Art 427 – DRESS and new colours

Remarks
- Buttons are according to scale, except: gold, silver, brons, nickel
- Piping is allowed in one contrasting colour at collar, manchettes and gilette.
- Contrasting lining is allowed also prints in the lining. It has to be in scale
- Blouse with standing collar or turtleneck shirt should be white, off-white or colour according to scale.
- Plastron should be white, off-white or colour according to scale.
- Breeches should be white or off-white.
- Gloves should be white, off-white or colour according to scale.
- Riding boots should be black or have a colour according to scale.
- Hats should be black or have a colour according to scale.

Scale
Every colour which has a Value for ‘V’ smaller then 32%, according the HSV colour model, will be aloud. Saturation and hue can be everything, as long the value will not be bigger then 32%.
For Grand Prix Freestyle only, any single colour tailcoat will be allowed. Striped or multi-coloured coats are not permitted. Tasteful and discreet accents, such as a collar of a different hue or modest piping or crystal decorations, are acceptable.

HSV model
The proposal is based on the world wide used HSV (Hue, Saturation, Value) colour model. A color model is an abstract mathematical model describing the way colours can be represented as tuples of numbers.
In the HSV colour model, every color is specified by its Hue (angular position on the circle), Saturation (distance from the circle’s center) and Value (height along the central axis). The model can be visualized as a cylindrical object:

**Hue** is the colour type, such as red, yellow or blue. Ranges from 0°-360°.
**Saturation** is the ‘vibrancy’ of the colour. The lower the saturation of a color, the more "grayness" is present and the more faded the color will appear. Ranges 0-100%
**Value** is the brightness of the colour. The lower the value of the colour, the more dark the colour will be. Ranges 0-100%.

![HSV Colour Model](image)

Standard
Every colour which has a value smaller then 32%, according the HSV colour model, will be allowed. Saturation and hue can be everything, as long the value will not be bigger then 32%.

Check
Transformation between HSV and RGB

\[
H \in [0, 360] \\
S, V, R, G, B \in [0, 1]
\]
Let \( MAX \) equal the maximum of the \((R, G, B)\) values, and \( MIN \) equal the minimum of those values.

\[
H = \begin{cases} 
\text{undefined,} & \text{if } MAX = MIN \\
60 \times \frac{G-B}{MAX-MIN} + 0, & \text{if } MAX = R \\
60 \times \frac{G-B}{MAX-MIN} + 360, & \text{if } MAX = R \\
60 \times \frac{R-B}{MAX-MIN} + 120, & \text{if } MAX = G \\
60 \times \frac{R-B}{MAX-MIN} + 240, & \text{if } MAX = B
\end{cases} 
\]

\[
S = \begin{cases} 
0, & \text{if } MAX = 0 \\
1 - \frac{MIN}{MAX}, & \text{otherwise}
\end{cases} 
\]

\[
V = MAX
\]

From HSV to RGB:

\[
H_i = \left\lfloor \frac{H}{60} \right\rfloor \mod 6
\]

\[
f = \frac{H}{60} - H_i
\]

\[
p = V(1 - S)
\]

\[
q = V(1 - fS)
\]

\[
t = V(1 - (1 - f)S)
\]

\[
\begin{align*}
&\text{if } H_i = 0 \rightarrow R = V, \quad G = t, \quad B = p \\
&\text{if } H_i = 1 \rightarrow R = q, \quad G = V, \quad B = p \\
&\text{if } H_i = 2 \rightarrow R = p, \quad G = V, \quad B = t \\
&\text{if } H_i = 3 \rightarrow R = p, \quad G = q, \quad B = V \\
&\text{if } H_i = 4 \rightarrow R = t, \quad G = p, \quad B = V \\
&\text{if } H_i = 5 \rightarrow R = V, \quad G = p, \quad B = q
\end{align*}
\]

In computer graphics, it is typical to represent each channel as an integer from 0 to 255 instead of a real number from 0 to 1. It is worth noting that when encoded in this way, every possible HSV color has an RGB equivalent. However, the inverse is not true. Certain RGB colors have no integer HSV representation. In fact, only 1/256th of the RGB colors are 'available' in HSV, effectively eliminating a single channel of control from the graphics artist.