

# Instruction Manual

## GVE 2



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# 1 Introduction

This technical handbook contains information and guidelines for operation and maintenance of the GVE 2 (the name is a (German) acronym for Gasversorgungseinheit), a gas supply unit for use by hand, with up to two cartridges. **Compliance with this instruction manual is part of the guarantee agreement.**

## 1.1 Use of the instruction manual

### **"Danger"**

This marker will be used if the failure to comply exactly with the guidelines regarding equipment, techniques, procedure or the like could result in injuries or accidents.

### **"Caution"**

This marker will be used if the failure to comply exactly with the guidelines regarding equipment, techniques, procedures or the like could endanger the equipment.

### **"Please note"**

This marker will be used when attention is to be drawn to some special feature.

## 1.2 Notes on Safety

**Danger:**

The GVE 2 may only be handled by authorized personnel.

This instruction must be located next to the unit within the service life.

The instruction is part of the unit and has to be handed on every subsequent user or operator. The unit is exclusively for industrial purpose.

The user has to be instructed accordingly the applicable accident prevention regulations. Any person who is assigned with the operating method of the unit must have read and understood the instruction and especially the safety instructions. All safety instructions in this instruction and on the machine have to be followed.

When in use, the combustion gas including the precursor (an organosilicon compound) in the flame will be turned entirely into silicate particles. The unit must not be used without fume hood. As the flame produces large amounts of heat, the fume hood must be designed for high temperatures.

### 1.2.1 Safety regarding the cartridges

- Extremely flammable aerosol.
- Pressurised container: May burst if heated.
- Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
- Do not spray on an open flame or other ignition source.
- Pressurized container: Do not pierce or burn, even after use.
- Protect from sunlight. Do not expose to temperatures exceeding 50°C/ 122°F.
- Do not breathe dust/fume/gas/mist/vapours/spray.
- Use only outdoors or in a well-ventilated area.

**Please note:**

Use only the associated cartridges. Don't try to open the empty cartridge by force or let it come in contact with the flame.

### 1.2.2 Safety regarding the basic GVE 2 unit

- high temperature flame (appr. 1,300 °C, 2,400°F)
- in use, the cover of the nozzles will be very hot
- in bright light, the flame will not be visible
- use only in a well ventilated area

The basic unit should be placed on a stable surface such as a work-table or the floor. Ensure that the gas-hose is neither constricted nor pulled taut. When in use, keep flammable objects away from the unit. If the Pyrosil begins to burn uncontrollably and cannot be stopped using the Pyrosil valve, then the flames must be extinguished using a fire extinguisher or a blanket. Please note the overrun of the unit after closing the valve. Be careful by depositing the hot burner nozzle.

### 1.3 Product liability and guarantee

For this unit, our guarantee covers the following:

After delivery to the buyer, the guarantee is valid for 12 months. It is only valid for the first buyer and does not cover expendable parts. Nor does it cover parts that have been mishandled, altered, neglected or those destroyed or damaged as a result of improper assembly or use.

Within the stated time period, all defective parts will be replaced by Bohle AG free of charge. Bohle AG will undertake all related repairs free of charge and cover the costs resulting from repairs.

The unit must be checked immediately after receiving for obvious defects. Please notify us immediately in writing with complaints.

**Important notice regarding product liability**

Because of the law on product liability, the manufacturer only assumes liability for its product if all parts come from or were authorized by the manufacturer and if the units are assembled and operated correctly.

With original Bohle AG accessories and replacement parts, you can be certain that all safety requirements are met. The unit should be checked for obvious defects immediately upon receipt. All complaints should be reported to us in writing immediately.

## 2 Description

### 2.1 Parts

basic unit	floor-mounted appliance for even ground with: <ul style="list-style-type: none"><li>▪ connector for burner</li><li>▪ pressure reducing valve (2-stage)</li><li>▪ two valves for external gas supply via levers</li></ul>
pressure hose	from basic unit to burner (appr.1.5 meter)
hand burner	2.16 inches (55 mm) width, with hand grip to control flame (pilot light/ full flame), 0.45 kg (0,9921lb)

### 2.2 Technical specifications for the GVE 2

**General**

max. number of cartridges	2
weight of a cartridge (accessory)	app. 480 g (1.058 lb) gross
duration of operation with one cartridge	app. 75 minutes (depending on the burner)
average gas flow	2 l/min
material used	Pyrosil cartridge 330g (0.728 lb) net
operating temperature	15 °C – 30 °C (60 °F – 90 °F)
inner pressure at room temperature	4-5 bar (constant)
working pressure	0,5 bar
allowable deviations of	± 0,1 bar
flame temperature	appr. 1300 °C
composition of the gas	propane/ butane mixture with organosilicon components

## **Dimensions**

width	300 mm (11.8 inches)
depth	210 mm (8.27 inches)
weight	400 mm (15.75 inches)
weight of the unit with burner	12.8 kg (28.219 lb)

### 2.3 Basic technological principles

Flaming has been used by industry for decades as a common procedure of treating material surfaces. Coating with silicates has been proved as a more effective and long-lasting method of raising the surface energy. Here the basic flaming technique is modified by adding substances containing silicon to the flame which leave a surface-active coating of a few nanometres thickness on the work-piece. Further handling involving e.g. pressure, lacquer or gluing is facilitated by a dramatic increase in the adhesive composition's ability to hold together.

### 2.4 Areas of application

One area of application for this technique is the cleaning and simultaneous activation of surfaces appropriate to gluing in preparation for gluing and other adhesive handling. The technique can moreover be used to improve the adhesion of lacquer on glass, synthetics or metal surfaces.

### 2.5 Description of function

Pyrosil is a special gas mixture for the cleaning of organic contaminants and the activation of surfaces. A silicate coating is produced during the burning process. Together with a primer (adhesion promoter, see section 6.2), one can produce an optimal composite and thus improve adhesion, in particular regarding long-term applications, by up to 50%.

The GVE 2 flaming device is intended for the preparation of large surfaces.

The unit has been tested by TÜV Thuringia in accordance with:

- DIN 4815-2
- DIN 8543-4
- DIN 3230-1 (now: DIN EN 12266-1:2012-06)
- DIN 3380

**Caution:**

The unit may only be used with the cartridges delivered by the supplier and when filled with the Pyrosil mixture! Operating the unit with anything but the cartridge supplied by SURA Instruments GmbH voids the guarantee.

## 2.6 Transport

If the unit is to be operated in various locations, one should do the following before transporting the unit:

1. Close valves. → see section 4.2, p. 11
2. Release Pyrosil or burn it off while the valves stay closed. → see section 4.2, p.11
3. Close the main valve of the burner. → see fig. 8, p. 11
4. Allow the burner to cool down.
5. Remove the cartridges from the device, replace the protective cap → see section 4.7.1, p. 15
6. Separate burner and hose from the basic unit.
7. After moving: reassemble. → see section 3, p.8

## 2.7 Accessories for the Pyrosil flaming Unit GVE 2

The following cartridges are available to equip the Pyrosil GVE 2 flaming unit or as



**330 g (3/4 lb.) Pyrosil-MGK cartridge**  
for metal, glass or ceramic surfaces  
(standard cartridge)

Figure 1: Pyrosil cartridges

These have to be exchanged in the basic GVE 2 unit (see sec. 4.7, p. 15)

## 3 Preparations for putting the GVE 2 into operation

### 3.1 General remarks

The GVE 2 unit is delivered preassembled with burner and pressure hose to the client. The unit can be put into operation after one hour of acclimatization. First the gas-hose has to be attached to the basic unit and at least one Pyrosil cartridge has to be screwed in.

### 3.2 Placement and installation

When putting the unit into operation, please keep in mind the notes on safety outlined in section 1.2.2. Place the basic unit on a safe place (work-table, floor) and ensure that the gas-hose is neither constricted nor pulled taut. If the GVE 2 is to be in constant operation, a ventilation system for the resulting fumes must be in place.



Working circles:



Figure 2: connector for the burner – plastic cap



Figure 3: connector for the burner - hose

1. Remove the plastic cap from the connector for the burner hose (see fig. 2).
2. Attach one end of the hose securely to the basic unit (leftward threading). Therefore you need:
  - A 19 mm (~3/4 inches) wrench for the screw nut on the hose
  - A 17 mm (~2/3 inches) wrench for the thread on the connector at the basic unit

The connector flange should not be put under pressure or be subjected to stresses.

3. Attach the other end of the hose securely to the burner (see fig. 3).

**Caution:**

Test for leaks with suitable material ( leak detections spray or soapsuds)

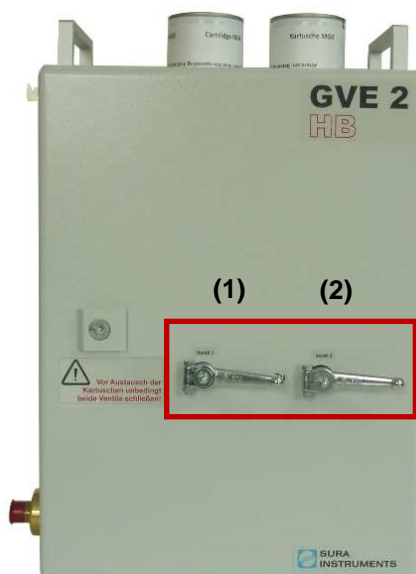


Figure 4: Closing the valves

4. Close valves (1) and (2) on the basic GVE 2 unit. To do so bring both levers to the horizontal position (“closed”, see fig. 4).

- The needed cartridges are inserted from above with the screw-end facing downward and are screwed in by hand in the clockwise direction.

→ The flaming unit is now ready for operation.

Access to the Pyrosil reduction unit through the front panel is not intended since the operating pressure of 0.5 bar is set in the factory. The unit's setting may not be changed except by the manufacturer in case of repairs.

**Please note:**

Opening up the unit or adjusting the manufacturer's settings results in the expiration of the guarantee.

## 4 Operation and maintenance

### 4.1 Lighting the burner

The following steps are to be followed in the given order:

- If you only use one cartridge, completely open the relevant valve (1) **or** valve (2) on the basic unit (see fig. 5 and 6).  
If you use two cartridges, also open valve (1) **or** valve (2) on the basic unit.  
Therefor the levers have to be turned into the vertical position. The manometer on the side of the housing will show a pressure of about 2 bars (see fig. 7)



Figure 5: Open left valve

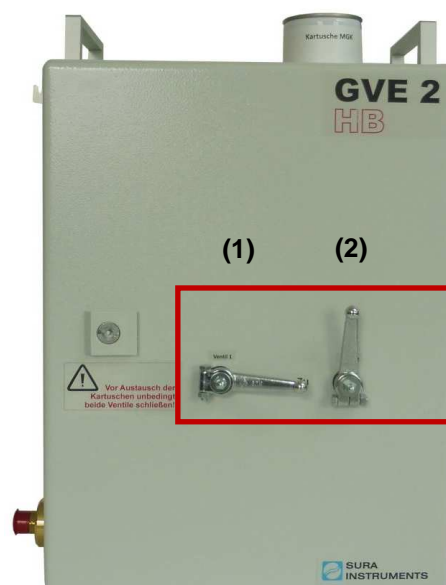


Figure 6: Open right valve



Figure 7: pressure display 2 bar

2. Open the main valve (3) on the hand burner (see fig. 8, p. 11) (Turn the valve counter clockwise, usually half a turn is sufficient).
3. Pull the lever (4) → gas flows. While the lever stays pulled, light the Pyrosil on both burner nozzles. Use a lighter or the like.

4. Release the lever (4) → the burner will form the pilot light (see sec. 5.3, p. 18)

Flaming can now begin. For flaming always the working flame must be used (**not** the pilot light). To create the working flame, pull the lever (4).

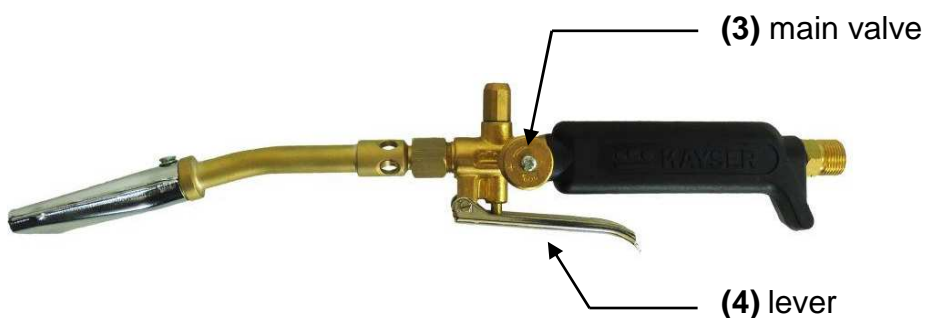


Figure 8: burner

**Caution:**  
Hot burner nozzle (fig. 9)!



Figure 9: burner nozzle

## 4.2 Turning off the burner

Follow the given steps in the given order to turn off the burner:

1. Close the open valves (1) and/ or (2) on the basic unit (turn the lever to the horizontal position → “off”, see fig. 10). The gas supply is now interrupted. The falling pressure can be read off the manometer.
2. The remaining Pyrosil in the hose and in the device will burn off. The flame of the hand burner will go out below a pressure of 0.5 bar. It takes about 1 minute for the Pyrosil to burn off, when the pilot light is used. With the full flame it takes about 20 seconds.
3. After extinguishing the flame, close the main valve (3) on the burner (turn the valve clockwise until it is tight).



Figure 10: valves closed

## 4.3 Notes on the operation of the GVE 2

### **Please note:**

The GVE 2 flaming unit is factory set for an optimal flame and provides safe operation if the fire precaution requirements are followed.

### **Caution:**

The GVE 2 flaming unit is a device with open flame. Therefore absolutely follow the safety instructions!

The Pyrosil pressure is regulated automatically by the two-stage pressure reducing valve in the basic unit and is adjusted to approx. 2 bar. The pressure can be checked on the manometer.

After opening the main valve of the hand burner (3) and pulling the lever (4), it is possible to work with the burner.

Notes on the ambient temperature and the duration of flaming:

- Flaming is to be performed at room temperature.
- The ambient temperature should be between +15 °C (60 °F) and +30 °C (85°F). If the ambient temperature is below +15 °C (60 °F), uninterrupted operation can result in a cool down of the cartridges, the pipe system or the vaporizing unit, and in a disturbance of the Pyrosil supply. Under such conditions, breaks during the operation are necessary to allow the GVE 2 unit to adjust itself back to working temperature.
- Uninterrupted operation should not exceed 120 minutes when using two cartridges, after which a break of some 30 minutes should follow (e.g. the time to exchange a cartridge).

#### 4.4 The flaming procedure

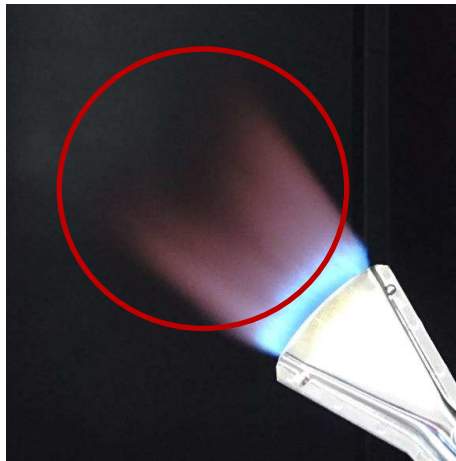


Figure 11: flame's area of operation

1. Light the flame and hold the hand burner loosely in your hand.
2. The surface has to be free of grease and oils and preheated if possible (a temperature of 40 °C – 50 °C/ 105 °F – 120 °F is sufficient).  
The work-piece should be handled by passing the non-glowing (oxidizing), front part of the flame (see fig. 11) over the surface in blanks.

Thereby the surface will be activated. Flaming with the glowing blue (deoxidising) part of the flame should be avoided at all cost, because it impairs the effect perceivably.

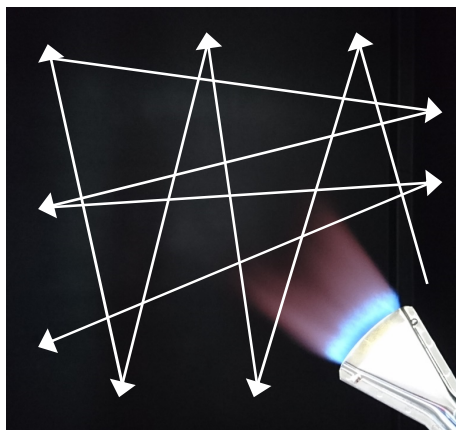


Figure 12: passing over the surface

3. The burner with the open flame should be passed over the surface, which is to be treated, in a fanning and crosswise way (see fig. 12). Be careful to avoid an overheating of the surface (substrate)!

It has proved beneficial to place the surface horizontally or at a slight incline. After partial flaming or when putting away the burner, the flame must always be extinguished. After extinguishing the flame, the burner can be rested on the clip on the basic unit (see fig. 13).

**Caution:**  
Hot burner nozzle! (fig. 9, p. 11)



Figure 13: Putting the burner on the clip

#### 4.5 Notes on the duration of treatment

The duration of treatment for a given work-piece depends to a great extent on the treatment speed, which lies between 10 cm/s and 50 cm/s for metal, glass or ceramic surfaces. We recommend conducting a short series of trials on the material which is to be treated, in order to determine the optimal treatment speed.

After flaming, the activated surface is effective for about 24 hours when stored in dry air at a temperature between 22 °C and 25 °C (72 °F and 77°F). We suggest beginning further processing immediately, such as improving adhesion with appropriate primer (see section 6.2, p.20).

**Please note:**

The effectiveness of activation and cleansing can suffer if the distance between the flame and the surface is too large or too small. Adhesion can be adversely affected by contaminants such as finger-prints. Thus further processing should begin without delay.

#### 4.6 Parallel and single operation

Single operation: cartridge 1 provides the burner with Pyrosil

Single operation: cartridge 2 provides the burner with Pyrosil

Parallel operation: cartridge 1 and 2 provide the burner with Pyrosil simultaneously

If the pressure falls below 0.5 bar, the cartridges must be exchanged.

#### 4.7 Exchanging cartridges

##### 4.7.1 Exchange when the machinery is off

To exchange the cartridges, the GVE 2 has to be turned off completely. Therefore the valves (1) and (2) must be closed. Follow the following steps:

1. Extinguish the flame. Afterwards close both valves (1) and (2) (see fig. 14).
2. Unscrew the old, empty Pyrosil cartridges from the basic unit by turning them counter clockwise.
3. Shake the new cartridges firmly so as to mix the contents.
4. Screw in the new, full cartridges hand-tightly by turning them clockwise.
5. Allow the unit to stand for 3 to 5 minutes after the exchange so as to let it reach operating conditions.
6. Further flaming: light flame.



Figure 14: valves closed

**Please note:**

The cartridge exchange can begin after the Pyrosil pressure has fallen below 0.5 bar. If the nature of the job allows it, the cartridges can be "burned down" to empty. Afterwards (after 30 seconds to a minute) close the valves and screw in the new cartridges.

In this case the old cartridges can be disposed without problem.

If the cartridges cannot be emptied entirely, both cartridges should be replaced, once the pressure has fallen below 0.5 bar. In this case, the cartridges must either be blown off at a later date or alternatively they have to be disposed as hazardous waste.

#### 4.7.2 Exchange during continuous operation

If the unit is being operated with only one cartridge, the other one can be exchanged simultaneously. Taking into account the necessary operating conditions (acclimatization), a quasi-uninterrupted operation is possible.

If such an exchange is undertaken, please do the following:

1. Cartridge 1 is in use, valve (1) is open. Valve (2) is closed (cf. fig. 15). Cartridge 2 is **not** supplying the device with Pyrosil.
2. Cartridge 2 may be exchanged. Valve (2) **must** be closed.
3. Pressure < 0.5 bar: close valve (1).
4. Open valve (2).

If the opening and closing of the valves is undertaken quickly, the pressure will fall only slightly and the operation will not be interrupted.

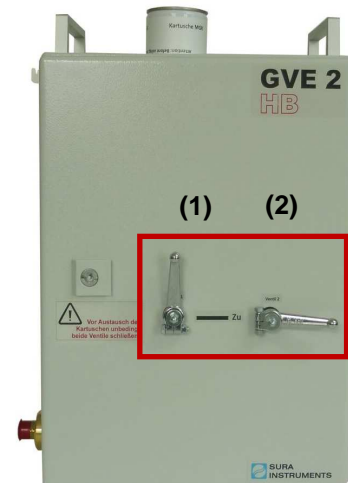


Figure 15: cartridge exchange during continuous operation 1



The procedure for cartridge 2 is analogous:

1. Cartridge 2 is in use, valve (2) is open. Valve (1) is closed (cf. fig. 16). Cartridge 1 is **not** supplying the device with Pyrosil.
2. Cartridge 1 may be exchanged. Valve (1) **must** be closed.
3. Pressure < 0.5 bar: close valve (2).
4. Open valve (1).



Figure 16: cartridge exchange during continuous operation 2

The operator should undertake this procedure scrupulously and with the greatest precision. Unpractised operators should exchange cartridges with an extinguished flame as described in the previous section.

**Danger:**

If one of the cartridges is empty, the corresponding valve should never be opened if the valve for the full cartridge is still open. Doing so can lead to a pressure equalization between the full and the empty cartridge. Gas from the full cartridge could stream into the empty cartridge and gas can get lost.

**Caution:**

Please use only original Pyrosil cartridges and exchange them in a well ventilated area. Do not exchange cartridges close to open flames and don't smoke!

## 5 Finding and fixing malfunctions

### 5.1 Flame does not light

If the flame cannot be lit despite open valves, check the manometer to see if there is sufficient pressure (> 0.5 bar). If the cartridges are empty, they should be replaced (see section 4.7, p. 15).

If Pyrosil is being released, but cannot be lit, the burner may be dirty. In this case, the burner nozzle (see fig. 9, p. 11) is to be cleaned carefully.

If the flame does not light when valves (1) and (2) and the main valve on the burner (3) (fig. 8, p.11) are open, the cartridges are full and the hose is sound, then the basic unit may be damaged. In this case, please contact the manufacturer.

Please also contact the manufacturer if the manometer shows a pressure over 2.2 bar.

## 5.2 Problems during flaming

If one of the following problems occurs

- flame larger than 15 cm (6 inches)
- large variation in the size of the flame
- flame goes out despite full cartridges and open valves
- flame does not form, but liquid Pyrosil leaks out
- abnormal formation of the flame with noticeable cooling of components

please do the following:

1. Close the main valve on the burner immediately! Do not work with an open flame in the vicinity of the device.
1. Close valves (1) and (2) on the basic GVE 2 unit. When the valves are closed, the levers are in horizontal position.
3. Take the entire device outdoors.
4. Remove the cartridges.
5. Allow the gas to escape with open valves (1), (2) and open main valve on burner under observance of the safety precautions.
6. Afterwards, close the valve (1) and (2) as well as the main valve and screw the cartridges in again.

After acclimatization, the GVE 2 flaming unit is again ready for use. If these problems show up again, please contact the manufacturer.

## 5.3 Further operations

### 5.3.1 Setting the pilot light on the hand-burner

In general, an adjustment of the hand burner's pilot light is not necessary. If nonetheless a variation is necessary, please do the following:

1. Light the hand-burner under observance of the safety warnings.
2. Turn the adjustment screw (5) (see fig. 17) clockwise with a screwdriver to reduce the flame.
3. Increasing the flame follows naturally by turning the adjustment screw (5) counter clockwise.

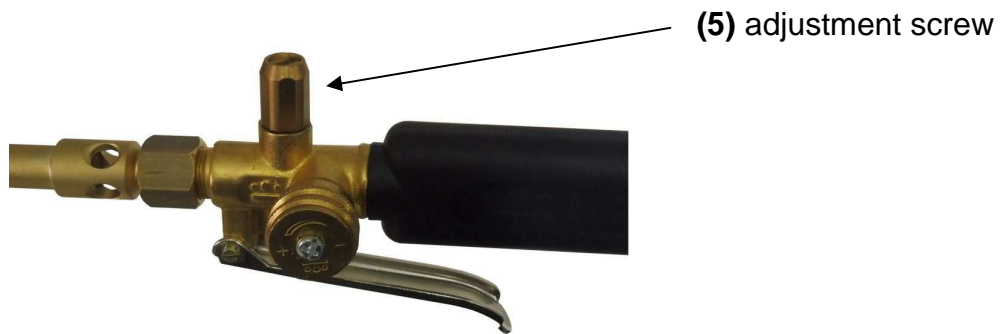


Figure 17: hand burner - adjustment screw

### 5.3.2 Regulating the flame on the hand-burner

The working flame (flame with pulled lever, (4), see fig. 18) can be adjusted within limits using the main valve (3) on the burner itself.

Turning the main valve forwards (counter clockwise), results in an intensification of the working flame. Turning the main valve backwards (clockwise) results in a reduction of the working flame.

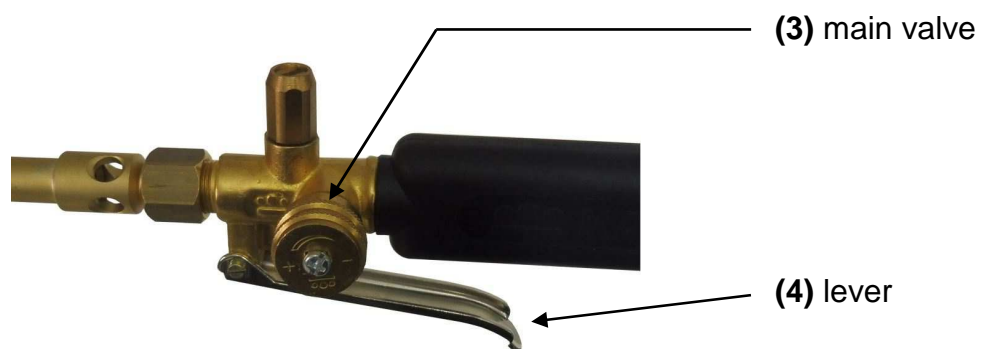
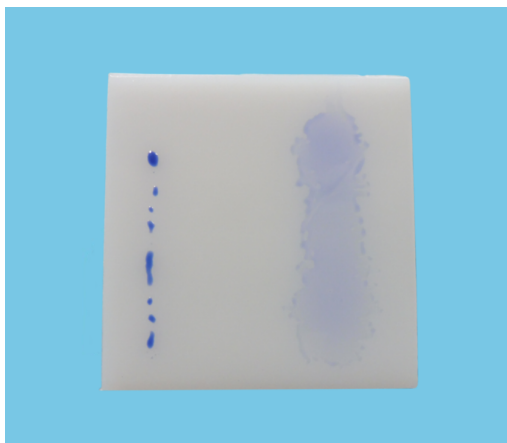


Figure 18: hand burner – main valve and lever

## 6 Recommendations for further treatment



Left:  
Test ink on untreated primed surface

Right:  
Test ink on Pyrosil primed surface

Figure 19: test ink on plastic



Figure 20: test ink TT40

### Improving adhesion with primers

Special primers (bonding agents) serve to improve the adhesion of printing inks, lacquers and glues on surfaces treated with Pyrosil flaming.

Such primers are liquid components with a silane basis developed to lend adhesion in combination with the Pyrosil technique and glues or lacquers. The right primer can be found for each type of lacquer or glue (see fig. 21).

**Caution:**

A substantial improvement of the adhesive power can only be reached when using Pyrosil and primer together and when both glued surfaces are treated.

**Please note:**

Contact the manufacturer for more detailed information on the cleaning and gluing of various materials!



Figure 21: Adhesive agent MP 94E in different sizes

The adhesive agent MP 94E is a colourless Primer, that is used on varnishes and adhesives on acrylate-base.