

SECTION 068322 – GEL COAT FIBERGLASS REINFORCED POLYMER LEAD SHEET ENCASED COMPOSITE WALL AND CEILING PANELS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This section includes:
 - 1. Gel coat fiberglass reinforced polymer lead sheet encased composite panels and accessories for interior walls and ceilings.
 - a. Spline, joint covers, mastic, finishing compound, sealants, fasteners, and other components required for a complete, hermetically sealed, wall and ceiling assembly.
 - b. Finishing accessories.
- B. Related Sections:
 - 1. Section 054000 - Cold-Formed Metal Framing
 - 2. Section 068320 - Gel Coat Fiberglass Reinforced Polymer Composite Molded Architectural Shapes
 - 3. Section 082200 - Fiberglass Reinforced Polymer (FRP) Doors.
 - 4. Section 083110 - Acrylic Access Doors and Panels
 - 5. Section 092216 - Non-Structural Metal Framing

1.3 REFERENCES

- A. ASTM C 364 - Standard Test Method for Edgewise Compressive Strength of Sandwich Constructions.
- B. ASTM C 393 - Standard Test Method for Flexural Properties of Sandwich Constructions.
- C. ASTM D 523 - Standard Test Method for Specular Gloss.
- D. ASTM D 638 - Standard Test Method for Tensile Properties of Plastics.
- E. ASTM D 695 - Standard Test Method for Compressive Properties of Rigid Plastics.
- F. ASTM D 696 - Standard Test Method for Coefficient of Linear Thermal Expansion.
- G. ASTM D 790 - Standard Test Methods for Flexural Properties.
- H. ASTM D 1621 - Standard Test Method for Compressive Properties of Rigid Cellular Plastics.

- I. ASTM D 2583 - Standard Test Method for Indentation Hardness of Rigid Plastics by Means of a Barcol Impresser.
- J. ASTM E 84 - Surface Burning Characteristics of Building Materials.
- K. ISO 9705-Annex B: 1993 (E) Full-scale room test.
- L. New York City MEA Approval 414-04-M - University of Pittsburgh Test Protocol for Measurement of Acute Lethality of Thermal Decomposition Products from Specimen.
- M. Canadian Military Standard (Mils) 1073.2 - Impact Resistance Test.
- N. ASTM E 96 - Standard Test Methods for Water Vapor Transmission of Materials.
- O. New York City MEA Approval 414-04-M - University of Pittsburgh Test Protocol for Measurement of Acute Lethality of Thermal Decomposition Products from Specimen.
- P. ASTM E 831 – Standard Test Method for Linear Thermal Expansion of Solid Materials by Thermo-Mechanical Analysis
- Q. Seismic Testing – Seismic requirements of NAS 4219 (2009) and ICC-ES AC156 (US) for Arcoplast wall and ceiling system
- R. ISO 846 - Plastics - Evaluation of the action of microorganisms- Resistance to Fungi & Bacteria Test method
- S. ASTM D 3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber
- T. ASTM D 3274 - Standard Test Method for Evaluating Degree of Surface Disfigurement of Paint Films by Fungal or Algal Growth, or Soil and Dirt Accumulation
- U. ISO 2812-4 and ASTM D1308 - Chemical Resistance Testing of Arcoplast fiberglass composite panels
- V. Determination of Extractives Residue according to US FDA 21 CFR 177.2600 Arcoplast finishing compound/sealant
- W. National Council for Radiation Protection and Measurements (NCRP):
 - 1. NCRP Report #147-Structural Shielding Design for Medical X-ray Imaging Facilities.
 - 2. NCRP Report #148-Radiation Protection in Veterinary Medicine
- X. US Department of Labor Occupational, Safety & Health Administration (ASHA)
 - 1. OSHA Standard 29CFR1910, 1025 Lead.
 - 2. OSHA Standard 29CFR1926 - Safety and Health Regulation for Construction.
 - 3. OSHA Standard 29CFR1926.62 – Lead.

1.4 SUBMITTALS

- A. Comply with Section 013300 - Submittal Procedures.
- B. Product Data: Submit manufacturer's product data including installation instructions.

- C. Shop Drawings: Submit manufacturer's shop drawings, including plans, elevations, sections, and details, indicating lead thickness or lead equivalence of components of composite ceiling panels and wall panels, wall base, joints, radius joints, finish junctions at wall-to-wall, wall-to-ceiling, wall-to-floor, wall-to-window/door frames, structural adhesive or tape adhesive, and attachment screws.
 - 1. Show ducts, pipes, conduit, and other objects that penetrate radiation protection; include details of penetrations.
 - 2. Indicate items to be supported by walls. Include loads.
 - 3. Indicate method of sealing joints, openings, and penetrations.
 - 4. Suspension system spacing and details.
 - 5. Splicing, joint treatment, and fastening details of ceiling panels.
 - 6. Changes in ceiling planes, openings, and intersections with vertical element.
 - 7. Ceiling access door dimensions and location.

- D. Samples: Submit manufacturer's samples.
 - 1. Composite ceiling panels.
 - 2. Composite wall panels.
 - 3. Wall base.
 - 4. Attachment joints.
 - 5. Finishing compound detailing.

- E. Manufacturer's Certification: Submit manufacturer's certification that materials comply with specified requirements and are suitable for intended application.

1.5 QUALITY ASSURANCE

- A. Manufacture Qualifications: Provide at time of bid; a list of references and comparable installations for Owner and Architect to contact and visit.

- B. Installer Qualifications: An experienced installer certified by composite panel Manufacturer for type of installation required.

- C. Mockups: Before installing entire installation, build ROOM MOCK-UP to demonstrate mechanics, aesthetic effects and set quality standards for materials and execution.
 - 1. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

- D. Source Limitations: Obtain glass-fiber reinforced polymer composite panels and accessories from single manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.

- B. Storage:
 - 1. Store materials in clean, dry area indoors in accordance with manufacturer's instructions.

2. Composite Panels: Store flat.
 3. Finishing Compound: Store for a maximum of 6 months from date of shipment at temperature of 50 degrees F to 80 degrees F (10 degrees C to 27 degrees C).
 4. Adhesive: Store for a maximum of 6 months from date of shipment at temperatures below 80 degrees F (27 degrees C).
- C. Handling: Protect materials and finish from damage during handling and installation in accordance with manufacturer's instructions.

1.7 ENVIRONMENTAL REQUIREMENTS

- A. Do not install materials until building is enclosed and areas to receive materials are protected from dirt and dust.
- B. Maintain the following conditions during and after installation in areas to receive materials.
1. Minimum Temperature: 60 degrees F (15 degrees C).
 2. Relative Humidity: 20 to 60 percent.

1.8 WARRANTY

- A. Warranty: Submit manufacturer's standard warranty. The manufacturer guarantees the product supplied shall be free of defects in material or workmanship under normal use and service
1. Warranty Period: Five years from the date of delivery.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. Basis of Design: Subject to compliance with requirements, provide the following by **Arcoplast, 1873 Williamstown Drive, St. Peters, Missouri 63376**. Toll Free (888) 736-2726. Phone (636) 978-7781. Fax (636) 978-7782. Web Site www.arcoplast.com.
1. Arcoplast for BSL-3 Environment
 2. Arcoplast for BSL-3 Ag Environment
 3. Arcoplast for BSL-4 Environment
- B. The following components meet critical environment and high containment facility requirements. SUBSTITUTION ARE NOT ALLOWED.

2.2 GEL-COATED FIBERGLASS REINFORCED POLYMER LEAD SHEET INCASED COMPOSITE CEILING AND WALL PANELS

- A. Wall and Ceiling Panels: Gel coat fiberglass reinforced polymer lead sheet incased composite panels with square or grooved edges, composed of chop strand mat impregnated with fire-rated resin.

1. Panel Thickness:
 - a. 3/8 inch (9.5mm), 3.5 lbs./sq.ft.
 - b. 1/2 inch (12.5mm), 4.4 lbs./sq.ft.
 2. Lead Sheet thickness:
 - a. 1/32 inch (0.79mm), 2 lbs./sq.ft. (9.75 Kg/Sq.M)
 - b. 1/16 inch (1.59mm), 4 lbs./sq.ft. (19.5 Kg/Sq.M)
 - c. 1/8 inch (3.17mm), 8 lbs./sq.ft.(39Kg/Sq.M)
 3. Size: Custom, maximum 4' (1.2m) wide (up to 12' (3.65m) long.
 4. Color: White.
- B. Physical Properties of Polymer-Faced Solid Glass Resin Matrix Core Panels: 3/8-inch (9.5mm) thick panels.
1. Tensile Strength, ASTM D 638: 10,141 psi.
 2. Tensile Modulus, ASTM D 638 : 10.07 Mpsi.
 3. Flexural Strength, ASTM D 790: 21,101 psi.
 4. Flexural Modulus, ASTM D 790 : 0.793 Mpsi.
 5. Compressive Strength, ASTM D 695: 15,920 psi.
 6. Compressive Modulus, ASTM D 695 : 1.467 Mpsi.
 7. Barcol Hardness, ASTM D 2583: 56.8.
 8. Water Vapor Transmission, ASTM E 96: Less than 0.01 perms, 73 degrees F at 50 percent relative humidity.
 9. Surface Burning Characteristics, ASTM E 84 and CAN/ULC-S102-10, Whole Panel, Class A:
 - a. Flame Spread Index: 25.
 - b. Smoke Development: 450.
 10. Gloss Property, ASTM D 523: 99.7 reflectance at 85-degree light source.
 11. Impact Resistance Test, MILS 1073.2: No damage on impact from 2-pound (1-kg) steel ball dropped 17 feet.
 12. Coefficient of Linear Thermal Expansion, ASTM D 696: 31.4 in/in °F x 10⁶ - 50°F - 104°F.
 13. Approval: New York City MEA Approval 414-04-M.
 14. ASTM E831-06 – Standard Test Method for Linear Thermal Expansion of Solid Materials by Thermo-Mechanical Analysis.
 15. Seismic Testing – Lateral movement at joints.
- C. Wall and Ceiling System Mock-Up Testing for Polymer-Faced Solid Glass Resin Matrix Core Panels:
1. Vacuum Decay Testing on Arcoplast Wall and Ceiling System Mock-up for High Containment Levels BSL-3, BSL-3 Ag, BSL-4:
 - a. Reference – The Public Health Agency of Canada document - Laboratory Biosafety Guidelines: 3rd Edition 2004.
 - b. ASME N 510 – Testing of Nuclear Air Treatment Systems.
 2. Supplemental Helium Leak Test.

3. Pressure Leak Testing with various MEP interface system for a High Containment Levels BSL-3, BSL-3 Ag, BSL-4:
 - a. The Public Health Agency of Canada – Laboratory Biosafety Guidelines: 3rd Edition (2004).
 - 1) Sealed Metal Duct interface with Arcoplast composite panel
 - 2) Electrical Box face plate interface with Arcoplast composite panel
 - 3) Expansion / Contraction joint system interface with Arcoplast composite panel
 - 4) Panel penetration by mechanical fastener
 - 5) ASME N 510 – Testing of Nuclear Air Treatment Systems.
 - 6) Arcoplast Flush Glazed Window Test Report NC-ARC 14810 A-01
 - 7) ISO 9705-Annex B: 1993 (E) Full-scale room test.
4. Polymer-faced solid glass resin matrix core composite panels under guidelines NIH/CDC biological decontamination procedures using:
 - a. Chlorine Dioxide
 - b. Formaldehyde Gas
 - c. Hydrogen Peroxide Vapor
5. Pull-Out Strengths of mechanical fasteners

2.3 ACCESSORIES

- A. Trim Accessories: Manufacturer's standard finishing accessories designed to provide airtight, leak proof and gas tight seal available in thickness from .060" to 1.250 in various sizes and may be installed in wall or ceiling panels.
 1. Finishing Accessories include the following:
 - a. Grommets
 - b. Face Plates
 - c. Device Trim Plates
 - d. Fire Outlet Boxes
 - e. Slip Connections
 - f. Access Doors
 - g. Escutcheons
 - h. Cabinets
 2. Acrylic finishing accessories are labeled as combustible and classified by UL as slow burning plastic. Protect material from flames and high heat sources.
 - a. Flame Spread: 140 per 3mm thickness – ASTM E 84
 - b. Smoke Density: 10.3% - ASTM D 2843
 - c. Self-Ignition temperature: 910F (1.5mm) thickness – ASTM D 1929
- B. Wall and Ceiling Panel Accessories:
 1. Splines: Aluminum spline for panel joints or seams.
 2. Lead: 99.9% Pure Lead. FED specification ASTM B740-03 – QQ-L-201f, Grade C
 - a. Flat stock stripes of lead, same thickness of panel construction.
 - b. Angle stock lead profile, same thickness as panel construction.

- c. U-channel stock lead profile, same thickness as panel construction.
- 3. Wall Base:
 - a. Solid engineered resin/glass matrix, same color as composite panels.
 - b. Surface mounted galvanized termination strip.
 - c. Surface mounted stainless steel termination strip.
- 4. Attachment Screws: Coated steel or stainless steel screws of length and type as determined by manufacturer to support composite panels.
- 5. Adhesive: Structural Adhesive, acrylic base A-2020 – white.
- 6. Tape Adhesive: 3M – VHB #4959 - thickness 120 mils x 1/2" (12.5mm) width
- 7. Finishing Compound Edge Tape – 3M - # 335 Pink – Polyester/Rubber 1.6 mils x 3/4" (19mm) width.
- 8. Finishing Compound: Arcoplast Sealant and Finishing Compound A-1010 Bio-Seal.
 - a. Description: A two-component, 2:1 mix, non-sag, non-porous, non-yellowing, high-gloss, odor-free, solvent-free structural adhesive.
 - b. Solids: 100 percent.
 - c. Color: Bright white.
 - d. FDA Approved: Determination of Extractives Residue according to US FDA 21 CFR 177.2600 Arcoplast finishing compound/sealant.
 - e. NSF Approved: Registration #148103.

PART 3 - EXECUTION

3.1 TRAINING AND CERTIFICATION

- A. Only manufacturer trained and certified specialty applicators shall be considered for the construction of High Containment Environments as well as BSL-3, BSL-3Ag, and BSL-4 facilities.
 - 1. Minimum Applicator requirements:
 - a. Minimum 2 years' experience in construction of High Containment facilities.
 - b. Familiar with construction guidelines pertaining to Bio-Safety in Microbiological and Biomedical Laboratories established by NIH (National Institute of Health), CDC (Center of Disease Control, NAID (National Institute of Allergy and Infectious Disease).
 - c. Accredited by manufacturer on application of fiberglass reinforced polymer panels for high containment establishments.
 - d. US Department of Labor Occupational Safety and Administration (OSHA).
 - 1) OSHA Standard 29CFR1926 - Safety and Health Regulation for Construction.
 - 2) OSHA Standard 29CFR1926.62 – Lead.

3.2 EXAMINATION

- A. Examine areas to receive composite wall and ceiling panels. Notify Architect of conditions that would adversely affect installation or subsequent use.

- B. Ensure other work to be performed behind composite panels is complete before starting installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION OF PENETRATING ITEMS

- A. At penetrations of lead linings, provide lead shields (flat stock, angle stock, U-channel stock) to maintain continuity of protection.
- B. Provide lead linings, sleeves, shields, and other protection in thickness of not less than that required in assembly being penetrated.
- C. Secure shields at penetrations using adhesive or wire ties but not penetrating fasteners unless indicated on Drawings.
- D. Outlet Boxes and Conduit: Cover or line with lead sheet lapped over adjacent lead lining at least 1 inch. Wrap conduit with lead sheet for not less than 10 inches from box.
- E. Duct Openings: Unless otherwise indicated, line or wrap ducts with lead sheet for distance from partition/ceiling equal to 3 times the largest opening dimension. Lap lead sheet with adjacent lead lining at least 1 inch.
- F. Piping: Unless otherwise indicated, wrap piping with lead sheet for not less than 10 inches from point of penetration.

3.4 INSTALLATION OF WALL AND CEILING PANELS

- A. Substrate compatibility and surface adhesion for a large variation of metals, plastics, and glass fiber composite materials is critical for a high performance seal capable of meeting BSL-3, ABSL-3 Ag, and BSL-4 compliance.
 - 1. Install composite wall and ceiling panels, accessories, and finish accessories in accordance with manufacturer's written instructions.
 - 2. When substrate compatibility and surface adhesion is doubtful, conduct physical bond test to determine best surface preparation, adhesive primer, and adhesive product to use and submit recommendations to owner/contractor for approval.
- B. Lay out panels to minimize joints and to provide balanced borders at room perimeter. Use full and uncut panels where possible.
- C. Field cut panels as necessary in accordance with manufacturer's instructions.
- D. Apply mastic or tape adhesive to furring, steel studs, or existing substrate in accordance with manufacturer's instructions.
- E. Screw panels into galvanized steel studs with attachment screws below floor base line and above ceiling line to hide exposed fasteners.
- F. Install panels plumb, level, square, and in proper alignment.
- G. Cover panel joints with finishing compound for flush joints.

- H. Finishing Compound: Clean floor, walls, and ceiling areas thoroughly, seal and quarantine area prior to application. Prepare surfaces and apply finishing compound in accordance with manufacturer's instructions.
- I. Finish wall-to-wall and wall-to-ceiling junctions with 1/2-inch radius joints using finishing compound.
- J. Wall Base: Finish wall-to-floor junctions with 1/2-inch radius joints using finishing compound prior to installing wall base before application of floor finish. Set in mastic in accordance with mastic manufacturer's instructions.
- K. Seamless Floor Application: Sand panels lightly to remove gloss from surface finish ensuring proper bond. If termination bars/strips are to be used for wall-to-floor base termination, install the bars/strips with VHB tape and avoid mechanical fasteners.
- L. Seal joints, openings, and penetrations in accordance with manufacturer's instructions and shop drawings.
- M. Sealants: Apply sealants in accordance with sealant manufacturer's instructions and shop drawings.
- N. Apply gel coat putty over countersunk fasteners and penetrations in accordance with manufacturer's instructions.
- O. Repair minor damages to composite panel finish in accordance with manufacturer's instructions and as approved by Architect.
- P. Remove and replace damaged components that cannot be successfully repaired as determined by Architect.

3.5 CLEANING

- A. Remove temporary protective film at doorways, windows, equipment, and accessories.
- B. Clean composite panels promptly after installation in accordance with OSHA Standard 1926.62.
- C. Do not use harsh cleaning materials or methods that would damage finish.
- D. Dispose of Construction Debris: Lead encased panel drops and trimmings to be containerized, labeled, and returned to Arcoplast manufacturing facility for further use as product modeling and samples. Lead dust and small debris must be disposed in compliance with health, safety and environmental codes and regulations.

3.6 PROTECTION

- A. Protect installed composite wall and ceiling panels from damage.
- B. Allow 24 hours curing time before pressure wash down sanitation procedures.
- C. Lock radiation-protected rooms once doors and locks are installed, and limit access to only those persons performing work in the rooms.

3.7 COMMISSIONING

- A. Room commissioning shall be performed by third party Commissioning Agency and reviewed by qualified radiation Physicist.
- B. Manufacturer shall have representative present at time of Commissioning Testing.
 - 1. Provide manufacturer 10 day notice prior to the scheduled testing.
- C. Correct deficiencies in or remove and replace radiation protection that inspection reports indicate does not comply with specified requirements.

END OF SECTION 068322