

# SUZHOU TRYBA BUILDING MATERIALS TECHNOLOGY CO.,LTD COMPUTER SIMULATION REPORT

## SCOPE OF WORK

TILT AND TURN WINDOW - NFRC 100/200/500

## REPORT NUMBER

P8762.01-116-45 R2

## TEST DATE

05/17/23

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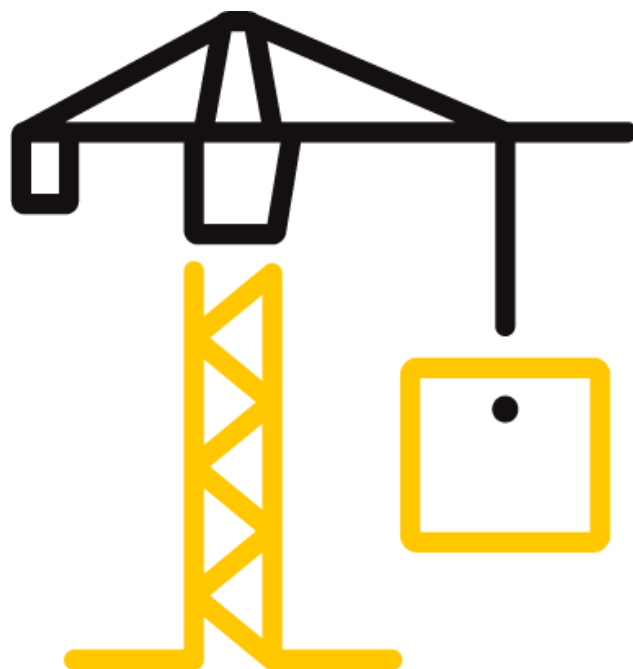
## PAGES

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## TEST REPORT FOR SUZHOU TRYBA BUILDING MATERIALS TECHNOLOGY CO., LTD

Report No: P8762.01-116-45 R2

Date: 05/17/23

### REPORT ISSUED TO

#### SUZHOU TRYBA BUILDING MATERIALS TECHNOLOGY CO., LTD

Room 3600-3606, 3608, Building 1

Golden River Building, No. 35

Shishan Road, Suzhou, China

### SECTION 1


#### SUMMARY

##### SERIES/MODEL: Tilt and Turn Window

Architectural Testing, Inc. (an Intertek company) dba Intertek Building & Construction (B&C) was contracted to perform U-Factor, Solar Heat Gain Coefficient, Visible Transmittance and Condensation Resistance simulations in accordance with the National Fenestration Rating Council (NFRC).

This report does not constitute certification of this product nor an opinion or endorsement by this laboratory. Intertek B&C will service this report for the entire test record retention period. The test record retention period ends five years after the test date. Test records, such as detailed drawings, datasheets, representative samples of test specimens, or other pertinent project documentation, will be retained for the entire test record retention period.

FOR INTERTEK B&C:

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**DATE:** 05/17/23

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**DATE:** 05/17/23

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**SECTION 2**

**TEST METHODS**

The products were evaluated in accordance with the following:

***ANSI/NFRC 100-2020, Procedure for Determining Fenestration Product U-Factors***

***ANSI/NFRC 200-2020, Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence***

***NFRC 500-2017, Procedure for Determining Fenestration Product Condensation Resistance Values***

*\*Condensation Resistance results obtained from this procedure are for controlled laboratory conditions and do not include the effects of air movement through the specimen, solar radiation, and the thermal bridging that may occur due to the specific design and construction of the fenestration system opening.*

Ratings values included in this report are for submittals to an NFRC-licensed IA and are not meant to be used directly for labeling purposes. Only those values identified on a valid Certificate of Authorization (CA) by an NFRC accredited Inspection Agency (IA) are to be used for labeling purposes. The ratings values were rounded in accordance with NFRC 601, NFRC Unit and Measurement Policy.

Intertek B&C is an NFRC accredited simulation laboratory and all simulations were conducted in full compliance with NFRC approved procedures and specifications. The values included in this report are not considered in compliance with ANSI/NFRC 100, ANSI/NFRC 200, and/or NFRC 500 unless the associated validation test requirements have been satisfied, as applicable.

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**SECTION 3**

**TEST PROCEDURE**

The total product, including specific frame, spacer, and glass details, was modeled using NFRC approved software.

|                                   |               |
|-----------------------------------|---------------|
| <b>FRAME AND EDGE MODELING</b>    | THERM 7.4.4   |
| <b>CENTER-OF-GLASS MODELING</b>   | WINDOW 7.4.14 |
| <b>TOTAL PRODUCT CALCULATIONS</b> | WINDOW 7.4.14 |
| <b>SPECTRAL DATA LIBRARY</b>      | IGDB 91.0     |

**Modeling Assumptions / Technical Interpretations**

Any modeling assumptions and technical interpretations required to model this product are listed below.

- 1) To prevent air infiltration, tape was applied to all interior sash crack locations.
- 2) Grids did not require modeling per the NFRC 3mm rule.

**SECTION 4**

**SIMULATION SPECIMEN DESCRIPTION**

|                       |                             |
|-----------------------|-----------------------------|
| <b>SERIES/MODEL</b>   | Tilt and Turn Window        |
| <b>PRODUCT TYPE</b>   | Dual Action (Tilt Turn)     |
| <b>FRAME MATERIAL</b> | VR - Vinyl w/ Reinforcement |
| <b>SASH MATERIAL</b>  | VR - Vinyl w/ Reinforcement |
| <b>STANDARD SIZE</b>  | 1200mm x 1500mm             |

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**SECTION 4 (Continued)**

**SIMULATION SPECIMEN DESCRIPTION**

| <b>SPACER OPTIONS</b>   |                     |                       |             |
|-------------------------|---------------------|-----------------------|-------------|
| <b>TYPE</b>             | <b>PRIMARY SEAL</b> | <b>SECONDARY SEAL</b> | <b>CODE</b> |
| Aluminum Spacer         | Butyl Rubber        | Silicone              | A1-D        |
| Technoform TGI-M Spacer | PIB                 | Silicone              | TS-D        |

| <b>GRID OPTIONS</b> |                                     |                     |
|---------------------|-------------------------------------|---------------------|
| <b>GRID SIZE</b>    | <b>GRID TYPE</b>                    | <b>GRID PATTERN</b> |
| 11mm x 18mm         | Aluminum Rectangular Grid (Painted) | NFRC Standard       |

| <b>REINFORCEMENT OPTIONS</b> |                 |
|------------------------------|-----------------|
| <b>LOCATION</b>              | <b>MATERIAL</b> |
| All frame and sash members   | Galv. Steel     |

| <b>GAS FILLING TECHNIQUE</b> |                      |
|------------------------------|----------------------|
| <b>FILL TYPE</b>             | <b>METHOD</b>        |
| 90% Argon                    | Single or dual probe |

| <b>EDGE-OF-GLASS CONSTRUCTION</b> |                                 |
|-----------------------------------|---------------------------------|
| <b>INTERIOR CONDITION</b>         | PVC glazing bead with EPDM fins |
| <b>EXTERIOR CONDITION</b>         | PVC leg with EPDM gasket        |

| <b>WEATHERSTRIPPING</b> |                 |                                 |
|-------------------------|-----------------|---------------------------------|
| <b>TYPE</b>             | <b>QUANTITY</b> | <b>LOCATION</b>                 |
| EPDM Gasket             | 2               | Frame Exterior/Center Perimeter |
| EPDM Gasket             | 1               | Sash Interior Perimeter         |

| <b>FRAME/SASH MATERIALS FINISH</b> |                      |
|------------------------------------|----------------------|
| <b>INTERIOR</b>                    | Vinyl (Renolit Film) |
| <b>EXTERIOR</b>                    | Vinyl (Renolit Film) |

| <b>VALIDATION MATRIX*</b> |                      |
|---------------------------|----------------------|
| <b>PRODUCT LINE</b>       | <b>REPORT NUMBER</b> |
| None                      | -                    |

*\*These products are part of a validation matrix. Only one is required for validation testing.*

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**SECTION 5**

**SPECIALTY PRODUCTS TABLE**

The specialty products method allows the manufacturer to determine the overall product SHGC and VT for any glazing option. The center of glass SHGC and/or VT must be determined using WINDOW 7.4.14. The method calculates overall product SHGC and VT indexed on center of glass properties. All values used in the calculations are truncated to six decimal place precision.

|              | No Dividers | Dividers < 1 | Dividers > 1 |
|--------------|-------------|--------------|--------------|
| <b>SHGC0</b> | 0.004992    | 0.007522     | 0.009894     |
| <b>SHGC1</b> | 0.664942    | 0.589974     | 0.519686     |
| <b>VT0</b>   | 0.000000    | 0.000000     | 0.000000     |
| <b>VT1</b>   | 0.659951    | 0.582452     | 0.509792     |

$$SHGC = SHGC0 + SHGCc (SHGC1 - SHGC0)$$

$$VT = VT0 + VTc (VT1 - VT0)$$

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### SECTION 6

### SIMULATION RESULTS

| TOTAL PRODUCT CALCULATIONS (Tilt and Turn Window) |  |                  |                       |  |                       |                  |                       |  |                       |                              |        |           |
|---|--|------------------|-----------------------|--|-----------------------|------------------|-----------------------|--|-----------------------|------------------------------|--------|-----------|
| Option Number                                     | Pane Thickness 1 (in)  | Gap Width 1 (in) | Pane Thickness 2 (in) | Gap Width 2 (in)   | Pane Thickness 3 (in) | Gap Width 3 (in) | Pane Thickness 4 (in) | Gap Fill   | Low-e (Surface #)     | Tint                         | Spacer | Grid Type |
|   | U-Factor (Btu/Hr-Ft2-F)  |                  |                       | Solar Heat Gain Coefficient (SHGC) Grids (None / <1 / >=1) |                       |                  |                       | Visible Transmittance (VT) Grids (None / <1 / >=1) |                       | Condensation Resistance (CR) |        |           |
| 1   | Clear/Air/Clear/Air/Clear (5mm/5mm/5mm) 1.77" IG                       |                  |                       |  |                       |                  |                       |  |                       |                              |        |           |
|   | 0.191  | 0.594            | 0.191                 | 0.594  | 0.191                 |                  |                       | AIR  |                       | CL                           | A1-D   | N,G       |
|   | U-Factor 0.29  |                  |                       | SHGC(N/<1) 0.46 / 0.41                                     |                       |                  |                       | VT(N/<1) 0.49 / 0.43                               |                       | CR 58                        |        |           |
| 2   | Clear/Air/Clear/Air/Light Gray (5mm/5mm/5mm) 1.77" IG                  |                  |                       |  |                       |                  |                       |  |                       |                              |        |           |
|   | 0.191  | 0.594            | 0.191                 | 0.594  | 0.191                 |                  |                       | AIR  |                       | GY                           | A1-D   | N         |
|   | U-Factor 0.29  |                  |                       | SHGC(N) 0.44   |                       |                  |                       | VT(N) 0.37   |                       | CR 58                        |        |           |
| 3   | CEV11-55T/Air/Clear/Air/Clear (5mm/5mm/5mm) 1.77" IG                   |                  |                       |  |                       |                  |                       |  |                       |                              |        |           |
|   | 0.195  | 0.594            | 0.191                 | 0.594  | 0.191                 |                  |                       | AIR  | 0.050(#2)             | CL                           | A1-D   | N         |
|   | U-Factor 0.24  |                  |                       | SHGC(N) 0.18   |                       |                  |                       | VT(N) 0.28   |                       | CR 63                        |        |           |
| 4   | CEV11-55T/Arg90/Clear/Arg90/Clear (5mm/5mm/5mm) 1.77" IG               |                  |                       |  |                       |                  |                       |  |                       |                              |        |           |
|   | 0.195  | 0.594            | 0.191                 | 0.594  | 0.191                 |                  |                       | ARG90  | 0.050(#2)             | CL                           | A1-D   | N         |
|   | U-Factor 0.22  |                  |                       | SHGC(N) 0.17   |                       |                  |                       | VT(N) 0.28   |                       | CR 65                        |        |           |
| 5   | CEV11-55T/Arg90/Clear/Arg90/Clear (5mm/5mm/5mm) 1.77" IG               |                  |                       |  |                       |                  |                       |  |                       |                              |        |           |
|   | 0.195  | 0.594            | 0.191                 | 0.594  | 0.191                 |                  |                       | ARG90  | 0.050(#2)             | CL                           | TS-D   | N         |
|   | U-Factor 0.21  |                  |                       | SHGC(N) 0.17   |                       |                  |                       | VT(N) 0.28   |                       | CR 71                        |        |           |
| 6   | CEF13-69/Arg90/CEF13-69/Arg90/Clear (6mm/6mm/6mm) 1.65" IG             |                  |                       |  |                       |                  |                       |  |                       |                              |        |           |
|   | 0.235  | 0.472            | 0.235                 | 0.472  | 0.231                 |                  |                       | ARG90  | 0.084(#2) / 0.084(#4) | CL                           | TS-D   | N         |
|   | U-Factor 0.18  |                  |                       | SHGC(N) 0.21   |                       |                  |                       | VT(N) 0.29   |                       | CR 74                        |        |           |
| 7   | CEF13-69/Arg90/Clear/Arg90/Gray (6mm/6mm/6mm) 1.65" IG                 |                  |                       |  |                       |                  |                       |  |                       |                              |        |           |
|   | 0.235  | 0.472            | 0.235                 | 0.472  | 0.233                 |                  |                       | ARG90  | 0.084(#2) / 0.084(#4) | GY                           | TS-D   | N         |
|   | U-Factor 0.18  |                  |                       | SHGC(N) 0.21   |                       |                  |                       | VT(N) 0.14   |                       | CR 74                        |        |           |
| 8   | CEF13-69/Air/Clear/Air/Gray (6mm/6mm/6mm) 1.65" IG                     |                  |                       |  |                       |                  |                       |  |                       |                              |        |           |
|   | 0.235  | 0.472            | 0.231                 | 0.472  | 0.233                 |                  |                       | AIR  | 0.084(#2)             | GY                           | A1-D   | N         |
|   | U-Factor 0.24  |                  |                       | SHGC(N) 0.26   |                       |                  |                       | VT(N) 0.18   |                       | CR 62                        |        |           |
| 9   | CES11-80T/Air/Low Iron Clear/Air/Low Iron Clear (6mm/6mm/6mm) 1.65" IG |                  |                       |  |                       |                  |                       |  |                       |                              |        |           |
|   | 0.230  | 0.472            | 0.239                 | 0.472  | 0.239                 |                  |                       | AIR  | 0.125(#2)             | CL                           | A1-D   | N         |
|   | U-Factor 0.25  |                  |                       | SHGC(N) 0.37   |                       |                  |                       | VT(N) 0.46   |                       | CR 61                        |        |           |
| 10  | Clear/Air/Clear/Air/Clear (6mm/6mm/6mm) 1.65" IG                       |                  |                       |  |                       |                  |                       |  |                       |                              |        |           |
|   | 0.231  | 0.472            | 0.231                 | 0.472  | 0.231                 |                  |                       | AIR  |                       | CL                           | A1-D   | N         |
|   | U-Factor 0.30  |                  |                       | SHGC(N) 0.45   |                       |                  |                       | VT(N) 0.49   |                       | CR 56                        |        |           |

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### SECTION 6 (Continued)

### SIMULATION RESULTS

| TOTAL PRODUCT CALCULATIONS (Tilt and Turn Window) |   |                  |                       |  |                       |                  |                       |  |                       |                              |        |           |
|---|---|------------------|-----------------------|--|-----------------------|------------------|-----------------------|--|-----------------------|------------------------------|--------|-----------|
| Option Number                                     | Pane Thickness 1 (in)   | Gap Width 1 (in) | Pane Thickness 2 (in) | Gap Width 2 (in)   | Pane Thickness 3 (in) | Gap Width 3 (in) | Pane Thickness 4 (in) | Gap Fill   | Low-e (Surface #)     | Tint                         | Spacer | Grid Type |
|   | U-Factor (Btu/Hr-Ft2-F)   |                  |                       | Solar Heat Gain Coefficient (SHGC) Grids (None / <1 / >=1) |                       |                  |                       | Visible Transmittance (VT) Grids (None / <1 / >=1) |                       | Condensation Resistance (CR) |        |           |
| 11  | CEF13-69/Air/Clear/Air/Clear (6mm/6mm/6mm) 1.65" IG                           |                  |                       |  |                       |                  |                       |  |                       |                              |        |           |
|   | 0.235   | 0.472            | 0.231                 | 0.472  | 0.231                 |                  |                       | AIR  | 0.084(#2)             | CL                           | A1-D   | N         |
|   | U-Factor 0.24   |                  |                       | SHGC(N) 0.27   |                       |                  |                       | VT(N) 0.37   |                       | CR 62                        |        |           |
| 12  | CEF13-69/Arg90/Clear/Arg90/Clear (6mm/6mm/6mm) 1.65" IG                       |                  |                       |  |                       |                  |                       |  |                       |                              |        |           |
|   | 0.235   | 0.472            | 0.231                 | 0.472  | 0.231                 |                  |                       | ARG90  | 0.084(#2)             | CL                           | A1-D   | N         |
|   | U-Factor 0.22   |                  |                       | SHGC(N) 0.27   |                       |                  |                       | VT(N) 0.37   |                       | CR 64                        |        |           |
| 13  | CEF13-69/Arg90/Clear/Arg90/Clear (6mm/6mm/6mm) 1.65" IG                       |                  |                       |  |                       |                  |                       |  |                       |                              |        |           |
|   | 0.235   | 0.472            | 0.231                 | 0.472  | 0.231                 |                  |                       | ARG90  | 0.084(#2)             | CL                           | TS-D   | N         |
|   | U-Factor 0.21   |                  |                       | SHGC(N) 0.27   |                       |                  |                       | VT(N) 0.37   |                       | CR 68                        |        |           |
| 14  | CEN12-40/Air/Clear/Air/Clear (6mm/6mm/6mm) 1.65" IG                           |                  |                       |  |                       |                  |                       |  |                       |                              |        |           |
|   | 0.236   | 0.472            | 0.231                 | 0.472  | 0.231                 |                  |                       | AIR  | 0.063(#2)             | CL                           | A1-D   | N         |
|   | U-Factor 0.24   |                  |                       | SHGC(N) 0.17   |                       |                  |                       | VT(N) 0.25   |                       | CR 62                        |        |           |
| 15  | Clear/Air/Clear/Air/Clear (8mm/8mm/8mm) 1.89" IG                              |                  |                       |  |                       |                  |                       |  |                       |                              |        |           |
|   | 0.311   | 0.472            | 0.311                 | 0.472  | 0.311                 |                  |                       | AIR  |                       | CL                           | A1-D   | N         |
|   | U-Factor 0.29   |                  |                       | SHGC(N) 0.42   |                       |                  |                       | VT(N) 0.47   |                       | CR 56                        |        |           |
| 16  | SJ65S-1/Arg90/SJ65S-1/Arg90/Clear (8mm/8mm/8mm) 1.89" IG                      |                  |                       |  |                       |                  |                       |  |                       |                              |        |           |
|   | 0.310   | 0.472            | 0.310                 | 0.472  | 0.311                 |                  |                       | ARG90  | 0.026(#2) / 0.026(#4) | CL                           | TS-D   | N         |
|   | U-Factor 0.17   |                  |                       | SHGC(N) 0.14   |                       |                  |                       | VT(N) 0.27   |                       | CR 75                        |        |           |
| 17  | Clear Lami/Air/Clear Lami (6mm   114PVB   6mm/6mm   114PVB   6mm) 1.63" IG    |                  |                       |  |                       |                  |                       |  |                       |                              |        |           |
|   | 0.506   | 0.594            | 0.506                 |  |                       |                  |                       | AIR  |                       | CL                           | A1-D   | N         |
|   | U-Factor 0.38   |                  |                       | SHGC(N) 0.43   |                       |                  |                       | VT(N) 0.51   |                       | CR 46                        |        |           |
| 18  | CEF13-69 Lami/Air/Clear Lami (6mm   114PVB   6mm/6mm   114PVB   6mm) 1.63" IG |                  |                       |  |                       |                  |                       |  |                       |                              |        |           |
|   | 0.511   | 0.594            | 0.506                 |  |                       |                  |                       | AIR  | 0.084(#2)             | CL                           | A1-D   | N         |
|   | U-Factor 0.29   |                  |                       | SHGC(N) 0.27   |                       |                  |                       | VT(N) 0.39   |                       | CR 54                        |        |           |
| 19  | Clear Lami/Air/Clear Lami (6mm   114PVB   6mm/10mm) 1.63" IG                  |                  |                       |  |                       |                  |                       |  |                       |                              |        |           |
|   | 0.506   | 0.594            | 0.390                 |  |                       |                  |                       | AIR  |                       | CL                           | A1-D   | N         |
|   | U-Factor 0.39   |                  |                       | SHGC(N) 0.43   |                       |                  |                       | VT(N) 0.51   |                       | CR 45                        |        |           |



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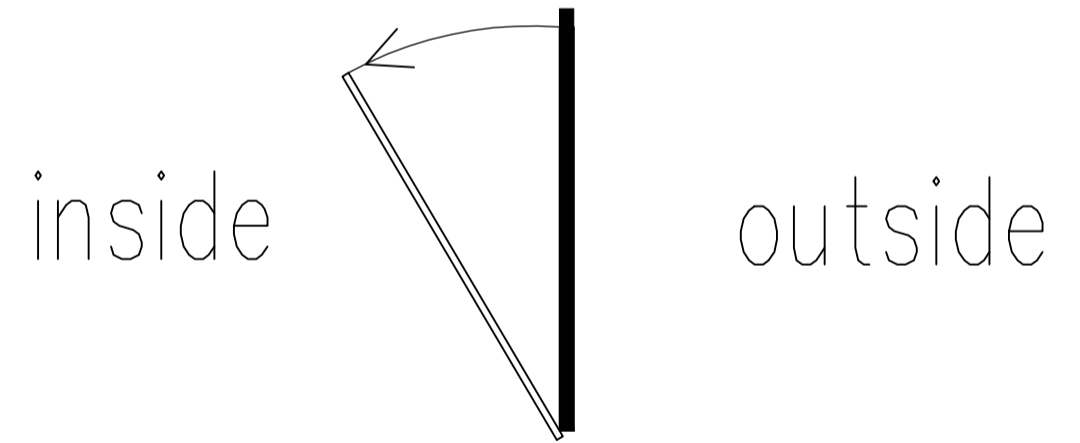
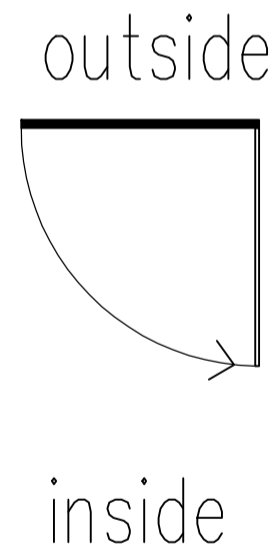
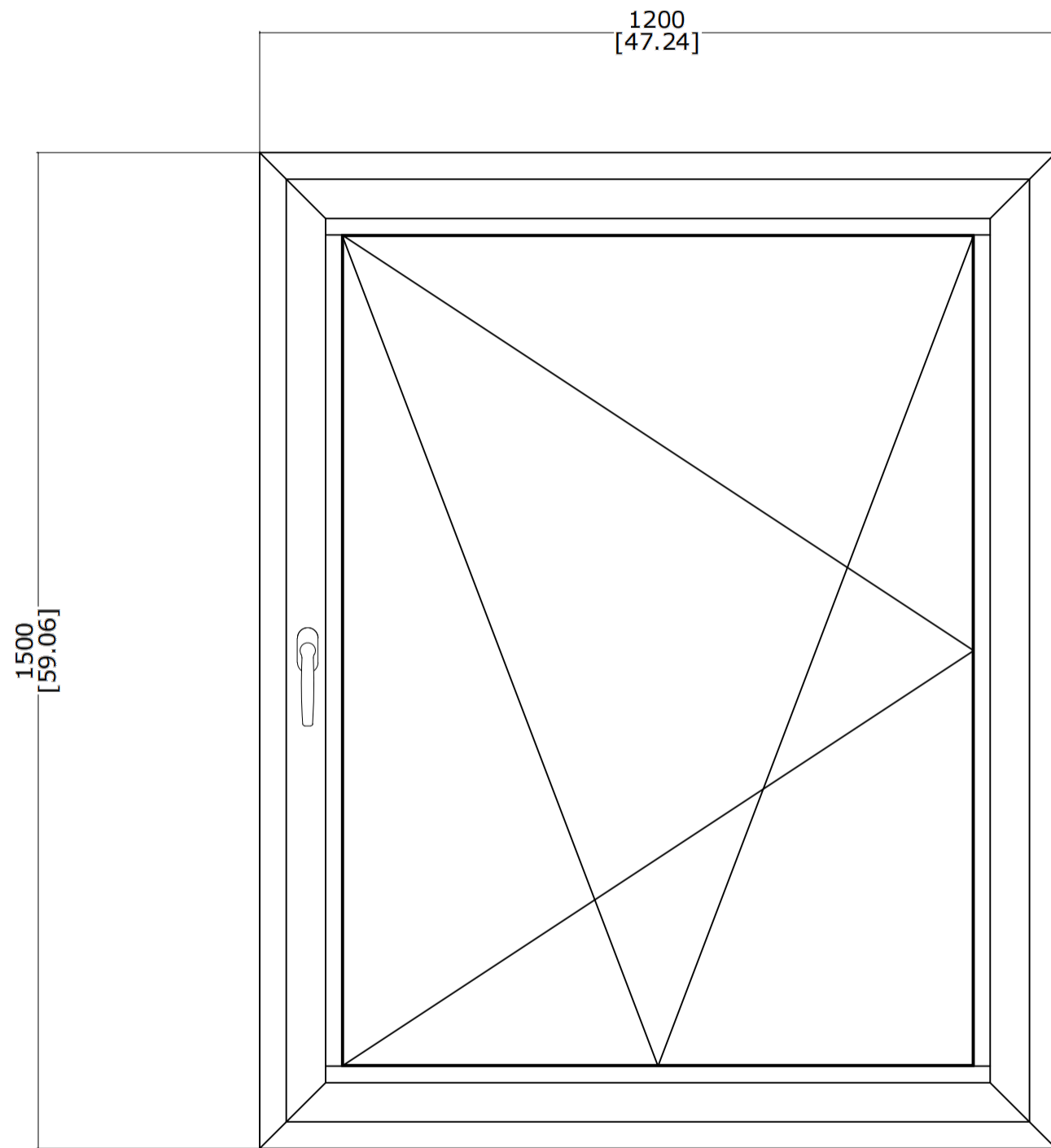
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**SECTION 7**

**DRAWINGS / BILL OF MATERIALS**

The drawings which follow have been reviewed by Intertek B&C and are representative of the simulation results reported herein. Any deviations are documented herein or on the drawings.

Product Name: Tilt and turn window



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**SECTION 8**

**REVISION LOG**

| REVISION # | DATE     | PAGES | REVISION  |
|------------|----------|-------|---|
| .01 R0     | 05/17/23 | N/A   | Original report issue.  |
| .01 R1     | 05/20/23 | N/A   | Revised to correct series/model, company name, amd drawings callouts. |
| .01 R2     | 05/31/23 | N/A   | Revised to correct drawing package.                                   |
| .02 R0     | 02/07/25 | N/A   | Updated Company Name and Address                                      |