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## Best Practices in Wood Waste Recycling

### **Specification for Thermoplastic Composites**

#### **Material: Wood Waste**

**Issue:** *There are a variety of different applications where wood and plastic can be combined to produce high-value materials. This specification addresses applications which use a matrix of thermoplastic resins and wood fiber for use in extrusion or other manufacturing process. Although there are some very different applications of wood-plastic composites, this specification addresses two types of composites; one which uses wood chips as a structural component and one which uses a very fine grade of wood particles (“wood flour”) as a filler for appearance and structural purposes.*

*Failure to satisfy end-user quality requirements for the different types of wood-plastic composites will affect market value and could damage supply relationships. Depending on the type of wood-plastic composite being considered and product requirements, the critical characteristics of the recycled wood waste could include:*

- *acceptable wood species*
- *acceptable size distribution*
- *acceptable geometry*
- *allowable contaminant levels*
- *acceptable color*
- *acceptable moisture content*

**Best Practice:** This best practice recommends that written specifications for acceptable wood waste feedstocks be developed and mutually agreed upon along with tests for monitoring compliance with these specifications. Feedstock specifications will vary from end-user to end-user. These variations are due to differences in processing equipment, handling techniques, and product lines. Specifications should be made part of a written contract or agreement that also stipulates other important conditions (price, volume, etc.).

#### Wood Species

- Wood Chip Applications: No limits on the acceptable types of tree species or on the softwood-hardwood mix unless there are process limitations (hardwoods causing wear on machinery) or appearance factors.
- Wood Flour Applications: Species limitations are highly variable. Some applications demand single-species sources while others may restrict a single species (perhaps oak due to tannins).
- Other applications may be more flexible in hardwood-softwood mixtures.

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### Size Distribution

#### **Wood Chips Applications**

Length: < 5 inches (125 mm) maximum of 5%                      Fines: <3/16 inches (5 mm) maximum 15%

Width/Thickness: not critical

#### **Wood Flour Application**

Particle sizes between 20- to 200-mesh

### Acceptable Geometry

For wood chip applications, the required geometry will depend on the specific application. For wood flour applications, some manufacturers prefer a higher length to diameter ratio (i.e., a more fibrous material) because this leads to a stronger product, while others prefer a smaller ratio because this will lead to bulk densities that are higher and subsequently easier to handle and blend with plastic.

### Maximum Allowable Contamination Levels \*

	<b>Wood Chips</b>	<b>Wood Flour</b>
Rot:	0%	0%
Bark:	0 - 5%	Varies **
Dirt, rock, sand:	0%	0%
Metals:	0%	0%
Plywood:	0 - 15%	Varies **
Particleboard:	0 - 5%	Varies **
Wood with laminates:	0 - 5%	Varies **
Plastics:	0 - 5%	0%
Painted wood:	0 - 10%	Varies **
Treated wood:	0 - 5%	Varies **
Other non-wood materials:	0 - 2%	0%

\*Acceptable contaminant levels are highly variable, and are often driven by appearance issues as well as technical or processing factors.

\*\*Varies depending on the color and market preferences for the finished material.

### Color/Brightness

There is frequently no color or brightness requirement for composites using wood chips, but both types of composites may have strict color/brightness requirements in some cases due to impacts on the appearance of the finished composite.

### Moisture

- Wood chips should be within the range of 10-50%.
- Wood flour generally must be in the range of 2-8% moisture, with the most common requirements in the range of 4-6%.

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**Implementation:** In the course of developing and maintaining supply relationships, processors must work with each manufacturer's fiber buyer to obtain specifications that are tailored to that manufacturer's system and products. Processors should then monitor their compliance through a consistent QA/QC program in order to detect and correct any problems before shipping, as well as prevent recurrence of these problems.

When problems do occur, they must be resolved properly. Problem loads should be evaluated and arbitrated quickly and objectively between buyer and supplier. It is especially important that both parties understand, in each instance, whether the problem is due to a failure of the supplier to meet target specifications or to changed expectations on the part of the buyer. This determination will not only affect the settlement of a problem but will help maintain a healthy business relationship. Clear communication on this point can help the wood waste processor, as a supplier, to anticipate and thus avoid future problems.

**Benefits:** Consistently providing high-quality feedstock will improve the marketability of the processor's material, potentially increasing both the price and volume of the material sold. Arbitrating problem loads promptly, adjusting specifications mutually, and continuously making equipment and process modifications are practices that can improve utilization of wood waste feedstocks. These are important element of creating and maintaining a positive and mutually beneficial working relationship between the processor and manufacturer.

**Application Site:** This Best Practice applies to wood-waste processing facilities.

**Contact:** For more information about this Best Practice, contact CWC (206) 443-7746, e-mail [info@cw.org](mailto:info@cw.org).

### References:

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2. English, Brent, North Wood Plastics, Inc., Sheboygan, WI
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