$Q_{ab}(x_r)$=achromatic receptor response & modified

$Q_{ab}(x_r)=\frac{b}{\ln\sqrt{2}}\ln[1+\frac{1}{1+\sqrt{2}e^{x_r/a}}]-b$

a=0,50, b=1,00, e=2,718282

$Q_{0.5\_2}(x_r)$ a=0,50^{1,0}=0,500 b=2,00

$Q_{0.5\_1}(x_r)$

$m_{0,51}$=0,97 $m_{0,52}$=1,95

L_u range of office luminance

L_u=28 cd/m^2

x_r=log [L/L_u]

eeo20−1n, DEB10−2A

Achromatic receptor-response function
$Q_{ab}[x_r/a]$

with x_r=log [L/L_u] (L=test luminance)
L_u=surround luminance

$Q_{ab}[x_r/a]=\frac{b}{\ln\sqrt{2}}\ln[\frac{1}{1+\sqrt{2}e^{(x_r/a)}}]-b$

function values for b=1 and a>0 :

$Q_{a1}[x_r/a\to-\infty]$	=−1	x=log$L$, u=logL_u
$Q_{a1}[x_r/a=0]$	= 0	x_r=log [L/L_u] = $x-u$
$Q_{a1}[x_r/a\to+\infty]$	=+1	

eeo20−2n

$Q_{ab}(x_r)$=achromatic receptor response & modified

$Q_{ab}(x_r)=\frac{b}{\ln\sqrt{2}}\ln[1+\frac{1}{1+\sqrt{2}10^{x_r/a'}}]-b$

a=0,50, b=1,00, e=2,718282
a'=a ln(10)=1,151

$Q_{0.5\_2}(x_r)$ a=0,50^{1,0}=0,500 a'=1,151, b=2,00

$Q_{0.5\_1}(x_r)$

$m_{0,51}$=0,97 $m_{0,52}$=1,95

L_u range of office luminance

L_u=28 cd/m^2

x_r=log [L/L_u]

eeo20−3n, DEB11−2A

Achromatic receptor-response function
$Q_{ab}[x_r/a']$ a'=a ln(10)

with x_r=log [L/L_u] (L=test luminance)
L_u=surround luminance

$Q_{ab}[x_r/a']=\frac{b}{\ln\sqrt{2}}\ln[\frac{1}{1+\sqrt{2}\,10^{(x_r/a')}}]-b$

function values for b=1 and a'=a ln(10)>0 :

$Q_{a1}[x_r/a'\to-\infty]$	=−1	x=log$L$, u=logL_u
$Q_{a1}[x_r/a'=0]$	= 0	x_r=log [L/L_u] = $x-u$
$Q_{a1}[x_r/a'\to+\infty]$	=+1	

eeo20−4n

$F_{ab}(x_r)$=achromatic receptor response & modified

$F_{ab}(x_r)=b\frac{e^{x_r/a}-e^{-x_r/a}}{e^{x_r/a}+e^{-x_r/a}}$

a=1,00, b=1,00 e=2,718282

$F_{1\_2}(x_r)$ a=1,00^{1,0}=1,000 b=2,00

$F_{1\_1}(x_r)$

$m_{1,01}$=0,98 $m_{1,02}$=1,97

L_u range of office luminance

L_u=28 cd/m^2

x_r=log [L/L_u]

eeo20−5n, DNC10−2A

Achromatic receptor-response function
$F_{ab}[x_r/a]$ x_r=log(relative luminance)

with x_r=log [L/L_u] (L=test luminance)
L_u=surround luminance

$F_{ab}[x_r/a]=b\frac{e^{x_r/a}-e^{-x_r/a}}{e^{x_r/a}+e^{-x_r/a}}=b\tanh[x_r/a]$

function values for b=1 and a>0 :

$F_{a1}[x_r/a\to-\infty]$	=−1	x=log$L$, u=logL_u
$F_{a1}[x_r/a=0]$	= 0	x_r=log [L/L_u] = $x-u$
$F_{a1}[x_r/a\to+\infty]$	=+1	

eeo20−6n

$F_{ab}(x_r)$=achromatic receptor response & modified

$F_{ab}(x_r)=b\frac{10^{x_r/a'}-10^{-x_r/a'}}{10^{x_r/a'}+10^{-x_r/a'}}$

a=1,00, b=1,00 e=2,718282
a'=a ln(10)=2,302

$F_{1\_2}(x_r)$ a=1,00^{1,0}=1,000 a'=2,302, b=2,00

$F_{1\_1}(x_r)$

$m_{1,01}$=0,98 $m_{1,02}$=1,97

L_u range of office luminance

L_u=28 cd/m^2

x_r=log [L/L_u]

eeo20−7n, DNC11−2A

Achromatic receptor-response function
$F_{ab}[x_r/a']$ x_r=log(relative luminance)

with x_r=log [L/L_u] (L=test luminance)
L_u=surround luminance

$F_{ab}[x_r/a']=b\frac{10^{x_r/a'}-10^{-x_r/a'}}{10^{x_r/a'}+10^{-x_r/a'}}=b\tanh[x_r/a']$

function values for b=1 and a'=a ln(10) >0 :

$F_{a1}[x_r/a'\to-\infty]$	=−1	x=log$L$, u=logL_u
$F_{a1}[x_r/a'=0]$	= 0	x_r=log [L/L_u] = $x-u$
$F_{a1}[x_r/a'\to+\infty]$	=+1	

eeo20−8n

$Q_{ab}(x_r)$=achromatic receptor response & modified

$Q_{ab}(x_r)=\frac{b}{\ln\sqrt{2}}\ln[1+\frac{1}{1+\sqrt{2}e^{x_r/a}}]-b$

a=0,50, b=1,00, e=2,718282

$F'_{ab}(x_r)=4b/[a\{e^{x_r/a}+e^{-x_r/a}\}^2]$

a=1,00^{1,0} b=1,00

$F'_{1\_2}(x_r)$ $F'_{1\_1}(x_r)$

$Q_{0.5\_2}(x_r)$ a=0,50^{1,0}=0,500 b=2,00

$Q_{0.5\_1}(x_r)$

$m_{1,01}$=0,97 $m_{1,02}$=1,95

L_u range of office luminance

L_u=28 cd/m^2

x_r=log [L/L_u]

eeo21−1n, DNB40−2A

Derivation of achromatic receptor response
$F'_{ab}[x_r/a]$ x_r=log(relative luminance)

with x_r=log [L/L_u] (L=test luminance)
L_u=surround luminance

$F'_{ab}[x_r/a]=\frac{4b}{a\{e^{x_r/a}+e^{-x_r/a}\}^2}=\frac{b}{a\sinh^2[x_r/a]}$

function values for b=1 and a>0 :

$F'_{a1}[x_r/a\to-\infty]$	=0	x=log$L$, u=logL_u
$F'_{a1}[x_r/a=1]$	=1	x_r=log [L/L_u] = $x-u$
$F'_{a1}[x_r/a\to+\infty]$	=0	

eeo21−2n

$Q_{ab}(x_r)$=achromatic receptor response & modified

$Q_{ab}(x_r)=\frac{b}{\ln\sqrt{2}}\ln[1+\frac{1}{1+\sqrt{2}10^{x_r/a'}}]-b$

a=0,50, b=1,00, e=2,718282
a'=a ln(10)=1,151

$F'_{ab}(x_r)=4b/[a\{(10^{x_r/a'}+10^{-x_r/a'}\}^2]$

a=1,00^{1,0} b=1,00

$F'_{1\_2}(x_r)$ $F'_{1\_1}(x_r)$

$Q_{0.5\_2}(x_r)$ a=0,50^{1,0}=0,500 a'=1,151, b=2,00

$Q_{0.5\_1}(x_r)$

$m_{1,01}$=0,97 $m_{1,02}$=1,95

L_u range of office luminance

L_u=28 cd/m^2

x_r=log [L/L_u]

eeo21−3n, DNB41−2A

Derivation of achromatic receptor response
$F'_{ab}[x_r/a]$ x_r=log(relative luminance)

with x_r=log [L/L_u] (L=test luminance)
L_u=surround luminance

$F'_{ab}[x_r/a]=\frac{4b}{a'\{10^{x_r/a'}+10^{-x_r/a'}\}^2}=\frac{b}{a'\sinh^2[x_r/a']}$

function values for b=1 and a'= a ln(10) >0 :

$F'_{a1}[x_r/a'\to-\infty]$	=0	x=log$L$, u=logL_u
$F'_{a1}[x_r/a'=1]$	=1	x_r=log [L/L_u] = $x-u$
$F'_{a1}[x_r/a'\to+\infty]$	=0	

eeo21−4n

$F_{ab}(x_r)$=achromatic receptor response & modified

$F_{ab}(x_r)=b\frac{e^{x_r/a}-e^{-x_r/a}}{e^{x_r/a}+e^{-x_r/a}}$

a=1,00, b=1,00 e=2,718282

$F'_{ab}(x_r)=4b/[a\{e^{x_r/a}+e^{-x_r/a}\}^2]$

a=1,00^{1,0} b=2,00

$F'_{1\_2}(x_r)$ $F'_{1\_1}(x_r)$

$F_{1\_2}(x_r)$ a=1,00^{1,0}=1,000 b=2,00

$F_{1\_1}(x_r)$

$m_{1,01}$=0,98 $m_{1,02}$=1,97

L_u range of office luminance

L_u=28 cd/m^2

x_r=log [L/L_u]

eeo21−5n, DNC40−2A

Derivation of achromatic receptor response
$F'_{ab}[x_r/a]$ x_r=log(relative luminance)

with x_r=log [L/L_u] (L=test luminance)
L_u=surround luminance

$F'_{ab}[x_r/a]=\frac{4b}{a\{e^{x_r/a}+e^{-x_r/a}\}^2}=\frac{b}{a\sinh^2[x_r/a]}$

function values for b=1 and a>0 :

$F'_{a1}[x_r/a\to-\infty]$	=0	x=log$L$, u=logL_u
$F'_{a1}[x_r/a=1]$	=1	x_r=log [L/L_u] = $x-u$
$F'_{a1}[x_r/a\to+\infty]$	=0	

eeo21−6n

$F_{ab}(x_r)$=achromatic receptor response & modified

$F_{ab}(x_r)=b\frac{10^{x_r/a'}-10^{-x_r/a'}}{10^{x_r/a'}+10^{-x_r/a'}}$

a=1,00, b=1,00 e=2,718282
a'=a ln(10)=2,302

$F'_{ab}(x_r)=4b/[a\{(10^{x_r/a'}+10^{-x_r/a'}\}^2]$

a=1,00^{1,0} b=2,00

$F'_{1\_2}(x_r)$ $F'_{1\_1}(x_r)$

$F_{1\_2}(x_r)$ a=1,00^{1,0}=1,000 a'=2,302, b=2,00

$F_{1\_1}(x_r)$

$m_{1,01}$=0,98 $m_{1,02}$=1,97

L_u range of office luminance

L_u=28 cd/m^2

x_r=log [L/L_u]

eeo21−7n, DNC41−2A

Derivation of achromatic receptor response
$F'_{ab}[x_r/a]$ x_r=log(relative luminance)

with x_r=log [L/L_u] (L=test luminance)
L_u=surround luminance

$F'_{ab}[x_r/a]=\frac{4b}{a'\{10^{x_r/a'}+10^{-x_r/a'}\}^2}=\frac{b}{a'\sinh^2[x_r/a']}$

function values for b=1 and a'= a ln(10) >0 :

$F'_{a1}[x_r/a'\to-\infty]$	=0	x=log$L$, u=logL_u
$F'_{a1}[x_r/a'=1]$	=1	x_r=log [L/L_u] = $x-u$
$F'_{a1}[x_r/a'\to+\infty]$	=0	

eeo21−8n

TUB-test chart eeo2; Model of two response functions $F_{ab}(x_r)$ & $Q_{ab}(x_r)$ and derivation $F'_{ab}(x_r)$
Tangens hyperbolicus tanh(x_r) and modified functions with e^{xr} and 10^{xr}; a^n=$a^{1,0}$