

## Now available on-line—CINDAS Cryogenic and Low Temperatures Database (CLTD)

The CLTD web-based database, released in May 2021, was developed based on suggestions and input from current customers. It offers material characteristics in the cryogenic and low temperature ranges. It consists of thermophysical, mechanical, electrical and other properties of over 2,000 materials in the temperature range from 0 K to 273 K.

The user friendly interface enables CLTD subscribers to quickly select and compare the attributes of the alloys and other materials for which they are looking.

### CLTD Users

Universities	Course Material Aid
Technical Schools	Project Reference & Guide
Government Agencies	New Material Research
Aerospace Industry	Turbine Design
Automotive Industry	Developing Engines & Frame
Industrial Suppliers	Manufacturing/Machinery
Research Corporations	Research & Development

*And many others...*

### About the Data

Initial data is from both NIST data resources as well as CINDAS data. More data will be added as it becomes available. This is an optimal source for cryogenic and low temperature data.

## Search and Browse the Cryogenic and Low Temperatures Database by

### **Material Group**

(Alloys, Ceramics, Compounds, Elements, Mixtures, Oxides, etc.)

### **Material Name**

(Al+Mg, Boron Nitride, CaSiO, Helium, BrF, CdO, etc.)

### **Property Group**

(Mechanical, Thermophysical, Thermoradiative, etc.)

### **Property Name**

(Density, Thermal Expansion, Thermal Conductivity, Specific Heat, etc.)

### Property Groups

The CLTD contains approximately 250 different properties. The majority are thermophysical and mechanical properties. These properties are separated into 14 easy-to-navigate property groups. Alternatively, you can search the property names by using keywords which would bring you directly to the property you're interested in.

Thermophysical

Thermoradiative

Electrical and Nuclear

Mechanical Properties

Modulus, Strength, Stress, Hardness, Fatigue, Crack Growth, Impact Energy, Strain, Area Reduction, Deformation and others

*Plus others...*

## Searching and Browsing: Cryogenic and Low Temperatures Database (CLTD) 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 Cryogenic and Low Temperatures Database contains 2,019 materials in 54 material groups and 247 properties in 14 property groups.*

## Customizing Information

**Select:** The independent variable.

## Viewing Information

The CLTD 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.

*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.*

### Select Materials ?

Select one or more materials from the list below. Hold the control key to select multiple materials. Available data curves will be displayed on the right. Then proceed to Step 2.

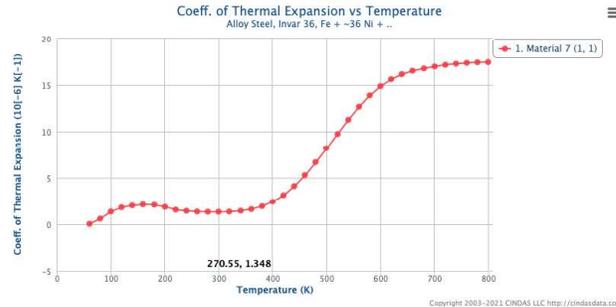
M3: A Graphite, C  
 M4: Al(2)Au Intermetallic  
 M5: Al + Cu Alloys  
 M6: Al + Cu + ... Alloys  
 M7: Alloy Steel, Invar 36, Fe + ~36 Ni + ...  
 (Listing 402 materials)

### Select Data Curves/Test Conditions ?

Select between one and twenty data curve descriptions from the list below to view graphs. Hold the Control key to select multiple data curves.

Key: Selected Material: (Set, Curve) - Remarks

1. M7 (1, 1) - C1: calculated values  
 2. M7 (2, 1) - C1: Bal. Fe, 36 Ni, 0.003 C, Annealed and quenched  
 3. M7 (2, 2) - C2: Similar to the above specimen  
 4. M7 (2, 3) - C3: Similar to the above specimen  
 5. M7 (2, 4) - C4: Similar to the above specimen



Learn how to use advanced features in the [Help](#) section.

## Results: Graphic and Numeric

- 23,285 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
- Unit conversion package
  - Contains both English and SI units
- Shows all typically used units for the variables
- Allows both X-axis and Y-axis selection

### Select Materials ?

Select one or more materials from the list below. Hold the control key to select multiple materials. Available data curves will be displayed on the right. Then proceed to Step 2.

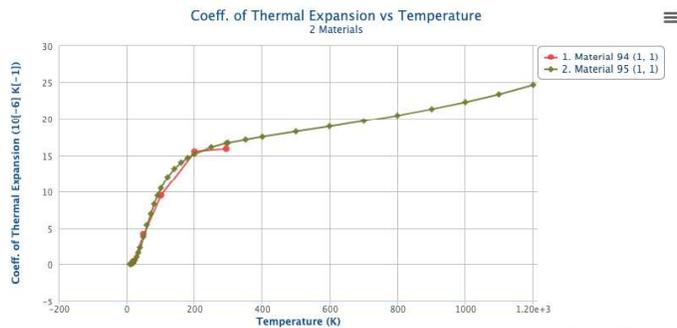
M90: Copper Alloy, Russian Alloy BrOf 10-1, Cu + Sn + ...  
 M91: Copper Alloy, Russian Alloy M2, Cu + Ni  
 M92: Copper Alloy, Russian Alloys, Cu + Al + ...  
 M93: Copper Alloy, Russian Alloys, Cu + Zn + ...  
 M94: Copper + Beryllium + ... Alloys, Cu + Be + ...  
 (Listing 402 materials)

### Select Data Curves/Test Conditions ?

Select between one and twenty data curve descriptions from the list below to view graphs. Hold the Control key to select multiple data curves.

Key: Selected Material: (Set, Curve) - Remarks

1. M94 (1, 1) - Cu + 2 Be + 0.5 Others, Provisional Values from CINDAS  
 2. M95 (1, 1) - C1: CINDAS evaluated data  
 3. M95 (2, 1) - cold drawn; vac ann for 4 hr at 573 K; ref temp = 19.9 K  
 4. M95 (3, 1) - ann at 770 K for several hr; reference temp = 60 K  
 5. M95 (4, 1) - Grade 1 copper, total metallic impurity level of less than 10 ppm



Learn how to use advanced features in the [Help](#) section.

## Show Text

Within the Cryogenic and Low Temperatures Database, you can show the graph and text associated with it.

The screenshot shows the CINDAS LLC website interface. At the top, there is a navigation bar with links for Home, About Us, Products, Learn, Support, and Contact. Below this, the page title is "CLTD (version 1, data updated 2021.4)". The main content area is divided into several sections: "Material Group" (Alloys: Aluminum Alloys), "Material Name" (Al + Fe + ... Alloys), "Property" (Thermal Conductivity, W/(cm K) (W cm<sup>-1</sup> K<sup>-1</sup>)), and "Independent Variable" (Temperature (K)). There are two dropdown menus for "Select Materials ?" and "Select Data Curves/Test Conditions ?". A line graph is displayed, showing Thermal Conductivity, W/(cm K) vs Temperature (K) for Al + Fe + ... Alloys. The graph shows a peak in thermal conductivity around 50 K, followed by a sharp decline and then a gradual increase. The y-axis ranges from 1.8 to 3.0, and the x-axis ranges from 25 to 275 K.

The screenshot shows the CINDAS LLC website interface, displaying the text associated with the graph. The page title is "CLTD (version 1, data updated 2021.4)". The main content area is divided into several sections: "Material Group" (Alloys: Aluminum Alloys), "Material Name" (Al + Fe + ... Alloys), "Property" (Thermal Conductivity, W/(cm K) (W cm<sup>-1</sup> K<sup>-1</sup>)), and "Independent Variable" (Temperature (K)). There are two dropdown menus for "Select Materials ?" and "Select Data Curves/Test Conditions ?". The text associated with the graph is displayed below the dropdown menus. It includes the material name, property, independent variable, and a table of data points.

Material: Al + Fe + ... Alloys  
Property: Thermal Conductivity, W/(cm K) (W cm<sup>-1</sup> K<sup>-1</sup>)  
Independent Variable: Temperature (K)

J 51, Composition (weight %):  
98.17Al, 0.56Fe, 0.56Mg, 0.01Cr, 0.20Cu, 0.02Mn, 0.39Si, 0.01Ti.  
Method Used: Longitudinal heat flow method

Data Points	
X	Y
Curve: 1	
2.866e+01	2.351e+00 98.17 Al, 0.56 Fe, ..
3.372e+01	2.697e+00
4.046e+01	2.774e+00
4.822e+01	2.812e+00
5.509e+01	2.753e+00
6.202e+01	2.661e+00
7.048e+01	2.469e+00
8.551e+01	2.264e+00

## We Are Confident in Our Products

The CINDAS LLC databases are quick, efficient, and frequently updated, and are currently used by a growing list of universities, corporations and research facilities. Please visit [www.cindasdata.com](http://www.cindasdata.com) for a demo.