



**CITY OF NOVI CITY COUNCIL
NOVEMBER 14, 2022**

SUBJECT: Consideration of approval to award Garland/DBS, Inc. \$562,480 for the roof restoration at the City of Novi Ice Arena using competitively bid contracts through Master Intergovernmental Cooperative Purchasing Agreements and Omnia Partners Public Sector Agreements.

SUBMITTING DEPARTMENT: Integrated Solutions – Facilities Division

EXPENDITURE REQUIRED	\$562,480
AMOUNT BUDGETED	\$875,000
APPROPRIATION REQUIRED	\$0
LINE ITEM NUMBER	590-000.00-969.046

BACKGROUND INFORMATION:

The original design at the Novi Ice Arena incorporates a metal roof system with a lower initial cost but higher maintenance and shorter life cycles than other designs. Flashing failure, sealant failure, gutter damage, and surface corrosion were all noted during inspections dating back as far as 2018. Repairs have been made on several occasions to alleviate active roof leaks in this building since 2016. The proposed restoration will remove the compromised components, rust-proof, and seal from leaks with a polyurethane. This coating will go over the existing metal roof to protect it and extend the current life of the roof another 10-15 years.

RECOMMENDED ACTION: Approval to award Garland/DBS, Inc. \$562,480 for the roof restoration at the City of Novi Ice Arena using competitively bid contracts through Master Intergovernmental Cooperative Purchasing Agreements and Omnia Partners Public Sector Agreements.



Garland/DBS, Inc.
3800 East 91st Street
Cleveland, OH 44105
Phone: (800) 762-8225
Fax: (216) 883-2055



ROOFING MATERIAL AND SERVICES PROPOSAL

City of Novi
Novi Ice Arena
42400 Nick Lidstrom Dr
Novi, MI 48375

Date Submitted: 11/01/2022
Proposal #: 25-MI-220936
MICPA # PW1925

Purchase orders to be made out to: Garland/DBS, Inc.

Please Note: The following budget/estimate is being provided according to the pricing established under the Master Intergovernmental Cooperative Purchasing Agreement (MICPA) with Racine County, WI and OMNIA Partners, Public Sector (U.S. Communities). The line item pricing breakdown from Attachment C: Bid Form should be viewed as the maximum price an agency will be charged under the agreement. Garland/DBS, Inc. administered an informal competitive process for obtaining quotes for the project with the hopes of providing a lower market-adjusted price whenever possible.

Scope of Work: Option 1 - Main Roof Restoration (CPR System)

1. Remove existing compromised sealant from roof top penetrations and seams.
2. Install new rubber pipe boots at soil / heat stacks.
3. Remove and replace damaged, loose or missing fasteners with new stainless steel gasketed fastener of larger diameter.
4. Roof surface and flashings to be cleaned using power washer (2000 psi) and 10% Simple Green solution. Soft bristle broom to be utilized to remove debris and scale from rooftop surface where necessary.
5. Prime entire roof surface with Rust-Go Primer at 0.25 gal./ 100 sq. ft. to promote prior adhesion.
6. Apply sealant dab over all exposed fastener heads prior to coating application.
7. Round corners of self-adhered seam tape prior to installation. Apply self-adhered reinforcement seam tape to rake, ridge and eaves. Roll seam tape into placelimiting areas of tenting over fasteners where possible. Utilize a steel roller to ensure proper adhesion.
8. Apply Cool-Sil BG (Brush Grade) at a rate of 2.0 gallons per square over all seam-tape reinforcement areas.
9. Apply Cool-Sil base coat to entire roof surface at specified rate of 1.5 gallons per square. Allow 24 hours to properly cure, no more than 72 hours.

22.06	MULTIPLIER - ROOF OR WALLS HAVE LARGE AMOUNT OF PENETRATIONS / ROOF TOP OBSTRUCTIONS Multiplier is applied when labor production is effected a large number of roof penetrations, a limited amount of open roof areas or low overhead clearance requiring more hand work. Situations include, but are not limited to rooftop penetrations like: soil stacks, sky lights, roof drains, exhaust vents, HVAC equipment, etc. or rooftop obstructions such as: pipes, duct work, electrical wires, hoses or raised equipment, etc.	35	\$ 369,458	%	\$ 129,310
22.23	MULTIPLIER - ROOF SIZE IS GREATER THAN 50,000 SF, BUT LESS THAN 100,000 SF Multiplier is applied when Roof Size is greater than 50,000 SF, but less than 100,000 SF. Situation creates the fixed costs: equipment, mobilization, demobilization, disposal, & set-up labor to be allocated across a large roof area resulting in fixed costs being a small impact on the overall job costs	-5	\$ 369,458	%	\$ (18,473)
Total After Multipliers					\$ 572,659

Option 1 - Main Roof Restoration (CPR System):

Total Maximum Price of Line Items under the MICPA: \$ 572,659

Proposal Price Based Upon Market Experience: \$ 562,480

Garland/DBS Price Based Upon Local Market Competition:

Schena Roofing & Sheet Metal	\$ 562,480
Royal Roofing	\$ 652,420
Lutz Roofing	\$ 712,189

Scope of Work: Option 2 - Main Roof Fluid-Applied Membrane (LiquiTec System)

1. Remove existing compromised sealant from roof top penetrations and seams.
2. Install new rubber pipe boots at soil / heat stacks.
3. Remove and replace damaged, loose or missing fasteners with new stainless steel gasketed fastener of larger diameter.
4. Roof surface and flashings to be cleaned using power washer (2000 psi) and 10% Simple Green solution. Soft bristle broom to be utilized to remove debris and scale from rooftop surface where necessary.
5. Prime entire roof surface with Rust-Go Primer at 0.25 gal./ 100 sq. ft. to promote prior adhesion.
6. Apply sealant dab over all exposed fastener heads prior to coating application.
7. Round corners of self-adhered seam tape prior to installation. Apply self-adhered reinforcement seam tape to rake, ridge and eaves. Roll seam tape into placelimiting areas of tenting over fasteners where possible. Utilize a steel roller to ensure proper adhesion.
8. Apply LiquiTec Base at a rate of 1.0 gallons per square over all seam-tape reinforcement areas. Allow to cure prior to base and top coat of field application.

22.06	MULTIPLIER - ROOF OR WALLS HAVE LARGE AMOUNT OF PENETRATIONS / ROOF TOP OBSTRUCTIONS Multiplier is applied when labor production is effected a large number of roof penetrations, a limited amount of open roof areas or low overhead clearance requiring more hand work. Situations include, but are not limited to rooftop penetrations like: soil stacks, sky lights, roof drains, exhaust vents, HVAC equipment, etc. or rooftop obstructions such as: pipes, duct work, electrical wires, hoses or raised equipment, etc.	35	\$ 519,566	%	\$ 181,848
22.23	MULTIPLIER - ROOF SIZE IS GREATER THAN 50,000 SF, BUT LESS THAN 100,000 SF Multiplier is applied when Roof Size is greater than 50,000 SF, but less than 100,000 SF. Situation creates the fixed costs: equipment, mobilization, demobilization, disposal, & set-up labor to be allocated across a large roof area resulting in fixed costs being a small impact on the overall job costs	-5	\$ 519,566	%	\$ (25,978)
Total After Multipliers					\$ 805,327

Option 2 - Main Roof Restoration (LiquiTec System):

Total Maximum Price of Line Items under the MICPA: \$ 805,327

Proposal Price Based Upon Market Experience: \$ 796,764

Garland/DBS Price Based Upon Local Market Competition:

Schena Roofing & Sheet Metal \$ 796,764

Royal Roofing \$ 821,262

Lutz Roofing \$ 1,083,701

Potential issues that could arise during the construction phase of the project will be addressed via unit pricing for additional work beyond the scope of the specifications. This could range anywhere from wet insulation, to the replacement of deteriorated wood nailers.

Please Note – The construction industry is experiencing unprecedented global pricing and availability pressures for many key building components. Specifically, the roofing industry is currently experiencing long lead times and significant price increases with roofing insulation and roofing fasteners. Therefore, this proposal can only be held for 30 days. DBS greatly values your business, and we are working diligently with our long-term suppliers to minimize price increases and project delays which could effect your project. Thank you for your understanding and cooperation.

ROOF REPLACEMENT SPECIFICATIONS

ROOF PROJECT 2022/23

Novi Ice Arena Roof Restoration

Note:

Site Meeting: **Thursday, Oct. 6th, 2022 @ 10AM**
Novi Ice Arena
42400 Nick Lidstrom Dr.
Novi, MI 48375

Quotes Due: **Friday, Oct. 14th, 2022 @ 5PM**
Novi Ice Arena
42400 Nick Lidstrom Dr.
Novi, MI 48375

Electronic Quotations will be accepted by:

DBSBids@Garlandind.com

SECTION 00 10 00 .001

SUMMARY OF WORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Attached SUMMARY OF WORK, INTENT OF THE SPECIFICATIONS, PROTECTION, HOUSEKEEPING, forms a component part of this section.

1.2 SUMMARY OF WORK: **City of Novi – Ice Arena – Main Roof Restoration**

- A. Remove existing compromised sealant from roof top penetrations and seams.
- B. Install new rubber pipe boots at soil / heat stacks.
- C. Remove and replace damaged, loose or missing fasteners with new stainless steel gasketed fastener of larger diameter.
- D. Roof surface and flashings to be cleaned using power washer (2000 psi) and 10% Simple Green solution. Soft bristle broom to be utilized to remove debris and scale from rooftop surface where necessary.
- E. Wipe existing metal surface with MEK prior to application.
- F. Prime entire roof surface with Rust-Go Primer at 0.25 gal./ 100 sq. ft. to promote prior adhesion.
- G. Apply sealant dab over all exposed fasteners.
- H. Apply self-adhered reinforcement seam tape to all field seams, rake, ridge and eaves. Roll seam tape into place limiting areas of tenting over fasteners where possible. Utilize a steel roller to ensure proper adhesion.
- I. Apply polyurea 2-part base coat to entire roof surface at specified rate of 1.5 gallons per square. Allow 24 hours to properly cure.
- J. Apply polyurea 2-part top coat over all areas of roof at specified rate of 1.0 gallons per square.
- K. All Sections: Clean up all debris and/or damage done to grounds, building and roof top (if any).
Contractor is responsible for any clean up and cost accrued.
- L. Contractor to provide a written (2) year workmanship warranty to manufacturer. The manufacturer is to provide a warranty coverage directly to the owner.

1.3 INTENT OF THE SPECIFICATIONS

A. The intent of these specifications is to describe the material and methods of construction required for the performance of the work. In general, it is intended that the drawings shall delineate the detailed extent of the work. When there is a discrepancy between drawings, referenced specifications, and standards and this specification, this specification shall govern.

1.4 PROTECTION

A. The contractor shall use every available precaution to provide for the safety of the property owner, visitors to the site, and all connected with the work under the Contract.

B. All existing facilities both above and below ground shall be protected and maintained free of damage. Existing facilities shall remain operating during the period of construction unless otherwise permitted. All access roadways must remain open to traffic unless otherwise permitted.

C. Barricades shall be erected to fence off all construction areas from operations personnel.

D. Safety Requirements:

1. All application, material handling, and associated equipment shall conform to and be operated in conformance with OSHA safety requirements.

2. Comply with federal, state, and local and owner fire and safety requirements.

3. Advise owner whenever work is expected to be hazardous to owner employees and/or operations.

4. Maintain a crewman as a floor guard whenever roof decking is being repaired or replaced and whenever any roofing is being removed.

5. Maintain proper fire extinguisher within easy access whenever power tools, roofing kettles, and torches are being used. A MINIMUM OF A 2 HOUR FIRE WATER SHALL BE STRICTLY ADHERED TO WHENEVER PROPANE TORCHES ARE IN USE.

6. ALL SAFETY REQUIREMENTS OF THE BUILDING OWNER MUST BE FOLLOWED. NO EXCEPTIONS WILL BE PERMITTED. SAFETY ORIENTATION MEETING REQUIRED PRIOR TO PERFORMING ANY WORK.

1.5 HOUSEKEEPING

A. Keep materials neat and orderly.

B. Remove scrap, waste and debris from the project area.

C. Maintenance of clean conditions while work is in progress and cleanup when work is completed shall be in strict accordance with the "General Conditions" of this contract.

D. Fire protection during construction.

E. Follow all requirements established by the building owner.

END OF SECTION



CITY OF NOVI



REVISION:



SHEET: 1 OF 1

DATE: 2022

SECTION

Ice Arena

JOB NUMBER:

DWG BY:

CHK BY:



THE GARLAND COMPANY INC.
 3800 E. 91st St. Cleveland, OH
 PHONE (800) 321-9336 / FAX (216) 641-0633

SECTION 00 72 00

GENERAL CONDITIONS

PART 1 GENERAL

1.1 DEFINITIONS

- A. The contract document consists of the AGREEMENT, the GENERAL CONDITIONS of the contract, the DRAWINGS and the SPECIFICATIONS, including all revisions hereto.
- B. The Owner, the Contractor and the Owner's Representative shall be indicated as such throughout these documents. The term Contractor as used herein shall designate the successful bidder to whom the roof contract is awarded.
- C. The term Owner shall be understood to be City of Novi.
- D. The term Owner's Representative shall be understood to mean the representative of the primary material manufacturer.

1.2 OWNER'S REPRESENTATIVE STATUS

- A. The Owner's Representative shall have general Rights of Inspection of the work and is the agent of the Owner in all matters pertaining to the work as provided in the Contract Documents. The Owner's Representative has the authority to stop work whenever such stoppage may be necessary to ensure the proper execution of the contract and shall have authority to reject any and all materials, whether worked or unworked, if such materials are not in accordance with the plans and specifications.

1.3 CONDITION OF SITE

- A. The bidders shall visit the site before submitting their bids and determine the field conditions affecting their work. In considering the bids, the Owner will assume that the bidders are aware of all items, pertinent to their work and have made allowance for same in their bids.

1.4 VERIFICATION OF DIMENSIONS AND ELEVATIONS

- A. Dimensions and elevations indicated on the drawings in reference to existing structures or utilities are the best available data but are not guaranteed by the Owner's Representative and the Owner's Representative will not be responsible for their accuracy. Before bidding on any paperwork dependent upon the data involved, the Contractor shall field check and verify all dimensions, grades, lines, levels or other conditions of limitations at the site to avoid construction errors. If any work is performed by the Contractor or any of his/her subcontractors prior to adequate verification or applicable data, any resultant extra cost for adjustment of work as required to conform to existing limitations, shall be assumed by the Contractor without reimbursement or compensation by the Owner.

1.5 PROTECTION OF OWNER'S OPERATIONS

- A. The Contractor shall erect such barriers, tarpaulins, doors, etc., as may be necessary to protect the Owner's operations while work is in progress. Any such openings that are essential to carrying on the work shall be securely closed by the Contractor when not in use to protect the Owner's operations.

1.6 PROTECTION OF WORK AND PROPERTY

- A. The Contractor shall maintain adequate protection of all his/her work from damage and shall protect the Owner's and adjacent property from injury or loss arising from this contract. He/she shall provide and maintain at all times any danger signs, guards and/or obstructions necessary to protect the public and his/her workmen from any dangers inherent with or created by the work in progress. He/she shall hold the Owner harmless from any loss arising due to injury or accident to the public or his/her workmen, or from theft of materials stored at the job site. All materials will be stored in locations other than on roof surfaces except as necessary and shall then be placed on plywood or other type of material to protect the roof surface at all times.
- B. Before starting any work, the Contractor shall protect all grounds, copings, paving and exterior of all buildings where work will be performed.
- C. In those areas where materials and/or hot asphalt will be raised to the roof area, a protective covering shall be placed from the base of the wall extending up and over the top edge of the roof. This coverage shall be wide enough to assure that the exterior walls do not become stained or soiled during roofing operations.
- D. Any areas of the building or grounds which have become stained or damaged in any way shall be repaired or replaced by the Contractor prior to the final inspections. The method of repair used must be acceptable to both the Owner and the Owner's Representative.

1.7 MATERIAL STORAGE AND CLEAN-UP

- A. The Contractor shall keep the premises free from rubbish at all times and shall arrange his/her material storage so as not to interfere with the Owner's operations. At the completion of the job, all the unused material and rubbish shall be removed from the site. The ground shall be raked clean and the building shall be broom cleaned. If the Contractor refuses at any time to remove his/her debris from the premises, or to keep the working area clean, such cleaning will be completed by the Owner and deducted from the balance due the Contractor.
- B. The Contractor shall also remove drippage of bitumen or adhesive from all walls, windows, floors, ladders and finished surfaces. Failure to do so will result in the work being done by others and the cost shall be deducted from the balance due the Contractor.
- C. Materials must be delivered with manufacturer's label in tact and legible. Labels must be affixed to the outside of the package stating the type of product, name and address of the manufacturer. All materials shall be stored and protected against weather, vandalism, and theft. Any materials found to be damaged or missing shall be replaced by the Contractor at no cost to the Owner.

1.8 INSPECTION OF WORK

- A. Where the drawings or specifications require the inspection and approval of any work in progress by the Owner's Representative, the Contractor shall give that Representative ample notice to allow for scheduling the inspection, which shall be made promptly to avoid delay of work. If work has progressed without the required inspections or approval by the Representative, it shall be uncovered for inspection at the Contractor's expense.
- B. Uncovering of work not originally inspected, or uncovering questioned work may be ordered by the Owner's Representative and it shall be done by the Contractor. If examination proves such work to be incorrectly done or not done in accordance with the plans and specifications, the Contractor shall bear all cost of the reexamination. If the work is proven correctly installed, all such expense shall be borne by the Owner.

1.9 INSPECTION OF WORK IN PROGRESS AND UPON COMPLETION

- A. If directed by the Owner's Representative, the Contractor shall cut not more than four (4) cores, of approximately 200 square inches each, from every newly constructed roof area, in order to establish the amount of materials used per square foot, and shall restore all such areas to sound and watertight conditions as prior to the core testing.
- B. In the event that such core cuts disclose any deficiency in materials, or soundness of construction, the Contractor shall, at his/her own expense, apply additional materials or otherwise correct the deficiencies to the satisfaction of the Owner's Representative.
- C. Noncompliance with the terms of this specification and ensuing contract can result in either the cancellation of the contract, or complete replacement of the defective areas at the Contractor's expense. In the event of cancellation, the Owner will not be obligated to compensate the Contractor for any work undertaken in a defective manner
- D. Damages caused by water infiltration resulting from the failure of the Contractor to secure each day's work in a weather tight manner, will be corrected at the Contractor's expense. Included as damages will be all labor costs incurred by the Owner as a result of such water infiltration.
- E. The Owner will require the Owner's Representative to examine the work in progress, as well as upon completion, in order to ascertain the extent to which the materials and procedures conform to the requirements of these specifications and to the published instructions of the Manufacturer.
- F. The authorized Owner's Representative shall be responsible for:
 - 1. Keeping the Owner informed on a periodic basis as to the progress and quality of the work;
 - 2. Calling to the attention of the Contractor those matters he/she considers to be in violation of the contract requirements;
 - 3. Reporting to the Owner any failure or refusal of the Contractor to correct unacceptable practices;
 - 4. Conducting preliminary and subsequent job-site meetings with the Contractor's official job representative;
 - 5. Supervising the taking of test cuts, and the restoration of such areas;
 - 6. Rendering any other inspection services which the Owner may designate; and

7. Certifying, after completion of the work, the extent to which the Contractor has complied with these specifications as well as to the published instructions of the Manufacturing Company.
- G. The presence and activities of the Owner's Representative shall in no way relieve the Contractor of his/her contractual responsibilities.

1.10 MISCELLANEOUS UTILITIES

- A. Electrical power will be furnished by the Owner for small tools only. All connections to the electrical system will be furnished by the Contractor.
- B. Water for concrete, mortar, washing and drinking purposes will be furnished by the Owner. Any connections to the water system shall be completed by the Contractor.
- C. At the completion of the work, or when the above connections are no longer required, the Contractor shall remove all connections and leave the facilities in a condition at least as satisfactory as prior to the commencement of his/her work.
- D. Toilet facilities will be provided by the Contractor. The Contractor will be responsible for supplying a portable toilet on the job-site. The Contractor's personnel are not permitted to enter the building without proper authorization from the Owner or Owner's Representative.

1.11 CHANGES OR EXTRA WORK

- A. The Owner may, without invalidating the original contract, order such changes or additions as may from time to time be deemed desirable. In so doing, the contract price shall be adjusted, as stated below, with all work being done under the conditions of the original contract except for such adjustments in extension of time as may be acceptable to the Owner. The value of such extra work shall be determined in one of the following ways:
 1. By firm adjustment;
 2. By cost plus with a guaranteed maximum;
 3. By cost with a fixed fee; or
 4. By unit cost.
- B. If agreement is reached that the extra cost shall be handled as per methods 2, 3, or 4, the Contractor shall keep and compile a correct amount of the cost together with such vouchers, etc., as may be necessary to substantiate same for presentation to the Owner. The Owner's Representative shall have authority to make minor job changes or additions as may be necessary to expedite the job providing such changes do not involve additional material cost. No major change or addition shall be made except upon receipt by the Contractor of a signed order from the Owner authorizing such a change. No claims for an extra to the contract price shall be valid unless so authorized.
- C. All work covered by unit prices submitted by the Contractor in his/her proposal must be covered by a written work order. The Owner's Representative will prepare the work order in triplicate covering the quantity of work and the total cost of the work. The work order which will be written at the end of each day, will be signed by the Owner's Representative and the Contractor's foreman and/or superintendent.

1.12 CORRECTION OF WORK PRIOR TO FINAL PAYMENT

- A. The Contractor shall promptly remove any work that does not meet the requirements of the plans and specifications or is incorrectly installed or otherwise disapproved by the Owner or the Owner's Representative as failing to meet the intent of the plans and specifications. The Contractor shall promptly replace any such work without expense to the Owner and shall bear the cost of making good all work of other contractors, or the Owner, destroyed or damaged by such removal or replacement.

1.13 CORRECTION OF WORK AFTER FINAL PAYMENT

- A. The Contractor shall guarantee all materials and workmanship for two (2) years from date of final payment of the contract by the Owner. Any defects which may arise during this period shall be promptly repaired by the Contractor including any damage done to the Owner's property due to such defects.

1.14 DEDUCTION FOR UNCORRECTED WORK

- A. If the Owner deems it unacceptable to have the Contractor correct work which has been incorrectly done, a deduction from the contract price shall be agreed upon therefore. Such a deduction from the contract price shall in no way affect the Contractor's responsibility for defects which may occur nor his/her ability for correcting them, and damage caused by them.

1.15 LIENS

- A. The Contractor shall, if required by the Owner, furnish him/her with a release in full of all liens arising out of this contract or in lieu thereof, and receipts in full for all materials and labor on the job. In either case, the Contractor shall furnish an affidavit that the liens or receipts include all the labor and material for which a lien could be filed. In lieu of the above, the Contractor may at his/her option furnish a bond to indemnify the Owner against all hazard of liens. Neither part nor final payment shall in any way release the Contractor from the above obligation and in the event that part or full payment has been made and any lien remains undischarged, the Contractor shall refund to the Owner the necessary funds to discharge such a lien including all cost and attorney's fees.

1.16 JOB CONDITIONS

- A. All surfaces to be covered shall be smooth, dry, and free from dirt, debris, and foreign material before any of this work is installed. Pumping equipment shall be located on the ground at a safe distance from building; the location being subject to the approval of the Owner. The Contractor shall be responsible for guarding against fires, and shall provide suitable fire extinguishers conveniently located at the site. Competent operators shall be in attendance at all times equipment is in use. Materials shall be stored neatly in areas designated by the Owner and dispersed so as to present a minimum fire hazard. Loads placed on the roof at any point shall not exceed the safe load for which the roof is designed.
- B. There is NO SMOKING allowed inside any buildings and the Contractor shall be responsible for enforcement of this job rule at all times with his/her personnel.
- C. The Contractor should be aware of Owner's property when tearing off the existing roof. This is required for removal of dirt, silt, debris, roof membrane and insulation from the roof surface in order to preserve the ecology, eliminate unsightly conditions and protect building faces. Specific locations will be discussed at the pre bid conference.

- D. Rolled Roofing Materials: All rolled roofing materials must be stored standing on end on a pallet or otherwise raised off of the roof. The materials are to be covered in a proper manner to assure that they will not become wet prior to application. Any materials that become wet or damaged must be removed from the job-site and replaced at the Contractor's expense.
- E. Asphalt Kettle: Placement of the kettle shall be in a position so as not to interfere with the ongoing operations of the Owner. The asphalt to be used must be placed on a protective covering of some type until it is raised to the roof. A minimum of two (2) fire extinguishers and "Fire Out" must be adjacent to the kettle.
- F. Ladders: Any ladders used on this project must be in good condition. The ladder must also be secured at the roof line at all times while in use. All ladders must be O.S.H.A. approved.
- G. No drugs or alcoholic beverages are permitted on the grounds.
- H. The Contractor shall place necessary barriers and/or protection around or under all work areas where his/her operations involve risk of injury to plant.
- I. The Contractor will also protect the building structure from damage in the process of the job. In the event that damage does occur to any property or equipment, or the Owner's work in process, notification must be made within two (2) working days of the incidents to the Owner and Owner's Representative.
- J. During the progress of the job, if waste material and rubbish are found or damage resulting from the Contractor's operations is found, or the Contractor does not comply with the requirement by keeping the premises free of accumulations and correct the damage, it shall be the Owner's prerogative to hire personnel to do so; and the cost of this work will be deducted from the balance due the Contractor.
- K. Existing roof top equipment walls, windows, etc. shall be completely protected by masking or other effective methods. Any mastics or asphalt must be cleaned off metal surfaces.
- L. The Contractor is responsible for protecting all materials from the elements. If any material, such as insulation, becomes wet, it cannot be installed and must be replaced at the Contractor's expense. NOTE: Insulation and rolled roofing materials must be covered with waterproof tarps at the end of each work day. Plastic wrappers supplied by the insulation manufacturer are not acceptable substitutes for tarps. The Owner's Representative will reject any covering method material which does not adequately protect roofing materials.
- M. Anyone guilty of willful destruction or unlawful removal of company property will be dismissed from the job and is subject to prosecution by law.
- N. Any lawns damaged by Contractor vehicles will be restored with a stand of grass at the Contractor's expense. Any damaged pavements will likewise be restored at the Contractor's expense.
- O. The Contractor must verify that all materials can be installed to accommodate the building design, pertinent codes and regulations, and the manufacturer's current recommendations.
- P. The Contractor will ensure that all substances are clean, dry, sound, smooth, and free of dirt, debris, and other contamination before any materials are supplied.

- Q. Any isolated areas that must be torn off and replaced will be built-up to the height of the existing roof prior to the installation of the new roofing membrane system.

1.17 WORKMANSHIP

- A. All materials will be securely fastened and placed in a watertight, neat and workmanlike manner. All workmen shall be thoroughly experienced in the particular class or work upon which they are employed. All work shall be done in accordance with these specifications and shall meet the approval of the Owner or Owner's Representative. The Contractor's representative or job supervisor shall have a complete copy of specifications and drawings on the job-site at all times.
- B. Contractor shall plan and conduct the operations of the work so that each section started on one day is complete and thoroughly protected before the close of work for that day.

1.18 INSULATION

- A. Insulation shall have accurate dimensional stability so as to properly conform to the surfaces of the roof, cants, curbs, pipes, etc. Joints between boards shall be tight and insulation shall be held back ½" from vertical surfaces and sumps. Insulation shall be protected from the weather at all times. No more insulation shall be laid than can be completely covered with roof materials on the same day. A base sheet shall not be considered as a proper weather barrier.
- B. Insulation that becomes wet during or after installation shall be removed and replaced with dry insulation. If roofing is in place, the roofing shall be also replaced. All replacing work shall be done at no added cost to the Owner.

1.19 ROOF DECK

- A. Contractor shall notify the Owner or Owner's Representative of any unforeseen areas of wet insulation. Where the damage is serious and extensive, it will be the Owner's prerogative to authorize removal and replacement of deteriorated roofing, insulation and repair of the vapor barrier, if present. Where damage to the roof deck is found, the Contractor shall furnish the Owner with a unit price for removal and replacement of the damaged deck.

1.20 SAFETY

- A. Contractor shall conform to requirements as designated by the United States Federal Government (O.S.H.A.). Contractor shall abide by all regulations as outlined in the O.S.H.A. handbook and shall have a handbook on location at all times.
- B. Contractors hereby acknowledged that they and their workers have undergone Safety Training and shall at all times act in compliance with all NRCA recommended safety compliance rules and regulations.

1.21 INSURANCE

- A. The following standard indemnity agreement and minimum insurance requirements are incorporated in the Specifications for all work performed by Contractors for the

Owner, its affiliated and associated organizations or subsidiaries, hereinafter referred to as Owner.

1. THE CONTRACTOR AGREES TO INDEMNITY AND SAVE THE OWNER AND OWNER'S REPRESENTATIVE HARMLESS FROM AND AGAINST ANY AND ALL COSTS, LOSS AND EXPENSE, LIABILITY DAMAGES, OR CLAIMS FOR DAMAGES, INCLUDING COST FOR DEFENDING ANY ACTION, ON ACCOUNT OF ANY INJURY TO PERSONS (INCLUDING DEATH) OR DAMAGE TO OR DESTRUCTION OF PROPERTY OF THE OWNER, ARISING OR RESULTING FROM THE WORK PROVIDED FOR OR PERFORMED, OR FROM ANY ACT, OMISSION, OR NEGLIGENCE OF THE CONTRACTOR, SUBCONTRACTOR AND THEIR AGENTS OR EMPLOYEES. THE FOREGOING PROVISIONS SHALL IN NO WAY BE DEEMED RELEASED, WAIVED OR MODIFIED IN ANY RESPECT BY REASON OF ANY INSURANCE OR SURETY PROVIDED BY THE CONTRACTOR.
2. All sub-contractors are required to file Certificated of Insurance properly completed and signed by an authorized insurance company representative before their work commences on the job or job site. No monies will be paid until the acceptable certificates are on file with the Contractor. Such certificates shall provide that there will be no cancellation, reduction or modification of coverage without thirty (30) days prior written notice to the Contractor. In the event such certificates are not provided to the Contractor prior commencement of work, Contractor's failure to demand such certificates shall not be deemed a waiver of Subcontractor's requirement to obtain the subject insurance.
3. The Contractor shall provide and maintain standard fire, extended coverage perils, vandalism and malicious mischief insurance to protect the interest of both the Contractor and the Owner for materials brought into the job or stored on the premises. Such insurance shall be for 100% of the insurable value of the work to be performed including all items of labor and materials incorporated therein, materials stored at the job-site to be used in completing the work, and such other supplies and equipment incidental to the work as are not owned or rented by the Contractor, the cost of which are included in the direct cost of the work. This insurance shall not cover any tools, derricks, machinery, tar buckets, ladders, engines, workmen's quarters, boilers, pumps, wagons, scaffolds, forms, compressors, shanties, or other items owned or rented by the Contractor, the cost of which is not included in the direct cost of the work.
4. In accordance with Section (1.21), the Contractor and subcontractor(s) shall maintain the following insurance:
 - a. Workmen's Compensation and Employer's Liability Insurance affording:
 - 1) Protection under the Workmen's Compensation Law of the States in which the work is performed; and
 - 2) Employer's Liability protection subject to a minimum limit of \$100,000.
 - b. Comprehensive General Liability Insurance in amounts not less than:
 - 1) Personal Injury: \$1,000,000 per person (including bodily injury) \$1,000,000 per occurrence
 - 2) Property Damage: \$1,000,000 per occurrence
 - c. Comprehensive Automobile Liability Insurance in the following minimum amounts:
 - 1) Bodily Injury \$1,000,000 per person \$1,000,000 per occurrence
 - 2) Property Damage \$1,000,000 per occurrence
 - d. This insurance shall:

- 1) Include coverage for the liability assumed by the Contractor under this section (section 1.21.A.1) (Indemnity);
- 2) Includes coverage for:
 - a) Premises, operations and mobile equipment liability
 - b) Completed operations and products liability
 - c) Contractual liability insuring the obligation assumed by the subcontractor in this agreement.
 - d) Liability which subcontractor may incur as a result of the operations, acts or omissions of subcontractors, suppliers or material men and their agents or employees; and
 - e) Automobile liability including owned, non-owned and hired automobile.
- e. All coverage will be on an occurrence basis and on a form acceptable to the Contractor.
 - 1) Include completed operation coverage which is to be kept in force by the Contractor for a period of not less than one year after completion of the work provided for or performed under these specifications;
 - 2) Not be subject to any of the special property damage liability exclusions commonly referred to as the exclusions pertaining to blasting or explosion, collapse or structural damage and underground property;
 - 3) Not be subject to any exclusion of property used by the insured or property in the case, custody or control of the insured or property as to which the insured for any purpose is exercising physical control; and
 - 4) The Certificate of Insurance furnished by the Contractor shall show specific reference that each of the foregoing items have been provided for.
5. The Certificates of Insurance furnished by the Contractor as evidence of the Insurance maintained by him shall include a clause obligating the Insurer to give the Owner thirty (30) days prior written notice or cancellation of any material change in the insurance.

1.22 WORK HOURS AND DAYS

- A. When the Contract is awarded, the Contractor will contact the Owner's Representative to arrange the work schedule and the hours of the day that the workmen may be on the building. The job is to be bid under the assumption that all work will be performed on a straight time basis.

1.23 COMPLIANCE WITH LAWS

- A. The Contractor shall give notices, pay all fees, permits and comply with all laws, ordinances, rules and regulations bearing on the conduct of work.

1.24 OWNER'S RULES

- A. The Contractor and all his/her personnel/agent(s) shall abide by all rules created by the Owner. The Contractor must contact the Owner's Representative for specific information regarding the rules governing all operations of the project.
- B. The Contractor shall properly notify all employees of conditions relating to roof areas with very poor condition and which will be worked on. After such notification, the

Contractor must take all necessary precautions to ensure the safety of his/her employees as well as the building personnel.

- C. THE CONTRACTOR SHALL "HOLD HARMLESS" THE MATERIAL MANUFACTURER, AGAINST ANY LITIGATION ARISING FROM ANY ACCIDENTS DURING THE COURSE OF THE CONTRACT.

1.25 SAFETY AND ECOLOGY

- A. The Contractor(s) shall conform to the requirements as designated by the United States Federal Governments (e.g., O.S.H.A).

1.26 ANTI-DISCRIMINATION IN EMPLOYMENT

- A. Contractors and subcontractors shall not discriminate against any employees or applicant for employment, to be employed in performance of his/her contract, with respect to his/her hire, tenure, terms, conditions or privileges of employment because of his/her race, color, gender, sexual preference, religion, national origin, or ancestry.

PART 2 INSTRUCTIONS TO BIDDERS

2.1 WITHDRAWAL OR MODIFICATION OF BID

- A. Any Bidder may withdraw his/her bid at any time before the scheduled closing date of the bid by appearing in person or by sending an authorized representative of the Bidder. An appointment should first be scheduled by calling the Owner's Representative. The Bidder or his/her representative shall be asked to sign, in writing that the bid was returned to him/her/ after the withdrawal from the contract, the Bidding Contractor may not resubmit them.

2.2 BID OPENINGS

- A. Bids will be opened publicly and read aloud at the published date and time. Notice of award will be made by written correspondence.

2.3 QUESTIONS

- A. Technical questions regarding this bid can be directed to: [Fill in the same of the contact]
- B. If the Contractor feels a conflict exists between what is considered good roofing practice and these specifications, he/she shall state in writing all objections prior to submitting quotations.
- C. It is the Contractor's responsibility, during the course of the work, to bring to the attention of the Owner's Representative any defective membrane, insulation or deck discovered which has not been previously identified.

2.4 RESPONSIBILITY FOR MEASUREMENTS AND QUANTITIES

- A. The Bidding Contractors shall be solely responsible for all accuracy of all measurements and for estimating the material required to satisfy these specifications.

2.5 DISCREPANCIES AND ADDENDA

- A. Should a Bidder find any discrepancies in the Drawings and Specifications, or should he be in doubt as to their meaning, he/she shall notify the Owner's Representative at once, who will send a written Addendum to all Bidders concerned. Oral instructions or decisions, unless confirmed by Addenda, will not be considered valid, legal or binding.
- B. No extras will be authorized because of the Contractor's failure to include work called for in the Addenda in his/her bid.
- C. It shall be the responsibility of all Bidders to call to the Owner's Representative's attention at the pre bid meeting, any discrepancies which may exist between or with any of the contract documents, or any questions which may arise as to their true meaning.
- D. Modifications to the specifications (if necessary) will be followed by an addendum; no verbal discussions or agreements shall be recognized.

2.6 COMPETENCY OF THE BIDDERS

- A. To enable the Owner to evaluate the competency and financial responsibility of a Contractor, the low Bidder shall, when requested by the Owner, furnish the information indicated in Section 5.0 below, entitled Contractor's Qualification Statement, which shall be sworn to under oath by him/her or by a properly authorized representative of the Bidder.

2.7 DISQUALIFICATION OF BIDDERS

- A. Any one or more of the following causes may be considered sufficient for the disqualification of a Bidder and the rejection of his/her bid(s):
 - 1. Failure to attend the pre bid meeting;
 - 2. Evidence of collusion among Bidders;
 - 3. Lack of responsibility as revealed by either financial, experience or equipment statements, as submitted;
 - 4. Lack of expertise as shown by past work, and judged from the standpoint of workmanship and performance history;
 - 5. Uncompleted work under other contracts which, in the judgment of the Owner, might hinder or prevent the prompt completion of additional work if awarded; or
 - 6. Being in arrears on existing contracts, in litigation with an Owner, or having defaulted on a previous contract.

2.8 NOTICE OF AWARD

- A. The award of this contract for the work is contingent upon receipt of an acceptable bid. Any part of or all bids may be rejected. All bids shall be good for a period of sixty (60) days following the date the bids are due. The contract shall be deemed as having been awarded when the formal notice of acceptance of his/her proposal has been duly served upon the intended awardee by an authorized officer or agent of the Owner.

2.9 WARRANTY

- A. A written warranty which will commence from date of acceptance by Manufacturer must be supplied with the roof installation. This warranty will cover all defects in workmanship and materials. Damages caused by storm, vandalism and other trades are not included in the warranty. This warranty shall be from the manufacturer (See further, Statement of Policy).
- B. A two (s) year workmanship warranty is required from the Contractor for all remedial maintenance done under the terms of this contract.

2.10 START AND COMPLETION DATE

- A. Work shall begin within thirty (30) days from the award of this contract, or as agreed upon by all parties.
- B. All work as required in these specifications and drawings shall be completed within sixty (60) days of the start date, or as agreed upon by the parties.
- C. Unless work is hampered by long period of inclement weather, by due proof of material unavailability, or by strike, the Owner will assess a penalty in the amount of \$300.00 a day for each day beyond the agreed completion date.
- D. The Contractor is responsible for supplying trained workmen in proper numbers and for scheduling and laying out his/her work, so that it will be started and completed in a professional manner within the time period indicated on his/her Proposal form.
- E. If the Contractor sets equipment onto the job-site without commencing work immediately, the action will be considered "Spiking the job" which is unacceptable and will be considered a breach of contract by the Contractor; thereby, the contract will be terminated and the Contractor at no cost to the Owner, must remove his/her equipment and possessions from the job-site upon notification by the Owner.

2.11 PAYMENT

- A. Payment for materials shall only be made after the material has been delivered to the job-site. An invoice for the material must be presented to the Owner for payment. Materials are not to be delivered to the job-site until the project is ready to begin. The Contractor must provide a release of lien from the Material Manufacturer. Subsequent requests for payment can made monthly. Final payment for the project will be made following completion, after final inspection has been made and an invoice presented to the Owner. A 10% retainer shall be held until delivery of the warranty.
- B. When the job in progress is interrupted for two (2) weeks or longer by causes beyond the Contractor's control such as a strike, weather, acts of God, etc., the Owner agrees to pay, upon request of the Contractor, a price equivalent to the percentage of work completed at that time. Regular progress payments shall be made for labor and/or materials.
- C. Each invoice shall be accompanied by a detailed estimate of the amounts and values of labor expended and materials purchased up to the last day of the preceding month. The amount of the invoice shall not exceed ninety percent (90%) of the labor and material values estimated for the preceding month.
- D. Such payments shall be viewed by both parties as progress payments and shall not in any way relieve the Contractor of performance obligations under this contract, nor

shall such payments be viewed as approval or acceptance of work performed under this contract.

- E. Final payment shall be withheld until all provisions of the specifications are met, including all necessary clean-up, and the Owner receives written verification of completion.
- F. Upon completion of the job, the Owner, the Owner's Representative, and the Contractor will make final inspection of the work done, and the Owner's Representative if requested by Owner's Representative.
- G. All payments for material used in the execution of this contract can be made by a check issued jointly, payable to the Contractor and Owner's Representative will sign a completion slip authorizing final payment.
- H. If requested by the Owner and/or Owner's Representative, the Contractor shall provide a Letter of Credit from the bank to secure payment to material supplier.
- I. If requested by the Owner and/or Owner's Representative, a certified check shall be paid by the Contractor to material supplied prior to release of order.
- J. If requested by the Owner and/or Owner's Representative, a certified check shall be paid by the Contractor to material supplier via common carrier upon receipt of delivery.
- K. Contractor shall have a pre-approved line of credit from the material supplier.
- L. Final payment shall be made to the Contractor no later than thirty (30) days after job approval, providing the Contractor submits waivers of lien with his/her final invoice indicating that all suppliers have been paid.

2.12 PERFORMANCE AND PAYMENT BOND

- A. The successful Contractor will be responsible for securing a performance and payment bond from an acceptable bonding company. The cost of the bond will be paid directly by the Contractor. Contractor has to identify his/her bonding company and agent, submitting this documentation with his/her proposal. Note: See "Instruction to Bidders."
- B. Financial documentation prescribed by the Owner to ensure that the Contractor is financially sound and capable of supporting the project to its conclusion.
- C. If the successful Bidder is incorporated, an affidavit authorizing persons to sign for the Corporation. This should be in the form of minutes of the meeting of the Board of Directors, authorizing person or persons to sign for this contract work and indicating a quorum being present.

2.13 TERMINATION BY THE OWNER FOR CAUSE

- A. The Owner may terminate the contract and finish the work by whatever reasonable method he/she deems expedient if the Contractor:
 - 1. Persistently or repeatedly refuses to supply specified materials or to provide enough skilled workers to ensure the project will be completed within the time period indicated on his/her Proposal form;

2. Fails to make payment to sub-contractors and/or suppliers for labor and materials as stipulated in the contract documents; and
 3. Is guilty of substantial breach of a provision of the contract documents.
- B. When the Owner terminates the contract for any of the above reasons, the Contractor shall not be entitled to receive further payment until the work is finished. If the unpaid balance of the contract sum exceeds the cost of finishing the work, it will be paid to the Contractor. If the cost to finish the work exceeds the unpaid balance, the Contractor shall pay the difference to the Owner.

2.14 COMPLIANCE WITH LAWS

- A. The Contractor shall give notices, pay all fees, permits and comply with all laws, ordinances, rules and regulations bearing on the conduct of work.

PART 3 --- CONTRACTOR'S INSTRUCTIONS

3.1 TAXES

- A. Contractor must comply with all state, federal and local taxes. The Contractor shall accept sole and exclusive responsibility for any and all state federal taxes with respect to Social Security, old age benefits, unemployment benefits, withholding taxes and sales taxes.

3.2 CONTRACTOR'S LICENSE

- A. All pertinent state and local licenses will be required.

3.3 QUALIFICATION OF BIDDERS

- A. Provide State of (state here) pre-certification forms.

3.4 BUILDING PERMITS

- A. The acquisition of the applicable permits and associated costs to obtain said permits will be the responsibility of the successful Contractor.

3.5 JOB COORDINATION

- A. Contractor is responsible for daily communication with the Owner or Owner's Representative relating to areas of roof work in order that the Owner may adequately protect tenant's personal belongings, and the people themselves against possible damage or injury. Contractor is also responsible for policing and protecting areas involving removal and replacement of roof projections, defective decking or other work involving deck penetration.
- B. Twenty-four hours prior to starting of the project and/or delivery of materials, the Contractor shall notify the owner.

3.6 CLEAN-UP

- A. Accumulated debris shall be removed periodically to assure maximum safety and sanitation at all times. At completion of work, the Contractor shall remove all excess material and debris from the site and leave all roof surfaces free from accumulations

of dirt, debris and other extraneous materials. The Contractor shall also remove any and all drippage of bituminous materials from the face of the buildings, floor, window, ladders and other finished surfaces.

3.7 SUPERINTENDENT

- A. The Contractor shall keep a competent superintendent, satisfactory to the Owner and Owner's Representative, on the job at all times when work is in progress. The superintendent shall not be changed without notifying the Owner and the Owner's Representative unless the superintendent ceases to be in the employ of the Contractor.
- B. The superintendent shall represent the Contractor in his/her absence and all directions and instructions given to the superintendent shall be as binding as if given directly to the Contractor.
- C. The superintendent shall be responsible for the conduct of all the Contractor's employees on the premises and shall promptly take necessary measures to correct any abuses called to his/her attention by the Owner.

3.8 INSPECTIONS

- A. Before any material applications are made, the Owner or his/her representative and the material supplier representative shall be available to ensure a complete understanding of the specification.
- B. The accepted Material Manufacturer will have a representative on site a minimum of three (3) times a week to verify compliance with the specifications, answer questions that may arise and provide on-going inspection services.
- C. A final inspection shall be conducted by Owner, Contractor, and the Owner's Representative upon being notified of completion of specified work and clean-up.

PART 4 – STATEMENT OF POLICY

4.1 ENGINEERING

- A. In addition to high-quality products, the Material Manufacturer provides recommendations and/or specifications for the proper installation of its material. However, the Material Manufacturer does not, nor does its representative, practice engineering or architecture. The Material Manufacturer makes no judgments on, and hereby disclaim any responsibility for the soundness of any roof deck or other structural component of buildings upon which the Material Manufacturer products are applied, and further recommend a structural engineer to examine the deck conditions. Re-roofing or Ballasted Roofing Systems will require certification from a structural engineer that the structure will support the proposed additional weight.

4.2 GUARANTEES

- A. A roofing guarantee is available for review from the Material manufacturer for the roofing systems published in these specifications. The guarantee will be issued only upon completion of all the guarantee requirements by an approved Contractor. Such guarantees cannot be altered or amended, nor may any other warranties, guarantees or representations be made by an agent or employee of the Material Manufacturer unless such alteration, amendment or additional representation is issued in writing

and is signed by a duly authorized officer of the Material Manufacturer, and sealed with the Material Manufacturer seal. This guarantee does not cover cosmetic deficiencies. THE MATERIAL MANUFACTURER WIL NOT BE RESPONSIBLE FOR ANY DAMAGES TO THE BUILDING OR ITS CONTENTS OR ANY OTHER CONSEQUENTIAL DAMAGES, AND ITS RESPONSIBILITY IS LIMITED TO REPAIRING LEAKS. The Contractor will warranty the roof to the Material Manufacturer for a period of two (2) years. The Contractor will inspect the roof with the Owner's Representative 18 months after completion, and, at the Contractor's expense, correct any workmanship defects before the 24th month following completion of the project.

4.3 APPROVED CONTRACTORS

- A. The roof systems must be applied only by those contractors who have received approval from the Material Manufacturer for such installations. No guarantees will be issued when installation has been performed by a non-approved contractor.

4.4 ROOFING SEQUENCE

- A. Phase roofing is not acceptable. Any insulation or base layers laid in any one day must be covered with the properly installed roof system that same day. Failure to do so will void any warranties and no guarantee will be issued for the roofing system.

4.5 ACCEPTABILITY OF COMPLETED WORK

- A. The acceptability of completed roofing work will be based on its conformance to the contract requirement. The Material Manufacturer is not obligated to accept non-conforming work, and such non-conforming work may be rejected. The rejected work shall be promptly replaced or corrected in a manner and by methods approved by the Material Manufacturer at the Contractor's expense. The Material Manufacturer will instruct the Contractor's foreman and work crew on the proper methods of installation of the roofing system, and will follow-up on a regular basis to inspect the work being done. Any deficiencies from the specified work noted by the Material Manufacturer will be immediately reported to the Owner, along with recommended corrective actions necessary. The Material Manufacturer will not act in a supervisory capacity, and will not be responsible for the Contractor's errors or omissions.

4.6 ENGINEERING AND ROOF DECK

- A. The Material Manufacturer nor its representatives, practice engineering nor architecture. It makes no judgments on, and hereby disclaim any responsibility for the soundness of any roof deck or other structural component of buildings upon which its products are applied. Re-roofing and general building structuring require certification from a structural engineer that the structure will support the proposed additional weight. In addition, the Contractor must notify the Owner or his/her representative on the job-site of any unforeseen areas of wet insulation. Where the damage is serious and extensive, it will be the Owner's prerogative to authorize removal and replacement of deteriorated roofing, insulation and repair of the vapor barrier if present. Where damage to the roof deck is found, the Contractor shall furnish the Owner with a unit price for removal and replacement of the damaged deck.

4.7 ASBESTOS IDENTIFICATION

- A. The Material Manufacturer routinely conducts roof surveys and inspections in order to provide recommendations and/or specifications for the use of its products. However, the MATERIALS MANUFACTURER IS NOT, NOR ARE ITS REPRESENTATIVES, CERTIFIED TO IDENTIFY, HANDLE OR MONITOR ASBESTOS IN ROOFING, DECKING OR INSULATION. THEREFORE, IT MAKES NO JUDGMENTS ON AND HEREBY DISCLAIMS ANY RESPONSIBILITY FOR IDENTIFYING, HANDLING OR MONITORING ASBESTOS. If a building owner suspects that an asbestos condition exists on or under the roof area in question, Material Manufacturer can recommend licensed laboratories and technicians that can identify, remove, dispose of, and monitor the project.

4.8 ASBESTOS LIMITATIONS

- A. The Owner has been informed, acknowledges and agrees that Material Manufacturer is not engaged in the business of identifying, abating, encapsulating or removing asbestos or asbestos containing materials from the work site and has not agreed to do so herein.
- B. IN CONSIDERATION OF THE PROVISION HEREOF, THE OWNER HEREBY AGREES TO INDEMNIFY, DEFEND AND HOLD HARMLESS THE MATERIAL MANUFACTURER, ITS OWNERS, OFFICERS, DIRECTORS, EMPLOYEES AND AGENTS, INCLUDING THE ENGINEER FROM AND AGAINST ANY AND ALL LIABILITIES, DAMAGES, LOSSES AND EXPENSES (INCLUDING BUT NOT LIMITED TO ATTORNEY'S FEES) ARISING OUT OF, OR RELATING TO, ANY CLAIMS, DEMANDS, OR CAUSES OF ACTION OF ANY KIND,, ATTRIBUTABLE TO, ARISING OUT OF, OR RELATING TO THE PRESENCE OF ASBESTOS OR ASBESTOS-CONTAINING MATERIALS ON OR AT THE WORK SITE AND/OR THE ABATEMENT, ENCAPSULATION AND/OR THE REMOVAL THEREOF.

4.9 MOLD LIMITATIONS

- A. The Garland Company makes no representation or warranty, express, implied, or otherwise, regarding mold, fungi, rust, corrosion or other bacteria or organism. Neither shall Garland have any duty to identify, nor accept any responsibility or liability for any claims associated with mold, fungi, rust, corrosion or other bacteria or organism related claims.

END OF SECTION

SECTION 07563
FLUID APPLIED ROOFING RESTORATION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Metal Surface Roof Restoration
- B. Accessories
- C. Edge Treatment and Roof Penetration Flashings

1.2 REFERENCES

- A. ASTM D 1002 - Standard Test Method for Apparent Shear Strength of Single-Lap-Joint Adhesively Bonded Metal Specimens by Tension Loading (Metal-to-Metal).
- B. ASTM E 1980 - Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces
- C. SRI - Solar Reflectance Index calculated according to ASTM E 1980.
- D. SMACNA Architectural Sheet Metal Manual.
- E. National Roofing Contractors Association (NRCA) - Roofing and Waterproofing Manual.

1.3 SYSTEM DESCRIPTION

- A. Metal Surface Roof Restoration: Renovation work includes:
 - 1. Surface preparation: Remove loose flaking rust, dust, dirt, debris, secure all gaped panels and replace all loose fasteners with next size larger.
 - 2. Metal Flashings: Repair/Replace metal flashings, pitch pockets, etc.
 - 3. Primer: Prime entire roof surface.
 - 4. Base coat: Apply base coat and fabric on seams and around penetrations/let cure/Apply base coat over the entire roof surface/let cure.
 - 5. Topcoat: Apply coating over entire roof surface.

1.4 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
- C. Verification Samples: For each product specified, two samples, minimum size 6 inches (150 mm) square, representing actual product, and color.
- D. Manufacturer's Certificates: Certify products meet or exceed specified requirements.
- E. Closeout Submittals: Provide manufacturer's maintenance instructions that include recommendations for periodic inspection and maintenance of all completed roofing work. Provide product warranty executed by the manufacturer. Assist Owner in preparation and

submittal of roof installation acceptance certification as may be necessary in connection with fire and extended coverage insurance on roofing and associated work.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with manufacturer's current Application and Installation Guidelines and the NRCA Roofing and Waterproofing Manual.
- B. Manufacturer Qualifications: Manufacturer: Company specializing in manufacturing products specified in this section with documented ISO 9001 certification and minimum twelve years and experience.
- C. Installer Qualifications: Company specializing in performing Work of this section with minimum five years documented experience and a certified Pre-Approved Garland Contractor.
- D. Installer's Field Supervision: Maintain a full-time Supervisor/Foreman on job site during all phases of roofing work while roofing work is in progress.
- E. Product Certification: Provide manufacturer's certification that materials are manufactured in the United States and conform to requirements specified herein, are chemically and physically compatible with each other, and are suitable for inclusion within the total roof system specified herein.
- F. Source Limitations: Obtain all components of roof system from a single manufacturer. Secondary products that are required shall be recommended and approved in writing by the roofing system Manufacturer. Upon request of the Architect or Owner, submit Manufacturer's written approval of secondary components in list form, signed by an authorized agent of the Manufacturer.

1.6 PRE-INSTALLATION CONFERENCE

- A. Convene a pre-roofing conference approximately two weeks before scheduled commencement of roofing system installation and associated work.
- B. Require attendance of installers of deck or substrate construction to receive roofing, installers of rooftop units and other work in and around roofing which must precede or follow roofing work including mechanical work, Architect, Owner, roofing system manufacturer's representative.
- C. Objectives include:
 - 1. Review foreseeable methods and procedures related to roofing work, including set up and mobilization areas for stored material and work area.
 - 2. Tour representative areas of roofing substrates, inspect and discuss condition of substrate, roof drains, curbs, penetrations and other preparatory work.
 - 3. Review structural loading limitations of deck and inspect deck for loss of flatness and for required attachment.
 - 4. Review roofing system requirements, Drawings, Specifications and other Contract Documents.
 - 5. Review and finalize schedule related to roofing work and verify availability of materials, installer's personnel, equipment and facilities needed to make progress and avoid delays.
 - 6. Review required inspection, testing, certifying procedures.
 - 7. Review weather and forecasted weather conditions and procedures for coping with unfavorable conditions, including possibility of temporary roofing.
 - 8. Record conference including decisions and agreements reached. Furnish a copy of records to each party attending.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store products in manufacturer's unopened packaging with labels intact until ready for installation.
- B. Store all roofing materials in a dry place, on pallets or raised platforms, out of direct exposure to the elements until time of application. Store materials at least 4 inches above ground level and covered with "breathable" tarpaulins.
- C. Stored in accordance with the instructions of the manufacturer prior to their application or installation. Store roll goods on end on a clean flat surface. No wet or damaged materials will be used in the application.
- D. Storage temperatures should be between 60 degrees F to 80 degrees F (15.6 degrees to 26.7 degrees C). Indoor ventilated storage is recommended. Ensure jobsite storage is in a shaded and ventilated area. Do not store in direct sunlight. Keep materials away from open flame or welding sparks.
- E. Avoid stockpiling of materials on roofs without first obtaining acceptance from the Architect/Engineer.

1.8 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.
- B. Weather Condition Limitations: Product application must not be done when rain or other conditions such as fog or heavy dew are possible within a 24 hour period. Roof surface must be at least 6 Fahrenheit degrees or 3 Celsius degrees above the dew point and rising.
- C. Proceed with roofing work only when existing and forecasted weather conditions will permit unit of work to be installed in accordance with manufacturer's recommendations and warranty requirements.
- D. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed during same day.
- E. When applying materials with spray equipment, take precautions to prevent over spray and/or solvents from damaging or defacing surrounding walls, building surfaces, vehicles or other property. Care should be taken to do the following:
 - 1. Close air intakes into the building.
 - 2. Have a dry chemical fire extinguisher available at the jobsite.
 - 3. Post and enforce "No Smoking" signs.
- F. Avoid inhaling spray mist; take precautions to ensure adequate ventilation.
- G. Protect completed roof sections from foot traffic for a period of at least 48 hours at 75 degrees F (24 degrees C) and 50 percent relative humidity or until fully cured.
- H. Take precautions to ensure that materials do not freeze.
- I. Minimum temperature for application of White-Knight Plus/ White-Stallion Plus, White-Knight Plus WC and LiquiTec coatings is 50 degrees F (10 degrees C) and rising.

1.9 WARRANTY

- A. Warranty Period: 10 years.

1. Upon completion of the work, provide the Manufacturer's written and signed limited labor and materials Warranty, warranting that, if a leak develops in the roof during the term of this warranty, due either to defective material or defective workmanship by the installing contractor, the manufacturer shall provide the Owner, at the Manufacturer's expense, with the labor and material necessary to return the defective area to a watertight condition.
 - a. Metal Surface Roof Restoration:
- B. Warranty Period: Installer is to guarantee all work against defects in materials and workmanship for a period indicated following final acceptance of the Work.
 1. Warranty Period:
 - a. 2 years from date of acceptance.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: Garland Company, Inc. (The); 3800 E. 91st St., Cleveland, OH 44105. ASD. Toll Free: 800-321-9336. Phone: 216-641-7500. Fax: 216-641-0633. Web Site: <http://www.garlandco.com>.
- B. Requests for substitutions will be considered in accordance with provisions of Section 01600.

2.2 METAL SURFACE ROOF RESTORATION

- A. LiquiTec:
 1. Primer: Rust-Go Metal Primer
 2. Base: LiquiTec Base
 3. Coating: LiquiTec:
 4. Liquid Flashing: LiquiTec.
 5. Reinforcement: Partial reinforcement on metal panel seams only.
 - a. UniBond ST

2.3 ACCESSORIES:

- A. Roof Insulation: In accordance with Section 07220.
- B. Nails and Fasteners: Non-ferrous metal or galvanized steel, except that hard copper nails shall be used with copper; aluminum or stainless-steel nails shall be used with aluminum; and stainless-steel nails shall be used with stainless steel, Fasteners shall be self-clinching type of penetrating type as recommended by the deck manufacturer. Fasten nails and fasteners flush-driven through flat metal discs not less than 1 inch (25 mm) diameter. Omit metal discs when one-piece composite nails or fasteners with heads not less than 1 inch (25 mm) diameter are used.
- C. Urethane Sealant - Tuff-Stuff MS: One-part, non-sag sealant as approved and furnished by the membrane manufacturer for moving joints.
 1. Tensile Strength, ASTM D 412: 250 psi
 2. Elongation, ASTM D 412: 950%
 3. Hardness, Shore A ASTM C 920: 35
 4. Adhesion-in-Peel, ASTM C 92: 30 pli
- D. Urethane Adhesive - Green-Lock Structural Adhesive: Single component, 100% solids structural adhesive as furnished and recommended by the membrane manufacturer.
 1. Elongation, ASTM D 412: 300%
 2. Hardness, Shore A, ASTM C 920: 50

- 3. Shear Strength, ASTM D 1002: 300 psi
- E. Silicone Dampproofing - Seal-A-Pore HP: Transparent and colorless solution designed to damp-proof above grade masonry surfaces as recommended and furnished by the membrane manufacturer.
 - 1. Density @77 degrees F 8.4 lb/gal min.
 - 2. Viscosity (Zahn #2 cup) Typical 14 sec.
- F. Acrylic Damp-Proofing Tuff-Coat: Damp-proofing that provides heavy body protection while bridging small hair line cracks and masonry imperfections as recommended and furnished by the membrane manufacturer.
 - 1. Density @77 degrees F 12.25 lb/gal typical
 - 2. Viscosity, ASTM D 562: 95 KU
- G. Butyl Tape: 100% solids, asbestos free and compressive tape designed to seal as recommended and furnished by the membrane manufacturer.
- H. Non-Shrink Grout: GarRock all-weather fast setting chemical action concrete material to fill pitch pans.
 - 1. Flexural Strength, ASTM C 78: (modified) 7 days 1100psi
 - 2. High Strength, ASTM C 109: (modified) 24 days 8400lbs (3810kg)
- I. Pitch Pocket Sealer - Universal Pitch-Pocket Sealer: Two-part, 100% solids, self-leveling, polyurethane sealant.
- J. Glass Fiber Cant - Glass Cant: Continuous triangular cross Section made of inorganic fibrous glass used as a cant strip as recommended and furnished by the membrane manufacturer.

2.4 EDGE TREATMENT AND ROOF PENETRATION FLASHINGS

- A. Flashing Boot - Rubbertite Flashing Boot: Neoprene pipe boot for sealing single or multiple pipe penetrations adhered in approved adhesives as recommended and furnished by the membrane manufacturer.
- B. Vents and Breathers: Heavy gauge aluminum and fully insulated vent that allows moisture and air to escape but not enter the roof system as recommended and furnished by the membrane manufacturer.
- C. Pitch pans, Rain Collar 24 gauge stainless or 20oz (567gram) copper. All joints should be welded/soldered watertight. See details for design.
- D. Drain Flashing should be 4lb (1.8kg) sheet lead formed and rolled.
- E. Plumbing stacks should be 4lb (1.8kg) sheet lead formed and rolled.
- F. Fabricated Flashing: Fabricated flashings and trim are specified in Section 07620.
 - 1. Fabricated flashings and trim shall conform to the detail requirements of SMACNA "Architectural Sheet Metal Manual" and/or the CDA Copper Development Association "Copper in Architecture - Handbook" as applicable.
- G. Manufactured Roof Specialties: Manufactured copings, fascia, gravel stops, control joints, expansion joints, joint covers and related flashings and trim are specified in Section 07710.
 - 1. Manufactured roof specialties shall conform to the detail requirements of SMACNA "Architectural Sheet Metal Manual" and/or the NRCA "Roofing and Waterproofing Manual" as applicable.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. Verify that work penetrating the roof deck, or which may otherwise affect the roofing, has been properly completed.
- C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 ROOF PREPARATION AND REPAIR

- A. General: All necessary field and flashing repairs must be done according to good construction practices, including the removal of all wet insulation and defective materials as identified through a moisture detection survey such as an infrared scan and replacement with like-materials.
 - 1. Remove damaged roof flashings from curbs and parapet walls down to the surface of the roof. Remove damaged existing flashings at roof drains and roof penetrations.
 - 2. Remove all wet, deteriorated, blistered or delaminated roofing membrane or insulation and fill in any low spots with like materials occurring as a result of removal work to create a smooth, even surface for application of new roof membranes.
 - 3. When mechanically attached, the fastening pattern for the insulation/recovery board shall be as recommended by the specific product manufacturer.
 - 4. Existing roof surfaces shall be primed as necessary and allowed to dry prior to installing the roofing system.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Repair all defects such as deteriorated roof decks, saturated materials, loose or brittle membrane or membrane flashings, etc. Verify that existing conditions meet the following requirements:
 - 1. Existing membrane is either fully adhered or that the membranes mechanical fasteners are secured and functional.
 - 2. Application of roofing materials over a brittle, damaged or poor condition roof membrane is not permitted.
- D. Remove all loose dirt and foreign debris from the roof surface. Do not damage roof membrane in cleaning process.
- E. Clean and seal all parapet walls, gutters and coping caps, and repair any damaged metal where necessary. Seal watertight all fasteners, pipes, drains, vents, joints and penetrations where water could enter the building envelope.
- F. Confirm local water run-off ordinances and restrictions prior to cleaning roof. Clean the entire roof surface by removing all dirt, algae, mold, moss, paint, oil, talc, rust or other foreign substance. Use a bio-degradable cleaner like Simple Green Oxy Solve when necessary and warm water. Scrub heavily soiled areas with a brush. Power wash roof thoroughly with an industrial surface cleaner equipped with one-piece balanced spray rotating jets for streak free close contact cleaning. Rinse with fresh water to completely remove all residuals. Allow roof to dry thoroughly before continuing.
- G. Repair existing roof membrane as necessary to provide a sound substrate for the liquid membrane. All surface defects must be repaired/renovated and be made watertight. Any repairs must be with only with materials compatible with the fluid-applied roofing restoration system.

- H. Power washing of metal roof surfaces to remove all loose rust or scale is mandatory before application. Use a high-volume air broom or compressed air to remove residual dust rust perforations, etc. Deteriorated metal roof decks must be repaired or replaced prior to the application of the coating system.

3.3 INSTALLATION

A. General Installation Requirements:

1. Install in accordance with manufacturer's current Application and Installation Guidelines and the NRCA Roofing and Waterproofing Manual.
2. Adequate coating thickness is essential to performance. If the applicator is unfamiliar in gauging application rates, we suggest that a controllable area be measured and the specified material be applied. In all cases, all minimum specified material must be applied and proper minimum dry film thicknesses must be achieved. Care must be taken to ensure that all areas completed including all flashings, roof penetrations, etc. are coated sufficiently to ensure a watertight seal.
3. Cooperate with manufacturer, inspection and test agencies engaged or required to perform services in connection with installing the roof system.
4. Insurance/Code Compliance: Where required by code, install and test the roofing system to comply with governing regulation and specified insurance requirements.
5. Protect work from spillage of roofing materials and prevent materials from entering or clogging drains and conductors. Replace or restore adjacent work damaged by installation of the roofing system.
6. All primers must be top coated within 24 hours of application. Re-prime if more time passes after priming.
7. Keep roofing materials dry during application.
8. Coordinate counter flashing, cap flashings, expansion joints and similar work with work specified in other Sections under Related Work.
9. Coordinate roof accessories and miscellaneous sheet metal accessory items, including piping vents and other devices with work specified in other Sections under Related Work.

B. Metal Surface Roof Restoration: Renovation work includes:

1. Surface Preparation: Remove loose flaking rust, dust, dirt, debris, secure all gaped panels and replace all loose fasteners with next size larger.
 - a. Remove rust by the most rigorous method suitable for the particular project and as approved by Garland.
 - b. Tighten all fasteners and verify that neoprene washers are in place.
 - c. Replace missing fasteners using oversize fasteners as necessary.
 - d. Seal all fastener heads by applying a heavy dab of compatible sealant to the tops and around of all fastener heads.
 - e. Repair gaps, holes and joints in the metal roof with appropriate patching materials.
 - f. Completely remove existing seam coatings, mastics and sealants.
 - g. Ensure skylights, scuppers, gutters, penetrations and structures are firmly secured, watertight and in good working condition.
 - h. Where necessary, install water deflecting crickets behind rooftop mechanical units.
 - i. All roof areas must promote positive drainage.
 - j. Previously coated roofs with well-adhered polyurethane or polyurea coating surfacing must be solvent-wiped with acetone after cleaning to reactivate surface for overcoating.
2. Flashing: Repair/Replace metal flashings, pitch pockets, etc.
3. Primer:
 - a. Prime entire roof surface with Rust-Go Primer rust inhibitive primer at 1/4 gallon per 100 SF.

4. Reinforcement: Treatment of field seams and around penetrations:
 - a. Application of UniBond ST seam tape with Base Coat on metal panel end laps, flashings and around penetrations.
 - 1) Verify that the surface to be coated is properly prepared.
 - 2) Remove the clear release liner from the back in workable sections
 - 3) Center 6 inch wide UniBond ST over the middle of the lap.
 - 4) Use care to install the tape uniformly. Do not stretch or cause air pockets, wrinkles or fishmouths.
 - 5) Apply pressure to tape starting at the center and work toward outside edge with a steel roller to activate the bonding process.
 - 6) Inspect the tape to ensure that it is properly installed. Verify edges are tightly fixed to surface. If any discrepancies are present, repair before the coating is applied.
 - 7) Saturate the tape with coating or baser as specified.
5. Coating: Ensure the fluid-applied coverage rates are obtained throughout the entire roof surface.
 - a. Material: Apply base coat in a uniform manner at 1.5 gallons per 100 SF over the entire roof surface. Allow to cure thoroughly, but no more than 72 hours. Apply a top coating over base coat at 1.0 gallons per 100 SF.
 - b. Use special attention to coating flashings and other critical areas to build adequate membrane thickness.
 - c. Use multiple coats on verticals or steep slopes to prevent sagging.
 - d. Apply to Garland's minimum membrane thickness over the entire roof surface.

3.4 REPAIR OF EDGE TREATMENT AND ROOF PENETRATION FLASHING

- A. General
 1. Repair flashing in accordance with the requirements/recommendations of the Membrane manufacturer and as indicated on the manufacturer's standard drawings. Provide system with base flashing, edge flashing, penetration flashing, counter flashing, and all other flashings required for a complete watertight system.
 2. Install and repair flashings concurrently with the roofing as the job progresses.
 3. Terminate flashings as required by the membrane manufacturer.
- B. Manufactured Roof Specialties: Manufactured copings, fascia, gravel stops, control joints, expansion joints, joint covers and related flashings and trim are provided as specified in Section 07710.
 1. Manufactured roof specialties shall conform to the detail requirements of SMACNA "Architectural Sheet Metal Manual" and/or the National Roofing Contractor's Association "Roofing and Waterproofing Manual" as applicable.

3.5 CLEANING

- A. Clean-up and remove daily from the site all wrappings, empty containers, paper, loose particles and other debris resulting from these operations.
- B. Remove coating markings from finished surfaces.
- C. Repair or replace defaced or disfigured finishes caused by Work of this section.

3.6 PROTECTION

- A. Provide traffic ways, erect barriers, fences, guards, rails, enclosures, chutes and the like to protect personnel, roofs and structures, vehicles and utilities.
- B. Protect exposed surfaces of finished walls with tarps to prevent damage.

- C. Plywood for traffic ways required for material movement over existing roofs shall be not less than 5/8 inch (16 mm) thick.
- D. In addition to the plywood listed above, an underlayment of minimum 1/2 inch (13 mm) recover board is required on new roofing.
- E. Special permission shall be obtained from the Manufacturer before any traffic shall be permitted over new roofing.

3.7 FIELD QUALITY CONTROL

- A. Require attendance of roofing materials manufacturers' representatives at site during installation of the roofing system.
- B. Perform field inspection and [and testing] as required under provisions of Section 01410.
- C. Correct defects or irregularities discovered during field inspection.

3.8 FINAL INSPECTION

- A. At completion of roofing installation and associated work, meet with Contractor, Architect, installer, installer of associated work, roofing system manufacturer's representative and others directly concerned with performance of roofing system.
- B. Walk roof surface areas, inspect perimeter building edges as well as flashing of roof penetrations, walls, curbs and other equipment. Identify all items requiring correction or completion and furnish copy of list to each party in attendance.
- C. If core cuts verify the presence of damp or wet materials, the installer shall be required to replace the damaged areas at his own expense.
- D. Repair or replace deteriorated or defective work found at time above inspection as required to produce an installation that is free of damage and deterioration at time of Substantial Completion and according to warranty requirements.
- E. Notify Architect upon completion of corrections.
- F. Following the final inspection, provide written notice of acceptance of the installation from the roofing system manufacturer.

3.9 SCHEDULES

- A. Primers:
 - 1. Rust-Go Metal Primer:
 - a. Flash Point: 40 degrees F (4.4 degrees C) min
 - b. Solids by Weight: 69.9% plus/minus 2.0%
 - c. Solids by Volume: 52.5% plus/minus 2.0%
 - d. Viscosity @ 77 degrees F (25 degrees C): 70 plus/minus 5 KU
- B. Base:
 - 1. Base Coating: LiquiTec Base: Multi-purpose, 100% solids, two-part, fast-cure, polyurea liquid waterproofing membrane having the following characteristics:
 - a. Elongation, ASTM D 412: 800%
 - b. Tensile Strength, ASTM D 412: 2500 psi
 - c. Tear Resistance, ASTM D 624: 449 lbs./in
 - d. Low Temperature Flexibility, ASTM D 522: -60 degrees F (-51.1 degrees C)
 - e. Hardness, ASTM D 2240 (Shore A): 80
 - f. Dynamic Impact Resistance (Fully Reinforced System): ASTM D 5635, 37

- g. Static Puncture Resistance (Fully Reinforced System): ASTM D 5602, 20 kg
 - h. Tensile-Tear Resistance (Fully Reinforced System): ASTM D 4073, 274 lbf
 - i. Tensile Load Strain (Fully Reinforced System): ASTM D 4073, 193 lbf/in.
 - j. Toughness: (Fully Reinforced System): 46 in.-lbf/in²
 - k. Dry Film Thickness (Fully Reinforced System), 90-100 mils
 - l. Lap Shear Strength (MB Seam with coating): ASTM D 7379, 231 lbf/in.
 - m. Density @ 77 degrees F (25 degrees C, ASTM D 2939) 9.6 lb./gal (1.2 g/m³)
 - n. Flash Point: ASTM D 93, 110 degrees F min. (43 degrees C)
 - o. VOC: 0 g/l
 - p. Microbial Resistance: ASTM G21, No Microbial Growth
 - q. Water Leakage Resistance: ASTM D7281, Pass
- C. Reinforcement:
1. UniBond ST: Fatigue resistant, polyester-faced adhesive tape.
 - a. Tensile Strength 4500 psi.
 - b. Elongation, 500%
 - c. Low Temperature Flexibility, -70 degrees F (-56.6 degrees C).
 - d. Service Temperature, -30 to 200 degrees F (-34.4 to 93.3 degrees C).
 - e. Permeance ASTM 96b, .001 perms.
 - f. Adhesion Greater than 20 lbs./in.
- D. Coatings:
1. Coating: LiquiTec: Multi-purpose, 100% solids, two-part, fast-cure, polyurea liquid waterproofing membrane having the following characteristics:
 - a. Elongation, ASTM D 412: 800%
 - b. Tensile Strength, ASTM D 412: 2500 psi
 - c. Tear Resistance, ASTM D 624: 449 lbs./in
 - d. Low Temperature Flexibility, ASTM D 522: -60 degrees F (-51.1 degrees C)
 - e. Hardness, ASTM D2240 (Shore A): 80
 - f. Dynamic Impact Resistance (Fully Reinforced System): ASTM D 5635, 37 joules
 - g. Static Puncture Resistance (Fully Reinforced System): ASTM D 5147, 135 lb/in
 - h. Tensile-Tear Resistance (Fully Reinforced System): ASTM D 4073, 274 lbf
 - i. Tensile Load Strain (Fully Reinforced System): ASTM D 4073, 193 lbf/in.
 - j. Toughness: (Fully Reinforced System): ASTM D 5147 46 in.-lbf/in²
 - k. Dry Film Thickness (Fully Reinforced System), 90-100 mils
 - l. Lap Shear Strength (MB Seam with coating): ASTM D 7379, 231 lbf/in.
 - m. Density @ 77 degrees F (25 degrees C), ASTM D 2939) 9.6 lb./gal (1.2 g/m³)
 - n. VOC: 0 g/l
 - o. Microbial Resistance: ASTM G21, No Microbial Growth
 - p. Water Leakage Resistance: ASTM D7281, Pass
 - q. Initial Reflectance: 0.84
 - r. Initial Emittance: 0.88
 - s. Initial SRI: 105
- E. Liquid Flashings
1. Coating: LiquiTec: Multi-purpose, 100% solids, two-part, fast-cure, polyurea liquid waterproofing membrane having the following characteristics:
 - a. Elongation, ASTM D 412: 800%
 - b. Tensile Strength, ASTM D 412: 2500 psi
 - c. Tear Resistance, ASTM D 624: 449 lbs./in
 - d. Low Temperature Flexibility, ASTM D 522: -60 degrees F (-51.1 degrees C)
 - e. Hardness, ASTM D 2240 (Shore A): 80
 - f. Dynamic Impact Resistance (Reinforced System): ASTM D 5635, 37 joules
 - g. Static Puncture Resistance (Reinforced System): ASTM D 5602, 20 kg

- h. Tensile-Tear Resistance (Fully Reinforced System): ASTM D 4073, 274 lbf .
 - i. Tensile Load Strain (Fully Reinforced System): ASTM D 4073, 135 lbf.in .
 - j. Toughness: ASTM D 5147 46 in.-lbf/in² .
 - k. Dry Film Thickness (Fully Reinforced System), 70-80 mils
 - l. Lap Shear Strength (MB Seam with coating): ASTM D7379,
 - m. 231 lbf/in.
 - n. Density @ 77 degrees F (25 degrees C, ASTM D 2939) 9.6 lb./gal (1.2 g/m³)
 - o. VOC: 0 g/l
 - p. Microbial Resistance: ASTM G 21, No Microbial Growth
 - q. Water Leakage Resistance: ASTM D7281, Pass
 - r. Initial Reflectance: 0.84
 - s. Initial Emittance: 0.88
 - t. Initial SRI: 105
2. Coating: LiquiTec Base:
- a. Elongation, ASTM D 412: 800%
 - b. Tensile Strength, ASTM D 412: 2500 psi
 - c. Tear Resistance, ASTM D 624: 449 lbs./in
 - d. Low Temperature Flexibility, ASTM D522: -60 degrees F (-51.1 degrees C)
 - e. Hardness, ASTM D2240 (Shore A): 80
 - f. Dynamic Impact Resistance (Fully Reinforced System): ASTM D 5635, 37 joules
 - g. Static Puncture Resistance (Fully Reinforced System): ASTM D 5602, 20 kg
 - h. Tensile-Tear Resistance (Fully Reinforced System): ASTM D 4073,
 - i. Tensile Load Strain (Fully Reinforced System): ASTM D 4073,
 - j. Toughness: ASTM D 5147 , 46 in.-lbf/in²
 - k. Dry Film Thickness (Fully Reinforced System), 70-80 mils
 - l. Lap Shear Strength (MB Seam with coating): ASTM D 7379, 231 lbf/in.
 - m. Density @ 77 degrees F (25 degrees C). ASTM D 2939 9.6 lb./gal (1.2 g/m³)
 - n. VOC: 0 g/l
 - o. Microbial Resistance: ASTM G 21, No Microbial Growth
 - p. Water Leakage Resistance: ASTM D7281, Pass

END OF SECTION

SECTION 01 43 33.75

ROOFING MANUFACTURER'S FIELD SERVICES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including the Conditions of the Contract and Division 07 Specification Sections apply to this Section.

1.2 SUMMARY

- A. Section includes Manufacturer's field services for roofing assemblies.
- B. Related Sections:
 - 1. Section 07 05 00 – Common Work Results for Thermal and Moisture Protection.

1.3 REFERENCES

- A. International building Code (current edition) or local authority building code.
- B. American Society of Civil Engineers (ASCE): ASCE 7, Minimum Design Loads for Buildings and Other Structures.
- C. Factory Mutual Global (FMG): Roof Assembly Classifications.
- D. National Roofing Contractors Association (NRCA): Roofing and Waterproofing Manual.
- E. American National Standards Institute and Single Ply Roofing Institute (ANSI/SPRI): ANSI/SPRI ES-1 Testing and Certification Listing of Shop Fabricated Edge Metal.

1.4 SUBMITTALS FOR REVIEW

- A. Product Data: Provide manufacturer's technical product data for each type of roofing product specified. Include data substantiating that materials comply with specified requirements.
- B. Specimen Warranty: Provide an unexecuted copy of the warranty specified for this Project, identifying the terms and conditions required of the Manufacturer and the Owner.
- C. Roofing System Manufacturer's Evaluation: Provide a comprehensive written assessment comparing available roofing solutions with validation of why the roofing system selection for the specific project is suitable and appropriate.

- D. Online Reporting Capabilities: Provide a sample of the roofing system manufacturer's online roof inspection report as well as information about how long inspection reports are available to owner.

1.5 SUBMITTALS FOR INFORMATION

- A. Manufacturer's Installation Instructions: Submit installation instructions and recommendations indicating special precautions required for installing the membrane.
- B. Manufacturer's Certificate: Certify that roof system furnished is approved by Factory Mutual Global, Underwriters Laboratories, Warnock Hersey or approved third party testing facility in accordance with ASTM E108, Class A for external fire and meets local or nationally recognized building codes.
- C. Manufacturer's Certificate: Certify that materials are manufactured in the United States and conform to requirements specified herein, are chemically and physically compatible with each other, and are suitable for inclusion within the total roof system specified herein.
- D. Manufacturer's Certificate: Submit a certified copy of the roofing manufacturer's ISO 9001 compliance certificate.
- E. Written certification from the roofing system manufacturer certifying the applicator is currently authorized for the installation of the specified roof system.
- F. Test Reports: Submit ANSI/SPRI ES-1 Testing and Certification Listing of Shop Fabricated Edge Metal Products.
- G. Substitutions: Products proposed as equal to the products specified for this project shall meet all of the requirements in the appropriate Division 7 specifications and shall be submitted for consideration at least 7 days prior to the date that bids must be submitted.
 - 1. Proposals shall be accompanied by a copy of the manufacturer's standard specification Section. That specification Section shall be signed and sealed by a professional engineer licensed in the state in which the installation is to take place. Substitution requests containing specifications without licensed engineer certification shall be rejected for non-conformance.
 - 2. Manufacturer's checklist will be accompanied with any substitution to verify equal performance characteristics to those specified in Division 7 specification.
 - 3. The Owner's decision regarding substitutions will be considered final.

1.6 CONTRACT CLOSEOUT SUBMITTALS

- A. Project Warranty: Provide specified warranty for the Project, executed by the authorized agent of the Manufacturer.
- B. Roofing Maintenance Instructions: Provide a roof care and maintenance manual of manufacturer's recommendations for maintenance of installed roofing systems.
- C. Insurance Certification: Assist Owner in preparation and submittal of roof installation acceptance certification as may be necessary in connection with fire and extended coverage insurance on roofing and associated work.

- D. Inspection Logs: Copy of inspection reports as performed by the manufacturer shall be submitted at project closeout and include photographic documentation of installation progress, weather conditions, and personnel on the project at the time of every inspection.

1.7 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this Section with not less than [12] years documented experience [and have ISO 9001 certification].
- B. Installer Qualifications: Company specializing in specified roofing installation with not less than [5] years experience and authorized by roofing system manufacturer as qualified to install manufacturer's roofing materials.
- C. Installer's Field Supervision: Maintain a full-time Supervisor/Foreman on job site during all phases of roofing work while roofing work is in progress. Maintain proper supervision of workmen.
- D. Maintain a copy of the roof plans, details, and specifications in the possession of the Supervisor/Foreman and on the roof at all times.
- E. Source Limitations: Obtain all primary components of roof system from a single manufacturer. Secondary products that are required shall be recommended and approved in writing by the roofing system Manufacturer.
 - 1. The manufacturer providing the roofing system warranty must verify that they manufacture a minimum of 75% of the products utilized in the roofing system of this project. Products that are private labeled shall not be considered as manufactured by the roofing system supplier.
 - 2. Upon request of the Architect or Owner, submit Manufacturer's written approval of secondary components in list form, signed by an authorized agent of the Manufacturer.
- F. Source Quality Control: Manufacturer shall have in place a documented, standardized quality control program such as ISO-9001.

1.8 PRE-INSTALLATION CONFERENCE

- A. Pre-Installation Roofing Conference: Convene a pre-roofing conference approximately two (2) weeks before scheduled commencement of roofing system installation and associated work.
- B. Require attendance of installer of each component of associated work: installers of deck or substrate construction to receive roofing work: installers of rooftop units and other work in and around roofing that must precede or follow roofing work (including mechanical work if any): architect and/or engineer: owner: roofing system manufacturer's full time employee: and other representatives directly concerned with performance of the Work, including (where applicable) owner's insurers, testing agencies and governing authorities. Objectives of conference include:
 - 1. Review foreseeable methods and procedures related to roofing work, including set up and mobilization areas for stored material and work area.
 - 2. Tour representative areas of roofing substrates (decks), inspect and discuss condition of substrate, roof drains, curbs, penetrations and other preparatory work performed by others.
 - 3. Review structural loading limitations of deck and inspect deck for loss of flatness and for required attachment.

4. Review roofing system requirements (drawings, specifications and other contract documents).
 5. Review required submittals both completed and yet to be completed.
 6. Review and finalize construction schedule related to roofing work and verify availability of materials, installer's personnel, equipment and facilities needed to make progress and avoid delays.
 7. Review required inspection, testing, certifying and material usage accounting procedures.
 8. Review weather and forecasted weather conditions and procedures for coping with unfavorable conditions, including possibility of temporary roofing (if not a mandatory requirement).
 9. Record discussion of conference including decisions and agreements (or disagreements) reached and furnish a copy of record to each party attending. If substantial disagreements exist at conclusion of conference, determine how disagreements will be resolved and set date for reconvening conference.
- C. The Owner's Representative will designate one of the conference participants to record the proceedings and promptly distribute them to the participants for record.
- D. The intent of the conference is to resolve issues affecting the installation and performance of roofing work. Do not proceed with roofing work until such issues are resolved to the satisfaction of the owner and [architect and/or engineer] of record. This shall not be construed as interference with the progress of Work on the part of the owner or [architect or engineer] of Record.

1.9 MANUFACTURER'S INSPECTIONS

- A. When the Project is in progress, a full-time employee of the roofing system manufacturer must provide the following:
1. Report progress and quality of the work as observed. Progress reports must be published to an online system as referenced in Section 1.4.
 2. Provide periodic (3, 4, or 5 days per week) roofing installation inspections: Inspections must include; photographic documentation of work in-progress and written statements of compliance with details/shop drawings.
 3. Report to the owner, architect and/or engineer in writing any failure or refusal of the contractor to correct unacceptable practices called to the contractor's attention.
 4. Confirm after project completion that the manufacturer has observed no application procedures in conflict with the specifications other than those that may have been previously reported and corrected.

1.10 WARRANTY

- A. Upon completion of installation, and acceptance by the owner and architect and/or engineer, the manufacturer will supply to the owner the specified warranty.
- B. Installer will submit a two (2)- year workmanship warranty to the membrane manufacturer with a copy directly to the owner.
- C. The roofing system manufacturer must have been in continuous business operation for a period of time at least as long as the length of the roof system warranty provided for this project.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 EXECUTION, GENERAL

- A. Comply with requirements of related Division 07 Section.

3.2 GENERAL INSTALLATION REQUIREMENTS

- A. Cooperate with manufacturer, inspection and test agencies engaged or required to perform services in connection with installing the roof system.
- B. Insurance/Code Compliance: Where required by code, install and test the roofing system to comply with governing regulation and specified insurance requirements.

3.3 FIELD QUALITY CONTROL

- A. Roofing Manufacturer Representative shall perform field inspection as specified in Article titled: MANUFACTURER'S INSPECTIONS above. Inspections must include photographic documentation of installation progress, weather conditions, and personnel on the project at the time of inspection.
- B. Correct defects or irregularities discovered during field inspection. Issues deemed defective must be re-inspected and determined suitable by the roofing manufacturer.
- C. Require attendance of roofing materials manufacturers' representatives at site during installation of the roofing system. A copy of the specification shall also be on site at all times.
- D. Frequent progress meetings shall be conducted during the performance of roof system installation and must be attended by the owner, architect or engineer, roofing system manufacturer's full time employee, and other representatives directly concerned with performance of the work.

3.4 FINAL INSPECTION

- A. At the completion of the roofing installation and associated work, meet with contractor, architect or engineer, installer, installer of associated work, owner, roofing system manufacturer's representative, and other representatives directly concerned with performance of roofing system.
- B. Walk roof surface areas of the building, inspect perimeter building edges as well as flashing of roof penetrations, walls, curbs and other equipment. List all items requiring correction or completion and furnish copy of list to each party in attendance.
- C. Notify the owner upon completion of corrections.
- D. The roofing system manufacturer reserves the right to request a thermographic scan of the roof during final inspection to determine if any damp or wet materials have been installed. The thermographic scan shall be provided by the roofing contractor.
- E. If core cuts verify the presence of damp or wet materials, the roofing contractor shall be required to replace the damaged areas at his own expense.

- F. Following the final inspection, provide written notice of acceptance of the installation from the roofing system manufacturer.
- G. Immediately correct roof leakage during construction. If the contractor does not respond within twenty four (24) hours, the owner may exercise right to correct the Work under the terms of the Conditions of the Contract.

END OF SECTION

OVERVIEW & FEATURES

LiquiTec is an extremely low odor, fluid-applied waterproofing system designed to maintain, restore and upgrade the performance of aged modified bitumen, metal and single-ply roof systems. This two-component, 100% solids, aliphatic polyurea cures quickly to form a highly durable, impact and UV resistant finished roof membrane that increases the life span of the existing roof. It can also be used as a repair material for maintenance applications. LiquiTec can easily be applied by brush, roller and squeegee.

Low Odor & Applicator Friendly - Virtually odorless with no VOCs, this restoration system is ideal for sensitive applications like hospitals, schools and any other structures where occupants are present. This catalyzed product provides faster curing and rain resistance, promoting more efficient installations than one-part coatings.

Energy Efficient & Chemical/Fungal Resistance - The bright white reflective finish provides energy savings through reduced cooling costs and prolongs the life of the existing roof membrane, decreasing the damaging effects of heat aging and thermal shock. LiquiTec's unique aliphatic formulation resists chemical and fungal attack.

Tough Seamless Membrane - Cures to an extremely tough and resilient membrane that forms a barrier against hail, foot traffic, wind scour and other impact that commonly damage roofs. It seals up existing roof membrane seams where roof leaks and other damage can occur.

Versatile Waterproofing - Can be used to seal laps/seams, make spot repairs, or restore entire roofing systems. Its outstanding waterproofing protection is ideal for low-slope roofing projects.

PREPARATION

Make any necessary repairs, including removal of any wet insulation and roofing materials and replace with like materials. Allow repairs to cure completely. Confirm local water run-off ordinances and restrictions prior to cleaning roof. Carefully power wash all roof surfaces with greater than 2,000 psi pressure to remove debris, rust, scale, dirt, dust, chalking, peeling or flaking coatings, etc. Do not force water into the roof system or damage roof surfaces. Wearing personal protective clothing and equipment, remove areas of algae, mildew or fungus with Garland D7 or Simple Green Solution. Rinse at least twice to be sure all cleaning agents or contaminants are completely removed to prevent adhesion issues. If the roof surface becomes contaminated with dirt, dust or other particles at any time during the application of the LiquiTec system, cleaning measures must be taken to restore the surface to a suitable condition.

APPLICATION

Refer to the LiquiTec Restoration Application Guides (Single-Ply, Modified Bitumen or Metal) for complete substrate specific repair, preparation and application requirements.

LiquiTec roof restoration systems typically require either partial reinforcement of seams, laps and details or full fabric reinforcement of the entire existing roof surface.

Mixing

Open LiquiTec container. Remove Part B jug and its plastic holding compartment out of the pail. Mix Part A liquid for one minute using an electric heavy-duty power drill and Jiffy mixer blade (ES model). Cordless drills are not permitted as they will not properly mix the materials. While mixing, slowly pour contents of Part B jug into the Part A pail. Mix the two components together for two (2) minutes moving the Jiffy blade from top to bottom and along the sides to ensure the product is thoroughly mixed. Always mix entire kit contents together as packaged. **Do not break down into smaller quantities.**

PRECAUTIONS

- Product application must not be done when rain or other conditions such as fog or heavy dew are possible within a 12-hour period.
- Moisture survey must be conducted prior to roof restoration to identify any wet areas of the existing roof system that must be replaced with like-materials
- In accordance with Garland's adhesion testing protocol, ensure that the LiquiTec coating bond strength to the existing roof substrate(s) is four (4) pounds per linear inch (pli) or greater
- Storage temperatures should be between 60°F to 80°F (15.6° C to 26.7°C). Indoor ventilated storage is recommended. Ensure job site storage is in a shaded and ventilated area. Do not store in direct sunlight
- Mixed product pot life is 25-35 minutes depending on ambient temperature. Rising temperatures may reduce pot life and increase the product's viscosity at a faster rate than desired
- Mix product near the application area and only enough material that can immediately be applied to the roof
- Dipping a roller into the bucket and rolling the material is not advised, as it can shorten the pot life of the product
- Do not spray
- Coverage rates may vary based on surface condition/texture and do not take into account material loss due to spraying, surface texture, surface absorption, waste, etc.
- Restrict coating application when ambient temperature is greater than 95°F (35°C).
- Roof surface must be at least six Fahrenheit degrees or three Celsius degrees above the dew point and rising
- In areas where the roof is subject to foot traffic, it is recommended to apply a granule non-skid walkway surface
- Excess water on the roof surface can cause the roof to become slippery
- Reinforcement fabric should be used when coating over heavily alligatored surfaces, areas that pond water, and over surface irregularities
- Not intended to restore glaze coats of asphalt
- FM Approved as a maintenance coating only

Technical Data	LiquiTec & LiquiTec Base
Density @ 77°F (25°C) (ASTM D 2939)	9.6 lbs./gal. (1.2 g/ml)
Tear Resistance (ASTM D 624)	449 lbs./in.
Elongation	>800%
Tensile Strength (ASTM D 412)	>2500 psi
Low Temperature Flexibility (ASTM D 522)	-60°F (-51°C)
Hardness	80 Shore A
Lap Shear Strength Modified seam with LiquiTec (ASTM D 7379)	231 lbf/in.
Volume Solids (ASTM D 2697)	100%
Water Absorption (ASTM D 570)	1.53% (24 hr)
Drying Time* (Typical) @ 77°F (25°C) and 50% R.H.	Skin time: 3-4 hours Over-coat time: 6 hours
Packaging	Part A - 4 gal. pail (15.1 l) Part B - 0.5 gal. jug (1.89 l)
Water Leakage Resistance (ASTM D 7281)	Pass

* Higher temperature will result in reduced skin and over-coat time, lower temperature and/or humidity may extend times.

Technical Data	LiquiTec Reinforced System
Dynamic Impact Resistance (ASTM D 5635)	37 joules
Static Puncture Resistance (ASTM D 5602)	20 kg
Tensile Tear (ASTM D 4073)	274 lbf
Tensile Load Strain (ASTM D 5147)	135 lbf/in.
Energy to Break Toughness (ASTM D 5147)	46 in.-lbf/in. ²
Thickness Dry film thickness	80-96 mils (dft)
Water Absorption	2.30%

Eco-Facts	LiquiTec (white)	LiquiTec Base (gray)
VOC (mixed)	0 g/l	0 g/l
Reflectance		-
Initial	0.84	
3-Year Aged	0.71	
Emittance		-
Initial	0.88	
3-Year Aged	0.89	
SRI		-
Initial	105	
3-Year Aged	88	
Microbial Resistance (ASTM G 21)	No microbial growth	No microbial growth

Tested using the Practice for Laboratory Aging of Roofing Materials, as specified in ASTM D7897

For specific application recommendations, please contact your local Garland Representative or Garland Technical Service Department.



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Tests verified by independent laboratories. Actual roof performance specifications will vary depending on test speed and temperature. Data reflects samples randomly collected. ± 10% variation may be experienced. The above data supersedes all previously published information. Consult your local Garland Representative or the home office for more information.

LiquiTec, All-Knight and Garland Greenhouse are trademarks of The Garland Company, Inc.

DESCRIPTION

LiquiTec is an extremely low odor, fluid-applied waterproofing system designed to maintain, restore and upgrade the performance of aged modified bitumen, metal and single-ply roof systems. When applied over Rust-Go® Primer it is suitable for application to steel, galvanized, galvalume, Kynar® coated, copper, aluminum, and stainless steel metal. This two-component, 100% solids, aliphatic polyurea cures quickly to form a highly durable, impact and UV resistant roof membrane that increases the life span of the existing roof.

MATERIALS

The materials used in the LiquiTec metal restoration system include:

1. Coating: LiquiTec Base, LiquiTec
2. Primer: Rust-Go Primer
3. Sealant: Tuff-Stuff® MS
4. Fabric Reinforcement: Grip Polyester™ Soft or UniBond™ ST
5. Cleaning Solution: Garland D7 or Simple Green® Oxy Solve

APPLICATION EQUIPMENT

LiquiTec can be applied at temperatures of 50°F (10°C) and rising, by brush or rollers and squeegee. Rollers should be medium-density shed-resistant 3/8 in. (10 mm) nap. You will also need an electric heavy-duty power drill and Jiffy mixer blade (ES model). Cordless drills are not permitted as they will not properly mix the materials.

INSTALLATION

Installation of the LiquiTec system is accomplished in the following steps: repair, preparation, priming, mixing, and application.

Prior to installation, ensure that adhesion testing was conducted in accordance with Garland adhesion testing procedures to verify a minimum adhesion strength of four (4) pounds per linear inch (pli) for LiquiTec to the applicable substrates. When calculating material requirements for a particular project, consideration must be given to applicator variance and the stretch-out factor for the particular metal roof profile. Any of the LiquiTec coatings may be used interchangeably as base or top coating layers. Best practice is to use a different coating color for each subsequent layer of coating (e.g. gray & white).

Repair

1. All necessary field and flashing repairs must be done according to good construction practices, including replacement of all metal that is deemed unsalvageable or unsafe.
2. All metal panel fasteners must be checked and any loose fasteners must be tightened, or if necessary, replaced with oversized fasteners with neoprene washers. Missing fasteners must be replaced.
3. Stitch-fasten metal panel laps together where gaps are greater than 1/8" wide.
4. Repair gaps, holes and joints in the metal roof with appropriate patching materials.
5. Completely remove existing seam coatings, mastics and sealants.
6. Ensure skylights, scuppers, gutters, penetrations and structures are firmly secured, watertight and in good working condition.

7. Where necessary, install water deflecting crickets behind rooftop mechanical units.
8. All roof areas must promote positive drainage.

Preparation

1. Confirm local water run-off ordinances and restrictions prior to cleaning roof.
2. Carefully power wash all roof surfaces with greater than 2,000 psi pressure to remove debris, rust, scale, dirt, dust, chalking, peeling or flaking coatings, etc. Do not force water into the roof system or damage roof surfaces.
3. Wearing personal protective clothing and equipment, remove algae, mildew or fungus with a Garland D7 or Simple Green® Oxy Solve and scrubbing with a push broom scrub brush. Rinse at least twice to be sure all cleaning agents or contaminants are completely removed to prevent adhesion issues.
4. Rust must be removed using the most rigorous method suitable for each particular job to ensure substrate is smooth and free of loose rust. Jet water blasting, sand blasting, grit blasting and/or power wire brushing is effective.
5. For optimal metal surface preparation to enhance coating adhesion, grit blasting is recommended.
6. Wipe galvanized metal surfaces clean with MEK prior to application.
7. If the roof surface becomes contaminated with dirt, dust or other particles at any time during the application of the LiquiTec system, then cleaning measures must be taken to restore the surface to a suitable condition.
8. Ensure roof is dry prior to application.

Priming

Immediately after cleaning, prime entire metal roof with Rust-Go Primer at 0.25 gal./ 100 sq. ft. (0.11 l/m²) to improve adhesion of LiquiTec Base or LiquiTec coating.

Mixing Procedure

1. Open LiquiTec container
2. Remove Part B jug and its plastic holding compartment out of the pail.
3. Mix Part A liquid for one minute using an electric heavy-duty power drill and Jiffy mixer blade (ES model). Cordless drills are not permitted as they will not properly mix the materials.
4. While mixing, slowly pour contents of Part B jug into the Part A pail. Mix the two components together for two minutes moving the Jiffy blade from top to bottom and along the sides to ensure the product is thoroughly mixed.

Always mix entire kit contents together as packaged. Do not break down into smaller quantities.

Note: Mixed product pot life is 25-35 minutes depending on ambient temperature. Rising temperatures may reduce pot life and lower the product's viscosity at a faster rate than desired. Lower product viscosity will increase flow rate making it more difficult to apply the coating at the specified coverage rate and fully saturate any fabric reinforcement.

APPLICATION

Fasteners

Create a watertight seal on all fastener heads by applying a heavy dab of Tuff-Stuff MS polyurethane sealant.

Treatment of Metal Panel End Laps & Penetrations

(Choose Method 1 or 2)

Method 1: Application of UniBond ST

1. Always begin with flashing seams, joints and details.
2. Verify the surface is clean and properly prepared.
3. Round corner edges of UniBond ST with scissors.
4. Remove the clear release liner from the back in workable sections.
5. Center 6" wide UniBond ST over the middle of lap. For other details requiring reinforcement such as drains, penetrations and curbs, 12" wide UniBond ST is available.
6. Use care to install the tape uniformly. Do not stretch or cause air pockets, wrinkles or fishmouths.
7. Apply pressure to tape starting at the center and work toward outside edge with a steel roller to activate the bonding process.
8. Inspect the tape to ensure that it is properly installed. Verify edges are tightly fixed to surface. If any discrepancies are present, repair before the coating is applied.
9. Saturate the tape's polyester surface with LiquiTec Base or LiquiTec coating and allow to cure before applying field coating.

Method 2: Application of Three-Course LiquiTec Base

1. Always begin with flashing seams, joints and details
2. Determine where the first run of 6 in. (150 mm) wide Grip Polyester Soft reinforcement will be started and verify the surface is clean. For other details requiring reinforcement such as drains, penetrations or curbs, 12" and 40" wide Grip Polyester Soft reinforcement is available.
3. Position Grip Polyester Soft to roll out, apply coating at 3.0 gal./100 sq. ft. (1.22 l/m²) extending 4 in. (100mm) on each side of lap to where the reinforcement is to be applied. Immediately roll reinforcement into the coating and completely saturate the surface, ensuring full encapsulation of fabric without pinholes, voids or openings.
4. Allow to cure before applying field coating.

Treatment of Metal Panel Side Laps

On any uncrimped metal panel side laps, apply LiquiTec Base 8 in. (200 mm) wide over the center of the lap.

Metal Field Coating

1. Prior to field coating application, the local Garland Representative needs to complete an inspection of all treated seams and details.
2. Apply a base coating of LiquiTec Base in a uniform manner at minimum application rate of 1.5 gal./100 sq. ft. (0.61 l/m²) over the entire roof surface, including all flashings. Allow to cure thoroughly, but no more than 72 hours.
3. Apply a top coating of LiquiTec Base or LiquiTec coating in a perpendicular direction over the base coat at 1.0 gal./100 sq. ft. (0.41 l/m²).

INSPECTION

Inspect entire roof area and touch-up deficient areas with additional LiquiTec as necessary to ensure complete and uniform coverage. Solvent wipe coating with acetone or MEK if it is exposed over 72 hours prior to overcoating. Special attention should be given to critical areas of roof, including roof penetrations, transitions, existing membrane seams, flashings and drains.

LIMITATIONS

These are general guidelines for application of the LiquiTec system. The material requirements may vary depending on the specific job requirements. If unusual conditions exist, contact your local Garland Representative. Garland's fluid-applied elastomeric roof systems must be applied to structurally sound substrates and properly prepared surfaces. All surfaces must be clean and dry before application of coatings. Garland's roof systems must not be applied over wet insulation or roofing materials. Failure of the substrate does not constitute failure of the Garland coating or system. Garland's systems are designed for use on roofs with positive drainage.

1. Product application must not be done when rain or other conditions such as fog or heavy dew are possible within a 24-hour period.
2. Roof surface must be at least six Fahrenheit degrees or three Celsius degrees above the dew point and rising.
3. Surfaces must always be clean before application of product. Care must be taken to ensure that on-site manufacturing emissions or extended time intervals after original cleaning does not interfere with any stage of the coating applications. If either condition occurs, then cleaning may be required again.
4. Drying time is affected by numerous factors, including temperature, direct sunlight, relative humidity, air movement, thickness, etc. Coating skin time is between 3-4 hours and overcoat time is 6 hours at 77°F (25°C) and 50% relative humidity. Higher temperature and/or humidity will result in reduced skin and overcoat times; lower temperature and/or humidity may extend skin and overcoat times.
5. Thinning of coating materials is not permitted.
6. Adequate coating thickness is essential to performance. A controllable area should be measured and the specified material applied. The minimum coverage rate must be achieved throughout the entire fluid-applied roofing assembly and must be verified using a wet mil gauge during application. Multiple coats may be necessary on verticals and steep slope to prevent sagging.



7. Solvent wipe coating with acetone or MEK if it is exposed over 72 hours prior to overcoating.
8. Deviations from these application guidelines and specific material requirements may seriously affect the fluid-applied roofing system performance and are strictly prohibited.
9. Applicator must comply with all applicable local, state and federal regulations if lead-based paint or other hazardous materials are encountered.
10. Roofing is hazardous work and coatings are very slippery when wet. Comply with fall protection rules and regulations
11. Do not spray

COLD WEATHER RESTRICTIONS

Do not attempt application if ice, snow, moisture or dew is present. Restrict application when the overnight temperature drops below 40 F (4.4 C) Ambient temperature must be 50°F (10°C) or rising through the day. Cooler temperatures will negatively impact the properties of the system. Contact your Garland Sales Representative for proper cold weather applications.

HOT WEATHER RESTRICTIONS

Do not attempt application if moisture or dew is present. Ambient temperature must be less than 95°F (35°C). Contact Garland Sales Representative for proper hot weather application.

STORAGE

LiquiTec on job site should be stored in a shaded ventilated area under a light-colored reflective tarp. Do not store in direct sunlight. Storage temperature should range from 60-80°F (15°C to 26°C). Indoor ventilated storage is recommended, specifically when ambient temperature is below 60°F (15 °C) or above 80°F (26 °C).

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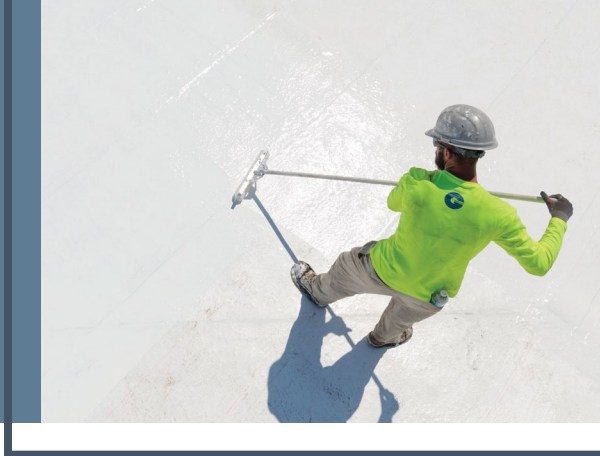
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GARLAND FLUID-APPLIED ROOF SYSTEMS

Impressive Strength...Seamless Protection



EXPLORING YOUR OPTIONS... CONFIDENTLY



Roofs can leak. There's no denying that. And while leaks can be frustrating and inconvenient, the mere existence of them doesn't always mean it's time for a new roof. Same with aging. As roofs age, the effects of constantly being exposed to the elements become more visible. That doesn't mean replacement is the only option.

Restoring your roof with a fluid-applied system can add years of robust, watertight protection and strength while simultaneously improving aesthetics and energy efficiency. Let your local Garland representative explain the numerous benefits restoration can offer so you can explore your options with confidence.

WHY CONSIDER FLUID-APPLIED SOLUTIONS



COST-SAVING BENEFITS

- Can cost up to 50% less* than a tear-off and replacement
- Can reduce energy consumption by up to 15%
- Opportunities for tax benefits and energy rebates



INSTALLATION ADVANTAGES

- Requires less labor and material
- Application is less disruptive and quicker than conventional roofing
- Can be easily applied with standard equipment



PERFORMANCE ATTRIBUTES

- Provides superior waterproof performance
- High impact resistant formulas available
- Easily maintainable and sustainable



ECO-FRIENDLY

- Select fluid-applied systems can extend a roof's useful life 20 years or more
- Avoiding a tear-off diverts waste from landfills
- Lower carbon footprint
- Reflective surfaces help reduce toxic greenhouse gas emissions

*Will vary by region due to variable costs of labor, bonding, etc.



Fluid-applied roof membranes are often incorrectly categorized as maintenance coatings. Though similar in appearance, fluid-applied systems provide numerous distinctive benefits. These fabric-reinforced restoration systems exhibit impressive strength and provide seamless waterproofing protection to aged modified bitumen, built-up roofs (BUR), metal and single-ply roofs.

A HELPFUL DISTINCTION

A maintenance coating is used to extend the life of an **existing** roof cover.

A reinforced fluid-applied membrane is defined by the NRCA as an **additional** roof system.

FLUID-APPLIED ROOF SYSTEM	VS.	MAINTENANCE COATING
<p>Roof system</p> <p>Waterproofing</p> <p>90 to 110</p> <p>Fabric-reinforced</p> <p>10 to 20+ years</p> <p>Restoration waterproofing warranty</p> <p>Polyurethane, polyurea, PMMA</p>	<p>NRCA DEFINITION</p> <p>WATERTIGHT PERFORMANCE</p> <p>MILS OF CURED FILM</p> <p>REINFORCEMENT</p> <p>LIFE CYCLE</p> <p>WARRANTY</p> <p>COMPOSITION</p>	<p>Protective coating</p> <p>Water resistant</p> <p>5 to 30</p> <p>Not reinforced</p> <p>8 to 12 years</p> <p>Material only warranty</p> <p>Acrylic and aluminum</p>



LIQUITEC® RESTORATION SYSTEM

LiquiTec is Garland's premier fluid-applied waterproofing system. With strength and durability comparable to that of truck bed liners, LiquiTec forms a virtually impenetrable roof surface protected against damage caused by hail, foot traffic, wind scour and other impact. LiquiTec, which is CRRC-rated, has a high solar reflectance, designed to shield roofs from UV damage. The fluid-applied system can be applied over aged modified bitumen, BUR, metal, and single-ply roof systems.

WHY LIQUITEC IS THE BEST CHOICE

LiquiTec has **zero VOCs** so it is ideal for sensitive applications where odor is a significant concern.

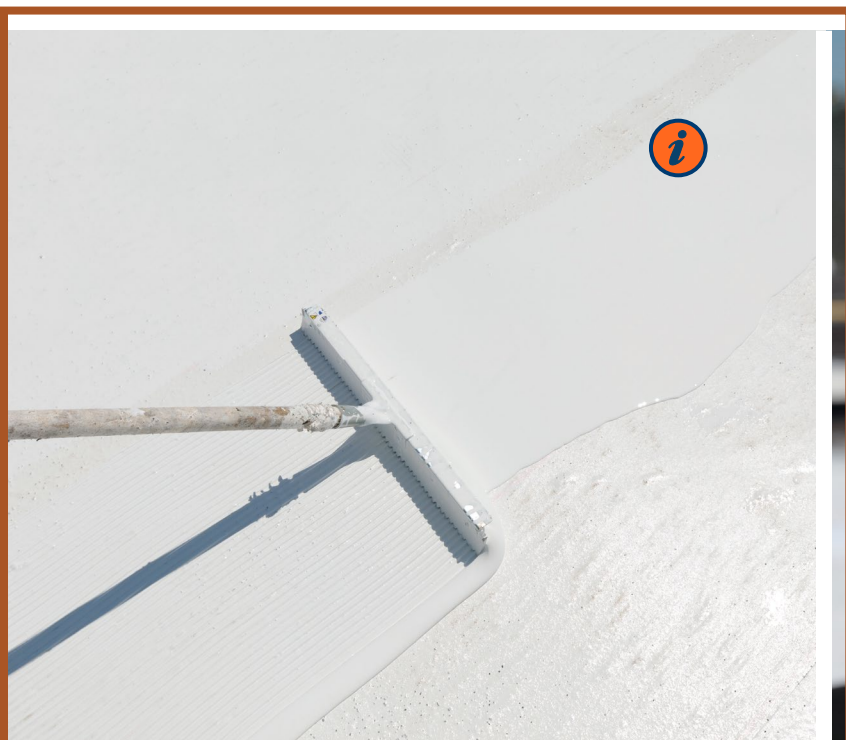
It is **extremely tough** and built to resist splitting and cracking to provide long-term watertight protection.

LiquiTec exceeds industry standards for **waterproofing performance**.

This two-component system **cures quickly**, allowing for faster installation and lower labor costs.


LiquiTec uses an innovative **two-component curing technology** so installation is less dependent on the weather to provide watertight protection more quickly.

Its bright white color **protects the roof** from UV damage while also reducing interior cooling costs and toxic greenhouse gas emissions.





LEVERAGING LIQUITEC'S STRENGTH

ASTM testing is the industry standard for evaluating the strength and performance of products. But what do those tests really tell us? We break it down with some relatable data to put into perspective the true strength of LiquiTec. 

ASTM D5635

Dynamic Puncture Resistance: ability to resist moving object punctures

Result: LiquiTec resists the force of baseball-sized hail, verifying that the fluid-applied membrane can withstand extreme weather conditions.



ASTM D5602

Static Puncture Resistance: ability to resist dead loads

Result: A one square foot area of LiquiTec supports 13 tons – the equivalent of four pickup trucks parked in a one square foot area. LiquiTec is built to handle heavy loads on the roof without failing (e.g. snow, HVAC equipment, solar panel systems, etc.)



ASTM D522

Low-Temperature Flexibility: ability to resist cracking when cold

Result: LiquiTec resists cracking at temperatures as low as -60°F (-51.1°C), which is colder than the average winter temperature in the South Pole. This premier fluid-applied system maintains its high performance even in extreme temperatures.



ASTM D7281

Water Leakage Resistance: verifies waterproofing performance of roof membranes (fluid-applied membranes are not required to be tested at this standard)

Result: LiquiTec's membrane remained watertight when it was exposed to ponding water and typical roof movement, proving its durable and reliable protection.



WHITE-KNIGHT®/WHITE-STALLION® PLUS/WC

White-Knight/White-Stallion Plus/WC has been a longstanding staple in the Garland line, providing decades of proven waterproofing protection to smooth and mineral modified bitumen, metal and single-ply roofs. This highly reflective, fluid-applied restoration membrane is infused with “moisture triggered” technology for a faster cure and superior strength and durability. White-Knight Plus and White-Knight Plus WC are ENERGY STAR® qualified and listed with the Cool Roof Rating Council. The WC formula is VOC compliant in the South Coast AQMD.

ADVANTAGES

Saves labor costs - faster cure speeds up installation

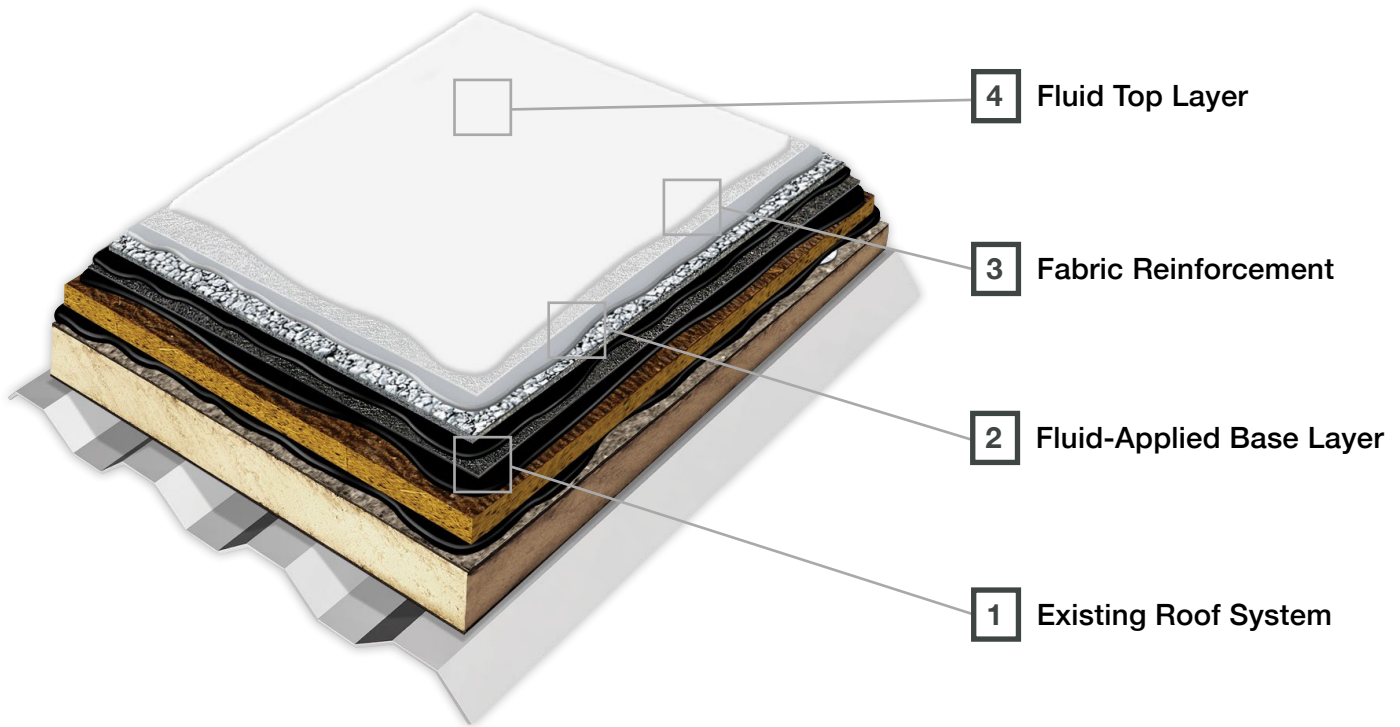
Quicker protection - cures from the top down, providing faster rain resistance and the potential for over coats the same day

Seamless protection - monolithic membrane with pinhole mitigation ensures watertight protection

Durable - superior tensile and tear strength provides long-term performance even in harsh weather conditions

Reduces cooling costs - bright white surface helps decrease rooftop temperatures





BUILT FOR **STRENGTH**

Although the white membrane is often all you'll see of a fluid-applied system, it's not the full picture. The components beneath the surface contribute significantly to the overall strength of the system. The base layer provides tenacious adhesion to the original roof substrate while the fabric reinforcement bolsters the system's strength at roof transitions where stress and strain are the greatest. Each component works seamlessly together to ensure the system provides the trusted protection you deserve.



GARLAND'S ADDITIONAL FLUID-APPLIED SOLUTIONS

Garland's fluid-applied systems offer some of the industry's toughest protection and are compatible with most existing roof assemblies. Our innovative products are built to exceed industry standards to ensure superior waterproofing performance.

CPR™ White Coating is a highly reflective fluid-applied membrane that provides excellent protection against UV and deterioration and can be easily applied over sloped, metal roof surfaces to provide lasting waterproof protection. It cures to a monolithic rubbery membrane with high tensile strength and remains elastic in extreme temperatures.

Energizer® BK is a cold-applied asphalt/coal tar blended fluid-applied membrane that provides natural resistance to moisture, chemicals, UV and aging. It's best suited for applications where heightened levels of chemical and ponding water resistance are required.

Energizer K Plus FR incorporates the incredible strength of KEVLAR® aramid fibers to add increased tensile strength, superior UV cracking resistance and added fire resistance to the fluid-applied membrane.

Energizer LO is a low odor asphalt/polyurethane waterproofing membrane that cures much faster than traditional asphalt coatings. It is intended for applications like hospitals, schools and food production plants where accelerated cure times and odor limitations are preferred.

Revitalizer™ is a heavy-bodied asphalt restoration system that seals, waterproofs, preserves and protects properly prepared smooth built-up or modified bitumen roof systems. When combined with fabric reinforcement, Revitalizer provides exceptional tensile strength and elongation.

Revitalizer Metal is an asphalt-based, fabric-reinforced fluid-applied restoration system designed to waterproof and prevent rusting of existing metal roof systems. The system readily conforms to surface irregularities and accommodates building movement.





WHICH SYSTEM IS BEST FOR YOU?

Determining the right solution for your roof is critical to its long-term success. The substrate chart below identifies ideal systems based on roof type. Lean on your Garland representative for expertise in product recommendations.

FLUID-APPLIED SYSTEMS SUBSTRATE COMPATIBILITY

	Modified Bitumen Mineral or Smooth	Asphaltic Smooth BUR	Coal Tar	Metal	Aged Single-Ply
LiquiTec	■	■		■	■
CPR				■	
Energizer BK	■	■	■		
Energizer K Plus FR	■	■			
Energizer LO	■	■			
Revitalizer	■	■			
Revitalizer Metal				■	
White-Knight Plus / White- Stallion Plus	■	■		■	■
White-Knight Plus WC	■	■		■	■

FIRST STEP TO RESTORATION: QUALIFICATION

Understanding the condition of your existing roof is the first step in determining if it qualifies for restoration. Garland representatives follow a stringent and thorough evaluation process, considering several factors such as the general condition of the roof's deck, surface, seams and insulation. Ensuring a solid foundation for the application of a fluid-applied system is key to its performance.

HOW WE QUALIFY YOUR ROOF

Roof Analysis

Gather information on the existing roof, such as type, age, preventive maintenance schedule, etc.

Evaluate the condition of the roof deck, roof surface, and seams and flashings, looking for areas that require repair

Identify the cause of leaking

Moisture Survey

Moisture survey and core cuts are conducted to identify any areas of wet insulation/roofing

Typically, roof restoration is an option if less than 25% of the insulation by area is wet (additional factors are always taken into consideration when recommending a solution)

Adhesion Testing

Ensures adequate adhesion and compatibility of fluid-applied systems with existing roof substrates


Select fluid-applied systems require more than four pounds per linear inch (pli) to ensure sufficient bond to the roof

Required to qualify for specific Garland's warranties.

CLEAR® ROOF ANALYSIS

Garland's roof core sample testing program is an additional resource available to qualify the roof for restoration. CLEAR – or Comprehensive Laboratory Effective Analysis Reporting™ – provides answers to questions such as:

- This roof is failing, but why?
- What type of roof is this?
- Does this roof need replaced?
- Is this roof a possible candidate for a moisture survey/restoration?
- What type of coating can be applied over this roof?
- Was there an application error during installation?
- Is repairing this roof worth the cost?

Reports provide factual information on the core sample tested, but will not make recommendations on whether to repair, restore or replace the roof. 

GETTING YOUR ROOF **READY**

Roof preparation and proper application are critical to the performance of your fluid-applied system. The existing roof must be brought back to a sound, watertight condition before the new system can be applied. Garland's recommended process includes:

STEP 1: Removing and replacing any wet insulation

STEP 2: Conducting any subsequent repairs

STEP 3: Cleaning the roof of all contaminants, dirt and debris and ensure the roof is completely dry to obtain proper adhesion

STEP 4: Reinforcing seams to provide critical sealing at stress points

STEP 5: Restoring or replacing flashings as necessary



YOU CAN SAVE MORE THAN **MONEY**

While saving money is a nice perk, the benefits of restoring your roof extend beyond the financials. Lengthening the useful life of your existing roof keeps those materials out of landfills – a positive move for the environment considering some 40 million tons of roofing waste end up in landfills every year. Along with that, reflective fluid-applied roof systems help lower energy usage, subsequently reducing toxic greenhouse gas emissions.

OTHER BENEFITS

You can install another fluid-applied roof system over the original to extend the life-cycle of the initial roof system

The existing roof membrane and insulation is maintained and continues to provide waterproofing along with insulating value

The aesthetics of your building will be improved, increasing its value and appeal

Operations can continue during installation without interruption



COMPLEMENTARY PRODUCTS

Complete your fluid-applied roof system with Garland's accessory products, including primers, reinforcements and surfacing.

PRIMERS

Garla-Block™ Primer

Enhance the adhesion of maintenance coatings and fluid-applied roof systems with Garla-Block Primer, a bleed-blocking, water-based acrylic primer that has no odor and is low VOC.

Garla-Block can be used with polyurethanes, polyurea, water-based acrylics and aluminized asphaltic coatings and prevents discoloration caused by asphalt roof systems.

Garla-Prime®/VOC

A quick-drying, asphalt-based roof primer that resaturates felts to form a tough, elastic bonding surface for Garland coatings. It can also be used to prime metal, masonry, wood and bare concrete roof decks. Garla-Prime VOC is the low VOC alternative.

Rust-Go® Primer

A high-quality alkyd primer that serves as a rust inhibitive primer or a base primer to enhance adhesion of various coatings over metal substrates.

SURFACING OPTIONS

Add granules to your fluid-applied membrane to create non-skid walkways around high traffic areas, rooftop equipment or as safety markers around roof edges and skylights.

REINFORCEMENTS

Grip Polyester™ Firm/Soft

Grip Polyester is an incredibly strong reinforcement fabric used in fluid-applied restoration systems. It has superior tensile strength, excellent elongation and is unaffected by water immersion and UV radiation when saturated with fluid-applied products.

Ulti-Mat®

When incorporated into a roof restoration system, this full strand fabric seals, waterproofs, preserves and protects the roof system. Ulti-Mat is designed to reinforce seams in single-ply and metal restoration systems.

UniBond™ ST

Reinforce seams and penetrations on metal, modified bitumen and single-ply roof systems with UniBond ST to create an instant barrier. UniBond ST aggressively bonds to a variety of surfaces and is approved for use with select Garland fluid-applied roof systems.



FLASHINGS & DETAILS

Fluid-applied roof systems offer the advantage of providing seamless watertight protection at flashings and around penetrations, ensuring the elements remain where they were intended - on the outside of your building. The innovative design of the system and ease of installation ensures a monolithic finish from the wall to the field. Fluid-applied membranes easily conform to difficult details to create a tight seal around pipes, drains and curbs. The strength of the system at flashings and details is especially critical since these areas are at the highest risk for leaks.





QUALITY INSTALLATION MATTERS

The impact installation has on product performance can't be overstated. The highest quality product installed incorrectly won't provide the protection you were promised. At Garland, we view contractor selection as important as product selection. That's why we've built a strong network of skilled, trusted contractors you can rely on. The combination of a high-performance product carefully installed by a master in their craft is your best assurance of long-term protection.

Our local and regional contractors have been screened for indicators of success, including:



FINANCIAL SECURITY



PERSONAL INTEGRITY



**SAFETY PERFORMANCE/
COMPLIANCE WITH OSHA
AND HSE STANDARDS**



WORKER SAFETY



**STRINGENT COMPLIANCE
WITH GARLAND'S RIGOROUS
PERFORMANCE STANDARDS**



**APPROPRIATE
CERTIFICATIONS
AND LICENSING**



QUALITY WORKMANSHIP





SEAMLESS SERVICE

Roofing and waterproofing projects are oftentimes complex and overwhelming, and that's why your Garland rep is such an important asset. Having a trusted partner by your side during the process provides you with that extra level of confidence to know your decision is the *right* one.

- Garland reps are expertly trained in determining if your existing roof is a candidate for restoration
- They always make sure you understand the *why* behind a recommended solution and explain how it will solve your problem
- They work with their network of locally-based contractors to ensure a professional installation
- Garland reps are driven to do what's right for you, *always*

WHAT MAKES YOUR GARLAND REPRESENTATIVE DIFFERENT?

Employee owners: Garland reps are employee-owners with a vested interest in the company's overall success, which drives their dedication and commitment to customers.

Locally-based: Garland reps live in or nearby the communities where they work and use their knowledge of the local community, building codes and general construction practices to provide personalized solutions.

Proven processes: Our reps are committed to following Garland's proven 12-step process to ensure your project will be a success.

The Garland Way

Garland is an employee-owned company, which is why ownership is a part of every product we manufacture and service we offer. It is what drives Garland employees to always do what is right for their customers and their company. It has led to the development of numerous innovative and industry-leading products, has resulted in thousands of Garland systems being installed on facilities across North America and the U.K., and has helped us earn the trust of countless customers.

Through ownership, Garland has created a culture of employees who go above and beyond to provide customers with high-caliber building envelope products and a level of service unmatched in the industry. Ownership is what we believe has led to Garland's tremendous and continued success throughout our more than 125 years in business.

Get to Know Garland

- Founded in 1895 and headquartered in Cleveland, Ohio
- Employs more than 220 territory managers across the U.S., Canada and the U.K.
- Owns 90+ patents and over 400 trademarks in the commercial building market
- Manufactures nearly 95% of its roof products sold in North America
- Was among the first manufacturers to offer green roof systems in North America and remains an industry leader in green initiatives today
- Introduced the first high-performance modified bitumen roof system manufactured in North America
- Developed the industry's first 40-year roof membrane
- First in the U.S. commercial roofing industry to receive ISO 9002 certification
- Has been 100% employee owned since 2004
- Donates thousands of dollars to local and national charities each year

For more information, visit us at: www.garlandco.com

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Photo Report

Client: City of Novi

Facility: Novi Ice Arena

Report Date: 08/26/2021

Title: Novi Ice Arena - Metal Section

Roof Section: Section A / Standing Seam Metal

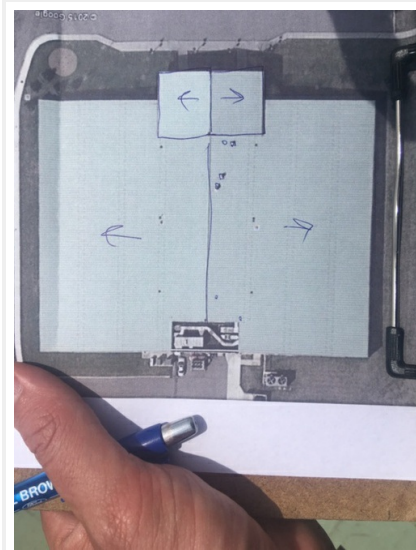


Photo 1

Overview - Slope



Photo 2

Overview - Standing Seam metal panel; trapezoid style



Photo 3

Overview - Ridge



Photo 4

Panel Ends - foam enclosures in poor condition leaving the roof susceptible to moisture entry. Fasteners have begun to back out over time.



Photo 5

Surface Corrosion notes on panels during inspection. Deterioration will continue to grow further compromising the thin metal panel.



Photo 6

Sealant has been applied along horizontal seams in an attempt to limit moisture entry. These sealants have a 3 to 5 year lifespan.



Photo 7

Another example of sealant deterioration noted at transition points throughout the roof.



Photo 8

Pitting, Surface corrosion.



Photo 9

Multiple repair attempts have been made over this weak point in the system.



Photo 10

Closer look reveals multiple types of sealant which are not compatible with each other.



Photo 11

Debris was noted during the inspection.



Photo 12

Additional examples of surface corrosion. The protective coating has worn, leaving the metal exposed and allowing for oxidation.



Photo 13

Gutter assemblies have been damaged due to ice and snow throughout the years.



Photo 14

Repair to a previously installed roof top penetration. The repair material is in poor condition.



Photo 15

Previously installed ice guards which have failed.



Photo 16

The rubber flashing boots originally installed on the roof have dried and become brittle. Punctures were noted during inspection.



Photo 17

Closer look at Flashing Failure.