



APPLIED TECHNICAL SERVICES, INC.

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1049 Triad Court • Marietta, GA 30062 • 770-423-1400

ATS Job No. X307082-1

TEST REPORT OF TDE FALL RESTRAINT HAND RAILS

LOCATED ON:

605 STONEHILL DRIVE SW
ATLANTA, GA

SUBMITTED TO:

TIE DOWN ENGINEERING
TIMOTHY AMMONS

TEST DATE: JANUARY 9, 2019

INSPECTED/TESTED AND APPROVED BY: Mike Whelan
Consultant

APPROVED / REVIEWED BY: Robert Ricaud - P.E.
Professional Engineer
GA P.E. License: # PE37114
GA Firm License: # PEF000027



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In states where Applied Technical Services, Inc. does not provide engineering services,
engineering services will be provided by ATS Engineering, (P)LLC or a licensed subcontractor.



1.0 BACKGROUND

Tie Down Engineering, Inc. (Tie Down) requested that Applied Technical Services, Inc. (ATS) provide testing services to determine if the Tie Down designed hand rail system, TDE RoofZone (RZ) Universal Guardrails, meets the OSHA test requirements. ATS only preformed the testing up to the OSHA 1926.502 limits. It shall be the responsibility of Tie Down to calculate and test any additional safety factor for ultimate design characteristics.

2.0 SUMMARY OF WORK PROJECT

The following summarizes the engineering review:

- The RZ Universal Guardrail comes in 10 ft. sections for long runs, 7½ ft. and 5 ft. where required. The tubing is powder coated steel, which is also available in pre-galvanized. Each section is pinned to a Zip base plate at both ends. Refer to Appendix B for Guardrail system assembly.
- The following OSHA standards were used to determine and assess the performance of the guardrail system as well as the testing procedures.
 - According to OSHA 1926.502(b)(3) Guardrail systems shall be capable of withstanding, without failure, a force of at least 200 pounds (890 N) applied within 2 inches (5.1 cm) of the top edge, in any outward or downward direction, at any point along the top edge.
 - According to OSHA 1926.502(b)(5) Midrails, screens, mesh, intermediate vertical members, solid panels, and equivalent structural members shall be capable of withstanding, without failure, a force of at least 150 pounds (666 N) applied in any downward or outward direction at any point along the midrail or other member.
- The following load test applications (conditions) of 200 lbs. and 150 lbs. were used to evaluate both sections of the guardrail system.
 - At one end a 4000 lbs. winch with 5000 lbs. dynamometer was attached to a rigid structural I-beam via a 6000 lbs. strap. The opposite end of the winch attachment was clamped to the handrail section.
 - The load test assembly was parallel with the floor to ensure a 90-degree angle between the handrail section and winch attachment point, for horizontal load testing applications. Refer to Photos 1 & 3 for Horizontal Load Testing.
 - A vertical anchor was installed into the building floor, via concrete anchors. The winch assembly was guided through the anchor attachment to implement vertical load testing. Refer to Photos 2 & 4 for Vertical Load Testing.
- Deflection was measured for the handrail sections at 50 lbs. increments and recorded using a Hilti PD-32 Laser Range Meter. For horizontal testing, deflections were measured from the wall and for vertical testing, deflections were measured from the floor. Refer to Appendix A for all data.
- Handrail sections were observed once maximum load was applied to ensure it was capable of withstanding, without failure. Refer to Table 2.1: Equipment Tested for handrail sections and the applicable loads. Following the load test the winch assembly was removed from the Guardrail system and observed for any deformities.
- No significant effects were observed at the maximum load for both upper and lower sections in both the horizontal and vertical directions.



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Table 2.1: Equipment Tested

Equipment	Location	Quantity	Results/Procedures	Maximum Load Applied	Test Date	Photos
Upper Handrail Cross Section	Tie Down Facility	1	Hand rails held 200 lbs. load in both vertical and horizontal directions.	200 lbs.	ATS Report X307082-1 01/09/19	1-2
Lower Handrail Cross Section	Tie Down Facility	1	Hand rails held 150 lbs. load in both vertical and horizontal directions.	150 lbs.	ATS Report X307082-1 01/09/19	3-4

Results of the test are described in Appendix A.

Inspected by:

Mike Whelan
Consultant

Approved by:

Robert Ricaud - P.E.
Professional Engineer
GA P.E. License: # PE37114
GA Firm License: # PEF000027



3.0 TESTING RESULTS

The TDE RoofZone (RZ) Universal Guardrails test verified to be an acceptable fall protection guardrail system for the configuration provided by Tie Down. ATS recommends that the mounting surface be inspected and deemed apt before installation.

4.0 CONDITION OF TESTING

- Tie Down provided the handrails for testing.
- Tie Down assembled the handrail structure that was tested on 01/09/2019.
- The handrail was only tested on a level surface and no additional inclined or declined elevation was tested.
- It is not the responsibility of ATS to perform or verify calculations for the design of the handrails.
- It is not the responsibility of ATS to verify the design of the handrails with respects to other OSHA handrail design requirements.
- It is not the responsibility of ATS to verify the design of the handrails with respects to other industry standards for handrail design.
- It is the responsibility of the end user to assemble and verify that the handrail and its locations are correct and within standard as set by OSHA, industry standard, and manufacturer specification.
- It is the responsibility of the end user to maintain and repair/replace (as needed) the system to ensure that the system stays in a conditional set by the manufacturer.
- ATS is not responsible for any manufacturer defects that may cause premature failure to the system.

5.0 PROJECT INFORMATION AND RESOURCES

- Information acquired from the **TDE , RoofZone Guardrail Systems Manual**.
- OSHA – 29 CFR Part 1926.502 Subpart Fall Protection.
- OSHA – 29 CFR Part 1910.28 Subpart Walking - Working Surfaces.



6.0 PHOTOS



PHOTO 1: Horizontal 200lbs. Test on Upper Rail Section.

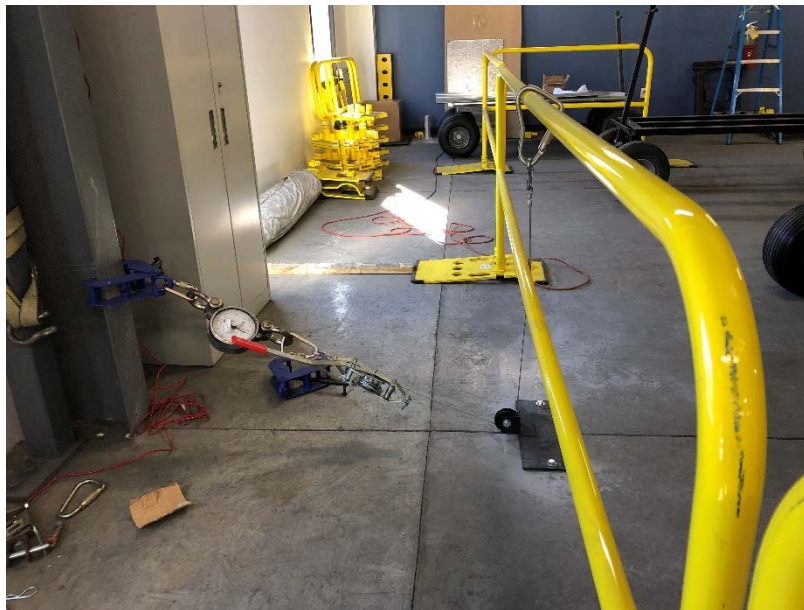


PHOTO 2: Vertical 200lbs. Test on Upper Rail Section.



PHOTOS – CONT.



PHOTO 3: Horizontal 150lbs. Test on Lower Rail Section.



PHOTO 4: Vertical 150lbs. Test on Lower Rail Section.



APPENDIX-A

LOAD TEST DATA

(see following page(s))

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*In the state of North Carolina, Engineering Services will be provided by ATS Engineering, PLLC or a properly licensed subcontractor
In the state of New York, Engineering Services will be provided by ATS Engineering, LLC or a properly licensed subcontractor*



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LOAD TEST DATA SHEET

Address: 605 Stonehill Dr SW, Atlanta, GA 30336
 Client: Tie-Down Engineering
 Items Inspected: **Hand Rails; TH, TB, BH, BV**
 ATS Procedure: 401.0
 Max. Test Load: 200 lbs.

Job Number: X307082
 Inspection Date: 1/9/19
 Prepared By: MJW
 Reviewed By: KMS
 Failure Criteria: Determined by Professional Engineer.

TEST EQUIPMENT

Type: Dynamometer	S/N: ATS-01768	Cal. Due: 11/16/19
Type: Laser Range Meter	S/N: ATS-02226	Cal. Due: 11/12/19

TEST RESULTS

Test #	Anchor ID	Dial Indicator Readings (inches)					Final Dial Indicator Reading (inches)	Δ Deflection (inches)	ACCEPT	REJECT	Comments
		0 lbs.	50 lbs.	100 lbs.	150 lbs.	200 lbs.					
1	TH	64.625	60.000	57.688	54.188	52.750	64.500	0.125	✓		Top bar pulled horizontally - did not tip over.
	TV	42.625	42.500	42.188	42.125	42.875	42.563	0.063	✓		Top bar pulled vertically.
2	BH	65.250	64.938	63.438	61.813	-	65.188	0.063	✓		Bottom bar pulled horizontally - did not tip over.
	BV	21.875	21.563	21.438	21.188	-	21.875	0.000	✓		Bottom bar pulled vertically.
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											

Rails loaded to 200 lbs.



APPENDIX-B

TDE ROOFZONE GUARDRAIL SYSTEMS MANUAL

(see following page(s))

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In the state of New York, Engineering Services will be provided by ATS Engineering, LLC or a properly licensed subcontractor*



Universal Guardrail Fall Protection

Instructions

Use these instructions as part of a training program as required by OSHA and any applicable state agency. The user must understand how to safely use the RZ Guardrails and all safety equipment used in combination with the RZ Universal Guardrails.

A competent person who is highly trained and experienced, assigned by the employer, must be responsible for all elements of a fall safety program, including the regulation, management, and application as it relates to the use of the RZ Guardrails and related system.

Safety Information

Serious injury, bodily harm or death may result if there is a failure to understand and comply with safety regulations. These instructions are not all-inclusive and are for reference only and not intended to replace a competent person, knowledge or judgment of Federal and State Standards. New OSHA Rule in affect: Walking-Working Surfaces, 1910.28, please consult this as well as all local, State and Federal OSHA rules

Workplace conditions including, but not limited to weather conditions, corrosive chemicals, potential electrical hazards, sharp objects/surface, and slope of the surface must be evaluated by a competent person before equipment is selected and installed and before work begins. Do Not misuse equipment. Do Not alter equipment. Unprotected leading edges and sides that are 6 feet or more above the next lowest level require the use of these guardrails, safety nets or personal fall protection devices. Never lean or climb on a Roof Zone Guardrail.

Inspection of the RZ Guardrail must take place routinely at intervals not to exceed 6 months. A competent person other than the end user must be responsible for the inspection of the RZ Guardrail System. All inspection must be recorded by a competent person who must sign their initials and date (month/year) in the appropriate box on the inspection grid decal for the month and year the inspection was conducted.

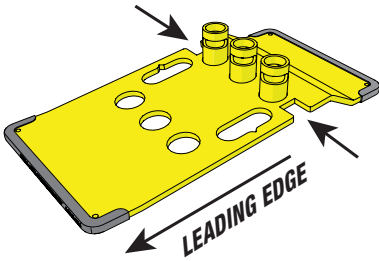
Prior to installation/set-up of the RZ Guardrail System, a competent person must develop a system layout plan.

1. Evaluate the roof surface to confirm that the RZ Guardrail system will not be installed on top of gravel or slippery surfaces.
2. Measure the work surface area to be protected and space the Zip base plate accordingly (10 ft. centers for long runs, 7-1/2' and or 5 ft. centers where required).
3. All Zip Base plates must be located a minimum distance of 18 in. from a "no curb"/parapet leading edge, or opening. If the work location has a curb or parapet edge, the Zip Base can be placed perpendicular against the rise of the structure.
4. Always be aware of all electrical hazards (ELECTRICITY KILLS). A minimum safe distance of 10 ft. away from power lines and other electrical hazards must be maintained at all times.
5. Zip base plates must be oriented correctly with the RZ Guardrails installed perpendicular. Toe boards are installed parallel to the guardrails. Safety clips pins must be inserted through all zip base plates and guardrails.
6. The RZ Guardrail System must be installed in a continuous run, and must completely block all applicable leading edges of potential fall hazards. Do not attempt to relocate a fully assembled system.
7. Guardrail Outriggers **MUST** be used at both ends of any interruption in continuous guardrail sections, or at both ends of a continuous guardrail section. See back for example.
8. A Guardrail Outrigger is installed perpendicular to a continuous guardrail run.
IMPORTANT: Zip Base plate must be placed perpendicular to the orientation of the guard rails with the long side nearest to the roofs leading edge.

Assembly and Use

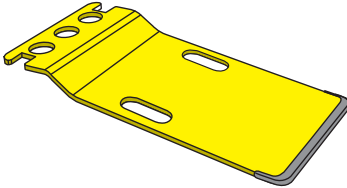
1. Place all Zip Rail Baseplate's around the leading edge of the fall hazard area, space the Zip Rail Baseplate's at approximate lengths of the corresponding length of guardrail (10', 7.5' and 5').
2. When assembling the guardrails into the Zip Rail Baseplate, position the guardrails between the fall hazard and the installers work area. Position one leg of each guardrail into the outermost Zip Rail Baseplate retaining tube. Maintaining the guardrail positions between the installers body and the fall hazard edge, position the tube into the adjacent Zip Rail Baseplate retaining tube.
3. Once each guardrail tube has been inserted into the Zip Rail Baseplate retaining tube, install the retaining pins.
4. Install toe-boards if and whenever required.

Assembly Instructions



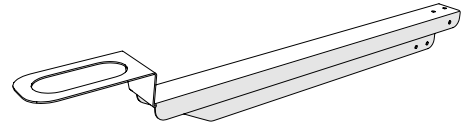
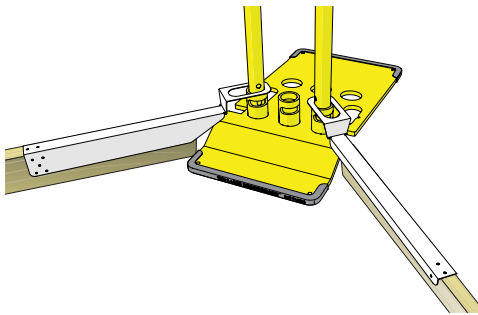
Zip Rail Base

Use toe board slots on both sides of the zip base plate for toe board insertion. Use only 2" x 4"s for toe boards when required. Toe boards must not exceed 1/4" clearance above the roofs surface.



Zip Rail Extender Base

Used in conjunction with Zip Base #70756, the Extender Base allows for more ballast weight where higher impact load ratings may be required. Extender base stacks for easy storage.

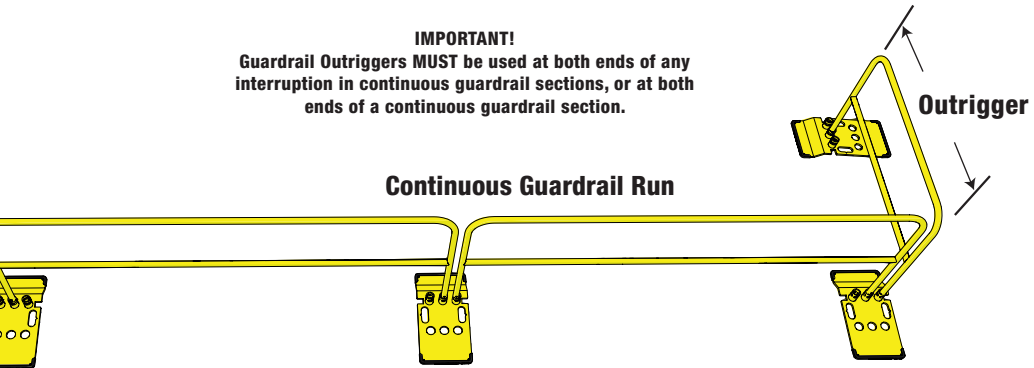


Toe Board Bracket: For angles other than parallel to the guardrail.

NOTE:

Toe boards are required if a risk exist for materials, equipment, tools and other objects to fall off the roofs leading edge.

IMPORTANT!
Guardrail Outriggers **MUST** be used at both ends of any interruption in continuous guardrail sections, or at both ends of a continuous guardrail section.



Leading Edge



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ISO 9001:2008 Certification

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