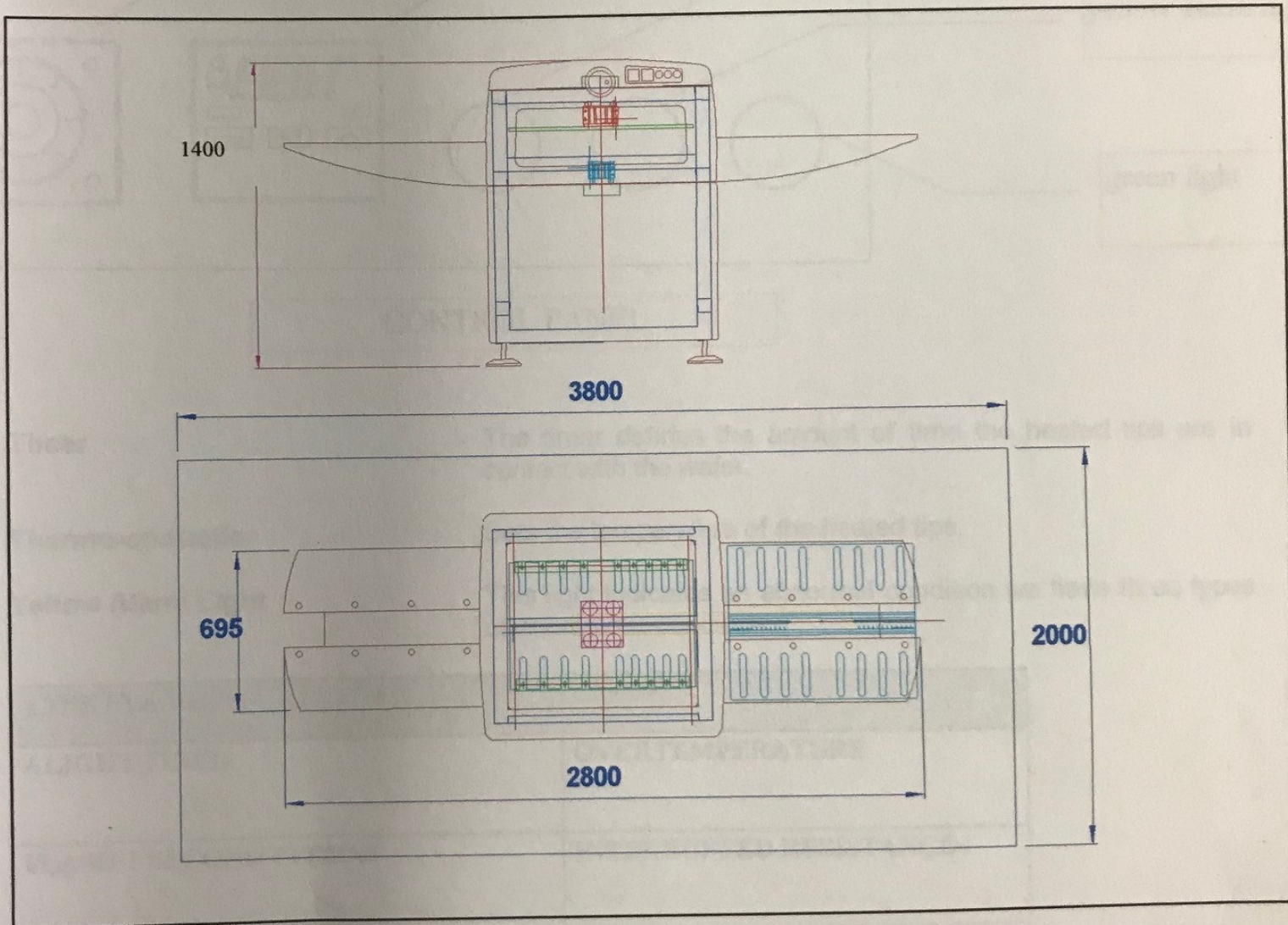


DESCRIPTION OF THE MACHINE

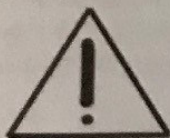
3.1 THE PURPOSE OF THE MACHINE

The AMM10 made by Piergiacomini Sud is a machine designed purposefully for the preparation of the wafers of multilayer printed circuit boards. Inner layers and pre-preg are piled on two reference pins to be then fixed together by a thermic process.



As shown in the diagram, the machine is made up of a central block and two side shelves. Two trays can slide alternately between the two shelves and the central part of the machine where the thermic fixing of the wafer is carried out; in this way it is possible to prepare a wafer on one side of the machine while the fixing is taking place on the other.

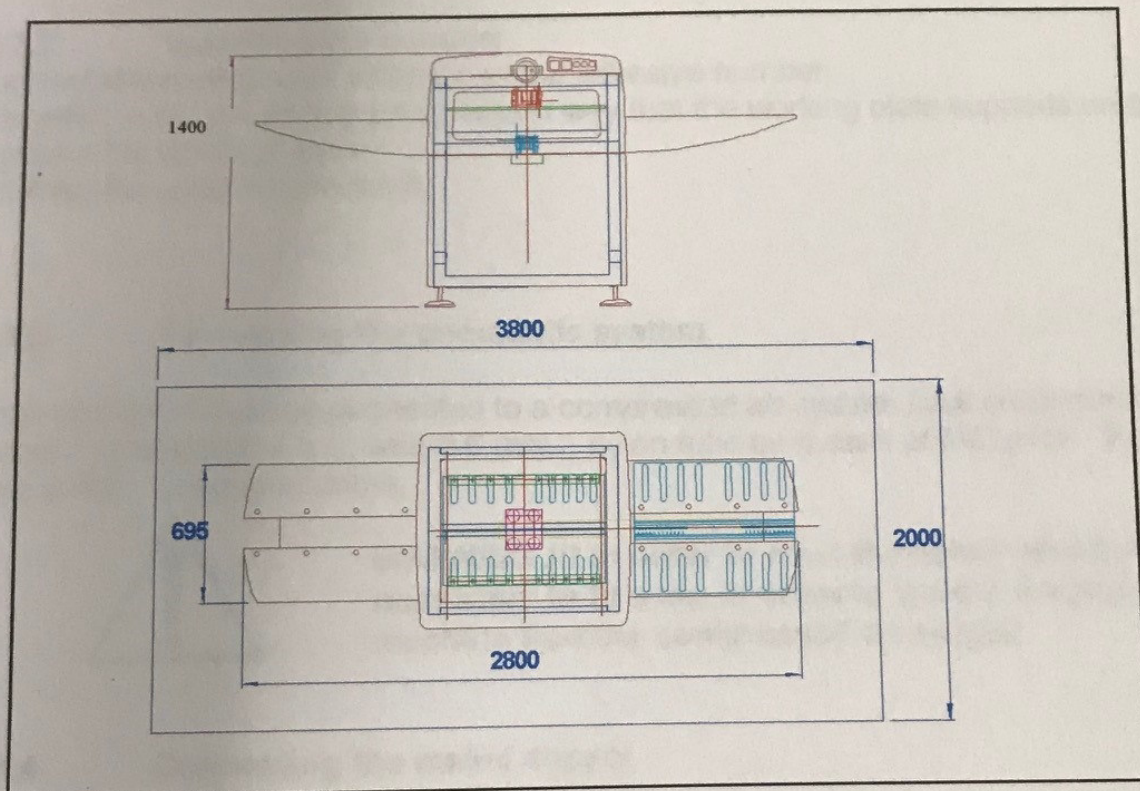
INSTALLATION



WARNING !!! The installation of the AMM10 requires a good knowledge of the machine and therefore should only be carried out by trained personnel.

1 NECESSARY WORKING SPACE

The diagram below shows the minimum dimensions required for correct operation of the AMM10 machine and its correct continuous working.



2 WORKING CONDITIONS OF THE MACHINE

The main working conditions of the machine with relation to company installations are shown below:

6.2.1 ENVIRONMENTAL CONDITIONS

- Working temperature: 10°C - 35°C
- Non working temperature: 0°C - 50°C
- Humidity: less than 70% and without condensation
- Operator lighting conditions: a high level of light is not required.

6.2.2 RECOMMENDATIONS FOR THE COMPRESSED AIR

- Amount of air required: about 30NI/min
- Pressure of air required: must be between 5.5 and 6.0 bar

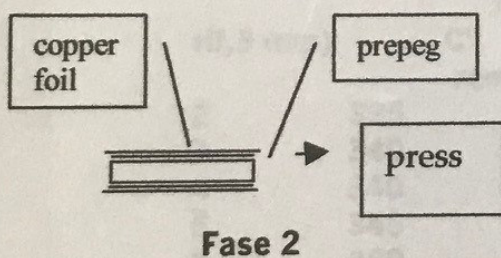
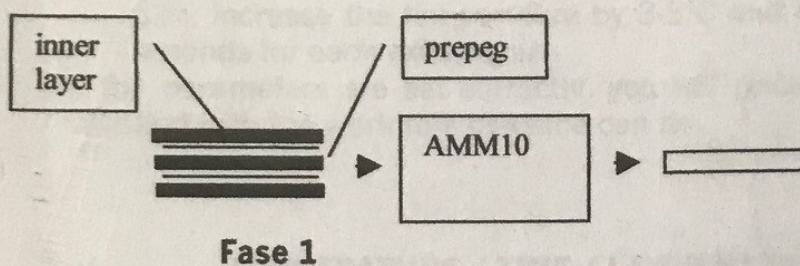
The air must not contain any impurities and must be completely dry, no lubrication is necessary.

INFORMATION FOR AMM 10

1. COMPOSITION OF THE PANEL

The inner layers are arranged in the required order on the surface of the AMM10 with the sheets of prepeg alternating between them and the reference holes corresponding to the registration pins. The prepeg must be slightly shorter longitudinally to allow the reference pins to pass through.

The prepeg should not be placed on the first and last inner layers. This operation will be carried out with the added external copper sheet before putting the panels in the press.



2. MAXIMUM NUMBER OF INNER LAYERS

There is no limit to the number of internal layers or their thickness. It should be said though that the maximum thickness of the panel that can be inserted into the machine is 6 mm. Tests have been carried out up to a total thickness of 5 mm.

3. REGISTRATION PRECISION

Two registrable pins of 3 or 4 mm in diameter are used for the positioning of the inner layers.

The pins are made to an accuracy of $\pm 10 \mu\text{m}$, which is the precision of the alignment of the inner layers, on condition that the drilling of the reference holes of the inner layers and the registration of the pins have been carried out without error.

It is important that the inner layer used for the adjustment of these pins has the reference holes drilled with the maximum precision.

4. TEMPERATURE SETTING/SOLDERING TIME

To achieve the best possible adhesion between the layers it is important that the colour at the soldering point is as close as possible to a dark orange without showing signs of burning.

In this way no excessive caution is needed in the handling of the panels. It is however advisable to remove the panel using the special support. Waiting a few seconds (5 - 10) before removing the panel will increase the cohesion between the layers.

- The colour at the soldering point depends in large on the set temperature.
- A panel composed of 3 inner layers of 0.3 mm with the temperature set as in the table will take about 30 secs.
- As a guide; for panels with more layers of a thickness of 0.3 mm, increase the temperature by 3-5°C and the time by 10 seconds for each extra layer.

If the parameters are set correctly, you will really be extremely satisfied with the work this machine can do.

TEMPERATURE / TIME / LAYER N° TABLE

N° Inner Layers (0,3 mm)	Temperat. C°	Soldering Time Time (in secs) removing)	Waiting Time (before removing)
2	335	30	5
3	340	30	5
4	340	40	5
5	345	50	8
6	350	60	8
7	355	70	8
8	360	80	10
9	360	95	10
10	360	110	10

The values in the table should to be used as a guide and are to be considered with a certain tolerance.

Before starting production it is advisable to set the parameters using samples of smaller dimensions but with the same panel composition in terms of inner layer thickness, number of inner layers and prepreg thickness.

Once the soldering has been done, verify the quality of cohesion of the layers.

Attention should be made to the fact that two distinct areas will be seen at the soldering point: a central area, the same size as the heating element, which is the strong area (as mentioned above, of a dark orange colour) and the surrounding area which will be of a yellowish - green colour.



5. HEATING TIP POSITIONING

The heating tips are normally positioned from 5 to 10 mm from the edge of the inner layers. If the tips are placed too close to the edge, the resin can flow onto the borders themselves; this fact is not damaging in itself, on the contrary it can increase the cohesion, but care should be taken that the tips do not become dirtied.

6. PRODUCTIVITY

This depends more on the thickness of the finished panel more than the number of layers and the thickness of the prepeg.

Panel Thickness (mm)	Indicative Time (secs)
1	35
1.5	35
2	45
3	70
4	90
5	120

