eppendorf

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Tracking and Documentation of Samples by Self-Identifying Consumables

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Executive summary

The documentation of experiments and processes is becoming ever more important. It is a deciding factor for reliable results, and thus the success of your laboratory. For unambiguous sample identification, as well as process tracking, all samples must be clearly labeled, above all. All laboratories absolutely agree on this point – however, in reality, one continues to come across vessels with very different levels of quality when it comes to identification. Besides unique identification, every sample vessel shall be traceable in regards to lot number, product information, and production conditions.
The Eppendorf SafeCode system provides you both, the unique pre-made identifier as well as a database connection for all vessel relevant information.

Introduction

Do you remember the last time you labeled 20 vessels manually? The first few tubes looked acceptable, but eventually, cooperation between your handwriting, the pen, and the smooth surface of the tube began to falter. You may have been able to read your artwork – but only you.

Different types of labeling tubes

The nerd in the lab next door printed all their labels on paper, cut them out with scissors, and affixed them to the tubes with transparent tape. It looked perfect, but it took forever.

Isn't there another – better – way?
Reliable labeling of your high-quality samples is crucial for secure identification and – last, but not least – reliable results. Illegible sample labels have now become a problem of the past. Barcodes allow quick, unambiguous sample identification. Eppendorf offers you prelabeled standard consumables for immediate use. Your vessels are turning digital.

Tracking
Beyond the clear and unique identification of the vessel, there is a growing need for process traceability. Are you able to backtrace your processes?
For years, everyone has been used to have access to the quality certificates of tubes and plates by using the lot number of the tube or plate. Where do you find this lot number? Plastic labware is bagged in a PE-bag of which a multiple is

stored in a cardboard box. This outer box is labeled with the relevant product information:
> Name of supplier
> Product name in clear writing
> Product name as QR code
> Order number
> Lot number

All relevant information is accessible. Accessible until you as a user open the cardboard box, remove the bag with the vessels for further usage in the laboratory and dispose the cardboard box for correct recycling. By removing the cardboard box with the sticker and all thereon printed information, all relevant information about the vessel history and any backtracing from the individual vessel to the production process is lost.

In contrast to instruments and their specific serial number as unique identifier, lab consumables are historically bulk ware with one lot number information on the packaging.

But that is the past.

The Eppendorf SafeCode system is based on cryogenic vials, conical tubes, plates, and related software

The SafeCode System

The SafeCode System for Eppendorf consumables is based on multi-level coding for secured individual sample identification. The pre-defined 2D data matrix code is supplemented with a clear coding of the same information. Some vessels like vials and plates also provide linear barcodes as third reading option. Redundant coding enables different reading technologies but also provide an increased safety level for readable codes.
The data matrix code on the vessel is read using a barcode scanner; the corresponding ID is transferred and then saved in your digital laboratory notebook, for example, the eLabNext® software.

Every vessel ID is connected to a set of data, related to the history of the corresponding tube or plate. By this, SafeCode symbolizes a new generation of consumables – the self-identifying consumables. All saved data are combined with the sample ID and their respective sample description.

The SafeCode portfolio is growing: Depending on your needs, you currently can choose between a series of Cryo-Storage Vials (0.5 to 4 mL), for 5 mL, 15 mL, 50 mL conical screw-cap tubes, and different types of plates (PCR, MTP, DWP).

1D barcodes
A classic 1D barcode codes data by varying the width of the parallel lines as well as their spacings. 1D barcodes are based on different standards (i.e. languages), e.g. type 128.

2D barcodes
Two-dimensional codes (2D) are based on dots, hexagons, rectangles, or other geometric patterns. The codes can handle far more information on same area compared to 1D barcodes. These codes have different languages as well.
The most popular 2D codes are the QR codes as well as data matrix codes.

QR codes (short for "quick response") were developed in 1994 for unique identification of parts in production. They are nowadays commonly known from internet addresses which can be scanned by mobile devices to open the related webpage. QR codes can be easily recognized by their three spots at the corners. The missing pattern in the fourth corner enables a clear position recognition. Some people use QR codes on stickers to code samples in the lab.

2D data matrix codes were developed in the late 1980s. They are used in a very broad range of different applications. In contrast to the corner spots of the QR codes, data matrix codes are based on two constant lines at left and bottom. The clock pattern surrounds the opposite two sides of the code. It consists of alternating black and white modules. It is used to define the size of the modules and the code itself.
The quiet zone surrounds the finder pattern, it should be free of any black-white contrast. The data matrix code in the center can be handled with white signal on black background (black quiet zone, white modules, black corners, inverse image) or with black signal on white background (white quiet zone, black modules, white corner, reverse image). SafeCode is based on the data matrix code.

Scanning process

Linear barcodes, QR codes, and data matrix codes are specific code languages which require a fitting reading tool to encipher the content information. The reading is done by specific scanners which act as detection tool. 2D codes can only be read by an image-based ID reader.

Handheld scanner for convenient code reading and processing

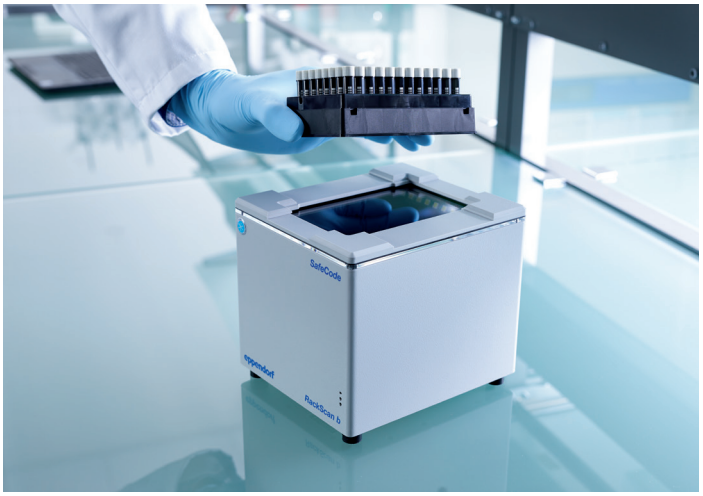
Handheld scanner

Depending on the type of code, a handheld scanner is the right choice for most situations. These handheld scanners can be cable-driven or cable-free. Although more and more scanners can read data matrix codes, please check within the specifications of the desired scanner if the dedicated code is readable. Handheld scanners normally do not require any software installation or administrator rights as they act as a keyboard. The reading can be automatically inserted in a program like MS-Excel, MS-Word, or a specific database. Pictured handheld scanners is Socket®mobile.

App-based code reading with a smartphone

Apps

In contrast to handheld scanners which are connected to the computer system, specific apps on mobile phone enable reading and translation of a code. Code-reading apps are available via the app stores of the major suppliers, they may differ countrywise. The apps normally do not transfer the information to downstream software applications. The types of available apps for data matrix codes depend on the operating system as well as the region. Some sample management software packages provide dedicated apps to also read codes.



Dedicated scanner instrument for high throughput code reading

Scanning instruments

Dedicated scanner instruments are the third option. These readers are designed for high-throughput reading and can read a multiple of sample codes in parallel. The vessel codes must be on the bottom side of the vessel as these scanners in general read from the bottom. Keep in mind the focus level of the scanner if codes cannot be read properly. The data matrix code of the SafeCode system is enriched by the ECC 200 error correction to ensure safe code reading with up to 25% damaged code.

Data file

Independent from the type of scanner, the barcode is translated into an alphanumerical code. There is no export file. The alphanumerical code is the starting point to connect the vessel ID with information.

What about documentation?

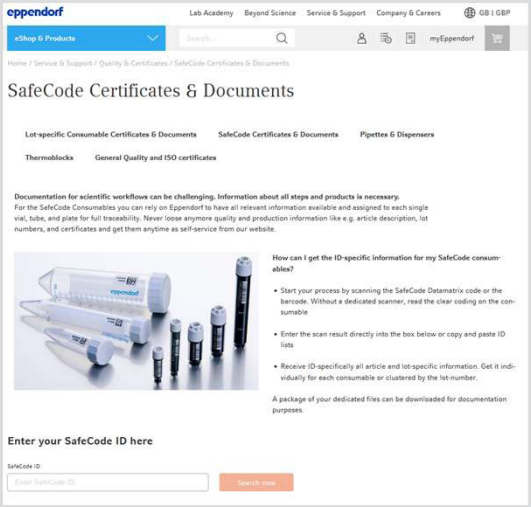
For the purpose of certification and documentation, more and more users must save and retain all information. For vessels with SafeCode, we make the information that is relevant to your process documentation available online via the SafeCode Dataport on our website.

Using the respective individual code of the vial, you can retrieve the following information here:
> Product description
> Lot number
> Order number
> Certificates of Quality (CoQ)
> Instruction for use
> Drawings

This information can be exported manually from the Eppendorf webpage to local databases. Alternatively, it can be transferred automatically to a sample management software – for example, Eppendorf eLabNext. This automatic process is a very convient way of data handling.

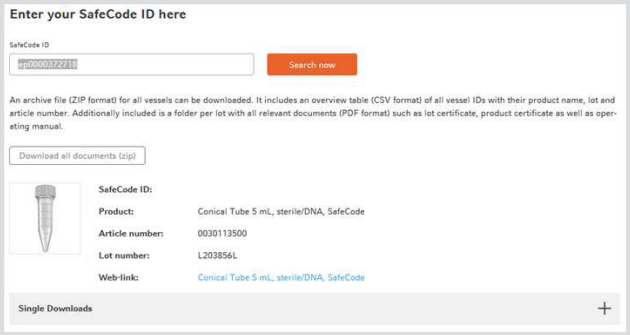
You can download single data sets but batch download is also possible. The data are provided as a *.zip file. The data can be accessed by www.eppendorf.com/safecode-data.

Check the digital SafeCode Concept on your own:
1) Go to www.eppendorf.com/safecode-data
2) Copy paste a SafeCode ID like ep0000372718



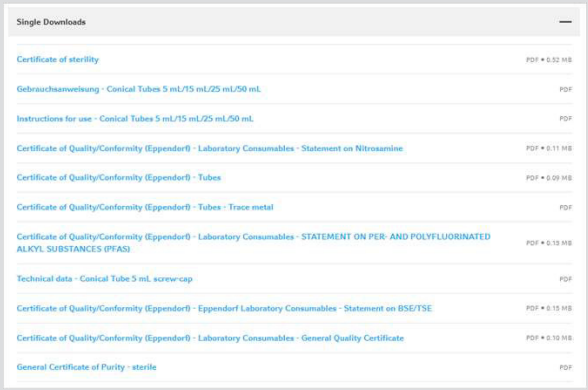
SafeCode page for downloading dedicated vessel information

The database provides you all relevant information which are related to the specific vessel.



Available data based on the SafeCode vessel ID

You can download the respective documents for documentation purposes as single file pdf or as a compressed zip-file.



Available data based on the SafeCode vessel ID

Our sample management software eLabNext has automatic and direct access to these data as soon as the SafeCode ID is uploaded into eLabNext. To benefit from this convenient automatic approach, check your 30-days-free-trial of eLabNext software:

www.elabnext.com/eppendorf

About Eppendorf

Since 1945, the Eppendorf brand has been synonymous with customer-oriented processes and innovative products, such as laboratory devices and consumables for liquid handling, cell handling and sample handling. Today, Eppendorf and its more than 5,000 employees serve as experts and advisors, using their unique knowledge and experience to support laboratories and research institutions around the world. The foundation of the company's expertise is its focus on its customers. Eppendorf's exchange of ideas with its customers results in comprehensive solutions that in turn become industry standards. Eppendorf will continue on this path in the future, true to the standard set by the company's founders: that of sustainably improving people's living conditions.

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