

XRQ GS04/17
General Guide Specification for XR-QUIKLINER

This specification is provided as a general foundation for the design and installation of a quality, high performance XR QuikLiner flexible membrane liner system. Addendums are inclusive by reference and considered part of any specification intended to guide or govern the installation of any XR QuikLiner.

PART 1 – GENERAL

1.1 SUMMARY

Scope

1. Furnish and install XR-QuikLiner as manufactured and supplied by:
Seaman Corporation
1000 Venture Blvd.
Wooster, Ohio 44691
Tel.: 1-800-927-8578
Fax: 1-800-649-2737

Special Conditions

1. This specification is applicable to only those capable of supporting XR-QuikLiner according to the guidelines set forth herein and specific system addendums included by reference.
2. All applications and project specifications require review by SEAMAN for acceptance prior to any commitment to provide a commercial warranty.
3. Chemical/Gas discharge not listed on the Seaman Corporation/XR-QuikLiner chemical resistance publication.
4. Compliance with EPA and OSHA requirements as published by Local, State and Federal authorities.

1.2 XR-QUIKLINERS REFERENCES

- A. XR-QuikLiner Information Data Sheet
- B. XR-QuikLiner Chemical Resistance Guideline

1.3 FACTORY FABRICATION

- A. Whenever possible the individual liners shall be factory fabricated into 1 piece liner parts custom designed for this project so as to minimize field seaming. Field seaming and seaming done at the precast facility may be required and is allowed at stacked joints, inlet/outlet and miscellaneous areas.
- B. A one or two inch butt seam done by heat or RF welding is recommended. The surface of the welded areas must be dry and clean. Pressure must be applied to the full width of the seam on the top and bottom surface while the welded area is still in a melt-type condition. On a hot air welder, the bottom surface must be flat to insure that the entire seam is welded properly. Enough heat shall be applied in the hot air welding process that a visible bead is extruded from both edges being welded. The bead insures that the material is in a melt condition and a successful thermal bond between the two surfaces is accomplished.

1.4 QUALITY ASSURANCE

- A. The fabricator shall perform 100% continuous visual inspection of each linear foot of seam as it is produced. Upon discovery of any defective seam, the fabricator shall stop production of liners used in this work and shall repair the seam, and determine and rectify the cause of the defect prior to continuation of the welding process.
- B. XR-QUIKLINERS SHALL BE INSTALLED ONLY BY AN INSTALLER, AUTHORIZED BY SEAMAN CORPORATION TO INSTALL XR-QUIKLINERS PRIOR TO BID AND/OR CONTRACT AWARD.
- C. INSTALLERS KEY PERSONNEL SHALL HAVE RECEIVED SPECIALIZED TRAINING IN THE INSTALLATION OF XR-QUIKLINERS BY SEAMAN CORPORATION.

- D. XR-QUIKLINERS SHALL BE INSTALLED IN ACCORDANCE WITH THE MOST CURRENT GUIDE SPECIFICATIONS AND DETAILS AS AMENDED AND/OR AUTHORIZED BY SEAMAN FOR SPECIFIC PROJECT REQUIREMENTS.
- E. THERE SHALL BE NO DEVIATIONS FROM APPROVED CONTRACT SPECIFICATIONS OR SHOP DRAWINGS WITHOUT PRIOR WRITTEN APPROVAL BY SEAMAN.
- F. UNAUTHORIZED DEVIATIONS MAY SUBJECT THE XR-QUICKLINER TO WARRANTY INELIGIBILITY.
- G. ANY AND ALL WORK FOUND TO BE SUBSTANDARD OR IN VIOLATION OF THE CONTRACT DOCUMENTS OR MANUFACTURER'S SPECIFICATIONS SHALL BE SUBJECT TO REJECTION INCLUDING COMPLETE REMOVAL AND REPLACEMENT WITH NEW MATERIALS AT THE EXPENSE OF THE PURCHASER.

1.5 SUBMITTALS

- A. Precast concrete manufacturer to provide source drawing, complete with all necessary details and dimensions for concrete parts, flanges, penetration, and any exposed concrete surface that needs protected.
- B. The fabricator of liners used in this work shall prepare shop drawings with a proposed layout to cover the liner area shown in products in the project plans. Shop drawings shall indicate the fabrication details of the liner component.
- C. Details shall be included to show the termination of the liner at the perimeter of lined areas, the methods of sealing around penetrations, and method of anchoring. Drawings shall contain all dimensional information required to ensure proper manufacturing and installation of the liner.
- D. Fabrication of the liner shall not commence until the shop drawings and details have been approved by the precast concrete manufacturer or his representative.
- E. Written approval from SEAMAN confirming any accessories submitted, not manufactured or expressly approved in XR-QuikLiner literature are acceptable and compatible with the proposed XR-QuikLiner.
- F. Material Safety Data Sheets (MSDS) relating to all products, chemicals and solvents.

Certification that the system specified complies with all identifiable building code and insurance requirements.

1.6 DELIVERY & STORAGE

- A. Deliver all materials to the Precast Company or job site in manufacturer's original, unopened containers, with legible labels and in sufficient quantity to allow for continuity of work.
- B. Factory fabricated liners shall be folded, or rolled, onto a sturdy wooden pallet designed to be moved by a forklift or similar equipment. Each factory fabricated liner shall be prominently and indelibly marked so as to properly identify the item.
- C. Liners shall be protected as necessary to prevent damage to the liner during shipment.
- D. Liners which have been delivered to the precast concrete manufacturer shall be stored in a dry area and away from operations which might puncture, tear or otherwise damage the liner.
- E. Select and operate material handling equipment in a safe manner, guarding against damage to the liner or other components of the concrete precast process.
- F. All membrane and fabricated liners shall be stored, lying down, and completely protected from moisture, until cast into concrete and final heat sealing is completed. (Manufacturer's packaging is not considered adequate for outdoor storage.
- G. Materials, having been determined by the precast concrete company to be damaged, shall be immediately removed from the construction site and replaced.

1.7 FABRICATOR QUALIFICATIONS

- A. The fabricator of the XR QuikLiner, other than SEAMAN CORPORATION, shall be experienced in the manufacturing custom fabrication of flexible membrane liners. Fabricator facilities must be approved by

Seaman Corporation. Sample welds must be tested and approved by the Seaman Corporation to assure compliance with the specification.

1. All Precast Concrete companies who will be working with XR-QuikLiner will have a trained associate, approved by Seaman Corporation, that can perform welding of the liner as may be necessary.
2. Welding by the Precast Company may be necessary if adjustments need to be made to a prefabricated liner. This may include cutting open a seam and adding material so the liner fits the mold. It may also involve welding penetration liners to the body of the tank or manhole.

B. COORDINATION

1. Prior to installation of materials, an installation conference shall be held with the concrete company, and Seaman Corporation to discuss the specified application and the expectations of all parties involved.
2. Plan and coordinate the installation of the XR-QuikLiner with the concrete producer in such a manner to avoid membrane damage, and in accordance with all approved details and warranty requirements.
3. SEAMAN CORPORATION shall be available to make recommendations necessary to ensure compliance with project specifications and specification alternatives due to unforeseen job conditions.
4. Field services are provided at the discretion of Seaman Corporation. A minimum two weeks' notice is required to evaluate and coordinate any request for onsite technical assistance.

1.8 WARRANTY

A. Inspections

1. It is the responsibility of the Concrete Producer to inspect the completed XR-QuikLiner installation, and certify that all exposed concrete surfaces that require protection are covered.

B. Warranty

1. Seaman Corporation offers the following XR-QuikLiner warranty:
 - a. The Warranty provides the owner protection against the cost of repairing defects in the membrane only. This warranty is offered at no cost to the owner.
 - b. The Warranty provides the owner protection against failure of the XR-QuikLiner to provide protection to the concrete product for a period of 10 years.
 - c. The Warranty is limited to the initial cost of the XR-QuikLiner and does not cover any costs associated with repair or replacement of the concrete part.

PART 2 – PRODUCTS

2.1 GENERAL

- A. All products and components for the XR-QuikLiner shall be supplied by Seaman Corporation.
- B. Components other than those manufactured and/or supplied by Seaman Corporation shall be submitted for review, prior to ordering. Any product(s) not specifically authorized in writing for the project by Seaman Corporation, shall be considered unacceptable and their performance excluded from the warranty.

2.2 MEMBRANE

A. XR-QuikLiner Membrane

The style 8228 XR-QuikLiner material is a composite lining material designed specifically for use in Precast Concrete (wet-cast) applications requiring Chemical and Corrosion protection and Water, Wastewater, and Chemical containment. 8228 XR-QuikLiner has the following specifications:

1. Total Composite:

- a. Weight36.0 oz./sq.yd.
- b. Thickness.....65 mil

2. **Backing material:** (to be embedded into the concrete)

a. Base – Type of fiber.....	Polypropylene
b. Weight	7.0

oz./sq.yd.

3. **Adhesive Layer:**

a. Type	PVC Adhesive
b. Weight.....	2.0 oz./sq. yd.
c. Adhesion.....	10.0

lbs./in.

4. **Chemical Resistant/Waterproofing Membrane:**

a. Base – type).....	Polyester
b. Fabric – (Weight).....	3.0 oz./sq. yd.
c. Finished Coated Weight (ASTM D-751).....	28± 2oz./sq.yd. min. of 32

mils

d. Trapezoid Tear (ASTM D-4533).	30/30 lbs. min.
e. Grab Yield Tensile (ASTM D-751, Grab Method).....	250/200 lbs. min.
f. Tongue Tear (ASTM D-751)	50/50 lbs.

min.

g. Elongation @Break (%)(ASTM D-751).....	20%
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min.

h. Adhesion – Heat Seam (ASTM D-751 – Dielectric Weld).....	30 lbs./2”
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min.

i. Adhesion – Ply (ASTM D-751, 2” min).....	15 lbs./in min. or Film Tearing
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Bond

j. Hydrostatic Resistance (ASTM D-751, Method A Proc. 1).....	400 psi.
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min.

k. Bursting Strength (ASTM D-751 Ball Tip).....	400 lbs.
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min.

l. Puncture resistance (ASTM D-751 screw driver tip).....	70 lbs. min.
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lb.

m. Bonded Seam Strength (ASTM D-751, Grab Test Method, Procedure A).....	200
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lb.

n. Cold Crack (ASTM D-2136, 4 hours – 1” Mandrel).....	Pass @ -25°F
o. Dimensional Stability (ASTM D-1204, 212°F. 1 hour, each direction).....	0.5%

Max.

p. Abrasion Resistance (Taber Method, Method 5306, 1000 cycles before Fed, Std. 191a, H-18 Wheel 100g load) fabric exposure 30mg/100 cycles max. wgt. loss	
q. Coefficient of Thermal Expansion/Contraction (ASTM E-228).....	8x10 ⁻⁶ in./in./°F. max.
r. Flame Resistance Method 5910 MFR.....	Not consumed in 2 minutes.

B. Acceptable Formwork

1. Authorized rigid, smooth wood formwork
2. Steel or aluminum formwork in good condition

2.3 RELATED MATERIALS "BY SEAMAN CORPORATION"

The following product(s)/material(s) shall be supplied by Seaman Corporation.

A. Fabricated small parts for penetrations

Small parts, supplied by Seaman Corporation that have been specially fabricated for XR-QuikLiner installations.

B. Seaming Tape

Seaming tape made from reinforced or non-reinforced XR-membrane for use in sealing joints in cast concrete products at Precast facility or field installation.

PART 3 – EXECUTION

3.1 GENERAL

- A. The “Authorized” installer shall ensure strict compliance with XRQ GS04/17; General Guide Specifications for Installation of XR-QuikLiner.
- B. Liner installation must be executed by a properly trained workforce in accordance with agreed upon best practices between Seaman Corporation and the Concrete Producer.

3.2 INSTALLATION ON FORMWORK USED TO MANUFACTURE PRECAST CONCRETE PRODUCTS

- A. Factory fabricated liner shall be folded, or rolled, onto a sturdy wooden pallet designed to be moved by a forklift or similar equipment. Each factory fabricated liner shall be prominently and indelibly marked so as to properly identify the item.
- B. Liners shall be protected as necessary to prevent damage to the liner during shipment.
- C. Liners which have been delivered to the precast concrete manufacturer shall be stored in a dry area and away from operations which might puncture, tear or otherwise damage the liner.
- D. The liner shall be placed over a clean and dry form surface. Use compressed air to do a final clean so as to eliminate any loose dirt or dust.
- E. FORM SURFACE SHOULD NOT BE OILED OR COATED WITH ANY FORM RELEASE AGENT.
- F. Liner should be unfolded as close to the installation area as possible, in a clean space, and to minimize handling.
- G. When installing the liner utilize sufficient workers to properly handle and place the liner onto the formwork. Move the liner into final position by hand assuring liner is properly fitted. Adjust liner to eliminate any large or obvious wrinkles. Some wrinkling should be expected and will not affect the performance of the XR QuikLiner or the precast part.
- H. DO NOT USE SHARP TOOLS OR PLIERS TO MOVE THE LINER.
- I. Liners are manufactured to close tolerances and a tight fit should be expected. By design the liner must be larger than the formwork to allow easy installation.
- J. If necessary, the Precast Concrete Company may cut and re-weld a liner that does not fit properly. This work must be done by an employee that has been trained and approved by Seaman Corporation. All re-welded seams must be inspected and probed before the liner is used.

3.3 INSTALLATION OF STEEL REINFORCEMENT IN LINED FORMS

- A. Extreme care must be taken when placing steel reinforcement on or around the liner so as to prevent punctures or tears.
- B. Utilize plastic chair/wheel spacers or plastic tipped metal supports between steel reinforcement and the liner.
- C. DO NOT store any material or tools on top of liner that has been placed in/on formwork.

3.4 INSTALLATION OF HOLE FORMERS IN LINED FORMS

- A. Extreme care must be taken when placing hole formers into lined formwork.
- B. Use care when locating and attaching any type of hole former material. Avoid sliding or dragging hole formers to prevent tearing the liner.

- C. Use of XR-QuikLiner on the hole formers is highly recommended. Prefabricated XR-QuikLiner to fit manhole forms and pipe penetration should be purchased. Place the XR-QuikLiner sleeve on the hole former and then place the hole former onto the lined mold.
- D. After the part is cast, remove the hole former from the part and cut out the liner, creating a hole into the tank or manhole riser.
- E. Use the appropriate method to seal the exposed concrete between the lined main body of the part and the lined pipe penetration or manhole access.
- F. Current approved methods include hand welding a tape made of the XR-QuikLiner compound to both edges of the embedded liner, covering the exposed concrete.

3.5 PLACEMENT (POUR) OF CONCRETE IN LINED FORMS

- A. Extreme care must be taken when placing concrete into lined formwork.
- B. DO NOT use any metal or sharp object to move concrete around on the lined areas during placement.
- C. DO NOT allow concrete truck discharge chute or concrete delivery bucket to come in contact with any lined surface.

3.6 REMOVAL OF LINED PRECAST UNITS FROM FORMWORK

- A. Care must be taken when removing lined precast concrete units from their formwork.
- B. Do not use any steel or other sharp tools to pry, push or pull on any lined area.
- C. Prevent chains, hooks, cables and other lifting equipment from contacting any lined surface.

3.7 CUTTING / CORING / DRILLING A LINED SURFACE

- A. Extreme care and attention to detail is required when cutting, coring or drilling into or through a lined surface.
- B. When preparing the area to cut/cored/drilled, ensure that the liner surface is clean and free of any debris.
- C. It is recommended to use new blades, bits, etc when possible to assure the best quality result.
- D. Take care if using ladders or other equipment that are to be place on a lined surface.
- E. USE PLYWOOD OR OTHER SMOOTH SOLID SURFACE BASE BELOW LADDERS OR EQUIPMENT/TOOLS TO PROTECT THE LINER DURING WORK.
- F. Carefully remove all debris and clean the affected area upon completion of the work.

3.8 SEAMING OF LINER COMPONENTS IN PRECAST FACILITY AND/OR FIELD

A. GENERAL

1. All field seams shall be welded with an approved hot air welder.
2. All field seams must be clean and dry prior to initiating any field welding.
3. Remove foreign materials from the seams (concrete, dirt, oils, etc.) and then wipe with acetone or authorized alternative.
4. Use CLEAN WHITE COTTON cloths and allow approximately five minutes for solvents to dissipate before initiating the hot air welder. Do not use denim or synthetic rags for cleaning.

5. Contaminated areas within a membrane seam will inhibit proper welding and will require a membrane patch or strip.
6. All welding shall be performed only by qualified personnel to ensure the quality and continuity of the weld.

B. Hot Air Hand Welding

1. The lap or seam area of the membrane may be intermittently tack welded to hold the membrane in place.
2. The back "interior" edge of the membrane shall be welded first, with a thin, continuous weld to concentrate heat along the exterior edge of the lap during the final welding pass.
3. The nozzle of the hand held hot air welder shall be inserted into the lap at a 45° angle to the lap. Once the polymer on the material begins to flow, a hand roller shall be used to apply pressure at a right angle to the tip of the hand welder. Properly welded seams shall utilize a 1-1/2 inch wide nozzle, to create a homogeneous weld, a minimum of 1-1/2 inches in width or a width that has been specified.
4. Smaller nozzles may be used for corners, and other field detailing, maintaining a minimum 1 inch weld.

C. Inspection

1. The job foreman and/or supervisor shall initiate inspections of all completed work which shall include, but is not limited to the probing of all field welding with a dull pointed instrument to assure the quality of the application and ensure that any equipment or operator deficiencies are immediately resolved.
2. Ensure that all aspects of the installation (attachment, welding, flashing details, etc.) are in strict accordance with the most current XR-QuikLiner Specifications and Details.
3. Excessive patching of field seams because of inexperienced or poor workmanship will not be accepted.
4. Any deviation from pre-approved specifications and/or details requires written authorization from the SEAMAN CORPORATION prior to application to avoid any warranty disqualification.

D. Testing

1. All field seams will be tested using a mechanical probe.
2. All leaks shall be repaired and tested.
3. All joints, on completion of the work, shall be tightly bonded. Any lining surface showing injury due to scuffing, penetration by foreign objects, shall be replaced or covered, and sealed with an additional layer of lining of the proper size, in accordance with the patching procedure.

E. Patching

1. Any repairs to the liner shall be patched with the lining material (XR-QuikLiner without nonwoven backing). The patch material shall have rounded corners and shall extend a minimum of two (2) inches in each direction from the damaged area.
2. Seam repairs or seams which are questionable should be cap stripped with a 2" wide strip of the lining material.

3.9 WARRANTY

- A. Prior to approval of a XR-QuikLiner project, the Precast Producer or Concrete Contractor shall submit the application, chemical exposure, temperature, and end customer (including street address) to Seaman Corporation, for review and approval.
- C. All orders for the XR-QuikLiner, should reference stated project.
- D. It is the obligation of the precast producer or concrete contractor to insure that all exposed concrete surfaces are fully covered with the XR-QuikLiner. It is required that a representative of the precast producer inspect the finished installation and verify compliance with Seaman Corporation specifications.

- E. Any corrections or modifications necessary for compliance with the specifications and acceptance for warranty (punch list) will be noted.
- F. The warranty will be considered in place after notification by the Precast Producer to Seaman Corporation that the project has been completed and that they have inspected the finished job.

END of SECTION XRQ GS04/17

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