Materials Group
Label and Packaging Materials

Technical Guide
North America

AD Fusion Smart Materials Technical Guide

AVERY DENNISON

The purpose of this document is to provide information regarding the AD Fusion program for smart materials, required order information, and recommended protocols for integration with your production processes.

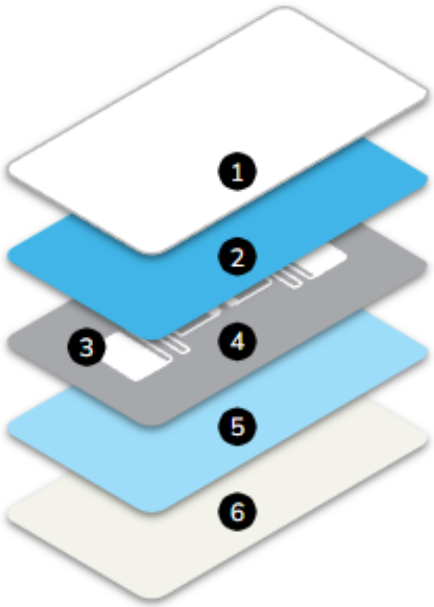
Program Overview

Traditionally, the barrier to entry for the RFID market has been a capital-intensive “all-or-nothing” proposition. Establishing a captive insertion operation requires a typical investment of $1MM for specialized machinery, specialized technical headcount, and a significant learning curve that often sidelines existing assets. AD Fusion removes these hurdles by delivering ready-to-convert, made-to-order rolls. This allows converters to utilize their existing standard flexographic and digital presses immediately, transforming a months-long infrastructure project into a startup period measured in days.

AD Fusion Technology Architecture

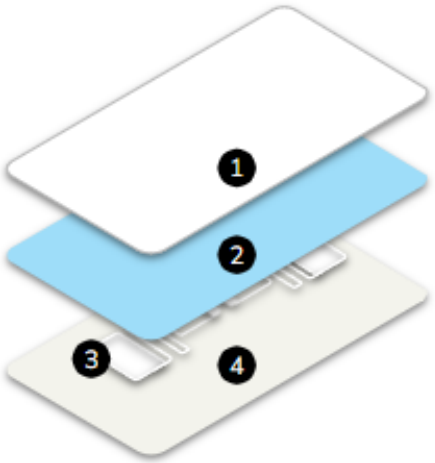
The technical foundation of the program is our patented SmartFace™ inlay transfer process. By rethinking the traditional stack, we have engineered a profile that is up to 40% thinner than standard RFID-inserted label constructions, reducing mechanical stress on the press and maximizing roll utilization:

Standard Label



1. Printable facestock
2. Laminate adhesive
3. Inlay (antenna & chip)
4. Paper or PET substrate/carrier
5. Functional adhesive
6. Liner

Smart Materials



1. Printable facestock
2. Functional Adhesive
3. RFID Circuit (strap & antenna)
4. Liner

Standard Material Constructions

We have qualified primary specifications that balance performance with versatility for the majority of retail and grocery applications. For the latest material constructions available in the AD Fusion program, please reach out to your Avery Dennison account representative.

Inlay Performance Profiles

We will be adding additional inlays to the program as we grow. The initial two inlays utilize the M830 chip:

AD-Burst M830 (70 x 10.5 mm): A versatile inlay certified for a wide range of ARC categories: Apparel/Home (F), Apparel/ETSI (I), Intimate Apparel (L), Books/ Stationery (O), Accessories (Q), Apparel/Footwear (R), Sunglasses (W5), Jewelry (W6), and Electronics (Y2).

AD-Stealth M830 (50 x 14.5 mm): A compact alternative carrying identical ARC certifications (F, I, L, O, Q, R, W5, W6, Y2), providing greater layout flexibility for narrow-format labels.

Engineered Solutions

For applications that require non-standard facestocks or specialized inlays, we apply our Engineered Solutions Protocol. Through this rigorous validation process, our technical team evaluates alternative constructions to ensure they meet our performance standards. Lead times, minimum order quantities, and cost structures are assessed on a case-by-case basis to safeguard operational throughput. By standardizing these high-performance materials, we establish a stable foundation for integrating ARC-certified RFID use cases.

Manufacturing Constraints and Roll Geometry

To ensure seamless integration with your current equipment, all rolls are produced to fixed manufacturing standards:

Web Dimensions: Maximum slit width is 15". However, we strongly recommend utilizing a 13" web width for 3-across and 4-across designs to optimize efficiency.
Roll Standards: 5000' total length on a 3" core, wound "face out." Each roll includes a 100' leader and 100' trailer (no inlays) to simplify press threading.
Pitch and Lane Configurations:

- **Minimum Pitch:** MD 1", CD 3".
- **Maximum Pitch:** MD 10", CD 4.125".
- **Lane Limits:** AD-Burst supports 2-3 across; AD-Stealth supports 3-4 across.

These standardized geometries provide the technical baseline required for our front-end design and approval workflow.

Ordering and Technical Drawing Requirements

The precision of a “ready-to-convert” material depends entirely on the accuracy of the front-end design process. We employ a rigorous five-step ordering path to ensure that the pre-inserted inlays align perfectly with your finished die-lines.

The 5-Step Ordering Path

1. Selection: Converter selects the material and inlay spec from the qualified list.
2. Template Provision: Converter provides digital die-line templates and specific machine requirements.
3. Quote/Draft Drawing: We generate a custom quote and detailed technical drawing.
4. Approval/Scheduling: Converter signs off on the final layout; production is scheduled.
5. Delivery: AD Fusion materials ship within a standard 4-week lead time.

Technical Drawing Requirements Checklist

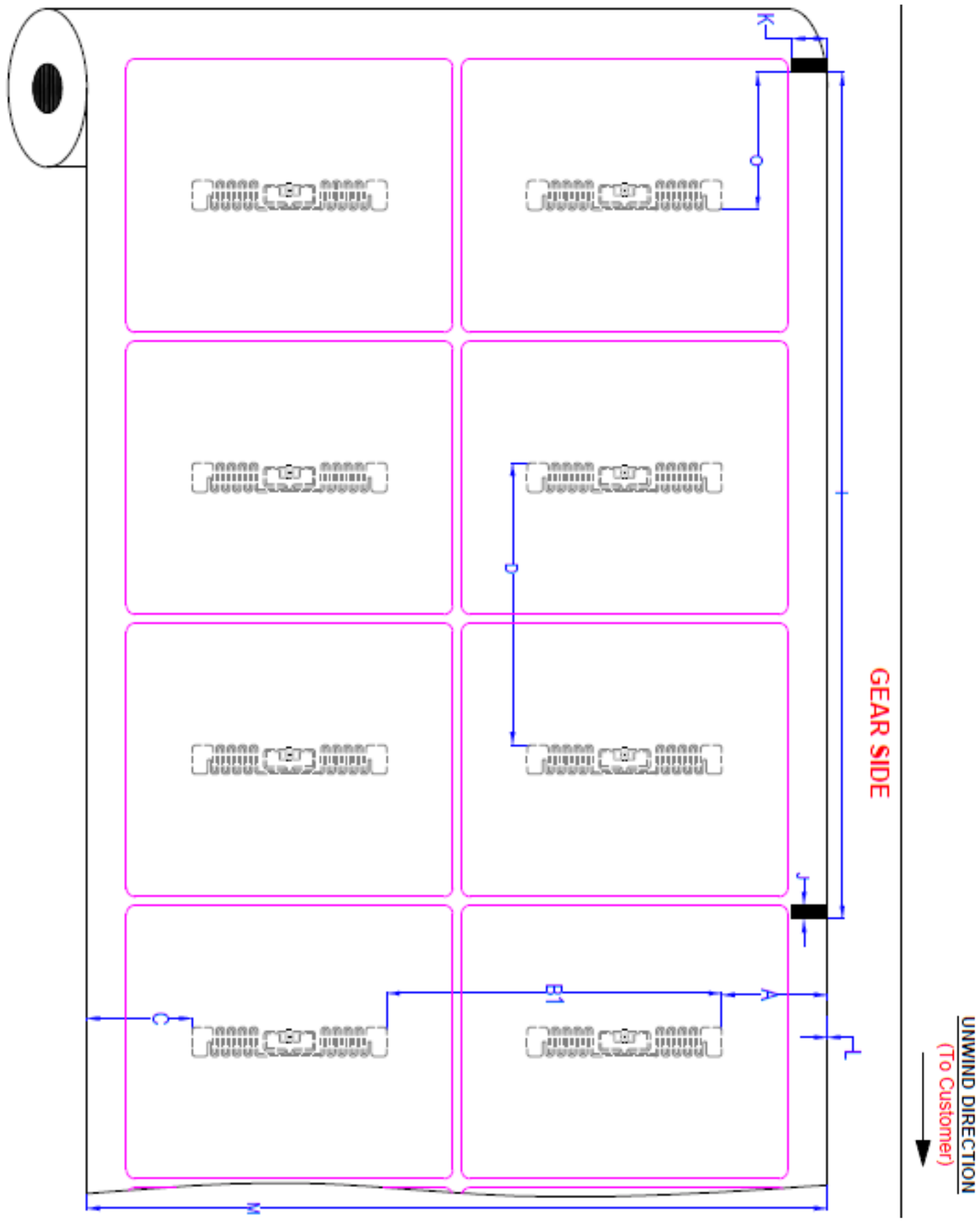
Converter-supplied instructions or templates must include:

MD and CD Pitch: Inlay will be wide-edge leading.
Eye Mark Specs: Re-registration marks must be 5mm x 5mm, or 5mm x 7mm.
Eye Mark Placement: Preference for alignment with the inlay; specify if required on Operator side, Gear side, or both.
Curvature Allowance: For labels applied to curved surfaces, a minimum edge distance of 0.5” (MD/CD) is required to prevent “winging” and maintain adhesion.
Web Width: Final confirmation of slit width

Quality Control (QC) for Final Layouts

Upon receipt of the Avery Dennison draft drawing, the converter’s technical team must verify:
CD/MD Pitch: Confirm edge-to-same-edge measurements.
Eye Mark Frequency: Verify if marks are required for every inlay or every repeat.
Placement Precision: Verify distance from the web edge (CD).

Once the technical layout is frozen and approved, the material can proceed to physical production and press-side verification.


K
O
D
J
B1
A
C
L
M
GEAR SIDE
UNWIND DIRECTION
(To Customer)

Recommended Integration Protocols

The final integration stage involves converting these smart materials into finished labels on your standard equipment.

Production Planning & Printing Protocol

You must determine your RFID data strategy prior to the first run. This includes deciding whether encoding and verification will occur high-speed inline or via offline quality control systems.

A critical consideration for smart materials is printing directly over the inlay. Because the antenna itself is not backed by a discreet carrier, the total construction is typically a much smoother profile, but converters should still evaluate ink laydown and print impression to ensure brand graphics remain crisp over the slight elevation of the antenna, strap, and chip.

Paper-based smart material constructions generally require minimal, if any, impression adjustments beyond kiss transfer. Conversely, filmic facestocks are more conformable and typically necessitate greater impression adjustment (see figure 1 below), which should be optimized during the initial press setup.

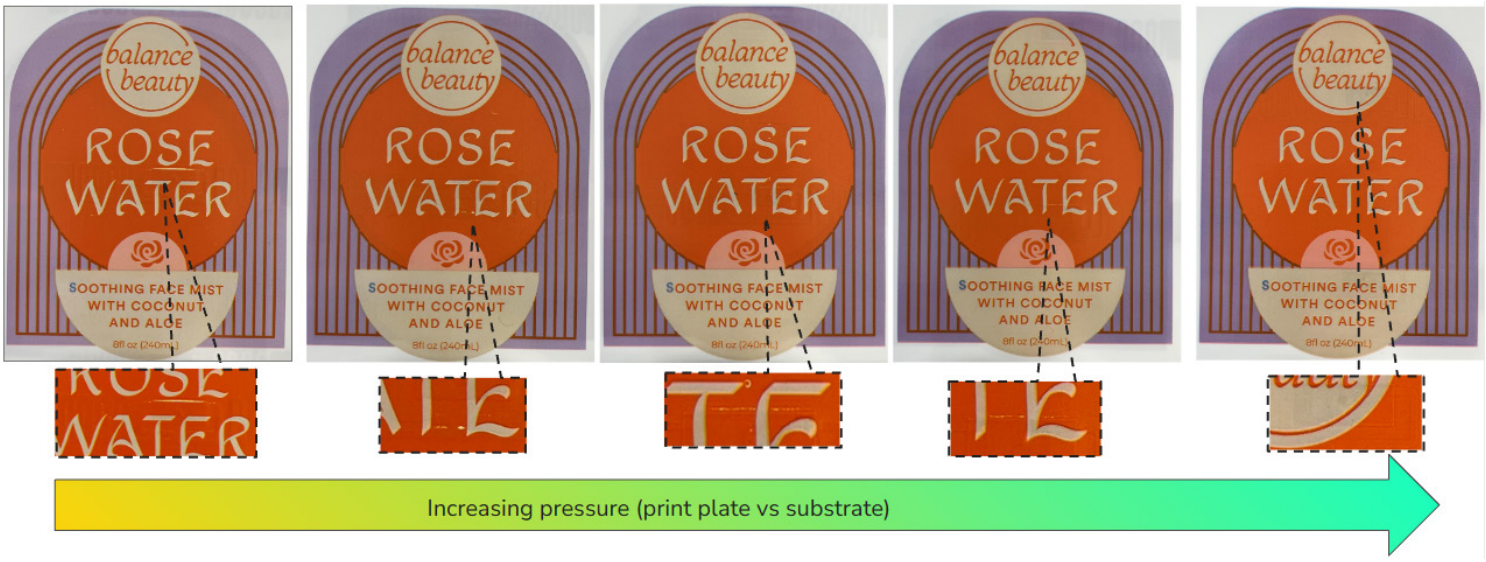


Figure 1: Usage of increased impression reduces the print defect with filmic smart material

Roll Winding Tension, Telescoping Protocol

When utilizing filmic smart material constructions, excessive winding tension may induce significant visual embossing where inlays manifest in non-inlay regions. Furthermore, high tension levels can cause rolls to "telescope" during press runs or offline slitting operations, and in extreme cases, result in chip fracture. These mechanical stresses are typically more pronounced near the roll core. While chip crushing remains an edge case not yet documented in our validation trials, it remains a critical risk factor at elevated tension settings.

In practice, utilizing a configuration of reduced web tension paired with an increased taper generally produces optimal operational outcomes. For instance, when converting B7655-based smart materials (2.4M WH BOPP TC/S7000ER/1.2M PET), maintaining tension between 0.77 and 1.15 PLI with an 80% taper yielded stable performance. Conversely, exceeding 1.5 PLI triggered substantial embossing and telescoping. Consequently, for all filmic specifications, we strongly recommend optimizing winding protocols to preserve roll geometry and material integrity.

Bad Tag Handling Protocol

Avery Dennison verifies inlay yield through our insertion process. Any inlay identified as defective at the manufacturing stage is marked with a black rectangle on the face of the material. Your production team can use these marks for manual inspection or integrate them with automated pick-and-place replacement systems to ensure guaranteed yield for the end-user.

By following these integration protocols, AD Fusion smart materials allow you to maximize asset utilization and minimize CapEx, delivering a best-in-class RFID solution that scales with the market.

label.averydennison.com 07/2026

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