

SPECIFICATION

CHEA (CONDUCTIVE HEA®)

6102012

PROPRIETARY YES NO
 x

REV	DATE	DESCRIPTION	WRITTEN BY
Original	1/4/90	Issued	Tim Engel
A	1-5-95	Changes to Electrical Performance	Mary Jo McNulty
B	10-9-95	Update to New Format	Mary Jo McNulty
C	1/9/96	Specification name, transmission performance (P.9.1), paragraph numbering, page numbering	Tom Faria
D	9/2/99	Include stock sheet yield and misc. other updates	Tom Jones

MASTER DOCUMENT
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This document shall be reviewed within 1 year of the latest release date by the releasing authority.

AUTHORIZED FOR RELEASE BY:

Michael L. Beard

RELEASE DATE:

9-2-99

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1.0 PURPOSE & SCOPE

This specification defines the product requirements for the multilayer CHEA (Conductive HEA®) high efficiency antireflection coating on 1.52 index glass. CHEA is a single side, conductive antireflective coating. Variations from these requirements shall be noted on the work order.

2.0 APPLICABLE DOCUMENTS

The following documents form a part of this specification to the extent specified herein:

- MIL-C-675C Coating of Glass Optical Elements (Antireflection)
- MIL-C-14806A Coating, Reflection Reducing for Instrument Cover Glasses and Lighting Wedges.

3.0 EQUIPMENT, MATERIALS, AND SUPPLIES

NA

4.0 RESPONSIBILITIES

NA

5.0 DEFINITIONS

Brightness - Brightness is a term used for the value of average reflectance weighted by the human eye response and is a measure of the level of sensation a person perceives as a result of reflection of light from an object.

Brightness is calculated as follows:

$$\text{Brightness} = \frac{\sum S(\lambda) V(\lambda) R(\lambda)}{\sum S(\lambda) V(\lambda)}$$

where S is an equal energy light source, V is the Photopic eye response curve and R is reflectance of the coated surface.

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6.0 SPECTRAL PERFORMANCE

6.1 Brightness

The brightness (reflected luminance) of the conductive HEA® coated surface when measured at a 10 degree angle of incidence shall not exceed 0.2%

6.2 Color - See color box Attachment A

The reflected color of the coated surface shall fall within the following color limits (color box coordinates) when measured at 10 degree incident angle. Color is calculated using an equal energy light source.

POINT	A	B	C	D	E
u'	.258	.125	.210	.353	.472
v'	.020	.344	.471	.441	.300

7.0 ELECTRICAL PERFORMANCE

The resistivity shall be 1000 ohms per square or less.

Electrical resistance of the coating can be measured by applying full length bus bars on the two opposing sides of the panels minor dimension (Y axis). Using a high impedance multimeter (e.g., "Fluke" model 8020B or equivalent), place a probe on each of the two opposing bus bars and measure the electrical resistance across the panel.

To calculate the ohms/sq., multiply the ohms reading (R) by the length of the bus bar (W) and divide this by the distance between the two bus bars (L).

Example:
$$\text{ohms/sq.} = \frac{R \times W}{L}$$

See Attachment B.

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8.0 COATING ENVIRONMENTAL AND DURABILITY REQUIREMENTS

8.1 Adhesion (Snap Tape)

The coating shall show no evidence of damage after "snap tape" test by which Scotch brand #600 cellulose tape is pressed firmly against the coated surface and removed quickly with a snap of the wrist as referenced in paragraph 4.5.12 of MIL-C-675C.

8.2 Abrasion Resistance

The coating shall be subjected to a 40 rub eraser abrasion resistance test and meet the requirements referenced in paragraph 4.5.10 of MIL-C-765C for sleeking at the area of abrasion.

8.3 Humidity Resistance

The coating shall be subjected to continuous exposure for 24 hours in an atmosphere of 120±4 degrees F. and 98±2% relative humidity without evidence of deterioration as referenced in paragraph 4.5.8 of MIL-C-675C.

8.4 Solubility

The coating shall show no evidence of deterioration after being immersed for 24 hours in water containing six ounces of Sodium Chloride per gallon as referenced in paragraph 4.5.7 of MIL-C-675C.

9.0 GLASS PANEL

9.1 Transmission

Transmission of substrate before coating can be 31%, 45%, 62%, or 92% nominal depending on customer requirements.

9.2 Temper (if a tempered product)

Each part shall be tempered per the requirements of Federal Specification ASTM C 1048-89 and CPSC 16CFR 1201 Category 2.

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10.0 SURFACE QUALITY REQUIREMENTS

10.1 Viewing Conditions & Technique

The parts will be inspected by transmission and reflection at a distance of approximately 18 inches against a flat black background using overhead fluorescent lighting adjusted to 100 ± 20 footcandles.

Transmission Inspection: Inspect the parts in front of the flat black background at a normal angle and observe the glass by transmission.

Reflection Inspection: Inspect the parts at approximately at 45 degree angle in front of the flat black background and use overhead fluorescent lights to inspect by reflection.

Quality Area: Disregard defects in the area external to the quality area, 28" x 48" (on 32" x 50" stock sheets) or as specified.

10.2 Circular Defects (such as digs, pinholes or spot stains). The size of the defect is $(L+W)/2$

>0.020"	None Allowed
0.010" - 0.020"	3 Maximum per 4" Circle Area, 6/Panel
<0.010"	Disregard

10.3 Linear Defects (such as scratches and lint marks) (Measured at the widest area)

>0.003"	None Allowed
0.0015" - 0.003"	Maximum single Length 1.0"
<0.0015"	Disregard

10.4 Stain (such as color shifts or surface irregularities)

The surface shall be free from distinct and objectionable color or stain visible to the unaided eye. Heavy or distinct stains visible under transmission inspection are not allowed. Very light stains visible only under reflection inspection conditions are acceptable. Stains which do not exceed the circular or linear defect criteria are allowed.

10.5 Edge Chips

Intrusion of edge chips shall not be greater than 0.125". Depth of edge chips shall not be greater than half the glass thickness. Length of a single chip shall not be greater than 0.5".

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10.6 Fractures (visible to the unaided eye)

None Allowed

11.0 STOCK SHEETS

11.1 The useable area of a 32" x 50" stock sheet is 48" x 28" .

11.2 Individual stock sheets (32" x 50") will yield a minimum of 90% useable parts when cut into pieces 5" x 6" .

12.0 QUALITY ASSURANCE PROVISIONS

Each part is certified to meet the requirements of this specification.

13.0 PREPARATION FOR DELIVERY

Finished parts shall be clean and packaged in a manner to ensure protection against breakage or damage during reasonable handling and transportation.

14.0 CUSTOMER CLEANING OF HEA® COATED SURFACES

HEA® coating is impervious to dust and dirt in normal environments. Dusting with a dry soft, clean cloth is sufficient. Heavier contaminants may be removed with:

Detergent and water - Joy, Sparkle, Alconox, Liquinox
Window cleaner - OCLI TFC, Windex, Glass X

ADMINISTRATIVE RESPONSIBILITY:

MAC Department

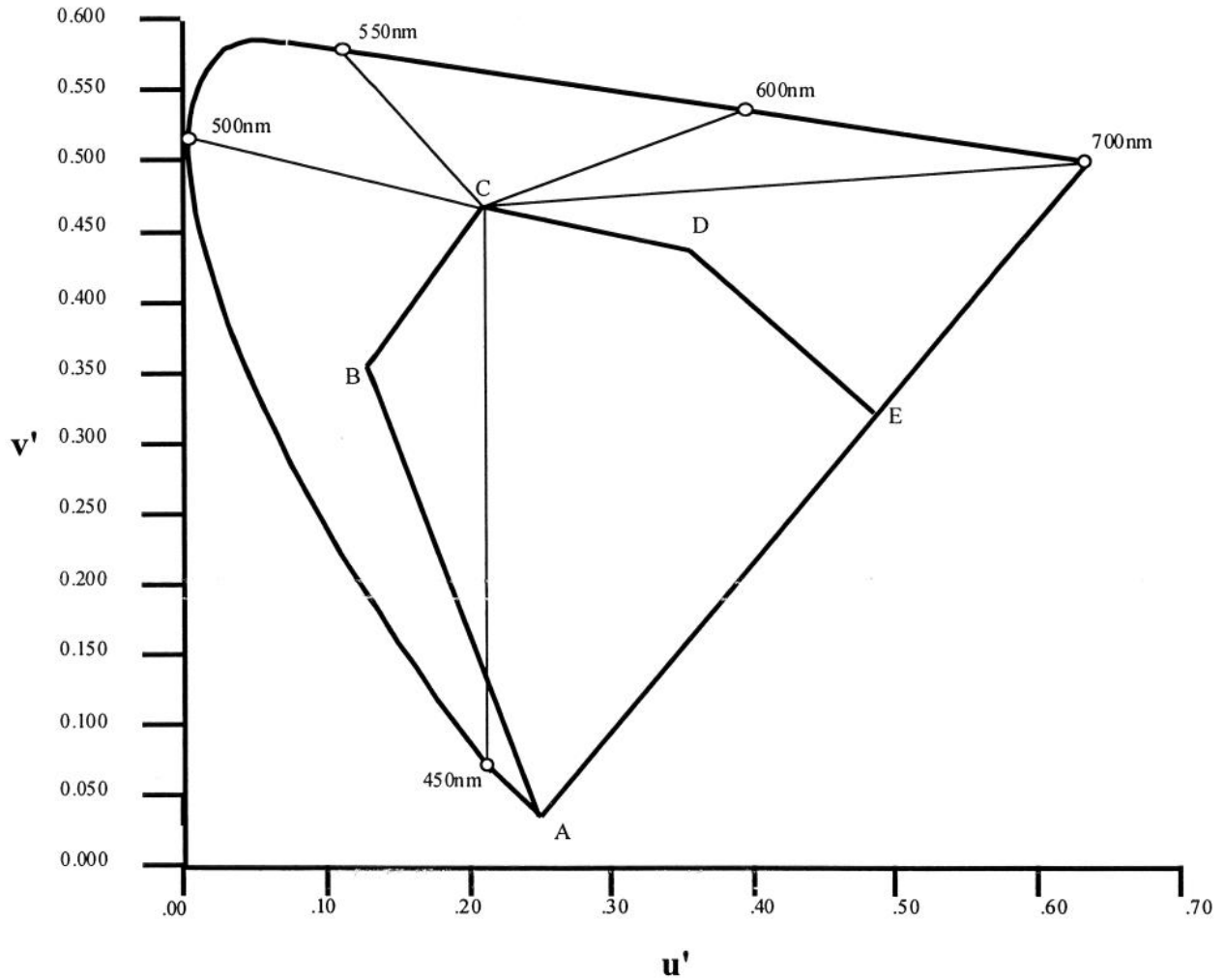
Quality Engineering

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Attachment A

CHEA Coated Product

OCLI COLOR BOX
WITH u' AND v' COORDINATES



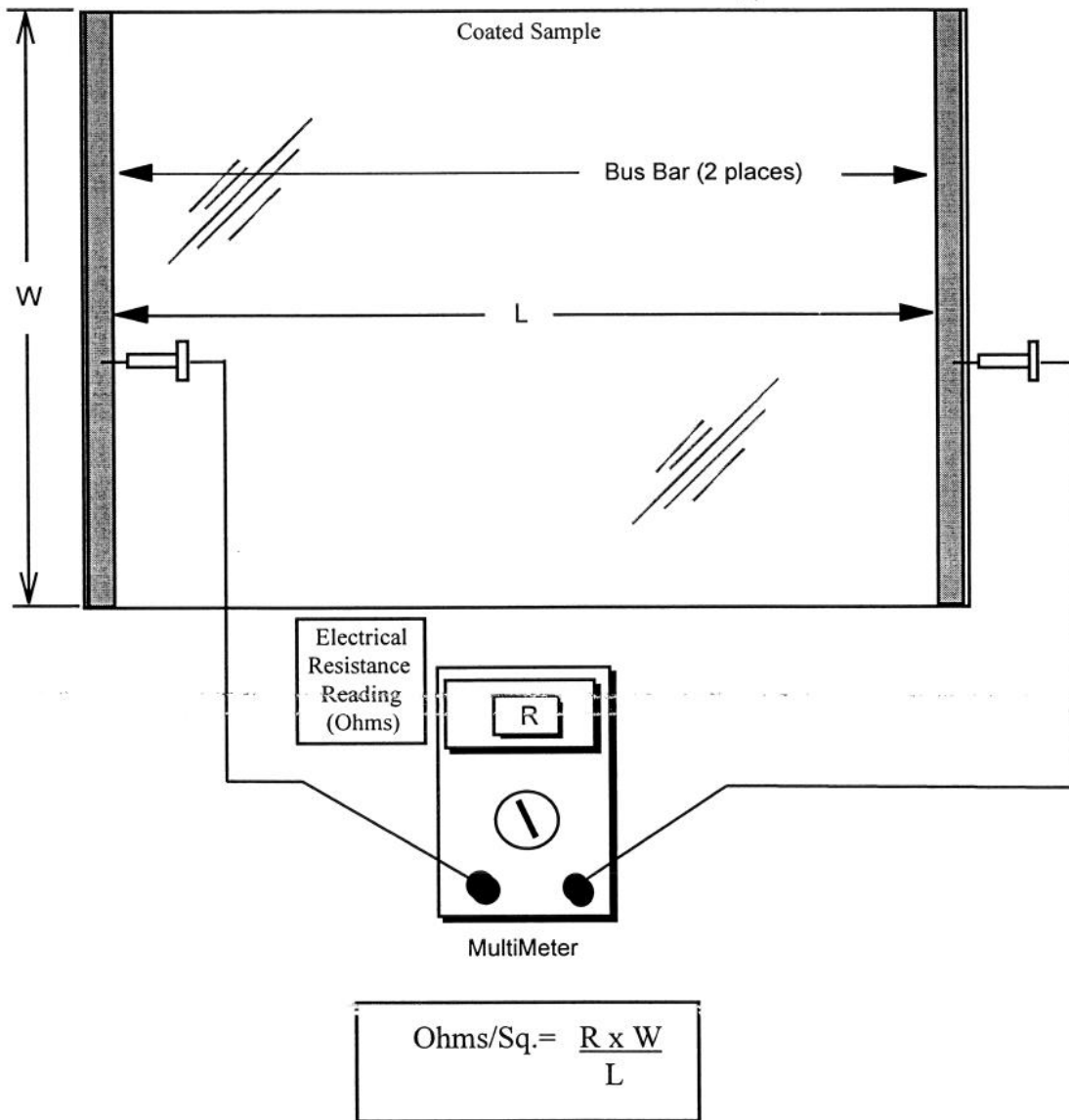
Color is calculated using an equal energy light source

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Attachment B

CHEA Coated Product

Electrical Measurement Technique For Calculating Ohms/Sq.



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