

Lehrstuhl für Maschinen- und Apparatekunde

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EVALUATION REPORT

**Verification of the cleanability
of the compact scale line BBA4x9...
in accordance with EHEDG-guidelines
Report no. 108/28.12.2005**

Company Mettler-Toledo (Albstadt) GmbH
72458 Albstadt

The report is comprised of 11 pages, including 4 figures and 1 table.
The evaluation pertains exclusively to the tested components mentioned in this report.
The appraisal was performed by trained personnel working in accordance
with the EHEDG-guidelines.

Freising-Weißenstephan, 20.02.2006


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DAR-registration number: DAP-PL-3148.00
Accreditation per DIN EN ISO/IEC 17025:2000 for:
**„microbiological-hygiene testing of food-processing
machines and apparatus“**

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1. STATEMENT OF PURPOSE

The company Mettler-Toledo (Albstadt) GmbH, Unter dem Malesfelsen 34, D-72548 Albstadt, Germany, commissioned the Lehrstuhl für Maschinen- und Apparatekunde (Chair of Process Engineering for Disperse Systems), University of Technology Munich in Weihenstephan, to evaluate the hygienic design of the compact scale line BBA4x9.... The evaluation was carried out abiding decisively by the EHEDG-guideline No. 8 “Hygienic Equipment Design Criteria”, second edition, April 2004.

The assessment was made by inspecting the scale on the 25th of October 2005.

2. DESCRIPTION OF THE COMPACT SCALE LINE

The compact scale line series BBA4x9... is designed as a compact unity of terminal and stand. To the stand the complete assortment can be attached and installed of platforms of the series PBA430. The series PBA430 was verified in a separate investigation (report no. 78/29.01.2004).

The investigation covers all variants of the product series of BBA4x9.... In the following the type designation of the series is specified (Table 1).

Type designation: **BBy4x9a_b_-ccd** (bold: fixed parts of the product name)

Table 1: type designation

Part of the name	Variable [range of values]	Remarks
BBy4	y [A,K]	4-series of compact scales with the indication of the weighing principle „A“: analog weighing sensors „K“: force compensation measuring cells
	x [0...9]	Indication of the application level (functionality)
9		IP69k protected execution with stainless steel enclosure
	a [x, xx]	Optional indication for the use in hazardous locations E.g.: „x“, Suitable for category 2 of hazardous areas E.g.: „xx“, Suitable for category 3 of hazardous areas
	b [Text]	Optional indication of the software application E.g.: „check“ or „check+“
- -		The specification of the weighing range and the size of the weighing platform follow after the hyphen.
	cc [A...Z]	The size of the weighing platform is coded by a maximum of two capital letters. E.g.: „A“: 240 x 300mm „BB“: 300 x 400mm The capital letter „Q“ indicates a square size of the weighing platform. E.g.: „QB“: 305 x 305mm
	d [integer]	Indication of the weighing range in kg E.g.: „6“, „30“
-		Space If both indications a and b are used, a space will separate these values. Otherwise no separator is used.

Typical examples from the product assortment:

BBA429

BBA439check – QC30

BBA449check+ - A6

BBA449xx check+ - BB30

The compact scales will be used in the wet area of the food industry and must meet all the hygiene and cleaning requirements within this area.

The weighing terminal is welded with the stand and consists of stainless steel of the alloy 1.4301. The surface is electrochemically polished, so that it is very smooth and is easy to clean. The casing has the safety class IP69K. The inclined surfaces are to ensure the self-drainage of liquids. Horizontal surfaces are reduced to a minimum.

The housing is sealed with an EPDM gasket inserted into the bottom section of the unit and flush to the side wall. The keypad and display are integrated into the front cover. The keyboard foil, made of polyester (PE), is continuously glued on the upper section. The keyboard foil covers the complete plane front surface of the terminal (Fig. 1).

The upper and lower part of the terminal are connected with hexagonal screws with integrated seal. The screws are attached on the back (Fig. 2) and have no recesses, in which soil could accumulate.

The stand is connected at the casings lower part by a circulating welding seam. The weld is done from the outside, so that a crevice free joint develops (Fig. 2). Thus a compact unit without hinge joints and areas which are not cleanable is designed. The stand is full-welded and has within the bottom area a pressure balance valve. To support the stand an additional single foot made of stainless steel is attached under the stand (Fig. 3).

The cable connections for the power supply (net or battery operation), data interfaces and the connection for the scale are attached on the backside of the stand (Fig. 3). In order to protect this area against contamination, the cable binding was diagonally to the rear attached at the lower end of the stand. The accessibility for cleaning is ensured. For the connection, cable joints or IP-protected plug connectors are used.

The front surface (control surface) of the weighing terminal and the front of the stand are product contact surfaces. By product splashes and the operation of the scale these areas are contaminated and being a hazard for food safety. Therefore these areas must be designed to be easy to clean. All other surfaces and areas of the

weighing terminal and the stand are turned away from the product side and can be contaminated only indirectly. Therefore these areas should likewise be accessible for cleaning and that no areas exist, in which remaining product (soil) can accumulate.



Fig. 1: front of the weighing terminal



Fig. 2: welded stand (backside of the scale)



Fig. 3: support foot and cable connections

3. BASIS FOR EVALUATION

The scale's hygienic design was evaluated in accordance with guideline no. 8 "Hygienic Design Criteria", second edition April 2004 of the European Hygienic Engineering & Design Group (EHEDG). These hygiene criteria were developed as a joint effort by mechanical-engineering and food-processing experts. The requirements are regarded to be state-of-the-art and are essential for the hygienic design of apparatus and equipment used in the processing of food. This is important to protect consumers and to avoid any risk of infection, sickness or contagion, which can originate in food. Such risks must be reduced to a minimum if they are not to avoid. The hygienic design principles must be applied especially to surfaces which come into contact with the product being made. All other areas and added on components, which do not come into contact with the product, must be designed and built in a certain way. They must prevent moisture and soil from accumulating and must prevent vermins from nesting. It must be possible to easily clean, monitor and maintain these areas and added on components.

4. EVALUTION IN ACCORDANCE WITH EHEDG RECOMMENDATION GUIDELINE NO. 8

General

Principally the requirements of the EHEDG guideline "Hygienic Equipment Design Criteria", 2004, encompass the provisions of both the European standard DIN EN 1672-2: 2005, DIN EN ISO 14159: 2004 and the European council directive for machinery 98/37/EC.

Materials –stainless steel

Requirements:

The material's surface must be corrosion-resistant, mechanically stable and non-toxic. It must be resistant to both the product and cleaning agents used during normal operating conditions. Product-contact surfaces should preferably be made of austenitic stainless steel belonging to the AISI 300 series (e.g. 304, 316, 316L). The corresponding German alloys have the material standards 1.4301, 1.4401 or 1.4404 respectively. Castings should be made with the appropriate grade of stainless steel with analogous properties.

For areas which do not come into direct food contact, the same requirements apply.

Evaluation:

The terminal's casing and the stand consists of the stainless steel alloy 1.4301 and is therefore permitted to come into contact with food. Corrosion may appear and is caused by the influence of chloride solutions, this dependant on the temperature and concentration of the chloride. It has to be paid attention to with the appropriate process and cleaning conditions.

Materials – plastics and elastomers**Requirements:**

Any plastics used must be easy to clean. Various types of plastics are recommended, like PP, PVC, PC, PE, etc. Plastics in contact with food must have the appropriate approval.

This also applies when using elastomers. If the elastomer comes into direct food contact, it must comply with the FDA CFR code. The following types of elastomers are recommended to be used in the food industry: EPDM, FKM, HNBR, VMQ, FFKM, etc.

Evaluation:

The keypad's foil consists of Polyester (PE) and exhibits a smooth and uniform surface. The display is made of Polycarbonate (PC) and stuck to the keypad's foil. The cables' sheathing is made of polyvinyl chloride (PVC), which is resistant to conventional cleaning agents and processes.

The casing's seal consists of EPDM. This is a common sealing material in the food industry and exhibits the appropriate resistance required.

The feet of the scales are made of Polyurethan (PU) which contains no softening agents.

All materials which are used have easy to clean surfaces and are recommended for the food contact.

Surfaces

All surfaces must be easy to clean and must not pose as a source of risk to foods becoming contaminated. All surfaces that come into contact with the product, must be resistant to it and to the cleaning agents and disinfectants used under all condi-

tions of indented use. The contact areas must be made out of non-absorbent materials (see materials) and must satisfy the specified requirements for roughness.

Requirements:

Product contact surfaces should have finishes characterized by a low mean roughness value (Ra) less than 0.8 μm . Non-product contact surfaces must be smooth enough to ensure easy cleaning. All surfaces must be free of defects such as holes, scratches and crevices.

Evaluation:

The stainless steel casing has a continuous smooth surface. The surface is electropolished and has an average roughness value Ra less than 0.8 μm . All surfaces are free of defects such as holes, scratches and crevices. Therefore all surfaces does not cause any problems in cleanability.

The keypad's foil has no defects. Its surface is smooth, uniform and can be easily cleaned.

All requirements for product contact surfaces are fulfilled.

Welded joints**Requirements:**

Metal-metal contacts must be continuously welded together, making sure that there are no crevices. The welding process should take place within an inert gas atmosphere. If the welding seam shows major unevenness or tarnishes an after-treatment will be necessary. While welding, no edges or unlevelled surfaces are allowed to not impede cleaning.

The welded joint must not have any defects or pores and it should run in a straight line.

Evaluation:

The welding in the corners of the casing was carried out within an inert gas atmosphere using the TIG welding method. The welding seams show no defects and have been polished and are no longer visible when looking at the unit. The welding seams show no tarnishes. The welding seam's surface is identical to that of the stainless steel sheets.

The welding between stand and terminal is continuous and done from the outside. The welding seam shows no defects at all and is electropolished afterwards. In the same way the welding in the bottom part of the stand is performed. There the cable connections are located.

Geometrical proportions

Rounding

Requirements:

Inside corners should preferably be rounded out to a radius of 6 mm or more. The minimum radius is 3 mm. Sharp corners with an angle less than 90 ° must be avoided. In the case of sharp corners cannot be avoided, or that a radius of less than 3 mm must be accepted, the design characteristics must compensate any loss in cleanability.

Evaluation:

The casing has no inward corners. The keypad's foil has the same size like the casing, so that the edge of the foil pass into the side wall of it. A flat continuous glued joint prevents detachment from the stainless steel surface.

A very small step is formed on the weighing terminal as the glass frame is stuck to it. On this step dirt can accumulate. Due to the fact that this area is easy accessible and visible, an appropriate cleaning instruction helps to prevent soiling.

Self-drainage

Requirements:

Each piece of equipment must be designed for self-drainage once it is in its installed state. Consequently, horizontal surfaces must be avoided. Instead, care must be taken to provide for an inclination towards one side. It may accumulate in no place water.

Evaluation:

The weighing terminal have no horizontal surfaces. The casing's design ensures that liquids can easily and completely flow off the unit. Likewise the stand has no areas where water can be retained.

5. RESULTS OF EVALUATION

Basically, the design of the weighing terminal and the stand conforms to the hygienic design requirements, which were made according to the EHEDG-recommendation. The platforms are already verified. The non-product contact surfaces are designed comparably and are appropriate for hygienic purposes. They also satisfy to a large extent the requirements applicable to product-contact surfaces.

6. SUMMARY EVALUATION

The subject appraisal shows that the *compact scales line BBA4x9...*, which were submitted by the company Mettler Toledo GmbH, Albstadt, Germany, meet the requirements for easy cleanability (Hygienic Design Criteria). The underlying EHEDG document no. 8 is state-of-the-art.

7. APENDIX: DRAWING

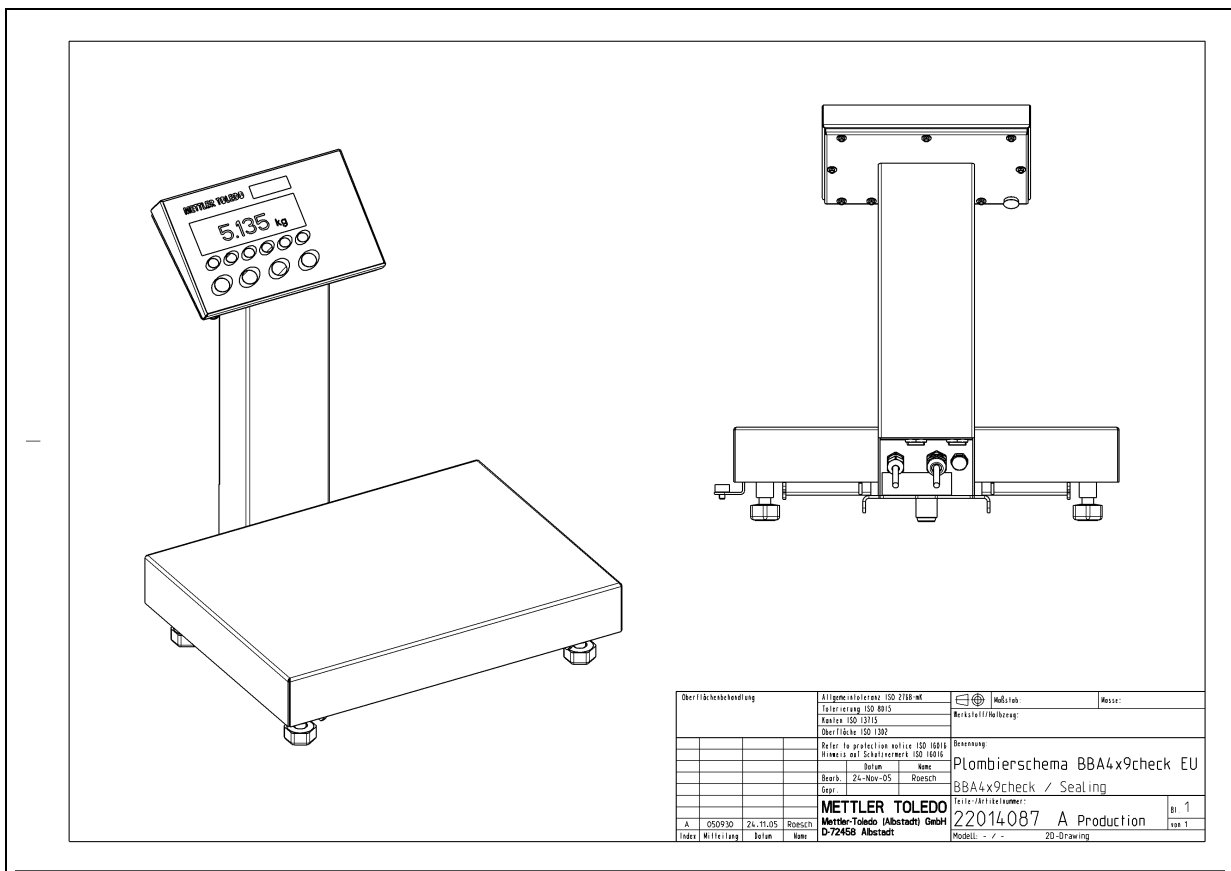


Fig. 4: compact scale line BBA4x9...