TCIF GUIDELINES FOR THE IDENTIFICATION AND BAR CODE LABELING OF CABLE REELS

SECTIONS

TCIF GUIDELINES FOR THE IDENTIFICATION AND BAR CODE LABELING OF CABLE REELS

1.0 SCOPE AND PURPOSE

1.1 Scope

The scope of this document is limited to resolving cable reel identification problems and the exchange of cable reel data between business trading partners within the telecommunications industry.

1.2 Purpose

The primary purpose of this document is to establish industry- wide understanding, acceptance and implementation of voluntary standards for coding the identity of cable reels.

This document specifically addresses the coding scheme for cable reel identification, the bar code representation of the data, and labeling requirements.

The purpose of the bar code label is to provide accurate, efficient data entry to mechanized systems for purposes of asset tracking, shipping, receiving, and inventory management.

These requirements were developed primarily for cable reels constructed of metallic materials and intended for use as returnable containers.

2.0 DATA REQUIREMENTS

2.1 Data Definitions

2.1.1 Owner Code

The Owner Code identifies the owner of a cable reel. This code consists of two alpha characters and will be formulated and assigned by the guidelines maintenance agent. A Table of Owner Codes (see Appendix, Section 6.2) will be published from time to time by TCIF.

2.1.2 Serial Number

The serial number is assigned by the owner of the reel and must not be duplicated on another reel with the same owner code. **The serial number used in combination with the owner code provides each reel with a unique identity.** The serial number is composed of six alphanumeric characters, with numeric being the preferred symbology.

2.1.3 Size Code

The size code identifies the size of the reel in terms of overall height, overall width and diameter of the drum. This code consists of three alpha characters as specified by TCIF. A Table of Reel Size Code Characters (see Appendix, Section 6.3) will be published from time to time by TCIF.

2.1.4 Data Identifier Code Field

A data identifier code precedes the bar coded representation of the cable reel identification code which consists of the owner code, serial number and size code concatenated into one continuous string of characters. This field is not to be used when cable reel data is only presented in human readable format.

2.2 Data Field Requirements

2.2.1 Owner Code

Name of Field:	Owner Code
Field Length:	Fixed length of two characters
Required/Optional:	Required data
Data Content:	Two alpha characters are required. No blanks or special characters permitted.
Restrictions:	Only codes sanctions by TCIF will be considered valid. See Appendix, Section 6.2, Table of Owner Codes.

2.2.2 Serial Number

Name of Field:	Serial Number
Field Length:	Fixed length of six characters
Required/Optional:	Required data
Data Content:	Six alphanumeric characters are required. No blanks or special characters permitted.
Restrictions:	The serial number cannot be duplicated on another reel with the same owner code. Alpha characters "I" and "O" are not permitted.

2.2.3 Size Code

Name of Field:	Size Code
Field Length:	Fixed length of three characters
Required/Optional:	Required data
Data Contents:	Three alpha characters are required. No blanks or special characters permitted.
Restrictions:	Only code characters sanctioned by TCIF will be considered valid. See Appendix, Section 6.3, Table of Reel Size Code Characters.

2.2.4 Data Field Identifier Code

Name of Field:	Data Field Identifier
Field Length:	Fixed length of two characters
Required/Optional:	Required only when cable reel data is represented by a bar code symbol.
Data Content:	The two character code set "1B" will always be used to identify cable reel data in a bar coded format.
Restrictions:	This field is not to be used when cable reel data is presented only in a human readable format. See Bar Code Requirements, Section 3.1.3, Data Field Identifier Code.

3.0 BAR CODE REQUIREMENTS

3.1 General

This section provides the basic bar coding requirements for labels designed to uniquely identify each cable reel in transactions between trading partners in the telecommunications industry.

3.1.1 Bar Code Symbology

The representation of cable reel codes in a bar coded format shall conform with the TCIF Bar Code Symbology Specification. All bar coded data shall use Code 39. This bar code symbology has been adopted as the preferred code for the telecommunications industry. The data character set includes 43 characters: A to Z, 0 to 9, and special characters: $, /, +, %, -, ., and space. Additional information is obtainable in the TCIF Bar Code Reference Guide.

3.1.2 Bar Code Height

The bar code height should be 0.5 inch.

3.1.3 Bar Code Label Size

The overall label size should be 2.0 inches vertical by 5.0 inches horizontal.

3.1.4 Human Readable Interpretation (HRI)

The human readable interpretation of the bar coded symbol shall be printed in bold face directly below the bar code symbol and should be 0.75 inch in height. The human readable interpretation of the bar code shall not include start/stop characters nor the Data Field Identifier code.

3.1.5 Code Density

For this application, a density of 3.6 characters per inch (CPI) with a 3 to 1 narrow element ratio shall be used. The narrow element shall be 17 mils (thousandths of an inch) in width.

3.1.6 Quiet Zone

A quite zone of 0.25 inch (minimum) shall precede and follow the bar code symbol.

3.1.7 Print Quality

Print quality shall conform to TCIF Bar Code Reference Guide. For additional information, refer to Section 4.0, Label Requirements.

3.1.8 Start/Stop Character

This is a special bar code character or characters that provide the scanner with start and stop reading instructions as well as scanning direction indicator. The start character is normally at the left hand end of a horizontally oriented bar code symbol. The stop character is normally at the right hand end of a horizontally oriented bar code symbol.

3.2 Bar Code Symbol

The three data fields, Owner Code, Serial Number and Size Code, shall be concatenated into one continuous field or string of characters. This field shall be preceded by the Data Field Identifier Code.

3.3 Data Field Identifier Code

This is a two character code within the bar code and is used to identify the data field(s) that will follow.

The Data Identifier Guidelines issued by the Federation of Automated Coding Technologies (FACT) should be used. For this application, the code set of "1B" will always be used to identify cable reel data.

The data field identifier code is used only with the bar code symbol and should not be shown when cable reel data is shown only in a human readable format. For additional information, see Section 4.0, Label Requirements.

4.0 LABEL REQUIREMENTS

4.1 Format of Label (also refer to Exhibit 7.1)

The format should conform to the following:

- All bar coded data shall be concatenated into a single line across the label.
- The human readable interpretation should be concatenated and into a single line across the label and directly below the bar code symbol.
- The label should not use any border lines.
- The title line of the bar code symbol shall begin with the data field identifier code and shall be enclosed by parentheses, e.g., (1B).
- The title line of the bar code symbol shall be immediately above the bar code symbol data and left justified.

4.1.1 Title Line for Bar Code Symbol

The title line shall be printed in bold face immediately above the bar code symbol and left justified. The title must be human readable characters and approximately 0.06 inch (1.5mm) in height. See Exhibit 6.1.

The title line on the label should contain the title "Reel ID" and shall appear immediately following the data field identifier code.

Example: (1B) REEL ID

A removal warning may be included on the title line. The field names (Owner, Serial, Size) should not be shown on the title line. Because the bar code data is fixed length, there is no need for field names to separate the data elements.

4.1.2 Removal Warning

A "DO NOT REMOVE" warning may be included on the title line and to the right of the title and separated by spaces and a hyphen. It should be printed in bold face and approximately 0.06 inch (1.5mm) in height.

Example: (1B) REEL ID - DO NOT REMOVE

4.1.3 Size of Label

The overall size of the label should be 2.0 inches vertical by 5.0 inches horizontal. See Exhibit 7.1.

4.1.4 Bar Code Symbol

The bar coded symbol shall be 0.5 inch vertical and shall not exceed 4.5 inches in horizontal length.

4.1.5 Quiet Zone

The bar coded symbol shall be preceded by a quiet zone of not less than 0.25 inch and shall be followed by a quiet zone of not less than 0.25 inch.

4.1.6 Human Readable Interpretation Field

The bar coded data elements shall be shown in human readable characters of not less than 0.5 inch vertical and shall not exceed a total of 4.5 inches horizontally. The data should be shown in bold face type. See Exhibit 6.1.

By using data elements with fixed length, the human readable interpretation does not require field names to separate and identify the data elements.

4.2 Placement of Labels on Reels

Bar code labels should be affixed to both sides of the reel. One label should be placed on the side adjacent to the cable starting hole for easy reference in finding the label. The other label should be placed on the opposite side, 180 degrees from the first label. Both should be located between the flutes and midway between the rim and the drum. The labels should be placed so the owner code is nearest to the drum. See Exhibit 6.3, Placement of Label on Reel.

4.3 Environmental Considerations

Bar code labels should be constructed of material(s) designed for worldwide outdoor use. Labels should remain serviceable through temperature ranges of approximately minus 40 degrees to plus 300 degrees Fahrenheit.

Labels should remain scannable after being subjected to extreme sunlight, dirt, water, and chemicals normally found in cable manufacturing environments, and on the road during transportation. They should be resistant to normal abrasion. Bar code labels attached with chemical adhesives should be capable of adhering to a smooth painted or bare metal surface that is rust free, dirt free, oil free and moisture free.

4.4 Life Expectancy Requirements

Labels should remain serviceable (scannable) for a minimum of 5 years when properly applied and maintained.

5.0 Maintenance Agent

These guidelines will be administered by Bellcore, serving as maintenance agent, having been recommended by TCIF and appointed by the Secretariat. A written agreement exists between the Secretariat and the Maintenance Agent.

5.1 Duties of Maintenance Agent

In the administration of these guidelines, the maintenance agent will have the sole authority to:

5.1.1 Formulate and assign owner codes.

5.1.2 Maintain records of owner codes.

5.1.3 Advise affected owners and the Secretariat of assigned owner codes.

5.1.4 Establish procedures for the assignment of owner codes.

5.2 Owner Codes

5.2.1 A cable reel owner may be assigned only one owner code.

5.2.2 A cable reel owner may request the assignment of a particular two character owner code. The maintenance agent will give due consideration to such a request, but will formulate all owner codes at its sole discretion.

5.3 Procedures

5.3.1 Requests for owner code assignments will be made directly to the maintenance agent at its designated guidelines administration address which is:

Cable Reel Maintenance Agent
Bellcore
445 South Street, Room 2K134
Morristown, NJ 07960

6.0 APPENDIX

6.1 Definitions/Glossary

Alphabetic - The character set containing the letters A through Z inclusive. It does not include special characters or punctuation marks.

Alphanumeric - The character set containing the letter A through Z inclusive and the digits 0 through 9 inclusive. It does not include special characters or punctuation marks.

Bar - The darker element of a bar code symbol.

Bar Code - An array of parallel rectangular bars and spaces that together represent data elements or characters in a particular symbology.

Bar Code Character - A single group of bars and spaces which represent an individual letter, number, punctuation mark or other symbol.

Bar Code Density - The number of data characters which can be represented in a linear unit of measure. Bar code density is often expressed in characters per inch (CPI). CPI is a function of the "X" dimension, element ratio, and intercharacter gap.

Bar Code Symbol - A graphic (printed or photographically reproduced) bar code composed of parallel bars and spaces of various widths. A bar code symbol contains a leading quiet zone, start character, data characters including a check digit (character) (if any), stop character, and a trailing quiet zone.

Bar Code Symbol Length - The distance between the outside edges of the quiet zones.

Bar Height - The bar dimension perpendicular to the bar width. Also called the length.

Bar Width - The perpendicular distance across a bar measured from a point on one edge to a point on the opposite edge. Each point will be defined as having a reflectance that is 50 percent of the difference between the background and bar reflectance.

Bar Width Ratio - The ratio of the largest to the narrowest bar width within a bar code.

Cable Reels - Returnable containers used to package and transport telecommunications cable products

Cable Reel Identity - Composed of three concatenated, mandatory, fixed length data elements.

Cable Reel Size - Data element composed of alpha characters to indicate the height, width and drum diameter. See Appendix, Section 6.3, Table of Size Codes.

Character - A letter, digit, or other special form that is used as part of the organization, control, or representation of data. A character is often in the form of a special arrangement of adjacent or connected strokes.

Characters Per Inch - The number of bar coded characters that are (CPI)displayed in each inch of bar code.

Character Set - Those characters which are available for encoding within the bar code symbol.

Code 39 - The 3 of 9 bar code is a variable length, discrete, self-checking, bidirectional, alphanumeric symbology. Its character set contains 43 meaningful characters: 0-9, A- Z, -, ., $, /, +, % and space. Each character is composed of nine elements: five bars and four spaces. Three of the nine elements are wide (binary value 1) and six elements are narrow (binary value 0). An additional common character (*) is used for both start and stop delimiters. See the TCIF Bar Code Reference Guide for the code symbology for the 3 of 9 bar code characters.

Data Field - The specific portion or area of a label designated to contain human readable, bar coded or graphic information.

Data Field Identifier - A specified character(s) which defines the specific intended use of the data that immediately follows. The identifier shall be an alpha character preceded by up to three numeric characters.

Density - See "Bar Code Density"

Element - In a bar code symbol, a single bar or a space.

FACT - Federation of Automated Coding Technologies

Human Readable - The interpretation of the encoded bar code Interpretation (HRI)data presented in a human readable font.

Intercharacter Gap - The space between the last element of one character and the first element of the adjacent character of a discrete bar code symbol.

Mandatory Data Field - A data field which must always contain data.

Nominal Width - The ideal width excluding any tolerance. For a printed bar code symbol, the average width for each element size.

Numeric - The character set containing the digits - 0 through 9 inclusive. It does not include special characters or punctuation marks.

Opacity - The property of a material to obstruct the transmission of light and prevent showthrough.

Owner Code - Data element that consists of two alpha characters to indicate the owner of the cable reel. See Appendix, Section 6.2, Table of Owner Codes.

Print Quality - The measure of compliance of a bar code symbol to the requirements of dimensional tolerance, edge roughness, spots, voids, reflectance, quiet zone and encodation.

Quiet Zone - A clear space, which precedes the start character of a bar code symbol and follows the stop character. Sometimes called the "Clear Area".

Reel ID - See Cable Reel Identity

Reflectance - The ratio of the amount of light of a specified wave length or series of wave lengths, reflected from a test surface to the amount of light reflected from a barium sulfate or magnesium oxide standard.

Scanner - An optical and electronic device that scans bar code symbols and outputs the bar coded information in the form of electrical signals suitable for input to a data collection device.

Serial Number - The serial number used in combination with the owner code provides each reel with a unique identity. The serial number is composed of six alphanumeric characters, with numeric being the preferred symbology.

Size Code - See Cable Reel Size

Space - The lighter element of a bar code usually formed by the background between bars.

Spot - The undesirable presence of ink or dirt in a space, intercharacter gap or quiet zone.

Start/Stop Character - A special bar code character or characters that provide the scanner with start and stop reading instructions as well as scanning direction indicator. The start character is normally at the left hand end of a horizontally oriented bar code symbol. The stop character is normally at the right hand end of a horizontally oriented bar code symbol.

Substrate - The surface on which a bar code symbol is printed.

Symbology - A discrete set of characters used to represent and transmit information, e.g., Morse code, Code 39.

TCIF - Telecommunications Industry Forum.

X Dimension - The intended width of the narrow element. The narrow bar and the narrow space are equal in Code 39.

6.2 **TABLE OF OWNER CODE ASSIGNMENTS**

CODE	COMPANY
AF	ALCOA-FUJIKURA
AL	ALCATEL
AM	AMERITECH
AT	AT&T
BA	BELL ATLANTIC
BC	BELDEN CORP
BI	BICC TELECOM
BR	BRAND REX
BS	BELLSOUTH
CC	CANSTAR
CI	CINCINATTI BELL
DN	DAINICHI-NIPPON
EB	ENSIGN-BICKFORD
EC	EOTEC CORP
ER	ERICSSON LIGHTWAVE
FG	FITEL GENERAL
GC	GENERAL CABLE
GS	GOLD STAR CABLE
GT	GENERAL TELEPHONE
IT	ITT ELECTRO-OPTICAL PRODUCTS
MC	MADISON CABLE
NT	NORTHERN TELECOM
NY	NYNEX
OC	OPTICAL CABLE CORP
PB	PACIFIC BELL
PC	PIRELLI
SE	SUMITOMO ELECTRIC
SN	SOUTHERN NEW ENGLAND TELEPHONE
SR	SIECOR CORP
SW	SOUTHWESTERN BELL
SX	ESSEX GROUP
TF	TIMES FIBER
US	US WEST
VA	VALTEC

6.3 Table of Size Code Characters

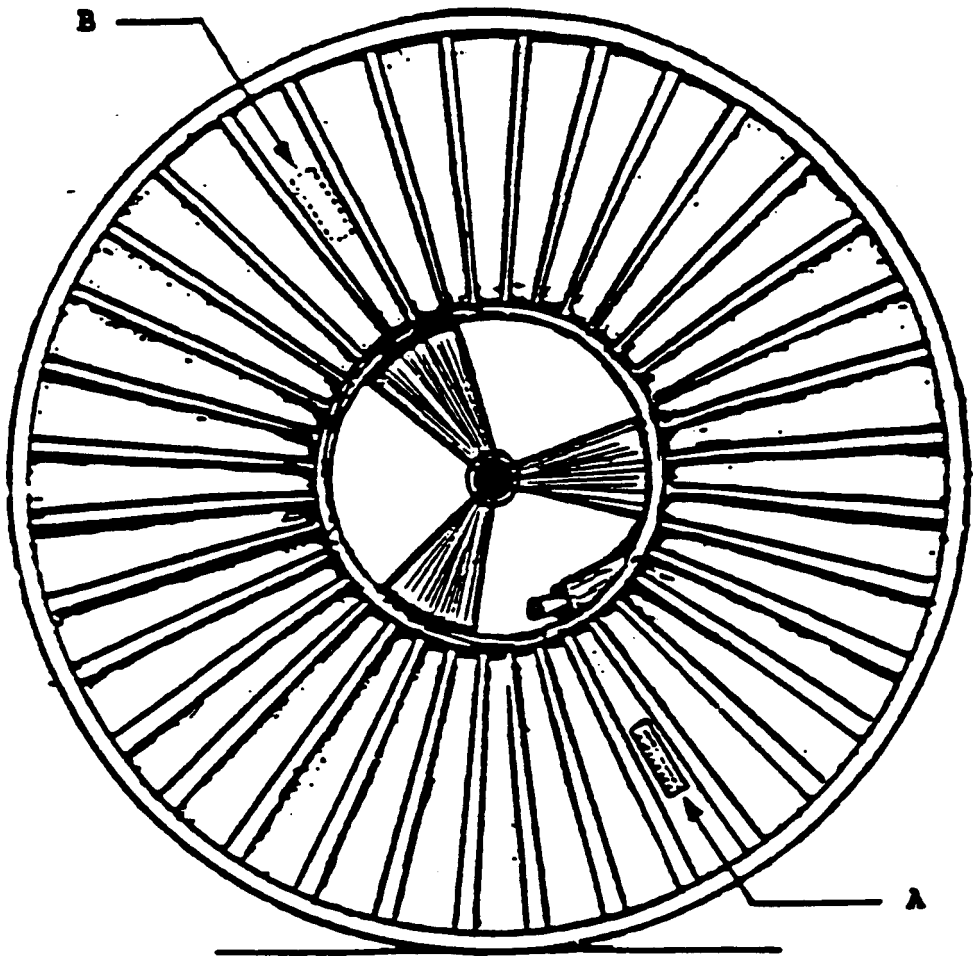
FIRST CHARACTER TOTAL HEIGHT IN INCHES		SECOND CHARACTER TOTAL WIDTH IN INCHES		THIRD CHARACTER DRUM DIAMETER IN INCHES	
Code Characters	Range	Code Characters	Range	Code Characters	Range
A	00.0 to 30.0	A	00.0 to 12.0	A	00.0 to 12.0
B	30.1 to 35.0	B	12.1 to 15.0	B	12.1 to 15.0
C	35.1 to 40.0	C	15.1 to 18.0	C	15.1 to 18.0
D	40.1 to 45.0	D	18.1 to 21.0	D	18.1 to 21.0
E	45.1 to 50.0	E	21.1 to 24.0	E	21.1 to 24.0
F	50.1 to 55.0	F	24.1 to 27.0	F	24.1 to 27.0
G	55.1 to 60.0	G	27.1 to 30.0	G	27.1 to 30.0
H	60.1 to 65.0	H	30.1 to 33.0	H	30.1 to 33.0
I	65.1 to 70.0	I	33.1 to 36.0	I	33.1 to 36.0
J	70.1 to 75.0	J	36.1 to 39.0	J	36.1 to 39.0
K	75.1 to 80.0	K	39.1 to 42.0	K	39.1 to 42.0
L	80.1 to 85.0	L	42.1 to 45.0	L	42.1 to 45.0
M	85.1 to 90.0	M	45.1 to 48.0	M	45.1 to 48.0
N	90.1 to 95.0	N	48.1 to 51.0	N	48.1 to 51.0
O	95.1 to 100.0	O	51.1 to 54.0	O	51.1 to 54.0
P	100.1 to 105.0	P	54.1 to 57.0	P	54.1 to 57.0
Q	105.1 to 110.0	Q	57.1 to 60.0	Q	57.1 to 60.0
R	110.1 to 115.0	R	60.1 to 63.0	R	60.1 to 63.0
S	115.1 to 120.0	S	63.1 to 66.0	S	63.1 to 66.0
T	Reserved	T	66.1 to 69.0	T	66.1 to 69.0
U	Reserved	U	69.1 to 72.0	U	69.1 to 72.0
V	Reserved	V	72.1 to 75.0	V	72.1 to 75.0
W	Reserved	W	Reserved	W	Reserved
X	Reserved	X	Reserved	X	Reserved
Y	Reserved	Y	Reserved	Y	Reserved
Z	Reserved	Z	Reserved	Z	Reserved

EXHIBIT 7.1 Label Format

Size of label: 2.0" vertical 5.0" horizontal

A = Quiet Zone (learing) (Minimum of 0.25 ")
B = Data Field Identifier (1B = CABLE REEL)
C = Title of Bar Code Symbol (REEL ID) (0.06" vertical)
D = Bar Code Symbol (0.5" vertical, 4.5" horizontal)
E = Quiet Zone (Trailing) (Minimum of 0.25")
F = Human Readable Interpretation of Bar Code Symbol (0.75" vertical, 4.5" horizontal)
G = Reel Size Code
H = Serial Number
I = Owner Identification Code

EXHIBIT 7.2 Placement of Labels on Reel



A = One Label should be placed adjacent to the cable starting hole.
B = A second label should be placed on the reverse side and at 180 degrees from the other label.

Note: Both labels should be placed between the flutes and midway between the rim and the drum. The label should be placed so the Owner ID code will be nearest to the drum.