ATECH

«DRAGON»

HOT AIR PVC (VINYL) PROFILE BENDING MACHINE

OPERATING AND MAINTENANCE MANUAL

ATECH

	CONTENTS	PAGE

1 IMPORTANT SAFETY INSTRUCTIONS

* Before putting machine into operation read the Operating and Maintenance Manual carefully.

* Produce multiple copies from the Operating and Maintenance Manual and give it to the operators for reference to keep it in their possesions anytime they need to refer.

* If you notice any abnormal situation on the machine, immediately inform the safety responsible of your plant.

* Since the temperature of the heating furnace is 145 ^{0}C, protective gloves or wet towels **MUST** be used while putting the profiles into or removing from the heater

* The main electrical connections and repairs **MUST ONLY BE MADE BY** AUTHORIZED **ELECTRICIANS.** In case of any problem consult to your authorized electrician.

* Do not work on the machine that does not have earthing connection.
* Do not hold buttons of control panel with your hands wet.

* Be careful not to subject the control buttons and control panel to water while cleaning

ATECH CANNOT BE HELD RESPONSIBLE FOR ALTERATIONS, MODIFICATIONS MADE ON THE MACHINE OR ON SAFETY DEVICES OF THE MACHINE WITHOUT GETTING WRITTEN APPROVAL OF AUTHORIZED PERSONNEL OF ATECH.

2 TECHNICAL SPECIFICATIONS

	UNIT	DESCRIPTION
Model and Type		DRAGON
Dimensions of work table	mm	2800 x 1800 x 900
Height of work table above ground	mm	900
Weight of work table	kg / (lb)	548
Work table left/right movement	mm / (inch)	300
Number of mould holders to be assembled on work table	pc	6
HEATER		
Heater volume	m3	0.27
Number of heaters	pcs	16 x 1000W
Heating capacity	kW	16KW
POWER SUPPLY		
Total supplied power	kW	16KW
Electric power supply	V, Hz, Ph	220, 60 , 3
GENERAL PROPERTIES		
General dimensions (lenght x width x height)	mm	8350 x 3000 x 865
Weight (total)	kg	850

"DRAGON'' Hot air PVC (Vinyl) profile bending machine has been designed and manufactued in accordance with following European Directives and European Standards

98/37/ EC	Machinery Directive 22.06.1998
2006/95/EC	Low Voltage Directive 27.December.2008
2004/108/EC	Electromagnetic Compatibility Directive 15.December.2008
EN ISO 12100-2	Safety of Machinery- Technical principles and specifications
EN 294	Safety of Machinery- Safety distances to prevent danger zones being reached by the upper limbs
EN 349	Safety of Machinery- Minimum gaps to avoid crushing of parts of the human body
EN 563	Safety of Machinery- Temperature of touchable surfaces
EN 418	Safety of Machinery – Emegency stop equipment
EN 60204-1	Electrical Equipment of Machines- General Requirements

3 DESCRIPTION OF THE MACHINE

"DRAGON" Hot Air Manual PVC Profile Bending Machine is used for bending of every kind of PVC window profiles to a desired form. The machine is composed of following main parts.

Figure 1 – Main parts of the machine

Pos no	Name of part	Pos no	Name of part
1	Work table	3	Heater electric panel
2	Profile heater resistance heater	4	Bending moulds

The PVC profiles heated upto a temperature of 145^{0}C is bent by drawing the profiles through the moulds manually.

The manual profile bending machine is composed of following main components;

- Heater
- Work table
- 5 Bending moulds

4 LOADING, TRANSPORTATION, UNPACKING AND DISMANTLING INSTRUCTIONS

The machine is shipped on 3 seperate wooden pallets as packed and covered on all sides with nylon cover supported with vertical and diagonal supports and suitable with overseas transportation. Every wooden pallet contains information label about the contents.

Whatever the type of loading/unloading do not stay under the machine during handling.

Molds are packed in a fully closed wooden box, or or placed into heater.

While removing wooden supports remove the nails with a suitable lever. Do not use any parts of the machine as a support to a lever. Do not leave the nails on the wooden poles unattended to cause danger. The nails either has to be removed from the wood or has to be bent sideways and tips must be burried into wood by means of a hammer.

During opening of the packing first remove the protective wooden poles and then remove the support poles.

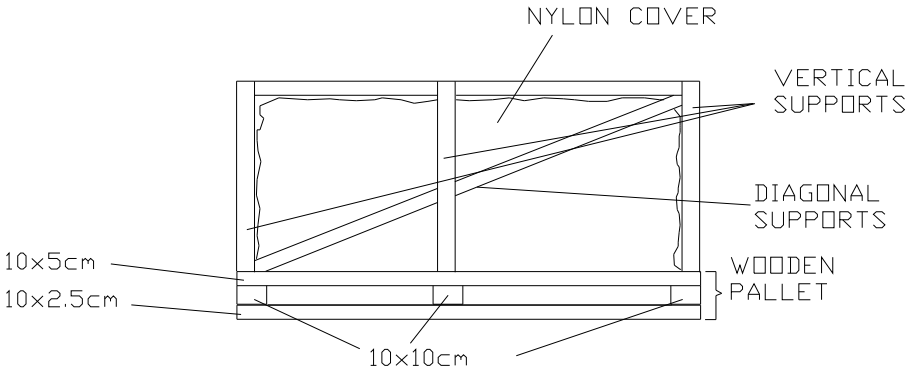


Figure 2 Typical packing

If the machine will be lifted with fork lift or with a crane use wide lifting belts. Do not used steel wire ropes. It may damage the machine structure.
Every machine part is marked clearly with respect to center of gravity to show proper locations for safe lifting with forklift or with lifting belt.

LIFT THE MACHINE FROM THE MARKED LIFTING POINTS.

Forklift must be used to lift the machine when in packed condition. For this, use forklift with long forks having 2 tons capacity.

The locations where the forks to be inserted is indicated with red color on the packing.

The size and weight of 3 packings belonging to machine are shown in below table.

Packing no	Packing content	Width (cm)	Length (cm)	Height (cm)	Net Weight (kg)
1	Work Table	**125**	**280**	**90**	**400**
2	Heater	**70**	**320**	**110**	**400**
4	Molds	**20**	**300**	**30**	**70**

DISMANTLING INSTRUCTIONS OF THE MACHINE

1-At first, the machine should be washed and dried completely.
2-The machine can be dismantled by applying the reverse of the procedure used for assembling. For this see item 5 "Assembling of the machine and its connections".
If the dismantled machine will be packed the followings should be made in below given sequence.

RE-PACKING OF THE MACHINE

A-HEATER

Pay attention not to damage the steel sheet parts/body of the machine and furnace. If ransportation is necessary, then a supporting wood structure (like the original packing of the machine) must be used. The wooden poles must support the machine at the bottom of chassis.

B- WORK TABLE

Remove the bending molds from the table. Place the molds into the wooden box. Protect the table surface by using nylon cover. Then place the table into its wooden case.

STORING CONDITIONS OF THE MACHINE (FOR FUTURE USE)

If the machine will not be used for a long time, the machine parts dismantled as explained above, should be placed side by side to occupy minimum place as much as possible and should be stored in a dry warehouse enviroment.

The machine which is dismantled above for future use, **THE WORK TABLE MUST BE VERY CAREFULLY CLEANED AND DRIED** . (See section 8 Maintenace and Trouble Shooting) To protect from dust cover the parts with a suitable cover

5 ASSEMBLY OF THE MACHINE AND MAKING ITS CONNECTIONS

The machine does not require a special foundation.

The ground for which the machine will be placed on should be flat and must not be slippery when the water is on, should not retain the water on it and should be made of material like glazed tile or similiar.

The strength of the ground should be sufficient to support the machine weight of 850 kg and other equipments around.

The location where the machine will be placed must have pressurized air supply mains.

Air supply **:** After cleaning of the machine, air is required to dry / remove the dust from the parts of the machine which may probably be left on the work table or in the canals of the work table. For this purpose a pressurized air of 5 barg will be sufficient.

The advisable height of the ceiling of the room where the machine will be located is 4 meters.

For the machine operators to walk around the machine freely and for maintenance purposes a space of minimum 2 meters must be left. Minimum clearances around the machine for proper operation is shown on Figure 3 below.

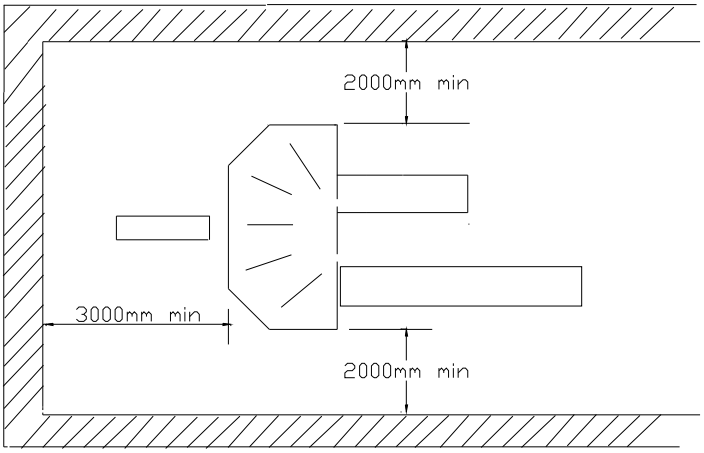


Figure 3 – Minimum clearances around the machine.

For comfortable working of the operator minimum room dimensions of 7 x 12 m or close to these dimensions is recommended.

Sufficient illumination is required in the working area. For this, a standard plant illumination level of 400 lux provides necessary illumination level.

Attention must be paid to keep the temperature of the working environment around 20^0 C. The heated profile must be taken into the molds before cooling down. For this reason, the machine must preferably be placed in a closed room.

The temperature of the environment is very important regarding the quality of bending to be obtained.

The machine parts removed from the packing must be installed at the following sequence. See figure 4.

1- Place the heater (2) (See Figure 4/1) to its predetermined place in the room.
2- Move the work table on its wheels towards the heater till it touches the heater. There is no mechanical connection between heater and work table.
3- After completion of the position adjustment fix the wheel brakes of the heater(2)
4- Make the electric connection of heater panel (3).

1-Place the heater in the room to required place

Figure 4 – Assembly sequence of machine

No special tool is requested for the assembling of the machine.

In future,when it is required to change position of the machine, the wheel brakes can be loosened, its position is adjusted and then re-tightened again.

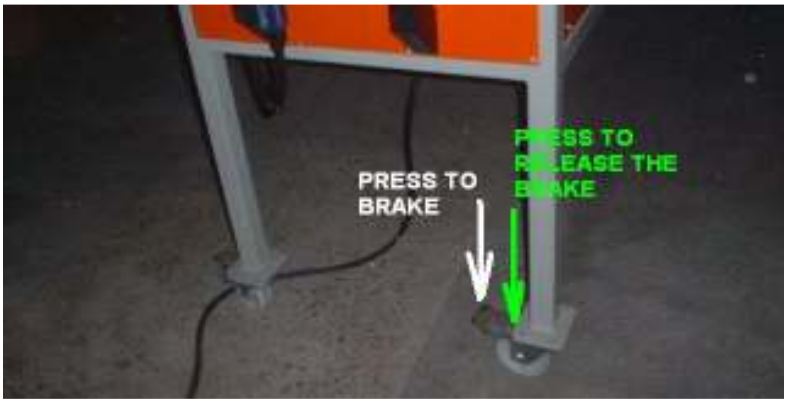


Figure 5 – Fixing of the brakes.

The electric connections of the machine MUST be made by an authorized electrician. Grounded connection MUST be used.

The electric schemes of the machine are attached.

Electric connection must be made to an electric source in accordance with the specifications indicated on the name plate. These connections must also be made in accordance with the electric diagram given.

The electric connection to heater panel must be made with 4 x 6mm^2 cable.

The electric power to the machine should reach from the top with a flexible, rubber cable.

The machine has one (1) electric panel and used for heater controls.

There is a switch near the heater cover which controls timer of the heating of the furnace upon opening/closing of heater cover. When the heater cover is opened to remove the heated profile, this switch stops the timer. When the cover is closed, the timer starts to work and gives an audiable and visual alarm indication that the heating cycle of the new profile is completed.

Figure 6- Cover switch

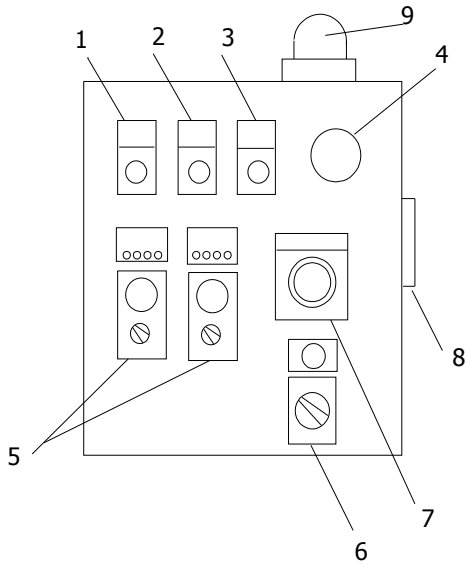
IMPORTANT NOTE :
THE MACHINE IS INSTALLED AT A DESIRED LOCATION, OPERATED AND THE OPERATORS OF THE CLIENT ARE TRAINED BY OUR SUPERVISORS.

6- OPERATING INSTRUCTIONS OF THE MACHINE

OPERATION OF THE MACHINE

1- Assemble the machine as explained in Section 5.
2- Insert the plug into the 3-phase socket.
3- Connect the earthing cable to machine's main grounding bar (insert the cable end to the grounding bolt on the machine and tighten the butterfly nut)
4- Introduce electric power to the machine by turning the main switch ON. Lift v-switch inside the control panel.
5- The leds of the temperature control devices becomes ON. Check that the phase indicator lamps (L1, L2, L3) are also ON.
6- Set the temperature control devices by using ▲ and ▼ buttons to a desired temperature.
7- Observe that the temperature indicators of both of the temprature control devices are raising. Observe that the heaters lamps will turn on and after some time will be off and on again.
8- When the internal temperature of the furnace(heater) reaches to a pre-set temperature, the resistance heaters will stop automatically and their lamps on the control panel will turn OFF. .
9- When the furnace reaches to desired temperature, open the front cover and insert the profile into the furnace.
10-By using the timer located on the control panel, select and adjust the duration which you want the profile to stay in the furnace.
11- The timer, when the pre-set time is reached, activates the rotating beacon and buzzer alarm which warns the operator that the heating duration of the profile is completed.
12- Open the furnace cover.
13- Remove and insert the heated profile into the mould.
14- Insert the new profile for heating for the next bending cycle and close the cover of the furnace(heater).
15- When you finished working, turn the main switch to OFF position.

HEATER CONTROL PANEL HAS THE FOLLOWING COMPONENTS ON COVERS.



HEATER PANEL	
1,2,3	Phase Lamps
4	Emergency stop button
5	Heater on/off butons and lamps
6	Timer on/off button and lamp
7	Timer
8	Main switch
9	Rotating beacon

Figure 7 – Heater panel

Adjustment of mold holders

To prepare the work table (See pos 1 Figure 1) for bending work, first it is necessary to determine the bending radius. Calculate the bending radius with the below given formula and add (internal thickness of the bending mold) to the figure from this formula to obtain the final bending radius. Make the adjustment of molder holder compas given together with the machine. **If you forgot to add this internal interval of mould, then the diameter of the bend profile becomes less than the required diameter.**

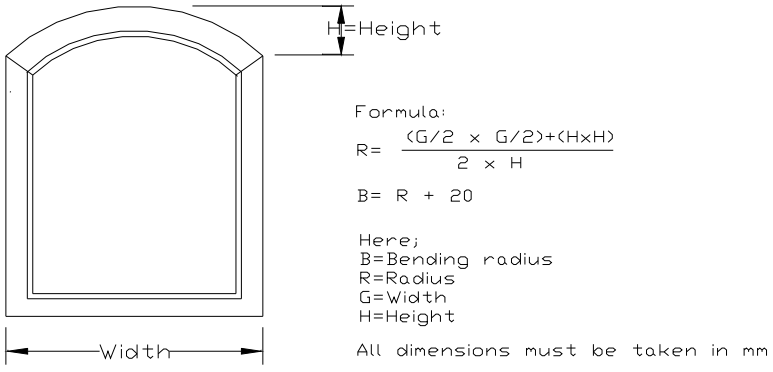
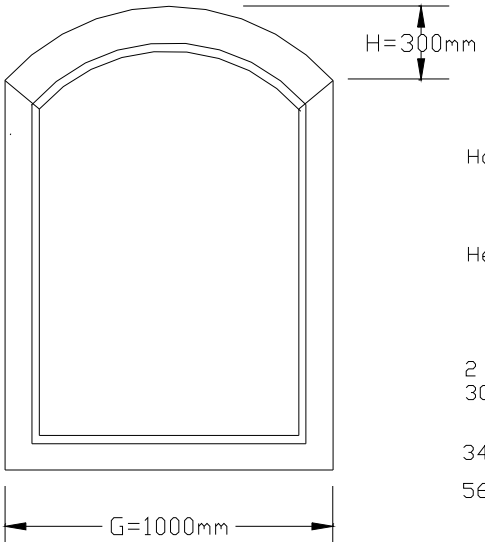


Figure 8 – Profile dimensions

Get the square of half of the width and multiply this with the square of half of the height and add these 2 figures and divide by 2 times of height and obtain the radius. Like that you get the bending radius.

Sample calculation:



Half of width x half of width
500mm x 500mm = 250.000

Height x height
300mm x 300mm = 90.000
340.000

2 x height
300mm x 2 = 600

340.000 / 600 = 566mm = R

566 + 20 = 586mm = B

Figure 9- Calculation metod

Fix the compass holder piece to the mold holder adjustment compass. Adjust the center piece to a pre-determined radius (B).
Mount the canal pieces (figure 16) onto the work table.

Screw the center of the mold holder adjustment compass (connection part), to the center piece at the middle of the work table. Fix the internal mold holders by holding them against outer surface of mold holder adjustment compass (See Figure 11).

Figure 16- mold holder

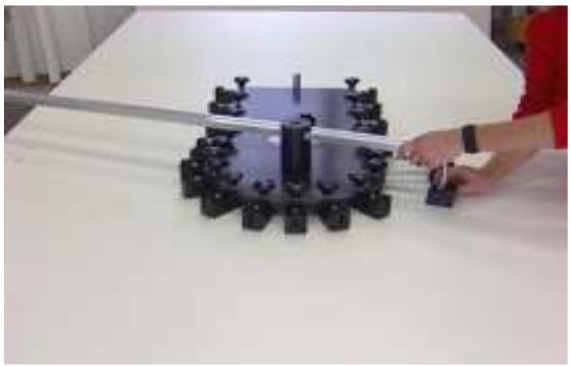
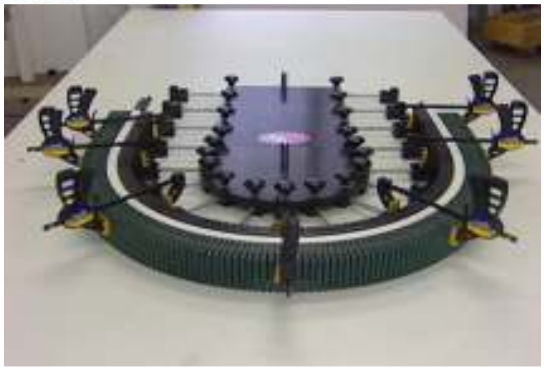


Figure 11 adjustment of outer mold holders

Then remove the compass from its place. Following this, fix the inner mold holders with the help of distance block as seen on Figure 12. The adjustment with distance blocks will be made with outer mold holders. See Figure 13.

Figure 12- use of distance blocks



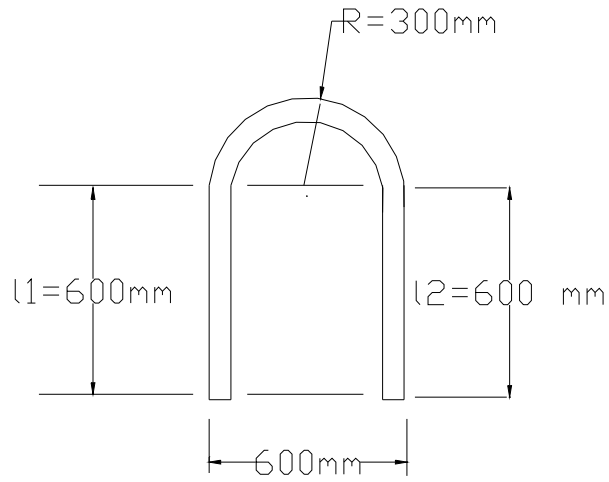
Sekil 13 – outer mold holders

While securing the bending molds with the mold holders, attention must be paid that the shoes of the mold holders fit on the projecting part of the mold.
Set the heater thermostat to 145^0C . A tolerance of ± 3 degrees is allowable.

Preperation of the profile
Cut the profile to a suitable length. This length can be calculated as follows;.;

L= 2 x π x R + l1 + l2 + 200mm

Here,
L = Length of profile to be bent (mm).
l1 ve l2 = straight part of the profile after bending(mm)
R= Bending radius (mm)
π = 3.14
200mm = Additonal part to be cut after bending



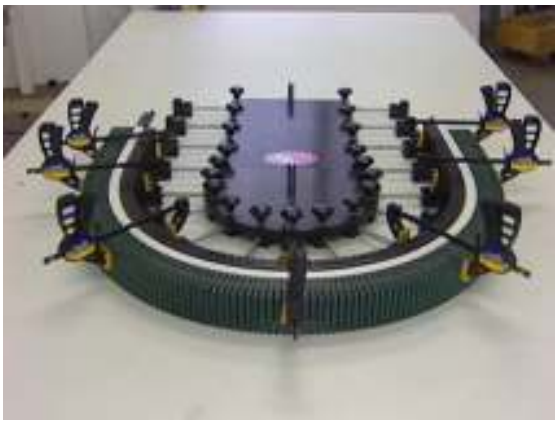
L=3.14R + l1 + l2 + 200
L=3.14×300+600+600+200
L=942+600+600+200
L=2342mm Total profile length required

Figure 14 – calculation for profile cutting

(When the bending operation is completed, cut the profile from both end to bring it down to required size.)

In the meantime, put separate internal moulds of profile in heater.
Keep them in the furnace approximately 8 – 9 minutes together with profiles.
After this, very quickly remove profile from the heater, and by attach to internal mould bend it.

While inserting the profile into the heater ALWAYS use protective gloves.



After approximately 3 minutes of the completion of drawing work, remove the the bent profile from the mould. For this, release the eccentric arms of the mold holders first and then remove the profile. With the help of a plier, remove all inner linings from the profile. Since the profile will be still warm, lay the profile on a flat surface and wait to cool down.

Upto this point the **U** bending is described. At the same time it is possible to bend manually into **C** form, arc form and **S** form.

Figure 15 - Various types of bends possible

Figure 16 – Special form bending

Figure 17 – Special form bending

For arched bend establish radius as in the figure 16, install internal form to inner face and bend it as in the figure 17.

IMPORTANT POINTS !

1- The heater temperature must always be 145^{0}C. A ± 3^0 C tolerance is allowable.
2- The temperature of 120^{0}C is dangerous for the operator. Protective gloves MUST be used putting in or removing the profile to/from the heater and inserting into the mold.
3- NEVER interfere with the electric system of the machine EXCEPT authorized electrician. In case of any problem consult to your authorized electrician.
4- Heater MUST be grounded. Do not work on the machine which earthing is not made yet.

7 ELECTRICAL EQUIPMENTS OF THE MACHINE

The heater control panel can be opened before turning off the main switch, for this reason, all components in the panel are selected as protecting againg touching.

Against short circuit and overloading, the system is equipped with fuses and thermal-magnetic relays.

In case of electric power failure and re-supply, the heater starts to work.

The machine can be connected to user's electric supply by means of socket & plug.

The electrical schema of the machine is attached to this manual

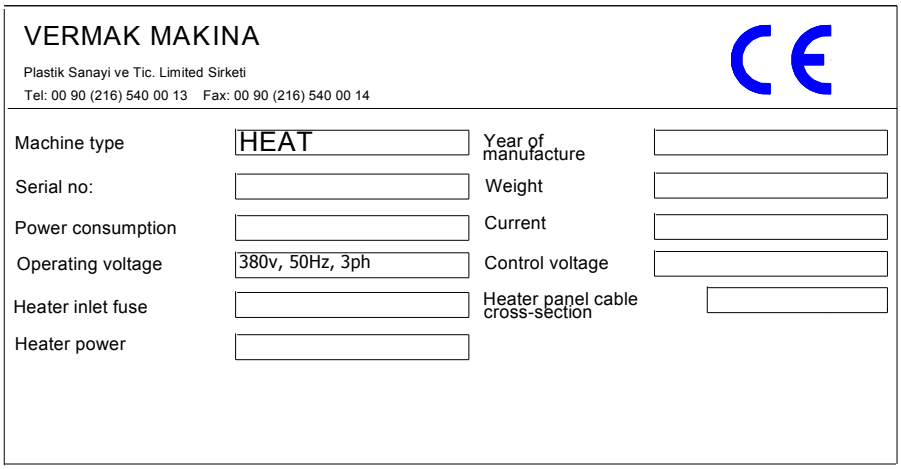


Figure 17 - Name plate on the machine

LIST OF ELECTRICAL MATERIALS USED

ITEM	CODE NO	QTY.	TYPE OF MATERIAL
1		2	3x25 A V Automatt
2		2	3x25 A Contactor
3		5	Terminal for cable of 6 mm2
4		8	Terminal for cable 4 mm2
5		5	Terminal for cable 2.5 mm2
6		1	Main switch 3x63 A
7		1	Timer 0—30 minutes
8		2	Temperature control device (ENDA)
9		3	Heater Lamp 220 V,30 mA
10		3	Heater button 230 V,2 A
11		1	Warning signal lamp 220 V , 5 W
12		16	Heater 220V, 1000W
13		5m	Power cable 5x6 mm2 TTR
14		1	Plu with grounding terminal with 5 pins
15		1	Button for cover 230 V ,2A
16		20	Porcelain terminal for 4 mm2 cable
17		40m	Fire prof silicon cable of 2x4 mm2

8 MAINTENANCE AND TROUBLESHOOTING

MAINTENANCE

If you follow the below given maintenance and cleaning rules, this machine can serve you for long years.

1- Remove the mould holders mounted on the work table and (See Figure 13) and canal pieces (See. Figure 10) from the work table and wash and thoroughly dry.

2- Clean the work plate (pos 1 Figure 1) and especially the canals at the end of every work day.

3- Wash the bending molds and inner linings with a pressurized air.

4- Wash the mold holders with water and dry with air.

NOTE- 1: The canal pieces which are removed during cleaning of the work table or for any other reason must be placed back into their place exactly in the same order as you have removed. Since canal pieces are specially made to fit each canal, the change in their order may cause deformations or traces on the bottom of profiles(See figure 18).

If the machine will not be operated for more than 24 hours, in addition to the above cleaning procedure, the mold holders must also be removed, cleaned and dryed completely.

TROUBLESHOOTING

PROBLEM	PROBABLE CAUSE	SOLUTION
Heater does not work	- Main switch may be off	-Turn on the main switch.
	-Heater switch may be off	- Turn on the heater switch
	-Thermo-element may be broken	-Check and replace if necessary
	-Thermostat may not be working	- Check and replace if necessary.
	-Timer may be off	- Check and turn ON if it is off
	- Fuses may blown out	- Check the fuses in the control panel. Replace if necessary.
	-Heater cable may be broken off	- Check and replace if necessary.
	-Resistances may be faulty	- Check and replace if necessary.

If you are still unable to identify the problem or cannot be solved by above measures , please consult to your supplier of this machine.

WARNING !
IN CASE OF ANY ELECTRICAL PROBLEM ON THE MACHINE, THE MACHINE OPERATOR MUST NOT ATTEMPT TO INTERFERE WITH THE ELECTRICAL SYSTEM OF THE MACHINE. CONSULT TO YOUR AUTHORIZED ELECTRICIAN

9 ORDERING SPARE PARTS

THE PARTS POSSIBLE TO WEAR AND THE PARTS NEED TO BE REPLACED ARE GIVEN ON THE BELOW SPARE PARTS LIST

Aluminum Mold Holders	once every 3 years
Work Plate	once every 5 years

IMPORTANT NOTE !
This booklet will guide you sufficiently during the use of this bending machine. It is a fact by experience that even with a most detailed written explanation of bending process may not give you necessray information to start for bending. For this reason, we advise that our supervisor should assist and train your operators during initial use of the machine.

SPARE PARTS LIST

No	Name of Part	Dwg no	Qty
1	Draw bar 3m		1
2	Draw bar 1m		1
3	Draw bar holder		1
4	Plier		1
6	Protective gloves		1pair
7	Mold holder clamps		6

10 SERVICING POINTS OF THE MACHINE

If you are unable to solve your problem with the above given solutions, please contact our service points given below.

ATech Machine, Inc.
309 Ridgemont Ave., Rockville, MD 20850
Tel: +1-240-505-1967 Toll-Free: 1-855-ATECH-US

Fax: +1-301-560-6627
E- mail : info@ATechMachinery.com
Web : www.ATechMachinery.com

11 DISPOSAL OF MANUAL PVC PROFILE BENDING MACHINE

Make SURE to take necessary measures before disposing the Profile Bending Machine.

- Cut all electric cables as close as possible to the unit.
- Remove all electric components (i.e. contactors, switches, resistance heaters, etc...) make a separate packages and inform electrical material scrap collector for collection.
- Do not leave any parts with sharp edges.

ATTENTION !
BEFORE going into above work, READ all the releated regulations of the country the machine will be working or APPLY to related institutes for help and consulting.

WARRANTY DOCUMENT

The machine tool is under our warranty in a case of industrial defects for 1 (one) year from date of the invoice and company gives a 1(one) year-long service.

THE FOLLOWING CASES ARE EXCLUDED FROM THE WARRANTY!

- **The damages which have arise during transportation**
- **At the malfunctions which have arisen in a consequent usage of not original spare parts**
- **At the malfunctions which have arisen in case of operation of the machine tool not by a qualified technician.**
- **The electric and electronic spare parts, all electric motors, in case of wrong usage**