Spray Applied Blast Mitigation System
Life Shield® LS-425 Hyperelastomeric Spray Applied Coating

1.00 GENERAL

1.01 Scope:

A. This specification covers the work necessary to furnish and apply a fluid applied polyurea onto a surface.

B. Spray applied coating system, complete, as shown on the drawings and as specified herein. Work includes, but is not limited to the following:

1. Surface preparation, concrete surface repair, crack and joint detailing, penetration detailing, and installation of the Spray applied coating system

2. Surface preparation and protective coating of miscellaneous exposed structural and mechanical metals as shown on the drawings.

C. Excluded from this application specification are blast mitigation requirements and engineered installation designs of the system against the specific threat conditions for the building. Installation designs by third party engineers for blast threat mitigation such as spray applied flange width, location of spray applied flanges, or use of mechanical fastening systems are strongly recommended.

1.02 Related Work Specified in Other Sections

A.	Section 03300	Cast-in-Place Concrete
B.	Section 03251	Expansion and Construction Joints
C.	Section 07194	Under Slab Vapor Barrier
D.	Section 07200	Exterior Below Grade Waterproofing
E.	Section 07900	Joint Sealants
F.	Section 09900	Painting

1.03 Referenced Specifications Codes and Standards

A. Without limiting the generality of other requirements of these specifications, all work hereunder shall conform to the applicable requirements of the referenced portions of the following documents, to the extent that the requirements therein are not in conflict with the provisions of this Section. All references and standards listed shall be the latest revisions. Joint and individual documents are referenced.

1. SSPC – The Society for Protective Coatings

40 24th Street, 6th Floor
Pittsburgh, PA 15222-4643
(412) 281-2331

2. NACE – National Association of Corrosion Engineers
P.O. Box 218340
Houston, TX 77218-8340
(281) 492-0535

   a. SSPC-SP 13/NACE No. 6, Surface Preparation of Concrete
   b. SSPC-SP10/NACE No. 2, Near White Metal Blast Cleaning
   c. SSPC-SP 6/NACE No. 3, Commercial Blast Cleaning

3. ICRI – International Concrete Repair Institute
3166 S. River Rd., Suite 132
Des Plaines, Il 60018
(847) 827-0830

   a. Technical Guideline No.03372, “Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays”
   b. Technical Guideline No. 03731, “Guide for Selecting Application Methods for the Repair of Concrete Surfaces”
   c. Technical Guideline No. 03741/SSPC-TR 5/NACE Pub 02203, “Design, Installation, and Maintenance of Protective Polymer Flooring Systems for Concrete”

4. ASTM – American Society for Testing and Materials
100 Barr Harbor Drive
West Conshohocken, PA 19428-2959
(610) 832-9585

   a. ASTM F1869 “Standard Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride”
   b. ASTM E-337: Test Method for Measuring Humidity with a Psychrometer
   c. ASTM D 4258 “Practice for Surface Cleaning Concrete for Coating”
   d. ASTM D 4261 “Practice for Surface Cleaning Unit Masonry for Coating”
   e. ASTM D 4262 “Test Method for pH of Chemically Cleaned or Etched Concrete Surfaces”
   f. ASTM D 4414 “Standard Practice for Measurement of Wet Film Thickness by Notch Gages”
   g. ASTM Committee D01.23: Test Method for Nondestructive

Measurement of Dry Film Thickness of Applied Organic Coatings Using an Ultrasonic Gauge

h. ASTM D 4541 "Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers"

5. ACI – American Concrete Institute
Box 19150, Redford Station
Detroit, Michigan 48219
(248) 848-3700

a. ACI 503 "Use of Epoxy Compounds with Concrete"
b. ACI 504 "Guide to Sealing Joints in Concrete Structures"

1.04 Submittals:

A. Submit product data for each component specified including data substantiating that the proposed materials comply with specified physical property requirements, and recommendations by the manufacturer covering all materials.

B. Submit product data for system as required by authority specified including data substantiating that the proposed materials comply with specified physical property requirements, and recommendations by the manufacturer covering all materials.

C. Submit blast performance validation data as required by owner, contractor, or cognizant authority from an independent authority or testing laboratory.

1.05 Quality Assurance

A. Acceptable Manufacturers: A company with a minimum of 5 years experience in manufacturing of, and providing technical service for polyurea elastomeric systems equivalent to those specified herein.

B. Single Source Supply: All products described in Part 2.01 shall be manufactured by or approved for use by the manufacturer of the spray applied coating system specified herein.

C. Installer (installation sub-contractor) Qualifications: Engage only factory trained and qualified applicator that has successfully completed applications using specified materials on projects of similar size and scope.

1. Provide written training certification from the equipment manufacturer and the material manufacturer or the Polyurea Development Association or equivalent.

2. Provide certification of Life Shield Engineered Systems, LLC certification.

D. Equipment Requirements

1. Correct material processing equipment is critical in achieving correct mix for the plural component system specified.

2. Equipment must be heated plural component unit capable of consistently producing 2200 psi, at 150^{o}F to 170^{o}F, with an output of up to 2 gallons per minute.

3. Acceptable pumps and spray gun: Gusmer H-20/35 using GX-7DI, GX-7 400 or GX-8 direct impingement spray gun or Graco Reactor EX-P2 or HXP3 system "Fusion" GX-7 DI, GX7-400, or GX-8 plural component direct impingement spray guns. Other heated, plural component equipment, for application of 100% pure polyurea may be acceptable when approved by the polyurea manufacturer in writing.

E. Substitutions

1. Manufacturers seeking approval of products other than the specified system must supply cured samples, full product information, project histories and references, technical data with specifications, MSDS and certifications regarding conformity of physical and performance properties from an independent authority or testing laboratory. The product being submitted for approval must meet all requirements of the performance properties specified within this specification. Contractors seeking approval to install substitute materials shall provide documented proof of training and approved status by equipment and material manufacturers. Compliance with the above quality assurances must be provided in written form at least fourteen (14) days before bids are received. Omission or non-conformance of any item will result in rejection of the request.

F. Pre-Installation Conference

1. The contractor, the installation sub-contractor, and spray applied coating system manufacturer's representative shall meet on site with the owner's representative as required. Particular emphasis shall be placed on these specifications, safety, weather conditions, surface preparation, material application, installation design, and inspection.

2. The contractor shall submit to the owner's representative any revisions or changes agreed upon, reasons thereof, and parties agreeing or disagreeing with them.

G. Substrate Conditions: Do not proceed with work until substrate preparation and tolerances have been approved by the owner's representative, spray applied coating system manufacturer's representative, the approved installation sub-contractor, and the contractor.

1.06 Delivery, Storage, and Handling

A. Deliver products to the job site in manufacturer's original, unopened containers bearing manufacturer's name and label and the following information

1. Product name
2. Product description (generic product classification)
3. Manufacturer's lot number

D. Store materials in sealed original manufacturer's containers. Store materials in a protected area out of direct sunlight. Keep containers clean and undamaged. Adhere to manufacturer's published storage temperature and shelf life recommendations. Protect all materials from freezing.

1.07 Warranty

A. Installation sub-contractor shall provide a ____ year warranty on a single document against defects of material and workmanship. Warranty shall commence on the Date of Substantial Completion.

B. Any defective work discovered during the ____ warranty period shall be corrected by the installation sub-contractor in accordance with the manufacturer at no additional expense to the Owner.

C. The _____ year limited joint warranty excludes failure caused by moisture vapor emissions (MVE), negative-side moisture migration, movement exceeding 1/8", failure of the substrate, abuse, conditions that exceed the limitations of the materials, sufficiency of the design, incidental and consequential damages, and other causes beyond the installation sub-contractor's control.

2.00 PRODUCTS

2.01 Acceptable Manufacturers and Materials

A. The spray applied coating system will consist of, LS-100 epoxy primer for masonry and concrete, STEEL-SEAM FT910 Epoxy Patching and Surfacing Compound, TPM 700 series repair mortars, Life Shield LS-425 Hyperelastomeric Coating. For interior use Flame-Control 2020 (optional) and Sherwin-Williams Duration, Cashmere or Harmony interior latex paints. For exterior use Acrolon 218 HS series of aliphatic polyurethane topcoats. All products are specified as a

standard of quality, and are manufactured by The Sherwin-Williams Company, Cleveland, Ohio.

1. Concrete repair of surface defects – Designated areas of the concrete deck shall receive application of Sherwin-Williams Cor-Cote Epoxy Polymer Concrete, Steel-Seam FT910 epoxy patching and surfacing compound, or TPM series repair mortar. Thickness shall be sufficient to fill voids and restore the surface to required surface plane. The selection of cementitious or epoxy mortar shall be at the discretion of the contractor to meet the desired requirements of workability and cure time.

2. Concrete Crack and Joint Details – Exposed cracks, construction joints, contraction joints, and isolation joints shall be prepared and detailed in accordance with the attached detail drawings using Sherwin-Williams Stampede polyurethane sealant or EnviroLastic JS-80 polyurea sealant or equivalent. Should any conditions or joint design be discovered that is not detailed in the attached drawings, the contractor shall notify the owner and consult with the material manufacturer for recommendations.

2.02 Coating Performance Criteria

A. The spray applied coating system shall be resistant to cracking from concrete shrinkage and atmospheric thermal movement at construction joints and contraction joints up to 1/8".

B. Physical Properties

Life Shield LS- 425

PROPERTY	TEST METHOD	RESULTS
Tensile Elongation	ASTM D-638	>400%
Tensile Strength	ASTM D-638	>2,800 psi
Tear Strength	ASTM D-624	>500 pli
Shore D Hardness	ASTM D-2240	51
Tensile Modulus	ASTM D-638	
	100% Modulus	>1100 psi
	300% Modulus	>2,100 psi
Secant Modulus	ASTM D-638	>27,000psi
Young's Modulus	ASTM-D-638	>35,000psi
Flash Point		> 200°F
Gel Time		15 seconds
Solids by Volume		100%
Water Vapor Permeance	ASTM E96	0.5 grains/hr ft2 in Hg
Abrasion Resistance	ASTM D-4060, CS-17	6.0 mg. wt. loss

Coefficient of Thermal Expansion	ASTM C-531	4 x 10^{-5} in./in./F.
Flame	SWBTC	Self extinguishing
Gardner Impact	ASTM D-2794 Direct and Indirect (Applied to 1/32" steel panels)	>160 in-lbs.
Mandrel Bend	ASTM D-522 Conical bend (Applied to 1/32" steel panels)	Pass
Flexibility / Crack Bridging @ -15 F (-26^{0}C)	ASTM C-836	>1/8" Pass

3.0 EXECUTION

3.01.1 Surface Preparation

A. Concrete

1. The NACE/SSPC Joint Surface Preparation Standards for concrete surface preparation are incorporated in and made part of this specification. All references to SSPC SP-13/NACE No 6 designate the definitions and other requirements in these documents. The International Concrete Repair Institute (ICRI) Technical Guideline #03732, Guide to Surface Preparation of Concrete to Receive Sealers, Coatings and Polymer Overlays shall be used to visually evaluate the concrete surface profile. Refer to Sherwin-Williams' Concrete Surface Preparation Guide.

2. Inspect concrete surface for soundness, flatness, levelness and overall condition. Report any discrepancies to the owner's representative.

3. Create a minimum surface profile for the system specified in accordance with the methods described in ICRI No. 03732 to achieve profile CSP-3 to CSP-5

4. Following surface preparation, concrete surfaces shall be tested for moisture vapor emissions in accordance with ASTM F1869, Standard Method for Measuring Moisture Vapor Emission Rate of Concrete Sub-floor Using Anhydrous Calcium Chloride Moisture Emissions Test. Report results to owner's representative and coating manufacturer's representative.

5. Concrete surface defects

a. Areas less than 1/2” deep shall be repaired with Steel-Seam FT910 epoxy patching and surfacing compound or TPM series repair mortar.

b. Areas that are greater than 1/2” deep shall be repaired with TPM series repair mortar.

6. Cracks, contraction joints, construction joints, profile changes, pipe penetrations shall be sealed with specified sealant flush with the surface.

a. Cracks and Joints less than 1” wide seal with urethane sealant. Depth of sealant shall be ½ the width of the crack or joint which shall be not less than ¼”

b. Provide 1” cant at all inside corners and cove with steel Seam FT910 if required.

c. Apply 4”-6” wide by 30 mil thick Life Shield LS-425 detail coat over the full length of all cant, cove, crack and joint details.

7. Expansion joints and isolation joints shall be sealed per drawings and specification Section 07900.

8. Provide a clean, saturated surface dry (SSD) concrete surface with no free standing or moving water, with a minimum surface profile as defined above. All substrates are to be vacuumed, swept and blown down with clean, dry air to remove spent abrasive, dust and other foreign material that might interfere with the adhesion of the primer.

9. Surface temperatures must be at least 50°F before use of LS-100 per manufacturer's recommendations

B. Masonry

1. Surfaces should be thoroughly clean and dry. Clean per SSPC-SP13/NACE 6/ ICRI 03732, CSP 1-3 if required. Concrete and mortar must be cured at least 28 days @ 75°F (24°C). Remove all loose mortar and foreign material. Surface must be free of laitance, concrete, dust, dirt, form release agents, moisture curing membranes, loose cement and hardeners.

2. Surface temperatures must be at least 50°F before use of LS-100 per manufacturer's recommendations.

3. Weathered masonry and soft or porous cement board must be brush blasted or power tool cleaned to remove loosely adhering contamination and to get to a hard, firm surface.

C. Miscellaneous Metals

1. The NACE / SSPC Joint Surface Preparation Standards for abrasive blasting approved in October 1994 are incorporated in and made a part of this specification. All references to SSPC-SP7 / NACE No. 3 and SSPC-SP10 / NACE No. 2 designate the definitions and other requirements in these documents. SSPC VIS 1-89 Visual Standard for Abrasive Blast Cleaned steel shall be used to visually evaluate the blast cleanliness.

2. Remove all oil and grease form surface by solvent cleaning per SSPC-SP1. Minimum surface preparation is SSPC-SP10 / NACE No. 2, Near White Metal Blast Cleaning. Abrasive blast clean all surfaces using a sharp, angular abrasive for optimum surface profile (2-3 mils). Prime any bare steel the same day as it is cleaned and before flash rusting occurs. Refer to Sherwin-Williams Guidelines Procedures for Surface Preparation of Metals.

D. Previously Painted Surfaces

1. If in sound condition, clean the surface of all foreign material. Smooth, hard or glossy coatings and surfaces should be dulled by abrading the surface.

2. Apply a test area, allowing paint to dry one week before testing adhesion. If adhesion is poor, additional abrasion of the surface and/or removal of the previous coating may be necessary. Retest surface for adhesion.

3. If paint is peeling or badly weathered, clean surface to sound substrate and treat as a new surface as above.

3.02 Application

A. Comply with manufacturers written installation procedures and individual product data sheet application bulletins.

1. Application bulletins should include equipment recommendations, equipment settings for optimal application, temperature ranges

B. Life Shield LS-425 Hyperelastomeric Spray Applied Coating

i. To prepare the surface of LS-425 for subsequent finishing with interior and exterior paints within 7 days of LS-425 application, a light solvent wipe with isopropyl alcohol or denatured alcohol should be performed.

ii. If after 7 days a light sanding followed by a light solvent wipe with isopropyl alcohol or denatured alcohol should be performed.

C. Apply materials in accordance with the following material coverage:

Products	**Thickness (mils dft)**
Masonry and Concrete Primer	
LS-100	3 – 4
Repair/Patching and Surfacing Compound	
STEEL-SEAM FT910	As needed
TPM 700 series	As needed
Blast Mitigation Coating	
LS-425 Hyperelastomeric Spray Applied Coating[1]	100-250*
**Thickness as required by third-party engineer*	
Interior Finish Coat Options	
Flame Control 2020 Intumescent Fire Retardant Latex Coating	5.5 minimum
Duration, Cashmere, Harmony Latex Paint [1]	1.4-1.7
Exterior Finish Coat Options	
Acrolon 218 HS	3-6
Note to Specifier:	
Hold primer for steel where flash rusting may occur	
Copoxy Shop Primer	*0.5 – 1.5*
Cold Temperature or Rapid Curing Epoxy Primer	
Corobond LT	*4.0 – 8.0*

[1]Coating meets or exceeds the criteria set forth by the U. S. Green Building Council LEED-CI Version 2.0 and and/or LEED-NC Version 2.2. All results have been verified by our ISO 9001 Laboratory.

3.03. Inspection and Testing

A. The owner or owner's authorized representative may require the services of an independent testing laboratory to test the installed system.

B. If test results indicate noncompliance with the specification, the following corrective action may be required of the application contractor:

1. Remove non-compliant systems or components.
2. Replace system or components in (1)
3. Assume the testing expenses.

C. Installation sub-contractor must provide quality assurance documenting verifying the application thickness in form acceptable to the Contractor and owner's representative or cognizant authority.

D. Minimum requirements of the spray applied coating system are that it be free of the following:

1. Uncured material
2. Inadequate thickness
3. Pinholes
4. Blisters
5. Delamination
6. Foreign matter
7. Unspecified materials

4.0 Related Products

A. Life Shield LS-URF and –RF series of opaque blast mitigation panels for walls

B. Life Shield LSC(V)-100 series of clear blast mitigation panels for windows

End of Section