

**SECTION 075400
THERMOPLASTIC MEMBRANE ROOFING**

PART 1 - GENERAL**1.01 DESCRIPTION**

- A. The project consists of installing Carlisle Sure-Weld gray FleeceBACK 115.
- B. Apply the Sure-Weld FleeceBACK Adhered Roofing System in conjunction with Polyisocyanurate Board Insulation after tear off of the existing roof system to expose the roof deck for verification of suitable substrate as specified in this specification.
- C. Membrane attachment by two component, heated, insulating type adhesive, with 150% elongation and no more than 25% MDI content, acceptable to the manufacturer and covered by the Total Systems Warranty. To be applied with full coverage spray or with High Pressure Extrusion Process at a minimum pressure of 500 psi at a maximum of 4" oc. No cold applied products or Asphalt allowed.

1.02 EXTENT OF WORK

- A. Prime Contractor is responsible for all work associated with the installation of the Sure-Weld FleeceBACK Adhered Roofing System, including (but not limited to) demolition, preparation, insulation, flashing and counterflashing, expansion joints, joint sealers, and electrical and mechanical work needed.

1.03 SUBMITTALS

- A. Prior to starting work, the roofing contractor must submit the following:
 - 1. Product Data: Provide data indicating membrane materials, flashing materials, insulation, fasteners, and for all other products employed on this project.
 - 2. Shop Drawings: Indicate joint or termination detail conditions, conditions of interface with other materials, setting plan for tapered insulation, mechanical fastener layout, and recommended details modified to fit project conditions.
 - a. Fastener Layout: Patterns for corner, perimeter and field-of-roof locations.
 - b. Tapered insulation: Include slopes
 - c. Layout: Include crickets, walkway pads and grease resistant sheet locations and dimensions.
 - d. A sample of the manufacturer's Membrane System Warranty.
 - e. Submit a letter of current certification from the manufacturer which certifies the roofing contractor is authorized to install the manufacturer's roofing system and lists foremen who have received training from the manufacturer along with the dates training was received.
 - f. Manufacturer's Installation Instructions: Indicate special procedures
 - g. Manufacturer's Certificate: Certify that products meet or exceed specified requirements. Certification from the membrane manufacturer indicating the membrane thickness over the reinforcing scrim (top ply membrane thickness) is nominal .015-mil or thicker.
 - h. Certification of the manufacturer's warranty reserve.
- B. Preconstruction Conference-Before installing roofing system, conduct conference at Project site to review the following:
 - 1. Owner, Architect, Contractor and Roofing Installer shall be present.
 - 2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
 - 3. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
 - 4. Review flashings, special roofing details, roof drainage, roof penetrations and equipment curbs
- C. Upon completion of the installed work, the roofing contractor must submit the following:

1. Maintenance Data-For roofing system to be included in the maintenance manuals specified in Division 1.
2. Copies of the manufacturer's final inspection to the Owner prior to the issuance of the manufacturer's warranty
3. Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Roofing Materials-Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, and directions for storing and mixing with other components. Deliver in sufficient quantity to permit work to continue without interruption.
- B. Comply with the manufacturer's written instructions for proper material storage.
 1. Store Sure-Weld membrane in a dry, cool, shaded area in the original undisturbed plastic. Sure-Weld membrane that has been exposed to the elements for approximately 7 days must be prepared with Weathered Membrane Cleaner prior to hot air welding.
 2. Store curable materials (adhesives and sealants) between 60°F and 80°F in dry areas protected from water and direct sunlight. If exposed to lower temperature, restore to 60°F minimum temperature before using.
 3. Store materials containing solvents in dry, well ventilated spaces with proper fire and safety precautions. Keep lids on tight. Use before expiration of their shelf life.
- C. Protect-Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling and other sources. Store insulation on pallets, off the ground and tightly covered with waterproof materials. Comply with insulation manufacturer's written instructions for handling, storing and protecting during installation. Any materials found to be damaged shall be removed and replaced at the applicator's expense.
- D. Deck-Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck. DO NOT OVERLOAD structure when moving materials on to roof.

1.05 QUALITY ASSURANCE

- A. Perform work in accordance with NRCA Roofing and Waterproofing Manual.
- B. Manufacturer Qualifications: Manufacturer to demonstrate ten years of experience in manufacturing and marketing thermoplastic adhered roofing system.
- C. Installer Qualifications: An established firm currently licensed through MABCD and a minimum of ten years of successful experience installing thermoplastic membrane roofing systems similar in size and scope of this project.
- D. Current factory certified system installer classification valid at the time of bidding and installation.
- E. Demonstrate experience with the successful installation of at least 3 projects equivalent to the specified roofing system for this project
- F. Installer shall be responsible for all work associated with thermoplastic membrane roofing, including (but not limited to) preparation, insulation, flashing and counterflashing, expansion joints, and joint sealers.
- G. **Installer shall have an established office within a 50 mile (80 km) radius of the project site.**
- H. Provide adequate number of experienced workmen regularly engaged in this type of work who are skilled in the application techniques of the materials specified. Provide at least one thoroughly trained and an experienced superintendent on the job at all times roofing work is in progress.
- I. There shall be no deviations made from this specification or the approved shop drawings without the prior written approval of the Owner. Any deviation from the manufacturer's installation procedures must be supported by written certification on manufacturer's letterhead

and presented for the Owner's consideration.

- J. Upon completion of the installation, the applicator shall arrange for an inspection to be made by a non-sales technical representative of the membrane manufacturer in order to determine whether or not corrective work will be required before the warranty will be issued. Notify the building owner seventy-two (72) hours prior to the manufacturer's final inspection.

1.06 JOB CONDITIONS, CAUTIONS AND WARNINGS

Refer to Carlisle's FleeceBACK Adhered Roofing System specification for General Job Site Considerations.

- A. Material Safety Data Sheets (MSDS) must be on location at all times during the transportation, storage and application of materials.
- B. Do not apply FAST Adhesive when surface and/or ambient temperatures are below 25°F.
- C. Drums of FAST Adhesive must be a minimum of 70°F at the time of use. Use drum band heaters when necessary.
- D. The addition of FAST Adhesive Catalyst (to Part B side) is recommended to speed up reaction time when temperatures are below 50°F.
- E. The contractor must exercise caution during adhesive spraying to avoid overspray.
 - Use a non-atomizing spray tip such as the Graco Spatter Tip and reduce spray pressure to 500 – 800 psi to increase adhesive droplet size and reduce airborne mist. Maintain hand held wind screens on-site for use as necessary.
 - Extruding FAST Adhesive method may be used to eliminate overspray concerns.
- F. When positioning membrane sheets, exercise care to locate all field splices away from low spots and out of drain sumps. All field splices should be shingled to prevent bucking of water.
- G. Proceed with roofing work only when weather conditions are in compliance with the manufacturer's recommended limitations, and when conditions will permit the work to proceed in accordance with the manufacturer's requirements and recommendations.
- H. The surface on which the insulation or roofing membrane is to be applied shall be clean, smooth, dry, and free of projections or contaminants that would prevent proper application of or be incompatible with the new installation, such as fins, sharp edges, foreign materials, oil and grease.
- I. New roofing shall be complete and weather tight at the end of the work day. Care must be taken to avoid wicking water through the fleece by properly sealing exposed edges of the membrane.
- J. Contaminants such as grease, fats and oils shall not be allowed to come in direct contact with the roofing membrane.

1.07 WARRANTY

- A. General Warranty: The warranties specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.
- B. System Warranty: Provide manufacturer's 20 year total system warranty with extended wind speed coverage of 90 mph (145 kilometer per hour) (UL-580 Class 90 wind uplift per Carlisle specific construction design requirements) ground wind-speed with no dollar limitation (NDL) and not pro-rated; signed by the roofing system manufacturer agreeing to promptly repair leaks resulting from defects in materials or workmanship. Owner's signature is not required.
 - 1. All roof related sheet metal shall be included in the warranty including copings, flashings, counterflashings etc.
 - 2. Roof edge products shall be included in the warranty for the same duration as the roofing system.
 - 3. Roofing system shall be designed to withstand 90 mph wind speed at 32.8 feet (10 m) above ground level.

- C. Warranty shall also cover leaks caused by:
 - 1. Hail: 3" diameter hail when 115-mil FleeceBACK installed
 - 2. Accidental Puncture: 20 man-hours per year for 115-mil FleeceBack
- D. Membrane Warranty: Provide a 20 year membrane warranty signed by the roofing manufacturer warranting that the membrane will be free from manufacturing defects and that the membrane will not prematurely deteriorate to the point of failure.
- E. Pro-rated System Warranties shall not be accepted.
- F. Evidence of the manufacturer's warranty reserve shall be included as part of the project submittals for the Owner's approval.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Thermoplastic Polyolefin Membrane Materials:
 - 1. Carlisle Roofing Systems, Inc; Sure-Weld TPO:
www.carlisle-syntec.com.

2.02 ROOFING

- A. Thermoplastic Membrane Roofing: One ply membrane, fully adhered, over insulation and cover board. System to provide extended wind speed coverage of 90 mph (145 kilometer per hour) (UL-580 Class 90 wind uplift per Carlisle specific construction design requirements)
- B. Roofing Assembly Requirements:
 - 1. Source Limitations: Obtain all components including but not limited to roof insulation, fasteners, membrane materials and flashing materials from the same manufacturer as the membrane roofing. All components shall be manufactured and labeled from the same manufacturer to provide a total system warranty. System to provide extended wind speed coverage of 90 mph (145 kilometer per hour) (UL-580 Class 90 wind uplift per Carlisle specific construction design requirements)
 - 2. Fire Resistance Rating: Provide materials which have been tested and listed by UL in "Building Materials Directory" for application indicated, with Class A for noncombustible decks, Class A for combustible decks, rated materials/system for roof slopes less than 1/2 inch (12.7 mm) per foot.
 - 3. Material Compatibility: Provide roofing materials that are compatible demonstrated by membrane roofing manufacturer based on testing and field experience.
 - 4. FM Approvals Listing: Provide membrane roofing, base flashings, and component materials that comply with requirements in FM Approvals 4450 and FM Approvals 4470 as part of a membrane roofing system, and that are listed in FM Approvals' "RoofNav" for Class 1 or noncombustible construction, as applicable. Identify materials with FM Approvals markings.
 - a. Fire/Windstorm Classification: Class 1-90 accordance to Property Loss Prevention Data Sheet 1-29, January 2006.
 - 5. Insulation Thermal Value:
 - a. Polyisocyanurate Board: Insulation values shall be in accordance with Long Term Thermal Resistance (LTTTR) values as determined by CAN/ULC-S770.
 - 1) The insulation (in uniform thickness) shall provide minimum R-18 thermal resistance. **Coverboard, deck sheathing and insulation used to create crickets is not to be included in calculating minimum R value.**
 - b. Acceptable Insulation Types - Constant Thickness Application:
 - 1) Minimum 2 layers of polyisocyanurate.
 - c. Acceptable Insulation Types - Tapered Application:
 - 1) Minimum 2 layers of constant thickness application below tapered application.
 - 2) Tapered polyisocyanurate board.

2.03 ROOFING MEMBRANE AND ASSOCIATED MATERIALS

- A. Membrane:
 - 1. Material: Sure-Weld gray FleeceBACK 115-mil reinforced TPO (Thermoplastic Polyolefin) membrane. Membrane thickness over the reinforcing scrim (top-ply thickness) shall be nominal .015-mil or thicker.
 - 2. Membrane Weathering Performance: The TPO membrane shall be formulated with OCTAGUARD XT Weathering Package to withstand 60 days of exposure at a 275° F temperature and a minimum of 17,000 kj/m² xenon arc resistance at 80°F without cracking or showing signs of material failure, exceeding ASTM 6878. Membrane Weathering Performance: The TPO membrane shall be formulated with OCTAGUARD XT Weathering Package to withstand 60 days of exposure at a 275° F temperature and a minimum of 17,000 kj/m² xenon arc resistance at 80°F without cracking or showing signs of material failure, exceeding ASTM 6878. Membrane Weathering Performance: The TPO membrane shall be formulated with OCTAGUARD XT Weathering Package to withstand 60 days of exposure at a 275° F temperature and a minimum of 17,000 kj/m² xenon arc resistance at 80°F without cracking or showing signs of material failure, exceeding ASTM 6878.
 - 3. Sheet Width: Gray Membrane Sheets are 12' wide by 100' long.
- B. Seaming Materials: As recommended by membrane manufacturer.
- C. Flexible Flashing Material: Same material as membrane.

2.04 COVER BOARDS

- A. Cover Board: Provide and install one of the following which meets warranty requirements.
 - 1. ASTM C 1177/C 1177M, glass-mat, water-resistant gypsum substrate, 1/2 inch (13 mm) thick, factory primed.
 - a. Manufacturers:
 - 1) Georgia-Pacific Corporation; Product Dens Deck Prime: www.gp.com
 - 2. ASTM C 1278/C 1278M, cellulosic-fiber-reinforced, water-resistant gypsum substrate, 1/2 inch (13 mm) thick.
 - a. Manufacturers:
 - 1) USG Corporation; Product Securock: www.usg.com

2.05 INSULATION

- A. General: Provide preformed roof insulation boards that comply with requirements, selected from manufacturer's standard sizes and of thicknesses indicated as required by membrane system manufacturer.
- B. Each roof must have a minimum 1/8" per 12" slope to the drains with a minimum R-18 value. This shall be accomplished either by existing structural slope or tapered insulation.
 - 1. Utilize tapered insulation to provide the required minimum 1/8" per 12" slope on the roof. Contractor is responsible for verifying existing conditions of all roofs at each site for this project.
- C. Provide preformed saddles, crickets, tapered edge strips and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated; back slope must provide minimum 1/4 inch per 12 inches (6.35 mm per 304.8 mm).
- D. Polyisocyanurate Board Insulation: Rigid cellular foam, complying with ASTM C1289, Type II, Class 1, cellulose felt or glass fiber mat both faces; Grade 3 and with the following characteristics:
 - 1. Compressive Strength: 25 psi (172 kPa)

2.06 METAL EDGING

- A. Roof Edging System: Manufacturer's decorative metal fascia to terminate roofing at perimeter. The system shall be watertight with no exposed fasteners.
 - 1. Tested per ANSI/SPRI ES-1 Standard and installed per roofing manufacturer's

2. Exterior fascia of 24 gauge galvanized steel with polyvinylidene fluoride system finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat.
3. Fascia Finishes: Select from manufacturer's standard colors.
4. Water Cut-Off: As recommended by manufacturer, apply under the anchor bar.

2.07 ACCESSORIES

- A. General: Provide products which are recommended by manufacturers to be fully compatible with indicated substrates, or provide separation materials as required by manufacturer to eliminate contact between incompatible materials.
- B. Expansion Joint Covers: Composite construction of flexible EPDM flashing of black color with closed cell urethane foam backing, each edge seamed to aluminum sheet metal flanges, designed for nominal joint width of 1 inch (25 mm) or as indicated on drawings. Include special formed corners, tees, intersections, and wall flashings, each sealed watertight.
- C. Stack Boots: Prefabricated flexible boot and collar for pipe stacks through membrane; same material as membrane.
- D. Insulation fastening components: Appropriate for purpose intended and approved by roofing manufacturer.
 1. Insulation Fasteners for attachment application to wood and metal decks: Length as required for thickness of insulation material and penetration of deck substrate, with metal washers for extended wind speed coverage of 90 mph (145 kilometer per hour) (UL-580 Class 90 wind uplift per Carlisle specific construction design requirements) Do not penetrate through lower pan of acoustical decks.
 2. Insulation Adhesive for attachment application to concrete, gypsum, tectum and light weight insulating concrete decks: Flexible FAST Adhesive, an elongating impact resistant two component insulating urethane adhesive used to attach insulation and FleeceBACK membrane. System to provide extended wind speed coverage of 90 mph (145 kilometer per hour) (UL-580 Class 90 wind uplift per Carlisle specific construction design requirements) Packaging formats include 50 and 15 gallon drums.
- E. Membrane Adhesive: Flexible FAST Adhesive, an elongating impact resistant two component insulating urethane adhesive used to attach insulation and FleeceBACK membrane. Packaging formats include 50 and 15 gallon drums.
 1. Adhesive to provide 150% elongation in conjunction with fleece backed membrane – ASTM D412.
 2. MDI content of Part A material less than 25%.
- F. Thinners and Cleaners: As recommended by adhesive manufacturer, compatible with membrane.
- G. Sealants: As recommended by membrane manufacturer.
- H. Water Cutoff Mastic: Manufacturer's standard butyl mastic sealant.
- I. Walkway Pads: Suitable for maintenance traffic, contrasting color or otherwise visually distinctive from roof membrane. Protective surfacing for roof traffic shall be Sure-Weld TPO Walkway Rolls installed per manufacturer's requirements.
- J. Install walkways at all traffic concentration points (such as roof hatches, access doors, rooftop ladders, mechanical equipment, etc.).
- K. Hot air weld walkway pads to the membrane sheet in accordance with the manufacturer's specifications.
- L. Metal Termination Bars: Manufacturer's standard aluminum bars, approximately 1 inch (25 mm) wide, roll formed and pre-punched.
- M. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, in-seam sealants, termination reglets and other accessories recommended by roofing system manufacturer for intended use.

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- N. Wood nailers shall be 3 ½" (89mm) minimum width or 1" (25mm) wider than the metal flange. They shall be of equal thickness as the insulation to substrate, and acceptable to roofing system manufacturer.
- O. Drains: Replace all roof drain screens and baskets. New retro-fit roof drains will be required.

PART 3 - EXECUTION

3.01 INSTALLATION - GENERAL

- A. Perform work in accordance with NRCA Roofing and Waterproofing Manual and manufacturer's instructions.
- B. Do not apply roofing membrane during unsuitable weather.
- C. Do not apply roofing membrane when ambient temperature is outside the temperature range recommended by manufacturer.
- D. Do not apply roofing membrane to damp or frozen deck surface or when precipitation is expected or occurring.
- E. Do not expose materials vulnerable to water in quantities greater than can be weatherproofed the same day.

3.02 EXAMINATION

- A. Verify that surfaces and site conditions are ready to receive work.
- B. Verify deck is clean and smooth, flat, free of depressions, waves or projections, properly sloped and suitable for installation of the roof system.
- C. Verify deck surfaces are dry and free of snow or ice.
- D. Verify that roof openings, curbs, and penetrations through roof are in place, solidly set and braced that roof drains are properly clamped/secured into position.
- E. Verify that wood nailers are in-place and secured and match thicknesses of insulation required.

3.03 PREPARATION

- A. Clean substrates of dust, debris and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.
- B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof drain plugs when no work is taking place or when rain is in the forecast.
- C. Concrete Deck - Confirm dry deck by moisture meter with 12 percent moisture maximum.
- D. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of the roofing system at the end of the workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.

3.04 INSULATION - UNDER MEMBRANE

- A. Attachment of Insulation:
 - 1. Secure insulation to the substrate with Flexible FAST Adhesive in accordance with the manufacturer's specifications and Factory Mutual requirements for specified Windstorm Resistance Classification.
 - 2. Mechanically fasten insulation to deck in accordance with roofing manufacturer's instructions and Factory Mutual requirements for specified Windstorm Resistance Classification.
 - a. Use fastener type and fastening pattern as required to achieve wind resistance specified. Required wind speed coverage of 90 mph (145 kilometer per hour) (UL-580 Class 90 wind uplift per Carlisle specific construction design requirements)
 - b. Spacing requirements at corners and perimeter must be strictly followed. Length of fasteners must meet manufacturer's requirement for deck penetration, but shall not penetrate the bottom flute or plate of metal decking.

- B. Lay subsequent layers of insulation with joints staggered minimum 6 inch (150 mm) from joints of preceding layer.
- C. Place tapered insulation to the required slope pattern in accordance with manufacturer's instructions.
- D. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inch (6.3 mm) with insulation.
- E. Lay boards with edges in moderate contact without forcing. Cut insulation to fit neatly to perimeter blocking and around penetrations through roof.
- F. Cut and fit insulation within 1/4 inch (6.3 mm) of nailers, projections and penetrations.
- G. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water - **no ponding around roof drain or scuppers.**
- H. Do not apply more insulation than can be covered with membrane in same day.
- I. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints a minimum of 6 inches (150 mm) in each direction from joints of insulation below. Loosely butt cover boards together and fasten to roof deck.

3.05 MEMBRANE APPLICATION

- A. Roll out membrane, free from wrinkles or tears. Place sheet into place without stretching.
- B. Shingle joints on sloped substrate in direction of drainage.
- C. Accurately align sheets and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.
- D. Apply adhesive to substrate at rate required by manufacturer. Fully embed membrane in adhesive except in areas directly over or within 3 inches (75 mm) of expansion joints. Fully adhere one roll before proceeding to adjacent rolls. Immediately after installation, roll with a 100-150 pound weighted steel roller.
 - 1. Do not apply to splice area of membrane roofing.
- E. Seams: Clean seam areas, overlap membrane roofing, and hot-air weld side and end laps of membrane roofing and sheet flashings according to manufacturer's written instructions to ensure a watertight seam installation.
 - 1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of sheet membrane. Lap sealant is not required on vertical splices.
 - 2. Repair tears, voids, and lapped seams in roofing that does not comply with requirements.
- F. Spread sealant bed over deck drain flange at roof drains and securely seal membrane roofing in place with clamping ring.
- G. Around roof penetrations, seal flanges and flashings with flexible flashing.
- H. Coordinate installation of roof drains and related flashings.
- I. Install walkway pads around roof hatches and roof mounted equipment. Extend minimum of 3 feet (1 m) from roof hatch on three sides and 5 feet (1.5 m) from service access locations on roof mounted equipment.

3.06 FLASHING INSTALLATION

- A. Install sheet flashings and preformed flashing accessories and adhere to substrates according to roofing system manufacturer's written instructions.
- B. Apply bonding adhesive to substrate and underside of flashing sheet at required rate and allow to partially dry. Do not apply bonding adhesive to seam area of flashing.
- C. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing as recommended by manufacturer.

- D. Clean splice areas, apply splicing cement, and firmly roll side and end laps of overlapping sheets according to manufacturer's written instructions to ensure a watertight seam installation. Apply lap sealant and seal exposed edges of sheet flashing terminations.
- E. Apply coatings to sheet roofing and flashings according to manufacturer's recommendations, by spray, roller, or other suitable application method.

3.07 CLEANING

- A. In areas where finished surfaces are soiled by work of this section, consult manufacturer of surfaces for cleaning advice and conform to their documented instructions.
- B. Repair or replace defaced or damaged finishes caused by work of this section.

3.08 PROTECTION

- A. Protect installed roofing and flashings from construction operations.
- B. Where traffic must continue over finished roof membrane, protect surfaces using durable materials. Materials must be smooth and free of fasteners and splinters.

END OF SECTION