Center of Glass U-Values for Double and Triple Glazed Insulating Glass Units using *Solarban*® 60 & *Solarban*® 70 Solar Control Low-e Glasses with 100% Air, Argon, or Krypton, or Mixtures of These Gases

As explained in Vitro's TD-101, insulating glass U-values vary with airspace width, gas fill type, and gas fill quantity. This technical document demonstrates how U-values vary in double and triple glazed insulating glass units (IGU) when using *Solarban*® 60 compared to *Solarban*® 70 Solar Control Low-e coated glasses.

Using the LBNL WINDOW v7.8 computer program, simulations were run for seven different IGU gap widths, and for six different gas fill configurations. As shown in the graphs to follow, there is an optimum gap width for each different gas fill configuration.

Notice that in both double-glazed and triple-glazed IGU, the line for "100% argon filled" nearly overlaps the line for "5% air & 95% argon filled" indicating the performance between these two gas fill types is similar. The same is true of krypton gas.

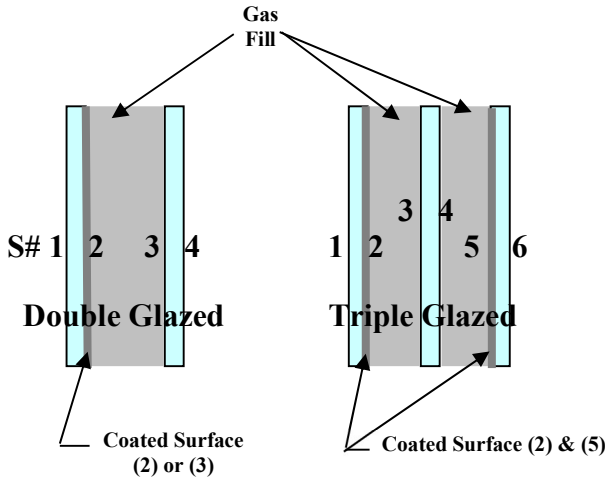
Gap widths analyzed:

- .250" (1/4" / 6mm)
- .313" (5/16" / 8mm)
- .375" (3/8" / 10mm)
- .438" (7/16" / 11mm)
- .500" (1/2" / 13mm)
- .563" (9/16" / 14mm)
- .625" (5/8" / 16mm)

Gas mixtures analyzed:

- 100% air
- 5% air & 95% argon
- 100% argon
- 12% air, 22% argon & 66% krypton
- 5% air & 95% krypton
- 100% krypton

- **In the analysis, clear glass is used.**
- **Glass thickness is 1/8" (3mm).**
- **Glass thicknesses of 2.5mm produces nearly identical results.**
- **Standard NFRC Environmental Conditions are used.**



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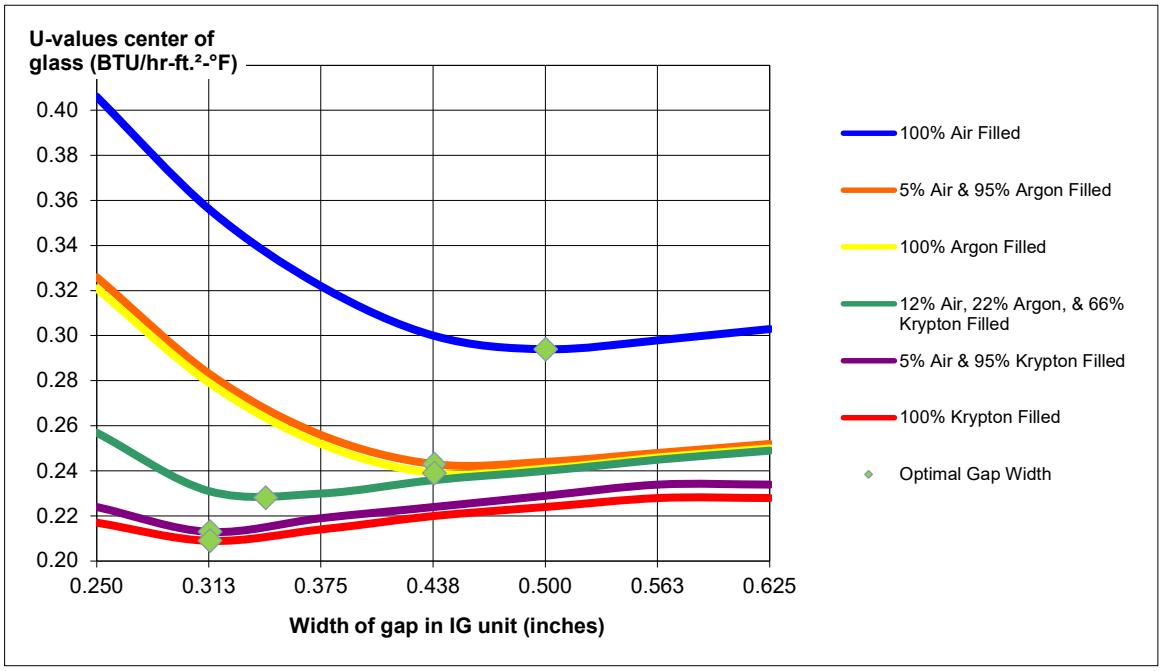
DOUBLE GLAZED INSULATING GLASS WITH LOW-E S(2) OR S(3)

		Winter Nighttime U-values for various gas fill types					
Gap Width	Low-e Coating	100% Air Filled	5% Air / 95% Argon Filled	100% Argon Filled	12% Air / 22% Argon / 66% Krypton Filled	5% Air / 95% Krypton Filled	100% Krypton
1/4”	*Solarban* 60	.406	.326	.321	.257	.224	.217
	Solarban 70	.401	.320	.316	.250	.217	.209
5/16”	*Solarban* 60	.356	.283	.279	.231	.213	.209
	Solarban 70	.351	.277	.273	.224	.205	.201
3/8”	*Solarban* 60	.322	.256	.252	.230	.219	.214
	Solarban 70	.316	.249	.245	.223	.211	.207
7/16”	*Solarban* 60	.300	.243	.239	.236	.224	.220
	Solarban 70	.294	.235	.232	.229	.217	.212
1/2”	*Solarban* 60	.294	.244	.241	.240	.229	.224
	Solarban 70	.288	.237	.234	.234	.222	.217
9/16”	*Solarban* 60	.298	.248	.246	.245	.234	.228
	Solarban 70	.292	.242	.239	.238	.227	.221
5/8”	*Solarban* 60	.303	.252	.250	.249	.234	.228
	Solarban 70	.297	.246	.243	.242	.227	.221

DOUBLE GLAZED INSULATING GLASS WITH *SOLARBAN*® 60



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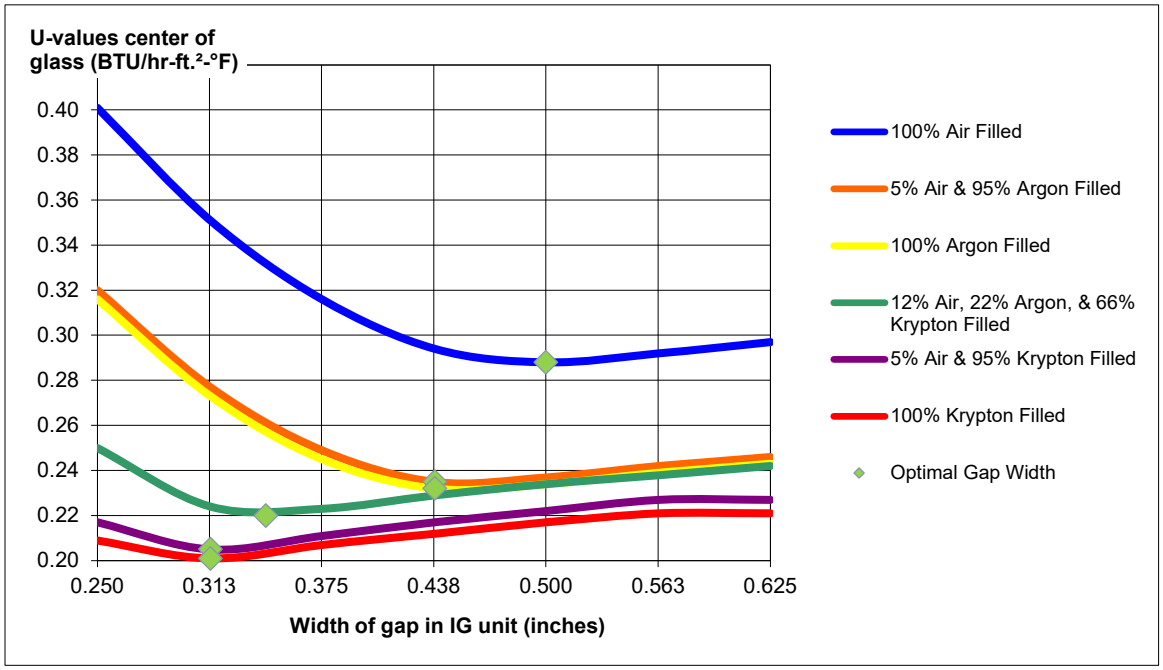
DOUBLE GLAZED INSULATING GLASS WITH *SOLARBAN*® 70



TRIPLE GLAZED INSULATING GLASS WITH LOW-E S(2) AND S(5)

		Winter Nighttime U-values for various gas fill types					
Gap Width	Low-e Coating	100% Air Filled	5% Air / 95% Argon Filled	100% Argon Filled	12% Air / 22% Argon / 66% Krypton Filled	5% Air / 95% Krypton Filled	100% Krypton
1/4”	*Solarban* 60	.254	.194	.191	.147	.124	.118
	Solarban 70	.250	.190	.187	.142	.119	.113
5/16”	*Solarban* 60	.216	.164	.162	.125	.108	.103
	Solarban 70	.212	.160	.157	.120	.102	.098
3/8”	*Solarban* 60	.190	.144	.141	.114	.103	.100
	Solarban 70	.185	.139	.137	.109	.098	.095
7/16”	*Solarban* 60	.170	.130	.128	.112	.105	.103
	Solarban 70	.166	.125	.123	.107	.100	.098
1/2”	*Solarban* 60	.158	.122	.120	.114	.108	.105
	Solarban 70	.153	.117	.115	.109	.103	.100
9/16”	*Solarban* 60	.151	.120	.118	.117	.110	.108
	Solarban 70	.147	.115	.113	.112	.105	.103
5/8”	*Solarban* 60	.151	.121	.119	.119	.112	.110
	Solarban 70	.147	.116	.115	.114	.107	.105

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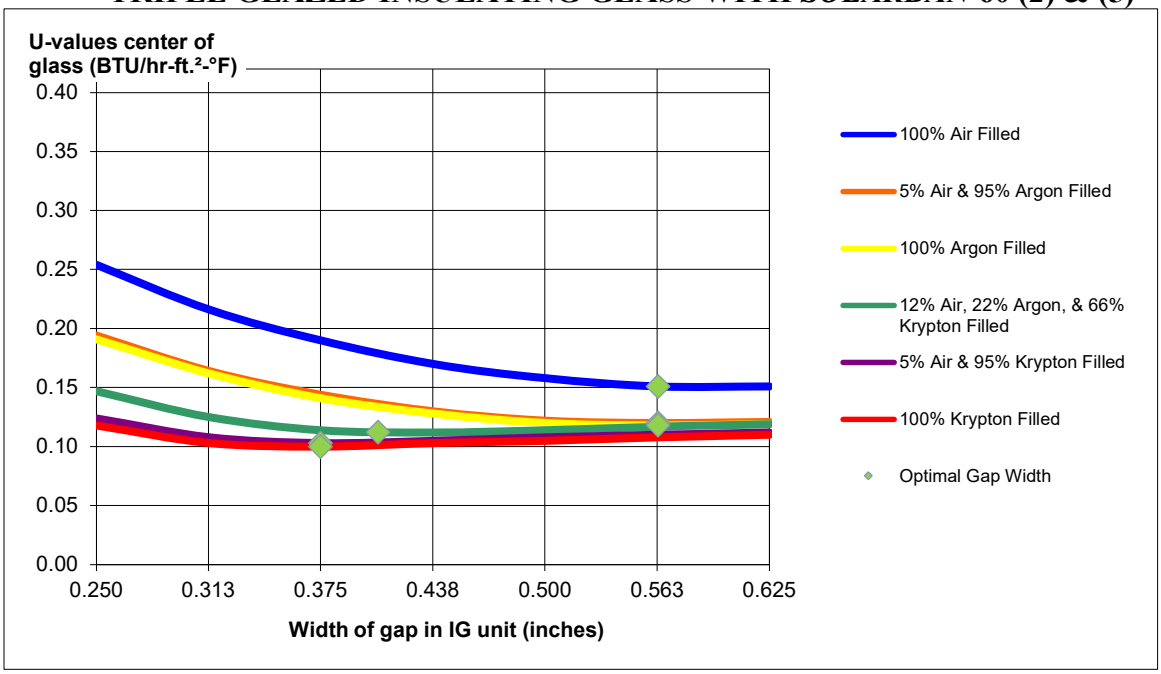
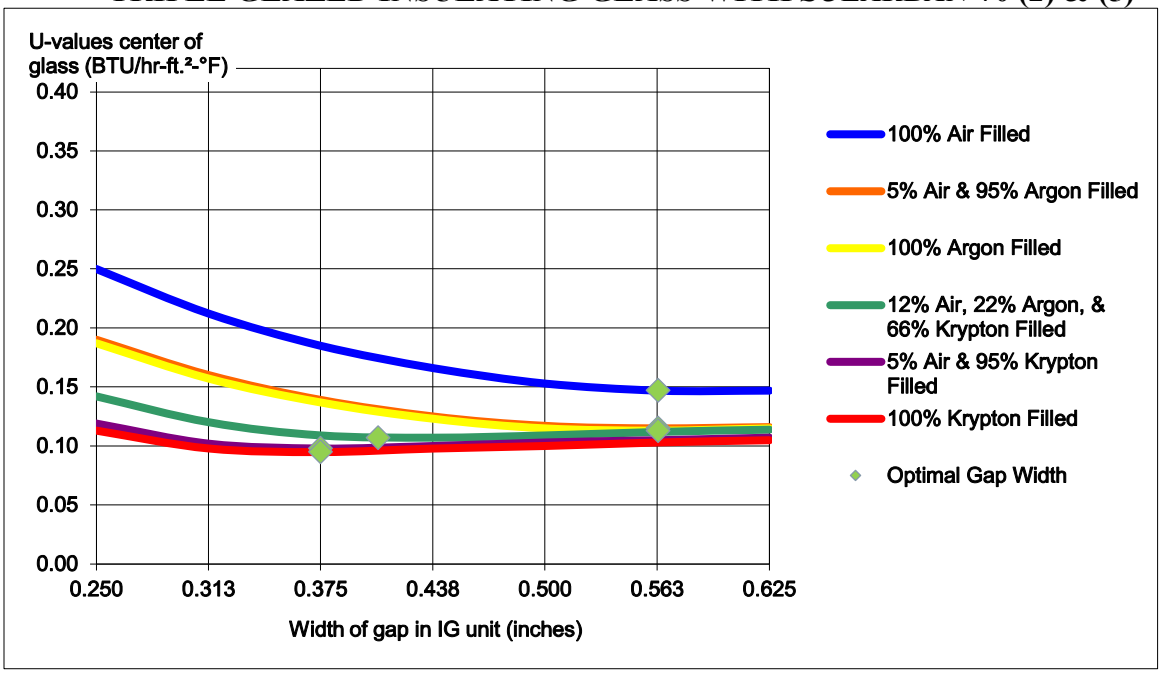
TRIPLE GLAZED INSULATING GLASS WITH *SOLARBAN* 60 (2) & (5)



TRIPLE GLAZED INSULATING GLASS WITH *SOLARBAN* 70 (2) & (5)



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To get a copy of the LBNL WINDOW computer simulation program and other software related to the glazing industry, use this Internet link: http://windows.lbl.gov/software/

HISTORY TABLE		
ITEM	DATE	DESCRIPTION
Original Publication	4/22/2002	TD-121
Revised and updated	5/4/2002	Added reference to TD-128
Revision #2	10/04/2016	Updated to Vitro Logo and format
Revision #3	1/25/2019	Updated to Vitro Logo and format
Revision #4	12/12/2023	Updated references and added Solarban 70