



10.1 Introduction

Consistency of symbol placement is critical to successful scanning. With manual scanning variation of symbol placement makes it difficult for the scanning operator to predict where the symbol is located, and this reduces efficiency. With automated scanning the symbol must be positioned so that it will pass through the field of vision of a fixed scanner as the bar coded item travels past. The recommendations in this section are advisory, not compulsory; but we strongly recommend that you follow them. Respecting the guidance in this section will result in the consistency and predictability required.

This guideline replaces previous recommendations, but it is not intended that manufacturers should immediately replace packaging printed according to previous guidelines. When packaging is redesigned these recommendations should be observed. In the meantime, provided scannability has not been affected, breaking these guidelines should not be taken as a reason for rejection of the trade item.

If government regulatory guidelines are inconsistent with those in this manual, the government guidelines should always take precedence.

Bar codes shown in this chapter are used to show Position Only and are not intended to denote correct symbol type, size, colour, or quality.





10.2 General Placement Principles

The following general principles for bar code placement should be considered for any package type, whether it is scanned as the retail Point-of-Sale (POS) or elsewhere in the supply chain.

10.2.1 Number of Symbols

Bar code representing different Global Trade Item Numbers (GTINs) must never be visible on any one item. Although a minimum of one symbol is required, two symbols representing the same GTIN are recommended on trade items for scanning in warehousing or General Distribution Scanning environments. See Chapter 10.5 Location for General Distribution Scanning (Non-Retail Trade Items) on page 253. Two or more symbols representing the same GTIN are recommended on large, heavy, or bulky items for Point-of-Sale (See “Exceptions to the General Placement Guidelines” on page 237) and are permissible on random wraps intended for Point-of-Sale (“Special Packaging Considerations” on page 241)

10.2.2 Scanning Environment

Before considering the package type, determine whether the item will be scanned in a POS or a General Distribution Scanning environment. If the item is scanned at POS only, the guidelines “Location for Retail Point-of-Sale (POS)” on page 235 apply. However, if the item is scanned in both a POS and a General Distribution Scanning environment or in a General Distribution Scanning environment only, “Location for General Distribution Scanning (Non-Retail Trade Items)” on page 253 takes precedence.





10.2.3 Orientation

Bar code orientation is determined primarily by the print process and any curvature of the item. If the printing process and curvature allow, the preferred placement is picket fence orientation rather than ladder orientation; that is, the bars of the bar code should be perpendicular to the surface on which the package stands in its normal display position. On a picket fence orientation bar code, the human readable characters beneath the symbol should read from left to right. The text and orientation of the ladder orientation bar code can be read either from the top down, or from the bottom up, whichever is consistent with other text and graphics on the item. Rules for positioning bar codes on curved surfaces are given on page 232.

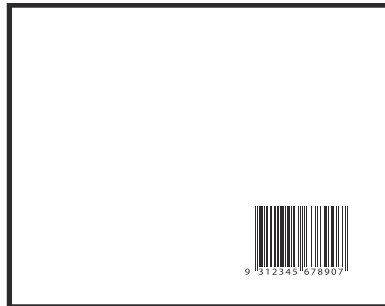


Figure 43 Picket Fence Orientation

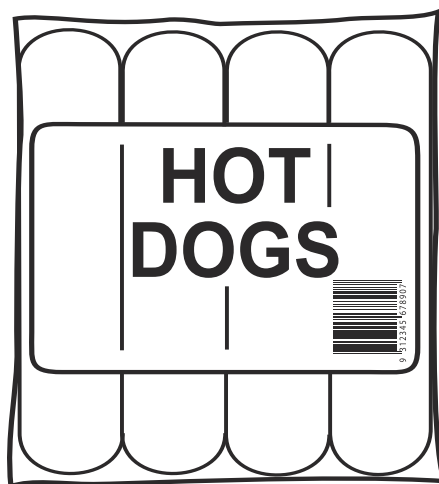


Figure 44 Ladder Orientation





10.2.4 Printing Direction

Bar code orientation is often determined by the printing process. Some printing processes give much higher quality results if the bars of the symbol run in the direction of print, also known as the web direction. The printing company should always be consulted.

10.2.5 Trade Items with Curved Surfaces

When a bar code is printed onto a curved surface it is sometimes possible for the extremes of the symbol to disappear around the curve, so that both ends cannot be visible to the scanner at the same time. This is more likely to occur the bigger the symbol and the tighter the curve of the packaging. There are certain combinations of magnification and diameter of curved surface in which the bars must be printed around the curve (e.g. in ladder orientation on a can, in picket fence orientation on a cylindrical packet of biscuits). The effect of this is to ensure that the curve results in an apparent loss of height of the bars rather than the more serious apparent loss of complete bars.

The angle between the tangent to the centre of the curved symbol (a) and the tangent to the extremity of the curved symbol (outer edge of the guard bar patterns for symbols in the EAN/UPC Symbology family) (b) must be less than 30°. If this angle is more than 30°, the symbol must be oriented such that the bars are perpendicular to the generating lines of the surface of the item.

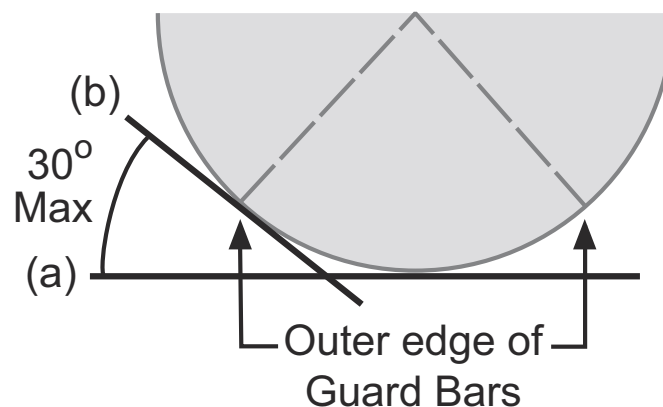


Figure 45 Minimum Angles for a Curved Bar Code



Maximum Symbol Magnification

The table below provides a guide to the relationship between the magnification of the bar code and the diameter of the curve of the trade item, and outlines the maximum allowable magnification factor based on the curve diameter.

Curve Diameter	EAN-13 or UPC-A Bar Code		EAN-8 Bar Code	
	Maximum Magnification	Maximum X-dimension	Maximum Magnification	Maximum X-dimension
30 or below	*	*	*	*
35	*	*	<i>(85%)</i>	<i>(0.28)</i>
40	*	*	<i>(95%)</i>	<i>(0.31)</i>
45	*	*	107%	0.35
50	<i>(83%)</i>	<i>(0.27)</i>	118%	0.39
55	<i>(92%)</i>	<i>(0.30)</i>	130%	0.43
60	100%	0.33	142%	0.47
65	108%	0.36	154%	0.51
70	117%	0.39	166%	0.55
75	125%	0.41	178%	0.59
80	135%	0.45	190%	0.63
85	142%	0.47	200%	0.66
90	150%	0.50	200%	0.66
95	159%	0.52	200%	0.66
100	167%	0.55	200%	0.66
105	175%	0.58	N/A	N/A
110	184%	0.61	N/A	N/A
115	192%	0.63	N/A	N/A
120 or above	200%	0.66	N/A	N/A

* Indicates that the package diameter is too small to permit a picket fence orientation bar code, and that the symbol must be rotated 90 degrees to a ladder orientation.

Italics indicate magnifications that are permissible, but are not recommended on curved surfaces.

All measurements are in millimetres.

TABLE 140 Maximum Allowable Magnification on Curved Items





Minimum Allowable Curve Diameter

The table below provides a guide to the relationship between the magnification of the bar code and the diameter of the curve of the trade item, and outlines the minimum allowable curve diameter based on the magnification of the bar code.

Magnification	X-dimension	EAN-13 or UPC-A Bar Code Minimum Curve Diameter	EAN-8 Bar Code Minimum Curve Diameter
80%	0.26	48	34
90%	0.30	54	38
100%	0.33	60	42
110%	0.36	66	47
120%	0.40	72	51
130%	0.43	78	55
140%	0.46	84	59
150%	0.50	90	64
160%	0.53	96	68
170%	0.56	102	72
180%	0.59	108	76
190%	0.63	114	80
200%	0.66	120	85

All measurements are in millimetres

TABLE 141 Minimum Allowable Curve Diameter for Curved Items

10.2.6 Avoiding Scanning Obstacles

Anything that will obscure or damage a bar code will reduce scanning performance and should be avoided. For example:

- Never position the bar code on the item in an area with inadequate space. Do not let the other graphics encroach on the space for the bar code
- Never place bar codes, including Quiet Zones, on perforations, die-cuts, seams, ridges, edges, tight curves, folds, flaps, overlaps, and rough textures
- Never put staples through a bar code or its Quiet Zones
- Never fold a symbol around a corner
- Never place a bar code under a package flap





10.3 Location for Retail Point-of-Sale (POS)

10.3.1 Number of Symbols

At least one bar code is needed on a trade item intended for the Point-of-Sale. Exceptions include large, heavy or bulky items (see “Large, heavy, or bulky items.” on page 239) and random or unregistered wrapping (see “Random (Unregistered) Wrap” on page 242) where two or more symbols with the same GTIN may be required.

Trade items should never have two or more bar codes encoding different GTINs. At the Point-of-Sale this is particularly relevant with multipacks such as over-wrapped items, sleeved items, and banded items, where the individual inner units carry a different GTIN from that on the outer wrapper or container. The bar codes on the inner products must be totally obscured so that they cannot be read by POS systems. For more information refer to “Overwrap” on page 241

10.3.2 Identifying the Back of the Trade Item

The front of the trade item is the primary trading/advertising area, which typically displays the product name and the company’s logo. The back of the trade item is directly opposite the front and is the preferred placement area for the bar code on most trade items.

Where an item is deemed to have two fronts, one in each orientation, the “portrait” face takes priority as the front.

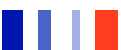
10.3.3 Symbol Placement

The preferred bar code placement is on the lower right quadrant of the back, respecting the proper Quiet Zones around the bar code and the edge rule. See also “Special Packaging Considerations” on page 241.

To avoid scanning difficulties make sure the distance between the bar code area and the scanner surface does not exceed 12 mm.

The undesirable alternative placement for a bar code is the lower right quadrant of another side of the container. Positioning the bar code on the base of a trade item continues to be acceptable, except for large, heavy or bulky trade items, however it is not preferred.

Whenever possible, do not place the bar code on the lid or neck of a trade item. This helps ensure that contents do not spill or leak when the trade item is passed over the scanner.



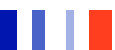


10.3.4 Edge Rule

When possible, the bar code must not be closer than 8mm or further than 100mm from the nearest edge of the item. Previous guidelines suggested a distance of 5mm as a minimum; however practical experience has shown this to be inadequate. For example, cashiers often grab the edges of bags and other trade items with their thumbs. Avoid placing the bar code too close to the edge. Such placement reduces efficiency at the Point-of-Sale.

10.3.5 Avoid Truncated Symbols

Truncation of a bar code is the reduction of the height of a symbol relative to its length/width. Truncation is not recommended because it destroys the ability of a symbol to be scanned omnidirectionally at the POS. A truncated symbol can only be scanned when the trade item is orientated in particular directions across the scanning beam. Truncation, therefore, reduces checkout efficiency. The more the height of the symbol is reduced, the more critical becomes the alignment of the symbol across the scanning beam. Truncation should be avoided unless absolutely necessary, for example, when printing on a tightly curved surface, and then the maximum height possible should be printed (see "Minimum Allowable Curve Diameter" on page 234).





10.3.6 Exceptions to the General Placement Guidelines

Some trade items require special considerations for bar code placement.

Bags

Settling of the contents usually results in bag edges bulging to the extent that bar codes located on the lower right quadrant may not be flat enough to permit successful scanning. For this reason, bar codes on bags should be placed in the centre of the back, about one third up from the bottom and as far from the edge as possible while respecting the edge rule.

Bags are often called sacks or pouches. This category includes paper or plastic containers that are:

- Fold-sealed on both ends (i.e. flour and sugar)
- Fold-sealed on one end and pinched sealed at the other end (i.e. potato chips)
- Pinch-sealed at both ends (i.e. cough drops)
- Fold-sealed on one end and gathered at the other end (i.e. bread)

Note: Some bags are sealed at both ends and carded for display, such as bags of sweets. These types of trade items are not considered a bag package type.

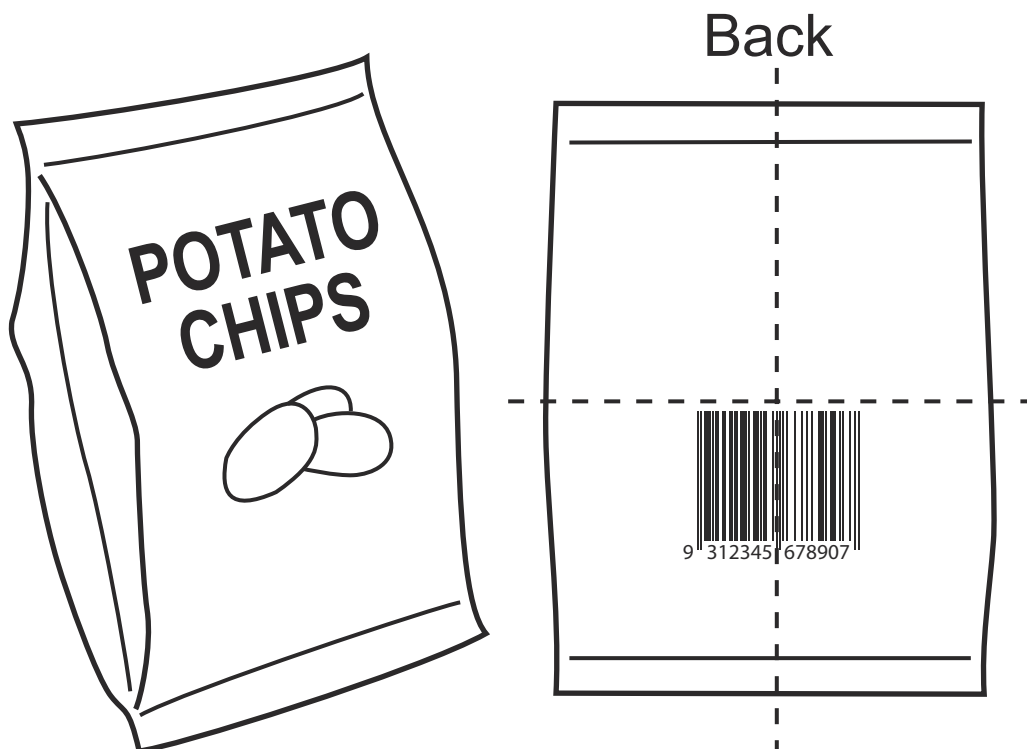


Figure 46 Symbol Placement on Bags



Blister packs or unpackaged items.

Trade items that cause scanners to read beyond the flat plane include blister packs and unpackaged items (e.g. Deep bowls). For these package types, the distance between the scanner window and the bar code on the item must be considered. The bar code cannot be closer than 8 millimetres or farther than 100 millimetres from any edge of the package/container.

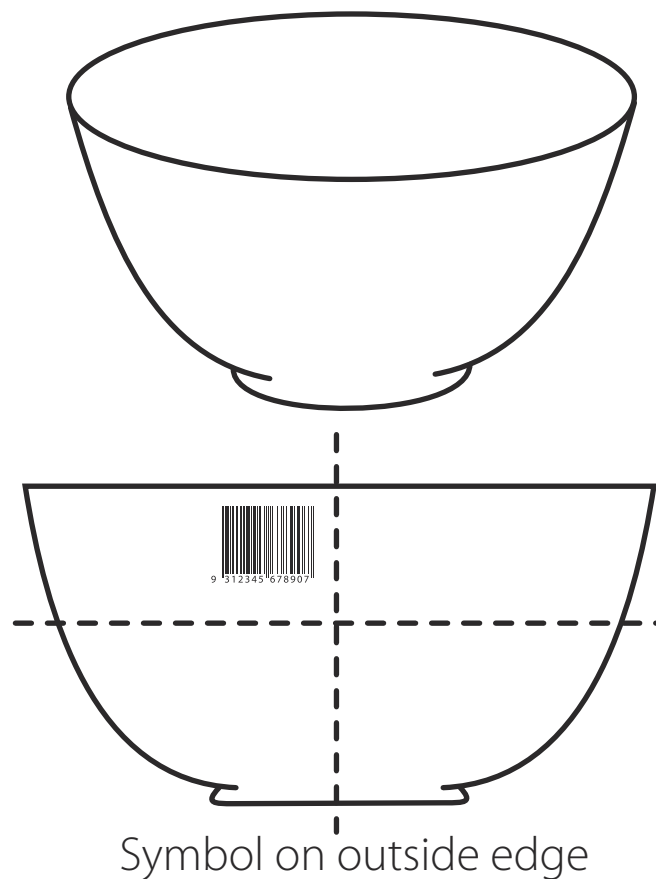


Figure 47 Symbol Placement on an Unpackaged Bowl



Large, heavy, or bulky items.

Any item weighing more than 13kg or having two dimensions greater than 450mm (width/height, width/depth, or height/depth) is considered a large, heavy, or bulky item. Large, heavy, or bulky items tend to be hard to handle. Large, heavy, or bulky items may require two or more symbols with the same Global Trade Item Number (GTIN) ideally one on top and one on the bottom of the opposite quadrant.

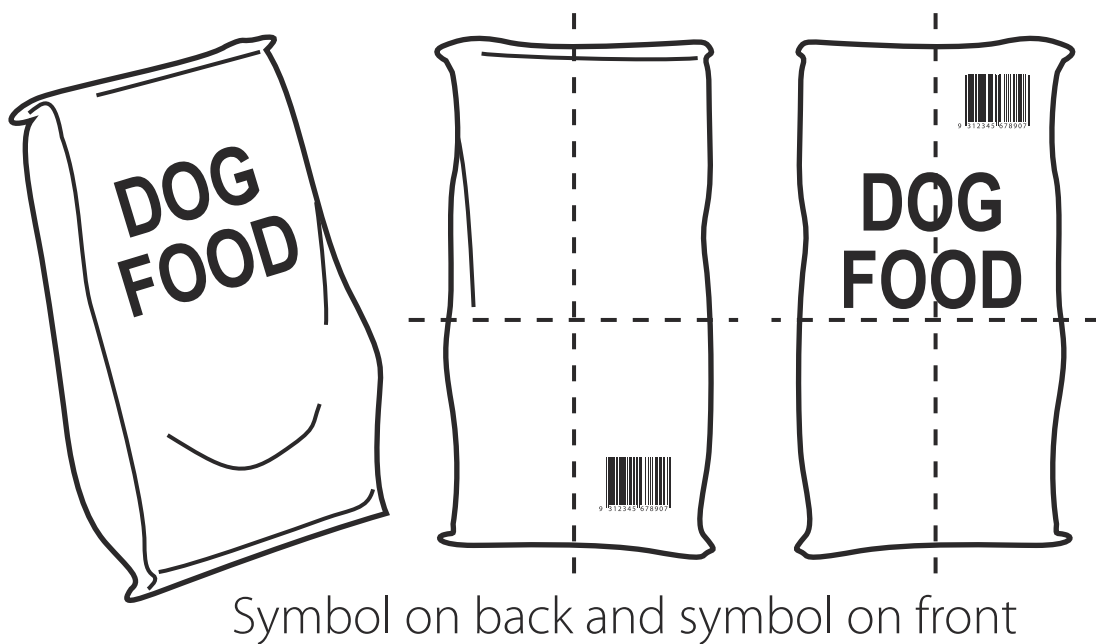


Figure 48 Symbol Placement on Large, Heavy or Bulky Items



Thin items or containers.

Thin items or containers are items with a dimension less than 25mm (height, width, or depth). Examples of thin items or containers are packages of pizza, powdered drink mixes, and writing pads. Any placement of the symbol on the edge hinders effective scanning because the symbol is obscured from the cashier and is likely to be truncated. The preferred location is on the lower right quadrant of the back, near the edge, respecting the proper Quiet Zones.

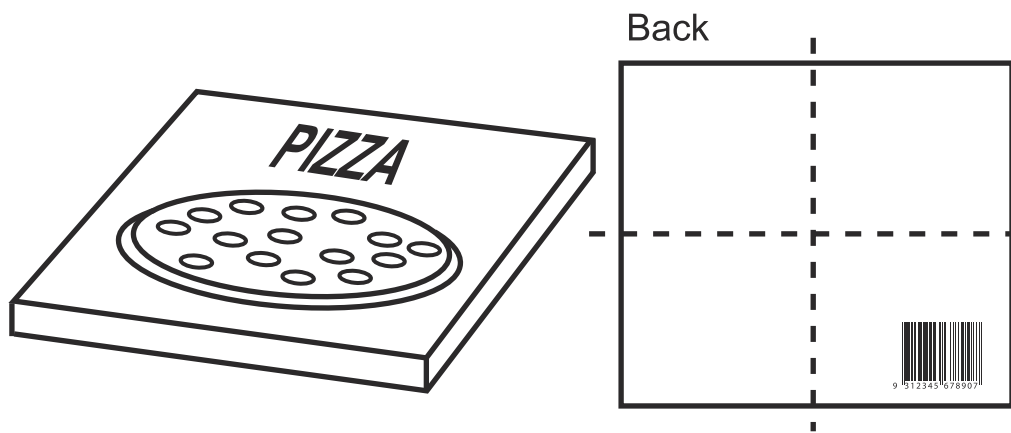


Figure 49 Symbol Placement on Thin Items or Containers





10.3.7 Special Packaging Considerations

Specific packaging methods require special considerations for bar code placement.

Overwrap

Trade items to be sold in multiples are mechanically gathered and covered with clear over-wrap material that will carry print. Typical over-wrapped items are small cereal boxes and chocolate bars. Package over-wrap can create two distinct problems:

- Obscuring the bar codes on individual units inside the multipack is necessary so they are not confused with the outer multipack bar code, which must be different.
- Over-wrapping with such materials as cellophane causes diffraction or reflection of the light beam of the scanner and can reduce contrast, which causes scanning inefficiencies.

To determine proper bar code placement for over-wrapped packaging, follow the guidelines specific to the applicable package type/shape as described in Section 10.4 Location Guidelines for Specific Packaging Types on page 245.

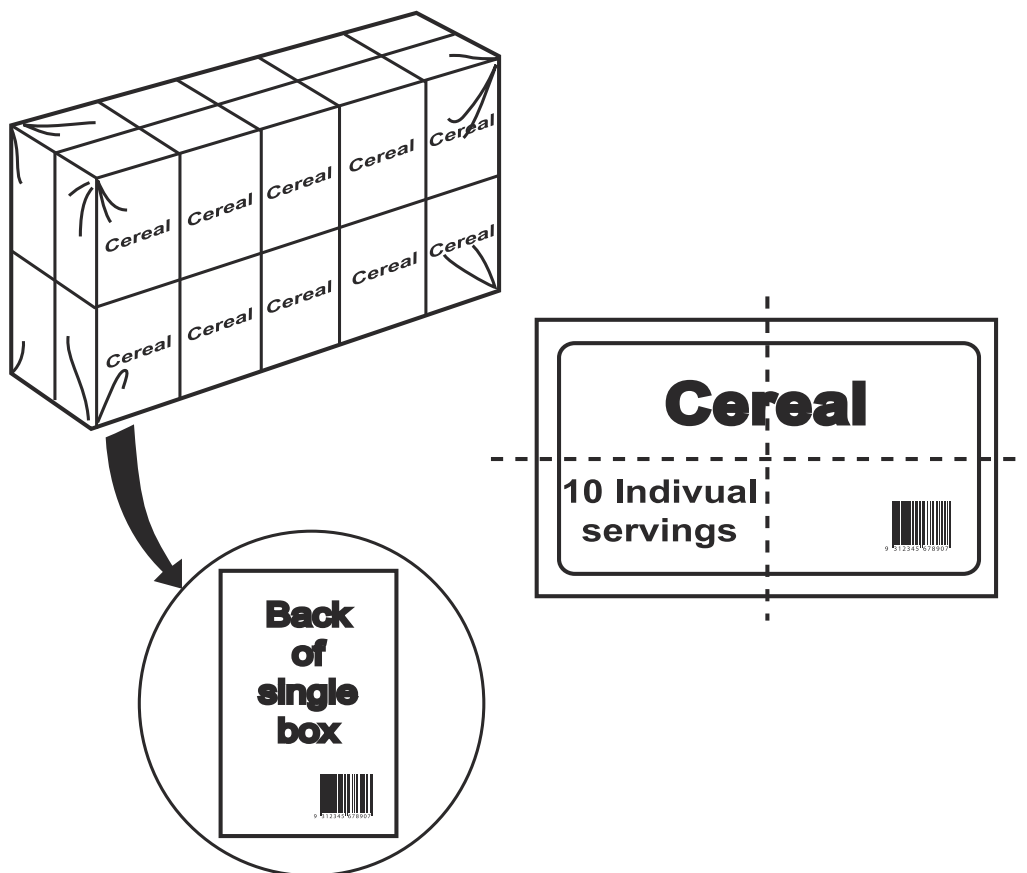


Figure 50 Symbol Placement on Over-Wrapped Items





Random (Unregistered) Wrap

Some wrappers, like those used on sandpaper, have a repeating design and are neither cut nor placed on the product such that a particular part of the design always appears in the same location. This is referred to as random or unregistered wrapping. As the wrapper is not registered, it is unlikely that the bar code will appear on one face of the package when the wrapper is placed on the product.

Experience has shown that the presence of more than one bar code on a package can have a detrimental effect on scanning productivity and, if these repeated symbols are too far apart, can lead to a double read. For this reason, the use of registered packaging is preferred. If random wrap must be used, the minimum requirement is to print the bar code with sufficient frequency that a full symbol will appear on one package face.

Double reads are more likely when the gaps between the bar codes are larger. Repeating symbols should never be more than 150mm apart.

Consideration should also be given to elongating the bars of the bar code to ensure a full bar code on one face, instead of repeating it.



Figure 51 Symbol Placement on a Random-Wrapped Item



Shrink Film.Vacuum-Formed Packages

The bar code on an item packaged in shrink film or that is vacuum-formed should be located on a flat surface and in an area free of creases, wrinkles, or other types of distortions. The figure below shows a bar code placement on hot dogs. Since the curvature of the hot dogs was greater than the diameter shown within the figures in Figure 44 on page 231 a ladder orientation bar code was selected.

To determine proper bar code placement for shrink film/vacuum-formed packaging, follow the guidelines specific to the applicable package type/shape.

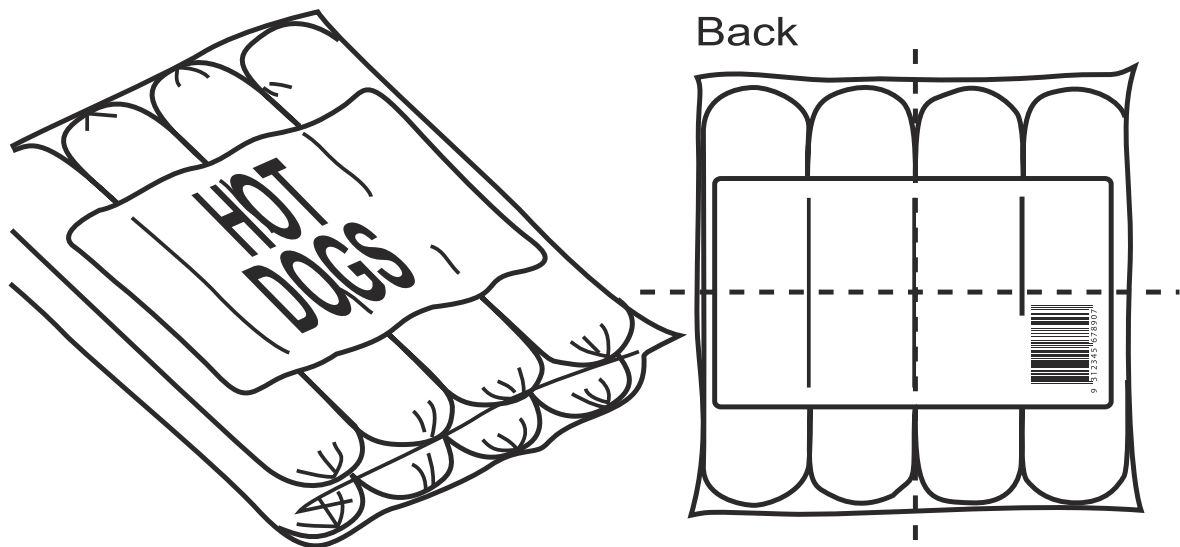


Figure 52 Symbol Placement on Shrink Film/Vacuum-Formed Items





Spot Labels

Bar codes printed on spot labels that are applied to the trade item are acceptable alternatives that incorporate symbols into existing packaging graphics or for use on items without packages, such as some pots, pans, tableware, and glassware. The most suitable type of spot labels are those that cannot be removed from the item without destroying the symbol. Labels that are applied directly to the product should use an adhesive that is strong enough to adhere to the label for an extended shelf life, but which also allows the label to be removed without the use of solvents or abrasives.

To determine proper bar code placement on items bearing spot labels, follow the guidelines specific to the applicable package type/shape.

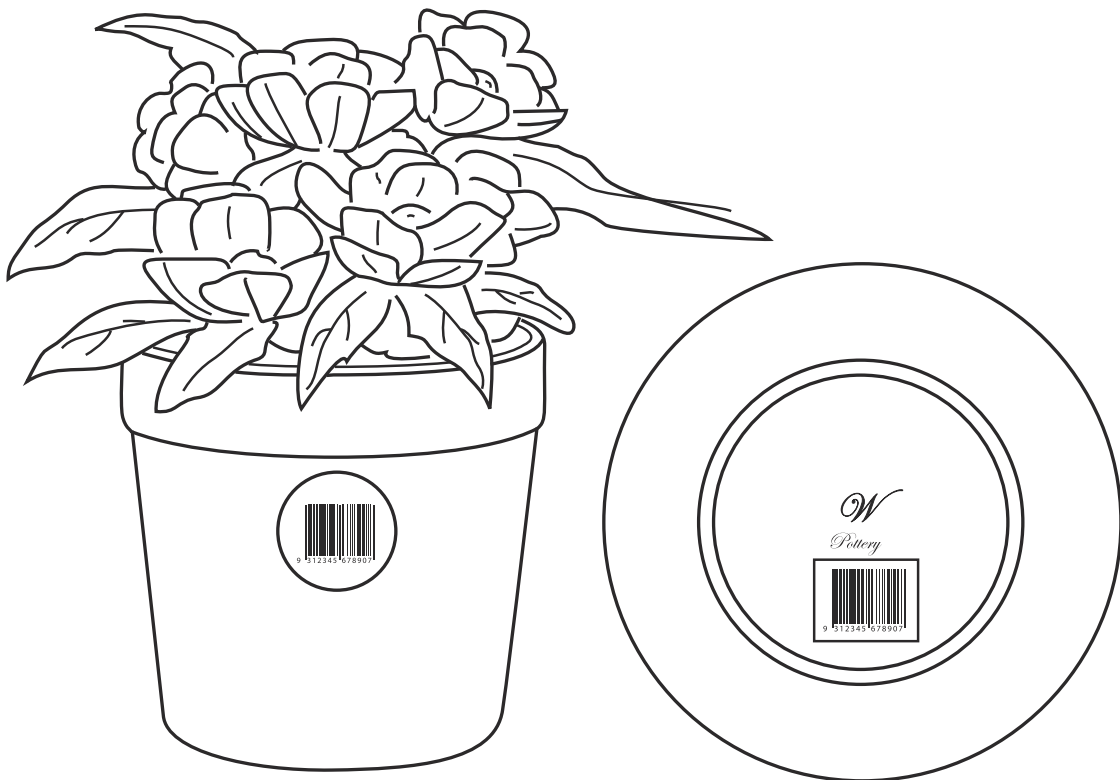


Figure 53 Symbol Placement with a Spot Label





10.4 Location Guidelines for Specific Packaging Types

10.4.1 Egg Cartons

Moulded pulp, foam, or plastic egg cartons come in sizes according to the count of the eggs contained.

The preferred location is near the edge, on the right half of the back, above the hinge on the lid, respecting the proper Quiet Zones and the edge rule.

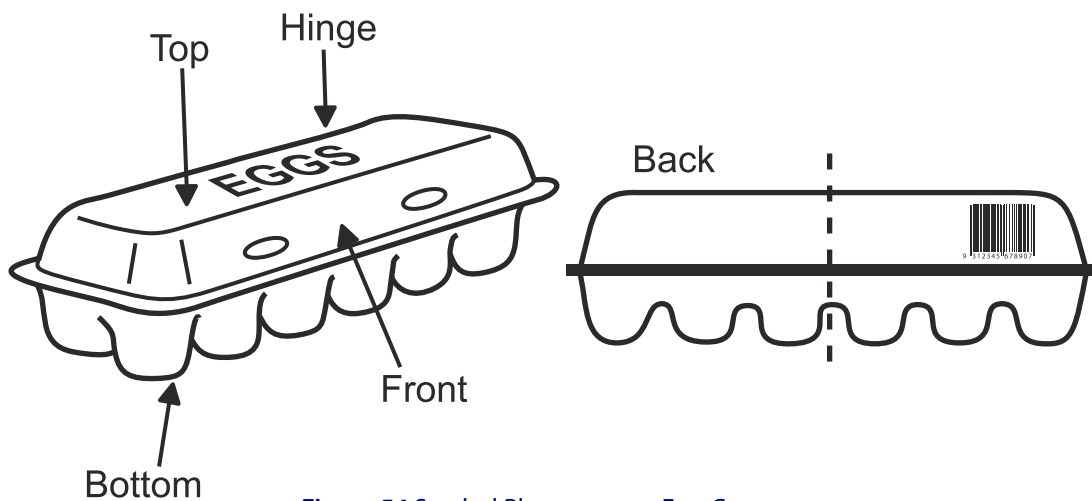


Figure 54 Symbol Placement on Egg Cartons



10.4.2 Tubes

Tubes are cylindrical shaped trade items or containers that are either sealed at both ends, such as sausage or refrigerated dough; or that are sealed at one end and have a cap or valve on the other end, such as toothpaste.

The preferred location is on the lower right quadrant of the back, near the edge, respecting the proper Quiet Zones and the edge rule.

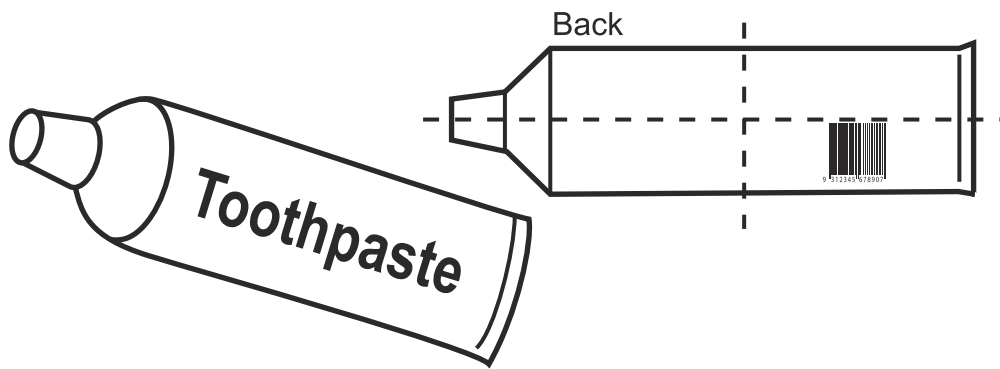


Figure 55 Symbol Placement on Tubes





10.4.3 Multipacks

Single trade items are sometimes packaged together as one unit or trade item. This is referred to as a multipack. Multipacks provide convenience to the consumer, and/or may represent a price reduction compared to purchasing trade items individually. Typical multipacks contain bottles, cans, jars and tubs.

As a general rule, a bar code should be placed on every consumer package traded through the supply chain. Consequently, trade items sold in multipacks as well as those sold individually must carry a unique bar code for each consumer package variation or aggregation. To avoid confusion at the POS, the multipack bar code should be the only visible symbol when both the multipack and individual trade items are bar coded. The binder of the multipack acts as a screen to obscure the bar codes on the individual trade items.

The preferred location is on the lower right quadrant of the back, near the edge, respecting the proper Quiet Zones and the edge rule.

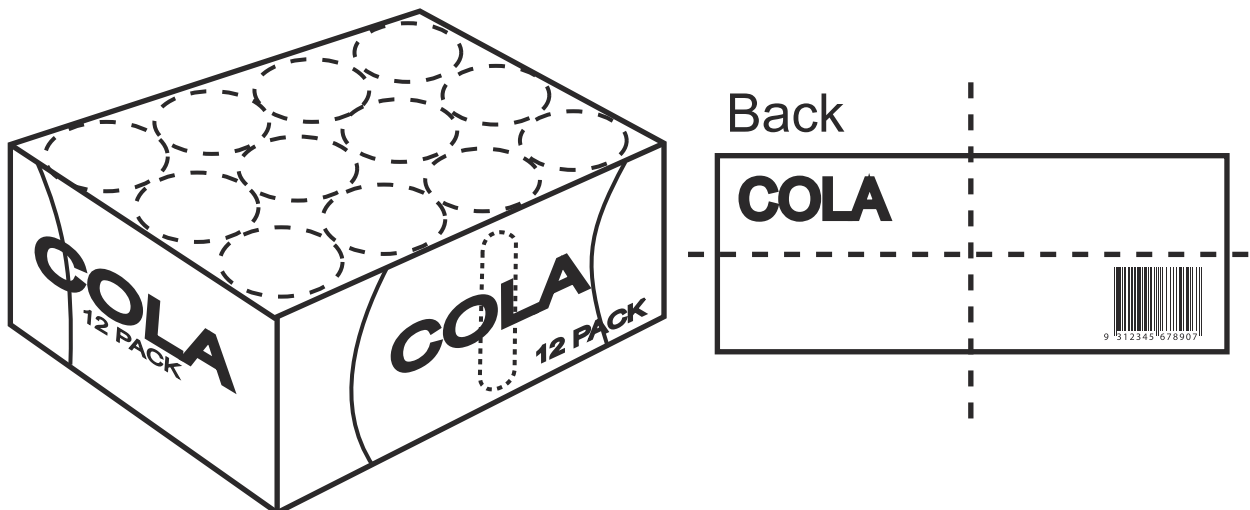


Figure 56 Symbol Placement on Multipacks



10.4.4 Books

The preferred location for the bar code on a book is on the lower right quadrant of the back, near the spine, respecting the proper Quiet Zones and the edge rule. If an Add-On Symbol is used it should be placed just to the right of the main bar code so that there is a consistent horizontal location and Quiet Zones are maintained for both symbols.

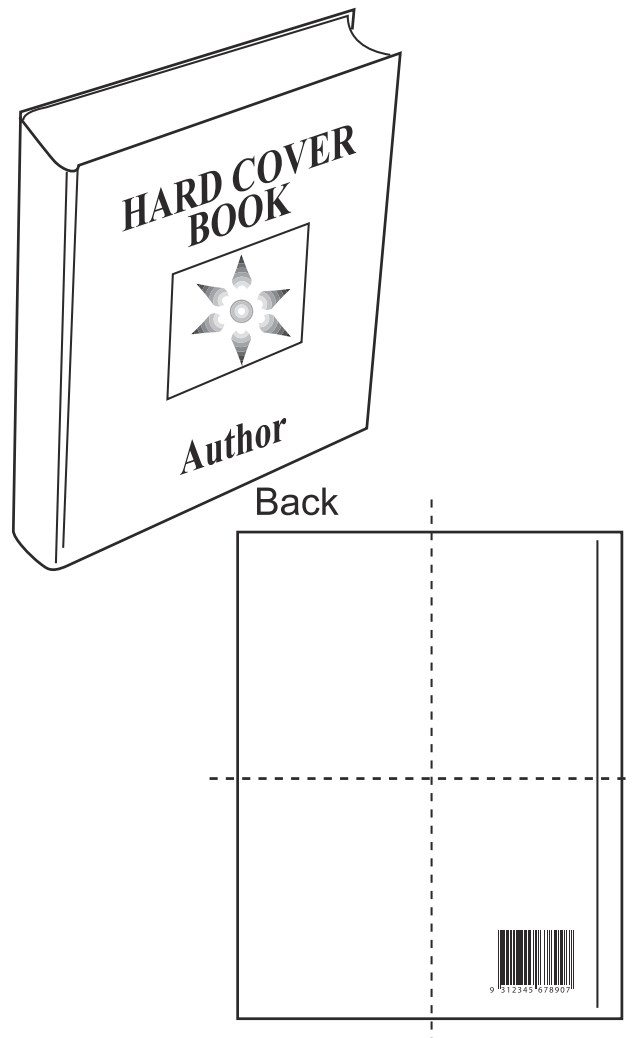


Figure 57 Symbol Placement on Books





10.4.5 Magazines

The preferred location for the bar code on a magazine is on the lower left quadrant of the front, near the edge, respecting the Quiet Zones and the edge rule.

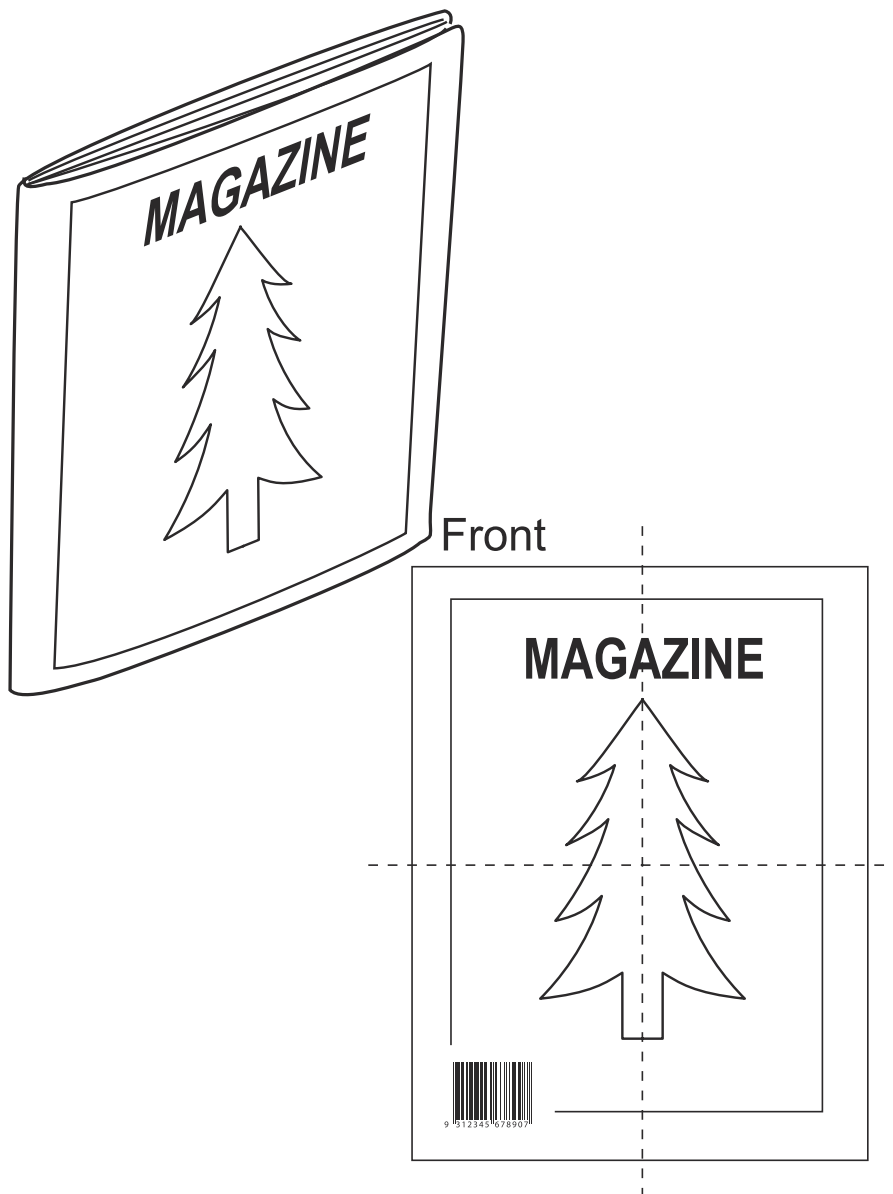


Figure 58 Symbol Placement on Magazines





10.4.6 Newspapers

The preferred location when displayed for sale folded is on the lower left quadrant of the front, near the edge, respecting the proper Quiet Zones and the edge rule.

If an Add-On Symbol is used it should be placed just to the right of the main bar code, so that there is a consistent horizontal location and Quiet Zones are maintained for both symbols.

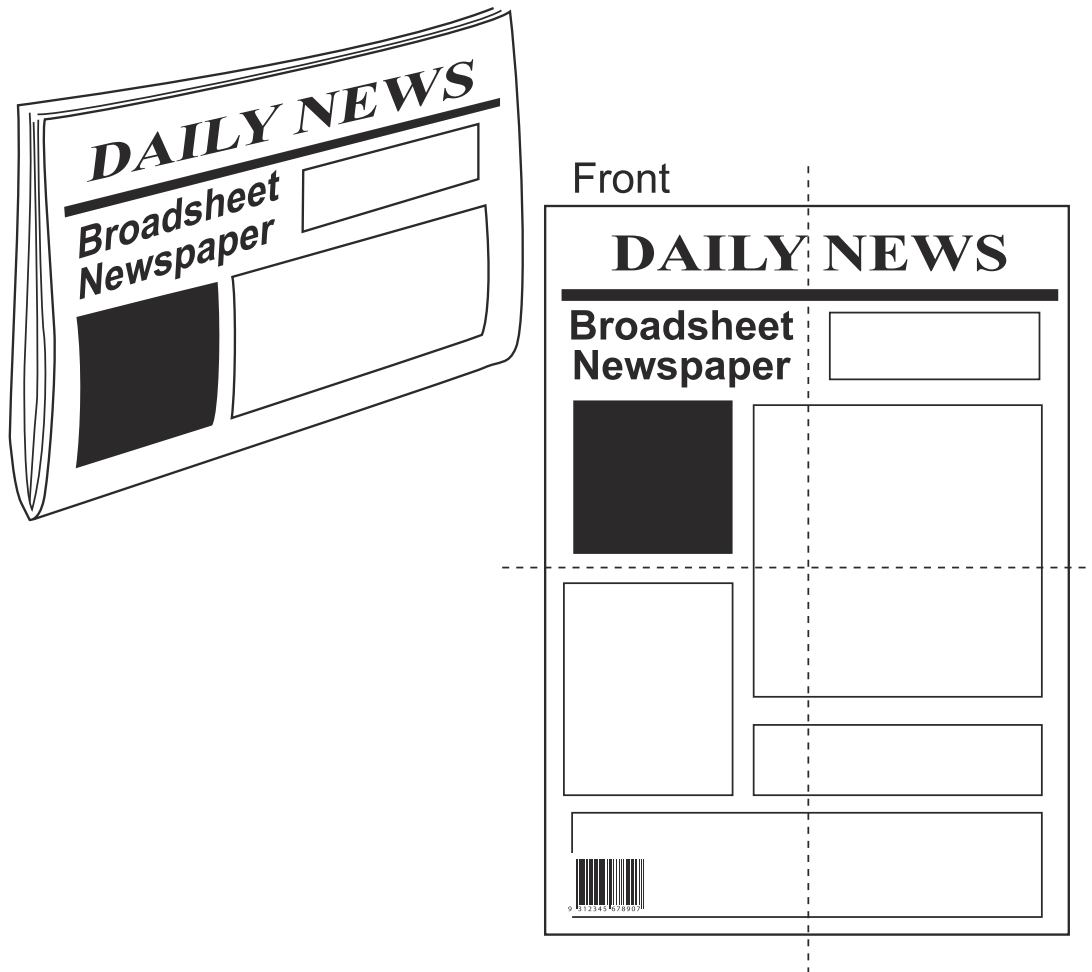


Figure 59 Symbol Placement on Newspapers Displayed for Sale Folded



The preferred location when displayed for sale as open/flat is on the lower right quadrant of the back, near the edge, respecting the proper Quiet Zones and the edge rule.

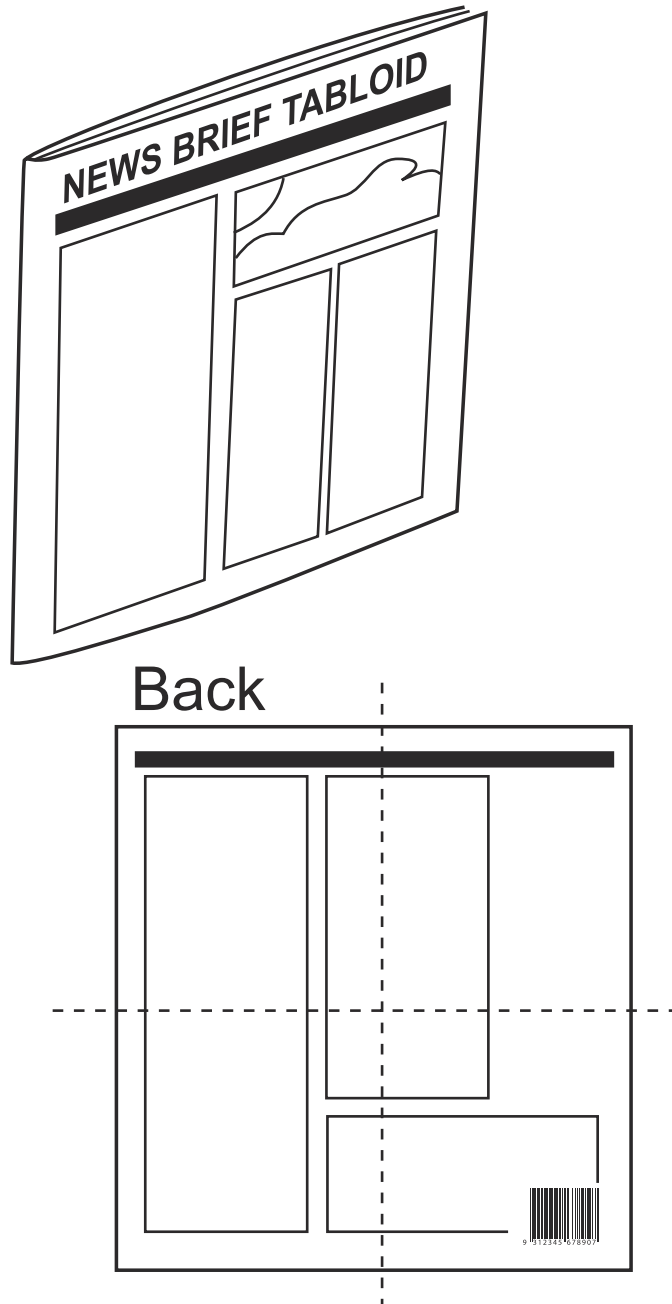


Figure 60 Symbol Placement on Newspapers Displayed for Sale Open/Flat

If an Add-On Symbol is used it should be placed just to the right of the main bar code so that there is a consistent horizontal location and Quiet Zones are maintained for both symbols



10.4.7 Hi-Cone Packs

Hi-cones are plastic rings used to attach cans together. When using hi-cone packaging, it is not possible to obscure the bar codes on the individual trade items. Each can in the pack should carry an individual bar code. Do not attempt to bar code the multipack separately.

10.4.8 Horticultural Items

Firmly attach the label to the trade item, for example, using a lock-in rigid label. This is also preferable for security reasons.

Lock-in rigid labels. Suitable positions for the bar code (in order of preference) are on the:

- Lower part of the front of the label
- Upper part of the back of the label

Pre-printed self-adhesive labels for punnets. The preferred location for the bar code is as high as possible on one of the narrow sides of the punnet. For all other trade items, the preferred location for the bar code is towards the lower part of the pot, avoiding any areas of excessive moisture.

Pre-printed pots or punnets. The preferred location is on the lower part of the punnet.

Trays for carrying punnets or tubs are a separate retail trade item. They must carry a separate bar code.

Pictorial tie-on labels. Suitable positions for the bar code (in order of preference) are on the:

- Removable perforated section
- Area left clear on the label for the addition of a bar code

10.4.9 Other Retail Trade Items

For Regulated Healthcare Trade Items See "Bar Code Location" on page 87.

For more information on location of specific packaging types for items not mentioned in this section, such as apparel, please contact GS1 Australia.





10.5 Location for General Distribution Scanning (Non-Retail Trade Items)

10.5.1 Introduction

Items for General Distribution Scanning include any items handled as a single unit in the transport and distribution process. This definition covers a wide variety of package types, such as pallets, cartons, cases, and bins. These items can be trade items and/or logistic units.

10.5.2 General Rule

The bar codes on units intended for a General Distribution Scanning environment should be upright (i.e. in picket fence orientation) and placed on the sides of the unit. Each item shall have at least one bar code, and two are highly recommended. The bar codes should be kept away from any vertical edges so that they are less likely to be accidentally damaged in transit.





10.5.3 Cartons and Outer Cases

Whilst the absolute minimum requirement for non-retail trade items is one bar code, for efficiency of scanning it is highly recommended that a minimum of two symbols be printed/applied to the sides of the carton.

Ensure that:

- The lower edge of the vertical bars (not the bottom of the surrounding horizontal bearer bar of an ITF-14 Bar Code) are exactly 32mm from the lower edge of the base of the carton
- No part of the bar code (including the Bearer Bars on an ITF-14 Bar Code, and Quiet Zones) is closer than 19mm to any vertical edge.

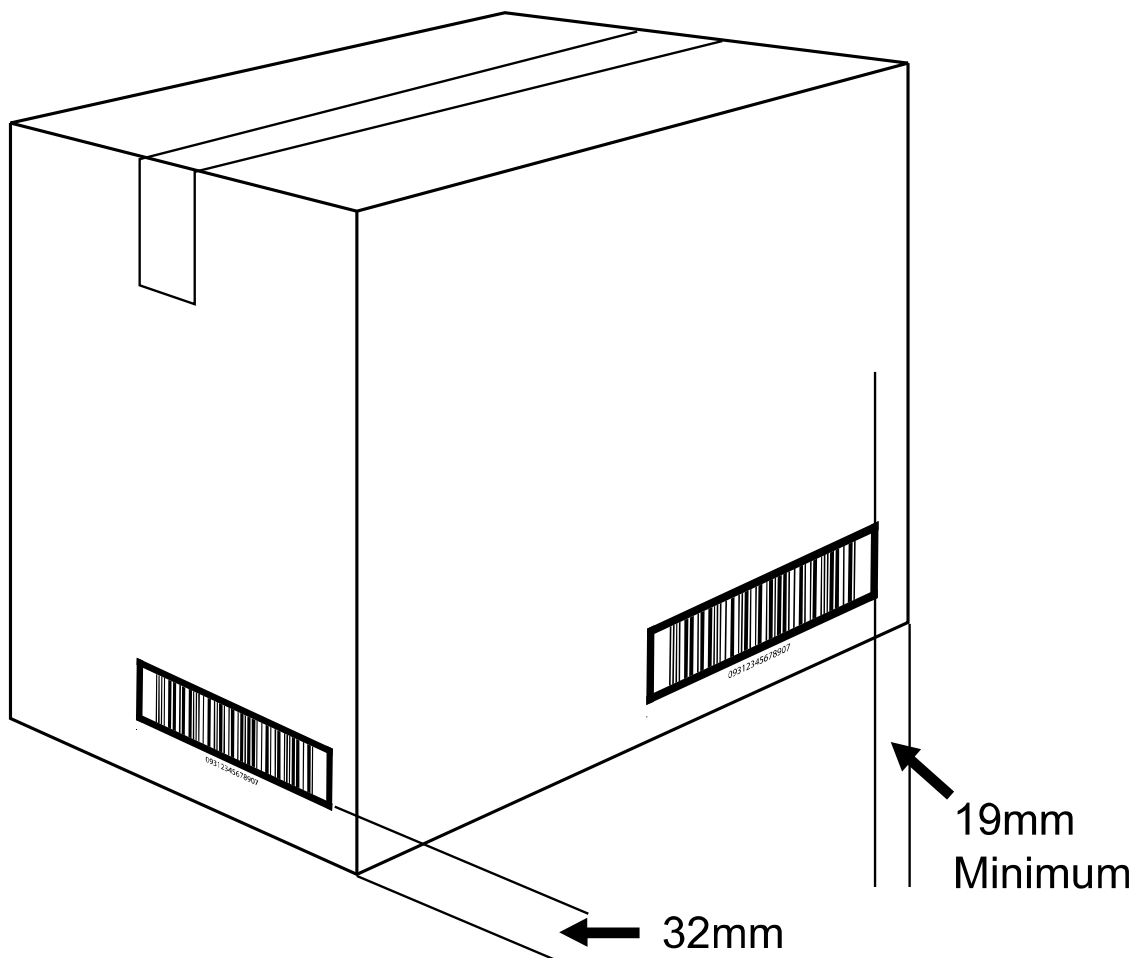


Figure 61 Symbol Placement on Cartons and Outer Cases





10.5.4 Shallow Trays

If the height of the non-retail unit is less than 50mm, making it impossible to print a full height bar code with the Human Readable Interpretation below the bars or if the construction of the unit is such that the full height bar code cannot be accommodated, the following options should be considered (in order of preference):

- Place the Human Readable Interpretation to the left of the bar code, outside the Quiet Zones
- When the height of the unit is less than 32mm, the bar code may be placed on the top of the package, with the bars perpendicular to the shortest side, no closer than 19mm from any edge

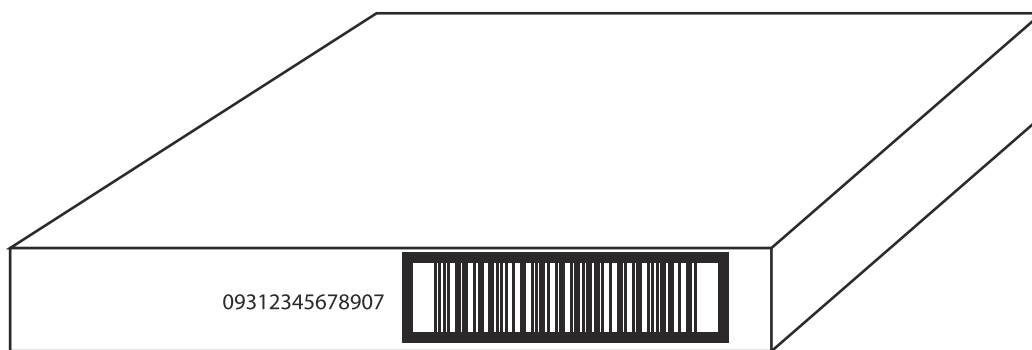


Figure 62 Symbol Placement on Shallow Trays

10.5.5 Film-Wrapped Items

If individual trade items in a film-wrapped (shrink-wrapped or stretch-wrapped) package all have bar codes, and the film-wrapped package also has a bar code, the danger exists of a scanner reading the symbols on the trade items within the non-retail package.

Make every possible effort to obscure the bar codes on the trade items inside the film-wrapped package. Place the retail trade item symbols close to the base of the item, in ladder orientation. This allows tray sides to obscure whole bar codes, not just reduce the height of (truncate) them.

If possible, place all retail trade items in the film-wrapped non-retail package with the bar code facing inwards. You can also use film-wrap that has obscuring patterns on it that hide the symbols on the inside of the wrapper.





10.5.6 Attribute Data (Add-On Symbols)

The preferred location for attribute data is aligned with and to the right or left of the main bar code so that a consistent horizontal location is maintained. It should be as close as possible to the main bar code whilst respecting the Quiet Zones and ensuring that it does not obscure the pre-existing bar code. If data can be concatenated and one bar code produced, this option should be pursued.

Bar codes containing data essential for complete item identification (trade measurements for example) should be aligned with and to the right of the bar code containing the GTIN (the main symbol).

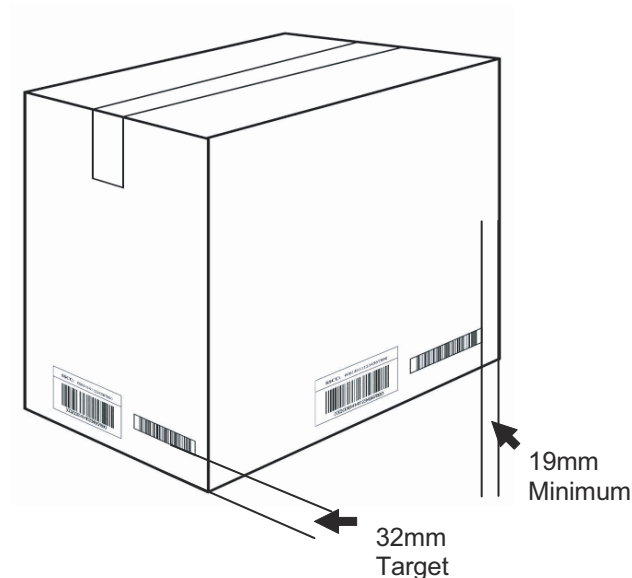


Figure 63 Add-on Symbol Location

10.5.7 Pallets

For all types of pallets, including full pallets containing individual trade items and single trade items, (such as a fridge or washing machine), bar codes should be placed at a height between 400mm and 800mm from the base of the unit. Including Quiet Zones, the bar codes should be no closer than 50mm from any vertical edge to avoid damage.

For pallets less than 400mm high, the bar codes should be placed as high as possible while protecting the logistics label.

For more information on numbering and bar coding pallets refer to Chapter 3 Logistic Units on page 65.