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# ESTA

**ANSI E1.54 – 2021**  
ESTA Standard for Color Communication in  
Entertainment Lighting

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Approved as an American National Standard by the ANSI Board of Standards  
Review on 7 January 2021

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## The ESTA Technical Standards Program

The ESTA Technical Standards Program was created to serve the ESTA membership and the entertainment industry in technical standards related matters. The goal of the Program is to take a leading role regarding technology within the entertainment industry by creating recommended practices and standards, monitoring standards issues around the world on behalf of our members, and improving communications and safety within the industry. ESTA works closely with the technical standards efforts of other organizations within our industry, as well as representing the interests of ESTA members to ANSI, UL, and the NFPA. The Technical Standards Program is accredited by the American National Standards Institute.

The Technical Standards Council (TSC) was established to oversee and to coordinate the Technical Standards Program. Made up of individuals experienced in standards-making work from throughout our industry, the Council approves all projects undertaken and assigns them to the appropriate working group. The Technical Standards Council employs a Technical Standards Manager to coordinate the work of the Council and its working groups as well as maintain a “Standards Watch” on behalf of members. Working groups include: Control Protocols, Electrical Power, Event Safety, Floors, Fog and Smoke, Followspot Position, Photometrics, Rigging, and Stage Machinery.

ESTA encourages active participation in the Technical Standards Program. There are several ways to become involved. If you would like to become a member of an existing working group, as have over four hundred people, you must complete an application which is available from the ESTA office. Your application is subject to approval by the working group and you will be required to actively participate in the work of the group if you join as a voting member. This includes responding to letter ballots and attending meetings. Membership in ESTA is not a requirement. There is a \$100 per year fee for participating in the Technical Standards Program, but there is a scholarship fund for hardship cases. You can also become involved by requesting that the TSC develop a standard or a recommended practice in an area of concern to you.

The Photometrics Working Group, which authored this standard, consists of a cross section of entertainment industry professionals representing a diversity of interests. ESTA is committed to developing consensus-based standards and recommended practices in an open setting.

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### Interest category codes:

CP = custom-market producer      DE = designer  
 DR = dealer rental company      G = general interest  
 MP = mass-market producer      U = user

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## 1 Scope

This standard specifies the color space to be utilized when communicating color between lighting controllers and color-changing luminaires. The method is generic and is neither manufacturer-specific nor color technology-specific. It facilitates communication of chromaticity only.

## 2 Requirements (normative)

### 2.1 ESTA Standard Color Space

#### 2.1.1 Color Space

The Color Space shall be CIE 1931 x,y. (Reference: <http://www.cvrl.org/database/text/ccs/cccie31.htm>)

### 2.2 Communication of Color

#### 2.2.1 Communication of x,y Coordinates

The required method of communicating chromaticity in this standard is by using CIE 1931 x,y color coordinates. If Color Matching Functions (CMF) are used to derive the x,y values, then the 1931 2-degree CMF shall be used.

##### 2.2.1.1 DMX512 16-bit

If DMX512 (ANSI E1.11) is used as the communication system, then CIE 1931 x,y color coordinates shall be sent as linearly scaled values where 100% in the communication system shall be interpreted as 0.85 for x, and 0.85 for y.

It is recommended that 16-bit values for both x and y are utilized with the following command mapping:

x = 0: command value = 0

x = 0.85: transmitted value for x = FFFFh

y = 0: command value = 0

y = 0.85: transmitted value for y = FFFFh

Values should be sent as two consecutive DMX512 channels with the most significant byte first.

##### 2.2.1.2 DMX512 8-bit

If DMX512 (ANSI E1.11) is used as the communication system, then CIE 1931 x,y color coordinates shall be sent as linearly scaled values where 100% in the communication system shall be interpreted as 0.85 for x, and 0.85 for y.

8-bit values are allowed but are discouraged. If 8-bit values are used, then they should utilize the following command mapping:

x = 0: command value = 0

x = 0.85: transmitted value for x = FFh

y = 0: command value = 0

y = 0.85: transmitted value for y = FFh

### 2.3.3 Requirements for a Transmitter

For a data transmitter such as a lighting controller to be compliant with this standard, it must be capable of sending x,y coordinates as defined in 2.2.1.

**2.3.3.1 Requirements for a Transmitter via DMX512**

For a data transmitter communicating via DMX512 (ANSI E1.11), such as a lighting controller, to be compliant with this standard, it must be capable of sending both 16-bit x,y coordinates as defined in 2.2.1.1 and 8-bit x,y coordinates as defined in 2.2.1.2

**2.3.4 Requirements for a Receiver**

For a data receiver such as a luminaire to be compliant with this standard, it must be capable of receiving x,y coordinates as defined in 2.2.1.

**2.3.4.1 Requirements for a Receiver via DMX512**

For a data receiver communicating via DMX512 (ANSI E1.11), such as a luminaire, to be compliant with this standard, it must be capable of receiving either 16-bit x,y coordinates as defined in 2.2.1.1 or 8-bit x,y coordinates as defined in 2.2.1.2

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