see similar files: http://farbe.li.tu-berlin.de/AEG9/AEG9.HTM
information: http://farbe.li.tu-berlin.de or http://130.149.60.45/~farbmetrik

TUB registration: 20200901-AEG9/AEG9L0N1.TXT /.PS
application for evaluation and measurement of display or print output

TUB material: code=tha4a

**Output − Input − Output: A loop for relative colour fidelity with the visual *rgb** and *LCh** CIELAB data**

For the ISO-test file with 729 colours, see http://standards.iso.org/iso/9241/306/ed-2/AE49/AE49F0PX_CY8_1.PDF
Use the OLM16 method for output linearization, see http://farbe.li.tu-berlin.de/OUTLIN16_01.PDF.
Then there are linear relations between *rgb** and *LCh** **Use reference test chart with 729 CIELAB colours**

**Ergonomic and colorimetric goals as option**

**Improved standardization**
Interdisciplinary standards shall replace isolated standards to realize the properties of the ISO-colour loop. The output shall be equal for rgb*/cmyk* data according to the 1-Minus-Relation (1MR) and continuous.

**Display output with rgb*/cmyk* data**
For different display reflections at work places a relative gamma slider and/or gamma profiles shall produce an ergonomic output for the whole display.

**Print output with rgb*/cmyk* data**
For different paper contrast at work places with the display or printer driver different relative gamma shall produce an ergonomic output. Any printer shall have a cmyk*-input channel as an option to produce an ergomomic output.

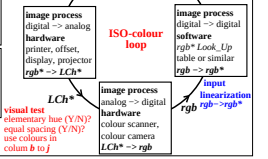
*A general ergonomic solution instead of the gamma transfer is the transfer of 16,7 million rgb*/cmyk* to rgb*/cmyk* data.*

AEG9r−3N

Colour scanners or cameras produce 729 *rgb* data.

Transfer the 729 *rgb* data to the 729 *rgb** data.

After the linearized input the 729 colour data *rgb** may be used again for the linearized output.




| Input | Output | Input and output media and applications<br>Input | Output | Application | Technical Report (TR) or Standard | Method & Test: Linearization |
|---|---|---|---|---|---|---|
| – | – | – | – | Basis | **ISO/IEC TR 24705**[3)4)]<br>**former DIS 19839-1**[3)] | **DIN 33866-1**<br>**DIN 33872-1** |
| **analog**[2)] | **analog** | ISO/IEC-file series equally spaced in *rgb** ISO/IEC-test chart (hardcopy) series equally spaced in *LCh** | Hardcopy | **Copier** | **ISO/IEC 15775**[2)]<br>**under revision** (2020) | **DIN 33866-2** [2)]<br>**JIS X 6933**[1)2)] |
| **analog**[2)] | **digital** | ISO/IEC-test chart (hardcopy) series equally spaced in *Lch** | File | **Scanner** | **ISO/IEC TR 24705**[3)4)]<br>**former DIS 19839-3**[3)] | **DIN 33866-4** |
| **digital**[1)] | **analog** | ISO/IEC-test chart (File) series equally spaced in *rgb** | Hardcopy<br>Softcopy | **Printer**<br>**Display** | **ISO/IEC TR 24705**[3)4)]<br>**former DIS 19839-3**[3)]<br>**ISO/IEC TR 24705**[3)4)]<br>**former DIS 19839-43**[3)]<br>**ISO 9241-306:2018**[1)] | **DIN 33866-3**<br>**DIN 33872-2,4**<br>**DIN 33866-5**<br>**DIN 33872-2,4** |

[1)] Digital ISO-test files for free download from: http://standards.iso.org/iso/9241/306/ed-2/index.html
[2)] Analog ISO-test charts are available from 3 sources: DIN 33866-2, JIS X 6933, *Richter, 2012*, offset print (3600dpi), siehe *Colour and Colour Vision*, compare as file http://standards.iso.org/iso/9241/306/ed-2/ES15.PDF
[3)] Free download of content of ISO documents for example for new standard projects, see many URLs in: http://farbe.li.tu-berlin.de/EE68/EE681-3N.PDF. [4)] Withdrawn in 2019.

**ISO/IEC-input linearization method**

| Input | Output | Application | Technical Report (TR) or Standard |
|---|---|---|---|
| Original scene + CIE colours | ISO/IEC Image File | Reference Image File | **ISO/IEC 15775**[2)]<br>under revision (2020)<br>ISO/IEC TR 24705[3)4)] |

**ISO/IEC-output linearization method,** OUTLIN16_01.PDF

| Input | Output media | Application | Technical Report (TR) or Standard |
|---|---|---|---|
| ISO/IEC File | Hardcopy | Printer | **ISO/IEC TR 19797**[3)4)] |
| ISO/IEC File | Softcopy | Display | **ISO 9241-306:2018**<br>8 viewing conditions |
| ISO/IEC File | Softcopy<br>Hardcopy<br>Hardcopy | Display<br>Offset<br>Printer | **CIE R8-09:2015**<br>{CIE internal} + http://farbe.li.tu-berlin.de/OUTLIN16_01.PDF |

AEG9l−7N

| Input | Output | Input and output media and applications<br>Input | Output | Application | Technical Report (TR) or Standard | Method & Test: Linearization |
|---|---|---|---|---|---|---|
| – | – | – | – | Basis | **ISO/IEC TR 24705**[3)4)]<br>**former DIS 19839-1**[3)] | **DIN 33866-1**<br>**DIN 33872-1** |
| **analog**[2)] | **analog** | ISO/IEC-file series equally spaced in *rgb** ISO/IEC-test chart (hardcopy) series equally spaced in *LCh** | Hardcopy | **Copier** | **ISO/IEC 15775**[2)]<br>**under revision** (2020) | **DIN 33866-2** [2)]<br>**JIS X 6933**[1)2)] |
| **analog**[2)] | **digital** | ISO/IEC-test chart (hardcopy) series equally spaced in *Lch** | File | **Scanner** | **ISO/IEC TR 24705**[3)4)]<br>**former DIS 19839-3**[3)] | **DIN 33866-4** |
| **digital**[1)] | **analog** | ISO/IEC-test chart (File) series equally spaced in *rgb** | Hardcopy<br>Softcopy | **Printer**<br>**Display** | **ISO/IEC TR 24705**[3)4)]<br>**former DIS 19839-3**[3)]<br>**ISO/IEC TR 24705**[3)4)]<br>**former DIS 19839-43**[3)]<br>**ISO 9241-306:2018**[1)] | **DIN 33866-3**<br>**DIN 33872-2,4**<br>**DIN 33866-5**<br>**DIN 33872-2,4** |

[1)] Digital ISO-test files for free download from: http://standards.iso.org/iso/9241/306/ed-2/index.html
[2)] Analog ISO-test charts are available from 3 sources: DIN 33866-2, JIS X 6933, *Richter, 2012*, offset print (3600dpi), siehe *Colour and Colour Vision*, compare as file http://standards.iso.org/iso/9241/306/ed-2/ES15.PDF
[3)] Free download of content of ISO documents for example for new standard projects, see many URLs in: http://farbe.li.tu-berlin.de/EE68/EE681-3N.PDF. [4)] Withdrawn in 2019.

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**Equally spaced colour steps in hue planes for offset with *rgb** and CIELAB data *LCh****

*Offset* colours (9 steps) in CIELAB colour space
CIELAB lightness *L**

*Offset* colours (9 steps) in CIELAB colour space
CIELAB lightness *L**

*rgb** input and *LCh** output of *Offset* colours

| Color | *rgb** | *LCh** |
|---|---|---|
| *R* elementary red | 1 0 0 | 47, 74, 26 |
| *Y* elementary yellow | 1 1 0 | 86, 88, 92 |
| *G* elementary green | 0 1 0 | 53, 57, 162 |
| *B* elementary blue | 0 0 1 | 42, 45, 272 |
| *N* black | 0 0 0 | 18, 0, 0 |
| *W* white | 1 1 1 | 95, 0, 0 |

*Data according to test chart DIN 33872-2, p.9-12*
http://farbe.li.tu-berlin.de/A/33872E.html

*Elementary-hue angles of CIE R1-47, see*
http://web.archive.org/web/20160304130704/http://files.cie.co.at/526.pdf

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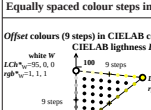
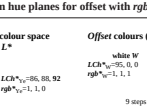
*Offset* colours (9 steps) in CIELAB colour space
CIELAB lightness *L**




*Offset* colours (9 steps) in CIELAB colour space
CIELAB lightness *L**