Food Packaging Design Accessibility Guidelines

Compliments of:

NSW GOVERNMENT HealthShare

Developed by:

Arthritis AUSTRALIA

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Food Packaging Design Accessibility Guidelines
Background

The *Food Packaging Design Accessibility Guidelines* were originally developed by Arthritis Australia and Georgia Tech Research Institute's *Principal Research Scientist* Dr Brad Fain for HealthShare NSW. The guidelines were part of a program designed to address issues patients had with opening portion controlled food packaging, which impacted their independence and nutrition. The guidelines were a world first and are now used to assist brand owners and manufacturers to develop packaging that is easy to understand, read and open by consumers. This is achieved by assisting the packaging industry to understand consumer's abilities to complete tasks, such as the amount of force consumers can exert when removing a seal or cap.

About the developers:

Arthritis Australia's *Accessible Design Division*

Arthritis Australia's Accessible Design Division works toward educating and providing decision-making tools to industry and government at a design and procurement level, so that the needs of the broader community are understood. The Division has undertaken work for more than fifty organisations throughout the supply chain and clients include small family owned companies through to large organisations like Nestle, SPC, Kellogg's and HealthShare NSW. The Division works with its research partner Georgia Tech's Principal Research Scientist Dr Brad Fain to undertake this work.

HealthShare NSW

HealthShare NSW is a state-wide organisation established to provide high-quality shared services to support the delivery of patient care within the NSW Health system. Its successful and sustainable business solutions ensure ongoing improvement, increasing levels of efficiency and greater savings for NSW Health. HealthShare NSW's Food and Patient Support Services provides quality meals to patients in NSW public hospitals and provides around 24 million meals each year for patients.

HealthShare NSW were critical in the development of the Guidelines as well as the development of the Packaging Accessibility Rating used to assess how easily consumers can safely open packaging. HealthShare NSW works with the Accessible Design Division to identify packaging that can be easily opened by patients in hospitals and reduce waste from hard-to-open packaging.

Georgia Tech

The guidelines were assembled by Dr. Brad Fain at Georgia Tech located in Atlanta, GA USA. Dr. Fain's research involves the objective evaluation of ease of use in consumer products and packaging solutions. He assists companies worldwide in the design and evaluation of manufactured goods including food packaging. Dr. Fain can be contacted at +1 678 321 6527.

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Design Strategy

Principle

One of the principles of sustainable packaging, "fit-for-purpose" means that the packaging should be designed to meet market and consumer needs, including accessibility. Packaging that is both functional and easy to open is a major consumer concern as well as a health and safety issue. As such, one of the sustainability design strategies that should be employed by designers in their review of new or existing packaging needs to be "design for consumer accessibility". For packaging to be truly accessible, it must be easy to open and have legible labeling without compromising product safety, integrity, or quality. Companies that do not address these factors are likely to suffer commercial consequences.

Steps Involved in Accessible Design

The following steps are involved when designing for consumer accessibility:

1. Identify staff members who are able to review packaging accessibility.
2. Staff members should be able to understand consumer tasks associated with purchasing, opening, using, and disposing of the products. This could involve a human factors or consumer specialist.
3. Document the process and all of the accessibility issues that have been reasonably considered.
4. Address issues in a cost-effective manner. The potential increase in sales due to a more accessible design should be considered in determining cost-effectiveness.
5. Test the results in the Sensory Kitchen.

Key Design Questions

The following questions from the Australian Packaging Covenant should be considered in the review process:

1. Have you considered the demographic of the consumer who will use the product including older adults, children, and consumers with arthritis? Are there limiting factors?
2. What functional abilities (vision, physical dexterity, strength, and range of motion) are required for each of the tasks involved in using the packaging?
3. Can alternative designs be used that minimize or eliminate the need for opening tools such as a knife or scissors?
4. Does the labeling ensure that consumers are aware of how to open the package and the contents? Are directions and warnings legible for intended, unintended, and potential users?
5. Can alternative designs eliminate the need for unusual strength, dexterity, or range of motion in opening?
6. Have you performed accessibility testing to verify the results?
7. To what extent have complaints been received about packaging, and are there systems in place to record the data?

Source: Australian Packaging Covenant (2011). Arthritis Australia contributed to their development.

Packaging Components

There are four common components to food packaging: the container, closure, opening feature, and labeling. The container is whatever holds the contents of the packaging. It may be a tray, cup, bowl, box, bag, bottle, jar, packet, or Tetra Pak. The closure is the component that keeps the contents of the packaging inside the container. Examples of closures include caps, lids, and seals. The opening feature is any design feature that provides a method for users to open or remove the packaging. Not all packaging has an opening feature. Opening features include the serrated edge on bags, perforated strips, tear strips, a notch or start slit, pull tab, push tab, and zipper. The fourth component, labeling, is the information provided on the packaging in the form of text or symbols. Labeling includes the product name, product description, best before date, opening instructions, and warnings.

Summary of Guidelines

Guideline	**Applicable Components**
Guideline 01: Ensure that the product is easy to grip and control. The shape of the product should be easy to hold, so that it fits the hand. There should also be a texture to the surface so that it can be gripped and held onto. For cylindrical products, provide a non-cylindrical grip feature, such as grip indentions, or use a non-cylindrical container.	Container Closure Opening Feature
Guideline 02: Provide a sufficient area for applying force to open or remove packaging. The larger the area available for grasping, the more force can be applied. The force required to open or remove packaging should not exceed 5.0 pounds (22.2 N).	Container Closure Opening Feature
Guideline 03: For products that are intended to be grasped with one hand, require a grip span of no more than 71 mm. If the size of the product exceeds the maximum grip span recommendations, then add design features such as handles or cutouts to facilitate a reduced grip span requirement.	Container Closure Opening Feature
Guideline 04: Reduce the requirement for fine motor control. Offer redundant modes of operation utilizing the next larger set of motor movements (finger to hand, hand to arm). Allow for alternatives to a standard grip. Size the gripping area and clearances to allow alternatives to the standard grip, including knuckles, the side, back and heels of the hand, and two-handed “pinch” grips.	Container Closure Opening Feature
Guideline 05: Do not require the use of tools.	Container Closure Opening Feature
Guideline 06: Avoid sharp edges.	Container Closure Opening Feature

Guideline	Applicable Components
Guideline 07: Minimize the number of actions required to remove packaging.	Container Closure Opening Feature
Guideline 08: Do not require simultaneous actions. For potentially harmful products, use intelligent opening systems such as lining up dots or arrows instead of the typical push down and turn cap.	Container Closure Opening Feature
Guideline 09: If packaging is intended to be torn open, then provide a perforated strip, a notch, a starter slit, or serrated edges. The force required to tear packaging open should not exceed 5.0 pounds (22.2 N).	Opening Feature
Guideline 10: Provide a sufficiently large grasping point on seals and opening features. A tab that is at least 0.47 inches (12 mm) wide by 0.79 inches (20 mm) long is recommended. The tab should be large enough to grip between the thumb and the knuckle.	Closure Opening Feature
Guideline 11: Minimize the force required to remove seals. Either provide a grasping point or use a seal that is easy to puncture without the use of a tool. The force required to remove or puncture the seal should not exceed 5.0 pounds (22.2 N).	Closure Opening Feature
Guideline 12: Provide texture on the grasp point of tabs and tear strips to facilitate grip. The grasp point should be textured with a series of bumps or raised strips that are perpendicular to the peel direction. Users should not have to grasp the tab or tear strip with a pinch force greater than 3.0 pounds (13.3 N).	Closure Opening Feature
Guideline 13: Require no more than 3.3 pounds (14.7 N) to push in a push tab.	Opening Feature
Guideline 14: Minimize the rotational force required to remove a cap from its factory sealed position. Rotational forces greater than 10 lb-in (1.1 N-m) often exceed the functional capabilities of the frail, elderly, and those living with arthritis. Removing a screw top cap should require no more than ¼ turn for each angular movement, and no more than two angular movements should be required.	Closure Opening Feature
Guideline 15: To prevent over tightening of caps, use steep rather than gradual threading.	Closure
Guideline 16: The method for removing packaging should be clearly evident, either because of the design of the packaging or because of instructions printed prominently on the packaging. Opening features, such as pull tabs, should be easily visible.	Container Closure Opening Feature Labeling

Guideline	Applicable Components
Guideline 17: To increase effectiveness and salience, warnings and instructions should be presented as bullets in an outline format. The salience of visual warnings and instructions can be further enhanced using large, bold print, high contrast, color, borders, and pictorial symbols. Warnings and instructions should contain a signal word to attract the attention of the user.	Labeling
Guideline 18: Enhance readability and comprehension of labels, critical instructions, and expiration dates. Print critical text with large print in a sans-serif font with high contrast on a solid background. The recommended minimum type size is 12 point (4.25 mm), especially for warnings, expiry dates and instructions. For small packaging or portion control items with a surface area of less than 100 cm^2, then the minimum type size is 9 point (3.17 mm). Lower case text is easier to read, especially if the text is several lines long, so avoid using text consisting entirely of capital letters. The height of and spacing between letters should not be modified.	Labeling
Guideline 19: Expiry or best before dates should be formatted in a way that the day, month and year are distinct from each other. Use the four digit format for the year and at least three letters for the month (e.g., JAN for January). A label identifying the expiry or best before date should be provided in close proximity to the date. To avoid confusion, the expiry date should be visually distinct from the lot number. Place the label and expiry date on the same line or with white space so that the date is closer to its label than it is to the lot number.	Labeling

Detailed Guidelines

Guidelines associated with the design of food packaging were identified to potentially facilitate self-assessment of some products. The guidelines take into consideration several types of food packaging commonly found in a hospital environment, such as bottles and jars, paper boxes, paper or plastic bags and packets, Tetra Paks, factory sealed trays and cups, and resealable trays and cups. The guidelines come from published articles and research performed by Arthritis Australia and GTRI. For each guideline, the *Sources* of the guideline and the impact that failing to meet the guideline has on the product's Accessibility Benchmarking Score are provided. An example of a product meeting the guideline and an example of a product failing to meet the guideline are also provided for some guidelines.

Guideline 01

Ensure that the product is easy to grip and control. The shape of the product should be easy to hold, so that it fits the hand. There should also be a texture to the surface so that it can be gripped and held onto. For cylindrical products, provide a non-cylindrical grip feature, such as grip indentions, or use a non-cylindrical container.

Sources: Cushman & Rosenberg, 1991; Haigh, 1993; GTRI

Applicable Components: Container, Closure, Opening Feature

Bad Example: A smooth glass bottle can easily slip out of a user's hands, especially if the bottle is large and there are no grip features (Figure 1).

Figure 1: Smooth glass bottle.

***Good Example*: The contoured shape of the bottle makes it easier to grasp and manipulate without dropping the bottle (Figure 2).**

Figure 2: Contoured bottle.

Guideline 02

Provide a sufficient area for applying force to open or remove packaging. The larger the area available for grasping, the more force can be applied. The force required to open or remove packaging should not exceed 5.0 pounds (22.2 N).

Sources: Department of Trade and Industry, UK, 2003; GTRI

Applicable Components: Container, Closure, Opening Feature

Guideline 03

For products that are intended to be grasped with one hand, require a grip span of no more than 71 mm. If the size of the product exceeds the maximum grip span recommendations, then add design features such as handles or cutouts to facilitate a reduced grip span requirement.

Sources: Steinfeld & Mullick, 1990; GTRI

Applicable Components: Container, Closure, Opening Feature

Good Example #1: A container requires a grip span of greater than 71 mm, but two cutouts reduce the required grip span to less than 71 mm (see Figure 3).

Figure 3: Grip cutouts.

Good Example #2: The indentations on the sides of a bottle reduce the required grip span to less than 71 mm (Figure 4).

Figure 4: Grip indentations.

Guideline 04

Reduce the requirement for fine motor control. Offer redundant modes of operation utilizing the next larger set of motor movements (finger to hand, hand to arm). Allow for alternatives to a standard grip. Size the gripping area and clearances to allow alternatives to the standard grip, including knuckles, the side, back and heels of the hand, and two-handed "pinch" grips.

Sources: Pirkl, 1995; Section 508 1194.31(f); Steinfeld & Mullick, 1990

Applicable Components: Container, Closure, Opening Feature

Bad Example: The tab is difficult to grasp because it is flush with the surface of the cap (Figure 5).

Figure 5: Grasping the tab requires fine motor control.

Good Example: The large tab can easily be grasped with the tips of the fingers or the whole hand (Figure 6).

Figure 6: Large tab allows alternative grips.

Guideline 05

Do not require the use of tools.

Source: GTRI

Applicable Components: Container, Closure, Opening Feature

Bad Example: The packaging instructs users to cut the bag open with a pair of scissors instead of providing a tear notch or other opening feature (Figure 7).

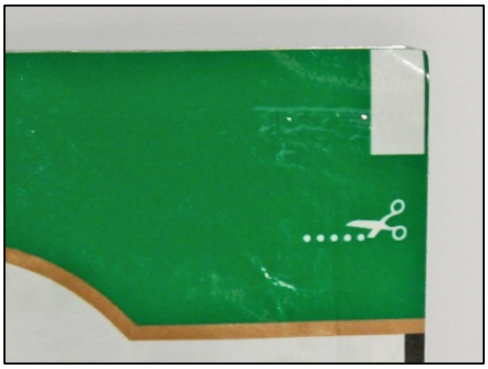

Figure 7: Packaging requires scissors.

Guideline 06

Avoid sharp edges.

Source: GTRI

Applicable Components: Container, Closure, Opening Feature

Bad Example #1: The edges of the cap make it painful to grip the cap with the force necessary to remove the cap (Figure 8).

Figure 8: Cap with sharp edges.

Bad Example #2: The sharp lift tab on the lid may cause pain for some users (Figure 9).

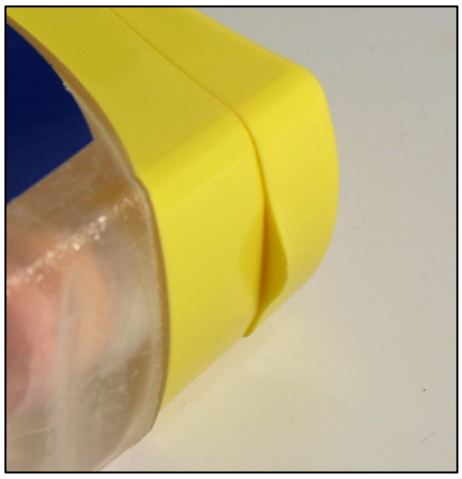

Figure 9: Sharp lift tab.

Guideline 07

Minimize the number of actions required to remove packaging.

Sources: HFDS 2.6.8; Hermansson, 1999; Vanderheiden, 1997

Applicable Components: Container, Closure, Opening Feature

Bad Example: The task list for identifying and accessing the contents of food packaging requires twenty distinct tasks, sixteen of which are critical (Figure 10).

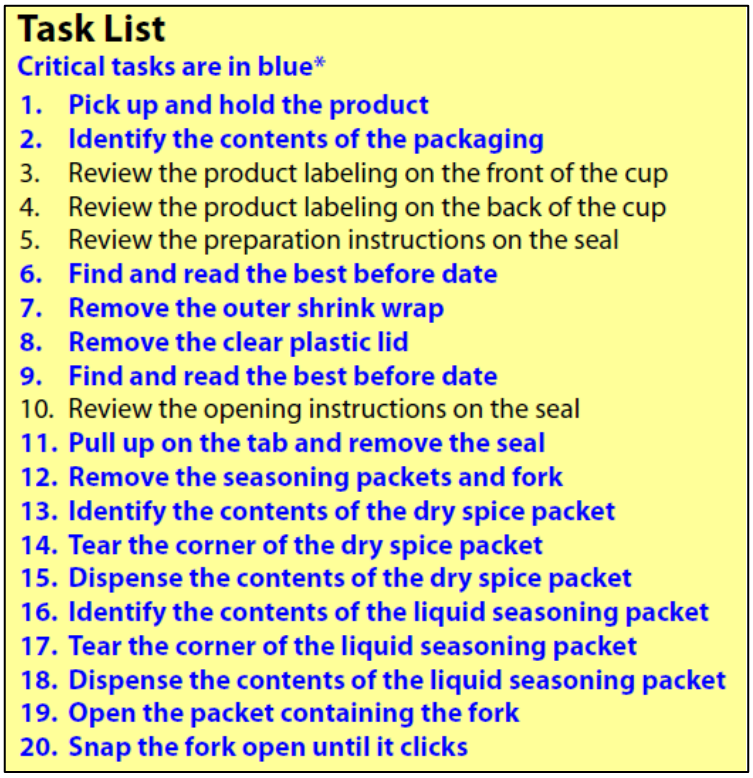

Figure 10: Opening food packaging involves twenty tasks.

Guideline 08

Do not require simultaneous actions. For potentially harmful products, use intelligent opening systems such as lining up dots or arrows instead of the typical push down and turn cap.

Source: GTRI

Applicable Components: Container, Closure, Opening Feature

Bad Example: A cap can only be removed by pushing down on the cap while simultaneously turning it (Figure 11).

Figure 11: Push down and turn cap.

Good Example: A cap can be removed in two separate steps – first by lining the arrows up and then pushing up on the cap (Figure 12).

Figure 12: Line-up and push-off cap.

Guideline 09

If packaging is intended to be torn open, then provide a perforated strip, a notch, a starter slit, or serrated edges. The force required to tear packaging open should not exceed 5.0 pounds (22.2 N).

Source: GTRI

Applicable Components: Opening Feature

Good Example: The serrated edge of the plastic bag reduces the force required to tear the bag open.

Figure 13: A serrated edge.

Guideline 10

Provide a sufficiently large grasping point on seals and opening features. A tab that is at least 0.47 inches (12 mm) wide by 0.79 inches (20 mm) long is recommended. The tab should be large enough to grip between the thumb and the knuckle.

Sources: Department of Trade and Industry, UK, 2003; Pirkl, 1995

Applicable Components: Closure, Opening Feature

Bad Example: The inner seal has three small tabs that are too small for most users to easily grasp (Figure 14).

Figure 14: Small grasping points.

Good Example: The large tab on the seal can be easily grasped between the thumb and a knuckle (Figure 15).

Figure 15: A large grasping point.

Guideline 11

Minimize the force required to remove seals. Either provide a grasping point or use a seal that is easy to puncture without the use of a tool. The force required to remove or puncture the seal should not exceed 5.0 pounds (22.2 N).

Source: GTRI

Applicable Components: Closure, Opening Feature

Bad Example: The seal has no grasping point for removing it, and the material is too thick to be punctured without using a sharp tool (Figure 16).

Figure 16: No grasping points on seal.

Good Example: Users can easily puncture the seal using a fingertip (Figure 17).

Figure 17: Seal can be punctured with a fingertip.

Guideline 12

Provide texture on the grasp point of tabs and tear strips to facilitate grip. The grasp point should be textured with a series of bumps or raised strips that are perpendicular to the peel direction. Users should not have to grasp the tab or tear strip with a pinch force greater than 3.0 pounds (13.3 N).

Source: Department of Trade and Industry, UK, 2003

Applicable Components: Closure, Opening Feature

Bad Example: The tab on the cap has no texture and can easily slip out of a user's fingers (Figure 18).

Figure 18: Tab with no texture.

Good Example: The tab on the seal is textured with a series of bumps to facilitate the user's grip (Figure 19).

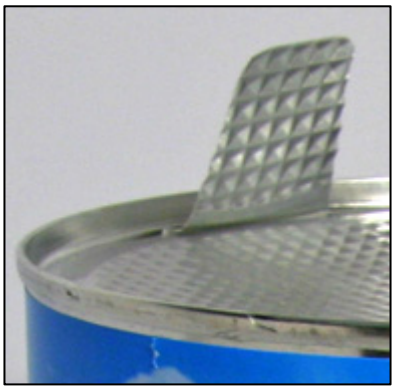

Figure 19: Textured tab.

Guideline 13

Require no more than 3.3 pounds (14.7 N) to push in a push tab.

Source: Berns, 1981

Applicable Components: Opening Feature

Bad Example: The box does not open along the perforations because the perforations around the push tab are not deep enough, so the force required to push the tab in is too high (Figure 20).

Figure 20: High force push tab.

Good Example: A push in tab has two perforated lines to reduce the force required to push it in (Figure 21).

Figure 21: Low force push tab.

Guideline 14

Minimize the rotational force required to remove a cap from its factory sealed position. Rotational forces greater than 10 lb-in (1.1 N-m) often exceed the functional capabilities of the frail, elderly, and those living with arthritis. Removing a screw top cap should require no more than ¼ turn for each angular movement, and no more than two angular movements should be required.

Sources: Berns, 1981; Langley, Janson, Wearn, & Yoxall, 2005; Voorbij & Steenbekkers, 2002; Haigh, 1993

Applicable Components: Closure, Opening Feature

Guideline 15

To prevent over tightening of caps, use steep rather than gradual threading.

Source: GTRI

Applicable Components: Closure

Bad Example: The gradual threading requires the user to twist the cap multiple times and also increases the likelihood that the user will over tighten the cap (Figure 22).

Figure 22: Gradual threading.

Good Example: The shallow threading on the cap and bottle prevent users from over tightening the cap and also require fewer rotations to apply and remove the cap.

Figure 23: Steep threading.

Guideline 16

The method for removing packaging should be clearly evident, either because of the design of the packaging or because of instructions printed prominently on the packaging. Opening features, such as pull tabs, should be easily visible.

Sources: Hermansson, 1999; Vanderheiden, 1997

Applicable Components: Container, Closure, Opening Feature, Labeling

Bad Example: The safety seal on this cap can easily be removed at the perforations, but the perforations are not visible (Figure 24).

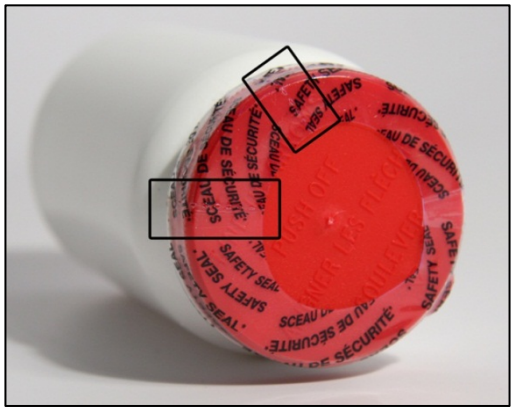

Figure 24: Perforations (outlined in black boxes) in the safety seal are not visible.

Good Example: The instructions for opening the packaging are very visible and easy to notice (Figure 25).

Figure 25: Red tab labeled "Lift Here".

Guideline 17

To increase effectiveness and salience, warnings and instructions should be presented as bullets in an outline format. The salience of visual warnings and instructions can be further enhanced using large, bold print, high contrast, color, borders, and pictorial symbols. Warnings and instructions should contain a signal word to attract the attention of the user.

Sources: Wogalter, Conzola, & Smith-Jackson, 2002; GTRI

Applicable Components: Labeling

Bad Example: The opening instructions are difficult to read due to the poor contrast between the text and the background (Figure 26).

Figure 26: Opening instructions are difficult to see.

Good Example: The instructions for brewing tea are presented as bullets using a high contrast color scheme (Figure 27).

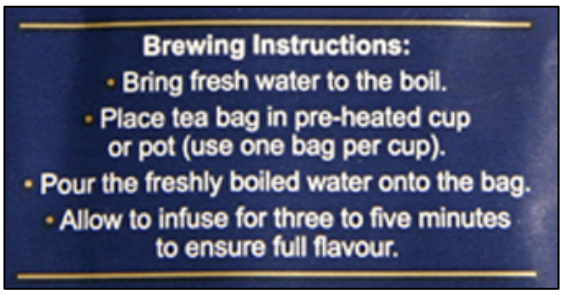

Figure 27: Instructions provided as bullets.

Guideline 18

Enhance readability and comprehension of labels, critical instructions, and expiration dates. Print critical text with large print in a sans-serif font with high contrast on a solid background. The recommended minimum type size is 12 point (4.25 mm), especially for warnings, expiry dates and instructions. For small packaging or portion control items with a surface area of less than 100 cm^2, then the minimum type size is 9 point (3.17 mm). Lower case text is easier to read, especially if the text is several lines long, so avoid using text consisting entirely of capital letters. The height of and spacing between letters should not be modified.

Source: American Printing House for the Blind, Inc; Canadian National Institute for the Blind; GTRI

Applicable Components: Labeling
Bad Example #1: This image illustrates eight characteristics of text that make labeling difficult to read, including the use of decorative font, low contrast, widely spaced text, condensed text, tall character heights, short character heights, all capital letters, and a patterned background (Figure 28).

Figure 28: Examples of bad labeling.

Bad Example #2: The nutrition information, list of ingredients, and food storage information is very difficult to read due to the small font size (Figure 29).

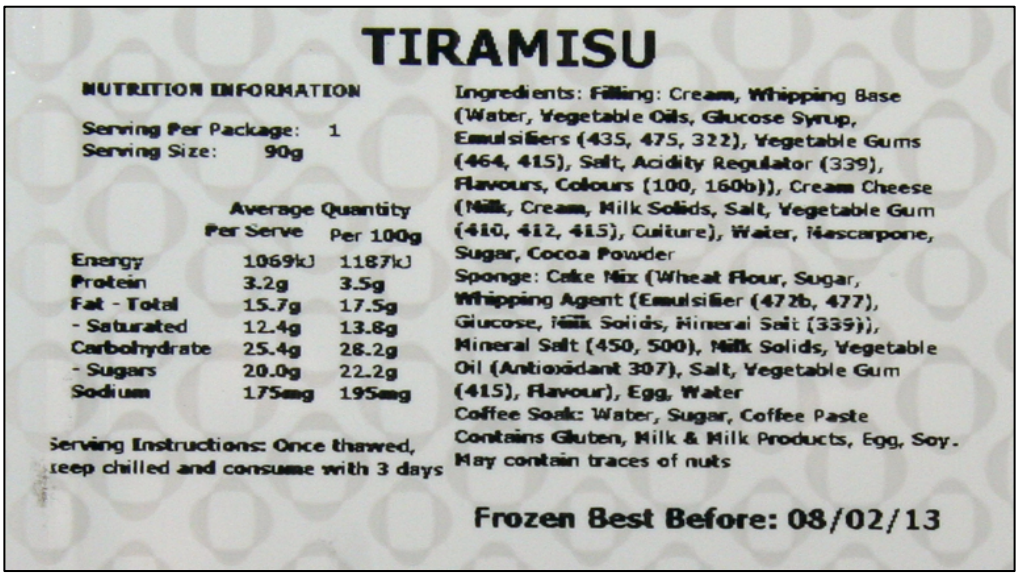

Figure 29: Small font size.

Bad Example #3: The best before date is embossed on the bottom of the plastic tray making it difficult to see the date due to the poor contrast (Figure 30).

Figure 30: Embossed labeling has no contrast.

Bad Example #4: The directions for preparing the coffee are difficult to read because it is printed in all caps.

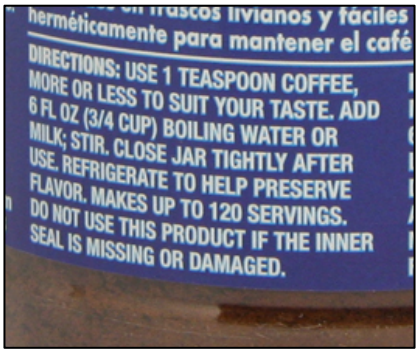

Figure 31: Several lines of text are in all caps.

Good Example: The two sets of instructions for serving the ham are easily distinguished by the bolded signal word (Figure 32).

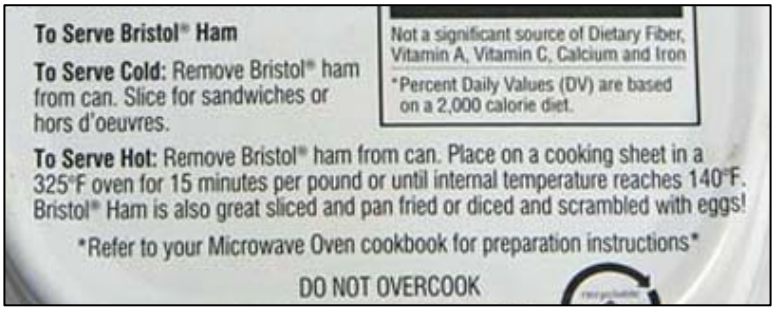

Figure 32: Signal words are bolded.

Guideline 19

Expiry or best before dates should be formatted in such a way that the day, month and year are distinct from each other. Use the four digit format for the year and at least three letters for the month (e.g., JAN for January). A label identifying the date as an expiry or best before date should be provided in close proximity to the date. To avoid confusion, the label and date should be visually distinct from the lot number. This can be accomplished by placing the label and date on the same line or with white space so that the date is closer to its label than it is to the lot number.

Source: GTRI

Applicable Components: Labeling

Bad Example #1: The best before date may be misinterpreted because it is labeled BB (Figure 33).

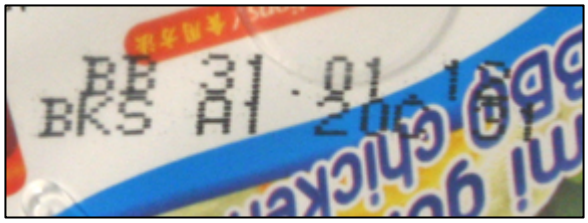

Figure 33: The best before date labeled only as BB.

Bad Example #2: The month for the expiration date appears as NO for November, but the NO could also be interpreted as an abbreviation for number (Figure 34).

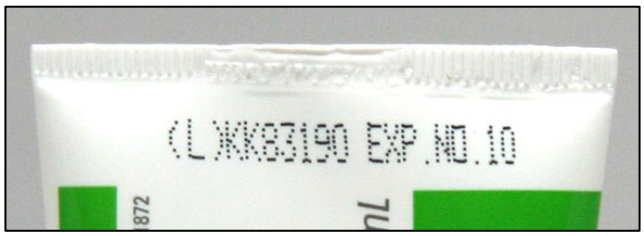

Figure 34: The month abbreviated using only two letters.

Bad Example #3: The expiration date (7 08) is not located in close proximity to the label identifying it as the expiration date (Figure 35).

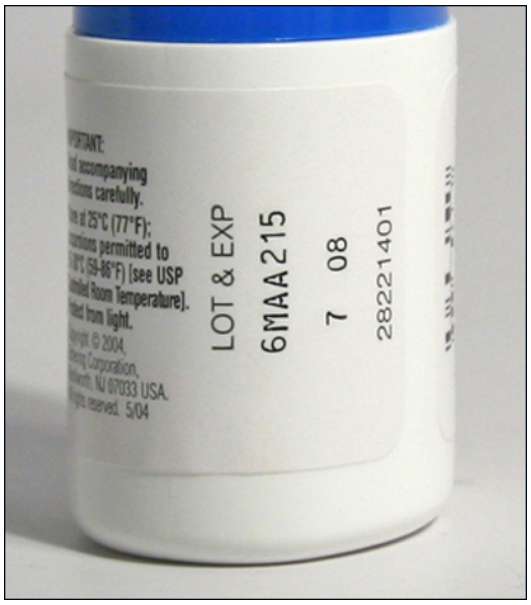

Figure 35: The label is far from the date.

Good Example: The format for the best before date makes it very easy to distinguish between the day, month, and year (Figure 36).

Figure 36: The best before date is easy to understand.

Using the Guidelines

These guidelines can be used to create design requirements for new products or to address issues with packaging already on the market. The following table contains a list of accessibility issues common to food packaging and the steps that can be taken to address those issues.

Accessibility Issue	**Issue Resolution**	**Applicable Guidelines**
A bag has a tear notch but users can't find it	Clearly and accurately indicate where the notch is located	Guideline 16
A thick foil seal has no obvious opening point	Provide a textured tab on the seal that is big enough to grip	Guideline 02, 10, 11, 12
The best before date is hard to see because it blends in	Print the date using high contrast colors	Guideline 18, 19
A can with a pull ring is hard to open	Raise the pull ring or deepen the pre-cut around the edge to make it easier to grasp the ring and pull it up	Guideline 04, 10
A heat sealed strip or a press and seal strip has to be pulled apart but there is no place to grip it	Provide enough room above the strip for fingers to grip the two edges	Guideline 02, 10, 12
A bottle and its cap are large and difficult to grasp	Reduce the diameter of the bottle and cap to less than 71 mm	Guideline 01

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