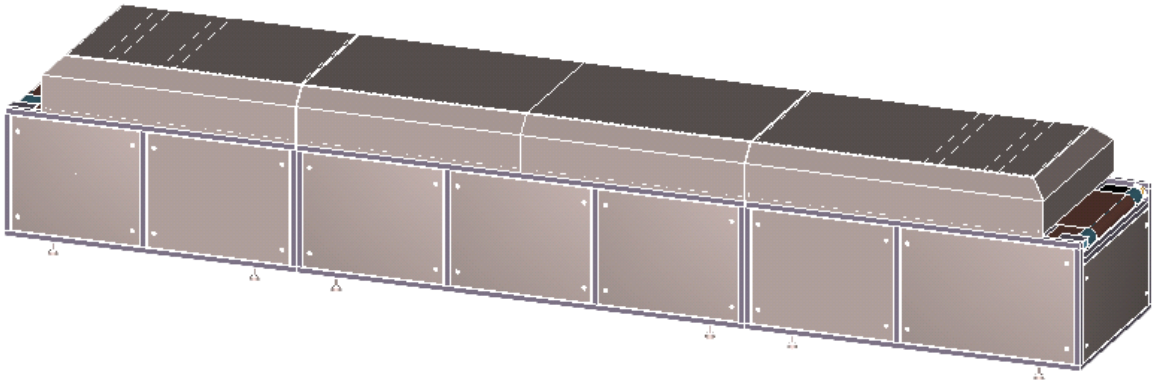
Horizontal conveyorized dryer
Typ HD 650
Modular build system



Process description:

The IR-drying line is designed to dry a carbon paste applied on printed circuit boards. The heating system ensures a fast and homogenous curing of the paste.
The printed circuit boards run through the process zone on a teflon-coated glass fiber textile belt.
Following the heating zone, the printed circuit boards are transported to a cooling zone for being cooled down again to less than 40°C.

Plant description basic frame:

The basic frame is made up of a stable welded steel frame. The outer jacket is made up of canted steel sheets. All the sheets allow to be opened with ease by entering catch locks and removed for allowing access. The plant is designed such that all components are clearly arranged. The basic frame is fitted with an insulated outer hood which for accessibility purposes allows the process muffle being mechanically folded up segment by segment.

Heating system:

The heating system is made up of several stainless steel process muffles. This modular design allows a later to be easily extended later by additional modules.
The number of process muffles is subject to the respective capacity required.

The stainless steel process muffle is made up of a double wall and insulated in the interior. This design ensures both a very good insulation value and a low energy consumption.
A further asset is that this plant design is clean-room-proof.
The process muffle allows to be opened segment by segment by spring covers, which ensure the access to both the product and the incorporated components.

The heating zone is made up of separately adjustable IR-heating zones. Medium-waved quartz glass radiators of the company Heraeus are used as heating source. The different radiators are combined as heating group and regulated by a temperature probe. The heating zones are arranged on top of the transport system on the process muffle cover.
As additional heatings and belt support, heating plates are built-in beneath the transport belt. The heating zones are arranged synchronously to the IR-zones. This arrangement can also separately be adjusted. In addition, the air is made circulating below the heating plate and over the printed circuit boards. This combination of the so-called IR-recirculating heating produces both a very exact temperature distribution and a very efficient drying process.

The fresh and exhaust air in each zone can be adjusted by throttle valves so that the escaping solvents can be sucked off in an efficient manner.

Cooling zone module:

The cooling zone is mounted in modular way behind the heating zone process muffle and is operated by fresh and exhaust air. The air is sucked in the upper area of the room by a blower (pipework not included in scope of supply) and blown on the material to be dried by slots from above and below and sucked off again. The slots are arranged such as to allow blowing and sucking by turns. In order to perform the cooling as effective as possible, a cooling register has been built-in.

Transport:

The transport is made by means of a temperature-proof and teflon-coated glass fiber textile belt. This textile belt runs over the heatable, coated aluminium plates, which serve also as belt support.
The speed allows to be adjusted infinitely variable and adapted to the line speed. The drive is made by a frequency-controlled three-phase current geared motor.

Control unit:

The control unit is incorporated in a separate switch cupboard.
The control element is made up of two different sections and elements, on the one hand the power pack and on the other hand the control unit itself.
The power pack contains the main contactors, fuses, semiconductor relays, protective motor switches and main power supply.
The control unit contains the PLC-control, make Siemens, and the controller components for heatings and drive.
The emergency stop is linked by a safety relay.
The plant is operated by a computer, which is designed to visualize the plant and organize the different temperature profiles. The visualization software to be VisiWin.
Apart from that, all process-relevant data are stored on the computer and allow to be retrieved for the process control.
The plant is set up according to VDE 0100, EN 60204 and UVV BGV 24 D and is checked accordingly.
A 3-couloured Towerlight serves to signal faults:

Safety control:

Each heating zone is controlled by a separate safety thermostat. The releasing temperature can be adjusted. When falling below or exceeding the belt speed and the set point temperature values, an indication will appear.
The fresh and exhaust air is controlled by a differential pressure gauge.

Technical data:

Plant length:	8.200 mm
Inlet:	250 mm
Heating length:	5.500 mm
Water for Cooling:	1.200 l/Std. 6-8°C
Plant width:	1.350 mm
Plant height:	1.300 mm
Temperature range:	20-250°C

Electric connection:	
Connected load:	82 kW
Power requirements:	400 V, 3P/N/PE 50 Hz or 480 V, 3P, PE, 60 Hz
Connected load Heating:	75 kW
Power consumption in operation:	about 45 % of total connected load

Exhaust heating module:	max. 1.500 m³/h
Supply air heating module	max. 1.500 m³/h
Exhaust cooling module:	max. 2.500 m³/h
Supply air cooling module:	max. 2 500 m³/h

Temperature profile:

Heating up to 220° C:	about 2 min.
Holding at 220° C:	8 min.
Cooling down to about 40° C:	4 min.
Total processing time at 0,5 m/min:	16,4 min.