Report Date: 01/25/2016
Test Date: 10/20/2015
Through: 10/21/2015

TEST REPORT
AAMA/WDMA/CSA 101.I.S.2/A440-11

Rendered to:

Superior Window and Door

PRODUCT TYPE: Dual Action Window
SERIES/MODEL: Vinyl Tilt Turn

Test Procedure	Details
AAMA/WDMA/CSA 101.I.S.2/A440-11	Class LC - PG60: Size Tested 1200 x 1500 mm (~47 x 59 in) - Type DAW
Air Infiltration per ASTM E283-12	.05 L/s/m² (.010 cfm/ft²) @ 75 Pa (1.57 psf), PASS
Water Penetration Test per ASTM E547-09	No Entry @ 580 Pa (12.11 psf), PASS
Uniform Load Deflection per ASTM E330M-14	± 4320 Pa (90.2 psf), PASS
Uniform Load Structural per ASTM E330M-14	± 4320 Pa (90.2 psf), PASS
Forced Entry per ASTM F588-14	Grade 10, Assembly B, PASS
Conc Load on Latch Rail (NAFS 9.3.6.4.3)	See Results, PASS
Stabilizing Arm Load Test (NAFS 9.3.6.5.3)	See Results, PASS
Thermoplastic Corner Weld Test (NAFS 9.3.6.2)	See Results, PASS

Test Completion Date(s): 10/20/2015
-10/21/2015

Reference must be made to Report No. QCT15-3707.01, dated 01/25/2016 for complete specimen description and data.

QUAST CONSULTING AND TESTING, INC.
Exterior Facade/Fenestration Consulting Testing
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AAMA/WDMA/CSA 101.I.S.2/A440-11
TEST REPORT

Rendered to:

Superior Window and Door
625 Petro Point Drive
Lake Charles, LA 70607

Report No.: QCT15-3707.01
Test Dates: 10/20/2015
Through: 10/21/2015
Report Date: 01/25/2016
Test Report Retention Date: 10/21/2019

Project Summary:

Quast Consulting and Testing, Inc. was contracted by Superior Window and Door to perform testing on a vinyl dual action window. The sample was supplied by Superior Window and Door and tested at Quast Consulting and Testing, Inc. laboratory in Mosinee, Wisconsin. Test specimen description and results are reported herein.

Test Procedure:

Testing was conducted in accordance with:

ASTM E283-12	*Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen*
ASTM E330M-14	*Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference*
ASTM E547-09	*Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Cyclic Static Air Pressure Difference*
ASTM F588-14	*Standard Test Methods for Measuring the Forced Entry Resistance of Window Assemblies, Excluding Glazing Impact*
ASTM E2068-08	*Test Method for Determination of Operating Force of Sliding Windows and Doors*

Primary Designator:

AAMA/WDMA/CSA 101.I.S.2/A440-11 Class LC - PG60: Size Tested 1200 x 1500 mm (~47 x 59 in) - Type DAW

Secondary Designator

Water Penetration Resistance Test Pressure: 580 Pa (12.11 psf)

Test Specimen Description:

Series/Model: Vinyl Tilt Turn
Product Type: Dual Action Window

Overall Size: 1200 mm (47.25 in) wide x 1502 mm (59.13 in) high
Overall Area: 1.80 m² (19.40 ft²)

Sash Size: 1114 mm (43.88 in) wide x 1419 mm (55.88 in) high

Frame and Sash Construction:

The extruded PVC frame members were mitered and welded at corners.

Glazing:

The sash was glazed using a 1 in insulating unit consisting of 3/16 in clear annealed, 5/8 in argon gap, 3/16 in clear annealed. The glass was set from the exterior against a vinyl gasket and secured on the exterior using a vinyl glazing bead and gasket. The glass was set onto 1/4 x 4 in setting blocks with a 5/8 in bite.

Reinforcement:

Steel reinforcement in all frame and sash members

Weatherstripping:

Type	Quantity	Location
Extruded vinyl fin	1 Perim	Interior perimeter of frame
Extruded vinyl fin	1 Row	Intermediate perimeter of frame
Extruded vinyl fin	1 Perim	Exterior perimeter of sash

Hardware:

Type	Quantity	Location
Locking handle	1	Sash
Hinges	2	Opposite of locking handle
Multipoint lock (7 points)	1	Handle jamb: 8 & 38 in from sill Hinge jamb: 26 in from sill Head and sill: 6 & 24 in from handle jamb

Drainage:

Type	Quantity	Location
1 x 3/16 in weep slot	2	Frame sill, 6-3/4 in from jambs
1 x 3/16 in weep slot	2	Bottom sash rail, 7 in from stiles

Installation:

The specimen was installed in a nominal 2x8 western pine buck with a 1/2 inch rough opening. The specimen was secured using #12 x 3 in phillips head countersunk fasteners: 3 spaced 21 in apart at the head and 3 spaced 15 in apart at the head.

Test Results:

Paragraph	Title of Test	Results	Allowed
9.3.1	**Operational Force Test Per ASTM E2068-08**		
	Casement Operation	**PASS**	
	Breakaway Force	0.0 N (0.00 lbf)	Reported
	Open Operating Force	3.3 N (0.73 lbf)	Reported
	Closing Operating Force	4.2 N (0.93 lbf)	Reported
	Vent Operation	**PASS**	
	Breakaway Force	0.0 N (0.00 lbf)	Reported
	Open Operating Force	2.1 N (0.47 lbf)	Reported
	Closing Operating Force	16.5 N (3.70 lbf)	Reported
	Handle	**PASS**	
	Open Operating Force	20.4 N (4.58 lbf)	22 N (5 lbf)
	Closing Operating Force	19.2 N (4.32 lbf)	22 N (5 lbf)
9.3.2.1	**Air Infiltration per ASTM E283-12**		
	Specimen #1	**PASS**	
	75 Pa	0.05 $L/s/m^2$	1.52 $L/s/m^2$
	(1.57 psf)	0.010 cfm/ft^2	0.300 cfm/ft^2
9.3.3	**Water Penetration per ASTM E331-09**		
	Water applied at a rate of approximately 5.5 gallons per hour per square foot		
	Temperature: 64.3 °F (17.9 °C)		
	Specimen #1	**PASS**	
	580 Pa (12.11 psf)	No Entry	No Entry

9.3.4.2 Uniform Load Deflection per ASTM E330M-14

Temperature: 65.2 °F (18.4 °C)

2-mil plastic film was used to prevent air leakage during testing. It is the opinion of the test engineer that this film did not influence the results of the test

Specimen #1

Positive Load:	4320 Pa (90.2 psf)	
Negative Load:	4320 Pa (90.2 psf)	
Hinge jamb between locks		
Span (L):	686 mm (27 in)	Reported
Positive Deflection:	0.5 mm (0.02 in)	NA
Negative Deflection:	0.5 mm (0.02 in)	NA

9.3.4.3 Uniform Load Structural per ASTM E330M-14

Temperature: 65.2 °F (18.4 °C)

2-mil plastic film was used to prevent air leakage during testing. It is the opinion of the test engineer that this film did not influence the results of the test

Specimen #1

Positive Load:	4320 Pa (90.2 psf)	
Negative Load:	4320 Pa (90.2 psf)	
Between Frame Anchors	**PASS**	
Span (L):	686 mm (27 in)	.3%*L
Positive Permanent Set:	0.0 mm (0.00 in)	2.0 mm (0.08 in)
Negative Permanent Set:	0.0 mm (0.00 in)	2.0 mm (0.08 in)

9.3.2.1 Forced Entry Per ASTM F588-14

Specimen #1 **PASS**

Grade: 10 Assembly Type: B

T1 = 5 min, L1 = 667 N (150 lbf)

L2 = 333 N (75 lbf), L3 = 111 N (25 lbf)

Disassembly Test	No Entry	No Entry
Concentrated Load Tests	No Entry/Damage	No Entry/Damage
Lock/Hardware Manipulation	No Entry	No Entry
Sash Manipulation	No Entry	No Entry

9.3.6.4.3 Sash Concentrated Load test on Latch Rail

Specimen #1	**PASS**	
Normal-to-sash deflection		
Toward exterior	1.3 mm (0.05 in)	1.5 mm (0.06 in)
Toward interior	1.3 mm (0.05 in)	1.5 mm (0.06 in)
In-plane deflection		
Toward sash	0.5 mm (0.02 in)	2.3 mm (0.09 in)
Away from sash	0.3 mm (0.01 in)	2.3 mm (0.09 in)

9.3.6.5.3 Stabilizing Arm Load Test

Specimen #1	**PASS**	
Sash-corner load	890 N (200.1 lbf)	
Center-of-rail load	1780 N (400.1 lbf)	
Condition	Sash operates. No damage/deformation	Sash operates. No damage/deformation

9.3.6.2 Thermoplastic Corner Weld Test

Sash Corner	**PASS**	
Breakage Load:	181 lbf	
Breakage Description:	The break propogated through the weld until 2 in from the corner and then split toward edges	The break shall not extend along the entire weld line

Frame Corner	**PASS**	
Breakage Load	137 lbf	
Breakage Description:	The break propogated through the weld until 2 in from the corner and then split toward edges	The break shall not extend along the entire weld line

List of Official Observers:

Name:	Company:
Brian Sasman	Quast Consulting and Testing, Inc.
Arlen Fisher	Quast Consulting and Testing, Inc.

Detailed drawings, data sheets, representative samples of test specimens, a copy of this report, or other pertinent project documentation will be retained by Quast Consulting and Testing, Inc. for a period of four years from the original test date. At the end of this retention period, such material shall be discarded without notice and the service life of this report will expire.

Results obtained are tested values and were secured by using the designated test methods. No conclusions of any kind regarding the adequacy or inadequacy of the glass in the test specimen can be made. This report does not constitute certification of this product nor an opinion or endorsement by this laboratory. It is the exclusive property of the client so named herein and relates only to the specimens tested. This report may not be reproduced, except in full, without the written approval of Quast Consulting and Testing, Inc.

QUAST CONSULTING & TESTING, INC.

Arlen Fisher
Test Engineer

QUAST CONSULTING & TESTING, INC.

Brian Sasman, PE
Reviewer

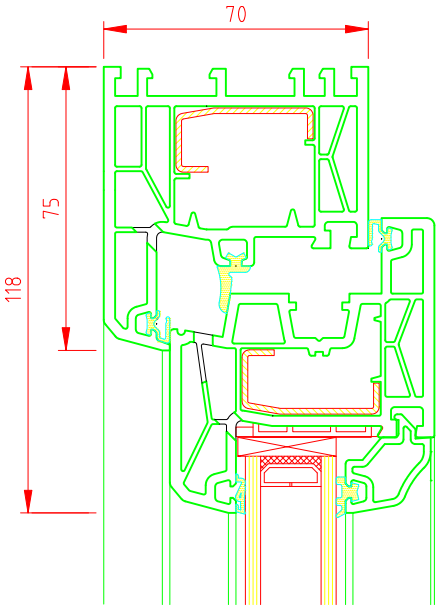
Attachments (pages): This report is complete only when all attachments listed are included.
Drawings (12 Pages)

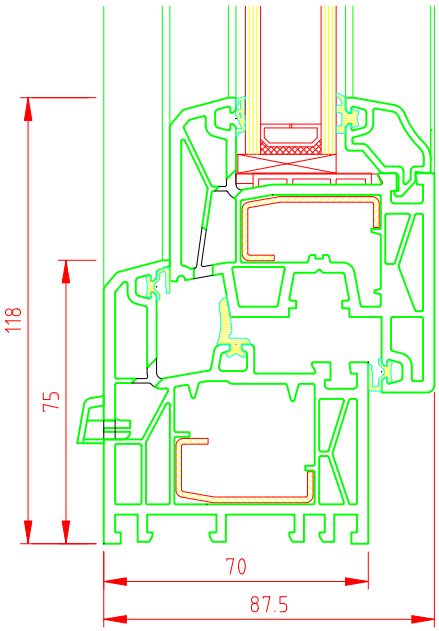
Revisions

Revision #	Date	Description
0	10/29/2015	First Issue

Profile	Label	Finish	Quantity	Unit	
021310	Glazing pad 100x28x5mm	neutral color	7.00	pc	
500530	Rubber seal frame	grey	5.51	m	
510310G	Frame M5 75mm with seal	white	5.51	m	
520608	Reinforcement 36,7x17,3x1,5mm	neutral color	9.60	m	
520640G	Wing M5 78mm with seal	white	5.19	m	
581330	Glazing pad 25mm Elegance with seal	white	4.70	m	
596210	Glazing bridge InnoNova_70	neutral color	7.00	pc	
Glass	**Label**	**Width**	**Height**	**Quantity**	**Unit**
246P	4-16-4 U=1,1 W/m2K CHRU grey	708 mm	1.623 mm	1	ks
Hardware	**Label**	**Finish**	**Quantity**	**Unit**	
201754	Central bolt 2200 V	Galvanized	1.00	pc	
207301	OS - transmission DM15 Gr. 1700 fix 2 i.S.	Galvanized	1.00	pc	
211678	Scissors 800 left	Galvanized	1.00	pc	
222201	Corner drive 1 i.S.	Galvanized	1.00	pc	
222205	Corner drive horizintal	Galvanized	1.00	pc	
222209	Corner drive 1 i.S.	Galvanized	1.00	pc	
354685	Bolt Trocal	Galvanized	5.00	pc	
354686	Bolt IS Trocal	Galvanized	1.00	pc	
356297	Bolt Trocal links	Galvanized	1.00	pc	
43651	Hinge cover	white	1.00	pc	
206584	Window hinge 120 kg 5mm 23 mm	white	1.00	pc	
204779	Window hinge 7 mm	white	1.00	pc	
207278	Window hinge 120 kg 7mm	white	1.00	pc	
206588	Window hinge 12/20-13	white	1.00	pc	
94491	Hinge pin	Galvanized	1.00	pc	
0530/US952	Windos handle Hoppe Atlanta	white	1.00	pc	

Drawings have been reviewed for compliance with specimen tested.
Reviewed By: A. Fisher
Project #: QCT15-отлт





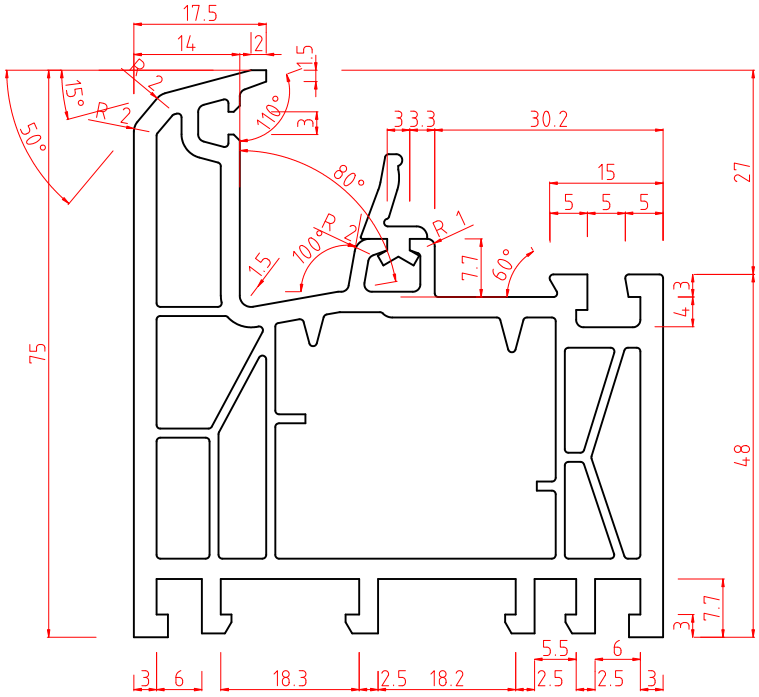
Drawings have been reviewed for compliance with specimen tested.
Reviewed By: A. Fisher
Project #: QCT15-ОТЛТ

TROCAL InnoNova__70.M5

51 03 10 / 52 06 40

Maßstab: 1 : 2	Datum: 29.08.07	Name: Witt	Blatt: 510310-520640

profine



Drawings have been reviewed for compliance with specimen tested.
Reviewed By: A. Fisher
Project #: QCT15-отлт

Vinyl

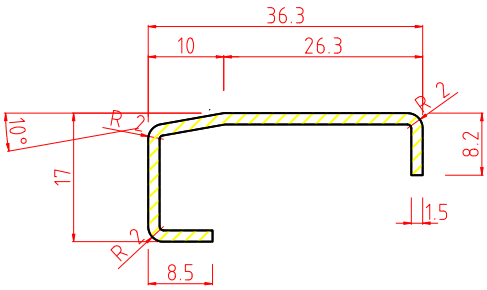
TROCAL

TROCAL InnoNova__70.M5

Rahmen 51 03 10

Maßstab: 1:1	Datum: 29.08.07	Name: Witt	Blatt: 510310

profine



Drawings have been reviewed for compliance with specimen tested.
Reviewed By: A. Fisher
Project #: QCT15-ОТЛТ

Galv. Steel

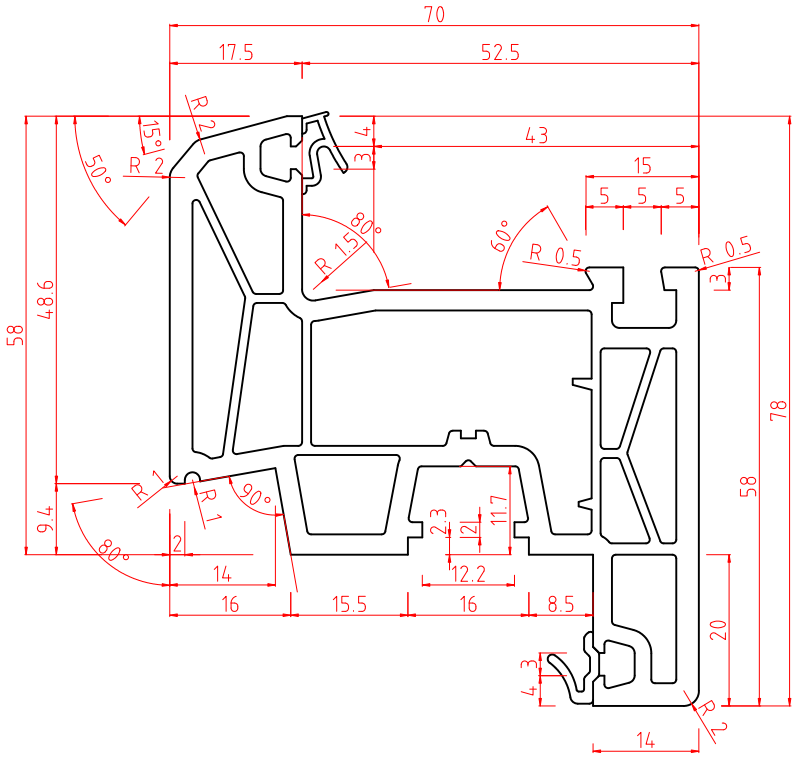
TROCAL

TROCAL InnoNova__70.M5

Stahl 52 06 08

Maßstab: 1:1	Datum: 29.08.07	Name: Witt	Blatt: 520608

profine



Drawings have been reviewed for compliance with specimen tested.
Reviewed By: A. Fisher
Project #: QCT15-отлт

Vinyl

TROCAL InnoNova__70.M5

Fluegel 52 06 40

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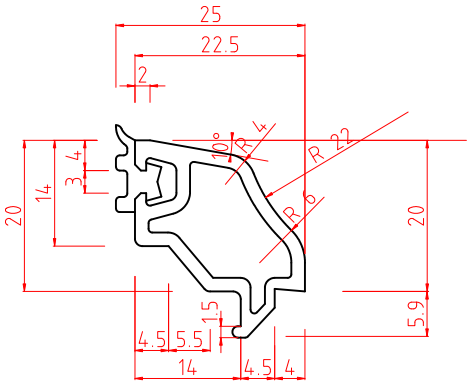
profine



Drawings have been reviewed for compliance with specimen tested.
Reviewed By: A. Fisher
Project #: QCT15-отлт

Vinyl w/ EPDM gasket

TROCAL

TROCAL InnoNova__70.M5
Glasleiste 581330

Maßstab:	Datum:	Name:	Blatt:
1:1	29.08.07	Witt	581330

profine

Glasleistenübersicht / *Glazing bead overview*

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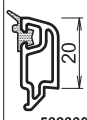
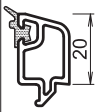
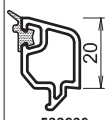
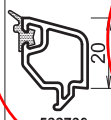
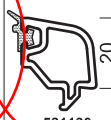
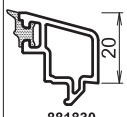
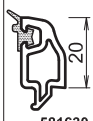
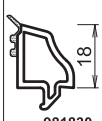
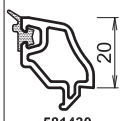
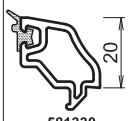
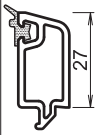
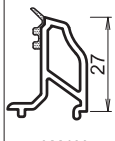
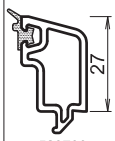
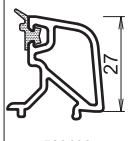
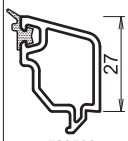
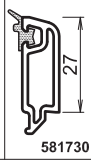
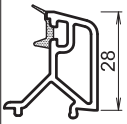
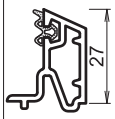
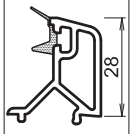
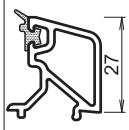
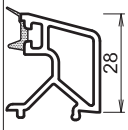
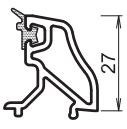
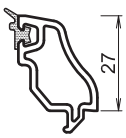
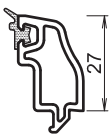
Glasleisten classic	 581930	 582030	 582330	 582430	 582530		 582630	 582730	 581130	 581230  881830
Glasleisten elegance				 581630	 581530	 981830		 582930  982430	 581430	 581330
Ferstverglasung					 580930		 982130	 580730	 580130	 580530
	 581830		 581730		 885630	 980430	 885430		 580230	 884830

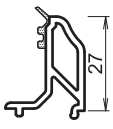
weitere Festverglasungs Glasleisten - *Glasstärke


580330
*24 - 27 mm


580630
*22 - 25 mm


580830
*26 - 29 mm


980830
*37 - 39 mm


981930
* 30 - 32 mm

Drawings have been reviewed for compliance with specimen tested.
Reviewed By: A. Fisher
Project #: QCT15-отлт

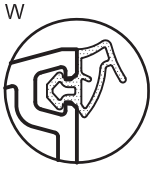
Dichtungssystem
Seals system

Verschweißbare Dichtungen

Verglasungsdichtungen

W

PCE-Dichtung

W

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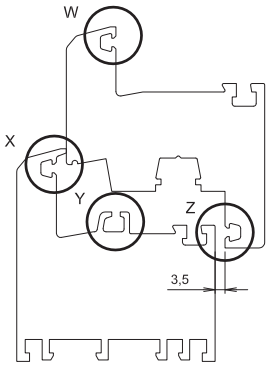
Reparaturdichtung



Anschlagdichtungen

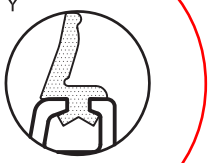
Z

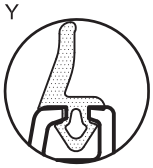
PCE-Dichtung

Z

50 05 00/30
Reparaturdichtung

Mitteldichtungen

Y

PCE-Dichtung

Y

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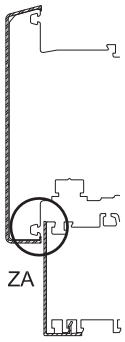
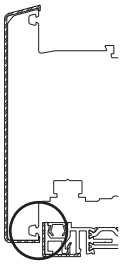
Reparaturdichtung

flex vinyl



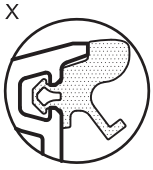

ZA

EPDM-Dichtungen

Anschlagdichtungen

X

50 16 00/30

X

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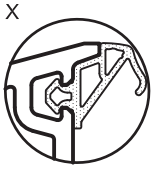
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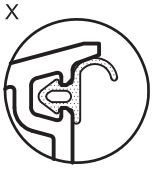
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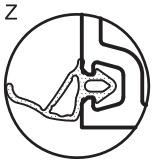
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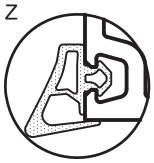
Z

50 23 00/30

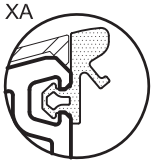
Verglasungsdichtungen

W

10 02 00/30

XA

50 12 00/30

XA

50 13 00/30

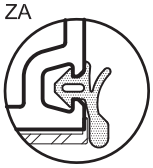
WA

50 10 00/30

Anschlagdichtungen

XA

50 03 00/30

ZA

10 10 00/30

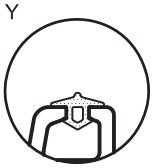
XA

50 25 00/30

Mitteldichtungen

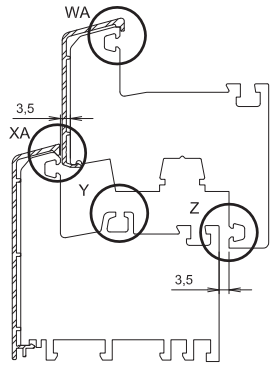
Y

50 02 00/30

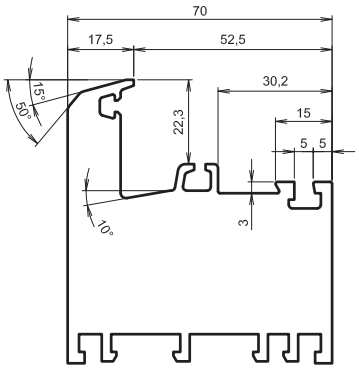
Y

90 07 00/20

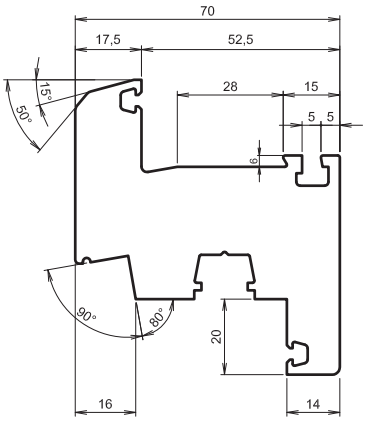
Y

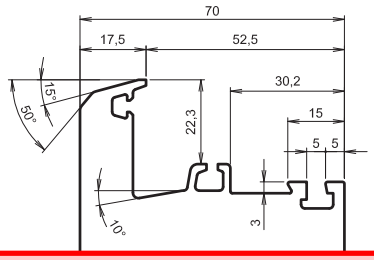
90 04 00/30



Systemmaße für Bearbeitungsmaschinen
System dimensions for processing machines







Drawings have been reviewed for compliance with specimen tested.
Reviewed By: A. Fisher
Project #: QCT15-ОТЛТ

ENERGY LABELLING OF CHROMATECH ULTRA SPACER PROFILES – Version F

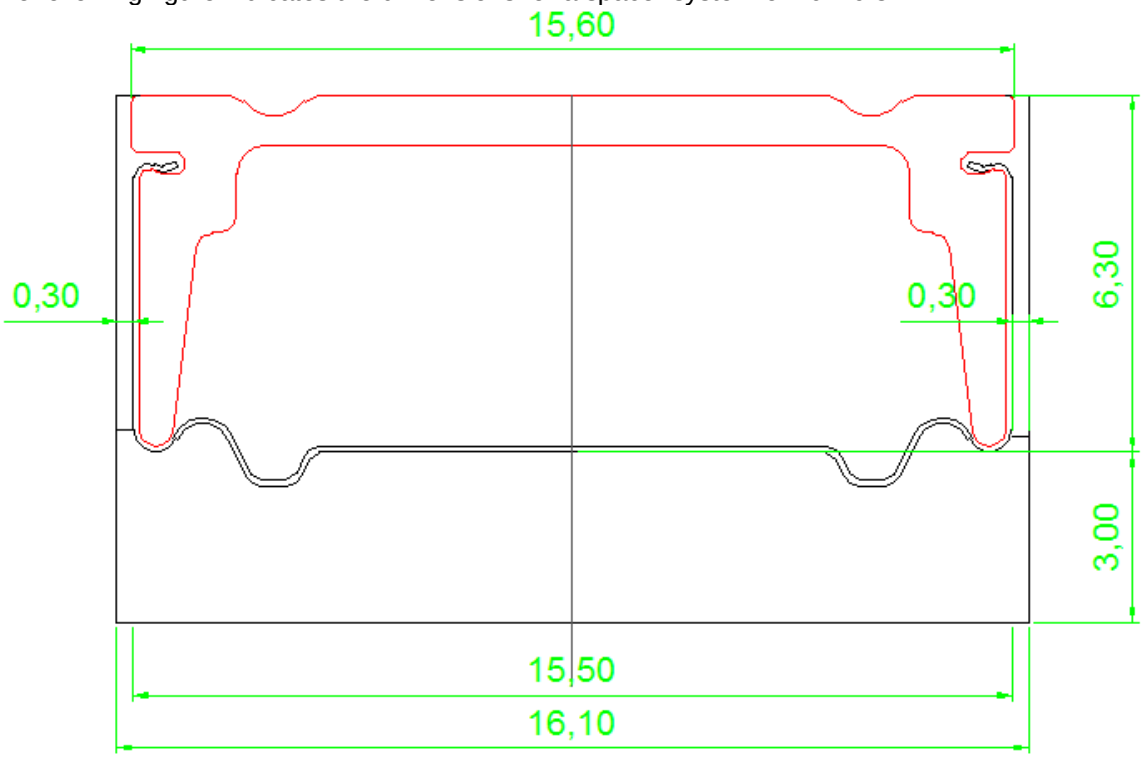
Material data:

When modelling the profiles following material data has been used:

Materials	λ in W / mK
Butyl	0.24
Dessicant	~~0.10~~ 0.03
Polysulfide	0.40
Stainless steel	~~15~~ 17
Engineered plastic	0.17

Normal spacers: CU16 V2.dxf

The following figure indicates the dimensions for a spacer system of 16 x 9.3 mm



Calculations on the spacer have been performed using 0.3mm butyl rubber along both sides of the spacer and 3 mm polysulfide along the lower part of the spacer.

Drawings have been reviewed for compliance with specimen tested.
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ENERGY LABELLING OF CHROMATECH ULTRA SPACER PROFILES – Version F

Calculations are based on the two box model and the equivalent thermal conductivity represents only the box with the engineered plastic and steel profile

Equivalent thermal conductivity of the box with the profile:
Data according to 10077-2 2012

Profile id	B1	Dimensions (with butyl & polysulfide) d x h	Equivalent thermal con-ductivity for dessicant filling	L value	Equivalent thermal conductivity for argon filling	L value
		[mm]	[W / mK]	[W / mK]	[W / mK]	[W / mK]
CHROMATEC ultra 8	7.5	8.1 x 9.3	0.2618	0.3517	0.1824	0.2900
CHROMATEC ultra 10	9.5	10.1 x 9.3	0.2642	0.2836	0.2055	0.2469
CHROMATEC ultra 12	11.5	12.1 x 9.3	0.2688	0.2391	0.2275	0.2176
CHROMATEC ultra 13	12.5	13.1 x 9.3	0.2732	0.2229	0.2335	0.2038
CHROMATEC ultra 14	13.5	14.1 x 9.3	0.2765	0.2086	0.2364	0.1907
CHROMATEC ultra 15	14.5	15.1 x 9.3	0.2855	0.1985	0.2422	0.1805
CHROMATEC ultra 16.	15.5	16.1 x 9.3	0.2897	0.1878	0.2531	0.1735
CHROMATEC ultra 18	17.5	18.1 x 9.3	0.2932	0.1683	0.2575	0.1559
CHROMATEC ultra 20	19.5	20.1 x 9.3	0.3025	0.1545	0.2688	0.1439
CHROMATEC ultra 22	21.5	22.1 x 9.3	0.3110	0.1429	0.2895	0.1368
CHROMATEC ultra 24	23.5	24.1 x 9.3	0.3138	0.1318	0.2925	0.1262

Drawings have been reviewed for compliance with specimen tested.
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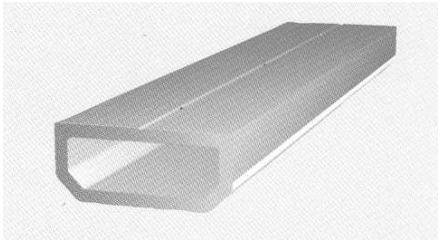
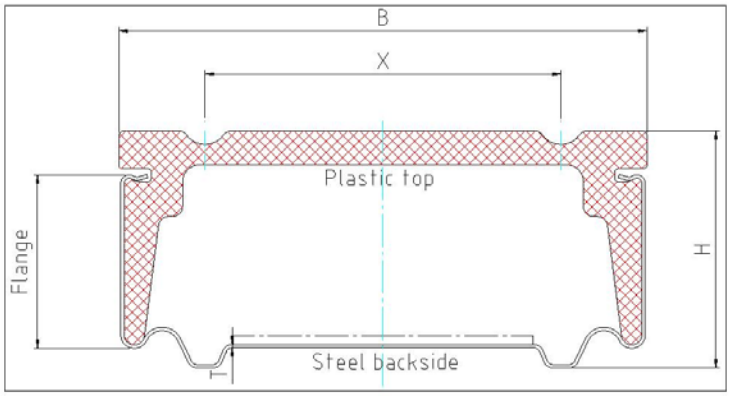
- Associated material

	D-4	D-5	D-6
Manufacturer	Giesbrecht AG	Rolltech	Technoform Glass Ins. GmbH
Product name	Swisspacer / Swisspacer V	Chromatech Ultra	TGI Wave Spacer
Material	Glass-fiber reinforced plastic	High-grade steel + polycarbonate	Polypropylene with metal foil
Surface finish	None	None	None
Venting holes	single-row	double-row	double-row
Geometry	*See picture*	*See picture*	*See picture*
Width	(7.5–19.5) ± 0.1 mm	(7.5–19.5) ± 0.1 mm	(7.5–19.5) ± 0.1 mm
Height	6.5 ± 0.3/-0 mm	7.0 ± 0.1 mm	6.9 ± 0.1 mm

SWISSPACER

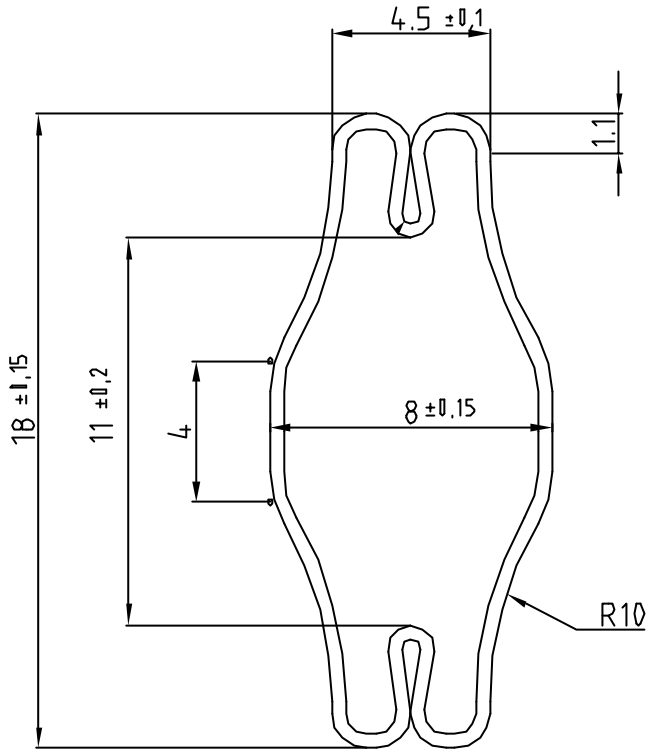


CHROMATECH ULTRA



TGI-W

Drawings have been reviewed for compliance with specimen tested.
Reviewed By: A. Fisher
Project #: QCT15-отлт



NUR ZUR INFORMATION

– unterliegt nicht dem Änderungsdienst –

Name : Rassek	Datum : 09.02.2004

Drawings have been reviewed for compliance with specimen tested.
Reviewed By: A. Fisher
Project #: QCT15-отлт

M1:1

Werkstoff: Auftragsbezogene Al-Legierungen und Banddicken				Für diese Zeichnung bzw. techn. Unterlage behalten wir uns alle Rechte vor.	Helmut Lingemann GmbH & Co. Am Deckershäuschen 62 42111 Wuppertal
	1999	Tag	Name		
	Bearb.	11.15.	Rassek		
	Gepr.	11.15.	Bauer		

Nr.	Änderung	Datum	Name	Gepr.
1	Toleranz Maß11	26.12.2002	Rassek	Bauer

Maßstab: 5:1	Bezeichnung: SPG 1808 eloxiert/roh/bandbeschichtet	
Stückzahl:	Zeichnungsnummer: K 011 118 000	Ä.-Nr. 1
Maße ohne Tol.-Angabe DIN ISO 2768-m	Ersatz für:	