

# Maintenance of MIHM-VOGT Sintering Furnaces



## Contents

1.	General information	3
2.	Heating chambers	3
2.1.	Manual cleaning of the heating chambers	3
2.2.	Cleaning the heating chambers by means of a cleaning firing	4
2.3.	Cleaning cycle of the heating chambers	4
3.	Heating elements	5
3.1.	Checking MoSi heating elements	5
3.2.	Regeneration firing of MoSi heating elements	6
3.3.	Regeneration cycle of MoSi heating elements	7
3.4.	Checking SiC heating elements	7
4.	Installing sintering furnaces	8
4.1.	Dust prevention	8
4.2.	Acidic ambient air	9
5.	Pre-drying of zirconium oxide	9
6.	Additional maintenance tasks	9

## 1. General information

The following information presents supplemental information to the operating instructions for MIHM-VOGT sintering furnaces. The contents of the operating instructions must be strictly observed. This supplemental information is intended to help ensure the smooth operation of MIHM-VOGT sintering furnaces.

## 2. Heating chambers

The heating chambers of MIHM-VOGT sintering furnaces are comprised of two high-quality insulating layers. The following information is intended to help ensure that MIHM-VOGT sintering furnaces have a long service life. A visual inspection of the heating chambers should be performed prior to each sintering process. Foreign particles and accumulations of dirt can affect the sintering results. Dust and foreign particles must be removed by means of manual cleaning, while chemical contamination (e.g. as a result of colouring liquids) can be eliminated by a cleaning firing.

### 2.1. Manual cleaning of the heating chambers

The heating chambers or sintering plating (see Fig. 1 or Fig. 2) must be cleaned using a soft brush. Under **no circumstances** should compressed air be used to clean the heating chambers!

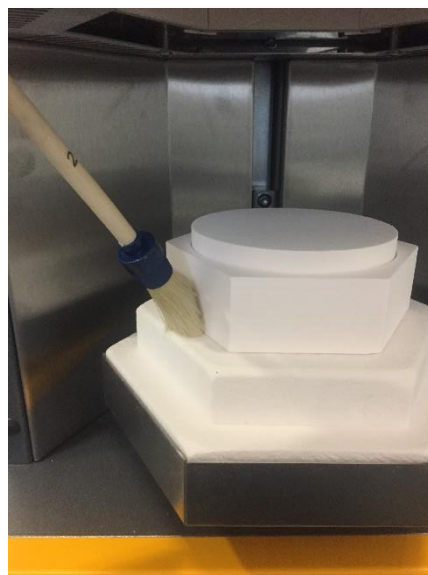


Fig. 1



Fig. 2

## 2.2. Cleaning the heating chambers by means of a cleaning firing

Chemical residues, for example from zirconium oxide, can be reduced using a cleaning program. If necessary, the cleaning program should be run multiple times.

In the case of devices with a 6-digit serial number, the cleaning program can be accessed as follows:

Type of device:	Program
TABEO-1/M/ZIRKON-100	C
TABEO-1/S/ZIRKON-100	C
TABEO-2/M/ZIRKON-120	C
TABEO-2/S/ZIRKON-120	C
HTS-2/M/ZIRKON-120	32
HT-2/M/ZIRKON-120	32

Tab. 1

In the case of devices with a 5-digit serial number, the cleaning program can be programmed as follows:

	Heating rate	Temperature	Holding time
	°C/min.	°C	min.
Level 4	25	300	0
Level 3	25	1500	120
Level 2	25	0	0
Level 1	25	0	0

Tab. 2

## 2.3. Cleaning cycle of the heating chambers

The wear of materials in the heating chambers of MIHM-VOGT sintering furnaces depends substantially on the individual use. The cleaning cycles described below should therefore simply serve as a suggestion.

What?	When?
Cleaning the heating chamber with a <b>brush</b>	weekly
Cleaning the heating chamber using a <b>cleaning program</b>	monthly

Tab. 3

### 3. Heating elements

Mihm-Vogt sintering furnaces are equipped either with MoSi heating elements (Fig. 3) or with SiC heating elements (Fig. 4). Furnaces equipped with MoSi heating elements can be heated to 1650 °C; furnaces with SiC heating elements can be heated to a maximum of 1550 °C.



Fig. 3



Fig. 4

#### 3.1. Checking MoSi heating elements

A visual inspection of the heating elements should be performed prior to each sintering process. MoSi heating elements are protected against outgassing by a glaze-like oxide layer. However, chemical contamination (e.g. by colouring liquids) can destroy the protective oxide layer on the heating elements, and spalling may occur on the surface (Fig. 5).

### 3.2. Regeneration firing of MoSi heating elements

A regeneration firing can be used to attempt to restore the protective oxide layer on the MoSi heating elements. The furnace must be empty when it is heated during the regeneration firing – i.e. without sintering support structures or sintering aids. The protective coating on the heating elements must be examined after the firing. If the surface does not have a glaze-like coating (see Fig. 6), the regeneration firing must be repeated.



Fig. 5



Fig. 6

In the case of devices with a 6-digit serial number, the regeneration firing can be accessed as follows:

Type of device:	Program
TABEO-1/M/ZIRKON-100	E
TABEO-2/M/ZIRKON-120	E
HTS-2/M/ZIRKON-120	33
HT-2/M/ZIRKON-120	33

Tab. 4

In the case of devices with a 5-digit serial number, the regeneration firing can be programmed as follows:

Serial number is lower than 50703:

	Heating rate	Temperature	Holding time
	°C/min.	°C	min.
Level 4	25	300	0
Level 3	25	1550	120
Level 2	25	1550	180
Level 1	25	1550	180

Tab. 5

### 3.3. Regeneration cycle of MoSi heating elements

Wear in MoSi heating elements in MIHM-VOGT sintering furnaces depends substantially on the individual use. The cycles described below should therefore simply serve as a suggestion.

What?	When?
Checking the heating elements	monthly
Regeneration of the heating elements with the aid of regeneration programs	monthly

Tab. 6

### 3.4. Checking SiC heating elements

A visual inspection of the heating elements should be performed prior to each sintering process. Unlike MoSi heating elements, SiC heating elements do not have an oxide layer. In particular in the case of the first sintering processes, blistering may occur on the surface of these heating elements. This blistering is not critical and can be ignored.

When SiC heating elements approach the end of their service life, there is a significant reduction in their heating capacity. As a rule, SiC heating elements can only be replaced as a complete set.

## 4. Installing sintering furnaces

When installing MIHM-VOGT sintering furnaces, the conditions in the operating manual must be observed. The following presents supplementary information.

### 4.1. Dust prevention

Excessive dust exposure can damage the sintering furnaces and thus substantially shorten the service life of the device. Dust must therefore be avoided as much as possible (for examples if an excessive load, see Fig. 7 and Fig. 8). Excessive dust exposure may be caused by zirconium oxide milling machines with insufficient extraction. If zirconium oxide milling machines are set up in the immediate vicinity of sintering furnaces, care should be taken to ensure that these devices have adequate extraction. Otherwise, zirconium oxide sintering furnaces should be set up in separate rooms that are not exposed to dust.



Fig. 7



Fig. 8



## 4.2. Acidic ambient air

Acidic ambient air can cause damage, especially to the electronic components in a sintering furnace (for examples, see Fig. 9 and Fig. 10) and therefore should be avoided. Acidic ambient air may arise due to the use of acidic colouring liquids. Such colouring liquids should therefore be used outside of the room in which the sintering furnaces are installed whenever possible. Care should also be taken to ensure that the sintering furnaces are only loaded with well-dried zirconium oxide restorations.



Fig. 9



Fig. 10

## 5. Pre-drying of zirconium oxide

Moisture can damage MIHM-VOGT sintering furnaces. It can be introduced into the furnace, for example, by colouring liquids or even by wet-grinding milling machines, for example. It is therefore recommended that restorations undergoing sintering are dried in an external furnace.

## 6. Additional maintenance tasks

The need to carry out maintenance work largely depends on the individual frequency of use of the furnace. The intervals shown below are therefore to be considered as approximate values only.

What?	When?	How?
Cleaning the housing	as needed	with a dry cloth
Cleaning the heating chamber <b>with a brush</b>	weekly	See the instructions above
Cleaning the heating chamber using <b>a cleaning program</b>	monthly	See the instructions above
Inspecting the surface of the heating element and performing a <b>regeneration firing</b>	monthly	See the instructions above
Checking the temperature	annually	using a MIHM-VOGT test kit

Tab. 7



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