

**STANWELL MAGNESIUM PROJECT
INSTALLATION INSTRUCTIONS
FOR
MAGNESIUM ALLOYING FURNACES AND COVERS**



2 INTRODUCTION

2.1 General Description Magnesium Alloying Crucible Furnaces

To provide electrically heated magnesium alloying crucible furnaces generally in accordance with the drawings and data supplied with the contract documents including steelwork, insulation, electrical heating system and control panels.

	Magnesium Alloying Furnace
Capacity of furnace	9000 kg of magnesium
Overall dimensions	See Dwg. No. Q2050-MS-51-M-515/0005
Maximum temperature	800°C
Operating temperature	725°C
Melting rate	500 kg / hr. of magnesium
Element rating	220 kW on 690 VAC

2.2 Steelwork

Prefabricated steel structure of mild steel plate stiffened with rolled steel sections and arranged to support the magnesium crucible on the furnace wall refractory, the whole being arranged to stand on a level concrete floor.

2.3 Crucible

Supplied by others.

2.4 Load Cells

The complete furnace structure including magnesium crucible and contents is mounted on three (3) load cells designed to measure to a tolerance of ± 50 kg. in a range of 0-25,000 kg. A multi range weigh indicator with digital readout is mounted in the local control panel to display weights.

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The advertised repeatable accuracy of the load cells is $\pm 0.07\%$ of the gross weight, 30,000 kg. The actual accuracy of the net weight is affected by gross build up and attachments to ground and similar complexities.

2.5 Insulation

Wall Insulation -

152 mm of light weight insulating brick backed with 30 mm of microporous board and backed by 40 mm of calcium silicate board. The resultant theoretical heat transfer with a hot face of 725°C is less than 500 w/m². The expected temperature of the outer steel shell to dissipate this rate of heat transfer is 45°C above ambient.

Hearth Insulation -

The hearth and lower side walls beneath the base of the crucible is insulated with 100 mm of 94% Al₂O₃, low silica castable backed up with 100 mm of insulating castable. This castable has a limiting service temperature of 1815°C. In this instance the rate of heat transfer is less than 675 w/m² and the surface temperature is 55°C above ambient.

2.6 Heating

The Kanthal electrical resistance heating system is mounted on the wall of the furnace and consists of a free radiating nickel chrome alloy rods suspended on support pins embedded in the hot face brickwork. Element lead outs are brought out through high alumina ceramic tubes into insulated and forced cooled terminal boxes. Element interconnections are made in these terminal boxes. The elements are divided into two horizontal zones of equal rating.

2.7 Electrical Control Panels

Main Control Panel -

A freestanding sheet steel dust proof Main Control Panel is provided for each furnace and contains the following equipment: -

- Necessary interconnecting cables.
- Burst fired SCR element controller for each zone.
- Ammeters for element current.
- Excess temperature controller.
- Necessary relays, fuses, control transformers, etc.

Element temperature control is via the Plant Wide Control System (PWCS - supplied by others).

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Temperature set-point and process variable are via the PWCS.
Temperature set-point and furnace power are displayed on the Local Control Panel.

Alarms are via the PWCS.
All equipment is wired down to numbered terminal strips and arranged for bottom entry.

Local Control Panel -

Mounted adjacent to the furnace is a Vynckier polyester panel which contains the following equipment :-

- 2 - Zone temperature indicators.
- 2 - Zone power indicators.
- 1 - Metal temperature indicator.
- Heating zone control.
- Fault indication.
- Weight display.
- Compressed air panel cooler

All equipment is wired down to numbered terminal strips and arranged for bottom entry.

2.8 Principal Dimensions of Magnesium Alloying Furnace

Furnace Diameter : 3,010 mm (not including terminal box)

Furnace Height : 3,370 mm

Furnace Weight : 11,000 kg.

Furnace Drawing: Furnace General Arrangement - Q2050-MS-51-M-515/0005.

2.9 Magnesium Alloy Furnace Cover

To cover and insulate the top opening of the crucible a Furnace Cover is provided and consists of a fabrication in nickel/chrome alloy with a mild steel top plate and is insulated with ceramic fibre blanket.

The insulated Cover is arranged to be lifted by shop crane. Incorporated in the Cover is an open flanged aperture to accept a molten metal pump and a molten metal stirrer (supplied by others). Other openings are also provided to enable cover gas to be introduced and exhausted, full details of all openings in the cover are provided on drawing Q2050-MS-51-M-515/0006. The lid seals by gravity on a ceramic fibre rope seal located on the furnace top plate.

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To seal the area between the Furnace Cover and the exterior of the crucible an insulated set of four (4) manually removable Surround Seal Covers are provided. Surround Seal Drawing: Furnace Lid Surround Sealing Assembly - Q2050-MS-51-M-515/0022.

2.10 Principal Dimensions of Magnesium Alloying Furnace Cover

Furnace Cover Diameter : 2,170

Furnace Cover Height : 550

Furnace Cover Weight : 1,500 kg

Furnace Cover Drawing: Crucible Furnace Cover General Arrangement - Q2050-MS-51-M-515/0006.