Amdeck Eco Installation Manual

STRONGER EVERY DAY

INNOVATIVE INSULATION CONSTRUCTION SOLUTIONS FOR ENERGY EFFICIENT AND COMFORTABLE BUILDINGS
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Along with Amvic’s Insulated Concrete Form (ICF) building system, Amvic offers a complementary Expanded Polystyrene (EPS) floor and roof system. Amdeck Eco floor and roof system is a modular, lightweight, stay-in-place form for the construction of one way concrete floors and roofs in the low rise residential buildings. The system is perfectly suited for use with Insulated Concrete Form (ICF) construction but can also be used independently with other wall types such as traditional reinforced concrete and concrete masonry unit (CMU) walls. Amdeck Eco is backed-up by Amvic’s renowned customer service and technical support and is available through Amvic’s extensive distributor network across North America.

If any of your questions or concerns are not completely addressed in this manual, feel free to contact us and our staff will be happy to answer your questions. At Amvic, we pride ourselves in offering our customers an exceptional level of customer service.

Technical Support
Please contact us for any inquiries pertaining to information included in this manual or if you require other technical assistance.
Phone: 1 (877) 470-9991 (toll free)
Email: technical@amvicsystem.com

Amvic Website
The Amvic website is updated regularly with the most updated information including, product data sheets, construction details and installation manuals. This technical and installation manual is posted on the website, see www.amvicsystem.com
PREFACE

Disclaimer
This document is provided for informational purposes only. The information contained in this document represents the current views of Amvic Inc. on the issues discussed as of the date of publication. These opinions, as expressed, should not be interpreted to be a commitment on the part of Amvic Inc. and cannot guarantee the accuracy of any information presented after the date of publication. The user assumes the entire risk as to the accuracy and the use of this document.

This manual provides a basic guide for the installation of the Amdeck Eco floor and roof system and is intended to supplement, rather than replace, the basic construction knowledge of the construction professional. All installations of Amdeck Eco must be in accordance with all applicable building codes and/or under the guidance of a licensed professional engineer. In all cases, applicable building code regulations take precedence over this manual.

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Amdeck Eco is a modular stay in place formwork for the construction of concrete floors and roofs. It is manufactured using closed cell Type II/Type 2 (ASTM C578 and CAN/ULC S701 respectively) Expanded Polystyrene (EPS) with a nominal density of 1.5 lb/ft$^3$ (24 kg/m$^3$), see QAI listing #B1062-2. Amdeck Eco comes in 8’ (2.4m) sections that are 2’ (610mm) wide with three available thicknesses (heights); 8” (203mm), 10” (254mm) and 12” (305mm). The sections are lightweight, easy to carry and can be easily cut to accommodate any shape or angle. This system is compatible with various wall construction systems such as ICF, traditional poured concrete and CMU walls.

The one-way concrete slab which is formed by Amdeck Eco can span up to 30’ (9.14m) using a combination of reinforcement, welded wire mesh (or rebar) in the slab and rebar in the beams. The concrete slab, joists and shoring requirements are site specific and need to be designed by a licensed engineering professional. When installed properly, the system provides the structural strength through the reinforced concrete slab and insulation through the EPS creating a finish ready system.
Amdeck Eco uses 2x6” (38x140mm) dimensional lumber joists spaced every 12” (305mm) to support the EPS sections and temporary construction loads. The wide availability of this size lumber makes it easy to source and relatively inexpensive (when compared to similar systems requiring metal channels). The wood joists are anchored into the concrete slab allowing for easy interior finish installation.

This lightweight system is well suited for smaller projects and is ideal for car garages, flat or sloped roofs, floors, cold cellars, terraces or balconies, first floor in high risk flood areas, safe rooms and green roofs.
Tool Checklist For Amdeck Eco Installation

☐ Protective gear
☐ Laser level
☐ Tape measure
☐ 4’ (1.2m) level or straight edge
☐ Cordless drill
☐ Hammer
☐ String line
☐ Felt-tip marker
☐ Protective gloves
☐ Foam dispensing gun and foam
☐ Wire tie tool
☐ Rebar bender/cutter
☐ Reciprocating saw
☐ Handheld cut off saw
☐ Chainsaw
☐ Shoring/bracing and scaffold planks

Tool Checklist For Concrete Pour

☐ Rubber boots and concrete pouring gloves
☐ Concrete pencil vibrator, 1” (25mm) maximum head size
☐ Concrete finishing tools
☐ Flat shovel for spill clean up

Note: Keep a spare concrete pencil vibrator head and shaft on hand.

Tool Checklist For Utilities Installation

☐ Hot knife
☐ Foam dispensing gun and foam
☐ Hand saw
☐ Electric chain saw
☐ Reciprocating saw
☐ Cordless drill
☐ Felt-tip marker

Material Checklist

☐ Tie wire in rolls and pre-made reinforcing steel tie loops
☐ Sleeves for utility penetrations
☐ Concrete screws
☐ Coated flat head deck screws (4” and 6” (102mm and 152mm)) with 2” (51mm) plastic washers
☐ Spray foam
☐ Strapping
☐ Flashing tape or waterproofing membrane (to protect wood joist ends)
☐ Rebar
☐ Welded wire mesh (if needed)
Waterproofing Joist Ends

Since the wood joists will be embedded in concrete, they require additional protection. The first step in the Amdeck Eco installation is waterproofing both ends of each wood joist with self adhering waterproofing or flashing membranes. Each joist requires a bearing of 4” (102mm) so the first 4.5-5” (114-127mm) require protection to make sure the lumber does not get deteriorated from the moisture.

Figures 4-6 – Joist end taping sequence

Joist Bearing

Once the ends are protected, the wood joists are installed on the walls. In most cases, the joists along with the Amdeck Eco sections will be running the shorter of the two room dimensions.

Figure 7 – Wood joist minimum bearing dimension
First Joist Installation

The installation of the first joist depends on the adjacent wall or supporting structure. For poured concrete and CMU block walls, the center line of the joist will be 6” (152mm) away from the inner edge of the wall/supporting structure. For ICF walls it is recommended for the Amdeck Eco section to be flush with the inner surface of the ICF (longitudinal and transverse directions) panel. When using Amvic R22 ICF, the first joist will be 3-1/2” (38mm) away from the outer surface of the foam. For Amvic R30 ICF, the first joist will be 2-3/4” (70mm) away from the outer surface of the foam. Once the location of the first joist has been established and marked with a chalk line or a marker, each consequent joist will be 12” (305mm) on center.

Once a pair of joists has been installed, place an Amdeck Eco section at each end. This will ensure that the joists are secured in place. Having completed the installation of the wood joists, the remaining Amdeck Eco sections can now be installed. It is recommended to work transversely (perpendicular to the joist span), stacking from one side to the other.
Installing Remaining Joists and Amdeck Eco Sections

In most cases, the dimensions between walls or other supporting structural elements are not exact multiples of the Amdeck Eco sections. This is true for both the transverse and longitudinal directions. For such instances, the blocks should be cut to accommodate site specific dimensions. When blocks are cut longitudinally, it is recommended to reinforce the edge with OSB/plywood while tying it back to the shoring system. In the case of ICF walls, attach a piece of dimensional lumber to the ICF webs with or without the additional OSB/plywood (depending on site conditions).

Wood Joist Anchoring

The wood joists do not require attachment or additional support once they are properly shored. After the concrete is placed and cured, they remain in place and act as attachment surfaces for interior finishes. The wood joists do require anchoring back to the concrete slab. This is especially important for spans greater than 15’ (4.6m) where the joists are hung from the concrete slab via the anchors.

Two types of anchors are used for Amdeck Eco installation, a short and a long one. The shorter anchor is installed flush with the surface to secure the EPS sections to the joists. The longer anchor (with double washers) sticks out above the surface of the EPS and gets embedded in the concrete, holding the wood joists to the concrete after it has consolidated and shoring is removed. The short anchor is site assembled using a screw (4”, 6 and 8” length for Amdeck Eco 8”, 10 and 12” respectively) and a single 2” (51mm) plastic washer. The long anchor is site assembled using a screw (6”, 8” and 10” length for Amdeck Eco 8”, 10 and 12” respectively) with two 2” (51mm) plastic washers. The anchors are spaced at 24” (610mm) on center, alternating between the short and long anchors.
Shoring Installation

For instances where the span of the room is greater than the length of the available wood joists, additional support in the middle is required until concrete is placed and cured. For clear spans under 15’ (4.6m) shoring is installed after the wood joists and the EPS sections are in place. For longer spans, the shoring should be erected in place before the installation of the joists and EPS sections.

Figure 15 – For clear spans of less than 15’ (4.6m), wood joists can be installed before the shoring

Figure 16 – For clear spans greater than 15’ (4.6m) shoring is installed before the wood joists and
Typical spacing for shoring for Amdeck Eco is approximately 4’ (1.2m) on center and is perpendicular to the Amdeck Eco sections and the wood joists. Shoring layout and design is also required to be site specific and must be provided by an engineering professional.

**Reinforcement**

Once the wood joists, the EPS sections and the shoring has been installed, rebar can be placed. The specifics of the reinforcement rebar design can vary quite significantly depending on the specifics of the site conditions. Amvic offers a design guide applicable for both the US and Canada to be used as a reference by an engineering professional to configure the rebar placement. The latest version of the guide can be found on Amvic’s website.

Amdeck Eco can be used as a full floor or roof system or only partially for areas such as garages, cold rooms, patios, etc. Amdeck Eco requires reinforcement in both the concrete joists which can be a single bottom bar going all the way up to four bars with stirrups for longer spans and/or heavier loads. The slab thickness can range from 2-4.5” (51-114mm) and also requires reinforcement which can be welded wire mesh for lighter loads or rebar for higher load applications such as car garages.
Penetrations

Before concrete is placed it is important to make sure that any vertical penetrations for HVAC, plumbing and/or electrical is done. It is possible to cut through the concrete at a later time but the process is expensive and time consuming. It is highly recommended to use plastic sleeves for the various utilities. The placement of penetrations should be done between the wood joists. Placing any penetrations at the locations of the concrete beams should be avoided as it would require potentially different and/or additional reinforcement design.

Figure 19 – Ideal location for penetrations is between the wood joists where there are no concrete joists

Figure 20 – Penetrations can be placed adjacent to the concrete joists but should be avoided if possible

Figure 21 – Vertical penetrations through the concrete joists should be avoided
Concrete Placement
This part of the manual covers the concrete pouring and consolidation process related to the Amdeck Eco floor and roof system with best practices that have been acquired so far. Amvic recommends reviewing part 10 of the Amvic ICF Installation Manual which cover a variety of subjects related to concrete fundamentals, pouring and consolidation.

Pre-Pour Checklist
Before placing the concrete, it is essential to review a pre-pour checklist. Some of the primary checks include but not limited to the following:

- Is the Amdeck Eco floor system level and at the correct elevation?
- Does reinforcing steel type and placement conform to the engineering drawings/specifications and/or local building code requirements?
- Are all the details for reinforcing steel splices and connections to the other building structural systems installed in accordance with engineering drawings/specifications and/or local building code requirements?
- Have all structural attachments for suspended ceiling (if required) been installed?
- Is shoring installed properly and erected in accordance with engineering specifications and/or building code requirements?
- Have all utility and service penetrations/block outs been accommodated?
- Has the delivery time for both the boom pump and concrete been coordinated and confirmed?
- Are there two mechanical vibrators on the job site (one as a backup)?
- Is adequate labor prepared for pouring?
- Is the site clean, and is there enough room for trucks, workers, etc.?

Safety Considerations for Handling and Placing Concrete
The following suggestions, precautions and safety measures are recommended for anyone handling wet concrete. Always wear a hard hat for head protection on a construction site. Wet fresh concrete is very abrasive to the skin. It can cause skin irritations, chemical burns and prolonged contact can cause third degree burns. It is therefore recommended to wear waterproof gloves, long sleeve shirt, long pants and rubber boots. Use waterproof pads to protect the skin, knees, elbows and hands from contact with fresh concrete during finishing. Flush eyes and skin that come in contact with fresh concrete immediately with clean water. Rinse clothing saturated from contact with fresh concrete with clean water. Wear full cover goggles or safety glasses with side shields during the concrete pour.

Concrete Specifications for Amdeck Eco
The following specifications are to be used as general guidelines or recommendations but do require an engineering professional to finalize. Generally, a minimum of 4500 psi (30 MPa) compressive strength at 28 days is required. The slump depends on the slope. For 0-15° slope, a 5.5” (140mm) slump is recommended. For 15-30° slope (usually for roofs), a 3” (76mm) slump is recommended. For 30-40° slope (roof), a 2” (51mm) slump is recommended. The recommended maximum water to cement ratio (W/C) is 0.55. Coarse aggregate should not exceed 3/4” (19mm). Air entrained should be around 3-5% with cement type 1 or type 10.

Crew Size
Assuming the concrete will be poured using a boom pump, a minimum crew of four is required on pour day. All of the crew members will be required on top of the deck; one handling the boom hose, one working the vibrator and two troweling/finishing the concrete surface as required.
Pouring the Concrete
Amdeck Eco is a floor and/or roof system. The rate of pouring concrete per hour and the concrete mix slump are not considered as critical factors during the pours as is the case with walls. Although this gives the contractor/installer some leeway, there are general guidelines that should be followed.

Ensure that the Amdeck Eco floor or roof is clean and free from any debris before the concrete pour. While pouring concrete, DO NOT pile or stack a load of concrete in any one place and try to move the pile to other areas using a shovel or wheelbarrow. Always pour the concrete as close as possible to where it will remain, which should be easy if using a boom pump.

Avoid stepping directly over or placing heavy equipment on the reinforcing steel rebar or the service and utility pipes. Always use wooden planks to spread the load as you move from one place to another. When pouring concrete, start at one end of the floor or roof and work your way to the other end. Pouring in this sequence is a good practice as it allows the finishing crew to follow close behind. When pouring concrete, DO NOT fill the joists (beam) portion first and then pour the top slab at a later stage. When placing concrete in a particular area, ensure that the joists and top slab are poured monolithically.

Unless otherwise specified by an engineering professional, the whole area covered by Amdeck Eco shall be filled with concrete in one continuous pour, with no construction or cold joints. Concrete shall be appropriately cured in place after the pour, as per engineering specifications and/or local building code requirements. Shoring shall not be removed until the poured concrete has gained its specified compressive strength.

Slump
Perform a field slump test on the first batch of concrete that arrives on the jobsite. If the slump is too low or too high, immediately inform the concrete supplier to adjust the concrete mix appropriately for the subsequent batches.

Compressive Strength
Amvic strongly recommends taking fresh random concrete samples for compressive strength testing at 28 days by a recognized independent laboratory. When tested, the samples should yield minimum results of not less than what was specified by the design engineer. With a minimum specified concrete compressive strength of more than 4500 psi (30 MPa), special inspection by an engineering professional according to the local building codes may be mandatory.

Consolidation
Consolidation is the process of compacting freshly poured concrete. Concrete MUST be consolidated to eliminate stone pockets, honeycombing, and entrapped air. The consolidation process helps mold concrete within the forms and around embedded items. It ensures reinforcing steel is properly embedded and bonded to the concrete paste.

There are two primary types of consolidation for concrete, internal and external. For external consolidation, a mechanical vibrating device is attached to the underside of the Amdeck Eco forms. This method may be acceptable, but it is not recommended. Manually tapping on the outside of the forms are NOT ACCEPTED as an adequate means of consolidating concrete. Internal consolidation can be done by “rodging” the concrete with metal rods which does not provide adequate consolidation. The second type of internal consolidation using an immersion type concrete vibrator (pencil vibrator, poker or spud vibrator) is recommended and provides adequate consolidation.
Using Concrete Vibrators

Concrete vibrators consist of a vibrating head connected to a driving motor by a flexible shaft. Inside the head, an unbalanced weight connected to the shaft rotates at high speed, causing the head to revolve in a circular orbit. The motor can be powered by electricity or gasoline. The vibrating head is usually cylindrical with a diameter ranging from 3/4-7” (19-180mm). The dimensions of the vibrator head as well as its frequency and amplitude in conjunction with the workability of the mixture affect the performance of a vibrator.

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum vibrator head diameter</td>
<td>1.5” (38mm)</td>
</tr>
<tr>
<td>Frequency (vibrations per minute)</td>
<td>9000 vpm</td>
</tr>
<tr>
<td>Minimum radius of action</td>
<td>6” (152mm)</td>
</tr>
<tr>
<td>Insertion on center spacing</td>
<td>9” (229mm)</td>
</tr>
<tr>
<td>Centrifugal force</td>
<td>550lb (250kg)</td>
</tr>
<tr>
<td>Compaction rate</td>
<td>3-6 yd^3/hr (2.3-4.6 m^3/hr)</td>
</tr>
</tbody>
</table>

Consolidation MUST be done immediately after fresh concrete is poured and before it sets. Completely immerse vibrator head in concrete during consolidation. Insert vibrator vertically and let it sink as quickly as possible under its own weight to the desired depth. Move vibrator and re-insert at a distance 1.5 times the radius of action. Stop vibration when the surface becomes shiny and there are no more breaking air bubbles.

Practices to Avoid with Concrete Vibrators

Do not use vibrator to move concrete laterally, this causes segregation. The vibrator head should not touch the steel reinforcement. It should only come in contact with the concrete. Do not immerse the vibrator head down the same path more than once. Do not run the vibrator in air for more than 15 seconds, this will cause overheating. Avoid sticking the vibrator head into the top of a concrete heap. To flatten a concrete heap, insert the head around the perimeter. Do this carefully to avoid segregation.

Finishing the Concrete Pour

Finishing refers to screeding, floating or troweling the concrete surface to provide further compaction of the surface and the type of surface required. Finishing has two stages: initial and final. The concrete surface may require finishing as per specifications that could include a floated, troweled or broomed finish.

Screeding

Screed or strike-off concrete to bring the slab to the proper level if there is an excess of concrete in particular areas. Any bleed water that appears should be left to dry up. Do not try to eliminate the bleed water by using stone, dust or cement, since this will weaken the concrete surface.

Bull Floating

After the bleed water disappears, bull floating is performed. Bull floating surface unevenness and embeds any large aggregates into the concrete. Additionally, bull floating helps to seal concrete from moisture loss. The most common sizes for bull floats are 8” (203mm) in width and between 42” (1.07 m) and 48” (1.22 m) in length. The bull float handle is usually 5-6’ (1.53-1.83m) in length. The parts comprising the handle are extendable, so that concrete areas that are out of reach can be accessed. Bull floats are composed of either aluminum or magnesium.

Final finishing
Bull floating, which was part of the initial process, may be repeated if required. The concrete can also be floated with a wood or metal hand float, or a finishing machine that uses such blades (power-floating). This helps embed any aggregate and rough spots and close minor cracks. Power floating leaves a finish superior to hand floating. Concrete level must now be checked, and it must fall to within specified tolerances. A power-trowel or a final hand trowel finish are conducted to ensure that plane surface tolerances are achieved, as per specifications. The final surface should be a smooth, hard, dense and free from any trowel marks. This step should be done twice. For producing a slip-resistant surface, the concrete can broom finished while the concrete surface is still not completely hardened, so as to create the slip-resistant grooves (straight lines, or s-shaped).

Concrete Curing
In order to develop the strength of the placed concrete it is necessary to cure it. Curing refers to keeping the concrete moist, so that the bond between the paste and aggregate gets stronger. Curing is very important, as it makes the concrete more durable, less susceptible to cracking and stronger. Curing begins after final finishing and after concrete has hardened (initial setting). In hot weather (30°C/86°F), high winds or low humidity, extra precautions must be taken to ensure that the concrete does not dry out.

Water Spray
A fine mist of spray can be applied to the concrete surface. The spray must be fine so that it will not damage the concrete. Keep concrete moist at ALL times during the curing period.

Wet Sheets
Wet sheets, which may be of cloth or plastic are an easy and low-cost method to cure concrete. The concrete may be either wetted and then covered with plastic, or if a cloth is used, then the overlying cloth must be wetted at regular intervals. The sheets must be held down by placing an appropriate weight over them. Ensure that the concrete surface is evenly moist, otherwise, some parts may become darker than others. Condensation under plastic sheets is a good sign of adequate curing.

Curing Compounds and Retarders
Curing compounds slow down the rate of water loss in concrete. The curing compound is added into the concrete as part of the concrete mix. Read the manufacturer’s instructions if these are used. Evaporation retardants also perform a similar function as curing compounds. They reduce rapid loss of surface moisture which in turn reduces the possibility of early concrete shrinkage. The difference between retardants and curing compounds is that the retardants must be applied after initial screeding and floating, and then again after each finishing process. Severe weather conditions also require re-application. Consequently, retardants have a temporary effect and once the concrete is finished, standard curing techniques must still be applied.

The amount of water absorbed by the EPS form blocks is less than 3.0% of the volume of the block. It is the responsibility of the installer to make sure that during the construction phase the blocks are emptied of rainwater and the forms are kept dried. If the water gets into these cavities anytime during construction, the floor system must be completely dried and moisture free prior to the attachment of finishing building materials on either side of the system. Amvic recommends curing for at least 7 days.

Shoring Removal
In order to remove the shoring, the concrete structure must be able to supports its own weight and temporary construction loads without excessive deflection. An engineering professional would be able to determine the appropriate removal or re-shoring time based on the concrete strength and curing conditions.
PART 3

INSTALLATION

Interior Finishes

For the underside of Amdeck Eco, exposed EPS foam is only allowed for spaces that are not occupied such as crawl spaces, cold rooms, etc. For occupied spaces, building codes require a thermal barrier with gypsum board being the most common (both fire rated and non-fire rated variants are acceptable) and cost efficient. The top surface, which would be exposed concrete can be finished as per project requirements.

Underside

For the underside of Amdeck Eco, gypsum board can be attached in one of two days, directly to the wood joist or to metal channels. For direct installation, use regular drywall screws spaced at 12” (305mm) apart. Metal channels can be installed between the gypsum board and the wood joists to create a small cavity, both hat and resilient channels are acceptable. Both the metal channels and the gypsum boards should be installed at 12” (305mm) on center.

If using pressure treated lumber for the joists, it is recommended to install metal channels to decouple the drywall from the lumber. Attaching metal channels to pressure treated lumber should be done with hot dipped galvanized, type 304 or 306 stainless steel or copper screws with 1/2-1” (13-25mm) penetration depth.

Figure 22 – Gypsum board attached directly to wood joists
Figure 23 – Gypsum board attached to metal resilient channels

Topside

The topside of Amdeck Eco is a concrete slab that can either be left as is or have finished flooring attached to it. If the concrete is left exposed, it should be coated with a concrete sealer to ensure proper protection and longevity during operation.

For solid and engineered hardwood, the system must be fully adhered to the concrete slab. Vinyl plank and laminate flooring can be installed either as glue down or floating with foam underlay.

Carpet installation can installed as glue down or stretch while (foam underlay is optional but is recommended). Tile installation is done conventionally.

Figure 24 – Exposed concrete finish with concrete sealer
Figure 25 – Solid hardwood fully adhered to concrete

Figure 26 – Engineered hardwood fully adhered to concrete

Figure 27 – Vinyl plank (min. 4mm thickness) with foam underpad

Figure 28 – Laminate (min. 6mm thickness) with foam underpad

Figure 29 – Carpet with foam underpad

Figure 30 – Conventional tile installation
Amvic’s Amdeck Eco is a high quality, innovative floor and roof system designed for low rise residential applications. Competitive pricing, extensive product distribution and excellent technical support are combined to provide our clients with a simplified approach to a superior finished product. If any questions or concerns are not completely addressed in this guide, please contact us and our staff will be happy to answer any question. At Amvic, we pride ourselves in offering our customers an exceptional level of customer service.

Disclaimer

Information contained in this document is provided as a guideline only, without any warranty of any kind, either expressed or implied, including, but not limited to, the implied warranties of merchantability, fitness for a particular purpose, and freedom of infringement.

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Technical Support

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Phone 1 (877) 470-9991 (toll free)

Email technical@amvicsystem.com

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