



**Force Engineering & Testing, Inc.**

19530 Ramblewood Drive  
Humble, Texas 77338  
Phone: (281) 540-6603  
Fax: (281) 540-9966  
[www.forceengineeringtesting.com](http://www.forceengineeringtesting.com)

Project Number : 456-0311T-11C

Test Report Date : March 14, 2012

Test Material: Riverclack 55 Standing Seam Roof System  
0.027" (0.7 mm) Aluminum, 21.653" (550 mm) Coverage

Test Protocol : ASTM E 2140-01 (Reapproved 2009)  
STANDARD TEST METHOD FOR WATER PENETRATION OF METAL  
ROOF PANEL SYSTEMS BY STATIC WATER PRESSURE HEAD

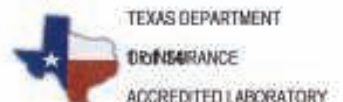
Test Location : Force Engineering & Testing, Inc.  
19530 Ramblewood  
Humble, TX 77338

Report by:

Brandon Jasek, P.E.

Reviewed by:

Terrence E. Wolfe, P.E.



Project Number: 456-0311T-11C

**PURPOSE:**

This test method covers the evaluation of a roof panel for the potential for water to penetrate the side lap.

**TEST DATE:**

February 27, 2012

**TEST SPECIMEN:**

Manufacturer: ISCOM SPA  
Via Belvedere, 78-37026  
Pescantina-Verona-Italy

Panel Description: Riverclack 55, 0.027" (0.7mm) thick Mill Finish Aluminum (H18-5754), 1.81" (46mm) tall standing seam rib with integrated drainage channel, 21.65" (550mm) coverage,

Panel Properties:  $F_y = 41.1$  ksi (283375 kN/m<sup>2</sup>), 0.0260" (0.66mm) Coated thickness per Tensile Test (See Appendix)

Panel Clip: Reinforced Polyamide Fixed Clip, 4 1/8" (105mm) wide x 1 15/16" (50mm) long x 1 1/2" (38.5mm) tall, NO sealant.

Clip Fastener: Two #12-14 x 1 1/2" (38.1mm) Pancake Self driller.

Panel Sealant: No sealant in panel seam.

Panel Laps: Four panel side laps and NO panel end laps.

Panel Length: 8'-11" (2717.8mm)

**TESTING APPARATUS:**

Test Chamber: 7'-5" (2260.6mm) x 8'-11" (2717.8mm) Wood Frame  
5'-0" (1524mm) & 3'-9" (1143mm) spans

**PANEL INSTALLATION:**

1. The panels were installed per manufactured details. The assembly consisted of four panel side laps and NO panel end lap.

**TEST PROCEDURE:**

1. Level test chamber on all four sides.
2. Place rulers on all four side of chamber.
3. Add 3" (76.2mm) of water and maintain for 5 minutes. Check for leaks during the 5 minutes. (A small amount of perimeter leakage is permitted provided that it does not impede the determination of the water leakage on the inside face of the roof panel systems).
4. Examine perimeter seal and repair if necessary. Restore water level to 3" (76.2mm) (if needed) and maintain for 5 minutes. Check for leaks during the 5 minutes.
5. Increase water level to 6" (152.4mm) and maintain for 6 hours.
6. Record the water level and observe for water leakage on the inside face of the roof panels at 1 hour, 3 hour and 6 hour.
7. The test is terminated after 6 hours or upon observation of water leakage on the inside face of the roof panels.
8. Remove all water from test specimen area. Observe and record condition of panels, and panel side laps.

**RESULTS/CONCLUSIONS:**

***Static Water Leakage Test***

Holes were drilled through the vertical perimeter 2"x12" (51mmx305mm) at every panel's end internal drain gutter to allow water to drain out of the panel side lap.

During testing, water leaked through the panel side lap and drained into the internal drain gutter then flowed out on each end of the panels through the 2"x12" (51mmx305mm) perimeter.

There were no signs of water leakage on underside of the test specimen during and after the test period with 6" (152.4mm) of water head on the test specimen.

**STATEMENT OF INDEPENDENCE:**

Force Engineering & Testing, Inc. or any persons employed by them do not have any financial interest in ISCOM SPA.

Force Engineering & Testing, Inc. is not owned, operated or controlled by ISCOM SPA.

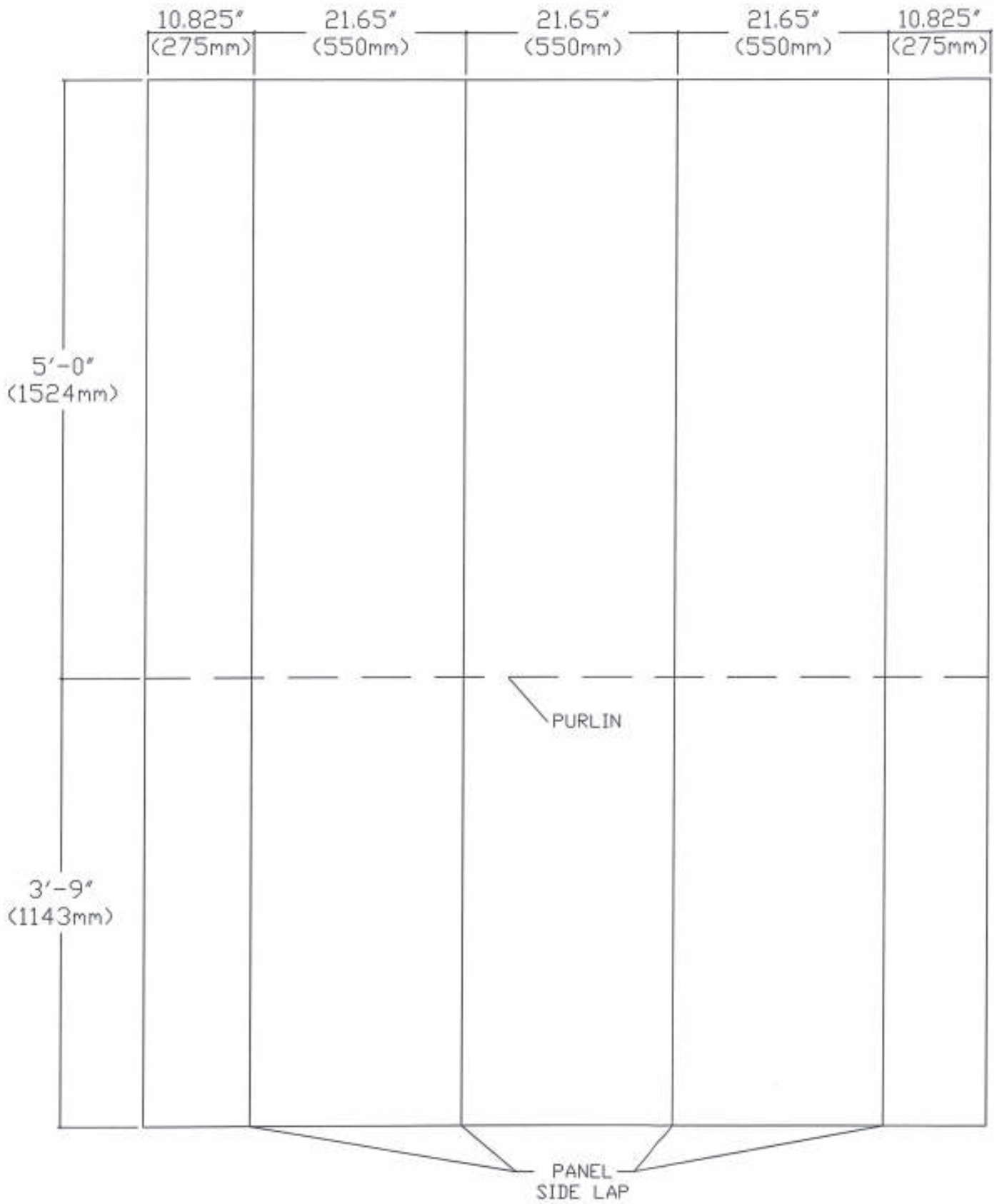
Force Engineering &  
Testing, Inc.  
State of Texas  
Reg. # F-4611

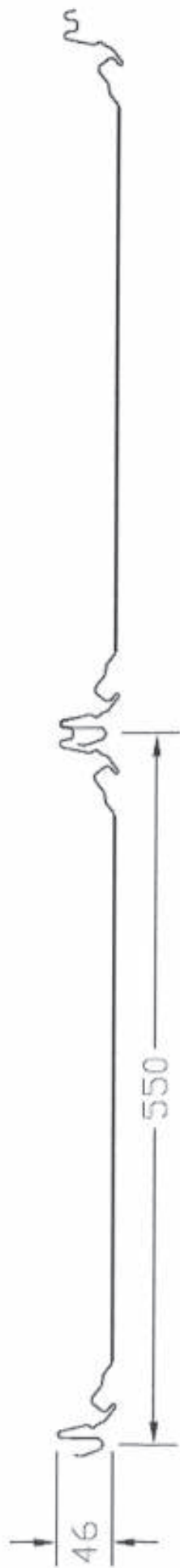


MAR 30 2012

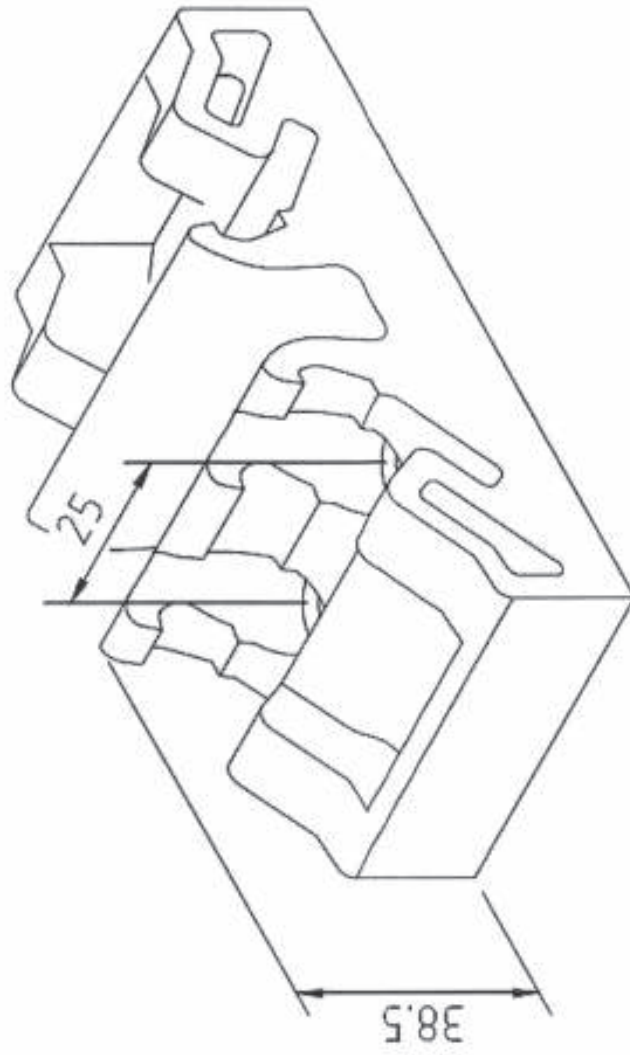
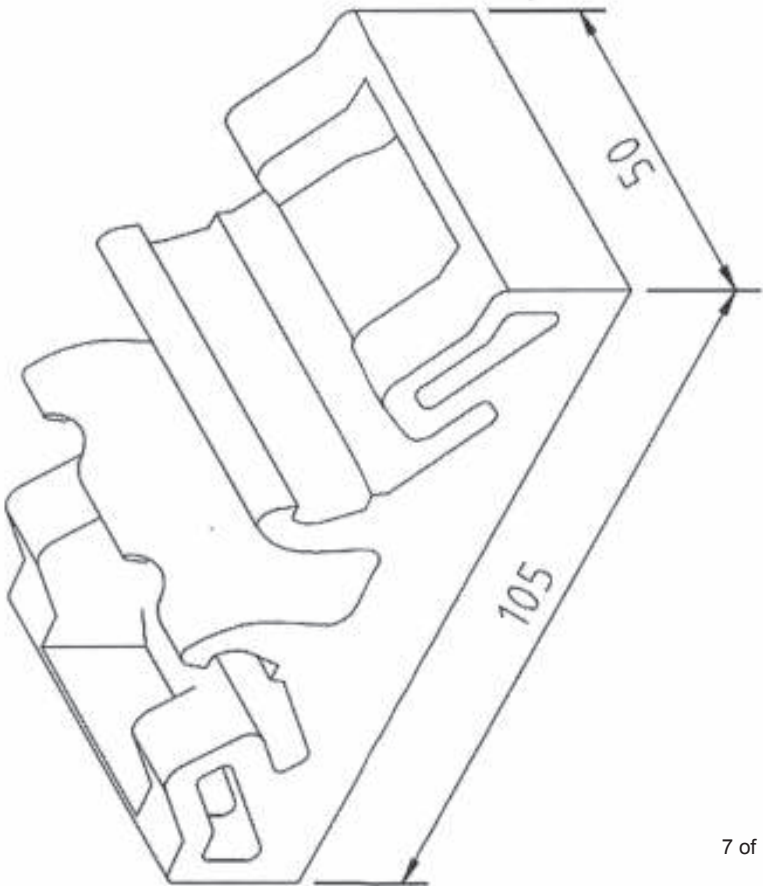
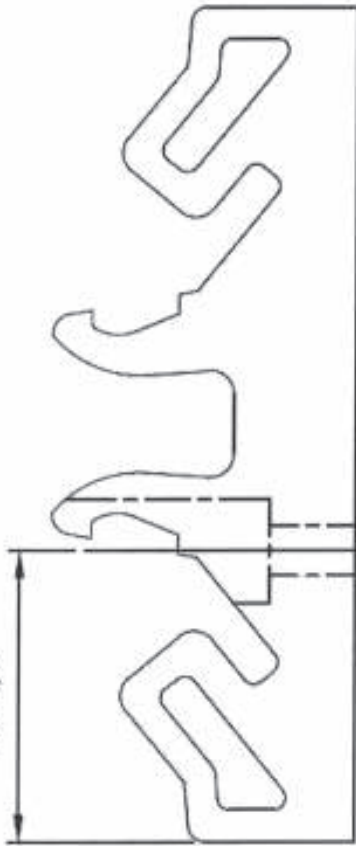
# Appendix

# PANEL LAYOUT



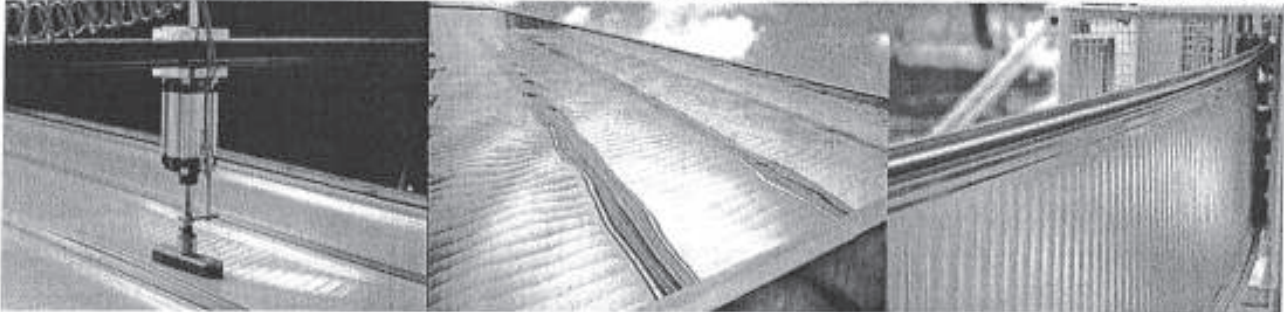


36,6





- Home
- Company
- Products
- Projects
- News
- Contact
- Worldwide
- Download
- Private Area



PRODUCTS



Roof & Facade Cladding

RIVERCLACK

- RIVERCLACK® System
- The Drainage Channel
- Fixing System
- Certification
- Span Table

- RIVERGRIP
- RIVERCLACK AGORA
- ON SITE ROLL FORMING
- SPECIAL PROCESSING
- METALS AND FINISHINGS
- ACCESSORIES

Integrated Fotovoltaic Solutions

- AN INTEGRATED OFFER
- ELIOS
- ELIOS DECK
- KRYSTAL
- 6QUATTRO
- ACCESSORIES

Green Solutions

- RIVERGREEN



THE RIVERCLACK® SYSTEM - THE SOLUTION FOR FLAT-LOW SLOPE ROOFS

The flat roof metal covering RIVERCLACK® is the solution, in industrial as well as in civil building, which complies with the latest architectural trends.



Thanks to its essential shape, aesthetic, constructive economies and outstanding technical properties, RIVERCLACK is the perfect balance between technology and appearance.



Riverclack is a concealed fixing standing seam roofing system, worldwide patented by ISCOM, and it's the result of constant research and testing which have seen it used in pan-European large-scale projects for over twenty years.

Bringing together the structural performance levels of high tensile metals and truly innovative geometry, its unique drainage joint is guarantee of full waterproofing whilst its original fixing system allows an incredible installation speed, free thermal movements and an electric and thermal break between the roof and the below structure.

The panels 550mm wide are manufactured in customized continuous lengths both in the factory and on site.





The flat roof metal covering RIVERCLACK® is the solution, in any situation, well as in civil building, which complies with the latest architectural trends.

Thanks to its essential shape, aesthetic, constructive, economic and outstanding technical properties, RIVERCLACK® is the perfect balance between technology and appearance.

**RIVERCLACK system in seven points**

**1 • FULL WATERPROOF**

Thanks to the walnuts and gaskets-free draining joints, this roof system is fully watertight even if it is submerged.

**2 • PENETRATIONS—LESS LOCKING SYSTEM**

Metal sheets are fixed on the below support structure without any through holes, thus allowing a free thermal expansion. Sheets more than 100 m long can be used.



**3 • DURABILITY**

Aluminium, copper or stainless steel sheets are unchangeable in time and have a hundred-year durability. All elements are 100% recyclable.



**4 • WALK-ABILITY**

It is guaranteed in every throat area and does not leave any deflection even after several carelessness transgressions.



**5 • EASY INSTALLATION**

Installation is quick, mark out free, and easy even for non skilled staff.

**EASE OF INSTALLATION**

The system is characterised by an exceptional ease of installation, with no sealants, gaskets or through penetrations. Fasten system is made by reinforced polyamide brackets to be placed along each spacer. They allow free thermal movement preventing in the same time thermal bridges or electro corrosion between RIVERCLACK® and the below structure.

The system is installed using simple fast pressure onto the purpose designed polyamide bracket fixed to the spacer by two screws.



**6 • COST EFFECTIVE**

Long life, no maintenance and installation quickness are the properties that make Riverclack system cost effective both for big and small works.



**RIVERCLACK sheet installation in 6 steps.**



**7 • SELF-BENDING**

RIVERCLACK sheets can self curve down to a 25 m minimum radius (with finish aluminium thickness 0.7), simply by fixing the system while following the curve shape of the below structure.



[Home](#)
[Company](#)
[Products](#)
[Projects](#)
[News](#)
[Contact](#)
[Worldwide](#)
[Download](#)
[Private Area](#)



**PRODUCTS**



**Roof & Facade Cladding**

**RIVERCLACK**

- RIVERCLACK@ System
- The Drainage Channel
- [Fixing System](#)
- Certification
- Span Table

- RIVERGRIP**
- RIVERCLACK AGORÀ**
- ON SITE ROLL FORMING**
- SPECIAL PROCESSING**
- METALS AND FINISHINGS**
- ACCESSORIES**

**Integrated Fotovoltaic Solutions**

- AN INTEGRATED OFFER**
- ELIOS**
- ELIOS DECK**
- KRYSTAL**
- 6QUATTRO**
- ACCESSORIES**

**Green Solutions**

- RIVERGREEN**



**SHAPE AND FIXING SYSTEM**

The system is characterized by an exceptional ease of installation, free of any seal, gasket or through perforations.

Fasten system is made by reinforced polyamide brackets to be placed along each spacer. They allow free thermal movement without any sheet to sheet friction preventing in the same time thermal bridges or electro corrosion between RIVERCLACK and the under structure.



The system is installed using simple foot pressure onto the purpose designed polyamide bracket fixed to the spacer by two screws.

RIVERCLACK@ sheet installation in 6 steps.



[Click to enlarge](#)

© Copyright 2012 ISCOM SPA  
 Via Belvedere, 78 - 37026 - PESCAZANA - VERONA - ITALIA  
 C.F. e P.I. 00251170239 - Reg.Imp. VR n. 00251170239 - R.E.A. VR n. 124122 - Cap.Sociale 1.008.000 euro int. ver.  
 e-mail: [iscom@iscom.it](mailto:iscom@iscom.it) - [Add to Bookmarks](#)



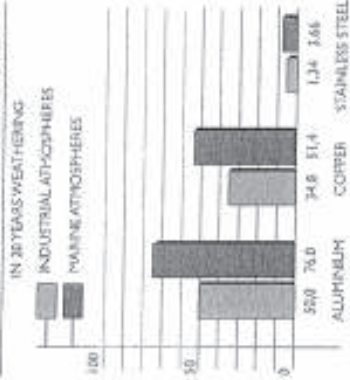
### RIVERCLACK METALS

The high RIVERCLACK® demanded performance has taken to the necessary choice of long-life and strong environment-resistant (such as acid rain, industrial pollution, etc.) materials. Aluminum, copper and stainless steel are the system safety and reliability warranty, showing up its structural performances

### GALVANIC BEHAVIOURS

As every-body knows it is advisable to avoid contacts between different metals in order to prevent electrochemical corrosion (galvanic couple). With the RIVERCLACK® system, stainless steel accessories can be used for elements in aluminum or copper without any compatibility problem between different metals.

### Thickness loss in microns



### DIFFERENCE BETWEEN ALLOYS 5000 AND ALLOYS 3000.

Aluminum alloy 5754 used for RIVERCLACK® has got mechanical and chemical characteristics far above the normal alloys 3000 used generally for metal roofing. The use of alloy 5754 is advised in the UNI 10372 norm, related to metal roofing design, for the use in marine as well as in industrial environments, rather than other alloys. The high hardening degree (H18), together with other features of the alloy 5754, with high magnesium content, used for RIVERCLACK® system, represent the right choice to have a light and resistant roof covering.

MATERIAL ALLOY	ALUMINIUM Alloy 5754 H18	COPPER Cu-0.04P UNI 5649 row	TITANIUM ZINC	STAINLESS STEEL UNI X 2 Cr Ni 18 10-AISI 304	GALVANIZED STEEL
DENSITY g/cm³	2.72	8.3	7.2	8.06	8.25
MELTING POINT °C	550	1080	418	1450	1420
COEFFICIENT OF EXPANSION mm/m°C	0.0240	0.0175	0.0225	0.0141	0.0141
ELASTIC MODULUS kg/cm²	6500	120000/13500	8000	19700	19700
ELONGATIONS	1	2	41	40	40
TENSILE STRENGTH N/mm²	305	400	218	550/700	520/700
BRINNEL HARDNESS HB	90	110	40	150	150

Type of Alloying	grade	Element in alloy	Content (in %)	Additional element	Strength Rm (in MPa) up to
Hardening by plastic deformation	1000	Niobium	0.15 ± 0.15	Cu	160
	3000	Magnesium	0.5 ± 0.8	Mg, Cu	240
	5000	Magnesium	0.5 ± 0.8	Mn, Cr	350
	8000	Ferrite + Silico	Si: 0.3 ± 1 Fe: 0.4 ± 1		190



ALUMINIUM ALLOY 5754

Lightest relation between durability and cost. It is the best acid rain-proof. It is used in the physical state H18/H19 which grants an extraordinary mechanic resistance to the metal.



PRE-PAINTED ALUMINIUM ALLOY 5754

In addition to the own features of the metal, pre-painting adds aesthetics specification following the architectural needs.



COPPER

It is a noble metal, with a unique reflection feature and it is the typical answer for any aesthetic.



ZINC TITANIUM

Prestigious material whose surface aesthetic value is given by the natural shade change. The metal mechanical features require a rigid back support.



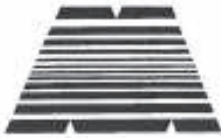
STAINLESS STEEL

It is an unchangeable material, it does not thin in time.



PRE-PAINTED GALVANIZED STEEL

In addition to the own features of the metal, pre-painting adds aesthetics specification following the architectural needs.



**METALLURGICAL ENGINEERING SERVICES, INC.**  
**Consulting • Failure Analysis • Laboratory Testing**

March 13, 2012

REPORT OF: Tensile Testing

REPORT TO: Force Engineering & Testing, Inc.  
 Gianna Willits  
 19530 Ramblewood Drive  
 Humble, Texas 77338

DATE APPROVED: March 9, 2012

IDENTIFICATION: 1 ea. Metal Roof Panel identified as:  
 A) Job #445-0311T-11; ISCOM SPA; Riverclack

PROCEDURES: Tensile testing was performed per ASTM E8-09 on the panel sample using a Satec Systems Model Apex 22EMF, S/N: 1017, calibration due 5/24/12.

RESULTS: *Tensile Test* - 2" Gage Length, 0.2% Offset

SQR Dimensions Inches			Ultimate Strength		Yield Strength		Elong %
Width	Thickness	Area, in <sup>2</sup>	Load, Lbs	PSI	Load, Lbs	PSI	
0.5010	0.0260	0.0130	592	45,500	534	41,100	5.7

*These results are based on the tests performed and are subject to change upon the receipt of new or additional information.*

Respectfully submitted,

METALLURGICAL ENGINEERING SERVICES, INC.  
 Firm Registration No. F-2674

Daniel A. Stolk, P.E.  
 President

Karen Goldstein  
 Quality Assurance Assistant

Purchase Order No. 445-0311T-11

Lab No. 26970\_A, Revision 1 (3/13/12)  
 Page 1 of 1

NOTE: Submitted material will be retained for 30 days unless otherwise notified in writing. Any interpretations and/or opinions made in our reports are not subject to the accreditation. Our letters and reports are for the exclusive use of the client to whom they are addressed. The use of our name must receive our prior written approval. Our letters and reports apply to the sample tested and/or inspected, and are not necessarily indicative of the qualities of apparently identical or similar materials.

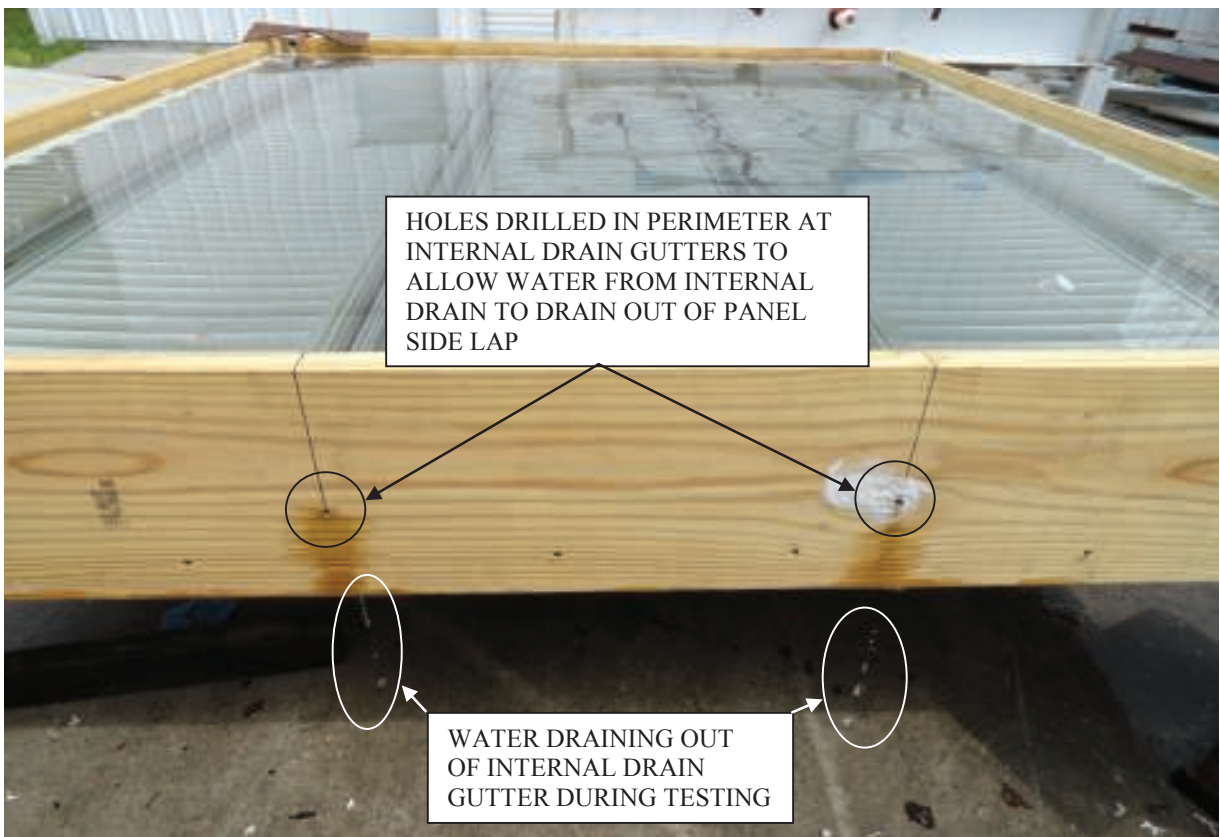
(972) 480-0033 • FAX (972) 480-0036 • 845 E. Arapaho Road • Richardson, Texas 75081 • www.metengr.com



## Photos



**PANEL ASSEMBLY DURING TESTING**



**PANEL ASSEMBLY DURING TESTING, HOLES DRILLED THROUGH PERIMETER 2X12  
TO ALLOW WATER TO DRAIN OUT OF THE INTERNAL GUTTERS**