

**Structural Performance: DH93WW Uneq. Glass Sloped Double Hung (1 Unit)**

**Analysis at Meeting Rails Region**

Rev.19-Feb-16

<b>Double Hung Width</b>	<b>48.000</b> [1219 mm.]	<b>Nominal Size:</b>	<b>4040</b>	© Veka Inc. 2010-2016
<b>Double Hung Height</b>	<b>48.000</b> [1219 mm.]	<b>Pressure:</b>	<b>Test: Design:</b>	
<b>Top Sash Width:</b>	<b>43.563</b>	<b>PSF:</b>	<b>105.3 70.2</b>	<b>Design (Pa):</b> <b>3360</b>
<b>Btm. Sash Width:</b>	<b>44.563</b>	<b>MPH:</b>	<b>202.8 165.6</b>	
<b>Sash Height:</b>	<b>23.625</b>	<b>End Vent Width:</b>	<b>48.000</b> [1219 mm.]	
		<b>Ctr. Vent Width:</b>	<b>N.A.</b>	
<b>Top Glass Width:</b>	<b>40.938</b>	<b>Top Glass Area:</b>	<b>6.0 Sq.Ft.</b>	
<b>Btm. Glass Width:</b>	<b>41.938</b>	<b>Glass Short Side to Long Side Ratio:</b>	<b>1 to 1.9</b>	
<b>Glass Height:</b>	<b>21.000</b>	<b>Bottom Glass Area:</b>	<b>6.1 Sq.Ft.</b>	
		<b>Glass Short Side to Long Side Ratio:</b>	<b>1 to 2.0</b>	

<b>Span:</b>	<b>48.000</b>	<b>Material:</b>	<b>Extreme Fibers (Max.)</b>	<b>Modulus</b>
<b>Span Profiles Mass Properties</b>	<b>No. of Pieces</b>	<b>Moments of Inertia:</b>	<b>At Exterior</b>	<b>At Interior</b>
<b>Profiles</b>				<b>E (PSI)</b>
SE9344 Keeper rail	1	0.2222	PVC	1.1625
SE9346 Lock Rail	1	0.2759	Al. 6063-T5	N.A.
N.A.	N.A.	N.A.	Al. 6063-T6	N.A.
N.A.	N.A.	N.A.	Al. 6061-T6	N.A.
N.A.	N.A.	N.A.	Steel (Rails)	0.8730
N.A.	N.A.	N.A.	30% glass-filled c	N.A.
N.A.	N.A.	N.A.	5% gl.filled PVC	N.A.
N.A.	N.A.	N.A.	Glass:	0.0575
N.A.	N.A.	N.A.	S.S. AISI 201	0.385
RF SE9344 S0 M Keeper Stl.	1	0.07132	<b>Load on Mtg. Rails(lb.): 631.6</b>	
RF SE9346b S0 M Lock R. Stl.	1	0.09747	<b>Bending Moment (in-lb): 4,631.6</b>	
N.A.	N.A.	N.A.	<b>Notes:</b> <i>1" I.G.unit of (1) DS pane AN &amp; of (1) DS pane AN</i>	
N.A.	N.A.	N.A.	<b>RF SE9346b S0 M in Lock Rail SE9346 (1/8" galv.)</b>	
N.A.	N.A.	N.A.	<b>RF SE9344 S0 M (0.105 galv. steel) is in SH9344 Keeper Rail.</b>	
Spacers:	2	0.002077	<i>Full Exposure Glass spacers: S.S. AISI 201</i>	
I.G. Unit	2	0.0089	<b>Hardware &amp; Sash Overlaps</b>	

<b>Deflection at Mid-Span:</b>	<b>End Unit</b>	<b>Ctr. Unit</b>	<b>Tilt Latch:</b>	<b>End Unit</b>	<b>Ctr. Unit</b>	<b>Remarks</b>
<b>Inches:</b>	<b>0.197</b>	<b>N.A.</b>	<b>Nominal:</b>	<b>0.244</b>	<b>N.A.</b>	
<b>L/175:</b>	<b>0.274</b>	<b>N.A.</b>	<b>Under Load:</b>	<b>0.243</b>	<b>N.A.</b>	<b>O.K.</b>
<b>Probable AAMA Class: CW-PG 70.18*</b>			<b>Interlocks:</b>	<b>End Unit</b>	<b>Ctr. Unit</b>	
			<b>Nominal:</b>	<b>0.236</b>	<b>N.A.</b>	
			<b>Under Load:</b>	<b>0.232</b>	<b>N.A.</b>	<b>O.K.</b>
<b>Materials:</b>	<b>PVC</b>	<b>Al. 6005-T5</b>	<b>Al.6063-T6</b>	<b>Al.6061-T6</b>	<b>Steel</b>	
<b>Will help unit resist loading:</b>	<b>CERTAIN</b>	<b>N.A.</b>	<b>N.A.</b>	<b>N.A.</b>	<b>N.A.</b>	
<b>OK:</b>	<b>N.A.</b>	<b>TRUE</b>	<b>TRUE</b>	<b>TRUE</b>	<b>*Below the Gateway size req'd</b>	
<b>Region:</b>	<b>Mullion</b>	<b>Mtg. Rails</b>	<b>Btm. Rail</b>	<b>All Stiles</b>	<b>Size</b>	

*Note: The rating may represent an Optional Performance Class (R, LC, CW or AW) of AAMA/WDMA /CSA 101/I.S.2/A440-11. Please check the glass with ASTM E1300-09a or equivalent software.*

<b>Stress in Extr. Fibers (PSI):</b>	<b>At Ext. (- Load)</b>	<b>At Int. (+ Load)</b>	<b>Prob. Stress Allowable</b>	<b>Allowable Strength</b>	<b>Remarks:</b>
<b>Material</b>					
<b>PVC</b>	<b>392</b>	<b>408</b>	<b>100.00%</b>	<b>6,556</b>	<b>(Tensile)</b>
<b>Alum. 6063-T5</b>	<b>N.A.</b>	<b>N.A.</b>	<b>N.A.</b>	<b>16,000</b>	<b>(Ult. Yield) Spacers or rebars</b>
<b>Alum. 6063-T6 (Rails)</b>	<b>N.A.</b>	<b>N.A.</b>	<b>N.A.</b>	<b>25,000</b>	<b>(Ult. Yield)</b>
<b>Alum. 6061-T6 (Rails)</b>	<b>N.A.</b>	<b>N.A.</b>	<b>N.A.</b>	<b>35,000</b>	<b>(Ult. Yield)</b>
<b>Steel (Hot Dipped Galv. G90)*</b>	<b>21,786</b>	<b>17,289</b>	<b>100.00%</b>	<b>42,000</b>	<b>(Ult. Yield)</b>
<b>30% glass-filled cell PVC</b>	<b>N.A.</b>	<b>N.A.</b>	<b>N.A.</b>	<b>95,000</b>	<b>(Tensile)</b>
<b>Stainless AISI 201</b>	<b>8,967</b>	<b>8,967</b>	<b>100.00%</b>	<b>90,000</b>	<b>(Ult. Yield) Spacers only</b>
<b>5.2% glass-filled cell PVC</b>	<b>N.A.</b>	<b>N.A.</b>	<b>N.A.</b>	<b>4,250</b>	<b>(Tensile)</b>
<b>Glass</b>	<b>995</b>	<b>995</b>	<b>0.5 breaks per 1000</b>	<b>O.K.</b>	

*\*Note: Ultimate yield of this steel ranges from 35,000 to 49,000 psi.*

*\*\*The glass breakage & stress results pertain only to the side of the structural members herein investigated.*

<b>Structural Performance: DH93WW Uneq. Glass Sloped Double Hung (1 Unit)</b>						
<b>Analysis at Top Stiles</b>			<b>Nominal Size:</b> 4040		Rev.19-Feb-16	
<b>Double Hung Width</b>	48.000 [1219 mm.]	<b>Pressure:</b>	<b>Test:</b>	<b>Design:</b>	© Veka Inc. 2010-2016	
<b>Double Hung Height</b>	48.000 [1219 mm.]	<b>PSF:</b>	105.3	70.2	<b>Design (Pa):</b>	
		<b>MPH:</b>	202.8	165.6	3360	
<b>Top Sash Height:</b>	23.625	<b>Top Glass Area (Sq. Ft.):</b>		6.1		
<b>Top Stile Clips:</b>	None	<b>Glass Short Side to Long Side Ratio:</b>		1 to 1.9		
<b>Top Glass Width:</b>	40.938	<b>Notes:</b> 1" I.G.unit of (1) DS pane AN & of (1) DS pane AN				
<b>Top Glass Height:</b>	21.000	<b>RF SE9345 A0 M (Alum. 6063-T5) used in SE9345 Top Stiles</b>				
<b>Load Area Width/Side:</b>	12.000	<i>Full Exposure</i> <span style="float:right"><i>Glass spacers: S.S. AISI 201</i></span>				
<b>Vertical Span (along vent):</b>	24.000					
<b>Span Profiles Mass Properties:</b>		<b>Moments of Inertia:</b>	<b>Material:</b>	<b>Extreme Fibers (Max.)</b>		<b>Modulus E (PSI)</b>
<b>Profiles:</b>	<b>Pcs.</b>			<b>At Exterior</b>	<b>At Interior</b>	
SE9345 Top Stile	1	0.2028	PVC	N.A.	0.7323	405400
RF SE9345 A0 M Stile Alum.	1	0.1536	Al. 6063-T5	0.7648	0.7352	1.00E+07
N.A.	N.A.	N.A.	Al. 6063-T6	N.A.	N.A.	1.00E+07
N.A.	N.A.	N.A.	Al. 6061-T6	N.A.	N.A.	1.00E+07
N.A.	N.A.	N.A.	Steel	N.A.	N.A.	3.00E+07
N.A.	N.A.	N.A.	30% glass-filled cell	N.A.	N.A.	6.00E+06
N.A.	N.A.	N.A.	5% gl.filled PVC	N.A.	N.A.	2.00E+05
N.A.	N.A.	N.A.	Glass:	N.A.	0.0575	1.04E+07
N.A.	N.A.	N.A.	S.S. AISI 201	0.385	0.385	2.80E+07
<b>Spacers:</b>	1	0.0020771				
<b>Glass</b>	1	0.00202	<b>Total Loading (Lb.)</b>		<b>Bending Moment:</b>	
<b>Deflection at Mid-Span:</b> (To Interior-Side)			<b>At Stile Span: 105.3</b>		<b>421.1 In-#</b>	
<b>Inches:</b>	<b>0.014</b>		<b>At Clip: None</b>		<b>(No clips used)</b>	
<b>L/175:</b>	<b>0.137</b>					
<b>Probable AAMA Class: CW-PG 70.18*</b>			<b>#NAME?</b>			
<b>Materials:</b>	PVC	Al. 6005-T5	Al.6063-T6	Al.6061-T6	Steel	
<b>Will help unit resist loading:</b>	<b>CERTAIN</b>	<b>CERTAIN</b>	<b>N.A.</b>	<b>N.A.</b>	<b>N.A.</b>	
<b>OK:</b>	<b>N.A.</b>	<b>TRUE</b>	<b>TRUE</b>	<b>TRUE</b>	<b>*Below the Gateway size req'd</b>	
<b>Region:</b>	<b>Mullion</b>	<b>Mtg. Rails</b>	<b>Btm. Rail</b>	<b>All Stiles</b>	<b>Size</b>	
<i>Note: The rating may represent an Optional Performance Class (R, LC, CW or AW) of AAMA/WDMA /CSA 101/I.S.2/A440-11. Please check the glass with ASTM E1300-09a or equivalent software.</i>						
<b>Stress in Extreme Fibers (PSI):</b>	<b>At Exterior (- Load)*</b>	<b>At Interior (+ Load)</b>	<b>Prob. Stress Allowable</b>	<b>Allowable Strength</b>		
<b>Material</b>				<b>Remarks:</b>		
PVC	N.A.	74	100.00%	6,556 (Tensile)		
Alum. 6063-T5	N.A.	1,824	100.00%	16,000 (Ult. Yield) Spacers or rebars		
Alum. 6063-T6 (Rebars)	N.A.	N.A.	N.A.	25,000 (Ult. Yield)		
Alum. 6061-T6 (Rebars)	N.A.	N.A.	N.A.	35,000 (Ult. Yield)		
Steel (Hot Dipped Galv. G90)	N.A.	N.A.	N.A.	42,000 (Ult. Yield)**		
30% glass-filled cell PVC	N.A.	N.A.	N.A.	95,000 (Tensile)		
Stainless AISI 201	N.A.	2,674	100.00%	90,000 (Ult. Yield) Spacers only		
5.2% glass-filled cell PVC	N.A.	N.A.	N.A.	4,250 (Tensile)		
<b>Glass***</b>	<b>N.A.</b>	<b>148</b>	<b>0.1 breaks per 1000</b>	<b>O.K.</b>		
<i>*Negative load results are ignored since the stiles would be pulled against the jambs, which are attached to the building. Thus the stile's stresses are greatly alleviated by the strength of the jamb/building assembly, which is beyond the scope of this program.</i>						
<i>**Note: Ultimate yield of this steel ranges from 35,000 to 49,000 psi.</i>						
<i>***The glass breakage &amp; stress results pertain only to the side of the structural members herein investigated.</i>						

**Structural Performance: DH93WW Uneq. Glass Sloped Double Hung (1 Unit)**

<b>Analysis at Bottom Stiles</b>		<b>Nominal Size:</b>	<b>4040</b>	Rev.19-Feb-16
<b>Double Hung Width</b>	<b>48.000</b> [1219 mm.]	<b>Pressure:</b>	<b>Test:</b>	<b>Design:</b>
<b>Double Hung Height</b>	<b>48.000</b> [1219 mm.]	<b>PSF:</b>	<b>105.3</b>	<b>70.2</b>
		<b>MPH:</b>	<b>202.8</b>	<b>165.6</b>
<b>Bottom Sash Height:</b>	<b>23.625</b>			<b>Design (Pa):</b> <b>3360</b>
<b>Bottom Stile Clips:</b>	<b>None</b>	<b>Btm. Glass Area (Sq. Ft.):</b>	<b>6.1</b>	
<b>Bottom Glass Width:</b>	<b>41.938</b>	<b>Glass Short Side to Long Side Ratio:</b>	<b>1 to 2.0</b>	
<b>Bottom Glass Height:</b>	<b>21.000</b>	Notes: 1" I.G.unit of (1) DS pane AN & of (1) DS pane AN		

**RF SE9345 A0 M (Alum. 6063-T5) used in SE9345 Bottom Stiles**

Load Area Width/Side: **12.000**  
 Vertical Span (along vent): **24.000** Full Exposure Glass spacers: S.S. AISI 201

Span Profiles Mass Properties:		Moments of Inertia:	Material:	Extreme Fibers (Max.)		Modulus E (PSI)
Profiles:	Pcs.			At Exterior	At Interior	
SE9345 Bot. Stile	1	0.2028	PVC	N.A.	0.7323	405400
RF SE9345 A0 M Stile Alum.	1	0.1536	Al. 6063-T5	1	1	1.00E+07
N.A.	N.A.	N.A.	Al. 6063-T6	N.A.	N.A.	1.00E+07
N.A.	N.A.	N.A.	Al. 6061-T6	N.A.	N.A.	1.00E+07
N.A.	N.A.	N.A.	Steel	N.A.	N.A.	3.00E+07
N.A.	N.A.	N.A.	30% glass-filled cel	N.A.	N.A.	6.00E+06
N.A.	N.A.	N.A.	5% gl.filled PVC	N.A.	N.A.	2.00E+05
N.A.	N.A.	N.A.	Glass:	N.A.	0.0575	1.04E+07
Spacers:	1	0.0020771	S.S. AISI 201	0.385	0.385	2.80E+07

<b>Glass</b>	1	0.00202	<b>Total Loading (Lb.)</b>	<b>Bending Moment:</b>
<b>Deflection at Mid-Span:</b> (To Interior-Side)			<b>At Stile Span: 105.3</b>	<b>421.1 In-#</b>
<b>Inches:</b>	<b>0.014</b>		<b>At Clip: None</b>	<b>(No clips used)</b>
<b>L/175:</b>	<b>0.137</b>			

**Probable AAMA Class: CW-PG 70.18\*** #NAME?

<b>Materials:</b>	<b>PVC</b>	<b>Al. 6005-T5</b>	<b>Al.6063-T6</b>	<b>Al.6061-T6</b>	<b>Steel</b>
<b>Will help unit resist loading:</b>	<b>CERTAIN</b>	<b>CERTAIN</b>	<b>N.A.</b>	<b>N.A.</b>	<b>N.A.</b>
<b>OK:</b>	<b>N.A.</b>	<b>TRUE</b>	<b>TRUE</b>	<b>TRUE</b>	<b>*Below the Gateway size req'd</b>
<b>Region:</b>	<b>Mullion</b>	<b>Mtg. Rails</b>	<b>Btm. Rail</b>	<b>All Stiles</b>	<b>Size</b>

Note: The rating may represent an Optional Performance Class (R, LC, CW or AW) of AAMA/WDMA /CSA 101/I.S.2/A440-11. Please check the glass with ASTM E1300-09a or equivalent software.

Stress in Extreme Fibers (PSI):	At Exterior (- Load)*	At Interior (+ Load)	Prob. Stress Allowable	Allowable Strength	Remarks:
PVC	N.A.	74	100.00%	6,556 (Tensile)	
Alum. 6063-T5	N.A.	1,824	100.00%	16,000 (Ult. Yield)	Spacers or rebars
Alum. 6063-T6 (Rebars)	N.A.	N.A.	N.A.	25,000 (Ult. Yield)	
Alum. 6061-T6 (Rebars)	N.A.	N.A.	N.A.	35,000 (Ult. Yield)	
Steel (Hot Dipped Galv. G90)	N.A.	N.A.	N.A.	42,000 (Ult. Yield)**	
30% glass-filled cell PVC	N.A.	N.A.	N.A.	95,000 (Tensile)	
Stainless AISI 201	N.A.	2,674	100.00%	90,000 (Ult. Yield)	Spacers only
5.2% glass-filled cell PVC	N.A.	N.A.	N.A.	4,250 (Tensile)	
Glass***	N.A.	148	0.1 breaks per 1000	O.K.	

\*Negative load results are ignored since the stiles would be pulled against the jambs, which are attached to the building. Thus the stile's stresses are greatly alleviated by the strength of the jamb/building assembly, which is beyond the scope of this program.

\*\*Note: Ultimate yield of this steel ranges from 35,000 to 49,000 psi.

\*\*\*The glass breakage & stress results pertain only to the side of the structural members herein investigated.

**Structural Performance: DH93WW Uneq. Glass Sloped Double Hung (1 Unit)**

<b>Analysis at Bottom Rail</b>		<b>Standard:</b> Probable AAMA Class: © Veka Inc. 2010-2016		
<b>Double Hung Width</b>	48.000 [1219 mm.]	<b>Nominal Size:</b>	4040 Rev.19-Feb-16	
<b>Double Hung Height</b>	48.000 [1219 mm.]	<b>Pressure:</b>	<b>Test:</b> <b>Design:</b>	
<b>Bottom Sash Width:</b>	44.563	<b>PSF:</b>	105.3 70.2 <b>Design (Pa):</b>	
<b>Bottom Stile Clips:</b>	None	<b>MPH:</b>	202.8 165.6 3360	
<b>Bottom Glass Width:</b>	41.938	<b>Btm. Glass Area (Sq. Ft.):</b>	6.1	
<b>Bottom Glass Height:</b>	21.000	<b>Glass Short Side to Long Side Ratio:</b>	1 to 2.0	
<b>Span:</b>	48.000	Notes: 1" I.G.unit of (1) DS pane AN & of (1) DS pane AN		
		RF SE9345 A0 M (Alum. 6063-T5) used in SE9345 Bottom Rail.		
		Full Exposure Glass spacers: S.S. AISI 201		
<b>Span Profiles Mass Properties:</b>		<b>Moments</b>	<b>Material:</b> <b>Extreme Fibers (Max.)</b> <b>Modulus</b>	
<b>Profiles:</b>	<b>Pcs.</b>	<b>of Inertia:</b>	<b>At Exterior</b> <b>At Interior</b> <b>E (PSI)</b>	
SE9345 Bot. Rail	1	0.2028	PVC 2.1538 2.3384 405400	
N.A.	N.A.	N.A.	Alum 6063-T5 0.7648 0.7352 1.00E+07	
RF SE9345 A0 M Bot. Rail Alum.	1	0.1536	Alum 6063-T6 NA NA 1.00E+07	
N.A.	N.A.	N.A.	Steel NA NA 3.00E+07	
N.A.	N.A.	N.A.	30% glass-filled ce N.A. N.A. 6.00E+06	
N.A.	N.A.	N.A.	5% gl.filled PVC N.A. N.A. 2.00E+05	
N.A.	N.A.	N.A.	Glass 0.0575 0.0575 1.04E+07	
N.A.	N.A.	N.A.	S.S. AISI 201 0.385 0.385 2.80E+07	
N.A.	N.A.	N.A.	<b>Total Loading (Lb.)</b> <b>Bending Moment:</b>	
N.A.	N.A.	N.A.	315.8 2315.8 In-#	
<b>Spacers:</b>	1	0.0020771	<b>Overlaps</b> <b>P. Bar/Side:</b> <b>Ext. Sill</b> <b>Int. Sill:</b>	
<b>I.G. Unit Iyy:</b>	1	0.0037	<b>Nominal:</b> 0.367 0.490 1.511	
<b>Deflection at Mid-Span:</b>	<b>Ext.</b> <b>Int.</b>		<b>Under Load:</b> 0.367 0.486 1.506	
<b>Inches:</b>	0.135 0.075		<b>Judgment:</b> Acceptable Acceptable	
<b>L/175:</b>	0.274		Water Hd: 2.021 at 10.53 psf	
<b>Upstand configuration:</b>	One-wall Two-wall		Resisting water Hd: 2.318	
<b>Probable AAMA Class: CW-PG 70.18*</b>			Water test met:* R to CW	
			* Exterior-Interior equalizing not factored in.	
<b>Materials:</b>	PVC Al. 6005-T5 Al.6061-T6 Steel			
<b>Will help unit resist loading:</b>	CERTAIN CERTAIN N.A. N.A.			
<b>OK:</b>	TRUE TRUE TRUE		*Below the Gateway size req'd	
<b>Region:</b>	Mtg. Rails Btm. Rail All Stiles		Size	
<b>Note: The rating may represent an Optional Performance Class (R, LC, CW or AW) of AAMA/WDMA /CSA 101/I.S.2/A440-11. Please check the glass with ASTM E1300-09a or equivalent software.</b>				
<b>Stress in Extreme Fibers (PSI):</b>	<b>At Exterior</b>	<b>At Interior</b>	<b>Prob. Stress</b>	
<b>Material</b>	<b>(- Load)*</b>	<b>(+ Load)*</b>	<b>Allowable</b>	
<b>Allowable</b>			<b>Strength</b>	
			<b>Remarks:</b>	
PVC (Bottom Rail)	220	95	100.00%	6,556 (Tensile)
PVC (Sill Upstands)	2,223	1,633	100.00%	6,556 (Tensile)
Alum. 6063-T5	4,361	2,342	100.00%	16,000 (Ult. Yield) Spacers or rebars
Alum. 6061-T6 (Rebars)	N.A.	N.A.	N.A.	35,000 (Ult. Yield)
Alum. 6063-T6 (Rebars)	N.A.	N.A.	N.A.	25,000 (Ult. Yield)
Steel (Hot Dipped Galv. G90)	N.A.	N.A.	N.A.	42,000 (Ult. Yield)**
30% glass-filled cell PVC	N.A.	N.A.	N.A.	95,000 (Tensile)
Stainless AISI 201	6,146	3,434	100.00%	90,000 (Ult. Yield) Spacers only
5.2% glass-filled cell PVC	N.A.	N.A.	N.A.	4,250 (Tensile)
<b>Glass***</b>	<b>341</b>	<b>341</b>	<b>0.2 breaks per 1000</b>	<b>O.K.</b>
*Negative wind loads are restrained by the lift rail and the sill's single-walled upstand or dam leg.				
*Positive wind loads are restrained by the lift rail and the sill's double-walled upstand or dam leg.				
**Note: Ultimate yield of this steel ranges from 35,000 to 49,000 psi.				
***The glass breakage & stress results pertain only to the side of the structural members herein investigated.				