

SEMI T6-0697 (Withdrawn 1110) PROCEDURE AND FORMAT FOR REPORTING OF TEST RESULTS BY ELECTRONIC DATA INTERCHANGE (EDI)

This Standard was technically approved by the Traceability Global Technical Committee. This edition was approved for publication by the global Audits and Reviews Subcommittee on August 27, 2010. Available at www.semiviews.org and www.semi.org in October 2010; originally published in 1997; previously published November 2004.

NOTICE: This Document was balloted and approved for withdrawal in 2010.

1 Purpose

1.1 To facilitate the electronic transfer of quality and test data between users and suppliers.

2 Scope

2.1 This Document describes a procedure and format using ANSI ASC X12 – 863 Report of Test Results, for electronic data interchange (EDI). The ANSI standard provides a basic structure and codes for transmitting messages. This is supplemented by SEMI-generated codes to describe product parameters and test methods specific to the semiconductor industry. For a description of the EDI business applications, see Appendices 1 and 2.

2.2 This Standard may be used to report test results for all products used in the semiconductor industry when the applicable codes are included in a SEMI Standard. It is intended to provide a consistent method for transmitting test results throughout the industry. Any implementation of this document shall be agreed upon between trading partners.

NOTICE: SEMI Standards and Safety Guidelines do not purport to address all safety issues associated with their use. It is the responsibility of the users of the Documents to establish appropriate safety and health practices, and determine the applicability of regulatory or other limitations prior to use.

3 Referenced Standards and Documents

3.1 SEMI Standards and Safety Guidelines

SEMI M12 — Specification for Serial Alphanumeric Marking of the Front Surface of Wafers

SEMI M18 — Format for Silicon Wafer Specification Form for Order Entry

3.2 ANSI Standards¹

ANSI ASC X12 — 863 Report of Test Results; version 003 release 050

ANSI ASC X12 — Data Dictionary

3.3 Other Documents

SEMI AUX001 — List of Vendor Identification Codes

NOTICE: Unless otherwise indicated, all documents cited shall be the latest published versions.

4 Terminology

4.1 Abbreviations and Acronyms

4.1.1 ANSI — American National Standards Institute

4.1.2 ASC X12 — Accredited Standards Committee X12

4.1.3 EDI — electronic data interchange

¹ American National Standards Institute, 25 West 43rd Street, New York, NY 10036, USA; Telephone: +1.212.642.4900, Fax: +1.212.398.0023, <http://www.ansi.org>

4.2 Definitions

4.2.1 *Accredited Standards Committee X12 (ASC X12)* — Comprised of industry members for the purpose of creating EDI standards for submission to ANSI for subsequent approval and dissemination.

4.2.2 *certificate of analysis EDI message* — one message containing measurement or statistical data for one shipment, from one supplier site to one user site, of one user part number against one user purchase order shipped. Multiple lot numbers may be included in the shipment (see Appendix 5).

4.2.3 *codes* — a recognized set of abbreviations or conventions for representing specific elements of data.

4.2.4 *electronic data interchange (EDI)* — The computer-to-computer exchange of information which has traditionally been communicated using paper documents.

4.2.5 *EDI translation* — the conversion of application data to and from the ASC X12 standard format.

4.2.6 *manufacturing lot* — a generic description for a group of parts that have a relationship as defined by the party establishing the identification (e.g., batch, shipment, production run, qualification/test run, individual product) (see Application Notes).

4.2.7 *mapping* — the process of identifying the standards data element relationship to application data elements.

4.2.8 *message* — entire data stream including the outer envelope.

4.2.9 *statistical results EDI message* — one message containing measurement or statistical data for defined parameters for a stated period of time (see Appendix 5).

4.2.10 *test results EDI message* — used to designate data provided by special request (e.g., engineering, qualifications). This message contains specific measurement or statistical data for one request, from one trading partner to another trading partner, of one part number against one purchase order. Multiple lot numbers may be included (see Appendix 5).

4.2.11 *trading partner* — all members within the channels of distribution within an industry (suppliers, carriers, users, and intermediaries).² This includes buyers and sellers which represent SEMI terms of user and supplier as well.

5 Requirements

5.1 An implementation model shall be agreed upon by trading partners. It is the intent of this document to make interpretation of the models used for transmitting electronic messages more consistent, so that implementations are based upon common practices.

5.1.1 Select one of the report types in Table 1 using the business model (Appendix 1) and the definitions found in § 4.

Table 1 Report Types

<i>Code</i>	<i>Type of EDI Message</i>
CA	Certificate of Analysis
RT	Test Results
SR	Statistical Results

5.1.2 Define data requirements representing the requested measurements and statistics that are recorded for reporting electronically. (See Appendix 2.)

5.1.3 Select codes for parameters, units of measure, and statistical terms. Appendix 4 is a guideline to assist in modeling the EDI message. It uses codes selected from the ANSI Data Dictionary as well as codes created by SEMI for the semiconductor industry.

² The term 'Trading Partner' is referenced from the Global Electronics Guidelines (DRAFT) for Bar Code & 2D Symbol Marking of Products and Packages in Conjunction with EDI.

5.1.4 Data is electronically reformatted from the application where it resides into a format suitable for EDI transmission. This usually requires the use of translation software and the development of application interface programs.

5.2 Thorough piloting, testing, and educating is required for successful implementation.

6 Procedures

6.1 See Appendix 4.

7 Application Notes

7.1 Pending ANSI approval, SEMI is an authorized agency to maintain the tables of codes.

7.2 The material contained in Appendix 4 was created by using an EDI simulator referencing the ASC X12 “863 Report of Test Reports”, version 003 release 050.

7.3 In using Appendix 4, refer to the column “SEMI Use” (far-left) to determine if data element usage is mandatory, conditional, or optional. SEMI mandatory elements include all ASC X12 863 mandatory elements, as well as selected other elements that are optional or conditional within ASC X12 863.

7.4 In Appendix 5, the example messages in this appendix were simplified by showing only a portion of what they can do. In practice, all of the transaction types (CA, RT, and SR) can use any combination of the statistical codes in Appendix 4, the new statistical codes in Appendix 4, or raw measurement data.

7.5 Additional statistical codes are defined in Appendix 3. These codes are pending ANSI approval.

7.6 This procedure will accommodate date/time considerations for the turn of the century. There are many options found in the data transmission segments in this document. The end result for which option is utilized will be agreed upon by the trading partners. The message is itself part of the ANSI standard, and any revisions to this standard will be incorporated.

7.6.1 In the data element type, DT is a standard ANSI definition and is being addressed by ASC X12 Committee.

7.6.2 In the BTR segment, used to identify the date of the actual transmission, BTR06 may be used as a century reference number.

7.6.3 In the DTM segments, used to identify the date for the actual data, the DTM05 data element of CC represents a two-digit century code (e.g., 19 for 1999, 20 for 2000).

7.7 Multiple levels of lot definitions (i.e., Lots and Sub-lots) may be handled through nesting within the LIN loop.

8 Listing of Appendices

8.1 *Appendix 1* — EDI Business Model

8.2 *Appendix 2* — EDI Transmission Flowchart

8.3 *Appendix 3* — New EDI Statistics (Definitions)

8.4 *Appendix 4* — EDI Transmission Components (863 Report of Test Results)

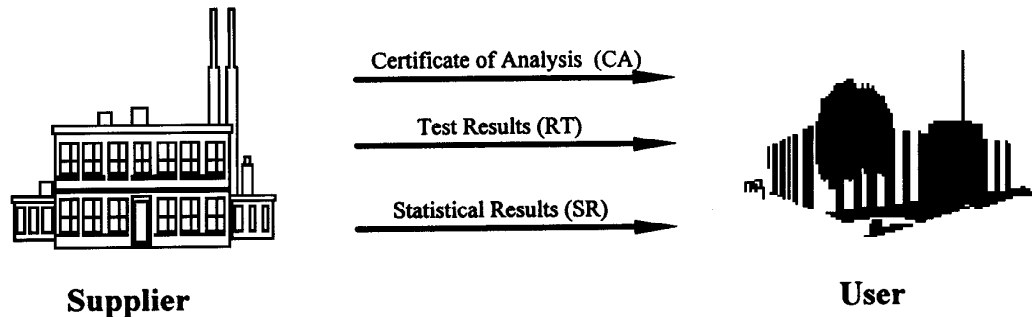
8.5 *Appendix 5* — Examples of EDI Transmissions

APPENDIX 1

EDI BUSINESS MODEL

NOTICE: The material in this Appendix is an official part of SEMI T6 and was approved by full letter ballot procedures.

A1-1 Any implementation model is agreed upon by trading partners. It is the intent of this Document to make interpretation of the models used for transmitting electronic messages more consistent, so that implementations are based upon common practices.



A1-2 Attributes of EDI Messages

A1-2.1 *Certificate of Analysis (CA)* — One message containing measurement or statistical data for one shipment, from one supplier site to one user site, of one user part number against one user purchase order shipped. Multiple lot numbers may be included in the shipment.

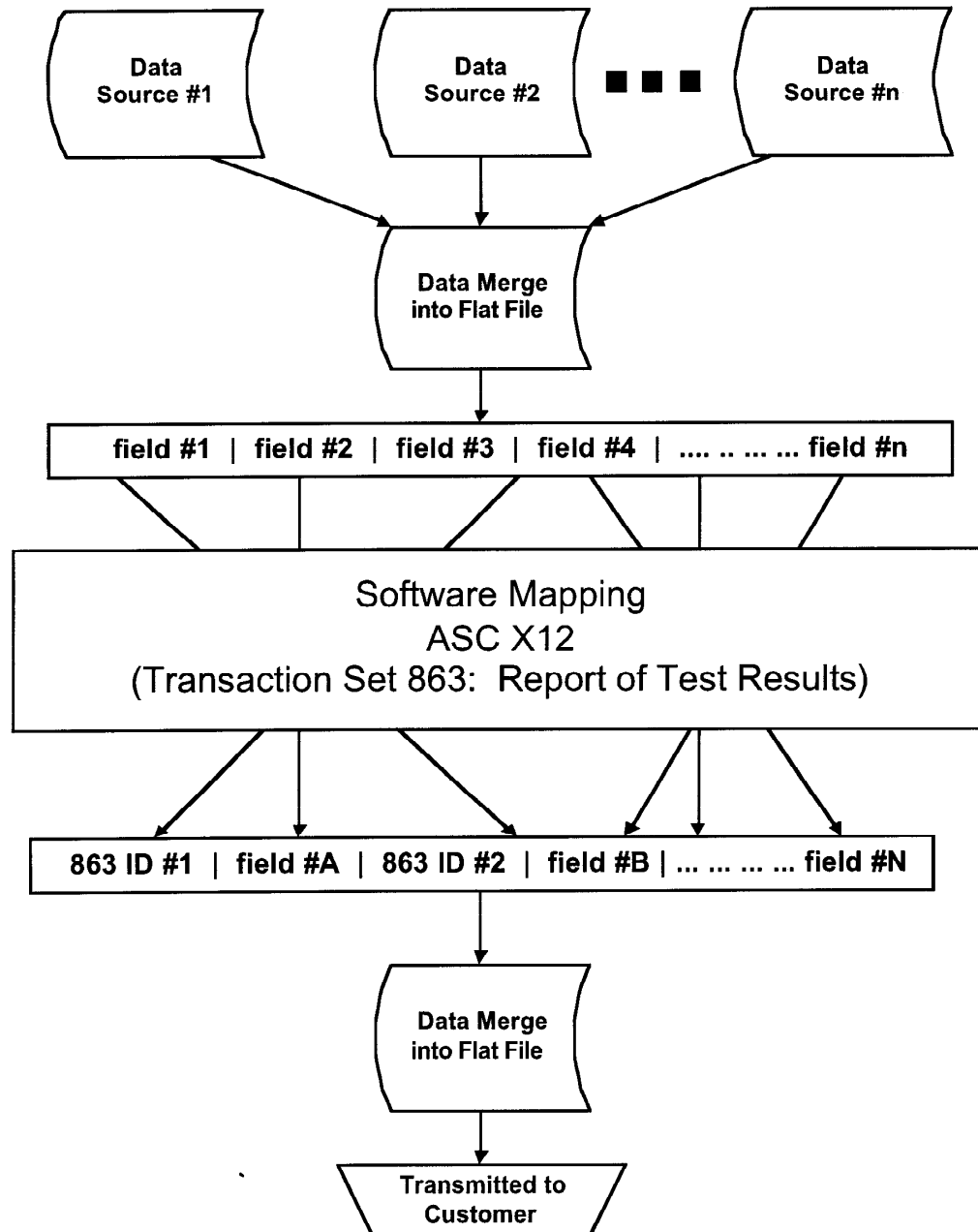
A1-2.2 *Test Results (RT)* — Used to designate data provided by special request (e.g., engineering, qualifications). This message contains specific measurement or statistical data for one request, from one trading partner to another trading partner, of one part number against one purchase order. Multiple lot numbers may be included.

A1-2.3 *Statistical Results (SR)* — One message containing measurement or statistical data for defined parameters for a period of time from one trading partner to another.

APPENDIX 2

EDI TRANSMISSION FLOWCHART

NOTICE: The material in this Appendix is an official part of SEMI T6 and was approved by full letter ballot procedures.



APPENDIX 3

NEW EDI STATISTICS (DEFINITIONS)

NOTICE: The material in this Appendix is an official part of SEMI T6 and was approved by full letter ballot procedures.

A3-1 Additions to ANSI's Statistical Codes to be Included within this Standard

A3-1.1 These new statistical codes are added to a predefined ANSI list of summary statistics found in Appendix 3 under the transaction segment STA. The codes are HS, HW, HC, GM, GS, PK, EC, OC, and PE and are submitted to ANSI for approval. The codes can be used in an EDI message as long as the trading partners agree to include them as part of their transmissions. Once the codes are approved, the ASC X12 convention will be updated to automatically accept these codes as standards.

A3-1.2 Histogram Information

A3-1.2.1 **HS** = Histogram Start (Left side of first class or bar)

A3-1.2.2 **HW** = Histogram Class Width (Width of class or bar)

A3-1.2.3 **HC** = Histogram Class Count (Count of classes or bars)

A3-1.3 Process Capability Information

A3-1.3.1 **GM = Geometric Mean (GMEAN)**. For the lognormal distribution, it's calculated as:

TMEAN = The mean of the natural log of the raw data values

GMEAN = $\text{EXP}(\text{TMEAN} + (\text{TSIGMA}^2)/2)$

A3-1.3.2 **GS = Geometric Sigma (GSIGMA)**. For the lognormal distribution, it's calculated as:

TSIGMA = The sigma of the natural log of the raw data values

GSIGMA = $\text{SQRT}((\text{EXP}((2 * \text{TMEAN}) + (\text{TSIGMA}^2))) * \text{EXP}((\text{TSIGMA}^2) - 1))$

A3-1.3.3 **PK** = The **peak** of the fitted probability distribution function. It's calculated as the maximum Y value of the probability distribution function after it is fitted to the process histogram.

A3-1.3.4 **EC = The equivalent normal Cpk (ECPK)**. For the lognormal distribution, it's calculated as:

$$\text{ECPK} = ((\text{LN}(\text{USL}) - \text{LN}((\text{GMEAN}^2 / (\text{SQRT}(\text{GMEAN}^2 + \text{GSIGMA}^2)))) / (3 * \text{SQRT}(\text{LN}(\text{GMEAN}^2 / \text{GMEAN}^2))))$$

A3-1.4 Outlier Information

A3-1.4.1 **OC = Outlier Count**. It may be calculated as A minus B, where A = the count beyond a chosen sigma point using the histogram, and B = the count beyond the chosen sigma point using the statistical distribution.

A3-1.5 Percentile Information

A3-1.5.1 **PE = Percentile**. Like the HG, it can be repeated to give different elements. The user and supplier need to agree on the order for a particular application.

APPENDIX 4

EDI TRANSMISSION COMPONENTS (863 REPORT OF TEST RESULTS)

NOTICE: The material in this Appendix is an official part of SEMI T6 and was approved by full letter ballot procedures.

A4-1 Introduction

A4-1.1 The purpose of this section is to provide the necessary information to enable trading partners to use the ASC X12 standards for the exchange of electronic business documents within the electronics industry.

A4-1.2 The transmission, in the ASC X12 format, is comprised of an outer envelope (transmission envelope) which identifies the sender and receiver. Within the transmission envelope are one or more functional groups.

A4-1.3 The functional groups are analogous to batches of like documents (i.e., certificate of analysis, test results, statistical results). Each functional group contains one or more transaction sets (electronic documents). Each transaction set is an ordered collection of segments. Each segment is an ordered collection of data elements.

A4-1.4 Each segment has been assigned a two or three character identifier.

A4-1.5 This identifier marks the beginning of each segment. Each element within the segment is separated by a data element separator character. Electronic Industry Data Exchange (EDIX) recommends the use of the asterisk (*) character as a data element separator. A segment terminator character is used to mark the end of a segment.

A4-2 Format

A4-2.1 The ASC X12 segment hierarchy lists all segments, in order, available from the ASC X12 standard. The segment ID's that are shaded indicate the segments utilized by EDIX. Following the ASC X12 segment hierarchy is a detailed description of each segment in the order that they appear in the transaction set.

A4-2.2 Each segment is listed with the segment ID and name, level (header, detail, or summary), loop (if the segment is contained within a loop), loop repeat (for the first segment in the loop), requirement within the transaction set, maximum use, purpose (as defined by ASC X12), ASC X12 syntax notes, ASC X12 comments for segment usage, and notes that explain the EDIX convention for this segment within the transaction set. It is important to note all shaded text is either an EDIX convention or EDIX terminology. Shaded coded lists refer to recommendations culled from the entire ASC X12 data element code list. The unshaded areas contain definitions and comments from the ASC X12 standard.

A4-2.3 The data element summary lists each data element, in order, for the segment; for each data element there is one line to identify reference designator, data element number, data element name, and attributes.

A4-2.4 Below the one line summary are usage notes and actual values identified for use.

A4-2.5 *Reference Designator* — This is the segment identifier with the data element sequence number within the segment.

A4-2.6 *Data Element Number* — This is the number assigned to the data element by ASC X12. This number may be used for direct reference into the ASC X12 Data Dictionary.

A4-2.7 *Data Element Name* — This is the name assigned to the data element by ASC X12, in the ASC X12 Data Dictionary.

A4-2.8 *Attributes* — Each data element has three ANSI attributes: element usage, element type, and Minimum/Maximum length.

A4-2.9 *Element Usage*

M Mandatory Designer

This is the segment identifier with the data element sequence number within the segment.

O Optional

The data element may be used if the segment is used.

X Conditional

The data element may be used only if other elements are used within the segment.

The particular condition/relation will be stated in the Data Element Summary for the segment when used.

A4-2.10 Element Type**ID Identifier**

Values for the identifier-type data elements are taken from a predefined list in the ASC X12 data element dictionary.

AN String

Values for the string-type data elements are a sequence of any printable characters.

DT Date

Values for a date-type data element are in the format YYMMDD.

TM Time

Values for a time-type data element are in the format HHMM expressed in a 24-hour clock.

Nx Numeric

Values for a numeric data element are in an implied decimal format, where “X” indicates the number of places to the right of the decimal point.

i.e.,

N0 is a whole number (999.)

N2 is 999.99

R Decimal

This is a numeric field in character format, with a decimal point included. It is treated as alpha/numeric. The decimal point is not sent for whole numbers. For example,

to send the number 0128.734, the field would contain “128.734”.

to send the number 0789.00, the field would contain “789”.

A4-2.11 Minimum/Maximum

A4-2.11.1 This is the minimum and maximum length the field can be. For example,

- 02/02 — fixed length of 2 characters.
- 04/09 — Minimum length of 4 characters and maximum length of 9 characters.

863 Report of Test Results – Overview

Heading: This section of information appears one time at the beginning of each transaction. The information is targeted at the identification of “Who is sending What to Whom, Where, and When.”

<i>SEMI USE:</i>	<i>Pos. No.</i>	<i>Seg. ID</i>	<i>Name</i>	<i>Req. Des.</i>	<i>Max. Use</i>	<i>Loop Repeat</i>
M	010	ST	Transaction Set Header	M	1	
M	020	BTR	Beginning Segment for Test Results	M	1	
X	040	REF	Reference Numbers (Order & Material Ident.)	O	12	
O	060	PID	Product/Item Description (Commodity ID)	O	200	
LOOP ID - NI						>1
M	080	N1	Name (Buyer & Seller Company)	O	1	
O	090	N2	Additional Name Information	O	2	
O	100	N3	Address Information	O	2	
O	110	N4	Geographic Location (Buyer & Seller Site)	O	1	
LOOP ID - PER						>1
O	130	PER	Administrative Communications Contact	O	1	

Detail: This section of information appears as often as necessary during the transaction. The information deals directly with the data specific to the product or process of the supplier.

<i>SEMI USE:</i>	<i>Pos. No.</i>	<i>Seg. ID</i>	<i>Name</i>	<i>Req. Des.</i>	<i>Max. Use</i>	<i>Loop Repeat</i>
LOOP ID - LIN						>1
M	010	LIN	Item Identification (Primary Data Loop)	O	1	
O	034	QTY	Quantity	O	10	
X	040	DTM	Date/Time Reference	O	10	
LOOP ID - CID						>1
M	060	CID	Characteristic/Class ID	O	1	
O	100	SPS	Sampling Parameters for Summary Statistics	O	>1	
O	120	DTM	Date/Time Reference	O	10	
LOOP ID - MEA						>1
X	150	MEA	Measurements	O	1	
O	170	REF	Reference Numbers	O	10	
LOOP ID - STA						>1
X	180	STA	Statistics	O	1	
O	195	REF	Reference Numbers	O	10	
LOOP ID - TSP						>1
M	210	TSP	Test Period or Interval	O	1	
LOOP ID - LM						>1
M	242	LM	Code Source Information	O	1	
M	244	LQ	Industry Code	M	>1	

Summary: Transmission segments to mark the end of the transaction set.

<i>SEMI USE: Pos. No. Seg. ID</i>	<i>Name</i>	<i>Req. Des.</i>	<i>Max. Use</i>	<i>Loop Repeat</i>
O 005 CTT	Transaction Totals	O	1	
M 010 SE	Transaction Set Trailer	M	1	

Transmission Segments and Data Elements:

Segment:	ST Transaction Set Header
Level:	Heading
Loop:	_____
Usage:	Mandatory
Max Use:	1
Purpose:	To indicate the start of a transaction set and to assign a control number.
Semantic Notes:	1 The transaction set identifier (ST01) used by the translation routines of the interchange partners to select the appropriate transaction set definition (e.g., 810 selects the invoice transaction set).

Data Element Summary

<i>SEMI USE:</i>	<i>Ref. Des.</i>	<i>Data Element</i>	<i>Name</i>	<i>Attributes</i>
M	ST01	143	Transaction Set Identifier Code	M ID 3/3
			Code uniquely identifying a Transaction Set.	
		863	X12.41 Report of Test Results	
M	ST02	329	Transaction Set Control Number	M AN 4/9
			Identifying control number that must be unique within the transaction set functional group assigned by the originator for a transaction set.	

Segment:	BTR Beginning Segment for Test Results
Level:	Heading
Loop:	_____
Usage:	Mandatory
Max Use:	1
Purpose:	To indicate the beginning of a test results transaction set.
Semantic Notes:	1 If BTR01 equals 01, 02, 03, 04, 05, 18, or 19, then BTR06 is required to identify the original test report reference number transmitted. 2 BTR02 is the date that this transaction set was created by the sending party. 3 BTR03 is the time that this transaction set was created by the sending party. 4 BTR05 specifies test results report reference number created by the sending party.
Comments:	This segment is used to identify date and purpose of the data transmission.

Data Element Summary

<i>SEMI USE:</i>	<i>Ref. Des.</i>	<i>Data Element</i>	<i>Name</i>	<i>Attributes</i>
M	BTR01	353	Transaction Set Purpose Code Code identifying purpose of transaction set. 00 Original 18 Reissue	M ID 2/2
M	BTR02	373	Date Date (YYMMDD). Seller generated date representing the data collection date or other mutually agreeable date. Not associated with the lot/date code of the material.	M DT 6/6
O	BTR03	337	Time Time expressed in 24-hour clock time as follows: HHMM or HHMMSS, or HHMMSSD or HHMMSSDD, where H = hours (00-23), M = minutes (00-59), S = integer seconds (00-59) and DD = decimal seconds are expressed as follows: D = tenths (0-9) and DD = hundredths (00-99). Seller generated time representing the data collection time or other mutually agreeable time. Not associated with the lot/date code of the material.	O TM 4/8
M	BTR04	755	Report Type Code Code indicating the title or contents of a document, report, or supporting item. CA Certificate of Analysis RT Report of Tests and Analysis Report SR Statistical Report	O ID 2/2
X	BTR05	127	Reference Number Reference number or identification number as defined for a particular Transaction Set, or as specified by the Reference Number Qualifier. Seller's unique shipment identification code visible on the shipping container and/or shipping paperwork that identifies the link to the data in a single Transaction Set. (Examples: Invoice No., Shipper No., Work Order No., etc.)NOTE: In the case of a re-transmittal (Purpose Code 18, reissue) of previous data due to correction or loss of data, this data element repeats the information from the prior transmission to be replaced.	O AN 1/30
O	BRT06	127	Reference Number Reference number of identification number as defined for a particular Transaction Set, or as specified by the Reference Number Qualifier.	O AN 1/30

Segment: REF Reference Numbers (Order & Material Ident.)
Level: Heading
Loop: _____
Usage: Optional
Max Use: 12
Purpose: To specify identifying numbers.
Syntax Notes: 1 At least one of REF02 or REF03 is required.

Comments: 1 It is recommended for use and for report types CA and RT.
 2 BTR03 is the time that this transaction set was created by the sending party.
 3 It is not repeated once for each REF01 Qualifier determined by mutual consent between the Buyer and Seller as required.

Data Element Summary

SEMI USE:	Ref. Des.	Data Element	Name	Attributes		
M	REF01	128	Reference Number Qualifier Code qualifying the Reference Number.	M	ID	2/2
			BV Purchase Order Line Item Identifier (<i>Buyer</i>)			
			MF Manufacturer's Part Number (<i>Seller</i>)			
			PM Part Number (<i>Buyer</i>)			
			PO Purchase Order Number (<i>Buyer</i>)			
			PP Purchase Order Revision Number (<i>Buyer</i>)			
			RE Release Number (<i>Buyer</i>)			
			S3 Specification Number (<i>Buyer</i>)			
			SZ Specification Revision (<i>Buyer</i>)			
			YB Revision Number (<i>Buyer</i>)			
			ZZ Mutually Defined			
X	REF02	127	Reference Number Reference number or identification number as defined for a particular Transaction Set, or as specified by the Reference Number Qualifier.	X	AN	1/30
O	REF03	352	Description A free-form description to clarify the related data elements and their content.	X	AN	1/80