

LEISTER Cosmo

Automatic wedge welding machine



Please read operating instructions carefully before use and keep for further reference

APPLICATION

The **LEISTER Cosmo** is an automatic wedge welding machine for overlap welding of geomembrane liners for earthwork and civil engineering.

• Thermoplastic lining membranes

Polyethylene high density	PE-HD
Polyethylene low density	PE-LD
Chlorinated polyethylene	PE-C
Polypropylene	PP

• Type of seam

welding seams are produced in accordance with DVS 2225 part I and BAM.
Other dimensions are possible on request.

DVS: German Welding Association

BAM: Federal Institute for Materials Research and Testing, Berlin





WARNING



Danger! Unplug the tool before opening it as live components and connections are exposed.



Incorrect use of the hot air tool can present a **fire and explosion hazard** especially near combustible materials and explosive gases.



Do not touch the hot air wedge when hot as it can cause **burns**. Allow the tool to cool down.



Connect tool to a **receptacle with protective earth terminal**. Any interruption of the protective conductor inside or outside the tool is dangerous!
Line/mains extension cables must always have a protective ground conductor!



CAUTION



The **voltage rating** stated on the tool should correspond to the mains voltage.



For personal protection, we strongly recommend the tool be connected to an **RCCB (Residual Current Circuit Breaker)** before using it on construction sites.



The tool **must be** operated under supervision. The radiating heat can ignite combustible materials.



Protect the tool from **damp and wet**.

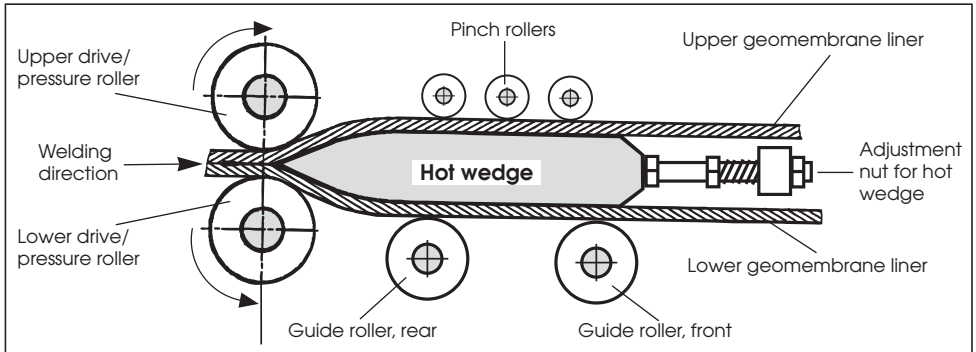
The tool is **CCA** certified (**CENELEC Certification Agreement**).

Technical Data

Voltage	V~	230
Power consumption	Hz	50 / 60
Capacity	W	2000
Temperature	°C	max. 450 stepless
Welding pressure	N	max. 2500 stepless
Drive	m/min.	0,5 – 5,0 stepless
Overlap width	mm	180
Material thickness	mm	1,5 – 3,0
Size	mm	600 × 380 × 450
Weight	kg	32,0

- **Heating System** → The hot wedge temperature is steplessly adjustable and electronically controlled. As required, the hot wedge can be steplessly adjusted to match the material thickness.

Heating system cross sectional diagram

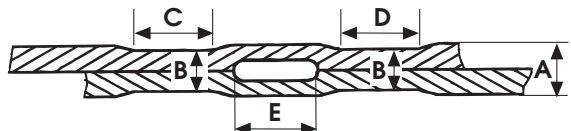


- **Welding pressure** → steplessly adjustable. The welding pressure is transmitted via the toggle lever to the pressure rollers. The **swivel-head guarantees an even seam thickness reduction** on both welded sections (C and D) as well as on a welded seam without test channel. This allows T-joints to be welded easily. During the welding process the pressure is matched linearly to the change in thickness of the geomembrane liner.

Cross-sectional diagram of an overlap weld

Seam thickness reduction = A – B

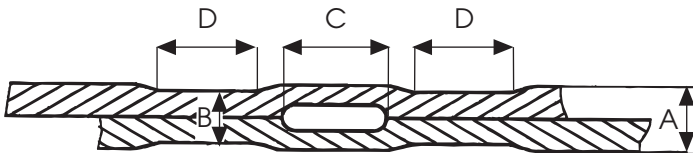
- A** : Thickness of upper and lower geomembrane liner
- B** : Thickness of welding seam
- C** : Welded section 1
- D** : Welded section 2
- E** : Test channel



- **Drive** → electronically steplessly adjustable and electronically controlled. Digital display of SET and ACTUAL value. The power transmission works through a three stage planetary gear. Should rippling occur in the laid-out geomembrane liners, the upper or lower drive/pressure roller can be switched over alternately.

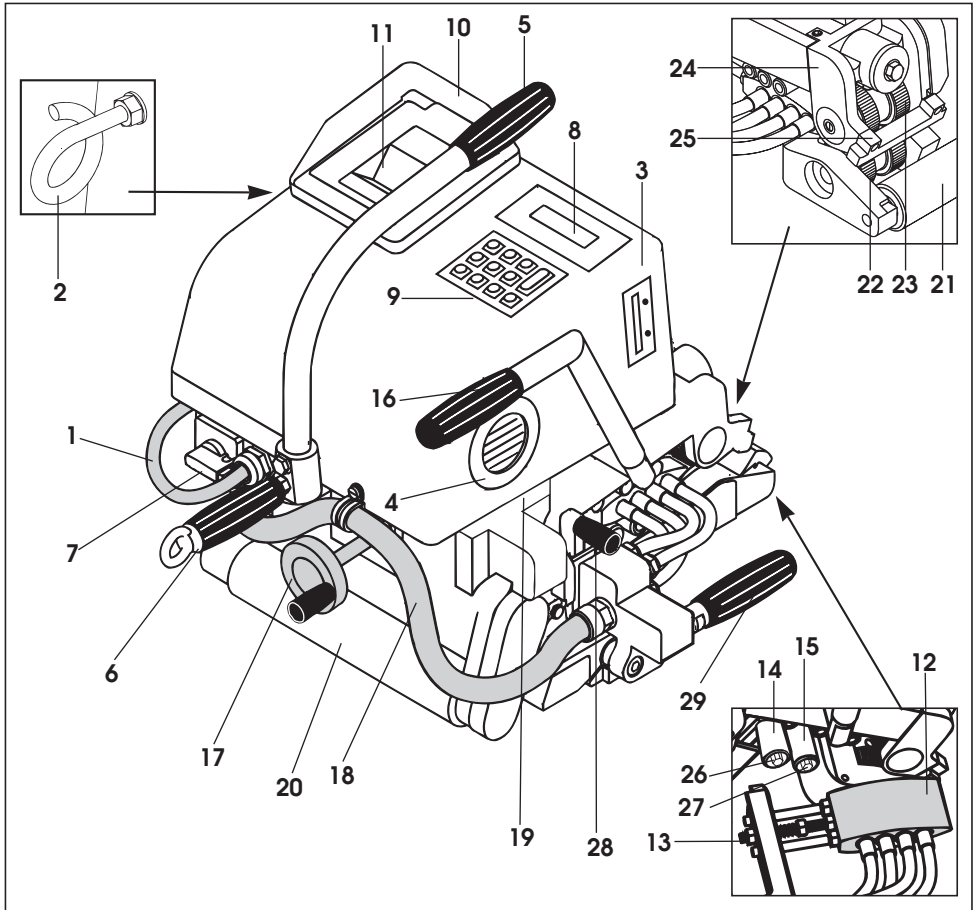
- **Welding seam geometry** → The proof of quality in a welding seam (peel test, tensile test) depends upon the thickness reduction in the area of the seam. With a seam thickness reduction ranging between 0.2 – 0.8 mm, the welding seam geometry is within the permissible range (DVS 2225 part II, BAM). This permissible range reflects the optimum interaction of the welding parameters for temperature, welding pressure and speed during the welding process.

Cross-sectional diagram of an overlap weld



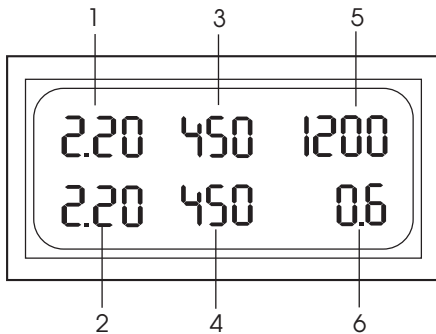
Seam thickness reduction = A – B

- A** : Thickness of upper and lower geomembrane liner
 - B** : Thickness of welding seam
 - C** : Width of test channel 15 +/- 2 mm
 - D** : Width of weld ≥ 15 mm
- **Monitoring the welding seam** → Contactless recording of the seam thickness reduction data, which is displayed digitally for the welding operator during the welding operation. Additionally, the seam thickness reduction is graphically recorded onto a paper print out continuously during the welding operation.
 - **Speed control system**
The influence of weather such as sun, shade, wind and moisture, which cause a temperature change in the lining membrane during the welding process, can lead to weld faults. The Cosmo speed control system interprets the data from the continuous measurement of the welding seam geometry. Through automatic adjustment of the welding speed, such weld faults are avoided. The welding operation can be done either with or without the speed control system. If the lower seam thickness reduction tolerance is exceeded, the welding speed slows down automatically; if the upper seam thickness reduction tolerance is exceeded, the welding speed is increased.



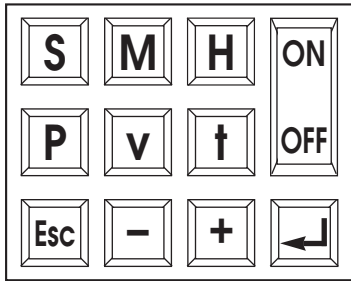
- | | |
|--|--|
| 1. Cable to mains | 17. Hand wheel for stepless adjustment of the welding pressure |
| 2. Cable holder | 18. ON/OFF switch lever for upper or lower drive/pressure roller |
| 3. Housing for drive motor | 19. Locking device for switch lever (18) |
| 4. Ventilator grill | 20. Front roller |
| 5. Carrying handle | 21. Rear roller |
| 6. Handle | 22. Lower drive/pressure roller |
| 7. Main switch | 23. Upper drive/pressure roller |
| 8. Display | 24. Swivel head |
| 9. Keyboard | 25. Sensor bar |
| 10. Protection cover (printer) | 26. Hexagonal cap screw for guide roller, front |
| 11. Printer | 27. Hexagonal cap screw for guide roller, rear |
| 12. Hot wedge | 28. Hot wedge locking lever |
| 13. Adjustment nut for hot wedge | 29. Hot wedge guide handle |
| 14. Guide roller, front | |
| 15. Guide roller, rear | |
| 16. Tension lever for welding pressure | |

Display



- | | |
|---|--------|
| 1. Welded speed
ACTUAL value | m/min. |
| 2. Welding speed
NOMINAL value | m/min. |
| 3. Temperature ACTUAL value | °C |
| 4. Temperature NOMINAL value | °C |
| 5. Welding pressure
ACTUAL value | N |
| 6. Seam thickness reduction
ACTUAL value | mm |

Keyboard



- P** **Welding programme check**
- Thickness of material
 - Seam thickness reduction offset
 - Speed control
 - Recording mode
 - Welding speed
 - Welding temperature

- v** **Welding speed**

- †** **Welding temperature**

- S** **Adjustment of system**
- Memory card
 - Alarm (audible)
 - Language
 - Data
 - Time
 - Diagnosis

- M** **Drive motor on/off**

- H** **Heating on/off**

- ON** **START**
Recording of data/
Recording of welding seam
geometry
- OFF** **END**

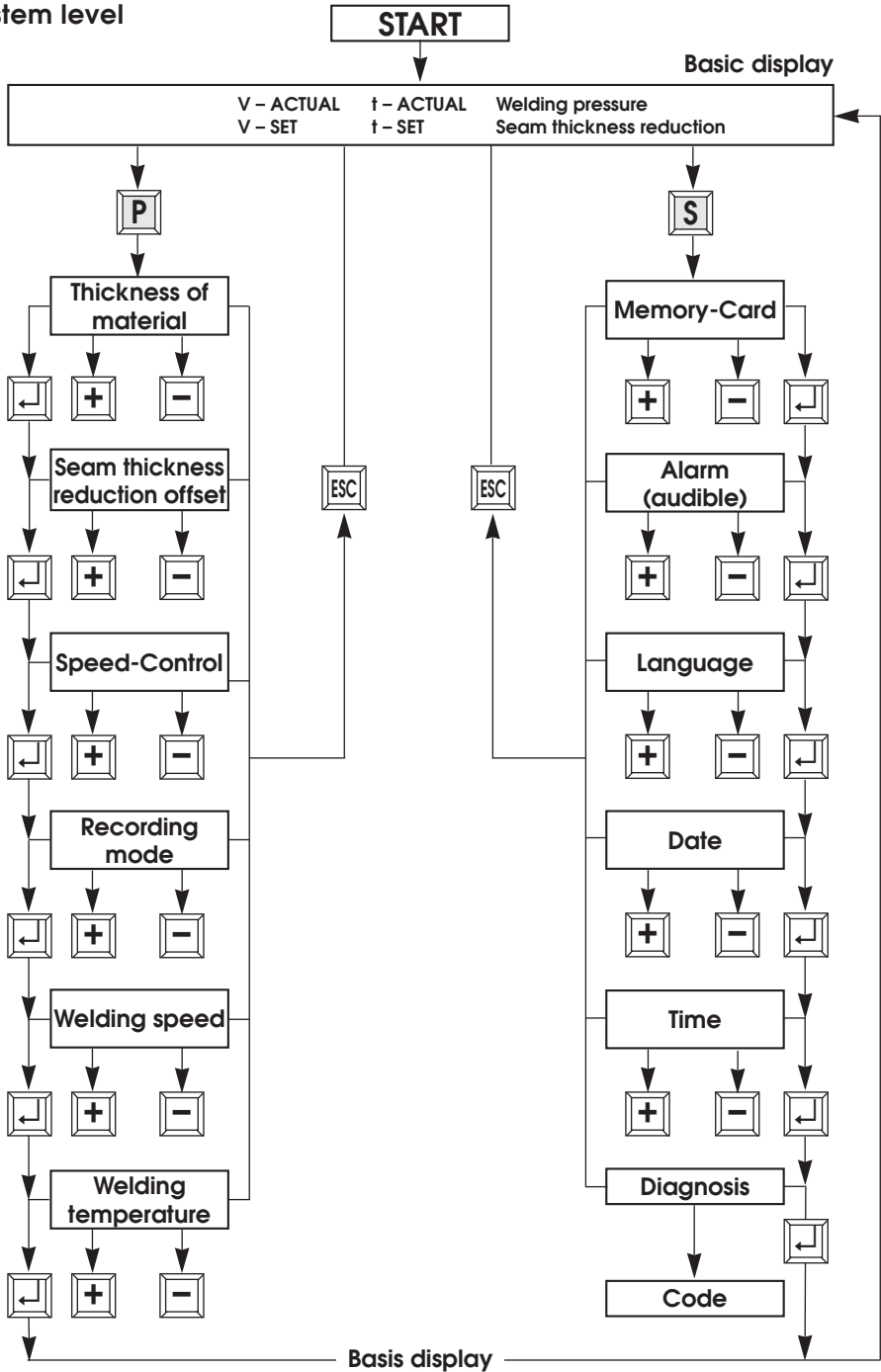
- Esc** **Skip to first function**

- +** **Value increase**

- **Value decrease**

- ←** **End of entry**
Change of menu

System level



P Thickness of material

Before welding, the operator must enter the thickness of the geomembrane material. The electronic processor requires this value to calculate the relevant seam thickness reduction. Depending on the material thickness, the range of seam thickness reduction is automatically adjusted on the print-out. The material thickness settings should not be changed during the welding process.

P Seam thickness reduction-offset

To get an accurate reading, before welding, the operator must adjust the seam thickness reduction display. The value on the display should read zero. See page 6 **Display (6)**.

As the knurl pressure rollers press into the geomembrane material according to the welding pressure, the electronic processor already interprets this as seam thickness reduction and it should therefore be neutralised accordingly.

P Speed Control System

The automatic adjustment of the welding speed can be set before starting the welding process by using the ON/OFF switch. See page 4.

P Recording Mode →

The print-out mode must be selected before starting the welding process.

- Graphic mode
Continuous recording and print-out of the seam thickness reduction over the whole length of the welded seam
- Tolerance mode
Recording of the seam thickness reduction is only printed out if the seam thickness reduction tolerance has been exceeded

Print-Out

Graphic mode

COSMO
 Software Rev:
 LEISTER, Switzerland
 Date:
 Time:
 Hours of operating

Start 29.05.98 15.39
 4.0 Measuring range [mm] 5.0

450 C 2.05 1250 N 1 m

452 C 2.00 1261 N 2 m

4.0 Measuring range [mm] 5.0
 Stop 29.05.98 15.40

Welding temperature
 min 447 °C
 max 459 °C

Welding speed
 without speed control
 min 2.00 m/min
 max 2.10 m/min

Pressure
 min 1240 N
 max 1292 N

 Seam thickness reduction
 min 0.04 mm
 max 0.45 mm

Ambient temperature 10 °C
 Thickness of material 2.50 mm
 Length of welded seam 2.40 m

Tolerance mode

COSMO
 Software Rev:
 LEISTER, Switzerland
 Date:
 Time:
 Hours of operating

Start 29.05.98 9.24
 MC-File: 00-07-28.002
 Tolerance excess by 8.10 m
 449 C 2.61 m/min 1300 N
 3.1 Measuring range [mm] 4.1

450 C 2.05 1250 N 1 m

452 C 2.00 1261 N 2 m

Stop 29.05.98 9.30

Welding temperature
 min 448 °C
 max 453 °C

Welding speed
 without speed control
 min 1.59 m/min
 max 2.61 m/min

Pressure
 min 1275 N
 max 1305 N

 Seam thickness reduction
 min 0.05 mm
 max 0.38 mm

Ambient temperature 19 °C
 Thickness of material 2.05 mm
 Length of welded seam 9.10 m

S **Memory-Card** If the welding data needs to be stored on a memory card, before starting the welding process, the operator should set the memory card level to **ON**. (See special operating instructions for Memory Card).

The following data is stored:

- welding speed
- welding temperature
- pressure
- seam thickness reduction
- ambient temperature
- length of welding seam

S **Alarm (audible)** If there is a deviation from the seam thickness reduction tolerance, an audible signal is activated. This signal can be set to ON/OFF on the alarm menu.

S **Language** The welding operator has a choice of different languages.

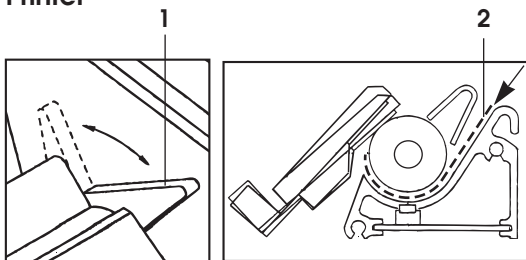
- German
- English
- French
- Italian
- Spanish

Depending on the choice, the terms are shown in the selected language on the display. This should not be changed during the welding process.

S **Date/Time** The welding operator can make changes to time and date on the Date/Time menu.
(Summer/winter time, different time zones).

S **Diagnosis** Adjustments are made at the factory on the Diagnosis menu. The welding operator has no access to this menu.

Printer



Slacken the paper feed with the **tension lever (1)**.

Feed in paper (2).

Pay attention to the direction of the arrow.

Tighten the paper feed with the **tension lever (1)**.










The Hot wedge can be adjusted according to the material thickness as required.

- Guide the automatic wedge welding machine into the geomembrane liner or film to be welded.
- Hold the **hot wedge guide handle (29)**, pull the **hot wedge locking lever (28)** and position the **hot wedge (12)** with the **hot wedge guide handle (29)**, to engage release the **hot wedge locking lever (28)**.
- Tighten the **tension lever (16)** to the specified welding pressure.
- Loosen the **hexagonal cap screw (26)**.
- Adjust the **guide roller, front (14)** to the correct height. The distance of the **hot wedge (12)** from the **guide roller, front (14)** should match the material thickness.
- Tighten the **hexagonal cap screw (26)** and secure the **guide roller, front (14)** with a spanner.
- Loosen the **hexagonal cap screw (27)**.
- Adjust the **guide roller, rear (15)** to the correct height. The distance of the **hot wedge (12)** from the **guide roller, rear (15)** should match the material thickness.
- Tighten the **hexagonal cap screw (27)** and secure the **guide roller, rear (15)** with a spanner.
- Do a test weld.







Welding preparation

- Attach the **carrying handle (5)** and **handle (6)**.
- Check laying out of material: Width of overlap min, 100 mm and max. 180 mm
The geomembrane liners must be clean between the overlap as well as above and below.
- Check: Mains supply ≥ 5 kW and a minimum cable cross section

230 V~	up to 50 m	2x2.5 mm²
	from 50 m	2x4.0 mm²



- Connect the hot wedge welding machine to the mains supply.
- Carry out adjustments in the system with keys  and .
- As required, correct with keys  and .
- Heating up: Switch on main **switch (7)**
Adjust temperature via the **keyboard (9)**   and 
Switch on heating  → **ON** Motor  → **OFF**
Heating up time approx. 5 min.

Beginning of welding process

- Check:
 - **Drive/pressure rollers (22) (23)** as well as the **hot wedge (12)** must be clean before positioning.
 - Required welding temperature must be achieved.
 - Cable length/cable guide.
 - Paper roll for printer.
- Guide and position the automatic wedge welding machine into the overlapped geomembrane liners.
- Pull the **tension lever (16)** (without engaging the hot wedge).
- Set welding pressure
 - Gently press the pressure roller with **hand wheel (17)** onto the material to be welded (laid overlap).
- Feed the welding parameter into the programme level with the  and  keys. Make corrections as necessary. Keys  and .
- Release the **tension lever (16)**.
- Switch on the drive motor.  → **ON**
- Engage the **hot wedge (12)**
- Pull the **tension lever (16)** slowly.
- Start recording with .

If the welding is done without speed control, the welding speed should be corrected with keys  and   should the seam thickness reduction deviate from the tolerance.

End of welding procedure

- At end of the welding procedure, approx. 10 cm before end of weld, before the hot wedge is moved out, the recording should be stopped. Key .
- 1 cm before the end of the welding seam, release the **tension lever (16)**, pull the **locking lever (28)**, move the **hot wedge (12)** by the **guide handle (29)** out of the overlap and swivel up until it stops.
- Switch off drive motor using key  → **OFF**.
- Clean **hot wedge (12)** with a wire brush.

Welding tips

- Should ripples occur in the laid-out geomembrane material, the upper or lower drive/pressure roller can be switched over alternately. This allows wrinkle-free welding, so that the overlap width remains constant and the welding process should not have to be interrupted. Rippling in the upper geomembrane liner: engage upper **drive roller (23)** only.
- Rippling in the lower geomembrane liner: engage lower **drive roller (22)** only.
- With T-joints or when welding upwards, both drive rollers must be engaged.
- For welding T-joints, a reduction in welding speed of approx. 20% is recommended.

ACCESSORIES

- Only LEISTER accessories should be used.

TRAINING

The LEISTER Company and its authorized Service Centres offer welding courses free of charge world-wide. The customer can be trained on site if necessary.

MAINTENANCE

- The **ventilator grill (4)** should be cleaned with a brush when dirty.
- Clean **hot wedge (12)** with a wire brush.

SERVICE AND REPAIR

- Repairs have to be carried out by authorised **LEISTER Service Centres** only. They guarantee a specialized and reliable **repair service within 24 hours** using original LEISTER spare parts.

GUARANTEE AND LIABILITY

- Guarantee and liability are in accordance with the guarantee certificate as well as with the currently valid general business and sales conditions.
- LEISTER Process Technologies rejects any guarantee claims for tools which are not in their original condition. The tools must never be altered or changed.

Technical data and specifications are subject to change without prior notice.

Your authorised Service Centre is: