

INTERNATIONAL FEDERATION FOR ANIMAL HEALTH

GUIDELINES FOR APPLICATION OF EAN UCC MARKINGS TO ANIMAL HEALTH PRODUCTS

Version 1, 01/2005

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1. Introduction

IFAH has agreed on a unique worldwide identification principle for Animal Health products production batches. Unique identification provides opportunity to differentiate with an optical machine readable marking the batch throughout the supply chain and is a pre-requisite for traceability of Animal Health products from production to application. It will increase products security and give logistic advantages in the warehouses.

This guideline is developed as a requirement, so that, when and where product identification is required, there will be consistency in the use of a data structure worldwide. This guideline specifies the use of EAN.UCC application identifiers (AI's) within a Data Matrix symbology for encoding the data. As appropriate, this document is based on the EAN.UCC Guidelines for Data Matrix.

Data Matrix is an accepted symbology in the EAN.UCC system. Data Matrix symbols are to be printed on all secondary packaging of the registered units of sale. The encoded information will contain the product number, lot number and the expiry date. The product number will be a 14 digit Global Trade Item Number (GTIN) or EAN-13.

Data Matrix was selected because of its small size, error correction, low contrast requirements and the amount of data that can be encoded compared to one-dimension codes.

Please note that the Data Matrix is not a retail point of sale bar code like EAN or UPC. The purpose of the bar code is as an aid to record electronically Product ID, Expiry Date and Lot Number.

2. Scope

All Animal Health products including feed additives are to be codified according to the present guidelines.

Use of this process, together with appropriate IT systems will allow accurate electronic tracking and tracing of products.

It can be applied on homogenous bundles and shippers using linear EAN128 or 2 dimensional symbols (out of EAN.UCC standard) with the same EAN.UCC syntax including the Quantity Application Identifier.

3. Normative references

The standards listed below are referenced in these guidelines. The relevant provisions contained in the referenced specifications constitute provisions of these guidelines.

- General EAN.UCC Specifications
- ISO/IEC 15415 Bar Code Print Quality Test Specifications – 2D symbols
- ISO/IEC 15418 EAN/UCC Application Identifiers and Fact Data Identifiers

and Maintenance.

- ISO/IEC 15426-2 Bar Code Verifier Conformance Specification – Part II: 2-D
- ISO/IEC 16022 Information Technology – International Symbolology Specification – Data Matrix

4. Symbols and Abbreviated Terms

| | |
|-------------|---|
| 1D | One dimensional or linear |
| 2D | Two-dimensional |
| DM | Data Matrix |
| AI | EAN.UCC Application Identifier |
| GS1 | Global Standard 1 (former EAN International) |
| GTIN™ | EAN.UCC term for Global Trade Item Number™. A GTIN may be a 12 digit UPC-12, 13 digit EAN-13 or a 14 digit EAN.UCC-14. For this document a 14 digit number is used to identify the product. |
| IFAH | International Federation for Animal Health |
| YYMMDD | Date expression of year, year month, month, day, day Note: the day (DD) is “00” if not applicable for expiry date. |
| UCC | Uniform Code Council, Inc. |
| HRI | Human readable interpretation |
| ECC200 | Error Check and Correction using the Reed Solomon algorithms. |
| UCC.EAN 128 | Coding system using application identifiers |
| UPC | Universal Product Code used for retailed items (12 characters) |

5. Syntax requirements: EAN.UCC 128 Data Syntax

The coding of data will follow the EAN.UCC 128 syntax described in this § 5. The coded data will be printed in a Datamatrix ECC200 symbol described at § 6.

5.1. Application identifiers in the EAN.UCC syntax

The Application Identifier system of the EAN.UCC128 allows data to be encoded in a standardized way recognized worldwide. The AI's are two three or four digit prefixes that are recognized by the bar code readers and give meaning to the data. The format can be fixed or variable length, numeric or alphanumeric. The complete list is available at EAN.UCC.

The EAN.UCC standard is to code the logistic unit. Two cases are envisaged:

a) the content is homogenous (same product, same batch) and correspond to a described standard and is numbered as a selling unit described in a catalogue: single unit, group of 12 sold as a commercial entity, pallet of 900 units sold as a commercial entity

Here after is given the list of codified Application Identifiers to be used according to the EAN.UCC standard with the standardized formats.

| AI | Description | Format of encoded data |
|----|-----------------------------|------------------------|
| 01 | Product Identification GTIN | 14 digits |
| 10 | Batch Number | 1-20 alphanumeric |
| 17 | Expiration Date | 6 digits: YYMMDD |

b) the content is homogenous (same product, same batch) and non standard, i.e. not a described standard: pallet of 843 units, box with 7 units

Here after is given the list of codified Application Identifiers to be used according to the EAN.UCC standard with the standardized formats.

| AI | Description | Format of encoded data |
|----|---|------------------------|
| 02 | GTIN of trade item contained in a logistic unit | 14 digits |
| 10 | Batch Number | 1-20 alphanumeric |
| 17 | Expiration Date | 6 digits: YYMMDD |
| 37 | Number of Units Contained | 1-8 digits |

5.2. Mandatory Data Elements

5.2.1. Product ID

The Global Trade Item Number is a 14 digits number that identifies unambiguously a commercial product described in a catalogue. Orders and invoices can be linked to that GTIN code.

Product ID is the GTIN identified by AI=(01). It identifies the registered product and standard packs grouping several units of the registered product described as a selling unit .

The format of the string following AI (01) is 14 numeric characters.

GTIN Syntax using EAN14:

A prefix in EAN14 indicates the group.

| Numbering 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 |

The code is composed of:

- A country prefix (country of subscription to GS1)
- A company prefix given by EAN organization in the country to the registration owner
- A sequential code given by the registration owner
- Check digit- for details please see www.gs1.org Check Digit Calculation

Check character

The code is not linked to the production location neither to the distribution location.

5.2.2. GTIN of trade item contained in a logistic unit: AI(01) and (02)

When having several levels of commercial groups of the same product, each level can be coded with a GTIN. For example this GTIN begins by the numbering of the level of group concerned: 0 is the single unit, 1 the next group (for instance the group of 10 units), 2 the next group (for instance 10 groups of 10) etc. In that case the different groups must be defined and communicated to the customers as selling entities. The interest of groups is to avoid scanning each individual item.

AI(01) is used for identifying this pre-defined groups.

AI=(02) identifies the GTIN of trade item contained in a non standard logistic unit. The format of the string following (02) is 14 numeric characters.

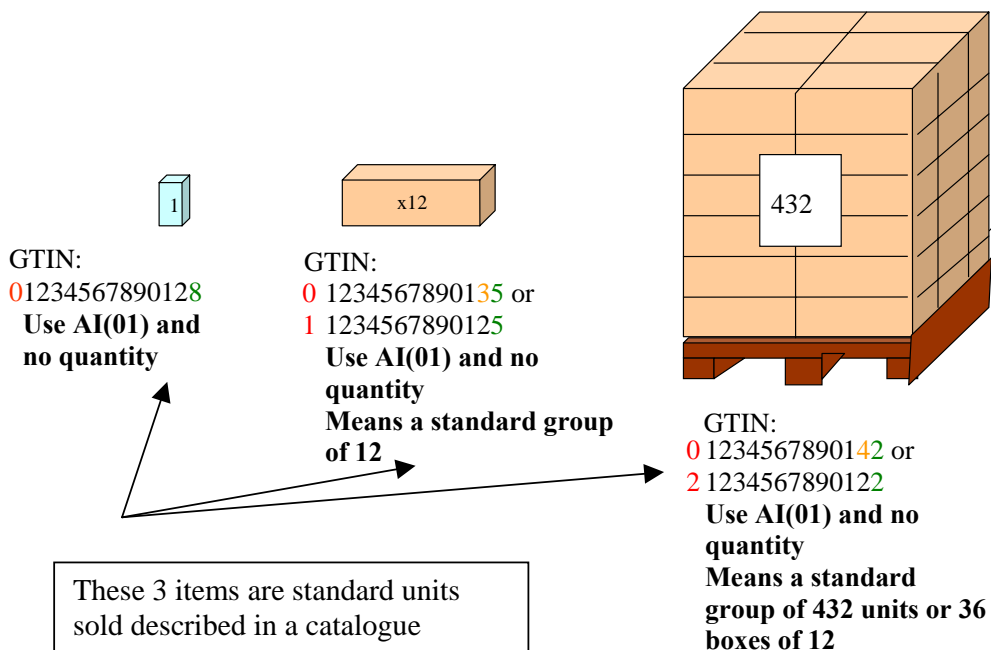
The following GTIN is the one of the unit contained and the usage of an AI (37) with a quantity is required.

The Indicator in an EAN/UCC-14 Identification Number allows each user to increase the numbering capacity when identifying similar trade units in different packaging configurations.

Indicator: A digit to complete the particular identification number or to add some sort of significance to the GTIN. The digits that may be used are 1 to 8 to denote packaging configuration (for example a case of 12 retail items could use indicator 1, while a case of 24 retail items could use the indicator 2. etc). The digit 9 in this position is not to be used since it denote a variable measure trade item. EAN.UCC GTIN of contained trade item (without check digit) : The GTIN of the contained unit, normally the lowest level of packaging, is the basis for this numbering structure. The GTIN of the contained item is based on the EAN.UCC-13 numbering structure.

Two options are available.

a) Option 1: numbering each pre-defined consecutive group with a different GTIN or using the indicator and use AI(01):



It means that each level is a commercial unit

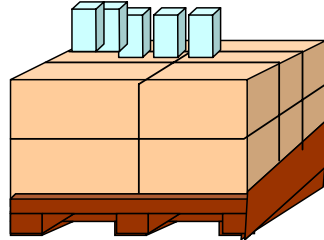
- Unit: 01234567890128
- Group of 12 01234567890135 or
11234567890125 1 box of 12 items of 01234567890128
- Pallet 01234567890142 or
21234567890122 36 boxes of 12 or 432 units

b) Option 2: the group is not defined as a commercial unit, use AI(02) plus quantity with the GTIN of the item contained:

It means that only the single unit is a commercial unit

- Unit: 01234567890128 always with AI(01)

- Group of 12 (02)01234567890128(37)12
- Pallet (02)01234567890128(37)432 432 units of 01234567890128
- Incomplete pallet (02) 01234567890128(37)149
149 units of 01234567890128



Examples are given in § 13 below.

For information check digit calculation for EAN13/EAN14

| | | | | | | | | | | | | | | |
|--|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| EAN.UCC-13 | | 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 |
| 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 |
| Multiply value of each position by | | | | | | | | | | | | | | |
| | x3 | x1 | x3 | x1 | x3 | x1 | x3 | x1 | x3 | x1 | x3 | x1 | x3 | |
| Accumulated results = Sum | | | | | | | | | | | | | | |
| Subtract sum from the next highest multiple of ten = Check digit | | | | | | | | | | | | | | |

5.2.3. Batch number

AI=(10)

The batch number is assigned at the point of manufacture. The code is alphanumeric and is variable up to 20 alphanumeric characters.

5.2.4. Expiry date

AI=(17)

The expiry date is often referred to as "use by date" or "maximum durability date" and indicates the date by which the product should be used. It is always encoded as a fixed length 6 numeric characters: YYMMDD

If the day is not specified, the DD must be filled with two zeros. (e.g. (17)070500).

5.3. Optional data elements- Application identifiers

Other data elements are available under the EAN.UCC standards and can be used.

5.3.1. Quantity

AI=(37)

Length is variable up to 8 numeric characters.
It is compulsory to use it after AI (02).

5.3.2. Others

Other data elements are available according to EAN.UCC AI list.(www.gs1.org). For example, a serial number, a weight, dimensions etc...

The following parts concentrate on the technical details of bar code printing and scanning. It forms a useful basis for the service provider to give them the necessary technical background. Once the appropriate equipment has been purchased and correct procedures established, the production of correct bar code may be largely automated.

6. Symbol syntax Data Matrix ECC200

Data Matrix Symbol using EAN.UCC Function Code 1 syntax. Protocol for FNC1

Function 1 (FNC1) is a specific function of EAN 128.

When FNC1 (Codeword ASCII value 232) appears in the first character position, it shall signal that the data conforms to the EAN.UCC Application Identifier Standard format. FNC1 in any other later position acts as a field separator. Transmission of symbology identifiers shall be enabled. The first FNC1 shall not be represented in the transmitted data, although its presence is indicated by the use of the appropriate option value (m=2) in the symbology identifier.

When used as a field separator, FNC1 shall be represented in the transmitted message by the ASCII character <GS> (ASCII value 29).

Symbology identifier for EAN.UCC Applications of Data Matrix ISO/IEC 15424 provides a uniform methodology for reporting the symbology read, options set in the reader and any special features of the symbology encountered.

The symbology identifier for EAN.UCC Data Matrix is **]d2**
where:

-]** is the symbology identifier flag (ASCII value 93)
- d** is the code character for Data Matrix symbology
- 2** is the modifier indicating: **ECC200 FNC1 in first position**

7. Representation of data: Data Matrix ECC200 symbol using EAN.UCC syntax

7.1. Concatenation of data when represented in a Data Matrix ECC200 symbol

Using the Data Matrix ECC200 Symbol, it is possible to concatenate (chain together) the discrete element strings associated with the two digits of an Application Identifier.

7.2. Concatenation of the Pre-Defined Length Element Strings

Concatenated Element Strings constructed from Application Identifiers with a pre-defined length do not require a separator character. The next Application Identifier follows fixed length element strings up to the last one.

7.3. Concatenation of the Variable Length Element Strings

Concatenating Element Strings of variable length, under Application Identifiers (10) and (37) involves the use of a Separator Character. The Separator Character used is the Function 1 Character (FNC1) *with ASCII value 29 (<GS>)*. It is placed immediately after the last symbol character of a variable length data string and is followed by the Application Identifier of the next element string. There is no character after the last element string even if of variable length.

The FNC1 character is not shown in Human Readable Interpretation.

When concatenating a mixture of pre-defined and variable length Element Strings, place the pre-defined Element Strings before the Variable element Strings to comply with EAN.UCC 128 standard.

8. Human readable information

For human readable information the recommended and minimum text character height are (type OCR-B font) :

| | Character Height (cm) | Character Height (in) | Character Height (points) |
|-------------|--------------------------|--------------------------|------------------------------|
| Recommended | 0.2 cm | 0.08 in | 5.76 pts |
| Minimum | 0.125 cm | 0.05 in | 3.6 pts |

Identification GTIN number (01), batch number (10) and expiry date (17) are to be printed in human legible characters as required by local regulatory authorities nearby the Data Matrix code associated with the symbol while respecting the quiet zones. Application Identifiers can be printed however between parentheses that are not encoded in the symbol.

9. Print Quality for Data Matrix Symbols

It is highly recommended to procure the ISO/IEC 15415 standard that gives all details regarding the print quality. The aim of the following is to give the acceptable levels of the measurement criteria.

Minimum cell size will be in the range of 0.0075 inch (0.19 mm) to 0.015 inch (0.38 mm).

EAN.UCC recommends a minimum of X dimension of 10 mils (.010")

The International Standard *ISO/IEC 15415 Information technology - Automatic identification and data capture techniques - Bar code symbol print quality test specification - Two-dimensional symbols* methodology shall be used for measuring and grading Data Matrix. Verifiers that comply with the standard measure the print quality grade. The grade includes a grade level, measuring aperture, the wavelength of light used for the measurement, and the illumination angle relative to the symbol.

A symbol grade is only meaningful if it is reported in conjunction with the illumination and aperture used. It should be shown in the format *grade/aperture/light/angle*, where:

- "grade" is the overall symbol grade as defined in *ISO/IEC 15415 Information technology - Automatic identification and data capture techniques - Bar code symbol print quality test specification - Two-dimensional symbols*, i.e. the arithmetic mean to one decimal place of the scan reflectance profile or scan grades,
- "aperture" is the diameter in thousandths of an inch (to the nearest thousandth) of the synthetic aperture defined in *ISO/IEC 15415 Information technology - Automatic identification and data capture techniques - Bar code symbol print quality test specification - Two-dimensional symbols*.
- "light" defines the illumination: a numeric value indicates the peak light wavelength in nanometres (for narrow band illumination); the alphabetic character W indicates that the symbol has been measured with broadband illumination ("white light") the spectral response characteristics of which must imperatively be defined or have their source specification clearly referenced,
- "angle" is an additional parameter defining the angle of incidence (relative to the plane of the symbol) of the illumination. It shall be included in the reporting of the overall symbol grade when the angle of incidence is other than 45°. Its absence indicates that the angle of incidence is 45°.

Note: This International Standard provides for 30° and 90° illumination in addition to the default 45°.

An asterisk following the value for "grade", in the case of a two-dimensional matrix symbol, indicates that the surroundings of the symbol contain extremes of reflectance that may interfere with reading – see *ISO/IEC 15415 Information technology - Automatic identification and data capture techniques - Bar code symbol print quality test specification - Two-dimensional symbols*.

| Aperture Diameter (in 0.001")/Aperture ref N° | Aperture Diameter (in mm) | "X" dimension range (in inch) | "X" dimension range (in mm) |
|--|------------------------------|----------------------------------|--------------------------------|
| 03 | 0.075 | 0.004 to 0.007 | 0.100 to 0.180 |
| 05 | 0.150 | 0.0071 to 0.013 | 0.180 to 0.330 |
| 10 | 0.250 | 0.0131 to 0.025 | 0.330 to 0.635 |
| 20 | 0.500 | 0.0251 and larger | 0.635 and larger |

Examples:

- 2,8/05/660 would indicate that the average of the grades of the scan reflectance profiles, or of the scan grades, was 2,8 when these were obtained with the use of a 0,125 mm aperture (ref. no. 05) and a 660 nm light source, incident at 45°.
- 2,8/10/W/30 would indicate the grade of a symbol intended to be read in broadband light, measured with light incident at 30° and using a 0,250 mm aperture (ref. no. 10), but would need to be accompanied either by a reference to the application specification defining the reference spectral characteristics used for measurement or a definition of the spectral characteristics themselves.

2,8/10/670 would indicate the grade of a symbol measured using a 0,250 mm aperture (ref. no. 10), and a 670 nm light source, and indicates the presence of a potentially interfering extreme reflectance value in the surroundings of the symbol.

For acceptance (as per ISO/IEC 16022 and 15415):

Minimum print quality of **1.5/06/670** and

Decode: **passes** and

Symbol Contrast **SC** \geq **40%** (6 to 10mil aperture, 660nm wavelength) and

Modulation \geq **0.30** and

Fixed Pattern Damage: Lower of the Transition Ratio (**0.08** \leq **TR** \leq **0.1**) and Notional damage (\leq **13%**) and

Axial non uniformity **AN** \leq **0.10** (spacing of mapping centre) and

Grid non uniformity \leq **0.63** and

Print Growth $-\mathbf{0.85} \leq \mathbf{D}' \leq \mathbf{0.85}$ (filling boundary volume compared to nominal) and

Unused Error Correction ≥ 0.37 (tests to measure to which extent damage has eroded the safety margin of error correction),

Overall quality is minimum C/2.0

10. Other marks

Other fixed local barcodes (e.g. linked to the registration number) in other symbols than Data Matrix may be kept pre printed on the packaging.

11. Scanners

It is imperative that the correct scanner be used.

Some CCD or 2D Imaging technology such as array scanners and vision systems are capable of scanning all symbols in the EAN.UCC System, including Data Matrix. **Note that linear imagers, like laser scanners, cannot scan Data Matrix;** only 2D or array imaging scanners can scan Data Matrix, as well as camera based or vision systems.

The imaging and camera based systems offer many advantages over the linear imagers most notably the elimination of the need to orientate the bar code and the ability to read all types of bar codes. The Data Matrix code can be scanned in any orientation. Many imaging scanners also offer the option of being able to take photographs which could have value in recording additional information i.e. signatures.

12. Samples of acceptable formats

Example of the preferred method of the DATA Matrix Symbol with the HRI GTIN, Lot Number and Expiry. The code below represents:

Lot Number: ABC123

Expiration Date: June 15, 2007

GTIN: 0412345678901

Exp 15Jun07 Lot ABC123



(01)04012345678901

Alternative Format: Example of the optional Data Matrix Symbol Encoded with HRI GTIN and AI's for Lot and Expiry

(17)070615(10) ABC123



(01)0412345678901

Alternative Format: including Lot Number, GTIN and Expiry

LOT ABC123
EXP 12JUN03
(01)0412345678901



13. Examples of concatenated strings

FNC1(01)01234567890128 (17)YYMMDD(10)ABC123

FNC1(02)01234567890128 (17)YYMMDD(10)ABC123**FNC1**(37)12

FNC1(02)01234567890128 (17)YYMMDD(10)ABC123**FNC1**(37)432

FNC1(01)01234567890142 (17)YYMMDD(10)ABC123

FNC1(01)21234567890122 (17)YYMMDD(10)ABC123

for a single unit.

for a bundle not being a commercial unit of 12 units of 01234567890128

for a pallet of 432 units of 01234567890128 if pallet is not a commercial unit

for a pallet of 36 units of 01234567890135 if the pallet is a commercial unit and numbered with a specific GTIN.

for a pallet of 432 units if the pallet is identified as a commercial unit using the indicator 2.