
F6400LVR Adhesive Series

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Guidelines for Use, Application, & Safe Handling



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Note: This manual contains important information for your application. Retain for future reference.

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I. PROCEDURES FOR USE

A. Scope of Application

Foamseal F6400LVR has been specifically formulated to meet the structural requirements of wall and floor construction for the Manufactured Housing Industry. It is a single component, moisture cured adhesive designed to bond flooring to joists, wallboard to stud and header framing. It may also be used for other structural wood applications within the home.

F6400LVR provides unique advantages for its various applications. Some of these advantages are:

- As a structural floor-decking adhesive, it provides exceptional strength and a means to eliminate floor squeaks.
- As a wallboard adhesive, F6400LVR provides reduced cure time of the adhered assembly.
- In many applications the required number of mechanical fasteners may be reduced.
- It reduces the stress concentration inherent to mechanical fasteners.
- During its curing process F6400LVR expands, filling the dimensional inconsistencies (i.e. gaps) inevitable in composite assemblies.
- Using a more controlled process enhances assembly efficiency.

B. Storage and Usage Temperature Considerations

Though F6400LVR is not harmed by short-term exposure to temperatures below 40°F, the proper storage and usage temperature is greater than or equal to 50°F. The optimal application temperature is greater than or equal to 50°F. Other considerations are as follows:

- Avoid storing F6400LVR at temperatures greater than 120°F.
- Ensure the desiccant filter is in place so that only dry air makes up the volume as material is dispensed from the bulk container.
- The viscosity of F6400LVR increases as the chemical temperature decreases. As a result, chemical temperatures less than 50°F will adversely affect the flow rate and slow down the application time of the adhesive.

C. Equipment Required

F6400LVR has been tested and is approved for bonding floor decking to joists, wall panels to structural framing and headers, and laminating ridge beams. Foamseal recommends the following dispense equipment package for in-plant operations:

- Properly Sized Transfer Pump
- Pump Air Inlet Filter / Regulator / Lubricator
- Manifold Delivery System (optional)
- Properly Sized Hydraulic Hose with min. 4,000 w.p.
- Fluid Flow Control Regulators

- Swivels
- Trigger Guns and Accessories
- Foamseal's Dispensing Tip & Wand Assembly

The dispense equipment package is sized to the in-plant application. Specific part numbers are defined during the quoting process.

F6400LVR may be used in plastic squeeze bottles as an alternative to the mechanical pumping system, such as pneumatic, diaphragm, and gear pumps. The plastic squeeze bottle may be viable as an alternative for use in areas of the plant out of reach from a pump such as panel replacements, and for attaching back panels.

NOTE: For cleanup use PC-40 for wiping off excess F6400LVR from walls and floors.

D. Substrate Preparation

Holcim Solutions and Products US LLC, recommends the substrate be dry and above 50°F, or curing time may be adversely affected, however, F6400LVR has been tested and passes AFG-01 for use on frozen lumber.

All surfaces must be free from grease, oil, mold release agents, gypsum powder and loose particles such as dirt, sawdust and wood chips. Adjacent surfaces, where F6400LVR is not needed, should be protected to avoid risk of contact resulting in any unnecessary cleanup. Contact your *Holcim* Sales & Service Representative for further suggestions.

E. Adhesive Application Instructions

1. Floor Decking

Apply F6400LVR to floor joists by laying two parallel 1/16" to 1/8" wide beads along the surface of each joist and box sill. The working time for F6400LVR is approximately 15 minutes. Do not apply F6400LVR to more framing than can be covered by panels and mechanically secured in place in approximately 15 minutes. Conditions of high humidity and temperatures will shorten the working time since F6400LVR is a moisture cured adhesive.

NOTE: Flooring must be fastened according to the approved fastener schedule.

2. Structural Walls (Shear Walls)

Apply F6400LVR by laying two parallel 1/16" to 1/8" wide beads along the surface of the top plate, bottom plate and all framing studs (i.e. two beads on all 1½" thick framing members and one bead on all ¾" framing members). F6400LVR becomes tack free in a relatively short period. Apply it to no more wall framing than can be covered by sheets of wallboard and mechanically fastened in place within 15 minutes. Once the adhesive has been applied, quickly place the wallboard on this section of wall framing and attach it with the proper mechanical fasteners. Our ASTM E 72-80 wall racking test results may allow you to use a reduced number of mechanical

fasteners when you use F6400LVR. Check with your DAPIA before you change your approved mechanical fastener schedule.

3. Interior Partition Walls

Since the testing requirements for interior structural walls are more stringent than those of interior partition walls, you may follow the same application guidelines as outlined for structural walls. As an option to this application method, you may elect to perform a transportation test and submit it to your DAPIA for approval. In non-shear wall construction for HUD code homes, F6400LVR adhesive may be applied in any manner or pattern approved by a HUD producer's third party standards. The fastening pattern may be varied and/or reduced with the approval of the HUD producer's third party inspection agency.

4. Side Walls

Since testing requirements for structural walls are more stringent than those of side walls, you may follow the same procedure outlined for structural walls. As an option to this application method, you may elect to perform a transportation test and submit it to your DAPIA for approval. In non-shear wall construction for HUD code homes, F6400LVR adhesive may be applied in any manner or pattern approved by a HUD producer's third party standards. The fastening pattern may be varied and/or reduced with the approval of the HUD producer's third party inspection agency.

F. Engineering Considerations

You should seek approval from your third party design approval agency prior to using F6400LVR or any other structural adhesive not in your DAPIA manual. *Holcim* will provide engineering test data upon request. Our test data includes CA 25-4 California Testing, PEI 93-7, ASTM E72 wall racking, ASTM C557, ASTM D905, ASTM D3498, ASTM D6464 and AFG-01.

G. Cleaning Procedure

1. Walls

Prior to lifting walls off tables or jigs, inspect vinyl-laminated gypsum and/or other "decorative" type walls for adhesive smears or marks. If these are present, they must be cleaned up immediately. Use PC-40 panel cleaner and a clean rag to wipe off. If the adhesive spill is larger than a quarter in size, remove the majority of the adhesive with a dry rag first. Then apply the PC-40 to a clean rag and remove the remaining film. This cleaning method prevents larger messes or panel replacements.

H. Panel Replacement

1. Walls

Wall panels must be attached in the same manner approved by your DAPIA for that particular wall type (e.g. structural walls, side walls, and partition walls). The safest way to avoid confusion and ensure compliance is to follow the procedure of installing structural wall panels as outlined above in section I. E. or follow the instructions outlined in *Holcim* "Wall Repair" Manual.

2. Floors

Replacement for floor decking must be attached in the same manner approved by your DAPIA for that particular floor. The safest way to avoid confusion and ensure compliance is to follow the procedure for installing floor panels as outlined above in section I.E.

II. FOAMSEAL F6400LVR SAFETY CHECKLIST (Post Near Equipment)

A. Personal Protective Equipment

Foamseal recommends that the operator and anyone working directly with the F6400LVR chemicals should wear the following:

- Goggles or safety glasses
- Gloves
- In the unlikely event that the level of MDI or cleaning solvent is known or suspected to be above the Threshold Limit Values (TLV) or Permissible Exposure Limit (PEL), a full-face fresh air supplied respirator is to be worn.
- An approved eye wash unit should be near the workstation at all times.

For further information on personal protective equipment, please consult the SDS.

B. Ventilation

When working with F6400LVR or cleaning solvents (e.g., GC33) in a poorly ventilated area, consider the following. Local ventilation, capable of moving air 100 cubic feet per minute away from the operator is recommended unless the MDI concentration is in excess of 0.02 ppm. If MDI concentration is equal to or greater than 0.02 ppm, only a full-face fresh air supplied respirator is sufficient for respiratory protection.

NOTE: Smoking *should not* be permitted in the area of F6400LVR application.

C. Preventing Pressure Related Injuries

- Do not exceed the working pressure ratings (WPR) of components, paying special attention to the high-pressure equipment.
- Use pressure-relief devices.
- Limit the air or hydraulic pressure to the motor so that the fluid pressure produced by the pump is less than the working pressure of all system components.
- Do not repair permanently coupled hoses. Use only genuine service parts.
- Do not modify pump (or any other) parts.
- Properly align tips to prevent back-spray.
- Do not use low-pressure relief procedures.
- Check for proper connections and make sure they are tight before pressurizing the system.

D. Hazard Warnings

Warning Symbol



This symbol alerts you to the possibility of serious injury or death if you do not follow the instructions.

Caution Symbol



This symbol alerts you to the possibility of damage to or destruction of equipment if you do not follow the instructions.



EQUIPMENT MISUSE HAZARD

Equipment misuse can cause the equipment to rupture or malfunction and result in serious injury.

- This equipment is for professional use only.
- Read all instruction manuals, tags, and labels before operating the equipment.
- Use the equipment only for its intended purpose. If you are not sure, call your pump distributor.
- Do not alter or modify this equipment.
- Check equipment daily. Repair or replace worn or damaged parts immediately.
- Do not exceed the maximum working pressure stated on the equipment or in the **Technical Data** for your equipment. Do not exceed the maximum working pressure of the lowest rated component in your system.
- Wear hearing protection when operating this equipment.
- Comply with all applicable local, state, and national fire, electrical and safety regulations.

MOVING PARTS HAZARD

Moving parts, such as the pump's priming piston and the wiper plate, can pinch or amputate your fingers.

- Keep clear of all moving parts when starting or operating the pump.
- Keep hands and fingers away from the priming piston during operation and whenever the pump is charged with air.
- Keep your hands away from the wiper plate and lip of the drum while the ram is operating.
- Before servicing the equipment, follow the Preventing Pressure-Related Injuries on page 3 to prevent the equipment from starting unexpectedly.

III. F6400LVR PROCESS: OPERATION & MAINTENANCE CHECKLIST

A. Daily Start Up

- Check adhesive level. Change if needed. Bottom drum must remain full at all times.
- Check the pump throat oil cup level. If needed, add oil prior to starting pump (i.e. air pneumatic pumps only). Lube cup should be kept 3/4" full at all times.
- Check desiccant filter for color change. Change if needed (i.e. pink color).
- Open all valves to allow polyurethane adhesive to flow from drum to drum to the pump.
- To turn on pump, connect airline to pump and open all ball valves down-line from the pump to the guns. Refer to your pump manual for proper pressure settings.
- Wear safety glasses with side shields and rubber or latex gloves. If there is potential for adhesive contact with clothing, aprons are advised.
- Remove applicator gun and wand assembly from stand being careful not to accidentally trigger the gun. Tap applicator head on top of bucket to remove excess gun cleaner from the head.
- If the application head is filled with grease, trigger gun into an empty container until grease is completely purged and adhesive is flowing freely from both tips.
- Check applicator tips and look for contamination. Use a wire brush to remove debris. Test flow rate and bead size. If F6400LVR does not flow freely from both tips, use a cleanout tool (#UCLOT-10) to clean the tips. If this fails to produce good flow through both tips, replace the problem tip with a new one. (Order more applicator tips, cleanout tools, or heads as needed).

B. Daily Shut Down

- Place each gun in their respective gun and wand assembly holders. As an option, filling each gun and wand assembly head with grease may help to prevent tip clogging. If provided, fill through the grease zirk on the side of the head.
- Close all ball valves starting at the guns and working up line to the bottle fill station.
- Pneumatic Pumps:
 - If provided near the pump, open the bottle fill valve and fill or top off enough plastic bottles to allow the pump piston to move to the full down position, starting up-stroke.
 - Check the oil level in the throat oil cup and replace if discolored. Refer to Holcim Solutions and Products US LLC, Lube Cup / Packing Maintenance Instructions listed below.
 - If throat oil cup is discolored it may be the early signs indicating the packings need to be snugged. Refer to Holcim Solutions and Products US LLC, Lube Cup Maintenance Instructions listed below.
- Close ball valve at the pump outlet near the bottom of the pump.
- Close all ball valves between the upper gravity feed container and pump inlet.
- Check gun cleaner in wand holders for level and contamination.

C. Long Term Shut Down

- Follow all procedures as outlined for daily shut down.
- Fill each gun and wand assembly head with grease. If provided, fill through the grease zirk on the side of the head.

D. Preventative Maintenance Schedule

1. Daily
 - Check all threaded fittings for leaks and retighten as required.
 - Keep glue heads immersed in suitable solvent.
 - Clean glue heads as needed.
 - Check upper packing lubricant cup and add as needed.
2. Weekly
 - Check all dispense hoses for wear or kinks.
 - Check upper packing adjustment and tighten as needed.
 - Make sure system air supply is clean, dry, and lubricated.

E. Lube Cup / Packing Maintenance Instructions

The lube cup assembly serves two purposes. The nut provides constant pressure on the packings to assist with wiping the shaft, and the lube cup contains lubricant to expose materials that may come through packings or shaft. A small amount of material "seepage" into the lube cup is normal. A constant flow is a leak and tightening the packings is recommended. To tighten packings:

- Disconnect air supply to pump to relieve pressure on pump.
- Bleed fluid pressure from top and bottom of pump to relieve pressure on packings.
- Take packing wrench and turn clockwise in 1/8" increments until snug. Avoid over-tightening; this can cause the pump to stall at lower operating pressures.
- If hardened material is in lube cup use a tongue depressor or similar tool to remove it.
- Check lubricant level in lube cup and add as needed to keep 3/4" full.
- Reconnect air supply to the pump.

IV. TECHNICAL BACKGROUND INFORMATION

Please refer to the SD sheet for the most recent Health and Safety information.

A. Biological Effects

Reports in the literature have noted that one of the components of F6400LVR an isocyanate (containing MDI) has an irritating effect on the mucous membranes, especially on the respiratory tract and the eyes, which can become more serious with repeated exposure. This has resulted in an upper limit being placed on the concentration of MDI vapors and particles in a work area by the Occupational Health and Safety Administration (OSHA). The current Permissible Exposure Limit (PEL) ceiling is 0.02 parts per million vapors in the air. These values apply regardless of the type of isocyanate, and they are well below the detectable odor level of 0.4 ppm.

The effect of inhalation exposure by humans to concentrations near the PEL has been progressive disabling illness characterized by shortness of breath, chest discomfort, and reduced pulmonary function. Exposure to higher concentrations has caused, within minutes, tracheal and laryngeal irritation and severe coughing spasms leading to respiratory distress and cyanosis. The respiratory tract is the most sensitive area, and if no effect is seen there, one would not expect to see other organs affected. It should be noted that some respiratory symptoms might not appear for several hours after exposure.

Isocyanates are also an irritant to skin and eyes. Skin contact may produce swelling and reddening; in the eye, corneal damage can occur by dehydration of the eye fluids. Occasional contact with the skin will usually result in a brown discoloration. This is simply a reaction of the isocyanate with the surface moisture on the skin and, although difficult to remove, is not serious or symptomatic of a serious effect. Ingestion results in similar irritation of the throat, stomach, and skin sensitization.

B. Personal Protective Equipment and Clothing

Respiratory protection is not expected to be required. Due to F6400LVR's low vapor pressure and chemical characteristics, MDI levels are expected to be non-detectable and well below the OSHA established Permissible Exposure Level (PEL) of 0.02ppm.

For eye protection it is recommended that the operator wear safety glasses with side shields. A full-face shield may be worn if preferred. Eyewash fountains should be available near the equipment, which are capable of flushing eyes for at least 15 minutes with an adequate stream of water.

To protect against skin contact, plastic or latex gloves should be worn. Some of the plastic gloves do not resist solvent as well as the latex. Untreated fabric gloves actually soak up liquids and increase the hazard. To protect the employee's footwear, disposable treated paper boots may be used. Long sleeve shirts are also recommended.

If clothing becomes saturated with F6400LVR, it must be quickly removed and the affected skin area washed with soap and water. It is usually preferable to have the workers wear

disposable treated paper coveralls. These resist liquids and can quickly be removed and disposed of before the liquid has soaked into the workers clothing. A shower should be available in case there is a substantial amount of skin contact.

Holcim recommends that the person applying F6400LVR should wear gloves. Because it is a solvent free product, it is difficult to remove from skin.

When removing from skin, use soap and water.

C. Fire Hazards and Thermal Decomposition

Liquid urethane chemicals, like most organic compounds, will burn. They are classified as Class III flammable materials and are not considered serious fire hazards because of their high flash points. Isocyanates decompose rapidly above 400° F and should not be exposed to temperatures in this range.

Liquid urethane chemical fires may be extinguished with carbon dioxide or dry chemical fire extinguishers. If a major fire is encountered, it should be remembered that isocyanate vapor would be present. Self-contained breathing apparatus should be worn by firefighting personnel exposed to the vapors generated by the fire.

D. Training of Workers

Employees should be instructed concerning isocyanate and other chemical hazards and the precautions to be followed. Please refer to the SDS sheet for the most recent Health & Safety information. Please contact *Holcim* if you need additional information.

E. Storage, Shipment & Handling

F6400LVR is shipped in disposable IBC's (intermediate bulk container, e.g. totes).

Cold, heat, and water are factors that are most likely to cause problems. Therefore, it is essential that these chemicals be stored inside, and out of contact with water. Material on line should be kept at greater than or equal to 50F. Although there is a slight danger of crystallization or separation on freezing, the viscosity increase makes for difficult handling. For shipments that have been exposed to cold temperatures, holding for a short time at 90F - 120F while agitating until the liquid temperature has been raised to greater than or equal to 50F is sufficient to lower the viscosity to tractable levels. Unopened containers will have a storage life of up to twelve months in these conditions.

Moisture, either as vapor or liquid, is the most probable source of isocyanate contamination. When containers have been opened either for sampling or partial withdrawal, the air above the F6400LVR should be replaced with nitrogen or dry air having a maximum dew point of – 40°F. Desiccant filters may also be used. The absorbing media should be replaced periodically. Carbon dioxide cannot be used as a purging gas due to its solubility in isocyanates. Lines leading from storage tanks should be protected with plugs or caps to protect residual isocyanate from coming in contact with moisture.

F. Empty Container Recommendations

- "Disposable IBC" Disposal - Holcim has contracted with Return Net System for pick up and proper recycling of your empty tote containers. Information regarding the program can be found directly on the tote containers themselves or you can also visit their website at www.returnnetsystem.com.

RESEARCH / TESTING REPORTS

Product Evaluation Report # ICC-ES ESL-1379 <https://icc-es.org/search-wpsolr/?q=ESL-1379>



SUSTAINABILITY GUIDE

GREENGUARD® Children & Schools Certified

GREENGUARD® Indoor Air Quality Certified

- Contributes to *LEED®* and other green building rating system credits:
 - *LEED-NC* and *LEED-CI* EQ Credits 3.2 and 4.1, and ID Credit 1.1-1.4
 - *LEED for Schools* EQ Credits 3.2 and 4, and ID Credit 1.1-1.4
 - *LEED for Homes* MR Credit 2.2 *Environmentally Preferable Materials*
 - *LEED Core & Shell* EQ Credit 4.1 and ID Credit 1.1-1.4
 - *LEED-EB* MR Credit 3
 - *CHPS®* (*Collaborative for High Performance Schools*) EQ Credit 2.2
 - *Green Guide for Health Care* EQ Credit 4.1
 - *NAHB Model Green Home Bldg Guidelines – Sect 7, Global Impact 7.1.3*

REGULATORY COMPLIANCE

- SCAQMD (South Coast Air Quality Management District), Rule 1168
- California Air District Regulations
- Ozone Transport Commission (OTC) model Rule for Adhesives & Sealants



REFERENCES/RESOURCES

- The Alliance for the Polyurethanes Industry, 1300 Wilson Boulevard, Arlington, VA 22209.
Websites: www.polyurethane.org, www.plastics.org
- SDS for F6400LVR is available from company website: www.Holcimmiracle.com
or contact your Customer Service Representative.
- Product Data Bulletin for F6400LVR Adhesive System Adhesive, available from company website:
www.Holcimmiracle.com or contact your Customer Service Representative.
- Return Net System for proper recycling of empty totes, company website: www.returnnetsystem.com

APPENDIX 1

Bead Size Vs Area of Coverage

The information contained in this section is current as of the manual release date.

Please contact *Holcim Sales Rep* to ensure you have the most up to date information.

Holcim Solutions and Products US LLC

BEAD SIZE vs. AREA OF COVERAGE

(F6400LVR Expanding Single Component Urethane Adhesive)

2 Bead Application

<u>Framing Size</u>	<u>Bead Size</u>	<u>Coverage</u>	<u>Coverage Width</u>
1" x 3"	1/32"	80%	3/4"
1" x 3"	1/16"	100%	3/4"
2" x 3"	1/16"	80%	1 1/2"
2" x 3"	1/8"	100%	1 1/2"

1 Bead Application

<u>Framing Size</u>	<u>Bead Size</u>	<u>Coverage</u>	<u>Coverage Width</u>
1" x 3"	1/16"	80%	3/4"
1" x 3"	1/8"	100%	3/4"
2" x 3"	1/8"	80%	1 1/2"
2" x 3"	1/4"	100%	1 1/2"

Note: The boards must not be warped to achieve the area of coverage with the stated bead sizes.