Very High Performance Glazing in Traditional Framing

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Window Design Considerations

Thermal insulation
   Always needed for continental climates

Solar Control
   Benefecial Passive Solar Gain vs. Blocking of unwanted summer solar heat gain

Daylighting
   Glare prevention

UV transmission control – Fading of organic materials and dyes

Aesthetic appearance:
   Privacy/transparency/color,
   optical quality of transmitted images,
   optical quality of reflected images

Acoustic insulation

Radio Frequency and Infra Red Electromagnetic insulation/transmission

Wind load resistance

Impact resistance
   Security - Protection against forced entry, storm penetration of building envelope

Fire protection – Prevent fire spreading; prevent interior ignition from wild brush fires.

Emergency exit/entry

A single sheet of clear glass only keeps out wind, rain, and the birds and the bees. It has negligible insulation, or solar and glare control properties.
Vacuum IG (VIG) Seal. Rigid Edges
Vacuum IG (VIG) Seal. Rigid Edges
Schematic: Flexible Metal Edge Seal VIG
VIG Vacuum Retention After 30 Years

Pressure (Torr) vs. Baking temperature (°C)

- Baking time:
  - 0.5 hr
  - 1.0 hr
  - 3.0 hr
Accelerated Ageing at 100°C of Baked VIG

Fig. 2 Ageing test results of 150°C baked VIG after long term storage at 100°C
Japanese sliding window system frame

6.2mm Spacia ST

Open

Closing

Impact

Impact (10 times the force of gravity)

Closed

Impact (10 times the force of gravity)

VIG Durability – Impact Test Cycling
VIG Retrofit into existing metal framing
VIG Renovation into Existing Frames

Starbucks (Suburban Store)

MacDonald

Hama Ssuhi (Revolving Sushi Bar)
VIG Renovation/Restoration in Europe

Hermitage Amsterdam

Library of Amsterdam University
MIT. Fixed & Operable Windows
Unacceptable Alternative Concept: Interior Operable Storm Window
Which Glass is Best?

Always: High Insulation - Low-E

Most houses from Seattle to NYC and North need High SHGC
See Canada Nat. Research study

Most commercial buildings have greater cooling costs so they need Low SHGC

Put Low-E on surface #2 if possible for slightly lower SHGC

Put Low-E on surface #3 for slightly higher SHGC
Residential: Summer Solar Heat Gain Control
**Effective Emittance for 2 Low-E Coatings**

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Performance Gains with Multiple Low-E Coatings

Room-Side Surface Temp. (°C)

Relative U-Factor

---------- U-Factor = 0 ----------
Multi-Layer Very High Performance Glazing
Multi-Layer Very High Performance Glazing

U-Factor = 0.83 W/sq.m.°C  (0.15 Btu/hr.sq.ft.°F)

Passive Solar Gain:
SHGC = 0.57
Tvis = 62%

or

Solar Control:
Spectrally Selective
Green tint Low-E:
SHGC = 0.195
Tvis = 33%