Design Operations

Corporate Reference Document 138

Description: Printing Requirements for Point-of-Sale Bar Code Symbols Using EAN/UPC Symbology

Specification No.: CRD-138

Date: 02.19.16 **Supersedes Issue:** 10/16/06 **Owner:** Michael John

Change Record: Incorporated GS1 terminologies, Updated 1.1; 4.1.1 and Appendix A, C and E.

SCOPE: This Corporate General Specification defines 3M requirements and responsibilities for the printing of Point-of-Sale bar code symbols using EAN/UPC symbology.

1.0 General Information

This General Specification covers point-of-sale bar code symbols known as Global Trade Item Numbers (GTIN) which use the EAN/UPC symbology as outlined in the GS1 General Specifications document referenced below. This includes the Universal Product Code (UPC) and International Article Number (EAN) family of point-of-sale bar code symbols: UPC-A, UPC-E, EAN-13, and EAN-8. The responsibilities and requirements stated herein are applicable to any bar codes that use this symbology.

Implementers of the EAN/UPC point-of-sale bar code symbols for 3M Company must familiarize themselves with the following publications which are used as the framework for Corporate General Specification 138. These are:

- GS1 General Specifications
  http://www.gs1.org
- ANSI x3.182 - Guideline for Bar Code Print Quality
  http://web.ansi.org
- ISO/IEC 15416 Bar Code Print Quality Test Specifications - Linear Symbols
  http://www.iso.org

2.0 PURPOSE:

To assure the printing of point-of-sale bar code symbols which conform with the GS1 General Specifications. This Corporate General Specification shall also supplement the individual 3M packaging item specification(s). Instructions in the individual 3M packaging item specification(s) have precedence over any instructions contained in this Corporate General Specification.

3.0 3M RESPONSIBILITY:

Specify bar code symbol format to be used (i.e. UPC-A, EAN-13, UPC-E, or EAN-8) and provide number to be encoded, bar code symbol location, orientation, magnification (size), and color. See the following Appendices for overview of considerations. Complete details are contained in the documents referenced in Section 1.2.

Communicate proofing procedure to be followed and provide written approval to print, if required.

Position EAN/UPC bar code symbol on packaged products to conform with 3M and GS1 General Specifications requirements.

4.0 SUPPLIER RESPONSIBILITY:

Print the GTIN bar code symbol in conformance with the GS1 General Specifications as stated herein.

Supplier Requirements - General

- Understand effect of print process on bar width and modify 3M bar code symbol artwork as necessary.
- Use an ANSI or ISO capable verifier.
- Use correct aperture setting. (6 mil for all UPC and EAN symbology's)
- Calibrate verifier and ensure NIST traceable.
- Train operators.
- Use appropriate sampling processes (see below*).
- Ensure that the human readable matches the encoded data within the printed bar code symbol.

Supplier Requirements - Specific

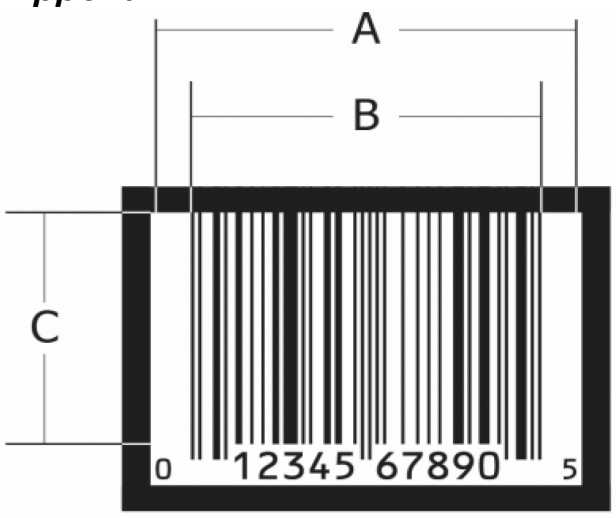
Overall ANSI/ISO grade of **1.5/06/670 (C/06/670)** or higher must be maintained on an on-going basis on the final symbol on the package at the point of sale. Wherever practical, the symbol grade **as printed** should equal or exceed **2.5/06/670 (B/06/660).**

Follow agreed upon proofing procedure as stated in 3.

On new items, advise 3M if unable to meet minimum bar code quality requirements prior to producing packaging supplies.

Develop and implement appropriate inspection procedures to ensure conformance to print quality requirements for each bar code symbol provided to 3M on an ongoing basis.*

Appendix A:



(sample shown for visual only)

UPC-A / EAN13 Size Chart

Magnification or Size	Narrow Bar Width	Print Tolerance +/-	Minimum Narrow Bar Width	Maximum Narrow Bar Width	Min. Width with Quiet Zone (A)	Bar to Bar Width (B)	Overall Height* (C)
80	.0104	.0014	.0090	.0118	1.175	0.988	0.718
85	.0110	.0020	.0090	.0130	1.243	1.050	0.763
90	.0117	.0027	.0090	.0144	1.322	1.112	0.808
95	.0124	.0034	.0090	.0158	1.396	1.173	0.853
100	.0130	.0040	.0090	.0170	1.469	1.235	0.898
105	.0136	.0043	.0093	.0179	1.543	1.297	0.943
110	.0143	.0046	.0097	.0189	1.616	1.359	0.988
115	.0150	.0049	.0101	.0199	1.695	1.420	1.033
120	.0156	.0052	.0104	.0208	1.763	1.482	1.078
125	.0163	.0055	.0108	.0218	1.837	1.544	1.123
130	.0169	.0058	.0111	.0227	1.910	1.606	1.167
135	.0176	.0061	.0115	.0237	1.984	1.667	1.212
140	.0182	.0064	.0118	.0246	2.057	1.729	1.257
145	.0189	.0067	.0122	.0256	2.131	1.791	1.302
150	.0195	.0070	.0125	.0265	2.204	1.853	1.347
155	.0201	.0073	.0128	.0274	2.277	1.914	1.392
160	.0208	.0076	.0132	.0284	2.350	1.976	1.437
165	.0215	.0079	.0136	.0294	2.424	2.038	1.482
170	.0221	.0082	.0139	.0303	2.497	2.100	1.527
175	.0228	.0085	.0143	.0313	2.571	2.161	1.572
180	.0234	.0088	.0146	.0322	2.644	2.223	1.616
185	.0241	.0092	.0149	.0333	2.712	2.285	1.661
190	.0247	.0095	.0152	.0342	2.791	2.347	1.706
195	.0253	.0098	.0155	.0351	2.865	2.408	1.751
200	.0260	.0101	.0159	.0361	2.938	2.470	1.796

** Height is measurement of the shortest bars and does not include the human readable or bearer bar/frame*

- Bearer bars are suggested for use in flexographic printing and strongly suggested for corrugated printing, 11X quiet zone is recommended (and shown above) to compensate for bar growth.
- 100% is considered standard and should be used as a minimum when space permits
- For best results printing on corrugated stock, 200%, with a bearer bar is suggested
- For best results printing on white label applied to corrugate, 150% or larger, bearer bar is optional
- ISO/ANSI verification requires a 0.006” (6 mil) aperture (light source)

Appendix B:

TRUNCATION

The geometry of a EAN/UPC bar code symbol facilitates omnidirectional scanning. Any truncation (shortening of the bar height) degrades this scanning ability. The more the bars are shortened, the more precisely the symbol must be presented to the scanner. Truncated symbols require re-scanning more often than do full height symbols. In some countries, a bar code symbol certification process includes a check to validate compliance to GS1 General Specifications, and truncation is an element under which the package may be deemed unacceptable for sale into certain channels.

It is recognized that the size or shape of some packages make it impossible to accommodate a full height bar code symbol. Truncation should be avoided, unless the package is physically not large enough to accommodate a full height symbol. In such cases, the bars should be printed as tall as possible.

Appendix C:

SHIPPING CONTAINERS WHICH ARE ALSO POINT OF SALE PACKAGES

When EAN/UPC symbols are applied to the outside of shipping containers, they must be scannable at both the point-of-sale and within the distribution environment. Compatibility with the distribution environment requires a narrow bar width (x dimension) of at least .0195" (0.495 mm), which equates to a minimum magnification factor of 150%. The quality level in this guideline generally precludes the printing of EAN/UPC symbols directly on natural kraft fiberboard, due to the ANSI/ISO parameter of Symbol Contrast. However, satisfactory quality can normally be achieved by using mottled white or full bleached fiberboard, or printing a white background for the symbol.

Note: Recommendation is to use magnification factor of 200% when flexographically printing directly on
corrugated liner. In addition, the use of bearer bars which completely surround any bar code symbol when direct contact printing is strongly recommended by the Fibre Box Association in the Fibre Box Handbook.

For best results when printing on a white label applied to corrugate, 150% or larger is recommended. Use of a bearer bar is optional

Appendix D:

PACKAGE DESIGN CONSIDERATIONS

The following considerations are meant as an overview of potential areas where communication between structural designer, packaging supplier, and graphics designer is critical in making proper decisions. The referenced documents in Section 1.2 contain more complete information on bar code implementation considerations.

Print process, substrate, and supplier capability all need to be considered when selecting the bar code symbol magnification factor and orientation. In general, packaging supplies printed using a flexographic process need larger print tolerances than other types of printing. In addition, press direction can affect print quality, therefore, bar height normally is to run parallel with press direction.

Package structural design needs to be understood so that die cuts, perforations, or seal areas do not interfere with barcode symbol placement. Bar code symbols printed on transparent materials may have problems due to color of product inside. One method of solving problem of product show-through is to print an opaque white background behind the bar code symbol.

The recommended color of bar code symbols is black against a white background. Blue and green will also work, providing the color provides enough contrast against the background. Avoid red and any color that contains red ink.

Printing an EAN/UPC symbol on natural Kraft or chip substrate usually results in a non-compliant symbol. A solid white background printed under the symbol may be needed to ensure a passing ANSI/ISO grade. (See Appendix C)

Appendix E:

EXAMPLE OF EAN/UPC SYMBOLS COVERED IN THIS DOCUMENT

UPC-A and UPC-E symbols use the same bar code symbology as EAN-13 and EAN-8 with a couple minor differences in appearance. The definitions and examples of each are as follows:

- UPC-A bar code symbols encode 12 digits in the GS1-12 Data Structure, consisting of a company prefix,item reference and check digit. All digits appear as part of the bar code symbol as shown in example below. GS1-12 Data Structures are primarily used in the U.S. and Canada.

- UPC-E bar code symbols represent a GS1-12 Identification Number in eight explicitly encoded digits using zero-suppression techniques. Not all product identification numbers are capable of being displayed ina UPC-E bar code symbol (i.e. only those numbers containing at least 4 zeroes in a specific sequence). Only eight digits appear within the UPC-E bar code symbol, although the scanning software will "explode" the numbers back into a GS1-12 Data Structure.

- EAN-13 bar code symbols encode 13 digits in an GS1-13 Data Structure, which all appear in human readable format within the bar code symbol (see examples below). The GS1-13 Data Structure consists of a company prefix, item reference

and check digit and are primarily assigned within countries other than the U.S. and Canada.

- EAN-8 bar code symbols encode 8 digits in the GS1-8 Data Structure, which are reserved for use on small packages. This data structure is composed of an assigned seven digit number, from the GS1 governing country, and a check digit. The GS1-8 Data Structure is a "stand alone" number, that is, it does not relate back to a GS1-13 Number.

A GS1-12 Number must not be printed in a GS1-13 symbol format.

Here are samples of all 4 bar code symbols covered by this document:

Note: When printing a GS1-13 or GS1-8 bar code symbol, a useful device (although optional) to help maintain the margins (called Quiet Zone) in some production processes is to include a less than (<) and/or greater than (>) character in the Human Readable Interpretation field, with its apex aligned with the edge of a Quiet Zone.

END DOCUMENT