



HOW TO GUARANTEE PACKAGING COMPLIANCE

AUTOMATE & VERIFY

ABOUT DIAGRAPH

For over a century, Diagraph Marking & Coding has been providing product identification solutions that make it easy for manufacturers to make the perfect mark – print after print after print – from technology pairing to comprehensive service support and beyond. With the 1893 invention of the revolutionary stencil cutting machine all the way to today's high-speed inkjet coders and all-electric automated labelers, Diagraph focuses on partnering with customers in every aspect of their coding and labeling operations – providing a holistic approach that maximizes efficiencies for customers and drives tangible value throughout a long-term partnership.

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INTRODUCTION

Packaging compliance is a traceability initiative to mitigate product safety concerns and ensure automated product identification throughout the supply chain. Global and governmental regulatory agencies and retailers largely dictate the necessary components of what is considered “compliant packaging” practices. If print message and label formats do not meet regulator and retailer requirements, manufacturers can be subject to significant penalties and fines.

Can consumer packaged goods manufacturers guarantee packaging compliance? At Diagraph, we believe that manufacturers can achieve virtually 100% compliant packaging with careful planning and an on-going commitment to following best practices.

In this whitepaper, we explore four key considerations to guarantee packaging compliance.

IMPORTANT TERMINOLOGY TO KNOW

ANSI VERIFICATION A specific procedure for measuring barcode quality as outlined by the American National Standard Institute

AUTOMATED PRESSURE SENSITIVE LABEL APPLICATION The practice of applying a label or sticker to a product

BARCODE An optical, machine-readable code representative of product data

BATCH CODE Used interchangeably with “Lot Code”, represents a batch of goods produced using the same ingredients or sub-components under the same conditions

DATABASE A structured set of information that is organized and easily accessible, managed, and updated

DATE CODE Identifies the date a product was manufactured

GS1 STANDARD Products are assigned a Global Trade Item Number (GTIN) in order to have a unique, globally accepted way to electronically refer to a given trade item

HIGH RESOLUTION INKJET A form of on-demand industrial inkjet printing that offers a high enough resolution to print complex messages that include alphanumerics, barcodes, and graphic images

IIoT The industrial internet of things, or IIoT, connects machines and devices across industries to enhance manufacturing and industrial processes

INDUSTRY 4.0 Referred to as the fourth industrial revolution, Industry 4.0 is the aggregate of new digital industrial technology that enables interconnectivity, automation, machine learning, and real-time data by utilizing IIoT protocols, cloud computing, data analytics, and artificial intelligence

LASER CODING A form of product marking that involves etching print messages on packaging using laser technology

LICENSE PLATE NUMBER A unique number given to a container to streamline the transfer of inventory within the supply chain

LOT CODE Used interchangeably with “Batch Code”, represents a lot of goods produced using the same ingredients or sub-components under the same conditions

OPERATOR CODE Identifies the individual operator that was overseeing production when a product was being manufactured

SMALL CHARACTER INKJET A form of on-demand industrial inkjet printing for applying simple print messages in small areas

THERMAL TRANSFER PRINTING A form of high resolution digital printing in which a heated ribbon is applied directly to a substrate to produce a specific image

UPC CODE The “Universal Product Code” assigned to trade items for use at the retail level



WHAT DOES PACKAGING COMPLIANCE LOOK LIKE?

Packaging compliance is achieved when product identification requirements as dictated by regulators and retailers are successfully applied to product packaging. A successful application requires the product identification information to be legible, accurate, and durable.

As with all consumer packaged goods, there are various levels of packaging needed to move goods to market, including primary packaging, secondary or case level packaging, and pallet level labeling. Each level of packaging has unique characteristics which dictate what type of product identification technology is appropriate and what level of information is needed to be displayed on the packaging for the benefit of the retailer and consumer.

Primary Packaging

Individually wrapped products require a UPC code which is most commonly preprinted as part of the overall design of the primary packaging in order to achieve perfect scan-ability at the retailer level. Lot codes, batch codes, operator codes, and date codes when dealing with perishable goods, are often applied to the packaging using real-time product coding technology when the package is filled.

The most common types of product coding technology for primary packaging applications include:

- Small Character Inkjet
- Thermal Transfer Printing
- Laser Coding

Secondary or Case Level Packaging

If a product utilizes both secondary and tertiary level packaging, the secondary level packaging is usually highly polished retail ready packaging. Like primary product packaging, this level of packaging typically utilizes a preprinted UPC code, yet still requires the real-time manufacturing codes to be applied using product coding technology. When primary products are packaged directly in case level packaging, UPC barcodes along with real-time manufacturing codes are most often applied on-demand using real-time product coding technology. This is the most cost effective approach to decorating case level packaging and provides the greatest amount of flexibility for manufacturers.

The most common types of product coding technology for secondary level retail ready packaging:

- Small Character Inkjet
- Laser Coding
- Thermal Inkjet

The most common types of product coding technology for case level packaging:

- High Resolution Inkjet
- Automated Pressure Sensitive Label Application
- Thermal Inkjet

Pallet Labeling

Nearly all bulk goods are shipped to distribution and retail centers on a pallet. This level of packaging typically includes both product information as well as destination information on what is referred to as a license plate label. Information supplied through the label includes part numbers, item name, quantity, serial numbers, organization name, date of manufacture, expiration date, lot number, and location. This helps group and manage the product by pallet unit while assigning a unique License Plate Number (LPN) and barcode label so that distribution and retail centers can track and manage logistics for the group of items on the pallet using a single scan. License plate labels are applied to pallets either manually by hand or using an automated pressure sensitive labeler.

WHAT'S AT RISK IF PACKAGING COMPLIANCE IS NOT ACHIEVED?

The practice of applying manufacturing codes including GS1-issued GTIN and UPC codes to products has been widely adopted to create efficiencies in the global supply chain as well as protect consumers, retailers, and manufacturers in the event of recalls.

Supply Chain Efficiencies

Manufacturing codes have created the ability to capture, track and trace, as well as audit product information at every step of the supply chain. This improves efficiencies and streamlines workflows as goods are passed between manufacturers, suppliers, and retailers all the way to consumers.

In today's high-tech world, suppliers and retailers have issued product identification requirements to primary manufacturers in order to streamline their own inventory management practices. In many cases, if a manufacturer cannot provide legible and perfectly scannable product information, they can be hit with fines for non-compliance and the affected product is often returned. When faced with a large amount of packaging compliance violations, a manufacturer damages its reputation and often loses business.

Product Recalls

Product recalls are expensive for manufacturers, especially when severe illness, injury, or death is caused by unsafe or defective products. Manufacturers risk lawsuits, fines from the Consumer Product Safety Commission (CPSC) and encounter major expenses to mitigate damages.

When utilized correctly, manufacturing codes can help pinpoint when and where a product was produced along with all raw- or sub-materials used in the production to help isolate compromised product in the event of a recall. Manufacturers can reference affected manufacturing codes in their request to return a product if they suspect safety issues or product defects. This allows suppliers, retailers and consumers to quickly identify and locate products of concern, helping to minimize the impact of a recall. If manufacturing codes are not legible, affected product will not be identified and runs the risk of further harm.

Retailer & Consumer Confidence

Retailers and consumers alike rely on date codes to understand the shelf-life of perishable goods. Retailers manage and rotate their inventory using product expiration date information as a guide. Likewise, consumers base their willingness to purchase products based on the expiration dates communicated on retail ready packaging. If a date code is missing or illegible, the product is less likely to be purchased. Because of this, if encountered with enough frequency, retailers may return impacted product and may even fine the supplier or manufacturer.

What's at risk if packaging compliance is not achieved? A manufacturer's bottom line, reputation, and consumer safety can all be impacted.

HOW MANUFACTURERS CAN ACHIEVE PACKAGING COMPLIANCE

Four Key Considerations

1: PRODUCT IDENTIFICATION SOLUTION SELECTION

Comparing Product Coding Technologies

The first consideration when building a packaging compliance game plan involves understanding your manufacturing code and application requirements. Once this is determined, you can select the ideal product coding technology.

Print Message Requirements

What kind of compliance information needs to be included in your print message?

- Product Information
 - Product Name
 - Product Description
 - Quantity/Counts
 - Ingredients
 - Nutrition Facts Panel
- Manufacturing Codes
 - Batch Code
 - Lot Code
 - Line Code
 - Operator Code
 - Date Code – Manufactured On or Expiration Date
- Barcode Requirements
 - EAN/UPC
 - 1D
 - 2D
 - GS1-128
 - GTIN-14
 - ITF-14
 - Other available barcode formats

What are your application requirements?

- Packaging Level
 - Primary Packaging
 - Secondary Retail Ready Packaging
 - Case Level Packaging
 - Pallet Level Labeling
- Packaging Substrate
 - Glass
 - Metal
 - Plastic
 - Paperboard
 - Cardboard
 - Shrink wrap
 - Other
- Line Speed and Product Throughput

Once print message requirements are considered along with the application details, manufacturers can begin to evaluate and select the ideal product coding technology for their operation.



PRIMARY & SECONDARY RETAIL READY PACKAGING PRODUCT CODING TECHNOLOGY

REQUIREMENTS	Small Character Inkjet	Thermal Transfer Printer	Laser	Thermal Inkjet
Substrate Compatibility	Best	Limited	Good	Limited
Fast Line Speeds	Best	Good	Best	Good
Inexpensive Cost Per Mark	Best	Best	Best *expensive cost of acquisition, but low cost per mark over time	Good for low volume production
Complexity of Message	Good	Best	Best	Best
Intervention Requirements	Best	Poor	Best	Poor
Ease of Product Changeover	Best	Poor	Good	Good
Code Durability	Good	Good	Best	Poor
Code Contrast	Best	Best	Poor	Good

CASE LEVEL CODING TECHNOLOGY

REQUIREMENTS	High Resolution Inkjet	Automated Pressure Sensitive Labeling	Thermal Inkjet	Manual Labeling
Substrate Compatibility	Good	Best	Good	Best
Fast Line Speeds	Best	Good	Good	Poor
Inexpensive Cost Per Mark	Best	Good	Poor	Poor
Complexity of Message	Best	Best	Poor	Best
Intervention Requirements	Best	Poor	Good	Poor
Ease of Product Changeover	Best	Poor	Good	Good
Code Durability	Good	Good	Poor	Good
Code Contrast	Good	Best	Good	Best

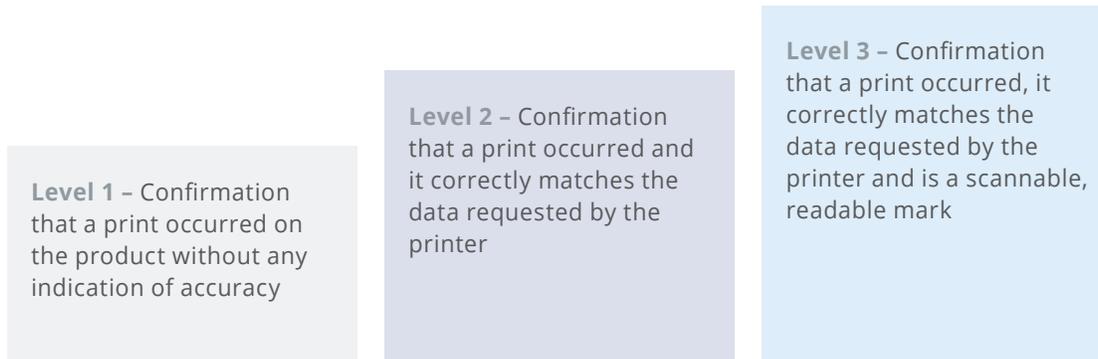
2: MESSAGE VALIDATION

Achieving Readable & Correct Marks

There have been many advancements in product identification and machine visioning technology that have enabled manufacturers to automate the monitoring of real-time print quality. This allows workers to focus on other critical areas of production rather than checking in to make sure their manufacturing codes are being applied accurately to the products. Thus, the next step in ensuring packaging compliance is validating that the real-time printed message applied to products is readable and correct.

Scanners and vision systems are common components added to the production line post-print to inspect and report any illegible codes or incorrect stock. At the most basic level, these scanners simply confirm that a print occurred on the product – regardless of accuracy. A level up from basic, scanners in place verify that the product was printed as instructed and correctly matches the data requested by the printer. The most sophisticated configuration will confirm a product was printed with the mark that matches the printer’s information and is scannable.

Levels of Message Validation



BARCODES ON PACKAGING

Barcodes are the most common mark example used to identify and track products as they move through the supply chain. Information like product numbers, serial numbers and batch numbers can all be encoded within barcodes and the type of barcode used – EAN/UPC, GTIN, DataBar, 1D, 2D – varies by situation. Knowing your industry’s compliance regulations will be crucial to create the appropriate composition of your product mark.

3: PACKAGE AUTOMATION & CONTROL

Proactive & Reactive Control of Packaging

Achieving guaranteed packaging compliance requires more than selecting the most optimal product coding technology and the right level of message validation for your operation. To ensure high quality real-time manufacturing codes are printed consistently, proactive material handling best practices need to be in place.

Proper material handling when working with coding equipment includes:

- Low vibration conveyors to reduce interference with the application of real-time print messages on the products
- Railing selections and configurations that consistently present the product to the coding technology for message application
- Tolerant product coding technology that provides consistent performance and enough flexibility to apply a quality code when there are slight inconsistencies in material handling

To guarantee packaging compliance, reactive measures also need to be worked into the overall material handling plan in order to separate non-compliant product from acceptable product. This prevents non-compliant products from ever reaching the customer. When material handling is used with scanner message validation, production lines can be shut down or, if there is enough space available in the production environment, out-of-spec packages can be automatically separated from the rest of the products if they are deemed unreadable or incorrect.

Reactive material handling measures often referred to as “Reject Systems” include:

- Jets of air
- Pusher arms
- Drop belts

Once a package has been deemed as illegible or non-compliant and an auto-reject measure takes place, manufacturers can choose to rework the code application or scrap the product altogether. When choosing to rework the code application, the non-compliant code is either removed, redacted or left in place. Manufacturers either opt to send the product back through the product coding step on the normal production line or have a separate rework station set up to reapply the manufacturing codes.

Scrapping product due to illegible codes can be expensive. Manufacturers that choose this option understand the time and costs involved with rework and opt to scrap product when it is a more cost-effective option than going through a rework process. Tightly controlled message validation and material handling measures can help reduce the amount of product impacted by illegible codes. This limits the amount of product that needs to be reworked or scrapped to a minimum.

Programmable Corrective Measures

OPTION 1 Full Production line shutdown for corrections

OPTION 2 Reject, redirect and rework

OPTION 3 Reject, redirect and scrap



4: DATA MANAGEMENT

Achieving Automated Compliance Through Data Connectivity

Under performing coding technology and poor material handling measures are not the only causes of packaging non-compliance. Manufacturers often find that user error is to blame for improper codes being applied to products. To minimize instances of user error in the print message creation and selection process, information can be drawn from a centralized database to auto-populate the print messages. This allows manufacturers to take basic message selection and editing responsibilities out of the hands of line workers and instead rely on automation to do the heavy lifting when it comes to variable print message editing and selection.

One-way Data Management

One-way data management leverages existing databases to populate components of print message formats that are required by regulators and retailers. Database linked messages are then sent in real-time to the printer for use.

- Centralized control point for variable message creation and management
- Seamless integration with company databases automates manual input of variable information
- Validated data matched to print messages protects against user error
- Less manpower required from IT and Operations to create and maintain message formats

Two-way Data Management

Two-way data management enables manufacturers to get real-time feedback from in-line equipment to further drive operational insights.

- Equipment availability reporting allows for the monitoring of equipment status in real time as well as drives long-term up-time insights
- Message validation tracking helps to understand the print performance of coding technologies and overall compliance achieved
- Realtime production insights provides throughput analytics to measure uptime productivity

Managing the integration of data down to the production floor allows for manufacturers to seamlessly and efficiently ensure the right information is being printed on the right products – ultimately helping manufacturers achieve automated compliance.

INDUSTRY 4.0 AND PACKAGING COMPLIANCE

Industry 4.0 allows data to be integrated from the office to the production floor, enabling manufacturers to seamlessly ensure the right information is being printed on the right products while remotely monitoring and managing the overall productivity of the equipment.



SO HOW DO YOU GUARANTEE PACKAGING COMPLIANCE?

At Diagraph, we believe that you can not only virtually guarantee packaging compliance, but that it is best achieved through automation. The chosen product coding technology, message validation process, material handling configuration, and data management practices are all key to a successful game plan.

Speak with a Diagraph packaging compliance specialist today to better understand your compliance risks and build a custom game plan that is ideal for your production environment.

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