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VCI-GUIDELINE

VPA 9
Packaging Traceability

Non-binding recommended standard

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Responsible Care – ein Beitrag zur Nachhaltigkeitsinitiative Chemie[3]

Used standards/guidelines:

Code type: ISO/IEC 18004:2015 (Information technology - Automatic identification and data capture techniques - QR Code bar code symbology specification)

Data structure: General GS1 Specifications, Chapter 5.7, Version 24, as of Jan 2024
Changes made to VPA9 (version 1 from 24 November 2024) are marked in red.

1. Purpose

The VPA 9 application enables the rapid identification of empty and filled packaging with the help of a GS1 QR code containing packaging specific and packaging manufacturer specific information. Applying the QR code not only enables implementation of the legally required traceability for pharmaceutical, food and feed packaging, but also, for example, the fulfilment of the IATF requirements from the automotive industry. In addition, applying the code makes it easier to comply with the maximum permitted period of use for dangerous goods packaging made from rigid plastic. With the help of the QR code, a plausibility check can be carried out before each filling. In the case of quality defects in empty or already filled packaging, the QR code facilitates rapid identification of affected packaging. The VPA 9.2 QR code can be applied to new and reconditioned packaging.
Due to emerging legal requirements in customs, tax law and the recycling process, the complete UN coding of the packaging material, the environmental labelling and the recycled content are now also embedded in the QR code.
Thus, the use of the QR code is another important step towards digitalization in the chemical industry.

2. **Structure and content of the QR code**

The QR code is encrypted according to the GS1 standard and must contain the information presented in Table 1.

Table 1: Mandatory data components of the QR code

Description	**Prefix (GS1)**	**Number of digits**	**Format**	**Example**
Packaging number chemical company	241	up to 30	numeric or alpha-numeric	ABC12345
Article number packaging supplier	240	up to 30	numeric or alpha-numeric	DEF6789
Identification number packaging supplier	91	up to 30	numeric or alpha-numeric	GHJ54321
Packaging supplier production plant *(analogous to UN marking)*	92	up to 30	numeric or alpha-numeric	KLM9876
UN-Code	99 + "&%00""&%01""&%02""&%03"	up to 90	numeric or alpha-numeric	Examples see below
Environmental label and recycled content: Total mass per material content: Recycled content of plastic	99 + "&%06"	up to 90	numeric or alpha-numeric	HDPE2:15.00kg:5.00kg: FE40:22.00kg: FOR50:21.00kg
Environmental label and recycled content: Total mass per material content: Taxable portion of plastic (UK)	99 + "&%07"	up to 90	numeric or alpha-numeric	HDPE2:15.00kg:10.00kg: FE40:22.00kg: FOR50:21.00kg
Packaging supplier batch number	10	up to 20	numeric or alpha-numeric	OPQ1928
Production Date & Time *(YYMMDDHHMM)*	8008	min. 8max. 12	numerical	2007011234
Sequential Number	21	up to 20	numeric or alpha-numeric	1

A limited number of places are available for each piece of information; in addition, it is specified whether the information must be numeric or alphanumeric (see Table 1).

Examples of UN Code:

liquid:	(99)&%00	UN/1A1/X1.2 Y1.8 Z2.25/23/D/BAM 12345-Manufacturer
solid:	(99)&%01	UN/1A2/X320 Y400 Z545/23/D/BAM 12345-Manufacturer
C-IBC	(99)&%02	UN/31HA1/Y/0323/D/BAM 12345-Manufacturer/4056/1723
F-IBC	(99)&%02	UN/13H4/Y/0723/D/BAM 12345-Manufacturer/4200/1060
others:	(99)&%03	UN/4GV/X25/S/23/D/BAM 12345-Manufacturer
	(99)&%03	UN/1A2T/X320 Y400 Z545/23/D/BAM 12345-Manufacturer
	(99)&%03	UN/3H1W/X1.5/250/23/D/BAM 12345-Manufacturer

The QR code must be generated according to the GS1 standard. The "GS1-General Specification" from 2024 under Chapter 5.7 is used here (https://www.gs1.org/docs/barcodes/GS1_General_Specifications.pdf). ISO/IEC 18004:2015 is used for QR code creation.

3. Application of the QR code (requirements for the labels, as well as their positioning and size)

The QR code with the information listed in Table 1 is printed on self-adhesive labels that the respective packaging manufacturer attaches to the packaging during its production.

The labels, the adhesive, and the used inks must comply with British Standard BS5609 (Sections 2 and 3) to be resistant to external influences and to thereby ensure the readability of the information contained in the QR code over the entire period of use.
Note: Depending on the packaging, the product to be filled, and the filling temperature, the label materials must be suitable accordingly. If necessary, the label material must be agreed bilaterally between the packaging user and the packaging manufacturer.

The choice of colour from label to ink must produce the maximum contrast for optimal readability, which can be achieved by a matt white label and black ink. The printing ink must be scratch-resistant.
The packaging manufacturer must ensure that the adhesive used is matched to the surface to be labelled in order to guarantee sufficient adhesion.
Note: The Finat test method (e.g. FTM 1) can be used to prove adhesion.

There is no specification regarding the printing process. However, the thermal transfer pro-cess is recommended for automatic application.
The specified minimum size of the QR code (minimum side length) must comply with the specifications in Table 2 to ensure reliable readability in practice.
The position of the label depends on the type of packaging and is defined in Table 2. A different position can be agreed upon between the packaging user and the packaging manufacturer.

Table 2: Specified minimum size of the QR code and position of the label on the packaging material

Packaging type	Minimum size (QR code side length)	Position of the label on the packaging
Steel Drum	≥ 3 cm	Centered on top or lid (+/- 100 mm)
C-IBC	≥ 2 cm	On the label board on the outlet side (front)
PE-Drum	≥ 3 cm	*drums:* Centered on the top (+/- 100 mm) beside the pinch seam *open head drums:* Centered on the lid (+/- 100 mm)

After reconditioning, a new label with a new QR code must be attached.

4. **Using the QR Code**

The QR code can be recorded automatically. All information according to Table 1, which al-lows for unique identification, is available digitally .

If the user links the individual QR code of the packaging with the corresponding batch information of the product in a database either before or after filling, it can be digitally traced which product (filling batch) is in precisely which packaging. This makes it possible to clearly identify the packaging, the filled product (filling batch) and the intended stay at any later point in time. This can be of particular interest, for example, in the event of a complaint.
By ensuring that the QR code is registered during transport and that this information is incorporated into the database, it becomes possible to achieve conditional localization.

By recording the packaging information immediately before filling, a plausibility check can be implemented to verify whether the respective packaging may be used for the product, allowing for a comparison of the packaging number on the QR code with the bill of materials for the specific packaged good.

If necessary, the merged information on the packaging used and the filled product can be passed on to downstream entities (including customers).

Even without a link to a database, the QR code enables the unique and digital identification of a packaging. The rapid availability of data accelerates for example the clarification of claims and complaints.

Contact:
Dr. Wadim Weber
Division Science, Technical and Environmental Affairs
Department Environmental Protection, Plant Safety, Transport
P +49 (69) 2556-1642 | **E** wadim.weber@vci.de

German Chemical Industry Association
Mainzer Landstrasse 55
60329 Frankfurt, Germany

www.vci.de | www.ihre-chemie.de | www.chemiehoch3.de

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