

MagWall™
Building Systems

INSTALLATION AND REFERENCE MANUAL

Residential Walls and Foundations



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INTRODUCTION

- MagWall is an engineered, insulated, structural wall
- MagWall is composed of expanded polystyrene insulation laminated between Multi-Panels M4™ structural sheathing
- MagWall replaces traditional 2x construction methods and combines structural strength, insulation, air and vapour barrier.
- The use of Multi-Panels M4 sheathing provides a non combustible wall on both the interior and exterior that is moisture and mold resistant. Unlike other mgo boards, M4 does not contain chloride and is therefore safe to use in wet environments without fear of leaching chloride. Chloride leaching can dissolve fasteners and lead to the sheathing breaking down.
- MagWall results in less air leakage which results in significantly lower utility costs and a more comfortable living environment
- MagWall is structurally superior to conventional construction
- MagWall is highly impact resistant and durable.
- MagWall is fast and easy to install



GENERAL INFORMATION

Shipping and Handling

- Store on level blocking and avoid exposing EPS foam to direct sunlight for prolonged periods

Connection and Fastenings

- Panels are joined together using lumber plates and splines. Panel joints must be structurally fastened to ensure integrity of the system. Use 2 ½” sheathing staples 2 3/8” nails or 3” bugle head coated deck screws every 6” on center, as well as an industrial foam adhesives and joint caulking. Please read over the manual and attached drawings or consult your dealer for instructions.

Vapour and Air Barrier

- A membrane vapour barrier or air sealing membrane is generally not required for MagWall. Magwall panels in combination with the adhesives/joint sealants create the air and vapour barrier assembly. A vapour barrier coating or paint may be used in extreme vapour drive conditions. Dampproofing is required for foundations.
- Seal all joints and voids on the exterior and interior with adhesive/caulking to ensure no air infiltration or exfiltration. See recommended adhesives/caulkings in the appendix. Seal all EPS Foam contact areas with foam adhesive.

Note – Stamped Engineered drawings are required when using MagWall in most jurisdictions. Please consult your dealer to arrange for an engineering quotation.

PANEL SPECIFICATIONS AND THERMAL RESISTANCE

Wall Thickness	6 5/8"	8 3/8"	10 3/8"
EPS Core	5.5"	7.25"	9.25"
Dimensional Lumber Top and Bottom Plates	2 x 6	2 x 8	2 x 10
Dimensional Lumber for Capped Vertical Splines	2 x 4	2 x 6	2 x 10
Weight (lbs)	193	198	202
R Value (min) Type 1 EPS <small>Higher R Values available with higher density foam</small>	21	27.65	35

Where there are no point loads – EPS type 3 core vertical SIP spline connectors (available through MagWall) eliminate thermal bridging and are generally recommended.

A Note on R Values

Stated “R” values can be misleading. Studies have shown that conventional stick built wall assemblies insulated with batt insulation have performed at R values less than half of the stated rating. MagWall does not undergo the loss of performance experienced when using conventional building techniques. For more information – see our website @www.magwall.com

DO'S AND DON'TS WITH MAGWALL

Do's

- Comply with local building codes and by-laws
- Seal all joints with adhesives/caulking and voids and under base plates with butyl caulking or a sill gasket
- Installation details are provided in MagWall shop drawings. Follow the prescribed anchor bolt pattern on the drawing as well as the detailed panel layout. Set, level and fasten panels. Drawings are intended to streamline installation and take away the need for calculations. Magwall endeavours to continuously improve the process and is always receptive to feedback.
- Follow all instructions provided by MagWall
- Handle wall sections with care
- Provide level blocking for storage of wall sections
- Cover panels when not in use
- Remove debris from panel connection areas prior to placement
- Lubricate the foam gun head with grease or petroleum jelly before fastening the foam can. This will allow easier changing of cans.
- Install plumbing in interior walls rather than exterior walls
- Install proper flashing and sealants around all rough openings and penetrations as required

Dont's

- Do not cut into the M4 board for electrical wiring Consult for advice
- Do not install plumbing in panels. Penetrations through walls is permitted
- Do not overcut skins for window and door installation
- Do not apply too much foam to window and door jambs
- Do not use swelled or warped lumber
- Do not be afraid to field trim lumber or panels for an exact fit. Contact Magwall or your dealer when in doubt.

Tools and ACCESSORIES

- Pneumatic nailer, stapler or autofeed screw gun
- Hot knife tool for holing out grooves in EPS for adjustments to panels if needed. Can be obtained from MagWall, your dealer, or www.hotwiredirect.com or www.demandproducts.com
- Heavy duty foam gun and petroleum jelly
- Adfast™ or DOW Enerbond™ Professional Foam Adhesive (sub-floor foam adhesive)
- High performance, low modulus, moisture curing, silicone or modified polyurethane joint sealant / adhesive for sealing moving joints.
- Fibre Cement Saw with Fibre Cement Blade and dust control
- Sawsall reciprocating saw to cut foam if approved modifications are required on site.
- Carbon Fibre Dust Mask - cutting M4 board results in fine dust particles. Avoid prolonged exposure to dust. There are several high quality dust masks available on the market. We recommend a high quality dust mask. See the Multi-Panels M4 MSDS sheet for further information. Generally, little or no modifications are required to panels.
- 12” long 1/2” SDS Plus drill bit designed for drilling in concrete, stone, block, masonry and brick work
- Electric hand planer (optional) in case wood becomes swelled.

RESIDENTIAL WALLS

Allowable Loads (safety factor = 3)

8 3/8” panel data accepted as a minimum for thicker panels

Wall Thickness (8 foot height)	Measure	6 5/8”	8 3/8”
Allowable Axial Load	Lbs per Lineal Ft	4645	5521
Allowable Shear Strength	Lbs per Lineal Ft	419	453
Allowable Transverse Load	Lbs per sq ft	59.5	65.7

All Numbers exceed International Residential Building Code requirements.

Panel Fabrication

- Panel pre-fabrication and premade splines are done for most projects.
- Where custom widths are required and a panel saw is not available - cut panels to required width sawing both faces of the panel with a fibre cement circular saw followed by using a reciprocating saw on the core EPS.
- Once panels are cut, the EPS foam must be trimmed back to prepare cavities for splines or plates. This is done with an adjustable electric hot knife. Cut a 1.5” rectangular groove to accommodate dimensional lumber or splines. If capping openings – allow for extra space for sheathing or cut 2” void and embed capping.

Foundation Walls

Reference Guides / Standards

For additional details refer to local building codes and for best practice guidelines only - the following building standards - -:

Canada:

Can/CSA S406-92 -Canadian Wood Council – Permanent Wood Foundations

USA

- ANSI / American Forest & Paper Association (AF&PA)
- PWF 2015 – Permanent Wood Foundation Design Specification
- Southern Pine Council PWF Foundation Design and Construction Guide

You must refer to these guides for the following information:

1. Soil Conditions
2. Site Preparation
3. Footing and back fill
4. Site drainage (see note below)
5. Material Specifications
6. Door and Window opening lintels
7. Point Loads
8. Stairwell openings
9. Floor to joist wall connections
10. Post and piers at center of house
11. Framing anchors

*** Please note – The manufacturers of MagWall support the use of a minimum of 4” weeping tile which is nylon filter equipped on Magwall foundations unless site conditions dictate otherwise. A sump drainage system designed by the

Engineer is a superior alternative. Please follow the damp proofing guidelines in this manual.

Lumber and Fasteners

It is important to use:

- Hot dip galvanized corrosion resistant fasteners or type 304 or type 316 stainless steel fasteners that conform to ASTM Standards A153 and A653 (10 D Hot Dipped Galvanized Nails and 3” bugle head coated deck screws) Coated ACQ screws used with PWF lumber
- CCA or ACQ 0.60 lumber for studs and plating

Damp Proofing Systems

There are several approved methods of damp proofing for the MagWall System that are in compliance with building codes.

We recommend Peel and stick damproofing (example Soprema) and a dimple drainage plane (example Delta MS, Platon) according to manufacturer instructions and specifications.

Wall Installation

Required Materials

- 2X lumber for plates and double stud splines. Vertical Spline lumber length is 93” for 8 ft walls 105” for 9 foot, and 117” for 10 ft walls. SIP splines may also be used above grade and are preferred to eliminate thermal bridging.
- All lumber to be used in MagWall basement panels shall be PWF, No 1/2 Spruce pine or fir (SPF). PWF Lumber is required below grade only. Top plates are generally above grade and therefore No 1 / 2 Spruce / Pine-fir is permitted. All cut ends of PWF lumber are to be treated with preservative. No 1 / 2 Spruce Pine-fir is permitted in above grade walls.
- For foundation base plates - concrete pin and shot nail gun and nails to hold base plates in place before wedge anchors are placed
Use butyl caulking or sill gasket to seal base plate to footing or floor. Spray foam adhesive is applied between studs on splines at the factory.
- Adhesive/ caulking to seal vertical joints in addition to foam.
- For foundations - Hot Dip Galvanized Wedge anchors – 1/2” x 5 - 1/2”. One for every two feet of base plate as delineated in the drawing.
- Adfast™ or DOW ENERBOND™ Professional Foam Adhesive – use approximately one can per 2 1/2 - 3 panels (sub floor foam adhesive)
- Use 2 3/8" galvanized nails, 2 1/2” galvanized sheathing staples and/or 3” bugle head deck screws or ACQ screws in pressure treated lumber
- Use 27” Hurricane Tie Straps or angle fastener specified for foundation walls

Other Notes on Foundations:

1. Footing width must exceed panel width and panel skins must be fully supported by the footing.
2. Footings must be level within 1/8" every 4 feet to ensure proper panel fit.
3. Backfill heights above 6' 6" are subject to structural engineer approval and additional support may be required.

Installation Steps for Walls (see drawings)

Note : Seal off all openings and fill all voids throughout the construction process. Use foam for all EPS connections and construction sealant in all other joints.

1. Ensure all electrical chases are cleared by removing foam inserts (if any).
2. Clean footing thoroughly.
3. Study and refer to the panel layout diagram to place plates correctly.
4. Use two beads of butyl type water seal caulk between plate and footing (or use a sill gasket). Caulk or spray foam adhesive between plates and treat cut plates with wood preservative. Lay down all base plates and attach with deck screws or 10d 3" hot dipped galvanized nails (pin shot concrete nails for foundations to hold in place.)
5. For basements - once plates are set - mark panel joints as well as window and door locations on the plates and footing according to the panel layout diagram before drilling through plates and installing wedge anchors every two feet. It is important that vertical splines do not fall on top on wedge anchors.
6. Splines are typically provided by the factory. Apply generous amounts of foam in all panel cavities.
7. On corners – refer to MagWall Connection Detail Drawings. If using a standard corner - leave 1/2" space to accommodate sheathing of end panel (that comes across the adjacement plate to the end.) Set back end panel 1/2" to line magboard cap with panel sheathing of the panel that butts up.

8. Once base plates are in place – for foundation walls - wedge anchors are applied every two feet. It is important that wedge anchors do not fall in line with panel joints and interfere with seating of vertical splines. Marking locations will assist with proper placement of wedge anchors. Pre-drill holes at wedge anchor location. After wedge anchor is installed – trim bolt off of wedge anchors flush with top of nut.
9. Panel erection starts at a corner. Refer to the panel layout and applicable corner diagram. (pages 5 – 6 of drawings) Prior to erection of corner – install 2 x vertical end plate into the panel and cap (if applicable according to the connection detail) Apply foam to base plate and lift the panel on to it. Adjust it's location, level, and brace and fasten 6" on center through the panel along the base plate.
10. The next panel to be installed must be perpendicular to the first panel installed forming the corner. This panel will stabilize the wall. Use 2 x dimensional lumber to create the perpendicular connection by attaching it to the first panel according to the diagram. Erect panel (ensuring foam is applied on the vertical connection and on the base plate – while wet – it acts as a lubricant for a short time) and slide into place. Once erected – before mechanical attachment – check panels with a level before fastening. Use foam on all connections to EPS foam and adhesive/ construction sealant on all other joints. Use 2 3/8" nails, 2 1/2" sheathing staples or 3" bugle head deck screws for attachment.
11. Top plates can be installed last. Ensuring the plates lap the joints and corners by trimming sheathing leading into the adjacent corner. Holes must be drilled through plates into electrical chases. Fasten every 6" through wall into plates with 2 1/2" sheathing staples. Make sure all joints are lapped.

Installing Headers and Cut Openings

Headers are generally designed at the time the panel layout drawings are created.

MagWall generally recommends an engineered LVL lintel built into the floor system (double up of rim board) to span openings and a suggested roof truss / lintel design to span openings. (page 8 of drawings) This will eliminate the need to build up headers in the panels. MagWall offers header panels with built in lintels or panels with voids to accommodate lintels.

General Notes

Exterior Cladding

For the most economical finish – Magwall can simply be primed and painted with potassium silicate primer and paint. Joints can be filled with adhesive/caulking (applied generously) trimmed level with the wall and 3” MagBoard battens applied to cover the joints.

Siding Install

Siding can be installed directly on the exterior face without building wrap according to the manufacturer’s instructions and specifications. Ensure all joints are sealed with adhesive/ caulking.

Coating or Conventional Paint Install

Most applications require priming and sealing with XIM UMA Brand Advanced Technology bonder and primer sealer or a suitable Urethane Modified Acrylic primer/sealer. All joints are sealed with adhesive/ caulking. Consult manufacturer or your dealer for further information.

Cultured Stone

Cultured stone can be applied directly to the exterior wall with an approved mastic. Ensure all joints are sealed. Consult manufacturer or dealer for further information.

Electrical Wiring

Electrical wires are pulled through pre-cut vertical channels inside of the panels called chases. Vertical electrical chases are located two feet on center. The panel installation crew will review the electrical service locations as drawn and will pre-drill the upper or lower plates corresponding with the chases to be used. Electrical boxes or light switches should be drawn at the desired location (ideally close to the vertical chase) and then cut out using a zip drive router, or small blade skill saw and the foam is removed with a hot knife or utility knife

creating access to the electrical chase. The wire is then pulled through the chase into the box cavity. The box (ideally a renovation box with face mounting plates) is then pinned with screws and / or nails and all voids around the box should be filled with polyurethane foam. Once foam is dry – trim excess foam and then wire and install the box. Note – electrical can be run from the joist cavity to the outlet location below and above. This reduces wire and splits wiring zones between floors.

Interior finish

For the highest level of finish – it is generally recommended that drywall is applied directly over Magwall. Joints should be lapped and an additional 1 1/8” base plate (that is the full width of the wall) is recommended to adjust wall height. If a batten over the seam is acceptable - interior joints must be more carefully fastened to facilitate direct interior finish so that fasteners are covered or part of the architectural feature.

PWF Footing and Floor

Details are available to eliminate the use of concrete for basement footings and floor slabs. Refer to Other Connection Details section of the manual or consult your dealer.

HVAC Design

A heating and ventilation system (HVAC) system must be designed to provide proper ventilation due to the inherent air tightness of the structure and be properly sized to account for the superior energy efficiency. A mechanical ventilation system should be used rather than a passive air system to ensure indoor air quality. In cold climates or if passive systems are used – use a heat recovery ventilator and in hot humid climates use an energy recovery ventilator to create positive air flow. Consult your HVAC professional for advice.

Plumbing

Plumbing should never be run horizontally or vertically through MagWall walls. Penetrations must be well sealed to prevent leakage and moisture penetration. In the case of vents and line chases – ideally they should be located at a panel joint

beside the vertical spline. (a void is cut in the foam to accommodate. An intermediate joint can be located in a panel by cutting the panel and using the same detail as posts (see page 12 of connection detail drawings)

Sealing All Openings, Joints, and Voids

The sealing of joints and voids is very important. A well sealed building envelope can eliminate air infiltration and resultant heat loss and vapour driving through the joints. Although the MagWall system is constructed with EPS insulation that does not permit air passage - elimination of air infiltration at the joints creates a thorough seal that allows precise control of heating, cooling and air exchange reducing overall energy requirements. Leakage of humid air into voids or dead air spaces can result in condensation leading to potential damage and deterioration of wood components and moisture penetration into the EPS. Particular attention to gaps around doors, windows and other penetrations is important. When using Magwall as a roof component – thermal and vapor sealing at roof ridges and valleys warrants extra attention.

Cabinetry

Cabinetry can be affixed directly to MagWall. Four 3” bugle head deck screws must be affixed per box. Screws should be fastened into studs to provide extra stability.