

## Work Tube Packages

### Air, gas atmosphere and vacuum work tube packages for TF, TS & TG tube furnaces

Work tube packages are listed in the optional accessories section of each tube furnace, with the intention of providing a 'quick ordering' system for combining the accessories required for the specified application. Each package comprises a work tube of the specified diameter with insulation plugs or heat shields appropriate for the operating atmosphere. A pair of end seals is included in the gas atmosphere and vacuum packages. A 3 mm diameter thermocouple gland with blanking plug is included in one end of all work tube packages for furnaces up to 1200 °C. Above 1200 °C one end seal will have a 10 mm diameter thermocouple gland with blanking plug to suit a probe thermocouple (probe thermocouple must be ordered separately).



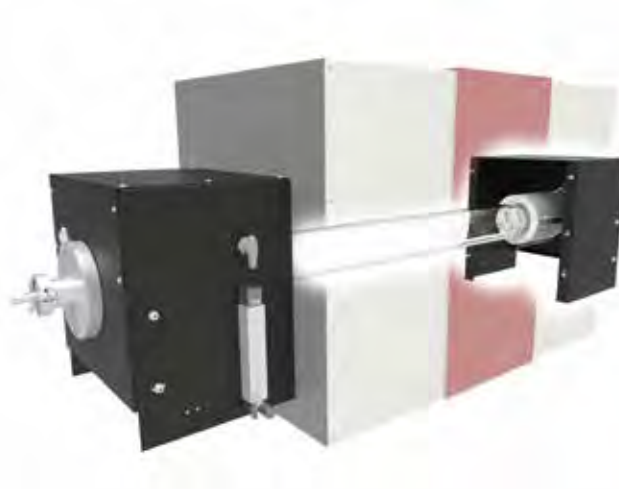
Work tube packages with extended length work tubes include guards as indicated in this image. The guards simply hook into the end plates of the tube furnaces and are each fixed with one screw.

#### The work tube material in the packages are:

- For TF, TS & TG 1200 °C furnaces there is a choice of mullite C610 / IAP or quartz.
- For TF 1600 °C furnaces there is a choice of RCA or mullite C610 / IAP.
- For F-range 1350 °C furnaces there is a choice of mullite or APM.
- For HTRH & HTRV 1800 °C furnaces RCA tubes are used.

See work tube selection guide on page 106 for maximum temperature limits.

**Alternatives to these packages can be created by selecting appropriate individual components.**



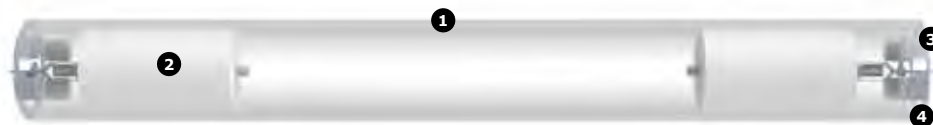
Attachment housings can be secured to the furnace for convenient vacuum / protective gas operation.

## Technical data

Work tube package	Type of package	Atmosphere				Type of end seals	Type of end insulation	leakage rate [mbar l/s]
		Air	Inert gas	Vacuum	Hydrogen			
1	Work tube package for air	Yes	No	No	No	None	Plug	-
2	Gas Atmospheres	Yes	Yes	No	Only with gas safety system p. 114 (LGSS)	6 mm gas inlet/outlet	Plug	<5x10E-2
3	Vacuum and inert gas	Yes	Yes	Yes	Only with gas safety system p. 114 (LGSS)	NW vacuum flanges	Radiation shield	<5x10E-2
4	Comprehensive vacuum and inert gas package	Yes	Yes	Yes	Only with gas safety system p. 115	Water-cooled NW vacuum flanges	Radiation shield	<5x10E-3

## Work tube package 1 for air

Tube furnace work tube package for air contains:



- 1) Standard length work tube
- 2) 2 x insulation plugs for standard length work tube
- 3) Support bracket for insulation plugs & thermocouple
- 4) Probe thermocouple access:
  - a: Up to 1200 °C:  
Diameter 3 mm gland to suit optional type N probe thermocouple
  - b: Above 1200 °C:  
10 mm gland with PTFE seal and blanking plug to suit optional type R or B or 20/40 probe thermocouple assembly

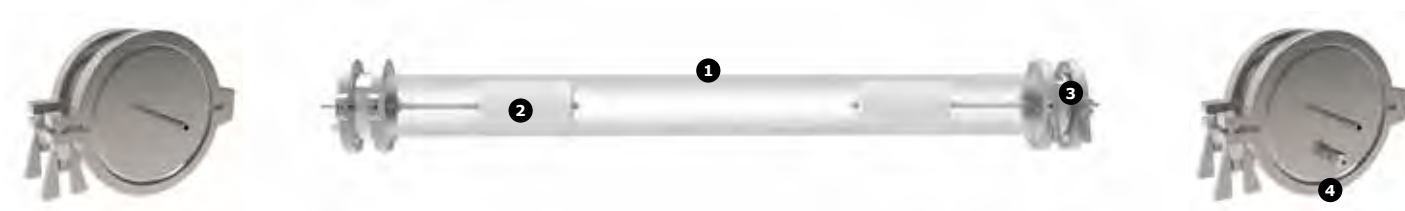
Available for all tube furnaces

## Work tube package 2 for gas atmosphere

The work tube package for gas atmosphere is suitable for either inert gas or hydrogen atmosphere.

If use with hydrogen a gas safety system **MUST** be used (see page 114).

Tube furnace work tube package for gas atmosphere contains:



- 1) Extended length work tube
- 2) 2 x insulation plugs for extended length work tube
- 3) Work tube end seals:
  - 1 x gas inlet/outlet pipe
  - 1 x gas inlet/outlet pipe + thermocouple gland
- 4) Probe thermocouple access:
  - a: Up to 1200 °C:  
Diameter 3 mm gland and blanking plug to suit optional type N probe thermocouple
  - b: Above 1200 °C:  
10 mm gland with PTFE seal and blanking plug to suit optional type R or B or 20/40 probe thermocouple assembly

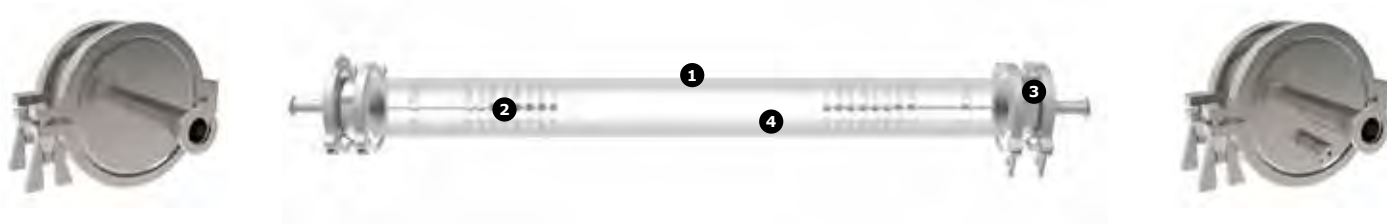
Available for all tube furnaces

**NOTE:** For hydrogen atmosphere a gas safety system **MUST** be used (see page 114).

## Work tube package 3 for vacuum and inert gas

Available for work tube outer diameters 60, 86, 125, 150, 200 mm.

Tube furnace work tube package for vacuum atmosphere is suitable for vacuum pressure to  $5 \times 10^{-2}$  mbar or  $1 \times 10^{-5}$  mbar depending on type of vacuum pump used (page 112) and contains:



1) Extended length work tube

2) 2 x radiation shields

3) Work tube end seals:

1 x NW16 vacuum flange + thermocouple gland

2 x end plates: 1 x NW25 (compatible with low vacuum pump package); 1 x NW40 for 60 mm work tube outer diameter or 1 x ISO-K 63 for 86, 125, 150 & 200 mm work tube outer diameters (compatible with high vacuum pump package)

4) Probe thermocouple access:

a: Up to 1200°C:

Diameter 3 mm gland and blanking plug to suit optional type N probe thermocouple

b: Above 1200°C:

10 mm gland with PTFE seal and blanking plug to suit optional type R or B or 20/40 probe thermocouple assembly

**Available for all tube furnaces**

## Work Tube Package 4 vacuum applications with low leakage and inert gas atmosphere

The package also includes furnace mounted flange holders. The vertical versions include a stand and differ slightly.



1) Overflow valve

2) Water cooled flange requires 2-4 l/min cooling water

3) Fibre wool blankets

4) Radiation shields

5) Gas outlet with hand valve

6) Extended length work tube

7) Gas inlet / 6 mm compression fitting

8) Flow controller mounted in the frame

**Available for FHA, FHC, FST, FZS, HTRH, HTRV, HTRV-A**

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**NOTE:** Models up to 1350°C. No radiation shields included in the package. They have to be ordered **SEPARATELY**.