Universal Multiple Octet Coded Character Set
International Organization for Standardization
Organisation internationale de normalisation
Международная организация по стандартизации

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The contributing editors have done some additional research into the use of recycling symbols and found clear evidence that the existing proposal incorrectly conflates two sets of recycling symbols. These two sets are the *Plastic Bottle Material Coding System* and the set of *Paper Recycling Symbols*.

In addition to clarifying the relation between these two sets and identifying the missing characters for standardization, this paper also presents background information about some of the related and more recent uses of iconic recycling related labels in other industries.

A listing of all symbols is presented at the end of the paper.

Plastic Bottle Material Code System

The seven numbered logos encoded from U+2673 ♳ – U+267A ♺ are from "The Plastic Bottle Material Code System," introduced in 1988 by the Society of the Plastics Industry (SPI) (see http://www.socplas.org). This set consistently uses thin, two-dimensional curved arrows suitable for use in plastics molding. Glyph variations using the thicker, folded arrows can sometimes be found in publications, possibly as result of a mistake on part of the graphic artist. They are not commonly found on products or packaging, or on the bottle manufacturers' web sites.

As of January 1995, 39 US states had adopted legislation regarding the use of this resin identification code system on bottles of 16 ounces or more and rigid containers of 8 ounces or more. The SPI code described above is the one being used. For example, labeling with these symbols is required by sections **459A.685** and **459A.680** of the 1997

Oregon Revised Statutes for all rigid plastic containers. The statutes provide a description, but no images, of the symbols.

> The code shall consist of a number placed inside a triangle and letters placed below the triangle. The triangle shall be equilateral, formed by three arrows with the apex of each point of the triangle at the midpoint of each arrow, rounded with a short radius. The pointer of each arrow shall be at the midpoint of each side of the triangle with a short gap separating the pointer from the base of the adjacent arrow. The triangle, formed by the three arrows curved at their midpoints, shall depict a clockwise path around the code number.
>
> — 1997 Oregon Revised Statutes

Note that these statutes make no requirements that such labels be licensed from a particular source, nor do they set up certification and/or detailed technical specification for which types of plastics get which label.

Recycling Symbol for Generic Materials
An unnumbered plastic resin code symbol (♲) is not formally part of the SPI system, but is found in many fonts. Occasional use of this symbol as a generic materials code symbol can be found in the field, usually with a text legend below, but sometimes also surrounding (or overlaid by) other text or symbols (see Recycling Symbols for Glass).

Observed variations include the symbol with the words "Ni-Cd" or "CFC-12" written below to identify the presence of nickel-cadmium batteries or Chlorinated Fluorocarbon refrigerant in a product, which must be recycled. Such usage is clearly productive. In our view, the best solution for the standard is to provide the common element as a freestanding character and not make any assumptions about combining nature.

Sometimes, the UNIVERSAL RECYCLING SYMBOL is substituted for the generic symbol in this context, but the clear semantic distinction between emphasis on recyclability and actual materials classification argues for encoding the generic symbol distinctly from the UNIVERSAL RECYCLING SYMBOL.

Paper Recycling Symbols
There are four variations of this symbol for use in labeling paper products:

- ♳ white arrows without circle

- ♲ black arrows without circle

- ♲ white arrows symbol with black circle

- ♲ black arrows symbol with white circle

The paper recycling symbols were designed at a different time and in a different context from the plastics recycling symbols. They were derived by the American Forest and Paper Association (AF&PA) from the inventor's original prize-winning design for the Universal Recycling Symbol (see History of the Universal Recycling Symbol below).

The first two are common glyph variants of the UNIVERSAL RECYCLING SYMBOL used to indicate that the material (in this case paper) is recyclable. The white form is the traditional version of the symbol, but presumably because its thin outlines do not always reproduce well, the black form is substituted at times.

The latter two of these can be used to distinguish fully and partially recycled fiber content. The recommendation of the American Forest and Paper Organization (AF&PA) is that qualifying text be placed next to the symbol. The following two examples show text, but

not the text recommended by the AF&PA – here there is no mention of the fiber content on the right. These examples also show the black glyph variation for the UNIVERSAL RECYCLING SYMBOL on the left.

The following scan from an insurance-company billing envelope demonstrates the fact that the distinction between recycled content and recyclable material is being made:

1. Include the **proper** portion of the notice.
2. Insert so company name shows through window.
3. If you have moved, contact your agent.
4. Check postage as the Postal Service will not deliver without postage.
5. **Do not** fold, staple or paper clip documents together.

recycled paper

recyclable paper

These symbols are in the public domain. Their use is not prescribed, but in the US is subject to the Federal Trade Commission's *Guides for the Use of Environmental Marketing Claims*. See http://www.ftc.gov/bcp/grnrule/guides980427.htm.

For a copy of American Forest and Paper Association (AF&PA) *Paper Recycling Symbol Guidelines* brochure, see http://www.afandpa.org/pdfs/paper.pdf.

Other Paper Products
Corrugated cardboard packaging can be labeled with the symbol below, which is promoted by The Corrugated Packaging Council to emphasize the fact that corrugated cardboard is recylclable as well as heavily recycled. It is usually associated with the text "corrugated recycles". There are no restrictions or special permissions needed for the use of this symbol, see http://www.corrugated.org.

Recycling Symbols for Glass

There are two common symbols for glass recycling, which can be found printed on the labels for glass bottles and on some manufacturers' and recycling organizations' websites.

So far, no ultimate source or controlling organization has been found for the first of these two labels. The "G" shaped one is sponsored by the Glass Packaging Institute (GPI), which places no restrictions on its use. See http://www.gpi.org/G.html. The two symbols have not been seen together. Such labeling for glass bottles appears to be relatively recent as evidenced by the competing logos and the fact that, unlike the resin coding symbols for plastic bottles, they are not present on all glass bottles.

Glass bottles can be easily identified by the end-user, so the driving force behind the use of these particular efforts appears to be consistency in making environmental marketing claims or possibly a sort of 'symbol envy' of glass bottlers towards their competitors using plastics.

Recycling Symbol for Steel

Sometimes steel cans use a logo from the Steel Recycling Institute http://www.recycle-steel.org/ shown on the left:

Possibly because steel can be identified and separated by magnet (and thus does not need to be labeled for sorting) this use is not widespread and the Steel Recycling Institute does not provide further information about this label. The symbol shown on the right is used by a major soft-drink bottling company.

Other materials

Materials commonly recycled by end users also include aluminum and motor oil. The symbol on the left has been found for aluminum recycling in Japan:

A version of the UNIVERSAL RECYCLING SYMBOL with the letters ALU inscribed (above on the right) has been found on soft drink cans by major soft-drink bottlers. There does not seem to be a consistent set of symbols for labeling products using or consisting of these materials. Standardization of character codes can be postponed until a consistent usage has been determined.

The PITCH-IN symbol

This symbol of a stylized person cleaning up the environment was adopted in 1976 as stated on the website of PITCH-IN Canada (http://www.pitch-in.ca/) which is associated Clean World International, a non-profit organization with worldwide membership.

Unlike the other recycling symbols, this symbol is not primarily used to identify materials for separation (though a variant of this design occurs as part of the glass-recycling symbol) but it is widely used in the context of public education and outreach for anti-littering efforts (with or without a recycling component). The use of this symbol is not limited to one country and therefore makes it a good candidate for inclusion in an international standard.

The Green Dot

The Green Dot is a symbol first introduced in 1994 by *Duales System Deutschland*, which implemented a novel financing system for recovering packaging by licensing the green dot

to its manufacturers and setting up a system to collect used packaging bearing this symbol from the end-user. Since 1994 this system has been adopted in eleven European countries altogether. See http://www.greendot.ie.

The widespread and transnational use of this symbol would appear to make it a good candidate for encoding in an International Standard. However, use of this symbol requires a licensing contract between manufacturer and a partner company in the PRO-Europe association. Therefore the green dot could not be considered for encoding without a request from the trademark owners. In this regard it is different from the other recycling symbols.

History of the Universal Recycling Symbol

The universal recycling symbol (shown below left) was invented by Gary Anderson in 1970 as part of a contest sponsored by a paper company. The design is deliberately based on a Möbius strip, i.e. an endless loop that has only one surface. It is shown below on the left. The symbol is not trademarked, which has lead to the creation of a large set of derived symbols or logos. A recent example is shown below right.
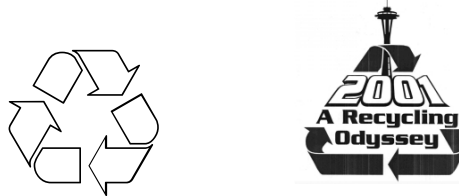
For more on the history of this symbol and the paper recycling symbols that were derived from it, see http://www.afandpa.org/recycling/anders.pdf

Summary

The set of recycling symbols investigated here has a history spanning over thirty years. Over time, as recycling efforts have become more established and better institutionalized, variations have developed to cover particular needs, from material classification to claims of recycled content.

Because the two labeling systems covered at the beginning of the report represent the bulk of commonly recycled materials, the authors recommend to proceed with the standardization of these two sets of well-established symbols, but to disunify the symbols belonging to the two labeling systems. Together they cover the most widespread usage and suffer least from the ongoing development.

For some of the other materials covered in this document there are competing labeling systems and further research will be needed to determine candidates for encoding.

Related Documents

Proposal to add 8 recycling characters to the UCS by Michael Everson and Asmus Freytag (2000-08-27) http://www.dkuug.dk/jtc1/sc2/wg2/docs/n2240.pdf

Proposal to encode two ecological symbols ISO/IEC 10646 (1997-12-08)
http://www.dkuug.dk/JTC1/SC2/WG2/docs/n1661.htm

List of Recycling symbols

1. This symbol exists in the current draft of PDAM1 / Unicode 3.1, but with a different reference glyph. The reference glyph should be the original, outline version of the symbol. The Unicode Standard should add the following annotation to its nameslist.

2672 ♻ UNIVERSAL RECYCLING SYMBOL
    used as generic symbol for recycling or to indicate that material is recyclable

2. These symbol exist in the current draft of PDAM1 / Unicode 3.1, but with different reference glyphs. The reference glyphs should include the shorthand notation for the resin into the glyph to match legislative requirements and usage by the sponsoring authority and industry. The names should not have parenthetical notations. The long chemical names could be added as annotations for the Unicode standard.

2673 ♳ RECYCLING SYMBOL FOR TYPE-1 PLASTICS

2674 ♴ RECYCLING SYMBOL FOR TYPE-2 PLASTICS

2675 ♵ RECYCLING SYMBOL FOR TYPE-3 PLASTICS

2676 ♶ RECYCLING SYMBOL FOR TYPE-4 PLASTICS

2677 ♷ RECYCLING SYMBOL FOR TYPE-5 PLASTICS

2678 ♸ RECYCLING SYMBOL FOR TYPE-6 PLASTICS

2679 ♹ RECYCLING SYMBOL FOR TYPE-7 PLASTICS

3. The following characters are identified as *missing* from the current repertoire of recycling symbols. Annotations are suggested for the nameslist in The Unicode Standard:

♲ RECYCLED CONTENT
    use to indicate 100% recycled content

♺ PARTIALLY RECYCLED CONTENT
    indicate the percentage in overlay or next to this symbol

♼ RECYCLING SYMBOL FOR GENERIC MATERIALS
    used together with other text and labels to indicate the type of material

4. These symbols are additional candidates for encoding:

♻ DO NOT LITTER SYMBOL
    = PITCH-IN

♲ BLACK UNIVERSAL RECYCLING SYMBOL

5. The following symbols need additional research. They are **not** candidates for encoding.

♽ Recycling Symbol For Glass-1

Recycling Symbol For Glass–2
= glass recycles, recycling G

Recycling Symbol For Corrugated Cardboard
= corrugated recycles

Recycling Symbol Aluminum-1

used in Japan

Recycling Symbol Aluminum-2

Recycling Symbol for Steel-1

Recycling Symbol for Steel-2