RE-STRUCTURE GROUP, LLC.

Technical Manual Part 1

August 2012

TABLE OF CONTENTS

RSG 3-D PANEL PROPERTY VALUES

DESIGN AND USE

Complete architectural freedom and flexibility appicable to any type of design, exterior and interior walls, flat and pitched roofs, intermediate floors, parapets, avobe and below ground, it can be used for sound barrier walls, security and property walls as well as retaining walls.

APPEARANCE

No evidence of prefabrication after application of cementitious skins variety of finishes, smooth to heavily texture.

DURABILITY

Excellent structural qualities to withstand earthquakes and high winds.
Excellent strengths as achieved with any reinforced concrete system.
Highly resistant to fire – termites – dry rot – fungus.

ENERGY SAVING

Thermal mass for passive temperature control.
Acoustic (sound barrier) qualities.
Excellent insulation values, great for leed type projects.

COST EFFECTIVE

Significant decreases in on-site construction time effective use of labor simplicity of erection.

1. GENERAL DESCRIPTION

STRUCTURAL"RSG 3-D PANEL" WALL PANELS

GENERAL DESCRIPTION

The components of our innovative panel system are simple. A core of modified EPS, this core is covered on two sides by wire mesh sheets (WELDED WIRE FABRIC), these WWF sheets are connected together with galvanized truss wires at specific angles then, cementitious skins are field applied on both sides of the panel. The characteristics of these outer coats are minimum 1.25" thick (can be thicker as per engineering requirements) for walls and should have a minimum 2,500 PSI. On roofs the top (or compression) layer is normally 2" thick. Consult a 3-D Distributor or a Certified Engineer for any specific information, you can find them on our web page www.RSG3D.com.mx

Yet its extraordinary design flexibility, ease of installation, versatility by welds of application and astonishing strength are changing the way the construction industry will build in the future.

Developed by EVG of Austria and manufactured by RE-STRUCTURE GROUP, LLC. Since 1993, these panels are produced to exacting tolerances using patented state of the art machinery. The panel's light weight yields dramatic advantages in lower shipping costs, easy job-site handling and rapid assembly / installation.

Each RSG 3-D PANEL is 4´wide by any length (up to 40´) required. It has different types and thickness´s of insulating cores and different gauges of 2"x2" face mesh (14 ga., 12.5 ga., & 11 ga.), both in brite basic and galvanized mesh. The panel can be manufactured in increments of 8" inches. The nominal thickness of the RSG 3-D PANEL wire frame varies depending of the Core thickness which also vary from 1.5" up to 5.0" (See Building Details Manual).

MATERIAL SPECIFICATIONS

Wire: No. 14, 12.5 and 11, conforming to ASTM A-82 and to ASTM a-185 as a welded steel wire fabric (galvanized and brite).

Expanded Polystyrene: Foam has a density of 1.0 to 2.0 pcf. The beads are produced by BASF Wyandotte BF-Styropor (Research Report No. 3401) or American Hoechst Corporation Fostfoam Type 86 Series (Research Report No. 3504) and comply with Section 1717 (a) of the Uniform Building Code.

Galvanized wire: No 9 gauge wire conforming to ASTM A-82 and to ASTM A-185.

Portland cement: Complies with ASTM C-150

Aggregate: Natural plaster sand complying with ASTM C144-62T

Cementitious Skins: A mixture of Portland cement and aggregates complying with the applicable Building Code. The plaster has a minimum 28 day compressive strength of 2,500 psi or greater, as required by design based on testing of three 2" inch cubes or 3" x 6" standard mortar cylinders following ASTM C109/C109M-11 or newer.

COMPOSITE BUILDING PANELS

Part 1. - PRODUCTS

1.01 MANUFACTURE: Products of only one manufacturer for respective items shall be used throughout the project for each item of equipment specified under this section unless otherwise indicated on the drawings or specified herein.

1.02 MATERIALS: Composite Buildings Panels shall be "RSG 3-D PANEL" manufactured and/or licensed for fabrication by RE-STRUCTURE GROUP, LLC. S.A. DE C.V., Carretera a San Felipe 733, Mexicali, B.C., Mexico, in 4 feet wide and varying lengths in increments of 8" as indicated on drawings. The nominal thickness of the RSG 3-D PANEL wire frame it varies, resulting in a finished wall thickness, after applying outer coats , from 4.5" to 8.0". "RSG 3-D PANEL" shall be a composite of the following materials:

1. - Wire frame: Welded in accordance with AWS D1.1 using ASTM A-82 No. 14, 12.5 and 11 gauge wire and to ASTM A-185 as a welded steel wire fabric.

2. - Expanded Polystyrene: Foam assembled as filler shall be 1.5" to 5.0" thick. Polystyrene foam having an approximate density of 1.0 to 2.0 pcf. The beads are produced by BASF Wyandotte BF-Styropor (Research Report No.3401) or American Hoechst Corporation Foastfoam Type 86 Series (Research Report No.3504) and comply with section 1717 (a) of the Uniform Building Code.

3. - Portland Cement Outer Skins: A mixture of Portland Cement and aggregates complying with the applicable Building Code. The plaster shall have a minimum 28 day compressive strength of 2,500 psi or greater as required by design based on testing of three 2-inch cubes or 3" x 6" mortar cylinders shall be as follows:
    a) Portland Cement: ASTM C-150
    b) Aggregate: ASTM C-144-62T, natural plasters sand.

1.03 OTHER MATERIALS: All other materials, not specifically described but required for a complete and proper installation of the work of this section, shall be new, first quality of their respective kinds, and subject to acceptance of the Architect.

A. Provide anchor bolts, shear receivers, Anchor Bars and metal screed at foundation unless indicated otherwise on drawings.
B. Join panels using "rings ¾ or ½" with pneumatic fastening tool. (see **Assembly Manual**), regular tie wire can also be used.
C. Other fasteners and panel support shall be RSG 3-D PANEL's items as indicated on the drawings and required or otherwise specified by a Structural Engineer.

2.01 QUALITY ASSURANCE

A) Qualifications of Installers:

1. - Use only skilled and experienced installers, training is available through distributors.
2. - Helpers and apprentices used for such work shall be under full and constant supervision at all times by skilled installers.
3. - In the acceptance or rejection of installed work, no allowance will be made for lack of skill on the part of the installer.

B) Association's and Manufacture's recommendations: The Associations and manufacturer's recommended methods of installation, when accepted by the Architect, shall be the basis for acceptance or rejection of actual installation methods used in this work.

C) Codes and Standards:

1. - In addition to complying with pertinent codes and regulations, comply with pertinent recommendations contained in the following
   a) Current edition of the International Building Codes (IBC)
   b) American Welding Society (AWS)`
   c) Federal Housing Authority (FHA and HUD) Structural Engineering

2. - Where provisions of pertinent codes and standards conflict with this specifications, the more stringent provisions shall govern IES-IBC.

D) The production facility is also audited according to ICC requirements to guarantee that Standards are maintained constantly, proof of these audits are available upon request.

2.02 SUBMITTALS

A) Material Lists: Submit a complete list of all materials and equipment proposed to be provided under this portion of the work, giving description for each item where applicable.

B) Accompanying the material list, submit for the Architect's acceptance and selection samples in accordance with Division 1 of these specifications

2.03 PRODUCT HANDLING

a) Shall be in accordance with Division 1 of these specifications.
b) Protection: Use all means necessary to protect the materials of this section before, during, and after installation and to protect the installed work and materials of all other trades.
c) Replacements: In the event of damage, immediately make all repairs and replacements necessary to the acceptance of the Architect or supervisor and at no additional cost to the owner.

2. RSG 3-D PANEL & Related Materials Description & Usage Schedule

RSG 3-D PANEL & RELATED MATERIALS DESCRIPTION & USAGE SCHEDULE

(Othere items might apply as applicable on each project, these are the be speficied and described by the designer)

PIECE #	DESCRIPTION	USAGE
001	RSG 3-D PANEL	As Required by Construction Plans.
002	EPS Piece	Provides insulation and sound barrier
003	Wire mesh sheets	Two outer layers of 2”x2” welded wire mesh (brite or galvanized 14, 12.5 & 11 ga.) connected with galvanized truss wires.
004	Truss wire	Galvanized 9 ga. That pierce the EPS core and are machine welded to both mesh layers by fully automated equip.
005	12” Flat Mesh	2” x 2” / 14-14, 12.5-12.5 or 11-11 welded wire fabric, 48” long used at vertical and Horizontal RSG 3-D PANEL Joints.
006	6” x 6” Corner Mesh (inside corner)	Same material as Flat Joint Mesh formed into and “L” with a 6”x 6” leg. Used to lap face of RSG 3-D PANEL corner joint. (inside)
007	12” x 12” Corner Mesh (outside corner)	Same as P/N 005 only up the “L” shape. Used on outside of RSG 3-D PANEL corner splice (outer corner sides).
008	“U” Mesh	12” or 24” “U” mesh for any type opening edge.
009	Diamond Mesh	27” x 96” sheet of plaster lath used around window frames and where foam has been removed from the RSG 3-D PANEL if applicable or specified in plans.
010	Corner Aid (40 ea per carton)	96” plaster screed used at each exterior corner joint or as screed for exposed edges or RSG 3-D PANEL if applicable and specified in plans.
011	Corned Bead (25 ea per carton)	120” plaster screed used around interior window openings and exposed interior edges of RSG 3-D PANEL. if applicable and specified in plans.
012	Tie Wire 16.5 ga (400’ coil)	A utility tie wire used on job site for installing electrical boxes, window frames, and wall brace plates.

PIECE #	DESCRIPTION	USAGE
013	Tie wire 12 ga. (600 ea per carton)	12” straight wire used to connect RSG 3-D PANEL to 3 1/8” channel, hold down connector , door frames, etc.
014	Shear Connectors	Typically 3/8” or ½” steel bar (rebar) embedded in the concrete with EPOXY at 24” o.c. Refer to Building Details Manual.
015	Hold Down Anchor	Used with anchor bolt to connect RSG 3-D PANEL to foundation and/or slab on either side of door openings or in cases where standard anchors (P/N’s 013 & 025) are not structurally sufficient.
016	Exterior Bottom Screed	A 26 ga x 120” long drip screed used between the slab and hold down anchor.
017	Interior Bottom Screed	A 26 ga x 120” long screed used between the slab and hold down anchor.
018	3 1/8” Channel	A 20 ga channel 96” long with 1/2” flanges on each side used to attach RSG 3-D PANEL to conventional construction. Holes for 12 ga wires (1 each side in ½” flangers) every 6” are prepunched.
019	Top Plate	A 30 ga channel 120” long with ½” flanges each side used along the top of all interior and exterior RSG 3-D PANEL walls.
020	Top Plate Splice 5”	A 3” x 5” predrilled plate used at each corner joint of top plate P/N 018.
021	Top Plate Splice 7”	A 3” x 7” predrilled plate used at each corner joint of top plate P/N 018.
022	Electrical Box	4” x 4” Electrical Box used for each electrical device, duplex outlets, switches, light fixtures, etc.
023	Cover, Electrical Box	Cover for P/N 021 must be installed prior to Plaster.
024	¾” PVC Pipe (20’ Length)	Class 200 Electrical Chase used from 1” to 2” above Top Plate (P/N 018) to Electrical Box or termination.

PIECE #	DESCRIPTION	USAGE
025	1/2" PVC Pipe (20' length)	Class 125 Electrical Chase used from 1" to 2" above Top Plate (P/N 018) to Electrical Box or termination.
026	Receiver	Used to attach Top Plate (P/N 018) to RSG 3-D PANEL on 32" centers, RSG 3-D PANEL to conventional construction, metal and wood door jambs to RSG 3-D PANEL, if applicable and specified in plans.
027	Shear Receiver	Used with anchor bolt to connect RSG 3-D PANEL to foundation and/or slab, connect Top Plate to RSG 3-D PANEL metal and wood door jambs to RSG 3-D PANEL and RSG 3-D PANEL to conventional construction. Recommended alternate to P/N's 013 and 025. Used on 48" centers for foundation slab connections and 32" centers for Top Plate Connections. Normally substituted with Rebars.
028	Mastic (12 ea 20 oz tubes per case)	Used as sealant to maintain moisture barrier between all RSG 3-D PANEL joints and between exterior Bottom Screed (P/N 015) and slab approximate usage 6 ounces per RSG 3-D PANEL required, similar products can apply.
029	TEK Screw #10 x 5/8"	Used for attachment of Top Plate splices and receiver to Top Plate Connection 2 ea required for each receiver (P/N 025 for 026) 4 ea required for each Top Plate Splice 5" (P/N 019) 12 ea required for each Top Plate Splice 7"
030	Screw #10 x 2" Sheet Metal	Used for attachment of 3 ½" channel (P/N 017) to conventional construction 15 each required for each 3 1/8" channel.
031	Nail – 8d box (7,250 per crtn)	Used to secure corner aid and corner bead (P/N's 009 & 010) prior to plaster. Alternate method to using tie wire (P/N 011).
032	Duct Tape (2" w x 60 yd. roll)	Used to Mesh Aluminum window and door jambs prior to plaster.
033	Rings 15100G, Rings 516G100	Used to attach joint mesh (flat and corners) to the RSG 3-D PANEL panels.

3. SHIPPING FACTORS

RSG 3-D PANEL SHIPPING FACTORS

Individual panels are 4´ wide, 8´ to 40´ long and 1.5” to 5.0” thick, and sometimes stacked into palletized bundles of 10 panels each. Ten palletized bundles perfectly cube out a 40 foot flatbed trailer which packing is recommended and containers are impractical for use in shipping RSG 3-D PANELS.

Typical Bundle Size: 7 RSG 3-D PANELS (4.0”)
4´x 8´ x 3” high
96 Cubic feet each bundle
500 pounds gross weight each bundle
Metric size: 1.22 meters x 2.44 meters x 0.91 meters high
2.71 cubic meters each bundle
230 kilos gross weight each bundle

Typical Bundle for:
2.5” foam = 10 panels
4.0” foam = 7 panels
5.0” foam = 7 panels

This is the loading chart (Could vary depending on panel length variety)

	2.0 ”	2.5 ”	4.0 ”	5.0 ”
40´ Flatbed	355 Pcs	310 Pcs	215 Pcs	195 Pcs
48´ Flatbed	425 Pcs	370 Pcs	260 Pcs	225 Pcs

** These numbers are not considering joint mesh (accessories)

Storage and care of Panels:

RSG 3-D PANEL is commonly delivered on flatbed trucks. Their lightweight means they can be unloaded either by hand or forklift truck. Gloves are recommended to be worn when handling these products. The panels can then be stored on a flat surface outdoors without protective covering. However, due their lightweight, care must be taken to prevent damage from strong winds or rain. Stacks of panels should be tied to adequate supports to prevent damage. Storage outside for several weeks is not a problem.

Tools and Accessories:

Related construction tools, such as clip guns, wall braces, etc. as well as panel accessories, such as joint mesh, hold down connectors, etc. will vary depending upon individual job requirements. Such items will be export packaged or containerized, depending upon quantities involved.

4. ASSEMBLY & INSTALLATION

RE-STRUCTURE GROUP, LLC. Recommends that a pre-assembly operation be considered, it will depend on the location and space of each project. RE-STRUCTURE GROUP, LLC. Can evaluate and recommend panel pre-assembly operations to support field construction activities, including a pre-assembly tool and equipment package. RE-STRUCTURE GROUP, LLC. Can also evaluate and recommend additional tools for field construction activities based upon probable projects demands.

The number of man-hours required for the RSG 3-D PANEL erection and pre-assembly operations will vary depending upon the size and complexity of the structure.

The following is presented as a guide to establish man-hour requirements for assembly and installation of RSG 3-D PANEL:

RSG 3-D PANEL cuts	.14 min. lineal ft. cut
Header notching	.15 min. lineal ft. notch
RSG 3-D PANEL joining	.14 min. lineal ft. of joint
RSG 3-D PANEL joint mesh installation	.14 min. lineal ft. of joint mesh
Electrical boxes	2.5 min. box
Rigid conduit installation	1 min. lineal ft. of conduit
Corner aid or bead	.14 min. lineal ft. corner aid or bead
Shear receivers or hold down	
Anchors to foundation	2 min. each
Exterior and interior bottom screed	.14 min. lineal ft.
3 1/8” channel	.25 min. lineal ft.
Top plate	.25 min. lineal ft.
Mastic	.14 min. lineal ft.
Wall erection	.25 min. sq. ft. of wall area
3-0 x 6-8 metal door jamb installation	35 min. each
Average window frame	35 min. each

The above man-hours are based upon trained installation personnel. Adjustments may have to be made one way or another to reflect local labor standards and efficiencies.

The following is presented as a basic guide for the installation of RSG 3-D PANEL and is based on methods currently being used by RE-STRUCTURE GROUP, LLC. Technologies and methods described in Council of American Building Officials. The use of other methods of installation are acceptable as long as they meet structural requirements and state and local codes.

The **RSG 3-D PANEL** is typically secured to the foundation with 3/8” or ½” bars located 24” on center (except SHEAR WALLS, refer to Building Details Manual) at least 1 ¾” in from edge of foundation and/or slab for the outer bars and depending on the panel thickness for the inner bars. If the bars are to be installed using Epoxy Products, care should be taken in defining the proper depth of each bar into the concrete slab, this will depend on the product (Epoxy) manufacturer’s instructions.

RSG 3-D PANEL joints are lapped with strips of 14, 12.5 or 11 ga. 2" square mesh centered over the joint and extending a minimum of 6" each side of the joint (the gauge of the joint mesh should be the same as the panel mesh or greater).

Lintel sections over openings consist of panel sections with truss reinforcement placed horizontally and reinforced as shown in construction details, some additional bar reinforcement may apply in this type of applications and will depend greatly on the span of the lintel and the load it will hold, refer to the Applicable Engineer's drawings or details for each project. Some walls could require Collector Beams depending on their application, refer to Building Details Manual for examples.

Electrical raceways, switch and outlet boxes should be installed prior to application of the cementitious skins and in accordance with applicable CODE. Outlet boxes should be covered before applying the skins.

Plumbing and waste lines are limited to extending at right angles through the panels and located to minimize the cutting of panel truss wires.

For additional information see **Assembly Manual and Building Details Manual.**

5. APLICATION OF OUTER CEMENTITIOUS SKINS

RSG 3-D PANEL Panels are designed to be covered after assembly with Portland Cement Cementitious Skins, the thickness of which will be defined by the Engineer of record. These layers can be applied using any of several plastering techniques including hand application, hopper gun application or pneumatic process if available (shotcrete or gunite)

Material Specifications:

1. - Portland Cement Mix: The mix shall have a minimum 28 day compressive strength of 2,500 psi or greater in accordance to the current version of the ICC. Using the 2" x 2" cubes or 3" x 6" mortar cylinders (use ASTM C109/C109M-11 for sample retrieval and testing).

2. - Portland Cement: Complies with ASTM C-150
3. - Aggregate: Natural plaster sand complying with ASTM C-35

Facts and limits for estimation purposes :

The following are based on experience, however it is the duty of the contractor to draft his figures based on the local market and labor yields.

1. - Minimum plaster thickness applied to each face of panel is 1.25" (3.20 cm.). Outside finish can be approximately 1/8" (3.175 mm.) color coat stucco or painted. Inside finish can be approximately 1/8" (3.175 mm.) putty coat and/or painted.

2. - Materials: This should be per design specification.

3. - Labor (Man –Hours), based on using a plaster pump machine:
** *Abbreviation MH used for man-hours.*

First coat:	.033 MH per square yard		or .04 MH per m2
Second coat:	.077 MH per	"	or .092 MH per m2
Inside finish:	.096 MH per	"	or .115 MH per m2
Outside finish:	.053 MH per	"	or .063 MH per m2

Waterproofing:

In areas of significant rainfall, some method of waterproofing should be considered. This can be accomplished with water repellent additives added to the plaster mix (recommendations upon request) or by applying a commercially available waterproof coating. Waterproof coatings normally replace the "finish" coat. Color may be added or texture coat can be used.

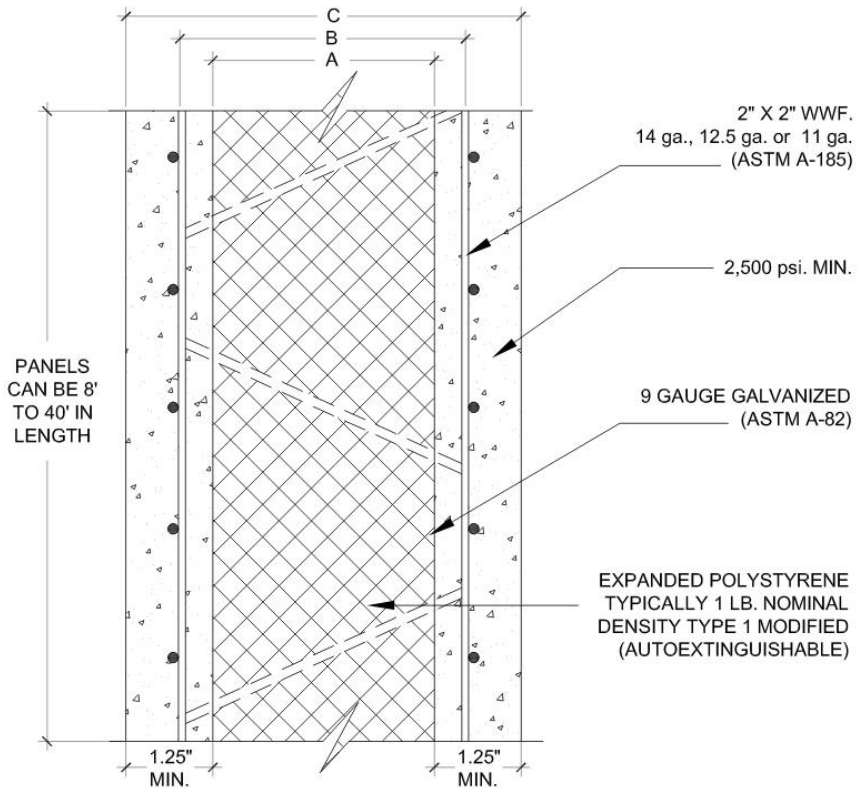
NOTE: The above information on plastering materials and labor are approximate only and based upon RE-STRUCTURE GROUP, LLC. Experience on their projects using United States of America and Mexico's materials and experienced personnel.

Adjustments may have to be made to reflect local material and labor standards and efficiencies.

(See Assembly manual).

6. Types of RSG 3-D PANEL available

RSG 3-D PANEL VARIATIONS AND FINISHED SECTIONS



(PANEL WIDTH IS ALWAYS 4')

A	B	C	PRODUCTION
1.5"	2.5"	4.0"	STD
2.0"	3.0"	4.5"	STD
2.5"	3.5"	5.0"	STD
3.0"	4.0"	5.5"	SPECIAL
3.5"	4.5"	6.0"	SPECIAL
4.0"	5.0"	6.5"	STD
4.5"	5.5"	7.0"	SPECIAL
5.0"	6.0"	7.5"	STD

Scale: None

DETAIL
T-01
August 2012
Revision # 1