IMPLEMENTATION GUIDE

Use of Red Cell Antigens with Test History [Data Structure 030]

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1 Introduction

1.1 Purpose

The purpose of this document is to provide implementation guidance for users and software developers who wish to implement Red Cell Antigens with Test History [Data Structure 030].

1.2 Scope

This document provides background information and examples of the use of Red Cell Antigens with Test History [Data Structure 030]. It provides supplementary information only and is therefore intended to be used in conjunction with the *ISBT 128 Standard Technical Specification* (ST-001).

1.3 Intended Audience

This document is intended for staff (management, laboratory, quality, validation and information technology) of facilities using ISBT 128 and software developers.

1.4 Normative Reference

ISBT 128 Standard Technical Specification (ST-001) (found at www.iccbba.org)

1.5 Other References

Implementation Guide: Use of Data Matrix Symbols with ISBT 128 (IG-014)
US Guidance on Printing Text Associated with Red Cell Antigens (IG-025)

1.6 Background

In many countries there is a need to convey not only the phenotype of red cells, but also the number of tests (one or more) that have been performed to confirm a phenotype and whether the results represent testing on the current donation or provide only historical information. To provide a mechanism for conveying this information, the Red Cell Antigens with Test History [Data Structure 030] was created.

Data structures for Special Testing: Red Blood Cell Antigens [Data Structures 012 and 013] allow the phenotype of a unit to be encoded. However, they do not allow reporting of the number of times a donor has been tested for an antigen or for differentiating serological test results from predicted phenotype based on genotype. This new data structure provides these capabilities. It also allows the user to encode whether the testing was performed on the current sample, historic samples, or both.

Further, data structures for Special Testing: Red Blood Cell Antigens allow a limited number of antigens to be encoded. This new data structure allows any antigen with an ISBT code (http://www.isbtweb.org/working-parties/red-cell-immunogenetics-and-blood-group-terminology/) to be encoded.

It is expected that this data structure will be used either in electronic messages or in a two-dimensional (2-D) symbol. It is not practical to use linear bar codes with this data structure given the number of characters and the consequent length of the bar code.

The tables associated with the data structure (RT040 and RT041) can be expanded as needed to allow additional information to be transferred. These tables can be found in this document, but the *ISBT 128 Standard Technical Specification* (ST-001) should be consulted for the most recent version of the tables. To request additions to these tables, contact the ICCBBA office (iccbba@iccbba.org).

For the purposes of ISBT 128, "phenotype" has been defined as: The observable expression of the genes inherited by a person that reflects the biological activity of the genes. In ISBT 128 coding of test results, the term phenotype includes predicted phenotypes based on genotyping where there is evidence in the literature to support such a prediction.

1.7 New in this Version

The following table indicates the major changes between Version 1.1.0 and Version 1.2.0. Actual changes or additions to requirements of the ISBT 128 Standard are in bold print; changes to formatting or organization, or additional guidance, are in regular print.

When changes were a result of a formal proposal, the number of the proposal is listed in the Rationale column.

	Version 1.1.0 Chapter, Section, Table, or Figure	Version 1.2.0 Chapter, Section, Table, or Figure	Change	Rationale
1.	Throughout	Throughout	Links to the ISBT Website have been updated.	The location of the reference tables has changed.
2.	New information	1.5	*US Guidance on Printing Text Associated with Red Cell Antigens* (IG-025) was added.	This is a new document.
3.	3, Table 2	3, Table 2	Value 06, Test history not specified, has been added to the table.	This value allows the users not to encode the test history.
4.	5	5	Throughout this chapter, the term "Structured Compound Messages" was changed to "ICCBBA-Specified Compound Messages."	"Structured" was not a correct term in that all compound messages were structured. The reference table discussed in this chapter lists messages ICCBBA has specified.

	Version 1.1.0 Chapter, Section, Table, or Figure	Version 1.2.0 Chapter, Section, Table, or Figure	Change	Rationale
5.	5 and 10	5 and 10	Indicated that reading software should be able to interpret both messages that are ICCBBA-specified and not specified.	Users will use both types of compound messages.
6.	5 and 10	5 and 10	Data should only be interpreted if the integrity of the relevant data structures has been confirmed.	Integrity must be confirmed. Not all data structures may be relevant to all facilities receiving product. Software only needs to interpret the relevant data structures.
7.	6	6	Indicated that the exact location that the 2-D symbol should appear is currently being reconsidered and a proposal is out that, if approved, will change the location of the symbol to the upper half of the label.	Proposal 15-002 is still under consideration, but should be consulted before designing labels with 2-D symbols.
8.	New information	6 and 10	*US Guidance on Printing Text Associated with Red Cell Antigens* (IG-025) was added as a reference.	This is a new document.

2 Precautionary Notes

The Red Cell Antigens with Test History [Data Structure 030] has information that may be the same as that carried in the Blood Groups [ABO and RhD] [Data Structure 002] and Special Testing: Red Blood Cell Antigens [Data Structures 012 and 013]. If a facility chooses to use the Red Cell Antigens with Test History Data Structure in conjunction with one of these other data structures, it shall have appropriate process control measures in place to ensure the information within these data structures is consistent.

Information in the Red Cell Antigens with Test History Data Structure must be firmly linked to the Donation Identification Number (DIN) to which it corresponds. It is strongly recommended that a Compound Message [Data Structure 023] that incorporates both the DIN and the Red Cell Antigens with Test History Data Structure be used (see Section 5).

Regulations in some countries do not allow labeling units of red cells with historic results. Users are responsible for knowing applicable regulations and using this data structure in accordance with regulations.

When the phenotype is predicted based on genotyping results, text and warnings should be nationally defined.

3 Red Cell Antigens with Test History [Data Structure 030]

Purpose: This data structure shall transfer information about red cell antigen phenotypes, including whether the test has been performed more than once and if the results represent current or historical data. It is anticipated that this data structure will be used in electronic communication or on documents accompanying the product rather than on the affixed label.

Data Structure: &%nnnpppppprrss…ppppprrss

Element	Length	Type
&	1	data identifier, first character
%	1	data identifier, second character
nnn	3	numeric {0-9}
		Repeating segment (repeats nnn times):
pppppp	6	numeric {0-9}
rr	2	numeric {0-9}
ss	2	numeric {0-9}

The character data string **nnnpppppprrss** shall be encoded and interpreted as follows:

nnn Shall indicate the number of occurrences of the repeating segment in the data structure

Repeating segment (repeats nnn times):

pppppp ISBT-defined antigen. The blood group system number should be listed first, followed by the antigen number.

rr Result interpretation as defined by Table 1 [RT040] (below).

ss Number of tests as defined by Table 2 [RT041] (below)

Table 1 Data Structure 030: RBC Serological Results [RT040]

01	Negative – Test methodology not specified
02	Positive – Test methodology not specified
03	Negative – Serological testing
04	Positive – Serological testing
05	Negative – Predicted phenotype based on genotyping
06	Positive – Predicted phenotype based on genotyping

Note: When test methodology is not specified, the methodology may appear in text on the labeling of the product. When testing history is a mixture of serological testing and genotyping, the "not specified" option, with further explanation in the accompanying or attached labeling, may provide an appropriate means of communication.

Table 2 Data Structure 030: Number of Tests [RT041]

Value	Meaning
01	Tested once on this collection
02	Tested once on prior collection
03	Tested ≥ twice on different collections (current and historic) with concordant results
04	Tested ≥ twice on different collections (historic only) with concordant results
05	Tested ≥ twice on this collection only, different samples with concordant results
06	Test history not specified

The ISBT-defined antigens nomenclature is found at http://www.isbtweb.org/working-parties/red-cell-immunogenetics-and-blood-group-terminology/. An excerpt of one of the tables from this website is found on Table 3.

Table 3 ISBT-Defined Antigens

System		Antigen number											
		001	002	003	004	005	006	007	008	009	010	011	012
001	ABO	A	B	A,B	A1	…							
002	MNS	M	N	S	s	U	He	Mi^a	M^c	Vw	Mur	M^g	Vr
003	P1PK	P1	…	P^k	NOR								
004	RH	D	C	E	c	e	f	Ce	C^w	C^x	V	E^w	G
005	LU	Lu^a	Lu^b	Lu3	Lu4	Lu5	Lu6	Lu7	Lu8	Lu9	…	Lu11	Lu12
006	KEL	K	k	Kp^a	Kp^b	Ku	Js^a	Js^b	…	…	Ul^a	K11	K12
007	LE	Le^a	Le^b	Le^{ab}	Le^{bH}	ALe^b	BLe^b						
008	FY	Fy^a	Fy^b	Fy3	…	Fy5	Fy6						
009	JK	Jk^a	Jk^b	Jk3									
010	DI	Di^a	Di^b	Wr^a	Wr^b	Wd^a	Rb^a	WARR	ELO	Wu	Bp^a	Mo^a	Hg^a
011	YT	Yt^a	Yt^b										
012	XG	Xg^a	CD99										
013	SC	Sc1	Sc2	Sc3	Rd	STAR	SCER	SCAN					
014	DO	Do^a	Do^b	Gy^a	Hy	Jo^a	DOYA	DOMR	DOLG				
015	CO	Co^a	Co^b	Co3	Co4								
016	LW	…	…	…	…	LW^a	LW^{ab}	LW^b					
017	CH/RG	Ch1	Ch2	Ch3	Ch4	Ch5	Ch6	WH				Rg1	Rg2

… = obsolete (see Table of Obsolete Numbers) on the URL listed above this table.

4 Constructing a Message

4.1 Example 1

A red blood cell product has the following results:

Antigen	Result Interpretation	Number of tests
C	Positive by serological testing	Once, this sample only
c	Positive by serological testing	Twice on different samples (historic only)
E	Negative by serological testing	Twice on different samples (historic and current)
e	Positive by serological testing	Once on prior donation

The data identifier and data content for this product would be:

Element	Value	Information
Data identifier	&%	
nnn	004	This is the number of repeating segments. In this case, four segments are needed (one for each antigen). So nnn is 004.
		First segment (C antigen)
pppppp	004002	From Table 3, C is from the RH System (004) and is antigen 002
rr	04	From Table 1, 04 is Positive – Serological testing
ss	01	From Table 2, 01 is: Tested once on this sample
		Second segment (c antigen)
pppppp	004004	From Table 3, c is from the RH System (004) and is antigen 004
rr	04	From Table 1, 04 is Positive – Serological testing
ss	04	From Table 2, 04 is: Tested ≥ twice on different samples (historic only)
		Third segment (E antigen)
pppppp	004003	From Table 3, E is from the RH System (004) and is antigen 003
rr	03	From Table 1, 03 is Negative – Serological testing
ss	03	From Table 2, 03 is: Tested ≥ twice on different samples (current and historic)
		Fourth segment (e antigen)
pppppp	004005	From Table 3, e is from the RH System (004) and is antigen 005
rr	04	From Table 1, 04 is Positive– Serological testing
ss	02	From Table 2, 02 is: Tested once on prior collection

This would become a string:

&%004004002040100400404040040030303004005040 2

4.2 Example 2

A red blood cell product has the following results:

Antigen	Result Interpretation	Number of tests
C	Positive – Test methodology not specified	Tested ≥ twice on different donations (historic only)
c	Negative – Test methodology not specified	Tested ≥ twice on different donations (historic only)
E	Negative – Test methodology not specified	Tested ≥ twice on different donations (historic only)
e	Positive – Test methodology not specified	Tested ≥ twice on different donations (historic only)
K	Negative – Test methodology not specified	Tested ≥ twice on different donations (current and historic)
Fy^a	Positive – Test methodology not specified	Tested ≥ twice on different donations (current and historic)
Fy^b	Negative – Test methodology not specified	Tested ≥ twice on different donations (current and historic)
Jk^a	Negative – Test methodology not specified	Tested ≥ twice on different donations (current and historic)
Jk^b	Positive – Test methodology not specified	Tested ≥ twice on different donations (current and historic)
S	Negative – Test methodology not specified	Tested ≥ twice on this donation only, different samples
s	Positive – Test methodology not specified	Tested ≥ twice on this donation only, different samples
Di^b	Negative – Test methodology not specified	Tested ≥ twice on this donation only, different samples

The data identifier and data content for this product would be:

Element	Value	Information
Data identifier	&%	
nnn	012	This is the number of repeating segments. In this case, twelve segments are needed (one for each antigen). So nnn is 012.
		First segment (C antigen)

Element	Value	Information
pppppp	004002	From Table 3, C is from the RH System (004) and is antigen 002
rr	02	From Table 1, 02 is Positive – Test methodology not specified
ss	04	From Table 2, 04 is tested ≥ twice on different donations (historic only)
		Second segment (c antigen)
pppppp	004004	From Table 3, c is from the RH System (004) and is antigen 004
rr	01	From Table 1, 01 is Negative – Test methodology not specified
ss	04	From Table 2, 04 is tested ≥ twice on different donations (historic only)
		Third segment (E antigen)
pppppp	004003	From Table 3, E is from the RH System (004) and is antigen 003
rr	01	From Table 1, 01 is Negative – Test methodology not specified
ss	04	From Table 2, 04 is tested ≥ twice on different donations (historic only)
		Fourth segment (e antigen)
pppppp	004005	From Table 3, e is from the RH System (004) and is antigen 005
rr	02	From Table 1, 02 is Positive – Test methodology not specified
ss	04	From Table 2, 04 is tested ≥ twice on different donations (historic only)
		Fifth segment (K antigen)
pppppp	006001	From Table 3, K is from the KEL System (006) and is antigen 001
rr	01	From Table 1, 01 is Negative – Test methodology not specified
ss	03	From Table 2, 03 is Tested ≥ twice on different donations (current and historic)
		Sixth segment (Fy^a antigen)
pppppp	008001	From Table 3, Fy^a is from the FY System (008) and is antigen 001
rr	02	From Table 1, 02 is Positive – Test methodology not specified
ss	03	From Table 2, 03 is Tested ≥ twice on different donations (current and historic)
		Seventh segment (Fy^b antigen)
pppppp	008002	From Table 3, Fy^b is from the FY System (008) and is antigen 002
rr	01	From Table 1, 01 is Negative – Test methodology not specified
ss	03	From Table 2, 03 is Tested ≥ twice on different donations (current and historic)
		Eighth segment (Jk^a segment)
pppppp	009001	From Table 3, Jk^a is from the JK System (009) and is antigen 001
rr	01	From Table 1, 01 is Negative – Test methodology not specified
ss	03	From Table 2, 03 is Tested ≥ twice on different donations (current and historic)
		Ninth segment (Jk^b segment)
pppppp	009002	From Table 3, Jk^b is from the JK System (009) and is antigen 002
rr	02	From Table 1, 02 is Positive – Test methodology not specified
ss	03	From Table 2, 03 is Tested ≥ twice on different donations (current and historic)

Element	Value	Information
		Tenth segment (S antigen)
pppppp	002003	From Table 3, S is from the MNS System (002) and is antigen 003
rr	01	From Table 1, 01 is Negative – Test methodology not specified
ss	05	From Table 2, 05 is Tested twice on this donation only, different samples
		Eleventh segment (s antigen)
pppppp	002004	From Table 3, s is from the MNS System (002) and is antigen 004
rr	02	From Table 1, 02 is Positive – Test methodology not specified
ss	05	From Table 2, 05 is Tested twice on this donation only, different samples
		Twelfth segment (Di^b antigen)
pppppp	010002	From Table 3, Di^b is from the DI System (010) and is antigen 002
rr	01	From Table 1, 01 is Negative – Test methodology not specified
ss	05	From Table 2, 05 is Tested twice on this donation only, different samples

This would become a string:

&%012004002020400400401040040030104004005020400600101030080010203008
0201030090010103009002020300200301050020040205010002010 5

5 Compound Messages

It is critical that the test results be associated with the appropriate unit of blood. It is therefore strongly recommended that the Red Cell Antigens with Test History Data Structure always be part of a compound message that includes the Donation Identification Number (DIN).

The *ISBT 128 Standard Technical Specification* (ST-001) describes the Compound Message [Data Structure 023]. This data structure allows multiple data structures to be combined into a single data string to facilitate the use of newer technology delivery system.

5.1 Compound Message

A compound message may be constructed as follows:

The Compound Message structure is =+aabbb where:

aa shall specify the number of ISBT 128 data structures that follow;

bbb shall be either:

- all zeros – indicating this is an undefined message, i.e., only the number of data structures is identified, but not what each one is;
- a three-digit number referencing an entry in an ICCBBA maintained table that defines the sequence of the data structures within a compound message (see Table W2, [RT017] ICCBBA-Specified Compound Messages on the ICCBBA Website).

Rules for constructing compound messages:

1. A compound message shall comprise a string of ISBT 128 data structures (excluding nationally defined structures), beginning with the Compound Message [Data Structure 023];
2. Data structures shall be combined sequentially with no intervening characters, and each shall begin with its data identifier characters;
3. The string shall only contain ISBT 128 data structures;
4. The number of data structures following the Compound Message Data Structure shall be indicated in element aa of the Compound Message Data Structure;
5. If the sequence of the message is unspecified, the Compound Message Data Structure shall have element bbb set to zeroes and element aa shall be set as specified in Rule 4;
6. If a specified sequence is used, the reference number of the selected message from Table RT017 shall be included in element bbb of the Compound Message Data Structure. The order of the data structures shall be that shown on Table RT017 for the reference number selected.

ICCBBA-specified compound messages are defined in Table W2, ICCBBA-Specified Compound Messages (found on the ICCBBA Website). Requests for additional entries should be submitted to the ICCBBA office (tech.manager@iccbba.org).

Reading software should be able to interpret both unspecified sequence and specified sequence compound messages. The software should always verify the integrity of the data string, including checking that the correct number of data structures appears and, when specified sequence messages are used, that the sequence of data structures is correct. Data should only be interpreted if the integrity of the relevant data structures has been confirmed.

5.2 Example 3 Compound Message

In the most basic message, the Donation Identification Number [Data Structure 001] and the Red Cell Antigens with Test History [Data Structure 030] would be conveyed. Using the information from 4.1 (Example 1), this message would be constructed as follows:

Compound Message:

Data identifier and data content:

Element	Value	Information
Data Identifier	=+	
aa	02	There are two data structures to be used: DIN and Red Cell Antigens with Test History
bbb	021	This element identifies the ICCBBA-Specified Compound Message when one exists. For this combination of data structures, 021 is the appropriate identifier. See Table W-2 ICCBBA-Specified Compound Messages [RT017] on the ICCBBA Website.

Data Structures:

The first data structure is the DIN.

Element	Value	Information
Data Identifier and Data Content	= A99991612345600	DIN

The next data structure is Red Cell Antigens with Test History. The data identifier and data content for it are:

Element	Value	Information
Data identifier	&%	
nnn	004	This is the number of repeating segments. In this case, four segments are needed (one for each antigen). So nnn is 004.
		First segment (C antigen)
pppppp	004002	From Table 3, C is from the RH System (004) and is antigen 002
rr	04	From Table 1, 04 is Positive – Serological testing
ss	01	From Table 2, 01 is: Tested once on this sample
		Second segment (c antigen)
pppppp	004004	From Table 3, c is from the RH System (004) and is antigen 004
rr	04	From Table 1, 04 is Positive – Serological testing
ss	04	From Table 2, 04 is: Tested ≥ twice on different samples (historic only)
		Third segment (E antigen)
pppppp	004003	From Table 3, E is from the RH System (004) and is antigen 003
rr	03	From Table 1, 03 is Negative – Serological testing
ss	03	From Table 2, 03 is: Tested ≥ twice on different samples (current and historic)
		Fourth segment (e antigen)
pppppp	004005	From Table 3, e is from the RH System (004) and is antigen 005
rr	04	From Table 1, 04 is Positive – Serological testing
ss	02	From Table 2, 02 is: Tested once on a prior collection

The full data string is:

=+02021=A99991612345600&%004004002040100400404040040030303004005040 2

5.3 Example 4 Compound Message

In this example, the Red Cell Antigens with Test History [Data Structure 030] will be combined with the DIN [Data Structure 001], Blood Groups [Data Structure 002], Product Code [Data Structure 003] and Expiration Date/Time [Data Structure 005]. Using the phenotype from Step 4.2 (Example 2), the following message may be constructed:

Compound Message:

Data identifier and data content:

Element	Value	Information
Data identifier	=+	
aa	05	There are five data structures to be used: DIN, Blood Groups, Product Code, Expiration Date/Time, and Red Cell Antigens with Test History

bbb	020	This element identifies the ICCBBA-Specified Compound Message when one exists. For this combination of data structures, 020 is the appropriate identifier. See Table W2 ICCBBA-Specified Compound Messages [RT017] on the ICCBBA Website.

Data Identifiers and Data Content for the first four data structures:

Data Structure	Value	Information
Donation Identification Number [001]	= A999916 12345621	A9999 16 123456 21
Blood Groups	=%5100	O, Rh Positive
Product Code	=<E0195V00	RED BLOOD CELLS|CPDA-1/450mL/refg, from a volunteer donor, undivided
Expiration Date and Time	&>0170152359	15 JAN 2017 at midnight

The next data structure is the Red Cell Antigen with Test History.

Its data identifier and content (from 4.2, Example 2) are:

Element	Value	Information
Data Identifier	&%	
nnn	012	This is the number of repeating segments. In this case, twelve segments are needed (one for each antigen). So nnn is 012.
		First segment (C antigen)
pppppp	004002	From Table 3, C is from the RH System (004) and is antigen 002
rr	02	From Table 1, 02 is Positive – Test methodology not specified
ss	04	From Table 2, 04 is tested ≥ twice on different donations (historic only)
		Second segment (c antigen)
pppppp	004004	From Table 3, c is from the RH System (004) and is antigen 004
rr	01	From Table 1, 01 is Negative – Test methodology not specified
ss	04	From Table 2, 04 is tested ≥ twice on different donations (historic only)
		Third segment (E antigen)
pppppp	004003	From Table 3, E is from the RH System (004) and is antigen 003
rr	01	From Table 1, 01 is Negative – Test methodology not specified
ss	04	From Table 2, 04 is tested ≥ twice on different donations (historic only)
		Fourth segment (e antigen)
pppppp	004005	From Table 3, e is from the RH System (004) and is antigen 005
rr	02	From Table 1, 02 is Positive – Test methodology not specified
ss	04	From Table 2, 04 is tested ≥ twice on different donations (historic only)

Element	Value	Information
		Fifth segment (K antigen)
pppppp	006001	From Table 3, K is from the KEL System (006) and is antigen 001
rr	01	From Table 1, 01 is Negative – Test methodology not specified
ss	03	From Table 2, 03 is Tested ≥ twice on different donations (current and historic)
		Sixth segment (Fy^a antigen)
pppppp	008001	From Table 3, Fy^a is from the FY System (008) and is antigen 001
rr	02	From Table 1, 02 is Positive – Test methodology not specified
ss	03	From Table 2, 03 is Tested ≥ twice on different donations (current and historic)
		Seventh segment (Fy^b antigen)
pppppp	008002	From Table 3, Fy^b is from the FY System (008) and is antigen 002
rr	01	From Table 1, 01 is Negative – Test methodology not specified
ss	03	From Table 2, 03 is Tested ≥ twice on different donations (current and historic)
		Eighth segment (Jk^a segment)
pppppp	009001	From Table 3, Jk^a is from the JK System (009) and is antigen 001
rr	01	From Table 1, 01 is Negative – Test methodology not specified
ss	03	From Table 2, 03 is Tested ≥ twice on different donations (current and historic)
		Ninth segment (Jk^b segment)
pppppp	009002	From Table 3, Jk^b is from the JK System (009) and is antigen 002
rr	02	From Table 1, 02 is Positive – Test methodology not specified
ss	03	From Table 2, 03 is Tested ≥ twice on different donations (current and historic)
		Tenth segment (S antigen)
pppppp	002003	From Table 3, S is from the MNS System (002) and is antigen 003
rr	01	From Table 1, 01 is Negative – Test methodology not specified
ss	05	From Table 2, 05 is Tested twice on this donation only, different samples
		Eleventh segment (s antigen)
pppppp	002004	From Table 3, s is from the MNS System (002) and is antigen 004
rr	02	From Table 1, 02 is Positive – Test methodology not specified
ss	05	From Table 2, 05 is Tested twice on this donation only, different samples
		Twelfth segment (Di^b antigen)
pppppp	010002	From Table 3, Di^b is from the DI System (010) and is antigen 002
rr	01	From Table 1, 01 is Negative – Test methodology not specified
ss	05	From Table 2, 05 is Tested twice on this donation only, different samples

The full data string is:

=+05020=A99991612345621=%5100=<E0195V00&>0170152359&%012004002020400
400401040040030104004005020400600101030080010203008002010300900101030090002020300200301050020040205010002010 5

6 Affixed Labels

Given the length of the Red Cell Antigens with Test History Data Structure, and the need to convey it in conjunction with minimally a DIN, a 2-D symbol is necessary.

Note: When a 2-D symbol is the only symbol on a label, its exact location on the label is currently being considered. A proposal has been made that, if approved, will locate the symbol on the upper half of the label. When the 2-D symbol is present with linear bar codes, it is considered a "transition label" allowing facilities time to develop the capacity to read and interpret 2-D symbols. In this case, the location of the 2-D symbol may be nationally-defined. In discussions of Technical Advisory Groups, the suggestion has been made to place the 2-D symbol as close to its eventual location as possible. It is recommended that facilities check with ICCBBA before designing labels with 2-D symbols for the latest information.

The size of the 2-D symbol will increase with the amount of information encoded. The example in 5.3 (Example 4) has 12 antigens as well as four other data structures. With an X dimension of about 0.3 mm, the symbol is 12 mm square. Consideration must be given to the size of the symbol, and what other information must appear in the lower right quadrant, when determining whether it should appear on the affixed label.

Bar code text (see *ISBT 128 Standard Technical Specification* (ST-001) for definition of "bar code text") associated with the Red Cell Antigens with Test History Data Structure, as well as the order of the antigens in the text, should be nationally defined. The US has published a guidance, *US Guidance on Printing Text Associated with Red Cell Antigens* (IG-025), that may be useful in other countries.

7 Other Labeling and Documents

The Red Cell Antigens with Test History Data Structure may be used on other labeling such as tie tags and documents that accompany the product. If the data structure is used in this manner, it should be encoded into a 2-D data symbol which should also include, at a minimum, the DIN.

8 Example Messages and Symbols

Symbols corresponding to the examples above are:

Example 3:

=+02021=A99991612345600&%00400400204010040040404004003030300400504 02

Example 4:

=+05020=A99991612345621=%5100=<E0195V00&>0170152359&%0120040020204004004 0104004003010400400502040060010103008001020300800201030090010103009002020300 2003010500200402050100020105

9 Electronic Data Interchange

Another appropriate use of the Red Cell Antigens with Test History Data Structure is in an electronic message, such as an HL7 message. For more information on HL7, see their Website at www.HL7.org. For more information on the use of this data structure within an HL7 message, see the *ISBT 128 Standard Technical Specification* (ST-001) including Table RT042.

10 Notes for Software Developers

There is no requirement for the order in which antigens may appear in the data string. Software shall be written to place an antigen in the appropriate field based on the value of pppppp. In the associated bar code text (see *ISBT 128 Standard Technical Specification* (ST-001) for definition of “bar code text”), the order of the antigens may be nationally defined. The US has published a guidance, *US Guidance on Printing Text Associated with Red Cell Antigens* (IG-025), that may be useful in other countries.

Reading software should be able to interpret both unspecified sequence and specified sequence compound messages. The software should always verify the integrity of the data string, including checking that the correct number of data structures appears and, when specified sequence messages are used, that the sequence of data structures is correct. Data should only be interpreted if the integrity of the relevant data structures has been confirmed.

New Red Cell Antigens may be defined in the future thus the table referenced at http://www.isbtweb.org/working-parties/red-cell-immunogenetics-and-blood-group-terminology/ may grow in size and software should be able to support additional entries.

Additional entries may be made to tables RT040 and RT041 in the future. For example, a future requirement could require historic test results to be further sub-divided into those performed within the last two years and those performed at an earlier date.

In most cases users will want to be selective about which results are included in the data structure and appropriate rules will need to be in place. Generally there is a greater interest in transferring information on negative results than positive.

When two or more results for a given antigen exist, they must be concordant to utilize this data structure.

As noted in the Precautionary Notes:

The Red Cell Antigens with Test History [Data Structure 030] has information that may be the same as that carried in the Blood Groups [ABO and RhD] [Data Structure 002] and Special Testing: Red Blood Cell Antigens [Data Structures 012 and 013]. If a system allows more than one of these data structures to be created for the same unit, the software must prevent inconsistent results to be encoded.

Information in the Red Cell Antigens with Test History Data Structure must be firmly linked to the DIN to which it corresponds. It is strongly recommended that a Compound Message [Data Structure 023] that incorporates both the DIN and the Red Cell Antigens with Test History Data Structure be used (see Section 5) when encoding this information.

