Customer: _____
Country: _____

VacWood®

Date: 03 February 2026

Technical Proposal for the supply of 1 Unit of
VACUUM THERMAL MODIFICATION SYSTEM (TVS)
Model: ROLL 2,05 E 15 L 10000

This Technical Proposal consists of two distinct sections:

Section A) - Equipment description, performances and technical features (pages 2-12).

Section B) - Description of the system-related service package (pages 13-15).

SECTION A) – EQUIPMENT, FEATURES AND PERFORMANCES

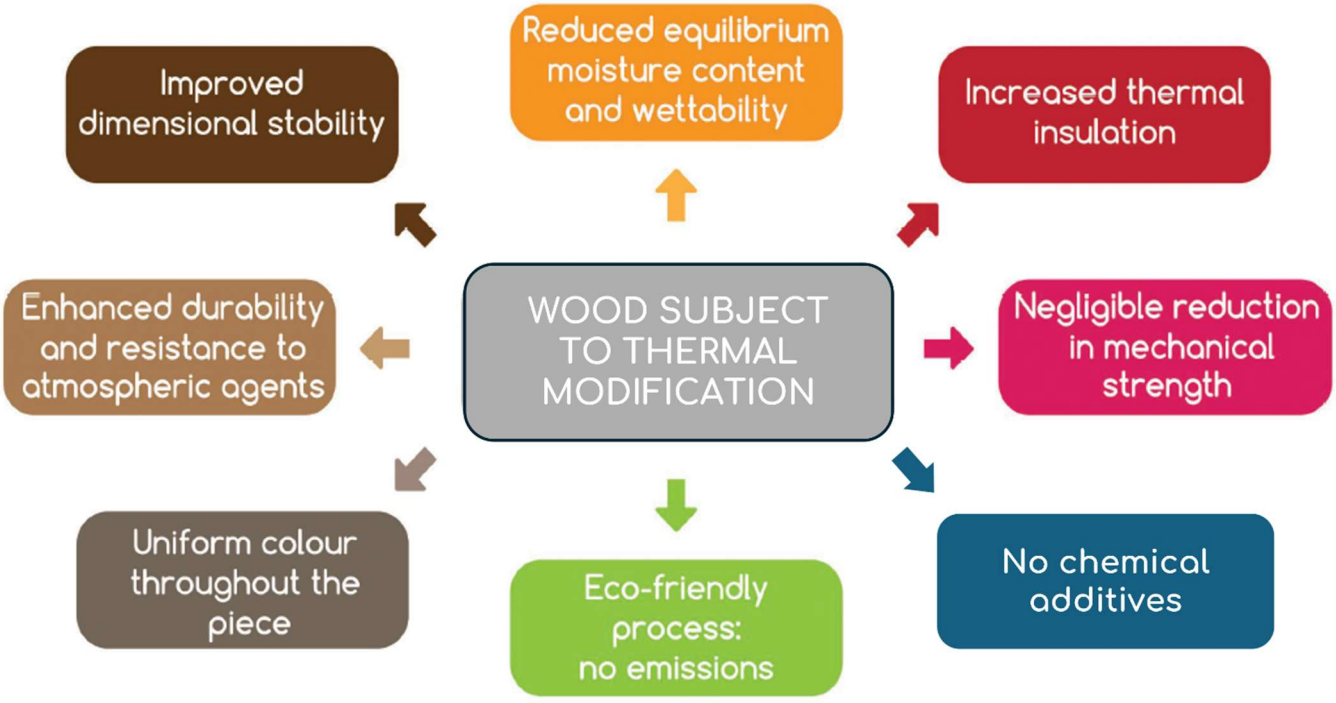
A.1) GENERAL INFORMATION

The ThermoVacuumSystem System (TVS) ROLL 2,05 E 15 L 10000 is an equipment designed for thermal wood modification. The transformation is based on the use of high temperatures in ambient atmosphere, **with no chemical additives**.

The characteristics of the final product are substantial: **increase of durability** according to the norm UNI EN 350-2:1996, which indicates the procedures to determine and classify the natural durability of each wooden specie.

Moreover, also the **mechanical properties** are modified (also characterized according to ISO standards), and the **wood color.**

Finally, the Thermal Modification process advantages are many others, as described in the following picture:



Thermally Modified wood, according to the WDE Maspell prescriptions based on the studies of "TECH4WOOD" project, is recognizable for its characteristics and durability class. Furthermore, the Thermally Modified wood respects the evaluation criteria of the norm CEN/TS 15679, that just defines the Thermally Modified wood characteristics.

WDE Maspell, founded in 1962, has extensive experience in wood drying and thermal modification, and is universally recognized for its technology, the result of in-depth research and passion, and for its after-sales service.

A.2) TIMING AND ENERGETIC PERFORMANCES

TVS ROLL 2,05 E 15 L 10000 is a very efficient system, which allows to use the cell and arrange the load with maximum **flexibility**.
Performance in terms of timing depends on wood conditions (i.e., initial humidity and thickness): the process quality (according to WDE standard) is referred to initial homogeneous wood conditions.

THERMALLY MODIFIED WOOD COLOR CHANGE

Times and energetic performances of each cycle can vary in a range that assures anyway the **final characteristics** of the product, both according to WDE standard and the EU norms; however, the user can **modify the cycle parameters** (inside the safety range) to **personalize the production and the final results**.

An adequate **thermal insulation**, as well as the correct and dot-like management of the heating system, based on the double control of the power and on the 4-spots measurement system, guarantee the **maximum efficiency** during heating and thermal modification temperature maintenance phase.

TECHNICAL FEATURES		ROLL 2,05 E 15 L 10000
External dimensions		3.6H x 3W x 13.3L meters
Standard loading capacity	**15**	Standard stack 1,2 x 1.7 x 10
Heating system	**E**	ELECTRIC
Installed power	**kW**	31
Thermal capacity (by electrical resistances)	**kW**	84
External coating	**A**	ALUMINIUM
Insulation		200 mm ROCKWOOL HD
Control system	**P**	TOUCH SCREEN PLC
Condensation recycling	**A**	AUTOMATIC
Water connection		½" - 2-3 bar
Electrical supply		115 kW – 480 V 60 Hz 3 Ph + N + G

A.3) SPECIFIC PRODUCTION PERFORMANCE

Nominal productivity is calculated with reference to standard 60mm thickness; however, the actual simulation is made by keeping in consideration thicknesses and wood types as indicated by the Customer.

Drying cycle and process final results are shown and evaluated according to **EN 14298:2018**, **a** European norm that defines evaluation criteria of the drying quality for sawn timber.

Net actual production is calculated on the base of **drying and thermal modification times so as obtained on the most commercial timbers worldwide**, considering also loading and unloading operations; likewise, consequent net load per cycle is showed and calculated according to the Customer's indications.

Stack dimensions H 1.7 x W 1.2 x L 10.5 Number of trolleys 1

CALCULATION FOR MODEL CYCLE: THERMAL MODIFICATION

WOOD TYPE			HEMLOCK	HEMLOCK	DOUGLAS FIR
THICKNESS		Inches	1"	2"	1"
INITIAL MOISTURE CONTENT IMC		%	10	10	10
CYCLE NET LOAD [2]		BF/Cycle	5,300	5,548	5,300
FINAL THERMAL MODIFICATION Temp		° C	214	214	214
ESTIMATED CYCLE TIME [3]		Hrs	35	38	34
CYCLES/MONTH		Nr.	15	15	15
MONTHLY PRODUCTION (100% duty cycle)		BF	79,500	83,220	79,500
SPECIFIC THERMAL CONSUMPTION [3]		kWh/BF	0.41	0.41	0.41
SPECIFIC ELECTRICAL CONSUMPTION [3]		kWh/BF	0.146	0.151	0.141

[1] Productivity is calculated on 330 working days (or 165 cycles/year), including the estimated ordinary maintenance time.

[2] Calculated considering 10% load loss and standard sticks, according to the thicknesses to be dried/thermally modified:

- 1" wood thickness = stickers 3/5"
- 2" wood thickness = stickers 1"

[3] Time and consumption estimation is referred to complete cycle (Preheating – Drying - Cooling) in standard temperature/pressure conditions (20°C – 1013 mbar). Steaming time is not calculated.

The above calculations and data are intended as an indicative estimation only and not binding for the effects of a possible sales contract, as real thermal modification data depend on many other factors, like initial wood quality and conditions, environment conditions, cycle parameters etc... that are not under WDE Maspell control.

A.4) CONTROL SYSTEM – "TOTAL VISION"

Thermal Modification process and all the system parts are controlled by PLC through an ultimate touch-screen panel; the **TOTAL VISION** system allows the operator the **remote management and control**, through server connected to the Internet (from PC or Smartphone).

The control system allows access to the **cycle parameters**, to visualize the **operation parameters** of the auxiliary equipment and to **monitor consumptions** and **condensate quantity** produced by the thermal modification process.

Moreover, the system grants access and can interact with information regarding the cycle timing, as well as with the preliminary and final operations of ordinary maintenance.

Finally, the software is provided with built-in thermal modification memory programs, specific for species and thickness, but also allows to personalize programs according to the customer's requirements.

CONTROL PANEL

A.5) "TOTAL VISION" SYSTEM SOFTWARE

The software allows the user, through an on-board control panel, or by remote, to have total control and management of the whole system so to easily recognize anomalies and punctually monitor the correct operation of the equipment.

A.4.1) SOFTWARE LICENSE

WDE Maspell grants the Customer a **non-exclusive, non-transferable, free-of-charge license** to use the proprietary control software named *"TOTAL VISION"*, developed by WDE Maspell specifically for the management of the equipment.

The Software is designed for the **correct management, monitoring and functioning of the equipment** as described in Section A).
Using TOTAL VISION, the Customer benefits from:

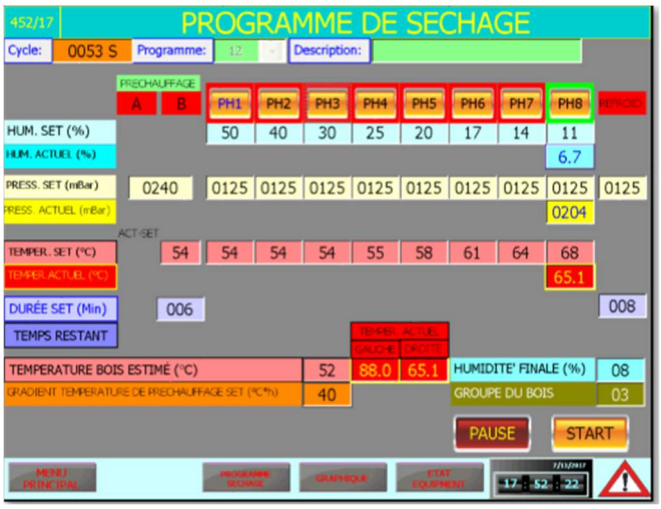
- a centralized and intuitive interface for operating the system;
- continuous monitoring of process parameters;
- automated control functions aimed at ensuring consistent quality and repeatability of results;
- information regarding the cycle timing, as well as with the preliminary and final operations of ordinary maintenance.

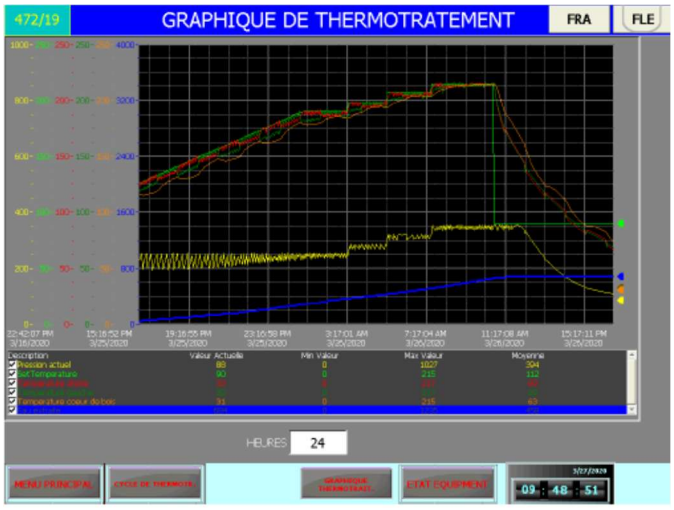
A specific License Agreement will need to be signed by the Customer.

A.4.2) CYCLE PROGRAMS MANAGEMENT

The correct management of each thermal modification cycle is made through control panel, provided with memory and/or customizable (according to customer's requirements) programs.
Graphics, very intuitive, is enriched by the **chart of the drying**, that encloses all cycle data so to allow a **fast and correct analysis**.
The programs have been designed, following specific parameters defined by tests made at different **Universities** and **other Partners** involved in the project worldwide, to guarantee wood quality and characteristics.

PROGRAMS PAGES AND PARAMETERS DISPLAY

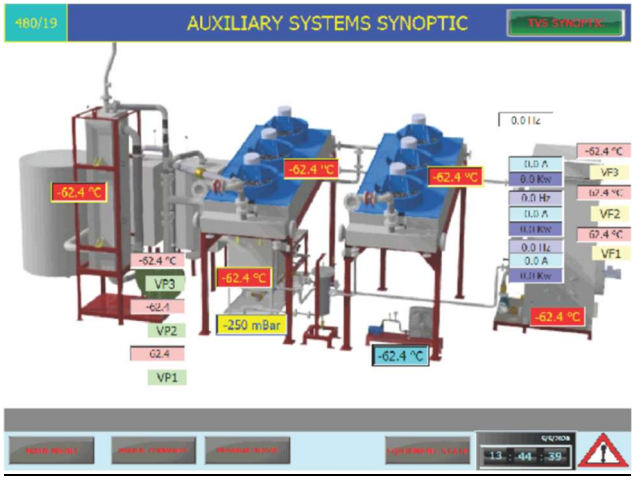


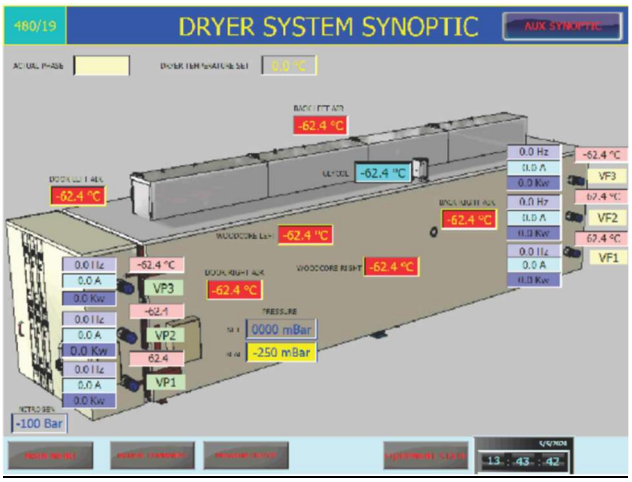


A.4.3) OPERATING PARAMETERS CONTROL

Thermal modification parameters control is made through synoptic screens or tables that enable the operator to ensure quick identification of the values necessary for the correct operations of the process and the equipment.
A wide variety of sensors allows a fast and accurate analysis of the state of the equipment, directly from PC.

MANAGEMENT AND CONTROL PAGES OF THE TVS





A.6) LOADING SYSTEM

The loading system is composed of stainless-steel **external trolley and rails** to allow the IN/OUT operations**.**

The rails can be drowned or at ground level, according to customer's needs; this option will have to be specified before the preliminary approval of the layout.

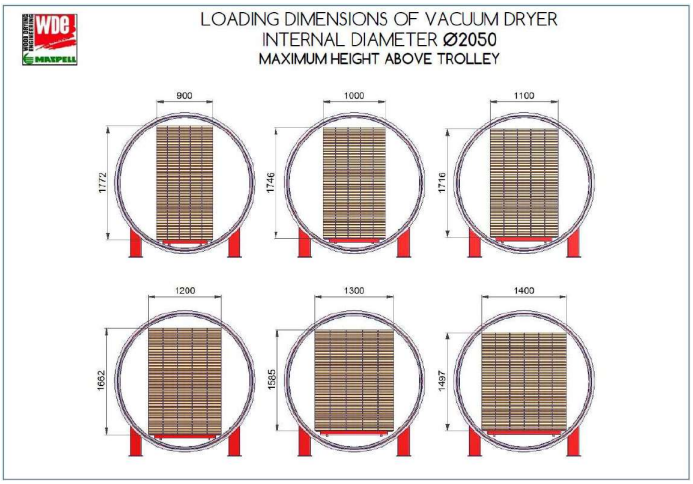
Trolley handling can be made by fork-lift, by a pulley system, by a steel rigid rod or by chain-driven mechanical handling of the trolley (optional).

ELEVATED RAIL

DROWNED RAIL

A.7) STACK TYPE AND STRUCTURE

The equipment design allows a **wide range of stack dimensions and length options**, thanks to a stainless-steel flap, mounted on both sides of the trolley**.**



(See enlargement at page 16)

A.8) COMPONENTS AND CONSTRUCTION

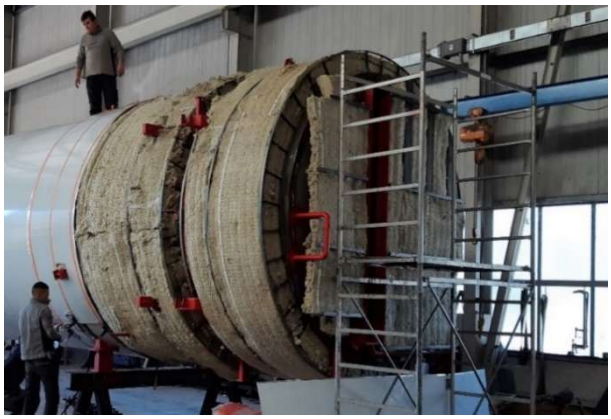
The equipment has been designed to withstand the atmosphere and temperature variations of the TVS process. All the parts of the cell in contact with the thermal modification environment, as well as hoses, are built in stainless-steel AISI 304.

Also, the parts exposed to the thermal modification is built by stainless steel, while other parts are in mild steel. Components are assembled and tested either at the arrival in our plant and during the start-up phase at customer's site. **Inverter technology engines** are mounted for maximum efficiency.

Thermal insulation is composed of 200 mm of **high density rockwool**, and the external coating that protects the insulation is made by aluminum, to guarantee a very long duration.

STAINLESS-STEES CELL CONSTRUCTION

INSULATION AND EXTERNAL COATING



SUPPLIERS OF MAIN EQUIPMENT AND INSTRUMENTS

EQUIPMENT	SUPPLIER
VACUUM SYSTEMS	**GARDNER DENVER /TRAVAINI**
WATER PUMPS	**CALPEDA**
CONDENSED	**WDE**
PLC	**ASEM**
ELECTRICAL ENGINES	**ISGEV**
FANS	**MULTIWING**
ELECTRICAL RESISTANCES	**FATI**
ELECTRIC EQUIPMENT	**SCHNEIDER**
DATA ACQUISITION ELECTRONIC BOARDS	**SENECA**
HEAT EXCHANGERS	**WDE/PACETTI**
ENGINE-DRIVEN VALVES	**CONTROLLI/COMPARATO**
PNEUMATIC COMPONENTS – ELECTROVALVES	**PARKER**
PNEUMATIC VALVES	**MAXAIR**
ROLLING BEARINGS	**FAG/SKF**
COOLING PUMP	**CALPEDA**
SEALS COOLING	**EMMEGI**
INSULATION	**ROCKWOOL**
INVERTER	**YASKAWA**

A.9) AUXILIARY SYSTEMS

For the proper operating of the TVS system, it is provided with a wide range of auxiliary equipment for the fluids management during the different of the cycle.

All auxiliary equipment are built in stainless-steel grade AISI 304 and 316, including condensers, pumps, and valves for the management of steams and condensate fluids.

AUXILIARY SYSTEMS

A.8.1) CONDENSER

The vapors generated during the thermal modification process are condensate and water is separated (drying/thermal modification) through a condenser and a compressed-air extraction pump; **it allows to condensate almost the total quantity of volatiles substances, otherwise emitted in the atmosphere.** The compressed-air pump ensures speed and efficiency of the drain. Two different hoses are dedicated to thermal modification water and drying water.

A.8.2) COOLING TOWER

A closed, heat-exchange and cooling tower system allows the proper operation of the liquid ring vacuum valve with recycling, **keeping the cooling water separated by the working water.**

A.8.3) FANS COOLING GROUP

The engines cooling circuit, composed of valve, cooler and control system, **keeps seals and rolling bearings at the correct operating temperatures, during high and extra-high temperature phases**.

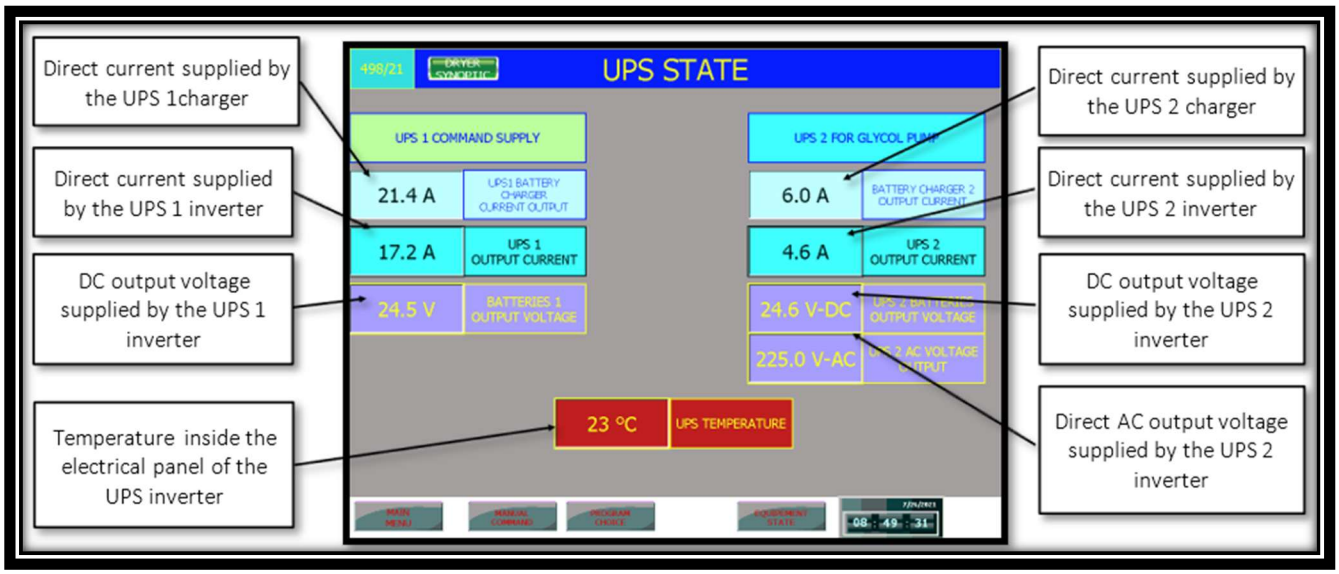
A.8.4) CELL COOLING SYSTEM

The end cycle or the cycle cooling, when endothermic phases of the wood are possible, is granted by high flow extractors that, through a heat exchanger extended on the whole surface of the cell, ensure very high efficiency. **This allows to cool without exchange of air polluting substances.**

A.9) INTRINSIC SAFETY SYSTEM

A.9.1) 24V SAFETY SUPPLY SYSTEM

The TVS is equipped with a 24V safety supply device, composed by UPS and emergency high-capacity batteries, integrated with the TVS controller, **keeps operating the essential parts of the system even in case of lack of electric power supply**, granting monitoring for a minimum of 6 hours and the fans cooling.



A.9.2) PHONE DIALER / NOTIFICATION SYSTEM ON SMARTPHONE

An automatic call system alerts the operators in case of anomalies that can jeopardize cycle safety and success. The system is enabled to continuously call or text 10 phone numbers, showing the type of ongoing alarm.

For the North American market, alerts system is based on Internet notification to a smartphone using a simple App.

However, all alarms are also highlighted and registered on a specific page of the touch screen, allowing the proper evaluation of the anomaly, even at the end of the cycle.

A.9.3) INERTIZATION IN NITROGEN

To face **uncontrollable events**, TVS **is provided also with a nitrogen inertization system** (the gas bottles stock plant is at customer's charge) actuated by PLC through a safety electro-valve (not utilized during the normal TM process, but only in extreme case of danger, or fire).

A.9.4) AUTOMATIC WASHING SYSTEM

To make the regular washing of the auxiliary equipment, TVS is provided with an **automatic washing program** that, thanks to a valves system, allows the sequence washing of the condenser, of the vacuum system, of the heat exchanger and, finally, of the condensate drain pump and of the hoses.

A.10) OPTIONAL

A.10.1) TOTAL GASEOUS EMISSIONS REDUCING SYSTEM

The entire system has been designed to produce emissions to the atmosphere reduced by 90%, compared to the absolute emissions of the cycle, but it can be also equipped, on customer's request, with a catalytic emission control system, to reduce the emission to the atmosphere by 99.6% compared to an untreated emission.

The emission limits comply with current regulations, except for any more restrictive local regulations, verification of which remains the responsibility of the Customer.

A.10.2) CONDITIONING AND FINAL STEAMING/SPRAYING SYSTEM

For optimum final wood conditioning, WDE Maspell offers, as a option, an automatic system composed of:

- steamer
- pressurized water sprayers

with control panel integrated into TVS programs.

***Note**: the practical use of steam generators and water sprayers is to restore some humidity to wood, after the thermal modification cycle. At the end of the cycle, the Final Moisture Content is approx. 2%, while some users prefer to have more humidity, so to allow a better "workability" of the wood (planing, drilling, screwing, etc…) in certain applications.*

The steamer and spray of water don't affect quality of the process as well as the main features of the wood (color darkening, durability and dimensional stability), while it has an impact on the cycle time, as it will take minimum + 6/8 hours (depends on thickness, type of wood, desired FMC %, etc…) in addition to the scheduled process time.

A.10.3) MASS LOSS CONTROL by WEIGHT CELLS

On request, it is possible to install weight cells to verify, during the cycle phases, the real **mass loss** of the load: through an algorithm, it is possible to obtain a higher accuracy of the thermal modification data and a program perfecting, even with different types of essences and thickness variations.

A.10.4) AUTOMATIC LOADING SYSTEM

The present model can be provided with a chain-driven **loading/unloading system**, equipped with push button panel.

A.10.5) WEIGHTS FOR STACK

To keep the **maximum planarity of the wood**, it is possible to provide the TVS with stainless steel weights, to be positioned on the top of the stack. This option is highly recommended for large thicknesses.

A.10.6) SPARE PARTS SET

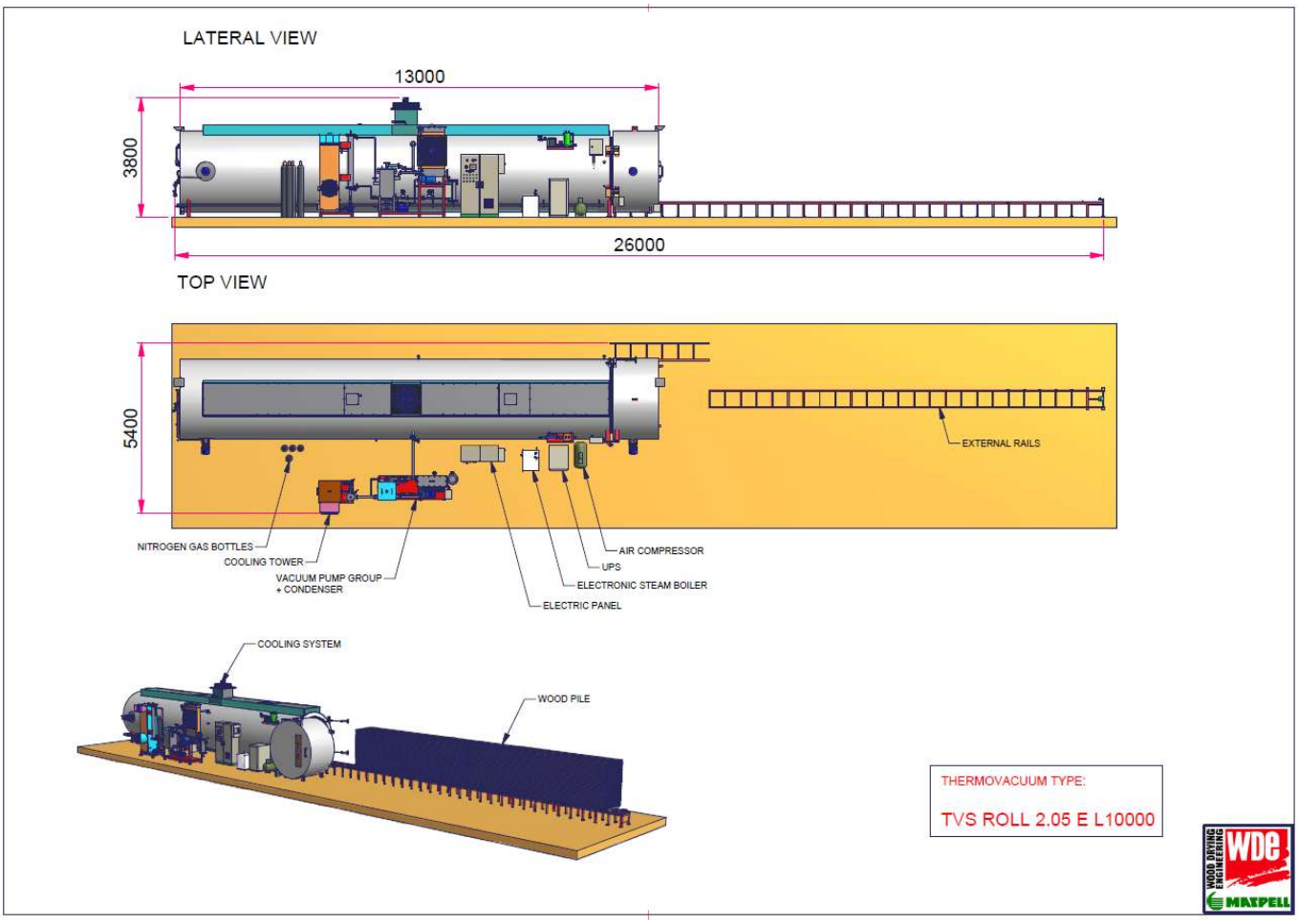
This offer includes, free of charge, a **first safety stock Spare Parts Set**, which includes a list of a "ready-for-replace" spare parts, so to prevent possible long machine downtimes.

A.11) PROPOSED LAY-OUT

The layout is proposed only to verify the **minimum space availability for the setup footprint**, it can be modified according to specific customer needs and requests.

It is possible to customize the setup for external installations, **in dedicated shelters** and / or in specific positions or environmental conditions, according to customer needs. WDE Maspell engineers are available for information and specific requests.

STANDARD LAY OUT



A.12) WARRANTY & SPARE PARTS

Warranty on stainless-steel cell walls corrosion is **10 years,** provided that chlorides are not introduced in the cell. Warranty on other components is granted according to the EU norms and the standard B2B industrial practices (1 year).

WDE Maspell also provides with an in-house **stock of spare parts as well as a consignment stock in the USA**, always available for immediate shipment thanks to the **Worldwide Shipping Service.**

However, to facilitate ordinary maintenance operations, most common spare parts are also available in the local market, when not differently specified by WDE Maspell.

SECTION B) – SYSTEM-RELATED SERVICES PACKAGE

B.1 LAY-OUT CUSTOMIZATION, INSTALLATION, START-UP

STANDARD LAY-OUT CUSTOMIZATION

WDE Maspell provides the Customer with a standard Lay-Out for installation and equipment placement (see Section A.11).
As part of the Services Package, WDE Maspell also provides "Fit-to-Suit" design modifications, executed by WDE Maspell engineers, aimed at adapting the standard layout to the Customer's specific space and logistical requirements.
By purchasing this service, the Customer benefits from a solution that is **perfectly integrated into their operational environment**, reducing installation risks and optimizing workflow.

INSTALLATION

The unit must be installed in a proper site, protected from the atmospheric agents (rain, snow, etc…), within the following ranges of temperature:

- Body of the equipment (cell): Min -15 ° / Max 35 ° C
- Accessories: Min 5 ° / Max 35 ° C
- Control Panel zone Min 0 ° / Max 35 ° C

On request, special anti-freeze predispositions for the vacuum system are available.

Connections at customer's charge: **power supply, mains water, sewerage (for condensation water drain), Internet connection, compressed air when necessary.**

The setup is quite easy to execute: however, **a WDE technician on-site will supervise work of the customer's personnel during the phases of unloading, handling, placement and connection of the equipment.**

START-UP

Start-up will be done by the WDE Maspell engineers, and the date of the execution will be agreed with the customer.

During the start-up, WDE Maspell engineers will **take care of the plants control, of the auxiliary plants control and start-up of the equipment,** which includes the presence and full assistance during two blank cycles tests.

Installation & Start-Up duration is approx. 15 days: T&E are at WDE Maspell charge.

B.2 OPERATORS' ON-SITE TRAINING

Moreover, included in the services package, WDE MASPELL delivers also training for the workers of the customer, so that they will be educated in getting the best performances by the equipment, perform correctly all the operations and assure the maximum quality of each single process, regardless of the thermally modified essence.

Also, WDE Maspell's engineers will train the customer's personnel about the safety features and devices of the equipment: training will also focus on personnel's behavior to keep safe the work ambient around the equipment, as well as the use and maintenance of the TVS.

B.3 REMOTE AFTER SALES SERVICE

WDE Maspell provides the Customer with a **dedicated After Sales Service by remote control**, subject to the availability of a stable internet connection at customer's site.
Through this service, WDE Maspell engineers will be able to carry out **system adjustments, updates and upgrades, as well as extra-ordinary maintenance** operations **by remote**, with the aim of minimizing equipment downtime and ensuring continuous and efficient operation of the system.
Moreover, WDE MASPELL can interact by remote either for the **drying and thermal modification cycle management and programs setting** (to support the customer during the first drying cycles) and for the software management for **modifications**, **up-grades** and **extraordinary maintenance** operations.

B.4 CONSULTANCY SERVICE

WDE Maspell also provides the Customer with a **perpetual and comprehensive consultancy service** dedicated to the drying and thermal modification processes.

The service goes well beyond the ordinary support and represents a **continuous technical Partnership**, aimed at ensuring that the Customer achieves the **highest possible standards of performance and product quality**.

The service includes continuous technical support with respect to:

- the type of wood species and their intrinsic features;
- the evaluation of thickness and all other characteristics of the wood to be thermally modified;
- the definition of the desired final thermal modification results (durability, dimensional stability, color darkening, or any combination thereof).

Such consultancy service is intended to ensure that the Customer can consistently achieve the required performance and quality standards, making it a **core and permanent component of WDE Maspell commitment**.

STACK DIMENSIONS / LOADING OPTIONS