

Simulation Report

For Vinyl window in accordance with

ECBC 2007

(revised version May 2008)

Prepared for:

Mr. Y.P.Singh
Fenesta
Plot no 52, sector 32,
Institutional Area, Gurgaon
Phone: 0122-4513700/743
Fax: 0122-4513704



Report: CEPT-1009-CS-Fenesta CW1 - 09/02/2009

Centre for Environmental Planning and Technology
K.L.Campus, Navarangoura, Ahmedabad 380 009
Phone : 79 2630 2074
Contact Person : Prof Rajan Rawal

SIMULATION REPORT

ECBC revised 2008 version modelling requirements (Add from the file)U-Factor (ECBC 2007), SHGC and VT (ECBC 2007 requirement).

| | | | |
|--|---|---|-------------------------------------|
| Fenestration Product: | Vinyl (UPVC) | | |
| Series Name | Series 3000 | | |
| Report#: | GBE-1009-CS-Fenesta CW1 | | |
| Submitted To: | Y P Singh | | |
| Manufacturer: | Fenesta | | |
| Address: | Plot no 52, sector 32, Institutional Area, Gurgaon | | |
| Phone#: | Phone: 0122-4513700/743 Fax: 0122-4513704 | | |
| Results: Option 1: Fenesta CW1 SG6mm Option 2: Fenesta CW1 DG24mm Option 3: Fenesta CW1 TG39mm | W/m ² -k U-Factor = 3.971 U-Factor = 1.796 U-Factor = 1.337 | SHGC = 0.58 SHGC = 0.49 SHGC = 0.44 | VT = 0.63 VT = 0.55 VT = 0.51 |
| Baseline Simulation Date: | 09/02/2009 | | |
| Revision Date: | | | |
| Product Type: | Vinyl (UPVC) Frame Casement Windows | | |
| Simulator: | Avlokita Agrawal | | |
| Simulator-in-Charge: | Avlokita Agrawal Supervised by : Centre for Environmental Planning and Technology | | |
| Simulation Method: | Approved NFRC Software THERM5.2 and WINDOW5.2 and NFRC WINDOW/THERM simulation manual. ECBC 2007 calculation procedure. | | |
| Model/Type: | Vinyl (UPVC) Frame casement Windows | | |

| | |
|-------------------------------|--|
| Size: | 1800mm x 1200mm |
| Frame Type and Finish: | Frame extrusion is UPVC and frame finish is Pristine white Glossy (extruded profile) |
| Sash Type and Finish: | Frame extrusion is UPVC and frame finish is Pristine white Glossy (extruded profile) |
| IG Glass Parameters: | Option 1: 6 mm clear glass (IGDB – ID 103) Option 2: 24 mm 2 pane IG unit with 12 mm air cavity, 6mm Laminated (IGDB ID # 1862) and 6mm clear glass on outer side (IGDB – ID 103) Option 3: 39 mm 3pane IG unit with 10.5 mm air cavities, 6mm Laminated glass (IGDB ID # 1862) and 6mm clear glass on outer and middle layer(IGDB – ID 103) |
| Glazing Method: | Glazing set with flexible vinyl gasket and exterior bead |
| Gas Fill Method: | - |
| Spacers: | Aluminum spacer system - single sealed. |
| Dividers: | None |
| Grouping: | None |
| Center-of-Glazing: | None |
| Frame: | None |
| Spacer: | None |
| Divider: | None |
| Miscellaneous: | - |
| General Assumptions | <ul style="list-style-type: none"> Since the Glass code was not specified, it has been taken to be ID103 and ID1862 as per the qualitative specification given. The mullion is considered to be in the center as the exact distance from edge is not specified. Location may have slight impact on the final U-value as the value is size dependant. |
| SHGC and VT: | Frame Absorption 0.3 |
| Assumption: | |
| THERM File Convention: | |

| | |
|--------------------|--|
| File Paths: | ..\ Therm = Therm files ...\\ Window = WINDOW5 database file ...\\ Drawing = Product drawing used for simulation ...\\ Report = simulation report |
|--------------------|--|

Disclaimer: The window U-factor, Solar Heat Gain Coefficient and Visible transmittance Resistance were determined using most recent ECBC 2007 requirements and simulation program THERM and WINDOW , International Glazing Database (IGDB)and calculation procedure in accordance with ECBC 2007 procedures and from information provided by the manufacturer. SI Units are the primary units for the standards mentioned, the data and report uses IEEE/ASTM SI 10 (1997) standard procedure for coversion of data to IP units in accordance with NFRC unit conversion policy. Rounding of numerical values has been performed as per IEEE/ASTM SI 10-1997 and all subsections except section 5.4.1.3. **This report does not constitute certification of this product and only relates to the fenestration products simulated.** Centre for Environmental Planning and Technologydoes not imply or claim that the product simulated in this report will perform as stated in actual use conditions. This report is the property of Centre for Environmental Planning and Technologyand the client, and shall not be reproduced, except in full, without the written approval from Centre for Environmental Planning and Technologyand the client. The report and the data shall be kept for a period of four years after which they may be destroyed.

Avlokita Agrawal
 Green Built Energy Pvt Ltd.
 Supervised and Issued by Centre for Environmental Planning and Technology

Procedure for Determining Fenestration Product UFactor and Solar Heat Gain Coefficient As per ECBC 2007 (revised May 2008)

§4.2.1.1 and §4.2.1.2 require that U-factors and solar heat gain coefficients (SHGC) be determined for the overall fenestration product (including the sash and frame) in accordance with ISO 15099. The building envelope trade-off option in §4.4 requires the use of visible light transmittance (VLT).

In several cases, ISO 15099 suggests that individual national standards will need to be more specific and in other cases the ISO document gives users the choice of two options. This section clarifies these specific issues as they are to be implemented for this code:

- (a) §4.1 of ISO 15099: For calculating the overall U-factor, ISO 15099 offers a choice between the linear thermal transmittance (4.1.2) and the area weighted method (4.1.3). The area weighted method (4.1.3) shall be used
- (b) §4.2.2 of ISO 15099: Frame and divider SHGC's shall be calculated in accordance with §4.2.2
- (c) §6.4 of ISO 15099 refers the issue of material properties to national standards. Material conductivities and emissivities shall be determined in accordance with Indian standards
- (d) §7 of ISO 15099 on shading systems is currently excluded
- (e) §8.2 of ISO 15099 addresses environmental conditions. The following are defined for India:

For U-factor calculations:

Tin = 24°C

Tout = 32°C

V = 3.35 m/s

Trm,out=Tout

Trm,in=Tin

Is=0 W/m²

For SHGC calculations:

Tin = 24°C

Tout = 32°C

V = 2.75 m/s

Trm,out=Tout

Appendix C: Default Values for Typical Constructions

Energy Conservation Building Code 2007 C.2

Trm,in=Tin

Is=783 W/m²

(f) §8.3 of ISO 15099 addresses convective film coefficients on the interior and exterior of the window product. In §8.3.1 of ISO 15099, simulations shall use the heat transfer coefficient based on the center of glass temperature and the entire window height; this film coefficient shall be used on all indoor surfaces, including frame sections. In §8.3.2 of ISO 15099, the formula from this section shall be applied to all outdoor exposed surfaces

(g) §8.4.2 of ISO 15099 presents two possible approaches for incorporating the impacts of self-viewing surfaces on interior radiative heat transfer calculations. Products shall use the method in §8.4.2.1 of ISO 15099 (Two-Dimensional Element to Element View Factor Based Radiation Heat Transfer Calculation). The alternate approach in §8.4.3 of ISO 15099 shall not be used

Table 1: Glazing Matrix

| Glz ID | Name | Pane 1 | Pane 2 | Pane 3 |
|---------------|------------------------------|---------------|---------------|---------------|
| | | | | |
| 1 | Option 1: Fenesta CW1 SG6mm | 103 | | |
| 2 | Option 2: Fenesta CW2 DG24mm | 103 | 1862 | |
| 3 | Option 3: Fenesta CW3 TG39mm | 103 | 1862 | 103 |

Bill Of Material:**Option 1 CW1 SG6mm**

| Glazing | | |
|-----------------------------|--------------------------------|--|
| Option 1: Fenesta CW1 SG6mm | Pane | 6 mm clear glass (IGDB – ID 103) |
| | | |
| | | |
| Spacer | | A1-S, Aluminium single seal spacer |
| | | |
| Vertical Mullion | Part # | Material |
| Glazing gasket | | Glazing set with flexible vinyl gasket and exterior bead |
| Frame | C65PS1, SAP CODE:30505 | VA- Vinyl reinforced frame |
| Frame | C65PS2, SAP CODE:30504 | VA- Vinyl reinforced frame |
| Bead | A65PB4, SAP CODE:20508 | Flexible Vinyl- Casement Single Glazing Bead |
| Reinforcement | A65RT1, SAP Code: 12683 | Galvanized Steel Sheet |
| Reinforcement | CS65RS5, SAP Code: 12695 | Galvanized Steel Sheet |
| | | |
| Head -openable | | |
| Glazing gasket | | Glazing set with flexible vinyl gasket and exterior bead |

| | | |
|------------------------|--------------------------------|---|
| Frame | A65PF1, SAP CODE:30534 | VA- Vinyl reinforced frame |
| Frame | C65PS2, SAP CODE:30504 | VA- Vinyl reinforced frame |
| Bead | A65PB4, SAP CODE:20508 | Flexible Vinyl- Casement Single Glazing Bead |
| Reinforcement | CS65RS5, SAP Code: 12695 | Galvanized Steel Sheet |
| Reinforcement | AS65RF1, SAP Code: 12679 | Galvanized Steel Sheet |
| Jamb -Openable | | |
| Glazing gasket | | Glazing set with flexible vinyl gasket and exterior bead |
| Frame | A65PF1, SAP CODE:30534 | VA- Vinyl reinforced frame |
| Frame | C65PS2, SAP CODE:30504 | VA- Vinyl reinforced frame |
| Bead | A65PB4, SAP CODE:20508 | Flexible Vinyl- Casement Single Glazing Bead |
| Reinforcement | CS65RS5, SAP Code: 12695 | Galvanized Steel Sheet |
| Reinforcement | AS65RF1, SAP Code: 12679 | Galvanized Steel Sheet |
| Sill - Openable | | |

| | | |
|---------------------|--------------------------------|--|
| Glazing gasket | | Glazing set with flexible vinyl gasket and exterior bead |
| Frame | A65PF1, SAP CODE:30534 | VA- Vinyl reinforced frame |
| Frame | C65PS2, SAP CODE:30504 | VA- Vinyl reinforced frame |
| Bead | A65PB4, SAP CODE:20508 | Flexible Vinyl- Casement Single Glazing Bead |
| Reinforcement | CS65RS5, SAP Code: 12695 | Galvanized Steel Sheet |
| Reinforcement | AS65RF1, SAP Code: 12679 | Galvanized Steel Sheet |
| Sill - Fixed | | |
| Glazing gasket | | Glazing set with flexible vinyl gasket and exterior bead |
| Frame | A65PF1, SAP CODE:30534 | VA- Vinyl reinforced frame |
| Bead | A65PB4, SAP CODE:20508 | Flexible Vinyl- Casement Single Glazing Bead |
| Reinforcement | AS65RF1, SAP Code: 12679 | Galvanized Steel Sheet |
| Head - Fixed | | |
| Glazing gasket | | Glazing set with flexible vinyl gasket and exterior bead |
| Frame | A65PF1, SAP | VA- Vinyl reinforced frame |

| | | |
|---------------------|--------------------------------|--|
| | CODE:30534 | |
| Bead | A65PB4, SAP CODE:20508 | Flexible Vinyl- Casement Single Glazing Bead |
| Reinforcement | AS65RF1, SAP Code: 12679 | Galvanized Steel Sheet |
| Jamb - Fixed | | |
| Glazing gasket | | Glazing set with flexible vinyl gasket and exterior bead |
| Frame | A65PF1, SAP CODE:30534 | VA- Vinyl reinforced frame |
| Bead | A65PB4, SAP CODE:20508 | Flexible Vinyl- Casement Single Glazing Bead |
| Reinforcement | AS65RF1, SAP Code: 12679 | Galvanized Steel Sheet |

Option 2: Fenesta CW1 DG24mm

| Glazing | | |
|----------------------------------|--------|---|
| Option 2: Fenesta CW1 DG 24mm | Pane | 24 mm 2pane IG unit with 12 mm air cavity, 6mm Laminated glass (IGDB ID # 1862) and 6mm clear glass on outer side (IGDB – ID 103) |
| Spacer | | A1-S, Aluminium single seal spacer |
| Vertical Mullion | Part # | Material |

| | | |
|-----------------------|--------------------------------|--|
| Glazing gasket | | Glazing set with flexible vinyl gasket and exterior bead |
| Frame | C65PS1, SAP CODE:30505 | VA- Vinyl reinforced frame |
| Frame | C65PS2, SAP CODE:30504 | VA- Vinyl reinforced frame |
| Bead | A65PB1, SAP CODE:20528 | Flexible Vinyl- Casement Single Glazing Bead |
| Reinforcement | A65RT1, SAP Code: 12683 | Galvanized Steel Sheet |
| Reinforcement | CS65RS5, SAP Code: 12695 | Galvanized Steel Sheet |
| Head -openable | | |
| Glazing gasket | | Glazing set with flexible vinyl gasket and exterior bead |
| Frame | A65PF1, SAP CODE:30534 | VA- Vinyl reinforced frame |
| Frame | C65PS2, SAP CODE:30504 | VA- Vinyl reinforced frame |
| Bead | A65PB1, SAP CODE:20528 | Flexible Vinyl- Casement Single Glazing Bead |
| Reinforcement | CS65RS5, SAP Code: 12695 | Galvanized Steel Sheet |
| Reinforcement | AS65RF1, SAP Code: 12679 | Galvanized Steel Sheet |

| | | |
|------------------------|--------------------------------|--|
| Jamb -Openable | | |
| Glazing gasket | | Glazing set with flexible vinyl gasket and exterior bead |
| Frame | A65PF1, SAP CODE:30534 | VA- Vinyl reinforced frame |
| Frame | C65PS2, SAP CODE:30504 | VA- Vinyl reinforced frame |
| Bead | A65PB1, SAP CODE:20528 | Flexible Vinyl- Casement Single Glazing Bead |
| Reinforcement | CS65RS5, SAP Code: 12695 | Galvanized Steel Sheet |
| Reinforcement | AS65RF1, SAP Code: 12679 | Galvanized Steel Sheet |
| Sill - Openable | | |
| Glazing gasket | | Glazing set with flexible vinyl gasket and exterior bead |
| Frame | A65PF1, SAP CODE:30534 | VA- Vinyl reinforced frame |
| Frame | C65PS2, SAP CODE:30504 | VA- Vinyl reinforced frame |
| Bead | A65PB1, SAP CODE:20528 | Flexible Vinyl- Casement Single Glazing Bead |
| Reinforcement | CS65RS5, SAP Code: 12695 | Galvanized Steel Sheet |
| Reinforcement | AS65RF1, | Galvanized Steel Sheet |

| | | |
|---------------------|--------------------------------|--|
| | SAP Code: 12679 | |
| Sill - Fixed | | |
| Glazing gasket | | Glazing set with flexible vinyl gasket and exterior bead |
| Frame | A65PF1, SAP CODE:30534 | VA- Vinyl reinforced frame |
| Bead | A65PB1, SAP CODE:20528 | Flexible Vinyl- Casement Single Glazing Bead |
| Reinforcement | AS65RF1, SAP Code: 12679 | Galvanized Steel Sheet |
| Head - Fixed | | |
| Glazing gasket | | Glazing set with flexible vinyl gasket and exterior bead |
| Frame | A65PF1, SAP CODE:30534 | VA- Vinyl reinforced frame |
| Bead | A65PB1, SAP CODE:20528 | Flexible Vinyl- Casement Single Glazing Bead |
| Reinforcement | AS65RF1, SAP Code: 12679 | Galvanized Steel Sheet |
| Jamb - Fixed | | |
| Glazing gasket | | Glazing set with flexible vinyl gasket and exterior bead |
| Frame | A65PF1, SAP CODE:30534 | VA- Vinyl reinforced frame |

| | | |
|---------------|--------------------------------|---|
| Bead | A65PB1, SAP CODE:20528 | Flexible Vinyl- Casement Single Glazing Bead |
| Reinforcement | AS65RF1, SAP Code: 12679 | Galvanized Steel Sheet |
| | | |

Option 3: Fenesta CW1 TG 39mm

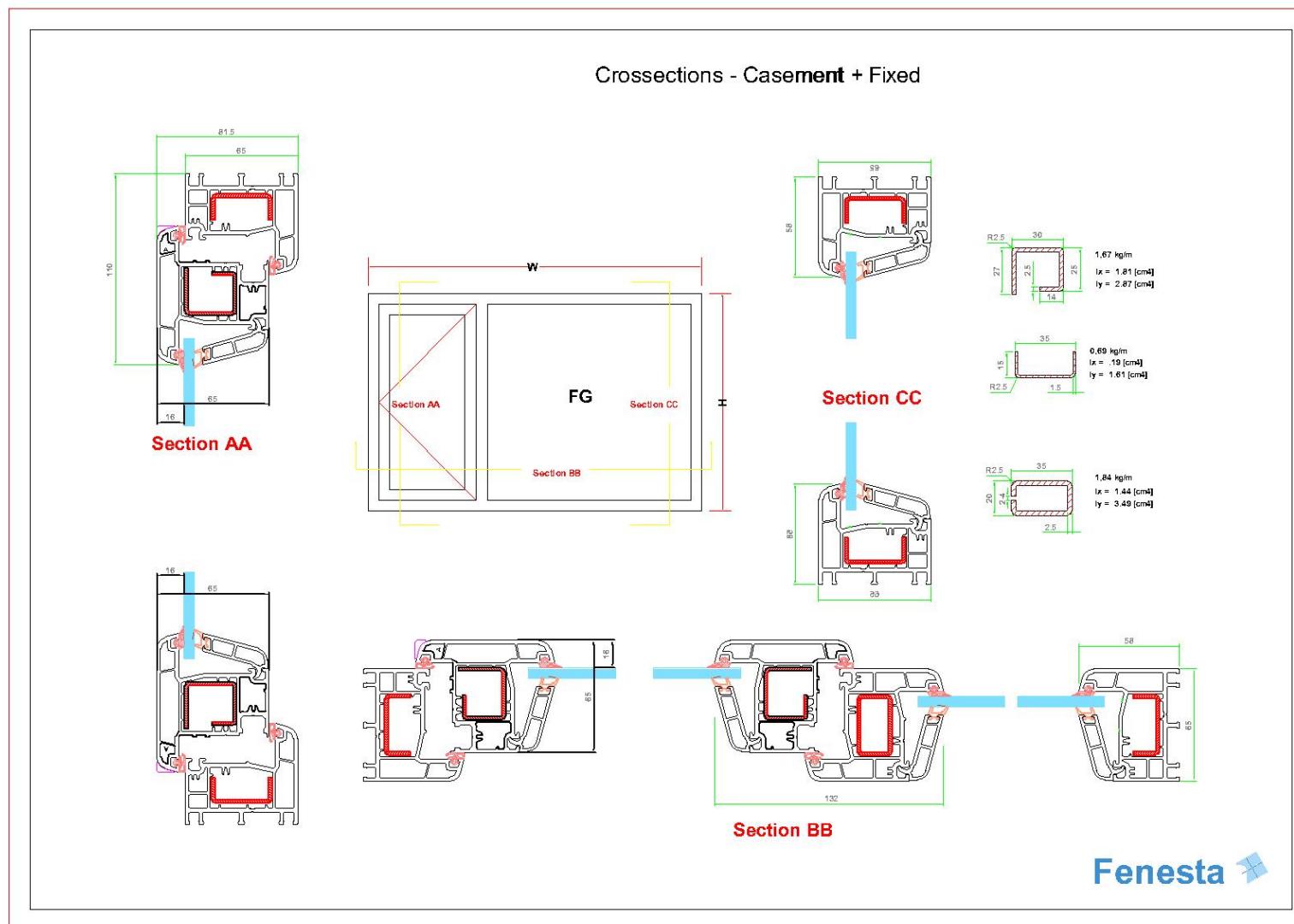
| Glazing | | |
|----------------------------------|------------------------------|--|
| Option 3: Fenesta CW1 TG 39mm | Pane | 39 mm 3 pane IG unit with 10.5 mm air cavities, 6mm Laminated glass (IGDB ID # 1862) and 6mm clear glass on outer and middle layer(IGDB – ID 103) |
| | | |
| | | |
| Spacer | | A1-S, Aluminium single seal spacer |
| Vertical Mullion | Part # | Material |
| Glazing gasket | | Glazing set with flexible vinyl gasket and exterior bead |
| Frame | C65PS1, SAP CODE:30505 | VA- Vinyl reinforced frame |
| Frame | C65PS2, SAP CODE:30504 | VA- Vinyl reinforced frame |
| Bead | A65PB2, SAP CODE:20524 | Flexible Vinyl- Casement Single Glazing Bead |
| Reinforcement | A65RT1, SAP Code: | Galvanized Steel Sheet |

| | | |
|-----------------------|--------------------------------|--|
| | 12683 | |
| Reinforcement | CS65RS5, SAP Code: 12695 | Galvanized Steel Sheet |
| | | |
| Head -openable | | |
| Glazing gasket | | Glazing set with flexible vinyl gasket and exterior bead |
| Frame | A65PF1, SAP CODE:30534 | VA- Vinyl reinforced frame |
| Frame | C65PS2, SAP CODE:30504 | VA- Vinyl reinforced frame |
| Bead | A65PB2, SAP CODE:20524 | Flexible Vinyl- Casement Single Glazing Bead |
| Reinforcement | CS65RS5, SAP Code: 12695 | Galvanized Steel Sheet |
| Reinforcement | AS65RF1, SAP Code: 12679 | Galvanized Steel Sheet |
| | | |
| Jamb -Openable | | |
| Glazing gasket | | Glazing set with flexible vinyl gasket and exterior bead |
| Frame | A65PF1, SAP CODE:30534 | VA- Vinyl reinforced frame |
| Frame | C65PS2, SAP CODE:30504 | VA- Vinyl reinforced frame |
| Bead | A65PB2, SAP CODE:20524 | Flexible Vinyl- Casement Single Glazing Bead |

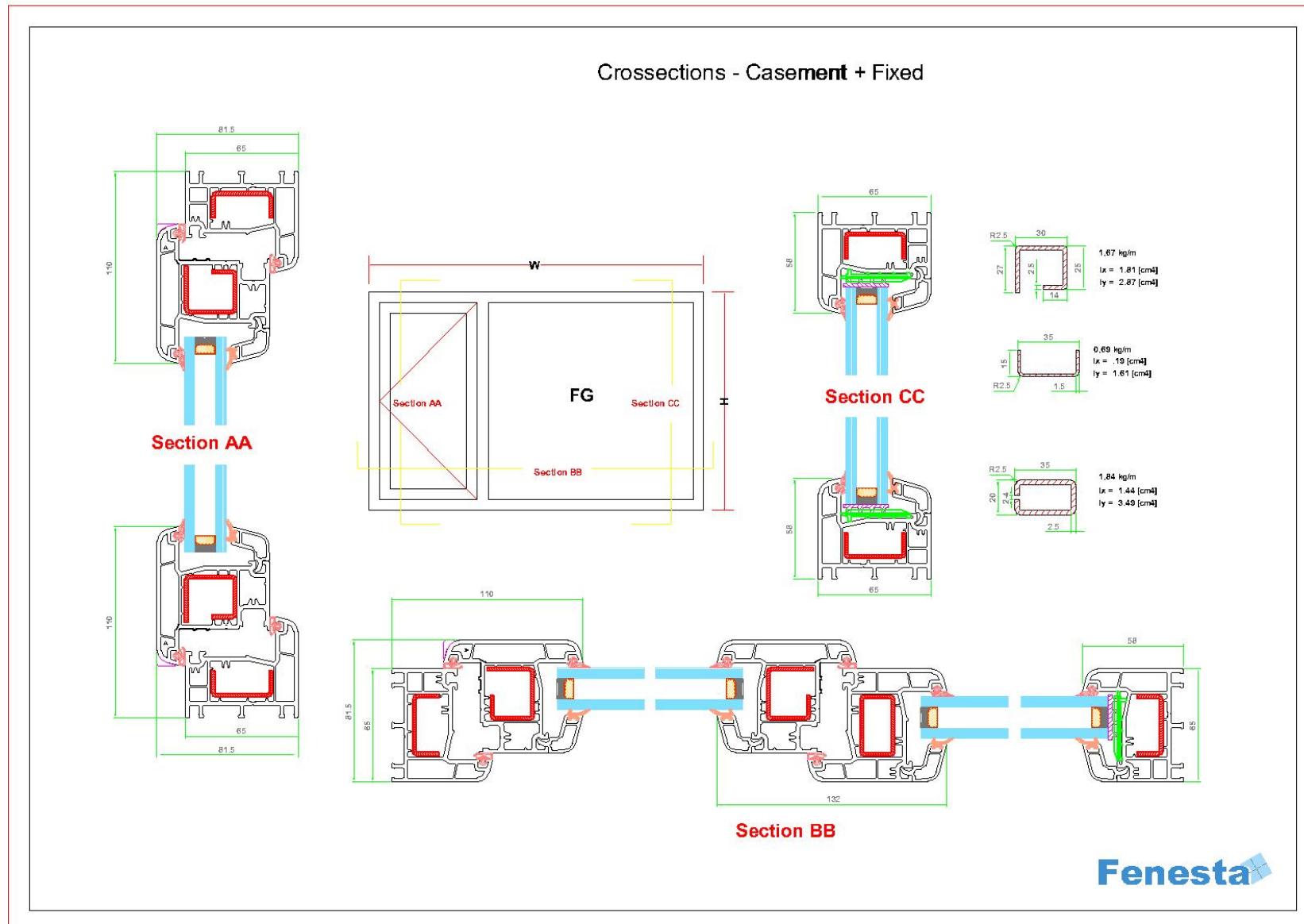
| | | |
|------------------------|--------------------------------|--|
| Reinforcement | CS65RS5, SAP Code: 12695 | Galvanized Steel Sheet |
| Reinforcement | AS65RF1, SAP Code: 12679 | Galvanized Steel Sheet |
| | | |
| Sill - Openable | | |
| Glazing gasket | | Glazing set with flexible vinyl gasket and exterior bead |
| Frame | A65PF1, SAP CODE:30534 | VA- Vinyl reinforced frame |
| Frame | C65PS2, SAP CODE:30504 | VA- Vinyl reinforced frame |
| Bead | A65PB2, SAP CODE:20524 | Flexible Vinyl- Casement Single Glazing Bead |
| Reinforcement | CS65RS5, SAP Code: 12695 | Galvanized Steel Sheet |
| Reinforcement | AS65RF1, SAP Code: 12679 | Galvanized Steel Sheet |
| | | |
| Sill - Fixed | | |
| Glazing gasket | | Glazing set with flexible vinyl gasket and exterior bead |
| Frame | A65PF1, SAP CODE:30534 | VA- Vinyl reinforced frame |
| Bead | A65PB2, SAP CODE:20524 | Flexible Vinyl- Casement Single Glazing Bead |
| Reinforcement | AS65RF1, | Galvanized Steel Sheet |

| | | |
|---------------------|--------------------------------|--|
| | SAP Code: 12679 | |
| Head - Fixed | | |
| Glazing gasket | | Glazing set with flexible vinyl gasket and exterior bead |
| Frame | A65PF1, SAP CODE:30534 | VA- Vinyl reinforced frame |
| Bead | A65PB2, SAP CODE:20524 | Flexible Vinyl- Casement Single Glazing Bead |
| Reinforcement | AS65RF1, SAP Code: 12679 | Galvanized Steel Sheet |
| Jamb - Fixed | | |
| Glazing gasket | | Glazing set with flexible vinyl gasket and exterior bead |
| Frame | A65PF1, SAP CODE:30534 | VA- Vinyl reinforced frame |
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| Reinforcement | AS65RF1, SAP Code: 12679 | Galvanized Steel Sheet |
| | | |

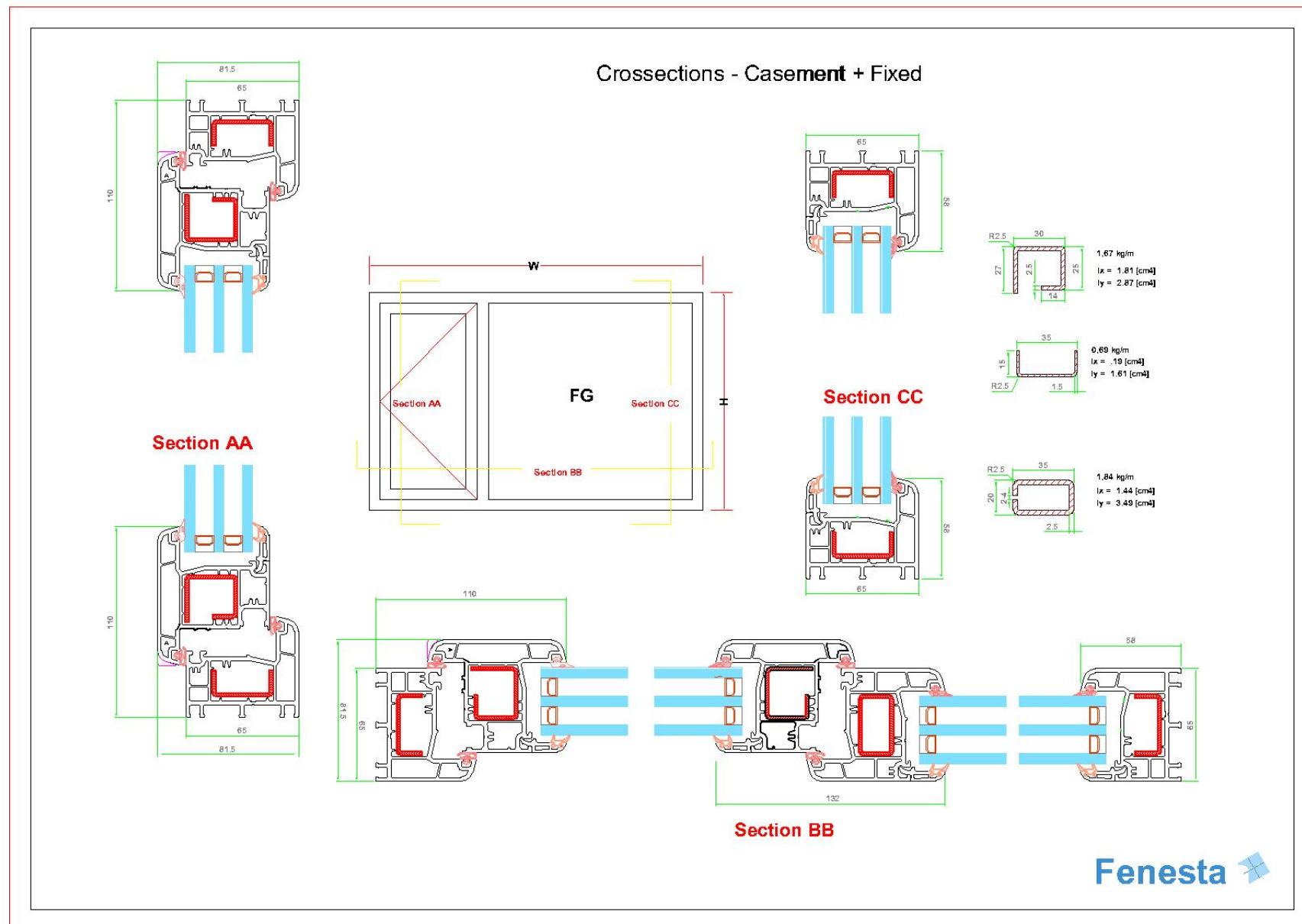
Appendix
Drawings
option 1 CW1 SG6mm



Option 2: CW1 DG24mm



Option 3: CW1 TG 39mm



Codes used in report

FRAME AND SASH CODES

| Code | Frame/Sash Type | Definition | Category |
|-------------|---------------------------------|-------------------------------|-----------------|
| VA | Vinyl w/ All Members Reinforced | Reinforcement of all members. | Vinyl |

THERMAL BREAK MATERIAL CODES

| Code | Material |
|-------------|--|
| N | No thermally broken frame/sash components. |

GAP FILL CODES

| Code | Gas |
|-------------|------------|
| N | None |
| | |

SPACER CODES

| Code | Type | Definition |
|-------------|-------------|---|
| A1-S | Aluminum | Aluminum spacer system - single sealed. |
| | | |

GRID CODES

| Code | Grid |
|-------------|-------------|
| N | No Muntins |

Conversion Table used for SI to IP conversion
Source: ASTM SI-10 (1997) document

| IP | SI | Multiply by |
|-----------------------------|--------------------|--------------------|
| btu/hr-ft ² -F | W/m ² K | 5.67823 |
| btu/s | W | 1055.056 |
| ft ² | m ² | 0.09290304 |
| F | C | 0.55555556 |
| btu/h | W | 0.2390711111 |
| inch | mm | 25.4 |
| mph | m/s | 0.44704 |
| btu/h-ft ² | W/m ² | 3.154591 |
| lb/ft ³ | kg/m ³ | 16.01846 |
| lb | kg | 0.45359237 |
| ft ³ | m ³ | 0.02831685 |
| ft | m | 0.3048 |
| btu-in/h-ft ² -F | W/m-K | 0.1442279 |
| in ² | m ² | 0.00064516 |
| in ² | mm ² | 645.16 |
| psi | kpa | 6.894757 |
| btu/lb-F | J/kg-K | 4186.8 |
| btu/lb | J/kg | 2326 |

Simulation Report

For Vinyl window in accordance with

ECBC 2007

(revised version May 2008)

Prepared for:

**Mr. Y.P.Singh
Fenesta
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Institutional Area, Gurgaon
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Phone : 79 2630 2074
Contact Person : Prof Rajan Rawal

SIMULATION REPORT

ECBC revised 2008 version modelling requirements (Add from the file)U-Factor (ECBC 2007), SHGC and VT (ECBC 2007 requirement).

| | | | |
|--|--|--------------------------------|----------------------------|
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| Series Name | Series 3000 | | |
| Report#: | GBE-1009-CS-Fenesta SW1 | | |
| Submitted To: | Y P Singh | | |
| Manufacturer: | Fenesta | | |
| Address: | Plot no 52, sector 32, Institutional Area, Gurgaon | | |
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| Baseline Simulation Date: | 09/02/2009 | | |
| Revision Date: | | | |
| Product Type: | Vinyl (UPVC) Frame Sliding Windows | | |
| Simulator: | Avlokita Agrawal | | |
| Simulator-in-Charge: | Avlokita Agrawal | | |
| Simulation Method: | Approved NFRC Software THERM5.2 and WINDOW5.2 and NFRC WINDOW/THERM simulation manual. ECBC 2007 calculation procedure. | | |
| Model/Type: | Vinyl (UPVC) Frame Sliding Windows | | |
| Size: | 1800mm x 1200mm | | |

| | |
|-------------------------------|--|
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| Sash Type and Finish: | Frame extrusion is UPVC and frame finish is Pristine white Glossy (extruded profile) |
| IG Glass Parameters: | Option 1: 6 mm clear glass (IGDB – ID 103) Option 2: 24 mm 2 pane IG unit with 12 mm air cavity, 6 mm Laminated glass (IGDB ID # 1862) and 6mm clear glass on outer side (IGDB – ID 103) |
| Glazing Method: | Glazing set with flexible vinyl gasket and exterior bead |
| Gas Fill Method: | - |
| Spacers: | Aluminum spacer system - single sealed. |
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| General Assumptions | <ul style="list-style-type: none"> Since the Glass code was not specified, it has been taken to be ID103 and ID1862 as per the qualitative specification given. The mullion is considered to be in the center as the exact distance from edge is not specified. Location may have slight impact on the final U-value as the value is size dependant. |
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| | |
|--|---------------------------------|
| | ...\ Report = simulation report |
|--|---------------------------------|

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Avlokita Agrawal

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Tout = 32°C

V = 3.35 m/s

Trm,out=Tout

Trm,in=Tin

Is=0 W/m²

For SHGC calculations:

Tin = 24°C

Tout = 32°C

V = 2.75 m/s

Trm,out=Tout

Appendix C: Default Values for Typical Constructions

Energy Conservation Building Code 2007 C.2

Trm,in=Tin

Is=783 W/m²

(f) §8.3 of ISO 15099 addresses convective film coefficients on the interior and exterior of the window product. In §8.3.1 of ISO 15099, simulations shall use the heat transfer coefficient based on the center of glass temperature and the entire window height; this film coefficient shall be used on all indoor surfaces, including frame sections. In §8.3.2 of ISO 15099, the formula from this section shall be applied to all outdoor exposed surfaces

(g) §8.4.2 of ISO 15099 presents two possible approaches for incorporating the impacts of self-viewing surfaces on interior radiative heat transfer calculations. Products shall use the method in §8.4.2.1 of ISO 15099 (Two-Dimensional Element to Element View Factor Based Radiation Heat Transfer Calculation). The alternate approach in §8.4.3 of ISO 15099 shall not be used

Table 1: Glazing Matrix

| Glz ID | Name | Pane 1 | Pane 2 | |
|---------------|------------------------------|---------------|---------------|--|
| | | | | |
| 1 | Option 1: Fenesta SW1 SG6mm | 103 | | |
| 2 | Option 2: Fenesta SW2 DG24mm | 103 | 1862 | |

Bill Of Material:

Option 1 SW1 SG6mm

| Glazing | | |
|-----------------------------|--------------------------------|--|
| Option 1: Fenesta SW1 SG6mm | Pane | 6 mm clear glass (IGDB – ID 103) |
| | | |
| | | |
| Spacer | | A1-S, Aluminium single seal spacer |
| | | |
| Vertical Mullion | Part # | Material |
| Glazing gasket | | Glazing set with flexible vinyl gasket and exterior bead |
| Frame | S65PS1, SAP CODE:30513 | VA- Vinyl reinforced frame |
| Farne Cap | S65 PO1, SAP CODE:30522 | Vinyl Interlock Cover |
| Bead | A65PB1, SAP CODE:20528 | Flexible Vinyl- Casement Single Glazing Bead |
| Reinforcement | SS65RS1, SAP Code: 12699 | Galvanized Steel Sheet |
| | | |
| Head | | |
| Glazing gasket | | Glazing set with flexible vinyl gasket and exterior bead |
| Frame | S65PF3, SAP CODE:30514 | VA- Vinyl reinforced frame |
| Frame | S65PS1, SAP CODE:30513 | VA- Vinyl reinforced frame |
| Bead | A65PB1, SAP CODE:20528 | Flexible Vinyl- Casement Single Glazing Bead |
| Reinforcement | AS65RF1, SAP Code: 12679 | Galvanized Steel Sheet |
| Reinforcement | SS65RS1, SAP Code: 12699 | Galvanized Steel Sheet |

| | | |
|----------------|--------------------------------|--|
| Jamb | | |
| Glazing gasket | | Glazing set with flexible vinyl gasket and exterior bead |
| Frame | S65PF3, SAP CODE:30514 | VA- Vinyl reinforced frame |
| Frame | S65PS1, SAP CODE:30513 | VA- Vinyl reinforced frame |
| Bead | A65PB1, SAP CODE:20528 | Flexible Vinyl- Casement Single Glazing Bead |
| Reinforcement | AS65RF1, SAP Code: 12679 | Galvanized Steel Sheet |
| Reinforcement | SS65RS1, SAP Code: 12699 | Galvanized Steel Sheet |
| Sill | | |
| Glazing gasket | | Glazing set with flexible vinyl gasket and exterior bead |
| Frame | S65PF3, SAP CODE:30514 | VA- Vinyl reinforced frame |
| Frame | S65PS1, SAP CODE:30513 | VA- Vinyl reinforced frame |
| Bead | A65PB1, SAP CODE:20528 | Flexible Vinyl- Casement Single Glazing Bead |
| Reinforcement | AS65RF1, SAP Code: 12679 | Galvanized Steel Sheet |
| Reinforcement | SS65RS1, SAP Code: 12699 | Galvanized Steel Sheet |

Option 2 SW1 DG24mm

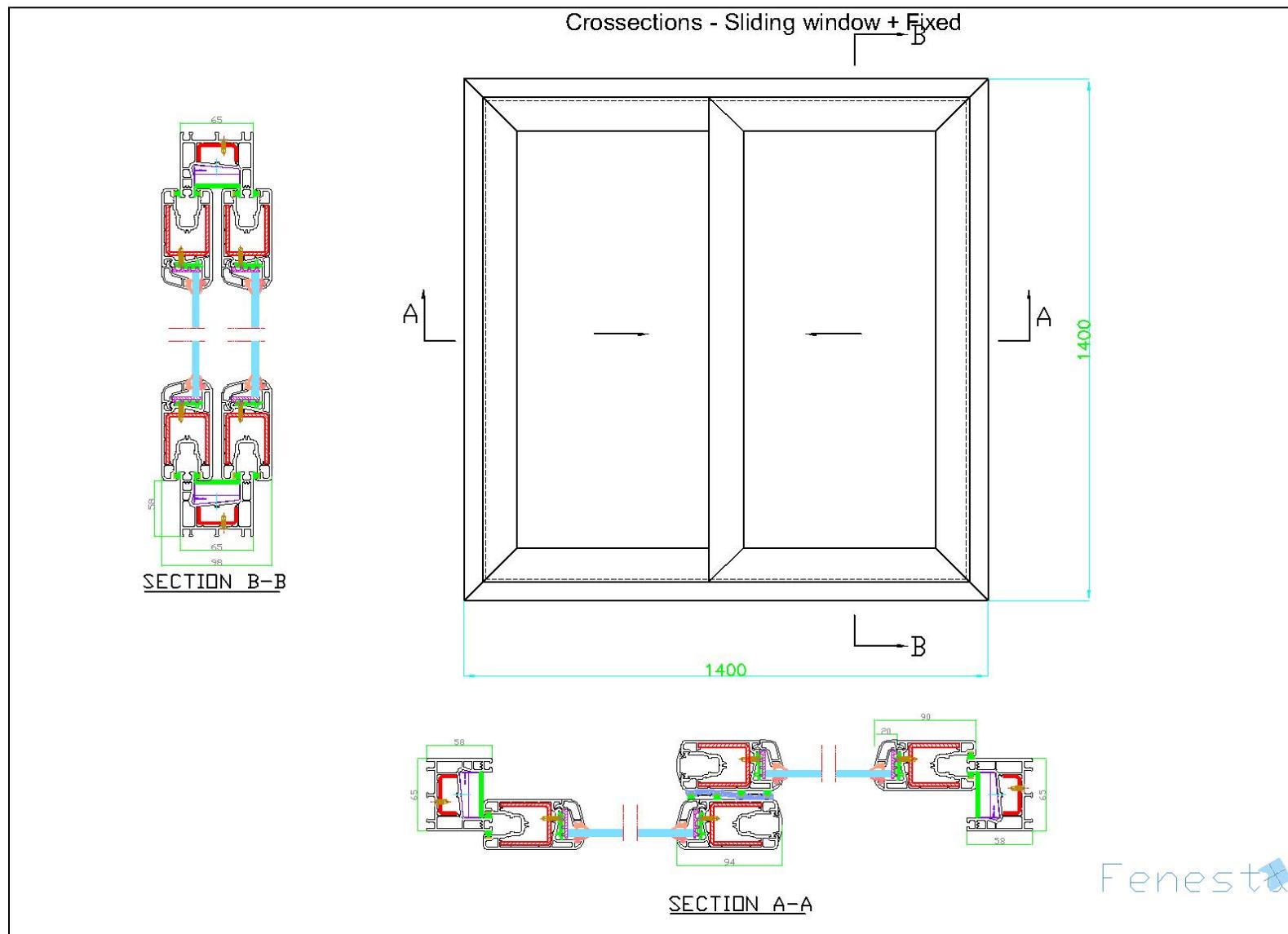
| | | |
|----------------|--|--|
| Glazing | | |
|----------------|--|--|

| | | |
|---------------------------------|--------------------------------|---|
| Option 1: Fenesta SW1 DG24mm | Pane | 24 mm 2 pane IG unit with 12 mm air cavity, 6 mm Laminated glass (IGDB ID # 1862) and 6mm clear glass on outer side (IGDB – ID 103) |
| | | |
| | | |
| Spacer | | A1-S, Aluminium single seal spacer |
| | | |
| Vertical Mullion | Part # | Material |
| Glazing gasket | | Glazing set with flexible vinyl gasket and exterior bead |
| Frame | S65PS1, SAP CODE:30513 | VA- Vinyl reinforced frame |
| Farne Cap | S65 PO1, SAP CODE:30522 | Vinyl Interlock Cover |
| Bead | A65PB2, SAP CODE:20524 | Flexible Vinyl- Casement Single Glazing Bead |
| Reinforcement | SS65RS1, SAP Code: 12699 | Galvanized Steel Sheet |
| | | |
| Head | | |
| Glazing gasket | | Glazing set with flexible vinyl gasket and exterior bead |
| Frame | S65PF3, SAP CODE:30514 | VA- Vinyl reinforced frame |
| Frame | S65PS1, SAP CODE:30513 | VA- Vinyl reinforced frame |
| Bead | A65PB2, SAP CODE:20524 | Flexible Vinyl- Casement Single Glazing Bead |
| Reinforcement | AS65RF1, SAP Code: 12679 | Galvanized Steel Sheet |
| Reinforcement | SS65RS1, SAP Code: 12699 | Galvanized Steel Sheet |
| | | |
| Jamb | | |
| Glazing gasket | | Glazing set with flexible vinyl gasket and exterior bead |

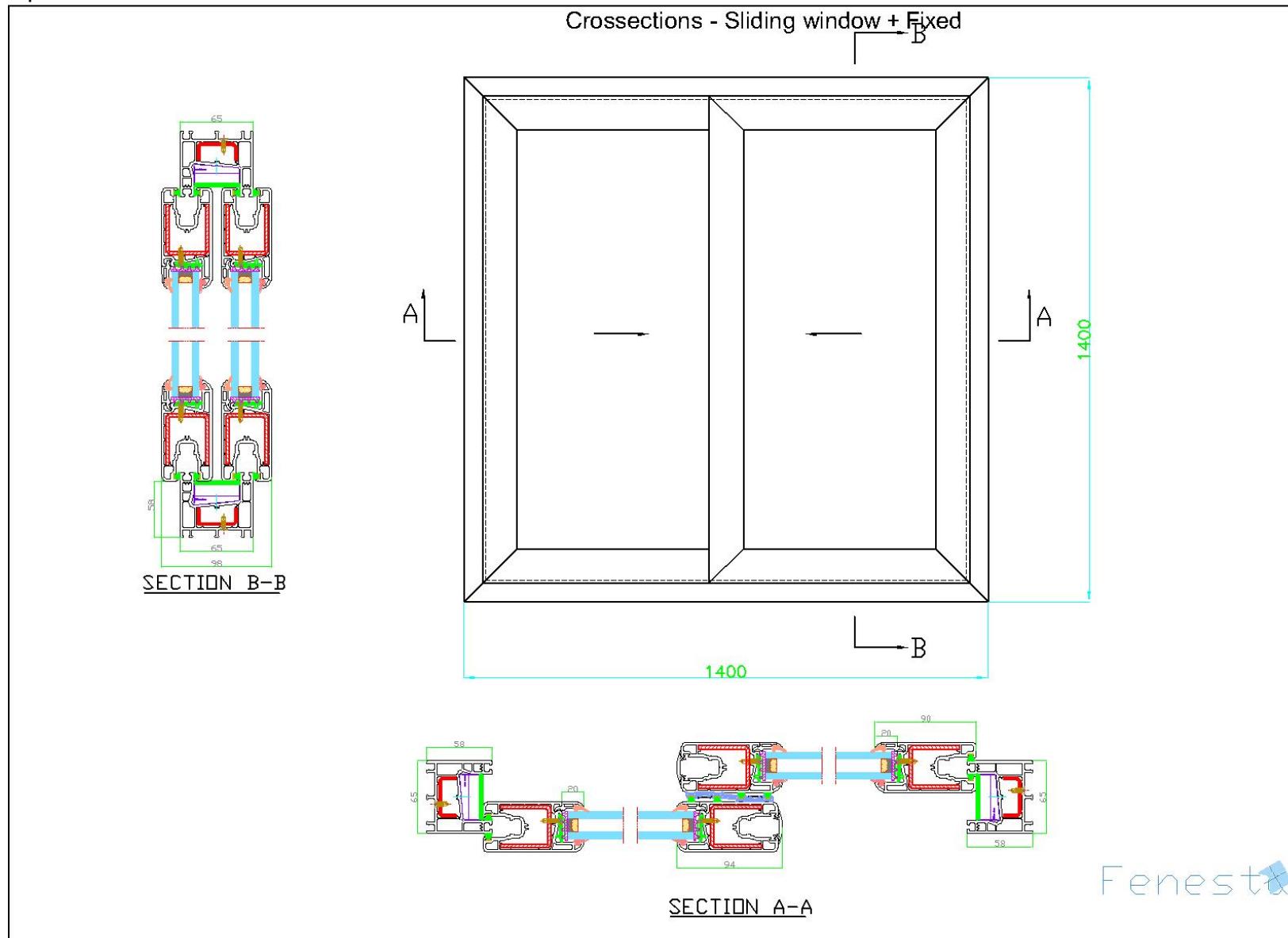
| | | |
|----------------|--------------------------------|---|
| Frame | S65PF3, SAP CODE:30514 | VA- Vinyl reinforced frame |
| Frame | S65PS1, SAP CODE:30513 | VA- Vinyl reinforced frame |
| Bead | A65PB2, SAP CODE:20524 | Flexible Vinyl- Casement Single Glazing Bead |
| Reinforcement | AS65RF1, SAP Code: 12679 | Galvanized Steel Sheet |
| Reinforcement | SS65RS1, SAP Code: 12699 | Galvanized Steel Sheet |
| Sill | | |
| Glazing gasket | | Glazing set with flexible vinyl gasket and exterior bead |
| Frame | S65PF3, SAP CODE:30514 | VA- Vinyl reinforced frame |
| Frame | S65PS1, SAP CODE:30513 | VA- Vinyl reinforced frame |
| Bead | A65PB2, SAP CODE:20524 | Flexible Vinyl- Casement Single Glazing Bead |
| Reinforcement | AS65RF1, SAP Code: 12679 | Galvanized Steel Sheet |
| Reinforcement | SS65RS1, SAP Code: 12699 | Galvanized Steel Sheet |
| | | |

Appendix
Drawings

Option 1 SW1 SG6mm



Option 2: SW1 DG24mm



Codes used in report

FRAME AND SASH CODES

| Code | Frame/Sash Type | Definition | Category |
|-------------|---------------------------------|-------------------------------|-----------------|
| VA | Vinyl w/ All Members Reinforced | Reinforcement of all members. | Vinyl |

THERMAL BREAK MATERIAL CODES

| Code | Material |
|-------------|--|
| N | No thermally broken frame/sash components. |

GAP FILL CODES

| Code | Gas |
|-------------|------------|
| N | None |
| | |

SPACER CODES

| Code | Type | Definition |
|-------------|-------------|---|
| A1-S | Aluminum | Aluminum spacer system - single sealed. |
| | | |

GRID CODES

| Code | Grid |
|-------------|-------------|
| N | No Muntins |

Conversion Table used for SI to IP conversion
Source: ASTM SI-10 (1997) document

| IP | SI | Multiply by |
|-----------------------------|--------------------|--------------------|
| btu/hr-ft ² -F | W/m ² K | 5.67823 |
| btu/s | W | 1055.056 |
| ft ² | m ² | 0.09290304 |
| F | C | 0.555555556 |
| btu/h | W | 0.2390711111 |
| inch | mm | 25.4 |
| mph | m/s | 0.44704 |
| btu/h-ft ² | W/m ² | 3.154591 |
| lb/ft ³ | kg/m ³ | 16.01846 |
| lb | kg | 0.45359237 |
| ft ³ | m ³ | 0.02831685 |
| ft | m | 0.3048 |
| btu-in/h-ft ² -F | W/m-K | 0.1442279 |
| in ² | m ² | 0.00064516 |
| in ² | mm ² | 645.16 |
| psi | kpa | 6.894757 |
| btu/lb-F | J/kg-K | 4186.8 |
| btu/lb | J/kg | 2326 |