ZVEI:
Die Elektroindustrie

ZVEI Recommendation: Electronic Labelling

## Product marking with respect to Internet of Things

Product approvals for global suppliers have nowadays reached a volume, which often can no longer be marked on the product labels especially of small products. Europe requires the CE-marking, e.g. for explosion protected equipment, pressure equipment, equipment for use in the food industry with various markings. The marking text for explosion protected equipment may be very elongated. If the international IEC Ex marking is required, a similar information is added. Additionally, in USA and Canada the North American Class/Division system has to be added to this marking. For level detection equipment, which is used in Germany as legally defined overfill protection system, the Ü-marking must be added. For products, which are distributed worldwide, additional marking must be supplemented. These are for example in the Eurasian Economical Union the "EAC" mark, for Korea the "KC"-mark, for Australia the RCM-mark for EMC compatibility. For measuring equipment the metrological marking may be required. If radio emitting devices or devices which emit radio waves for functional purposes (e.g. Radar level meters) are placed on the market, must bear a corresponding radio emission marking (e.g. FCC for USA, IC for Canada). Electronic products, which are placed on the market under the European WEEE Directive (Waste of Electrical or Electronic Equipment) must be marked with the crossed-out wheeled bin. Electronic products which are placed on the market in China, must be marked with the Chinese RoHS-label. Equipment falling under the Chinese regulation of the CCC-marking, e.g. proximity switches >36 V, must be marked with the CCC-label and text in Chinese letters.

CE 0044 ⟨Ex⟩ TÜV16ATEX1561 II 1/2 G Ex ia IIC T6 Ga/Gb TÜV SÜD

U EHEDG   IEC Ex TIIS PTB
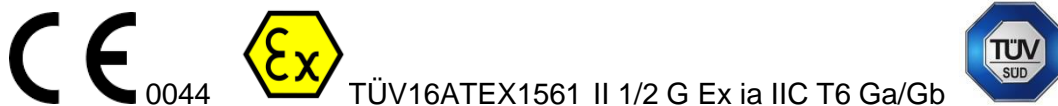
The multitude of these markings often does no longer fit on a conventional type label. The European Directives in those cases also allow to affix the marking on the packaging, but also here the available space is limited.
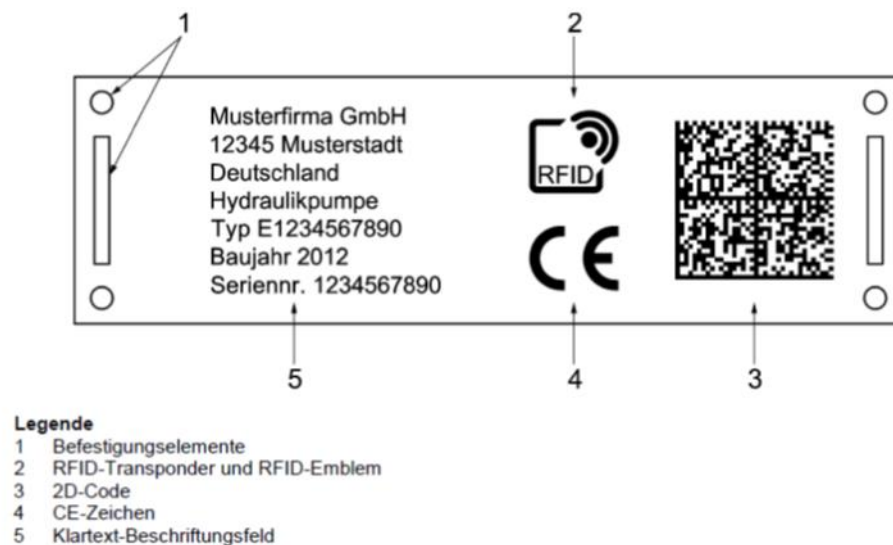
The manufacturers of smart phones have solved this problem very elegant, simple, sustainable and cost effective. They have integrated the world wide markings into the electronic screen, which can be displayed under the respective menu option. Only the CE-mark appears permanently visible on the product enclosure. Even after years the electronic marking can be read in constant quality, because it is not exposed to the ambient conditions of the application. Marking on the product or the packaging is often no longer or not at all readable after years.
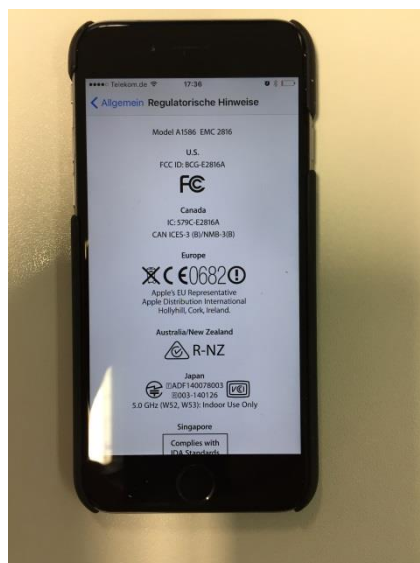
Example: Marking of mobile phones via the electronic display

This procedure is offered basically for all smart electronic products, which have an appropriate display or must be connected to a unit with such a display. Alternatively, this marking could be stored in a RFID Chip and be read with an RFID reader, without supplying the device electrically. Many measuring devices in the process automation and automation technology are already equipped with RFID chips (see DIN 66277:2014). Due to the increasing integration of NFC-Technology in smart phones for the reading of RFID chips, from special readers may be abstained in future. An appropriate App in the (Ex approved) smart phone may then be sufficient.

A further alternative would be the presentation of the whole marking via QR-code in accordance with ISO IEC 18004. Today every smart phone can read the QR-code and display the content or provide a link to a website, where the marking is illustrated for the user or project engineer.

Legende
1   Befestigungselemente
2   RFID-Transponder und RFID-Emblem
3   2D-Code
4   CE-Zeichen
5   Klartext-Beschriftungsfeld

Example: Electronic marking via RFID Chip and/or QR-code (source: DIN 66277:2014).

A further option is the marking of the serial number only and a web-link on the conventional type label, QR-Code, RFID or display. With the serial number the equipment can be identified at the manufacturer website and the complete marking can be provided. According to DIN 66277 the manufacturer coding and serial number can be combined by a defined format into an unique code (UID). With the web-link also a download of the corresponding equipment documentation may be provided by the manufacturer.

Advantages and disadvantages of the various methods of marking

The conventional type label provides all necessary information at every time, independent whether the equipment is connected to the power supply or not, whether switched on or off. This has the advantage, that e.g. equipment in the stock or in the workshop can be identified uniquely at all time. Regarding electronic marking this can temporarily not be ensured. But the information is retained sustainably, in contrast conventional type labels may be impaired by rough environmental conditions, e.g. by corrosion or dirt.

Without power supply, internet connection or without reader some methods of marking may temporarily not provide the identification of equipment. Hence it is recommended to provide minimum information e.g. name of manufacturer, equipment type, serial number and basic legal marking (e.g. CE-mark, Ex-mark, FCC-mark) as usual on a conventional type label.

In the following table the advantages and disadvantages of the various methods are summarized:

	Conventional label	QR-Code	Transponder (RFID)	Display/ Software	URL+Serial# on label
Number of characters	Limited by size of label	4000-7000 characters	Limited by memory of RFID chip	Limited by memory of equipment	unlimited
Reader required	no	yes, e.g. smart phone	yes, e.g. smart phone	no	yes, e.g. smart phone
Internet connection required	no	no	no	no	yes
Readable without power supply	yes	yes	yes	no	yes
Readable after environmental stress	restricted	restricted	yes	yes	restricted
Readable in darkness	no	no	yes	illuminated display	no
Including equipment documentation	no	no	restricted	restricted	yes
Storage of operational data*	no	no	yes	yes	conditionally
Data loss	no	no	yes	yes	yes**
Explicit identification of the device	yes	yes	yes	yes	conditionally**

 *e.g. maintenance or calibration data, maintenance plans, calibration protocols
** e.g. by insufficient data maintenance or bankruptcy

Unfortunately these technologies are not yet incorporated in the European Directives and only partially in the international standards. Legal conditions still require the marking visible legible on the product. In the age of internet of things his marking concept is not suitable for the mobile data acquisition and no longer state-of-the art.

Hence, the manufacturers association ZVEI recommends, that these marking technologies are picked up in the standardization and legislative bodies. During a transition period both methods of marking may be used, but in long term the electronic marking will take over as the future concept. During a continuous transition more and more information from the conventional label may be transferred into the digital label.

ZVEI Automation Division

Working Group CE-Marking