Master Data of ERP Retail EAN/GTIN

Applies to:

SAP ERP Retail – all releases. For more information, visit the Business Process Expert homepage.

Summary

This document will give you an overview about the capabilities of SAP to handle 'EAN/GTIN'. It will not be another kind of help documentation, but more a deep dive into the architecture, process flow and influence factors. It will give you tips and tricks about customizing, number ranges, additional external knowledge sources and a kind of trouble shooting guide.

Disclaimer

The information in this document is a collection based on sources from the former EAN organization now known as Global Standards One (GS1). Details about the latest valid versions can be found at www.gs1.org

Author: Björn Panter – Development Architect

Company: SAP AG - Trade Engineering

Created on: 23 October 2008

Author Bio

Started 1998 at SAP as developer in support area for IS Retail Masterdata, I collected many experiences in different customer projects or interal lines of business. Most time focussed on Master Data topics of ERP Retail or ERP PLM. Currently I'm working in the Trade Engineering Team.

Table of Contents

What is an EAN?

The EAN is the name for international article number (former European article number) and represents a unique identifier for retail products. Every retail product (article) received a unique number of the length 8 or 13 digits defined by the GS1 organization. As mentioned this encoding was used in the European market. But later on the EAN-13 was used worldwide.

In North America, the Universal Product Code was more popular. With the length of 12 digits the semantic was more complex. The usage of defined prefixes represented special subsets of goods. Furthermore compression logic could be used to create zero-compressed 6 digit UPC-E version of a 12 digit UPC-A code to allow barcode printing on small packages.

Elements on an EAN code

In most cases an EAN code is a pure numeric number. But the semantic of the single digits have their own meaning.

Prefix

The GS1 Prefix is a two or three digit number jointly administered and issued by EAN International and GS1. They are allocated to each GS1 Member Organization and their main purpose is to allow decentralization of the administration of identification numbers.

The prefix and the Company Number form the GS1 Company Prefix which is assigned to each system user by an EAN Member Organization or UCC. EAN and UCC assign Company Prefixes to entities that administer the allocation of the GS1 identification numbers. These entities may be commercial companies, not for profit organizations, governmental agencies, business units within organizations, etc. The criteria to qualify for the assignment of a GS1 Company Prefix are set by the EAN Member Organizations and the UCC.

The Item, Serial, Location, Asset or Service Reference is assigned by the system user. Rules for its allocation depend on the particular application. EAN/UCC-8 Identification Numbers are available from numbering organizations.
 The prefix is also used to identify the code, the currency, the member, the vendor etc.
E.g. in the JAN (Japanese article code) the prefix is a 3 digit number in range (450-459,490-499); for

Check digit

A check digit is a form of redundancy check used for error detection, the decimal equivalent of a binary checksum. It consists of a single digit computed from the other digits in the message. With a check digit, one can detect simple errors in the input of a series of digits, such as a single mistyped digit, or the permutation of two successive digits. The check digit, if used for EAN type is located at the right position on a barcode.

For instance, the UPC-A barcode for a box of tissues is "036000291452". The last digit is the check digit "2", and if the other numbers are correct then the check digit calculation must produce 2.

A GS1 check digit calculator and detailed documentation is online at GS1's website.

Different EAN types

The GS1 system provides data structures for different applications. The application will determine how the number is to be used, but regardless of application each number must be used in its entirety and not broken down into constituent parts. The data structure guarantees worldwide uniqueness within the relevant area of application.
The following roster of popular barcode types will show you the capabilities in the world.

Code	Description	Code length
EAN-13	European Article Number	13
RCN	Restricted Circulation Numbers (perishable, weight)	13
ISBN	International Standard Book Number	10, 13
ISRC	International Standard Recording Code	12
ISIN	International Securities Identification Number	12
EAN-8	European Article Number (Short)	8
UPC-A	Universal Product Code	12
UPC-E	Universal Product Code (Short)	6
PZN	Pharma Zentral Nummer	7
ISMN	International Standard Music Number	10 (13)
ISSN	International Standard Serial Number	8 (13)
EAN-14 (GTIN)	Global Trade Item Number	14

GLOBAL TRADE ITEM NUMBER (GTIN)

The GTIN is used for the unique identification of trade items worldwide.

A trade item is any item (product or service) upon which there is a need to retrieve pre-defined Information and that may be priced or ordered or invoiced at any point in any supply chain. This includes Individual items as well as all their different configurations in different types of packaging.

Each of the following four data structures provides unique numbers when right justified in a 14-digit field. Global Trade Item Number (GTIN) is the new term for the 14-digit data structure to uniquely identify trade items (products and services) within the EAN•UCC system.

The GTIN combines the following different formats under one hat.

- EAN/UCC-14
- EAN/UCC-13
- UCC-12
- EAN/UCC-8

The above-mentioned data structures provide unique identification when processed in a 14-digit data field As shown below:

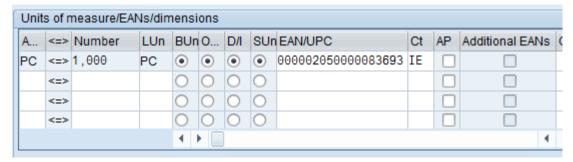| Data Structures	14-digit Global Trade Item Number (GTIN)*													
	T_1	T_2	T_3	T_4	T_5	T_6	T_7	T_8	T_9	T_{10}	T_{11}	T_{12}	T_{13}	T_{14}
EAN/UCC-14	N_1	N_2	N_3	N_4	N_5	N_6	N_7	N_8	N_9	N_{10}	N_{11}	N_{12}	N_{13}	N_{14}
EAN/UCC-13	0	N_1	N_2	N_3	N_4	N_5	N_6	N_7	N_8	N_9	N_{10}	N_{11}	N_{12}	N_{13}
UCC-12	0	0	N_1	N_2	N_3	N_4	N_5	N_6	N_7	N_8	N_9	N_{10}	N_{11}	N_{12}
EAN/UCC-8	0	0	0	0	0	0	N_1	N_2	N_3	N_4	N_5	N_6	N_7	N_8

*Where T represents the position of each individual digit in a computer file format, N represents the position of each individual digit in a given data structure, and 0 represents a filler digit.

Simply by adding leading zeros in front of the existing types, we will receive a new combined type. The benefit here, the structured remains unchanged, the number ranges will not overlap and it is easy to customize. The big advantage of the SAP ERP system is that no altering of existing master data on database must be done.

Where to find EANs in a SAP system?

The assignment of EAN/GTINs can be made in the article master or material master.

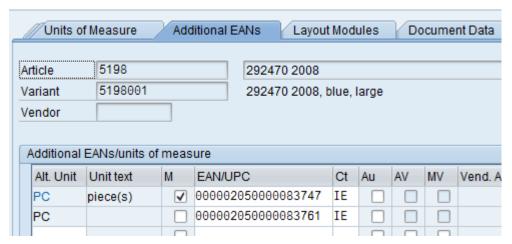### Classical maintenance view in the basic data

Represent the main EAN code for a given unit of measure. If the radio button 'Base Unit' is set, the EAN is valid for the base unit of measure. In this case this EAN code will be send to external system like POS.

If you activate the flag 'AP' the check digit will be recalculated.

The flag 'Additional EAN' will be activated as soon as further EAN codes are available for this specific unit of measure.

Additional EANs

This maintenance view can be reached via button 'Additional data' in the header. You are able to add further EAN codes to the article. The flag 'AU' determines the check digit and to recalculate it.

The flags AV, MV are used for vendor specific EAN codes. The maintenance mode is only available if you enter the article master with a valid vendor. The name of the vendor will be visible the header of the screen.

The field vendor article number is maintainable only for variants of a generic article. The correct place to maintain vendor article numbers is the info record. But based on fact that variants of a generic article have no own info record a fall back logic will determine the vendor article number from this screen.
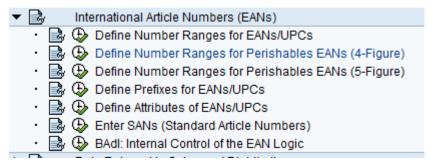
Customizing
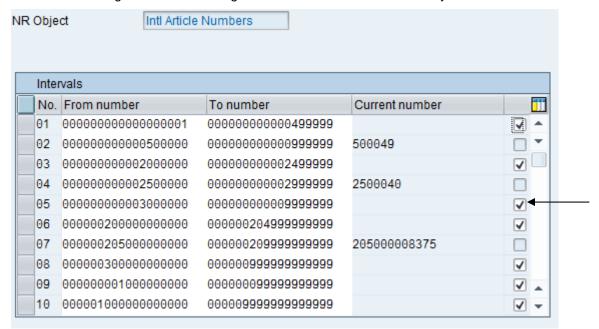
The customizing of EANs can be found in IMG in path

Logistics - General

> *Material Master*

> *Settings for Key Fields*

> *International Article Numbers (EANs)*

Number Range Customizing

We start with the general number ranges for classical EAN/UPCs or today GTINs.

Every number range shall cover an interval where the wished EAN number will fit it. Please remark, that the number range represents the EAN always without the check digit. That means if you have an EAN-14(GTIN) number, you have to define or reuse a number range with 13 digits. In our example here we would use the number range 10.

 Further we have to ensure that a number range will be internal or external. The difference is simple. External number ranges must be entered manually in the maintenance screens and will be checked against the interval. If you use an internal EAN type like IE, the system will draw the next free number from the internal number range. Please ensure that nobody will manually edit the value 'current number'. If you do this the system will be messed up. Internal number generation will not have a check implemented to validate duplicate usage of the same number for different articles. This check will be performed only for external numbering.

The maintenance for perishable or weight EANs are the same, but with a reduced length of the EAN. The number range will not represent the full EAN code, it is more the internal or external number for a defined product code determined at a scale directly in market. (Restricted Circulation Number)

Prefix Customizing

The prefix customizing will help you to determine prefixes for different use cases. In the central check routine for EAN handling, these prefixes will be checked against the EAN type attributes and EAN code.

The prefix has a length of 2 or 3 digits.

Pfx	Description of prefix
07	USA and Canada (UCC)
08	USA and Canada (UCC)
09	USA and Canada (UCC)
20	Internal numbering
21	Weight EAN, var. price + indl art. no.
22	PerishEAN, var. pr., SAN, trad. unit dgt
25	Weight EAN, var. pieces + indl art. no.
26	Weight EAN, variable pieces and SAN
27	Weight EAN, variable price and SAN
28	Weight EAN, var. weight + indl art. no.
29	Weight EAN, variable weight and SAN
30	France (GENCOD)

SAP EAN Type Customizing (Attributes)

The most important part of the EAN customizing is the area of attribute definition for the EAN types. The definition of such an EAN type is SAP specific. It is an additional identifier for end-users to see what kind of EAN code is behind.

Let us see an example to make it easier.

Ct	Number category description
01	Test EAN Group01
E5	PerishEAN, var. wt, indl art. no. 5-fig.
EA	PerishEAN, var. pr, indl art. no. 4-fig.
FS	
HE	Manufacturer EAN
HK	Manufacturer short EAN codes
I6	ITF code, 16-character
IC	ITF codes
IE	Instore EAN (int. assignment possible)
IK	Instore short EAN (int.assignment poss.)

Starting the attribute customizing you will find the figure above.

If you will see an EAN code e.g. 4011111102008 and a code 2050000002182. Do you know what it is? Of course the numbers are different, but what is the meaning behind? That's the reason why SAP introduced the EAN type. This type will help to understand the logic behind such an EAN code and will also trigger some follow up processes. But it will have no impact on external interfaces to other systems. In this case only the pure number will send out.

We will focus on the setting of the HE Manufacturer EAN code.

In the field EAN category, you are able to define a nice name for your EAN type. This name will be shown in article master data, if you call the search help.

The number range object will allow you to select the wished number range object. The default entries are

- EUROPARTNR for common EAN/GTIN

- EANGEWICH5 for perishable weight EANs 5 digits

- EANGEWICHT for perishable weight EANs 4 digits

The internal and external number ranges control how to handle the EAN.

If there is no internal number range assigned, in article maintenance you will not be able to enter only the EAN type to draw the next free number from the number interval. Manual entered EAN codes will be checked against the external number range interval.

The check-digit algorithms will provide a list of hard coded rules how to determine the last digit of the code or to validate the last digit.

Entering a 12 digit code with EAN type HE will automatically lead to a calculation of the needed check digit. Wrong check digits will be adopted if they are wrong.

Caution: If you are not using a check digit algorithm, you have to ensure that your assigned number range is longer.

Fresh produce prefix (I guess this is an error in translation) is the prefix for the EAN code. For general GTINs it makes no sense to check against a prefix. In general, the system will check if the prefix of the EAN code will fit in any available prefix value. If you enter here a defined restriction, the code must fit and the corresponding prefix must be used. This feature will be used for RCNs or Coupons.

EAN length is the most important setting for the EAN types. It controls the output in screens and printers. The issue with migration the EAN-13 to EAN-14/GTIN format can be handled also by changing some setting without modifying the master data on database. (Example will follow)

We close the settings with the field 'Alphanumeric EANs'. This is a setting for the future to prepare the SAP system to support also characters within an EAN code. Sometimes used for customer specific internal EAN codes.

Technical references

How SAP will save the EANs on database

Within an SAP system the EAN code will be saved on database always without leading zeros. Sounds strange but makes sense. With the help of this setting in any output scenarios of EAN codes, the system will fill up the EAN code with leading zeros until the wished number of output digits will be reached. This feature will be handled by a SAP conversion exit in the background. This conversion exit is also responsible to convert UPC-E into UPC-A formats and reversely.

Number Range Objects

As mentioned before there are only 3 pre defined number range object supported

- EUROPARTNR for common EAN/GTIN
- EANGEWICH5   for perishable weight EANs 5 digits
- EANGEWICHT   for perishable weight EANs 4 digits

Caution: You are able to use your own customer specific number range object to be created via SNRO. But we do not recommend this. The validity check against number ranges to determine double entries or overlapping will work only within a number range object.

Frequently asked questions

1. Why are leading zeros not stored in the database?

Leading zeros are not saved in the SAP system as these are not necessary according to the EAN standard. For example, EAN '123' is identical with EAN '00123', thus the leading zeros are superfluous. As of Release 4.5B, you can set the display of leading zeros in Customizing.

2. Can I use numbers in UPC-E format (UPC short format) in a release earlier than Release 4.5B or why are leading zeros not displayed?

Both are only possible as of Release 4.5B. A downgrade of the function necessary for this purpose is not possible.

3. Why does the number range not work for numbers in the UPC-E format?

Numbers in the UPC-E format are internally saved in the same format as numbers in the UPC-A format, the numbers are only represented in a reduced form for the display. Therefore, in Customizing, you must set the same number range as for numbers in UPC format.

4. Why does the system issue error message WE 109 ("The interval & was not found"), even though Customizing for the EAN to be maintained is correct?

Check whether a non-existing number range is assigned to another EAN type. This must be corrected as the system might check which EAN type matches the EAN. Therefore, Customizing must always be consistent. Remove all EAN types and number ranges that you do not require.

In addition, you can use a user-defined number range object, but Note 381788 that is required for this is not yet implemented.

5. How do I maintain alphanumeric EANs?

 In Transaction W4ES in the detail view of the EAN category, you must activate the 'Alphanumeric' indicator. Here the number range that is assigned externally must have leading zeros.

6. How do I extend EAN Customizing for the EAN14 standard?

For information about this topic, refer to the presentations of the UCC standard organization that are attached to this note 545520. According to this, you do not have to create a parallel EAN type for EAN14 for the existing EAN type for EAN13 and you cannot do this either due to number range overlaps. You should rather change the EAN type for EAN13 to the EAN14 format by increasing the number range and, as of Release 4.5B, by changing the length of the EAN number to 14 to display the leading zeros.

9

7. Why does the system change the EAN types, even though the EAN fits into the interval?

Check your Customizing for inconsistencies. The number ranges must be maintained correctly both in Transaction W4ES and in Transaction W4EN. The intervals must not overlap. Ensure that leading zeros are not written to the database. A further option is: Truncating leading zeros and check digits are before the type is checked. Therefore, the EAN can fit into several intervals. The system takes the EAN type that it finds first. This should also be taken into account in Customizing.

8. Why does the system issue error message WE 110 ("The interval & is not external")?

Check your Customizing. If the number range is maintained as an external number range in Transaction W4ES, you must also maintain it as an external number range in Transaction W4EN

9. Why does the system issue error message WE 219 ("The EAN & has an invalid prefix") even though the prefix is correct?

Check your Customizing to see whether the prefix is entered in the corresponding table. Follow the menu path:

Logistics - General
> Material Master
> Settings for Key Fields
> International Article Numbers (EANs)
> Define Prefixes for EANs/UPCs.

Here you can add the required prefix if it does not exist. All prefixes of the CCG with their meanings are maintained in the standard system. If new prefixes are defined by the CCG these must be updated and expanded.

10. How to maintain a PZN in SAP ERP?

Please find details in note 917551

11. How to check my EAN customizing?

Please check out note 879460. It will provide the following reports to check your customizing

The reports EAN_CHECK and EAN_CUSTOMIZING are available in any SAP ERP system. They can help you to find errors in your EAN customizing and provides tips to solve issues.

Report: EAN_CHECK

With a given EAN/GTIN/UPC code you can test if this code will fit into you customizing.

Report : EAN_CUSTOMIZING

This tool will help you to find some inconsistencies in your master data and will give you hints to solve them.

12. Am I able to implement my own check digits algorithms modification free?

Please check note 880520 and implement the BAdI BADI_EAN_SYSTEMATIC

13. I'm reading EAN codes directly from the table MEAN, but the leading zeros are missing?

If you read EAN codes directly from the table MEAN, they are always in an unformatted status. Please use the function modules CONVERSION_EXIT_EAN11_OUTPUT to add leading zeros or convert it into the UPC-E format.

14. How to maintain multiple EANs for one article?

If you want to add multiple EANs to an article, please follow the steps on page 5. Under 'additional data' there is a tab view 'Additional EANs'

Please avoid use of same EAN code for different articles.

Appendix

Transactions

W4ES	EAN Type maintenance
W4EN	Number range maintenance EUROPARTNR
W4E5	Perishable EAN Number ranges (5 digits)
W4EM	Weight EAN (4 digits)

Tables

MEAN	Main EAN Tables, contains all EAN in system
MARM	Units of measure – assignment to the EAN for a UNIT
MARA	Material basic data – do not use this EAN or field (deprecated)
MLEA	Vendor specific EAN table
TNTP	Customizing for EAN

Function Modules and Reports

EAN_SYSTEMATIC

Main function to process EAN logic

Conversion_Exit_EAN11_OUTPUT

Function module to check output

Conversion_Exit_EAN11_INPUT

Function module to convert an EAN into the SAP format

Reports

EAN_CHECK

Check Tool for EAN codes

EAN_CUSTOMIZING

Check too for EAN customizing inconsistencies

Customer Exits and BADIs

BADI_EAN_SYSTEMATIC

Customer individual processing

Notes

545520	FAQ for EAN handling
879460	Check reports for EAN customizing
917551	Pharmazentralnummer
381788	Customer specific number range processing
880520	BAdI Extensions for EAN handling

Please have a look at http://service.sap.com/notes and look for the latest EAN specific features always delivered in support packages for your convenience.

Related Content:

Training Content 'SAP Retail Master Data' IRT310

    PLM110 (Basic Data1)

    PLM112 (Customizing Master Data)

For more information, visit the [Business Process Expert homepage](#).

Copyright