

Manufacturer's recommendation for regular safety inspection

MELAG pressure devices

EN

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1 Aims

This document describes the regular safety inspections of MELAG steam sterilizers which the manufacturer views as necessary in order to maintain the safety of the pressure vessel and the value of the device.

It describes the components to be checked, the recommended inspection intervals and the inspection intervals applicable in Germany, as well as the performance of these cyclically recurring inspections.

It is intended to serve as guidelines to ensure the safe operation of a MELAG steam sterilizer over its entire lifetime; the operator/employer should use it, unless legal or branch-specific regulations require other inspections and inspection intervals.



NOTICE

The inspections described in these guidelines are to be carried out only by technicians trained by MELAG. MELAG will only provide authorised MELAG technicians with regular training in the performance of the inspections outlined in this document. Exceptions are the daily visual inspections of the device which are to be performed by the operator/employer or user and the pressure resistance test.

2 Scope of application

This manufacturer recommendation applies to the following pressure equipment:

- Careclave 618
- Cliniclave 45, 45 M, 45 D, 45 MD
- Cliniclav 25
- DAC Premium Plus
- DAC Professional
- Euroklav 23 VS+, 29 VS+, 23 S+
- Euroklav 23V-S, 29V-S, 23-S, 29-S
- MELAtronic 15 EN, 17 EN, 23 EN, 15 EN+
- MELAtronic 15, 17, 23
- MELAquick 12, 12+, 12+ p
- Vacuclave 105, 118 (S), 123 (S), 305, 318, 323, 550
- SteriHero Beauty, Vet, Podo 18 (S), Vet 23 (S), Speed+
- Vacuklav 40 B+ (*Evolution*), 41 B+ (*Evolution*), 43 B+ (*Evolution*), 44 B+ (*Evolution*)
- Vacuklav 40-B, 41-B, 43-B, 44-B
- Vacuklav 23 B+, 24 B+, 24 BL+, 30 B+, 31 B+
- Vacuklav 23-B, 24-B, 24-B/L, 30-B, 31-B
- Vacuquick 13-B, 14-B
- Vacuвет 23 B+

3 Inspection intervals

Not everywhere in the world are there identical specifications for the inspections and inspection intervals of pressure systems. The operator/employer must determine the inspections and inspection intervals taking into account their hazard assessment and the laws, ordinances and regulations applicable at the installation site. This document specifies the following inspection intervals according to the MELAG risk evaluation for international operation. The respective national laws, ordinances and regulations of the individual countries may require other intervals and inspections. Special requirements of the German Industrial Safety Regulations (BetrSichV) are partly described in the footnotes.

Table 1: Overview of the inspections and inspection intervals to be complied with for the regular safety inspection

Interval	Check/inspection	Scope	Measure
Daily	Visual inspection by the user/operator/employer	Check for contamination or deposits in the chamber interior	Remove impurities or deposits in the chamber interior according to the user manual (e.g. with MELAG Chamber Protect).
		Inspection for obvious damage in the chamber interior e.g. tears and corrosion.	In case of abnormalities, inform the authorised technician
Annually	External inspection of the steam generator ¹⁾	Inspection of the steam generator safety components	Replacement of the damaged or worn pressure bearing parts
Every 2 years	Spring loaded safety valve replaced	Replacement of the spring loaded safety valve and seal, see Replacing of the spring loaded safety valve [▶ Page 5], by an authorised technician	
	External inspection ²⁾	External inspection, see External inspection [▶ Page 8], by an authorised technician	Replacement of the damaged or worn pressure bearing parts
First after 6 years then every 4 years ³⁾	Internal inspection ²⁾	Work, see Internal inspection [▶ Page 12], by an authorised technician	Replacement of the damaged or worn pressure bearing parts
After 15 years at the latest ^{4) 5)}	Replace all the pressure-bearing door components ²⁾	Work, see Replacement of the pressure bearing door components [▶ Page 22], by an authorised technician	Replace all the pressure-bearing door components
After 20 years at the latest ^{5) 6)}	Strength test ²⁾	Strength test, see Strength test [▶ Page 31]	Perform strength test
Every 25,000 sterilization cycles ⁷⁾	Internal inspection ²⁾	Work, see Internal inspection [▶ Page 12], especially inspection of highly stressed areas by authorised technician	Replacement of the damaged or worn pressure bearing parts If necessary, shut down the system

¹⁾ Only Cliniclave 45, 45 M, 45 D, 45 MD

²⁾ All devices except Vacuclave 105, 305, SteriHero Speed+, MELAquick 12, 12+, 12+ p

³⁾ Only Vacuclave 550 and Careclave 618 every 10 years

⁴⁾ Due to the maintenance interval, an earlier replacement may be more economical (e.g. after 14 years during maintenance).

⁵⁾ According to the German Industrial Safety Regulations (BetrSichV), a maximum inspection interval of 15 years applies to strength testing. The derivation of the maximum inspection interval for the strength test according to BetrSichV is described in the [Appendix](#) [▶ Page 35].

⁶⁾ Only Cliniclave 45, 45 M, 45 D, 45 MD: Strength test of steam generator and pressure vessel every 15 years.

⁷⁾ Only Cliniclave 45, 45 M, 45 D, 45 MD: every 44,500 sterilization cycles.
Careclave 618 only: every 56,000 sterilization cycles.
Vacuclave 550 only: every 75,000 sterilization cycles.

4 Description of the inspections to be performed



PLEASE NOTE

The regular device safety inspections recommended here do not obviate the need for regular maintenance of your steam sterilizer. Always comply with any local/national and branch-specific prescriptions and laws pertaining to the operation of sterilizers.

4.1 Replacing of the spring loaded safety valve

Check the device for leaks after replacing the spring loaded safety valve. If available, perform a vacuum test and then a test run.

For device type:

- Careclave 618
- Vacuclave 105, 118 (S), 123 (S), 305, 318, 323, 550
- SteriHero Beauty, Vet, Podo 18 (S), Vet 23 (S), Speed+
- Vacuklav 40 B+ (*Evolution*), 41 B+ (*Evolution*), 43 B+ (*Evolution*), 44 B+ (*Evolution*)
- DAC Premium Plus

Replace the spring loaded safety valves on the housing rear wall against two newly-adjusted spring loaded safety valves.

Installation and torque are described in the instruction manual supplied with the spring loaded safety valve.

Spare parts	Art. no.
Spring loaded safety valve for Premium-Plus-Class Evolution/DAC Premium Plus (3 bar)	ME83145
Spring loaded safety valve with FKM seal Vacuclave 118/318 (2.35 bar, Japan)	ME20950
Spring loaded safety valve with plastic seal (2.7 bar) for Careclave 618; Vacuclave 105, 118 (S), 123 (S), 305, 318, 323, 550; SteriHero Beauty, Vet, Podo 18 (S), Vet 23 (S), Speed+; Vacuklav 40 B+ (<i>Evolution</i>), 41 B+ (<i>Evolution</i>)	ME83148



Art. no. ME20950, ME83145, ME83148

For device type:

- Vacuklav 40 B+, 41 B+, 43 B+, 44 B+
- Vacuklav 40-B, 41-B, 43-B, 44-B
- Vacuquick 13-B, 14-B
- Vacuklav 23 B+, 24 B+, 24 BL+, 30 B+, 31 B+
- Vacuvel 23 B+
- Vacuklav 23-B, 24-B, 24-B/L, 30-B, 31-B
- Euroklav 23 VS+, 29 VS+, 23 S+
- Euroklav 23V-S, 29V-S, 23-S, 29-S
- MELAtronic 15 EN, 17 EN, 23 EN, 15 EN+
- MELAquick 12+, 12+ p
- DAC Professional

Replace the spring loaded safety valve on the housing rear wall against a newly-adjusted spring loaded safety valve. Depending on the device type, the spring loaded safety valve can also be installed in the internal storage tank.

Installation and torque are described in the instruction manual supplied with the spring loaded safety valve.



PLEASE NOTE

To facilitate subsequent dismantling of stand-alone Pro-Class devices with the serial numbers SN 0723-B3001 to SN 1223-B1231 and SN 0731-B3001 to SN 1231-B1561 you can swap the short bracket for the spring loaded safety valve with a long bracket (Bracket screw connection for spring loaded safety valve 23-B/31-B, 23 B+/31 B+, complete, art. no. ME38505) as required.

This prevents damage of the bracket when changing the spring loaded safety valve.

Spare parts	Art. no.
Spring loaded safety valve (3 bar) Vacuvel 23 B+/DAC Professional	ME20944
Spring loaded safety valve with plastic seal (2.7 bar)	ME83148
Spring loaded safety valve for MELAtronic/MELAtronic EN (for MELAtronic 17 from SN 0317E1244, for MELAtronic 23 from SN 0323-E1203)	ME20946
Spring loaded safety valve with Cu seal 31 B+/29 VS+ (Japan)	ME20949



Art. no. ME20944, ME20949



Art. no. ME83148



Art. no. ME20946

For device type:

- Cliniclave 45/45 M
- Cliniclave 45 D/45 MD

Due to their design, it is not necessary to replace the spring loaded safety valves. Instead, they require an annual inspection within the scope of the maintenance. Replacement is required only following a malfunction.

Spare parts	Art. no.
Spring loaded safety valve for steam generator, Cliniclave 45/45 M (2.7 bar)	ME70525
Spring loaded safety valve for chamber Cliniclave Cliniclave 45/45 M	ME70526
Spring loaded safety valve C45D/C45MD (2.7 bar)	ME70527



Art. no. ME70525



Art. no. ME70526



Art. no. ME70527

With the device type:

- Cliniklav 25

Replace the spring loaded safety valve on the housing rear wall against a newly-adjusted spring loaded safety valve.

Spare parts	Art. no.
Spring loaded safety valve for Cliniklav 25, 2.45 bar	ME24105



Art. no. ME24105

4.2 Adjusting the spring safety valve

With the device type:

- MELAquick 12

Adjust the spring-loaded safety valve according to the separate instructions (doc. JA_001-10). MELAG recommends replacing the spring and ball of the safety valve every 2 years.

Spare parts	Art. no.
MELAquick 12 safety valve ball	ME30720
Spring for MELAquick 12 SS valve ball	ME34230

Check the device for leaks after adjusting the spring-loaded safety valve. Then perform a test run as a control.

4.3 Internal and external inspection

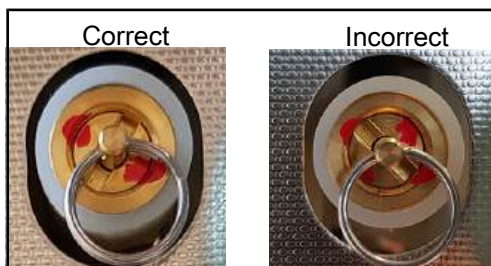
We differentiate between an internal and an external inspections. ¹⁾ The device cover and door panel must be removed in order to conduct the internal and external inspections. The chamber insulation need not be removed.

Inspections which are already carried out during maintenance are labelled “^{M)}” [Maintenance instructions] in the following.

4.3.1 External inspection

The external inspection consists of the following individual inspections:

- Detection of leakage, discolouration or corrosion from the outside
- Safe discharge of media from the spring loaded safety valves
- Inspection of all hoses, see [Checking all the hoses](#) [▶ Page 8]^{M)}
- Inspection of pressure bearing door components, see [Inspection of the pressure bearing door components](#) [▶ Page 9]^{M)}
- Check if paint dots of spring loaded safety valves are correct²⁾:



For device type:

- Cliniclave 45, 45 M, 45 D, 45 MD
 - In addition, the inspection of the safety components of the steam generator is carried out with the inspection of the safety valves according to the maintenance instructions.

4.3.1.1 Checking all the hoses

1. Check all hoses in the interior of the steam sterilizer for damage or abrasion following vibration. Check that they are all in the correct position.^{M)}
2. Replace damaged hoses.^{M)}
3. Check for limescale and water residue in the steam sterilizer and point out any leaking hose connections.^{M)}
4. Check that all hose screw connections are tight. Tighten any loose hose screw connections by hand and then with an open-end wrench (max. 1/2 revolution).^{M)}

¹⁾ If in doubt, MELAG recommends performing these inspections with suitable procedures for weld joints.

²⁾ except for Cliniclave 45, 45 M, 45 D, 45 MD and Cliniclav 25

4.3.1.2 Inspection of the pressure bearing door components



PLEASE NOTE

All torque, calibration, door contact switch settings etc. must be checked. Detailed information for each device type is specified in the maintenance and adjustment instructions.

1. Check all the pressure bearing door components for corrosion, material damage and wear. Check all areas around the hinges, especially the door bars for permissible level of play.^{M1)}
2. Check all locking elements (snap ring, holding screws, grub screws etc.) for stability and full functionality.^{M1)}
3. Check the fixing screws of the hinge brackets, hinge blocks and hinges for the prescribed torque and tighten if necessary.^{M1)}
4. Check the round blanks and doors for grooving and deformation. Check the door seal for damage (wear and material fatigue).^{M1)}
5. Check all threads on the door lock for damage (no mechanical damage) permissible play and ease of movement.^{M1)}
6. Check the contact pressure / the permissible clearance of the door / round blank to the seal face.^{M1)}
7. Check all the components of the electromagnetic door locks (e.g. ball bearing, motor shaft etc.).^{M1)}
8. Check that the components requiring lubrication have the correct and sufficient lubrication.^{M1)}
9. Check the door locking elements and contacts/final position switches for their full functionality.^{M1)}

4.3.1.3 Specific inspection specifications for the door and locking elements

For device type:

- Careclave 618

1. With the door slightly ajar (setting without door panel), measure the distance between door bar and lower edge of the display in its "hanging" and "lifted" condition. The difference may amount to max. 5 mm.
2. Check whether the locking spindle locks cleanly into the door lock nut.
3. Check the lock nut for wear with a test gauge (art. no. ME27522).^{M1)}
4. Adjust the distance and the contact pressure of the door bar.^{M1)}
5. Check the door contact switch 1 and 2 for their faultless function and adjust in accordance with the maintenance instructions if necessary.

For device type:

- Vacuclave 550

1. Check whether the locking spindle locks cleanly into the door lock nut. If necessary, adjust according to maintenance instructions.
2. Check the lock nut for wear with a test gauge (art. no. ME27521).^{M1)}
3. Adjust the distance and the contact pressure of the door bar.^{M1)}
4. Check the door contact switch 1 and 2 for their faultless function and adjust in accordance with the maintenance instructions if necessary.

For device type:

- Vacuclave 118 (S), 123 (S), 318, 323
 - SteriHero Beauty, Vet, Podo 18 (S), Vet 23 (S)
1. Check the snap rings on the door hinge and locking pin for presence and correct fit.^{M1)}
 2. Check the locking mechanism for wear. There must be no grooves, scores or flattening in the critical areas of the latch and locking pin.^{M1)}
 3. Check all pressure-bearing door components for wear and hinge blocks for wear, abrasion and damage.
 4. Check the door handle ensure that it is firmly seated.^{M1)}
 5. Check the electrical door locking mechanism for ease of movement (press in flush on the front plate). The distance between the locking pin (face) and front plate must be 5 ± 1 mm.^{M1)}
 6. Regrease the locking pin if necessary. This must be able to be turned by hand and must not jam in the locking blocks.^{M1)}
 7. Check the ease of movement of the locking pin on closing the door. It must not be possible to open the door when it is locked.
 8. Check the adjustment of the door contact switch (17 to 18 mm between the front plate and face of the locking pin).^{M1)}
 9. Door opening test in locked condition (no door contact switch switching signal).^{M1)}
 10. Check the gap between the latch and the locking block. The distance must be min. 1 mm.^{M1)}
 11. Retighten the hinge and locking blocks to 20 Nm.^{M1)}

For device type:

- Vacuklav 40 B+ (*Evolution*), 41 B+ (*Evolution*), 43 B+ (*Evolution*), 44 B+ (*Evolution*)
 - Vacuklav 40-B, 41-B, 43-B, 44-B
 - Vacuquick 13-B, 14-B
 - DAC Premium Plus
1. With the door slightly ajar (setting without door panel), measure the distance between door bar and lower edge of the display in its "hanging" and "lifted" condition. The difference may amount to max. 5 mm.
 2. Check whether the locking spindle locks cleanly into the door lock nut.
 3. Check the lock nut for wear with a test gauge (art. no. ME27522)^{3), M1)}
 4. Adjust the distance and the contact pressure of the round blank.^{M1)}
 5. Check door contact switch 1 and 2 for their faultless function and adjust in accordance with the maintenance instructions if necessary.
 6. Re-tighten the fixing screws with a torque of 45 Nm.

For device type:

- Vacuklav 23 B+, 24 B+, 24 BL+, 30 B+, 31 B+
 - Vacuclav 23 B+
 - Vacuklav 23-B, 24-B, 24-B/L, 30-B, 31-B
 - Euroklav 23 VS+, 29 VS+, 23 S+
 - Euroklav 23V-S, 29V-S, 23-S, 29-S
 - DAC Professional
1. With devices up to and including year of construction 2006, check whether the locking pins and lock slider correspond to the latest series production status. Otherwise, these components must be replaced. After being replaced, the door locking mechanism and the door contacts must be reset.
 2. Check the door bar of the device for permissible play (measurement between the upper door bar and the upper locking hinge). The permissible play lies between 0.5 and 1.5 mm.
 3. Re-tighten the fixing screws for the hinge and locking hinge with a torque of 25 Nm.
 4. Check whether the locking pins only lock if the lower edge of the locking section lies 1 to 2 mm under the locking pin.
 5. Re-tighten collar-tightening screws from the chamber collar with a torque of 12 Nm.

³⁾except Vacuquick 13-B, 14-B

For device type:

- MELAtronic 15 EN+
 - MELAtronic 15 EN, 17 EN, 23 EN
 - MELAtronic 15, 17, 23
1. Check the hinge bar for its faultless function. The locking cavity on the hinge bar may not be permitted to become worn.
 2. Check the door for permissible play on the hinge bar. The play may not exceed 3 mm.
 3. Check whether the locking pin locks securely in the door twist grip.
 4. Re-tighten the fixing screws for the hinge and hinge block with a torque of 55 Nm.
 5. Depending on the device type, secure the nuts for securing the round blank with Loctite or a nut.

For device type:

- Cliniclave 45, 45 M, 45 D, 45 MD

**NOTICE**

Due to their function as safety-relevant components, the door lock nut must be changed regularly every 3 years.

1. Check the holding screw fixing the round blank for tight fit.
2. Check the snap rings on the hinge pins for damage and correct position. Always replace the snap ring when replacing the hinge pin.
3. Check the adjustment of the electromagnetic door lock and all locking components in accordance with the separate instructions:
 - Setting the door bar (doc. JA_007-13)
 - Setting the round blank of the door (doc. JA_008-13)
 - Setting the roller chain (doc. JA_006-13)
4. Check for the correct position of the split pin in the hinge block, the spindle nut/locking spindle and the door lock nut. Replace all defective components.
5. Check the lock nut for wear with a test gauge (art. no. ME27521).^{M1)}
6. Tighten the hinge nut with a torque of 370 Nm.
7. Re-tighten the lock nut for the hinge nut with a torque of 180 Nm.

For device type:

- Kliniklav 25

**NOTICE**

Due to their function as safety-relevant components, the door lock nuts must be changed regularly every 4 years.

1. Check the door and its locking components as well as the electromagnetic door lock for correct play, adjustment and dimensional accuracy in accordance with the maintenance and adjustment instructions.
2. Check the lock nut for wear with a test gauge (art. no. ME27521).^{M1)}
3. Check the drillholes for the hinge pins on the door and the door lock nut for damage. Replace the door if you find any damage.
4. Check the door for permissible play. The permissible play may not exceed 3 mm.
5. Check the pressure switch of the door locking mechanism for its faultless function (0.2 bar).
6. Re-tighten the hinge block retaining nuts with a torque of 80 Nm.

4.3.2 Internal inspection

The internal inspection consists of the following individual inspections depending on the device version:

1. Chamber inspection for all steam sterilizers
2. Steam generator inspection
3. Console inspection
4. Chamber collar inspection
5. Inspection of highly stressed areas

4.3.2.1 Chamber inspection for all steam sterilizers

The chamber must be clean in order to detect damages, malfunctions etc. All encrusted and deposited material must be entirely removed. This should be done as gently as possible and can be done, for example, with the help of stainless steel cleaning agents (e.g. with MELAG Chamber Protect). Remove all cleaning fluid residue.⁴⁾

1. The chamber is to be examined on the inside for surface corrosion, fissure corrosion and pitting corrosion.
2. Check the longitudinal weld seam of the chamber, the circumferential weld seam on the bumped boiler end and the joint of both seams for damage and irregularities.
3. Check that the weld-on sockets and their threads (if present) in the chamber interior are not damaged.
4. Check the chamber sealing surface and the flange radius for damage.

⁴⁾For Cliniclave 45, 45 M, 45 D, 45 MD, the scratch guard must be removed so that the complete chamber can be seen.

4.3.2.2 Steam generator inspection for steam sterilizers with screw-in tubular heating element

For device type:

- Careclave 618
- Cliniclave 45, 45 M, 45 D, 45 MD
- DAC Premium Plus
- Vacuclave 550
- Vacuklav 40 B+ (*Evolution*), 41 B+ (*Evolution*), 43 B+ (*Evolution*), 44 B+ (*Evolution*)
- Vacuklav 40-B, 41-B, 43-B, 44-B
- Vacuquick 13-B, 14-B

Remove the tubular heating element according to the separate instructions (doc. AS_015-08) and check the interior of the double jacket for abnormal deposits and corrosion. Black deposits on the tubular heating element and in the double jacket are normal and harmless-⁵⁾

After each removal of the tubular heating element, the O-ring (seal of the tubular heating element) must be replaced according to separate instructions (doc. AS_015-08).

Inspection of the double jacket for deposits and corrosion



⁵⁾ The inspection is ideally carried out together with the replacement of the O-ring according to the maintenance instructions, if this is provided for the device.

4.3.2.3 Console inspection for steam sterilizers with chamber consoles

For device type:

- Cliniclav 25
 - MELAtronic 15 EN, 17 EN, 23 EN and 15 EN+
 - MELAtronic 15, 17, 23
 - Vacuquick 13-B, 14-B
1. With devices with chamber insulation in the chamber console areas, expose the console weld seams c. 5 cm. Cut into the chamber insulation with a Stanley knife and open the insulation.
 2. Check the console weld seam for damage. The weld seam may not present any cracks, craters or other surface blemishes.
 3. Perform a visual inspection of the chamber console geometry for deformation, form alteration and cracks.
 4. Then return and secure the insulation.

For device type:

- Cliniclave 45 (from serial number 2016C451030) and Cliniclave 45 M
- Cliniclave 45 D and Cliniclave 45 MD

Exposed areas in the form of six small circles in the chamber insulation in the area of the chamber consoles are intended for the Cliniclave 45 (from serial number 2016C451030) and all Cliniclave 45 M. The Cliniclave 45 D and 45 MD must be checked on both sides.

- ▶ Make incisions with a Stanley knife to connect these exposed areas into a rectangle (see adjacent figure) and remove the insulation from both locations. To do so, remove the air gap from the right-hand side of the steam sterilizer in accordance with a separate instructions and disconnect the vacuum pump plug.

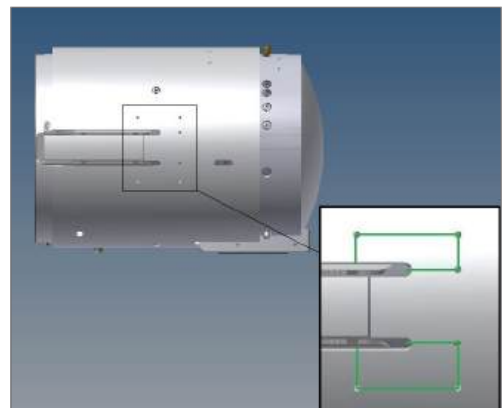


Fig. 1: Cutting the chamber insulation free (Cliniclave 45)

For device type:

- Cliniclave 45 (to serial number 2016C451030)

Devices up to serial number 2016C451030 either do not have any exposed areas (small circles) in the chamber insulation or have other exposed areas in the insulation.

1. Cut out a corner from the insulation (see green line in fig. 1 detail) with a Stanley knife. To do so, remove the air gap from the right-hand side of the steam sterilizer in accordance with a separate instructions and disconnect the vacuum pump plug.

2. Check the weld seams of the console drains under the insulation for cracks, craters or other surface blemishes. The round drain zones are areas of high tension and are therefore a critical point.

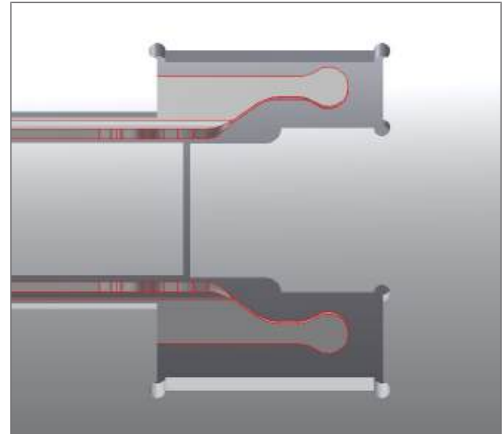


Fig. 2: Chamber console drain

3. Check the two drain zones on the other side of the steam sterilizer.
4. Then return the insulation.
5. Check the chamber console geometry for deformation, form alteration and cracks.

4.3.2.4 Chamber collar inspection for steam sterilizers with chamber collar

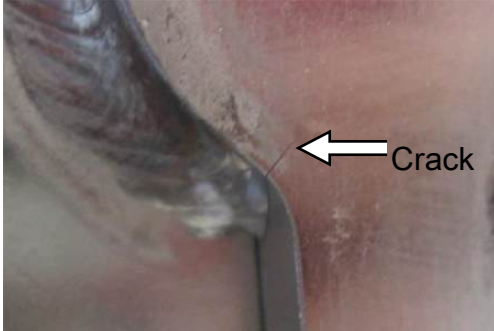
For device type:

- DAC Professional
 - Euroklav 23 VS+, 29 VS+, 23 S+
 - Euroklav 23V-S, 29V-S, 23-S, 29-S
 - Vacuklav 23 B+, 24 B+, 24 BL+, 30 B+, 31 B+
 - Vacuklav 23-B, 24-B, 24-B/L, 30-B, 31-B
 - Vacuvet 23 B+
- ▶ Check the chamber collar for deformation, form change, cracks and other damage. Pay especial attention to the areas of the radii for cracks.

4.3.2.5 Inspection of highly stressed areas

The device cover and door panel must be removed in order to conduct the inspection of highly stressed areas. MELAG recommends the use of a torch for easier crack detection.

The inspections must be carried out at the latest when the respective sterilization cycles mentioned are reached. If the sterilization cycles mentioned are not reached by the next internal inspection, no inspection is required.


Inspection interval	Example of a crack on the hinge bracket
75,000 sterilization cycles (fatigue test on a prototype after 75,000 sterilization cycles)	

The following highly stressed points were identified in the design calculation due to the alternating stress. The highly stressed points are therefore to be checked for cracks by means of direct visual inspection.

Only points with an inspection interval of less than 100,000 sterilization cycles are indicated. In case of longer operation, MELAG must be contacted.


For device type:

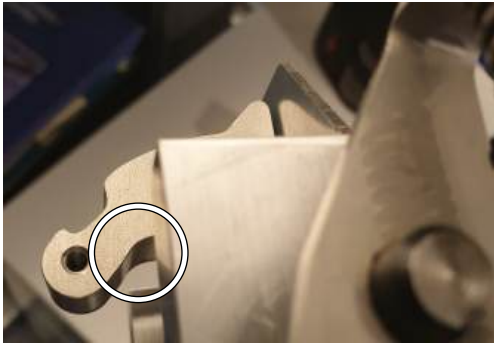
- Careclave 618


Inspection interval	Hinge bracket
<p>56,000 sterilization cycles (especially next to the seam on the chamber and bracket plate)</p>	<div style="text-align: center;">  </div> <p>The inspection is also carried out on the opposite weld seam (below).</p>

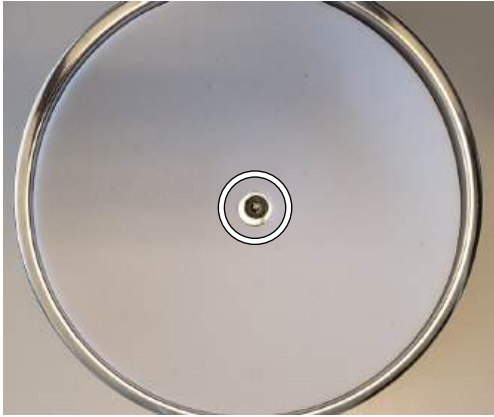
For device type:

- Vacuclave 118 (S), 123 (S) 318, 323
- SteriHero Beauty, Vet, Podo 18 (S), Vet 23 (S)

Inspection interval	Chamber radius
<p>25,000 sterilization cycles</p>	<div style="text-align: center;">  </div>

Inspection interval	Latch
<p>30,000 sterilization cycles (inspection of top, bottom and side surfaces)</p>	<div style="text-align: center;">  </div>

Inspection interval	Door bar centre
55,000 sterilization cycles	
Inspection interval	Bolt door handle at the hole for the dowel pin circumferentially in the marked area
60,000 sterilization cycles	
Inspection interval	Chamber collar on the closure side
77,500 sterilization cycles	


Inspection interval	Pressure plate at the centre hole
120,000 sterilization cycles	


For device type:

- DAC Premium Plus
- Vacuklav 40 B+ (*Evolution*), 41 B+ (*Evolution*), 43 B+ (*Evolution*), 44 B+ (*Evolution*)
- Vacuklav 40-B, 41-B, 43-B, 44-B

The inspections must be performed recurrently every 25,000 sterilization cycles. If 25,000 sterilization cycles are not reached by the next internal inspection, no inspection is required.

The double jacket should be heated. The door must be in a pressure-tight condition so that the construction is pre-stressed and cracks can be detected more easily (except when inspecting the hinge).

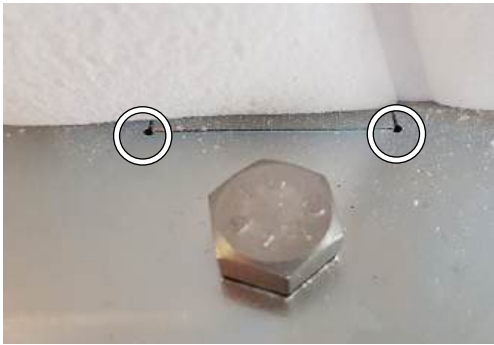
Inspection interval	Hinge bracket (top)
25,000 sterilization cycles	 <p data-bbox="815 1400 1262 1429">Fatigue-critical point on the hinge bracket</p>

Inspection interval	Hinge
25,000 sterilization cycles	 <p data-bbox="804 815 1273 846">Fatigue-critical points on the hinge (outside)</p> <p data-bbox="772 1211 1305 1243">Fatigue-critical points on the hinge (chamber side)</p>



PLEASE NOTE

Cracks generally occur next to the weld seam.

Inspection interval	Door bar on the pressure piece (from above)
25,000 sterilization cycles	 <p data-bbox="839 1809 1238 1841">Fatigue-critical points on the door bar</p>

Inspection interval	Door bar on the pressure piece (from below)
25,000 sterilization cycles	 <p data-bbox="839 589 1238 613">Fatigue-critical points on the door bar</p>

For device type:

- Vacuclave 550


Hinge bracket (top)

1. Carefully cut the insulation with the cutter knife.
2. Check for cracks next to the weld seam on the chamber plate.

Inspection interval	Hinge bracket (top)
75,000 sterilization cycles	


Pressure piece

- ▶ Check the pressure piece at all four corners.

Inspection interval	Pressure piece
75,000 sterilization cycles	

Round blank under the test connection piece

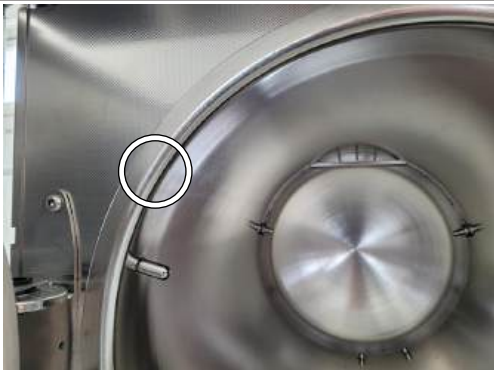
- ▶ Loosen the nut (AF30) and check the marked areas.

Inspection interval	Round blank under the test connection piece
75,000 sterilization cycles	

For device type:

- Cliniclave 45, 45M, 45D, 45MD

Chamber radius at the height of the longitudinal weld seam

Inspection interval	Chamber radius at the height of the longitudinal weld seam
44,500 sterilization cycles	

4.4 Replacement of the pressure bearing door components

4.4.1 List of spare parts for the replacement of the pressure bearing door components

When replacing the pressure-bearing door components, make use of the specially drawn up spare parts sets. These can be used separately for the replacement of individual door components (e.g. hinge forks, locking latch etc.) or together, for the replacement of all the door components. The spare parts sets presented on the following pages are grouped by device.

The replacement intervals are outlined in section [Inspection intervals](#) [▶ Page 4].

For device type:

- Careclave 618



PLEASE NOTE

When selecting your required parts, please note that the door lock nut (art. no. ME70206) and the hinge (art. no. ME70204) are already included in the complete assembly of the door bar (art. no. ME70203) and do not have to be ordered separately.

For the door lock spindle, you can choose whether you want to replace only the door spindle (art. no. ME70208) or the complete assembly of the door spindle including the door motor (art. no. ME70205).

Description	Art. no.	Description	Art. no.
Door beam complete for Careclave 618	ME70203	Door locking nut with spring/washers for Careclave 618	ME70206
Door hinge complete with bolts for Careclave 618	ME70204	Door round with gasket Careclave	ME70207
Door locking complete for Careclave 618	ME70205	Door locking spindle Careclave	ME70208

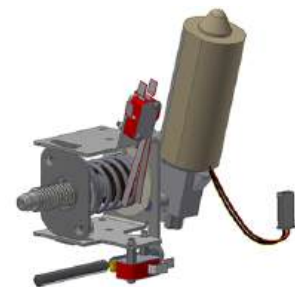
Example fig.:



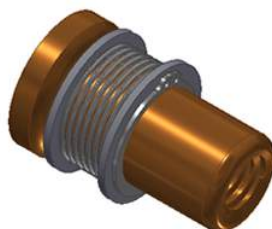
ME70203



ME70204



ME70205



ME70206



ME70207



ME70208

For device type:

- DAC Premium Plus
- Vacuklav 40 B+ (*Evolution*), 41 B+ (*Evolution*), 43 B+ (*Evolution*), 44 B+ (*Evolution*)
- Vacuklav 40-B, 41-B, 43-B, 44-B
- Vacuquick 13-B, 14-B

Description	Art. no.	Description	Art. no.
Door hinge complete with bolts, screws Vacuquick	ME70234	Door hinge complete with bolt, screws for Premium-Class	ME70239
Door beam complete for Vacuquick 13-B/14-B	ME70235	Door beam complete for Vacuklav 40's series	ME70240
Door locking nut with spring, washers for Vacuquick (A)	ME70236	Door lock nut with spring, discs for Vacuklav 40 series	ME70241
Door locking spindle complete for Vacuquick (A)	ME70237	Locking spindle with spring, ball bearing for 40 series	ME70242
Round blank complete with seal for Vacuquick	ME70238	Round blank with seal for Vacuklav 40 series	ME70243

Example fig.:



ME70234



ME70235



ME70236



ME70237



ME70238



ME70239



ME70240



ME70241



ME70242



ME70243

For device type:

- DAC Professional
- Euroklav 23 VS+, 29 VS+, 23 S+
- Euroklav 23V-S, 29V-S, 23-S, 29-S
- Vacuklav 23 B+, 24 B+, 24 BL+, 30 B+, 31 B+
- Vacuvel 23 B+
- Vacuklav 23-B, 24-B, 24-B/L, 30-B, 31-B

Description	Art. no.	Description	Art. no.
Door hinge with bolt and screws, Euroklav/Vacuklav/Vacuvel	ME70228	Door locking slide complete for Euroklav/Vacuklav	ME70231
Door beam complete for Euroklav/Vacuklav/Vacuvel	ME70229	Door locking slide complete for S-Class/Pro-Class/Vacuvel	ME70232
Door locking latch complete for Euroklav/Vacuklav/Vacuvel	ME70230	Door rond complete with gasket for Euroklav/Vacuklav/Vacuvel	ME70233

Example fig.:



ME70228

ME70229

ME70230



ME70231

ME70232

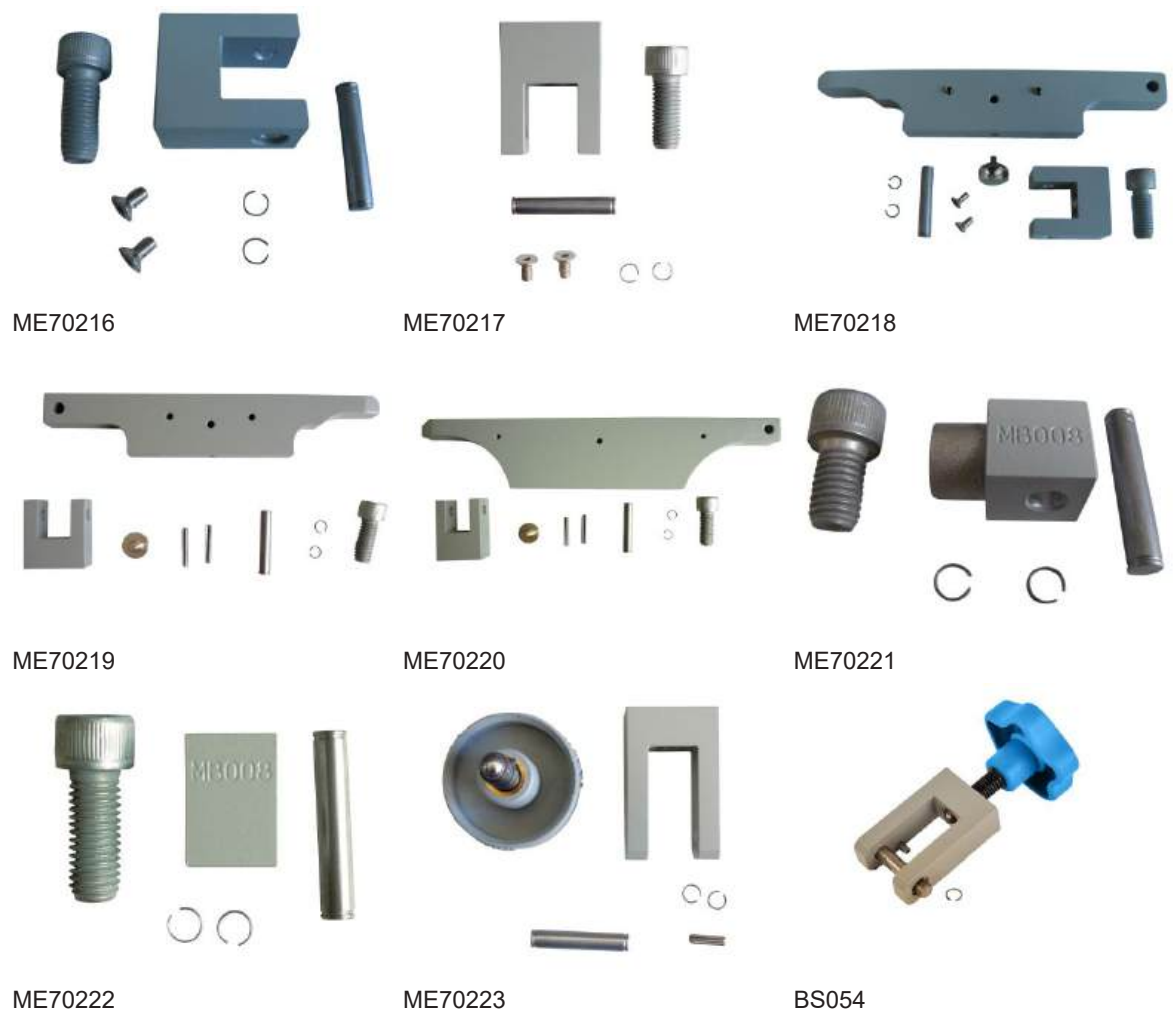
ME70233

For device type:

- MELAtronic 15 EN+
- MELAtronic 15 EN, 17 EN, 23 EN
- MELAtronic 15, 17, 23

Description	Art. no.	Description	Art. no.
Door hinge complete for MT15/ MT17/15EN/17EN/15 EN+	ME70216	Door locking block with bolt and screw, MT23/23EN	ME70222
Door hinge with bolt and screws, MT23/23EN	ME70217	Door grip with locking latch, bolt and screw, MT15/17/23 MT17 from SN 0317-E1161 MT23 from SN 0323-E1181	ME70223
Door beam with hinge, bolt and screws, MT15/15EN/15 EN+	ME70218	Door grip with locking latch, MT15EN/ 17EN/23EN/15 EN+	ME70225
Door beam with hinge, bolt and screws, MT17/17EN	ME70219	Door with gasket for MELAtronic 15/15EN/15 EN+	ME70226
Door beam with hinge, bolt and screws, MT23/23EN	ME70220	Door with gasket for MELAtronic 23/23EN	ME70227
Door locking block complete of MT15/ MT17/15EN/17EN/15 EN+	ME70221	--	--

Example fig.:





ME70225



ME70226



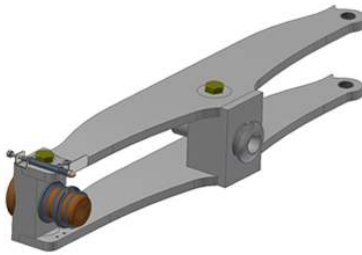
ME70227

For device type:

- Vacuclave 550

Description	Art. no.	Description	Art. no.
Door beam complete	ME70210	Door locking nut with spring and discs	ME70213
Locking spindle complete	ME70211	Door plate complete with gasket	ME70214
Bolts with clamp lock	ME70212	--	--

Example fig.:



ME70210



ME70211



ME70212



ME70213



ME70214

For device type:

- Vacuclave 118 (S), 123 (S), 318, 323
- SteriHero Beauty, Vet, Podo 18 (S), Vet 23 (S)

Description	Art. no.	Description	Art. no.
Door beam with bolt	ME70253	Door round Vacuclave	ME70256
Door locking latch with tension pin	ME70254	Hinge blocks	ME70257
Bolt for door handle	ME70255	Door locking blocks	ME70258

Example fig.:



ME70253



ME70254



ME70255



ME70256



ME70257



ME70258

For device type:

- Cliniklav 25

Description	Art. no.	Description	Art. no.
Door hinge with bolts and screws, complete, Cliniklav 25	ME70244	Door locking nut with cogwheel, washers, bearing for Cliniklav 25	ME70201
Door with hinge, bolts, nuts and insulation of Cliniklav 25	ME70245	Door locking spindle complete with spring for Cliniklav 25	ME70202

Example fig.:



ME70244

ME70245

ME70201



ME70202

For device type:

- Cliniclave 45, 45 M, 45 D, 45 MD

Description	Art. no.	Description	Art. no.
Door hinge with bolts and screws for Cliniclave	ME70246	Door locking nut (complete) for Cliniclave 45/45 M/45 D/45 MD	ME70249
Door beam for Cliniclave 45/45 M/45 D/45 MD (door hinge left)	ME70247	Door locking spindle complete for Cliniclave 45/45 M/45 D/45 MD	ME70250
Door beam for Cliniclave 45/45 M/45 D/45 MD (door hinge right)	ME70248	Door rond for Cliniclave 45/45 M/45 D/45 MD	ME70251

Example fig.:



ME70246

ME70247

ME70248



ME70249



ME70250



ME70251

4.4.2 List of spare parts sets for the replacement of all pressure-bearing door components



PLEASE NOTE

In the case of devices where all pressure-bearing door components are no longer available, complete replacement is not possible.

Device type	Designation	Art. no.
MELAtronic 15	Door beam with hinge, bolt and screws, MT15/15EN/15 EN+	ME70218
	Door locking block complete of MT15/MT17/15EN/17EN/15 EN+	ME70221
	Door grip with locking latch, bolt and screw, MT15/17/23	ME70223
	Door with gasket for MELAtronic 15/15EN/15 EN+	ME70226
MELAtronic 17	Door beam with hinge, bolt and screws, MT17/17EN	ME70219
	Door locking block complete of MT15/MT17/15EN/17EN/15 EN+	ME70221
	Door grip with locking latch, bolt and screw, MT15/17/23	ME70223
	Door with seal for MELAtronic 17/17EN	N/A
MELAtronic 23	Door beam with hinge, bolt and screws, MT23/23EN	ME70220
	Door locking block with bolt and screw, MT23/23EN	ME70222
	Door grip with locking latch, bolt and screw, MT15/17/23	ME70223
	Door with gasket for MELAtronic 23/23EN	ME70227
MELAtronic 15 EN, 15 EN+	Door beam with hinge, bolt and screws, MT15/15EN/15 EN+	ME70218
	Door locking block complete of MT15/MT17/15EN/17EN/15 EN+	ME70221
	Door grip with locking latch, MT15EN/17EN/23EN/15 EN+	ME70225
	Door with gasket for MELAtronic 15/15EN/15 EN+	ME70226
MELAtronic 17 EN	Door beam with hinge, bolt and screws, MT17/17EN	ME70219
	Door locking block complete of MT15/MT17/15EN/17EN/15 EN+	ME70221
	Door grip with locking latch, MT15EN/17EN/23EN/15 EN+	ME70225
	Door with seal for MELAtronic 17/17EN	N/A
MELAtronic 23 EN	Door beam with hinge, bolt and screws, MT23/23EN	ME70220
	Door locking block with bolt and screw, MT23/23EN	ME70222
	Door grip with locking latch, MT15EN/17EN/23EN/15 EN+	ME70225
	Door with gasket for MELAtronic 23/23EN	ME70227
Euroklav 29-S, 29V-S, 23-S, 23V-S	Door hinge with bolt and screws, Euroklav/Vacuklav	ME70228
	Door beam complete for Euroklav/Vacuklav	ME70229
	Door locking latch complete for Euroklav/Vacuklav	ME70230
	Door locking slide complete for Euroklav/Vacuklav	ME70231
	Door rond complete with gasket for Euroklav/Vacuklav	ME70233

Device type	Designation	Art. no.
Vacuklav 23-B, 24-B, 24-B/L, 30-B, 31-B	Door hinge with bolt and screws, Euroklav/Vacuklav	ME70228
	Door beam complete for Euroklav/Vacuklav	ME70229
	Door locking latch complete for Euroklav/Vacuklav	ME70230
	Door locking slide complete for Euroklav/Vacuklav	ME70231
	Door rond complete with gasket for Euroklav/Vacuklav	ME70233
Euroklav 23 S+, 23 VS+, 29 VS+	Door hinge with bolt and screws, Euroklav/Vacuklav	ME70228
	Door beam complete for Euroklav/Vacuklav	ME70229
	Door locking latch complete for Euroklav/Vacuklav	ME70230
	Door locking slide complete for S-Class/Pro-Class	ME70232
	Door rond complete with gasket for Euroklav/Vacuklav	ME70233
Vacuklav 23 B+, 24 B+, 24 B/L+, 30 B+, 31 B+ Vacuvet 23 B+ DAC Professional	Door hinge with bolt and screws, Euroklav/Vacuklav	ME70228
	Door beam complete for Euroklav/Vacuklav	ME70229
	Door locking latch complete for Euroklav/Vacuklav	ME70230
	Door locking slide complete for S-Class/Pro-Class	ME70232
	Door rond complete with gasket for Euroklav/Vacuklav	ME70233
Vacuquick 13-B und 14-B	Door hinge complete with bolts, screws Vacuquick	ME70234
	Door beam complete for Vacuquick 13-B/14-B	ME70235
	Door locking spindle complete for Vacuquick (A)	ME70237
	Round blank complete with seal for Vacuquick	ME70238
Vacuklav 40-B, 41-B, 43-B, 44-B Vacuklav 40 B+ (Evolution), 41 B+ (Evolution), 43 B+ (Evolution), 44 B+ (Evolution) DAC Premium Plus	Door hinge complete with bolt, screws for Premium-Class	ME70239
	Door beam complete for Vacuklav 40's series	ME70240
	Locking spindle with spring, ball bearing for 40 series	ME70242
	Round blank with seal for Vacuklav 40 series	ME70243
Careclave 618	Door beam complete for Careclave 618	ME70203
	Door hinge complete with bolts for Careclave 618	ME70204
	Door locking complete for Careclave 618	ME70205
	Door locking nut with spring/washers for Careclave 618	ME70206
	Door round with gasket Careclave	ME70207
	Door locking spindle Careclave	ME70208
Cliniklav 25	Door with hinge, bolts, nuts and insulation of Kliniklav 25	ME70245
	Door locking nut with cogwheel, washers, bearing for Kliniklav 25	ME70201
	Door locking spindle complete with spring for Kliniklav 25	ME70202
Cliniclave 45, 45 M, door hinge left	Door hinge with bolts and screws for Cliniclave	ME70246
	Door beam for Cliniclave 45/45 M/45 D/45 MD (door hinge left)	ME70247
	Door locking nut (complete) for Cliniclave 45/45 M/45 D/45 MD	ME70249
	Door locking spindle complete for Cliniclave 45/45 M/45 D/45 MD	ME70250
	Door rond for Cliniclave 45/45 M/45 D/45 MD	ME70251
Cliniclave 45, 45 M, door hinge right	Door hinge with bolts and screws for Cliniclave	ME70246
	Door beam for Cliniclave 45/45 M/45 D/45 MD (door hinge right)	ME70248
	Door locking nut (complete) for Cliniclave 45/45 M/45 D/45 MD	ME70249
	Door locking spindle complete for Cliniclave 45/45 M/45 D/45 MD	ME70250
	Door rond for Cliniclave 45/45 M/45 D/45 MD	ME70251

Device type	Designation	Art. no.
Vacuclave 550	Door beam complete	ME70210
	Door plate complete with gasket	ME70211
	Bolts with clamp lock	ME70212
	Door locking nut with spring and discs	ME70213
	Door plate complete with gasket	ME70214
Vacuclave 118 (S), 123 (S), 318, 323 SteriHero Beauty, Vet, Podo 18 (S), Vet 23 (S)	Door beam with bolt	ME70253
	Door locking latch with tension pin	ME70254
	Bolt for door handle	ME70255
	Door round Vacuclave	ME70256
	Hinge blocks	ME70257
	Door locking blocks	ME70258

4.5 Strength test

The increased safety requirements mean that the strength test should not be performed at the installation location. Please consult MELAG given a pending strength test.

Certificate of inspection of a pressure system and its components

Type of inspection: External inspection of all system parts
 (multiple selection possible) Internal inspection of all system parts
 Inspection of the pressure system

Contact information

Company (name, address/stamp)	Operator/employer/operating site (name, address/stamp)
Customer number	Inventory number/reference
Order	Equipment number
	Location number

Device data

Manufacturer: MELAG Medizintechnik GmbH & Co. KG

Device name/type Serial number (device) Serial number (chamber name-plate)

------	------	------

Year of construction Status of total batch counter Intended use

------	------	------

Scope of inspection in accordance with manufacturer recommendation from MELAG

Document review				
Inspection of technical documents	<input type="radio"/>	Yes	<input type="radio"/>	No
Inspection of the intervals for the recurring inspections	<input type="radio"/>	Yes	<input type="radio"/>	No
Technical inspection (external inspection, inspection of the pressure system)				
Detection of leakage, discolouration or corrosion from the outside	<input type="radio"/>	Yes	<input type="radio"/>	No
Safe discharge of media from the spring-loaded safety valves	<input type="radio"/>	Yes	<input type="radio"/>	No
Inspection of hoses	<input type="radio"/>	Yes	<input type="radio"/>	No
Inspection of pressure-bearing door components	<input type="radio"/>	Yes	<input type="radio"/>	No
Inspection whether paint dots of the spring-loaded safety valves are correct	<input type="radio"/>	Yes	<input type="radio"/>	No
Inspection of highly stressed areas	<input type="radio"/>	Yes	<input type="radio"/>	No
Spring-loaded safety valve replaced	<input type="radio"/>	Yes	<input type="radio"/>	No

Technical inspection (Internal inspection)				
Internal condition (chamber)	<input type="radio"/>	Yes	<input type="radio"/>	No
Internal condition (steam generator)	<input type="radio"/>	Yes	<input type="radio"/>	No
Inspection of highly stressed areas or chamber collar/console inspection	<input type="radio"/>	Yes	<input type="radio"/>	No

An inspection was carried out in the pressure hazard area.

Result of the inspection

The inspection was completed.

Defects				
Defects present	<input type="radio"/>	Yes	<input type="radio"/>	No

The following defects were found:

Assessment				
Safe operation is expected until the next regular inspection.	<input type="radio"/>	Yes	<input type="radio"/>	No
No measures are required. The suitability of the technical and organisational protective measures as well as the functionality of the technical protective measures have been established.	<input type="radio"/>	Yes	<input type="radio"/>	No
Operation is permitted.	<input type="radio"/>	Yes	<input type="radio"/>	No

The following defects must be rectified before recommissioning:

Inspection intervals for the recurring inspections

The proposal is made on the basis of the inspection result.

External inspection

Periodic inspection of the pressure system

Current inspection due

Current inspection due

Inspection interval (months)

Inspection interval (months)

Next inspection due

Next inspection due

Internal inspection

Current inspection due

Inspection interval (months)

Next inspection due

Other comments:

--	--	--

Name (examiner)

Date of inspection

Inspection location

.....
Signature (examiner)

Appendix

Derivation of the testing responsibilities according to BetrSichV

The inspection intervals and inspection responsibilities from Annex 2, Section 4, Table 12, No. 7.28 of the German Industrial Safety Regulations (BetrSichV) apply to pressure vessels with quick-release fasteners.

For pressure equipment at risk of overheating, Annex 2, Section 5, No. 6 Table 2 must also be observed. For MELAG steam sterilizers, this results in the following inspection responsibilities:

MELAG steam sterilizers	All MELAG small steam sterilizers and Cliniklav 25	Cliniclave 45, 45 M, 45 D, 45 MD
Pressure litre product	≤ 200 bar x litre	> 200 bar x litre and ≤ 1000 bar x litre
Inspection before commissioning	For steam sterilizers with a pressure litre product ≤ 200 bar x litres, the inspection before commissioning may be carried out by a competent person in accordance with Table 2 and 4.	For steam sterilizers with a pressure litre product > 200 bar x litres and ≤ 1000 bar x litres, the inspection prior to commissioning may be carried out by a competent person if a sample test of the approved inspection body (ZÜS) independent of the installation location is available. For Cliniclave 45, 45 M, 45 D, 45 MD a sample test was carried out by the ZÜS.
Recurring inspections	The responsibility for inspection results from BetrSichV Annex 2, Section 4, No. 6, Table 2 (for the steam generator)/Table 4 (for the pressure vessel). For steam sterilizers with a pressure litre product of ≤ 1000 bar x litre, the inspection may be carried out by a competent person. This applies to all MELAG steam sterilizers.	

Derivation of the maximum inspection intervals according to BetrSichV

Pressure system:

Maximum inspection intervals for the pressure system (complete device) is 10 years (BetrSichV Annex 2, Section 4, No. 5.3).

Plant components:

Annex 2, Section 4, No. 7.28 of the BetrSichV specifies the following inspection intervals for pressure vessels with quick-release fasteners:

External inspection	Internal inspection	Strength test
2 years	10 years	10 years

BetrSichV Annex 2, Section 4, No. 7, sentence 2 states: “Nos. 2.4 and 5.9, sentence 2, apply *mutatis mutandis*.” Due to the inspection responsibility, sentence 2 in Annex 2, Section 4, No. 5.9 can be applied:

“For system parts which may be inspected periodically by a person qualified to carry out inspections in accordance with Number 6, Tables 2 to 9, the inspection interval to be determined by the employer within the framework of a risk assessment may not exceed ten years. Deviating from sentence 1, the period of the strength tests may be extended to 15 years if it is proven within the scope of the external/ internal inspection that the pressure system can be operated safely. The proof shall be presented in the documentation of the risk assessment.”

The maximum period for strength testing can therefore be extended to 15 years.

This results in the following maximum inspection intervals according to the Industrial Safety Regulations:

External inspection	Internal inspection	Strength test
2 years	10 years	15 years

The assessment of safe operation can be documented, for example, with the template “Certificate of inspection of a pressure system and its components” under the section “Extension of strength test interval”. The proof must be presented in the documentation of the risk assessment.