



***DRAWING REQUIREMENTS FOR
CONNECTOR INTERFACES RELEASED
AS “EWCAP” CONNECTOR DRAWINGS***

Rev W June 2022

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HOW TO USE THESE REQUIREMENTS

General Motors, Ford and Stellantis have agreed to accept drawings in the format listed.

- For newly-released EWCAP drawings:
 - Older designs are not expected to be revised to this format. At the time an existing drawing is being revised it will be evaluated to determine if the format should be brought up to the latest drafting standard.
 - Use the “Checklist Summary Sheet” -- available as Appendix E -- to verify a drawing is ready.
 - Follow all requirements. Drawing will be rejected unless a variance has been approved. Contact EWCAP if variances are wanted.
 - Do not work with a specific OEM on this drawing, even if that OEM has first use. (EWCAP drawings require approval by a majority of the participating OEMs. No single OEM partner has priority on approval.)
- For changes:
 - Make changes only if instructed to.
 - EWCAP will issue a change number that must be shown on the title block.
 - Physical changes to parts that make them incompatible with previous revisions require new part numbers. Please make EWCAP aware of any part change.

STEPS IN DRAWING CREATION

1. Create a drawing using or creating a template per these guidelines
2. Follow the General Requirements
3. Establish Views and Orientation and Datums Feature “A”
4. Establish Datum Features of Size “B” and “C”
5. Establish Connector Floor and standoffs
6. Create Packaging view
7. Place Standard notes
8. Define Blade Depth
9. List Default tolerances
10. Add Supplier-specific information and Logo
11. Apply ‘envelope’ method for showing draft
12. Add Color/index/part number table

GENERAL EWCAP DRAWING / DRAFTING REQUIREMENTS

- Req.#1: Use Part Number assigned by EWCAP. Place that number as-indicated on each page.
- Req.#2: Deliver CAD data per Appendix C.
- Req.#3: Dimensioning and Tolerancing compliant to ASME Y14.5M
- Req.#4: Use drawing size A2 with 10mm border. It's OK to use multiple sheets.
- Req.#5: Place supplier name (and optional logo) to the left of the title block.
- Req.#6: Create sheets this way (most drawings will have multiple sheets):

Sheet #	Placement for object
first sheet, center	interface detail
first sheet, above title block	revision table
first sheet, right center	note field
first sheet, left side center	keying details
upper right left of notice on Page 1	isometric view
upper center area of Page 1	packaging views.
Additional sheets	optional constructions, additional details
last sheet	legal notice per Appendix E.

- Req.#7: Use Template / Title block as shown in Appendix A (DXF & DWG formats are available).
- Req.#8: Place "Standard notice" per Appendix B in the upper right-hand corner of the drawing.
- Req.#9: Review and obtain approval for any deviation from EWCAP engineer.
- Req.#10: Critical or important dimensions are controlled with specific tolerances and detailed in the view best suited to describe the feature being controlled.
- Req.#11 Where clarification is needed as to how the part is measured, place applicable SPC, gauging and layout requirements in the note field.

DRAFTING REQUIREMENTS

- ❑ Req. #28 (Font)
 - Font Type = Standard
 - 3mm Character Height for Dimensions, Notes, View, Line and Point Callout ie; SECTION A-A VIEW A
 - 5mm Character height for View, Line and Point Designations ie; SECTION A-A

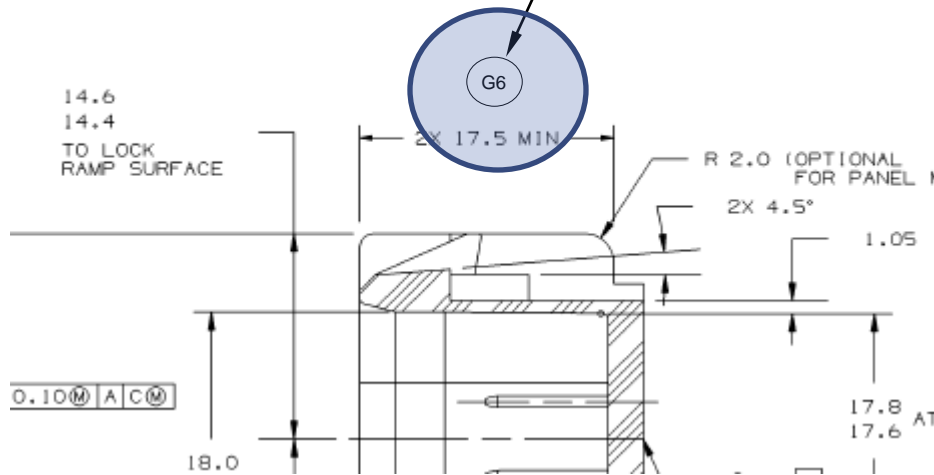
- ❑ Req. #29 (Line Type and Weight)
 - Dimension Lines = Continuous .35 mm
 - Extension lines = Continuous .35 mm
 - Extension line Offset = 0.25 mm
 - Leader Lines = Continuous .35 mm
 - Object lines = Continuous .50 mm
 - Cross Hatch Lines = Continuous .35 mm
 - Arrow heads = Continuous .35 mm, filled, approximate ratio is 3:1 Length x Width
 - Section Designation = Phantom .35 mm

- ❑ Req. #30 (Revision Table and Balloons)
 - Font Type = Standard
 - For initial release of drawings, list revision “A” in the Revision Record and the title block.
 - For subsequent revisions start with the letter B. Revisions level are always letters. “I”, “O”, and “Q” are not used.
 - Identify specific changes in the revision table with the revision letter and the change number (i.e. could be B1 through B9).
 - 3mm Character Height for rev balloons Refer to the example.
 - Revision records will always start with a word describing the change such as ‘was’, ‘removed’, or ‘added’.
 - Revision record of the rev column shall state what the previous information was.
 - Rev balloons shall be placed near the dimension or note that was changed, removed or added.

DRAWING REVISION PROCESS

□ Req. #30

Balloon on drawing indicates change.
Corresponding number in revision record describes change



030	H	WAS 8.0	03NW03	JC	JJ
	G9	EDIT DRAWING TO CONFORM WITH LATEST USCAR SPECIFICATION			
	G8	REMOVED NOTICE			
	G7	ADDED NOTE 8 AND 9 NOTE 5 WAS NOTE 6 NOTE 6 WAS NOTE 7 ADDED 1" DRAFT TO NOTE 7			
	G6	WAS 18.2/17.6 REMOVED DIM. 21.0 SEC. B-B, ADDED 16.951, ADDED NOTE TO LOCK RAMP SURFACE TO 16.95/10.45			
	G5	ADDED NOTE TO 15.0 AT DATUM G REMOVED BASE DIM FROM 2.5, 6.0 SEC. C-C, ADDED DIM 1.95, 15° WAS 17°/15°			
	G4	PLAN VIEW- ADDED DIM 2x 6.05 TO SLOT SURFACE			
	G3	ADDED DIM. 8.0 MIN. PACKAGE VIEW- MOVED DIMS TO TOP VIEW REMOVED "MINIMUM" FROM NOTE			
	G2	ADDED DIM. 3 X 7.65 ADDED BLADE DIM			
019	G1	MOVED 45° FROM SEC. A-A TO DETAIL VIEW E	24MR03	JC	JJ
018	F	SEE CHANGE NOTICE	21FE03	JC	JJ
014	E	SEE CHANGE NOTICE	23JA03	JC	JJ
011	D	REMOVED TERMINAL DIM. AND ADDED NOTE B. 21.0 WAS 20.7	150C02	JC	JJ
007	C	UPDATE FORMAT TO LATEST USCAR STANDARDS REMOVED @ ON FACE VIEW, SECTION A-A, AND SECTION C-C REMOVED "NO BURRS" NOTE ±1.70 DIM	29AP02	JC	JJ
003	B	note #2 0.0005MM (20μ-INCHES) WAS 0.001MM (40μ-INCHES)	17JL01	JC	JJ
	A	INITIAL RELEASE	09MR00	UVH	JJ
CHANGE SERIAL NUMBER	LET	REVISION RECORD	DATE	DWN	CHK

Show EWCAP Change Notice number

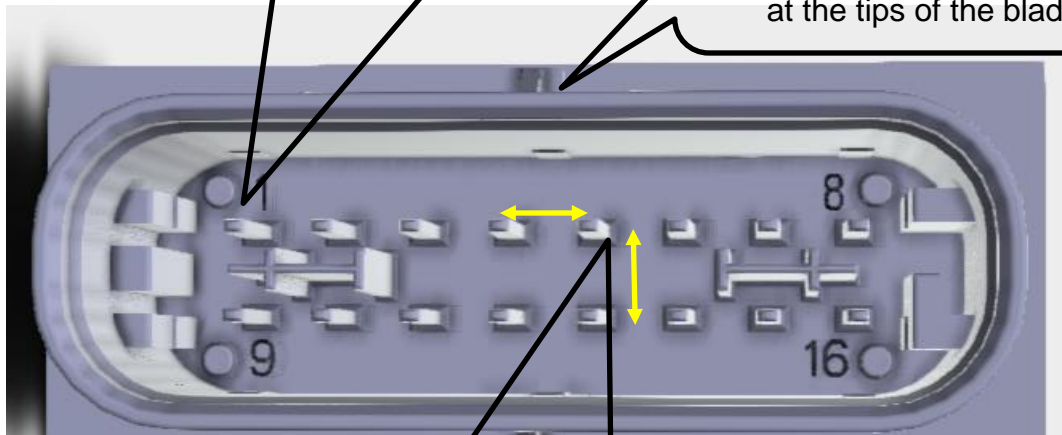
Drawings are released at Rev. A

BLADE LOCATION LABELING AND PRIMARY VIEW ORIENTATION

□ Req. #12 Interface Orientation with Blade Location and pitch and row-to-row distance confirms to EWCAP preferences per USCAR-12.

#12 Number cavities per USCAR-12 Appendix A. #1 is in the upper left corner*

#12: Make the primary view oriented with the latch feature at the top, looking into the interface at the tips of the blades.

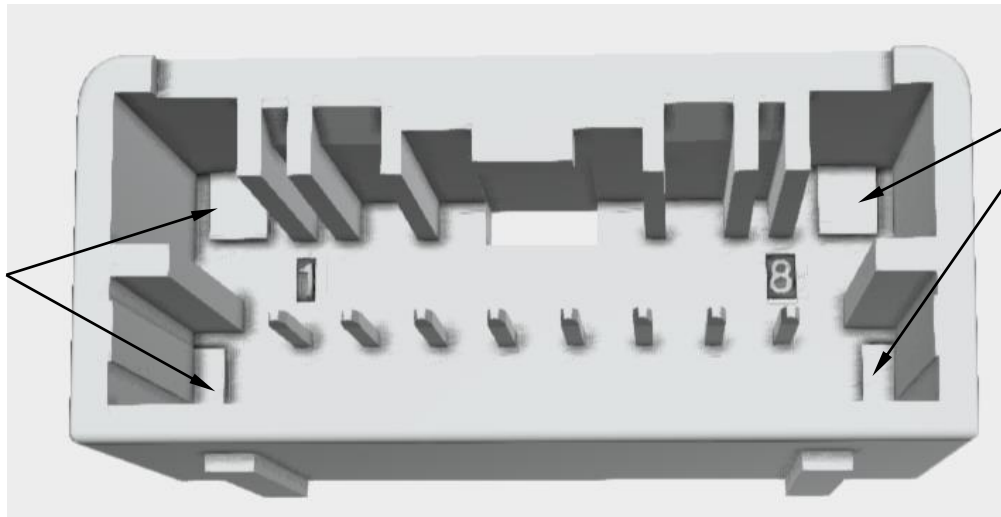


#12: Pitch and row spacing must be per USCAR-12. unless an engineering reason exists for a variance.

* Follow USCAR-12 Appendix A for non-standard terminal layouts.

ESTABLISH DATUM “A” FOR UNSEALED

□ Req. #13 - Datum A



Unsealed Connector Datum
-A- scheme shown

For **Un-Sealed** Connectors, Datum A is the “floor” of the connector interface or pads just off the floor. This is a stop point reference for the mating connector. Show distance to “front Face,” “lock face,” and blade tip from -A- in this view.

Preferred design if unsealed is to have 4 landing pads that are raised ~ 0.375 from the floor. They are typically located in the 4 corners of the pocket.

Three of these 4 landing points establish the datum targets for the Datum A plane.

If landing points are not available, use the connector floor in about the same area

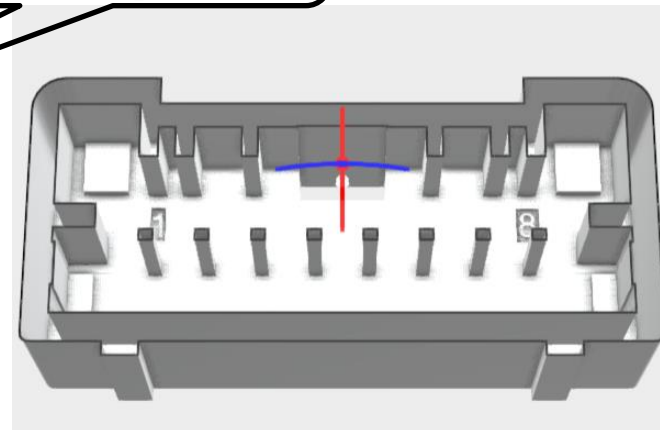
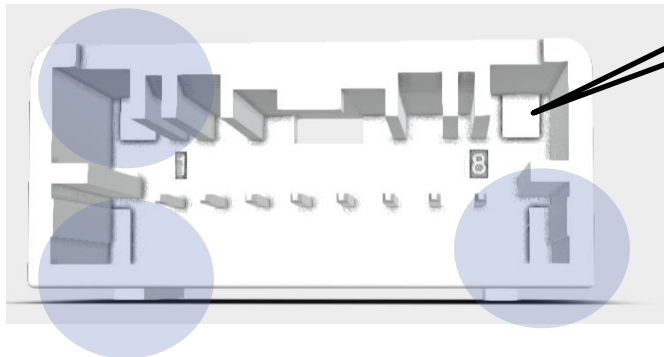
Note: Where existing drawings and designs differ from this datum system, it may be acceptable to use those standards. If a deviation is wanted, contact EWCAP.

ESTABLISH DATUMS “A” “B” AND “C”

Use this method to establish datums to make measurement methods clear:

1. Establish Datum –A- on floor or top of shroud as described
2. From Datum A, create two planes, perpendicular to –A- that pass through either side of the narrow end of the connector. The midplane (or average plane) of these two planes establishes Datum B. This datum is the primary shroud length (interior). Use of datum markers to define how to set-up the two planes is encouraged.
3. Req. # 15 Datum C is the width (interior). Set it up using the same method as used with Datum B.
4. Req. # 16 Terminal spacing is basic from datum B and C centerlines.
5. Req. #17 Profile tolerance is used to define the shroud interior.
6. Draft is specified as “within tolerance.” No specific draft is defined.

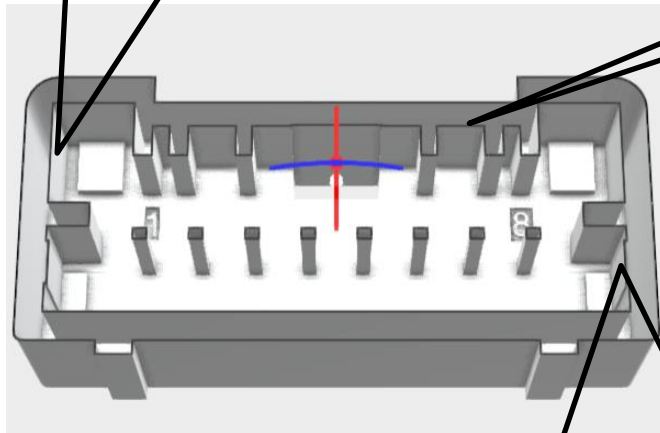
Define datum A
from raised pads
(4X) if possible



DETAIL ON CREATING DATUMS “B” AND “C”

Step 2: Create Datum B by taking the two planes along the short walls and finding the “midplane” that is perpendicular to datum A. (approx. at red line)

Step 3: Repeat step 2 with the two long sides to form Datum C.

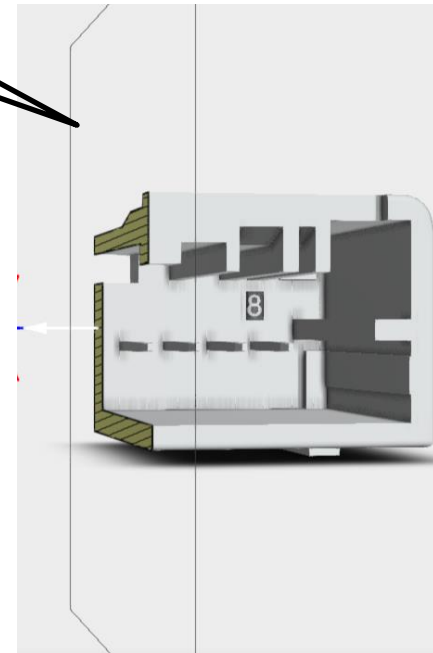
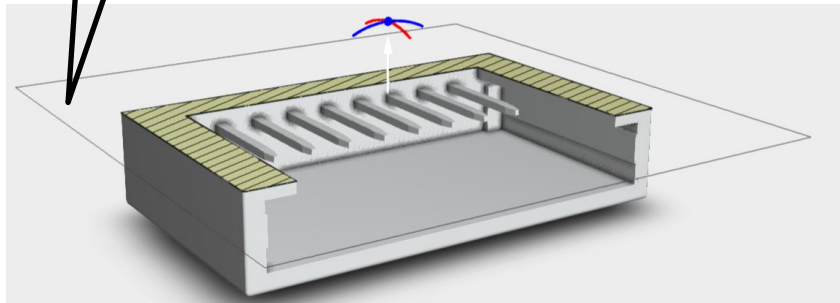


Step 1: Form four planes \perp to datum A with each plane defined by points on one of the four connector walls. If there is a preferred measurement point, identify it for use as a datum target.

DETAIL ON DATUMS "B" AND "C" - CONT'D

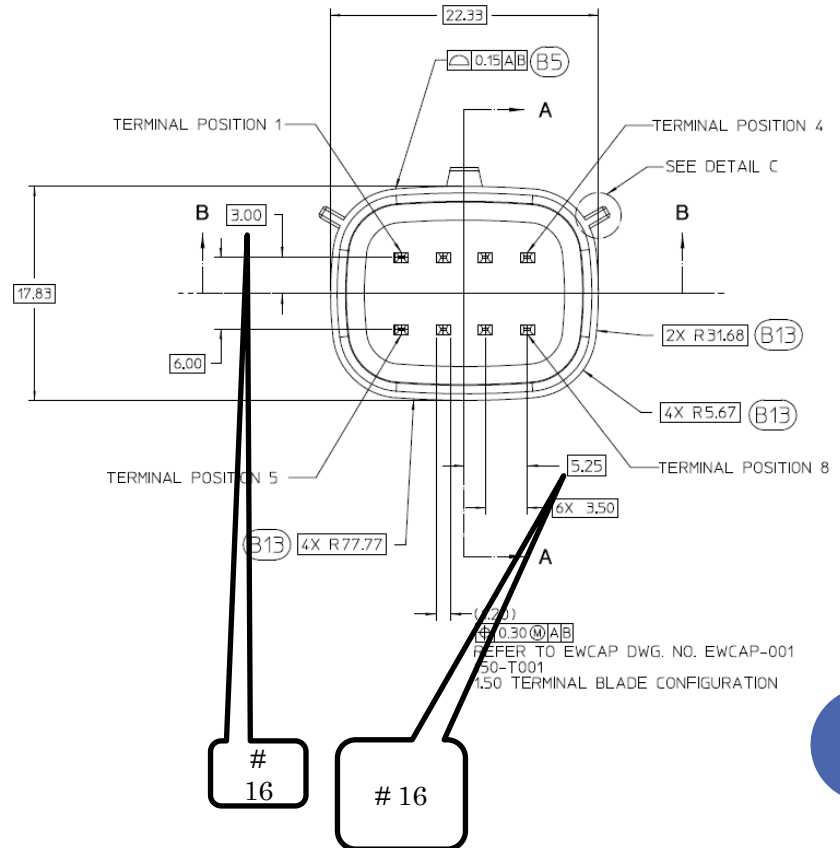
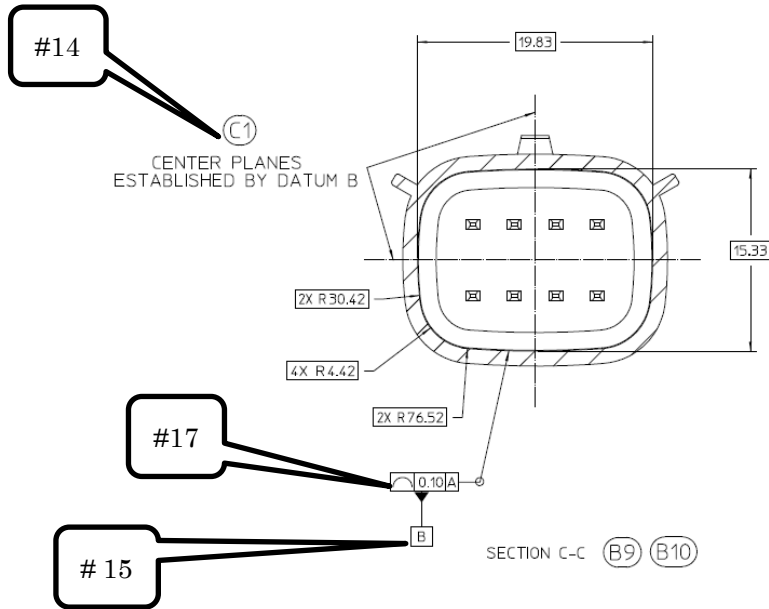
Datum -C- is the midplane as shown here in cross-section

Datum -B- is the midplane of the two planes created from the short ends... as shown in this cross-section



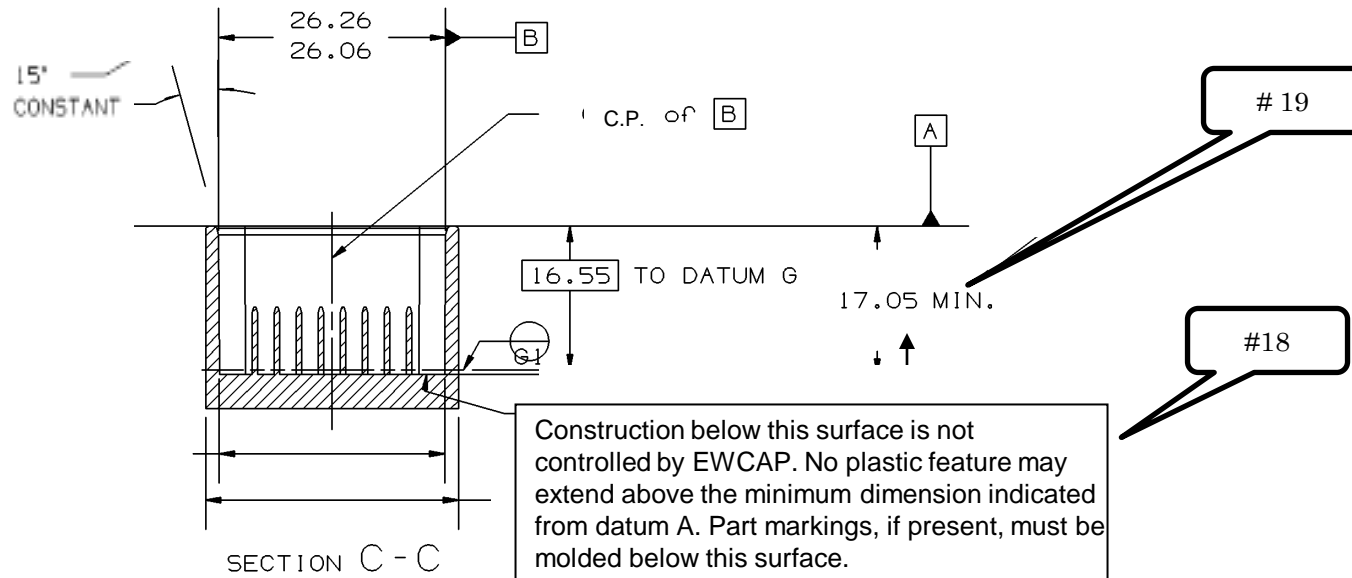
DATUMS “B” AND “C” FOR SEALED ELLIPTICAL SHAPES

- ❑ Req. # 14 Both X and Y Datum center planes are established by the actual part profile of the shroud interior.
 - ❑ Req. # 15 The datum marker is below the profile Callout
 - ❑ Req. # 16 Terminal spacing is basic from datum B and C centerlines.
 - ❑ Req. # 17 Profile of a Surface or Line tolerance is used to define the shroud interior and datum planes.
- The part profile establishes both X&Y center planes. Refer to ASME Y14.5



CONNECTOR FLOOR VIEW

- ❑ Req. #18 This note is required to indicate minimum dimension.
- ❑ Req. #19 Show dimension of datum "A" to floor. (May be Minimum or toleranced based on design intent)



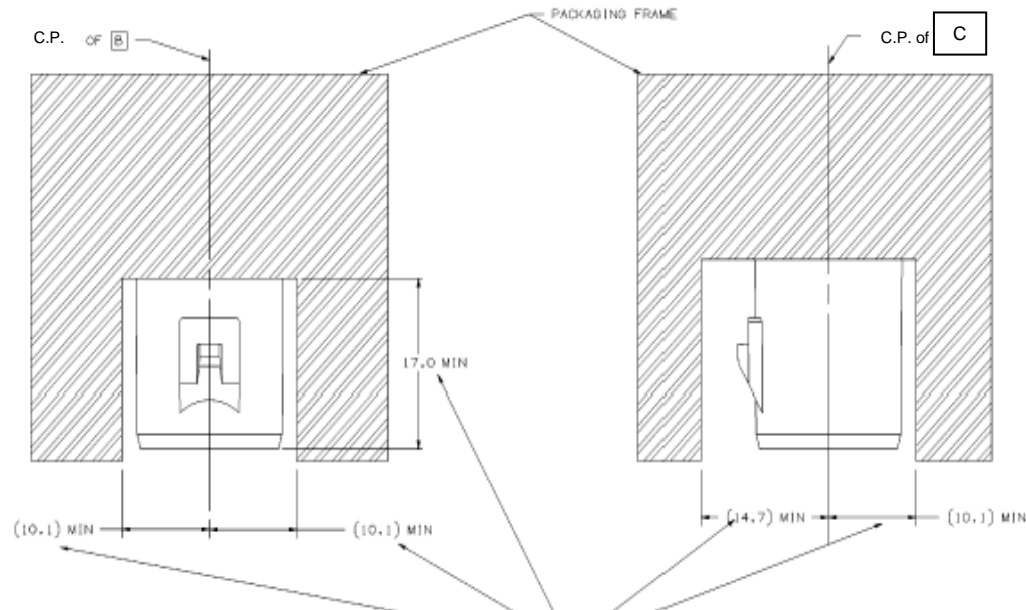
Connector Floor

This note places the floor of the connector at a minimum dimension from datum A. The floor can float below the minimum dimension. This allows for features (ribs, moats, pyramids, etc.) on the floor of the connector, as needed, without interfering with any mating connector. No plastic including part markings may be above this minimum dimension.

This may be shown as a plane relative to datum A.

PACKAGING VIEWS

- Req. #20 Show clearance Dimensions



If header is recessed into a pocket, these dimensions represent the minimum clearance required for the mating connector shroud. Note: Additional clearance may be required to allow latch function.

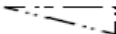

Packaging View:

The packaging view provides reasonable space for the mating part shroud or other features in the final part design. Dimensions shown are for packaging only. For clarity, show the packaging view in the same orientation as the interface drawing and show only clearance dimensions. Note: Excessive length between datum "A" and the device housing could interfere with connector mating/un-mating. (See Req#13 for Datum "A" requirement)

APPLY “STANDARD” NOTES AND THEN UNIQUE NOTES

- Req. #21 Show applicable notes in a notes field located left of the title block and revision table.

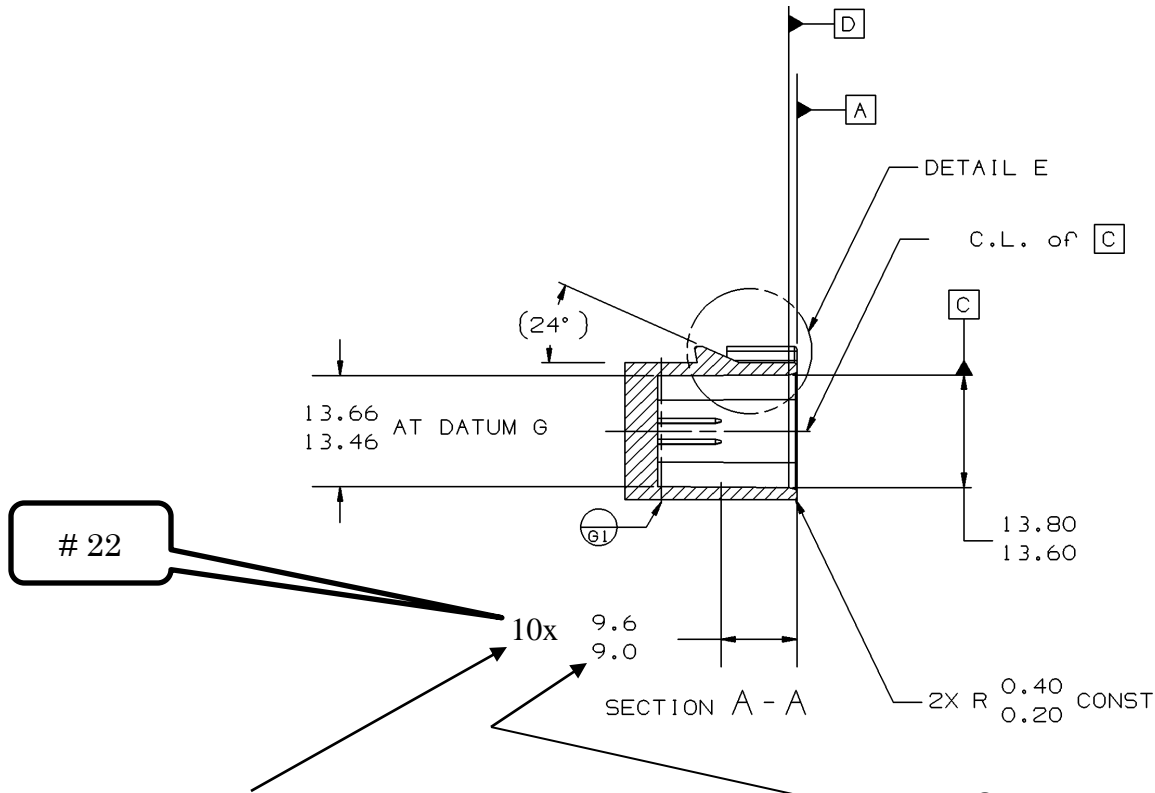
NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M.
2. 0.25 MAX RADII ON ALL CORNERS SHOWN SHARP.
3. ALL UNSPECIFIED RADII 0.25 MAX.
4. STANDARD COLORS FOR POLARIZATION (SEE CHART IN LEFT LOWER CORNER OF THE DRAWING SHEET)
5. REFER TO “SAE/USCAR 12 CONNECTOR DESIGN CRITERIA” FOR GUIDANCE ON CONNECTOR DESIGN.
6. EXCEPT WHERE NOTED, DRAFT ON OUTSIDE SURFACES IS PERMISSIBLE WITHIN TOLERANCE.
7.  SYMBOL INDICATES DRAFT DIRECTION WHEN NECESSARY TO SPECIFY.
8. FOR TERMINAL REQUIREMENTS (MATERIAL, DIMENSIONAL, AND COATING SEE EWCAP-001 TERMINAL **XXX-TOOX**).
9. ~~REMOVED: Was “TO CLAIM USCAR COMPLIANCE, PARTS PRODUCED TO THIS FOOTPRINT DRAWING MUST BE TESTED TO AND MEET THE REQUIREMENTS OF SAE/USCAR 2.”~~
10.  DENOTES DIMENSION THAT IS TYPICALLY APPLICABLE TO MONITOR PART QUALITY.
11. WHEN USING SILVER PLATED TERMINALS, THE SILVER PLATING MUST STOP A MINIMUM OF 1MM FROM HEADER PLASTIC

(OTHER NOTES DESCRIBING ADDITIONAL REQUIREMENTS ARE SHOWN AFTER THE DEFAULT NOTES).

BLADE DEPTH

- Req. # 22 Show blade depth dimension from datum "A" and number of blades controlled by this dimension.



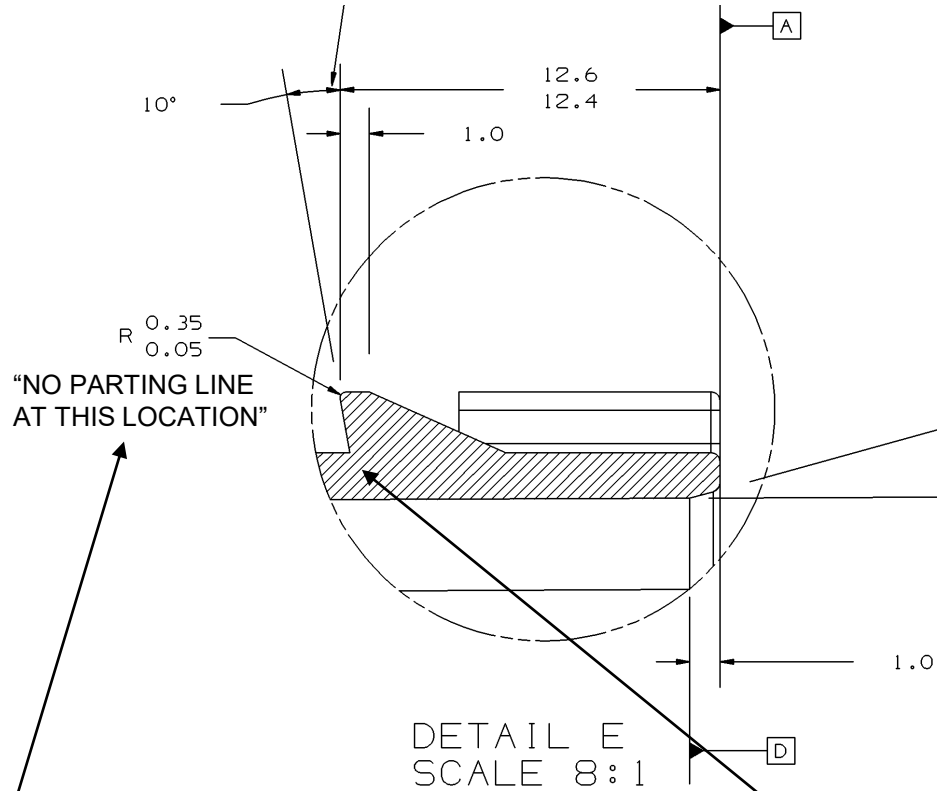
Blade depth:
Indicate the number of pins and depth dimension from tip to datum "A"

(Blade tip Depth is dimensioned from Datum A)

Standard tolerance for blade depth is $\pm 0.30\text{mm}$. Any variance from this dimension must be highlighted FOR DISCUSSION WITH OEM committee.

CONNECTOR LATCH DETAIL

Req. #27



Latch details:

Apply note for "No parting line allowed here" and define radius as shown for back of external lock. (Radius prevents flash and possible lock arm hang-up). Alternate radius must be explained and approved.

Inside radius not required for external lock connectors where there is sufficient plastic back-up

APPLY DEFAULT BLADE TOLERANCES

- Req. #23 Use True Position Tolerance unless approved to deviate from EWCAP.

Default tolerances for all USCAR drawings must follow ASME Y14.5 M, paragraph 1.6.1 for correct decimal dimensioning.

The following default tolerances for terminals are to be used unless approval to deviate is given by the EWCAP projects committee.

Make Blade True position @ Max Material relative to –B– and –C– datums shall be as shown (or approved variance).

	Base	Tip
0.5mm –	0.1	0.3
0.64mm –	0.15	0.3
1.2mm –	0.15	0.3
1.5mm –	0.2	0.3
2.8mm –	0.1	0.2 Sealed
2.8mm –	0.2	0.3 Un Sealed
6.3mm –	0.2	0.3

PLACE SUPPLIER LOGO

- Req. #5 Show supplier logo and supplier drawing file number left of the title block. EWCAP logo is optional alternate for EWCAP in name block.



Supplier's internal file number (if applicable) should also be shown for file tracking purposes (this is not a "part" number)

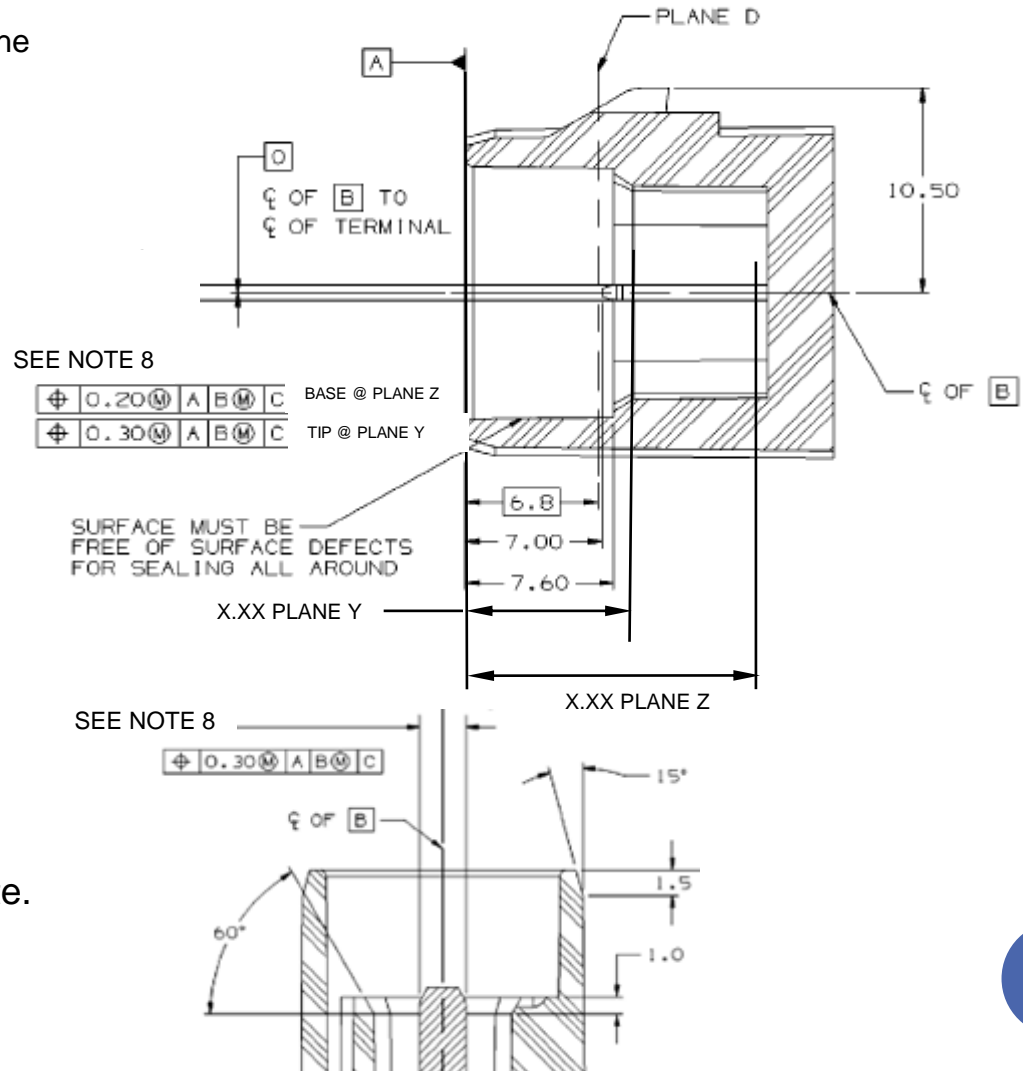
CHANGE SERIAL NUMBER	LET	REVISION RECORD	DATE	DWN	CHK
TOLERANCES (UNLESS OTHERWISE SPECIFIED)			THIRD ANGLE PROJECTION		
DIMENSIONS ARE IN MILLIMETERS					
ANGLES ± 0° 30'					
USCAR-EWCAP			EWCAP <small>ELECTRICAL WIRING COMPONENT APPLICATION PARTNERSHIP</small>		
SCALE	**	DRAWN BY	*****	CHECKED BY	*****
				DATE	**-**-**
TITLE					

SHEET	DRAWING NUMBER		SIZE	DO NOT SCALE DRAWING	REVISION LEVEL
1 OF X	XXX-X-XXX-X-XXX		A2	COMPUTER AIDED DRAWING	A



SET BLADE POSITIONAL TOLERANCE

Req. #25 Show blade requirements per the EWCAP 001 drawing.

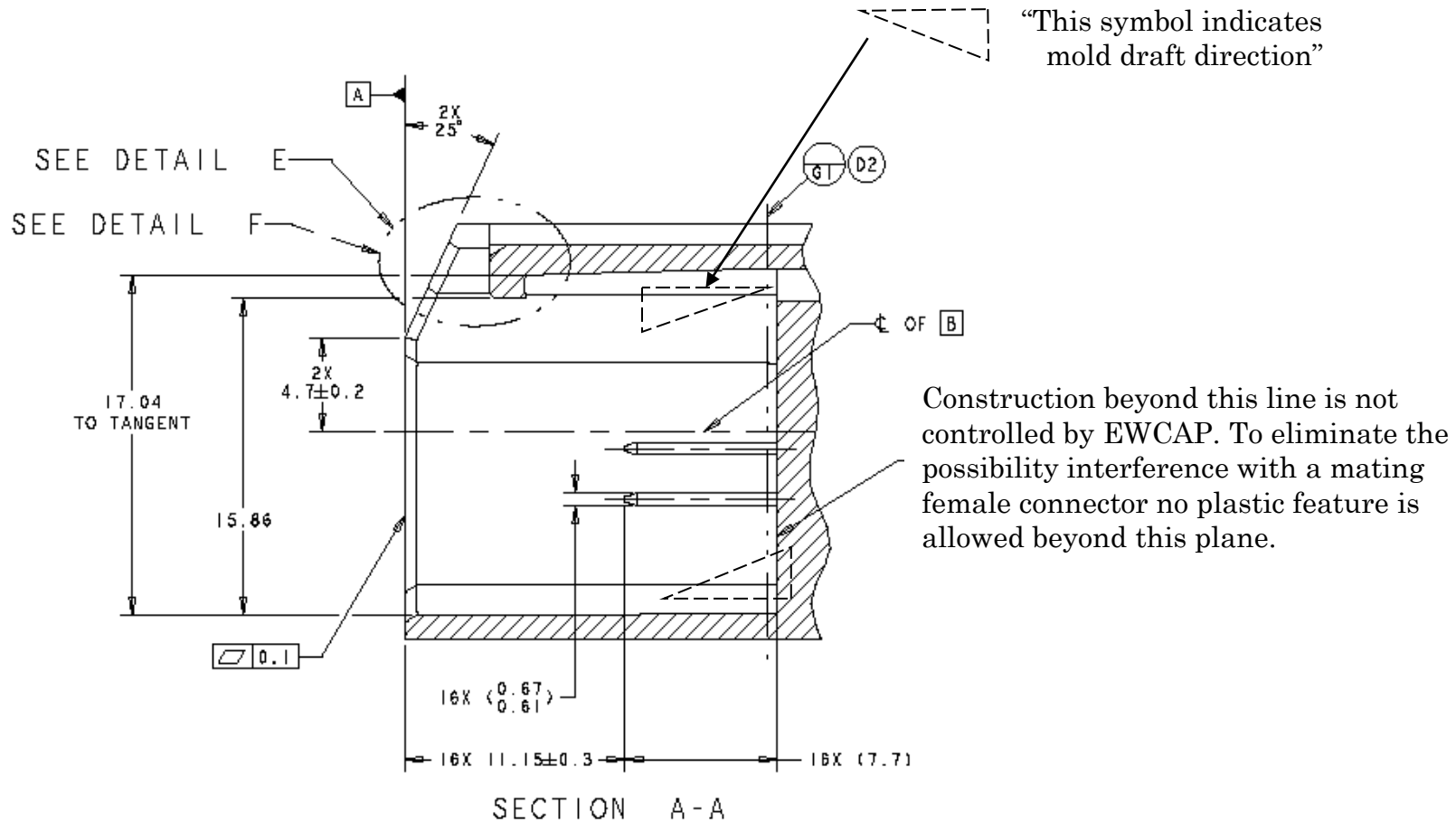


Use this method of showing blade positional tolerance. Do not show the blade dimension even as a reference. This assures that the user refers to the EWCAP 001 blade drawing per the note.

For hybrid applications terminal type (XXX-T-00X) must be identified by location.

ADD DRAFT WITH THIS METHOD

- Req. #24 Show direction of draft if and when necessary.



ADD COLOR/INDEX/PART NUMBER TABLE

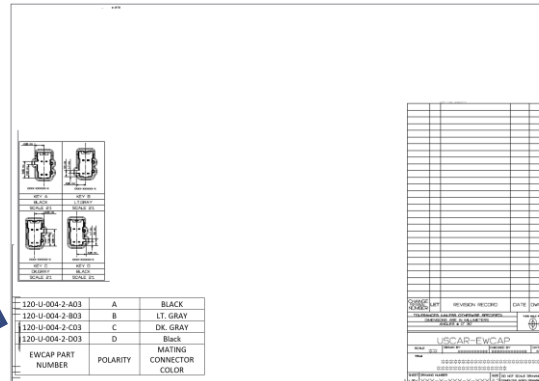
Req. #26 Color /index/part number table must be present in the left lower corner of the drawing sheet. Colors specified will be as shown in the drawing table below. Deviations from the color chart will be handled by the OEM release engineer and will not be shown on the USCAR drawing.

Example Sealed Color Chart

150-S-016-2-A01	A	BLACK
150-S-016-2-B01	B	LT. GRAY
150-S-016-2-C01	C	DK. GRAY
150-S-016-2-D01	D	BLACK
EWCAP PART NUMBER	POLARITY	MATING CONNECTOR COLOR

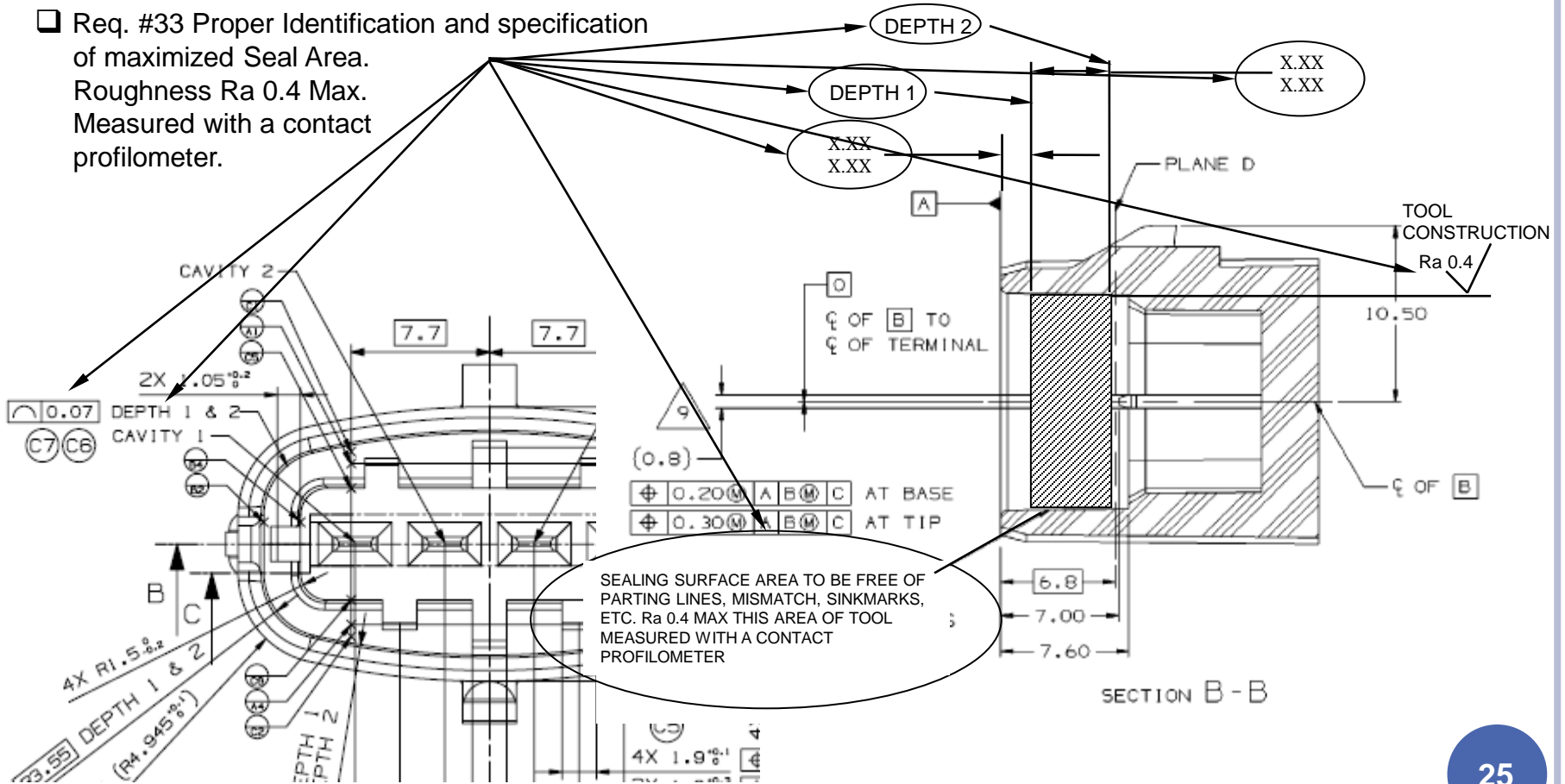
Example Unsealed Color Chart

064-U-016-2-A01	A	BLACK
064-U-016-2-B01	B	LT. GRAY
064-U-016-2-C01	C	DK. GRAY
064-U-016-2-D01	D	Black
EWCAP PART NUMBER	POLARITY	MATING CONNECTOR COLOR



SEALED CONNECTOR SURFACE ID AND CALLOUT

- Req. #33 Proper Identification and specification of maximized Seal Area. Roughness Ra 0.4 Max. Measured with a contact profilometer.



Appendix C: Deliverables with drawing submission

□ Req. #2

- Other than the drawing, the following must be submitted as part of a complete drawing package.
 1. Identification of whether this part is tooled or design-only. Submit the following information to the EWCAP release engineer: Supplier part number, OEM part number (list all that apply), color, and polarizations available.
 2. 2D C or A2 size drawing as a (.dxf) and Acrobat (.pdf) file. Drawing border = 406 x 534. Use multiple sheets if additional drawing space is required.
 3. Provide native CAD model. This CAD information will be considered confidential and will be used by USCAR should revisions be necessary. This information not be shared with suppliers.
 4. 3D data (STEP format) for footprint modeling by users. One model for each keying detail.

APPENDIX D: LEGAL NOTICE

Req. 31: EWCAP Legal Notice, exactly as shown below, is placed as last page of EWCAP

Drawing with

- The name of the company drawing the part replacing "----- COMPANY NAME ---- "
- APPLICABLE EWCAP DRAWING NUMBERS ARE FILLED IN

NOTICE

EWCAP HAS SELECTED COMMON DIMENSIONS FOR THE CONNECTOR(S) DEPICTED AND DESCRIBED HEREIN (LISTED BELOW). FURTHER, EWCAP HAS SELECTED FOR PUBLICATION THIS DRAWING (AND ITS COMPANION ELECTRONIC MODEL) PREPARED BY ----- COMPANY NAME ---- AS REPRESENTATIVE OF A CONNECTOR HAVING THESE DIMENSIONS. IN EXCHANGE FOR THE CONSIDERATION OF THE SELECTION OF THIS DRAWING FOR PUBLICATION (INCLUDING POSTING ON EWCAP'S WEB SITE) AND OTHER GOOD AND VALUABLE CONSIDERATION FLOWING FROM THIS SELECTION, ---- COMPANY NAME ---- HEREBY AGREES ON BEHALF OF ITSELF AND ITS SUCCESSORS AND ASSIGNS, WITH RESPECT TO ANY COPYRIGHTS IT MAY HAVE IN THIS DRAWING AS WELL AS ANY PATENT RIGHTS IT MAY HAVE IN THE CONNECTOR ILLUSTRATED IN THIS DRAWING, NOT TO ENFORCE SUCH COPYRIGHTS AND PATENTS AGAINST ANY PERSON OR ENTITY ON ACCOUNT OF THEIR ACTIVITIES TO MAKE, HAVE MADE, USE AND SELL THE CONNECTOR ILLUSTRATED IN THIS DRAWING FOR VEHICULAR APPLICATIONS. THE TERM "CONNECTOR" AS USED IN THIS PARAGRAPH IS LIMITED SOLELY TO THE STRUCTURE SPECIFICALLY ILLUSTRATED IN THIS DRAWING. NO WARRANTIES OR INDEMNITIES OF ANY KIND ARE MADE OR IMPLIED BY ---- COMPANY NAME ---- OR EWCAP. IN PARTICULAR THERE ARE NO EXPRESS OR IMPLIED WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE, MERCHANTABILITY, NON-INFRINGEMENT OR ANY OTHER WARRANTY OF ANY KIND. IN ADDITION, THERE ARE NO EXPRESS OR IMPLIED WARRANTIES OR INDEMNITIES OF ANY KIND RELATING TO THIRD PARTY CLAIMS ARISING UNDER THE INTELLECTUAL PROPERTY LAWS OF ANY COUNTRY. ANYONE USING THE INFORMATION IN THIS DRAWING DOES SO AT THEIR OWN RISK.

APPLICABLE EWCAP DRAWING NUMBERS:

APPENDIX E: CHECKLIST

Rev Level _____ Date _____

Checklist Summary Part Number _____

Checked _____

Requirement #	Requirement Description	Compliant	Comments
1	Part Number compliance		
2	Data format and related info per Appendix C		
3	GD&T per ASME Y14.5M		
4	C (A2) size sheets (420 x 594)mm		
5	Supplier Name/ Logo and Drawing File number		
6	Compliance with view placement		
7	EWCAP Title block compliance		
8	EWCAP disclosure notice per latest release		
9	Deviation approval by projects committee		
10	Fully detailed interface can be tooled from the drawing		
11	Gauging requirements are listed in the notes.		
12	Blade location and labeling.		
13	Datum A is Connector face		
14	Datum B is Primary shroud length		
15	Datum C is Secondary shroud length		
16	Confirm terminal spacing is dimensioned to datum B and C		
17	Connector defined with basic dimensions to allow Profile of a surface tolerance		
18	Disclaimer note stating we don't control stuff below given dimension		
19	Datum A to Connector floor dimensioned		
20	Packaging views are present and located per the requirements		
21	Drawing Notes are present and at the latest level.		
22	Blade depth, Datum A to blade tip is appropriately dimensioned		
23	Verify Blade Positional Tolerance		
24	Draft is defined if / when necessary and designated properly		
25	Blade size is not referenced or detailed and note is specified concerning EWCAP 001 Blade drawing including the correct terminal reference		
26	Color / Polarization / Part number table is on the drawing in lower left corner.		
27	Shark fin (lock) is defined correctly with correct size		
28	Drafting font type and size is correct		
29	Drafting line Type and Weight is correct		
30	Rev Column and Balloon callouts are correct		
31	Legal Notice is added as last page of the drawing		
32	Identify thin sections on the print		
33	For sealed connectors: proper identification of seal area with notes		