VIRACON®

800 Park Drive
Owatonna, MN 55060

800.533.2080
viracon.com

July 5, 2016

NGG Ltd Inc.
1850 Craigshire Rd. Ste 202
St Louis, MO 63146
Attn: Dan Ward, Project Manager

Re: Webster University Interdisciplinary Science Building – Submittal Package

Mr. Ward,

Please see the following items included in this submittal:

- Glazing Descriptions for GLE-1, GLE-2, GLE-3, GLE-4 & GLE-5
- Solar Optical Properties and Thermal Characteristics for GLE-1, GLE-2, GLE-3, GLE-4 & GLE-5
- Sealant Compatibility
- VOC Content Statement
- Certificate of Product Compliance
- IGCC Certification
- Product Warranty
- Glass Cleaning and Maintenance Recommendations

Please call if I can be of any further assistance or if you should have any questions.

Sincerely,

Tamera Reuvers

Technical Services Specialist

Cc: Doug Urich
Scott Knutson

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July 5, 2016

Webster University Interdisciplinary Science Building – Glazing Descriptions

Glazing: Glass Treatment will be provided as dictated by NGG Ltd. Inc.'s glass order. Fully tempered or laminated glass may be usesd where safety glazing is required. Safety glazing requirements will be dictated by NGG along with proper glazing requirements. Heat treatment will be noted on the glass order provided by NGG.

GLE-1: Viracon 1" VNE1-63 Insulating Glass HS/HS
- ¼" (6mm) Clear VNE1-63 #2 Heat Strengthened
- ½" (13.2mm) airspace – black
- ¼" (6mm) Clear Heat Strengthened

GLE-2: Viracon 1" VNE1-63 Insulating Glass HS/HS Spandrel
- ¼" (6mm) Clear VNE1-63 #2 Heat Strengthened
- ½" (13.2mm) airspace – black
- ¼" (6mm) Clear Heat Strengthened with V908 Gray Viraspan #4

GLE-3: Viracon 1" VNE1-63 Insulating Glass HS/HS Silkscreen
- ¼" (6mm) Clear VNE1-63 #2 Heat Strengthened with V908 Gray Silkscreen #5006 - 40% #2
- ½" (13.2mm) airspace – black
- ¼" (6mm) Clear Heat Strengthened

GLE-4: Viracon 1" VNE1-63 Insulating Glass HS/HS Silkscreen/Spandrel
- ¼" (6mm) Clear VNE1-63 #2 Heat Strengthened with V908 Gray Silkscreen #5006 - 40% #2
- ½" (13.2mm) airspace – black
- ¼" (6mm) Clear Heat Strengthened with V908 Gray Viraspan #4

GLE-5: Viracon 1-5/16" Clear/VNE1-63 Laminated Insulating Glass HS/HS/HS
- ¼" (6mm) Clear Heat Strengthened
- 0.060" (1.52mm) Clear PVB
- ¼" (6mm) Clear VNE1-63 #4 Heat Strengthened
- ½" (13.2mm) airspace – black
- ¼" (6mm) Clear Heat Strengthened

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SOLAR OPTICAL PROPERTIES AND THERMAL CHARACTERISTICS****

Customer: NGG
Project Name: Webster University Interdisciplinary Science Bldg.
GlassType: GLE-1

INSULATING PERFORMANCE DATA

Makeup:
1/4" (6mm) Clear VNE1-63 #2
1/2" (13.2mm) airspace
1/4" (6mm) Clear

Transmittance

Visible Light:	62%
Solar Energy:	24%
Ultra-Violet:	5%

*** UltraViolet defined as 300 to 380 nanometers(nm)**

Reflectance

Visible Light-Exterior:	10%
Visible Light-Interior:	10%
Solar Energy:	37%

U-Value

NFRC Winter Conditions:	0.29 Btu/(hr x sqft x ºF)
NFRC Summer Conditions:	0.26 Btu/(hr x sqft x ºF)

Shading Coefficient: (SC)	0.33
Solar Factor (SHGC):	0.29
Relative Heat Gain:	70 Btu/hr x sqft

****** Centerpane Values** ******Calculated using Windows 7.4**

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SOLAR OPTICAL PROPERTIES AND THERMAL CHARACTERISTICS****

Customer: NGG
Project Name: Webster University Interdisciplinary Science Bldg.
GlassType: GLE-2

INSULATING SPANDREL PERFORMANCE DATA

Makeup: 1/4" (6mm) Clear VNE1-63 #2
1/2" (13.2mm) airspace
1/4" (6mm) Clear

Transmittance

Visible Light:	NA
Solar Energy:	NA
Ultra-Violet:	NA

*** UltraViolet defined as 300 to 380 nanometers(nm)**

Reflectance

Visible Light-Exterior:	NA
Visible Light-Interior:	NA
Solar Energy:	NA

U-Value

NFRC Winter Conditions:	0.29	Btu/(hr x sqft x ºF)
NFRC Summer Conditions:	0.26	Btu/(hr x sqft x ºF)

Shading Coefficient: (SC)	NA	
Solar Factor (SHGC):	NA	
Relative Heat Gain:	NA	Btu/hr x sqft

****** Centerpane Values** ******Calculated using Windows 7.4**

VIRACON®
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SOLAR OPTICAL PROPERTIES AND THERMAL CHARACTERISTICS****

Customer: NGG
Project Name: Webster University Interdisciplinary Science Bldg.
GlassType: GLE-3

INSULATING SILKSCREEN PERFORMANCE DATA

Makeup: 1/4" (6mm) Clear VNE1-63 #2
with V908 Gray Silkscreen #5006 - 40% coverage #2
1/2" (13.2mm) airspace
1/4" (6mm) Clear

Transmittance

Visible Light:	38%
Solar Energy:	15%
Ultra-Violet:	3%

* UltraViolet defined as 300 to 380 nanometers(nm)

Reflectance

Visible Light-Exterior:	7%
Visible Light-Interior:	11%
Solar Energy:	24%

U-Value

NFRC Winter Conditions:	0.29 Btu/(hr x sqft x ºF)
NFRC Summer Conditions:	0.26 Btu/(hr x sqft x ºF)

Shading Coefficient: (SC)	0.24
Solar Factor (SHGC):	0.20
Relative Heat Gain:	51 Btu/hr x sqft

**** Centerpane Values

****Calculated using Windows 7.4

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SOLAR OPTICAL PROPERTIES AND THERMAL CHARACTERISTICS****

Customer: NGG
Project Name: Webster University Interdisciplinary Science Bldg.
GlassType: GLE-4

INSULATING SILKSCREEN SPANDREL PERFORMANCE DATA

Makeup:
1/4" (6mm) Clear VNE1-63 #2
with V908 Gray Silkscreen #5006 - 40% coverage #2
1/2" (13.2mm) airspace
1/4" (6mm) Clear
with V908 Gray Viraspan #4

Transmittance

Visible Light:	NA
Solar Energy:	NA
Ultra-Violet:	NA

*** UltraViolet defined as 300 to 380 nanometers(nm)**

Reflectance

Visible Light-Exterior:	NA
Visible Light-Interior:	NA
Solar Energy:	NA

U-Value

NFRC Winter Conditions:	0.29	Btu/(hr x sqft x ºF)
NFRC Summer Conditions:	0.26	Btu/(hr x sqft x ºF)

Shading Coefficient: (SC)	NA	
Solar Factor (SHGC):	NA	
Relative Heat Gain:	NA	Btu/hr x sqft

****** Centerpane Values** ******Calculated using Windows 7.4**

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SOLAR OPTICAL PROPERTIES AND THERMAL CHARACTERISTICS****

Customer: NGG
Project Name: Webster University Interdisciplinary Science Bldg.
GlassType: GLE-5

LAMINATED INSULATING PERFORMANCE DATA

Makeup:
1/4" (6mm) Clear
0.060" (1.52mm) Clear pvb interlayer
1/4" (6mm) Clear VNE1-63 #4
1/2" (13.2mm) airspace
1/4" (6mm) Clear

Transmittance

Visible Light:	60%
Solar Energy:	22%
Ultra-Violet:	< 1%

*** UltraViolet defined as 300 to 380 nanometers(nm)**

Reflectance

Visible Light-Exterior:	9%
Visible Light-Interior:	10%
Solar Energy:	18%

U-Value

NFRC Winter Conditions:	0.28 Btu/(hr x sqft x ºF)
NFRC Summer Conditions:	0.25 Btu/(hr x sqft x ºF)

Shading Coefficient: (SC)	0.33
Solar Factor (SHGC):	0.29
Relative Heat Gain:	70 Btu/hr x sqft

****** Centerpane Values** ******Calculated using Windows 7.4**

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July 5, 2016

Webster University Interdisciplinary Science Building – Sealant Compatibility

Structural Silicone Glazing

Viracon uses Dow Corning 982 silicone as the secondary sealant in our insulating units. The following silicone sealants have been found to be compatible with Dow Corning 982:
Dow Corning 756, 790, 791, 795, 799, 983, 995 and 1199 structural silicones.
Dow Corning 756, 790, 791 non-structural glazing silicone sealants for weather seals.
Other sealants need to be approved by their respective manufacturer. Acetic acid liberating silicone sealants (acetoxy sealants) must not be used.

Please see attached letter from Tremco representative regarding compatibility of materials.

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VOC Content

LEED is a rating system developed by the US Green Building Council (USGBC) as a standard for high performance sustainable buildings created to define green building through a standard of measurement and raise consumer awareness of green building benefits.

One of the categories in the rating system is Indoor Environmental Quality (IEQ). IEQ Credits 4.1 - 4.6 are related the use of low-emitting building materials. According to the USGBC, the intent of credits 4.1 – 4.6 is *"To reduce the quantity of indoor air contaminants that are odorous, irritating and/or harmful to the comfort and well-being of installers and occupants".* The USGBC uses a building product's volatile organic compound (VOC) content as the measure to receive the points for the credits.

Viracon is often asked to provide VOC information related to our products in order to help achieve IEQ Credit 4.1 Low-emitting materials – adhesives and sealants or IEQ Credit 4.2 Low emitting materials – paints and coatings.

It is important to understand, the USGBC is specifically asking for this information for adhesives, sealants, paints and coatings that are "used on the interior of the building (i.e., inside of the weatherproofing system and applied on-site)".

Since Viracon's products are not inside of the weatherproofing and Viracon does not apply any products on-site, LEED IEQ Credit 4.1 and IEQ Credit 4.2 do not apply to our products.

This credit, however may apply to the adhesives and sealants used by the sub-contractor who installs our glazing on-site. The sub-contractor should be able to supply VOC Content for the adhesives, sealants, paints or any coatings they are using on-site.

VIRACON®

Certificate of Product Compliance

Customer: NGG Ltd. Inc.

Project: Webster University Interdisciplinary Science Building

Raw glass purchased by Viracon for our glass products meets the requirements of ASTM C 1036 Standard Specification for Flat Glass (supersedes FS-DD-G-451d). Viracon's products will be fabricated with transparent flat glass of Type 1, Class 1 (clear) or Class 2 (tinted), quality q3.

Heat treated glass components fabricated by Viracon meet the requirements of ASTM C 1048 Standard Specification for Heat-Strengthened Flat Glass (supersedes FS-D-G-1403). We will provide: Kind HS for heat strengthened glass; Kind FT for fully tempered glass; Condition A for uncoated glass; Condition B for spandrel glass and Condition C for coated glass. All fully tempered glass meets the safety glazing requirements of ANSI Z97.1-2009 and CPSC 16 CFR 1201 Categories I and II. Our tempered products are certified by the Safety Glazing Certification Council (SGCC) which serves as our third party independent testing agency. Surface compression for heat strengthened glass with a thickness of 1/4" (6mm) or less is 4,000-7,000 psi (31.0-48.3 Mpa). Surface compression for 5/16" (8mm) or 3/8" (10mm) heat strengthened glass is 5,000-8,000 psi (34.5-55.2Mpa). Because of reader repeatability and measuring instrument variances, Viracon's tolerance for heat-strengthened glass surface compression is + or - 1,000 psi (6.9Mpa).

All laminated glass manufactured by Viracon meets the requirements of ASTM C 1172 Standard Specification for Laminated Architectural Flat Glass. In addition our laminated glass (minimum of .030" pvb interlayer) meets the safety glazing requirements of ANSI Z97.1-2009 and CPSC 16 CFR 1201 Categories I and II.

All vacuum deposition (sputter) coated glass manufactured by Viracon meets the requirements of ASTM C 1376 Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Glass.

Viracon's standard insulating units are constructed with a primary seal of polyisobutylene and a secondary seal of silicone. While more than 90% of Viracon's insulating glass units are fabricated with 4 bent corners and butyl injected straight key joints (maximum of 4), some may be fabricated with a butyl-spliced corner key. Viracon's insulating glass units are certified through the Insulating Glass Certification Council (IGCC) to ASTM E 2190 in accordance with ASTM E 2188 and E 2189 (which supersede the class CBA level standards in ASTM E 773 and E 774).

Viracon's heat soaked glass lites meet the requirements of a 100% heat soak program for fully tempered (FT) glass that is consistent with the EN 14179-1 standard (290ºC +/-10ºC) for a dwell time of two hours.

INSULATING GLASS IGCC® CERTIFICATION COUNCIL

Administrative Management Systems, Inc.
100 West Main Street, PO Box 730
Sackets Harbor, NY 13685
Phone: (315) 646-2234
Fax: (315) 646-2297
E-mail: staff@amscert.com

IGMA INSULATING GLASS MANUFACTURERS ALLIANCE

ACKNOWLEDGEMENT OF CERTIFICATION

THIS IS TO ACKNOWLEDGE THAT AS OF THIS DATE

Viracon Inc.

Owatonna, MN

IS A CURRENT LICENSEE AND HAS MET ALL GUIDELINES AND REQUIREMENTS FOR THE IGCC®/IGMA® CERTIFICATION PROGRAM AND AS SUCH IS ELIGIBLE TO LABEL THE BELOW INDICATED PRODUCT(S) AS IGCC®/IGMA® CERTIFIED. THE FOLLOWING ARE IN COMPLIANCE WITH ASTM E2190 FOR SEAL DURABILITY OF INSULATING GLASS UNITS AND PASSING GAS CONTENT INITIAL AND AFTER WEATHERING (GCIA) CERTIFICATION REQUIREMENTS AS INDICATED.

CERT #	GLASS	SPACER	FRAME CONST.	DESICCANT	SEALANT	GCIA
980	U/C3/U	AA/AA	BC4/ALJ/CT	LF/LF	PIB/S2	Yes
1462	U/C3/U	MA/MA	BC4/ALJ/CT	LF/LF	PIB/S2	Yes
1911	U/C3/U	SS/SS	BC4/ALJ/CT	LF/LF	PIB/S2	Yes

THIS IGCC®/IGMA® PROGRAM CERTIFICATION IS CURRENT AND IN FULL EFFECT AS OF THIS ISSUE DATE. CERTIFICATION IN THE IGCC®/IGMA® PROGRAM IS SUBJECT TO SEMI-ANNUAL RENEWAL. PLEASE CHECK THE CURRENT CERTIFIED PRODUCTS DIRECTORY OR THIS OFFICE FOR MOST CURRENT INFORMATION.

Monday, January 4, 2016
DATE OF ISSUE

February 1, 2016 - January 31, 2017
CERTIFICATION PERIOD

ADMINISTRATIVE MANAGER

VIRACON®

800 Park Drive
Owatonna, MN 55060

800.533.2080
viracon.com

VIRACON'S STANDARD TEN-YEAR LIMITED WARRANTY

Viracon's Standard Ten-Year Limited Warranty ("Limited Warranty") applies to the Viracon products listed below manufactured after the effective date.** The provisions on page 2 are incorporated into Viracon's Limited Warranty.

TEMPERED AND HEAT STRENGTHENED GLASS

Viracon warrants its tempered and heat strengthened glass to meet the requirements of ASTM C-1048 **for a period of ten (10) years from the date of manufacture.**

VIRASPAN™ CERAMIC FRIT SILKSCREENED AND SPANDREL GLASS

Viracon warrants its Decorative Silkscreened and Spandrel Glass with a Viraspan™ ceramic frit coating **for a period of ten (10) years from date of manufacture** against defective materials or workmanship which could result in peeling, cracking or deterioration of the ceramic frit under normal conditions.

HIGH-PERFORMANCE COATED GLASS

Viracon warrants its high-performance coated glass **for a period of ten (10) years from the date of manufacture** against defective materials or workmanship which could result in peeling, cracking or deterioration in the metallic coating greater than 1/8 inch into the viewing area under normal conditions.

INSULATING GLASS UNIT (DUAL SEAL UNIT)

Viracon warrants its dual seal insulating glass **for a period of ten (10) years from date of manufacture** against defective materials or workmanship which result in fogging or moisture residue formation on internal glass surfaces due to failure of the insulating glass seal.

INSULATING GLASS STRUCTURAL GLAZING

Viracon warrants that the structural bond between the glass substrates of Viracon insulating glass units will not fail adhesively or cohesively as a result of defective materials or workmanship when installed in accordance with Viracon application recommendations. Viracon's warranty shall be **for a period of ten (10) years from the date of manufacture.** The structural glazing system designer is responsible for design of the structural glazing support system including structural silicone joint dimension (glass to metal support). Viracon assumes no responsibility for adhesive or cohesive failure of structural silicone seals resulting from incompatible structural or weather sealants, incompatible materials (setting blocks/glazing gaskets), improper use or handling, faulty installation or faulty building construction or design.

INSULATING GLASS UNIT (SLOPED GLAZING)

Viracon warrants its insulating glass **for a period of ten (10) years from date of manufacture** against defective materials or workmanship which result in fogging or moisture formation on internal glass surfaces due to failure of the insulating glass seal.

STRUCTURAL GLAZING OF METAL EXTRUSIONS

Viracon warrants that the structural bond between the aluminum extrusion and glass substrate will not fail adhesively **for a period of ten (10) years from the date of manufacture** as a result of defective materials or workmanship when installed in accordance with Viracon application recommendations. The structural glazing system designer is responsible for the design of the system including the structural silicone joint dimension (glass to extrusion) and the compatibility of any finishes applied to the metal extrusions.

LAMINATED GLASS AND LAMINATED GLASS SLOPED GLAZING

Viracon warrants its laminated glass **for a period of ten (10) years from the date of manufacture** against defective materials or workmanship that results in delamination.

**** Viracon's Standard 10-Year Limited Warranty does not cover the following products or processes – Digital Distinctions (digital print), heat soaking of tempered glass, HRG or glass clad polycarbonates.**

per Viracon, this verbage cannot be removed for legal resons. See attached warranty which identifies the 5 year warranty requested in specs.

DISCLAIMERS, EXCLUSIONS, LIMITATIONS, AND ADDITIONAL TERMS AND CONDITIONS APPLICABLE TO VIRACON'S LIMITED WARRANTY

In the event that a Viracon product is found and verified by Viracon to be defective under the Limited Warranty, Viracon will replace the product without charge, FOB nearest shipping point to the place of installation or, at Viracon's option, refund the purchase price of the glass. In no event will Viracon's liability exceed the purchase price of the glass. If Viracon elects to replace the defective glass, Viracon will not be liable for any other expenses, including but not limited to, removal of the defective unit, installation of labor, materials, and/or any other damages, including incidental, indirect, special, or Further, the warranty of the replacement glass will be limited to the remainder of the original glass.

mes no responsibility for and Viracon's Limited Warranty does not cover the following: t failure due to improper usage; product failure due to improper handling, loading, compatibility with other glazing or installation materials, including but not limited to, coatings, sealants, gaskets, setting blocks, lubricants, insulation or any other materials; faulty installation or building construction; damage caused by water not attributable to the Viracon product; failure to adhere to Viracon's instructions regarding installation and/or maintenance of the unit, including written proof of routine maintenance (consult Glass Association of North America Glazing Manual); improper design; errors in provided specifications; scratches or abrasions to the product; abnormal weather conditions; or damage caused by cleaners, solvents, acids, alkalies or any other chemicals used on or around the products. Viracon reserves the right to inspect, in the field, any Viracon product that is alleged to be defective.

The purchaser's exclusive remedy is limited to the legal remedies described in Viracon's Limited Warranty. Viracon will not be liable for any incidental or consequential damages of any kind. Viracon's Limited Warranty will be void in the event that full payment is not received for goods and services within the agreed upon terms of sale. VIRACON MAKES NO OTHER WARRANTY, EITHER EXPRESS OR IMPLIED, REGARDING THE PRODUCT, INCLUDING, BUT NOT LIMITED TO, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Viracon's Limited Warranty may only be modified upon written approval of Viracon's President or Vice President(s).

Notice of a claim under Viracon's Limited Warranty must be provided to Viracon in writing within 90 days of discovery of the facts giving rise to the claim and should be directed to:

Viracon Sales Department
800 Park Drive, Owatonna, MN 55060
Phone: (507) 451-9555

VIRACON®

800 Park Drive
Owatonna, MN 55060

800.533.2080
viracon.com

Glass Cleaning and Maintenance Recommendations

All of Viracon's architectural glass products require routine cleaning to prevent the build-up of potentially harmful mineral deposits and airborne contaminants.

During the construction period, the glass may become more heavily soiled then at any other time. Special care should be taken at the initial cleaning to make certain the glass surface will not be damaged because of heavy surface contamination. The first time the glass is cleaned after building construction or at any time during the construction phase, the glass surface should first be rinsed with clean water. This is done to remove any surface contamination that may be present which could potentially scratch the glass during the cleaning process. The glass should be cleaned with a soft, clean, grit-free cloth and a mild, non-abrasive, non-alkaline cleaning solution. The glass should be rinsed immediately with clean water and excess water should be removed from glass surfaces with a squeegee.

For routine cleaning, use a commercial window washing solution or mild soap and water. Uniformly spray or apply the cleaning solution with a soft, grit-free, cloth sponge or pad and rinse thoroughly. The glass surface should then be wiped dry with a clean grit-free cloth or squeegeed dry. Care should be taken to ensure that metal does not come in contact with the glass surface and that no abrasive particles are trapped between the glass and cleansing materials. Razor blades, scrapers, putty knives and metal parts of glazing tools can scratch glass surfaces and should not be used to clean glass.

Additional Considerations.

In all cases when cleaning glass, extreme care should be taken to ensure that no abrasive particles are trapped between the glass and cleaning materials.

Construction Sites: Debris or grit that accumulates on glass can be damaging if not handled correctly. Cleaning should begin by soaking the surfaces with a water and soap solution. Flush as much of the grit as possible with a spray of clean water. Reapply the window washing solution and wash with a squeegee or grit free rag. Uniformly spray or apply the cleaning solution with a soft grit free cloth sponge or pad and rinse thoroughly. The glass surface should then be wiped dry with a clean grit free cloth or squeegeed dry.

Concrete or motar slurry that runs down (or is splashed on) glass can be especially damaging and should be washed off as soon as possible. It is extremely alkaline and will eventually etch the glass surface. Begin by soaking the surfaces with a water and soap solution to loosen mortar. Next, flush as much of the grit as possible with a spray of clean water. Reapply the window washing solution and use a squeegee or grit-free cloth. It is strongly recommended that window washers clean a small area or one window, then stop and examine the surface for any damage to the glass.

Cup Marks: Vacuum cups are utilized to move and install large glass lites. The cups are made of silicone or rubber and can transfer small amounts of these materials onto the glass surface.

The appearance of cup marks can be exacerbated by accumulation of dust and debris from the construction process. Glass protection and/or routine cleaning during the construction process will help to minimize this effect.

Over the course of time, cup marks normally fade away due to repeated cleanings and exposure to the environment.

Manually removing cup marks is challenging. Utilize a lambswool pad with cerium oxide on a cordless drill.

RoomSide™ Low-E: No special cleaning requirements are necessary to clean Viracon's RoomSide™ Low-E coated glass.

Silicone: Excess silicone on the glass face can be removed. If the glass is dirty, flush off the grit particulates with a spray of clean water. Remove as much of the silicone as possible from the glass without damaging the surface. A thin film of silicone may remain on the face of the glass. Once the silicone is thin enough, soak it with an isopropyl alcohol solution and use 4 ought steel wool (0000) to remove the remainder.

Suggested Cleaners: We recommend mild, non-abrasive, non-alkaline cleaning solutions. The following have been used successfully in the past:

- Basic H® Classic
- Formula 409® Glass & Surface Cleaner
- Sparkle Glass Cleaner
- Windex® Original Glass Cleaner

Tremco Incorporated
3735 Green Road Beachwood, OH 44122 216.292.5000 www.tremcosealants.com

TREMCO®
Commercial Sealants & Waterproofing

July 14, 2016

Scott Dickson
Technical Applications Specialist
P: 216.514.7719
C: 440.522.7623
E: sdickson@tremcoinc.com

Dan Ward
NGG Ltd., Inc.
1850 Craigshire Road, Suite 202
St. Louis, MO 63146

Re: Compatibility of Spectrem 2 and Proglaze SSG with Dow 982
Project reference: Webster University Science Building

Mr. Ward:

It has been brought to the attention of Tremco technical services that NGG Ltd., Inc. seeks a confirmation of adhesion and compatibility between Tremco's Spectrem® 2 and Proglaze® SSG silicone sealants with Dow's® 982 Insulating Glass Sealant. Tremco Technical Services has previously tested the adhesion and compatibility characteristics between these products and is able to provide historic information regarding this request. Tremco always recommends the implementation of project-specific testing for compatibility and adhesion with the materials specific to the project; the presentation of historic information is not a substitution for project-specific testing.

This historic testing information does not indicate any compatibility concerns between Dow's® 982 silicone sealant and Tremco's Spectrem® 2 or Proglaze® SSG silicone sealants. Additionally, this testing indicated tenacious adhesion development between Spectrem® 2 and Proglaze® SSG silicone sealants when applied to Dow's® 982 silicone sealant.

As stated above, the historic information provided is not a substitution for the recommended project-specific testing. This recommended testing can be performed in Tremco's technical services laboratory, please feel free to contact me directly if you have any questions.

Sincerely,

Please provide project specific testing to confirm adhesion and long term compatibility.

Scott Dickson
Tremco Technical Services

HEAT SOAKED TEMPERED GLASS
STANDARD LIMITED WARRANTY

Viracon warrants its Heat Soaked Tempered glass to not break spontaneously as a result of Nickel Sulfide (NiS) inclusions at a rate exceeding 0.5% (5/1000) **for a period of five years from the date of manufacture.**

In the event that Viracon's Heat Soaked Tempered glass does break in excess of the 0.5% rate as a result of a verifiable NiS inclusion, Viracon will replace the broken Heat Soaked Tempered glass without charge, FOB nearest shipping point to the place of installation and pay for the costs of reasonable market replacement labor. Viracon will not be responsible for any other expenses or costs, including, but not limited to, incidental, indirect, special or consequential damages. In no event shall Viracon's liability exceed the replacement costs, including reasonable labor, of the glass. The warranty of the replacement glass will be limited to the remainder of the warranty period of the original Heat Soak Tempered glass.

Viracon expressly assumes no responsibility for glass breakage not attributable to NiS inclusion beyond 0.5%; or the following: product failure due to improper usage; product failure due to improper handling, loading, unloading, or storage; incompatibility with other glazing or installation materials, including, but not limited to, coatings, sealants, gaskets, setting blocks, lubricants, insulation or any other materials; faulty installation or building construction; damage caused by water not attributable to the Viracon product; failure to adhere to Viracon's instructions regarding installation and/or maintenance of the unit, including written proof of routine maintenance (consult Glass Association of North America Glazing Manual); improper design; errors in provided specifications; scratches or abrasions to the product; abnormal weather conditions; or damage caused by cleaners, solvents, acids, alkalies or any other chemicals used on or around the product. Viracon reserves the right to inspect in the field any product that is alleged to be defective.

The purchaser's exclusive remedy is limited to the legal remedies described in this warranty. Viracon will not be liable for any incidental or consequential damages of any kind. Viracon's warranty will be void in the event that full payment is not received for goods and services within the agreed upon terms of sale. VIRACON MAKES NO OTHER WARRANTY, EITHER EXPRESS OR IMPLIED REGARDING THE PRODUCT, INCLUDING, BUT NOT LIMITED TO, MERCHANTABILITY AND/OR FITNESS FOR A PARTICULAR PURPOSE. This warranty may only be modified upon prior written approval of Viracon's President or Vice President(s). Any inquiries on these warranties or defective product should be directed to:

Viracon Sales Department, 800 Park Drive, Owatonna, MN 55060 Phone: (507) 451-9555

Project Name: _____ Project Number: _____

For Viracon, Inc.

Signed: _____ Title: _____

Name: _____

Date Signed: _____

SAMPLE

CANNONDESIGN

SUBMITTAL IDENTIFICATION SHEET

To be completed by Contractor/CM

WEBSTER UNIVERSITY ISB
PROJECT NAME

8274 BIG BEND BLVD
ADDRESS

NUMBER

WEBSTER UNIVERSITY
OWNER

CANNON DESIGN
ARCHITECT / ENGINEER

DEVIN D GATES
SUBMITTED BY

088000-006
CONTRACTOR / CM SUBMITTAL NO.

CANNON DESIGN SUBMITTAL NO.

DRAWING / DETAIL REFERENCE

088000-006
SPECIFICATION SECTION / PARAGRAPH

NGG
MANUFACTURER / SUPPLIER

ITEM / PRODUCT ID

REQUIRED DATE

PRIORITY

◯ CRITICAL

ITEM BEING SUBMITTED (check only one)

- ◯ Shop Drawings
- ◯ Samples (_____ copies)
- ◯ LEED Submittal
- ◯ Certification / Qualifications
- ◉ Record Documents
- ◯ Product Data
- ◯ Coordination Drawing
- ◯ Calculations
- ◯ Schedules
- ◯ O&M Manuals
- ◯ Other _____

ITEM BEING SUBMITTED FOR (check only one)

◉ Action ◯ Information Only ◯ Record

REMARKS OR DEVIATIONS

Revision 3 attached.

CONTRACTOR / CM CERTIFICATION
(SUBMITTALS NOT CERTIFIED WILL BE RETURNED WITHOUT REVIEW)

PARIC

PARIC CORPORATION
SUBMITTAL STAMP

THIS SHOP DRAWING HAS BEEN REVIEWED BY PARIC CORPORATION

Subcontractor remains responsible for dimensions, quantities, coordination with other trades and compliance with contract documents.

By:
Devin D. Gates

DEVIN D GATES — 7/15/16
REVIEWED BY — DATE

To be completed by Reviewer

08 8000-006 REV002
CANNON DESIGN SUBMITTAL NUMBER

7/15/16
RECEIVED DATE

- ◯ A. No Exceptions Taken
  No further review of submittal is required.
- ◉ B. Make Corrections Noted
  Incorporate corrections in work; resubmission is not required.
- ◯ C. Revise and Resubmit
  Revise as noted, and resubmit for review.
- ◯ D. Rejected
  Submittal is not in compliance with Contract Documents; provide new submittal.
- ◯ E. For Record / Information Only
  Submittal was reviewed for Record / Information purposes only.
- ◯ F. Not Required for Review
  Submittal is not required by Contract Documents and has not been reviewed.

Review is for conformance with the design concept of this project and for general compliance with contract documents. Contractor is responsible for quantities, dimensions and compliance with contract documents and for information that pertains to fabrication processes, construction techniques and coordination of this work with all trades which will be affected thereby. This review is null and void if submittal deviates from contract documents and does not indicate or note deviations.

A/E COMMENTS ◯ See attached sheet(s) for additional comments

See comments below in "green"

REVIEWED BY — 7-20-16
DATE

PARIC
EXPERIENCE. EXCELLENCE.
77 Westport Plaza
Suite 250
St. Louis, MO 63146

TRANSMITTAL

No. 15051-0140

Paric Corporation

PROJECT: 15051-Webster University Interdisciplinary Science Building

DATE: 07/15/2016

TO: Cannon Design
1100 Clark Ave
St Louis MO 63102

RE: GLE-1 through GLE-5 product data REV3

ATTN: Kelvin Patel

JOB: 15051

WE ARE SENDING:	SUBMITTED FOR:	ACTION TAKEN:
☐ Shop Drawings	☑ Approval	☑ Approved as Submitted
☐ Letter	☐ Your Use	☐ Approved as Noted
☐ Prints	☐ As Requested	☐ Returned After Loan
☐ Change Order	☐ Review and Comment	☐ Resubmit
☐ Plans		☐ Submit
☐ Samples	**SENT VIA:**	☐ Returned
☐ Specifications	☐ Attached	☐ Returned for Corrections
☑ Other:	☐ Separate Cover Via:	☐ Due Date:

Item	*Package*	*Code*	*Rev.*	*Copies*	*Date*	*Description*	*Status*
Submittal		088000-006	3		07/15/2016	GLE-1 through GLE-5 product data REV3	Rejected

NOTES:

CC:

Signed: _____
Devin Gates

CANNONDESIGN

SUBMITTAL IDENTIFICATION SHEET

To be completed by Contractor/CM

WEBSTER UNIVERSITY ISB
PROJECT NAME

8274 BIG BEND BLVD
ADDRESS

NUMBER

WEBSTER UNIVERSITY
OWNER

CANNON DESIGN
ARCHITECT / ENGINEER

Joe Voypick
SUBMITTED BY

084423-006
CONTRACTOR / CM SUBMITTAL NO.

CANNON DESIGN SUBMITTAL NO.

DRAWING / DETAIL REFERENCE

084423
SPECIFICATION SECTION / PARAGRAPH

NGG
MANUFACTURER / SUPPLIER

ITEM / PRODUCT ID

REQUIRED DATE

PRIORITY

○ CRITICAL

ITEM BEING SUBMITTED (check only one)

- ○ Shop Drawings
- ○ Samples (_____ copies)
- ○ LEED Submittal
- ○ Certification / Qualifications
- ◉ Record Documents
- ○ Product Data
- ○ Coordination Drawing
- ○ Calculations
- ○ Schedules
- ○ O&M Manuals
- ○ Other _____

ITEM BEING SUBMITTED FOR (check only one)

◉ Action ○ Information Only ○ Record

REMARKS OR DEVIATIONS

Requested Additional Information Attached

CONTRACTOR / CM CERTIFICATION
(SUBMITTALS NOT CERTIFIED WILL BE RETURNED WITHOUT REVIEW)

PARIC

PARIC CORPORATION
SUBMITTAL STAMP

THIS SHOP DRAWING HAS BEEN REVIEWED BY PARIC CORPORATION

Subcontractor remains responsible for dimensions, quantities, coordination with other trades and compliance with contract documents.

By:
Devin D. Gates
Date:

Joe Voypick — REVIEWED BY
6/17/16 — DATE

To be completed by Reviewer

08 4423-006
CANNON DESIGN SUBMITTAL NUMBER

6/17/16
RECEIVED DATE

- ○ A. No Exceptions Taken
  No further review of submittal is required.
- ○ B. Make Corrections Noted
  Incorporate corrections in work; resubmission is not required.
- ○ C. Revise and Resubmit
  Revise as noted, and resubmit for review.
- ○ D. Rejected
  Submittal is not in compliance with Contract Documents; provide new submittal.
- ◉ E. For Record / Information Only
  Submittal was reviewed for Record / Information purposes only.
- ○ F. Not Required for Review
  Submittal is not required by Contract Documents and has not been reviewed.

Review is for conformance with the design concept of this project and for general compliance with contract documents. Contractor is responsible for quantities, dimensions and compliance with contract documents and for information that pertains to fabrication processes, construction techniques and coordination of this work with all trades which will be affected thereby. This review is null and void if submittal deviates from contract documents and does not indicate or note deviations.

A/E COMMENTS ○ See attached sheet(s) for additional comments

Note: information received refers to specification section 088000

Received acoustical data and glass performance data.

Product data should include more complete information on products making up IGU unit.

Lynn Grossman — REVIEWED BY

Digitally signed by Lynn Grossman
DN: C=US, E=lgrossman@cannondesign.com, O=CannonDesign, CN=Lynn Grossman
Date: 2016.06.28 12:47:52-05'00'

06.28.16 — DATE

77 Westport Plaza
Suite 250
St. Louis, MO 63146

TRANSMITTAL

No. 15051-0089

Paric Corporation

PROJECT: 15051-Webster University Interdisciplinary Science Building

DATE: 06/17/2016

TO: Cannon Design
1100 Clark Ave
St Louis MO 63102

RE: GLE-1 through GLE-5 product data REV1

ATTN: Kelvin Patel

JOB: 15051

WE ARE SENDING:	SUBMITTED FOR:	ACTION TAKEN:
☐ Shop Drawings	☑ Approval	☑ Approved as Submitted
☐ Letter	☐ Your Use	☐ Approved as Noted
☐ Prints	☐ As Requested	☐ Returned After Loan
☐ Change Order	☐ Review and Comment	☐ Resubmit
☐ Plans		☐ Submit
☐ Samples	**SENT VIA:**	☐ Returned
☐ Specifications	☐ Attached	☐ Returned for Corrections
☑ Other: Product Data	☐ Separate Cover Via:	☐ Due Date:

Item	*Package*	*Code*	*Rev.*	*Copies*	*Date*	*Description*	*Status*
Submittal		084423-006	2		06/17/2016	GLE-1 through GLE-5 product data REV1	Revise and Resubmit

NOTES:

CC: Paric Corporation, Kathy Bathe

Project Coordinator: Paric Corporation, Kathy Bathe

Signed: _____
Devin Gates

VIRACON®

800 Park Drive
Owatonna, MN 55060

800.533.2080
viracon.com

June 16, 2016

NGG Ltd Inc.
1850 Craigshire Rd. Ste 202
St Louis, MO 63146
Attn: Dan Ward, Project Manager

Re: Webster University ISB – Solar Optical Properties and Thermal Characteristics and glass treatment

Mr. Ward,

Performance data provided on the Solar Optical Properties and Thermal Characteristics form is based on centerpane values only. Heat treatment of the glass, i.e. heat strengthened, fully tempered or annealed, will have no impact on the performance data supplied. Just as the color of the airspace would have no impact on the performance numbers as well.

Submitted 12”x12” samples are for aesthetic viewing only. Typically, sample tags denote minimum treatment.

Viracon produces glass to your specifications upon receipt of order. As a glass fabricator we do not determine code requirements, location etc.

Please accept this letter as a formal supplemental submittal to be evaluated along with the previously submitted performance data.

Please call if I can be of any further assistance or if you should have any questions.

Sincerely,

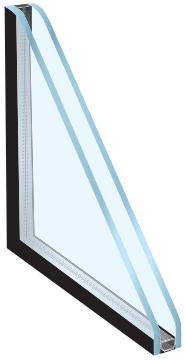
Tamera Reuvers

Technical Services Specialist

Cc: Doug Urich
Scott Knutson

VIRACON®

ACOUSTIC PERFORMANCE DATA TABLES



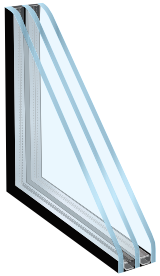
INSULATING ACOUSTICAL DATA

Viracon Acoustical Glass is made from combinations of various glass types along with acoustical window frames to help you effectively reduce sound transmission from airplanes, trains, vehicles and other unwanted noises. The performance data below applies to an insulating unit constructed with two plies of glass and an air or argon filled space. Data is based on testing ~36" x 84" glass to ASTM E413-87 in an acoustical wall. *OITC is estimated based on this test. Glass size and glazing system will affect STC rating.

The **STC (Sound Transmission Class)** rating is a single-number rating system for interior building partitions and viewing windows used to categorize acoustic performance. Its original intent was to quantify interior building partitions not exterior wall components. As a result it is not recommended for glass selection of exterior wall applications since the single-number rating was achieved under a specific set of laboratory conditions.

The **OITC (Outside-Inside Transmission Class)** rating is used to classify acoustic performance of glazing in exterior applications.

Insulating Glass Construction	STC	OITC*	Frequency (Hz)																	
			100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000
			Sound Transmission Loss (dB)																	
1/2" overall - 1/8" glass, 1/4" airspace, 1/8" glass	**28**	**26**	26	21	23	23	26	21	19	24	27	30	33	36	40	44	46	39	34	45
5/8" overall - 1/8" glass, 3/8" airspace, 1/8" glass	**31**	**26**	26	23	23	20	23	19	23	27	29	32	35	39	44	47	48	41	36	43
1" overall - 1/4" glass, 1/2" airspace, 1/4" glass	**35**	**30**	27	24	29	22	22	25	30	33	35	38	40	42	42	37	37	43	46	49
1" overall - 1/4" glass, 1/2" **argon** space, 1/4" glass	**35**	**29**	32	29	28	22	20	25	30	33	37	40	43	45	44	39	40	45	49	52
1" overall - 1/4" glass, 9/16" airspace, 3/16" glass	**37**	**30**	32	26	25	20	24	29	33	34	38	41	43	46	46	42	36	43	48	53
1-1/8" overall - 5/16" glass, 1/2" airspace, 5/16" glass	**37**	**32**	26	24	25	31	24	32	32	35	37	39	39	38	36	38	42	44	46	49
1-1/4" overall - 3/8" glass, 1/2" airspace, 3/8" glass	**37**	**32**	29	23	23	29	31	34	34	35	36	36	35	35	36	40	43	47	49	48
1-1/2" overall - 1/4" glass, 1" airspace, 1/4" glass	**37**	**30**	22	19	27	23	31	30	35	35	36	39	41	42	41	36	37	46	51	56
1-1/16" overall - 1/4" glass, 1/2" airspace, 5/16" glass	**38**	**33**	30	24	29	26	29	33	34	36	39	41	41	40	38	37	39	43	46	48
1-1/4" overall - 1/4" glass, 3/4" airspace, 1/4" glass	**38**	**31**	27	23	28	21	27	29	34	35	37	41	43	45	44	39	39	46	49	52
1-1/8" overall - 1/4" glass, 1/2" airspace, 3/8" glass	**39**	**34**	28	26	32	29	29	31	35	37	38	39	41	43	41	40	41	44	47	49
1-3/16" overall - 5/16" glass, 1/2" airspace, 3/8" glass	**39**	**34**	29	26	26	31	30	37	36	37	39	39	40	37	35	39	43	46	48	49
1-3/8" overall - 1/4" glass, 3/4" airspace, 3/8" glass	**40**	**33**	30	23	31	28	33	37	39	40	41	39	38	38	39	39	40	47	51	53



TRIPLE INSULATING ACOUSTICAL DATA

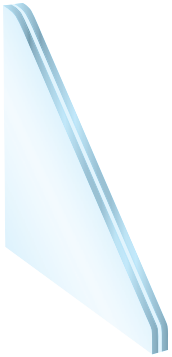
The performance data below applies to triple insulating glass units constructed with three plies of glass, two airspaces and an interlayer (where applicable). Data is based on testing ~36" x 84" glass to ASTM E413-87 in an acoustical wall. *OITC is estimated based on this test. Glass size and glazing system will affect STC rating.

Triple Insulating Glass Construction	STC	OITC*	Frequency (Hz)																	
			100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000
			Sound Transmission Loss (dB)																	
1-3/4" overall - 1/4" glass, 1/2" airspace, 1/4" glass, 1/2" airspace, 1/4" glass	**39**	**31**	25	22	29	24	25	29	34	37	40	43	46	48	47	41	41	47	52	58
1-7/8" overall - 1/4" glass, 1/2" airspace, 1/4" glass, 1/2" airspace, 3/16" glass, .030" PVB, 3/16" glass	**41**	**33**	24	25	31	29	31	36	37	39	39	41	41	42	42	43	44	48	50	49
2-3/4" overall - 3/8" glass, 3/4" airspace, 5/16" glass, 3/4" airspace, 1/4" glass, .060" PVB, 1/4" glass	**45**	**35**	33	30	34	37	39	43	44	45	46	43	41	41	43	49	55	57	61	65

MONOLITHIC ACOUSTICAL DATA

The performance data below applies to monolithic glass. Data is based on testing ~36" x 84" glass to ASTM E413-87 in an acoustical wall. *OITC is estimated based on this test. Glass size and glazing system will affect STC rating. The monolithic glass is one lite of glass.

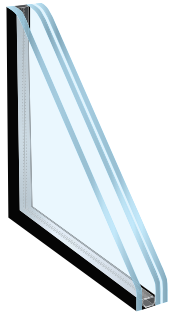
Monolithic Glass Construction	STC	OITC*	Frequency (Hz)																	
			100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000
			Sound Transmission Loss (dB)																	
1/8" overall - 1/8" glass	**30**	**25**	19	17	18	21	23	22	24	27	28	30	30	32	34	35	36	33	26	30
1/4" overall - 1/4" glass	**31**	**29**	23	25	25	24	28	26	29	31	33	34	34	35	34	30	27	32	37	31
3/8" overall - 3/8" glass	**34**	**32**	26	27	27	30	32	31	34	35	36	35	33	30	30	35	38	41	46	48
1/2" overall - 1/2" glass	**36**	**33**	26	30	26	30	33	33	34	36	37	35	32	32	36	40	43	46	50	51



LAMINATED ACOUSTICAL DATA

The performance data below applies to laminated glass units constructed with two plies of glass and an interlayer. Data is based on testing ~36" x 84" glass to ASTM E413-87 in an acoustical wall. *OITC is estimated based on this test. Glass size and glazing system will affect STC rating.

Laminated Glass Construction	STC	OITC*	Frequency (Hz)																
			100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000
			Sound Transmission Loss (dB)																	
1/4" overall - 1/8" glass, .015" PVB, 1/8" glass	33	30	27	23	27	24	27	28	29	31	33	35	35	35	33	31	32	37	41	45
3/16" overall - S/S glass, .030" PVB, S/S glass	35	31	29	29	29	25	27	29	29	31	32	34	34	34	34	35	33	36	39	41
1/4" overall - 1/8" glass, .030" PVB, 1/8" glass	35	31	25	26	28	27	29	29	30	32	34	35	35	36	36	35	35	38	43	46
1/4" overall - 1/8" glass, .045" PVB, 1/8" glass	35	31	24	27	27	28	28	29	30	32	34	35	36	36	37	36	35	38	43	46
5/16" overall - 1/8" glass, .060" PVB, 1/8" glass	35	31	25	25	26	29	28	30	30	32	34	35	35	36	36	36	36	39	43	46
3/8" overall - 3/16" glass, 0.15" PVB, 3/16" glass	36	32	27	25	26	30	31	31	33	35	35	35	35	33	33	37	41	44	48	51
3/8" overall - 3/16" glass, .030" PVB, 3/16" glass	36	33	27	27	27	30	31	31	33	34	35	36	36	35	34	37	41	45	49	52
3/8" overall - 1/4" glass, .030" PVB, 1/8" glass	36	33	27	28	26	30	31	31	32	34	35	36	36	35	35	36	40	44	48	51
1/2" overall - 1/4" glass, .015" PVB, 1/4" glass	36	32	25	25	27	30	32	32	34	35	35	35	33	32	35	40	43	46	49	51
9/16" overall - 1/4" glass, .075" Storm, 1/4" glass	36	35	27	30	30	31	31	33	32	33	34	35	35	34	36	40	43	45	47	47
9/16" overall - 1/4" glass, .090" SGP, 1/4"glass	36	34	31	30	29	31	32	33	33	34	35	35	34	32	34	37	40	42	44	47
7/16" overall - 1/4" glass, .060" PVB, 1/8" glass	37	33	27	28	27	30	31	31	33	35	36	37	37	37	36	37	41	44	48	51
9/16" overall - 1/4" glass, .100" StormGuard, 1/4" glass	37	35	32	31	30	31	33	34	34	34	35	36	35	35	37	41	44	47	49	51
1/2" overall - 1/4" glass, 030" PVB, 1/4" glass	38	34	25	29	28	30	33	33	34	36	37	37	37	36	37	41	45	48	51	53
1/2" overall - 1/4" glass, .045" PVB, 1/4" glass	38	34	26	30	27	30	33	33	34	36	37	38	37	36	37	41	45	48	51	54
9/16" overall - 1/4" glass, .060" PVB, 1/4" glass	39	34	26	29	28	30	33	33	35	36	37	38	38	37	38	41	44	47	51	54
3/4" overall - 1/2" glass, .030" PVB, 1/4" glass	39	36	31	35	33	33	34	36	36	37	36	35	34	39	41	46	48	50	52	56
5/8" overall - 3/8" glass, .030" PVB, 1/4" glass	40	36	29	30	28	32	34	35	36	38	38	38	36	38	42	46	49	52	55	57
13/16" overall - 1/2" glass, .060" PVB, 1/4" glass	41	36	29	30	29	32	35	35	37	38	38	38	37	41	44	48	50	53	56	56

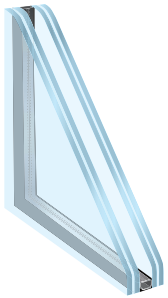


INSULATING LAMINATED ACOUSTICAL DATA

The performance data below applies to insulating laminated glass units constructed with three plies of glass, an interlayer and an airspace. Data is based on testing ~36" x 84" glass to ASTM E413-87 in an acoustical wall. *OITC is estimated based on this test. Glass size and glazing system will affect STC rating.

Insulating Laminated Glass Construction	STC	OITC*	Frequency (Hz)																	
			100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000
			Sound Transmission Loss (dB)																	
13/16" overall - 3/16" glass, 3/8" airspace, 1/8" glass, .030" PVB, 1/8" glass	37	31	27	27	26	24	22	28	32	35	38	38	39	40	42	43	41	45	52	57
15/16" overall - 3/16" glass, 1/2" airspace, 1/8" glass, .030" PVB, 1/8" glass	39	31	26	23	25	23	27	31	34	36	38	39	41	43	45	46	43	49	55	55
1" overall - 1/4" glass, 1/2" airspace, 1/8" glass, .030" PVB, 1/8" glass	39	31	28	20	29	24	26	30	34	36	39	42	43	44	44	41	40	47	52	56
1-5/16" overall - 1/4" glass, 1/2" airspace, 1/4" glass, .075" Storm, 1/4" glass	39	34	29	25	30	27	31	34	35	34	36	38	40	41	42	43	44	47	50	49
1-5/16" overall - 1/4" glass, 1/2" airspace, 1/4" glass, .090" SGP, 1/4" glass	39	34	29	24	32	27	32	34	35	34	36	38	40	40	41	41	42	46	48	49
1-1/8" overall - 1/4" glass, 1/2" airspace, 1/4" glass, .030" PVB, 1/8" glass	40	30	28	17	28	29	33	34	38	40	40	41	41	41	41	40	43	49	54	58
1-1/16" overall - 1/4" glass, 7/16" airspace, 3/16" glass, .030" PVB, 3/16" glass	40	33	31	25	30	27	29	34	36	37	39	40	42	43	42	41	44	47	51	51
1-5/16" overall - 1/4" glass, 1/2" airspace, 1/4" glass, .100" Stormguard, 1/4" glass	40	34	28	23	30	28	32	35	36	36	37	39	41	43	43	43	45	48	50	49
1-5/8" overall - 1/4" glass, 1" airspace, 3/16" glass, .030" PVB, 3/16" glass	40	32	24	24	31	28	33	36	37	39	39	40	41	41	41	42	43	47	49	47
1-1/16" overall - 1/4" glass, 1/2" airspace, 1/8" glass, .060" PVB, 1/8" glass	41	32	24	23	28	26	28	33	36	37	39	42	44	46	46	43	44	50	53	55
1-1/8" overall - 1/4" glass, 1/2" airspace, 3/16" glass, .030" PVB, 3/16" glass	41	35	32	27	29	28	31	35	37	39	41	42	43	44	43	42	45	50	53	54
1-1/16" overall - 1/4" glass, 7/16" airspace, 3/16" glass, .030" AC, 3/16" glass	41	34	31	26	29	26	30	33	36	36	39	42	44	45	45	44	45	49	51	50
1-3/16" overall - 1/4" glass, 1/2" airspace, 3/16" glass, .060" PVB, 3/16" glass	42	35	30	29	31	28	31	34	37	39	41	42	44	46	45	44	47	52	55	60
1-5/16" overall - 1/4" glass, 1/2" airspace, 1/4" glass, .060" PVB, 1/4" glass	42	34	29	24	30	29	32	37	40	40	41	42	44	45	44	45	48	53	57	59
1-5/16" overall - 1/4" glass, 5/8" airspace, 3/16" glass, .060" PVB, 3/16" glass	42	35	29	24	30	29	32	37	40	40	41	42	44	45	44	45	48	53	57	59

Insulating Laminated Glass Construction	STC	OITC*	Frequency (Hz)																	
			100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000
			Sound Transmission Loss (dB)																	
1-1/4" overall - 1/4" glass, 1/2" airspace, 1/4" glass, .030" PVB, 1/4" glass	43	36	31	29	32	30	32	35	38	40	40	42	44	46	47	46	47	52	56	61
1-3/8" overall - 5/16" glass, 5/8" airspace, 3/16" glass,.060" PVB, 3/16" glass	43	37	28	28	34	36	33	40	41	42	43	43	42	40	40	43	49	53	57	61
1-7/16" overall - 3/16" glass, 11/16" airspace, 3/8" glass, .030" PVB, 3/16" glass	43	35	27	27	29	29	30	35	39	40	41	42	43	46	50	52	50	53	57	59
1-11/16" overall - 3/8" glass, 3/4" airspace, 1/4" glass, .060" PVB, 1/4" glass	43	37	25	31	38	33	37	39	42	43	43	42	40	40	41	56	50	55	58	61
1-7/16" overall - 1/4" glass, 3/4" airspace, 3/16" glass, .060" PVB, 3/16" glass	44	36	28	26	32	30	35	37	40	41	43	44	45	47	47	44	47	53	57	60
1-9/16" overall - 1/4" glass, 3/4" airspace, 1/4" glass, .060" PVB, 1/4" glass	44	37	28	29	36	32	34	39	41	41	41	43	44	45	45	46	47	52	56	61
1-15/16" overall - 3/8" glass, 1" airspace, 1/4" glass, .060" PVB, 1/4" glass	46	36	24	30	33	35	40	41	44	45	45	44	44	44	43	46	50	54	57	58



DOUBLE LAMINATED INSULATING ACOUSTICAL DATA

The performance data below applies to double laminated insulating glass units constructed with four plies of glass, two interlayers and an airspace. Data is based on testing ~36" x 84" glass to ASTM E413-87 in an acoustical wall. *OITC is estimated based on this test. Glass size and glazing system will affect STC rating.

Double Laminated Insulating Glass Construction	STC	OITC*	Frequency (Hz)																	
			100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000
			Sound Transmission Loss (dB)																	
1-7/16" overall - 1/4" glass, .030" PVB, 1/4" glass, 1/2" airspace, 3/16" glass, .060" PVB, 3/16" glass	41	35	32	25	29	31	33	35	37	38	39	39	40	41	42	43	43	44	45	46
1" overall - 1/8" glass, .030" PVB, 1/8" glass, 1/2" airspace, 1/8" glass, .030" PVB, 1/8" glass	42	33	26	21	29	28	30	34	36	40	42	44	44	44	45	46	47	52	57	58
1-3/8" overall - 5/32" glass, .030" PVB, 5/16" glass, 1/2" airspace, 5/32" glass, .030" PVB, 1/4" glass	42	35	29	24	30	35	35	37	39	39	40	40	40	39	44	48	52	56	59	61
1-5/16" overall - 1/4" glass, .030" PVB, 1/4" glass, 1/2" airspace, 5/32" glass, .060" PVB, 5/32" glass	43	36	30	25	29	33	34	38	42	42	43	44	42	41	42	44	49	52	55	57
1-11/16" overall - 1/4" glass, .060" PVB, 1/4" glass, 3/4" airspace, 3/16" glass, .030" PVB, 3/16" glass	44	33	21	23	31	35	37	40	42	42	43	42	42	42	44	48	51	55	57	59

Double Laminated Insulating Glass Construction	STC	OITC*	Frequency (Hz)																	
			100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000
			Sound Transmission Loss (dB)																	
1-9/16" overall - 1/4" glass, .060" PVB, 1/4" glass, 3/4" airspace, 1/8" glass, .030" PVB, 1/8" glass	44	37	32	26	35	35	35	40	41	42	42	43	44	44	45	47	50	56	54	45
2-1/8" overall - 1/4" glass, .100" PVB, 1/4" glass, 3/4" airspace, 1/4" glass, .060" PVB, 1/2" glass	45	38	30	31	36	35	38	42	42	41	41	40	41	44	47	50	53	56	58	60
2-3/8" overall - 3/8" glass, .060" PVB, 3/8" glass, 3/4" airspace, 3/8" glass, .090" PVB, 3/8" glass	45	38	28	32	37	35	38	39	41	38	40	41	44	46	49	52	55	57	56	53
2-5/8" overall - 3/8" glass, .060" PVB, 3/8" glass, 1" airspace, 3/8" glass, .090" PVB, 3/8" glass	45	38	29	32	37	37	37	40	42	38	39	41	44	47	50	53	55	57	59	60

DOUBLE GLAZED INSULATING ACOUSTICAL DATA

The performance data below applies to double glazed insulating glass units. Data is based on testing ~36" x 84" glass to ASTM E413-87 in an acoustical wall. *OITC is estimated based on this test. Glass size and glazing system will affect STC rating. **These double-glazed applications are provided for information only and refer to field-glazed applications. Viracon supplies only the glass components.**

Double Glazed Insulating Glass Construction	STC	OITC*	Frequency (Hz)																	
			100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000
			Sound Transmission Loss (dB)																	
1-7/16" overall - 1/8" glass, .030" PVB, 1/8" glass, 1" airspace, 3/16" glass	42	33	22	27	27	28	31	35	38	41	42	43	44	45	47	47	45	50	58	61
2-7/16" overall - 1/8" glass, .030" PVB, 1/8" glass, 2" airspace, 3/16" glass	45	35	24	25	34	33	34	40	41	44	44	46	47	47	48	48	46	50	55	56
1-13/16" overall - 1/4" glass, .030" PVB, 1/4" glass, 1" airspace, 1/8" glass, .060" PVB, 1/8" glass	46	35	21	28	33	37	38	42	43	45	44	44	44	45	49	53	57	59	62	63
2-11/16" overall - 1/4" glass, .030" PVB, 1/4" glass, 2" airspace, 3/16" glass	46	39	27	36	33	33	35	39	41	45	45	46	46	46	49	51	52	56	60	62
2-7/8" overall - 1/4" glass, .030" PVB, 1/4" glass, 2" airspace, 3/8" glass	46	42	34	37	33	38	40	42	44	48	47	46	45	52	56	51	55	59	61	62
4-7/16" overall - 1/8" glass, .030" PVB, 1/8" glass, 4" airspace, 3/16" glass	48	39	26	36	34	37	37	43	44	48	49	51	51	50	51	50	47	51	58	60
4-11/16" overall - 1/4" glass, .030" PVB, 1/4" glass, 4" airspace, 3/16" glass	49	41	30	37	33	38	37	42	45	49	50	51	50	48	50	53	58	57	61	64
4-7/8" overall - 1/4" glass, .030" PVB, 1/4" glass, 4" airspace, 3/8" glass	49	44	38	38	33	40	40	43	46	51	52	52	50	45	48	53	56	59	62	64
4-15/16" overall - 1/2" glass, .060" PVB, 1/4" glass, 4" airspace, 1/8" glass	49	40	29	33	31	36	38	43	44	46	47	49	50	52	52	55	59	59	58	60

Double Glazed Insulating Glass Construction	STC	OITC*	Frequency (Hz)																	
			100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000
			Sound Transmission Loss (dB)																	
5-1/16" overall - 1/4" glass, .060" PVB, 1/4" glass, 4" airspace, 1/4" glass, .030" PVB, 1/4" glass	**50**	**43**	31	39	35	39	41	43	46	51	52	52	49	48	50	54	59	61	63	64
5-5/16" overall - 1/2" glass, .060" PVB, 1/4" glass, 4" airspace, 1/4" glass, .030" PVB, 1/4" glass	**50**	**43**	31	42	33	40	42	43	46	50	50	50	49	50	52	55	60	62	64	64
4-3/4" overall - 1/4" glass, .030" PVB, 1/4" glass, 4" airspace, 1/8" glass, .030" PVB, 1/8" glass	**51**	**44**	34	38	34	40	41	45	47	51	52	53	53	51	52	55	58	60	62	64

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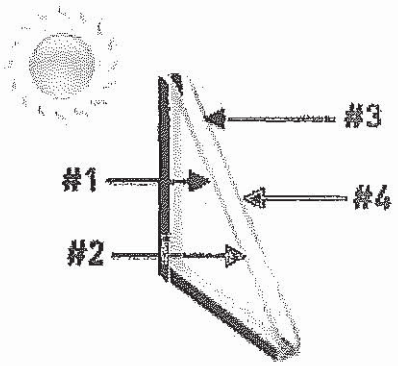
1" (25mm) Insulating VNE1-63 (GLE-1)

PERFORMANCE DATA

Transmittance	
Visible Light	62%
Solar Energy	24%
U-V*	5%
Reflectance	
Visible Light-Exterior	10%
Visible Light-Interior	10%
Solar Energy	37%
NFRC U-Value	
Winter	0.29 Btu/(hr x sqft x °F)
Summer	0.26 Btu/(hr x sqft x °F)
Shading Coefficient (SC)	0.33
Relative Heat Gain	70 Btu/(hr x sqft)
Solar Heat Gain Coefficient (SHGC)	0.29
LSG	2.14

Makeup



1/4" (6mm) Clear VNE-63 #2
1/2" (13.2mm) airspace
1/4" (6mm) clear

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SOLAR OPTICAL PROPERTIES AND THERMAL CHARACTERISTICS****

Project Name: **Interdisciplinary Science Building Webster U**

INSULATING SPANDREL PERFORMANCE DATA (GLE-2)

Makeup: **1/4" (6mm) Clear VNE1-63 #2**
1/2" (13.2mm) airspace
1/4" (6mm) Clear
with V908 Gray Viraspan #4

Transmittance

Visible Light:	NA
Solar Energy:	NA
Ultra-Violet:	NA

*** UltraViolet defined as 300 to 380 nanometers(nm)**

Reflectance

Visible Light-Exterior:	NA
Visible Light-Interior:	NA
Solar Energy:	NA

U-Value

NFRC Winter Conditions:	0.29	Btu/(hr x sqft x °F)
NFRC Summer Conditions:	0.26	Btu/(hr x sqft x °F)

Shading Coefficient: (SC)	NA	
Solar Factor (SHGC):	NA	
Relative Heat Gain:	NA	Btu/hr x sqft

****** Centerpane Values** ******Calculated using Windows 7.4**

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SOLAR OPTICAL PROPERTIES AND THERMAL CHARACTERISTICS****

Project Name: **Interdisciplinary Science Building Webster U**

INSULATING SILKSCREEN PERFORMANCE DATA (GLE-3)

Makeup: **1/4" (6mm) Clear VNE1-63 #2**
with V908 Gray Silkscreen #5006 - 40% Coverage #2
1/2" (13.2mm) airspace
1/4" (6mm) Clear

Transmittance	
Visible Light:	38%
Solar Energy:	15%
Ultra-Violet:	3%

*** UltraViolet defined as 300 to 380 nanometers(nm)**

Reflectance	
Visible Light-Exterior:	7%
Visible Light-Interior:	11%
Solar Energy:	24%

U-Value	
NFRC Winter Conditions:	0.29 Btu/(hr x sqft x °F)
NFRC Summer Conditions:	0.26 Btu/(hr x sqft x °F)
Shading Coefficient: (SC)	0.24
Solar Factor (SHGC):	0.20
Relative Heat Gain:	51 Btu/hr x sqft

****** Centerpane Values** ******Calculated using Windows 7.4**

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SOLAR OPTICAL PROPERTIES AND THERMAL CHARACTERISTICS****

Project Name: **Interdisciplinary Science Building Webster U**

INSULATING SILKSCREEN SPANDREL PERFORMANCE DATA (GLE-4)

Makeup: **1/4" (6mm) Clear VNE1-63 #2**
with V908 Gray Silkscreen #5006 - 40% Coverage #2
1/2" (13.2mm) airspace
1/4" (6mm) Clear
with V908 Gray Viraspan #4

Transmittance

Visible Light:	NA
Solar Energy:	NA
Ultra-Violet:	NA

*** UltraViolet defined as 300 to 380 nanometers(nm)**

Reflectance

Visible Light-Exterior:	NA
Visible Light-Interior:	NA
Solar Energy:	NA

U-Value

NFRC Winter Conditions:	0.29	Btu/(hr x sqft x °F)
NFRC Summer Conditions:	0.26	Btu/(hr x sqft x °F)

Shading Coefficient: (SC)	NA	
Solar Factor (SHGC):	NA	
Relative Heat Gain:	NA	Btu/hr x sqft

****** Centerpane Values** ******Calculated using Windows 7.4**

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SOLAR OPTICAL PROPERTIES AND THERMAL CHARACTERISTICS****

Project Name: **Interdisciplinary Science Building Webster U**

LAMINATED INSULATING PERFORMANCE DATA (GLE-5)

Makeup:
1/4" (6mm) Clear
0.060" (1.52mm) Clear pvb interlayer
1/4" (6mm) Clear VNE1-63 #4
1/2" (13.2mm) airspace
1/4" (6mm) Clear

Transmittance	
Visible Light:	60%
Solar Energy:	22%
Ultra-Violet:	< 1%

*** UltraViolet defined as 300 to 380 nanometers(nm)**

Reflectance	
Visible Light-Exterior:	9%
Visible Light-Interior:	10%
Solar Energy:	18%

U-Value	
NFRC Winter Conditions:	0.28 Btu/(hr x sqft x °F)
NFRC Summer Conditions:	0.25 Btu/(hr x sqft x °F)
Shading Coefficient: (SC)	0.33
Solar Factor (SHGC):	0.29
Relative Heat Gain:	70 Btu/hr x sqft

****** Centerpane Values** ******Calculated using Windows 7.4**