



SPECIFICATION HS 001

SEMI AUTOMATIC HOT-PLATE WELDING MACHINE FOR DIN AND BS TYPE INDUSTRIAL CELLS

One off Hot Plate Welding Machine with 300mm x 250mm hot-plate.

The machine will have the axis vertical, so that the hot-plate is horizontal. The machine will be capable of welding both DIN and BS types up to 25 plate sizes, and cell heights up to 710 mm.

The machine will have a length of slat-type powered conveyor which will match the production line conveyor and will allow the operator to marshall cells into position ready for welding the lid on.

The operator will position the cell on the conveyor and power the cell into the welding position, where it will be halted against a retractable stop. The operator will place the lid into the lid nest, which will sense the lid and bring on the clamp automatically.

With the lid and cell now ready, the operator presses the cycle start button. The guard closes and the cell is lifted up to the weld level, the top of the cell is centred by a mechanism which also pulls out the walls of the cell using vacuum cups, to eliminate any slight bowing of the cell wall. The centring is aided by quick-change plastic “fingers”, which are sized for either the DIN or BS width. The centring is controlled front to back by bars which house the vacuum cups, and are brought in pneumatically and evenly about the centre using racks and pinions each side. The conveyor is raised to the correct height controlled by quick-change length bars. When the conveyor reaches the required height, the length bars contact a stop and its presence is sensed to allow the weld process to commence.

The machine is accurately made with the main frame being of thick steel plates, bolted up and dowelled to form a very rigid box. Generously sized bearings maintain accurate alignment of the components to the hot-plate and to each other. There are no bearings in the heat affected area.

A PLC provides reliable control, and the cabinet will be cooled to ensure reliability in high ambient temperatures. The welding cycle is automatic, but all machine functions can be manually controlled from the panel for setting up purposes. The machine is fully guarded, with interlocks on the moving guards, and isolation of the outputs is through a Pilz-type safety relay. Manual movement with the guards open is only possible through the use a key controlled override switch, for use by trained and authorised personnel only. The temperature of the hotplate is controlled, and melt and squeeze times can be set to optimise welding.



The hot-plate is thick enough to provide an even temperature at the surface. Cartridge heaters are carried in accurate gun-drilled holes, which are lined with stainless steel to provide good heat transfer and prevent them jamming in.

The general design of the machine is well-proven, based on years of experience of not only building machines, but also running them in a high production environment. They are very robust, and run reliably for years, in multi-shift production, with minimal maintenance.

A set of tools for either DIN or BS range of cells as per the client's requirement will be provided.

The tools are self-contained complete with clamps and melt and squeeze stops, so that type change-over is speedy with no loss of quality.

The tools comprise a common nest tool for BS lids and a similar tool for DIN lids, with an automatic clamp and sensor incorporated in the tool. Each size of lid requires a location plate which can be easily changed. The melt stops are incorporated into the nest, and once set should not need changing from type-to-type. Mirrors are provided to be fixed onto the hot-plate to match each lid type, (some commoning of mirrors to reduce changeover time is possible to be determined at the detail design stage) and a lower mirror common to all cells in each category. Location fingers for the centring mechanism are provided for BS and DIN, and spacer bars are provided for each cell type to guide the cell into the machine. Adjustable length bars are provided for each cell height.

Note that due to the design, tool changeover from one type to another will be rapid. No re-adjustment of the machine is required.

After change over all the stop settings are incorporated into the tools. Once fixed, these do not normally need re-adjustment.

Pre acceptance tests will be carried out in the UK prior to despatch. The client will be requested to supply ample quantities of production quality mouldings, prior to shipment, so that the pre shipment tests can be undertaken.

Warranty of the supplied equipment will be 12 months from date of commissioning in the Customer's premises but no later than 15 months from date of shipment from Manufacturer's premises.

The output from the machine will be approximately 1 cell per minute.

Service requirements:

Electricity: 380 Volts 3 phase 20 amp supply.

Compressed air: Dry clean air at 6 bar 10 cfm.

APPENDIX ONE.

Successful operation of the machine is only possible if the quality of the components presented to it is adequate. Most problems encountered with hot-plate welding are due to component variations of one sort or another.

(1) Some of the factors affecting weld quality.

There are a number of factors which affect weld quality and consistency, and unless these are taken into account, weld quality and productivity will be seriously affected.

- Cell height consistency and squareness of the top.
- Clean cutting of the cell burr-free.
- Good flatness in the cell wall.
- Lid flatness, and size control.
- Flash-free moulding of the lids.
- Material consistency and weldability.

(2) Some of the factors affecting functioning of the process.

There are a number of factors which will adversely affect the running of the machine, and unless these are taken into account, the machine will not function as intended.

- Pillar position has to be accurate and truly vertical, or the lid will not engage with the seals properly.
- Adequate chamfering of the pillar to engage the bore of the seal cleanly.
- The seal has to be of consistent size and flexibility.
- Cell dimensions have to be consistent, so that the cell positions itself in the guides accurately.