# CINDAS LLC

# Now available on-line—CINDAS Thermophysical Properties of Matter Database (TPMD)

The Thermophysical Properties of Matter Database (TPMD) is a web-based version of the Thermophysical Properties of Matter, the TPRC data series, from CINDAS LLC. It is a searchable on-line database that contains multiple thermophysical and thermoradiative properties for metallic alloys and elements, nonmetallic liquids and solids, composites, ceramics, gases and coatings. In addition to the searchable data, the TPMD includes theories and measurements PDF documents with hundreds of pages of supplemental text for additional research.

Similar to other CINDAS databases, the Thermophysical Properties of Matter Database has an easy-to-navigate interface.

The TPMD database contains 52,818 data curves with 126 properties for nearly 5,200 materials categorized into 93 general material groups that are updated regularly.

## **Interface Tools**

Save – data for further analysis.

Copy – graphs with ease into PowerPoint.

Project and Manipulate – the database content live.

#### Interface Features

- Find material group or property group by browsing, or material name or property name by searching.
- View the effects on a given property with changes in temperature or other independent variable.
- Compare multiple data curves of different materials on a single graph.
- References are available for every graph and description in the show text feature.
- Theories & Measurements provide information on property definition and tests.

## Search and Browse the Thermophysical Properties of Matter Database by

Material Group (Composites, Ceramics, Coatings, Organic Compounds, etc.) Material Name (Borosilicate Glass, Glass Fiber/Silicone Resin, Graphite, etc.) Property Group (Thermophysical, Thermoradiative, Optical, etc.) Property Name (Normal Total Emittance, Thermal Conductivity, Viscosity, etc.)

The TPMD allows the user to search using the full or partial name of the property or material. The user can also browse the TPMD using the drop-down menu browse feature.

## Searching and Browsing: Thermophysical Properties of Matter Database (TPMD) Finding Information

Search: Enter the full or partial name of the property or material.

Browse: Use the drop-down menu to find the property or material.

The Thermophysical Properties of Matter Database contains 5,191 materials in 93 material groups and 126 properties in 4 property groups.

| Browse By:             |  | Search By:                             |                              |
|------------------------|--|--|------------------------------|
| Material Group         |  | Material Name                          |                              |
|                        | ۵)   |  | Gu                           |
|                        |  | e.g., ni inco, Nickel Incoloy          |                              |
|                        |  |  |                              |
| or                     |  | or                                     |                              |
| Property Group         |  | Property Name                          |                              |
|                        | -  |  | Go                           |
|                        |  | e.g., electric, Electric Resistivity   |                              |
|                        |  |  |                              |
| FPMD (version 7, dat   | a updated 2011.1)  |  | Start Over H                 |
|                        | Thermophysical Properties  |  | Start Over H                 |
|                        |  |  | <u>Start Over   H</u>        |
| Select Property Group: | Thermophysical Properties *  |  | <u>Start Over   H</u>        |
|                        | Thermophysical Properties  (4 property groups) Coeff. of Ihermal Linear Lxpansion  |  | <u>Start Over</u>   H        |
| Select Property Group: | Thermophysical Properties  (4 property groups) Coatt. of Ihermal Linear Expansion Density, Kg m[-3]  |  | <u>Start Over</u>   <u>H</u> |
| Select Property Group: | Thermophysical Properties  (4 property groups) Coatt of Ihermal Linear Lxpansion Density, Kgm[-3] Enthalpy Class Transition Temperature  |  | <u>Start Over</u>   <u>H</u> |
| Select Property Group: | Thermophysical Properties  (4 property groups)  Cost: of Ihermal Linear Expansion Uensity Density, Kg m[-3] Enthalpy Glass Transition Temperature Lattice Parameter in   | Nicy - <u>Terms of Service</u>         | <u>Start Over</u>   <u>H</u> |
| Select Property Group: | Thermophysical Properties (4 property groups)<br>(4 property groups)<br>Coatt of Ihermal Linear Expansion<br>Density<br>Density, kg m[-3]<br>Enthalpy<br>Class Transition Temperature<br>Lattice Parameter 24  | ulicy - <u>Terms of Service</u>        | <u>Start Over</u>   <u>H</u> |
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## **Customizing Information**

Select: The independent variable.

| Select Property Group: Therm            | ophysical f                         | Properties 👻      |                |        |  |
|---|-------------------------------------|-------------------|----------------|--------|--|
| (4 pro                                  | (4 property groups)                 |                   |                |        |  |
|   | o <mark>l Therma</mark><br>operties | Linear Expansion  | •              |        |  |
| Property Range                          |                                     |                   |                |        |  |
| Coeff. of Thermal Linear Expansion (10  | -6] K[-1]                           | ) -256.6 - 1788.0 |                |        |  |
|   |                                     |                   |                |        |  |
| Select an Independent Variable, and the |                                     | the Show Graph o  | or Show Text b | utton. |  |
|   |                                     |                   | or Show Text b | utton. |  |
| Independent Variable                    | Minimun<br>14.4                     | n Maximum         | or Show Text b | utton. |  |
| Angle (degree)                          | Minimun<br>14.4                     | n Maximum<br>74,7 | or Show Text b | utton. |  |

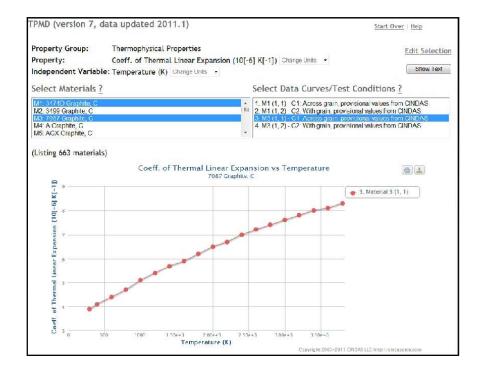
Purdue Technology Center-Aerospace, 1801 Newman Road, Suite 1150, West Lafayette IN 47906-4524 USA Phone: 765-807-6052 • 765-807-5400 • Fax: 765-807-5291 • www.cindasdata.com

#### **Viewing Information**

The TPMD allows the user to view a property of multiple materials on one graph.

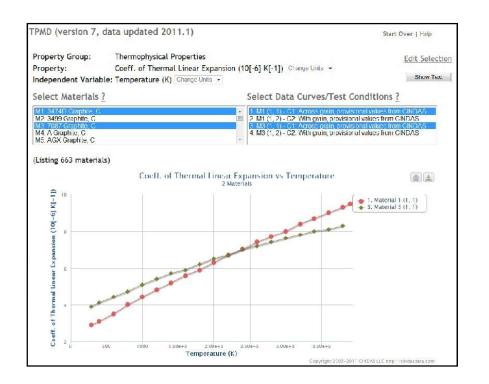
- Step 1: Select Materials.
- Step 2: Select Data Curves or Test Conditions.
- Step 3: If needed, you can also modify the Graph Parameters of the properties.

Note: At any time, the user can click on the "Show Text" button to see the values of the data points, text description, references, etc.



#### **Results: Graphic and Numeric**

- 52,818 data curves
- Color-coded data curves
- Multiple curves of different materials per graph
- Hovering cursor to show X and Y values of each data point
- Modifiable Y-axis and X-axis range of the graph



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#### Material Groups

The nearly 5,200 materials in the TPMD are conveniently subdivided into 93 material groups with drop down selection options for the specific

| Material   | Number |
|--|--------|
| Aggregate Mixes  | 30     |
| Alloys: Alloy Steels   | 129    |
| Alloys: Aluminum Alloys                                      | 107    |
| Alloys: Carbon Steels and Cast Iron                          | 74     |
| Alloys: Chromium Alloys                                      | 17     |
| Alloys: Cobalt Alloys  | 28     |
| Alloys: Copper Alloys  | 82     |
| Alloys: Magnesium, Manganese, Molybdenum and Niobium         | 72     |
| Alloys: Miscellaneous Alloys And Mixtures                    | 15     |
| Alloys: Nickel Alloys  | 91     |
| Alloys: Other Nonferrous Binary Alloys                       | 154    |
| Alloys: Other Nonferrous Multiple Alloys                     | 76     |
| Alloys: Stainless Steels                                     | 74     |
| Alloys: Titanium Alloys                                      | 45     |
| Alloys: Zirconium Alloys                                     | 22     |
| Animal and Vegetable Natural Substances                      | 35     |
| Borides  | 56     |
| Bromides   | 20     |
| Carbides   | 55     |
| Carbonates   | 22     |
| Ceramics   | 2      |
| Cermets  | 65     |
| Chlorides  | 66     |
| Coatings: Anodized Conversion                                | 31     |
| Coatings: Metallic Contact                                   | 125    |
| Coatings: Metallic Pigmented                                 | 15     |
| Coatings: Nonmetallic Inorganic Carbide Contact              | 19     |
| Coatings: Nonmetallic Inorganic Other Contact                | 36     |
| Coatings: Nonmetallic Inorganic Oxide Contact                | 82     |
| Coatings: Nonmetallic Inorganic Silicate or Titanate Contact | 22     |
| Coatings: Nonmetallic Pigmented, Other Binders               | 101    |
| Coatings: Nonmetallic Pigmented, Others                      | 17     |
| Coatings: Nonmetallic Pigmented, Potassium Silicate Binder   | 44     |
| Coatings: Nonmetallic Pigmented, Silicone Binder             | 66     |
| Coatings: Other Contact                                      | 51     |
| Coatings: Other Pigmented                                    | 33     |
| Coatings: Oxidized and Others Conversion                     | 48     |
| Coatings: Pigmented, Trade Name                              | 81     |
| Coatings: Resin Contact                                      | 47     |
| Coatings: Thermal Barrier                                    | 14     |
| Composites: Ceramic Matarix, Particulate-Reinforced          | 42     |
| Composites: Ceramic Matarix, Wisker-Reinforced               | 29     |
| Composites: Kevlar Fiber                                     | 18     |
| Composites: Laminates (Glass Fiber)                          | 46     |
| Composites: Laminates (Others)                               | 19     |
| Composites: Metal Matrix                                     | 9      |
| Composites: Others   | 66     |
| Composites: Polymer (Epoxy, Resin) Matrix                    | 45     |

materials in each Material Group. Alternatively, you can reach a specific material by entering a keyword in the Material Name box.

| Compounds: Inorganic Nonoxide Compounds33Compounds: Organic Compounds27Compounds: Other Oxide Compounds144Elements: Carbon, Graphite144Elements: Others155Fabrics, Yarns, And Hairs22Gas Mixture: Monatomic and Polyatomic Systems77Gas Mixture: Monatomic and Polyatomic Systems22Gas Mixture: Polyatomic Systems111Glasses110Glasses110Hydrides111Intermetallic Compounds, Mixtures33Intermetallics: Aluminides22Intermetallics: Beryllides22Indides23Intermetallics: Silicides24Iquids: Fluorocarbons and Hydrocarbons111Liquids: Mineral and Silicone Oils44Liquids: Mineral and Silicone Oils44Mixtures: Binary Mixtures of Oxides55Mixtures: Binary Mixtures of Oxides33Mixtures: Mixtures of Oxides34Mixtures: Mixtures of Oxides34Mixtures: Mixtures of Oxides34Mixtures: Sulfides and Their Mixtures34Mixtures: Sulfides and Nitrures34Mixtures: Sulfides and Nitrures34Mixtures: Sulfides and Nitrures34Mixtures: Sulfides and Nitrures34Polymers: Epoxy, Resins, Rubber, Silicones66Polymers: Others33Polymers: Others34   | Material                                     | Number |
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Thermophysical Properties – 39 Properties

Thermoradiative Properties – 36 Properties

**Optical Properties – 18 Properties** 

Other Properties – 33 Properties

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