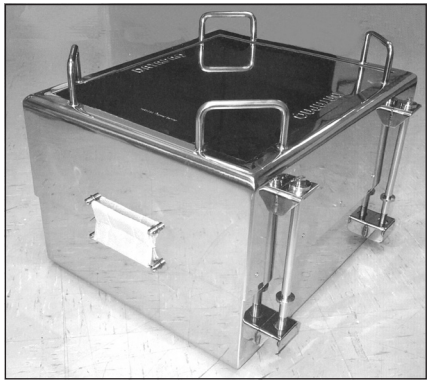
Furnace Tracker®

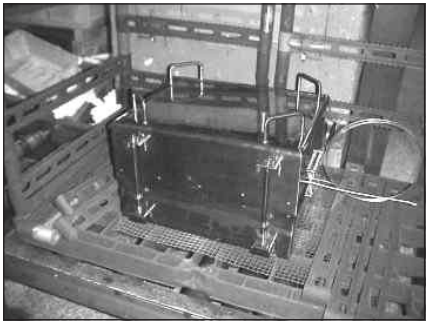
TB4939 Thermal Barrier

USER GUIDE

THE TB4939 thermal barrier is designed specifically for use in surveying applications in sealed-quench carburising furnaces and tempering furnaces. It may also be used in other types of furnace where conditions do not exceed the barrier's specification (see below). *The TB4939 is not designed to go though the oil quench, but is designed to sit above the oil and to cool within the watercooled jacket that surrounds the oil-quench chamber.*



Datapaq® 4900 Series thermal barriers combine experience with advanced design technology to give maximum thermal protection to the data logger as the system passes through the furnace. Using a balanced combination of microporous insulation and phase-change heatsink, the logger is kept at a maximum temperature of 58°C/136°F



throughout the process, even though the external temperature may exceed 1,000°C/1,832°F. For safety reasons, all exposed surfaces of the microporous insulation are covered with Mullite textile material rather than with

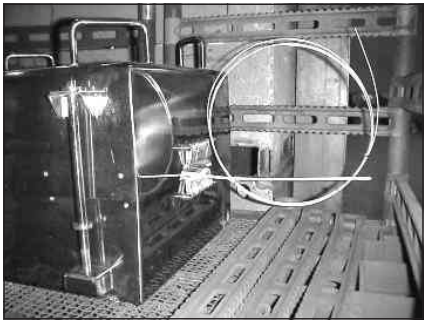
ceramic fiber cloth. At the thermocouple exit, the Mullite textile is formed into a user-replaceable strip.

Before Use

Before using the thermal barrier for a survey, it should be fully assembled (barrier and heatsink, but no logger), then heated in a furnace at 400°C for 5 hours to dry out any residual moisture from the manufacturing process. After this it should be removed from the furnace and disassembled immediately, then left to cool to ambient temperature before use in a survey.

Assembling the Barrier

After placing the lid on the thermal barrier, locate the bolts in the side nuts and tighten using the T-wrench provided. Do not overtighten: hand-tightening plus a half-turn of the wrench should be ample. The TB4939 is supplied with a container of anti-seize compound which must be used to coat the bolt threads before each run.

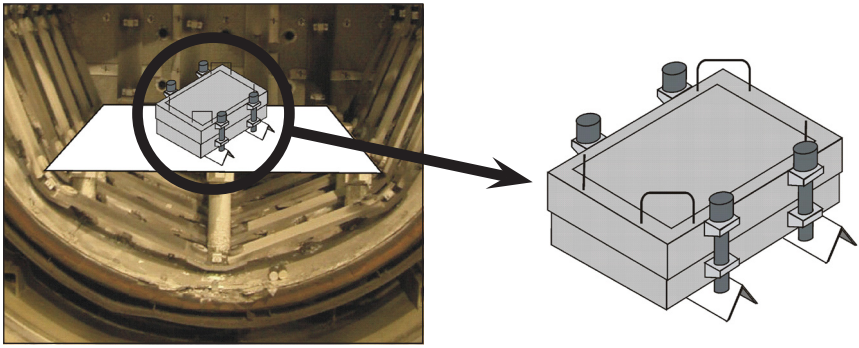


Placing in the Product Basket

When placing the barrier in the product basket leave enough room for the antenna to exit the barrier without distortion. Ensure the insulation on the antenna is intact and that it does not touch the product basket sides, or any parts that make up the ballast load.

Use in a Vacuum Furnace

Although designed for use in sealed quench and tempering furnaces, some customers will want to use the TB4939 in vacuum furnaces. If the barrier is to sit on a solid layer of ceramic (or steel, etc.) rather than on the open mesh of a product basket, supports (e.g. two lengths of angle-iron) should be placed beneath the barrier so the heating and cooling is even.

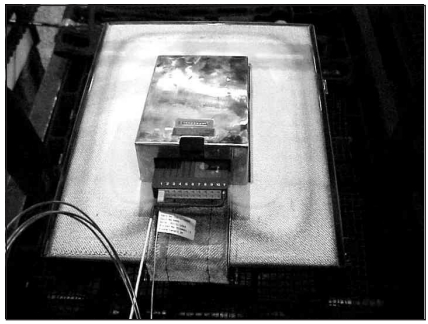


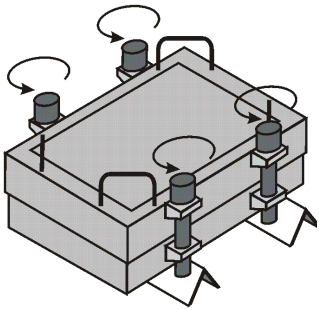
If a gas quench is used in the vacuum furnace you should avoid the quench hitting the top of the barrier directly and thereby cooling it unevenly; if either heating or cooling is uneven, the casing of the barrier may distort severely. If necessary, use a deflector plate on top of the barrier to shield it from the direct blast of the quench; contact Datapaq for details.

Should the TB4939 barrier be used in a vacuum furnace, the maximum furnace temperature is limited to 1,050°C/1,922°F – or to 1,100°C/2,012°F if it can be wrapped with two layers of 25-mm/1-inch-thick Superwool insulation.

Removing the Logger

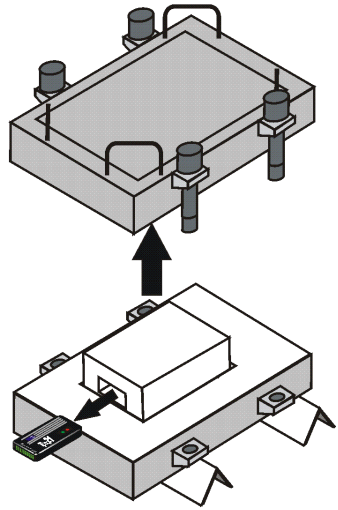
The logger must be removed as soon as possible after the barrier has exited the furnace. Do not leave the logger in a closed barrier or it will overheat. Follow the procedure shown below.

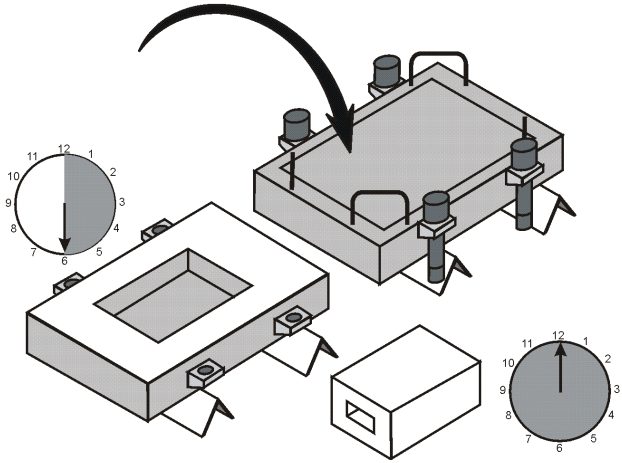




I *Immediately after the barrier exits the furnace, place on supports (e.g. angle-iron) and completely unscrew all bolts.*

2 *Remove lid, using hoist if possible; wear heat-resistant gloves. Remove logger from heatsink.*





3 *Remove heatsink from barrier and cool for 12 hrs (if repeat surveys are required within a short period, obtain a second heatsink). Place barrier lid on supports and cool for 6 hrs.*

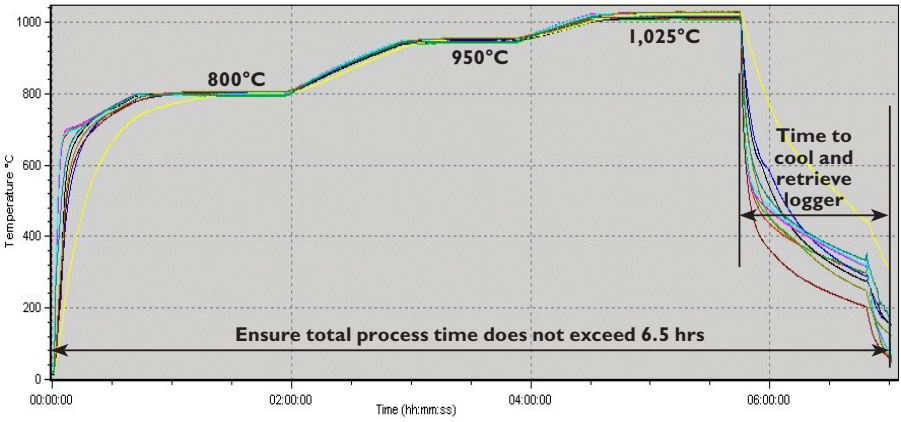
Specifications and Thermal Duration

TB4939

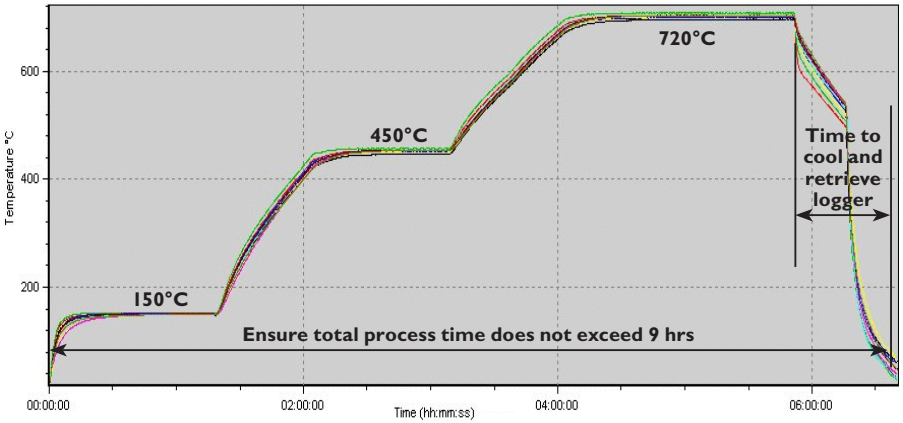
Dimensions	Height inc. handles	Width	Overall width	Length	Weight
	364 mm 14.3 in.	406 mm 16.0 in.	466 mm 18.3 in.	507 mm 20.0 in.	44 kg 97 lb

Temp °C	200	400	600	800	1,000
Temp °F	392	752	1,112	1,472	1,832
Duration (hrs)	27	18	10.5	8.5	7.5

The specified maximum duration is based on average (not maximum) temperature in still air in the furnace throughout the process; in turbulent furnace atmospheres the permitted duration could be reduced. Duration must include the time to cool at the end of the process (above the oil), plus any transportation time from the exit of the furnace to the area where the thermal barrier can be opened and the logger removed; this is known as 'total process time' (see sample temperature profiles below). Total process times for vacuum furnaces are generally longer than process times for sealed quench and tempering furnaces. Contact Datapaq for more information on barrier duration in vacuum.

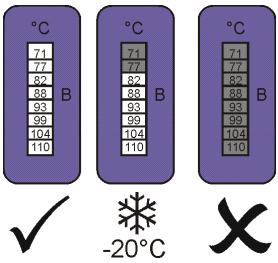


Example 1 *High-temperature 2- or 3-level survey in sealed-quench furnace.*



Example 2 *Lower-temperature 3-level survey in tempering furnace.*

Exceeding Specified Thermal Duration

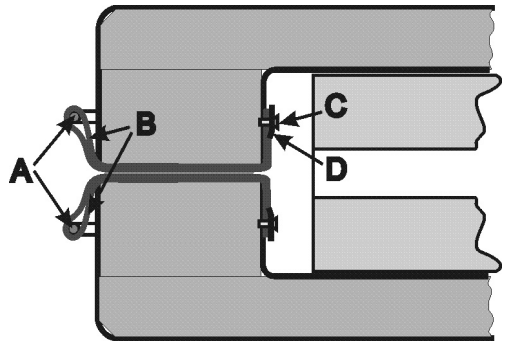


The temperature-indicator labels on the heatsink show the temperature reached during the process. Should the heatsink exceed 77°C/170°F (the color of the non-reversible labels will show this), the heatsink should be frozen at a temperature of -20°C/-4°F for 24 hours, and then left to return to room temperature.

Maintenance: Replacing the Thermocouple Wear-strips

The Mullite fiber wear-strips in the base and lid of the TB4939 barrier can be replaced by the user as follows.

1. Undo the screws retaining the bracket that secures the wear-strip inside the barrier (**C** and **D**).



2. Remove the old Mullite fiber wear-strip (**B**).
3. Thread the new Mullite fiber wear-strip over the small-diameter bar outside the barrier (**A**), and over the face of the inside insulation.
4. Fasten the ends of the new wear-strip with the bracket and screws (**C** and **D**).

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