# 1. SCOPE

This document defines requirements supporting the creation of a production Dimensional Drawing.

# 2. DEFINITIONS

2.1. **Dimensional Drawing:** A digital asset which serves as a visual reference that represents the structural design of a packaging component to articulate tooling and manufacturing requirements. It is a diagram that reflects design, layout, and dimensional requirements of a component in 2-dimentional form. This document should be easily and effectively used in the creation or reproduction of a packaging element and used as a guide for production processes and tooling creation.

# 3. ROLES & RESPONSIBLITIES

3.1. **3M Responsibilities**:

3.1.1. Request, review, and approve or reject Dimensional Drawing submitted by packaging suppliers.

3.1.1.1. **Business Rules – CAD Drawing Requests**

The creation and inclusion of a CAD Drawing in a PLM Structure Specification is required ONLY when one or both conditions is true. A Dieline drawing may still be required, please refer to the 'Global Dieline Requirements PkgSol-RD-902588'.

- Structural design is not considered Standard as it relates to material or commodity type. Standard Design examples include Regular Slotted Container or Reverse Tuck Carton, or any ECMA or FEFCO standards (**Note:** ECMA and/or FEFCO catalog numbers must be noted in the structure spec if a dimensional drawing is not included in the structure spec.)
- Structural design contains features or attributes that are "unique" and critical to functionality (for example, a glue flap (or any other structural element) needing to be within a certain tolerance to run on a particular case erector) or not part of a Standard Design.

3.1.2. Provide Dimensional Drawing file name. Refer to Section 5: "Dimensional Drawing File Naming Requirements" for more details.

3.1.3. Refer to Appendix A: "Additional 3M Responsibilities" for more details.

3.2. **Packaging Supplier/Responsibilities**:

3.2.1. Provide 3M with Dimensional Drawing files upon request.

3.2.2. Ensure all structural attributes/features associated with the package component design are completely and accurately represented on the Dimensional Drawing file. **Note**: All manufacturing constraints including, but not limited to die cutting, and glueing should be accounted for in the Dimensional Drawing file.

3.2.3. Ensure the Dimensional Drawing submitted to 3M complies with the requirements outlined in this document.

# 4. DIMENSIONAL DRAWING FORMATTING REQUIREMENTS

4.1. **File Format**: Editable **PDF** (Portable Document Format) **AND** a **CAD** File.

4.1.1. **PDF** file must be saved without any password protections, retaining editing capabilities.

4.1.2. Do not "outline" a Dimensional Drawing as this can sometimes create "double lines".

4.1.3. Refer to Appendix B: "Additional Dimensional Drawing Formatting Requirements" for more details.

4.1.4. If supplier utilizes ArtiosCAD a **native .ARD file must be provided to 3M in addition to the PDF**

4.1.5. If an ArtiosCAD file is not available, then a **.DXF** file is required in addition to the PDF.

4.2. **Scale**:

4.2.1. All Dimensional Drawing **CAD (ARD or DXF)** files must be built and supplied at **100% scale.**

4.2.2. All Dimensional Drawing **PDF** files must be exported and supplied **scaled down** to **8.5" x 11.5 or A4** sheet size.

4.3. **Format For PDF**: Dimensional Drawing must be built and saved as a line drawing (vector) art rather than a static image file. **Note**: This is typically the default PDF export using any available CAD software.

4.4. **Line Strokes/Definitions**: Each line type (i.e. cut, crease, partial cut, reverse crease, etc..) must be represented as a unique "spot color" (not RGB color) and lines must be exported so that any perforation or 'cut & crease' or 'perf in channel' lines export as individual line segments which accurately represent the length of the cut and/or crease segments. To achieve this using the following CAD software applications:

4.4.1. **ArtiosCAD:** See **Appendix B** or instructions.

4.4.2. **ImpactCAD:** Please refer to: https://impact-support.ardensoftware.com/support/solutions/articles/101000496468-adobe-pdf.

4.4.3. **All other CAD software:** See CAD software vendor documentation OR adjust file in Illustrator to meet all of the Dimensional Drawing formatting requirements.

4.4.4. **Alternative Software**: If you are using alternative software that does not have export options, the PDF will need to be modified to meet the requirements outlined in this document and be re-saved prior to submission to 3M.

4.5. **Line Segments:** All line segments (where applicable) must be "connected" (sharing the same end point coordinates where lines meet).

4.6. **Dimensions:** All dimensions critical to the form and function of the final packaging must be included in the Dimensional Drawing. **Note:** Dimensions that are omitted will be seen as optional/styling and can be altered for external manufacturing tolerancing and/or optimization.

4.6.1. **Positioning:** Dimensions should be to the outside of the die outline whenever possible and leader lines should not cross the die outlines whenever possible.

4.6.2. **Units:** Either imperial or metric units are acceptable

4.6.3. **Rounding (if applicable):** For imperial units rounding must be to at least 3 decimal places, for metric units rounding must be to at least 2 decimal places.

4.7. **Line Type Legend:** A line type legend must be included in the Dimensional Drawing file.

4.8. **Confidentiality and Privacy Requirements:** All Dimensional Drawing must comply with the following Confidentiality and Privacy requirements:

4.8.1. All Dimensional files provided to 3M by supplier are the sole property of 3M and supplier assigns any rights it may have in the Dimensional Drawing file. Supplier shall not include any references or markings on or with the file that would assert or otherwise imply that the Dimensional Drawing file is the confidential and/or proprietary information of the supplier. 3M will remove any such markings if they are included with the Dimensional Drawing file at its sole discretion.

4.8.2. Supplier acknowledges that 3M may share Dimensional Drawing files outside of 3M to other suppliers involved in the design process. Supplier acknowledges it has all necessary rights and consents to allow 3M to share this information. If Supplier does not wish to have information shared outside of 3M, Supplier is solely responsible for submitting files without including any personal or confidential information appended to the file. 3M will have no obligation to review, remove, or redact any part of the files before sharing it with a third party.

## 5. DIMENSIONAL DRAWING FILE NAMING REQUIREMENTS

All Dimensional Drawing files must be identified with a specific naming convention that establishes uniqueness and enables traceability of the digital asset by 3M, packaging suppliers, and/or graphic designers. An example is provided below for referencing purposes:

| Example: SS-123456 | |
|---|---|
| SS | The refix **SS** must be used to identify the digital asset as a Dimensional Drawing. |
| 123456 | Unique system generated serialized Structure Specification ID that links back to the structural design of a packaging component (assigned by 3M in PLM) |

## 6. Dimensional Drawing BUILD REQUIREMENTS

**Note:** Refer to Example 1 in Section 7: "Dimensional Drawing Examples" for a visual representation of each Element Type listed below.

| Reference | Element Type | Element Definition | Element Requirements |
|---|---|---|---|
| A | Die Outline | The external cut lines that represent the outline of the packaging | Die outline must be a joined end to end to create a continuous cut path. |
| B | Internal Features | Represents all the folds, creases, or internal die-cut features that are associated with the package component (where applicable). | Dimensional Drawings must include all folds, creases or internal die-cut features that comprise the packaging component from a design/manufacturing perspective. This can include apertures and window patching elements. |
| C | Dimensional Drawing ID | Defined as the unique identifier that is used to properly identify a specific Dimensional Drawing asset (this unique ID is assigned by 3M. Example: SS-123456) | Dimensional Drawing ID must be created as described in Section 5: "Dimensional Drawing File Naming Requirements" and must be present on the Dimensional Drawing file. The specific location of the Dimensional Drawing ID should center below the Die Outline itself, but in proximity for quick and easy identification. |
| D | Information Box | Used to communicate vital information pertaining to the Dimensional Drawing (the box size style and position is not critical the content it includes **is critical** examples below are a guide to what is acceptable | All Dimensional Drawings must include an Information Box that communicates specific details about the Dimensional Drawing itself. The Information Box must include the following information:<br>• **Source**: Refer to Section 4.8 "Confidentiality and Privacy Requirements".<br>• Dimensional Drawing **File Name**: (SS-123456)<br>• **Date**: Date the Dimensional Drawing was created.<br>• **Substrate**: Detailed technical description of input material used to manufacture the packaging component. This detail will be used to ensure that the specified packaging materials can be matched and reproduced accurately across 3M supply chain globally. **Note**: avoid internal board codes that are only identifiable to specific supplier systems, Use universal packaging industry terms and coding for example: Corrugated = B flute 135K/90/135T or ECT 32 B Flute. Carton Board (Paperboard) = CCNB 22pt. or 400GSM CCNB or GC2 450mic<br>• **Drawing View:** Indicator used to identify which surface of the packaging component the dimensional drawing represents. (inside/outside/other). Default view is outside, but may differ by package type and/or Application.<br>• **Blank Size:** Used to define the overall footprint/area of material used to convert the package structure (represented in two dimensions: length x width).<br>• **Finished Area:** Used to define the measurement of material area used to convert the package structure. |

| | | | |
|---|---|---|---|
| | | | • **Packaging Item Weight:** Measurement representing the weight of the finished packaging component (measured in grams).<br>• **Material Grain/Flute corrugation** direction must be indicated.<br>• **Internal/panel dimensions -** the dimensions representative of the L, W, D (Length, Width, Depth) dimensions of the inside of the package when erect.<br><br>****For Corrugated Packaging Only****<br><br>• **External panel dimensions –** (in corrugated) material's the dimensions representative of the L, W, D (Length, Width, Depth/Height) dimensions of the external size of the packaging when erect.<br>• **Manufacturers Joint:** Type and Location (inside/outside) |
| E | **Key/Legenda/Line Type Labels** | Used to define each line type or hatched area used within the Dimensional Drawing file. | All Dimensional Drawing must include a Key/Legend which provides a visual representation of each different line type or hatch area used along with a written (text) definition of each of those different line types. Variations within line types must also be differentiated (Example, a 1/8" x 1/8" perf must use a different and dimensionally accurate patten from a ¼" x ¼" perf and a 5mm x 5mm perf must use a different and dimensionally accurate patten from a 2mm x 2mm. Each unique perforation and/or different rule type must be indicated with a line type label or in the key/legend) **Note**: Avoid using colors and/or patterns that are hard to distinguish from one another (e.g.: pastel colors, shades of the same color, etc.). |
| F | **Dimensions** | All measurement data associated with the packaging component design. | All dimensions critical to the correct reproduction of the package must be communicated in the drawing dimensions. **Note:** Dimensions that are omitted will be treated as optional/manufacturers' discretion and can be altered for external manufacturing tolerancing and/or optimization. |
| G | **Dimensional Drawing Notes** | Defined as any supporting notes required for reproduction of the packaging and its features and elements in compliance with manufacturing. | Any notes or textual comments that need to be communicated to the packaging supplier should be incorporated as part of Dimensional Drawing. |

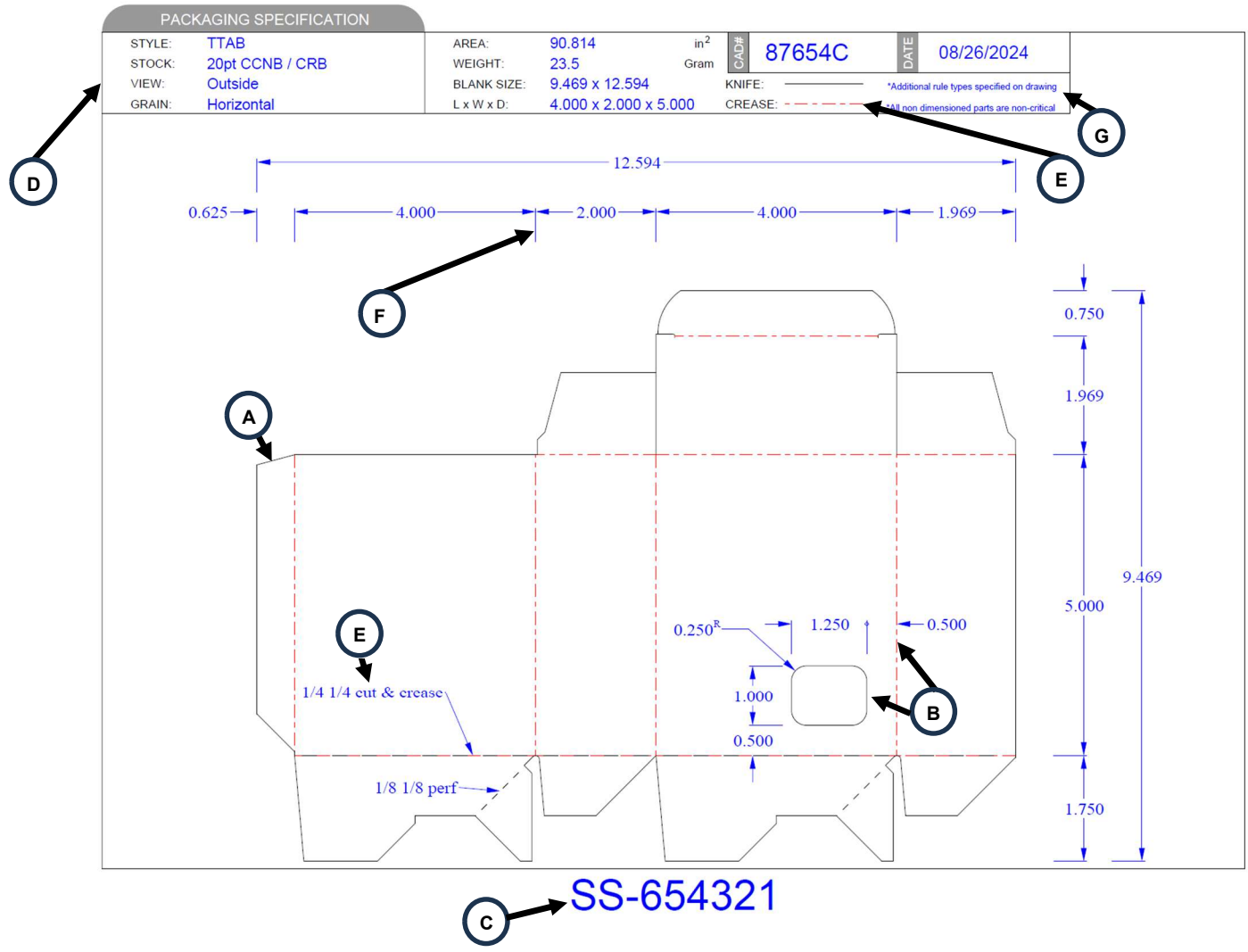
## 7. DIMENSIONAL DRAWING EXAMPLES

Included below are a series of image files that are intended to act as examples of Dimensional Drawings that are representative of common package types used by 3M and that meet the requirements within this document. Note that the line types, info boxes, line colors, hatch patterns, and line patterns shown below do not need to be followed exactly but are to be used as an example illustrating how a Dimensional Drawing could be constructed to meet the above requirements. Note that the elements and the application of the elements shown in the examples below will apply to any other diecut or sheeted packaging formats that may not be listed below (Labels, films, etc.)

**Example 1: This Dimensional Drawing example reflects ALL the various Element Types that could be represented on a Dimensional Drawing**

| Dimensional Drawing Element Types | |
|---|---|
| A - Die Outline | E - Key/Legenda/Line Type Labels |
| B - Internal Features | F - Dimensions |
| C - Dimensional Drawing ID | G - Dimensional Drawing Notes |
| D - Information Box | |

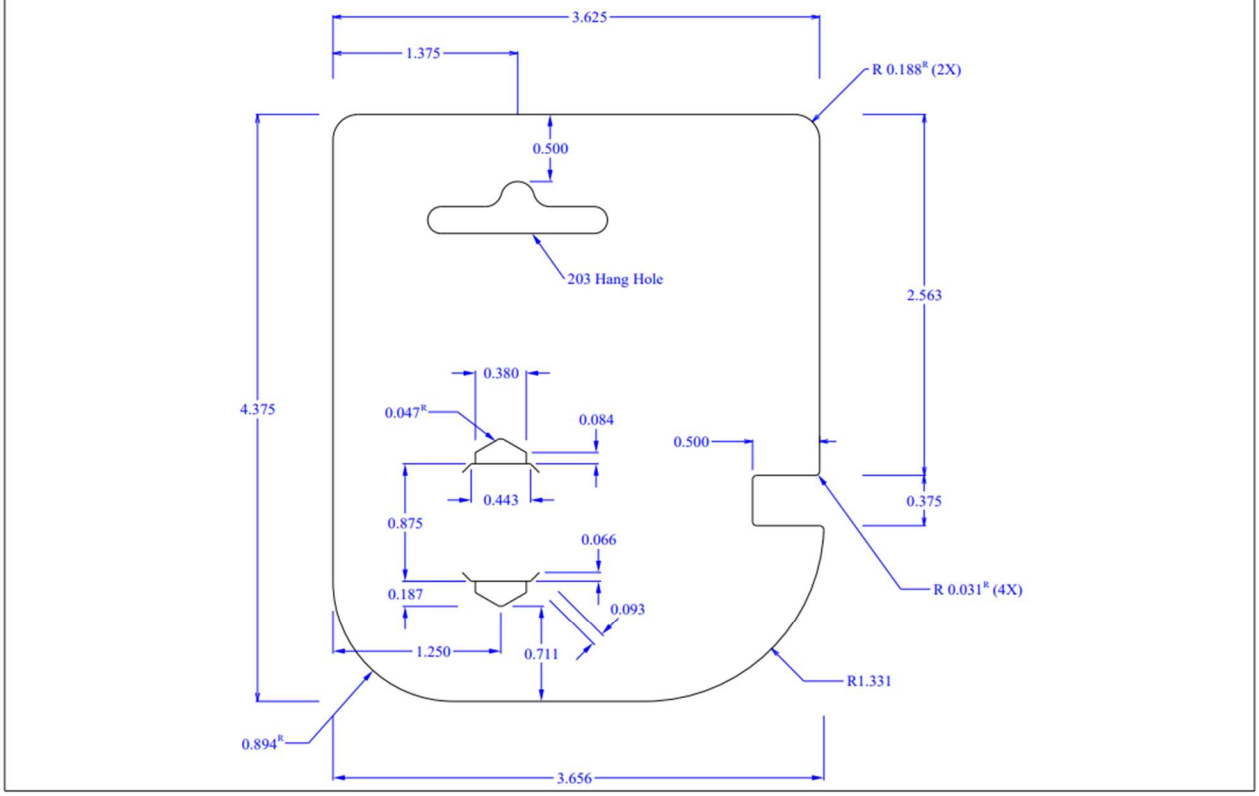
<u>Note:</u> The inclusion of "call-outs" in this Dimensional Drawing example are intended ONLY to act as visual. reference to describe each Element Type and should NOT be included in fine production Dimensional Drawings




**Example 2: Carton Board/Paperboard - Backer Card**

PACKAGING SPECIFICATION

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| STYLE: | Card/Insert | AREA: | 14.738 | $in^2$ | CAD# | 45678A | DATE 08/26/2024 |
| STOCK: | 12pt C1S SBS | WEIGHT: | 2.2 | Gram | | | |
| VIEW: | Outside | BLANK SIZE: | 4.375 x 3.656 | | KNIFE: | | *Additional rule types specified on drawing |
| GRAIN: | Vertical | | | | CREASE: | | *All non dimensioned parts are non-critical |




SS-123456

## Example 3: Corrugated - Box

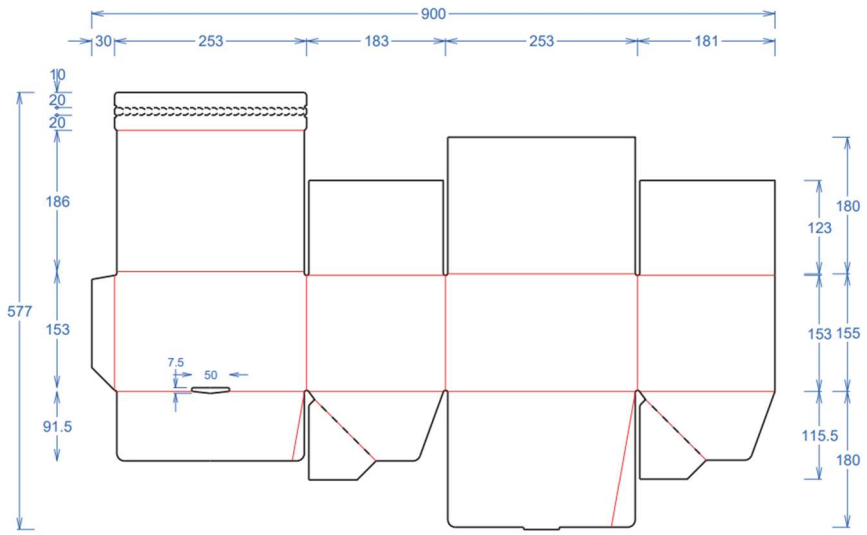
### Dimensional Drawing

Date: 23/08/24
Design Style: FT_0886
Style Description:
Full CLB tear open top
File Name: 3M_SD100137EMEA.ARD
Inside Dims: 250.00 x 180.00 x 150.00
Outside dims: 259 x 186 x 162
BlankArea sq/mm: 385982.59
Blank Size: 900.00 x 577.00
Board: B Kraft/Test
Outer Liner Kraft liner 135
Inner Liner Test Liner 135
Man Joint: outside lap
View: outside
Min BCT:
Weight Gram: 203.96
GRAIN/FLUTE: horizontal

**SPECIFIC RULE LEGEND**

Cut
Crease
Tear edge 11.
Tear edge 11 mirror
10 10 cut & crease

Dimensions




SS-123456

Drawing Notes

## APPENDIX

### Appendix A: Additional 3M Responsibilities

3M Package Engineer shall…

- Determine final development requirements associated with the packaging structure.
- Communicate pertinent information to the packaging supplier (assuming the creation of the Dimensional Drawing will be requested of the packaging supplier).
- Complete inspections of submitted Dimensional Drawing (assuming they are created and submitted by a packaging supplier) to verify for completeness and accuracy of the Dimensional Drawing when compared to the packaging component design (including compliance to the requirements outlined in this document).
- Non-compliance to any/all requirements as defined within this policy shall be reason for "rejection" by 3M and returned to the packaging supplier/printer for correction and resubmission.

### Appendix B: Additional Dimensional Drawing Formatting Requirements Notes

- This file format is being leveraged as a "universal format" to display documents in an electronic form that is independent of the software, hardware, or operating system they are viewed in.
- PDF file must be saved with "editing capabilities". Note: If not saved properly, potential exists that connected lines can split at their points.
- ArtiosCAD PDF Export Process:
    - Select File->Export->Artios->PDF with Technical Inks
    - Set scale to 'Fit to one page'
        - The default Artios PDF export is set to 11" x 8.5" sheet size, no adjustment needs to be made.
    - Within 'Properties' in the 'Processing' Tab, 'Line processing options' should be set to 'Design Representation. This should already be the default.