



# Drop-In Specifications

AGRU ULTRA-GRIP® HDPE  
CONCRETE PROTECTIVE LINER  
FOR PRECAST APPLICATIONS



The following specification is a sample guideline to be customized by the engineer for preparing site specific specification. This information is provided for reference purposes only and is not intended as a warranty or guarantee. AGRU assumes no liability in connection with the use of this information.

## Part 1 GENERAL

### 1.1 DESCRIPTION OF WORK

1. Furnish and install all labor, materials, equipment, and incidentals required to supply and install High Density Polyethylene (HDPE) concrete protective liner (CPL) in the lift station/wet wells, receiving manholes, drop manholes, manholes, and pipes as required or as shown on the plans.
2. HDPE or concrete protective liner (CPL) shall be designed and installed to protect concrete surfaces from corrosion.

## Part 2 PRODUCT

### 2.1 MATERIALS

1. Liner shall be AGRU Ultra-Grip HDPE (high-density polyethylene). All HDPE liner sheets shall be extruded with a large number of anchoring studs, a minimum of 39 per SF (420/m<sup>2</sup>), manufactured during the extrusion process in one piece with the sheet so there is no welding and no mechanical finishing work to attach the studs to the sheet. The liner shall have a pull out of 16,500 psf. Minimum distance between studs shall be no less than 2.1275". Stud height shall be no less than 13mm or 9/16"
2. Option I: Flat liner sheet, non anchored, used for overlapping joints, shall have a minimum thickness of 3 mm. All joints shall be sealed by means of thermal welding. Option II: Factory install and weld a 90 degree liner turnback into the inside horizontal plane of the upper and lower construction joint, and sealed with ramnek, butyl or close cell rubber gasket, or approved equal.
3. When an interface is required to attach the HDPE liner to non-HDPE penetrations, use the polyester-backed HDPE sheet to provide a positive seal and transition between dissimilar pipe materials. Use a construction-grade two-part adhesive epoxy to attach the collar to the non-HDPE product.
4. The lining shall have good impact resistance, shall be flexible, and shall have an elongation sufficient to bridge up to a 1/4" settling crack, without damage to the lining. The liner shall be able to bridge any expansion cracks that may occur.
5. The lining shall be repairable at any time during the life of the structure.
6. A fabricator would custom fit the liner to the form-work to protect the precast concrete surfaces from sewer gases. The interior surfaces to be protected shall include the precast walls, precast top slabs, and pipe entries.
7. Pipe penetrations for 4" thru 12" to have HDPE sleeve cast in manhole wall. The HDPE wall sleeve is welded to the liner prior to casting. The flexible boot connector is installed inside of the HDPE wall sleeve. No further welding to this penetration is required. Should the contractor grout in the annular space inside the manhole for cosmetic reasons then a field applied epoxy coating can be applied to cover the non structural grout. The cast in sleeve will provide protection to keep any gas from getting behind the liner. For pipe's 10" and larger the method of sealing the hole opening around the pipe will vary, as required by the resilient connector installation guidelines. Pipe to manhole connectors must meet the requirements of ASTM C-923. The manufacturer will determine the best method to provide a gas tight seal between the connector and the inside wall of the structure.
8. Aluminum Hatches cast in lined wet well structures must have an aluminum skirt and 2" return at bottom of skirt. Liner is to be

cut to fit snugly against the skirt and sealed to the return flange with butyl sealant prior to casting. Vent piping can be pre-welded at engineers' option when PVC vents are allowed.

## 2.2 PHYSICAL PROPERTIES

A. The AGRU Sure-Grip CPL systems and welding rod shall be manufactured from the same resins and meet the following properties:

PRODUCT DATA				
Property	Test Method	Minimum Average Values		
Thickness (nominal), mil (mm)	ASTM D5199	80 (2.0)	120 (3.0)	200 (5.0)
Density, g/cc, minimum (black)	ASTM D792, Method B	0.94	0.94	0.94
Density, g/cc, minimum (yellow/other)		0.935	0.935	0.935
Tensile Properties (ave. both directions) Strength @ Yield (min. ave.), lb/in width (N/mm)	ASTM D6693, Type IV 2 in/minute	176 (30.8)	264 (46)	440 (77)
Elongation @ Break (min. ave.), %(GL=2.0in)		300	300	300
Carbon Black Content (range in %) **	ASTM D4218	2 - 3	2 - 3	2 - 3
Carbon Black Dispersion (Category) **	ASTM D5596	Only near spherical agglomerates for 10 views: 9 views in Cat. 1 or 2, and 1 view in Cat. 3		
Pull Out Resistance psf (kN/m <sup>2</sup> )	ISO 4624	16,500 (800)		
Back Pressure Resistance long term	SKZ-Test 700mm x 700mm	1000 hour at 1.5 bar (21.76 psi)		

AGRU America geomembranes are certified to pass Low Temp. Brittleness via ASTM D746 (-80 °C) and Dimensional Stability via ASTM D1204 (±2% @ 100°C).

1) per batch change and min. once a week

B. Upon request, the manufacturer shall provide written certification that the liner used meets or exceeds the requirement of this specification.

## Part 3 WELDING

A. All welding shall be performed in accordance with the published directives and procedures of the manufacturer and by welders certified as trained by the manufacturer. Completion of welding will provide a one piece monolithic concrete protective liner system that will provide excellent resistance to hydrogen sulfide attack and will not pull off the wall in the event that infiltration occurs.

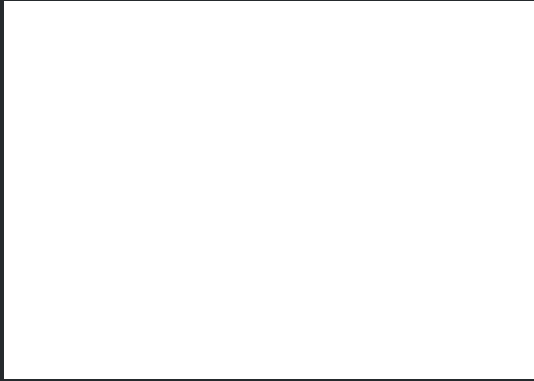
The following welding techniques are acceptable:

1. Extrusion Welding: Used to seal all seams inside structure, primary welding method.
2. Butt Welding: Used to fuse flat sheets together.
3. Hot Air Welding: Used as a tack weld or only in triple pass method where extrusion welding is not possible.

B. Testing and supervision of the installation and welding shall be performed by qualified staff only and must be checked when completed by visually checking and by Spark Testing all welded joints.

C. Sample welds are to be taken weekly at minimum and submitted to the quality assurance department for testing. The following tests are performed: Shear and Peel Test. Shear weld test results shall meet or exceed at least 80% strength of parent material in a destructive test, which pulls the sample apart to test the strength and integrity of the extrusion weld. The peel test pulls the weld apart from the backside of the weld using a peeling type motion. The results of this test shall meet or exceed 70% of the value of the parent material.





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