Specification of sRGB.

(Specified in IEC 61966-2-1:1999)

Chromaticity co-ordinates of primaries:
R: x=0.64, y=0.33, z=0.03;
G: x=0.30, y=0.60, z=0.10;
B: x=0.15, y=0.06, z=0.79.
Note: these are defined in ITU-R BT.709-3 (the Television Standard for HDTV).

'Gamma': Approximately 2.2 (see precise specification below).

The reference white for sRGB is specified as D65 (i.e. chromaticity co-ordinates of x=0.3127, y=0.3290; z=0.3583).

Conversion from XYZ (D65) to sRGB:

$$\begin{bmatrix} Rs \\ Gs \\ Bs \end{bmatrix} = \begin{bmatrix} 3.2406 & -1.5372 & -0.4986 \\ -0.9689 & 1.8758 & 0.0415 \\ 0.0557 & -0.2040 & 1.0570 \end{bmatrix} \begin{bmatrix} X \\ Y \\ Z \end{bmatrix}$$

where XYZ are normalised such that Y=1 for the reference white and values of RGB outside of 0-1 are clipped.

The colour component transfer function is as follows:

If Rs, Gs, or Bs are less than or equal to 0.0031308

R = Rs*12.92
G = Gs*12.92
B = Bs*12.92

If Rs, Gs, or Bs are greater than 0.0031308

$R = 1.055*(Rs)^{1/2.4}-0.055$
$G = 1.055*(Gs)^{1/2.4}-0.055$
$B = 1.055*(Bs)^{1/2.4}-0.055$

Hints for Profile makers:

1) D50 referenced characterisation data

When chromatically adapted to the D50 white point, using the recommended 'Bradford' chromatic adaptation matrix published on the ICC web site, and normalised such that Y=1 for white, the tristimulus values of the primaries and white are:

R: X=0.4360, Y=0.2225, Z=0.0139;
G: X=0.3851, Y=0.7169, Z=0.09710;
B: X=0.1431, Y=0.0606, Z=0.7139

White: X=0.9642, Y=1.00, Z=0.8249

For D50 data it is necessary to first apply a chromatic adaptation matrix. Since this is a 3x3 matrix it can be combined with the 3x3 matrix above to produce a single matrix to convert XYZ to linear sRGB (i.e. prior to applying the colour component transfer function). The resultant matrix (obtained by the matrix multiplication of the inverse of the chad tag given on the web site and the matrix above - with slight modifications to produce 1,1,1 for the D50 white defined in the specification) is:

$$\begin{bmatrix} Rs \\ Gs \\ Bs \end{bmatrix} = \begin{bmatrix} 3.1339 & -1.6170 & -0.4906 \\ -0.9785 & 1.9160 & 0.0333 \\ 0.0720 & -0.229 & 1.4057 \end{bmatrix} \begin{bmatrix} X_{(50)} \\ Y_{(50)} \\ Z_{(50)} \end{bmatrix}$$

2) Measurement 'correction'

The above transformation produces 1 and 0 in each of RGB when XYZ is set to 0.9642, 1, 0.8249 and 0, 0, 0 respectively. However, in practice some degree of flare will be present if sRGB is intended to represent a real viewing situation. The amount of this flare will vary with the actual conditions used. However, it has been concluded by the committee developing ISO 22028-1 (a standard pertaining to colour image encodings) that for measurement consistency a level of flare should be assumed for display RGB colour encodings that is consistent with the 0/45 measurement condition assumed for ICC PCS measurements. The specification in IEC 61966-2-1 states that the white should be assumed to have a luminance of 80cd/m^2 and defines other viewing conditions that have led to the conclusion in ISO 22028-1 that a reference black would have a luminance of 1 cd/m^2. This would be the luminance measured at the position of the observer. So, it is recommended that profile makers utilise this information when producing profiles and assume the black point has a Y value of 0.0125 when the white is 1. This correction can be achieved by applying the following corrections to the computed RGB values:

sRGB′ = 0.0125 + 0.0764319 * sRGB sRGB <= 0.04045
sRGB′ = 0.0125 + 0.868423*(0.055 + sRGB)^2.4 sRGB > 0.04045