



# Testing & Engineering Report

GR-1 Lateral Restraint

TER No. 0712-01

GERRYRIGS, LLC

Issued: December 10, 2007

**GERRYRIGS, LLC**  
2288 Rose Hill Church Lane  
Charlottesville, VA 22902  
434-295-7062  
gerryrigs@gmail.com

## 1. Subject

GERRYRIGS GR-1 Lateral Restraint

## 2. Application Summary

The GR-1 lateral restraint and truss spacing device shall be used as an aid for truss installation in accordance with the GERRYRIGS application instructions. GR-1 can safely be used with the following lateral design capacity values:

**Table 1. Allowable Design Loads for GR-1**

Type of Load	Capacity (pounds)
Tension	178
Compression	220

Identical testing was performed on 2x4 short member temporary lateral restraints as defined in BCSI B2, which provides the standard of comparison for lateral restraint design values. The results of this comparison are provided in Table 2.

**Table 2 Comparative Lateral Restraint Design Values – BCSI and GR-1**

Product Tested	Tension		Compression	
	S.F.	Design Value	S.F.	Design Value
GR-1	2.5	178 lbs.	2	220 lbs.
BCSI	2.5	180 lbs.	2.5	188 lbs.

Testing has shown that GR-1 performance is compatible with the lateral restraint techniques known as option 1 through option 3 shown in BCSI-B2.

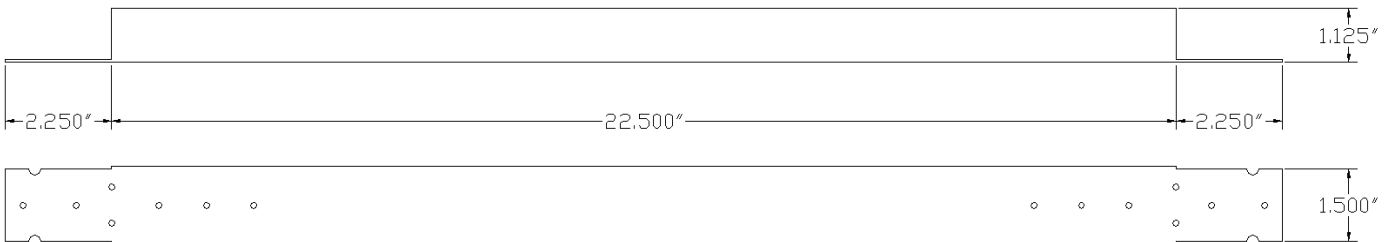
## 3. Evaluation Scope

A pre-manufactured metal lateral restraint and truss spacing device that is applied to the top and bottom chords.

**4. Product Description/Materials:**

The GR-1 lateral restraint and truss spacing device, as shown in Figure 1 below, are die-formed from 20 gauge galvanized steel (Design Thickness = 0.038 inches). The GR-1 is designed to attach to adjacent nominal 2 inches wide trusses to provide a 24 inch on center spacing and resist truss lateral forces as trusses are installed within the overall truss roof or floor system. The steel that forms the GR-1 conforms to ASTM A1008 specifications with minimum yield strength of 33,000 psi and a minimum tensile strength of 47,000 psi. The minimum strength wood species that can be used based on tests performed with this product is Spruce Pine Fir, which has an average specific gravity of 0.42.

**Figure 1. GR-1 lateral restraint and truss spacing device**



**5. Design and Installation:**

Table 1 above lists the allowable loads for the GR-1 lateral restraint and truss spacing device. The design capacity values of each loading type are based on:

- i. Testing of 5 assemblies that consisted of 8 GR-1 devices.
- ii. The average ultimate strength of the 5 assemblies resulted in a design value for each GR-1 as listed in Table 1 above, which was based on a total of 40 GR-1 devices tested.
- iii. The average ultimate strength was then reduced by an appropriate safety factor of 2.0 for a steel failure mode and 2.5 for a wood failure mode.

**Table 1. Allowable Design Loads for GR-1**

Type of Load	Capacity (pounds)
Tension	178
Compression	220

The manufacturer's installation instructions shall be adhered to and a copy of these instructions must be available at all times on the jobsite during installation.

## 6. Identification:

Each GR-1 lateral brace and spacer described in this report shall be identified with a marking or label bearing the product's name and/or trademark and this TER Number for field identification.

## 7. Evidence Submitted:

Qualtim Test Report Number: 071210 GERRYRIGS GR-1 entitled "**Strength Tests of GR-1, Comparative Tests and Design Values**" containing compression and tension tests.

## 8. Conditions of Use:

- ◆ Design loads applied to the GR-1 lateral brace and spacer shall be determined in accordance with the applicable code and shall not exceed the allowable loads provided in Table 1 of this report.
- ◆ Allowable loads in Table 1 above are based on the use of the fasteners indicated by the manufacturer. The scope of this report is limited to the use of these connectors with wood that is free of knots and other strength reducing lumber characteristics at the location of attachment.
- ◆ Allowable loads in Table 1 above are for the GR-1 lateral restraint and spacer only. All framing members must be designed in accordance with the requirements of the design specifications for the framing application, the specifications of the Building Designer, or as referenced in the applicable building code.

## 9. Basis of Report:

The GR-1 can be used to comply with the lateral restraint requirements found in the following sections of the 2000, 2003 & 2006 IRC:

2006 IRC, **R802.10.3 Bracing**. Trusses shall be braced to prevent rotation and provide lateral stability in accordance with the requirements specified in the construction documents for the building and on the individual truss design drawings. In the absence of specific bracing requirements, trusses shall be braced in accordance with the Building Component Safety Information (BCSI 1-03) Guide to Good Practice for Handling, Installing & Bracing of Metal Plate Connected Wood Trusses.

2003 IRC- **R802.10.3 Bracing**. Trusses shall be braced to prevent rotation and provide lateral stability in accordance with the requirements specified in the construction documents for the building and on the individual truss design drawings. In the absence of specific bracing requirements, trusses shall be braced in accordance with TPI/HIB.

2000 IRC - **R802.10.3 Bracing**. Trusses shall be braced to prevent rotation and provide lateral stability in accordance with the requirements specified in the construction documents for the building and on the individual truss design drawings. In the absence of specific bracing requirements, trusses shall be braced in accordance with TPI/HIB.

## SBCRI Confidential Research and Testing

The GR-1 can be used to comply with the lateral restraint requirements found in the following sections of the 2000, 2003 & 2006 IBC:

2003 IBC- **2308.10.7.2 Bracing.** The bracing of wood trusses shall comply with their appropriate engineered design.

2000 IBC- 2308.10.7.2 Bracing. The bracing of wood trusses shall comply to their appropriate engineered design.

The 2006 IBC does not provide any guidance for temporary lateral restraint and diagonal bracing. Section 2303.4 does reference using standard industry bracing details (BCSI) for truss member permanent bracing. Using standard industry details or BCSI is therefore also appropriate for applying temporary lateral restraint and diagonal bracing, for which GR-1 is applicable.

The 2006 International Building Code® also has this to say about how a company can gain acceptance of any Building Official for the use of any product so that it complies with the building code:

**IBC 104.1 and IRC R104.1 General.** The building official is hereby authorized and directed to enforce the provisions of this code. The building official shall have the authority to render interpretations of this code and to adopt policies and procedures in order to clarify the application of its provisions. Such interpretations, policies and procedures shall be in compliance with the intent and purpose of this code. Such policies and procedures shall not have the effect of waiving requirements specifically provided for in this code.

**IBC 104.2 and IRC R104.2 Applications and permits.** The building official shall receive applications, review construction documents and issue permits for the erection, and alteration, demolition and moving of buildings and structures, inspect the premises for which such permits have been issued and enforce compliance with the provisions of this code.

**IBC 104.4 and IRC R104.4 Inspections.** The building official shall make all of the required inspections, or the building official shall have the authority to accept reports of inspection by approved agencies or individuals. Reports of such inspections shall be in writing and be certified by a responsible officer of such approved agency or by the responsible individual. The building official is authorized to engage such expert opinion as deemed necessary to report upon unusual technical issues that arise, subject to the approval of the appointing authority.

**IBC 104.11 and IRC R104.11 Alternative materials, design and methods of construction and equipment.** The provisions of this code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by this code, provided that any such alternative has been approved. An alternative material, design or method of construction shall be approved where the building official finds that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, method or work offered is, for the purpose intended, at least the equivalent of that prescribed in this code in quality, strength, effectiveness, fire resistance, durability and safety.

## SBCRI Confidential Research and Testing

**IBC 104.9 and IRC R104.9 Approved materials and equipment.** Materials, equipment and devices approved by the building official shall be constructed and installed in accordance with such approval.

**IBC 105.3.1 and IRC R105.3.1 Action on application.** The building official shall examine or cause to be examined applications for permits and amendments thereto within a reasonable time after filing. If the application or the construction documents do not conform to the requirements of pertinent laws, the building official shall reject such application in writing, stating the reasons therefore. If the building official is satisfied that the proposed work conforms to the requirements of this code and laws and ordinances applicable thereto, the building official shall issue a permit therefore as soon as practicable.



### Responsibility Statement

The information contained herein is based on a product evaluation performed in accordance with the referenced testing and/or analysis using generally accepted engineering practices. Product quality control is the responsibility of the manufacturer. Consult your local jurisdiction or design professional to assure compliance with the local building code and the proper detailing and application for the intended purpose. Qualtim, Inc. and SBC Research Institute do not make any warranty, express or implied, or assume any legal liability or responsibility for the use, application of, and/or reference to opinions, findings, conclusions, or recommendations included in this report.



# Testing & Engineering Report

GR-3 Framing and Uplift Anchor

TER No. 0709-01

GERRYRIGS, LLC

Issued: September 26, 2007

**GERRYRIGS, LLC**  
2288 Rose Hill Church Lane  
Charlottesville, VA 22902  
434-295-7062  
gerryrigs@gmail.com

## 1. Subject

GERRYRIGS GR-3 Framing and Uplift Connector

## 2. Application Summary

The allowable loads for the GR-3 framing and uplift anchor based on standard engineering mechanics calculations follow:

**Table 1 - Allowable Loads for GR-3 Framing and Uplift Anchor**

Fasteners (Nails)			Maximum Allowable Load <sup>1</sup> (lbs)				
Truss	Side of Support	Top of Support	Uplift (F1) <sup>2</sup>			Lateral	
8 – 10d (0.148x1.5")	4 – 10d (0.148x3")	6 – 10d	SPF (0.42)	DF-L (0.50)	So. Pine (0.55)	Parallel to Truss (F2) <sup>2</sup>	Perp. to Truss (F3) <sup>2</sup>
		(0.148x1.5")	320 <sup>3</sup>	505 <sup>3</sup>	645 <sup>3</sup>		
		(0.148x3")	625 <sup>3</sup>	725 <sup>3</sup>	790 <sup>3</sup>	585 <sup>4</sup>	610 <sup>3</sup>

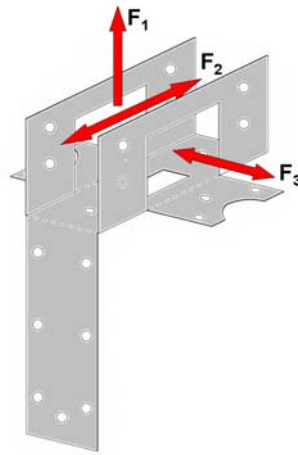
The manufacturer's installation instructions must be adhered to and a copy of these instructions must be available at all times on the jobsite during installation.

## 3. Evaluation Scope

Structural connection for wood construction

#### 4. Product Description/Materials:

The GR-3 anchors are die-formed from 20 gauge galvanized steel (design thickness = 0.038 inches). The GR-3 anchors are designed to attach 1-1/2" wide wood framing members such as metal plate connected wood trusses, engineered wood I-joists and dimension lumber joists and rafters to a wood support beam or the double top plates of a wood supporting wall to resist both uplift and lateral forces. The steel that forms the GR-3 anchor conforms to ASTM A1008 specifications with a minimum yield strength of 33,000 psi and a minimum tensile strength of 47,000 psi. See Figure 1.



**Figure 1 – GR-3 Framing and Uplift Anchor**

#### 5. Design and Installation:

Table 1 below lists the allowable loads for the GR-3 framing and uplift anchor. The load values are based on the lowest load obtained from the following calculations:

- ◆ Allowable fastener values in accordance with the ANSI/AF&PA NDS-2005, National Design Specification<sup>®</sup> for Wood Construction based on wood specific gravities of 0.42, 0.50 and 0.55.
- ◆ Allowable steel values in accordance with AISI/COFS/NASPEC 2001, North American Specification for the Design of Cold Formed Steel Structural Members. Properties evaluated include:
  - Tensile strength (yield and fracture)
  - Tension rupture (lag shear)
  - Block shear rupture
  - Shear strength
  - Connection shear limited by bearing
  - Connection shear limited by end distance
  - Pull-over

**Table 1 - Allowable Loads for GR-3 Framing and Uplift Anchor**

Fasteners (Nails)			Maximum Allowable Load <sup>1</sup> (lbs)				
Truss	Side of Support	Top of Support	Uplift (F1) <sup>2</sup>			Lateral	
8 – 10d (0.148x1.5")	4 – 10d (0.148x3")	6 – 10d	SPF (0.42)	DF-L (0.50)	So. Pine (0.55)	Parallel to Truss (F2) <sup>2</sup>	Perp. to Truss (F3) <sup>2</sup>
		(0.148x1.5")	320 <sup>3</sup>	505 <sup>3</sup>	645 <sup>3</sup>		
		(0.148x3")	625 <sup>3</sup>	725 <sup>3</sup>	790 <sup>3</sup>	585 <sup>4</sup>	610 <sup>3</sup>

- 1 Loads assume full penetration of nails into member.
- 2 Refer to Figure 1 above for direction of load.
- 3 Loads have been adjusted to include a load duration factor of 1.6 for wind and seismic per 2005 NDS. Reduced loads to account for other load duration factors (LDF) by multiplying the tabulated load by LDF/1.6.
- 4 Load may be increased to 670 lbs for applications in which the duration of load is greater than 1.0.

The manufacturer's installation instructions must be adhered to and a copy of these instructions must be available at all times on the jobsite during installation.

**6. Identification:**

Each GR-3 Framing and Uplift Anchor described in this report shall be identified with a marking or label bearing the manufacturer's name (GERRYRIGS, LLC) and/or trademark, the connector's designation (GR-3) and this TER Number for field identification.

**7. Conditions of Use:**

- ◆ Design loads applied to the GR-3 Framing and Uplift Anchor shall be determined in accordance with the applicable code and shall not exceed the allowable loads provided in Table 1 (above) of this report.
- ◆ Allowable loads in Table 1 above are based on the use of the fasteners and wood species indicated. Values are limited to dry service conditions where the moisture content of the wood is assumed to be less than 19 percent. The scope of this report is limited to the use of these connectors with wood that has not been pressure treated with chemicals such as those used for fire-retardant treatment and preservative treatment.

- ♦ Allowable loads in Table 1 above are for the GR-3 Framing and Uplift Anchor only. All framing members must be designed in accordance with the requirements of the design specifications for the framing application, the specifications of the Building Designer or as referenced in the applicable building code.

## 8. Basis of Report:

The GR-1 can be used to comply with the lateral restraint requirements found in the following sections of the 2003 & 2006 IRC and IBC:

**2003 and 2006 IRC R802.10.5 Truss to wall connection.** Trusses shall be connected to wall plates by the use of approved connectors having a resistance to uplift of not less than 175 pounds (779 N) and shall be installed in accordance with the manufacturer's specifications. For roof assemblies subject to wind uplift pressures of 20 pounds per square foot (960 Pa) or greater, as established in Table R301.2(2), adjusted for height and exposure per Table R301.2(3), see section R802.11.

**2003 and 2006 IRC R802.11 Roof tie-down.**

**2003 and 2006 IRC R802.11.1 Uplift resistance.** Roof assemblies which are subject to wind uplift pressures of 20 pounds per square foot (960 Pa) or greater shall have roof rafters or trusses attached to their supporting wall assemblies by connections capable of providing the resistance required in Table R802.11. Wind uplift pressures shall be determined using an effective wind area of 100 square feet (9.3 m<sup>2</sup>) and Zone 1 in Table R301.2(2), as adjusted for height and exposure per Table R301.2(3). A continuous load path shall be designed to transmit the uplift forces from the rafter or truss ties to the foundation.

**IBC 2003 and 2006 2308.10.1 Wind uplift.** Roof assemblies shall have rafter and truss ties to the wall below. Resultant uplift loads shall be transferred to the foundation using a continuous load path. The rafter or truss to wall connection shall comply with Tables 2304.9.1 and 2308.10.1.

The Building Code has this to say about how a company can gain acceptance of any Building Official for the use of any product so that it complies with the building code:

**IBC 104.1 and IRC R104.1 General.** The building official is hereby authorized and directed to enforce the provisions of this code. The building official shall have the authority to render interpretations of this code and to adopt policies and procedures in order to clarify the application of its provisions. Such interpretations, policies and procedures shall be in compliance with the intent and purpose of this code. Such policies and procedures shall not have the effect of waiving requirements specifically provided for in this code.

**IBC 104.2 and IRC R104.2 Applications and permits.** The building official shall receive applications, review construction documents and issue permits for the erection, and alteration, demolition and moving of buildings and structures, inspect the premises for which such permits have been issued and enforce compliance with the provisions of this code.

**IBC 104.4 and IRC R104.4 Inspections.** The building official shall make all of the required inspections, or the building official shall have the authority to accept reports of inspection by approved agencies or individuals. Reports of such inspections shall be in writing and be certified by a responsible officer of such approved agency or by the responsible individual. The building official is authorized to engage such expert opinion as deemed necessary to report upon unusual technical issues that arise, subject to the approval of the appointing authority.

**IBC 104.11 and IRC R104.11 Alternative materials, design and methods of construction and equipment.** The provisions of this code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by this code, provided that any such alternative has been approved. An alternative material, design or method of construction shall be approved where the building official finds that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, method or work offered is, for the purpose intended, at least the equivalent of that prescribed in this code in quality, strength, effectiveness, fire resistance, durability and safety.

**IBC 104.9 and IRC R104.9 Approved materials and equipment.** Materials, equipment and devices approved by the building official shall be constructed and installed in accordance with such approval.

**IBC 105.3.1 and IRC R105.3.1 Action on application.** The building official shall examine or cause to be examined applications for permits and amendments thereto within a reasonable time after filing. If the application or the construction documents do not conform to the requirements of pertinent laws, the building official shall reject such application in writing, stating the reasons therefor. If the building official is satisfied that the proposed work conforms to the requirements of this code and laws and ordinances applicable thereto, the building official shall issue a permit therefor as soon as practicable.



#### **Responsibility Statement**

The information contained herein is based on a product evaluation performed in accordance with the referenced testing and/or analysis using generally accepted engineering practices. Product quality control is the responsibility of the manufacturer. Consult your local jurisdiction or design professional to assure compliance with the local building code and the proper detailing and application for the intended purpose. Qualtim, Inc. and SBC Research Institute do not make any warranty, express or implied, or assume any legal liability or responsibility for the use, application of, and/or reference to opinions, findings, conclusions, or recommendations included in this report.