

# WYSSMONT IS THE WORLD LEADER IN TORREFACTION

Wyssmont has successfully demonstrated the ability to dry and torrefy cellulosic materials in a single operating system. The Wyssmont Torrefaction system can produce end products having different BTU values by simple adjustments of operating parameters.

Wyssmont is the front runner in this rapidly emerging business. We have the only large scale, **commercially viable**, process for producing torrefied wood (or other cellulosic materials).

The Wyssmont laboratory is being used daily to continuously improve processing conditions and to increase the capacity of Wyssmont system.

Please visit our Web site at [www.wyssmont.com](http://www.wyssmont.com) frequently to keep up to date with our progress.

If you need additional information, or if you wish to test your cellulosic material in our laboratory, please contact me directly.



## Drying and Torrefying in the Wyssmont TURBO-Dryer Full Size Production Unit Generic Budget Estimate Issue date: September 16, 2009

Dear Customer,

We are pleased to provide a budget estimate to dry and torrefy cellulose based materials in the Wyssmont TURBO-DRYER®. This budgetary estimate is based upon our experience drying many different types of cellulosic materials.

The size we are proposing may not match your specifications. It is our largest production unit and therefore, the most economical to operate. Higher capacities can be achieved by grouping multiple units together. Smaller capacities can be quoted upon completion of laboratory testing of your specific materials.

This estimate is based upon the torrefaction of Southern Pine.

<b>SPECIFICATIONS: Drying and Torrefying in a single system</b>				
<b>Feed Rate: lbs/hr</b>	<b>Species</b>	<b>Density; lbs/ft<sup>3</sup></b>	<b>Feed Moisture; percent</b>	<b>Product Rate: lbs/hr</b>
32,600	Southern pine	15	40	16,000
32,600	Southern Pine	15	10	24,000
95,000	Southern Pine	45 (pelletized)	10	68,400

Operating Hours:  
Caloric value:

24 hours/day, 360 days per year  
9,500 BTU's/lb. (20.9 MJ/kg)

The above capacities will vary depending upon;

1. The final BTU value desired  
9500 Btu/lb results listed above. Other values are possible.
2. The nature of the feed stock being used
3. The inlet moisture content
4. The bulk density of the wet feed

**TURBO-DRYER Size**

**Quantity**

Diameter, ft.

Height, ft.

**Model: DTLC**

**1 unit**

30 feet = 9.2-meters

48 feet =14.8-meters

**Materials of Construction**

Carbon steel construction

Includes sealed recirculation fan and all compact, interconnecting ductwork necessary to create the superheated steam loop for drying and torrefaction, and to connect to the external heating system (outlined below) and any additional piping or ductwork required to complete the system venting loop.

**Horsepower Requirements:**

Includes variable frequency drives for the TURBO-Fans and Tray Drive Motors.

TURBO-Fans	(1)	30 HP
Tray System	(1)	10 HP
Rotary Valves	(3)	5 HP
Feeder	(1)	2 HP each

**Ancillaries**

A limited control system including temperature pressure and oxygen control instrumentation, all installed in a local control panel is included. The customer would need to provide a PLC controller to operate the dryer/torrefier

A Multiple Screw Feeder and Airlock to continuously feed the TURBO-DRYER<sup>®</sup> and seal the feed opening are included.

At the discharge of the TURBO-DRYER<sup>®</sup> a double airlock system with a small transition between the two (2) airlocks is provided. The transition must be purged with steam or inert gas to keep oxygen out of the system. These airlocks are long rectangular units designed to minimize headroom requirements.

The system outlined above is very flexible. It can also be used to dry only or torrify only.

The unit listed above is shipped in sub-assemblies for erection in the field by bolting. Wyssmont provides erection drawings and instructions.

**Approximate Price**

**each @\$2,200,000**

The external heating system to recirculate the superheated steam which includes the following is **not included**.

- 1) A biomass or a natural gas fired heater & heat exchanger to reheat the superheated steam
- 2) Interconnecting ductwork as required to tie into the TURBO-DRYER® superheated steam loop
- 3) A fully automated control panel utilizing a programmable logic controller (PLC). Air flow and fuel feed rates are constantly adjusted by way of variable frequency drives to insure a consistent heating air temperature. Temperature and pressure receiver instrumentation necessary to control process conditions in the TURBO-DRYER® by way of the PLC would be mounted in this local control panel.

Prices listed in this letter are ex-works, export packed in US funds. Shipping time is approximately 8-9 months from the date of order.

We are appending our Laboratory Testing Bulletin in the event that you wish to proceed with specific laboratory testing of your materials.

Very truly yours,

WYSSMONT COMPANY, INC.

*Edward DePouli*

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## **TESTING BULLETIN GUIDELINES & PROCEDURES**

### **DRYING TEST**

1. **Wet Material Required:** 1 – 2 gallons (usually 10 – 15 lbs)
2. **Dry Material Required for Comparison Purposes:** Few ounces (if available).
3. **Test Charges:** \$800 for the initial eight-hour day or any part thereof plus the expense of any required special materials (i.e., inert gas). Up to \$1600 is creditable towards purchase if an order for a new TURBO-Dryer results within one year of testing. Usually 1 – 2 days are required to complete the testing and analyses. For additional days of testing the same charge per day applies.

This \$800 per day rate is partially subsidized by Wyssmont. It is the rate applicable where the information developed is to be used by the customer **only to assist Wyssmont in designing its equipment and for customer evaluation of proposed Wyssmont equipment. Where the information is to be used for other purposes**, Wyssmont charge of \$5,000 per day for developmental testing will apply.

4. **Test Report:** Normally a test report will be submitted after the conclusion of these tests and their associated analyses.

### **FEEDING AND LUMPBREAKING TESTS**

1. **Material Required:** 1 - 2 cubic feet

### **GENERAL GUIDELINES FOR TESTING**

1. Lead-time for all tests generally will be 1 – 2 weeks. Unless brought by the client, materials should be shipped prepaid and scheduled to arrive at Wyssmont's facilities 3 – 5 working days prior to the test date. The client is encouraged to witness most tests.
2. Customer shall, before testing, provide all appropriate information as to the potential hazards and precautions to be taken during handling, storage, testing and cleaning.
3. **Material Safety Data Sheets (MSDS) are required prior to testing.** An MSDS should be included for the feed material, any end product should they differ from the feed material, and for any solvents present in the sample. All samples will be returned after completion of the testing, freight collect. Any special labels required for the return shipment should be included with the sample.
4. Unless indicated otherwise, all charges include normal test setup and simple water wash cleanup. Additional costs, if incurred, will be for customer's account.
5. **Customer shall provide UPS or Federal Express account numbers for return of samples.**