Operating Instructions

Tubular heating elements for baking ovens and storage heaters 20.x/24.x

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1 About these operating instructions

1.1 Validity

These operating instructions are for the following material number range of tubular heating elements for baking ovens and storage heaters:

- 20.xxxxx.xxx
- 24.xxxxx.xxx

1.2 Handling of these operating instructions

These operating instructions are part of the product and describe the intended use of the product.

- ▶ Read these operating instructions, especially the safety instructions, carefully before use.
- ▶ Observe all other applicable documents.
- ▶ Keep these operating instructions during the product lifetime.
- ▶ Make sure that these operating instructions are available completely and legibly at all times.
- ▶ Pass these operating instructions to each subsequent owner or user of the product.

1.3 Revisions

Date	Version	What is new?
26.02.2021	01	Initial version
20.09.2022	02	Chapter 7, new formulation
09.11.2022	03	Chapter 1.4 – addition added

Tab. 1: Revisions

1.4 Other applicable documents

- Technical data sheet
- Type drawing
- Approved technical data

1.5 Symbols and markings

Symbols	Meaning
✓	Requirement of an action
▶	One-step action
▷	Measure to avoid a hazard in a warning
1.	• Step within a multi-step action list • Keep order
➥	Final result of an action
	Tip for easier work
 **DANGER!**	Hazardous situation that will lead to death or serious injuries, if the safety measures are not followed.
 **WARNING!**	Hazardous situation that can lead to death or serious injuries, if the safety measures are not followed.
 **CAUTION!**	Hazardous situation that can lead to minor injuries, if the safety measures are not followed.
NOTICE!	Hazardous situation that can lead to property damage if the safety measures are not followed.

Tab. 2: Symbols and markings

2 Safety

2.1 Intended use

EGO Tubular Heating Elements are used mainly for heating air, particularly in ovens and storage heaters (e.g. night storage heaters), in the household and commercial sector.
Any other use requires the written consent of E.G.O..

Proper use also includes the following points:

- Compliance with the permissible operating conditions according to the type drawing and technical data sheet.
- Follow these operating instructions.

2.2 Staff qualification

These operating instructions are intended for following staff / staff groups:

Staff	Required qualification
Production staff of the electrical appliance manufacturer	Has received instruction for the required activity from the electrical appliance manufacturer.
Qualified electrician	• Knows the relevant standards and regulations for electrical installation. • Has experience in using the relevant tools and aids for electrical installation. • Has knowledge of electrical appliances. • Has received training from the electrical appliance manufacturer.

Tab. 3: Staff qualification

2.3 Residual risks

Unless otherwise indicated the following residual risks apply to all types:

2.3.1 Installation with applied voltage

If there is voltage applied on the tubular heating element during installation, electric shock hazard consists.

- ▶ The tubular heating element must be installed or replaced by qualified staff only.
- ▶ Power supply of the cooking appliance must be completely switched off before all installation or replacement work at a tubular heating element.

2.3.2 Insufficient grounding

People could suffer an electric shock by having insufficient grounding.

- ▶ The tubular heating element must be integrated into the grounding concept of the device manufacturer according to DIN EN 60335-1 (general guideline) and depending on the application also according to DIN EN 60335-6 (valid for backing ovens) and DIN EN 60335-2-30 (valid for storage heaters). Pay attention to the regional regulations.

2.3.3 Wrong connection

Insufficient electric contacts could lead to an excessive heating. This can cause fires.
Insufficient electric contacts have among others the following causes:

- Mixing up the insertion position of the connection wire.
- Unsuitable receptacles or wire material.

A wrong connection of terminals leads to incorrect grading of the heating power.

- ▶ Pay attention to the regional regulations.
- ▶ The tubular heating element must be connected according to these operating instructions, the technical data sheet and its type drawing.
- ▶ All advices of these operating instructions about cables, receptacles and wire end ferrules must be considered.
- ▶ The terminal assignment is the responsibility of the device manufacturer and must also be checked by him.

2.3.4 Incorrect choice of connection material

The wrong choice of connection material can lead to overheating due to increased contact resistance and loosening of the connections. This can cause fires.

- ▶ Material connection according to intended use (according to DIN EN 61210 for receptacles).
- ▶ Use suitable wires (temperature resistance and cross-section).

2.3.5 Damage of the electrical connection area

Incorrect transport may damage the electrical connection area. This could lead to an electric shock hazard.

- ▶ Never carry tubular heating elements at the connections.
- ▶ Never use tubular heating elements with deformation in the shape and position of the electrical connection area.

2.3.6 Use of damaged tubular heating elements

In case the tube sheathing surface of the tubular heating element is warped or damaged (e.g. cracks or corrosion due to wrong transport, storage and / or handling), it is possible that live parts get accessible and this could lead to malfunction, electric shock or burning hazard.

- ▶ Carry out transport and storage as described in these operating instructions (see chapter 3 transport and storage).
- ▶ Never use damaged tubular heating elements.
- ▶ Never deform tubular heating elements subsequently.
- ▶ Never touch cracked tubular heating elements that are under voltage.

2.3.7 Overvoltage on tubular heating elements

Overvoltage on the tubular heating element can cause fire and electric shock.

- ▶ Operate the tubular heating element only with the intended nominal voltage according to the drawing or type plate.

2.3.8 Insufficient clearance and creepage distances

Insufficiently long clearances and creepage distances to conductive housing parts when connecting the tubular heating element can cause electric shock to persons.

- ▶ Maintain minimum air clearances and minimum creepage distances when connecting the tubular heating element.
- ▶ Construction according to DIN EN 60335-1 (general guideline) and depending on the application also according to DIN EN 60335-6 (valid for backing ovens) and DIN EN 60335-2-30 (valid for storage heaters). Pay attention to the regional regulations.

2.3.9 Hot surfaces

Tubular heating elements heat up heavily during operation. After switching off the heat is retained for some time. This leads to a risk of burning.

- ▶ Do not touch the tubular heating element, which is in operation or was switched on recently.

2.3.10 Use of the tubular heating element outside its intended use

In case of using the tubular heating element outside the intended use, there are hazards of burning and electric shocks. By doing a misuse (e.g. usage of the tubular heating element in the application baking oven as room heating, usage of the tubular heating element in the application storage heater inside the application without sufficient safety distance, etc.), a hazard of burning consists.

- ▶ The tubular heating elements must be used only as described in this operating manual.

2.3.11 Application baking oven only: Incorrect use of baking utensils

Incorrect use of baking utensils (e.g. silicone moulds, meat thermometers) in the application can result in smoke appearance, a hazard of burning and possible adverse health effects.

- ▶ Use of suitable baking utensils.

2.3.12 Humidity

Tubular heating elements as single components, which are not built-in into an appliance, have protection class IP00.
In case of liquid entry, a hazard of electric shock consists.

- ▶ Tubular heating elements must be protected from humidity and accessibility to the electric connections.

2.3.13 Application baking oven only: Material degradation

Oxidation processes on the material surface of the tubular heating element can cause hammer scale. During the product lifetime, particles of the tubular heating element may fall into the oven chamber or onto the food.

- ▶ Do not eat the food, if particles have fallen on the food.
- ▶ Replace the tubular heating element.

2.3.14 Application baking oven only: Steam in the oven

When opening the oven door, there might be a risk of scalding due to steam.

- ▶ Do not open the oven door if there is steam in the cavity.

2.3.15 Application baking oven only: Incorrect material selection of tube sheathing

Particularly in the case of mixed applications such as air, water and steam, shock cooling of the tubular heating element can lead to chemical changes in the material or the material surface. These changes may cause health impairments under certain circumstances.

- ▶ Depending on the application, care must be taken to select the appropriate material.

2.3.16 Sharp edges

Packaging boxes and mechanical parts of the tubular heating element (e.g. metal parts) can have sharp edges. People can cut themselves into hands or fingers.

- ▶ Wear safety clothing during transport and installation.

2.3.17 Non-compliance with tightening torques

If the tightening torques are not observed during mechanical fastening when installing the tubular heating element in the application or if the mounting parts are fastened in a tilted manner, there is a risk of injury from loose radiators in the application.

- ▶ Tubular heating elements must be tightened to the tightening torques described in these operating instructions (see chapter 4.2 – Electrical connection). If the required tightening torque specifications are not described, please contact E.G.O..

2.3.18 Application baking oven only: Strand breakage due to mechanical stress

In the case of a hinged flange, mechanical stress can lead to strand breakage, creating a risk of electric shock for persons.

- ▶ Use of a highly flexible wire.
- ▶ Comply with the appropriately necessary constructions.
- ▶ Ensure that sufficient edge protection is available.

2.3.19 Smoke appearance

During the first use of a brand-new tubular heating element an obvious smoke appearance will be visible. Health impairments can be possible.

- ▶ Ensure sufficient and continuous fresh air flow.

2.3.20 Application baking oven only: Unsuitable cleaning of the tubular heating element

Cleaning the oven or the tubular heating element itself with unsuitable cleaning agents may cause adverse health effects to persons.

- ▶ Use only commercially available household oven cleaning agents that do not attack the tubular heating element.
- ▶ Do not spray the tubular heating element directly with cleaning agent.

2.3.21 Application baking oven only: Corrosion on the tubular heating element surface

Corrosion on the tubular heating element surface caused by contact with organic substances (e.g. grease splashes) can lead to health problems.

- ▶ Position food with sufficient distance to the tubular heating element surface.

2.3.22 Application storage heater only: Dust deposits on the tubular heating element

Booster function can cause unpleasant, strong odours due to dust deposits on the tubular heating element. This can cause adverse health effects for persons.

- ▶ Regular cleaning of the interior.

2.3.23 Thermal load on tube end and tube sheathing

Exceeding the maximum temperature leads to thermal decomposition of the sealing elements at the tube end. This may cause damage to health. After complete thermal decomposition of the sealing elements, touching the end of the tube may cause an electric shock.

- ▶ Maximum temperatures must not be exceeded. Please observe the maximum operating temperatures according to the material quality and sealing type as well as the respective valid approval, as described in these operating instructions from chapter 3.1.

3 Transport and storage

3.1 Classification of environmental conditions

For the *classification of environmental conditions,* we use the actual valid versions series of standards DIN EN 60721-3 and differentiate between:

Part	Description	Definition
1	Long-term storage	The product will be stored for a long time at a defined location; but it is not planned to use it within this period of storage.
2	Transport	The product will be transported through different climatic zones within a defined time. Directly weather influence can´t be excluded (truck loading area).
3	Stationary usage, partially weatherproof	A location, where the product is protected against weather influence. Directly weather influence can´t be excluded (canopied location).

From our sight of view, the important criteria are specified in the following schedule.

Environmental condition	Long-term storage		Transport		Stationary usage	
	⇐	⇒	⇐	⇒	⇐	⇒
Climate/Temperature [°C]	**--**	**0 …+70**	**-25 … 0**	**0 …+70**	**--**	**Application[1)]**
Climate/Humidity [% rh]	--	**max. 75**	**max. 93**	max. 93	--	Application[1)]
Climate/Air pressure [hPa]	700 … 1060					
Climate/Insolation [W/m²]	max. 700					
Climate/Airflow [m/s]	max. 30					
Biological	No mould growth, no rodents or other vermin.					
Chemical active	Salt fog can occur not roundly closed at locations nearby the coast and at the open ocean.					
Mechanical active	max. 30 mg/m³ sand in the air max. 0,2 mg/m³ dust (aerosol content)					
Mechanical	Sinusoidal vibration till 1,5mm, 5m/s², 2…200 Hz possible Push till 40 m/s² possible					
Period [Month]	--	max. 6	max. 1	max. 3	--	ca. 120

[1)] The climatic conditions at the location refer to the so-called standard atmosphere (23°C / 50% rh). The location temperature at tube end of the heating element is limited by the used sealant quality.

Sealant quality	**Max. operation temperature [°C]**	**Max. operation temperature UL [°C]**
Silicone	200	150
PTFE	250	180

3.2 Actions and instructions

- Temperature fluctuations greater than 10 K/h should be avoided during the storage to block the generation of condensate.
- The tubular heating elements should be stored for 12 to 24 hours close to the production line before fitting to equalize any temperature differences. The packing has to be opened to prevent any condensation of the moisture in the air (below the dew point!).
- If the periods specified in the table on page 12 are exceeded, the insulation resistance values may be affected, which could result in a reduction of the resistance to high voltage. In these cases we recommend to carry out an additional check and drying out the tubular heating elements as necessary.
- Have a storage temperature between 0 – 70 °C.
- Store dry in a closed room (hygroscopic insulation material).
- Have a protection against corrosion and pollution.
- Use suitable packaging to prevent damage to the product.
- For block storage: Stack a maximum of two tubular heating element pallets on top of each other with the maximum of own weight.
- Recommended drying parameter:

Product group	Temperature [°C]	Time [h]
tubular heating element	≤100	>24

Temperatures named in the chart above should not be exceeded in any cases!

- Other temperatures and drying times have to be agreed with the development department for tubular heating elements at E.G.O..

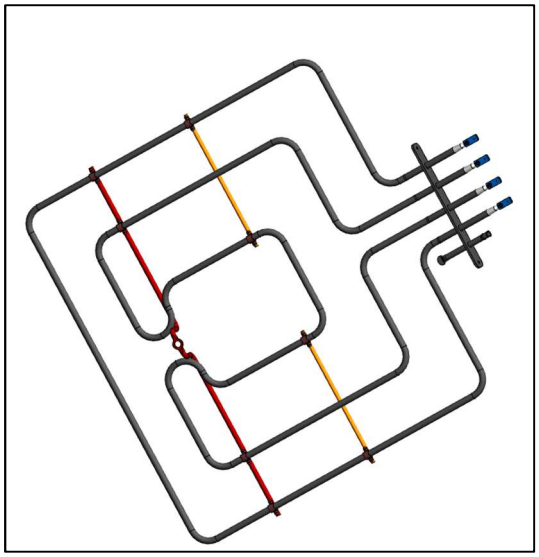
4 Installation and Commissioning

4.1 Mechanical installation

This chapter lists the most common mounting variants for tubular heating elements in the applications baking oven and storage heater. For mounting variants other than those listed here, please contact E.G.O..
Assembly of tubular heating elements must be carried out according to the specific instructions of the application manufacturer.

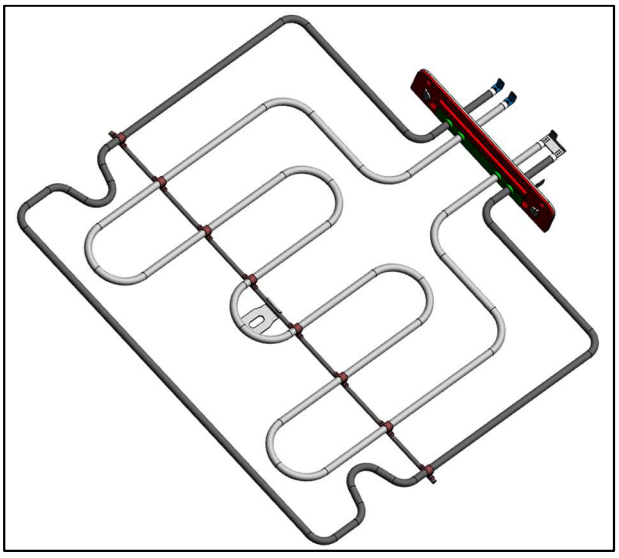
4.1.1 Variant 1

Top heating grill element with fixed flange and a support bar.



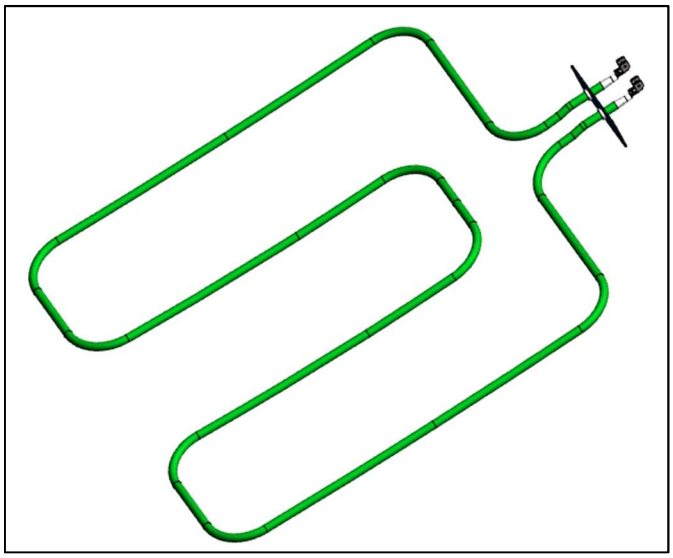
4.1.2 Variant 2

Top heating grill element with a tiltable flange and a support bar.



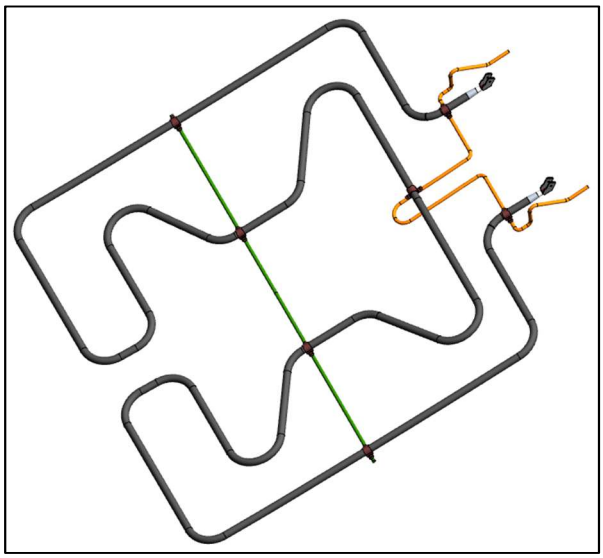
4.1.3 Variant 3

Bottom heating element with a fixed flange.



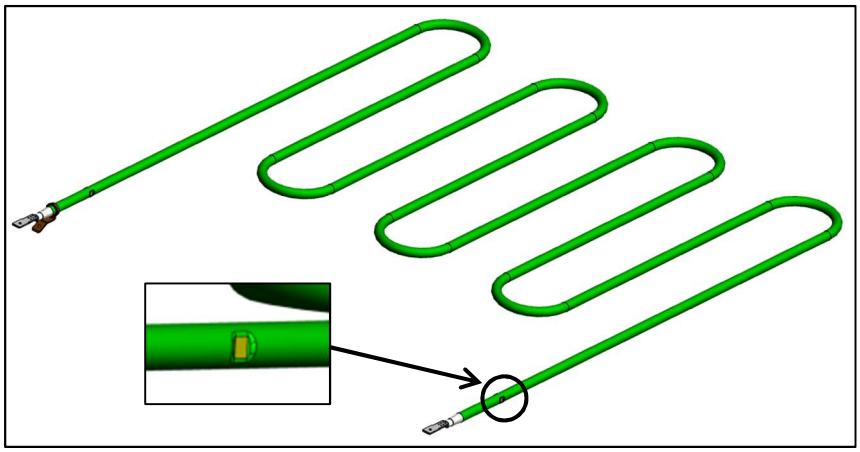
4.1.4 Variant 4

Bottom heating element with support bars for clamping.



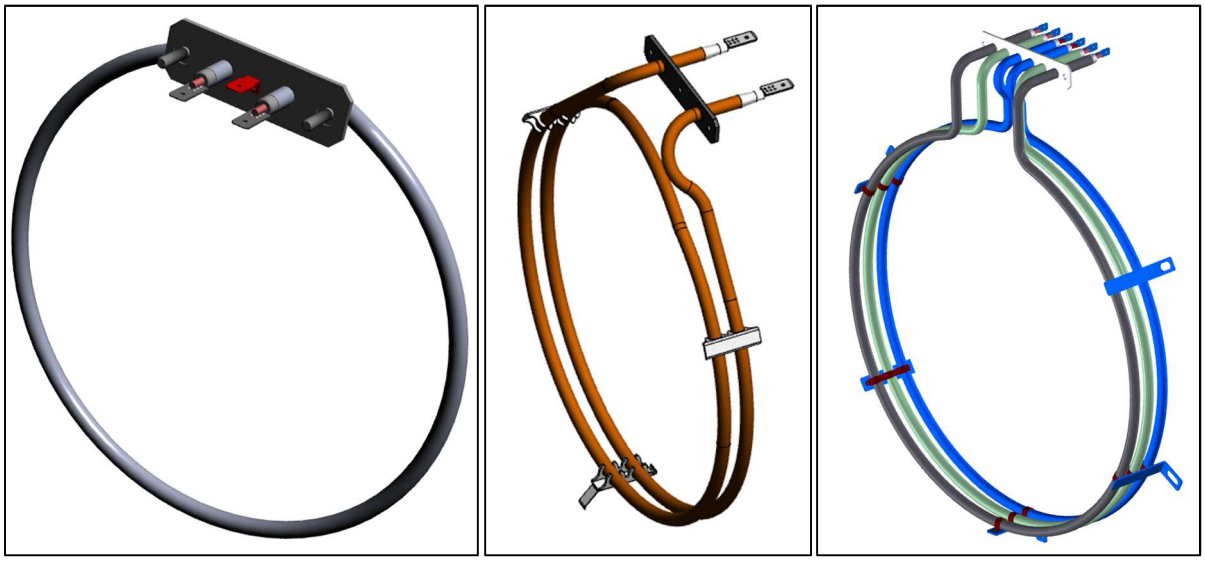
4.1.5 Variant 5

Bottom heating element for clamping directly in oven wall.



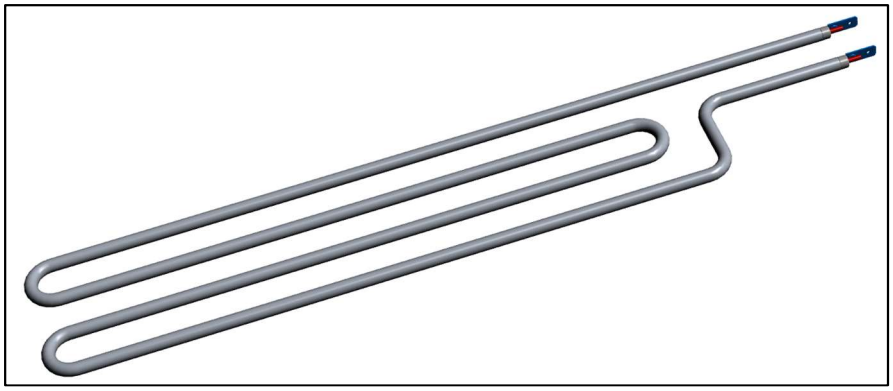
4.1.6 Variant 6

Fan heating elements with a fixed flange.



4.1.7 Variant 7

Storage heating element.



4.2 Electrical connection

4.2.1 Basic information on the electrical connection

- ▶ Observe the corresponding type drawing and the technical data sheet before connecting the tubular heating element.
- ▶ Observe the cross-section, insulation material and circuit diagram according to the type drawing / technical data sheet.
- ▶ Observe national standard information on electrical connection, such as DIN EN 61210.
- ▶ Make sure that the shape and position of the electrical connection are not changed (e.g. bending).
- ▶ Ensure permanent low-resistance connection.
- ▶ Use only conductive and insulating material, which is designed for the high temperatures in the appliance with tubular heating elements.
- ▶ Maintain sufficient air and creepage distance to conductive housing parts.
- ▶ Ensure that the tubular heating element housing is properly and permanently connected to ground potential (if necessary). Consider according to valid national guidelines.

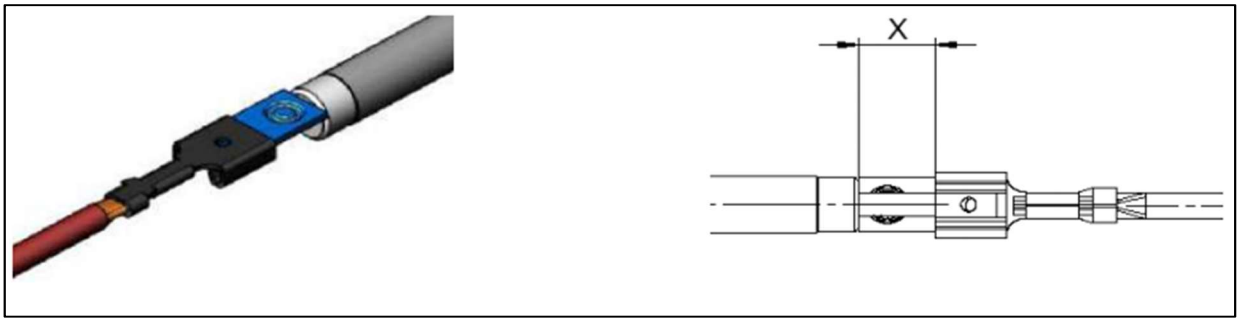
Observe the following instructions for electrical connection and earthing of the tubular heating element:

- Plug connection:
  - Ensure that the flat receptacle on the flat plug is firmly seated.
  - Do not bend the connection when plugging it in.
- Screw-connection:
  - Pay attention to the tightening torque and secure fit of the cable.

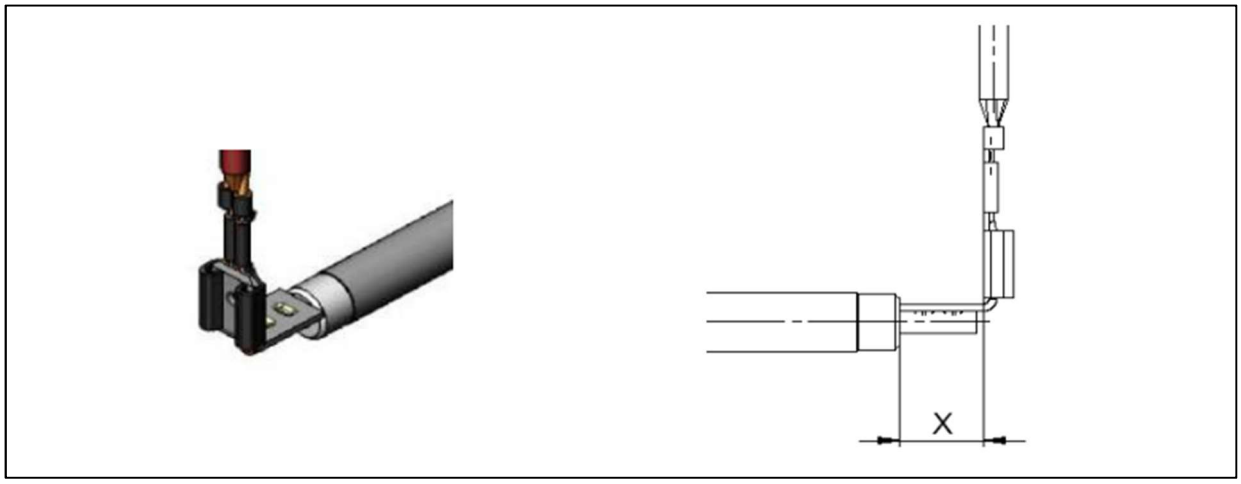
4.2.2 Plug connection for tubular heating elements for the application baking

We refer to the valid standard DIN EN 61210 as well as relevant valid DIN standards for plug and screw connections.

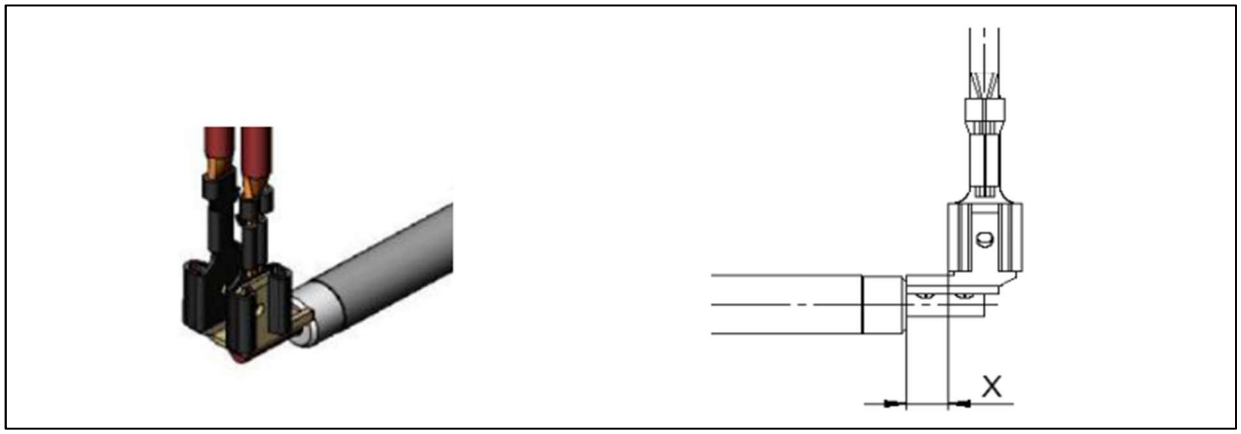
Plug connection straight



Plug connection single bended



Plug connection twin bended



- Use 6.3 x 0.8 receptacles for tabs of iron (Fe) / Nickel (Ni).
- Use suitable connection material with a temperature resistance of ~150-250 °C depending on the design of the used sealing quality and approval (e.g. VDE, UL, etc.).
- Depending on the application we recommend stranded wires with a temperature resistance of 250 °C and higher.

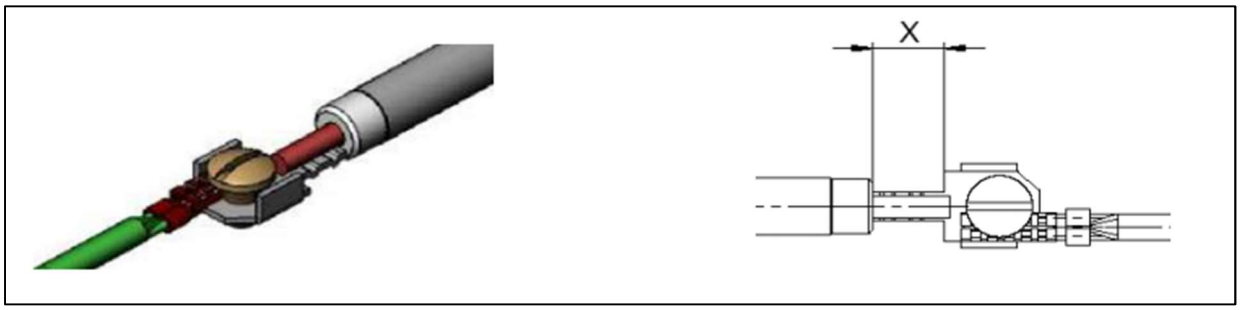
A use of group connectors has to be tested by the customer according to the appliance.

- When using group connectors:
  - Use only group connectors which have a material approved for temperatures in the specific application.
  - Use receptacles that correspond to the push on and pull off forces according to the DIN EN 61210.

4.2.3 Clamping Bracket connection for tubular heating elements

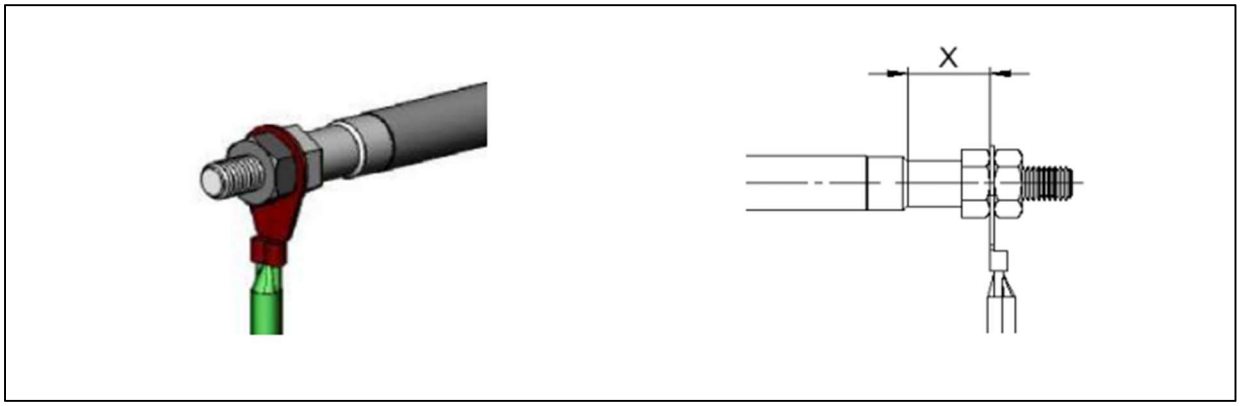
We refer to the valid standard DIN EN 60335-1 as well as the relevant valid DIN standards for flat and screw connections.

Clamping bracket



- Observe correct tightening torque (e.g. M4 → 1,2 Nm rated torque and M5 → 2,0 Nm rated torque)
- We recommend the mounting direction as shown in the picture above.
- Cable lugs according to DIN 46225 are allowed.

Threaded bolt



- Observe correct tightening torque (e.g. M4 → 1.2 Nm rated torque and M5 → 2.0 Nm rated torque)
- Hold up the nut behind crimped cable lug while tightening the front nut.
- We recommend cable lug according to DIN EN 46225 form A.

4.2.4 Ground the tubular heating element

1. Depending on the application, assess whether and which components need to be integrated into the earthing concept.
2. Establish electrical connection.

5 Cleaning and Maintenance

5.1 Cleaning

5.1.1 Application baking oven only: cleaning of a tubular heating element

- Use only commercially available household oven cleaning agents that do not attack the tubular heating element.
- Do not spray the tubular heating element directly with cleaning agent.

5.1.2 Application storage heater only: cleaning of a tubular heating element

- Regular cleaning of the interior.

5.2 Maintenance

EGO Tubular Heating Elements cannot be repaired.

- A damaged tubular heating element has to be replaced by a completely new one.

6 Disposal

- Do not dispose of the tubular heating element with household waste.
- Dispose of the tubular heating element in accordance with locally applicable regulations.

7 Technical data

For further details please refer to our type drawing and our technical data sheet.

8 Contact

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