

OPERATING/INSTALLATION INSTRUCTION

(Translation)






Container cleaning devices

Spate cleaner TANKO® EX-S

Type series

TANKO-EX-S10
TANKO-EX-S20
TANKO-EX-S30
TANKO-EX-S40
TANKO-EX-S50




   II 1 G Ex h IIB T6 Ga
II 1 D Ex h IIIC T60°C Da

TPS 20 ATEX 055073 0008 X

Spray cleaner TANKO® EX-RB

Type series

TANKO-EX-RB30
TANKO-EX-RB40
TANKO-EX-RB64
TANKO-EX-RB90

   II 1 G Ex h IIB T6 Ga
II 1 D Ex h IIIC T60°C Da

TPS 20 ATEX 055073 0008 X

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ID no.: 664BA010706ENX - 2020/01 Rev.1

NOTE



These instructions are an essential part of the device and must be available to operating and maintenance personnel at all times throughout its entire life cycle. The safety precautions contained therein must be observed.

If the device is resold, the instructions must always be transferred to the new owner.

Translation

The operating instructions must be written in an official European Community language acceptable to the manufacturer of the machinery in which the partly completed machinery will be assembled, or to his authorized representative. If any discrepancies arise in the translated text, the original operating instructions (German) must be consulted for clarification, or the manufacturer must be contacted.

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Contents

Contents	I
List of Figures	II
List of Tables.....	III
Abbreviations and Units.....	IV
1 Introduction	1
1.1 Means of Presentation.....	1
1.1.1 Explanation of Signal Words.....	1
1.1.2 Explanation of the Warnings	2
1.1.3 Pictograms and Symbols	4
1.2 Warranty and Liability.....	5
1.3 Product Names and Trademarks.....	5
1.4 Related Documents.....	5
2 Safety.....	6
2.1 Intended Use.....	7
2.2 Spare Parts, Replacement Parts and Accessories	12
2.3 Duties of the Operating Company	12
2.4 Requirements for Personnel.....	15
2.4.1 Personal Protective Equipment.....	16
2.5 Labeling.....	17
2.5.1 Type Designation.....	17
2.5.2 Type Plate	17
2.5.3 Labeling for Explosion Protection	18
3 Construction and Function	23
3.1 Structure	23
3.2 General Function Description	24
3.3 Technical Data	26
3.4 Cleaning Media.....	39
4 Transportation and Storage.....	44
4.1 Packaging.....	45
4.2 Transport.....	45
4.3 Storage.....	46
5 Installation.....	47
5.1 Safety Instructions for Installation	47
5.2 Installation	50
5.2.1 Interfaces.....	51
5.2.2 Installation Position	52
5.2.3 Installing the Device	53
6 Commissioning.....	57
6.1 Safety Instructions for Commissioning	57
6.2 Functional Check/Trial Run	60
6.3 Switch-on Procedure	61

- 6.4 Operation..... 62
- 7 Maintenance 66**
 - 7.1 Safety Instructions for Maintenance 66
 - 7.2 Switch-off Procedure 69
 - 7.3 Removal..... 70
 - 7.3.1 Removing the Device 71
 - 7.4 Maintenance 72
 - 7.4.1 Maintenance Intervals 74
 - 7.4.2 Tools and Tightening Torque Values 76
 - 7.4.3 Notes on Cleaning 77
 - 7.5 Spare Parts and Customer Service..... 79
 - 7.5.1 Spare parts 80
- 8 Faults..... 81**
 - 8.1 Safety Instructions for Troubleshooting 81
 - 8.2 Faults and Remedial Action 82
 - 8.3 What to Do in Case of an Emergency 83
- 9 Decommissioning..... 84**
 - 9.1 Disposal..... 84
- Index..... 86**
- Appendices 88**
- Notes 94**

List of Figures

- Illustration 2.5-1: Type Plate Position 17
- Illustration 3.1-1: Overview of designs..... 23
- Illustration 3.2-1: Actuator structure (example TANKO-S) 24
- Illustration 3.3-1: Spray pattern..... 26
- Illustration 3.3-2: External dimensions 26
- Illustration 3.3-3: Consumption data S10 32
- Illustration 3.3-4: Range S10..... 32
- Illustration 3.3-5: Consumption data S20 33
- Illustration 3.3-6: Range S20..... 33
- Illustration 3.3-7: Consumption data S30 34
- Illustration 3.3-8: Range S30..... 34
- Illustration 3.3-9: Consumption data S40 35
- Illustration 3.3-10: Range S40 35
- Illustration 3.3-11: Consumption data S50 36
- Illustration 3.3-12: Range S50 36

Illustration 3.3-13: Range RB30 360°	37
Illustration 3.3-14: Range RB40 360°	37
Illustration 3.3-15: Range RB64 360°	38
Illustration 3.3-16: Range RB90 360°	38
Illustration 5.2-1: Interfaces of the devices (similar to illustration)	51
Illustration 5.2-2 Weld-on version	53
Illustration 5.2-3: Installation of threaded connection	54
Illustration 5.2-4: Clip-on dimensions	55
Illustration 5.2-5: Clip-on installation	56
Illustration 7.4-1: Maintenance points.....	75

List of Tables

Table 1.1-1: Overview of Signal Words	1
Table 2.5-1: Type series.....	17
Table 2.5-2: Relationship between zones and equipment protection levels (EPL).....	18
Table 2.5-3: EX labeling explanation – Gas.....	20
Table 2.5-4: EX labeling explanation – dust.....	21
Table 3.3-1: Operating parameters of the device TANKO-EX-S	28
Table 3.3-2: Operating parameters of the device TANKO-EX-RB	30
Table 3.3-3: Material combinations body - balls	30
Table 3.3-4: Material combinations device - locking pin (examples).....	31
Table 5.2-1: Recommended Filler Materials	54
Table 5.2-2: Clip-on dimensions.....	55
Table 7.4-1: Inspection and Maintenance Work	76
Table 7.5-1: Spare part wire locking pin for clip-on	80
Table 8.2-1: Operating Faults – Cause and Remedy	82

Abbreviations and Units

Abbreviations

ATEX	AT mosphère EX plosible; Synonym for the ATEX Directive of the European Union; comprises measures for explosion protection for explosive atmospheres
AWH	Armaturenwerk Hötensleben GmbH
BetrSichV	Betriebssicherheitsverordnung (German industrial safety ordinance); ordinance concerning health and safety when using work equipment; German implementation of Directive 2009/104/EC of the European Parliament concerning the minimum safety and health requirements for the use of work equipment by workers at work
or	or
approx.	approximately
CIP	Cleaning in Place; a local (automated) cleaning process without dismantling plant parts. Denotes a procedure for cleaning processing plants, predominantly in sectors with particularly critical hygiene requirements, such as the pharmaceutical industry, food and beverage industry or biofuel plants.
DIN	Deutsches Institut für Normung e.V.; is a national standards organization in the Federal Republic of Germany; The standards of this organization are referred to as DIN standards.
DK	Head diameter
EN	European Standard
EPL	Protection level of the device (equipment protection level)
ISO	International Organization for Standardization
L	Length
$L_{EX,8h}$	Daily noise exposition level
L_{PA}	Emission noise pressure level at workplace
MC [MA]	Media connection In the context of these instructions, this colloquial term describes the interface used in cleaning technology for supplying cleaning agent from the supply line to the device.
max.	maximum
min.	minimum
up/down	Spray pattern up/down
PC [PA]	Process connection In the context of these instructions, this colloquial term describes the interface used in cleaning technology for the connection to the process from the device to the container.
Ra	Average roughness value (dimension for the surface roughness)
SI	Système international d'unités; the most widely used international system of units for physical variables

SN	Serial number
SW	Width across flats [wrench size]
TRBS	“Technische Regeln für Betriebssicherheit” (German technical rules for operational reliability and safety); these rules put the “Betriebssicherheitsverordnung” (BetrSichV) into concrete terms with regard to the identification and assessment of hazards and the derivation of suitable measures.
TRGS	“Technische Regel für Gefahrstoffe” (German technical rules for hazardous materials); these rules reflect the state of the art, occupational medicine and occupational hygiene as well as other sound scientific knowledge for activities involving hazardous materials, including their classification and labeling.
etc.	and so on
v_{eff}	effective vibration velocity

Units of Measure



The following indicated factors are intended for orientation and the conversion of the SI units to common units of measure for the American market.

bar	Unit of measure for pressure p [bar] All pressure [bar] specifications stand for positive pressure [bar] [bar _g] unless expressly described otherwise. Conversion: 1 bar = 14.50376... psi [pound-force per square inch]
°C	Unit of measure for temperature T [degrees Celsius] Conversion from Celsius to Fahrenheit: °C × 1.8 + 32 = °F [degrees Fahrenheit]
h	Unit of measure for time t [hour]
K	Unit of measure for temperature T and temperature differences ΔT [Kelvin] Conversion: 273.15 K = 0°C
kg	Unit of measure for mass m [kilograms] Conversion: 1 kg = 2.20462 ... lb [Latin libra; pound]
l/min	Unit of measure for volume flow rate V [liters per minute] Conversion: 1 l/min = 0.06 m ³ /h [cubic meters per hour] 1 l/min = 0.26417 ... gpm (US) [gallons per minute (US)] 1 m ³ /h = 4.40286 ... gpm (US) [gallons per minute (US)]
lx	Unit of measure for illuminance E _v [Lux]
m	Unit of measure for length l [meters] Conversion: 1 m = 3.28083... ft [feet]
mm	Unit of measure for length l [millimeters] Conversion: 1 mm = 1/25.40005 in [inches] = 0.03937 in [inches]
Nm	Unit of measure for moment/torque M [newton meters] Conversion: 1 Nm = 0.737 lbft [pound-force feet]

rpm	Unit of measure for speed n [revolutions per minute] Conversion: 1 U/min = 1 rpm [revolutions per minute]
μm	Unit of measure for length l [micrometers]
pS/m	Unit of measure for electrical conductivity of materials κ [piko Siemens per meter]

1 Introduction

These operating/installation instructions (referred to hereinafter as the instructions) are a component part of the device. They provide you with all the information required for smooth operation of the TANKO®EX-S/TANKO®EX-RB cleaning system (referred to hereinafter as the device).

The instructions must be read, understood, and applied by all persons employed to carry out installation and assembly, commissioning, maintenance, cleaning and troubleshooting on the device. This applies in particular to the listed safety instructions.

After studying the manual, you will be able to

- Assemble, install and operate the device safely,
- Clean and service the device correctly and
- Take the correct measures if a fault occurs.

In addition to these instructions, generally applicable, statutory and other binding regulations in regard of the prevention of accidents and in regard of environmental protection in the country of use must also be observed.

The instructions must be kept at the location of use of the device so that they are available in legible condition at all times. If the device is resold, the instructions must always be transferred to the new owner.

Download the instructions, if necessary, from the <http://www.awh.eu/de/downloads> Internet page.

1.1 Means of Presentation

1.1.1 Explanation of Signal Words

The warnings are introduced with a signal word which describes the extent of the hazard. The meaning and their classification in case of hazardous situations are explained in the following overview.

Signal Word	Meaning	Consequences of Failure to Observe
⚠ DANGER	Hazard with a high level of risk	Death or severe physical injury
⚠ WARNING	Hazard with a medium level of risk	Death or severe physical injury
⚠ CAUTION	Hazard with a low level of risk	Minor or moderate physical injury
NOTE	Hazard with a low risk	Risk of material damage
NOTE ON EXPLOSION PROTECTION	Important note on explosion protection	Loss of explosion protection and resulting hazards

Table 1.1-1: Overview of Signal Words

1.1.2 Explanation of the Warnings

Section-related Warnings

The section-related warnings apply not only to one particular action, but rather to all actions within a section. In addition, the pictograms and symbols indicate a general or specific danger.



DANGER

This warning warns of a hazard with a high level of risk!

Failure to observe it can lead to death or severe physical injury.

- Measure(s) to prevent the danger



WARNING

This warning warns of a hazard with a medium level of risk!

Failure to observe it can lead to death or severe physical injury.

- Measure(s) to prevent the danger



CAUTION

This warning warns of a hazard with a low level of risk!

Failure to observe it can lead to minor or moderate injury.

- Measure(s) to prevent the danger

NOTE

This warning warns of a hazard with a minor level of risk!

Failure to observe it can lead to material damage.

- Measure(s) to prevent the danger



NOTE ON EXPLOSION PROTECTION

This note contains instructions regarding explosion protection.

Non-compliance results in the explosion protection being removed, thus leading to hazards.

Embedded Warnings

The embedded warnings apply to specific actions and are integrated directly into the action before the specific action step.

The embedded warnings are structured as follows.

▲ SIGNAL WORD Type and source of the danger

Possible consequences in case of failure to observe

- Measure(s) to prevent the danger

Further Means of Presentation



The “Info” symbol provides useful information, additional tips and recommendations.

- Texts which follow this mark are bulleted lists.
- Texts which follow this mark describe measures for prevention of the danger.
- 1. Texts which follow this numbering describe the first step of a task, followed by further numbered steps which have to be performed in the specified order.
- a) Texts which follow this lettering as a subitem of a numbering (e.g. 1) describe the first step of a task for a higher-level task, followed by further lettered steps which have to be performed in the specified order.
- (1) Numbers in brackets reflect the item numbers in figures or parts lists.
- “ ” Texts in quotation marks are (direct) quotes from documents (e.g. directives or standards) or words, word groups and parts of a text or word with a special meaning.
Important, significant information is shown with additional **bold type**, *in italics* or CAPITAL LETTERS for emphasis of individual words or phrases.

1.1.3 Pictograms and Symbols

The following pictograms and symbols are used as a supplementary measure in these instructions to clarify the sources of dangers and measures. They can appear at all levels of danger.



Warning about electrical voltage



Warning about explosive atmosphere



Warning about hand injuries



Warning about a hot surface



Warning about corrosive substances



Warning about substances which are a water hazard



Unauthorized access prohibited



Wear protective work clothing



Wear safety shoes



Wear protective gloves



Wear safety goggles



Wear a hard hat



Wear hearing protection



Wear a welding mask



Isolate from voltage before work



Obey instructions



Protective grounding connection required



Secure against power being switched back on



Return for recycling



Operating equipment for Ex zone

1.2 Warranty and Liability

The commitments agreed in the contract of supply and delivery, the general terms and conditions and the terms of delivery of Armaturenwerk Hötensleben GmbH (referred to hereinafter as AWH) and the statutory regulations valid at the time the contract was concluded shall apply.

Warranty and liability claims in case of personal injury and damage to property shall be excluded, in particular if these can be attributed to one or more of the following causes:

- improper or incorrect use of the device,
- improper assembly and installation, commissioning, operation and maintenance of the device,
- failure to observe the instructions in the instructions regarding assembly and installation, commissioning, operation and maintenance of the device,
- constructional modifications to the device (Conversions or other modifications to the device must not be made without previous written approval from AWH. In case of infringement, the device will lose its EU conformity and the operating authorization.),
- use of spare parts that do not comply with the specified technical requirements,
- improperly performed repairs,
- disasters, the effects of foreign objects and force majeure.

Disclaimer

AWH reserves the right to make alterations to this document at any time and without prior notice. AWH provides no guarantee (neither expressed nor implied) with regard to all information in this document, including but not limited to the implied warranty of merchantability and suitability for a particular purpose. Furthermore, AWH does not guarantee the correctness or completeness of information, text, graphics or other parts in this document.

1.3 Product Names and Trademarks

The product names and trademarks included in these instructions are brands or registered trademarks of the respective owners. TANKO® and AWH® are registered trademarks of Armaturenwerk Hötensleben GmbH.

1.4 Related Documents

The following documents may contain supplementary information for these instructions:

- Manufacturer's declaration and/or certificates of conformity
- Certificates
- Additional documents for any attached or upstream components, e.g. Drawings, technical data, information on accessories etc.
- Supplements to these instructions (e.g. special versions)
- AWH catalog, product data sheet

2 Safety

The device has been built in accordance with state-of-the-art technology and the recognized rules of safety. Nevertheless, use of the device may represent a danger to the life and limb of the user and third parties or a risk of impairments to the device and other objects of material value as a result of its function.

The following basic safety instructions are intended to prevent injury to personnel and material damage. The operating company must ensure that the basic safety instructions are observed and adhered to.

These instructions contain basic notes on installation, operation, maintenance and servicing of the device which must be complied with.

Anyone involved in installation, operation, maintenance and servicing must have read and understood these instructions.

The safety systems and safety instructions described in these instructions must be adhered to.



WARNING



Failure to comply with this manual, incorrectly performed installation and repair work or incorrect operation could lead to malfunctions on the device and to dangerous situations!

There is a risk of death or severe physical injury.

- *All work performed on the device must be carried out only by a specialist and in compliance with*
 - *the corresponding detailed operating and installation instruction(s),*
 - *the warning and safety signs on the device,*
 - *the regulations and requirements specific to the plant and*
 - *the national/regional regulations for safety and the prevention of accidents.*
- *Never install damaged devices or components.*



The figures in this manual are intended to provide basic understanding, and are primarily representations of the principles involved. They may differ from the actual design of the device.



For maintenance and repair, we recommend a training course provided by the manufacturer or a person authorized by the manufacturer.



If questions or doubts about handling the cleaning device arise during maintenance, please contact AWH.

Built-in Safety Systems

The built-in safety devices used by the higher-level plant in which the device is installed are to be tested at regular intervals.



WARNING

Dangerous situations arising from changing or disabling safety devices!

Only functional safety devices can ensure safe operation and prevent inadmissible operating conditions.

Changing or disabling safety devices can lead to unpredictable and dangerous situations.

There is a risk of death or severe physical injury.

- *Disabling the safety devices or changing the way they operate is strictly prohibited.*

2.1 Intended Use



WARNING

Risk of hazardous situations caused by use going beyond intended use and/or other types of use of the device!

There is a risk of death or severe physical injury.

- *Only use the device for the intended use.*
 - *Only ever use the device in accordance with the specifications contained in these instructions and the specifications on the device's type plate.*
 - *All the specifications in these instructions must be adhered to at all times.*
 - *Always keep the operating instructions at the location where the device is used.*
 - *Keep all signs on the device in legible condition.*
 - *Only use original spare parts.*
- *Modifications or conversions to the device are NOT permitted.*

**WARNING*****Danger from the incorrect use of materials/agents!***

The materials/agents to be used for the intended operation of the device are procured and utilized by the operating company for the device.

If unsuitable materials or agents are selected, strong chemical reactions could lead to fatal injury or severe physical injuries.

- *The proper selection and treatment of these materials/agents is solely the responsibility of the operating company.*
- *When selecting the materials/agents, make sure that the permitted technical parameters of the device are NOT exceeded.*
- *The cleaning agents and media must be approved for all of the materials of the device (e.g. washers, bushings) and for the substances in the container to be cleaned which come into contact with them.*
- *Adhere to the specified chemical limitations for use in the material data sheets.*
- *Adhere to the safety data sheets supplied by the manufacturers of the materials and media, in particular for hazardous substances:*
 - *Comply with the hazard and disposal instructions.*
 - *Set out protective measures and compile operating instructions for hazardous substances.*
 - *This also applies to hazardous substances that may arise during work processes.*

Refer to the order confirmation/parts list from AWH for the materials used in the device.

The TANKO-EX-S is a cleaning device without an external actuator and is a member of the spate cleaners group. The TANKO-EX-RB is a cleaning device without an external actuator and is a member of the spray cleaners group. The device is driven by the cleaning medium. The device is used for cleaning the interiors of containers with and without installed equipment.

For the purpose of these instructions the word “container” refers to **closed** tanks, silos, barrels, containers, pipes, etc. that are provided with an outlet that ensures a free flow of the supplied cleaning medium.

When using the device, it is necessary to distinguish between the following operating states.

Operating state - cleaning process (cleaning > cleaning medium is sprayed and spray head rotates)

In this case, ignitable gases, steams, mists or flammable dusts may already be present in the container or are only added by the intended cleaning process in the form of sprayed fluid (aerosol).

Ignitable steams and mists must be expected as soon as flammable fluids with a flash point of 15 K over the cleaning medium temperature are sprayed (including those permitted in accordance with [Section 3.4 Cleaning Media](#)). For this reason, both the conditions in the container and the type and temperature of the cleaning medium must be taken into account when determining the following three process conditions:

A) During cleaning, no explosive mixture is present, nor is it possible for one to arise from the cleaning medium. (Explosive mixtures consist of ignitable gases, steams, mists or stirred up flammable dust in the air or another oxidizing agent that reacts to a self-propagating flame when an ignition source becomes active, generally causing a sudden increase in temperature and pressure).

- Pressure in the container: 0 to 0.5 bar (0 to 7.25 psi g)
- Temperature of the cleaning medium: +5 °C to +180 °C
- Ambient temperature in the container to be cleaned: +5 °C to +180 °C

B) An explosive atmosphere (ATEX conditions) is present during cleaning.

(An explosive atmosphere is a mixture with air as an oxidizing agent under atmospheric conditions (ambient temperature of - 20 °C to +60 °C and absolute pressure of 0.8 bar a to 1.1 bar a, that is already present before the use of the device, or that arises during spraying of a cleaning medium during the cleaning process)

- Pressure in the container: 0 to 0.1 bar (0 to 1.45 psi g)
- Temperature of the NON-flammable cleaning medium: +5 °C to +60 °C
- Temperature of the flammable cleaning medium: +5 °C to flash point $T_{\text{flash point}} - 15 \text{ °C}$ (max. +60 °C)
- Ambient temperature in the container to be cleaned: +5 °C to +60 °C

C) An explosive mixture is present during cleaning, but there is no explosive atmosphere.

Cleaning is PROHIBITED! If necessary, the process conditions must be changed before use of the device so that process conditions exist in accordance with **A)** or **B)**.

For processes that are outside atmospheric conditions, the operating company must make a differentiated assessment of the effects.

The necessary safety-related parameters must be determined and an additional risk assessment must be created for explosion hazards in order to demonstrate the suitability of the device used.

The cleaning process with the tank cleaning devices TANKO-EX-S and TANKO-EX-RB is prohibited in operating conditions that lead to explosive mixtures outside atmospheric conditions (outside temperatures of - 20 °C to +60 °C and absolute pressures of 0.8 bar a to 1.1 bar a) in the container to be cleaned or in the presence of oxidizing agents other than air.

The cleaning process with the tank cleaning devices TANKO-EX-S and TANKO-EX-RB is also prohibited in the presence of explosive mixtures with ignitable substances such as hydrogen, ethylene, acetylene, carbon disulfide, carbon monoxide, ethylene oxide, and trichlorosilane.

Operating state - idle state (NO cleaning > cleaning medium is NOT sprayed and spray head is stationary)

- Pressure in the container: Depending on the permissible maximum pressure of the container and the attached fittings including media supply. The media supply must be closed tightly, the cleaning device does not have its own shut-off device.
- Ambient temperature in the container to be cleaned: -20°C to 180°C

The device was developed, engineered and built exclusively for industrial and commercial use. It must not be used for private use.

Operation may also be carried out if an explosive dust or gas atmosphere is present, or can develop, inside the tank that is to be cleaned.

The TANKO-EX-S or TANKO-EX-RB is suitable for use in an explosive Zone 0 or Zone 20 atmosphere.

Please note the additional information on the type plate for the Ex labeling (see [Section 2.5.3 Labeling for Explosion Protection](#)).

In all cases, operating company must check whether the device is suitable for its application.

**NOTE ON EXPLOSION PROTECTION**

The area of application of the device must always be adjusted to the relevant operating conditions and the materials in contact with the product. These materials must be selected to ensure that they do not react with the cleaning medium or the substances in the container to be cleaned in any way that could impair the explosion protection.

It must be ensured that no hybrid mixtures can occur in the container or the environment (a hybrid mixture is a mixture of air with combustible substances in different states of aggregation - e.g. gas/steam and dust).

Non-compliance can result in the loss of explosion protection.

Locations for containers in which the device is to be installed are usually enclosed spaces. In different setups, the operating company must ensure the protection of the device from harmful weather and environmental influences while maintaining the specified application limitations/conditions (see [Section 3.3 Technical Data](#)).

In the process, the following must always be observed:

- Only operate the device when installed inside an enclosed container.
- Never direct the cleaning jet or torrent from the device at persons.
- Protect the device from freezing (e.g. risk of frost from possible residual water).
- Use a suitable filter system in the supply line for the cleaning medium.
- Operate the device only within the approved parameters, e.g. pressure and temperature (see [Section 3.3 Technical Data](#)). If necessary, appropriate monitoring and limiting systems (e.g. for pressure and temperature) should be implemented.
- Only cleaning agents which are compatible with the materials of the device (see [Section 3.4 Cleaning Media](#)) may be used.
- The preferred installation position for the device is vertical with the cleaning head pointing downwards. Other installation positions are possible.
- The device may generate vibrations when cleaning the container. Any vibrations going beyond this must be avoided (see [Section 7.4.1 Maintenance Intervals](#)).
- The device is designed for fixed pipe installation only. Installation on a hose is PROHIBITED.

Non-Intended Use

The device is **NOT suitable** for the following applications:

- The device is NOT suitable for private use.
- The device is NOT suitable for use outside of containers.
- Holding the device with your hand during operation is PROHIBITED.
- The device must NOT be immersed in the product of the production process (NOT even partially). This could cause the product to enter into the device. The spray holes may become blocked. The free movement of the actuator may be obstructed.
- The device must NOT be operated with gases (e.g. air) over a long period, as the cleaning medium is used for lubrication of the bearings.

The device is intended exclusively for the purpose outlined above. Any other use beyond that described here or alteration of the device without written approval from the manufacturer is considered IMPROPER use.

The manufacturer accepts NO liability for damage arising from such use. The operating company is solely responsible for the risk.

The device must not be put into operation until it has been assured that all the safety devices are fully functional and the plant in which the device is installed meets the safety requirements of all relevant European directives (e.g. the Machinery Directive).

2.2 Spare Parts, Replacement Parts and Accessories



WARNING

Risk of damage, malfunction or complete failure of the device!

Incorrect or faulty spare/replacement parts and accessories put the functional safety and reliability of the device at risk. This can result in failure of components or a device malfunction, as well as material damage and consequential damage.

There is a risk of death or severe physical injury.

- *Use only the manufacturer's original spare parts.*

We expressly draw attention to the fact that spare parts and accessories NOT supplied by AWH have NOT been checked or approved by AWH. The installation and/or use of such products could therefore, under certain circumstances, result in changes with negative results to the properties of the device specified by its design and the higher-level plant.

AWH is not liable for any damage arising from the use of non-original parts or non-original accessory parts. Standard parts can be obtained from specialist dealers.

[Section 7.5.1 Spare parts](#) includes a list of spare parts.

2.3 Duties of the Operating Company

The device is used in the commercial sector. The operating company is thus subject to the legal obligations regarding occupational safety.

In the EEA (European Economic Area), the national implementation of the Framework Directive 89/391/EEC on carrying out measures for improving safety and protecting the health of employees during work, as well as the associated individual directives shall be observed and complied with in their current valid versions.

Of particular importance in this connection is Directive 2009/104/EC on the minimum specifications for safety and health protection of employees using work equipment in their work.



NOTE ON EXPLOSION PROTECTION

For applications in the presence of explosive atmospheres, the Directive (1999/92/EC with Annexes I and II) on minimum requirements for improving the safety and health protection of workers potentially at risk from explosive atmospheres also applies.

If this is not observed, the explosion protection could be disabled.

As a basic rule, in Germany the Industrial Safety Regulation (BetrSichV) must be observed.

In other countries, the respective national guidelines, statutes and country-specific regulations regarding occupational safety and accident prevention must be complied with.

At the same time, the following, non-exhaustive instructions apply in particular:

- The operating company must ensure that the device is used only as intended (see [Section 2.1 Intended Use](#)).

- The operating company must keep informed of the locally applicable occupational health and safety regulations and, in addition, use a risk assessment to determine the hazards resulting from the specific working conditions at the location of use of the device. This must then be implemented in the form of operating instructions for the operation of the device.
- When using hazardous materials, protective measures must be specified in accordance with the safety data sheets and operating instructions shall be compiled for hazardous materials. Personnel must be briefed accordingly. This also applies to hazardous substances that may arise during work processes.
- A continuous risk assessment must be carried out for workplaces, including temperature conditions for the medium and the place of use (falling). The measures are to be defined in operating instructions. Personnel must be instructed accordingly.
- Supervisors must monitor compliance with the measures specified in the operating instructions.
- Throughout the entire operating period of the device, the operating company must check whether the operating instructions he has compiled reflect current legislation requirements and adapt them as necessary.
- The operating company must clearly regulate and specify the responsibilities of personnel (e.g. for operation, maintenance and cleaning).
- The operating company must only allow sufficiently qualified and authorized personnel to work on the device.
- The operating company must ensure that all employees handling the device have read and understood the instructions.
Furthermore, it must provide personnel with training at regular intervals with certification and inform them of the hazards.
- The operating company must provide sufficient workplace lighting at the plant in accordance with the locally applicable regulations for occupational health and safety, in order to prevent hazards occurring as a result of poor lighting.
- The operating company must provide personnel with personal protective equipment and make sure that this is used (see [Section 2.4.1 Personal Protective Equipment](#)).
- The operating company must make sure that the danger area of the higher-level plant in which the device is installed is not accessible to unauthorized persons.
- The operating company must ensure that no persons work on the device whose ability to react is impaired by drugs, alcohol, medication or similar.
- The operating company must take appropriate measures to inform groups of persons who are not intended to come into direct contact with the device (e.g. visitor groups), about the potential dangers involved.
- The operating company is responsible for making sure that the device is only ever operated in perfect condition.
- Wherever high pneumatic pressures occur, there is a possibility of sudden failure of or damage to the lines and connections. This poses a hazard. The operating company must instruct operating and maintenance personnel at least once a year on the possible hazards.

- The constructor of the overall plant must install the switching and safety devices required for setting up, inspection, shutting down (including emergency shutdown), operation, maintenance, cleaning and repair.
- The operating company must design the disconnection of the energy sources on the higher-level plant technically in such a way that the described in [Switch-off Procedure 7.2 Section](#) can be adhered to.
- The operating company must define and adhere to the intervals for inspections and control measures in accordance with the environment and media used.
- The operating company must provide fire safety devices, e.g. the appropriate quantity of suitable hand-held fire extinguishers of the appropriate size, in easily accessible places and provide employees with training in fire safety.
- Warnings in the documentation for externally supplied assembly groups must be adhered to and incorporated into the risk assessments for the specific workplace.
- For installation of the device in a plant, the operating company must guarantee safe access using steps, platforms and rails in accordance with EN 14122-1-3.
- The operating company must ensure that the permitted operating parameters (see [Section 3.3 Technical Data](#)) are not exceeded.

Connections:

Before operating the machine with the device, the operating company must make sure that the local regulations are observed for assembly, installation and commissioning, if these tasks are performed by the operating company.

- Hydraulic connections must fulfill the requirements of DIN EN ISO 4413.
- Pneumatic connections must fulfill the requirements of DIN EN ISO 4414.
- The grounding measures must be implemented and checked prior to commissioning of the device and the container.



NOTE ON EXPLOSION PROTECTION

Any person working in a hazardous area must be regularly instructed with regard to the necessity of grounding measures and they should also be made aware of typical grounding faults (e.g. subsequent grounding of objects or devices that are already charged)



NOTE ON EXPLOSION PROTECTION

When operating the device in a container, the resulting ignition hazards (“mechanically generated sparks” (see [Section 5.2 Installation](#)) and “static electricity” (see [Section 3.4 Cleaning Media](#)) must be considered by the user within the framework of a hazard/risk assessment.

2.4 Requirements for Personnel

The device must only be operated, maintained and repaired by persons with the appropriate qualifications. These persons must be familiar with this manual and act in accordance with them. The respective authorizations for personnel must be clearly defined.

The following qualifications are designated in the manual for various fields of activity:

Expert/Specialist Personnel

An expert is a person whose professional training, knowledge, and experience and knowledge of the relevant standards and regulations enables them to carry out work on the device and identify and prevent potential risks independently.

Instructed Person

An instructed person has been briefed and, if necessary, trained by the operating company or an expert in a briefing on the assigned tasks and possible hazards in the event of improper actions, and instructed on the necessary safety devices and protective measures.

Only personnel with the following expertise are permitted to perform work on the device:

- **Assembly/disassembly:** Industrial mechanic or comparable vocational qualification, practical experience in the assembly/disassembly of devices
The person must be familiar with the construction, mechanical installation, maintenance and troubleshooting of the device, and have the following qualifications:
 - Vocational training and final qualification in the field of mechanics (e.g. mechanic or mechatronics technician)
- **Welding work:** Welder qualification in pipeline engineering or similar apprenticeship
- **Electrical work:** Electrician; person with appropriate specialized apprenticeship, knowledge and experience, enabling them to identify and avoid the risks that may arise from working with electricity
The person must be familiar with the electrical installation, commissioning, troubleshooting and repair of the device and have the following qualifications:
 - Vocational training and final qualification in electrical engineering (e.g. electrician, electronics engineer or mechatronics technician)
 - Several years of vocational experience in the field of electrical engineering
- **Cleaning:** Instructed person

Work performed in other areas **transportation, storage, operation and disposal** must be performed exclusively by personnel who have received suitable instruction.

All of the personnel listed above must wear protective clothing in accordance with their respective activities.

2.4.1 Personal Protective Equipment



NOTE ON EXPLOSION PROTECTION

Persons working in potentially explosive atmospheres must not be dangerously charged. The personal protective equipment must satisfy the requirements of explosion protection. Non-compliance can result in the loss of explosion protection.

- Observe TRGS 727 "Prevention of ignition hazards due to electrostatic charge" Chapter 7 "Electrostatic charging of persons and personal protective equipment (PPE)".
- DIN EN 1149-5 Protective clothing - Electrostatic properties - Part 5: Observe performance requirements for material and design.

Personal protective equipment must be used in accordance with the respective task when working on the device in order to minimize health hazards.



Protective work clothing

Protective work clothing is tight-fitting work clothing with low resistance to tearing, with close-fitting sleeves and without protruding parts. It is mainly used for protection against becoming entangled in moving components. Do not wear any rings, necklaces or other jewelry.



Safety shoes

Wear slip-resistant safety shoes for protection against heavy, falling objects or for protection against slipping on slippery surfaces.



Protective gloves

Wear protective gloves to protect your hands against friction, grazes, getting pricked or deep cuts and for protection against coming into contact with hot surfaces or chemical substances.



Protective goggles

Wear protective goggles for protection against media escaping at high pressure and against flying objects.



Hardhat

Wear a hardhat for protection against falling or flying objects.



Hearing protection

Wear hearing protection to protect yourself from an increased noise pressure level (≥ 85 dB(A)).



Welding hood

Wear a welding mask to protect against damage to the eyes or skin caused by the welding arc and to protect against burns caused by flying particles during welding.

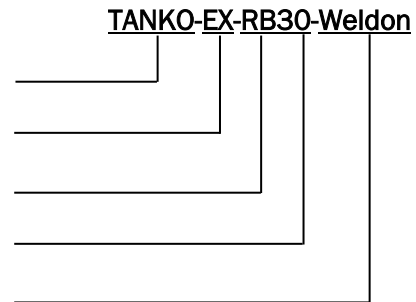
Personal protective equipment must be provided by the operating company in accordance with the valid requirements. Furthermore, both the national regulations and, if necessary, the internal instructions from the operating company, must be observed.

2.5 Labeling

2.5.1 Type Designation

Example: Spray cleaner

- 1) Brand of the cleaning devices
- 2) ATEX version
- 3) Type: RB (rotating ball = rotating spray head)
- 4) Size: Head diameter 30 mm
- 5) Connection: Welded connection



Available type series

Device	Threaded version	Welded version	Clip-on version
TANKO-EX-S10	X	X	---
TANKO-EX-S20	X	X	X
TANKO-EX-S30	X	X	X
TANKO-EX-S40	X	X	X
TANKO-EX-S50	X	X	X
TANKO-EX-RB30	X	X	X
TANKO-EX-RB40	X	X	X
TANKO-EX-RB64	X	X	X
TANKO-EX-RB90	X	X	X

Table 2.5-1: Type series

2.5.2 Type Plate

The marking is applied to the device according to the following illustration.

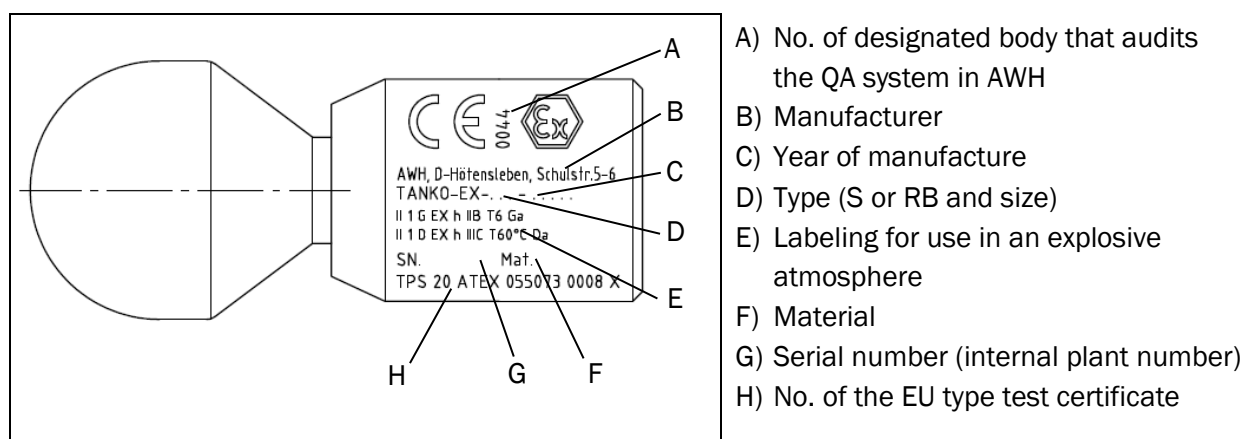


Illustration 2.5-1: Type Plate Position

2.5.3 Labeling for Explosion Protection

Devices in explosion-proof design are labeled by specifying the device group, category, ignition protection type, explosion group, temperature class, and EPL on the type plate. A CE and Ex mark confirms compliance of the device with the European ATEX Directive 2014/34/EU.

For the intended use of the devices in the respective zones, the devices must have an appropriate level of protection.

The equipment protection levels specified in ISO 80079-36 are related to the corresponding device groups, and device categories according to the following table.

IEC 60079-10-X		Directive 2014/34/EU			ISO 80079-36			
Zone		Device group	Device category			Group	EPL	
Gas Steam Mist	0	II	1G	—	—	II	Ga	—
	1			2G	—			Gb
	2				3G			
Dust	20	II	1D	—	—	III	Da	—
	21			2D	—			Db
	22				3D			

Table 2.5-2: Relationship between zones and equipment protection levels (EPL)



The operating company is responsible for division into zones.

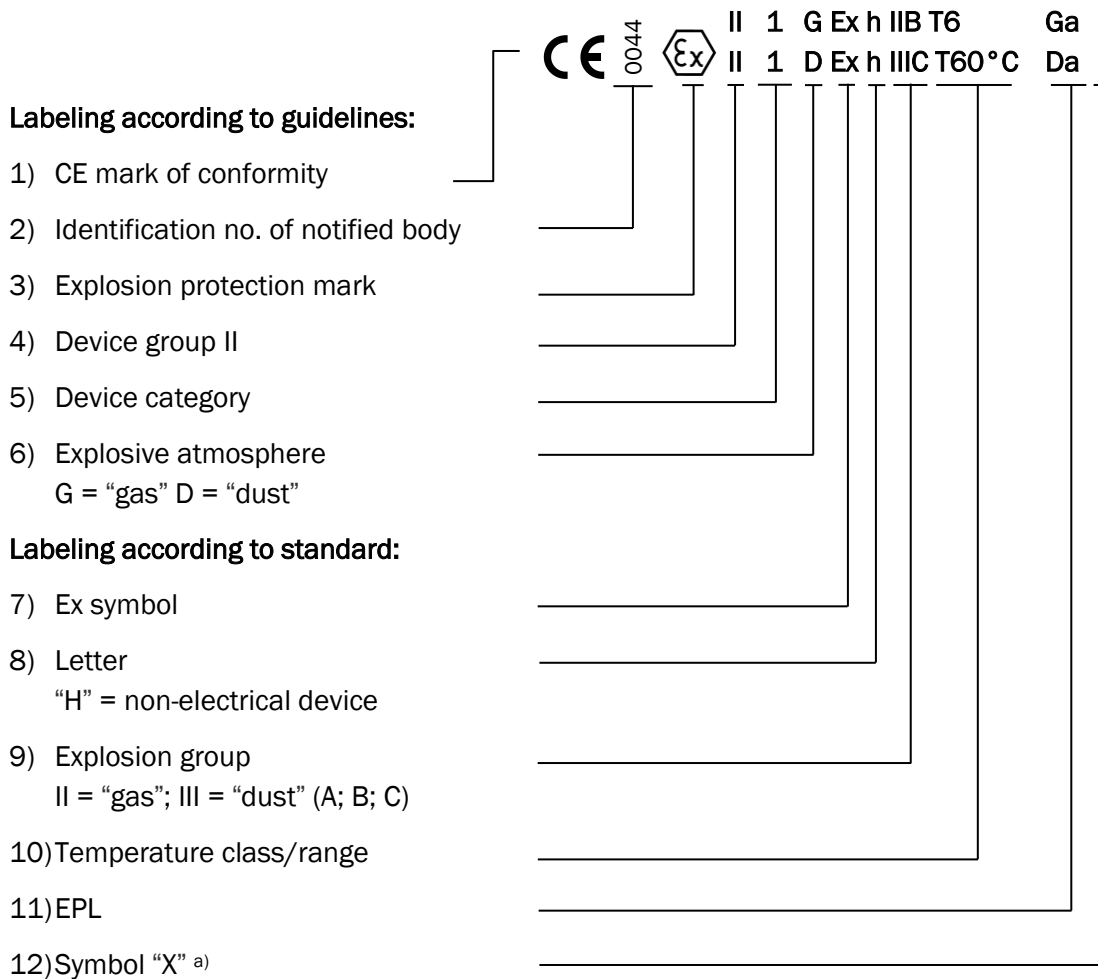
Identification of the device:

II 1 G Ex h IIB T6 Ga
II 1 D Ex h IIIC T60°C Da
TPS 20 ATEX 055073 0008 X

The type plate on the device also contains the information required for operation in a potentially explosive atmosphere according to ATEX Directive 2014/34/EU and applied standards:

Explanation of labeling:

Certificate number: TPS 20 ATEX 055073 0008 X^{a)}



^{a)} The "X" symbol means that the safe use of the device depends on specific operating conditions specified in the operating instructions. If the symbol "X" is included in the certificate number on the device, it is not included in this label.

Operating state			Flammable gases or vapors within the container to be cleaned			
			II1G Ex h IIB T6 Ga			
	Temperature		Surface temperature of the device inside the container	Explosive atmosphere in the container	Temperature class	EPL
	Working temperature cleaning medium	Inside the container				
Cleaning process	+5 °C to 60 °C	+5 °C to 60 °C	The device adopts max. the temperature of the cleaning medium or that of the container. The result is a max. surface temperature of the device of 60 °C.	Gases or vapors of explosion groups IIA or IIB. The cleaning process (spraying of liquids) when explosive mixtures with ignition-sensitive substances are present in accordance with Section 2.1 and Section 3.4 is not permitted. Group IIC gases are NOT allowed during cleaning.	T6	Ga
Cleaning process	greater than 60 °C up to 180 °C	greater than 60 °C up to 180 °C	The device adopts max. the temperature of the cleaning medium or that of the container. The result is a max. surface temperature of the device of 180 °C.	If explosive mixtures outside of atmospheric conditions are possible in the container, the cleaning process is not part of the intended use under these conditions, and requires a separate risk assessment.	---	---
Idle state (no cleaning)	N/A	max. 60 °C	The device adopts max. the temperature of the container.	Gases or vapors of explosion groups IIA or IIB. Group IIC gases are permitted in the container, but must be completely removed for cleaning, and the container must be suitable for this.	T6	Ga
Idle state (no cleaning)	N/A	greater than 60 °C up to 180 °C	The device adopts max. the temperature of the container.	If explosive mixtures in the container outside of atmospheric conditions are possible, the device has no potential ignition source other than the hot surface with the temperature of the surrounding container when used as intended in the idle state.	---	---

Table 2.5-3: EX labeling explanation – Gas

Operating state			Flammable dust inside the container to be cleaned			
			II 1D EX h III C T60 °C Da			
	Temperature		Surface temperature of the device inside the container	Explosive atmosphere in the container	Max. surface temperature	EPL
	Working temperature cleaning medium	Inside the container				
Cleaning process	+5 °C to 60 °C	+5 °C to 60 °C	The device adopts max. the temperature of the cleaning medium or that of the container. The result is a max. surface temperature of the device of 60 °C.	Dusts of dust groups IIIA, IIIB or IIIC	T60 °C	Da
Cleaning process	greater than 60 °C up to 180 °C	greater than 60 °C up to 180 °C	The device adopts max. the temperature of the cleaning medium or that of the container. The result is a max. surface temperature of the device of 180 °C.	If explosive mixtures outside of atmospheric conditions are possible in the container, the cleaning process is not part of the intended use under these conditions, and requires a separate risk assessment.	--	--
Idle state (no cleaning)	N/A	max. 60 °C	The device adopts max. the temperature of the container.	Dusts of dust groups IIIA, IIIB or IIIC	T60 °	Da
Idle state (no cleaning)	N/A	greater than 60 °C up to 180 °C	The device adopts max. the temperature of the container.	If explosive mixtures in the container outside of atmospheric conditions are possible, the device has no potential ignition source other than the hot surface with the temperature of the surrounding container when used as intended in the idle state.	--	--

Table 2.5-4: EX labeling explanation – dust

The maximum surface temperature of the device is determined by the ambient temperature in the system (container) to be cleaned and by the temperature of the cleaning medium.

The permitted temperatures must be taken into account (see [Section 3.3 Technical Data](#)).

**NOTE ON EXPLOSION PROTECTION**

In accordance with EN 1127-1:2011, 6.4.2, the maximum surface temperature in the container may not exceed 80% of the ignition temperature of the explosive gas/air mixture or 2/3 of the ignition temperature of the dust/air mixture (determined in accordance with the latest version of EN 50281-2-1).

In addition, the smoldering temperature of the dust (ignition temperature of the dust layer (determined in accordance with the latest version of EN 50281-2-1) must be at least 75 K above the maximum surface temperature. The thickness of the dust layer may reach a maximum of 5 mm.

Where dust layers of > 5 mm are formed, the safety distance between the smoldering temperature and the maximum surface temperature of the device must be increased. In this regard, the requirements set out in the latest version of EN 60079-14 must be observed.



For processes that follow the cleaning, the potentially increased surface temperature of the device must be taken into account.

If necessary, the device must be left to cool down for enough time until a safe temperature is reached.



Before the start of processes in which explosive mixtures may arise, the device and/or the ambient temperature in the container must cool down to a safe temperature that no longer poses an explosion hazard (see also the note on explosion protection above).

Possible hazards when spraying fluids must also be taken into account and considered in a separate risk assessment by the operating company.

3 Construction and Function

3.1 Structure

Designs

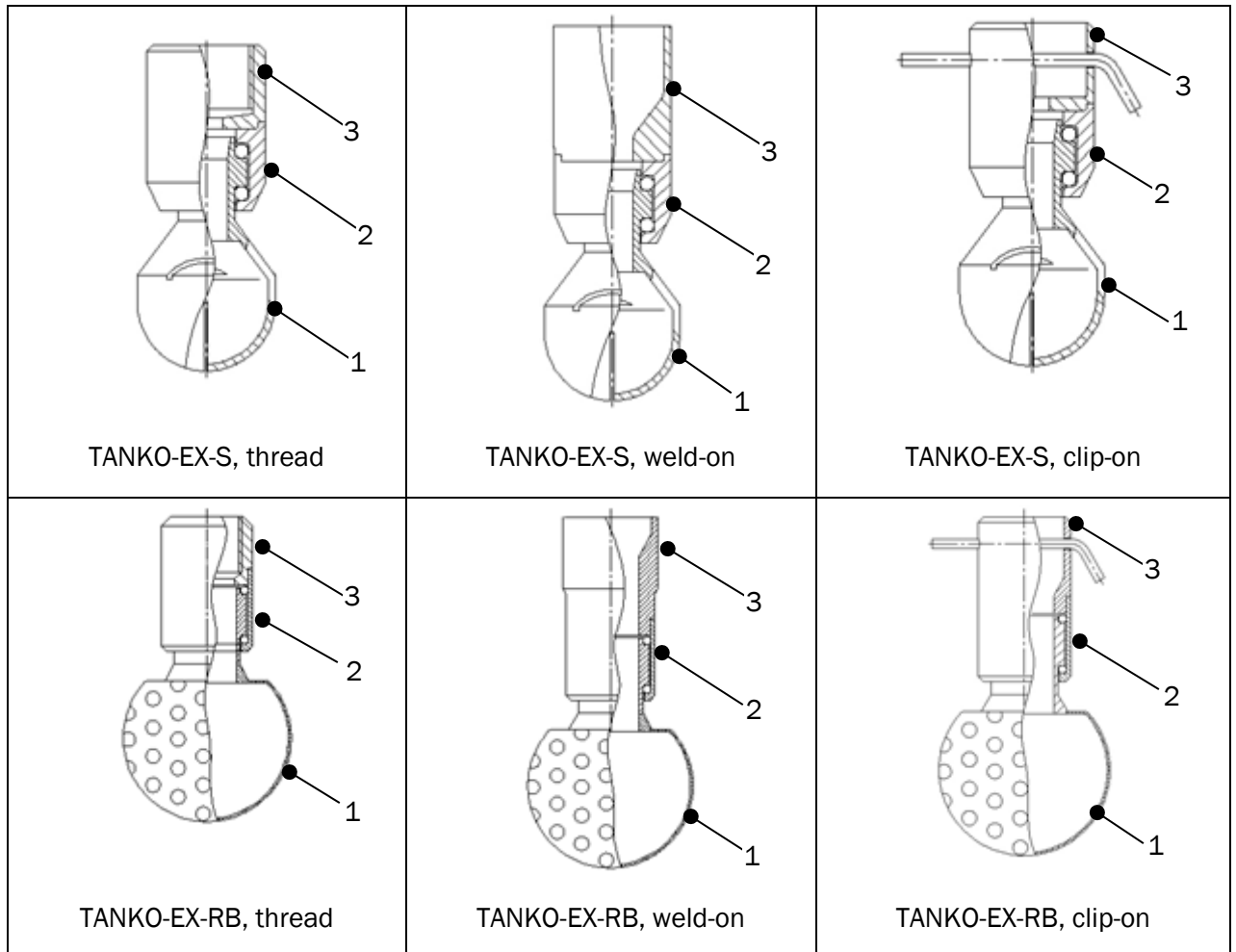


Illustration 3.1-1: Overview of designs

The TANKO-EX-S and TANKO-EX-RB series consist of the following main components:

- 1 Rotating head
- 2 Actuator
- 3 Connection

3.2 General Function Description

The TANKO-EX-S/RB type series are compact, axially rotating cleaning devices.

They have no electrical equipment and are powered by the cleaning agent flowing through them.

In the case of the TANKO-EX-S type, this is achieved via asymmetrical slots. In the case of the TANKO-EX-RB type, via internal paddle wheels. The type TANKO-EX-RB features a rotating spray ball which can output a larger volume of cleaning agent in a shorter space of time (area of low pressure).

The rotating movement of the devices ensures that the cleaning jet (torrent) is able to reach and clean every part of the inner wall over the course of time.

The different types of cleaner are made of stainless steel. Several versions (sizes) of the TANKO-EX-S and TANKO-EX-RB series are available for different applications and container dimensions.

The shafts of both TANKO-EX type series are supported in double ball bearings and can be operated in all installation positions.

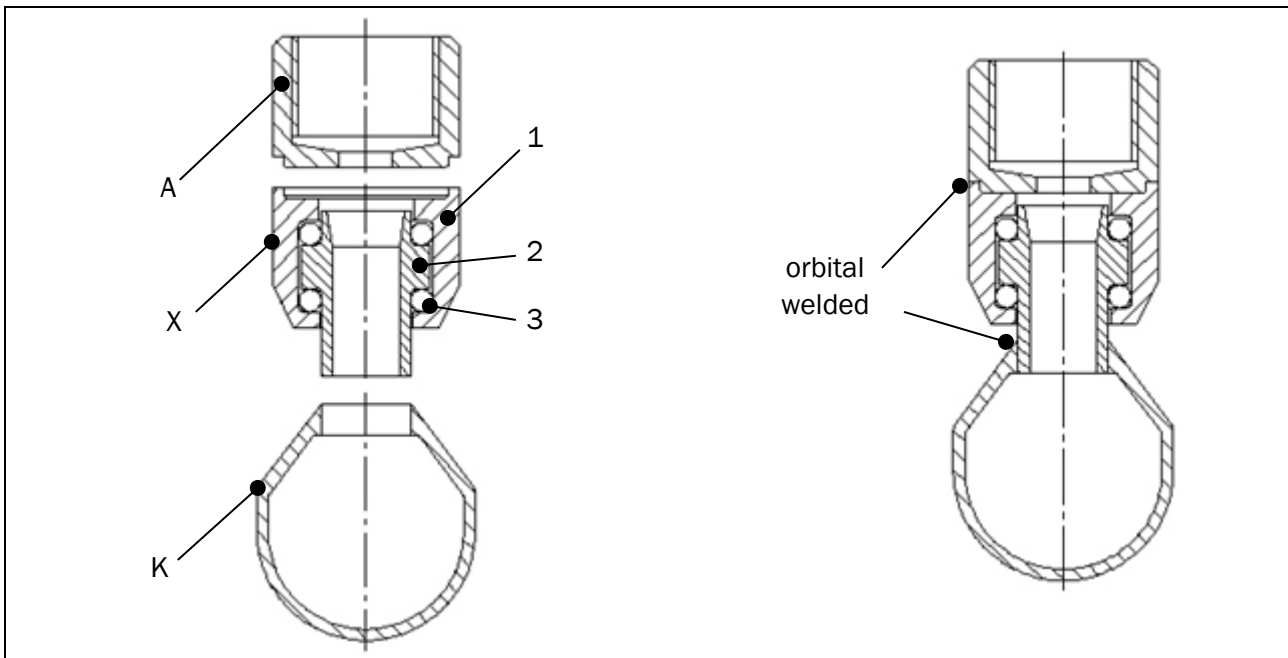


Illustration 3.2-1: Actuator structure (example TANKO-S)

- A Connection
- K Head
- X Labeling of the device and warning for clip-on locking pin
- 1 - 3 Components of the actuator
 - 1 Housing
 - 2 Shaft
 - 3 Balls

Only plants (containers) with sufficient grounding, made of conductive material, may be cleaned. The container outlet must be open during a cleaning process, i.e. no accumulation of cleaning agent should occur.

Cleaning times:

The time for one cleaning cycle depends on several factors, and must be defined individually by the owner.

Comment on the cleaning process

The result of a cleaning process with the device, like all other cleaning processes, depends on multiple parameters. According to the “Sinner’s circle” definition, the four most important parameters for cleaning are:

- Chemicals (cleaning medium, plus the product and its concentration)
- Mechanics (removal of dirt, establishment of contact with the cleaning medium)
- Temperature
- Time (reaction time of the cleaning medium and duration of the cleaning process).

All four factors are interdependent and variable in relation to each other in terms of their magnitudes.

The desired cleaning results can only be achieved with a well-balanced combination of pressure, flow, reaction time, temperature and cleaning medium.

Application examples for spate cleaner TANKO-EX-S and spray cleaner TANKO-EX-RB

Tanks, silos, barrels, containers, pipes, dryers, centrifuges, agitators, vacuum tanks, spray towers, container washing plants, fermenters, filters, mixing containers and horizontal dryers.

3.3 Technical Data

The estimated safe service life of the device is 10 years with single-shift operation and the use of drinking water.

Prerequisite for this: the device must be maintained properly at the intervals specified in the [Section 7.4 Maintenance](#).

All media other than tap water can reduce the service life of the device.



NOTE ON EXPLOSION PROTECTION

Restriction on the operating parameters of the device!

The maximum permitted operating parameters such as container size, operating pressure, and flow rate must be taken into account due to electrostatic charge build-up when handling fluids.

Non-compliance can result in the loss of explosion protection.

- Comply with the notes in [section 3.4 Cleaning Media](#) before commissioning or recommissioning the device.

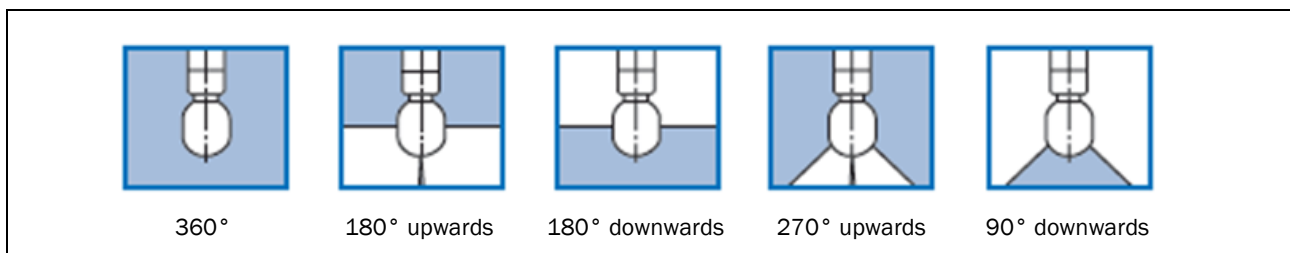


Illustration 3.3-1: Spray pattern

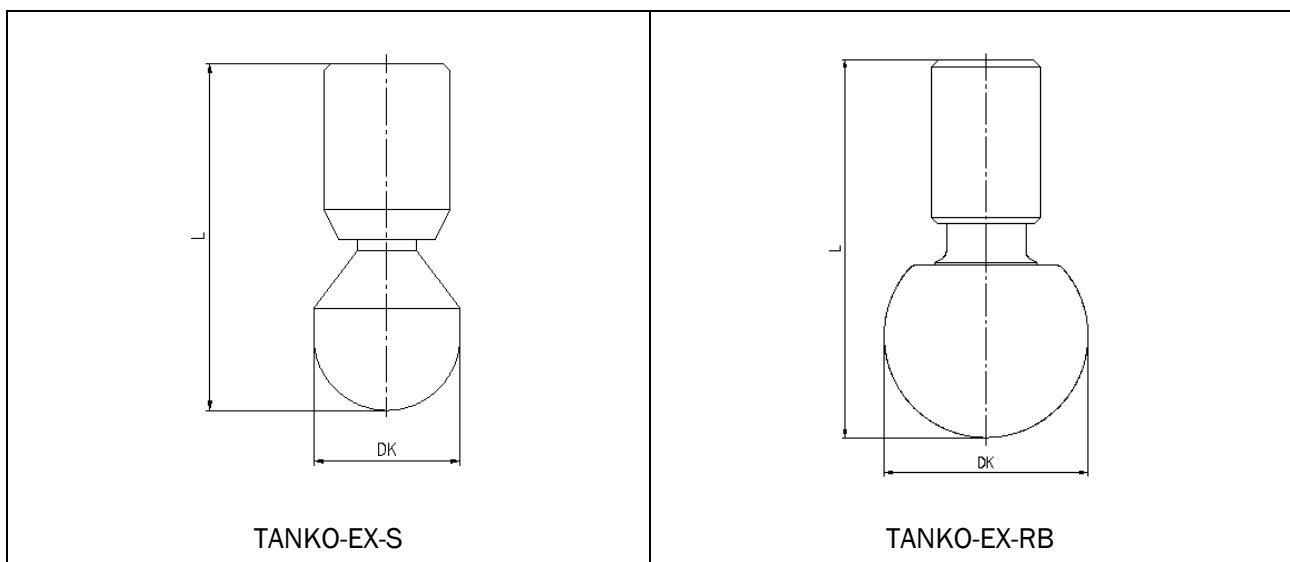


Illustration 3.3-2: External dimensions

Device type	TANKO-EX-S10	TANKO-EX-S20	TANKO-EX-S30 Threaded and welded version	TANKO-EX-S30 Clip-on version	TANKO-EX-S40 Threaded and welded version	TANKO-EX-S40 Clip-on version	TANKO-EX-S50 Threaded and welded version	TANKO-EX-S50 Clip-on version
Range: – Cleaning radius	0.4 m (1.3 ft) <i>see Illustration 3.3-4</i>	0.75 m (2.5 ft) <i>see Illustration 3.3-6</i>	1.0 m (3.3 ft) <i>see Illustration 3.3-8</i>		2.0 m (6.6 ft) <i>see Illustration 3.3-10</i>		3.2 m (10.5 ft) <i>see Illustration 3.3-12</i>	
Operating temperature (permitted): – Cleaning medium	+5 °C (+41 °F) to +180 °C (+356 °F) There is no explosive mixture in the container during cleaning. The cleaning medium must not lead to the formation of explosive mixtures even during spraying.							
	+5 °C (+41 °F) to +60 °C (+140 °F) There is an explosive atmosphere in the container during cleaning, and the cleaning medium is not flammable.							
	+5 °C (+41 °F) to flash point T _{Flash point} -15 °C (max.60 °C) There is an explosive atmosphere in the container during cleaning, and the cleaning medium is flammable and a flash point can be demonstrated for this material.							
Ambient temperature (permitted): – Inside the container	+5 °C (+41 °F) to +180 °C (+356 °F) There is no explosive mixture in the container during cleaning. The cleaning medium must not lead to the formation of explosive mixtures even during spraying.							
	+5 °C (+41 °F) to +60 °C (+140 °F) There is an explosive atmosphere in the container during cleaning.							
Operating pressure range in the container to be cleaned – during the cleaning process	0.0 to 0.5 bar (0.0 to 7.25 psi g) There is no explosive mixture in the container during cleaning. The cleaning medium must not lead to the formation of explosive mixtures even during spraying.							
	0.0 to 0.1 bar (0.0 to 1.45 psi g) There is an explosive atmosphere in the container during cleaning.							
	Depending on the permissible maximum pressure of the container and the attached fittings including media supply. The media supply must be closed tightly, the cleaning device does not have its own shut-off device.							
– in idle state								
Operating pressure: – Liquid medium	< 1 - 4 bar (14.5 - 58 psi)	< 1 - 7 bar (14.5 - 101.5 psi)	< 1 - 12 bar (14.5 - 174 psi)	< 1 - 10 bar (14.5 - 145 psi)	< 1 - 12 bar (14.5 - 174 psi)	< 1 - 7 bar (14.5 - 101.5 psi)	< 1 - 12 bar (14.5 - 174 psi)	< 1 - 7 bar (14.5 - 101.5 psi)
Optimum pressure: – Liquid medium	1.5 bar (21.8 psi)	approx. 3 bar (43.5 psi)						
– Gaseous medium (air or nitrogen)	1 bar (14.5 psi g), max 1 min. 0.5 bar (7.25 psi g), max. 2 min.							

Device type	TANKO-EX-S10	TANKO-EX-S20	TANKO-EX-S30 Threaded and welded version	TANKO-EX-S30 Clip-on version	TANKO-EX-S40 Threaded and welded version	TANKO-EX-S40 Clip-on version	TANKO-EX-S50 Threaded and welded version	TANKO-EX-S50 Clip-on version
Volume flow rate:	0 - 5.4 l/min <i>see Illustration 3.3-3</i>	0 - 35 l/min <i>see Illustration 3.3-5</i>	0 - 120 l/min <i>see Illustration 3.3-7</i>	0 - 120 l/min <i>see Illustration 3.3-7</i>	0 - 240 l/min <i>see Illustration 3.3-9</i>	0 - 240 l/min <i>see Illustration 3.3-9</i>	0 - 680 l/min <i>see Illustration 3.3-11</i>	0 - 680 l/min <i>see Illustration 3.3-11</i>
Installation opening min.:	1)	1), 2)	1)	2)	1)	2)	1)	2)
Media connection [MA]:	For the relevant technical data, please refer to the product pages of the current AWH "Stainless steel cleaning equipment" catalog.							
Length [L]"	26 - 51 mm (1.02 - 2.01 in)	43 - 69 mm (1.69 - 2.72 in)		60 - 86 mm (2.36 - 3.39 in)	93 - 109 mm (3.66 - 4.29 in)		158 - 181 mm (6.22 - 7.13 in)	
Head diameter [DK]"	10 mm (0.39 in)	17 mm (0.67 in)		25 mm (0.98 in)	39 mm (1.54 in)		70 mm (2.76 in)	
Weight	7	26 - 47 g		81 - 132 g	248 - 323 g		1650 - 1780 g	
Spray pattern:	180° down / 360°	90° down / 180° down / 270° up / 360°	90° down / 180° down / 180° up / 270° up / 360°		180° down / 180° up / 270° up / 360°			
Rotation speed: – with water – with air	1000 - 3000 rpm (depending on the device and pressure): 2000 - 5000 rpm at max. 1 bar							
Installation position:	Suspended vertically Others possible, but reduces the service life of the wearing parts							
Materials:	<i>see Table 3.3-3; Table 3.3-4 and Appendix 2</i>							
Sound pressure level – Outside the container	Dependent on the properties of the container! The sound pressure level may exceed the maximum permitted exposure value of $L_{EX, 8h} = 85$ dB(A).							

Table 3.3-1: Operating parameters of the device TANKO-EX-S

- 1) The installation opening of the threaded and welded connection variants must be 2 mm larger than the head exterior diameter of the device.
- 2) The installation opening of the clip-on connection variant must be 2 mm larger than the length of the installed connection element.

Device type	TANKO-EX-RB30	TANKO-EX-RB40	TANKO-EX-RB64 Threaded and welded version	TANKO-EX-RB64 Clip-on version	TANKO-EX-RB90 Threaded and welded version	TANKO-EX-RB90 Clip-on version
Range: – Cleaning radius	0.75 m (2.5 ft) <i>see</i> <i>Illustration</i> 3.3-13	1.25 m (4.1 ft) <i>see</i> <i>Illustration</i> 3.3-14	1.5 m (4.9 ft) <i>see</i> <i>Illustration</i> 3.3-15		2.5 m (8.2 ft) <i>see</i> <i>Illustration</i> 3.3-16	
Operating temperature (permitted): – Cleaning medium	<p>+5 °C (+41 °F) to +180 °C (+356 °F) There is no explosive mixture in the container during cleaning. The cleaning medium must not lead to the formation of explosive mixtures even during spraying.</p> <p>+5 °C (+41 °F) to +60 °C (+140 °F) There is an explosive atmosphere in the container during cleaning, and the cleaning medium is not flammable.</p> <p>+5 °C (+41 °F) to flash point T_{Flash point} -15 °C (max.60 °C) There is an explosive atmosphere in the container during cleaning, and the cleaning medium is flammable and a flash point can be demonstrated for this material.</p>					
Ambient temperature (permitted): – Inside the container	<p>+5 °C (+41 °F) to +180 °C (+356 °F) There is no explosive mixture in the container during cleaning. The cleaning medium must not lead to the formation of explosive mixtures even during spraying.</p> <p>+5 °C (+41 °F) to +60 °C (+140 °F) There is an explosive atmosphere in the container during cleaning.</p>					
Operating pressure range in the container to be cleaned – during the cleaning process	<p>0.0 to 0.5 bar (0.0 to 7.25 psi g) There is no explosive mixture in the container during cleaning. The cleaning medium must not lead to the formation of explosive mixtures even during spraying.</p> <p>0.0 to 0.1 bar (0.0 to 1.45 psi g) There is an explosive atmosphere in the container during cleaning</p>					
– in idle state	<p>Depending on the permissible maximum pressure of the container and the attached fittings including media supply. The media supply must be closed tightly, the cleaning device does not have its own shut-off device</p>					
Working pressure cleaning medium: – Liquid medium	< 1 - 5 bar (14.5 - 72.5 psi)	< 1 - 5 bar (14.5 - 72.5 psi)	< 1 - 7 bar (14.5 - 72.5 psi)	< 1 - 5 bar (14.5 - 72.5 psi)	< 1 - 7 bar (14.5 - 101.5 psi)	< 1 - 5 bar (14.5 - 72.5 psi)
Optimum pressure: – Liquid medium	approx. 3 bar (43.5 psi)					
– Gaseous medium (air or nitrogen)	1 bar (14.5 psi g), max 1 min. 0.5 bar 7.25 psi g), max. 2 min.					
Volume flow rate:	0 - 60 l/min	0 - 200 l/min	0 - 400 l/min		0 - 590 l/min	
Installation opening min.:	1), 2)	1), 2)	1)	2)	1)	2)
Media connection [MA]:	For the relevant technical data, please refer to the product pages of the current AWH “Stainless steel cleaning equipment” catalog.					

Device type	TANKO-EX-RB30	TANKO-EX-RB40	TANKO-EX-RB64 Threaded and welded version	TANKO-EX-RB64 Clip-on version	TANKO-EX-RB90 Threaded and welded version	TANKO-EX-RB90 Clip-on version
Length [L]	70 - 90 mm (2.76 - 3.54 in)	80 - 102 mm (3.15 - 4.02 in)	120 - 140 mm (4.72 - 5.51 in)		160 - 185 mm (6.30 - 7.28 in)	
Head diameter [DK]	30 mm (1.18 in)	40 mm (1.57 in)	64 mm (2.52 in)		90 mm (3.53 in)	
Weight	160 g	190 g	370 g		470 - 690 g	
Spray pattern:	180° down/ 180° up/ 360°	180° down/180° up/270° up/360°				
Speed of rotation: – with water	1000 - 3000 U/min (depending on the device and pressure)					
Installation position:	Suspended vertically Others possible, but reduces the service life of the wearing parts					
Materials:	see Table 3.3-3 ; Table 3.3-4 and Appendix 2					
Sound pressure level – Outside the container	Dependent on the properties of the container! The sound pressure level may exceed the maximum permitted exposure value of $L_{EX, 8h} = 85$ dB(A).					

Table 3.3-2: Operating parameters of the device TANKO-EX-RB

- 1) The installation opening of the threaded and welded connection variants must be 2 mm larger than the head exterior diameter of the device.
- 2) The installation opening of the clip-on connection variant must be 2 mm larger than the length of the installed connection element.

Material Combinations

		TANKO-EX-S/RB body				
		1.4404	1.4435	1.4571	2.4610 (HC4)	2.4602 (HC22)
Balls	1.4401	S	S	S	–	–
	2.4610 (HC4)	X	X	X	S	–
	2.4602 (HC22)	X	X	X	–	S
		S = Standard		X = optional		

Table 3.3-3: Material combinations body - balls



Other materials and material combinations are available on request.

		Locking pin material							
		1.4435	1.4430	1.4571	1.4576	2.4602 (HC22)	2.4607	2.4610 (HC4)	2.4819
Device material	1.4404	X	X	S	X	X	X	X	X
	1.4435	X	X	S	X	X	X	X	X
	1.4571	X	X	S	X	X	X	X	X
	2.4602 (HC22)	—	—	—	—	S ¹⁾	X	X	X
	2.4610 (HC4)	—	—	—	—	X	S	X	X
S = Standard		X = Optional			¹⁾ = can be changed due to delivery shortages caused by the suppliers				

Table 3.3-4: Material combinations device - locking pin (examples)

Consumption Data

The specified values for consumption and rotation speed are average values, and may deviate by approx. ±10% during normal operation.

They apply to operation with clean water as the cleaning fluid at a temperature of +25 °C/+77 °F. The values may differ if a different cleaning fluid and a different medium temperature are used.



For additional technical data, please refer to the product pages of the current AWH "Stainless steel cleaning equipment" catalog.

Volume flow depending on the pressure TANKO-S10

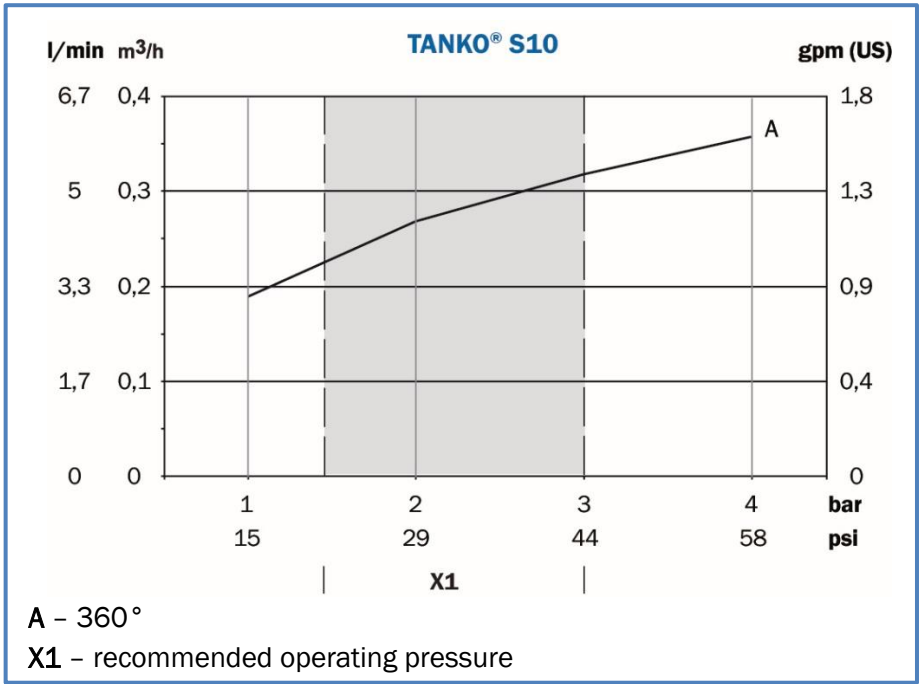


Illustration 3.3-3: Consumption data S10

TANKO-S10 range

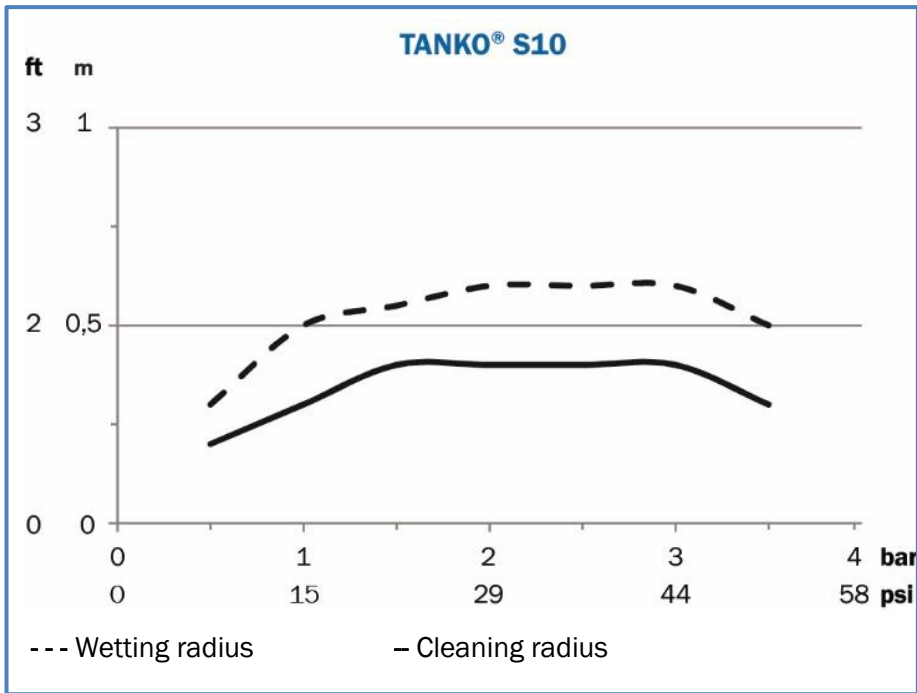


Illustration 3.3-4: Range S10

Volume flow depending on the pressure TANKO-S20

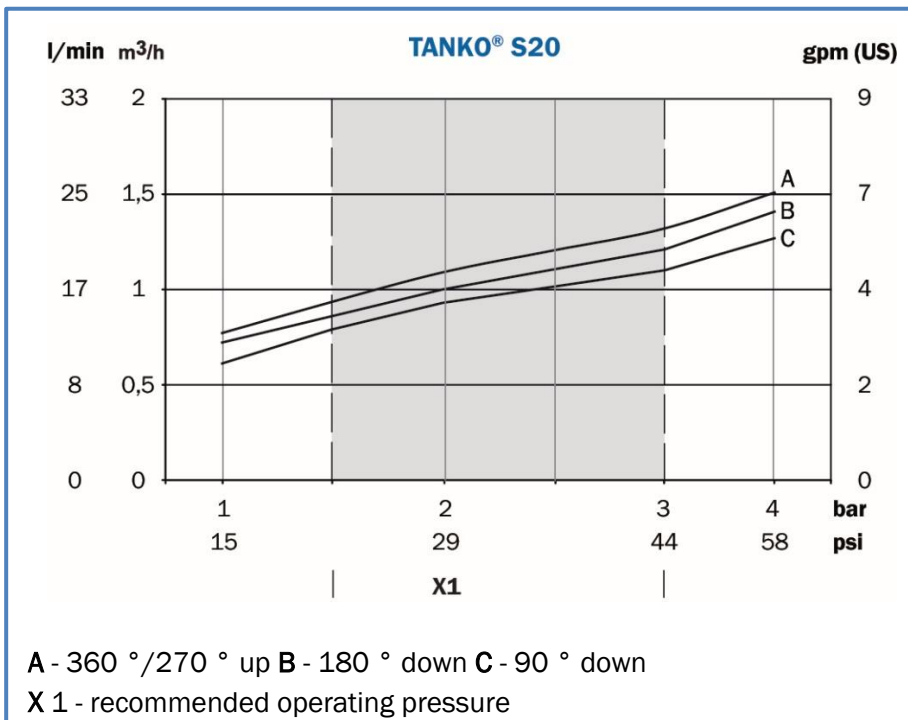


Illustration 3.3-5: Consumption data S20

Range TANKO-S20

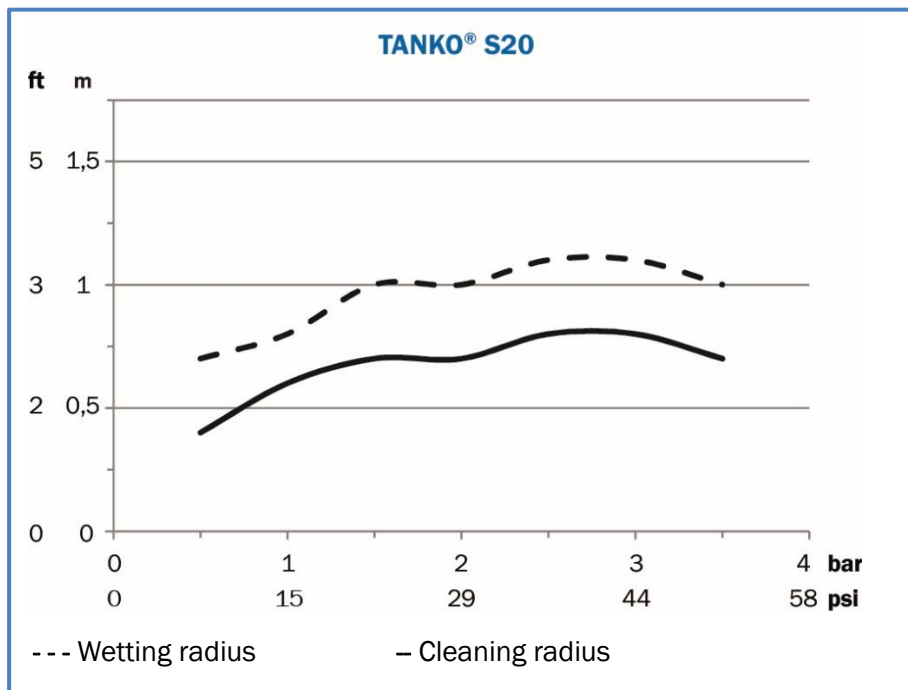


Illustration 3.3-6: Range S20

Volume flow depending on the pressure TANKO-S30

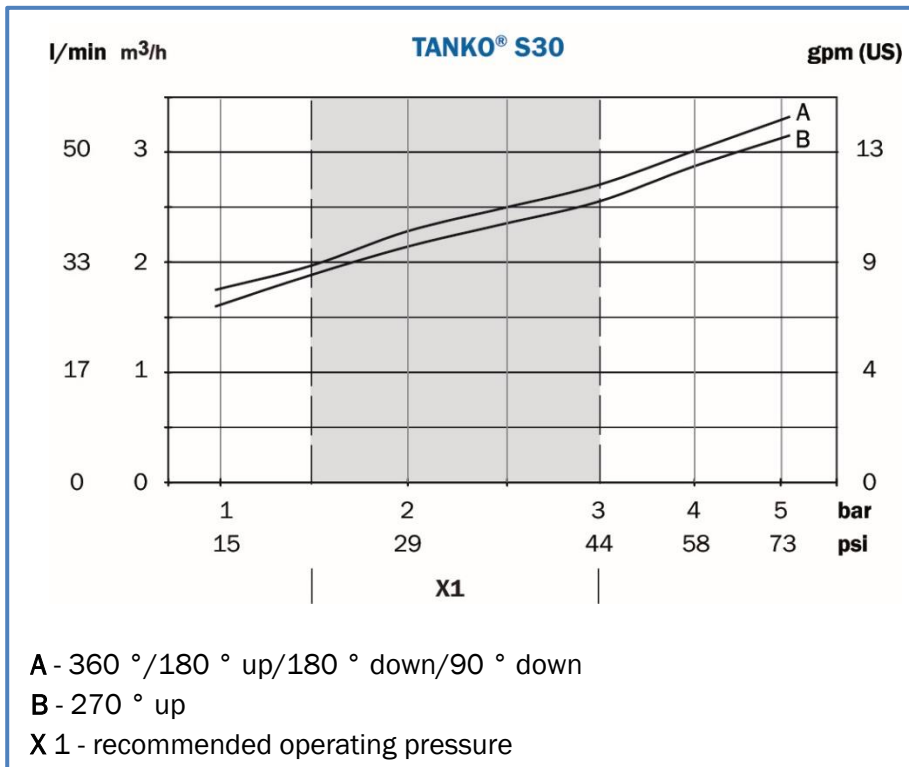


Illustration 3.3-7: Consumption data S30

TANKO-S30 range

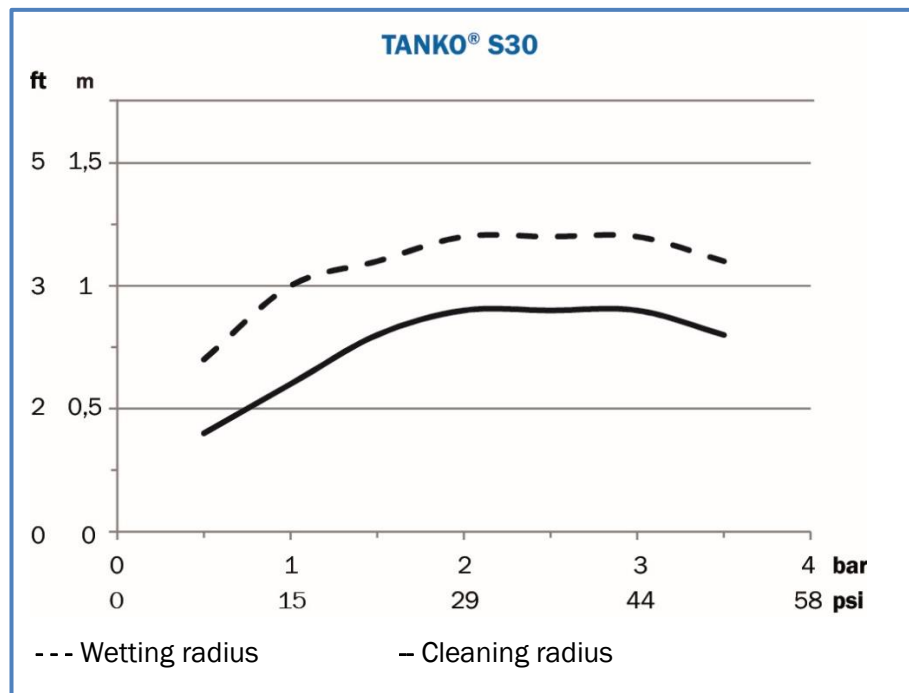
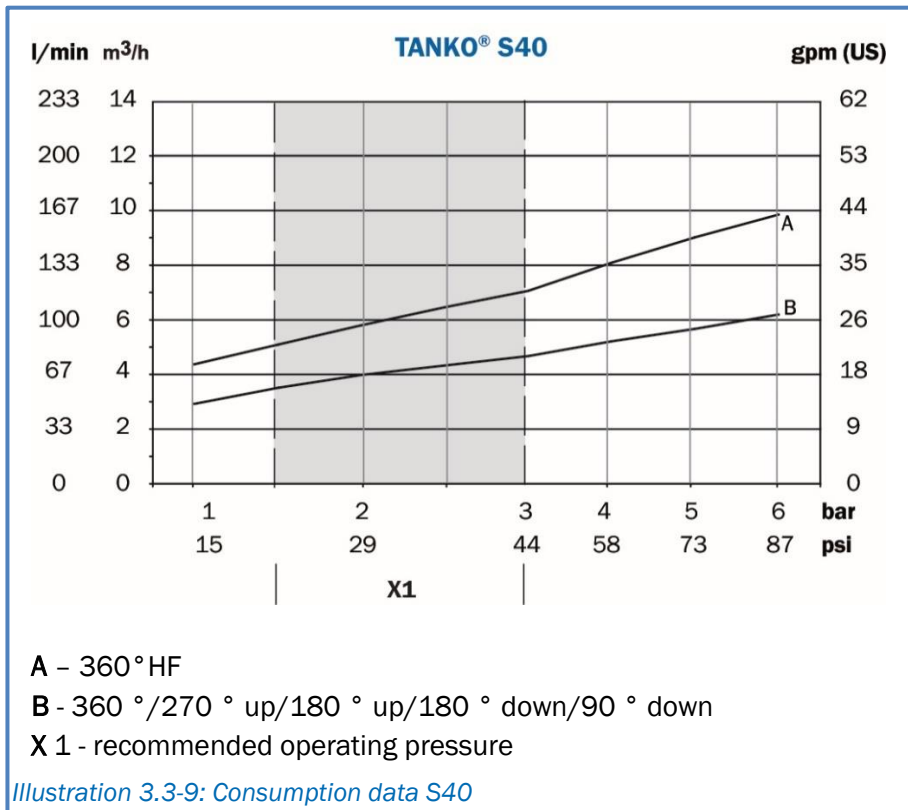


Illustration 3.3-8: Range S30

Volume flow depending on the pressure TANKO-S40



TANKO-S40 range

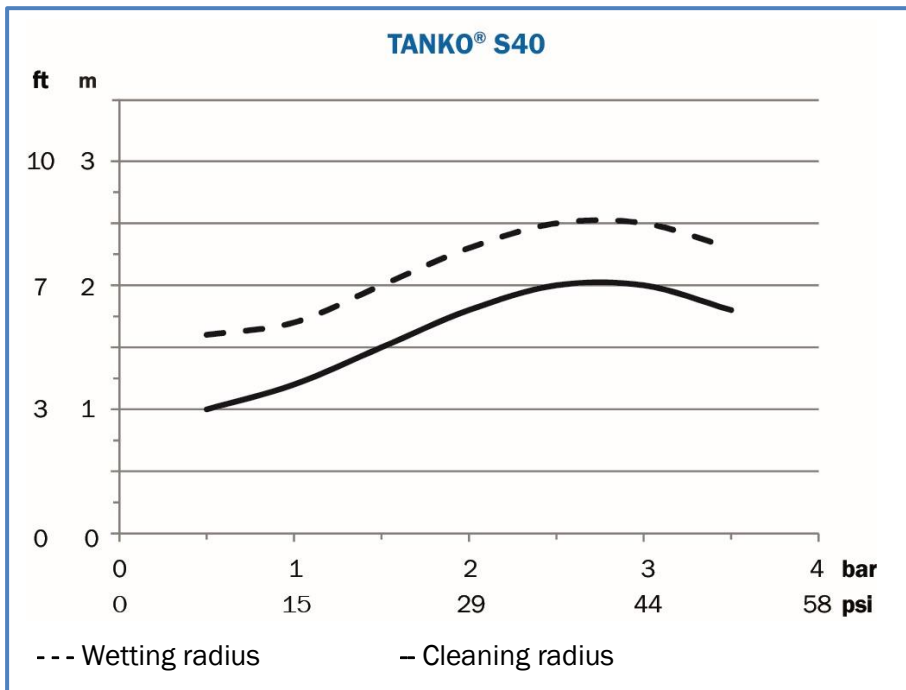


Illustration 3.3-10: Range S40

Volume flow depending on the pressure TANKO-S50

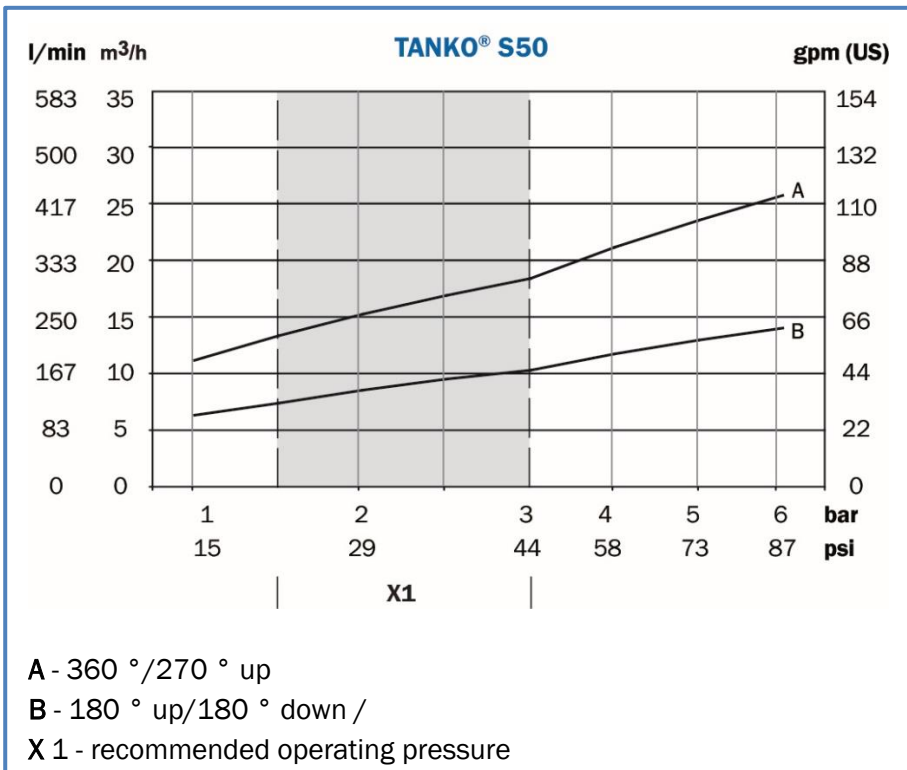


Illustration 3.3-11: Consumption data S50

TANKO-S50 range

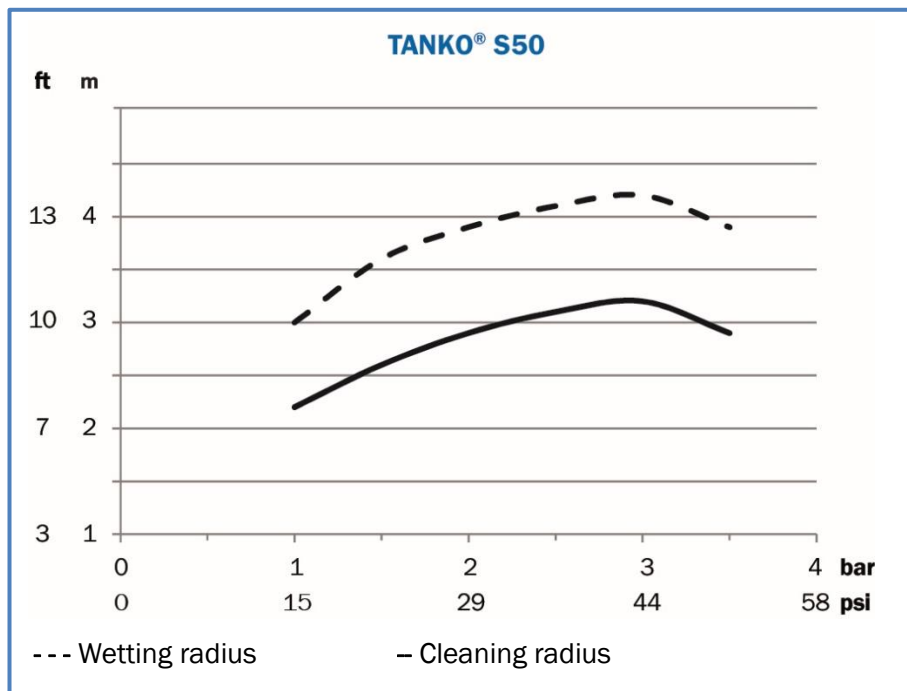


Illustration 3.3-12: Range S50

Range TANKO-RB30 360°

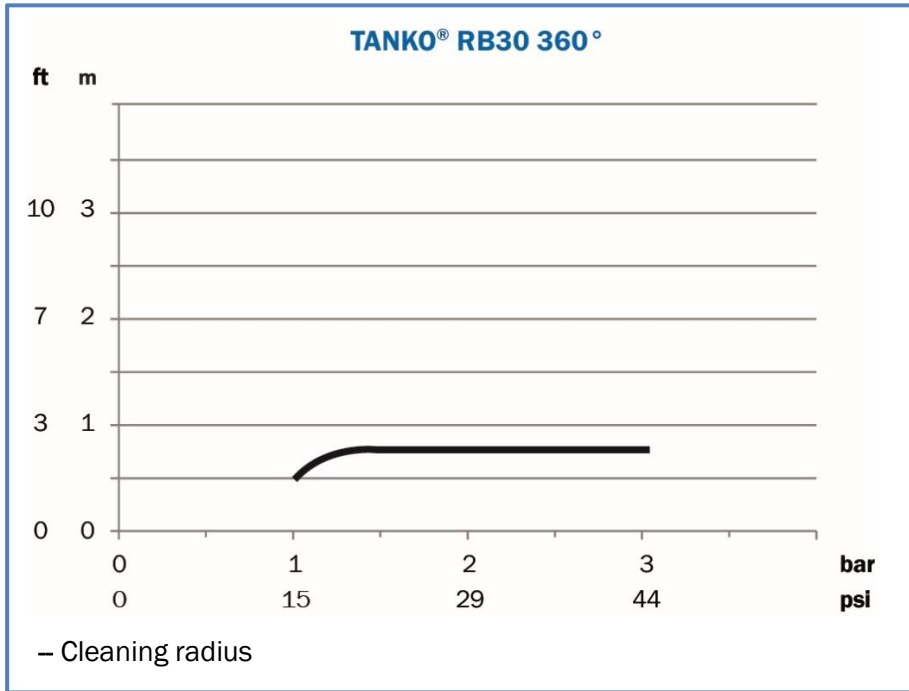


Illustration 3.3-13: Range RB30 360°

Range TANKO-RB40 360°

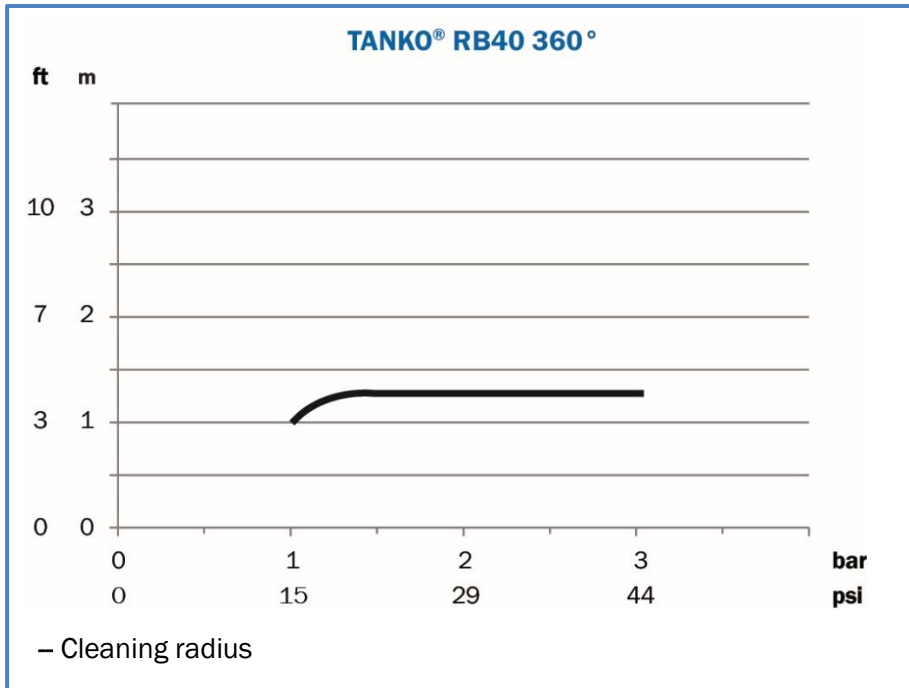


Illustration 3.3-14: Range RB40 360°

Range TANKO-RB64 360°

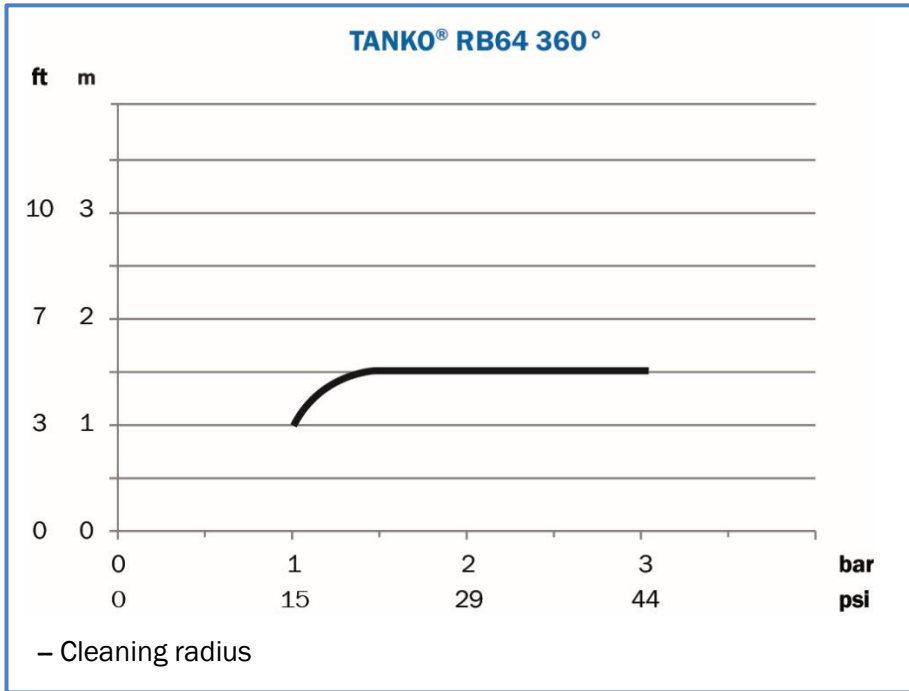


Illustration 3.3-15: Range RB64 360°

Range TANKO-RB90 360°

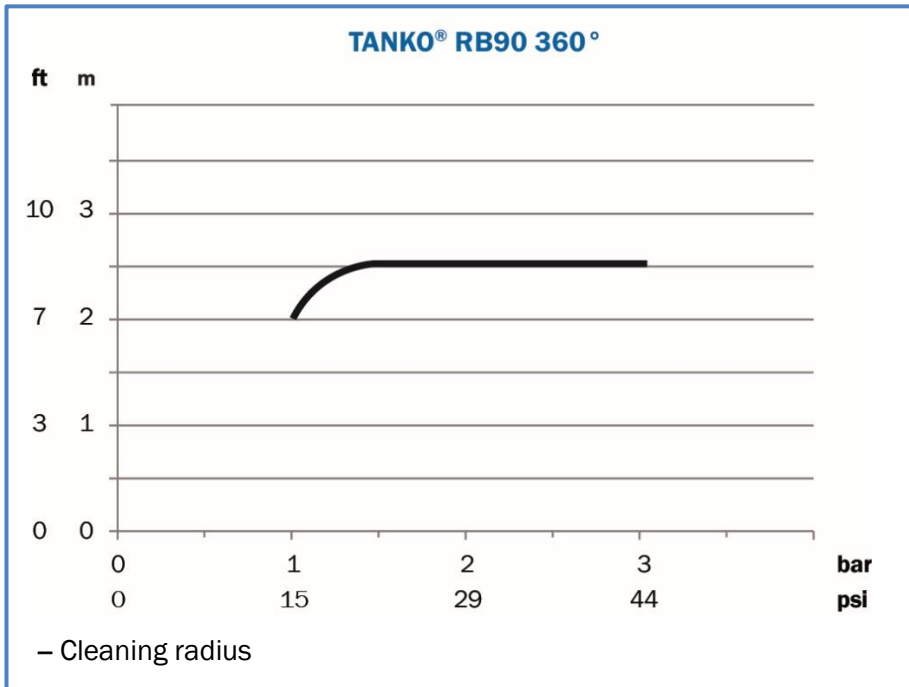


Illustration 3.3-16: Range RB90 360°

3.4 Cleaning Media

Due to the wide variety of practical cases of application and use for the cleaning device, it is NOT possible for AWH to recommend specific cleaning media for the operating company.

The operating company holds sole responsibility for the type of cleaning media, their use and handling.

For this reason, AWH can provide the owner with **a few reference points and notes** (for a device in a container) **but only as a precautionary measure**, which must be observed and integrated into the owner's risk assessments.



NOTE ON EXPLOSION PROTECTION

Before using the device in an Ex area, the technical rules for avoiding the dangers of explosive atmospheres must be observed.

Non-compliance can result in the loss of explosion protection.

- *TRBS 2152 "Hazardous, potentially explosive atmosphere - General -"*
- *TRBS 2152 Part 1/TRGS 721 "Hazardous, potentially explosive atmosphere - Assessment of the explosive hazard -"*
- *TRBS 2152 Part 2/TRGS 722 "Hazardous, potentially explosive atmosphere - Preventing or limiting hazardous potentially explosive atmosphere-"*
- *TRGS 727 "Prevention of ignition hazards due to electrostatic charge", Chapter 4.12 "Cleaning Containers"*
- *IEC/TS 60079-32-1, Explosive atmospheres – Part 32-1: Electrostatic hazards, guidance, Chapter "Spraying liquids and tank cleaning"*

Excerpt from the **TRGS 727** "Prevention of ignition hazards due to electrostatic charge"

Chapter 4 Electrostatic charges when handling liquids

"When filling and emptying containers with liquids, when recirculating, stirring, mixing and spraying liquids and also when implementing measuring, sampling and cleaning work, the liquids themselves or the interior of the container can be provided with a hazardous charge. The size and intensity of the charge generated depends on the properties of the fluid, its flow rate, the procedure, the size and geometry of the container as well as its material."

Section 4.12 Cleaning Containers

(1) When cleaning containers, particularly during jet cleaning, high electrostatic charges can occur.

(2) The resulting amount of charge is influenced by various factors, including:

- the properties of the jet cleaning material,
- additives in the jet cleaning material,
- the phase status of the jet cleaning material,
- the phase status of the contaminated jet cleaning material,
- the flow during fluid jet cleaning,
- the shape and number of jet nozzles,
- the operating pressure,
- the size and geometry of the container,
- the fluid properties in the container,
- the residual fluid,
- the fluid level.

(3) Ignitable mixtures (e.g. carbon disulfide/air mixtures) require additional measures.

(4) Impacting cleaning jets form droplets or mists that are normally charged and generate electrical charges in the container. Existing turbulence distributes the charged mist throughout the container, thereby generating a space charge density with high field strengths.

Note 1: The electric potential generated by the mist has its maximum value in the middle of the container and is dependent upon the type of cleaning liquid (e.g. water, oil or the use of additive substances) and the parameters of the jet cleaner used (e.g. fluid pressure, flow rate and nozzle diameter).

Note 2: Furthermore, isolated conductors can be formed when cleaning with a water jet. Falling contiguous water clusters can be charged by electrostatic induction on the potential in the center of the tank. Ignitable discharges can occur when the water clusters approach grounded conductive objects or the ground.

To prevent hazardous charges, appropriate measures must be taken in terms of the construction and equipment to guarantee with a very high level of reliability (corresponding to category 1 based on directive 2014/34/EU), that the relevant process variables

- Type of cleaning medium
- Conductivity of cleaning medium
- Operating pressure of cleaning medium
- Flow rate of cleaning medium
- Proportion of a 2nd phase in cleaning medium
- Container size
- Maximum number of cleaning nozzles per container
- Temperature in the container to be cleaned and temperature of the cleaning medium

are complied with in the sense of the Technical Specification IEC/TS 60079-32-1 and TRGS 727 in the valid edition, and as described in the operating instructions.

 **DANGER****Hazard due to formation of an explosive atmosphere!**

Splashing or spraying of flammable fluids to clean the container can create an explosive atmosphere.

There is a risk of death or severe physical injury.

- Avoid the creation of a hazardous explosive atmosphere and the activation of ignition sources.

Explosions with dangerous effects may occur if the following four conditions are met simultaneously:

- High dispersion of the inflammable substances
- Concentration of the inflammable substances in the air within the explosive limits
- Hazardous quantity of explosive atmosphere
- Effective ignition source
- Adhere to the regulations and specifications in the safety data sheets for the cleaning media (e.g. ignition temperature; flash point; explosive limits).
- When using combustible cleaning media, the maximum operating temperature of the cleaning medium must be 15 K below the flash point of the cleaning medium and must not exceed 60 °C.
- The following items are **PROHIBITED** for use as cleaning media:
 - Corrosive or explosive fluids, fluids with solid content (e.g. abrasives) and substances that can undergo exothermic reactions with the material of the container or the plant (e.g. chlorine, substances containing chlorine ions or saline substances) may not be used for cleaning purposes.
 - Conductive solvents (hydrocarbons) as cleaning media ($\kappa > 10,000$ pS/m), such as alcohols, ketones, glycols, glycol ethers, ethers, ethyl acetate and isopropyl acetate.
- To ensure fault-free operation, an upstream filter system with a mesh width of 50 μ m should be fitted.

 **DANGER****Explosion hazard due to ignition source!**

Existing explosive atmosphere can be ignited.

There is a risk of death or severe physical injury.

- The cleaning medium and the material to be cleaned may not cause a chemical reaction that might cause an ignition.
- Electrostatic charges when handling liquids.

**WARNING****Warning of corrosive and aggressive cleaning agent!**

There is a risk of death or severe physical injury.

- Adhere to the regulations and specifications in the safety data sheets for the cleaning media (e.g. vapors or hazardous substances).

**CAUTION****Danger as a result of use of incorrect cleaning media!**

Due to their material resistance, the materials used in the device impose certain limitations on the cleaning media used.

Failure to observe these restrictions can result in the failure of components or a device malfunction, causing material damage and consequential damages.

- The cleaning media must be approved for all of the materials of the device (e.g. seals, bushings) and for the substances to be cleaned in the container that come into contact with it.
- Cleaning media containing the following (corrosive) substances may NOT be used:
 - chlorine and chlorine ions
 - substances containing salt (no resistance to seawater)
 - medium-concentrated to highly concentrated organic acids
 - strong acids, in particular nitric acid and sulfuric acid (with acid content >65%)

NOTE**Risk of damage to the device from the cleaning medium!**

Soiling or foreign objects in the cleaning medium can have a negative effect on the function of the device.

There is a risk of material damage and consequential damages.

- Use a suitable filter system in the cleaning medium supply line. The use of a filter with a filtration effect which equates to a mesh size of 50 µm is recommended.
- Adhere to the instructions on supply and return lines in [Section 5.2 Installation](#).

The following Agents are permitted for use for Container Cleaning:

Only clean, sprayable fluids may be used.

The process of spraying and jet cleaning with fluids always requires individual consideration by the operating company.

The only permitted cleaning media are solvents with low and medium conductivity ($k \leq 10,000$ pS/m, flash point $T_{\text{Flash point}} > 20^\circ$, where the maximum working temperature must be 15 K below the flash point, and water is allowed in the following conditions:

- When cleaning with solvents with low and medium conductivity, the cleaning medium may not contain any portions of a second phase (e.g. water or solid). Cleaning media may only be applied in a closed circuit if the level of contamination is kept below 0.5%.
- When cleaning with water jets, a maximum of 20 cleaning nozzles may be used in one container. When calculating this, all spray heads of the retractor system must be taken into account, including the nozzles of other devices. The container volume may not exceed 10 m³. The water flow rate must not exceed 7 l/s per container.
- When spraying or misting aqueous solutions (e.g. water with alkaline cleaning additives and similar), they must not generate electrostatic charges that are stronger than those that would be generated when using water without additives (see TRGS 727 appendix A 1.3).

4 Transportation and Storage

AWH products are checked carefully before they are dispatched, and are packaged in accordance with the respective transportation and storage conditions. However, it is NOT possible to rule out the possibility of damage during transportation completely.



NOTE ON EXPLOSION PROTECTION

Transport and storage of the device in an explosive atmosphere is PROHIBITED!



CAUTION



Risk from protruding sharp edges on the device!

Depending on the design, the device may have protruding sharp edges which can be dangerous when handling it.

There is a risk of minor cuts.

- *Wear protective gloves when working on the device.*
- *When handling, e.g. unpacking, transportation without packaging, assembly/disassembly and maintenance work, beware of protruding sharp edges.*

In the event of damage (including cases involving spare parts) please contact AWH immediately with a damage report.

Scope of Delivery

- Container cleaning device
- Operating and installation instructions
- Technical documents in accordance with the order (e.g. certificates and reports)

The scope of delivery ends at the interfaces of the device (see [Section 5.2.1 Interfaces](#)).



Refer to the delivery note and the order confirmation for full details of the scope of delivery.

Inspection on Receipt of Goods:

- Immediately check the delivery against the delivery note and the order confirmation on receipt to make sure that it is complete.
- Check the delivery for any transport damage (visual inspection).

Claims:

- Register claims for damaged and/or incomplete deliveries with the transport company immediately.
- Keep the packaging for a possible inspection by the transport company or for return delivery.

Return Delivery:

In the event of a possible return delivery, pack the device parts so that they cannot become damaged during transportation. If possible, use the original packaging and the original packaging material. If neither is available anymore, request a packaging company with specialist personnel.

- Consult AWH if you have any questions regarding packaging and transport safety.

4.1 Packaging

The device is supplied fully assembled. The packaging is selected to suit the conditions of transportation. Required accessories, spare parts, operating or installation instructions and technical documents are packaged separately and enclosed with the delivery.

The packaging should protect the device up until the time of installation against transport damage, corrosion and other damage. Therefore, do not remove the packaging until shortly before installation.

NOTE



Risk of environmental damage as a result of incorrect disposal of the packaging!

Packaging materials are valuable raw materials and can often be re-used or usefully processed and recycled.

Improper disposal can cause environmental damage.



- *Dispose of packaging materials in an environmentally friendly manner and recycle them.*
- *Adhere to the locally valid disposal regulations.*

4.2 Transport



NOTE ON EXPLOSION PROTECTION

Transport damages can lead to the loss of explosion protection.

- *In the event of discernible damage during transport, DO NOT operate the device!*
- *Contact the manufacturer of the device.*

NOTE Improper transportation can cause damage to the device.

The functional safety and reliability of the device may be compromised.

- Adhere to the symbols and instructions on the packaging.
- Always transport the device in a dry condition.
- The device must be protected from impacts.
- If possible, use the original packaging for transportation.
- Proceed with care when unloading the device and when transporting it on your premises.
- Do not remove the packaging until shortly before installation.

4.3 Storage



NOTE ON EXPLOSION PROTECTION

Improper storage can lead to the loss of explosion protection.

- *In the event of discernible storage damage, DO NOT operate the device!*
- *Contact the manufacturer of the device.*

The packaging of the device, the components and the spare parts is designed for a storage period of 3 months.

NOTE Risk of damage to the device as a result of incorrect storage!

Incorrect storage can cause damage to the device and its components and lead to premature aging (e.g. plastic parts).

The failure of components or a device malfunction can cause material damage and consequential damages.

- Adhere to the following storage conditions:
 - Store the device in the original packaging wherever possible.
 - Store the device in a clean and dry place (e.g. enclosed, dust-free room).
 - Store the device in stable environmental conditions.
 - Prevent major temperature fluctuations so that condensation does not form.
 - Prevent dirt and moisture from entering into the device.
 - Protect the device from the elements (e.g. formation of condensation in the device, sunlight).
 - Protect unpacked devices or components with dust-proof covers. Condensation must not be allowed to form beneath the covering.

Parameters for Storage (recommended):

- | | |
|----------------------------|-------------------------------------|
| – Room temperature | +10 °C – +55 °C (+50 °F – +131 °F) |
| – Relative humidity | max. 60% (non-condensing) |
| – Temperature fluctuations | max. 10 °C (18 °F) per day |
| – Occurrence of vibrations | $v_{\text{eff}} < 0.2 \text{ mm/s}$ |

5 Installation

5.1 Safety Instructions for Installation



NOTE ON EXPLOSION PROTECTION

Work on the device in an explosive atmosphere is PROHIBITED!

Non-compliance can result in the loss of explosion protection.

- *Only allow instructed personnel to work in potentially explosive atmospheres.*
- *The personal protective equipment must satisfy the requirements of explosion protection.*
- *Do not use a tool that could create sparks.*



DANGER



Danger of ignition in potentially explosive atmosphere due to potential differences!

When filling and emptying containers with fluids, when recirculating, stirring, mixing and spraying fluids and also when implementing measuring, sampling and cleaning work, the fluids themselves or the interior of the container can be provided with a hazardous charge.

Differences in potential (e.g. electrostatic charge) can cause igniting sparks or heat, which can act as an ignition source.

There is a risk of death or severe physical injury.

- *Only clean electrically conductive containers.*
- *Make sure that an electrostatic charge is prevented. Also ensure that all the electrically conductive parts on the device and the container must be grounded for potential equalization to the same potential using grounding cables with a sufficient diameter.*
- *The grounding must always be implemented before the commissioning of the device. Avoid grounding faults (e.g. subsequent grounding of already charged objects or equipment).*
- *Do not secure or seal mechanical connections with electrical insulating materials (such as sealing tape, sealant, adhesive, etc.), if it impairs the grounding of the device on the container.*

Within potentially explosive areas, a potential equalization is required. "All conductive parts of the device and the container must be assembled in such a way that no dangerous potential differences can occur between them. If there is a possibility that insulated metal parts can be recharged and thereby act as an ignition source, earthing connections must be provided" (Excerpt from ISO 80079-36 "Non-electrical equipment intended for use in potentially explosive atmospheres - Part 1 Basic concepts and requirements", section 6.7.2 Grounding connections for conductive parts).

WARNING



Risk of accidents as a result of improper installation!

Incorrect installation, falling components or failure to comply with the indicated safety notes can result in accidents or damage to property.



There is a risk of minor or moderate injuries.



- Only allow experts to perform work on the device.
- Before starting work, observe the **working steps of the switch-off procedure** (see [Section 7.2 Switch-off Procedure](#)).
- Wear protective work clothing, protective gloves and safety shoes when performing work.
- Do not work on the device unless it is depressurized and in a cool state.
- Maintain a safe distance when working on the device. We recommend that you provide 1 m of space for free movement around the device and container.

WARNING



Risk of falling when working at heights!

When carrying out assembly/disassembly work on parts of the plant at heights, there is a risk of falling.



There is a risk of death or severe physical injury.



- Do not perform any work at heights except with a safety platform with cage or suitable fall protection (e.g. safety rope and safety harness).
- If you are using a harness as fall protection, it is imperative that the rescue concept is observed for a person in the harness.
- A person must not remain suspended in the harness for longer than 15 min as there is otherwise a risk of shock or even death.
- Wear protective work clothing, safety shoes, protective gloves and a hard hat for work at heights.



CAUTION



Danger due to freely rotating components of the device!

When gripping the device, the rotatable mounted spray head can move.

There is a risk of minor cuts.

- When handling, e.g. unpacking, transportation without packaging, assembly/disassembly and maintenance work, be aware of the freedom of rotation.
- Grip the device at the media connection.
- Wear protective gloves when working on the device.

 **CAUTION****Risk from protruding sharp edges on the device!**

Depending on the design, the device may have protruding sharp edges which can be dangerous when handling it.

There is a risk of minor cuts.

- Wear protective gloves when working on the device.
- When handling, e.g. unpacking, transportation without packaging, assembly/disassembly and maintenance work, beware of protruding sharp edges.

 **CAUTION****Insufficient lighting in the working environment!**

The device DOES NOT have illumination. Insufficient lighting when working on the device can cause accidents.

There is a risk of minor or moderate injuries.

- Make sure that there is sufficient and even lighting in all areas of the plant in which the devices is used when work is performed on the device.
- In Germany, the technical rules for workplaces (ASR A3.4) apply. An illumination level of **300 lx (Lux)** is recommended (maintenance value).

Connection to the Power Supply:

Connection to the power supply should only be done once the device is securely mechanically attached to the container. The connection must be done in such a way that a permanent, secure connection can be maintained.

- Hydraulic connections must fulfill the requirements of EN ISO 4413.

 **WARNING****Danger due to swinging hydraulic equipment!**

In certain operating states, screw and clamp connections may unforeseeably loosen due to significant swinging motions and/or vibrations. This means it is possible for leaks to form at the sealed points of the connections and line connections, from which hot and/or corrosive liquid may spray out at high pressure.

There is a risk of death or severe physical injury.

- All connections and line connections should be securely attached without mechanical tensions and technically permanently sealed.
- During initial start-up, the swinging and vibration behavior of the device must always be observed and, insofar as is possible, tested under various operating conditions.
- In the event of oscillations and/or vibrations, avoid loosening of the connections by additional measures, such as spot welding or gluing (e.g. Loctite).

5.2 Installation

The safety notes in [Section 5.1 Safety Instructions for Installation](#) must be adhered to before installation of the device in the container.



CAUTION

Failure due to incorrect installation position/location of the device!

Installation of the device which is NOT performed properly can cause damage to the device which puts the functional safety and reliability at risk when it is commissioned.

This can result in hazards.

There is a risk of minor or moderate injuries.

- When choosing the installation position of the device, care should be taken that
 - a safe distance is maintained from the internal wall of the container and from nearby components, in order to prevent grinding or impacts during operation and
 - It is imperative to prevent collisions while the cleaning head and surrounding components (e.g. agitators) are moving simultaneously.
- Only fixed pipe installation is permitted. Installation with a hose can cause the installed cleaning device to thump/whip.
- Install the device free of mechanical strain.
- For the installation dimensions, refer to [Section 3.3 Technical Data](#) and the dimensional drawing of the AWH catalog or the device drawing.
Make sure sufficient space is available for operation and maintenance.



CAUTION

Risk of a fault as a result of soiling, foreign objects or damage to the device!

Foreign objects such as scale, burrs, chips, etc. can restrict flow or get into the piping system and cause malfunctions or damage to components, including seals. This can result in hazards that endanger the functional safety of the device.

There is a risk of minor or moderate injuries.

The following measures must be observed before installing the device for the first time, and also when installing it after retooling work on the plant in which the device is installed.

- All supply and return lines for the cleaning medium must be rinsed with clear water in order to remove any contamination, foreign objects or residue in the supply line (e.g. scale, chippings, welding particles etc.).
- Take suitable measures to prevent soiling and foreign objects from entering via the interfaces of the device. Install a filter upstream of the media connection [MA] in the supply line for the cleaning medium (see [Section 3.4 Cleaning Media](#)).
- Paint must not be applied to the surface of the device.

The installation position of the cleaner can be freely selected.

Observe the prescribed installation method (welded, screwed or with locking pin (clip-on)).



The operating company is solely responsible for fastening the device to the container.

The vessel connector must be securely sealed.

*The use of insulating materials (such as Teflon tape or similar) for sealing is **NOT** permitted.*

It is also important to pay attention to the following:

- When using the device outdoors, or in rooms with a risk of frost, it must be protected against freezing.
- The pipe or hose connections and the media connection [MA] for the cleaning medium must be tightly secured and have a permanently leak-proof design (hazard due to spraying in case of leaks).
- After assembly, it must be ensured that all parts of the device have a conductive connection with the container and are earthed (leak resistance versus earth RE < 10⁶ Ohm).
- The spray heads may only be operated with the corresponding locking pins from the manufacturer. When replacing a spray head, a new locking pin must be used.

5.2.1 Interfaces

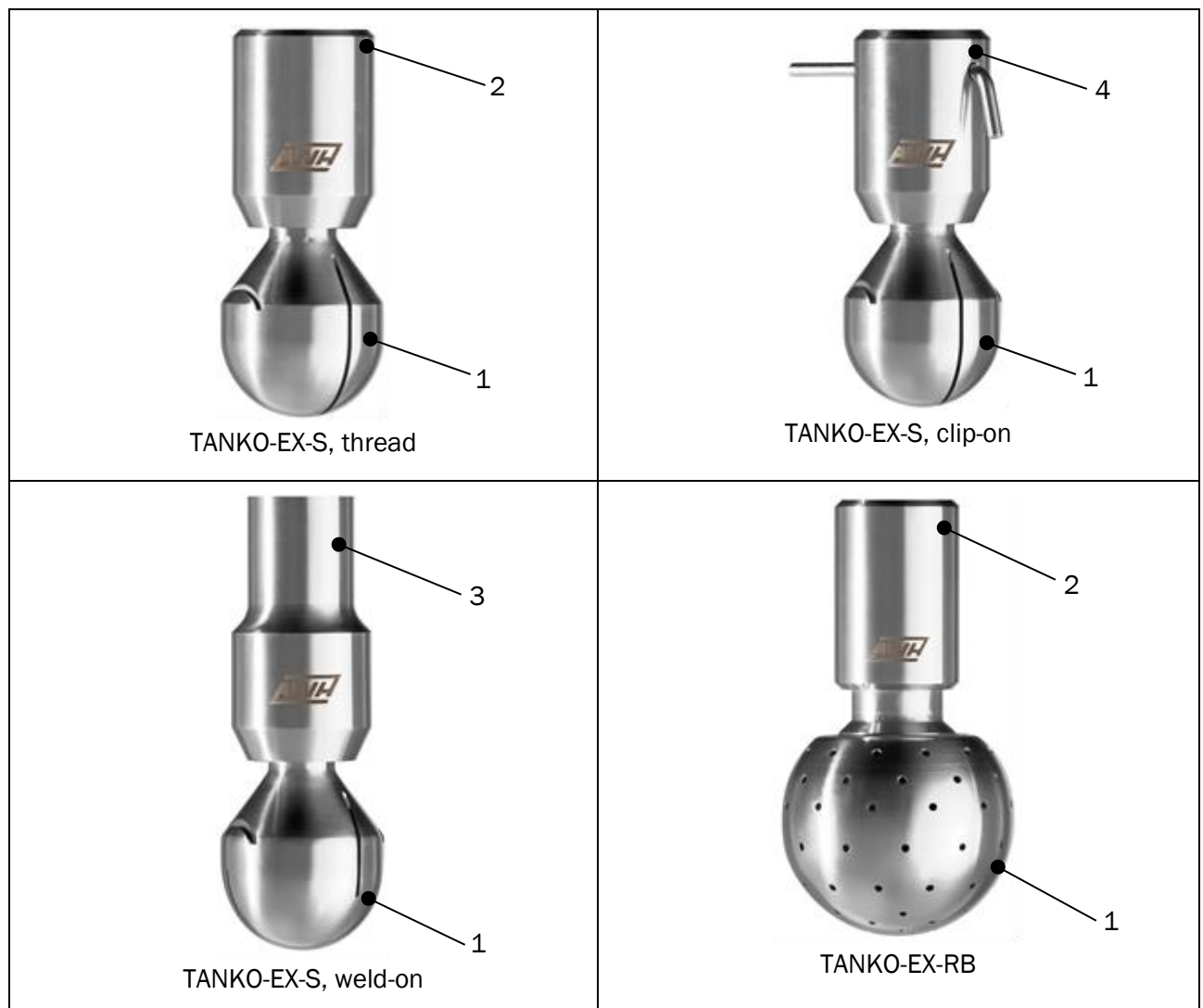


Illustration 5.2-1: Interfaces of the devices (similar to illustration)

The following interfaces can be found on the device:

- 1 Rotating spray head
- 2 Threaded connection Thread
- 3 Welded connection Weld-on
- 4 Plug connection Clip-on

5.2.2 Installation Position

The device is designed for vertical installation, downward suspension or standing upwards, as the preferred position. In the event of a different installation position, observe the following:

- The running performance may be compromised.
- The service life of the bearing elements may be shortened as a result of the increased strain.
- Maintenance intervals should be shortened, if necessary (see [Section 7.4.1 Maintenance Intervals](#)).

5.2.3 Installing the Device

▲ WARNING Risk of the device falling accidentally!

The device may strike personnel when falling.

There is a risk of severe physical injury.

- Hold the device firmly when installing/removing it.
- There must be nobody beneath the device when installing/removing it.

NOTE Risk of dirt and foreign objects in the device!

Functional safety and reliability may be compromised.

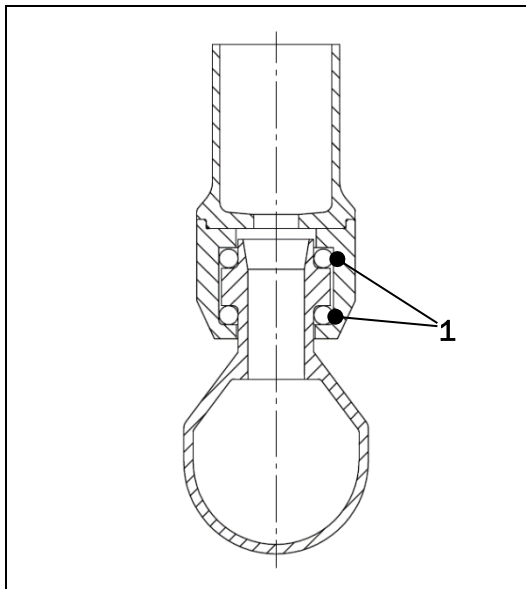
- During assembly, make sure and check that there is no dirt or foreign objects in the device (e.g. small particles, sealing material).

Installation welded connection

NOTE The temperature in the ball bearings area must not exceed 90 °C during welding!

The result is distortion of the housing and disruption of the rotational behavior.

- Ensure suitable cooling measures during welding.
- Request special versions (e.g. extended welding ends) from AWH.



1 Ball-bearings

(similar to picture)

Illustration 5.2-2 Weld-on version

1. Cleaning the parts to be welded.
2. **NOTE** Welding distortion can be avoided by selecting suitable welding parameters.

Aligning and welding the TANKO-S with the downpipe (on-site).

The operating company is responsible for the selection of the correct welding filler and for the correct execution of the welding joint.

Base material	Suitable filler material
1.4435	1.4430, 1.4440
2.4602	2.4607

Table 5.2-1: Recommended Filler Materials

3. Welding

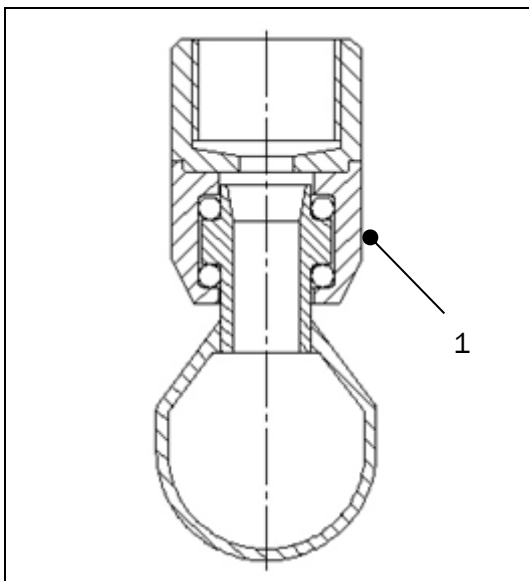
- Before welding, connect the forming gas.
- Before welding, affix 3 to 4 tack weld-ons.

4. Welding post-treatment

- In the interior area, an acid cleaning treatment is recommended after the welding.
- The surface of accessible points can be improved by grinding.
- The exterior can be treated afterwards by staining, brushing, grinding and polishing.
- After welding, thoroughly rinse the downpipe with the device to remove residues from welding and after-treatment.

5. Install downpipe with device in the container.

Installation threaded connection



- 1 Do NOT place the strap wrench/belt pipe wrench in the ball bearings area

Illustration 5.2-3: Installation of threaded connection

1. Push the device with the interior thread onto the pipe for the media supply.

NOTE There is a risk of damage to the thread if the tightening torque applied to the threaded device connection and the pipe is excessive!

- The tightening torque value between the threaded device connection and the pipe depends on the material of the pipe for the media supply.

NOTE When tightening and loosening the device, the ball bearings can be damaged! The rotation behavior can be disturbed!

- Do NOT place the strap wrench/belt pipe wrench in the ball bearings area.

2. Tighten the threaded device connection to the pipe with the strap wrench/belt wrench.

- The tightening torque value for the threaded connections between the connection cover and pipe depends on the material of the pipe for the media supply.

3. Screw connections are to be prevented from working loose by using appropriate measures (2 weld points between the device and supply line, bolting of the device to the supply line).

Installation clip-on connection

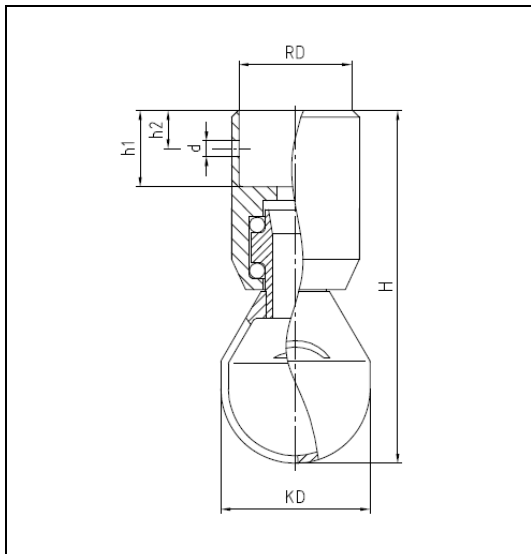


Illustration 5.2-4: Clip-on dimensions

The bore holes for the clip-on locks are manufactured for delivery in such a way that the following wire diameters can be used for the cleaning devices:

Cleaning device	Wire diameter [mm]	d [mm]	h1 [mm]	h2 [mm]
TANKO-EX-S20	2.0	2.2	7	3
TANKO-EX-S30	2.0	2.2	10.5	5
TANKO-EX-S40	3.6 – 3.8	4.0	20	10
TANKO-EX-S50	4.5 – 5.2	5.5	19/35.2	10/24.2
TANKO-EX-RB30	2.0	3.0	17	8
TANKO-EX-RB40	2.4	3.0	17	8
TANKO-EX-RB64	3.6 – 3.8	4.0	21	10
TANKO-EX-RB90	4.5 – 5.2	5.5	28	13

Table 5.2-2: Clip-on dimensions



The article no. for the wire locking pins are listed in [section 7.5.1 Spare parts](#).

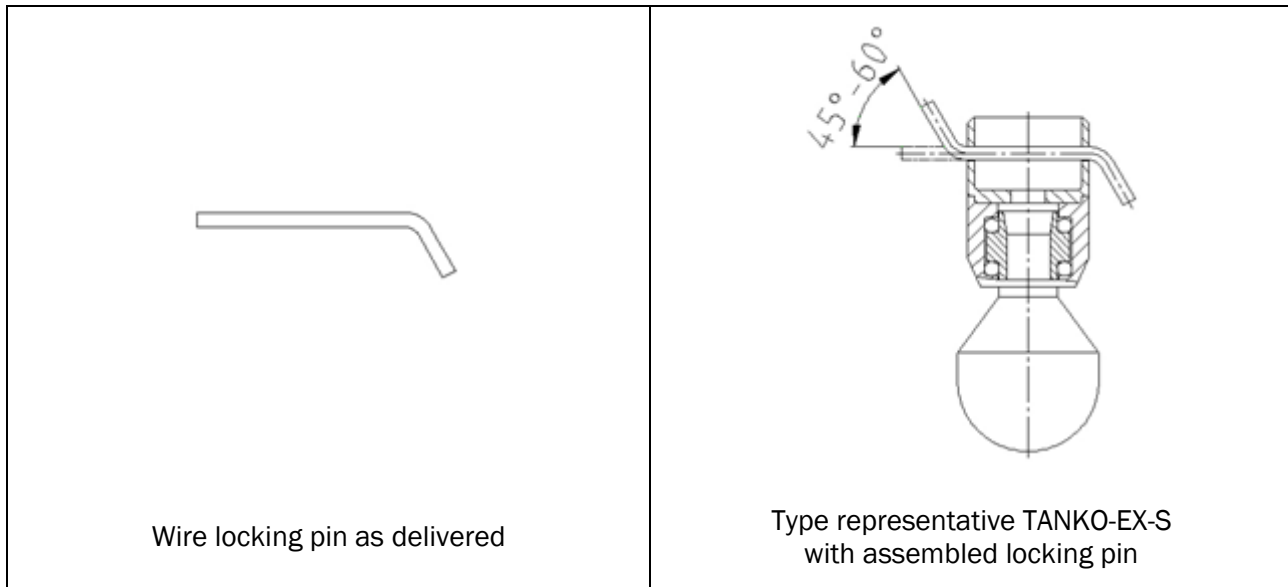


Illustration 5.2-5: Clip-on installation

NOTE Multiple utilization of the wire locking pin.

The material experiences fatigue and loses its rigidity when the wire locking pin is subjected to multiple bending. The wire locking pin may come loose.

The device and the wire locking pin could fall into the container.

- The wire locking pin is to be replaced by a new wire locking pin after it has been bent (see [Section 7.5.1 Spare parts](#)).

NOTE Non-compliance with the dimensions for media connection (see [Table 5.2-2: Clip-on dimensions](#)) Problems with the fastening of the device to the downpipe could be the result.

- The distance between the bore hole for the clip in the downpipe and the end of the downpipe may not exceed a maximum of $h_1 - h_2$.
 - The bore hole diameter for the clip in the downpipe has a diameter of d .
1. Slide the device connection over the downpipe and rotate it until the clip bore holes in the downpipe match the clip boreholes of the device.
 2. Insert the wire locking pin through the bore holes in the downpipe and the device until it hits the stopper.
 3. Bend the straight end of the wire locking pin with the assembly/disassembly tool for the locking pin by at least 45° (see [Illustration 5.2-5: Clip-on installation](#)).

6 Commissioning

Before the device is commissioned in Germany, the operating company of the plant must adhere to the Industrial Safety Ordinance (BetrSichV).

In other countries, the respective national guidelines, statutes and country-specific regulations regarding occupational safety and accident prevention must be complied with.



WARNING

Hazardous situations as a result of incorrect installation of the device!

If the device is not installed properly, unpredictable situations may arise during commissioning or operation.

There is a risk of death or severe physical injury.

- *As a basic rule, commissioning of the device (with cleaning medium) must not be performed until the following has been checked:*
 - *Correct mechanical installation of the device on/in the container*
 - *Correct hydraulic connection*
 - *The safe and reliable functioning of the device*

6.1 Safety Instructions for Commissioning

Before the device is commissioned, the operating company must ensure that local regulations are observed during commissioning.



We recommend that you document the commissioning and its operating conditions in a report.



NOTE ON EXPLOSION PROTECTION

Work on the device in an explosive atmosphere is PROHIBITED!

Non-compliance can result in the loss of explosion protection.

- *Only allow instructed personnel to work in potentially explosive atmospheres.*
- *The personal protective equipment must satisfy the requirements of explosion protection.*
- *Do not use a tool that could create sparks.*

DANGER**Danger of ignition in potentially explosive atmosphere due to potential differences!**

When filling and emptying containers with fluids, when recirculating, stirring, mixing and spraying fluids and also when implementing measuring, sampling and cleaning work, the fluids themselves or the interior of the container can be provided with a hazardous charge.

Differences in potential (e.g. electrostatic charge) can cause igniting sparks or heat, which can act as an ignition source.

There is a risk of death or severe physical injury.

- Only clean electrically conductive containers.
- Make sure that an electrostatic charge is prevented. Also ensure that all the electrically conductive parts on the device and the container must be grounded for potential equalization to the same potential using grounding cables with a sufficient diameter.
- The grounding must always be implemented before the commissioning of the device. Avoid grounding faults (e.g. subsequent grounding of already charged objects or equipment).
- Do not secure or seal mechanical connections with electrical insulating materials (such as sealing tape, sealant, adhesive, etc.), if it impairs the grounding of the device on the container.

DANGER**Explosion hazard due to ignition source!**

Existing explosive atmosphere can be ignited.

There is a risk of death or severe physical injury.

- The cleaning medium and the material to be cleaned may not cause a chemical reaction that might cause an ignition.
- Electrostatic charges when handling liquids.

WARNING**Risk of burns from hot surfaces!**

The device is supplied without additional measures to provide protection from hot surfaces.



The device may heat up significantly as a result of the cleaning medium or the heat transfer from the container. If you touch the device or the supply line for the cleaning medium, your skin may be burned.

There is a risk of burns from the cleaning medium at temperatures of more than +60 °C (+140 °F).

- Insulate hot surfaces.
- Secure hot surfaces with a guard or barriers.
- Put up warning signs in the direct vicinity of the hot surfaces.
- Use protective work clothing and protective gloves when working.

**WARNING*****Danger resulting from negative pressure/vacuum in the container!***

A cold cleaning process in hot enclosed containers can generate negative pressure, which may lead to damage to the container.

There is a risk of death or severe physical injury.

- *Take precautions to allow gases or vapors to escape during operation (e.g. install devices for ventilation or pressure equalization).*

As a result of the variety of practical applications and uses for the cleaning device, AWH CANNOT specify a noise level for the device under load, i.e. when installed in the container and operating with cleaning agent.

For this reason, the manufacturer can only provide the operating company **with a few points of reference and instructions as a precautionary measure** which must be observed and integrated into the operator company's hazard or risk assessment.

**CAUTION*****Risk of hearing damage as a result of an increased noise level!***

The device emits a noise pressure level of $L_{pA} < 70$ dB(A).

When the device is operated in a container, the noise level may exceed the maximum permitted exposure value of $L_{EX, 8h} = 85$ dB(A), and varies depending on the properties of the container in the plant and on the existing operating conditions of the device.

Hearing damage could be incurred as a result.

- *The plant noise level must always be measured and documented by the operating company.*
- *Keep the plant noise level within the legal range:*
 - *Carry out noise reduction measures (e.g. sound insulation).*
 - *Place barriers around the noise area and mark it accordingly (e.g. with mandatory sign "Use hearing protection").*
 - *Use effective hearing protection!*

Comply with the technical health and safety rules relating to noise and vibration (TRLV Lärm in Germany). State-of-the-art technology must be used to implement the measures to provide protection from exposure to noise based on the risk assessment. In this case, noise emissions must be prevented at source, or reduced as far as possible.

**CAUTION*****Insufficient lighting in the working environment!***

The device DOES NOT have illumination. Insufficient lighting when working on the device can cause accidents.

There is a risk of minor or moderate injuries.

- *Make sure that there is sufficient and even lighting in all areas of the plant in which the devices is used when work is performed on the device.*
- *In Germany, the technical rules for workplaces (ASR A3.4) apply. An illumination level of **300 lx (Lux)** is recommended (maintenance value).*

The following conditions must be met before the device can be used in an Ex area:

- The details on the type plate of the device must comply with the requirements of the local explosion area on-site (device group, Ex category, Ex zone, temperature class).
- The ambient temperature during later use is within the permitted range.
- The device and the container are properly grounded and have equalized potential.
- The distances from the device to the on-site plant components are tested and comply with the requirements of explosion protection.
- All connections at the interfaces of the device are securely fastened and tightly sealed (danger of zone carryover).
- All required safety devices are installed.

6.2 Functional Check/Trial Run

A trial run should be carried out to check that the device functions safely and reliably once installed.



Do not operate the device unless it is in perfect condition.

The container to be cleaned must be emptied and depressurized.

⚠ WARNING Persons in the container. Persons may be struck by the jets from the cleaning head!

There is a risk of death or severe physical injury.

- Do NOT start cleaning operation while there are persons in the container.

Functional Check

1. Securely close all of the openings on the container (e.g. inspection openings).
2. Switch off all moving parts in the container and secure them to prevent them from being inadvertently switched back on or set in motion.
3. Check to ensure that there is a safe distance around the container and the surrounding components.
4. Switch on the device (see [Section 6.3 Switch-on Procedure](#)).
5. Check the interfaces on the device for impermeability.

6. **NOTE** Danger of collisions with moving parts!

Observe the following steps if components in the container are required to rotate during the cleaning process:

- Start up the surrounding components (e.g. agitators) step by step.
 - Carefully check that the cleaning head and surrounding components (e.g. agitators) do NOT collide while moving simultaneously.
7. Make sure that there are no unusual vibrations.
8. Check the device to make sure that it runs quietly and smoothly.
9. Switch off the device (see [Section 7.2 Switch-off Procedure](#)).

6.3 Switch-on Procedure

In accordance with the type of device activation and how it is integrated (e.g. manual or automatic) on the cleaning plant, the switch-on procedure must be integrated and the following instructions must be observed when switching on.



WARNING

Risk from sudden, unforeseeable or unauthorized activation of the device (e.g. triggering of a start command as a result of incorrect operation of a start-up control device)!

There is a risk of death or severe physical injury.

*When commissioning the device, it is imperative to perform the following **working steps** in the specified order.*

Switch-on procedure

1. Securely close all of the openings on the container (e.g. inspection openings).
2. Empty and depressurize the container.
3. Switch on the electrical power supply.
 - Check to make sure that the electrical power supply is NOT interrupted, and that there is voltage available at any sensors.
 - Take suitable measures to secure the electrical power supply to prevent it from switching off suddenly, unexpectedly or without authorization.
4. Switch on the cleaning medium supply (e.g. slowly open the shut-off valve or ball cock).
 - Check that the supply of cleaning medium is NOT interrupted, and the media pressure on the device is established.
 - Take suitable measures to secure the supply of cleaning medium to prevent it from switching off suddenly, unexpectedly or without authorization.

NOTE***Risk of breakage due to material overload!***

Pressure surges when switching the cleaning medium on or off, in particular pressure surges which exceed the operating pressure, and gas components in the cleaning medium may cause hammering in the cleaning device.

There is a risk of material damage or destruction of plant parts, e.g. leakage in the pipe system or on connected devices.

- *Prevent pressure surges (“water hammers”) and gas components in the cleaning medium, e.g. caused by:*
 - *Installing a water hammer arrester or pressure relief valve in the supply line,*
 - *starting up/stopping the pump slowly and*
 - *opening/closing the shut-off fitting slowly (e.g. valve or ball cock).*

The term “water hammer” denotes a pressure surge in a fluid line which is generated by opening/closing a shut-off fitting (e.g. valve or ball cock) quickly at the end of a pipeline.

Pressure hammers/pressure surges can also be provoked by quick changes in the flow rate (pressure increase or pressure drop), or by sudden changes in direction of the flow of fluids. This effect is particularly common in pump systems with long pipelines when starting up, stopping or changing the speed of pumps.

6.4 Operation

Once it has been commissioned and inspected, the device can be put into operation, observing the following instructions.

**WARNING*****Risk when using outdoors!***

The devices are usually operated in an enclosed factory hall, and are thus protected from the risk of lightning. If the device is used outdoors, there is a risk of a lightning strike in case of a storm.

There is a risk of death or severe physical injury.

- *The plant in which the device is installed must be protected by suitable lightning protection measures.*
- *In case of use outdoors and in case of storms or the risk of lightning strikes, stop work immediately.*

WARNING**Risk if the operating/working area is accessed by unauthorized persons!**

Unauthorized persons ARE NOT familiar with the hazards in the working area as described in these instructions.

There is a risk of death or severe physical injury.

- Permit only authorized specialist personnel who are qualified and trained for the operation to operate the cleaning device.
- Keep unauthorized persons away from the working area of the plant/machine in which the device is installed.

If in doubt, address these persons direct them to exit the working area.

- Stop the work for as long as there are unauthorized persons in the working area.

WARNING**Risk of chemical burns and burns when opening the container!**

The supply line is pressurized. The person may be struck by cleaning jets or come into contact with residual fluid from the supply line and device. There may also be hot vapors in the container.



There is a risk of death or severe physical injury.



- **DO NOT open the container during the cleaning process.**
- Before starting work, adhere to the **working steps of the switch-off procedure** (see [Section 7.2 Switch-off Procedure](#)).
- Before opening the container, observe the **cooling and draining time**.
- Use personal protective equipment (e.g. protective gloves, safety shoes, safety goggles).

WARNING**Danger due to hot surfaces!**

The device may heat up significantly as a result of the cleaning medium or the heat transfer from the container. Contact with the device can cause burns on the skin.



There is a risk of burns from the cleaning medium at temperatures of more than +60 °C (+140 °F).

- Comply with the warning signs and **DO NOT touch the indicated areas**.
- Do **NOT** remove insulation from protected hot surfaces.
- Maintain safety clearance of existing protective equipment or barriers.
- Use personal protective equipment (e.g. protective gloves; cloth) against hot surfaces.
- Do not touch the device until after a sufficient cooling time.

**WARNING*****Danger of injuries caused by ejection of the cleaning agent!***

If the cleaning medium is ejected unexpectedly after a system failure (e.g. pressure drop due to interruption of the pressure supply), there is a risk of accident.

There is a risk of death or severe physical injury.

- Do NOT remove the device if the cleaning medium has failed.
- Always follow the switch-off procedure (see [Section 7.2 Switch-off Procedure](#)).

When operating the device, adhere to the following additional instructions:

⚠ WARNING Persons in the container. Persons may be struck by the jets from the cleaning head!

There is a risk of death or severe physical injury.

- Do NOT start cleaning operation while there are persons in the container.
- NEVER direct the cleaning jet or torrent at persons.

⚠ WARNING Incorrect operation of the device!

There is a risk of death or severe physical injury.

- Only operate the device when it is in perfect condition.
- Do not operate the device unless it is installed inside an enclosed container.
- Drain and depressurize the container that needs to be cleaned.
- Securely close all of the openings on the container (e.g. inspection openings).
- When operating the device, **adhere to the switch-on and switch-off procedures** (see [Sections 6.3 Switch-on Procedure](#) and [7.2 Switch-off Procedure](#)).
- There is no need for the device to be run in.
- The following operating states of the device are NOT permitted:
 - Operation of the device without cleaning medium.
 - Immersing the device in the product of the production process.
 - Operation of the device outside the permitted parameters (see [Section 3.3 Technical Data](#)).
 - Operate the device with air or gas for a longer period (several minutes)
- Immediately stop operation in the event of leaks outside the container.
- Refrain from any type of work which compromises the safe and reliable function of the device.
- Immediately inform the operating company of any changes to the device or the plant that may impair its safety.

If you notice vibrations on the plant that are NOT generated by the device while commissioning the device, these must be prevented with suitable measures so that the vibrations CANNOT be transmitted to the device.

If this is NOT possible, the maintenance intervals must be shortened in accordance with [Section 7.4.1 Maintenance Intervals](#).

During normal operation of the device, you must make sure that the mixture of supplied cleaning medium and dislodged substances can flow freely from the container.

NOTE Clogging in the drain of the container is to be eliminated at once so that:

- no large quantities of dirt can accumulate in the container,
- there is NO impermissible filling of the container with cleaning medium,
- the device does NOT become immersed as the fluid level rises.

For cleaning media in circulation:

Run the final cleaning step with clean water to remove any suspended matter which may have been introduced.

7 Maintenance

The following safety instructions apply to all work on the device that is listed and described in this chapter, and must be observed at all times.

Use only **original spare parts** when replacing parts of the device. A **functional check** must be performed after every repair (see [Section 6.2 Functional Check/Trial Run](#)).



WARNING

Risk of accident caused by incorrectly performed maintenance and repair work!

Improper maintenance, falling components or failure to adhere to the listed safety instructions can lead to accidents.

There is a risk of death or severe physical injury.

- Only allow **experts** to perform work on the device.
- Do not work on the device unless it is insulated from electrical voltage, depressurized and in a cool state.
- Maintain a safe distance when working on the device.

We recommend that you provide 1 m of space for free movement around the device and container.

7.1 Safety Instructions for Maintenance



NOTE ON EXPLOSION PROTECTION

Work on the device in an explosive atmosphere is PROHIBITED!

Non-compliance can result in the loss of explosion protection.

- Only allow instructed personnel to work in potentially explosive atmospheres.
- The personal protective equipment must satisfy the requirements of explosion protection.
- Do not use a tool that could create sparks.



DANGER



Fatal shock hazard through contact with live parts!

Activated electrical components are live with dangerous electrical voltage and may perform uncontrolled movements.

There is a risk of death or severe physical injury.

- Allow only **qualified electricians** to perform work on the electrical system.
- Before starting work, observe the **working steps of the switch-off procedure** (see [Section 7.2 Switch-off Procedure](#)).
- Cover adjacent live parts to prevent contact.
- Beware of the hazards caused by electrical current (e.g. warnings).


DANGER

Danger of ignition in potentially explosive atmosphere due to potential differences!

When filling and emptying containers with fluids, when recirculating, stirring, mixing and spraying fluids and also when implementing measuring, sampling and cleaning work, the fluids themselves or the interior of the container can be provided with a hazardous charge.

Differences in potential (e.g. electrostatic charge) can cause igniting sparks or heat, which can act as an ignition source.

There is a risk of death or severe physical injury.

- *Only clean electrically conductive containers.*
- *Make sure that an electrostatic charge is prevented. Also ensure that all the electrically conductive parts on the device and the container must be grounded for potential equalization to the same potential using grounding cables with a sufficient diameter.*
- *The grounding must always be implemented before the commissioning of the device. Avoid grounding faults (e.g. subsequent grounding of already charged objects or equipment).*
- *Do not secure or seal mechanical connections with electrical insulating materials (such as sealing tape, sealant, adhesive, etc.), if it impairs the grounding of the device on the container.*


WARNING

Risk of chemical burns and burns when opening the container!

The supply line is pressurized. The person may be struck by cleaning jets or come into contact with residual fluid from the supply line and device. There may also be hot vapors in the container.



There is a risk of death or severe physical injury.



- ***DO NOT open the container during the cleaning process.***
- *Before starting work, observe the **working steps of the switch-off procedure** (see [Section 7.2 Switch-off Procedure](#)).*
- *Before opening the container, observe the **cooling and draining time**.*
- *Use personal protective equipment (e.g. protective gloves, safety shoes, safety goggles).*



 **WARNING****Danger due to hot surfaces!**

The device may heat up significantly as a result of the cleaning medium or the heat transfer from the container. Contact with the device can cause burns on the skin.



There is a risk of burns from the cleaning medium at temperatures of more than +60 °C (+140 °F).

- Do not remove the devices unless they are in a cool state.
- Allow the device to cool down before starting work.
- Be careful with hot surfaces (e.g. pay attention to warning signs)!
- Use protective equipment (e.g. protective gloves; cloth) against hot surfaces.

 **WARNING****Risk of crushing when carrying out maintenance, cleaning and repair work!**

The container and the interfaces of the device, and the fluid connection may be under pressure.



There is a risk of death or severe physical injury.

- Before starting work, depressurize the container and all lines.
- Switch off all moving parts in the container and secure them to prevent them from being inadvertently switched back on or set in motion.
- Do not remove the device unless it has been depressurized.
- Wear protective gloves.

7.2 Switch-off Procedure

In accordance with the type of device activation and how it is integrated (e.g. manual or automatic) on the cleaning plant, the switch-off procedure has to be integrated and the following instructions have to be observed when switching off.

WARNING



Risk from sudden, unforeseeable or unauthorized reactivation of the device

(e.g. triggering of a start command as a result of incorrect operation of a start-up control device)!

There is a risk of death or severe physical injury.

*Before performing any disassembly, maintenance, repair or cleaning work on the device, it is imperative to carry out the following **working steps** in the specified order:*

Switch-off Procedure

1. *Stop the supply of cleaning medium (e.g. slowly close the shut-off valve or ball cock).*
 - *Check that the supply of cleaning medium is stopped and there is not media pressure on the device.*
2. *Safeguard the supply of cleaning medium to prevent sudden, unforeseeable or unauthorized reactivation (e.g. lockable switch/shut-off elements).*
 - *Check that an inflow of media is securely prevented and insert dummy discs if necessary.*
Observe a cooling-down phase for media temperatures over 80 °C.
 - *Make sure that the cleaning device and supply line for the cleaning medium have been completely drained (waiting time at least 60s).*
3. *Interrupt power supply to the higher-level plant/the device.*
 - *Check to make sure that the power supply is interrupted, and that no voltage is applied to any sensors present.*
 - *Safeguard the power supply to prevent sudden, unforeseeable or unauthorized reactivation (e.g. lockable switches)*
4. *Depressurize the container against the ambient pressure.*
 - *Safeguard the supply of steam or other media that affect the pressure to prevent sudden, unforeseeable or unauthorized reactivation (e.g. lockable switches/shut-off elements).*
 - *Make sure that the pressure inside the container is equal to the ambient pressure.*

NOTE

Risk of breakage due to material overload!

Pressure surges when switching the cleaning medium on or off, in particular pressure surges which exceed the operating pressure, and gas components in the cleaning medium may cause hammering in the cleaning device.

There is a risk of material damage, e.g. leakage in the pipe system or on connected devices.

- Prevent pressure surges (“water hammers”) and gas components in the cleaning medium, e.g. caused by:
 - Installing a water hammer arrester or pressure relief valve in the supply line,
 - starting up/stopping the pump slowly and
 - opening/closing the shut-off fitting slowly (e.g. valve or ball cock).

7.3 Removal

The safety instructions in [Section 7.1 Safety Instructions for Maintenance](#) must be adhered to before removing the device from the container.

**WARNING****Risk of chemical burns and burns when opening the container!**

The supply line is pressurized. The person may be struck by cleaning jets or come into contact with residual fluid from the supply line and device. There may also be hot vapors in the container.



There is a risk of death or severe physical injury.

- **Do NOT open the container** during the cleaning process.
- Before starting work, observe the **working steps of the switch-off procedure** (see [Section 7.2 Switch-off Procedure](#)).
- Before opening the container, observe the **cooling and draining time**.
- Use personal protective equipment (e.g. protective gloves, safety shoes, safety goggles).



 **CAUTION*****Danger due to freely rotating components of the device!***

When gripping the device, the rotatable mounted spray head can move.

There is a risk of minor cuts.

- *When handling, e.g. unpacking, transportation without packaging, assembly/disassembly and maintenance work, be aware of the freedom of rotation.*
- *Grip the device at the media connection.*
- *Wear protective gloves when working on the device.*


 **CAUTION*****Risk of a fault as a result of soiling, foreign objects or damage to the device!***

Foreign objects such as scale, burrs, chips, etc. can restrict flow or get into the piping system and cause malfunctions or damage to components, including seals. This can result in hazards that endanger the functional safety of the device.

There is a risk of minor or moderate injuries.

- *Implement suitable measures to prevent soiling and foreign objects from entering via the interfaces of the device.*
- *Before starting work, make sure that all necessary tools, auxiliary materials and information are available and observe the instructions for the interfaces.*
- *When lifting the device out of the container, maintain a distance from the inner wall of the container and surrounding components (e.g. agitators), to avoid scraping or knocking.*
- *Set the device down on a stable surface after removing it.*

7.3.1 Removing the Device

 WARNING Risk of the device falling accidentally!

The device may strike personnel when falling.

There is a risk of severe physical injury.

- Hold the device firmly when installing/removing it.
- There must be nobody beneath the device when installing/removing it.

Removing the welded connection



To disassemble the welding version, the downpipe must be removed from the holder together with the device.

1. **NOTE** The device could fall down!

The device could become damaged by impact effects.

- When screwing out the parts, take care to ensure that the housing CAN NOT fall down (e.g. by holding it with one hand).
- Disconnect downpipe [DP] at process connection [PA].

2. Lift the downpipe out of the container.

For permanent dismounting, the device can be separated from the downpipe with a suitable procedure. The device will no longer be able to be used afterwards.

Removing the threaded connection

1. **NOTE** The device could fall down!

The device could become damaged by impact effects.

- When screwing out the parts, take care to ensure that the housing CAN NOT fall down (e.g. by holding it with one hand).
- Remove the thread lock (locking pin, welding points)
- Undo the threaded connection to the media supply line (downpipe) using the strap wrench/belt pipe wrench.

2. Unscrew the device from the pipe for the media supply.

Removing the clip-on connection

1. Bend open the wire locking pin with the assembly/disassembly tool for locking pin (clip-on) to one side.

2. **NOTE** The device could fall down!

The device could become damaged by impact effects.

- When screwing out the parts, take care to ensure that the housing CAN NOT fall down (e.g. by holding it with one hand).
- Remove the wire locking pin.

3. Detach the device from the pipe for the media supply.

7.4 Maintenance

To ensure the trouble-free operation, high operational safety and long service life of the cleaning device, it is imperative to have it cleaned and maintained at regular intervals.



NOTE ON EXPLOSION PROTECTION

Work on the device in an explosive atmosphere is PROHIBITED!

Non-compliance can result in the loss of explosion protection.

- *Only allow instructed personnel to work in potentially explosive atmospheres.*
- *The personal protective equipment must satisfy the requirements of explosion protection.*
- *Do not use a tool that could create sparks.*



We recommend that you document the maintenance work in a report.

The safety instructions in [Section 7.1 Safety Instructions for Maintenance](#) must be adhered to when carrying out cleaning, maintenance and repair work.

NOTE***Risk of damage to the device as a result of improper assembly/disassembly work!***

Assembly/disassembly of the device which is NOT performed properly can cause damage to the device which puts the functional safety and reliability at risk when re-commissioning.

The failure of components or a device malfunction can cause material damage and consequential damages.

- *Use only suitable tools which do not damage the surface.*
- *For assembly work, adhere to the specified tightening torque values.*

NOTE***Damage to the screw connections!***

Stainless steel screw connections may tend to seize up during assembly as a result of friction caused by high preload forces and high friction values, and can cause problems when tightening and unfastening.

- *Lubricate the screw connections before assembly.*
- *Define the choice of lubricant very exactly for the application and the requirements (e.g. Klüberpaste UH1 96-402 or UH1 84-201).*
- *Adhere to the information in the safety data sheets provided by the lubricant manufacturer.*

NOTE***Risk of dirt and foreign bodies in the device!***

Dirt or foreign bodies can compromise the functional safety and reliability of the device.

- *During assembly, make sure and check that there is no dirt or foreign objects in the device (e.g. small particles, sealing material).*

NOTE***Edge compression in the area of the wrench flats!***

If workpieces are NOT grasped without play and in a protective manner by the flats during assembly/disassembly, then they are at risk of damage:

- *For gentle, protective assembly/disassembly work, use an adjustable or pliers wrench with parallel, smooth clamping jaws.*
- *Apply the clamping jaws of the adjustable wrench or pliers wrench to the flats without play so that they rest evenly across the surface and loosen or tighten the screwed part.*

7.4.1 Maintenance Intervals

NOTE

Component failure due to vibration damage!

During operation, vibration can cause screw and clamp connections to work loose or the device to be subjected to severe strain, thus possibly leading to component failure.

The failure of components or a device malfunction can cause material damage and consequential damages.

- *Check the installed device for loose connections at regular intervals.*
- *Watch out for vibration damage during maintenance and checking.*
- *Adapt the maintenance intervals according to the operating conditions of the plant. After commissioning, start with short maintenance intervals at first. If no damage occurs, the maintenance intervals can be adapted incrementally until the intervals specified in the instructions are reached.*

Maintenance Intervals and Methods



Shorten the maintenance intervals by 30% in the event of:

- Deviation from the preferred installation position of the device (see [Section 5.2.2 Installation Position](#)).
- Vibrations that occur in the plant which are NOT caused by the device and CANNOT be prevented.

If the device is NOT operated for a longer period, we recommend that you check the device completely before re-commissioning to make sure that it is fully functional (see [Section 6.2 Functional Check/Trial Run](#)).



Service life of the ball bearings

The integrated ball bearings in the TANKO-EX series are subject to low wear.

The typical lifetime corresponds to the following standard parameters

- *Vertical installation position hanging down*
- *Cleaning agent: water*
- *Agent pressure 3 bar (43.5 psi)*
- *Agent temperature 25 °C (77 °F)*

A service life of 300 hours

With a typical cleaning cycle of 20 minutes per day and 200 days per year, this results in a product service life of 4.5 years.

Overview of Maintenance Points

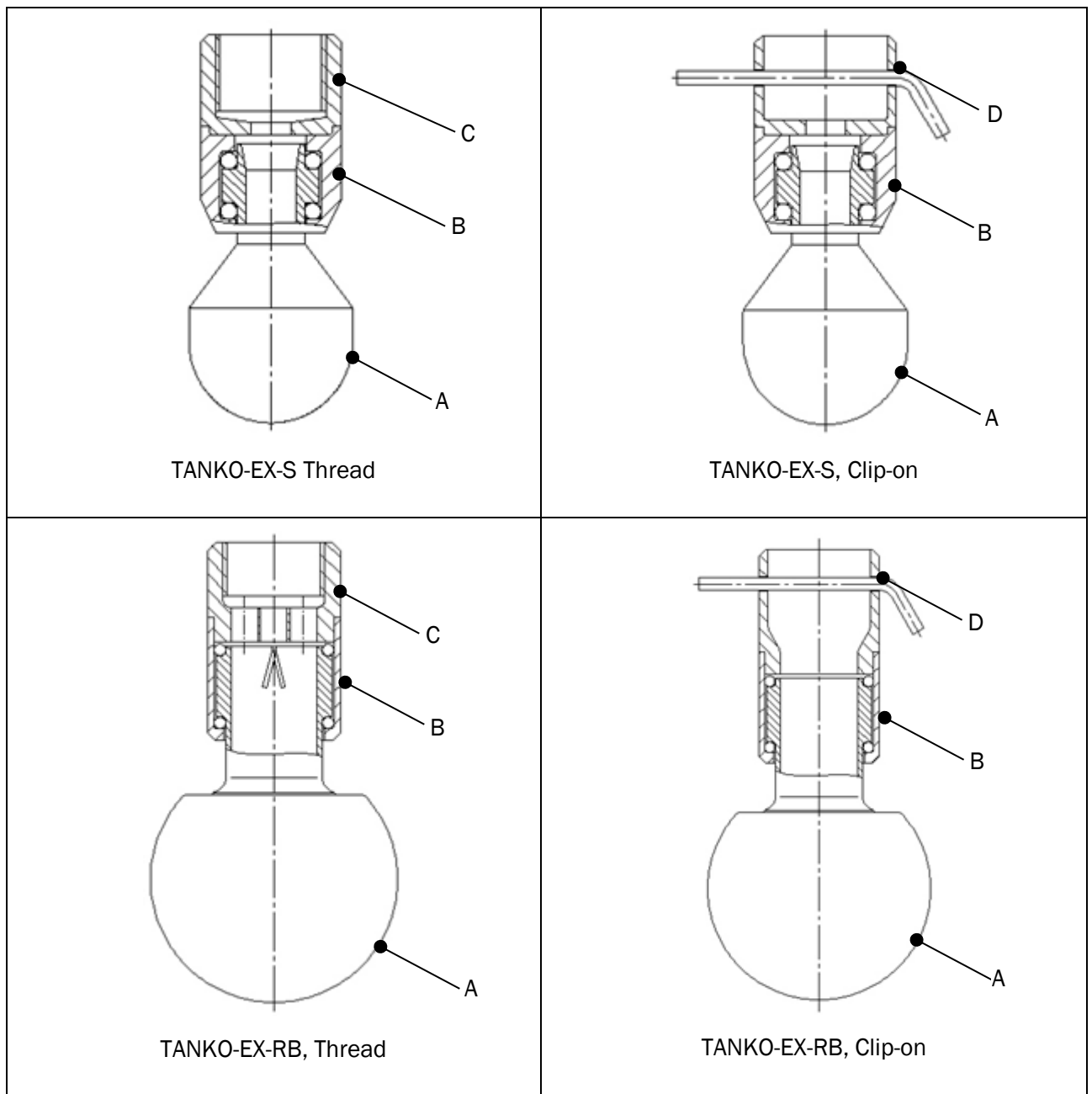


Illustration 7.4-1: Maintenance points

Maintenance Points	A	Rotating head
	B	Actuator/ball bearing area
	C	Thread connection
	D	Clip-on connection with clip

Interval: h_B = operating hours of the device

Method: S = visual inspection
 F = functional check
 M = measurement
 R = cleaning
 A = replacement

Point	Inspection and Maintenance Work	Interval		Method
		Initial inspection	Follow-up check	
A	Check spray openings for contaminations, wear and damage. <ul style="list-style-type: none"> • Clean in the event of contaminations. • Replace device in the event of wear or damage. 	200 h _B	200 h _B	S/R/A
B	Check functioning (rotatability) of actuator for contaminations, wear and damage. <ul style="list-style-type: none"> • Clean in the event of contaminations. • Replace device in the event of wear or damage. 	200 h _B	50 h _B	R/S/F/A
C	Check tightness of thread and check the functional safety of the thread lock. <ul style="list-style-type: none"> • Restore safety. 	200 h _B	200 h _B	S/F
D	Check clip-on connection for contaminations, wear and damage. <ul style="list-style-type: none"> • Replace device in the event of wear or damage to the connection. • Replace wire locking pin with original part. 	200 h _B	50 h _B	S/A

Table 7.4-1: Inspection and Maintenance Work

NOTE Multiple utilization of the wire locking pin.

The material experiences fatigue and loses its rigidity when the wire locking pin is subjected to multiple bending. The wire locking pin may come loose.

The device and the wire locking pin could fall into the container.

- The wire locking pin is to be replaced by a new wire locking pin after it has been bent (see [Section 5.2.3 Installing the Device, “Installation Clip-on Connection”](#)).

7.4.2 Tools and Tightening Torque Values

Use only proper tools which are required for performing the required work and approved for use.



NOTE ON EXPLOSION PROTECTION

When working in areas where flammable or easily ignitable vapors, liquids or dusts are present, where sparks could result in a potential fire or explosion hazard, tools that are unlikely to create sparks should be used.

Non-compliance can result in the loss of explosion protection.

- *Do not use a tool that could create sparks.*

When working in explosive atmospheres, it must be taken into account that possible sparking is influenced not only by the tool but also by other factors, e.g. caused by:

- The material to be processed
- The hardness of the material to be processed compared to the hardness of the tool
- The impact or friction energy applied
- Additional, existing deposits that could cause sparking, such as rust, aluminum, combustible dusts and the amount of oxygen.

The following tools/special tools are sufficient for mechanical work on the device.

- Screwdriver set (slot head)
- Open end/box wrench set (WAF 12; 16; 22; 28; 32; 38; 48; 54; 75 mm)
- Pliers wrench, adjustable wrench or crescent wrench with smooth parallel jaws
- Torque wrench with socket shaft □ 14 x 18
- Torque screwdriver with inserts and accessories
- Strap wrench/belt pipe wrench (e.g. Ø 140) with woven belt



The tightening torques must be selected according to the strength of the material and the thread size of the pipe connection.

Special Tools



Assembly/disassembly tool for locking pin (clip-on):

- Art. no. 664 MW0 101 005 0 size A for wire Ø 2.0 mm
- Art. no. 664 MW0 102 005 0 size B for wire Ø 2.4 mm
- Art. no. 664 MW0 103 005 0 size C for wire Ø 3.6 mm
- Art. no. 664 MW0 104 005 0 size D for wire Ø 4.5 mm

7.4.3 Notes on Cleaning



NOTE ON EXPLOSION PROTECTION

Cleaning work on the device in an explosive atmosphere is PROHIBITED!

Non-compliance can result in the loss of explosion protection.

- *Only allow instructed personnel to work in potentially explosive atmospheres.*
- *The personal protective equipment must satisfy the requirements of explosion protection.*
- *Do not use a tool that could create sparks.*

It is recommended for the device to be cleaned during maintenance.

Comply with the following safety instructions prior to cleaning.



WARNING



Hazard from corrosive or aggressive cleaning agents!

There is a risk of death or severe physical injury.

- Adhere to the regulations and specifications in the safety data sheets for the cleaning agents (e.g. vapors or hazardous substances).
- Use personal protective equipment (e.g. protective gloves, safety shoes, safety goggles).
- Avoid excessively strong concentration of the cleaning agent.
- Use only clean and chlorine-free water as a diluting agent.
- Rinse the device with plenty of clean water after cleaning.
- Store cleaning agent in accordance with the applicable safety guidelines.



NOTE

Risk of damage to the device during cleaning!

The use of incorrect cleaning agent or sharp objects can damage the device.

The functional safety and reliability of the device may be compromised.

- The cleaning agents must be approved for all of the materials in the device (e.g. seals, bushings).
- Do not use sharp objects (e.g. knives) or tools.

NOTE

Formation of hydrochloric acid when cleaning the device!

No dry adhesions or deposits of cleaning agent should be left behind in the device. This could cause the cleaning agent to salt out or form crusts. If the cleaning agent contains volatile solvents containing chloride, then hydrochloric acid could arise when rinsing with clear water.

The functional safety and reliability of the device may be compromised.

- DO NOT rinse with clear water if the cleaning agent includes volatile solvents containing chloride.



The following must be observed when blowing out the device with air:

- fix the head in place in such a way that it cannot rotate while being blown out
- use filtered, oil-free compressed air
- Time of the dry-blowing 5 – 10 min (longer is technically possible but not necessary under normal circumstances)

Cleaning in Assembled State:

As a basic rule, cleaning of the device parts that are located in the **interior of the container** is NOT necessary. Self-cleaning takes place during the cleaning process.

Cleaning is carried out by simply rinsing the surfaces that come into contact with media (CIP cleaning).

Cleaning media:	3% nitric acid	max. +60 °C (+140 °F)
	3% caustic soda	max. +80 °C (+176 °F)

Cleaning in Disassembled State:

Prior to cleaning, the device must have been removed from the container by an **expert**. The safety instructions in [Section 7.1 Safety Instructions for Maintenance](#) must be observed.

Cleaning of the device can be carried out by **instructed persons**. After cleaning, the device must be assembled, checked and reinstalled in the container by an **expert** (see [Section 5.2 Installation](#)):

NOTE



Environmental damage in case of improper disposal!

Cleaning agents, consumables and lubricants must **NOT** be allowed to get into the groundwater, waterways or sewer system.

There is a risk of environmental damage.

- Dispose of any cleaning agents, lubricants and consumables (e.g. brushes and cloths) which have been used for cleaning in accordance with the local regulations and in accordance with the information in the manufacturer's safety data sheets.
- Dispose of packaging materials in an environmentally friendly manner and recycle them.

7.5 Spare Parts and Customer Service



Subject to technical modifications in the interest of further development and improvement to the properties of the device. The Article No., dimensions or materials may differ from those of the supplied device.

The following data is important when requesting spare parts and for all inquiries:

Device

- Type
- Serial number

Spare part

- Designation
- Article No.

Customer Service



For technical questions or spare part requests, you can contact the Customer Service department as follows:

Armaturenwerk Hötensleben GmbH

Schulstraße 5 – 6

D-39393 Hötensleben, Germany

Telephone +49 39405 92-0

Fax +49 39405 92-111

E-mail info@awh.eu

Internet <http://www.awh.eu>

7.5.1 Spare parts

Article no. (Pack = 4 pieces)	Material	Wire Ø/ length [mm]	TANKO-EX-S20	TANKO-EX-S30	TANKO-EX-S40	TANKO-EX-S50	TANKO-EX-RB30	TANKO-EX-RB40	TANKO-EX-RB64	TANKO-EX-RB90
6640000A20044	1.4430	Ø 2.0/L = 40	X	--	--	--	X	--	--	--
6640000A20064	1.4576	Ø 2.0/L = 40	X	--	--	--	X	--	--	--
6640000A20094	2.4607	Ø 2.0/L = 40	X	--	--	--	X	--	--	--
6640000A30064	1.4576	Ø 2.0/L = 49	--	X	--	--	--	--	--	--
6640000A30044	1.4430	Ø 2.0/L = 49	--	X	--	--	--	--	--	--
6640000A30094	2.4607	Ø 2.0/L = 49	--	X	--	--	--	--	--	--
6640000A50064	1.4576	Ø 2.4/L = 49	--	--	--	--	--	X	--	--
6640000A50044	1.4430	Ø 2.4/L = 49	--	--	--	--	--	X	--	--
6640000A50094	2.4607	Ø 2.4/L = 49	--	--	--	--	--	X	--	--
6640000A60054	1.4571	Ø 3.6/L = 78	--	--	X	--	--	--	X	--
6640000A60074	2.4610	Ø 3.6/L = 78	--	--	X	--	--	--	X	--
6640000A70054	1.4571	Ø 4.5/L = 115	--	--	--	X	--	--	--	X
6640000A70074	2.4610	Ø 4.5/L = 115	--	--	--	X	--	--	--	X

Table 7.5-1: Spare part wire locking pin for clip-on

8 Faults

8.1 Safety Instructions for Troubleshooting

Before clearing a fault, the following safety instructions must always be adhered to:



NOTE ON EXPLOSION PROTECTION

Work on the device in an explosive atmosphere is PROHIBITED!

Non-compliance can result in the loss of explosion protection.

- *Only allow instructed personnel to work in potentially explosive atmospheres.*
- *The personal protective equipment must satisfy the requirements of explosion protection.*
- *Do not use a tool that could create sparks.*



DANGER



Danger of ignition in potentially explosive atmosphere due to potential differences!

When filling and emptying containers with fluids, when recirculating, stirring, mixing and spraying fluids and also when implementing measuring, sampling and cleaning work, the fluids themselves or the interior of the container can be provided with a hazardous charge.

Differences in potential (e.g. electrostatic charge) can cause igniting sparks or heat, which can act as an ignition source.

There is a risk of death or severe physical injury.

- *Only clean electrically conductive containers.*
- *Make sure that an electrostatic charge is prevented. Also ensure that all the electrically conductive parts on the device and the container must be grounded for potential equalization to the same potential using grounding cables with a sufficient diameter.*
- *The grounding must always be implemented before the commissioning of the device. Avoid grounding faults (e.g. subsequent grounding of already charged objects or equipment).*
- *Do not secure or seal mechanical connections with electrical insulating materials (such as sealing tape, sealant, adhesive, etc.), if it impairs the grounding of the device on the container.*

WARNING



Risk of chemical burns and burns when opening the container!

The supply line is pressurized. The person may be struck by cleaning jets or come into contact with residual fluid from the supply line and device. There may also be hot vapors in the container.



There is a risk of death or severe physical injury.



- **DO NOT open the container** during the cleaning process.
- Before starting work, observe the **working steps of the switch-off procedure** (see [Section 7.2 Switch-off Procedure](#)).
- Before opening the container, observe the **cooling and draining time**.
- Use personal protective equipment (e.g. protective gloves, safety shoes, safety goggles).



WARNING

Hazardous situations caused by performing work on the device incorrectly!

There is a risk of death or severe physical injury.

- Repairs and fault clearance work must be performed only by qualified experts who have knowledge of the “Technische Regeln für Betriebssicherheit (TRBS)” (German technical rules for operational reliability and safety).
- Before eliminating any malfunction, comply with the safety instructions in [Chapter 7 Maintenance](#).
- In case of any uncertainty or doubt, contact AWH.

8.2 Faults and Remedial Action

Fault	Cause	Remedy
Screw connection not tight.	Thread damaged.	Replace the device.
	Thread not screwed fully.	Retighten the threaded connection.
Effectiveness of the cleaning process is inadequate.	Connection pressure is too low.	Check, increase the connection pressure. Attention! Observe pressure limit for clip-on versions.
	Connection pressure is too high, cleaning agent is misty.	Check, reduce the connection pressure.
Head/bearing does not rotate.	Openings locked.	Clean openings.
	Openings deformed.	Replace the device.
	Ball bearing worn.	Replace the device.

Table 8.2-1: Operating Faults – Cause and Remedy

If the specified measures are NOT successful, please contact AWH.



In the event of return shipment (e.g. repair/servicing/return), a hazardous substance declaration must be enclosed with the device in accordance with the German Ordinance on Hazardous Substances (GefStoffV).

Request the form for the hazardous substance declaration from AWH.

8.3 What to Do in Case of an Emergency

If a hazardous situation occurs, or if you need to avert a potential danger, quickly set the device to a safe state.

The type of EMERGENCY STOP circuit used for the device is to be determined depending on the hazards and operating conditions and is the sole responsibility of the operating company.

It is for this reason that AWH can offer the operating company, solely as a precautionary measure, a few points of reference and notes to be observed and to be integrated into the operating company's hazard assessments.

- The working steps for switching off the device listed in [Section 7.2 Switch-off Procedure](#) must be adhered to.
- The EMERGENCY STOP circuit must be designed in such a way that the machine or system operator can actuate it immediately in the event of an emergency.
- Switching off with the “EMERGENCY STOP” in case of emergency is designed to disconnect the entire machine from the supply voltage without delay in order to eradicate the risks caused by electrical voltage immediately.
- Shutting down in case of emergency using the “EMERGENCY STOP” is intended to prevent risks which cause hazardous movements as soon as possible.
- The EMERGENCY STOP must have priority over all other functions and actuations in all operating modes.
- Resetting must not cause the plant/machine to start up again.



Source:

- DIN EN 60204-1/VDE 0113-1 “Safety of machinery – Electrical equipment of machines – Part 1: General requirements”
- DIN EN ISO 13850: “Safety of machinery - Emergency stop - Principles for design”

In Case of Emergency:

Trigger the EMERGENCY STOP function on the higher-level plant/machine.

- Actuate the **EMERGENCY STOP** switch
- Interrupt actuating energy supply
 - Interrupt electricity supply (e.g. electrical actuator)
 - Switch off higher-level main switch
 - Pull out power plug
 - Close the compressed air shut-off valve (e.g. pneumatic actuator)
- Interrupt the supply of cleaning medium (actuator energy)
 - Close the shut-off valve

9 Decommissioning

Once the device has reached the end of its service life, it must be removed from the container and disposed of in an environmentally friendly manner. Disposal must be performed in accordance with the respective valid local, national and international regulations.



NOTE ON EXPLOSION PROTECTION

Work on the device in an explosive atmosphere is PROHIBITED!

Non-compliance can result in the loss of explosion protection.

- *Only allow instructed personnel to work in potentially explosive atmospheres.*
- *The personal protective equipment must satisfy the requirements of explosion protection.*
- *Do not use a tool that could create sparks.*



WARNING



Danger due to improper removal from operation/disposal!

There is a risk of intoxication or chemical burns when using harmful or toxic media, or media which is hazardous in any other way.



There is a risk of death or severe physical injury.



- *Only an **expert** should perform the work.*
- *Before starting work, observe the **working steps of the switch-off procedure** (see [Section 7.2 Switch-off Procedure](#)).*
- *Use protective work clothing, protective gloves and safety goggles when carrying out the tasks.*
- *In case of any uncertainty or doubt, contact AWH.*

Removal

Only **experts** are permitted to perform the removal from the container and the disassembly of the device for disposal. The [Section 7.3 Removal](#) contains information on the removal of the devices and its interfaces. The safety instructions in [Section 7.1 Safety Instructions for Maintenance](#) must be observed.

9.1 Disposal



CAUTION



Danger of injuries from harmful liquids which are a health hazard!

When performing disposal, there is a risk of injury from contact with harmful fluids.

There is a risk of minor or moderate injuries.



- *Use personal protective equipment (e.g. protective gloves, safety shoes, safety goggles).*

NOTE

The cleaning device is made of stainless steel and plastic. Stainless steel is a valuable raw material and can easily be recycled.

After removal, for proper disposal, the entire device must be properly

- cleaned (see [Section 7.4.3 Notes on Cleaning](#)) and
- broken down into assembly groups and individual parts.

Unless other arrangements have been made for return or disposal, disassembled components should be recycled:

- Scrap any parts made of metal
- Recycle any parts made of plastic

If necessary, contact a specialist company to arrange for disposal.

Comply with locally applicable health, safety, disposal and environmental protection regulations.

NOTE

Risk of environmental damage as a result of improper disposal!

Cleaning agents, consumables and lubricants must NOT be allowed to get into the groundwater, waterways or sewer system.

There is a risk of environmental damage.

- *Dispose of any cleaning agents, lubricants and consumables (e.g. brushes and cloths) which have been used for cleaning in accordance with the local regulations and in accordance with the information in the manufacturer's safety data sheets.*
- *Dispose of packaging materials in an environmentally friendly manner and recycle them.*

Index

A	
Abbreviations	IV
C	
Category	18
<i>Cleaning</i>	22
Cleaning media	8, 39
Commissioning	57
Connection to the power supply	49
Construction and Function	23
Consumption Data	31
Container	
Container in the Context of these Instructions	8
Customer Service	80
D	
Decommissioning	84
Device group	18
Device Interfaces	
Media connection [MA]	28, 29
Disposal	84
Duties of the Operating Company	12
E	
Emergency	83
Equipment protection levels	18
Expert	
Electrician	66
Expert	15, 48, 66, 79
Instructed Person	15, 79
Explanation of Signal Words	1
Explanation of the Warnings	2
Explosion group	18
F	
Faults	6, 81
Faults and Remedial Action	82
Functional Check	
Trial Run with the Device	60, 66, 74
G	
General Function Description	24
I	
Ignition protection type	18
Installation	47, 50
Clip-on connection	55
Threaded connection	54
Welded connection	53
Installation opening	
Installation Opening of the Container ...	28, 29
Installation Position	28, 30, 52, 74
Installing the Device	53
Intended Use	7
Interfaces	51
L	
Labeling	17
Labeling for Explosion Protection	18
M	
Maintenance	66, 72
Maintenance Intervals	74
Material combinations	30
Means of Presentation	1, 3
N	
Noise level	
Noise level of the device	28, 30, 59
Noise Level of the Plant	59
Non-Intended Use	11
Notes on Cleaning	77
O	
Operation	62
Original spare parts	7, 12, 66
P	
Packaging	45
Personal Protective Equipment	16
Pictograms and Symbols	4
Product Names and Trademarks	5
R	
Related Documents	5
Removal	70, 84, 85
Clip-on connection	72
Threaded connection	72
Welded connection	71
Removing the Device	71
Requirements for Personnel	15
S	
Safety	6

Safety Instructions for Commissioning	57	Temperature class.....	18
Safety Instructions for Installation	47	Tools and Tightening Torque Values	76
Safety Instructions for Maintenance.....	66	Transport.....	45
Safety Instructions for Troubleshooting.....	81	Transportation and Storage	44
Safety Equipment.....	7	Type Designation	17
Scope of Delivery.....	44	Type Plate.....	17, 19
Spare Parts and Customer Service	79	U	
Spare Parts, Replacement Parts and		Units of Measure	V
Accessories	12	W	
Storage.....	46	Warranty and Liability.....	5
Structure	23	What to Do in Case of an Emergency.....	83
Switch-off Procedure	69	Work steps	
Switch-on procedure	61	Switch-off Procedure ...	48, 67, 69, 82, 83, 84
T		Switch-on procedure.....	61
Technical Data.....	26	Working steps Switch-on Procedure.....	61
Temperature	22	Z	
Ambient temperature.....	27, 29	Zone.....	10, 18
Operating temperature	27, 29		
Surface temperature.....	21		

Appendices

Appendix 1: Declaration (Translation).....	89
Appendix 2: Corrosion Resistance of Steels (Excerpts from Data Sheets).....	91

Appendix 1: Declaration (Translation)

Armaturenwerk Hötensleben GmbH
Schulstraße 5 - 6
D-39393 Hötensleben, Germany

Telephone: + 49 (0) 39405 92-0
Fax: + 49 (0) 39405 92-111
E-mail: info@awh.eu
Homepage: <http://www.awh.eu>

Declaration of incorporation as per

- EC Directive - Machinery 2006/42/EC, Annex II B

EU declaration of conformity in accordance with

- EU Directive relating to Equipment and Protective Systems intended for use in Potentially Explosive Atmospheres 2014/34/EC

We hereby declare that the container cleaning device

Name: Spray cleaner, spate cleaner

Type: TANKO-EX-S, TANKO-EX-RB

Year of manufacture: See type plate on the device

Serial number: See type plate on the device



is consistent with the following basic health and safety requirements of Directive 2006/42/EC, Annex I: 1.1.2 – 1.1.7, 1.3, 1.5.2 – 1.5.9, 1.5.15, 1.5.16, 1.6, 1.7.1 – 1.7.3, 1.7.4, 1.7.4.1, 1.7.4.2, 1.7.4.3.

The specific technical documents were compiled in accordance with Directive 2006/42/EC, Annex VII B.

The supplied version of the device is consistent with the following directives and standards:

Directive/Standard	Title	Version	Comments
2006/42/EC	EC Directive - Machinery	2006	
DIN EN ISO 12100	Safety of machinery - General principles for design - Risk assessment and risk reduction	2011-03	Harmonized standard
	Correction to DIN EN ISO 12100:2011-03	2013-08	---
2014/34/EU	EU Directive relating to Equipment and Protective Systems intended for use in Potentially Explosive Atmospheres	2014	
DIN EN 1127-1	Explosive atmospheres - Explosion prevention and protection - Part 1: Basic concepts and methodology	2011-10	Harmonized standard
DIN EN ISO 80079-36	Explosive atmospheres - Part 36: Non-electrical devices for use in potentially explosive atmospheres - basics and requirements	2016-12	Harmonized standard
DIN EN ISO 80079-37	Explosive atmospheres - Part 37: Non-electrical devices for use in potentially explosive atmospheres - protection through constructional safety "c", ignition source monitoring "b", fluid encapsulation "k"	2016-12	Harmonized standard

Labeling according to ATEX Directive 2014/34/EU and applied standards:



II 1 G Ex h IIB T6 Ga
II 1 D Ex h IIIC T60°C Da
TPS 20 ATEX 055073 0008 X

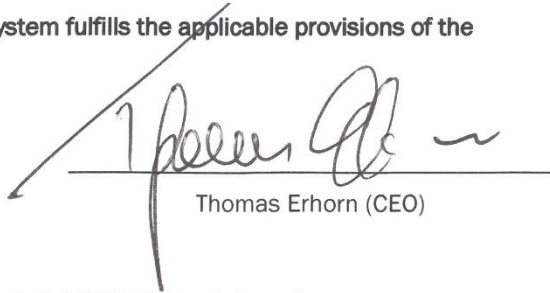
EU type examination certificate TPS 20 ATEX 055073 0008 X of the designated body TÜV SÜD Product Service GmbH, certification body, identification number 0123, Ridlerstrasse 65, 80339 Munich, Germany.

Quality assurance system according to DIN EN ISO/IEC 80079-34, certified by the designated body TÜV NORD CERT GmbH, identification number 0044, Langemarckstraße 20, 45141 Essen, Germany.

If any modifications are made to the device WITHOUT our consent, this declaration shall lose its validity.

Commissioning is prohibited until it is certain that the overall system fulfills the applicable provisions of the directives applied.

Hötensleben, 12. March 2020



Thomas Erhorn (CEO)

Person authorized to compile the technical documentation:

Armaturenwerk Hötensleben GmbH, Ms. Schlange; Schulstr. 5 - 6, D-39393 Hötensleben, Germany

Appendix 2: Corrosion Resistance of Steels (Excerpts from Data Sheets)

Material no. 1.4401 (AISI 316)

The corrosion resistance of 1.4401 is significantly better than that of stainless steel grades 1.4301 and 1.4307, particularly when chlorides are also present, thanks to the addition of 2 - 3% molybdenum. 1.4401 exhibits excellent corrosion resistance in natural environmental media (water, rural and urban atmospheres), as well as in industrial sectors with moderate chlorine and salt concentrations, in the food industry and the agricultural food sector.

Due to its relatively high carbon content it must be taken into account that 1.4401 is not resistant to intergranular corrosion. Furthermore, it should also be pointed out that 1.4401 is not resistant to sea water.

Material no. 1.4404 (AISI 316L)

The corrosion resistance of 1.4404 is significantly better than that of stainless steel grades 1.4301 and 1.4307, particularly when chlorides are present, thanks to the addition of 2 - 3% molybdenum.

1.4404 exhibits excellent corrosion resistance in natural environmental media (water, rural and urban environments), as well as in industrial sectors with moderate chlorine and salt concentrations, in the food and pharmaceutical industries and in the agricultural food sector. Due to its low carbon content 1.4404 is even resistant to intergranular corrosion after welding.

1.4404 is not resistant to sea water!

Material no. 1.4430

1.4430 is the filler material for the base materials 1.4404 and 1.4435.

Material no. 1.4435 (AISI 316L)

1.4435 exhibits excellent corrosion resistance in natural environmental media (water, rural and urban environments), in industrial sectors with moderate chlorine and salt concentrations, as well as in the food industry and the agricultural food sector. In addition, this grade is also resistant to various acidic media. As this material is also resistant to intergranular corrosion after welding, it complies with the following standardized test procedures:

DIN EN ISO 3651-2

The higher proportion of molybdenum in 1.4435 compared to 1.4404 makes it significantly more resistant to reducing acids and chloride media.

Material no. 1.4462 (AISI 316L)

1.4462 shows excellent corrosion resistance in acidic environments (especially in phosphoric and organic acids) and in media containing chloride. Due to its duplex structure of austenite and ferrite, 1.4462 is insensitive to intergranular corrosion and stress corrosion cracking and is therefore significantly superior to austenitic steels. Since 1.4462 is resistant to intergranular corrosion even after welding, it satisfies the standardized test methods DIN EN ISO 3651 Part 1 & Part 2.

1.4462 is characterized by very good corrosion resistance, very good weldability, very good chemical resistance, good polishability and good forgeability.

Material no. 1.4571 (AISI 316Ti)

1.4571 exhibits good resistance to corrosion in most natural waters (urban and industrial), provided that the concentrations of chloride, salt, hydrochloric acid and organic acids are low to medium. 1.4571 exhibits excellent corrosion resistance both in the food and beverage industry, as well as in the agricultural food sector.

As this grade is also resistant to intergranular corrosion after welding, it complies with the following standardized test procedures:

DIN EN ISO 3651-2

Material no. 1.4576

1.4576 is the filler material for the base material 1.4571

Material no. 2.4602 (HASTELLOY® C-22™ alloy)

HASTELLOY® C-22™ alloy also offers good resistance to liquid media, such as sulfuric acid, phosphoric acid, nitric acid, chlorine gas, acidic mixtures consisting of sulfuric acid and oxidizing acids with chloride ions. The use of this material is recommended when strong oxidants such as iron (III) and copper (II) chlorides, chlorine, formic acid, acetic acid, sea water and other salt solutions are present.

A special feature of this alloy is its high resistance to crevice, pitting and stress corrosion at higher temperatures under oxidizing and reducing conditions. Due to its good thermal stability HASTELLOY® C-22™ alloy can generally be used in a welded condition without any additional heat treatment.

Material no. 2.4605 (ALLOY 59)

2.4605 / Alloy 59 is a nickel-chromium-molybdenum alloy with particularly low levels of carbon and silicon.

It has excellent resistance to a variety of corrosive media, both under oxidized and reduced conditions. Excellent resistance to pitting and crevice corrosion and to mineral acids.

2.4605 is well-suited for use in equipment and vessels for the manufacture and processing of organic chloride chemicals, acetic acid production and flue gas desulfurization plants.

Material no. 2.4607

2.4607 is the filler material for the base material 2.4602, 2.4610, 2.4819

Stainless with high corrosion resistance in reducing media and oxidizing media

Material no. 2.4610 (HASTELLOY® C-4 alloy)

HASTELLOY® C-4 alloy belongs to the group of highly corrosion resistant nickel-chrome-molybdenum alloys and exhibits good corrosion resistance even at higher temperatures.

HASTELLOY® C-4 alloy offers good resistance under reducing and oxidizing conditions, for example in hot, contaminated media such as sulfuric acid, nitric acid, dry chlorine, formic acid, acetic acid, solvents, chlorine and chloride media. This material is characterized by its low tendency for intergranular corrosion, stress corrosion cracking and pitting corrosion. Due to its excellent thermal stability HASTELLOY® C-4 alloy is extremely suitable for welding and is generally used in a welded state.

Material no. 2.4819 (HASTELLOY® C-276 alloy)

Nicrofer 5716 hMoW can be used in numerous chemical processes with both oxidizing and reducing media. Its high content of chrome and molybdenum make the alloy resistant to chloride ion attack. The tungsten content further enhances this resistance. Nicrofer 5716 hMoW is one of the few materials that is resistant to wet chlorine gas, hypochlorite and chlorine dioxide solutions. The alloy exhibits excellent resistance to concentrated solutions of oxidizing salts (such as iron III and copper chloride).

Notes

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