

**Application for Renewal of Exemption No. 13b-III Cadmium pigments in glazes used for reflectance standards**

(a)

Company requesting Renewal: Lucideon Limited

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(b)

Introduction.

Ceramic Colour Standards manufactured and supplied by Lucideon Limited are optical reflectance materials that are used to calibrate and check the measurement performance of spectrophotometers and optical devices. The Colour Standards may also be compared with coloured samples by the human eye, without using any instruments.

Characteristics

They are not sold by ourselves as a part of any instrument but as an accessory which may be momentarily held against the instruments measuring aperture/in the measurement path, before the instrument is used, and are usually stored in a separate box.

The Colour Standards are usually sold as 5cm or 10cm squares, sealed into plastic trays with waterproof silicone sealant and are usually stored in protective cases to further protect them and prolong their lifetimes.

As such they fall within the EU Taxation and Customs Union Code 9027900000, namely;

Instruments and apparatus for physical or chemical analysis (for example, polarimeters, refractometers, spectrometers, gas or smoke analysis apparatus); instruments and apparatus for measuring or checking

viscosity, porosity, expansion, surface tension or the like; instruments and apparatus for measuring or checking quantities of heat, sound or light (including exposure meters); microtomes.

The functional part of the standards is a modified glass (glaze) which is permanently bonded to a porous ceramic substrate by high-temperature heat-treatment. The standards have specific colours with the steepest reflectance slopes practically possible to provide a rigorous test of spectrophotometer performance, while remaining stable in colour.

The glazes that Lucideon Limited uses do not require Lead as all of the standards contained in the range of Ceramic Colour Standards have eliminated this material. However, there are two standards which use Cadmium-containing pigments to produce colours for which there is no suitable Cadmium-free alternative. These two standards are the Red and Orange Ceramic Colour Standards.

The Orange and Red Colour Standards contain approximately 0.03% of Cadmium on a weight basis.

(c)

It is possible to produce red or orange coloured glazes or plastic without this element. In glaze the steep reflectance slopes required cannot be achieved without a Cadmium-containing pigment. (See Figure 1 below). In addition the alternatives often have complex reflectance curves which make results from such standards hard to interpret in terms of instrument performance.

(d)

In plastics the organic dyes used will produce steep reflectance curves but they are unstable and bleach (lose their colour) under the UV component of the spectrophotometer illuminating light.

(e)

The Lucideon Ceramic Colour Standards have been proven not to change colour over time (see: Stability of Ceramic Color Reflectance Standards; Hugh S. Fairman, Henry Hemmendinger, Received: 11 August 1997, 13 May 1998 (copy attached) and many are still being used or stored in laboratories around the world. They are seldom disposed of unless damaged beyond use by mistreatment.

(f)

The 12-piece Sets of Ceramic Colour Standards contain the following Colours:



If instrument users are not able to obtain the Orange and Red Colour Standards to check their instruments then this will deny them the ability to use two of the seven Chromic Standards that cover the instruments colour gamut, thus potentially rendering about 28% of the gamut inaccessible.

(g)

Lucideon Limited started life as the British Ceramic Research Association in the late 1940s and keeps abreast of developments in the technical developments in the field of ceramic technology, so if any Cadmium-free alternative pigments ever become available we will be aware of them and will be more than willing and able to test them as suitable alternatives.

(h)

The specific recipes that we use to produce these Colour Standards are proprietary to Lucideon Limited, but the glazes and pigments we use are commercially available for purchase.

(i)

The wording of the new Exemption should be:

13b-III Cadmium in glazes used for reflectance standards

(j)

### Summary

The Ceramic Colour Standards are physical optical accessories to spectrophotometers, not an integral part of such equipment, and have no electrical parts or contact with electricity.

All of the standards are now Lead-free and most of them have eliminated Cadmium. Cadmium has only been used where no suitable alternative is available.

The Cadmium-containing pigment is encapsulated in an inert zirconium silicate (otherwise known as Zircon, which is often used as a replacement for diamonds because it is so inert chemically) crystal. The inert zirconium silicate crystals are

encapsulated in the homogeneous glass matrix, which no longer includes lead oxide. The glass surface does not come into contact with people during normal usage.

Figure 1 Comparison of Cadmium Reflectance Curve (in Blue) with alternative without Cadmium (in Red)

