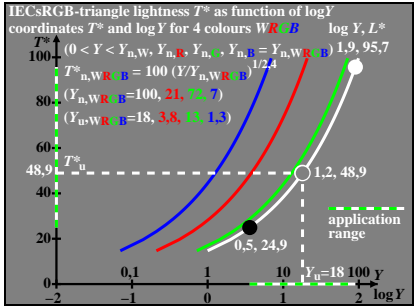


sensation scaling functions
lightness L^* and tristimulus value Y
adaptation on surround white W
 $L^*W = 100 (Y / 100)^{1/2,0}$
adaptation on surround grey U
 $L^*U = 100 (Y / 100)^{1/2,4}$
description with CIELAB 1976
 $L^*_{CIELAB} = 116 (Y / 100)^{1/3,0} - 16$
adaptation on surround black N
 $L^*_N = 100 (Y / 100)^{1/3,0}$



Viewing situations of adjacent greys

1A $R; R+\Delta R$

$R_U=0,18$

R=reflection

2A $Y; Y+\Delta Y$

$Y_U=18$

Y=tristimulus value

3A $L; L+\Delta L$

$L_U=28 \text{ cd/m}^2$

L=luminance

Viewing situations of separated greys

1B $R; R+\Delta R$

$R_U=0,18$

R=reflection

2B $Y; Y+\Delta Y$

$Y_U=18$

Y=tristimulus value

3B $L; L+\Delta L$

$L_U=28 \text{ cd/m}^2$

L=luminance

Viewing situations of adjacent greys

1A $L; L+\Delta L$

$Y_N=3,6$

2A $L; L+\Delta L$

$Y_U=18$

3A $L; L+\Delta L$

$Y_W=90$

Viewing situations of separated greys

1B $L; L+\Delta L$

$Y_N=3,6$

2B $L; L+\Delta L$

$Y_U=18$

3B $L; L+\Delta L$

$Y_W=90$

Dynamic range conversion of images with equally spaced rgb^* data
 Equally spaced visual output and lightness L^* output with GammaAdjuster

raw image data (8bit) $0 \leq rgb \leq 1$ (PhotoCD) not equally spaced search $0 \leq r_{gb_N} \leq 1$, and $0 \leq r_{gb_W} \leq 1$

16 grey steps ISO/IEC 15775 ISO 9241-306 standard range

Gamma Adjuster $(rgb^*)^{1/2,4}$ $\gamma_{rel} = \gamma / 2,4$ $1,2 \leq \gamma \leq 4,8$

SDR display SDR range

visual image (8bit) $0 \leq (rgb^*)^{1/2,4} \leq 1$ equally spaced between $rgb^*_N=0$ and $rgb^*_W=1$ $L^*_N=18$ and $L^*_W=95$ $\Delta L^*=5$ $\Delta r_{gb^*} = 1/15, \Delta L^*=5$

Baseline image $0 \leq rgb^* \leq 1$ equally spaced $rgb^*_N=0, L^*_N=18, Y_N=2,5$ $rgb^*_W=1, L^*_W=95, Y_W=90$ $\Delta L^*=5$

apply $\gamma_{rel} = 1/\gamma_{rel} = \text{invers}$

Alternate image $0 \leq (rgb^*)^{1/2,4} \leq 1$ equally spaced $rgb^*_N=0, L^*_N=18, Y_N=2,5$ $rgb^*_W=1, L^*_W=95, Y_W=90$ $\Delta L^*=5, \gamma_{rel}=1,0, \gamma_{rel}=1,0$

Determine visually the value of γ_{rel} in the range $0,5 \leq \gamma_{rel} \leq 2$ with the following two test charts.

Links to 16 test-chart pages according to ISO 9241-306 with $0,5 \leq \gamma_{rel} \leq 2$:
<https://standards.iso.org/iso/9241-306/ed-2/AE18/AE18F0XP.PDF>, flower motif with $0,5 \leq \gamma_{rel} \leq 2$.
<https://standards.iso.org/iso/9241-306/ed-2/AE18/AE18F0XN.PDF>, flower motif with $1 \leq \gamma_{rel} \leq 2$.
 and similar for the ISO series AE49, AE09, AE28 instead of AE18, see <https://standards.iso.org/iso/9241-306/ed-2/index.html>.

Dynamic range conversion of images with equally spaced rgb^* data
 Equally spaced visual output and lightness L^* output with GammaAdjuster

raw image data (8bit) $0 \leq rgb \leq 1$ (PhotoCD) not equally spaced search $0 \leq r_{gb_N} \leq 1$, and $0 \leq r_{gb_W} \leq 1$

16 grey steps ISO/IEC 15775 ISO 9241-306 standard range

Gamma Adjuster $(rgb^*)^{1/2,4}$ $\gamma_{rel} = \gamma / 2,4$ $1,2 \leq \gamma \leq 4,8$

SDR display SDR range

visual image (8bit) $0 \leq (rgb^*)^{1/2,4} \leq 1$ equally spaced between $rgb^*_N=0$ and $rgb^*_W=1$ $L^*_N=18$ and $L^*_W=95$ $\Delta r_{gb^*} = 1/15, \Delta L^*=5$

Baseline image $0 \leq rgb^* \leq 1$ equally spaced $rgb^*_N=0, L^*_N=18, Y_N=2,5$ $rgb^*_W=1, L^*_W=95, Y_W=90$ $\Delta L^*=5$

apply $\gamma_{rel} = 1/\gamma_{rel} = \text{invers}$

Alternate image $0 \leq (rgb^*)^{1/2,4} \leq 1$ not equally spaced $rgb^*_N=0, L^*_N=18, Y_N=2,5$ $rgb^*_W=1, L^*_W=95, Y_W=90$ $\Delta L^*=5, \gamma_{rel}=0,8, \gamma_{rel}=1,3$

Determine visually the value of γ_{rel} in the range $0,5 \leq \gamma_{rel} \leq 2$ with the following two test charts.

Links to 16 test-chart pages according to ISO 9241-306 with $0,5 \leq \gamma_{rel} \leq 2$:
<https://standards.iso.org/iso/9241-306/ed-2/AE18/AE18F0XP.PDF>, flower motif with $0,5 \leq \gamma_{rel} \leq 2$.
<https://standards.iso.org/iso/9241-306/ed-2/AE18/AE18F0XN.PDF>, flower motif with $1 \leq \gamma_{rel} \leq 2$.
 and similar for the ISO series AE49, AE09, AE28 instead of AE18, see <https://standards.iso.org/iso/9241-306/ed-2/index.html>.

Visual definition of γ_{rel} by test-chart output on display
 according to ISO 9241-306 with 16 values $0,5 \leq \gamma_{rel} \leq 2$

raw image data (8bit) $0 \leq rgb \leq 1$ (PhotoCD) not equally spaced search $0 \leq r_{gb_N} \leq 1$, and $0 \leq r_{gb_W} \leq 1$

16 grey steps ISO/IEC 15775 ISO 9241-306 standard range

Gamma Adjuster $(rgb^*)^{1/2,4}$ $\gamma_{rel} = \gamma / 2,4$ $1,2 \leq \gamma \leq 4,8$

SDR display SDR range

visual image (8bit) $0 \leq (rgb^*)^{1/2,4} \leq 1$ equally spaced between $rgb^*_N=0$ and $rgb^*_W=1$ $L^*_N=18$ and $L^*_W=95$ $\Delta r_{gb^*} = 1/15, \Delta L^*=5$

Baseline image $0 \leq rgb^* \leq 1$ equally spaced $rgb^*_N=0, L^*_N=18, Y_N=2,5$ $rgb^*_W=1, L^*_W=95, Y_W=90$ $\Delta L^*=5$

apply $\gamma_{rel} = 1/\gamma_{rel} = \text{invers}$

Alternate image $0 \leq (rgb^*)^{1/2,4} \leq 1$ equally spaced $rgb^*_N=0, L^*_N=18, Y_N=2,5$ $rgb^*_W=1, L^*_W=95, Y_W=90$ $\Delta L^*=5, \gamma_{rel}=1,0, \gamma_{rel}=1,0$

Determine visually the value of γ_{rel} in the range $0,5 \leq \gamma_{rel} \leq 2$ with the following two test charts.

Links to one test-chart page according to ISO 9241-306 with $0,5 \leq \gamma_{rel} \leq 2$:
<http://farbe.li.tu-berlin.de/cec4/cec400np.pdf>, 1080 colors including 729(9x9x9) colors.
<http://farbe.li.tu-berlin.de/cec7/cec700np.pdf>, flower motif, slide film, +0,5 stops.
<http://farbe.li.tu-berlin.de/cec7/cec700np.pdf>, flower motif, slide film, +0,5 stops.
<http://farbe.li.tu-berlin.de/cec7/cec700np.pdf>, flower motif, negative film, +2 stops.
 see for papers: <https://farbe.li.tu-berlin.de/XY91FEN.html>.

Visual definition of γ_{rel} by test-chart output on display
 according to ISO 9241-306 with 16 values $0,5 \leq \gamma_{rel} \leq 2$

raw image data (8bit) $0 \leq rgb \leq 1$ (PhotoCD) not equally spaced search $0 \leq r_{gb_N} \leq 1$, and $0 \leq r_{gb_W} \leq 1$

16 grey steps ISO/IEC 15775 ISO 9241-306 standard range

Gamma Adjuster $(rgb^*)^{1/2,4}$ $\gamma_{rel} = \gamma / 2,4$ $1,2 \leq \gamma \leq 4,8$

SDR display SDR range

visual image (8bit) $0 \leq (rgb^*)^{1/2,4} \leq 1$ equally spaced between $rgb^*_N=0$ and $rgb^*_W=1$ $L^*_N=18$ and $L^*_W=95$ $\Delta r_{gb^*} = 1/15, \Delta L^*=5$

Baseline image $0 \leq rgb^* \leq 1$ equally spaced $rgb^*_N=0, L^*_N=18, Y_N=2,5$ $rgb^*_W=1, L^*_W=95, Y_W=90$ $\Delta L^*=5$

apply $\gamma_{rel} = 1/\gamma_{rel} = \text{invers}$

Alternate image $0 \leq (rgb^*)^{1/2,4} \leq 1$ not equally spaced $rgb^*_N=0, L^*_N=36, Y_N=9$ $rgb^*_W=1, L^*_W=88, Y_W=71$ $\Delta L^*=3, \gamma_{rel}=0,8, \gamma_{rel}=1,3$

Determine visually the value of γ_{rel} in the range $0,5 \leq \gamma_{rel} \leq 2$ with the following two test charts.

Links to one test-chart page according to ISO 9241-306 with $0,5 \leq \gamma_{rel} \leq 2$:
<http://farbe.li.tu-berlin.de/cec4/cec400np.pdf>, 1080 colors including 729(9x9x9) colors.
<http://farbe.li.tu-berlin.de/cec7/cec700np.pdf>, flower motif, slide film, +0,5 stops.
<http://farbe.li.tu-berlin.de/cec7/cec700np.pdf>, flower motif, slide film, +0,5 stops.
<http://farbe.li.tu-berlin.de/cec7/cec700np.pdf>, flower motif, negative film, +2 stops.
 see for papers: <https://farbe.li.tu-berlin.de/XY91FEN.html>.

Dynamic range conversion of images with equally spaced rgb^* data
 Equally spaced visual output and lightness L^* output with GammaAdjuster

raw image data (8bit) $0 \leq rgb \leq 1$ (PhotoCD) not equally spaced search $0 \leq r_{gb_N} \leq 1$, and $0 \leq r_{gb_W} \leq 1$

16 grey steps ISO/IEC 15775 ISO 9241-306 standard range

Gamma Adjuster $(rgb^*)^{1/2,4}$ $\gamma_{rel} = \gamma / 2,4$ $1,2 \leq \gamma \leq 4,8$

SDR display SDR range

visual image (8bit) $0 \leq (rgb^*)^{1/2,4} \leq 1$ equally spaced between $rgb^*_N=0$ and $rgb^*_W=1$ $L^*_N=18$ and $L^*_W=95$ $\Delta r_{gb^*} = 1/15, \Delta L^*=5$

Baseline image $0 \leq rgb^* \leq 1$ equally spaced $rgb^*_N=0, L^*_N=18, Y_N=2,5$ $rgb^*_W=1, L^*_W=95, Y_W=90$ $\Delta L^*=5$

apply $\gamma_{rel} = 1/\gamma_{rel} = \text{invers}$

Alternate image $0 \leq (rgb^*)^{1/2,4} \leq 1$ equally spaced $rgb^*_N=0, L^*_N=18, Y_N=2,5$ $rgb^*_W=1, L^*_W=95, Y_W=90$ $\Delta L^*=5, \gamma_{rel}=1,0, \gamma_{rel}=1,0$

Determine visually the value of γ_{rel} in the range $0,5 \leq \gamma_{rel} \leq 2$ with the following two test charts.

Links to 16 test-chart pages according to ISO 9241-306 with $0,5 \leq \gamma_{rel} \leq 2$:
<https://standards.iso.org/iso/9241-306/ed-2/AE18/AE18F0XP.PDF>, flower motif with $0,5 \leq \gamma_{rel} \leq 2$.
<https://standards.iso.org/iso/9241-306/ed-2/AE18/AE18F0XN.PDF>, flower motif with $1 \leq \gamma_{rel} \leq 2$.
 and similar for the ISO series AE49, AE09, AE28 instead of AE18, see <https://standards.iso.org/iso/9241-306/ed-2/index.html>.

Dynamic range conversion of images with equally spaced rgb^* data
 Equally spaced visual output and lightness L^* output with GammaAdjuster

raw image data (8bit) $0 \leq rgb \leq 1$ (PhotoCD) not equally spaced search $0 \leq r_{gb_N} \leq 1$, and $0 \leq r_{gb_W} \leq 1$

16 grey steps ISO/IEC 15775 ISO 9241-306 standard range

Gamma Adjuster $(rgb^*)^{1/2,4}$ $\gamma_{rel} = \gamma / 2,4$ $1,2 \leq \gamma \leq 4,8$

HDR display HDR range

visual image (8bit) $0 \leq (rgb^*)^{1/2,4} \leq 1$ equally spaced between $rgb^*_N=0$ and $rgb^*_W=1$ $L^*_N=18$ and $L^*_W=95$ $\Delta r_{gb^*} = 1/15, \Delta L^*=5$

Baseline image $0 \leq rgb^* \leq 1$ equally spaced $rgb^*_N=0, L^*_N=18, Y_N=2,5$ $rgb^*_W=1, L^*_W=95, Y_W=90$ $\Delta L^*=5$

apply $\gamma_{rel} = 1/\gamma_{rel} = \text{invers}$

Alternate image $0 \leq (rgb^*)^{1/2,4} \leq 1$ not equally spaced $rgb^*_N=0, L^*_N=107$ $rgb^*_W=1, L^*_W=167$ $\Delta L^*=10, \gamma_{rel}=1,3, \gamma_{rel}=0,8$

Determine visually the value of γ_{rel} in the range $0,5 \leq \gamma_{rel} \leq 2$ with the following two test charts.

Links to 16 test-chart pages according to ISO 9241-306 with $0,5 \leq \gamma_{rel} \leq 2$:
<https://standards.iso.org/iso/9241-306/ed-2/AE18/AE18F0XP.PDF>, flower motif with $0,5 \leq \gamma_{rel} \leq 2$.
<https://standards.iso.org/iso/9241-306/ed-2/AE18/AE18F0XN.PDF>, flower motif with $1 \leq \gamma_{rel} \leq 2$.
 and similar for the ISO series AE49, AE09, AE28 instead of AE18, see <https://standards.iso.org/iso/9241-306/ed-2/index.html>.

