
3. User influence on lighting control
   - personal
   - semi automatic
   - automatic
4. Lighting control and well being of the user
   - analysis of CIE Symposium
5. Lighting control and health of the user
   - analysis of CIE Symposium

Producing a technical report will be a major piece of work. This will involve reviewing papers and research work as well as investigating real installations and applications.