QUESTIONS AND ANSWERS

1. What is the ThermaSteel Building System? How long has it been around?

Answer: The ThermaSteel Building System is a unique patented process utilizing ***the power of composite technology.*** A structural grade double steel frame (G-90 galvanized, 24 gauge) with rigid, fire retardant Modified Expanded Polystyrene Resin (EPS) bonded to the steel frame, produces a light weight (48-50 lb. for 5 1/2" thick x 4'0" wide x 8'-0" high) composite panel that provides structural framing, insulation, sheathing, and a vapor barrier in one, fast, high-tech step. The ThermaSteel panel may be used for exterior and interior walls, partitions, floors, and roofs. Combinations of panels are screwed together to form a building system that is fast, light weight, and extremely strong with superior thermal properties. Rough openings for doors and windows can be formed during the manufacturing process.

For nearly a quarter of a century, ThermaSteel Corporation has been manufacturing structural building panels. They have been used in thousands of projects around the world. Over 6 million square feet of structural panels were used in on single commercial/industrial project in Mexico City. One thousand housing units for the U.S. Government were constructed in Germany. The ThermaSteel system has been approved for use in all climatic regions and seismic Zone 9 in Russia. A standard ThermaSteel panel with a modified exterior has passed the Hurricane Lab tests prescribed by Miami - Dade County, Fl. using protocols PA 201, 202, and 203. There are projects in every state within the USA and more than 30 other countries around the world. The ThermaSteel System is being used in every facet of construction.

2. What is Modified Expanded Polystyrene (EPS)?

Answer: The expanded Polystyrene resin used in ThermaSteel panels has been modified by a flame retardant additive and is in full compliance with model building codes. It has also received HUD approval. The use of EPS as a major material component gives the ThermaSteel panel the following advantages:

- R-Values are consistent and stable due to the closed cellular structure, which contains stabilized air.
- The panels are rigid and lightweight.
- Contains no CFC's or HCFC's. There is no off gassing.
- Contains no formaldehyde.
- Resists fungus, decay and moisture gain
- Will not rot - highly resistant to mildew
- Environmentally safe.
- Lessens risks of cancer and of respiratory and skin irritations associated with certain other types of insulation.
- No food value for termites and other common wood eaters.

3. What is the cost comparison of a ThermaSteel vs. a traditional "stick built" structure?

Answer: Weighing all the factors - speed of construction, strength-to-weight ratios, thermal efficiency, quality and consistency of material along with reduced Life Cycle Utility costs, you will find ThermaSteel will provide significant savings over conventional construction. Don't forget to factor in the cost to shop for, pick, cull and return unusable lumber as well as disposal of waste. Detailed cost comparisons can be furnished upon request.

4. Why should I consider using the ThermaSteel Building System over conventional "stick built" structures?

Answer: It will save you big dollars. You will have a superior structure when you incorporate ThermaSteel panels. We must consider the environment. The steel and EPS are fully recyclable. When you consider the waste on the typical job site, you can see the value of using ThermaSteel Panels as costs are skyrocketing for land fill dump fees. The following are excellent reasons for using ThermaSteel Building Systems:

STRENGTH/INTEGRITY - Years in the field, not hours in the lab, give ThermaSteel Building Systems the advantage. Extensive structural testing has been performed by independent laboratories under ASTM B 72, C-S 18-76, B 96-80, B 119, B 90, and E 413 to evaluate the structural integrity of the panels and to obtain building code compliance. ThermaSteel regularly performs the following tests on all sizes of the panels:

Axial Compressive Load Tests**,** Racking Shear Load Test, and Transverse Load Test

HURRICANE TEST - In August of 1998, a standard 5 1/2" x 4' x 8' ThermaSteel panel assembly, reinforced on the exterior side with 24 gauge, G-90 galvanized metal studs closely spaced, was subjected to a series of test protocols required by Miami Dade County, Florida, at the Hurricane Test Laboratory, Inc. in Riviera Beach, Florida. Three different specimens of ThermaSteel wall panel assemblies passed with flying colors.

THERMAL ENERGY PERFORMANCE - ThermaSteel wall panels are **ENERGY STAR™** compliant. The ThermaSteel panel provides not only structural integrity, but excellent insulation properties as well. The EPS component of the panel is solid and does not provide voids or allow air movement through the walls. The unique design and utilization of the steel structural members within the panel provides for a thermal break across the panel. In "stick built" walls, each stud is a thermal conductor from one wall surface to the other. Quoted R-Values apply only to the properly installed insulation between the wood studs, not to the wall assembly as a whole. (Look at any thermal photo). Due to the low permeability properties of EPS (water resistance or ability of panel to breathe), ever-present moisture does not affect the R-Values or thermal performance. The unique design of the panel and the use of EPS as a component provide little or no R- Value drift or loss and results in a stable thermal performance for the life of the structure. Conventional types of batt and blown-in insulation may lose up to 50% of

effective R-Value due to compression, dust and moisture retention. Even Urethane foam loses its R-Values over time. The R-Value of EPS remains the same in Year 20 as on Day 1.

The thermal insulation properties of expanded polystyrene are well known. In addition, ThermaSteel panels are designed with thermal breaks throughout. The steel studs are designed so as not to create a thermal bridge from inside to outside of the panel. Even the ship lap joints preserve the integrity of the thermal break. As determined by the Thermal Resistance Test (ASTM C 518- 76 Aged R-Value).

US	Metric	@40°F	@75°F	Water Vapor Transmission
2 ¾"	(70 mm)	R-13; U=0.07	R-12; U=0.08	
3 ½"	(89 mm)	R-16; U=0.06	R-l5; U=0.066	.6 Perms
4"	(102 mm)	R-18; U=0.05	R-17; U=0.058	
5 ½"	(140 mm)	R-24; U=0.04	R-23: U=0.04	.5 Perms
7 ½"	(190 mm)	R-34: U=0.03	R-32: U=0.03	

Due to the following factors -- reduction of air infiltration; elimination of thermal bridges; the effect of the interior and exterior cladding; and the effect of the ship lap joints; the effective R & U-Values may be 34% over theoretical -- e.g. A 3 ½" wall panel with no penetrating 2 x 4's with exterior and interior finish is effective R-22;
A 5 ½" wall panel with no penetrating 2 x 6's with exterior and interior finish is effective R-33.

The R-Value only tells half of the story for various materials used in wall assemblies and is not a measure of the thermal efficiency of a house. (Wood studs have an R-Value of approximately R-l per inch and steel studs actually act as a heat sink). Rather, it is a measure of the resistance to heat loss by conduction, convection, and radiation of various materials. Heat loss occurs in other ways through cracks, poorly fitted windows and doors, and other forms of air infiltration. A conventionally framed house using batt insulation may experience considerable air infiltration. The ThermaSteel panel, due to its design and the material used, is extremely effective in limiting these forms of heat loss. A ThermaSteel home tested with the standard blower door pressure of 50 Pascals was determined to have 35% lower air infiltration than a comparable wood frame house. Owners of ThermaSteel buildings have verified savings in utility bills when proper installation procedures are followed and the panels are utilized to their fullest extent.

In a study conducted by energy scientists at the Oak Ridge National Laboratory*, the stated R-Value of virtually every product on the market evaluated in the "real world" of thermal breaks such as, corners, window, and doors and stud walls was drastically reduced... **EXCEPT *Structural Insulated Panels*. For example:** A 2" x 6" stud wall

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24" on center R-19 fiberglass batts tested out with an R- Value of 13.7. A ***Structural*** * ***Insulated Panel*** wall tested at R-21.7. That means that the ***Structural Insulated Panels*** out performed a 2" x 6" stud wall by **58%**.

SOUND PERFORMANCE - Panels have been tested (ASTM E90, E4 13) as a wall system with gypsum wall board: 3 ½" panel STC 37, party wall STC 51, double 3 ½" panels with 2" air space STC 57. Other materials may be used on panels for other STC ratings.

PRECISION - QUALITY - ThermaSteel panels are manufactured in a controlled factory process. Each panel is inspected, measured and labeled. This assures In-Plant Quality Control along with third party inspection services, in order to be in compliance with national building codes.

CONSTRUCTION ADVANTAGES - Properly designed structures utilizing ThermaSteel panels speed up construction with resulting savings in labor costs and construction loan interest. Security requirements are also reduced. Remember. . . when a ThermaSteel wall is erected it is a structural load-bearing rigid composite panel that provides structural framing, insulation, sheathing, and a vapor barrier in one high-tech step. Other advantages include:

1. Light Weight. Easy to handle.
2. Fast Assembly. Compare 64 sq. ft. of exterior load bearing wall assembled using self-tapping screws vs. 12 pieces of wood, 6 pieces of insulation, vapor barriers, corner bracing, 2 sheets of exterior sheathing, approximately 100 fasteners to produce 64 sq. ft. of wood load-bearing wall. ThermaSteel panels eliminate an insulation day on the building schedule.
3. Dimensionally Stable. Walls are straight and true and will not shrink, twist or move the way wood does. Eliminates callbacks for nail pops and door adjustments.
4. Damage Resistant. Because the EPS material between the studs is solid it makes it difficult to break the gypsum board. Conventional interior sheathing is easily damaged causing air infiltration problems and repair callbacks.
5. Quality. Finished walls are straight and flat. Appearance of exterior siding and interior drywall is significantly improved. Installing chair rail is actually a pleasure. Drywall installers prefer ThermaSteel because they have flat walls with a 3" target instead of a 1 ½" stud.

5. How is **electrical wiring and plumbing installed in the ThermaSteel Panel?**

Answer: Pre-molded electrical chases can be provided in the EPS core of each panel as required. Electricians and plumbers familiar with conducted metal stud construction have no problem with the ThermaSteel System. A hot knife can be used to form custom raceways of various configurations for wiring and plumbing.

6. Does ThermaSteel Corporation have in-house plans?

Answer: YES! ThermaSteel has a number of pre-designed home plans. Due to it's extreme flexibility the panels can be incorporated into virtually any house or building design utilizing good engineering design practices. Our experienced, CAD-trained design team will work with you from conception to construction. You will find our rates compare favorably with other designers.

7. Does the ThermaSteel panel require special or different materials for finishing the structure?

Answer: NO! In fact most finishes require less work than old-fashioned "stick built" construction. The dimensional modules are compatible with standard 2x building materials. The 16" and 24" on-center metal stud members allow virtually all standard exterior and interior finishing materials to he attached and utilized with the panels. Cement based plasters can be applied following manufacturers' recommendations.

8. Has the ThermaSteel System been tested and listed with the building codes?

Answer: YES! Extensive testing has been performed by independent certified laboratories. Ongoing quality reviews and testing is conducted by a third party independent inspections service (RADCO). The ThermaSteel panel (also known as RADVA panel and Thermastructure®/Wallframe™ panel) is currently listed with the most stringent certification organizations:

BOCA - (Building Offices and Code Administration) under National Building Code Research Report #9140

ICBO - (International Conference of Building Officials) under the Uniform Building Code- ICBO # PFC 4216

ThermaSteel also maintains listings with the following:

HUD - (Department of Housing and Urban Development) Bulletin No. 1072

UL - (Underwriters Laboratories) under Report #NC554

HURRICANE TEST LAB. INC, Broward County, FL – Passed

9. Have ThermaSteel Panels been fire tested?

Answer: YES! The panels have been systems tested with thermal barriers for surface burning characteristics, smoke development, room fire tests, and hourly fire test ratings, as per building code requirements. Panels have been tested as a wall system with gypsum wallboard thermal barriers for 15 minutes, 1-hour, and 2-hour fire ratings. Most codes require a 15-minute minimum interior thermal barrier. Paper auto-ignites @451°F. Wood, depending on its species, auto-ignites @ approx. 904°F. Fire tests have proven that EPS gives off fewer toxins than conventional wood framing. UBC Std. 17-5, ASTM E 119. ThermaSteel panels have been tested as a wall system with gypsum wallboard thermal barriers for 15 min., 1-hour, and 2-hour ratings. Most codes require a 15 -minute interior thermal barrier.

	3 ½" , 1.5 PCF	**5 ½", 1.0 PCF**
UL Flame Spread Rating	**5-10**	**5-20**
UL Smoke Developed Rating	**65-300**	**125-175**

10. How do ThermaSteel panels stand up to termites, ants and wood boring insects?

Answer: The bottom line is...insects just don't feed on steel. Certain species of termites will bore through concrete to get to their favorite food… wood. Likewise they have been known

to bore their way through EPS to get to wood, and ants have been known to nest in certain types of EPS. The problem has been corrected by soil treatment, by creating barriers between the panels and the slab and by treatment of the panels. An approved insecticide can he sprayed into the bottom channel or on the panels to provide a barrier.

11. Is the ThermaSteel system patented?

Answer: YES! The following US Patents belong to ThermaSteel Corporation and apply to the ThermaSteel/Wallframe building system: #4,144,296; #4,241,555; #4,953,334; #4,094,110. In addition, several foreign patents apply and/or are pending.

12. Have local building officials approved the use of ThermaSteel panels?

Answer: YES! However, some regions have additional requirements for high wind load, heavy snow loads, high seismic activity, or any combination of these. ThermaSteel panels can be engineered to meet these additional requirements.

13. Will I need special engineering?

Answer: Certain building designs and regions require a stamp or letter of recommendations from a licensed structural engineer. For an additional fee, ThermaSteel can provide engineering on a case by case basis. Special designs and circumstances may require extra reinforcement. If special engineering is required, we can assist an engineer of your choice or recommend one who may be in your area.

14. Who can I get to build for me?

Answer: If there are no approved ThermaSteel builders in your area, a competent builder/contractor would be able to complete the project. Commercial contractors, metal building erectors and drywall contractors are not afraid to work with steel and screws. Thousands of satisfied customers have built their own homes with a little help from friends and some technical support from ThermaSteel (see Question l7).

15. How can I get an estimate done on my project?

Answer: Since project applications and structural load requirements often dictate the size and type of panels needed, our standard policy is to provide estimates from dimensioned architectural drawings that include floor plan elevation, and roof plans with rough opening sizes. In most cases we adapt customers' plans to our system, but we also can provide a limited number of stock plans, pre-engineered to maximize the benefits of ThermaSteel. We will be happy to receive a set of drawings from you for an estimate. Usually estimates are completed within a week of receipt of your drawings. Estimates are based upon information received from you. The more detail we receive, the more accurate the estimate, however, the estimate is based on drawings submitted for a material take-off. Prior to production, we will submit a firm quotation for your approval.

16. Once I decide to use ThermaSteel, how do I place my order and arrange for delivery of my project?

Answer: Once you make the wise decision to use ThermaSteel on your project, we will enter into a Purchase Agreement with you. At that time your architectural plans will be used to produce a set of shop drawings which adapt our panels to your plans. Due to the custom nature

of each individual structure, **a deposit of 10% of the estimated price or $500.00 (whichever is greater) is required before we begin shop drawings.** Given the scope of the project and sufficient architectural details, a complete set of shop drawings will be sent to you for final approval. At this stage, changes and additions can he made before the project goes into production. If your drawings require structural engineering, additional time will be required to complete the drawings and an extra charge will be applied. Upon receipt of your signed copy of the shop drawings and an additional 40% deposit, the panels will go into production. Your project will be processed in the order in which it was received. Turn-around time is a function of demand and complexity of the project and can range from two to four weeks from the time we receive your approval on the shop drawings and your 40% deposit. The panels will be shipped directly to your job site within this time period. Panels are typically shipped by common carrier or specialty carrier, which we arrange through a broker. Shipping charges are calculated from Radford, VA. You may also choose to arrange your own shipping. The balance due on your project must be paid before the panels are shipped from Radford.

17. Does ThermaSteel provide technical support once my panels are delivered?

Answer: YES! A representative of ThermaSteel will be available at our offices to meet with you and/or your Contractors to review technical details and plans if needed. Your area ThermaSteel representative can provide local technical support. Additional support personnel can be assigned for an hourly charge. A detailed set of shop drawings and an assembly manual will also be provided for ease in assembly.

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