

AAMA 507-03 THERMAL PERFORMANCE REPORT

Rendered to:

TUBELITE, INC.

SERIES/MODEL: 14000 Center

TYPE: Glazed Wall System

Report No: 65916.01-116-45
Report Date: 06/23/06

AAMA 507-03 THERMAL PERFORMANCE REPORT

Rendered to:

TUBELITE, INC.
4878 Mackinaw Trail
Reed City, Michigan 49677

Report No: 65916.01-116-45
Report Date: 06/23/06

Project Summary:

Architectural Testing, Inc. (ATI) was contracted by Tubelite, Inc. to provide U-Factor and Solar Heat Gain Coefficient thermal performance ratings on the 14000 Center Glazed Wall System. The thermal performance ratings were determined in accordance with AAMA 507-03, *Standard Practice for Determining the Thermal Performance Characteristics of Fenestration Systems Installed in Commercial Building*.

Reference Documents:

AAMA 507-03, Standard Practice for Determining the Thermal Performance Characteristics of Fenestration Systems Installed in Commercial Buildings

NFRC 100-2001, Procedure for Determining Fenestration Product U-Factors

NFRC 200-2001, Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence

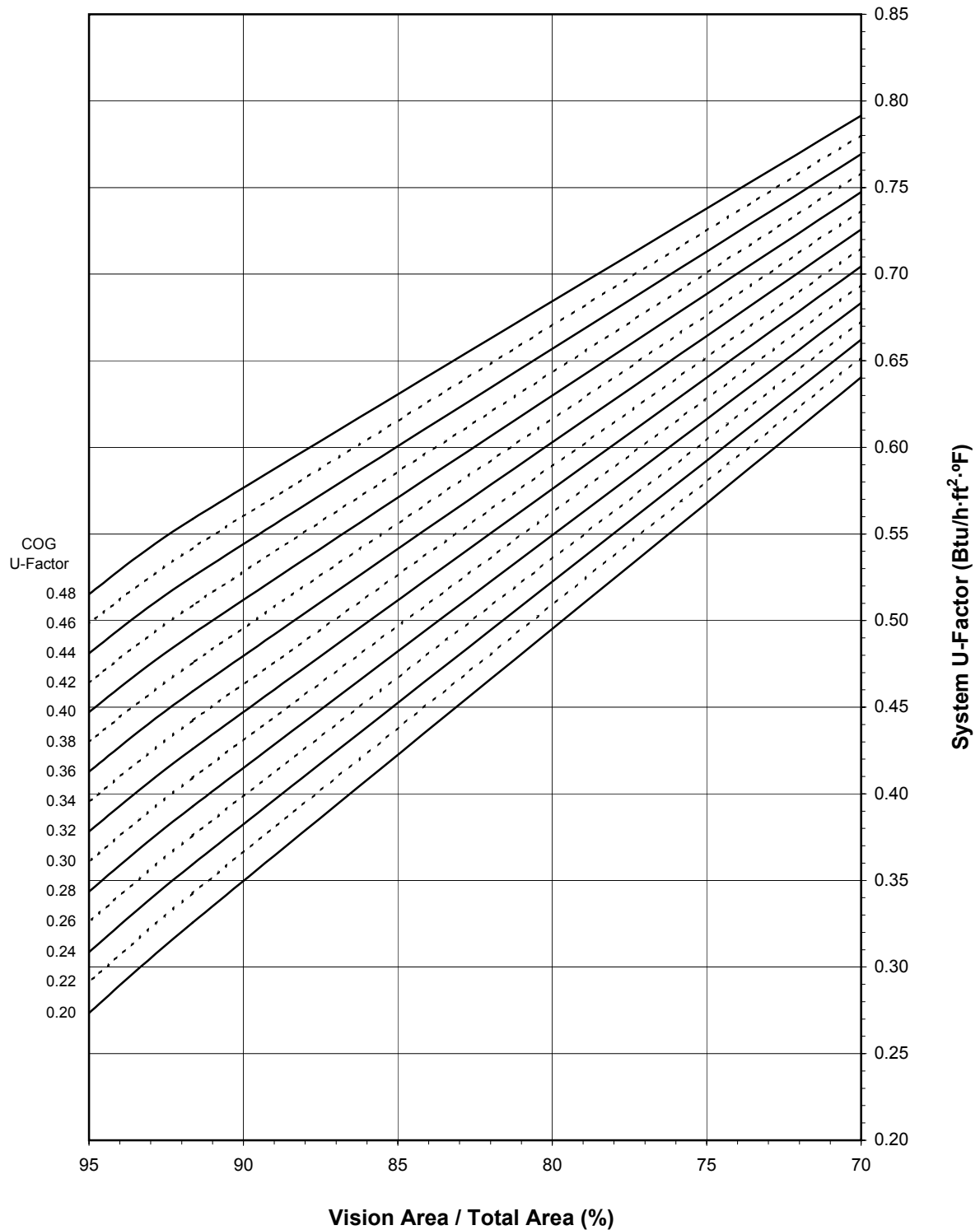
NFRC Technical Interpretation TI-2003-12, Curtain Wall Simulation

Simulation Specimen Description:

| | |
|---------------------------|---|
| Series/Model: | 14000 Center |
| Type: | Glazed Wall System |
| Frame Material: | Thermally Broken Aluminum Framing System |
| Specimen Size: | 2000mm wide by 2000mm high (78-3/4" by 78-3/4") |
| Configuration: | Two vision lites separated by one intermediate vertical |
| Drawing Reference: | Tubelite Drawing 14000 Center |

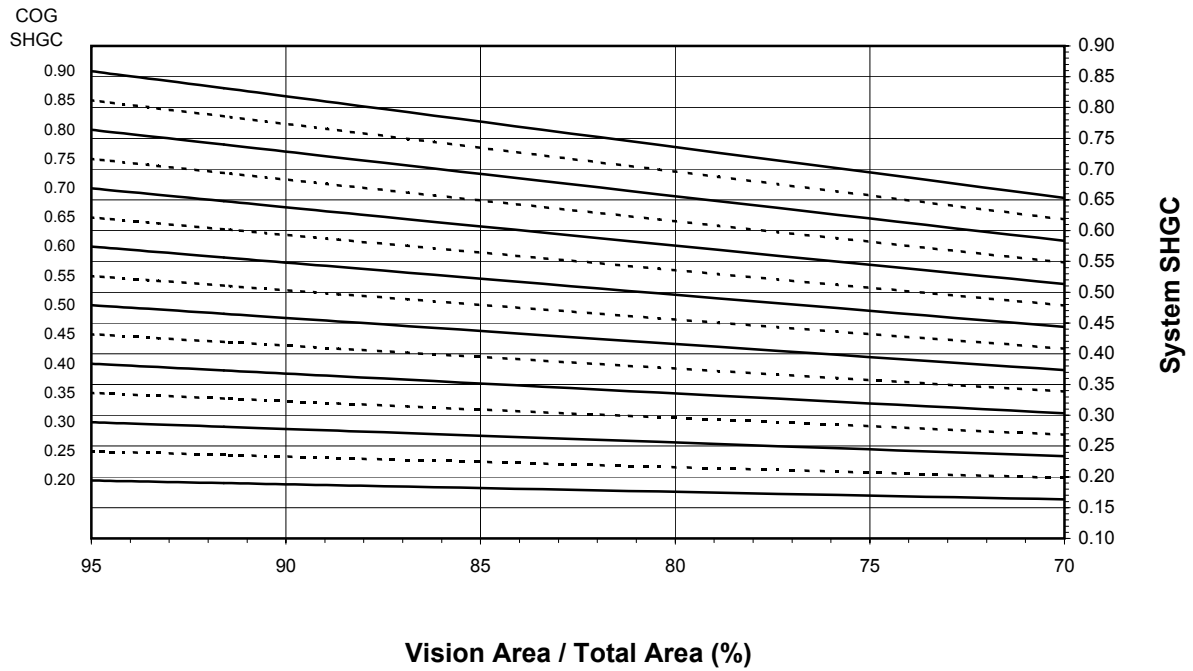
Tubelite, Inc.
14000 Center Glazed Wall System

System U-Factor vs. Percentage of Vision Area

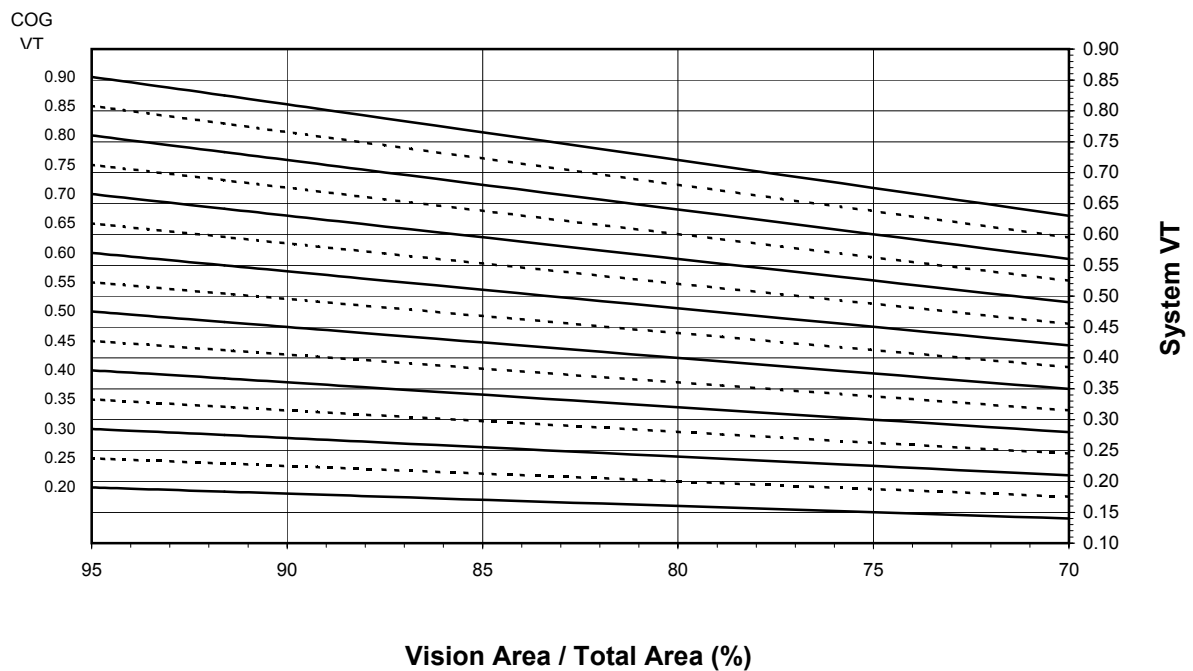


Tubelite, Inc.
14000 Center Glazed Wall System

System SHGC vs. Percentage of Vision Area



System VT vs. Percentage of Vision Area



Tubelite, Inc.
14000 Center Glazed Wall System

Size Specific U-Factor Matrix*

| Glazing Option | Center of Glass U-Factor | Overall U-Factor |
|----------------|--------------------------|------------------|
| 1 | 0.48 | 0.56 |
| 2 | 0.46 | 0.54 |
| 3 | 0.44 | 0.53 |
| 4 | 0.42 | 0.51 |
| 5 | 0.40 | 0.49 |
| 6 | 0.38 | 0.48 |
| 7 | 0.36 | 0.46 |
| 8 | 0.34 | 0.44 |
| 9 | 0.32 | 0.43 |
| 10 | 0.30 | 0.41 |
| 11 | 0.28 | 0.39 |
| 12 | 0.26 | 0.38 |
| 13 | 0.24 | 0.36 |
| 14 | 0.22 | 0.34 |
| 15 | 0.20 | 0.33 |

Size Specific SHGC Matrix*

| Center of Glass SHGC | Overall SHGC |
|----------------------|--------------|
| 0.90 | 0.83 |
| 0.85 | 0.79 |
| 0.80 | 0.74 |
| 0.75 | 0.69 |
| 0.70 | 0.65 |
| 0.65 | 0.60 |
| 0.60 | 0.56 |
| 0.55 | 0.51 |
| 0.50 | 0.46 |
| 0.45 | 0.42 |
| 0.40 | 0.37 |
| 0.35 | 0.33 |
| 0.30 | 0.28 |
| 0.25 | 0.24 |
| 0.20 | 0.19 |

Size Specific VT Matrix*

| Center of Glass VT | Overall VT |
|--------------------|------------|
| 0.90 | 0.82 |
| 0.85 | 0.78 |
| 0.80 | 0.73 |
| 0.75 | 0.69 |
| 0.70 | 0.64 |
| 0.65 | 0.60 |
| 0.60 | 0.55 |
| 0.55 | 0.50 |
| 0.50 | 0.46 |
| 0.45 | 0.41 |
| 0.40 | 0.37 |
| 0.35 | 0.32 |
| 0.30 | 0.27 |
| 0.25 | 0.23 |
| 0.20 | 0.18 |

*Size Specific U-Factor, SHGC, and VT Matrices are based on the standard Glazed Wall System specimen size of 2000mm wide by 2000mm high (78-3/4" by 78-3/4"). This represents 91.6% Vision Area / Total Area.

Vision Area Data

| Option No. | COG U-Factor | COG Temperature | Cross Section | Frame Height | Frame U-Factor | Edge U-Factor | Total Product U-Factor | | |
|------------|--------------|-----------------|---------------|--------------|----------------|---------------|------------------------|------------------------|--------------------------|
| | | | | | | | 70% Vision Area | NFRC 100-2001 | 95% Vision Area |
| | | | | | | | 20.73" by 20.73" | 78.74" by 78.74" | 132.64" by 132.64" |
| 1 | 0.48 | 43.7 | Head | 1.1190 | 1.1599 | 0.4945 | 0.7916 | 0.5586 | 0.5153 |
| | | | Vertical | 2.2333 | 1.6023 | 0.5232 | | | |
| | | | Sill | 1.1167 | 1.1613 | 0.4994 | | | |
| 2 | 0.46 | 44.8 | Head | 1.1190 | 1.1575 | 0.4805 | 0.7803 | 0.5419 | 0.4982 |
| | | | Vertical | 2.2333 | 1.6020 | 0.5098 | | | |
| | | | Sill | 1.1167 | 1.1588 | 0.4854 | | | |
| 3 | 0.44 | 45.8 | Head | 1.1190 | 1.1561 | 0.4666 | 0.7693 | 0.5253 | 0.4811 |
| | | | Vertical | 2.2333 | 1.6023 | 0.4965 | | | |
| | | | Sill | 1.1167 | 1.1575 | 0.4715 | | | |
| 4 | 0.42 | 46.8 | Head | 1.1190 | 1.1548 | 0.4529 | 0.7584 | 0.5089 | 0.4642 |
| | | | Vertical | 2.2333 | 1.6026 | 0.4833 | | | |
| | | | Sill | 1.1167 | 1.1562 | 0.4579 | | | |
| 5 | 0.40 | 47.9 | Head | 1.1190 | 1.1536 | 0.4391 | 0.7475 | 0.4923 | 0.4471 |
| | | | Vertical | 2.2333 | 1.6030 | 0.4700 | | | |
| | | | Sill | 1.1167 | 1.1550 | 0.4441 | | | |
| 6 | 0.38 | 48.9 | Head | 1.1190 | 1.1524 | 0.4255 | 0.7367 | 0.4757 | 0.4300 |
| | | | Vertical | 2.2333 | 1.6034 | 0.4569 | | | |
| | | | Sill | 1.1167 | 1.1538 | 0.4306 | | | |
| 7 | 0.36 | 50.0 | Head | 1.1190 | 1.1513 | 0.4120 | 0.7259 | 0.4591 | 0.4128 |
| | | | Vertical | 2.2333 | 1.6038 | 0.4438 | | | |
| | | | Sill | 1.1167 | 1.1527 | 0.4170 | | | |
| 8 | 0.34 | 51.0 | Head | 1.1190 | 1.1502 | 0.3984 | 0.7151 | 0.4425 | 0.3955 |
| | | | Vertical | 2.2333 | 1.6043 | 0.4308 | | | |
| | | | Sill | 1.1167 | 1.1515 | 0.4034 | | | |
| 9 | 0.32 | 52.0 | Head | 1.1190 | 1.1492 | 0.3850 | 0.7046 | 0.4259 | 0.3782 |
| | | | Vertical | 2.2333 | 1.6047 | 0.4179 | | | |
| | | | Sill | 1.1167 | 1.1505 | 0.3902 | | | |
| 10 | 0.30 | 53.6 | Head | 1.1190 | 1.1482 | 0.3717 | 0.6940 | 0.4093 | 0.3609 |
| | | | Vertical | 2.2333 | 1.6054 | 0.4051 | | | |
| | | | Sill | 1.1167 | 1.1495 | 0.3769 | | | |
| 11 | 0.28 | 54.1 | Head | 1.1190 | 1.1473 | 0.3584 | 0.6834 | 0.3926 | 0.3435 |
| | | | Vertical | 2.2333 | 1.6059 | 0.3923 | | | |
| | | | Sill | 1.1167 | 1.1486 | 0.3636 | | | |
| 12 | 0.26 | 55.2 | Head | 1.1190 | 1.1464 | 0.3452 | 0.6729 | 0.3759 | 0.3260 |
| | | | Vertical | 2.2333 | 1.6065 | 0.3795 | | | |
| | | | Sill | 1.1167 | 1.1477 | 0.3504 | | | |
| 13 | 0.24 | 56.3 | Head | 1.1190 | 1.1456 | 0.3320 | 0.6624 | 0.3593 | 0.3087 |
| | | | Vertical | 2.2333 | 1.6069 | 0.3667 | | | |
| | | | Sill | 1.1167 | 1.1469 | 0.3373 | | | |
| 14 | 0.22 | 57.3 | Head | 1.1190 | 1.1449 | 0.3188 | 0.6519 | 0.3426 | 0.2912 |
| | | | Vertical | 2.2333 | 1.6076 | 0.3540 | | | |
| | | | Sill | 1.1167 | 1.1462 | 0.3242 | | | |
| 15 | 0.20 | 58.4 | Head | 1.1190 | 1.1442 | 0.3057 | 0.6405 | 0.3257 | 0.2735 |
| | | | Vertical | 2.2333 | 1.6045 | 0.3407 | | | |
| | | | Sill | 1.1167 | 1.1454 | 0.3111 | | | |

Detailed drawings, simulation data disks, and a copy of this report will be retained by ATI for a period of four years. The above results are the exclusive property of the client so named herein and are applicable to the sample simulated. This report does not constitute an opinion or endorsement by this laboratory. This report may not be reproduced except in full without the approval of ATI.

For ARCHITECTURAL TESTING, INC.:

SIMULATED BY:

REVIEWED BY:

Kevin S. Louder
Project Engineer

Michael J. Thoman
Director - Simulations and Thermal Testing
Simulator In Responsible Charge

KSL:ksl
65916.01-116-45

Attachments (pages):

Appendix A: Drawings and Bills of Material (1)

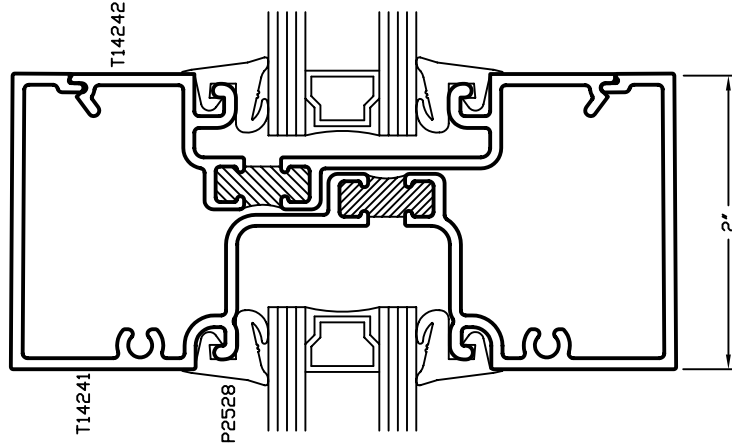
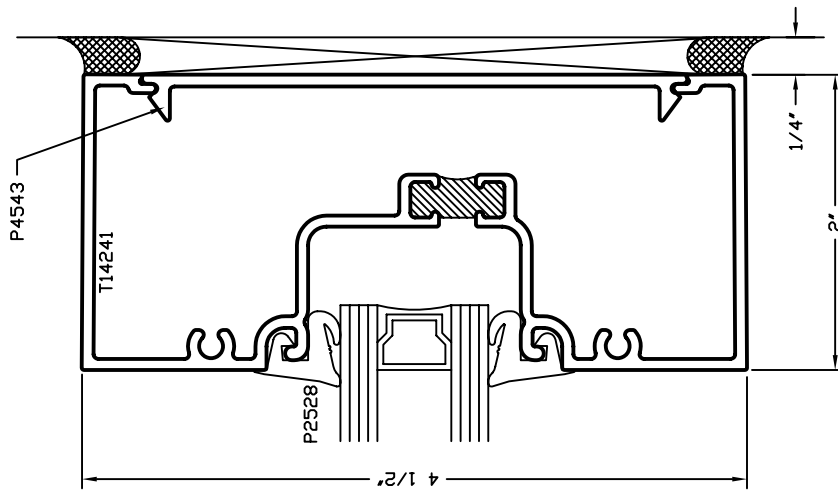
Revision Log

| <u>Rev. #</u> | <u>Date</u> | <u>Page(s)</u> | <u>Revision(s)</u> |
|---------------|-------------|----------------|-----------------------|
| .01 R0 | 6/23/2006 | All | Original Report Issue |



All drawings and Bills of Material used in simulating this product are enclosed in this Appendix.

Appendix A



ATI

Report # 65916

Date 6/23/06

Simulator *Ken Lamb*

