AERCalc V 1.5

User Guide

Lawrence Berkeley National Laboratory

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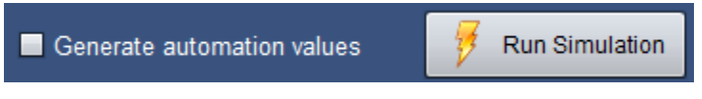
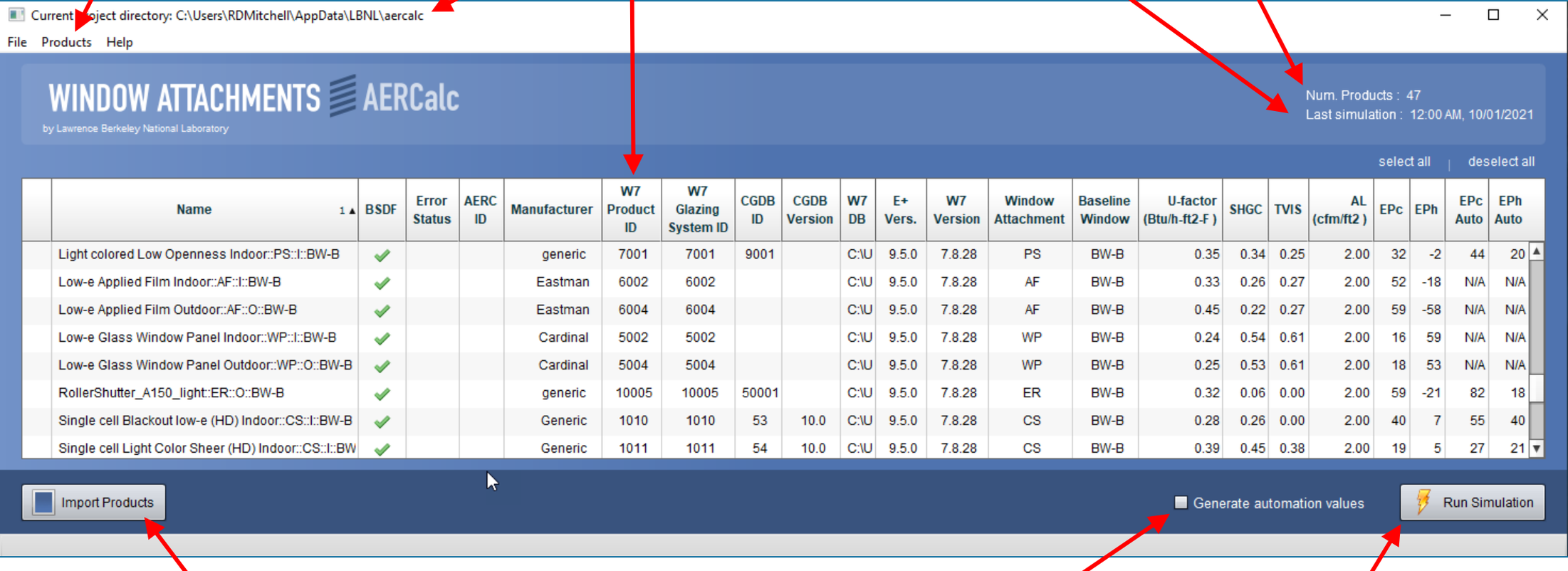
AERCalc Workflow

- Import the attachment products from the WINDOW Window Library
  - When you first open AERCalc, there are no records in the main screen
- Save as a Project if desired
  - The default location is C:\Users\<usename>\AppData\LBNL\aercalc but a project can be saved to any directory
- Edit the record as needed
  - Adjust the **AL** value if needed (for fixed products such as Window Panels)
  - Add an **AERC ID** value if needed
- Simulate the products (select the records and click the simulate button)
  - Check the “Generate automation values” if those results are desired



- Export the products (for the AERC CPD) and edit as needed
  - Edit the **Manufacturer** or **Material Manufacturer** if needed
  - For Venetian blinds and vertical louvers, copy the **U-factor**, **SHGC** and **Tvis** values from the appropriate child record to the parent record

Main Screen: Overview



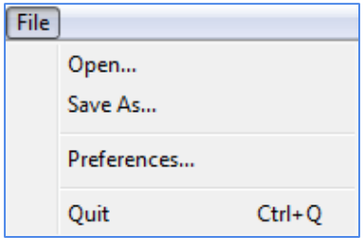
Name	BSDF	Error Status	AERC ID	Manufacturer	W7 Product ID	W7 Glazing System ID	CGDB ID	CGDB Version	W7 DB	E+ Vers.	W7 Version	Window Attachment	Baseline Window	U-factor (Btu/h-ft2-F)	SHGC	TVIS	AL (cfm/ft2)	EPc	EPh	EPc Auto	EPh Auto
Light colored Low Openness Indoor::PS::I::BW-B	✓			generic	7001	7001	9001		C:\U	9.5.0	7.8.28	PS	BW-B	0.35	0.34	0.25	2.00	32	-2	44	20
Low-e Applied Film Indoor::AF::I::BW-B	✓			Eastman	6002	6002			C:\U	9.5.0	7.8.28	AF	BW-B	0.33	0.26	0.27	2.00	52	-18	N/A	N/A
Low-e Applied Film Outdoor::AF::O::BW-B	✓			Eastman	6004	6004			C:\U	9.5.0	7.8.28	AF	BW-B	0.45	0.22	0.27	2.00	59	-58	N/A	N/A
Low-e Glass Window Panel Indoor::WP::I::BW-B	✓			Cardinal	5002	5002			C:\U	9.5.0	7.8.28	WP	BW-B	0.24	0.54	0.61	2.00	16	59	N/A	N/A
Low-e Glass Window Panel Outdoor::WP::O::BW-B	✓			Cardinal	5004	5004			C:\U	9.5.0	7.8.28	WP	BW-B	0.25	0.53	0.61	2.00	18	53	N/A	N/A
RollerShutter_A150_light::ER::O::BW-B	✓			generic	10005	10005	50001		C:\U	9.5.0	7.8.28	ER	BW-B	0.32	0.06	0.00	2.00	59	-21	82	18
Single cell Blackout low-e (HD) Indoor::CS::I::BW-B	✓			Generic	1010	1010	53	10.0	C:\U	9.5.0	7.8.28	CS	BW-B	0.28	0.26	0.00	2.00	40	7	55	40
Single cell Light Color Sheer (HD) Indoor::CS::I::BW	✓			Generic	1011	1011	54	10.0	C:\U	9.5.0	7.8.28	CS	BW-B	0.39	0.45	0.38	2.00	19	5	27	21

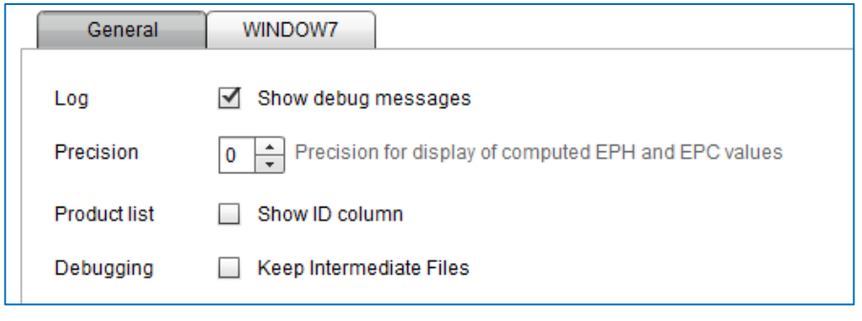
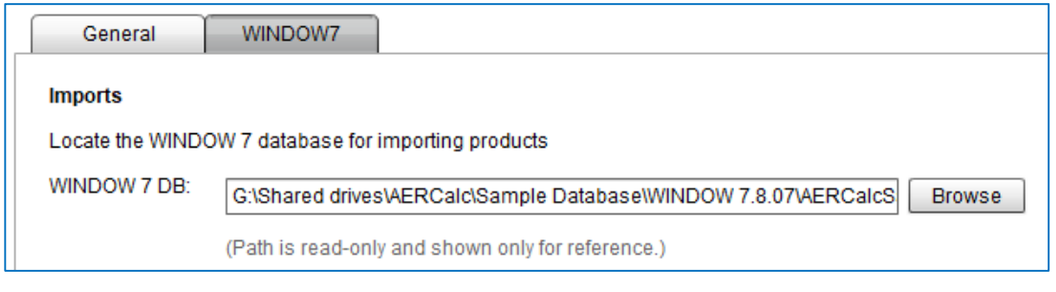
Button to import attachment products from a WINDOW database

Checkbox to simulate products with Automation enabled (Note that only 1D products can be modeled with Automation; see simulation section for more details)

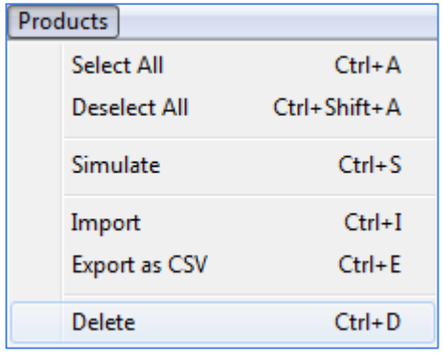
Button to calculate the EPc and EPh values for the highlighted records

Main Screen: File Menu



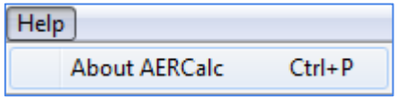
Open	Open a project, which will open a Browse window to select the folder containing the desired Project
Save As	Save the current products to a Project. This opens a Browse window to select the folder which will contain the saved Project
Preferences	Opens the Preferences window, where the following can be specified • **General Tab:** ○ **Log:** Creates a log with messages that can be used for debugging ○ **Precision:** allows control of the number of decimal places for the EPc and EPh values. The default is 0 decimal points. ○ **Product List:** An option to show (or not) the AERCalc database ID column in the main screen ○ **Debugging:** This saves intermediate files that AERCalc generates  • **WINDOW7 tab:** ○ Allows specification of the WINDOW 7 database from which the attachment products will be Imported 
Quit	Closes the program

Main Screen: Products Menu

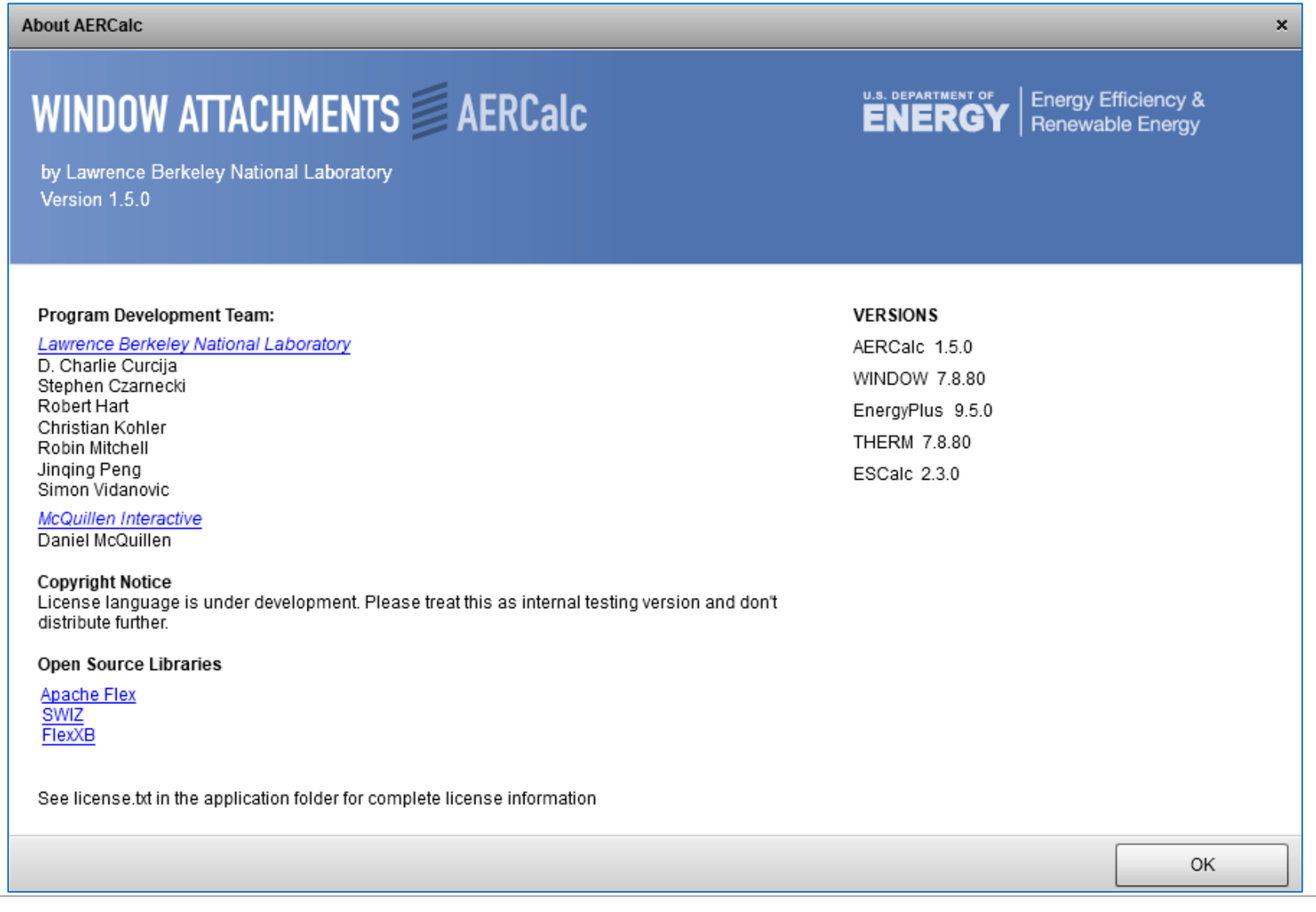


Select All	Selects all products in the grid
Deselect All	Unselects all the products in the grid
Simulate	Starts the calculation of the EPc and EPh values for all the selected products. Equivalent to clicking the Simulate button
Import	Opens the Import dialog box, which allows selection of attachment products to be imported into AERCalc from the WINDOW database specified in the File/Preferences menu, WINDOW tab
Export as CSV	Exports all the records in the grid to a CSV file
Delete	Deletes any selected records

Main Screen: Help Menu



About AERCalc	Shows the About screen, which indicates the version numbers of AERCalc and associated components, as well as developers and license information. The version numbers for the program and associated components are included in the Export file



Main Screen: Fields

Glazing System ID for the Window from WINDOW 7

Product ID (Window ID from WINDOW 7)

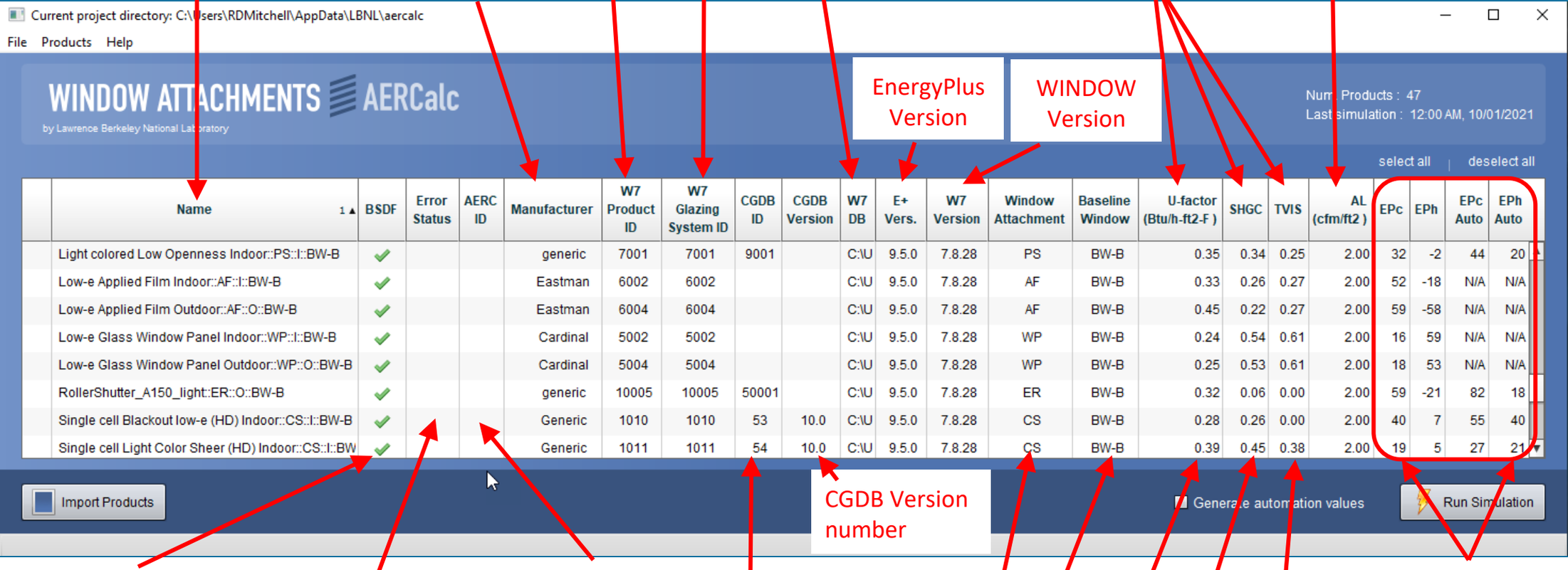
Name of WINDOW db where the record originated

Air Leakage
The program automatically defaults AL to 2.0 cfm/ft2, but this value can be edited

Product Name (from WINDOW Window Library name)

Attachment Manufacturer

These properties are calculated in WINDOW 7



Name	BSDF	Error Status	AERC ID	Manufacturer	W7 Product ID	W7 Glazing System ID	CGDB ID	CGDB Version	W7 DB	E+ Vers.	W7 Version	Window Attachment	Baseline Window	U-factor (Btu/h-ft2-F)	SHGC	TVIS	AL (cfm/ft2)	EPc	EPh	EPc Auto	EPh Auto
Light colored Low Openness Indoor::PS::I::BW-B	✓			generic	7001	7001	9001		C:\U	9.5.0	7.8.28	PS	BW-B	0.35	0.34	0.25	2.00	32	-2	44	20
Low-e Applied Film Indoor::AF::I::BW-B	✓			Eastman	6002	6002			C:\U	9.5.0	7.8.28	AF	BW-B	0.33	0.26	0.27	2.00	52	-18	N/A	N/A
Low-e Applied Film Outdoor::AF::O::BW-B	✓			Eastman	6004	6004			C:\U	9.5.0	7.8.28	AF	BW-B	0.45	0.22	0.27	2.00	59	-58	N/A	N/A
Low-e Glass Window Panel Indoor::WP::I::BW-B	✓			Cardinal	5002	5002			C:\U	9.5.0	7.8.28	WP	BW-B	0.24	0.54	0.61	2.00	16	59	N/A	N/A
Low-e Glass Window Panel Outdoor::WP::O::BW-B	✓			Cardinal	5004	5004			C:\U	9.5.0	7.8.28	WP	BW-B	0.25	0.53	0.61	2.00	18	53	N/A	N/A
RollerShutter_A150_light::ER::O::BW-B	✓			generic	10005	10005	50001		C:\U	9.5.0	7.8.28	ER	BW-B	0.32	0.06	0.00	2.00	59	-21	82	18
Single cell Blackout low-e (HD) Indoor::CS::I::BW-B	✓			Generic	1010	1010	53	10.0	C:\U	9.5.0	7.8.28	CS	BW-B	0.28	0.26	0.00	2.00	40	7	55	40
Single cell Light Color Sheer (HD) Indoor::CS::I::BW	✓			Generic	1011	1011	54	10.0	C:\U	9.5.0	7.8.28	CS	BW-B	0.39	0.45	0.38	2.00	19	5	27	21

CGDB Version number

This column indicates if the required BSDF file exists (created on import)

If the products are from a previous version of AERCalc, this column will show an error icon, and the products will need to be re-imported and re-simulated in this version of AERCalc

AERC ID (editable)

CGDB ID (WINDOW Shading System ID)

Abbreviation for the Attachment type

Abbreviation for the Baseline Window

U-factor

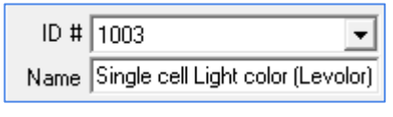
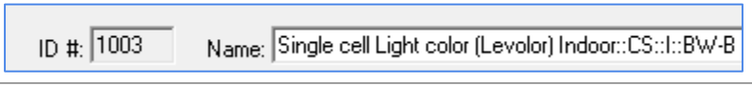
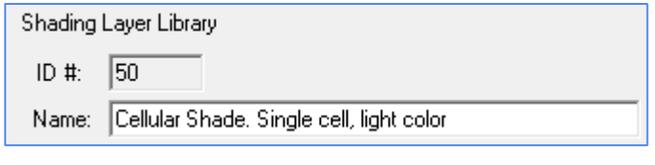
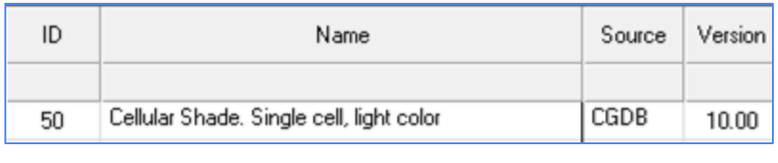
Solar Heat Gain Coefficient

Visible Transmittance

Energy Performance results (blank means they have not been simulated yet)

Main Screen: Field Descriptions

The table below lists all of the fields in the main screen.

Name	Name of the Attachment product, from the Window Library in WINDOW. It must have a prescribed format. A Window record without this name format can not be imported into AERCalc <name>::<shadeType><slat tilt>::<attachment position>::BW<basecase window ID>
BSDF	When importing a product from WINDOW, a BSDF file is generated (and stored in a subfolder called BSDF below where the AERCalc database is located). This must exist in order to calculate the EPc/EPh values. The program will show an icon indicating the existence (or not) of this file. ● A green checkmark means that the file exists and the product can be simulated ● A red X means that the file does not exist and the product must be re-imported into AERCalc from WINDOW
Error Status	If the product was imported in a previous version of AERCalc, a warning icon appears, showing the older version numbers. In this case the product must be re-imported (and a new BSDF file generated) and re-simulated in AERCalc
AERC ID	A user-editable field that can be used for any type of identifying reference. It is blank by default.
Manufacturer	The Manufacturer from WINDOW as follows: ● For AP and WP, it is the Manufacturer from the WINDOW Glass Library ● For all others, it is the Manufacturer from the WINDOW Shading Layer Library
W7 Product ID	The ID from the WINDOW Window Library (that was imported into AERCalc) 
W7 Glazing System ID	The ID from the WINDOW Glazing System Library used for this product 
CGDB ID	The ID from the WINDOW Shading Layer Library 
CGDB Version	The CGDB Version number for the product, as shown in the WINDOW Shading Layer Library 

Main Screen: Field Descriptions (cont'd)

The table below lists all of the fields in the main screen.

W7 DB	The name (including complete directory path) of the WINDOW database the product was imported from, for example the default database is found here. C:\Users\RDMitchell\AppData\LBNL\aercalc\W7
E+ Version	The EnergyPlus program version used to simulate the products. This is also listed in AERCalc Help/About
W7 Version	The WINDOW 7 program version used when importing the product from WINDOW into AERCalc. This can be found in WINDOW in the Help/About menu option
Window Attachment	The abbreviation for the Attachment Product Type ● AF: Applied Film ● AO: Operable Awning ● AS: Seasonal Awning ● AY: Fixed Awning ● CS: Cellular Shade ● ER: Roller Shutter ● SS: Solar Screen ● PS: Pleated Shade ● RS: Roller Shade ● RM: Roman Shade ● VB: Venetian Blind ● VL: Vertical Louver ● WP: Window Panel
Baseline Window	The abbreviation for the AERC baseline window. The initial window is BW-B, but in the future there will be windows BW-A through BW-G
U-factor (Btu/h-ft^2-^{o}F)	U-factor of the product from the WINDOW Window Library. This is calculated by WINDOW. If this value is zero, recalculate it in WINDOW and reimport the product into AERCalc
SHGC	Solar Heat Gain Coefficient of the product from the WINDOW Window Library. This is calculated by WINDOW. If this value is zero, recalculate it in WINDOW and reimport the product into AERCalc
TVIS	Visible Transmittance of the product from the WINDOW Window Library. This is calculated by WINDOW. If this value is zero, recalculate it in WINDOW and reimport the product into AERCalc
AL (cfm/ft^2)	Air Leakage of the product. The default value assigned on import is 2.0 cfm/ft2, but this field is user editable and can be changed as needed.

Main Screen: Field Descriptions (cont'd)

The table below lists all of the fields in the main screen.

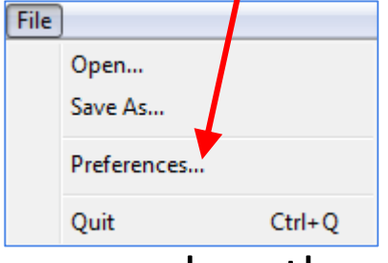
EPc	The Energy Performance value for cooling, calculated by highlighting records and clicking the Simulate button on the main AERCalc screen.
EPh	The Energy Performance value for heating, calculated by highlighting records and clicking the Simulate button on the main AERCalc screen.
EPc Auto	The Energy Performance value for cooling with Automation, calculated by highlighting records and clicking the Simulate button on the main AERCalc screen with the "Generate Automation values" checked.
EPh Auto	The Energy Performance value for heating with Automation, calculated by highlighting records and clicking the Simulate button on the main AERCalc screen with the "Generate Automation values" checked.

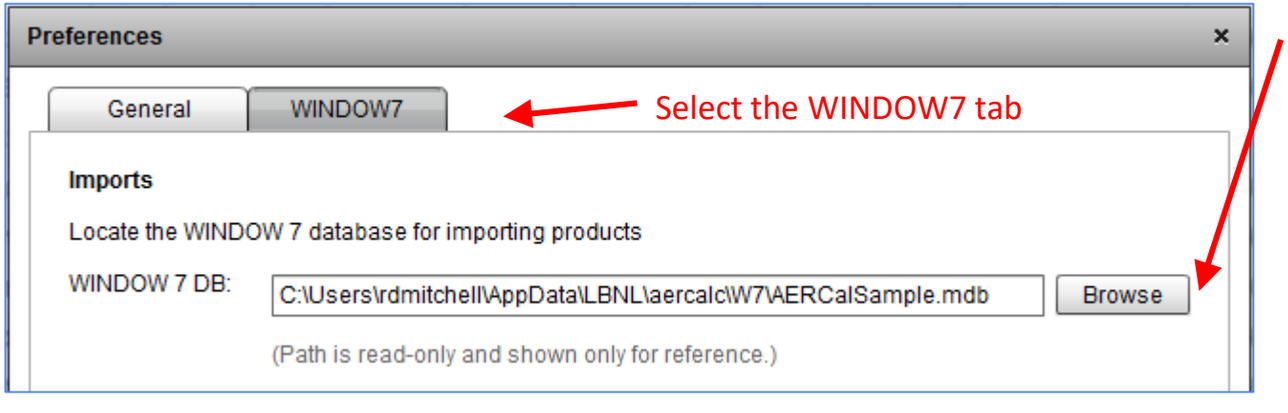
Import Products: Specify WINDOW 7 Database

File / Preferences: Specify the WINDOW 7 database to import products from

- The default WINDOW database in **File/Preferences** is located in the W7 subdirectory of the default AERCalc working directory:
  C:\Users\<username>\AppData\LBNL\aercalc\W7
- To change to another database
  - Click on the **File/Preferences** menu option
  - Select the **WINDOW7** tab and use the **Browse** button to select another WINDOW 7 database
  - The database specified here will be the database that EP Calc opens when the **Import** button is clicked

Go to the File/ Preferences menu option





Use the Browse button to select another WINDOW 7 database, such as the default database in the WINDOW 7 working directory, or any other WINDOW 7 database. (The default database is called AERCalcSample.mdb and is located in:
C:\Users\<username>\AppData\LBNL\aercalc\W7

Make sure that all the needed XML, THMX, and other associated files (referenced by WINDOW) are in the correct folders for the selected database.

The easiest way to check this is to calculate (in WINDOW) the Windows that you want to import. If they calculate in WINDOW, AERCalc will be able to simulate them

Import Products: Calculate Products in WINDOW

In WINDOW: Make sure to calculate the products in WINDOW before importing them

	ID	Name	Type	Width	Height	Ufactor	SHGC	Tvis
				mm	mm	W/m2-K		
	1003	Single cell Light color (Levolor) Indoor::CS::I::BW-B	Fixed (picture)	1200	1500	?	?	?
	1004	Stacked double cell Light color(Levolor) Indoor::CS::I::BW-B	Fixed (picture)	1200	1500	1.494	0.214	0.046
	1007	Cell-in-cell Light color (HD) Indoor::CS::I::BW-B	Fixed (picture)	1200	1500	1.564	0.270	0.029
	1010	Single cell Blackout low-e (HD) Indoor::CS::I::BW-B	Fixed (picture)	1200	1500	1.584	0.249	0.000
	1011	Single cell Light Color Sheer (HD) Indoor::CS::I::BW-B	Fixed (picture)	1200	1500	1.944	0.434	0.420

If the products have not been calculated in WINDOW, when the program imports them, there will be zeros for SHGC, TVis and U-factor.

Import from WINDOW7 :: C:\Users\rdmitchell\AppData\LBNL\aercalc\W7\AERCalSample.mdb

WINDOW7 Products List

Available to Import | Unavailable for Import

	W7 ID	W7 GlzSys ID	W7 ShdSys ID	CGDB Ver.	Window Name	Manufacturer	Window Attachment	SHGC	TVis	U-factor...
	1003	1003	50	10.0	Single cell Light color (Levolor) Indoor::CS::I::BW-B	Generic	Cellular Shade	0.00	0.00	0.00
	1004	1004	51	10.0	Stacked double cell Light color(Levolor) Indoor::CS::	Generic	Cellular Shade	0.21	0.05	0.26
	1007	1007	52	10.0	Cell-in-cell Light color (HD) Indoor::CS::I::BW-B	Generic	Cellular Shade	0.27	0.03	0.28
	1010	1010	53	10.0	Single cell Blackout low-e (HD) Indoor::CS::I::BW-B	Generic	Cellular Shade	0.25	0.00	0.28

= window import complete.

= window cannot be imported.

Import | Done

If you then try to simulate a product with zeros for SHGC, Tvis and U-factor, you will get an error message.

You will need to calculate the product in WINDOW and reimport it.

Invalid Scenario

Window WindowQuilt_Fixed_Light::SS::I::BW-B has invalid UVal: 0

OK

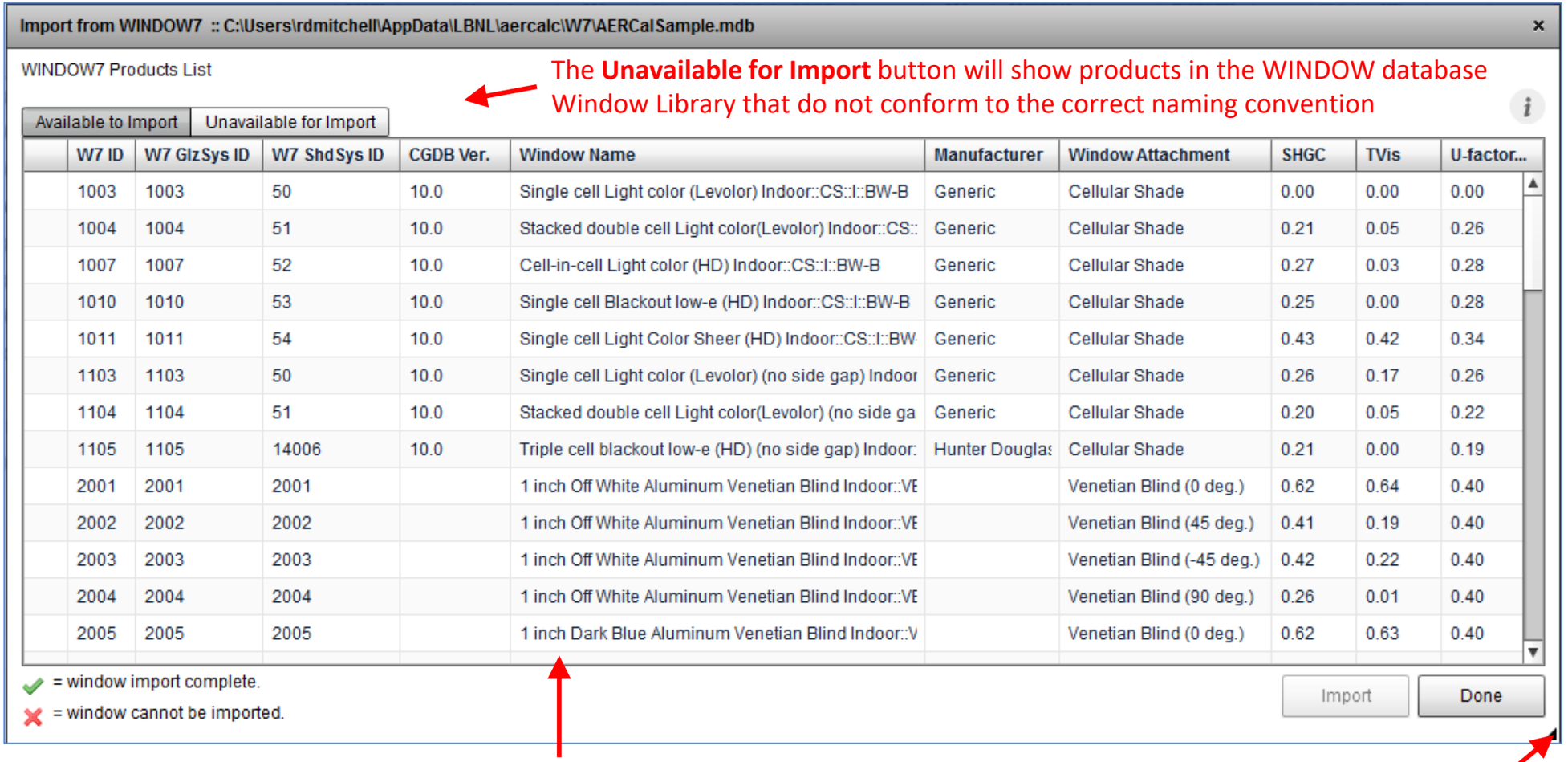
Import Products: Import from WINDOW database

Click the Import Products button on the main screen to open the import window

Import Products

Click the **Import Products** button on the main screen to see the list of products from a WINDOW database

The products modeled in WINDOW will be displayed (AERCalc reads the WINDOW database)
If there are many records in the WINDOW database, it may take while to display the list – be patient !



	W7 ID	W7 GlzSys ID	W7 ShdSys ID	CGDB Ver.	Window Name	Manufacturer	Window Attachment	SHGC	TVis	U-factor...
	1003	1003	50	10.0	Single cell Light color (Levolor) Indoor::CS::I::BW-B	Generic	Cellular Shade	0.00	0.00	0.00
	1004	1004	51	10.0	Stacked double cell Light color(Levolor) Indoor::CS::	Generic	Cellular Shade	0.21	0.05	0.26
	1007	1007	52	10.0	Cell-in-cell Light color (HD) Indoor::CS::I::BW-B	Generic	Cellular Shade	0.27	0.03	0.28
	1010	1010	53	10.0	Single cell Blackout low-e (HD) Indoor::CS::I::BW-B	Generic	Cellular Shade	0.25	0.00	0.28
	1011	1011	54	10.0	Single cell Light Color Sheer (HD) Indoor::CS::I::BW	Generic	Cellular Shade	0.43	0.42	0.34
	1103	1103	50	10.0	Single cell Light color (Levolor) (no side gap) Indoor	Generic	Cellular Shade	0.26	0.17	0.26
	1104	1104	51	10.0	Stacked double cell Light color(Levolor) (no side ga	Generic	Cellular Shade	0.20	0.05	0.22
	1105	1105	14006	10.0	Triple cell blackout low-e (HD) (no side gap) Indoor:	Hunter Douglas	Cellular Shade	0.21	0.00	0.19
	2001	2001	2001		1 inch Off White Aluminum Venetian Blind Indoor::VE		Venetian Blind (0 deg.)	0.62	0.64	0.40
	2002	2002	2002		1 inch Off White Aluminum Venetian Blind Indoor::VE		Venetian Blind (45 deg.)	0.41	0.19	0.40
	2003	2003	2003		1 inch Off White Aluminum Venetian Blind Indoor::VE		Venetian Blind (-45 deg.)	0.42	0.22	0.40
	2004	2004	2004		1 inch Off White Aluminum Venetian Blind Indoor::VE		Venetian Blind (90 deg.)	0.26	0.01	0.40
	2005	2005	2005		1 inch Dark Blue Aluminum Venetian Blind Indoor::V		Venetian Blind (0 deg.)	0.62	0.63	0.40

The **Unavailable for Import** button will show products in the WINDOW database Window Library that do not conform to the correct naming convention

The program uses a strict naming convention to interpret what products are represented, so it is important to get the naming convention right.
(**See the next page**)

Change the screen size with this resize handle

Import Products: Naming Convention

Here is the naming convention to use in WINDOW when creating products

Double semi colons divide the name sections

<name>::<attachment type><slat tilt>::<attachment position>::BW<basecase window ID>

The name of the product
- Make sure to NOT use any of the following characters
  - /
  - \
  - <
  - >
  - “

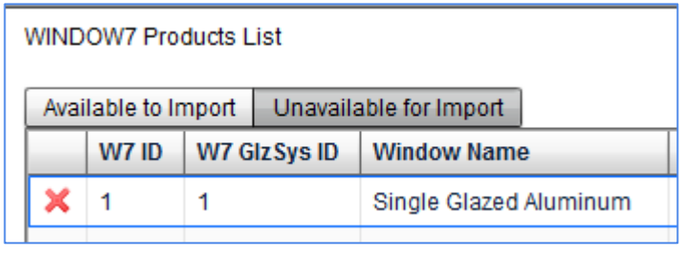
Attachment Type abbreviation
- AF: Applied Film
- AO: Awning Operable
- AS: Awning Seasonal
- AY: Awning Fixed
- SS: Solar Screen
- CS: Cellular Shade
- PS: Pleated Shade
- RM: Roman Shade
- RS: Roller Shade
- VB: Venetian Blind
- VL: Vertical Louver
- WP: Window Panel

Slat Tilt
(only for Venetian Blinds and Vertical Louvers)
- 0
- 45
- -45
- 90

Attachment Position
- I = Indoor
- O = Outdoor
- B = Between (currently not used by AERC)

Base Case Window abbreviation
For now, there is only one choice
- BW-B

If the products are not correctly named, they will appear in the **Unavailable for Import** tab



Examples:

- Sample **Solar Screen Outside**::**SS**::**O**::BW-B

For Venetian blinds, all four slat angles must be defined

- White Venetian Blind Outside::VB0::O::BW-B
- White Venetian Blind Outside::VB45::O::BW-B
- White Venetian Blind Outside::VB-45::O::BW-B
- White Venetian Blind Outside::VB90::O::BW-B

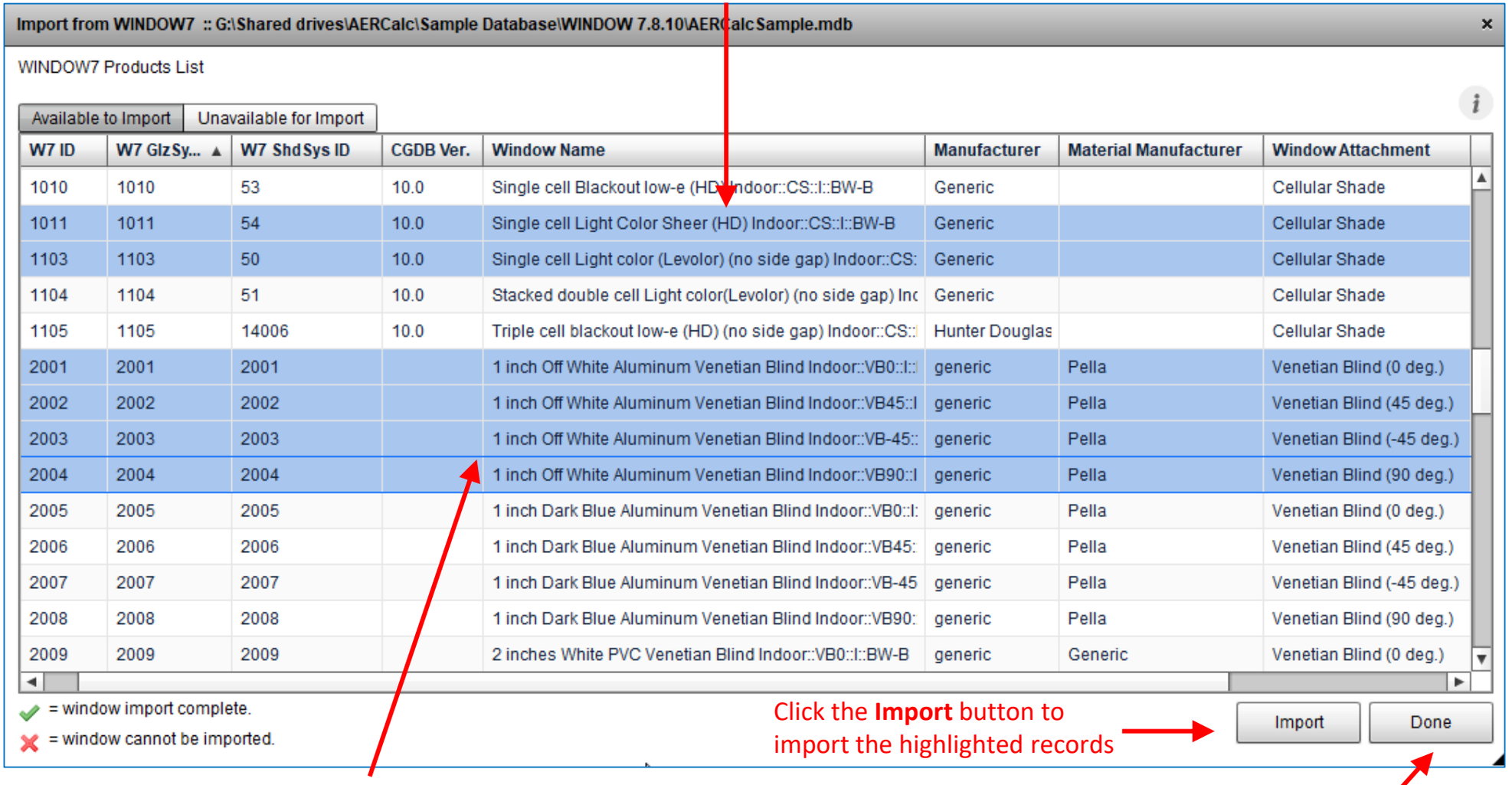
For Venetian Blinds, make sure that all the names are IDENTICAL except for the slat tilt -- the program will not be able to import them if they are not identical

Import Products: Select Products to Import

Highlight the products to import and click the Import button

Highlight the products you want to import

- Holding the **Shift** key down will allow selecting multiple **consecutive** records
- Holding the **Ctrl** key down will allow selecting multiple **non-consecutive** records



Click the **Import** button to import the highlighted records

When importing **Venetian Blinds**, import records for all 4 slat angles at the same time

Click the **Done** button to close the window

Import Products: Select Products to Import

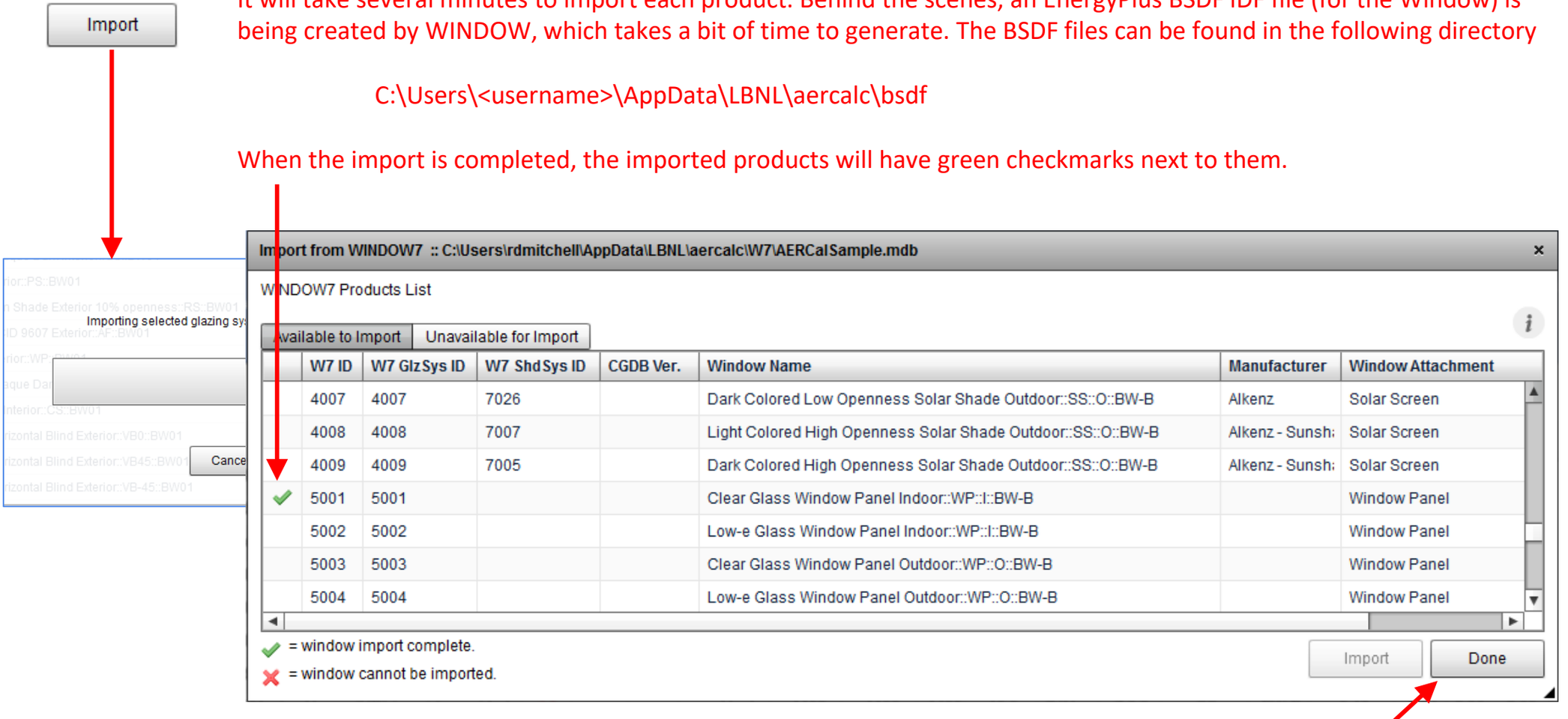
Importing products takes a while

When the **Import** button is clicked, the program will put up a progress bar for the import

It will take several minutes to import each product. Behind the scenes, an EnergyPlus BSDF IDF file (for the Window) is being created by WINDOW, which takes a bit of time to generate. The BSDF files can be found in the following directory

C:\Users\<username>\AppData\LBNL\aercalc\bsdf

When the import is completed, the imported products will have green checkmarks next to them.



Click the **Done** button to close this screen and see the imported records in the Main screen

Import Products: Imported Products in Main Screen

The imported products are now shown in the Main Screen

When the products are imported, there are no results in the EPc and EPh columns

N/A in the EPc Auto and EPh Auto fields means automation will not be modeled for those products

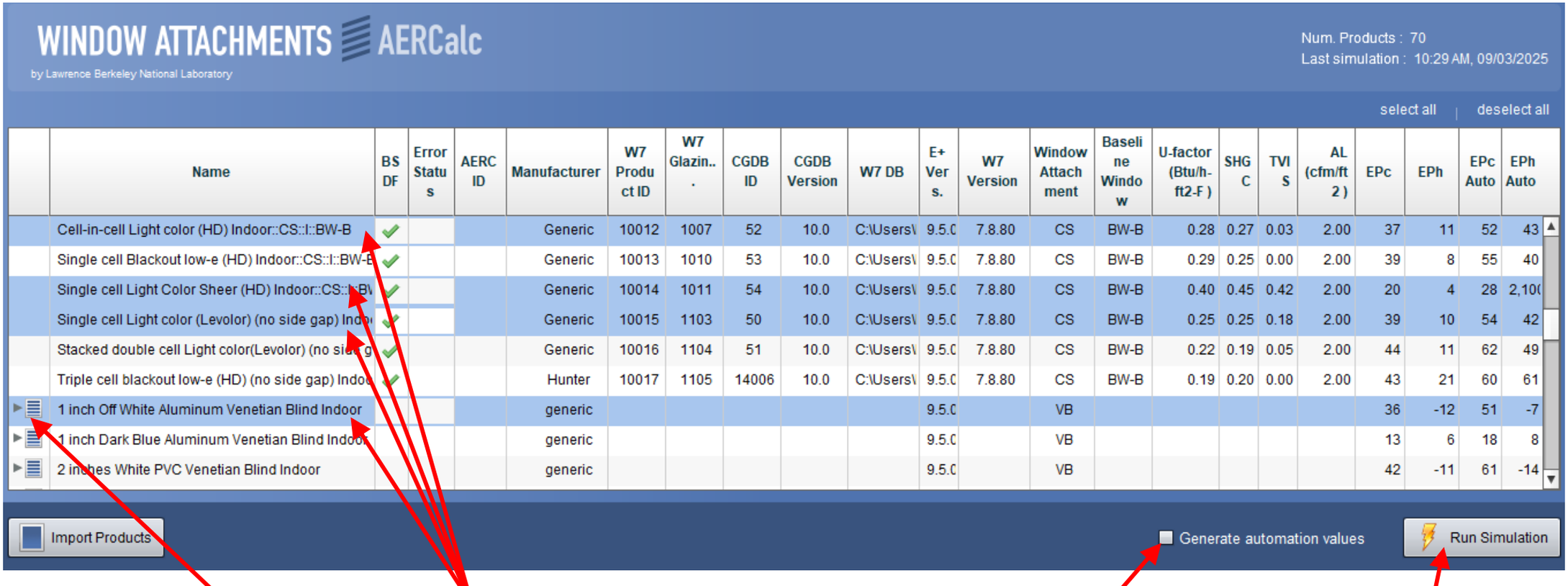
Name	BSDF	Error Status	AERC ID	Manufacturer	W7 Product ID	W7 Glazing..	CGDB ID	CGDB Version	W7 DB	E+ Vers.	W7 Version	Window Attachment	Baseline Window	U-factor (Btu/h-ft2-F)	SHGC	TVIS	AL (cfm/ft2)	EPc	EPh	EPc Auto	EPh Auto
1 inch Off White Aluminum Venetian Blind Indoor				generic						9.5.0		VB						36	-12	51	-7
1 inch Off White Aluminum Venetian Blind	✓			generic	2001	2001	2001		C:\Users\	9.5.0	7.8.80	VB0	BW-B	0.41	0.62	0.64	2.00			N/A	N/A
1 inch Off White Aluminum Venetian Blind	✓			generic	2002	2002	2002		C:\Users\	9.5.0	7.8.80	VB45	BW-B	0.40	0.41	0.19	2.00			N/A	N/A
1 inch Off White Aluminum Venetian Blind	✓			generic	2003	2003	2003		C:\Users\	9.5.0	7.8.80	VB-45	BW-B	0.40	0.42	0.23	2.00			N/A	N/A
1 inch Off White Aluminum Venetian Blind	✓			generic	2004	2004	2004		C:\Users\	9.5.0	7.8.80	VB90	BW-B	0.40	0.26	0.01	2.00			N/A	N/A
1 inch Dark Blue Aluminum Venetian Blind Indoor				generic						9.5.0		VB						13	6	18	8
2 inches White PVC Venetian Blind Indoor				generic						9.5.0		VB						42	-11	61	-14
2 inches Wood Venetian Blind Indoor				generic						9.5.0		VB						15	7	21	13
Light Colored Low Openness Roller Shade Indoor	✓			Alkenz -	3001	3001	7015		C:\Users\	9.5.0	7.8.80	RS	BW-B	0.35	0.19	0.10	2.00	46	-15	64	14
Dark Colored Low Openness Roller Shade Indoor	✓			Alkenz	3002	3002	7026		C:\Users\	9.5.0	7.8.80	RS	BW-B	0.35	0.49	0.00	2.00	12	12	16	28
Light Colored High Openness Roller Shade Indoo	✓			Alkenz -	3003	3003	7007		C:\Users\	9.5.0	7.8.80	RS	BW-B	0.36	0.24	0.16	2.00	42	-13	59	13
Dark Colored High Openness Roller Shade Indoo	✓			Alkenz -	3004	3004	7005		C:\Users\	9.5.0	7.8.80	RS	BW-B	0.36	0.50	0.04	2.00	11	11	15	27
Light Colored Low-e 0.04 Openness Roller Shade	✓			Aerosol	3005	3005	20024		C:\Users\	9.5.0	7.8.80	RS	BW-B	0.32	0.24	0.05	2.00	41	-1	58	29
Light Colored Low Openness Roller Shade Outdo	✓			Alkenz -	3006	3006	7015		C:\Users\	9.5.0	7.8.80	RS	BW-B	0.33	0.11	0.09	2.00	56	-21	78	14
Dark Colored Low Openness Roller Shade Outdo	✓			Alkenz	3007	3007	7026		C:\Users\	9.5.0	7.8.80	RS	BW-B	0.33	0.08	0.00	2.00	55	-21	76	13

Parent Venetian Blind Product
Click the arrow icon to expand the records to show the associated "child" records or collapse the records to just show the "parent" record

Child Venetian Blind Product records, one for each slat angle

Simulating Products

Select the products to be simulated and click the Run Simulation button



Highlight the products to simulate

For Venetian Blinds, you can hide the child records and just highlight the parent record

Check the “Generate automation values” if desired. If it is checked and the simulated product cannot be modeled with automation, the program will just display N/A in the “Auto” results columns

Click the **Run Simulation** button

Simulating Products: Automated Operation

AERCalc version 1.5.00 has added the ability for all operable (both interior and exterior) shading systems to be modeled with automation.

- **Awnings - Operable**
- **Cellular Shades**
- **Pleated Shades**
- **Roller Shades**
- **Roller Shutters**
- **Roman Shades**
- **Venetian Blinds**
- **Vertical Louvered Shutters**

For these window attachment types, the attachment operation consists of the attachment either fully deployed or fully retracted. The performance is calculated in a single EnergyPlus run utilizing the EMS (Energy Management System) feature to deploy or retract the shade for each simulation timestep based on a given deployment schedule. The deployment schedules for Automated 1D window attachments were developed by the AERC Automation working Group and are shown in the tables below.

Deployment Schedule for North (Heating) Climate Zone

	Window Orientations			
	North	South	East	West
June 1 – August 31	Closed All Day	Closed All Day	Closed All Day	Closed All Day
September 1 – May 31	Closed All Day	Open 08:00 – 16:00	Open 08:00 – 12:00	Open 12:00 – 16:00

Deployment Schedule for South (Cooling) Climate Zone

	Window Orientations			
	North	South	East	West
April 1 – October 31	Closed All Day	Closed All Day	Closed All Day	Closed All Day
November 1 – March 31	Open 08:00 – 16:00	Closed All Day	Open 12:00 – 16:00	Open 08:00 – 12:00

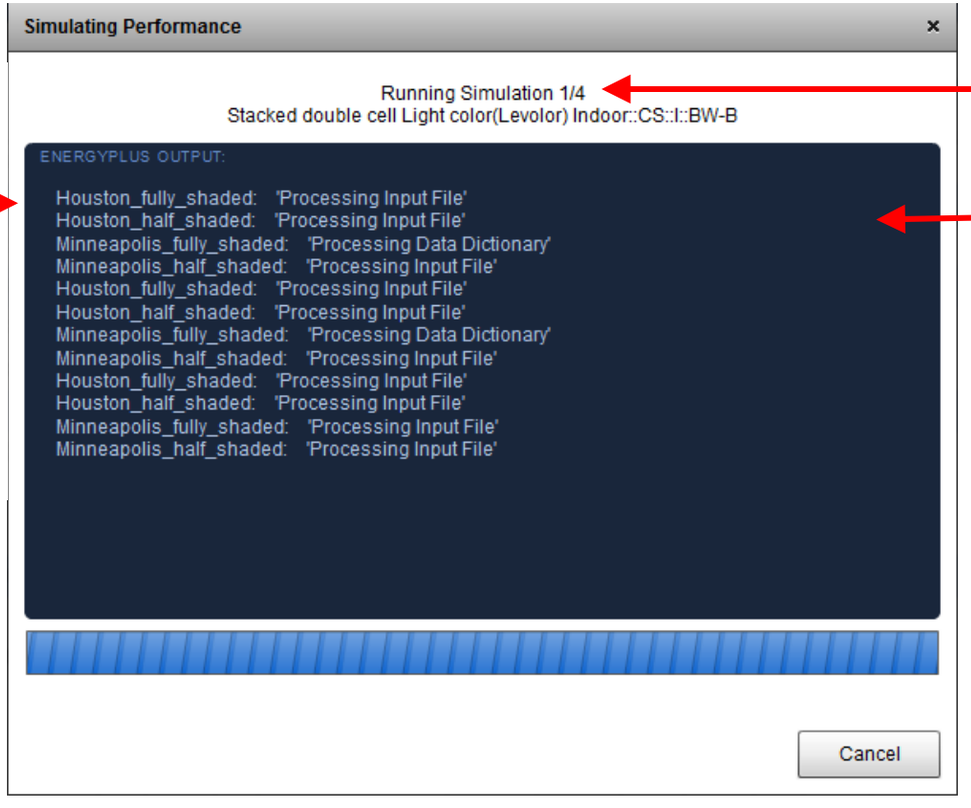
Simulating Products

During the simulations, the program displays the progress
The simulations for each product will take quite a while, many minutes each

When all the simulations are complete, the Main Screen will again have focus and there will be results in the EPc and EPh columns

This dialog box shows the progress of the EnergyPlus simulations

The program uses multiple computer cores (total cores - 1) to speed up the simulation process.



In this example, 4 EnergyPlus simulations will be run

- Fully deployed Minneapolis
- Half deployed Minneapolis
- Fully deployed Houston
- Half deployed Houston

The **EPcAuto** and **EPhAuto** will be calculated for appropriate shades; those that can't be automated will have **N/A** for a result

When the simulations are complete, the **EPc, EPh,** and **EPcAuto, EPhAuto** (if appropriate) values will be displayed in the Main Screen

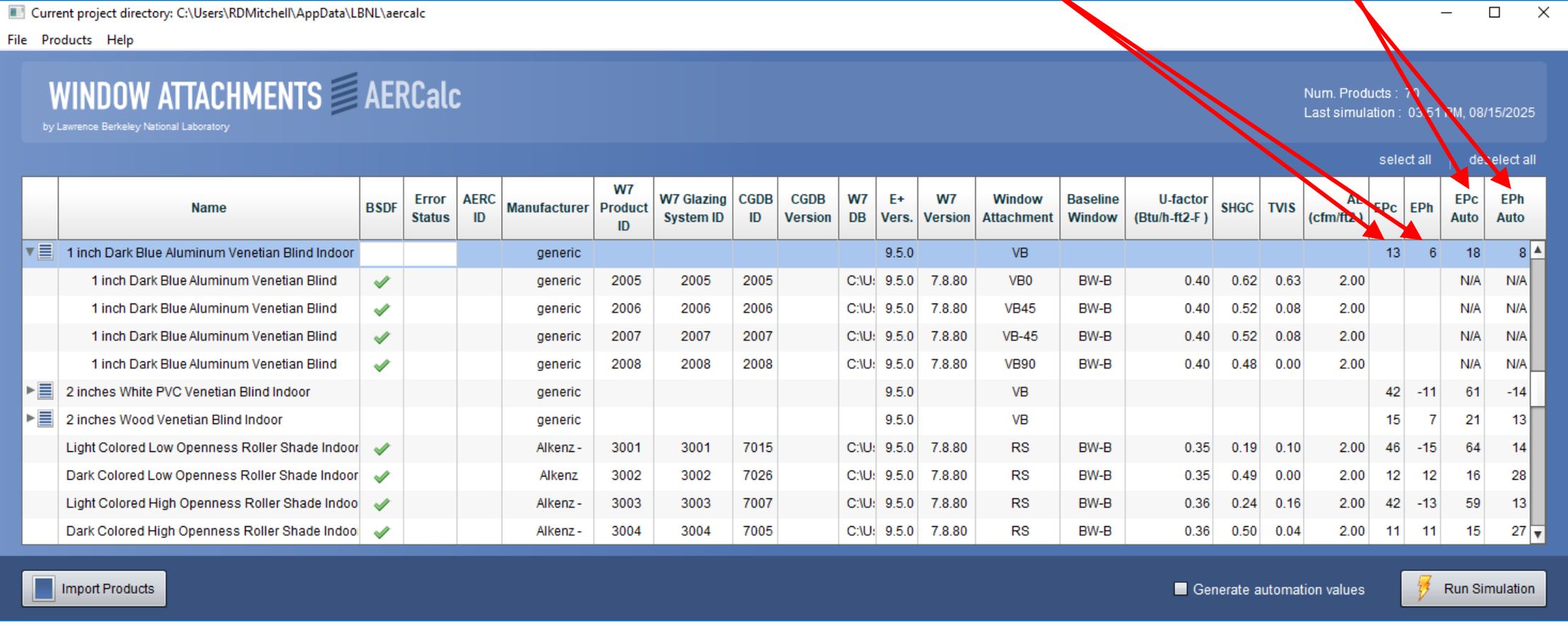
EPc	EPh	EPc Auto	EPh Auto
28	6	40	29
14	15	20	34
41	8	N/A	N/A
21	25	N/A	N/A
43	21	60	61
44	8	61	44

Simulating Products: Venetian Blind Simulation Results

The main screen after the Venetian Blinds have finished calculating

The results for **EPc** and **EPh** are shown only for the master **Venetian Blind** record

Venetian blinds can be simulated with automation, so **EPcAuto** and **EPhAuto** can be calculated

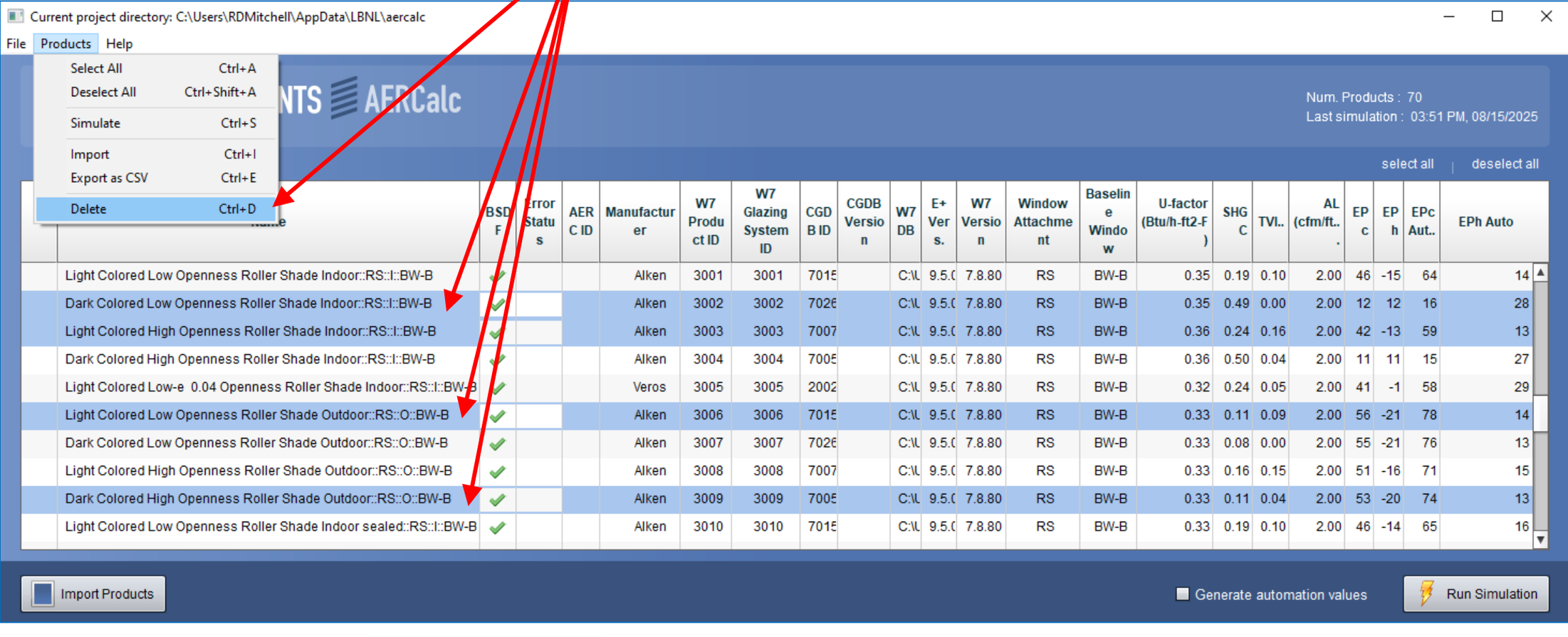


Name	BSDF	Error Status	AERC ID	Manufacturer	W7 Product ID	W7 Glazing System ID	CGDB ID	CGDB Version	W7 DB	E+ Vers.	W7 Version	Window Attachment	Baseline Window	U-factor (Btu/h-ft2-F)	SHGC	TVIS	AL (cfm/ft2)	EPc	EPh	EPc Auto	EPh Auto
1 inch Dark Blue Aluminum Venetian Blind Indoor				generic						9.5.0		VB						13	6	18	8
1 inch Dark Blue Aluminum Venetian Blind	✓			generic	2005	2005	2005		C:\U:	9.5.0	7.8.80	VB0	BW-B	0.40	0.62	0.63	2.00			N/A	N/A
1 inch Dark Blue Aluminum Venetian Blind	✓			generic	2006	2006	2006		C:\U:	9.5.0	7.8.80	VB45	BW-B	0.40	0.52	0.08	2.00			N/A	N/A
1 inch Dark Blue Aluminum Venetian Blind	✓			generic	2007	2007	2007		C:\U:	9.5.0	7.8.80	VB-45	BW-B	0.40	0.52	0.08	2.00			N/A	N/A
1 inch Dark Blue Aluminum Venetian Blind	✓			generic	2008	2008	2008		C:\U:	9.5.0	7.8.80	VB90	BW-B	0.40	0.48	0.00	2.00			N/A	N/A
2 inches White PVC Venetian Blind Indoor				generic						9.5.0		VB						42	-11	61	-14
2 inches Wood Venetian Blind Indoor				generic						9.5.0		VB						15	7	21	13
Light Colored Low Openness Roller Shade Indoor	✓			Alkenz -	3001	3001	7015		C:\U:	9.5.0	7.8.80	RS	BW-B	0.35	0.19	0.10	2.00	46	-15	64	14
Dark Colored Low Openness Roller Shade Indoor	✓			Alkenz	3002	3002	7026		C:\U:	9.5.0	7.8.80	RS	BW-B	0.35	0.49	0.00	2.00	12	12	16	28
Light Colored High Openness Roller Shade Indoo	✓			Alkenz -	3003	3003	7007		C:\U:	9.5.0	7.8.80	RS	BW-B	0.36	0.24	0.16	2.00	42	-13	59	13
Dark Colored High Openness Roller Shade Indoo	✓			Alkenz -	3004	3004	7005		C:\U:	9.5.0	7.8.80	RS	BW-B	0.36	0.50	0.04	2.00	11	11	15	27

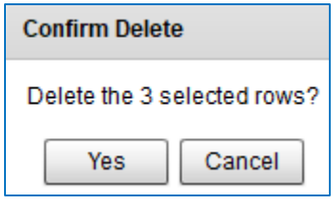
Delete Products

Delete products by highlighting them, then using the Products/Delete menu

- Highlight the records to delete
- Click the **Products / Delete** menu option



Name	BSDF	Error Status	AERC ID	Manufacturer	W7 Product ID	W7 Glazing System ID	CGDB ID	CGDB Version	W7 DB	E+ Vers.	W7 Version	Window Attachment	Baseline Window	U-factor (Btu/h-ft2-F)	SHGC	TVI..	AL (cfm/ft..)	EPc	EPh	EPc Aut..	EPh Auto
Light Colored Low Openness Roller Shade Indoor::RS::I::BW-B	✓			Alken	3001	3001	7015		C:\L	9.5.0	7.8.80	RS	BW-B	0.35	0.19	0.10	2.00	46	-15	64	14
Dark Colored Low Openness Roller Shade Indoor::RS::I::BW-B	✓			Alken	3002	3002	7026		C:\L	9.5.0	7.8.80	RS	BW-B	0.35	0.49	0.00	2.00	12	12	16	28
Light Colored High Openness Roller Shade Indoor::RS::I::BW-B	✓			Alken	3003	3003	7007		C:\L	9.5.0	7.8.80	RS	BW-B	0.36	0.24	0.16	2.00	42	-13	59	13
Dark Colored High Openness Roller Shade Indoor::RS::I::BW-B	✓			Alken	3004	3004	7005		C:\L	9.5.0	7.8.80	RS	BW-B	0.36	0.50	0.04	2.00	11	11	15	27
Light Colored Low-e 0.04 Openness Roller Shade Indoor::RS::I::BW-B	✓			Veros	3005	3005	2002		C:\L	9.5.0	7.8.80	RS	BW-B	0.32	0.24	0.05	2.00	41	-1	58	29
Light Colored Low Openness Roller Shade Outdoor::RS::O::BW-B	✓			Alken	3006	3006	7015		C:\L	9.5.0	7.8.80	RS	BW-B	0.33	0.11	0.09	2.00	56	-21	78	14
Dark Colored Low Openness Roller Shade Outdoor::RS::O::BW-B	✓			Alken	3007	3007	7026		C:\L	9.5.0	7.8.80	RS	BW-B	0.33	0.08	0.00	2.00	55	-21	76	13
Light Colored High Openness Roller Shade Outdoor::RS::O::BW-B	✓			Alken	3008	3008	7007		C:\L	9.5.0	7.8.80	RS	BW-B	0.33	0.16	0.15	2.00	51	-16	71	15
Dark Colored High Openness Roller Shade Outdoor::RS::O::BW-B	✓			Alken	3009	3009	7005		C:\L	9.5.0	7.8.80	RS	BW-B	0.33	0.11	0.04	2.00	53	-20	74	13
Light Colored Low Openness Roller Shade Indoor sealed::RS::I::BW-B	✓			Alken	3010	3010	7015		C:\L	9.5.0	7.8.80	RS	BW-B	0.33	0.19	0.10	2.00	46	-14	65	16



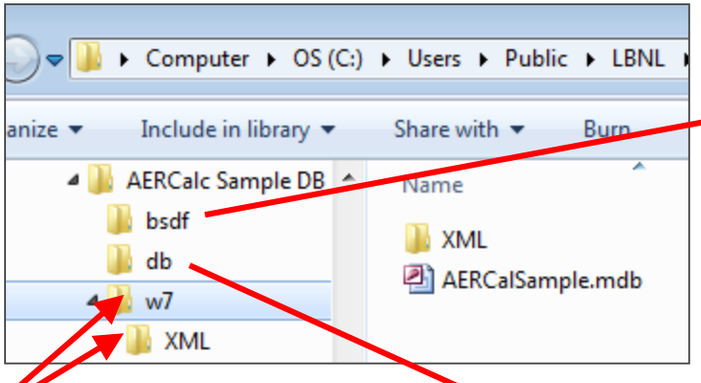
The program will ask you to confirm the deletion

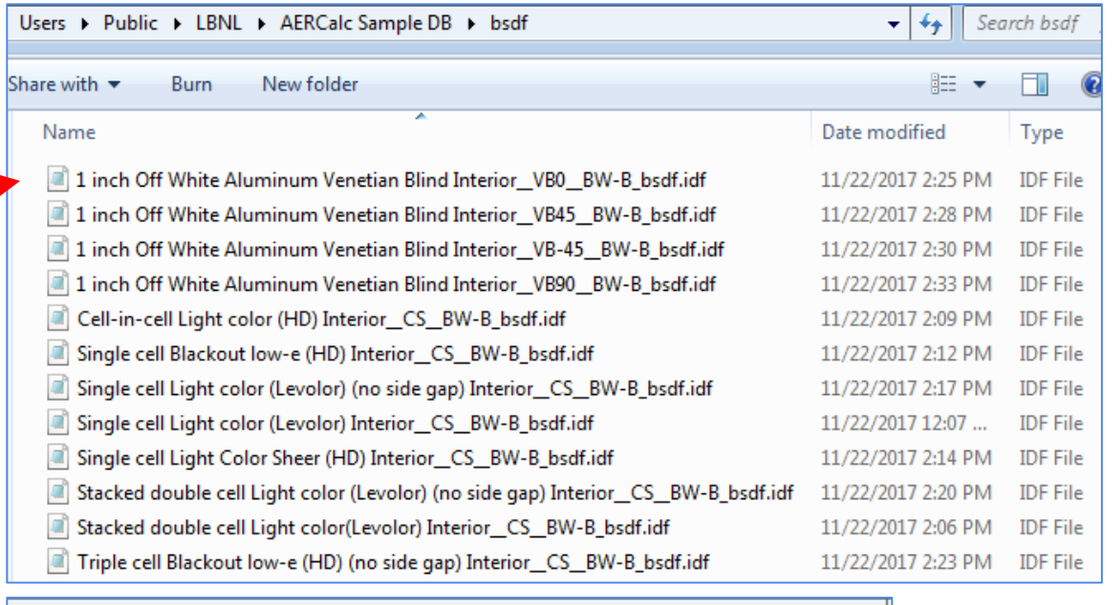
Projects

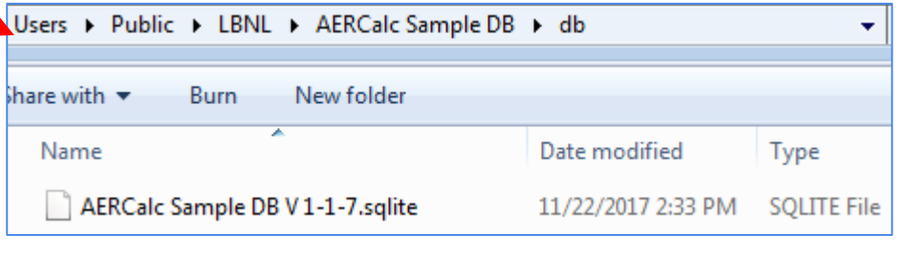
AERCalc is organized around a concept of Projects

A Project is defined as a folder which contains the minimum set of files needed by AERCalc. These folders are

- **bsdf:** a folder containing the Energy Plus BSDF IDF files (generated by WINDOW when records are imported into AERCalc) needed for the simulations that are used to calculate EPc and EPh. There should be one BSDF IDF file for every product in the AERCalc main screen
- **db:** a folder that contains the AERCalc sqlite database





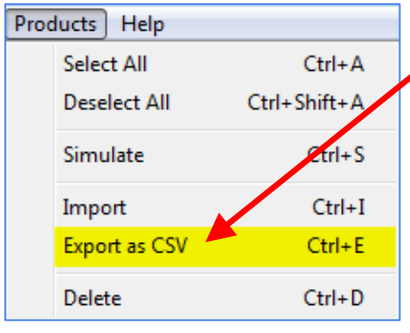


You may also want to copy the associated WINDOW database file. If you do that, make a subdirectory called **W7**, and copy the **WINDOW database** and all the files in the **XML subdirectory** needed to each of the WINDOW records (such as XML, THMX, GenBSDF files)

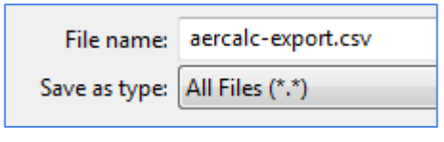
Export

Export a CSV file of all the Products in the Main Screen

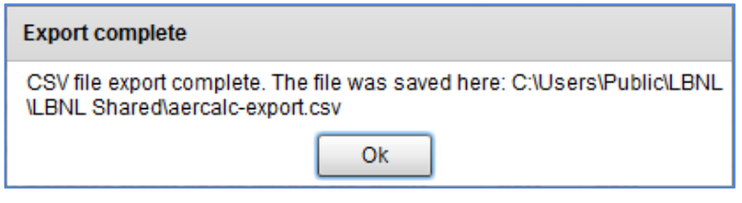
Click the **Product / Export** menu option



The program allows you to save the file to any folder and with any name (**keep the CSV extension**)



The program confirms the filename and location



Open the file to view the exported results

AERCalc Record ID	Parent ID	Parent/ Child	CGDB Version	Simulated Product Name	W7 ID	W7 Glz Sys ID	CGDB ID	Shading System Type	AERC Baseline Window Type	U-factor	SHGC	VT
1			10	Single cell Light color (Levolor) Indoor::CS::I::BW-B	1003	1003	50	CS	BW-B	0	0	0
2			10	Stacked double cell Light color(Levolor) Indoor::CS::I::BW-B	1004	1004	51	CS	BW-B	0.263114328	0.214341	0.046162
3			10	Cell-in-cell Light color (HD) Indoor::CS::I::BW-B	1007	1007	52	CS	BW-B	0.275512296	0.270322	0.028713
4			10	Single cell Blackout low-e (HD) Indoor::CS::I::BW-B	1010	1010	53	CS	BW-B	0.278959121	0.248699	0.000004
5			10	Single cell Light Color Sheer (HD) Indoor::CS::I::BW-B	1011	1011	54	CS	BW-B	0.342377564	0.433584	0.420052
6			10	Single cell Light color (Levolor) (no side gap) Indoor::CS::I::BW-B	1103	1103	50	CS	BW-B	0.258484572	0.256318	0.17483
7			10	Stacked double cell Light color(Levolor) (no side gap) Indoor::CS::I	1104	1104	51	CS	BW-B	0.221463256	0.195161	0.046162
8			10	Triple cell blackout low-e (HD) (no side gap) Indoor::CS::I::BW-B	1105	1105	14006	CS	BW-B	0.187243498	0.207161	0.000056

Export: Venetian Blinds, Vertical Louvers, Awnings

For Venetian Blinds, Vertical Louvers and Awnings, the Parent record in the export file will not have values for

U-factor
SHCG
Tvis

These values are associated with the Child records for each of the four slat angle cases.

For the file to be uploaded to the CPD, the values for those field from the appropriate Child record must be copied into the Parent record.

Export: Fields

The table below lists all of the fields in the AERCalc export file.

AERCalc Record ID	Auto-incrementing ID given to each record that is imported from WINDOW into AERCalc. It can be turned on and off in File/Preferences
Parent ID	For Venetian blinds and vertical slats that have Parent and child records, this is the ID of the parent record
Parent/Child	For Venetian blinds and vertical slate that have Parent and child records, this indicates which is the Parent (P) and the child (C)
CGDB Version	The CGDB version number for the shading layer
Simulated Product Name	Name of Window (product) as defined in the Window Library, that the record was imported from (from the WINDOW database)
W7 ID	Window ID from the Window Library (from the WINDOW database)
W7 Glz Sys ID	Glazing System ID used in the Window (from the WINDOW database)
CGDB ID	The Shading System ID used in the Glazing System in the Window (from the WINDOW database)
Shading System Type	Abbreviation for Shading system
AERC Baseline Window Type	Abbreviation for the AERC Baseline Window Type
U-factor	U-factor of the AERC Baseline Window with the shading system (from the WINDOW database). Units: (Btu/h-ft^2-^{o}F)
SHGC	Solar Heat Gain Coefficient of the AERC Baseline Window with the shading system (from the WINDOW database)
VT	Visible Transmittance of the AERC Baseline Window with the shading system (from the WINDOW database)
TvT	TvT is a number that shows variability of the measurements between pieces of the same fabric. Not currently used.
AL	Air Leakage of the AERC Baseline Window with the shading system. Units: (cfm/ft^2)
EPc Ratio	Energy Performance ratio for cooling
EPh Ratio	Energy Performance ratio for heating
EPc Auto Ratio	Energy Performance ratio for cooling for the Automation simulation
EPh Auto Ratio	Energy Performance ratio for heating for the Automation simulation

Export: Fields

The table below lists all of the fields in the main screen.

EPc	EPc Ratio multiplied by 100
EPh	EPh Ratio multiplied by 100
EPcAuto	EPc Ratio multiplied by 100 for the Automation simulation
EPhAuto	EPh Ratio multiplied by 100 for the Automation simulation
WINDOW Origin DB Filepath	WINDOW database name including full path
THERM Files	THERM files used to define the frames for the product being modeled
Manufacturer	Manufacturer of the product, from the Manufacturer field in the Shading Layer Library (WINDOW database)
Material Manufacturer	Material Manufacturer of the product, from the Shade Material Library reference in the Shading Layer Library (WINDOW database)
AERCalc Version	Version of AERCalc used to calculate the EPh and EPc results
WINDOW Version	Version of WINDOW used to import the products from the WINDOW database
EnergyPlus Version	Version of EnergyPlus used to simulate the models used to calculate the EPh and EPc values
ESCalc Version	Version of the internal AERCalc calculation module called “ESCalc”, which calculates EPh and EPc from the EnergyPlus results
BSDF	The status of the EnergyPlus BSDF IDF file generated by WINDOW when a record is imported
Status	Indication of a record having been calculated with a previous version of AERCalc, EnergyPlus, WINDOW or ESCalc
AERC ID	An ID input by the user
Emissivity Front	Emissivity of the front side (Outside) of the product
Emissivity Back	Emissivity of the back side (Inside) of the product
Tsol	Solar transmittance of the product
Attachment Position	Position of the attachment in the glazing system, either Indoor or Outdoor.