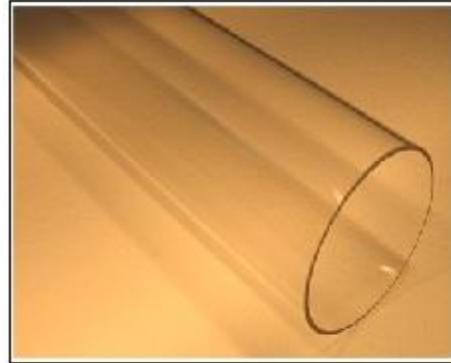


Setup & Use Tips for
TUBES AND VACUUM FLANGES

Memorandum of Tube Characteristics and Limitations

QUICK INSTALLATION GUIDE



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FOREWORDS

It is very important that the tubes and flanges installed on furnaces are set up and utilized properly. Having the necessary knowledge on their capabilities and functions will allow the user to perform experimentations under the most ideal conditions and attain the best possible results. This also ensures that the longevity of the furnace components is best preserved.

Different kinds of tubes have different characteristics that possess their own inherent limitations. This guide aims at providing existing and prospective users the basic knowledge necessary for properly utilizing and maintaining the tubes. It also serves to help the users to understand the characteristics of each tube type and the extent of their capabilities.

TUBES

Below are some basic properties of the two most common types of tubes used on MTI's line of tube furnaces. Please take time to get familiarized with their characteristics and use them accordingly.



ATTENTION:

Tubes are consumable parts that are not covered by MTI's one year limited warranty. It is the end user's responsibility to be cognizant of their properties in order to ensure their full utilization with the utmost safety.

Quartz:

- Transparent color
- Max. Temperature: 1200 °C
- Excellent resistance to thermal shock; offers maximum versatility with all furnaces' heating and cooling rates
- Can be used under vacuum conditions at temperature settings lower than 1000 °C

Alumina:

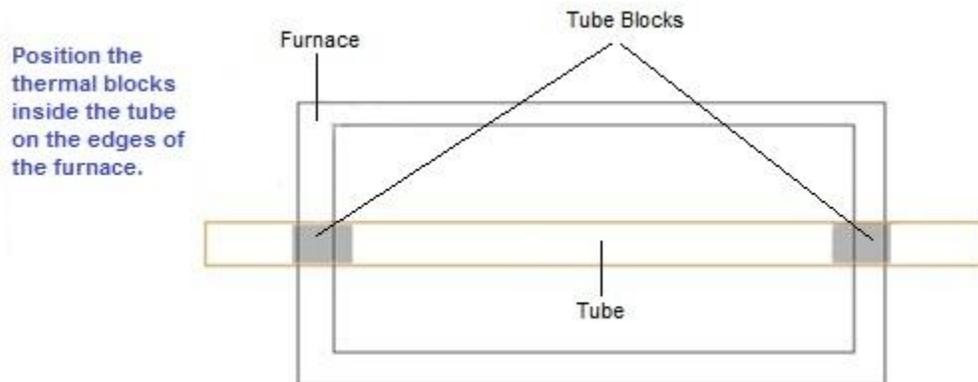
- Beige color
- Max. Temperature: 1800 °C
- Susceptible to thermal shock; to prevent tube from cracking: heating rate must not exceed 5C/min for temperatures above 1500 °C and cooling rate must not exceed 5C/min for temperatures above 800 °C
- The tube gets softened when temperature is greater than 1500 °C. Use of vacuum above this temperature is strictly prohibited as the vacuum will cause the tube to collapse when it becomes softened

SETTING UP THE TUBE AND VACUUM FLANGES

Properly setting up the tube and vacuum flanges prior to heating will ensure the furnace to work under the most ideal conditions. This will insulate the heat from the flanges while simultaneously preventing the dissipation of heat from the furnace chamber. The insulation of heat stabilizes the heating zone which in turn expends less energy and places less wear on the heating elements.

Please use the tips below for safe and proper handling of the furnace equipment.

1. Refractory tube blocks should **ALWAYS** be inserted inside the tube and placed on both ends of the furnace casing (shown in the picture below).



2. Install the vacuum sealing flanges on each side of the tube using the picture below as reference. Seal the flanges by tightening the screws to finish the assembly.



3. Limit the pressure regulator attached to the gas tank to below 1.1 atm before filling the tube with gas. Keep the vacuum valve(s) open during gas filling to avoid high pressure from building up inside tube.

WARNING:

- Tube furnaces are designed to be used under vacuum with low pressure gases. **NEVER** inject gas into the tube with pressure higher than 1.2 atm. Pressure build up inside the tube may cause the flange(s) to be catapulted which may cause injury or death.
- Use of vacuum on alumina tubes at temperatures over 1500 °C is strictly prohibited.

4. MTI will not be responsible for any equipment damage, physical injuries, or fatalities resulting from negligence, misuse and lack of proper knowledge of the end users. For further guidance on using the tube furnace, please contact MTI engineers at info@mtixtl.com for assistance.

Please call or email MTI, assistance will be provided within 48 hours.

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