

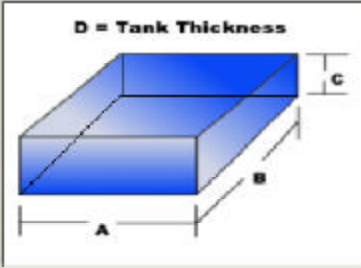
WATTAGE CALCULATOR

ISE Wattage Calculator

File Edit Summary Help

Basic Description Select Material Fill Tank Temperature Heat Losses Results

D = Tank Thickness



Dimensions

A 2 FT

B 2 FT

C 2 FT

D 125 IN

Weight 122.50 LBS

Rectangular Tank

Open Top

Application Description

Steel - Mild Carbon Rectangular Tank
2 FT x 2 FT x 2 FT (125 IN Thick Walls)
Heatup from 70F to 150F in 1 Hours

Tank Contents

Tank is 100 % Full of

Water

463.76 LBS

Next

ISE, Inc.

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ISE, Inc. Wattage Calculator

General Description

The Wattage calculator was designed to estimate heat up wattage requirements and heat losses in many applications. Provisions are provided to calculate requirements for several shapes of solid materials and several tank and contents applications. The program should handle most basic material heating applications. Calculations are performed automatically upon entering application specifics. Results are change instantly to reflect any entered application specification changes. Many material characteristics are included in the materials database. Others can be easily added by the user.

Editable summaries of the calculations are available and can be saved as a text (.rtf) document. Calculations can be saved for later retrieval.

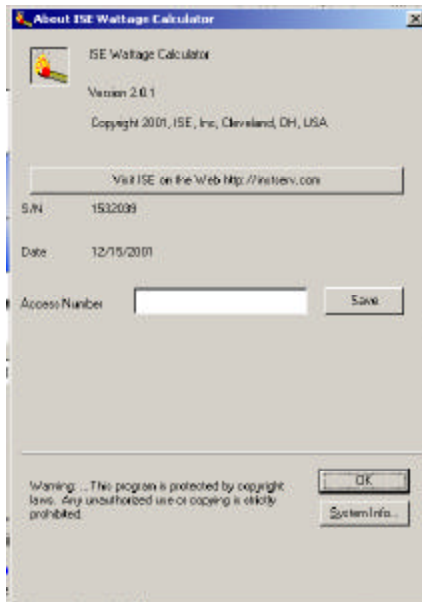
Default settings can be modified and saved to allow for quicker calculations for similar applications.

Program Registration

The program can be used for up to 30 days on a trial basis. It will cease operation after 30 days if program is not properly registered.

To Register:

From the **Help** menu select **About Wattage Calculator**.



- 1) A Serial Number will be displayed. Record this number.
- 2) Contact ISE, Inc., arrange payment and advise with your serial number.
- 3) ISE will supply the access number required to license the software to your computer.
- 4) Enter the Access Number in the appropriate box and click save.

Note: Every computer that the program is installed will need an additional unique access number.

Contact Information for Access Number or Support:

Web Site: <http://instserv.com>

E-mail: sales@instserv.com

ISE, Inc.
10100 Royalton Rd.
Cleveland, OH 44133 USA
Tel: (440) 237-3200
Fax: (440) 237-1744

We accept all major credit cards.

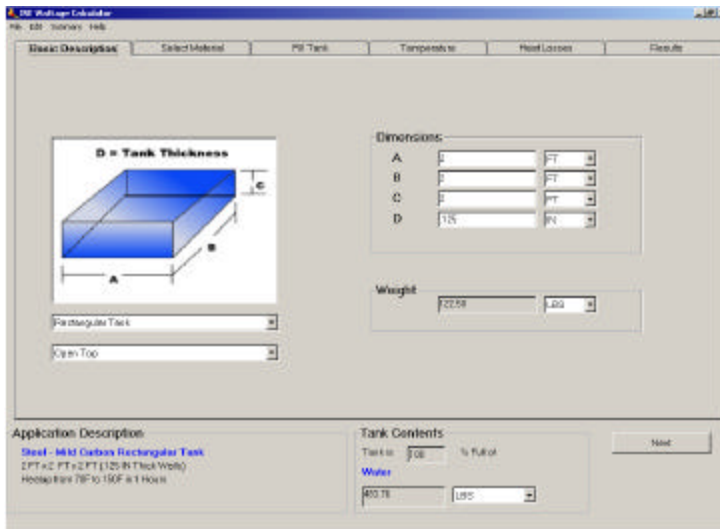
Basic Description Tab

Solids & Tanks:

1) Select Shape from drop down box. The program allows you to choose between:

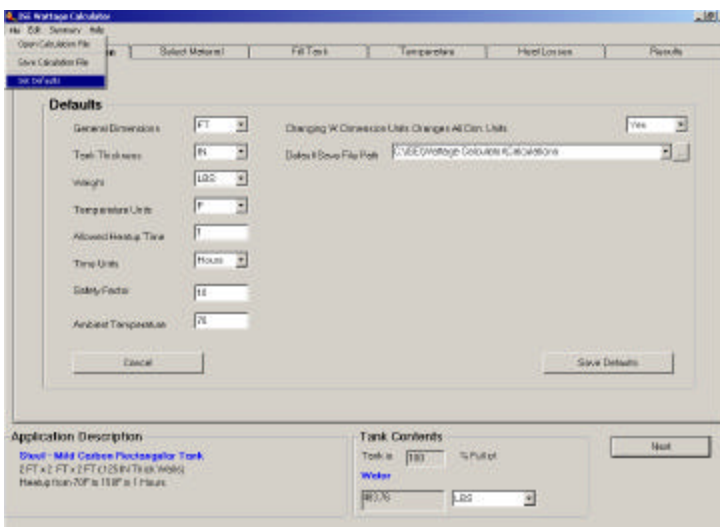
- Rectangular Solid**
- Cylindrical Solid**
- Horizontal Cylindrical Solid**
- Rectangular Tank**
- Cylindrical Tank (Vertical)**
- Cylindrical Tank (Horizontal)**

2) Enter the **Dimensions** of the item that is to be heated and select the measurement units for each.



If Rectangular or Vertical Cylindrical Tank is selected an option of open or closed top is available.

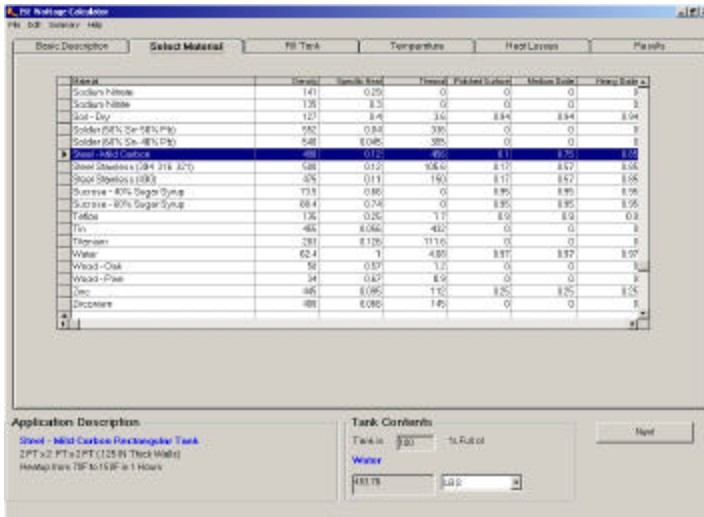
An option is provided in the "File" menu to save various program defaults.



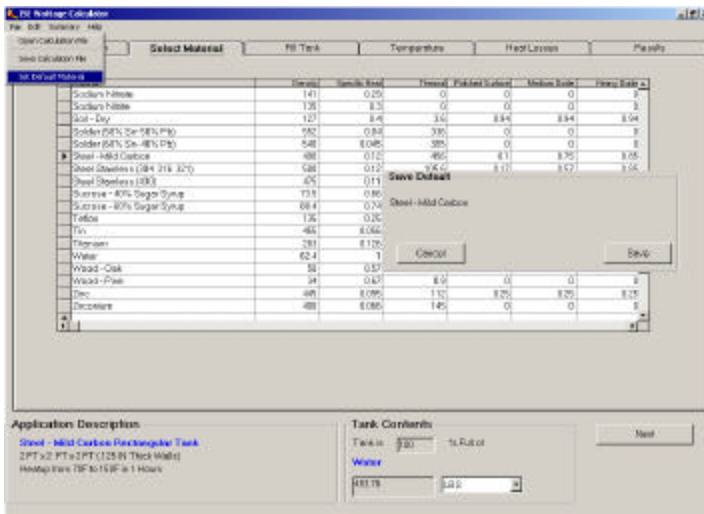
Click "**Next**" Button or select a different tab to continue.

Select Material Tab

Select the material that the block or the tank is constructed by clicking on the list.



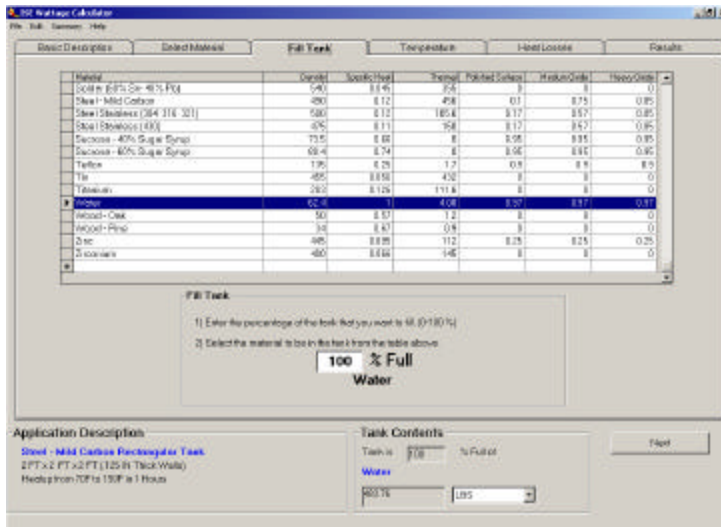
An option in the “File” menu is available to allow you to select the desired default material for your calculations.



Click “Next” Button or select a different tab to continue.

Fill Tank Tab

- 1) Select the material that is to be contained in the tank by clicking on the list.
- 2) Enter the percentage of the tank that will be filled.



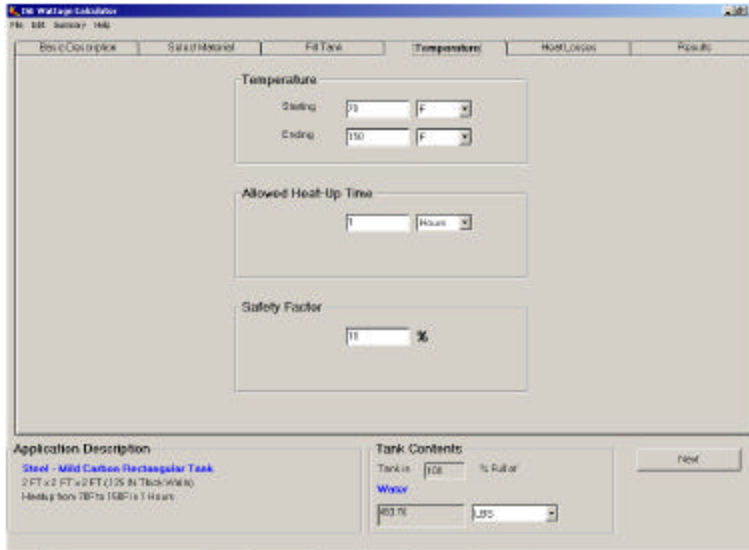
An option in the “File” menu is available to allow you to select the desired default material for your calculations.

Note: No allowances are made for pressure, boiling or melting. The program was not designed to handle these situations.

Click “Next” Button or select a different tab to continue.

Temperature (& Time) Tab

- 1) Enter the starting and ending temperature.
- 2) Select the appropriate temperature units.
- 3) Enter the desired heat-up time and units.
- 4) Enter the desired safety factor that is to be used in the wattage calculations.



The screenshot shows the 'Temperature' tab of the 'Wattage Calculator' software. The interface includes a title bar with the file name 'File: 121501 - 121501 - 121501'. Below the title bar are several tabs: 'Basic Operation', 'Safety Manual', 'Fill Type', 'Temperature', 'Heat Losses', and 'Results'. The 'Temperature' tab is active and contains the following input fields:

- Temperature:** Two rows of input fields. The first row has 'Starting' with a value of '70' and a unit dropdown set to 'F'. The second row has 'Ending' with a value of '150' and a unit dropdown set to 'F'.
- Allowed Heat-Up Time:** A single input field with a value of '1' and a unit dropdown set to 'Hours'.
- Safety Factor:** A single input field with a value of '11' and a '%' symbol to its right.

At the bottom of the window, there are three sections:

- Application Description:** Displays 'Steel - Mild Carbon Rectangular Tank', '2 FT x 2 FT x 2 FT (1.25 in Thick Wall)', and 'Heats from 70F to 150F in 1 Hour'.
- Tank Contents:** Includes a 'Tank is' dropdown set to 'Full', a unit dropdown set to '% Full', and a 'Water' label. Below this is a 'Water' input field with a value of '100' and a unit dropdown set to 'Gallons'.
- Next:** A button labeled 'Next'.

Click “**Next**” Button or select a different tab to continue.

Heat Losses Tab

- 1) Select the amount of insulation on all block or tank surfaces.
- 2) Select the condition of the block or tank surface (amount of oxidation).
- 3) Change or enter the emissivity for the material(s) if required.
- 4) Enter the ambient temperature and units.

The screenshot shows the 'Heat Losses' tab of the 'ISO Wattage Calculator' software. The interface is divided into several sections:

- Insulation:** Three dropdown menus for 'Top surface' (Open Top Tank), 'Side Surface' (No Insulation), and 'Bottom Surface' (No Insulation). Each dropdown is followed by its respective area in square inches (576, 2304, and 576). A 'Med Oxidation' dropdown is also present.
- Emissivity:** Two input fields for 'Tank' (0.25) and 'Contents' (0.37).
- Ambient:** Two dropdown menus for 'F' and 'C' units.
- Losses:** Four input fields showing calculated values: 'Heat Losses Top, Watts' (2141164), 'Heat Losses Side, Watts' (348024), 'Heat Losses Bottom, Watts' (1752788), and 'Total Losses' (1,298,5).
- Application Description:** A text box containing: 'Steel - Mild Carbon Rectangular Tank, 2 FT x 2 FT x 2 FT (125# Thick Walls), Heatup from X°F to 150°F in 1 Hour'.
- Tank Contents:** A section with 'Tank is' (Oil) and 'Water' (6075) input fields, and a 'LBS' unit dropdown.
- Next Button:** A button labeled 'Next' is located at the bottom right of the main form area.

Note: Emissivity is entered in the range of 0-1 where 1 has the greatest heat losses. Some of the materials in the included database do not have known emissivity values. Losses will likely be underestimated on these materials if values are not entered for these materials. A warning will be displayed for these materials. We recommend that you enter the emissivity if known or use a high emissivity value such as 0.95 to prevent underestimating the losses.

Click “**Next**” Button or select a different tab to continue.

Results Tab

This tab displays the results of the calculations and displays application warnings.

The screenshot shows the 'Results' tab of the 'Wattage Calculator' application. The main display area contains the following data:

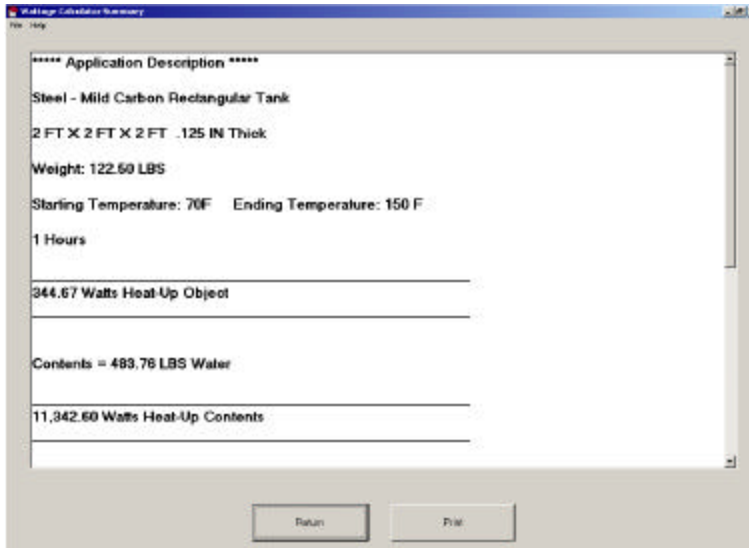
Field	Value
Hydrz Object	344.67
Conkrts	11,342.60
Heat Losses	7,298.98
Heat-Up	7,200.34
Total Estimated Watts Including Safety Factor	13,808.23 Watts

Below the main display, the 'Application Description' section reads: 'Steel - Mid Carbon Reinforcing Task, 2FT x 2 FT x 2FT (125-B1 Thick Walls), Heat-Up from TOP to 150F in 1 Hour'. The 'Task Contents' section shows 'Task is: [10] % Full' and 'Water' with a value of '83.3%' and a unit dropdown set to 'LBS'.

A summary button is provided for displaying an editable text document that can be printed and/or saved as desired.

Summarizing and Printing Results

Click the **Summarize** Button. A text box will be displayed. The data may be edited (For example a description of the application could be added).



The summary can be printed by clicking the **Print** button.

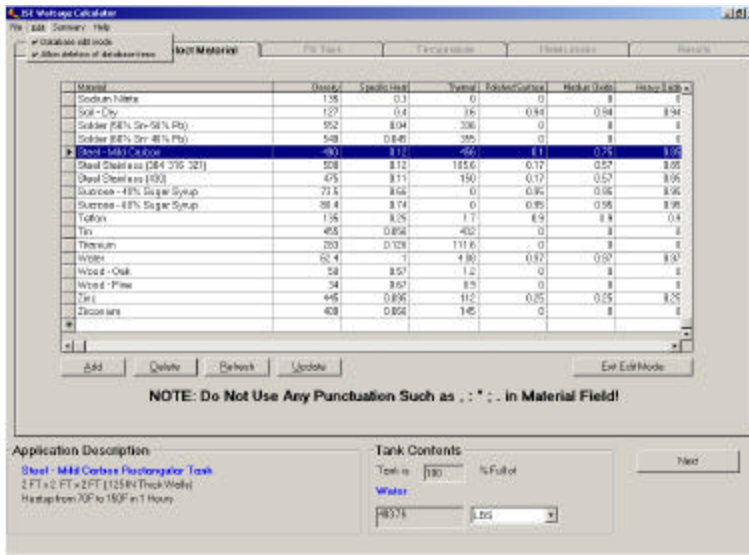
The summary can be saved as a text document with an option in the **File** menu.

Return to the main calculation screen by clicking the **Return** button.

Adding & Deleting Materials from the Materials Database

Select **Database Edit Mode** from the **Edit** menu. If this menu is checked you can change any data in the database by selecting the desired cell and entering revised data. If this menu is checked you can also add additional material descriptions by typing in the last row of the list (Row with a * at the left of it). Click the Refresh button and the data list will be re-sorted.

Select **Allow deletions from the materials database** from the **Edit** menu. If this menu is checked and you press the Delete button at the bottom of your screen or the Delete button on your keyboard you will permanently remove the currently selected row from the materials database.



Click the **Exit Edit Mode** button or uncheck the menu the edit menu selection(s) to exit the edit mode.

Notes:

- 1) Changes to the materials database are immediate and cannot be undone. The only way to undo changes made to the data base is by reentering the data.
- 2) Contents in open top tanks use the Emissivity value entered in the medium oxidation column. Other emissivity column entries for contents are ignored.
- 3) The program uses material names when saving calculations. Caution should be used in changing existing material names or deleting data. These changes in the database can cause problems retrieving previously saved calculations.
- 4) Do not use any punctuation (periods, commas etc.) in the material name.

Materials Database Data Description

Material: Material Description (List will be sorted by this entry)

Density: Density of Material in lbs/ft³

Specific Heat: BTU/(lb-degrees F)

Thermal Conductivity: BTU-in/(hr-ft²-degrees F)

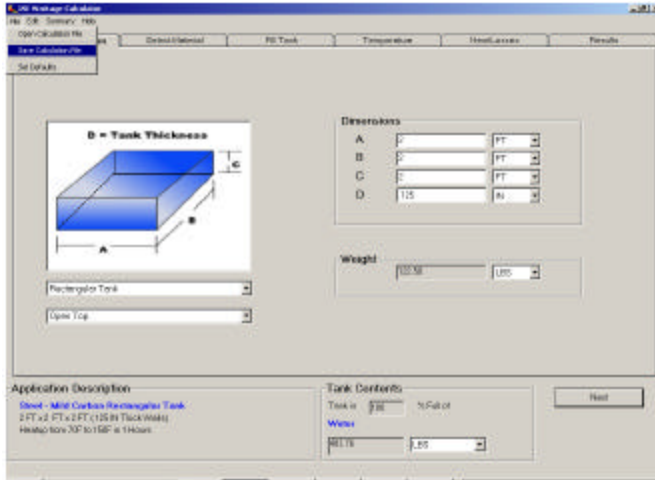
Polished, Medium Oxidized & Heavy Oxidized: Emissivity

If you add materials to the database make sure that the units match the units listed above. Using other units (example: lbs/in³ for density) will cause large errors in you results.

Note: Thermal Conductivity is not required in any calculations at this time. Do not use any punctuation (periods, commas etc.) in the material name.

Saving Calculations

Calculations may be saved and later retrieved by using the options in the **File** menu.



Program Limitations

Heat up wattage requirements are based on weight. If the exact shape is not provided that matches your application select the closest match. Errors in the calculated weight and the actual weight will cause proportionate errors in the calculated heat up wattage.

Heat losses are based on surface area. If your shape has numerous holes or cutouts the surface area and actual losses will be higher than calculated.

All calculations are based on the object being in open air. Conductive heat losses can affect actual results.

All calculations assume that the materials are not changing states (solid to liquid, liquid to gas). The program is not designed to calculate wattage for items in applications where the material state will change during heat up.

No allowances are given for pressure or changes in density when heating gasses. Caution must be used in these applications. Significant errors can result.

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ISE Contact Information

Contact Information for Access Number or Support:

Web Site: <http://instserv.com>

E-mail: sales@instserv.com

ISE, Inc.

10100 Royalton Rd.

Cleveland, OH 44133 USA

Tel: (440) 237-3200

Fax: (440) 237-1744

Major credit cards are accepted.