

Release

Alpha 1.0

TAYLOR SYSTEMS ENGINEERING, INC.

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Professional Engineering Services

**TSe+ Materials Library**

PROFESSIONAL ENGINEERING SERVICES

# TSe+ Suite of Applications

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# Table of Contents

1. <u>TSE+ MATERIALS LIBRARY</u> .....	1
OVERVIEW.....	1
2. <u>NAVIGATING THE TSE+ MATERIALS LIBRARY</u> .....	2
MAIN MENU.....	2
MAIN PANEL .....	3
CATEGORY/SUBCATEGORY FIELDS .....	3
E+ DATA SETS PANEL.....	4
DISPLAY UNITS.....	4
3. <u>BUILDING THE TSE+ MATERIALS LIBRARY</u> .....	5
MATERIALS .....	5
MATERIALS.....	5
REFERENCE.....	6
PROPERTIES .....	6
STORE AS .....	6
MATERIAL MOISTURE MTF.....	8
REFERENCE.....	8
PROPERTIES .....	8
MATERIAL MOISTURE EMPD.....	10
REFERENCE.....	10
PROPERTIES .....	10
4. <u>EXPORTING MATERIALS DATA TO IDF</u> .....	12
OVERVIEW.....	12
EXPORT.....	12

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# Preface

TSE has provided technical engineering services to facility owners and managers, worldwide, since 1974. We are specialists in complex mechanical heating, ventilation and air conditioning (HVAC) systems for corporate, industrial, laboratory and biotech facilities. We apply quality control and techniques gained from our experience in the following areas: Mechanical HVAC Systems Design and Analysis; Temperature and Building Control; Energy Conservation/Efficiency; Commissioning; Project Management; Operation/Maintenance Consulting; Facilities Operation Training; Fire and Life Safety

Adding to the base of services, TSE is endeavoring to develop a suite of applications to serve the EnergyPlus users. The tools aim to ease the process of management and editing of data associated with EnergyPlus. TSe+ Materials Library is the first of the series of tools that are under development. It aims to provide management of the materials that users frequently input in their EnergyPlus analysis. TSe+Mat then allows for the export of the selected materials from the saved data into the IDF compliant format to be used in the E+ input file.

This manual assumes that the users are fairly familiar with the EnergyPlus input format and data requirements.

**Please email all feedback and comments to: [tseplus@tse-inc.net](mailto:tseplus@tse-inc.net)**

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# 1. TSe+ Materials Library

## Overview

TSe+Mat is designed to support the EnergyPlus users and allows you to quickly enter information into a database. The database stores materials for use in several types of building projects.

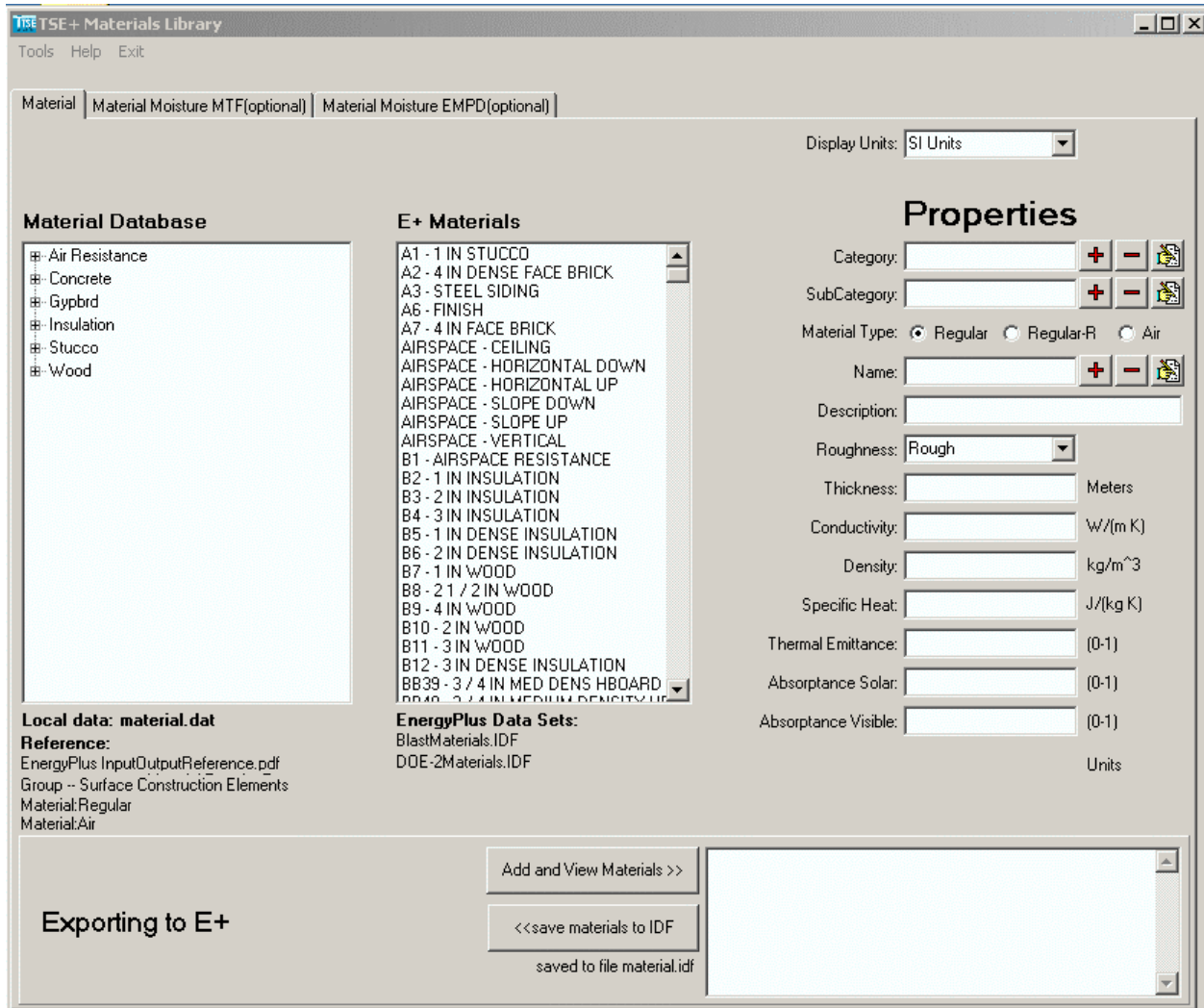


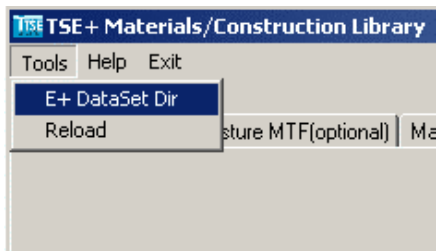
Figure 1 TSe+ Materials Library

## 2. Navigating the TSe+ Materials Library

### Main Menu

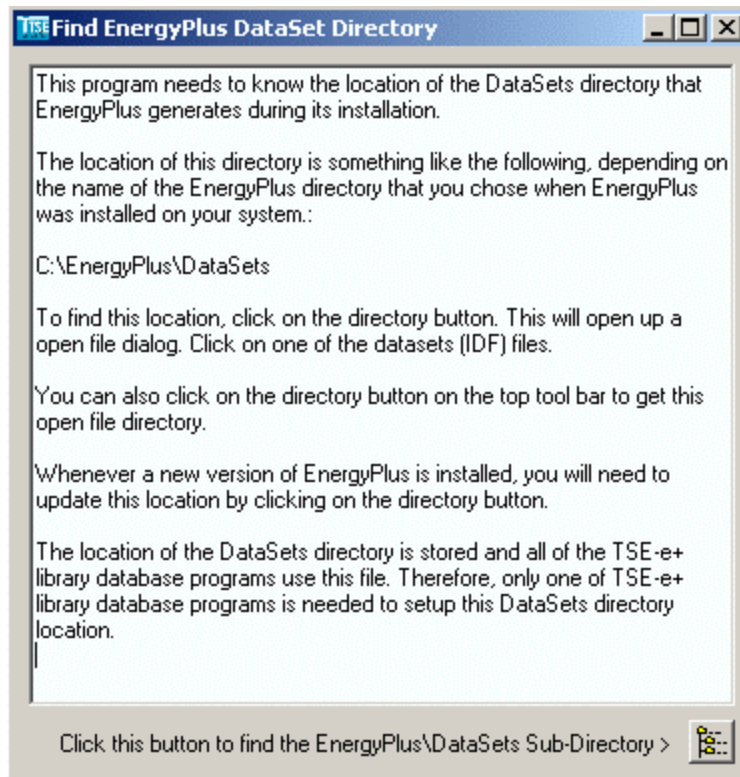
At the top of the TSe+ Materials Library window, there is a tool bar, which provides buttons for the most commonly used commands.

### Setting up E+ Dataset



Use <Tools> then <E+ DataSet Dir> to set the directory where EnergyPlus is installed on your computer and point to the DataSet sub directory

EnergyPlus Data Set Directory. **(Read and follow the instructions in Figure 2 below.)**



*Figure 2 EnergyPlus DataSet Directory Instructions*

Use the <Reload> under the <Tools> menu to update the E+ dataset panel after you have changed the directory location.

Note:

You can as an alternative, edit the file Dataset.txt file in the TSe+Mat folder for the correct location path of the EnergyPlus Dataset directory, the default location is set as C:\EnergyPlus\Datasets\. Save the file and restart the application for the change to take effect.

## Main Panel

Located directly below the tool bar is a three-tab configuration window. This window provides the three basic configuration properties available in the TSe+Mat. To navigate through these windows, simply click on the labeled tab. They are:

- Material
- Material Moisture MTF (optional)
- Material Moisture EMPD (optional)

## Category/Subcategory Fields

Note:

The categories and subcategories in TSe+Mat are created solely for the purpose of user saved materials. They have no implication on the EnergyPlus input data.

Within each tab window, a set of command buttons displays to control the **Category** and **Subcategory** assignments within the *Properties* panel. They are:



Add a New Category/Subcategory



Delete an Existing Category/Subcategory




Edit an Existing Category ID/Subcategory.

To create a category/subcategory


1. In the <tab window>, click on the first item listed in the tree panel on the left -side of the window. This will enable the **Category** and **Subcategory** fields in the *Properties* panel.
2. In the **Category/Subcategory** field, type a short label for the type of material you are creating.

3. Click the  **Add a New Category/Subcategory** command button to add the category/subcategory to the listing in the tree panel.

### To edit a category/subcategory

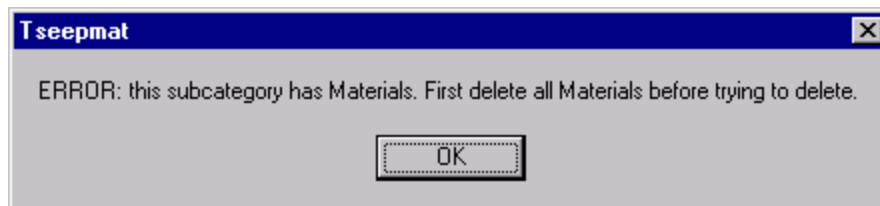
1. In the <tab window>, click on the category/subcategory in the tree panel that you wish to modify.
2. In the **Category/Subcategory** field, make the desired modification.
3. Click the  **Edit an Existing Category ID/Subcategory** command button to display the modification in the in the tree panel.

### To delete a category/subcategory

1. In the <tab window>, click on the category/subcategory in the tree panel that you wish to delete.
2. Click the  **Delete an Existing Category/Subcategory** command button to delete the category from the tree panel.

#### Note:

**The following Error Message displays if you have one or more subcategories listed for the category you are deleting.**



*Figure 3 Error Message for Deleting a Category w/Subcategories*

## E+ DataSets Panel

The *E+ DataSets* panel contains a listing of dataset files included in the EnergyPlus program. The TSe+ program reads the Material, Moisture, and Construction dataset files and allows the user to copy the information into the program database.

## Display Units

The **Display Units** field allows you to view specific data fields within the *Properties* panel in either English or SI Units



## 3. Building the TSe+ Materials Library

### Materials

The **Material** tab allows you to define a type of material and assign it to the TSe+Material/Construction Library. You are able to define the material parameters using the fields in the *Properties* panel.

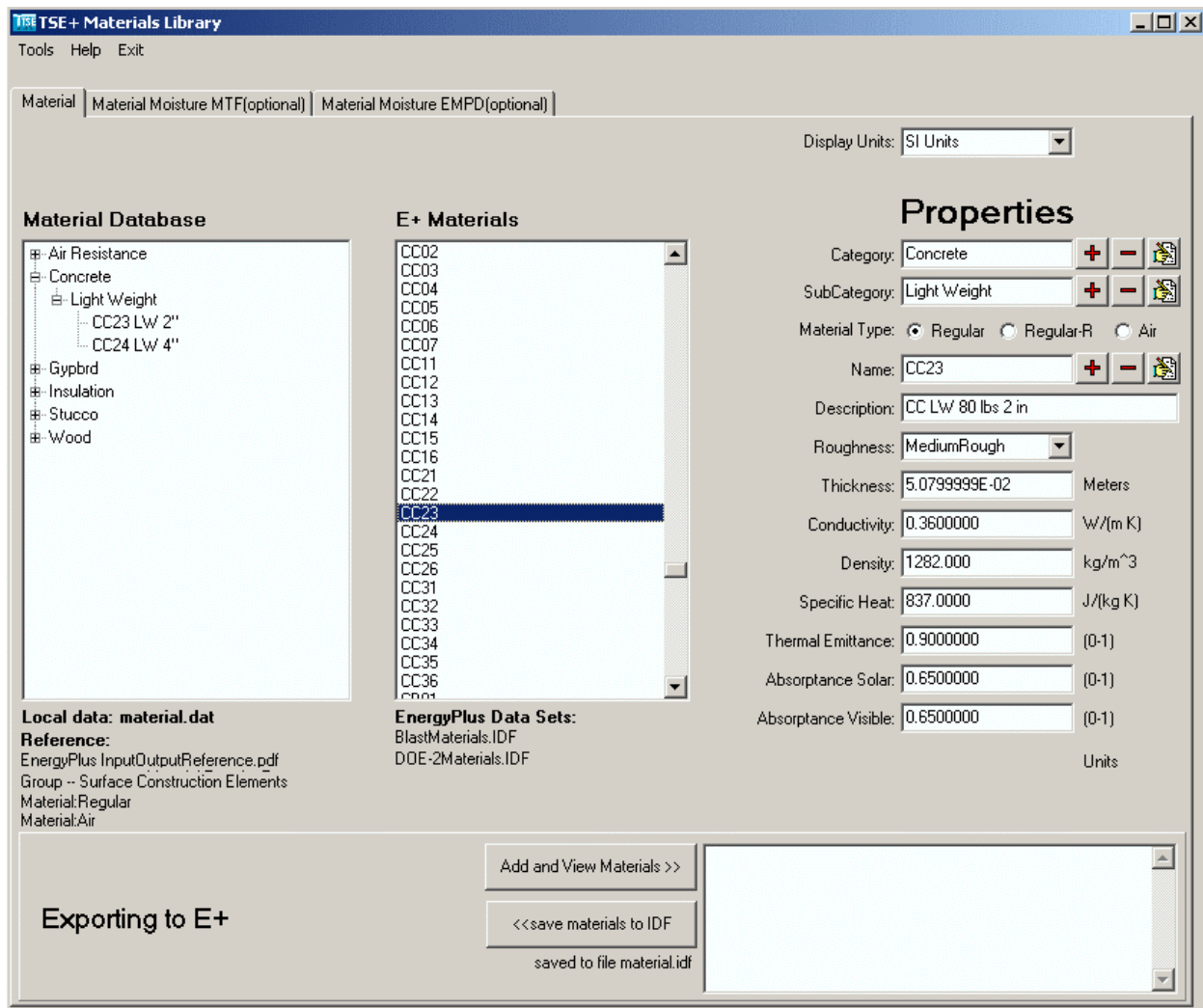


Figure 4 Material Tabs

### Materials

On the left side of the *Material* window, a materials tree displays a listing of each type of material category and subcategory you have created such as wood, stucco, insulation, etc.

**Note:**

To add, delete, or edit the contents of the Materials panel, you must select a type of material from the materials tree to enable the Properties panel functionality.

## Reference

For an indepth description of the Properties fields, reference the *EnergyPlus InputOutputReference.pdf/Group – Surface Construction Elements/Material:Regular, Material:Regular-R, and Material:Air* directories.

## Properties

The *Properties* panel allows you to enter configurable data into the TSe+ database for the following fields:

### Material Type

**Reference *EnergyPlus InputOutputReference.pdf/Group – Surface Construction Elements/Materials*.**

- **Regular – Referenced as “Material:Regular”** – Material is described with Heat Capacity, Thermal Conductivity, Roughness, and Absorptance.
- **Regular-R – Referenced as “Material:Regular-R”** – Material is described with Resistance, Roughness, and Absorptance.
- **Air – Referenced as “Material: Air”** – Material is described with Resistance only.

## Store As

The **Store As** field allows you to store information in the TSe+ database in English or SI Units.

### To create a material


1. In the *Materials* panel, click on the <category>subcategory> where you intend to insert the material.
2. In the *E+ DataSets* panel, select the preferred dataset or manually enter data into the fields in the *Properties* panel.
3. In the **Name** field, enter a unique short definitive label for the material.
4. In the **Description** field, enter a brief description of the material subcategory. (OPTIONAL)

**Note**


**The fields that are displayed are dependent upon your Material Type selection: Regular, Regular-R, or Air. (See the *Material Type* section).**

5. Click the  **Add a Material** command button to display the material subcategory in the *Materials* panel.

**To edit a material**

1. In the *Materials* panel, click on the *<material>* you wish to modify.
2. In the *E+ DataSets* panel, select the preferred dataset or manually enter data into the fields in the *Properties* panel.
3. Click the  **Edit a Material** command button when you are finished.

**To delete a material**

1. In the *Materials* panel, click on the *<material>* you wish to delete.
2. Click the  **Delete a Material** command button when you are finished.

**Note:**

**The local materials database is stored in the file *material.dat*, found in the TSe+Mat folder. Please be cautious if opening this file and editing outside of TSe+Mat as it may corrupt your stored data.**

## Material Moisture MTF

The **Material Moisture MTF** tab allows you to define material moisture properties in materials. EnergyPlus moisture simulation is optional and is usually used in humid climates. You are able to copy the moisture parameters by clicking on one of the materials listed in the *E+ DataSet* panel.

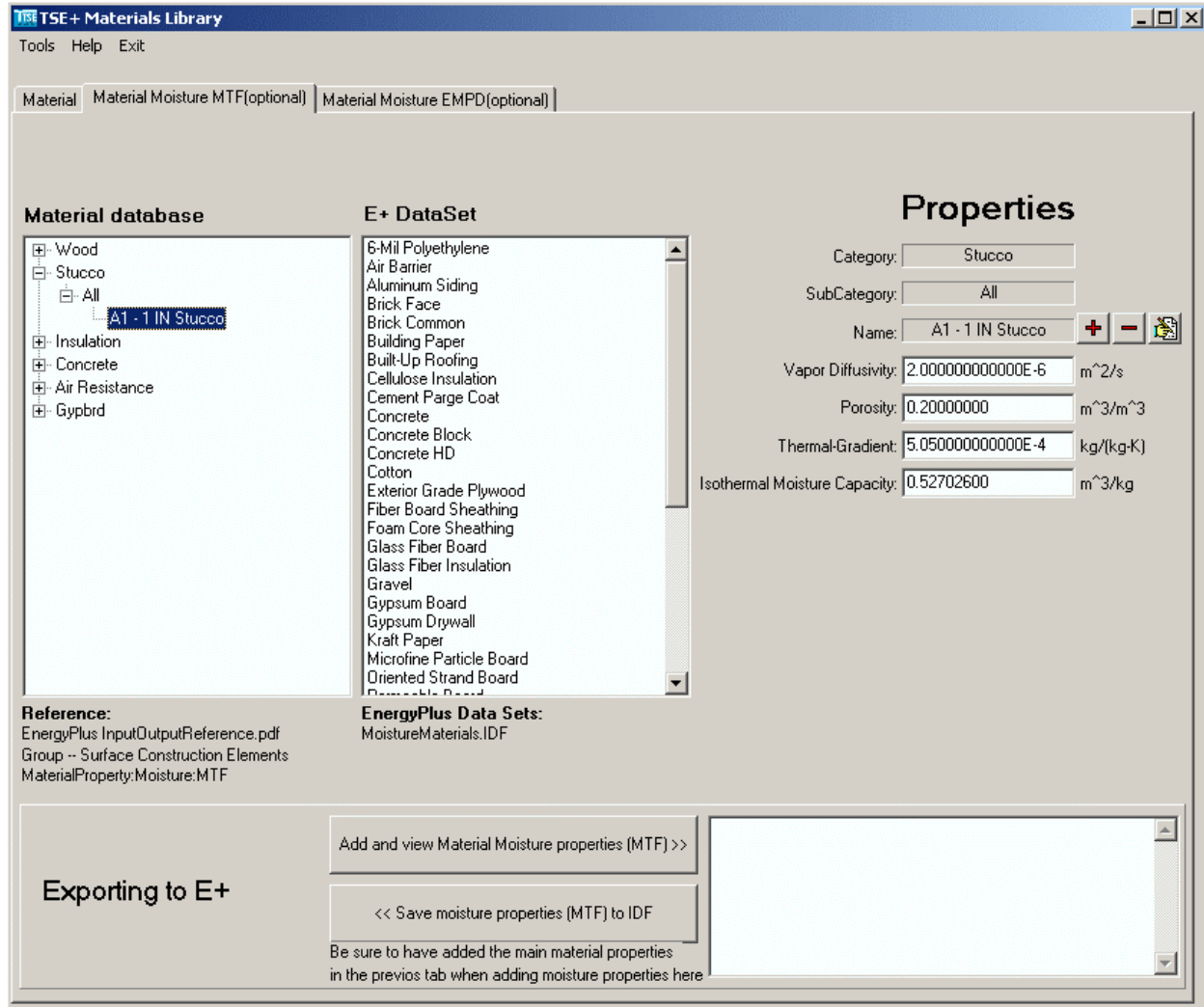


Figure 5 Material Moisture MTF Tab


### Reference

Reference the EnergyPlus *InputOutputReference.pdf/Group – Surface Construction Elements/MaterialProperty:Moisture:MTF* directory.


### Properties

**For an indepth description of the Properties fields, reference EnergyPlus *InputOutputReference.pdf/Group – Surface Construction Elements/MaterialProperty:Moisture:MTF*.**


### To add a material moisture MTF property

1. In the *Materials* panel, click on the <category>subcategory> for which you are defining the moisture properties.
2. In the *E+ DataSets* panel, select the preferred moisture dataset or manually enter data into the fields in the *Properties* panel.
3. Click the  **Add a Material Moisture MTF** command button when you are finished.

### To edit a material moisture MTF property

1. In the *Materials* panel, click on the <material> you wish to modify.
2. In the *E+ DataSets* panel, select the preferred dataset or manually enter data into the fields in the *Properties* panel.
3. Click the  **Edit a Material Moisture MTF** command button when you are finished.

### To delete a material moisture MTF property

1. In the *Materials* panel, click on the <material> you wish to delete.
2. Click the  **Delete a Material Moisture MTF** command button when you are finished.

## Material Moisture EMPD

The **Material Moisture EMPD** tab allows you to define the moisture in materials. E+ moisture simulation is optional and is usually used in humid climates. You are able to calculate the moisture parameters using the fields in the *Properties* panel.

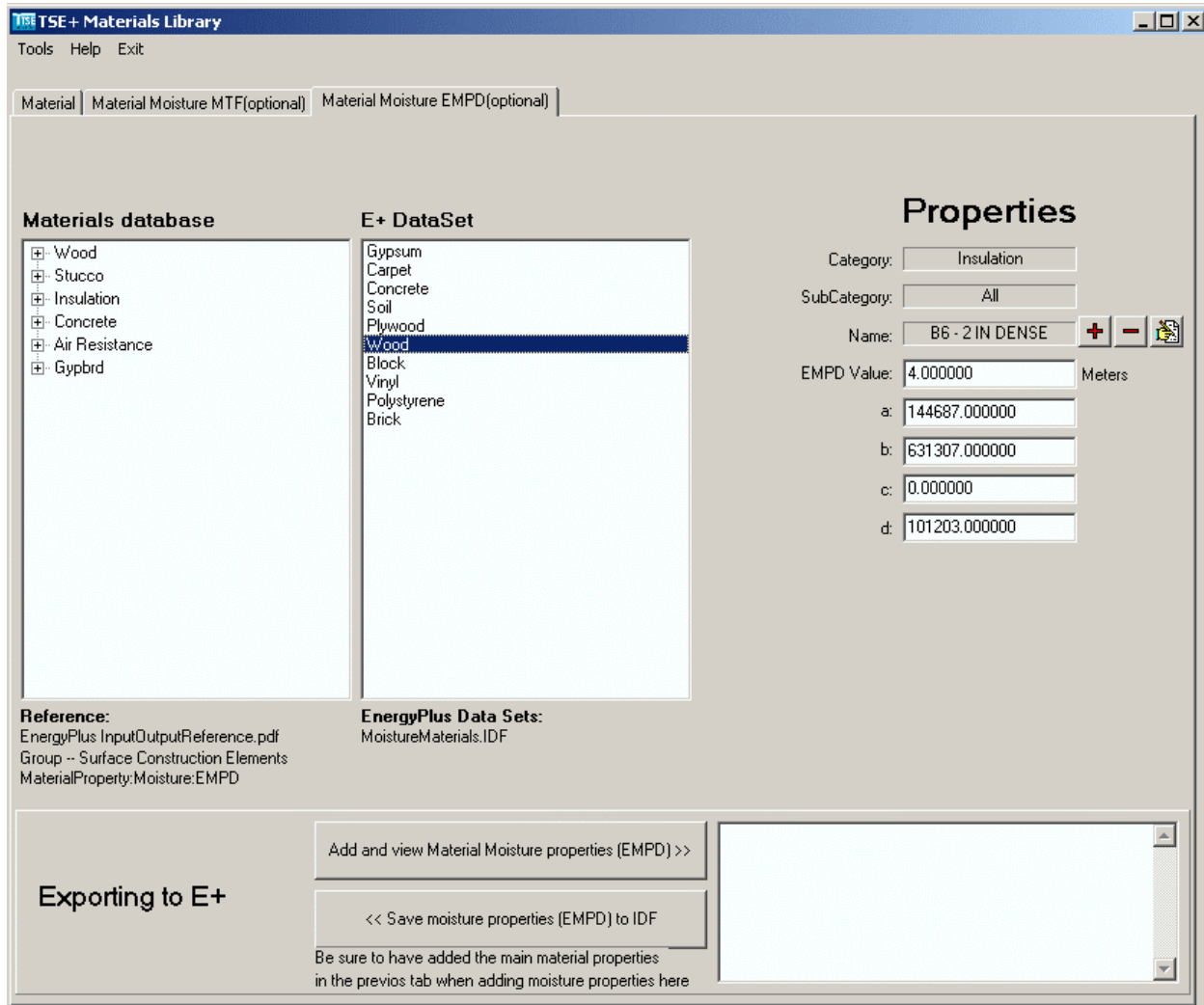


Figure 6 Material Moisture EMPD Tabs


### Reference

Reference the EnergyPlus *InputOutputReference.pdf/Group – Surface Construction Elements/MaterialProperty:Moisture:EMPD* directory.


### Properties

*For an indepth description of the Properties fields, reference EnergyPlus InputOutputReference.pdf/Group – Surface Construction Elements/MaterialProperty:Moisture:EMPD.*


### To add a material moisture EMPD property

1. In the *Materials* panel, click on the <category>subcategory> for which you are defining the moisture properties.
2. In the *E+ DataSets* panel, select the preferred moisture dataset or manually enter data into the fields in the *Properties* panel.
3. Click the  **Add a Material Moisture EMPD** command button when you are finished.

### To edit a material moisture EMPD property

1. In the *Materials* panel, click on the <material> you wish to modify.
2. In the *E+ DataSets* panel, select the preferred dataset or manually enter data into the fields in the *Properties* panel.
3. Click the  **Edit a Material Moisture EMPD** command button when you are finished.

### To delete a material moisture EMPD property

1. In the *Materials* panel, click on the <material> you wish to delete.
2. Click the  **Delete a Material Moisture EMPD** command button when you are finished

## 4. Exporting materials data to IDF

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### Overview

This section gives the details of the export sequence of materials data selected by user to the requisite IDF format for EnergyPlus input.

### Export

At the bottom of the window is a frame, which provides the functionality to view and export the user selected materials information into the IDF format.

Select a material from the E+ or the user created/saved Materials database panes so as the properties are visible in the various fields, then click the *<Add and View Materials>* button to display the material properties in the text box alongside. Click and add as many materials as required to populate the text box. When finished, click the *<save materials to IDF>* button to save the materials to a file **materials.idf** found in the TSe+Mat folder. This file can then used as a base or to copy paste the materials input for EnergyPlus.

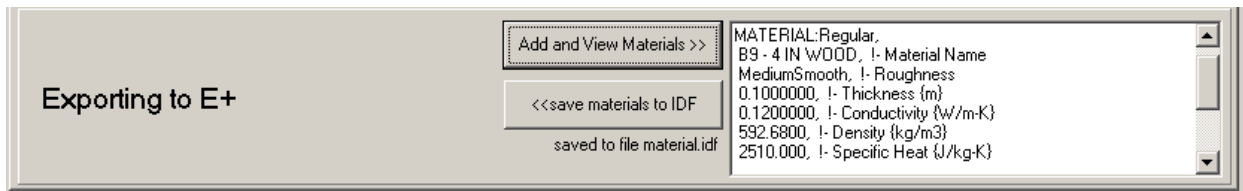


Figure 7 Exporting to E+ section

This procedure can be repeated for the Material Moisture properties tabs as well. The moisture properties selected will be appended to the material properties selected and exported in the previous tab to the *material.idf* file. Be sure to first select and add the main material properties before adding on the moisture properties.