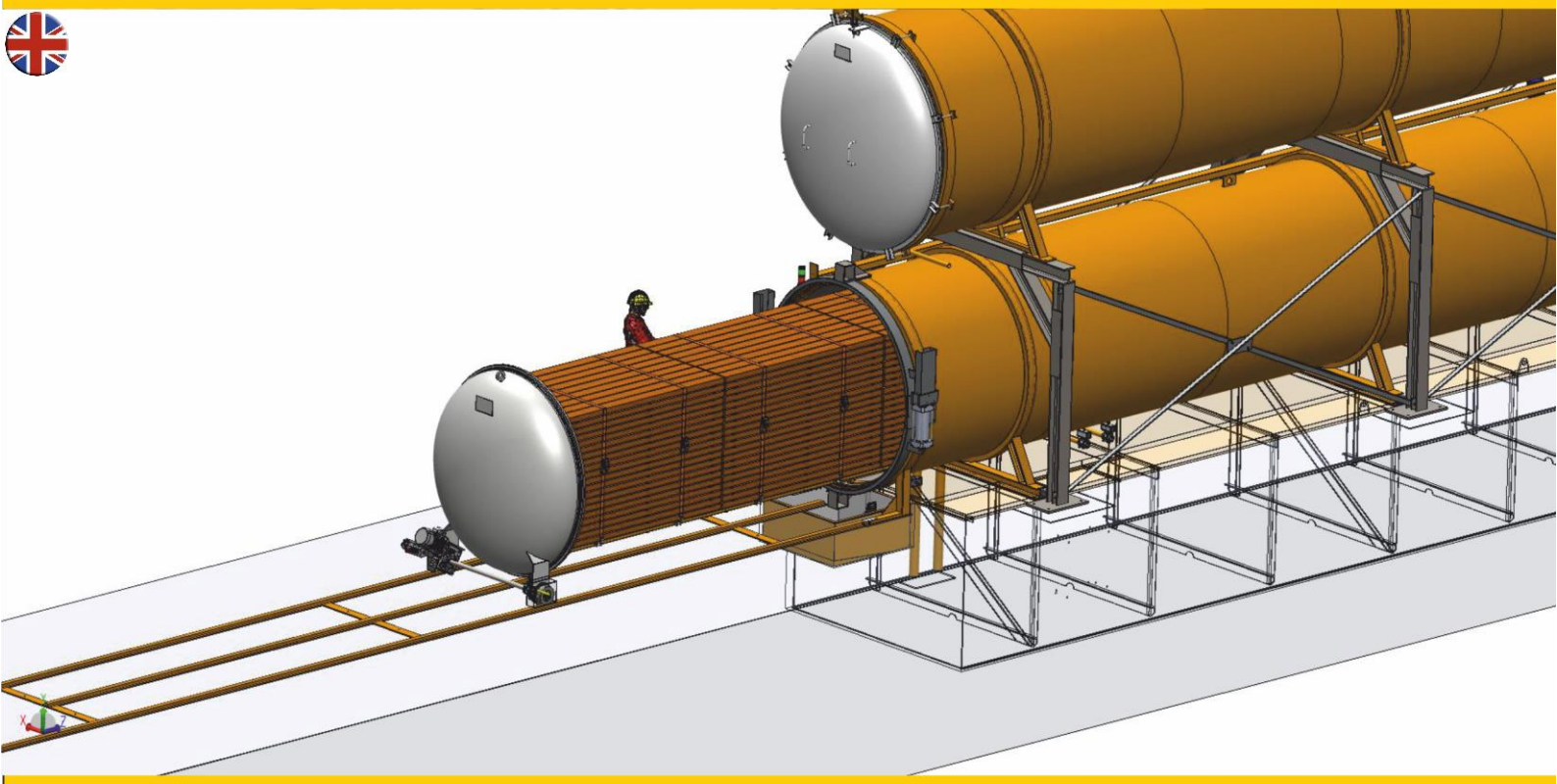

IMP-VP SERIES

SISTEMI PER
TRATTAMENTO DEL LEGNO

SISTEMAS PARA
EL TRATAMIENTO DE LA MADERA

SYSTÈMES POUR
LE TRAITEMENT DU BOIS

SYSTEME ZUR
HOLZBEHANDLUNG

СИСТЕМЫ ПО
ОБРАБОТКЕ ДЕРЕВА

ISVE WOOD
WOOD TECHNOLOGICAL PARTNER

ISVE GROUP
COMPETITIVE SUSTAINABILITY

INTRODUCTION

This brochure besides being a brief reference on the characteristics and application possibilities of the IMP-PG impregnator series produced by I.S.V.E. Srl., aims to provide some information on the durability of wood according to the various environmental conditions.

Data, characteristics and illustrations are purely indicative. I.S.V.E. Srl reserves the right to make any changes it feels necessary.

Index

BIBLIOGRAPHY

G. GIORDANO – WOOD TECHNOLOGY – UTET
ENC (EUROPEAN NORMALISATION COMMITTEE) EUROPEAN STANDARD EN 335

IMP-VP with double store tank for two impregnating products

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IMPREGNATION TREATMENT OF WOOD IN AUTOCLAVES USING THE VACUUM UNDER PRESSURE SYSTEM

People love and appreciate living and working in environments with wood finishing and panelling, they value its warmth and the unique incomparable **natural beauty** no other material of mineral or synthetic origin has.

These qualities are however penalised by a single factor: durability.

As atmospheric and biological agents such as fungi, insects and bacteria attack wood more or less rapidly, the preference has fallen on selecting and using "naturally" resistant wood.
The continual demand for these species has considerably reduced its availability and increased the price.
This has led to the need to use less long lasting but much more inexpensive wood, but however applying effective treatment to increase its natural resistance.
Right from the beginning of the last century the first applications of preservative products were attempted using autoclaves and the results were very encouraging. Since then a lot of progress has been made both in the construction of autoclaves for treatment purposes and in the production of products suitable for the purpose. At the beginning wood was protected using creosote or CCA salts (Copper Chrome arsenate) which although very effective were very damaging for the environment.

At present, with the development and research carried out in modern chemistry, new salts are available on the market, which give excellent protection to the wood with a very low impact on the environment.
An idea of the spread of these treatments can be got from the consumption of salts which over the last ten years have increased tenfold.

The reasons for this growth are numerous and stem from four main sources:
1. the reduced offer and the high cost of "naturally" more resistant wood;
2. the continuous increase in the demand for wood in construction, agriculture for stables and horse boxes etc.;
3. the regulations which ever increasingly require the use of treated wood (packing, urban furniture, etc.);
4. new uses in the field of outdoor furniture in housing in substitution of plastic.

The I.S.V.E. Srl plants offer the customer the possibility of exploiting this continually growing market, providing quality tested, designed and built plants which guarantee the treated wood a very long life.

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1. THE ENEMIES OF WOOD

The destructive agents that cause the most damage to wood are fungi, xilofagi saprophyte insects and marine invertebrates.
The technology applied to I.S.V.E. autoclaves aims to kerb the action of these organisms.

1.1 Fungi

Fungi are lower vegetable organisms without chlorophyll that feed on already elaborated organic material. This material may be the remains of organisms which had at one time been alive (in this case the Fungi are the so called *Saprophytes*) or an integral part of living organisms (in this case the Fungi are *Parasites*)
The importance of fungi in the wood sector is particularly relevant because of the destruction and disruption they cause in the wood.

Wood cavity fungi
In order for these fungi to develop the wood must have a humidity level of over 20%.

- **Basidiomycetes cavity fungi:** are fungi which when they attack the cellulose cause a loss in size of the wood, together with the formation of prism or cube shaped soft cracks, so soft they can be squashed with the fingers. The development area of the fungi becomes brown, thus the name *brown* or *destructive* cavities.
  Should the attack by basidiomycetes not be limited only to the cellulose but also attack the lignin, the colour of the wood becomes lighter than the healthy material and is reduced to a whitish fibrous mass (*white or corrosive cavities*).

- **Deuteromycetes soft cavity fungi:** fungi that cause a type of cavity characterised by softening of the surface of the wood, although it can also cause deep cavities. These fungi need a higher humidity level than the one required for basidiomycetes. They are particularly important for wood which is in contact with the ground or water.

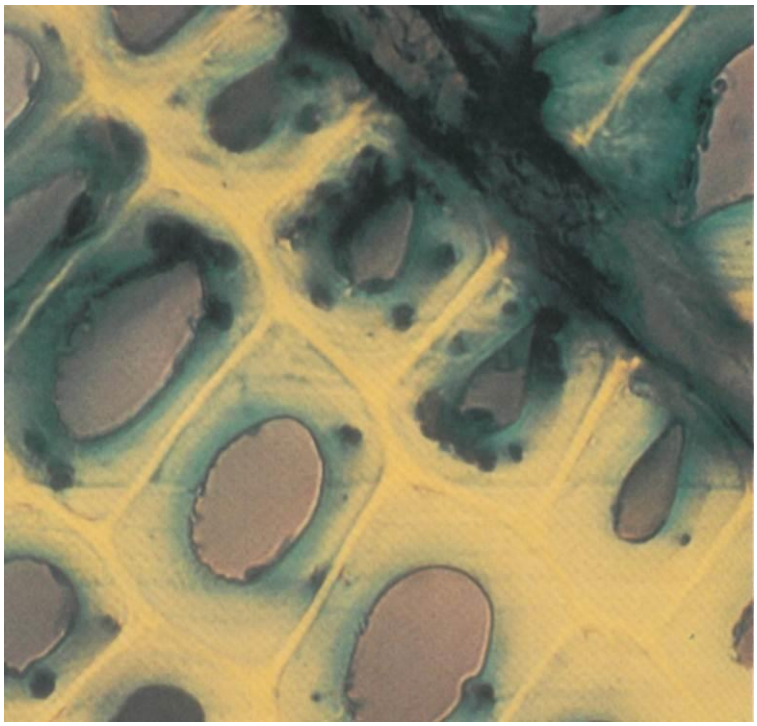


***Figure 1.1**: spreading of the "dark spot" fungus called "soft cavities" which will gradually destroy the structure of the wood making it similar to a brittle sponge.*

Colouring fungi
They cause the bluing and mildew on installed wood. These fungi may cause concern only from the point of view of aesthetics, spoiling in some cases decorative panelling.

- **Bluing fungi:** they cause permanent colouring from blue to black and at various depths, above all in the alburnum of certain wood. Attacks by these fungi do not impair the mechanical properties of the wood, but may increase the level of permeability.

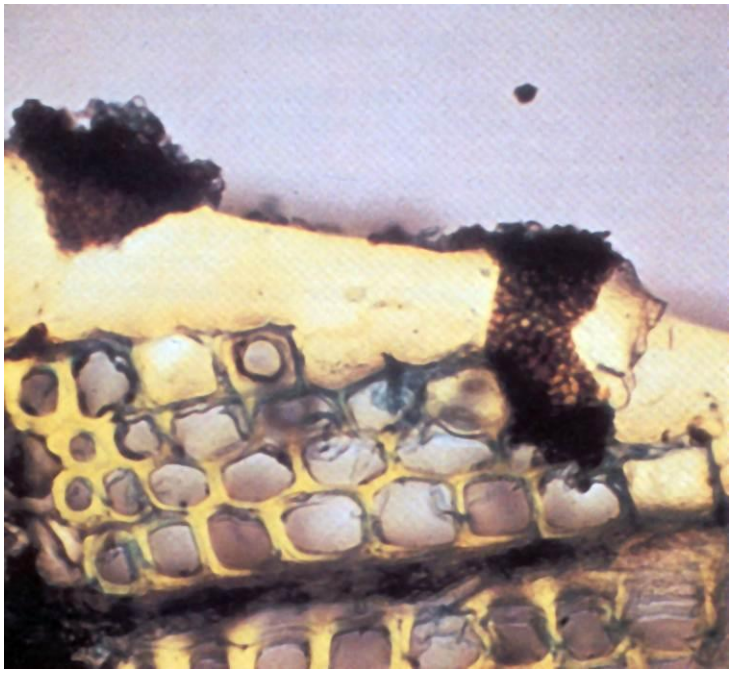


Figure 1.2: *action of blue fungus that during its development succeeds in breaking through the film of coating and reach the surface.*

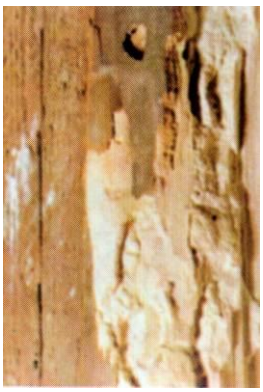
- **Mildews:** fungi which appear as spots in various colours on the surface of damp wood and which can appear only when the humidity on the surface of the wood is over 20%. This condition appears when there is high relative humidity or condensation from steam. The attack by mildew does not have an important influence on the mechanical properties of the wood but which gives the wood an unwanted and unacceptable appearance. These fungi are not specific to wood and may appear on any material where humidity is high.

1.2 Insects

Beetles
Insects which fly and lay their eggs in the pores and cracks in wood. The larva causes the most serious damage, by burrowing internal galleries in the installed material. They are present throughout Europe, but attacks vary greatly depending on the geographic area.
The most important are *Hylotrupes bajulus, Anobium punctatum* and *Lyctus brunneus*. There are many other insects of less importance, which destroy the wood; among which, for example, are Hesperophanes and *Xestobium rufovillosum.*

- **Hylotrupes bajulus (House Longhorn):** is undoubtedly one of the worst enemies of installed wood, in particular conifers, and the damage caused by the larva is very serious. It is present up to an altitude of about 2,000-m, not so widespread in the North and Northwest of Europe. The vitality of this insect depends on the temperature and humidity of the air. The incubation period for the eggs may be 5 to 9 days at a temperature of 31.5°C and a humidity level of 90 to 95% or 48 days at a temperature of 16.6°C and environmental humidity at 18% (the latter condition being very unfavourable). The larvae burrow galleries in particular in the alburnum which become full of gnawed waste causing serious structural damage to the wood which can lose all its structure and solidity.





- **Anobiidae punctatum (Furniture woodworm):** is particularly widespread in maritime climates and wherever there is high humidity. It attacks in particular timber or installed wood of conifers or hardwood indifferently, affecting the alburnum and the duramen. The larvae burrow galleries with coarse gnawed waste mixed with excrement. Even if heavily attacked the wood does not completely lose its resistance and the structure remains recognisable.



- **Xestobium rufovillosum (Deathwatch beetle):** attacks preferably timber or already installed wood, of various **hardwoods** (Oak, Elm, Walnut, Ontano, Poplar) but which is fairly humid, or old lopped decaying willow trees. The damage caused by Xestobium is the same as the damage caused by Anobiidae. Its importance is felt in particular in the structures in old buildings throughout most of Europe.

- **Lyctus brunneus (Lyctus):** in the past it was given little importance, but the damage it causes in installed casings and furniture is at present considered very serious. The larvae which breeds at its best in very humid wood, attacks all indigenous hardwood with soft wood and with large vessels, plus the alburnum of the hard species, in particular Oak. The only species that seems to be immune are Popular, Beech and Birch, whereas the Eucalyptus trees are very vulnerable. If the infestation is particularly strong, the whole mass of wood is transformed into a solid compressed gnawed waste where the structure of the texture is no longer recognisable. The Lyctus brunneus is the most common in Italy.



- **Hesperophanes sp.p.:** a species common to Central and South Europe. The wood that suffers most is: Cerro, Robinia, Beech, Popular, Walnut and Chestnut. The females usually lay their eggs in the nooks and cracks of installed wood such as framework for roofs, furniture, wooden floors and all types of frames. The damage caused by the larvae can be very serious because it involves the structure and mechanical resistance of the part without any possibility of repairing. It is also very difficult to diagnose.

Termites
Social insects divided up into various families. The most dangerous species for buildings are those which live underground, mainly **Reticulitermes lucifugus** and **Reticulitermes santonensis**.
In Europe termites can be found only in certain limited geographical areas; they are present in Italy throughout the whole peninsula and on the islands. In these areas, the use of wood preservants in the fight against termites is integrated by the use of other protective means, for example for floors, for foundation work and walls. The danger of the attacks stems from the fact that, as their activity is hidden from the light, a superficial inspection will not reveal their presence. They always respect the external surface of the pieces of wood so that the alarm (always to late) is given by some beam or frame collapsing. The infection is by this time widespread.

1.3 Marine organisms

A name given mainly to marine invertebrates such as **Limnoria sp.p.** and **Teredo sp.p**., which require a certain level of salt in the water and which burrow large tunnels and cavities in the wood.
These organisms can seriously damage both fixed and floating structures.

2.THE RISK CLASSES

As can be appreciated from the previous paragraphs, the agents causing degradation of wood are numerous. However, both as regards to fungi and insects, humidity is very often the limiting factor for their development. *Therefore there is a very important correlation between the environment the installed wood is in and the attacks of destructive biological agents*.
.
For example it is easy to imagine how wood protected in a closed, dry environment is more long lasting than the same wood in contact with humid ground.

The ENC (European Normalisation Committee) through the European standard EN 335 parts 1, 2, and 3 have identified 5 risk classes that have been established on the basis of the humidity the wood id exposed to under different conditions of use.
The higher the risk, the greater the need to increase the natural resistance level of the wood using impregnation treatment.

2.1 Definition of the risk classes

Risk class 1: situation where the wood or wood-based product is shielded, completely protected from atmospheric agents and not exposed to humidity.

Risk class 2: situation where the wood or the wood-based product is shielded, completely protected from atmospheric agents, but where high environment humidity may cause occasional but not persistent humidity.

Risk class 3: situation where the wood or the wood-based product is not shielded and is not in contact with the ground. It is continuously exposed to the atmospheric agents or, even though protected from them, is subjected to frequent humidity.

Risk class 4: situation where the wood or the wood-based product is in contact with the ground or fresh water and is therefore exposed to permanent humidity.

Risk class 5: situation where the wood or the wood-based product is permanently exposed to salt water.

In the table that follows the distribution of fungi, insects and marine invertebrates is highlighted for each risk class. **The column regarding the type of protection shows the areas where the use of the IMP-VP plant is particularly suitable**.

RISK CLASS	EXPOSURE CONDITIONS	EXPOSURE TO HUMIDITY	DISTRIBUTION OF BIOLOGICAL AGENTS				PROTECTIVE MEASURES	TYPE OF PROTECTION
			Fungi	Insects	Termites	Marine Organisms		
1	Wood for indoors in dry environment. Panelling and finishing.	None	-	Present	Locally present	-	Treatment optional depending on the fact whether its cost is not more than repair work or treatment.	Surface depth: from 1 to 3 mm
2	Wood for structural work used in closed environment.; Wood with risk of	Occasional	Present	Present	Locally present	-	Preventive treatment advisable, especially in the case of difficult and expensive repairs.	Inclusive from depth from 1 to 3 mm
3	Wood exposed to periods of humidity and dryness, no contact with the	Frequent	Present	Present	Locally present	-	Preventive treatment	Surface, minimum 3 mm depth 65% Alburnum
4	Wood in contact with permanent humidity source (Wood humidity>20%). Wood for indoors/ outdoors.	Permanent	Present	Present	Locally present	-	Preventive Treatment and suitable construction measures.	Average depth 3-6 mm. 100% Alburnum
5	Wood in permanent contact with salt water. The humidity level of the wood is always over 20%. The part immersed attacked by marine	Permanent	Presenti	Presenti	Localmente presenti	Presenti	Preventive Treatment with salts soluble in water plus suitable construction measures.	Deep; minimum 6 mm 100% Alburnum

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WOOD TYPES	NATURAL DURABIITY PROPRTIES N Non resistant R Average resistance MR Very resistant **A** Alburnum **LS** Healthy wood (duramen)										IMPREGNABILITY Not impr. Not possible Low imp Low Aver. Impr Average **Very impr.** High	
	FUNGI		**TERMITES**		**TARLI**		**LYCTUS**		**CAPRICORNI**			
	A	**LS**	**A**	**LS**	**A**	**LS**	**A**	**LS**	**A**	**LS**	A	**LS**
RESINOUS WOODS												
Douglas Fir	R	MR	N	N	N	MR	MR	MR	N	MR	Poco imp.	Non impr.
Épicéa	N	N	N	N	N	N	MR	MR	N	N	Poco imp.	Non impr.
Hemlock	N	N	N	N	N	N	MR	MR	N	N	Med. Impr.	Non impr.
Larice	R	MR	N	N	N	MR	MR	MR	N	MR	Med. Impr.	Non impr.
Austrian Black pine	N	R	N	R	N	MR	MR	MR	N	MR	**Molto impr.**	Non impr.
Maritime Pine	N	R	N	R	N	MR	MR	MR	N	MR	**Molto impr.**	Non impr.
Silvestre Pine	N	R	N	R	N	MR	MR	MR	N	MR	**Molto impr.**	Non impr.
Spruce	N	N	N	N	N	N	MR	MR	N	N	Med. Impr.	Non impr.
Red Cedar	MR	MR	N	N	N	MR	MR	MR	N	MR	**Molto impr.**	Non impr.
HARDWOOD (TEMPERATE CLIMATES)												
Chestnut	R	MR	N	R	N	MR	N	MR	MR	MR	**Molto impr.**	Non impr.
Oak	N	MR	N	N	N	MR	N	MR	MR	MR	**Molto impr.**	Non impr.
Ash	N	N	N	N	N	N	N	MR	MR	MR	Med. Impr.	Non impr.
Beech	N	N	N	N	N	N	MR	MR	MR	MR	**Molto impr.**	**Molto impr.**
Elm	R	R	N	N	N	MR	N	MR	MR	MR	Med. Impr.	Non impr.
Popular	N	N	N	N	N	N	MR	MR	MR	MR	**Molto impr.**	**Molto impr.**
Walnut	N	MR	N	N	N	N	MR	MR	MR	MR	**Molto impr.**	Poco imp.
HARDWOOD (TROPICAL CLIMATES)												
Mahogany	N	R	N	N	Allo stato attuale si ritiene che le latifoglie tropicali resistano all' attacco dei tarli.		N	MR	MR	MR	**Molto impr.**	Non impr.
Afrormosia	R	MR		MR			N	MR	MR	MR	**Molto impr.**	Non impr.
Azobé	R	MR	R	MR			N	MR	MR	MR	Med. Impr.	Poco imp.
Balsam	N	N	N	N			MR				Poco imp.	Poco imp.
Ilomba	N	N	N	N			N	N	MR	MR	**Molto impr.**	**Molto impr.**
Iroko	N	MR	N	MR			N	MR	MR	MR	**Molto impr.**	Med. Impr.
Samba	N	N	N	N			N	N	MR	MR	**Molto impr.**	Med. Impr.

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3. PROTECTION OF WOOD USED OUTDOORS

The IMP-VP plants are suitable for treatment of items that fall into risk classes three, four and five.

AS has been shown in the previous chapters, the natural conformation of wood makes it unsuitable for use outdoors.
Its composition (20-30% lignin 40-50% cellulose, 20-24% carbohydrates) makes it vulnerable to "degradation" agents which begin their action when humidity is high and the temperature is between 10 and 40 °C.
Fungi, mildew and bacteria are in ideal conditions to develop, whereas the ultraviolet rays present in the sun light photochemically decompose the lignin making it soluble in water.
The only way to fight the action of the enemies to wood is to turn to the help modern chemistry provides.
In fact:

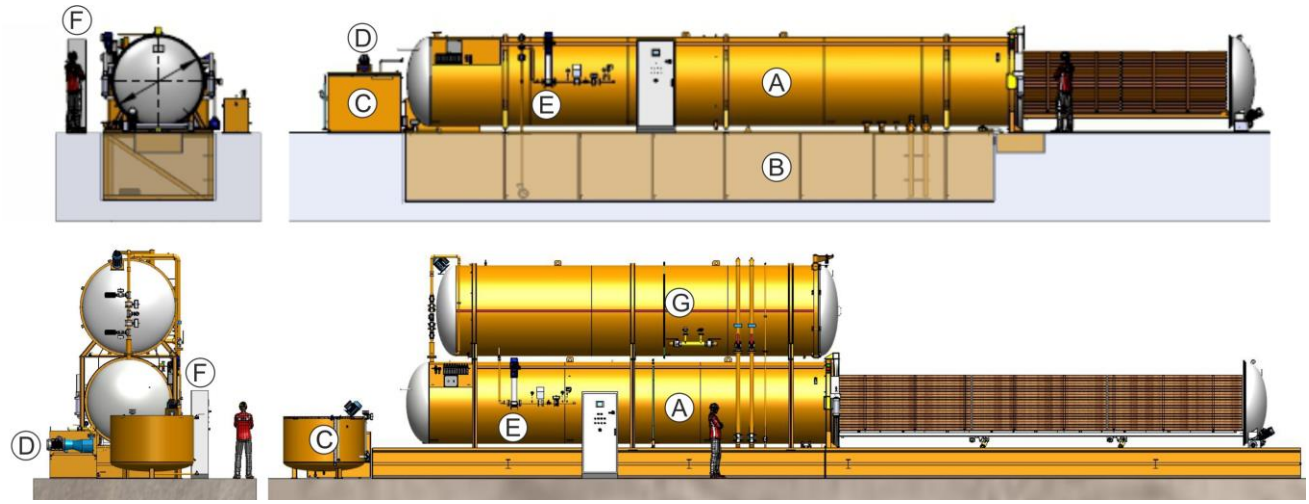
- If a good insecticide and fungicide is applied in sufficient quantity so that the internal parts of the wood are involved, the attack from micro organisms and insects can be offset for several years. Both the fungicide and the insecticide lose their effectiveness over the years, therefore the duration of the protection is directly proportional to the quantity applied. An impregnant with a high dry residual level can make the wood waterproof defending it against water as long as it is not applied so as to form a surface film.

- The pigments, which are not transparent, form an impermeable surface barrier against ultraviolet rays, thus preventing decomposition of the lignin.

The traditional systems of dipping, brush painting and spraying are not able to guarantee to achieve the three results.
A product with a high dry residue level will form a surface film, limiting the penetration of the insecticide and fungicide solution.
On the contrary, a product with a low dry residue level will have better penetration allowing the insecticide and fungicide solution to be more active, but having very little resistance to the penetration of humidity into the internal parts of the manufactured item.
Only the use of **pressure-vacuum technology** has enabled pigmentation products with high dry residue levels (12-30%) to be applied **resulting in complete protection of the item**

Figure 3.1: *Degradation of the wood by UV rays*

4. TECHNICAL DESCRIPTION OF AN IMP-VP PLANT



A standard plant is made up of:

a) An autoclave capable of resisting a vacuum of –700mmHg at a pressure of 12 atm.
b) Storage tank for the impregnant.
c) A small sized preparation tank for the impregnant
d) A vacuum pump.
e) A high-pressure pump.
f) An electric switchboard panel with a microprocessor, with the possibility of connecting it to a personal computer.
g) Should the plants be "off the ground" the possibility exits for structuring the plant with an autoclave positioned higher acting as a storage tank for the solution.

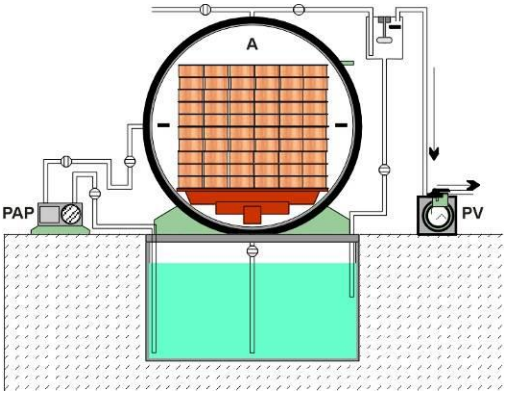
The reduced sizes compared to the productivity of these plants allow considerable savings in terms of space and they are easy to place inside the company.

The quality of the materials used in manufacturing the autoclave, such as stainless steel, guarantees long life against corrosion and the components have all been selected from leading Italian and foreign companies, giving a high level of reliability.
These characteristics, common to all ISVE plants are reflected in the high impregnation quality achieved in a short time and with very limited operating costs.

5. THE IMPREGNATION CYCLE

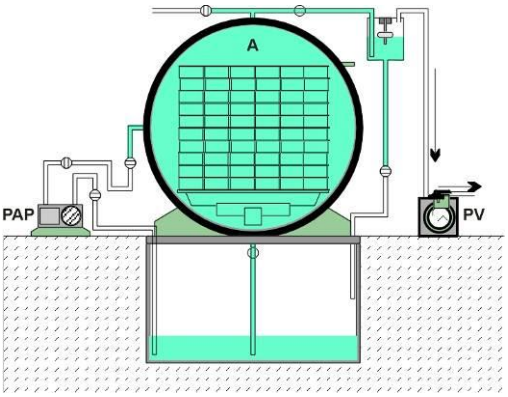
Phase 1: Initial Vacuum

The pile of wood, once positioned on the powered trolley of the autoclave, is placed inside the plant to start the cycle.
The hermetic closing of the door enables the machine to begin treatment by starting the vacuum pump. This phase, which is very important for the success of the cycle, frees the pores of the wood of air, by generating a "vacuum" which will allow the wood "to breathe" in the preserving solution. The length of the vacuum phase can vary from 30 to 90 minutes according to the characteristics of the wood.



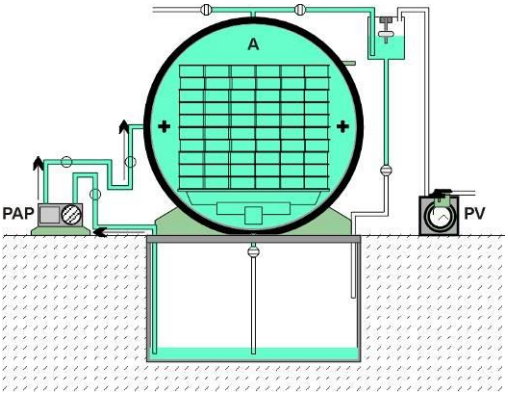
Phase 2: Filling

Once the first phase is over, the vacuum is used to convey the treatment solution from the lower tank to the autoclave positioned above.
A level sensor that sends the plant computer a control signal controls the filling phase.



Phase 3 : Application of pressure

The third treatment phase has the important task of "forcing" the solution into the wood. The pressure pump may operate for from between 30 to 180 minutes depending on the characteristics of the wood.
The combined action with the vacuum will enable the active principles to establish themselves deep in the wood thus guaranteeing long lasting protection.



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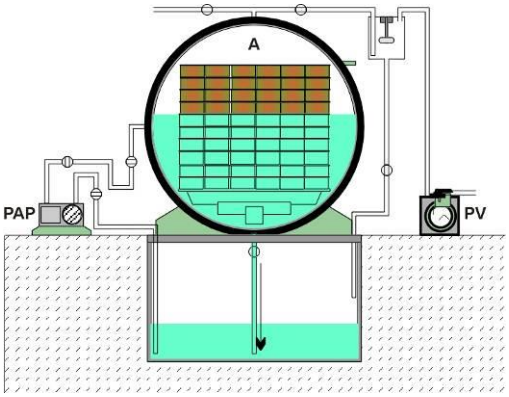
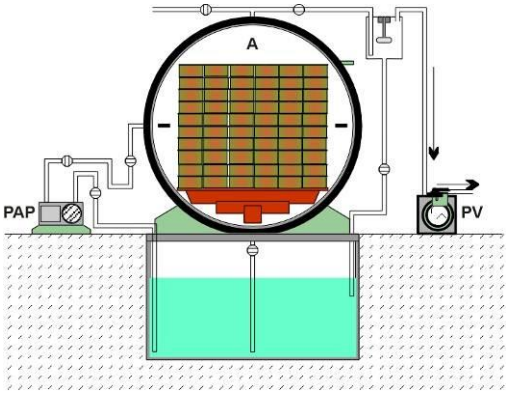
Phase 4: Discharging the solution

On termination of the treatment phases, the solution not absorbed by the wood returns to the lower tank by means of a discharge valve positioned on the bottom of the autoclave.
Special automatic systems top up the salt contents and restore the level of the impregnant so that it is ready for a new cycle.
All solution not absorbed is available for a new cycle without any waste.



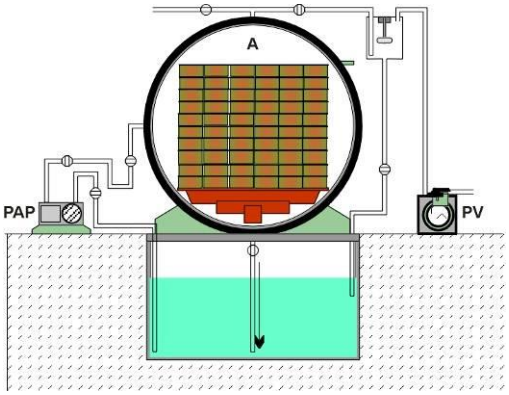
Phase 5: Recovery vacuum

A further vacuum phase lasting about 20-40 minutes facilitates the bonding of the active principles of the wood.
This phase is important in the "dripping" phase of the material being treated.



Phase 6: End of cycle

At the end of the impregnation cycle the autoclave returns to atmospheric pressure and the wood is ready for the following phases.



Duration of the process
The duration of the cycle varies depending on the following factors:

- Characteristics of the wood;
- Thickness;
- Humidity

Quantity and concentration of the salts required to be administered

6. GENERAL INDICATIONS ON THE USE OF IMP-VP IMPREGNATORS

The use of vacuum-pressure impregnators is advisable for all those products, such as garden furniture, brushes, fences, prefabricated elements for building, platforms for trucks, flooring, ship fittings, piles in agriculture, packing, which are exposed for varying lengths of time to external weather conditions.
In the same way, treatment of all those exotic and non-exotic woods with insecticides is indispensable in that even if only used indoors, they are subject to woodworm and other similar xylophages.

The products that can be used in our plants are:

- Solvent based IMPREGNANTS having a protective, exterminating action against mildew, insects, bacteria;
- Salt based IMPREGNANTS dissolved in water having a protective, exterminating action against mildew, insects, bacteria;
- Fireproof salt based IMPREGNANTS dissolved in water having also a protective action.

7. ADVANTAGES OF IMP-VP SYSTEM

There are many points in favour of this type of investment. Here following are the most important:

1. *Low capital investment*
   Very few investments in the wood industry can be compared to the capital investment over thousands of m^3 of treated wood a year, as an IMP-VP plant.

2. *Low labour cost*
   One person in charge for each work shift is sufficient to manoeuvre, unload and load the plant, as long as there is a mechanical means of handling the piles of wood.

3. *Wide and expanding market*
   All is that is required is to evaluate the customs entry for imports of treated material to assess the available market space.

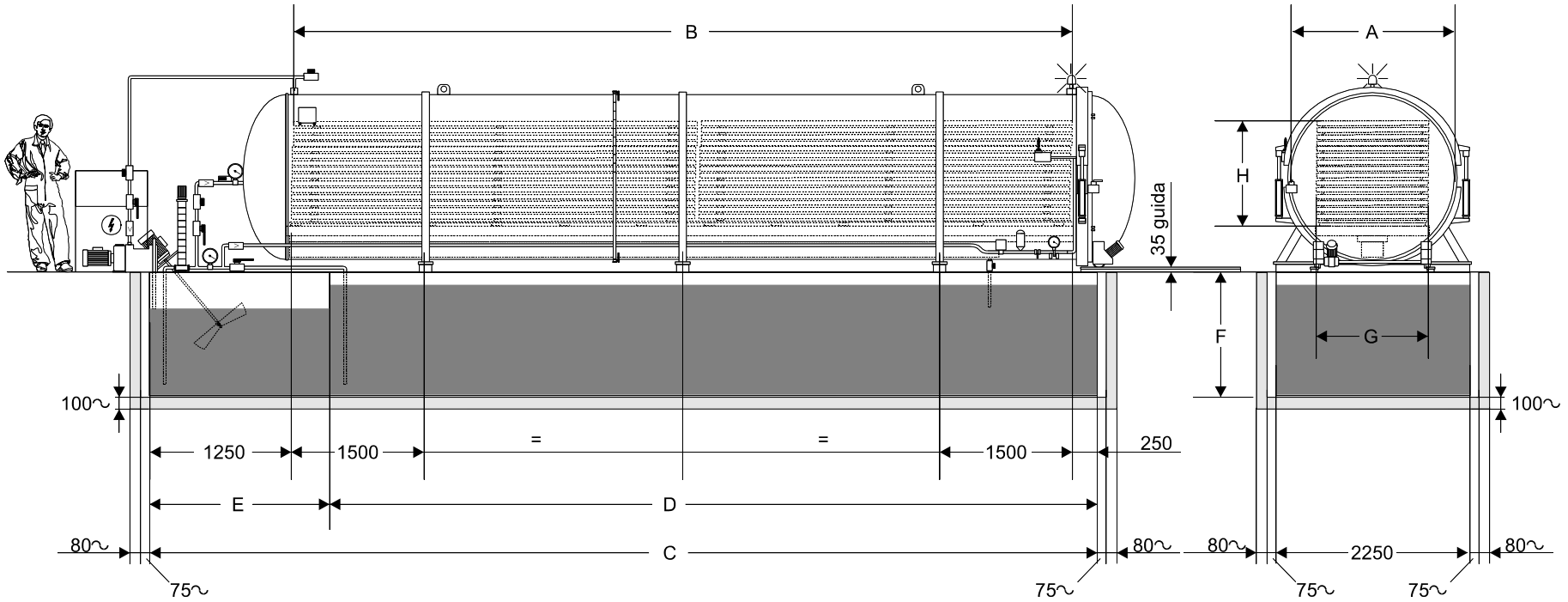
4. *Low maintenance costs*
   If care is taken in keeping the plant clean, the maintenance costs are very low as there are very few moving parts.

5. *Very marketable*
   Not only can the material be treated with a humidity of 30%, but, the material can be used and handled without problems only a few days after treatment.

6. *Easy to adapt to market requirements*
   Thanks to the limited labour required it is easy to face variations in production without creating serious problems.

7. *No form of contract is required for impregnated products.*
   I.S.V.E. Srl operates in the company industrial engineering sector and does not sell impregnated products. The customer is therefore free to move on the market without any form of restriction.

8. *No danger of ruining the material*
   I.S.V.E IMP-VP plants are supplied with an electric control panel equipped with a PLC Siemens of latest generation which minimises the possibility of an erroneous manoeuvre.



									Pacco stivabile				Volume in litri		
	MODELLO	A	B	C	D	E	F	G	H	B	m^3	Autoclave	Vasca	Peso (t.)
	IMP-VP 1500/6000	1500	6000	7500	6000	1500	1250	950	950	6000	5,4	11500	12800-3200	5,6
	IMP-VP 1500/9000	1500	9000	10500	9000	1500	1250	950	950	9000	8,1	16800	19000-3200	9,0
	IMP-VP 1500/12000	1500	12000	13500	11500	2000	1250	950	950	12000	10,8	22000	24000-4200	14,0
	IMP-VP 1800/6000	1800	6000	7500	6000	1500	1500	1200	1200	6000	8,6	16500	16000-4000	11,0
www.isve.com	IMP-VP 1800/9000	1800	9000	10500	9000	1500	1500	1200	1200	9000	12,9	24000	24000-4000	16,0
	IMP-VP 1800/12000	1800	12000	13500	12500	2000	1500	1200	1200	12000	17,2	32000	31000-5300	20,0

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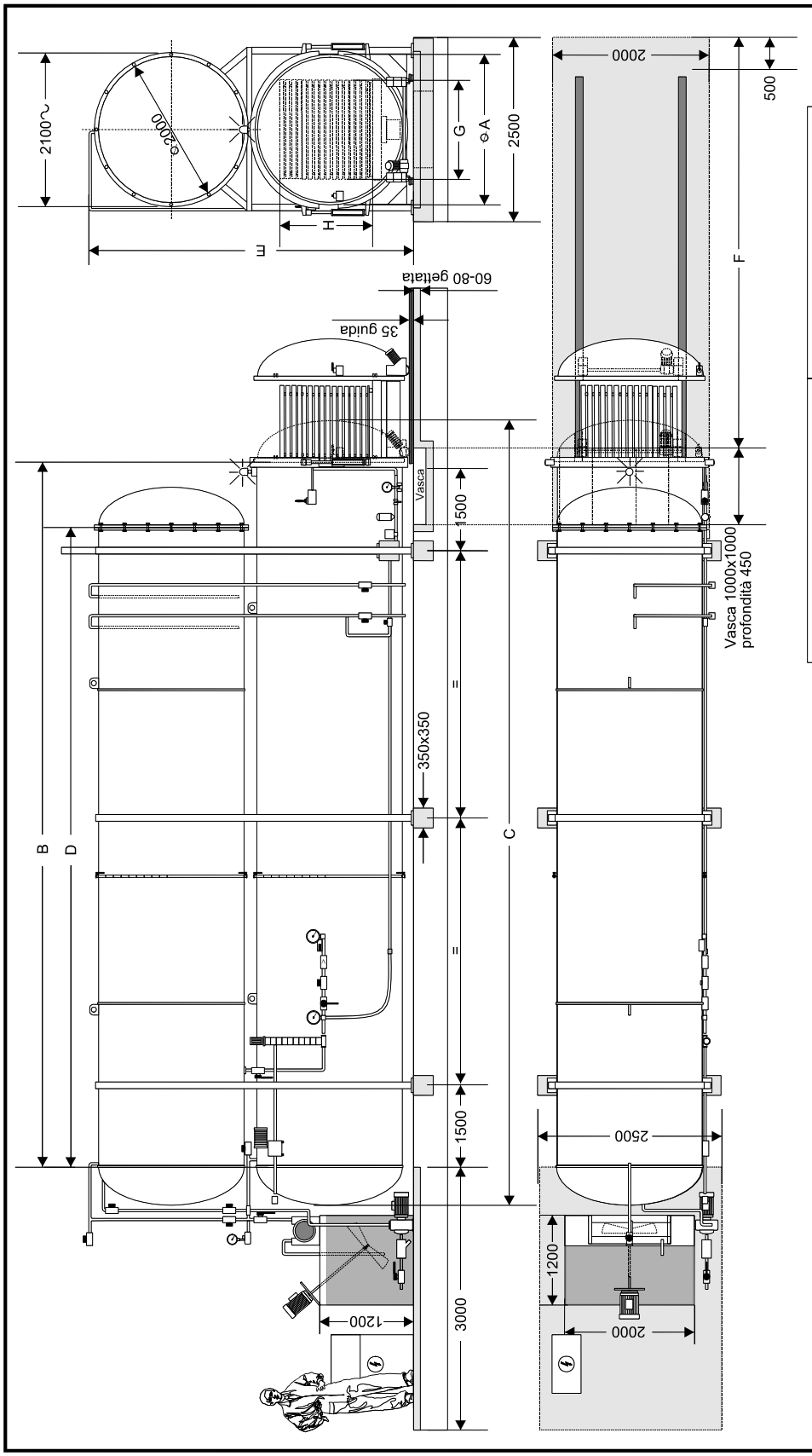
ISVE WOOD
WOOD TECHNOLOGICAL PARTNER



MODELLO	A	B	C	D	E	F	G	H	B	m^3	Pacco stivabile	Autoclave	Autoclave super.	Volume in litri
IMP-VP D 1500/6000	1500	6000	7500	4000	4100	7000	950	950	6000	5,4		11500	12000	
IMP-VP D 1500/9000	1500	9000	10500	6000	4100	10000	950	950	9000	8,1		16800	18000	
IMP-VP D 1500/12000	1500	12000	13500	7000	4100	13000	950	950	12000	10,8		22000	22000	
IMP-VP D 1800/6000	1800	6000	7500	5500	4400	7000	1200	1200	6000	8,6		16500	17000	
IMP-VP D 1800/9000	1800	9000	10500	8000	4400	10000	1200	1200	9000	12,9		24000	25000	
IMP-VP D 1800/12000	1800	12000	13500	11000	4400	13000	1200	1200	12000	17,2		32000	34000	

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PICTURES OF SOME OF OUR TREATMENT PLANTS TYPE IMP-VPDAROUND THE WORLD:

IMP-VPD of 9m in Novorossjisk (Russia)

IMP-VPD of 14m in Leòn (Spain)

IMP-VPD of 6m in Tuscany (Italy)

IMP-VP D in Santiago de Compostela (Spain)

IMP-VPD of 18m in Ioannina (Greece) (Italy)

IMP-VPT of 12m in Assisi

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IMP-VPD with store aside of 6m in Marche Region (Italy)

IMP-VPD of 9m in Denmark

IMP-VPD with load/unload motorized system in Barcelona (Spain)

IMP-VPT of 12m with double store tank in Murcia (Spain)

IMP-VPD& UIMP-VP in Udine (Italy).

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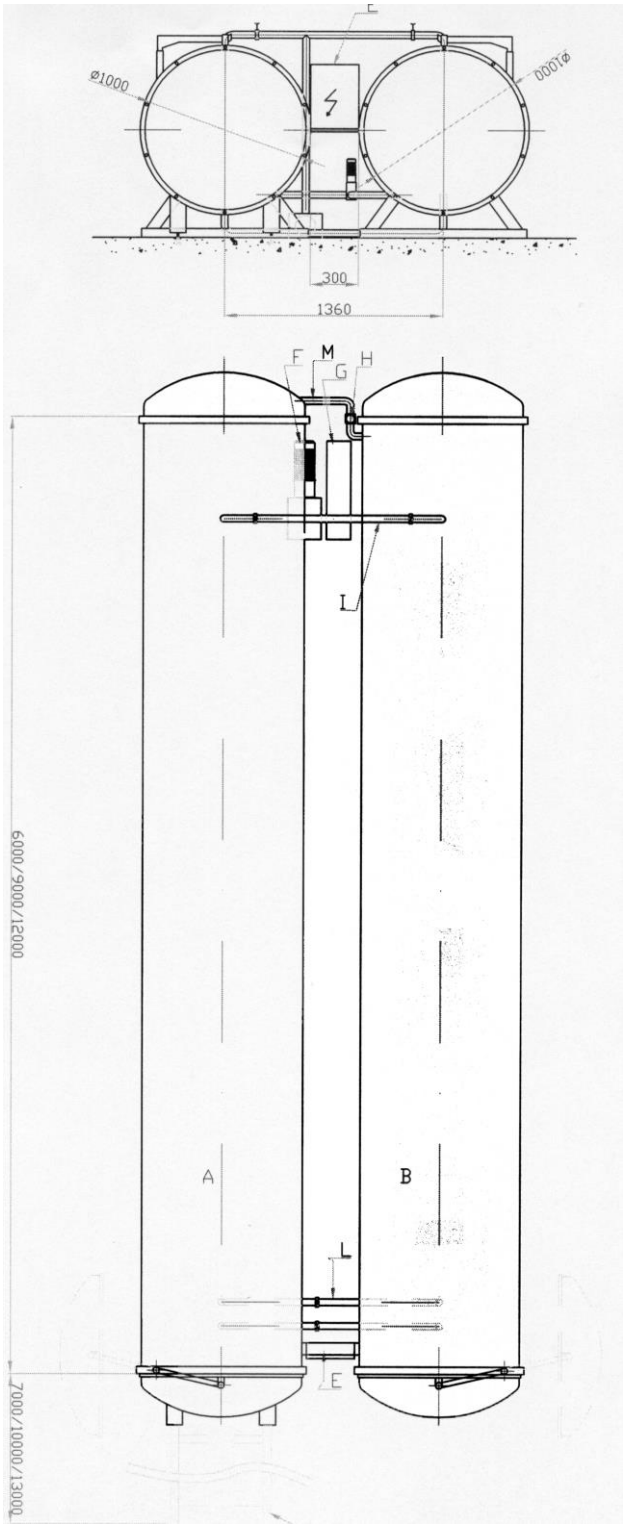
8. SEMI-AUTOMATIC VERSION OF VP/D PLANTS

It is possible for us to make a smaller and cheaper version of the vacuum/pressure plants, making the autoclave of 1000mm that is necessary to manage manually by an operator using ball-valves. The plants consist normally in a double cylinder, one used to load the wood to be treated and the other to store de chemicals. The carriage can load packages of 650x650mm per the length of the cylinder, that standard can be 6, 10 or 12 meters long.



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IMP-VPD1000/12m in our factory

IMP-VPD1000/12 in Mexico

IMP-VPD1000/12 in Guatemala

IMP-VP/D1000/6m in Croatia

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