

2.1 MANUFACTURERS
 A. IN OTHER PART 2 ARTICLES WHERE TITLES BELOW INTRODUCE LISTS, THE FOLLOWING REQUIREMENTS APPLY FOR PRODUCT SELECTION:
 1. AVAILABLE MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, MANUFACTURERS OFFERING PRODUCTS THAT MAY BE INCORPORATED INTO THE WORK INCLUDE, BUT ARE NOT LIMITED TO, THE MANUFACTURERS SPECIFIED.
 2. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY THE MANUFACTURERS SPECIFIED.

2.2 PVC ROOFING MEMBRANE
 A. PVC SHEET: ASTM D 4434, TYPE IV, FABRIC REINFORCED.
 B. MANUFACTURERS:
 1. DURKO-LAST ROOFING, INC.
 2. THICKNESS: 40 MILS (1.0 MM), NOMINAL
 3. EXPOSED FACE COLOR: WHITE.

2.3 AUXILIARY MATERIALS
 A. GENERAL: AUXILIARY MATERIALS RECOMMENDED BY ROOFING SYSTEM MANUFACTURER FOR INTENDED USE AND COMPATIBLE WITH MEMBRANE ROOFING.
 1. ADHESIVES AND SEALANTS THAT ARE USED INSIDE OF THE WEATHERPROOFING SYSTEM SHALL COMPLY WITH THE FOLLOWING LIMITS FOR VOC CONTENT WHEN CALCULATED ACCORDING TO 40 CFR 59, SUBPART D (EPA METHOD 24):
 a. POLYURETHANE ADHESIVES: 50 G/L.
 b. GYPSUM BOARD AND PANEL ADHESIVES: 50 G/L.
 c. MULTIPURPOSE CONSTRUCTION ADHESIVES: 70 G/L.
 d. FIBERGLASS ADHESIVES: 80 G/L.
 e. CONTACT ADHESIVES: 80 G/L.
 f. PLASTIC CEMENT WELDING COMPOUNDS: 350 G/L.
 g. PVC WELDING COMPOUNDS: 510 G/L.
 h. OTHER ADHESIVES: 250 G/L.
 i. SINGLE-PLY ROOF MEMBRANE SEALANTS: 450 G/L.
 j. NONMEMBRANE ROOF SEALANTS: 300 G/L.
 k. SEALANT PRIMERS FOR NONPOROUS SUBSTRATES: 250 G/L.
 l. SEALANT PRIMERS FOR POROUS SUBSTRATES: 775 G/L.

B. SHEET FLASHING: MANUFACTURER'S STANDARD SHEET FLASHING OF SAME MATERIAL, TYPE, REINFORCEMENT, THICKNESS, AND COLOR AS PVC SHEET MEMBRANE.
 C. BONDING ADHESIVE: MANUFACTURER'S STANDARD SOLVENT-BASED BONDING ADHESIVE FOR MEMBRANE, AND SOLVENT-BASED BONDING ADHESIVE FOR BASE FLASHINGS.
 D. METAL TERMINATION BARS: MANUFACTURER'S STANDARD PREDRILLED STAINLESS-STEEL OR ALUMINUM BARS, APPROXIMATELY 1 BY 1/8 INCH (25 BY 3 MM) THICK, WITH ANCHORS.
 E. METAL BATTENS: MANUFACTURER'S STANDARD ALUMINUM-ZINC-ALLOY-COATED OR ZINC-COATED STEEL SHEET, APPROXIMATELY 1 INCH (25 MM) WIDE BY 0.05 INCH (1.3 MM) THICK, PREPUNCHED.
 F. FASTENERS: FACTORY-COATED STEEL FASTENERS AND METAL OR PLASTIC PLATES MEETING CORROSION-RESISTANCE PROVISIONS IN FMG 4470, DESIGNED FOR FASTENING MEMBRANE TO SUBSTRATE, AND ACCEPTABLE TO MEMBRANE ROOFING SYSTEM MANUFACTURER.
 G. MISCELLANEOUS ACCESSORIES: PROVIDE POURABLE SEALERS, PREFORMED CONE AND VENT SHEET FLASHINGS, PREFORMED INSIDE AND OUTSIDE CORNER SHEET FLASHINGS, T-JOINT COVERS, TERMINATION REGLETTS, COVER STRIPS, SLIP SHEET, AND OTHER ACCESSORIES.

2.4 ROOF INSULATION
 A. EXTRUDED-POLYSTYRENE BOARD INSULATION: ASTM C 578, TYPE IV, 1.6-LB./CU. FT. (26-KG./CU. M) MINIMUM DENSITY; SQUARE EDGED.
 B. TAPERED INSULATION: PROVIDE FACTORY-TAPERED INSULATION BOARDS FABRICATED TO SLOPE OF 1/4 INCH PER 12 INCHES (1:48), UNLESS OTHERWISE INDICATED.
 C. PROVIDE PREFORMED SADDLES, CRICKETS, TAPERED EDGE STRIPS, AND OTHER INSULATION SHAPES WHERE INDICATED FOR SLOPING TO DRAIN. FABRICATE TO SLOPES INDICATED.

2.5 INSULATION ACCESSORIES
 A. FASTENERS: FACTORY-COATED STEEL FASTENERS AND METAL OR PLASTIC PLATES MEETING CORROSION-RESISTANCE PROVISIONS IN FMG 4470, DESIGNED FOR FASTENING ROOF INSULATION TO SUBSTRATE, AND ACCEPTABLE TO ROOFING SYSTEM MANUFACTURER.
 B. COLD-FLUID-APPLIED ADHESIVE: MANUFACTURER'S STANDARD COLD-FLUID-APPLIED ADHESIVE FORMULATED TO ADHERE ROOF INSULATION TO SUBSTRATE.
 C. COVER BOARD: ASTM C 208, TYPE II, GRADE 2, CELLULOSIC-FIBER INSULATION BOARD, 1/2 INCH (13 MM) THICK.

2.6 WALKWAYS
 A. FLEXIBLE WALKWAYS: FACTORY-FORMED, NONPOROUS, HEAVY-DUTY, SOLID-RUBBER, SLIP-RESISTING, SURFACE-TEXTURED WALKWAY PADS OR ROLLS, APPROXIMATELY 3/16 INCH (5 MM) THICK, AND ACCEPTABLE TO MEMBRANE ROOFING SYSTEM MANUFACTURER.

PART 3 - EXECUTION
 3.1 SUBSTRATE BOARD INSTALLATION
 A. INSTALL SUBSTRATE BOARD WITH LONG JOINTS IN CONTINUOUS STRAIGHT LINES, PERPENDICULAR TO ROOF SLOPES WITH END JOINTS STAGGERED BETWEEN ROWS. TIGHTLY BUTT SUBSTRATE BOARDS TOGETHER.
 1. FASTEN SUBSTRATE BOARD TO TOP FLANGES OF STEEL DECK ACCORDING TO MEMBRANE ROOFING SYSTEM MANUFACTURER'S WRITTEN INSTRUCTIONS.
 3.2 INSULATION INSTALLATION
 A. COORDINATE INSTALLING MEMBRANE ROOFING SYSTEM COMPONENTS SO INSULATION IS NOT EXPOSED TO PRECIPITATION OR LEFT EXPOSED AT THE END OF THE WORKDAY.
 B. COMPLY WITH MEMBRANE ROOFING SYSTEM MANUFACTURER'S WRITTEN INSTRUCTIONS FOR INSTALLING ROOF INSULATION.
 C. INSTALL TAPERED INSULATION UNDER AREA OF ROOFING TO CONFORM TO SLOPES INDICATED.
 D. INSTALL ONE OR MORE LAYERS OF INSULATION UNDER AREA OF ROOFING TO ACHIEVE REQUIRED THICKNESS. WHERE OVERALL INSULATION THICKNESS IS 2 INCHES (50 MM) OR GREATER, INSTALL 2 OR MORE LAYERS WITH JOINTS OF EACH SUCCEEDING LAYER STAGGERED FROM JOINTS OF PREVIOUS LAYER A MINIMUM OF 6 INCHES (150 MM) IN EACH DIRECTION.
 E. MECHANICALLY FASTENED INSULATION: INSTALL EACH LAYER OF INSULATION AND SECURE TO DECK USING MECHANICAL FASTENERS SPECIFICALLY DESIGNED AND SIZED FOR FASTENING SPECIFIED BOARD-TYPE ROOF INSULATION TO DECK TYPE.
 1. FASTEN INSULATION TO RESIST UPLIFT PRESSURE AT CORNERS, PERIMETER, AND FIELD OF ROOF.
 F. INSTALL COVER BOARDS OVER INSULATION WITH LONG JOINTS IN CONTINUOUS STRAIGHT LINES WITH END JOINTS STAGGERED BETWEEN ROWS. LOOSELY BUTT COVER BOARDS TOGETHER AND FASTEN TO ROOF DECK.
 1. FASTEN TO RESIST UPLIFT PRESSURE AT CORNERS, PERIMETER, AND FIELD OF ROOF.

3.3 MECHANICALLY FASTENED ROOFING MEMBRANE INSTALLATION
 A. INSTALL ROOFING MEMBRANE OVER AREA TO RECEIVE ROOFING ACCORDING TO ROOFING SYSTEM MANUFACTURER'S WRITTEN INSTRUCTIONS. UNROLL ROOFING MEMBRANE AND ALLOW TO LAY BEFORE INSTALLING.
 1. INSTALL SHEET ACCORDING TO ASTM D 5082.
 B. MECHANICALLY OR ADHESIVELY FASTEN ROOFING MEMBRANE SECURELY AT TERMINATIONS, PENETRATIONS, AND PERIMETER OF ROOFING.
 C. SEAMS: CLEAN SEAM AREAS, OVERLAP ROOFING MEMBRANE, WELD OR WELD SIDE AND END LAPS OF ROOFING MEMBRANE ACCORDING TO MANUFACTURER'S WRITTEN INSTRUCTIONS TO ENSURE A WATERTIGHT SEAM INSTALLATION.
 1. REPAIR TEARS, VOIDS, AND LAPPED SEAMS IN ROOFING MEMBRANE THAT DOES NOT MEET REQUIREMENTS.
 D. IN-PLACE ATTACHMENT: SECURE ONE EDGE OF ROOFING MEMBRANE USING FASTENING PLATES OR METAL BATTENS CENTERED WITHIN MEMBRANE SPICE AND MECHANICALLY FASTEN ROOFING MEMBRANE TO ROOF DECK. FIELD-SPICE SEAM.
 E. THROUGH-MEMBRANE ATTACHMENT: SECURE ROOFING MEMBRANE USING FASTENING PLATES OR METAL BATTENS AND MECHANICALLY FASTEN ROOFING MEMBRANE TO ROOF DECK. COVER BATTENS AND FASTENERS WITH A CONTINUOUS COVER STRIP.

3.4 BASE FLASHING INSTALLATION
 A. INSTALL SHEET FLASHINGS AND PREFORMED FLASHING ACCESSORIES AND ADHERE TO SUBSTRATES ACCORDING TO MEMBRANE ROOFING SYSTEM MANUFACTURER'S WRITTEN INSTRUCTIONS.
 B. APPLY SOLVENT-BASED BONDING ADHESIVE TO SUBSTRATE AND UNDERSIDE OF SHEET FLASHING 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 SHEET FLASHING.
 D. CLEAN SEAM AREAS AND OVERLAP AND FIRMLY ROLL SHEET FLASHINGS INTO THE ADHESIVE. WELD SIDE AND END LAPS TO ENSURE A WATERTIGHT SEAM INSTALLATION.
 E. TERMINATE AND SEAL TOP OF SHEET FLASHINGS AND MECHANICALLY ANCHOR TO SUBSTRATE THROUGH TERMINATION BARS.

3.5 WALKWAY INSTALLATION
 A. GENERAL WALKWAYS: INSTALL WALKWAY PRODUCTS IN LOCATIONS INDICATED. ADHERE WALKWAY PRODUCTS TO SUBSTRATE WITH COMPATIBLE ADHESIVE ACCORDING TO ROOFING SYSTEM MANUFACTURER'S WRITTEN INSTRUCTIONS.
 3.6 FIELD QUALITY CONTROL
 A. TESTING AGENCY: OWNER WILL ENGAGE A QUALIFIED INDEPENDENT TESTING AND INSPECTING AGENCY TO PERFORM ROOF TESTS AND INSPECTIONS AND TO PREPARE TEST REPORTS.
 B. FINAL ROOF INSPECTION: ARRANGE FOR ROOFING SYSTEM MANUFACTURER'S TECHNICAL PERSONNEL TO INSPECT ROOFING INSTALLATION ON COMPLETION AND SUBMIT REPORT TO ARCHITECT.
 C. REPAIR OR REMOVE AND REPLACE COMPONENTS OF MEMBRANE ROOFING SYSTEM WHERE TEST RESULTS OR INSPECTIONS INDICATE THAT THEY DO NOT COMPLY WITH SPECIFIED REQUIREMENTS.

SECTION 076100 - SHEET METAL ROOFING

PART 1 - GENERAL
 1.1 SUMMARY
 A. SECTION INCLUDES:
 1. STANDING-SEAM METAL ROOFING.
 1.2 PERFORMANCE REQUIREMENTS
 A. WIND-UPLIFT RESISTANCE: CAPABLE OF PRODUCING SHEET METAL ROOFING ASSEMBLIES THAT COMPLY WITH UL 580 FOR CLASS 90 WIND-UPLIFT RESISTANCE.

1.3 SUBMITTALS
 A. SHOP DRAWINGS: SHOW INSTALLATION LAYOUT OF SHEET METAL ROOFING, INCLUDING PLANS, ELEVATIONS, EXPANSION JOINT LOCATIONS, AND KEYED DETAILS. DISTINGUISH BETWEEN SHOP- AND FIELD-ASSEMBLED WORK.
 1. INCLUDE DETAILS FOR FORMING, JOINING, AND SECURING SHEET METAL ROOFING, INCLUDING PATTERN OF SEAMS, TERMINATION POINTS, FIXED POINTS, EXPANSION JOINTS, ROOF PENETRATIONS, EDGE CONDITIONS, SPECIAL CONDITIONS, CONNECTIONS TO ADJOINING WORK, AND DETAILS OF ACCESSORY ITEMS.
 B. SAMPLES: FOR EACH EXPOSED PRODUCT AND FOR EACH FINISH SPECIFIED.
 C. PORTABLE ROLL-FORMING EQUIPMENT CERTIFICATE: ISSUED BY UL FOR EQUIPMENT MANUFACTURER'S PORTABLE ROLL-FORMING EQUIPMENT CAPABLE OF PRODUCING PANELS THAT COMPLY WITH UL REQUIREMENTS.
 1.4 QUALITY ASSURANCE
 A. INSTALLER QUALIFICATIONS: FABRICATOR OF SHEET METAL ROOFING.
 B. ROLL-FORMED SHEET METAL ROOFING FABRICATOR QUALIFICATIONS: AN AUTHORIZED REPRESENTATIVE OF ROLL-FORMED SHEET METAL ROOFING MANUFACTURER FOR FABRICATION AND INSTALLATION OF UNITS.
 C. SHEET METAL ROOFING STANDARD: COMPLY WITH SMACNA'S "ARCHITECTURAL SHEET METAL MANUAL".
 1.5 WARRANTY
 A. SPECIAL WARRANTY ON FINISHES: MANUFACTURER'S STANDARD FORM IN WHICH MANUFACTURER AGREES TO REPAIR FINISH OR REPLACE SHEET METAL ROOFING THAT SHOWS EVIDENCE OF DETEIORATION OF FACTORY-APPLIED FINISHES WITHIN SPECIFIED WARRANTY PERIOD.
 1. FLUOROPOLYMER FINISH WARRANTY PERIOD: 20 YEARS FROM DATE OF SUBSTANTIAL COMPLETION.
 B. SPECIAL INSTALLER'S WARRANTY: SPECIFIED FORM IN WHICH ROOFING INSTALLER AGREES TO REPAIR OR REPLACE COMPONENTS OF CUSTOM-FABRICATED SHEET METAL ROOFING THAT FAIL IN MATERIALS OR WORKMANSHIP WITHIN TWO YEARS OF DATE OF SUBSTANTIAL COMPLETION.

PART 2 - PRODUCTS
 2.1 ROOFING SHEET METALS
 A. MANUFACTURERS AND PRODUCTS:
 1. BERRIDGE MANUFACTURING CO.
 B. METALLIC-COATED STEEL SHEET: RESTRICTED-ATNEE STEEL SHEET, METALLIC COATED BY THE HOT-DIP PROCESS AND PREPARED BY THE COIL-COATING PROCESS TO COMPLY WITH ASTM A 755/A 755M.
 1. ZINC-COATED (GALVANIZED) STEEL SHEET: ASTM A 653/A 653M, G90 (Z275) COATING DESIGNATION; STRUCTURAL QUALITY.
 2. SURFACE: SMOOTH, FLAT FINISH.
 3. THICKNESS: 24 GAUGE, UNLESS OTHERWISE INDICATED.
 4. EXPOSED FINISHES:
 a. HIGH-PERFORMANCE ORGANIC FINISH: THREE-COAT WITH FLUOROPOLYMER COATING CONTAINING NOT LESS THAN 70 PERCENT POLYVINYLIDENE FLUORIDE RESIN BY WEIGHT; COMPLYING WITH PHYSICAL PROPERTIES AND COATING PERFORMANCE REQUIREMENTS OF AAMA 2604, EXCEPT AS MODIFIED BELOW:
 1) HUMIDITY RESISTANCE: 2000 HOURS.
 2) WATER RESISTANCE: 2000 HOURS.
 3) COLOR: AS INDICATED ON DRAWINGS.
 2.2 UNDERLAYMENT MATERIALS
 A. POLYETHYLENE SHEET: 6-MIL (0.15-MM)-THICK POLYETHYLENE SHEET COMPLYING WITH ASTM D 4397.
 B. FELTS: ASTM D 226, TYPE II (NO. 30), ASPHALT-SATURATED ORGANIC FELTS.
 1. SELF-ADHERING, HIGH-TEMPERATURE SHEET: MINIMUM 30 TO 40 MILS (0.76 TO 1.0 MM) THICK, CONSISTING OF SLIP-RESISTING POLYETHYLENE-FILM TOP SURFACE LAMINATED TO LAYER OF BUTYL OR SBS-MODIFIED ASPHALT ADHESIVE, WITH RELEASE-PAPER BACKING; COLD APPLIED.
 C. SLIP SHEET: BUILDING PAPER, 3-LB/100 SQ. FT. (0.16-KG/SQ. M) MINIMUM, ROSIN SIZED.

2.3 INSTALLATION, GENERAL
 A. GENERAL: ANCHOR SHEET METAL ROOFING AND OTHER COMPONENTS OF THE WORK SECURELY IN PLACE WITH PROVISIONS FOR THERMAL AND STRUCTURAL MOVEMENT. INSTALL FASTENERS, SOLDER, WELDING RODS, PROTECTIVE COATINGS, SEPARATORS, SEALANTS, AND OTHER MISCELLANEOUS ITEMS AS REQUIRED FOR A COMPLETE ROOFING SYSTEM AND AS RECOMMENDED BY FABRICATOR FOR SHEET METAL ROOFING.
 1. FIELD CUTTING OF SHEET METAL ROOFING BY TORCH IS NOT PERMITTED.
 2. RIGIDLY FASTEN EA VE END OF SHEET METAL ROOFING AND ALLOW RIDGE END FREE MOVEMENT DUE TO THERMAL EXPANSION AND CONTRACTION. PREDRILL ROOFING.
 3. PROVIDE METAL CLOSURES AT PEAKS AND EACH SIDE OF RIDGE CAPS.
 4. FLASH AND SEAL SHEET METAL ROOFING WITH WEATHER CLOSURES AT EAVES, RAKES, AND PERIMETER OF ALL OPENINGS. FASTEN WITH SELF-TAPPING SCREWS.
 5. LOCATE ROOFING SPLICES OVER, BUT NOT ATTACHED TO, STRUCTURAL SUPPORTS. STAGGER ROOFING SPLICES AND END LAPS TO AVOID A FOUR-PANEL LAP SPICE CONDITION.
 6. LAP METAL FLASHING OVER SHEET METAL ROOFING TO ALLOW MOISTURE TO RUN OVER AND OFF THE MATERIAL.
 B. FASTENERS: USE FASTENERS OF SIZES THAT WILL NOT PENETRATE COMPLETELY THROUGH SUBSTRATE.
 1. STEEL ROOFING: USE STAINLESS-STEEL FASTENERS.
 C. METAL PROTECTION: WHERE DISSIMILAR METALS WILL CONTACT EACH OTHER OR CORROSIIVE SUBSTRATES, PROTECT AGAINST GALVANIC ACTION BY PAINTING CONTACT SURFACES WITH BITUMINOUS COATING, BY APPLYING RUBBERIZED-ASPHALT UNDERLAYMENT TO EACH CONTACT SURFACE, OR BY OTHER PERMANENT SEPARATION AS RECOMMENDED BY FABRICATOR OF SHEET METAL ROOFING OR MANUFACTURERS OF DISSIMILAR METALS.

2.4 MISCELLANEOUS MATERIALS
 A. FASTENERS: SELF-TAPPING SCREWS, SELF-LOCKING RIVETS AND BOLTS AND OTHER SUITABLE FASTENERS DESIGNED TO WITHSTAND DESIGN LOADS.
 1. EXPOSED FASTENERS: HEADS MATCHING COLOR OF SHEET METAL ROOFING USING PLASTIC CAPS OR FACTORY-APPLIED COATING.
 2. FASTENERS FOR FLASHING AND TRIM: BLIND FASTENERS OR SELF-DRILLING SCREWS WITH HEX WASHER HEAD.
 B. BLIND FASTENERS: HIGH-STRENGTH ALUMINUM OR STAINLESS-STEEL RIVETS.
 C. SEALING TAPE: PRESSURE-SENSITIVE, 100 PERCENT SOLIDS, POLYISOBUTYLENE COMPOUND SEALING TAPE WITH RELEASE-PAPER BACKING. PROVIDE PERMANENTLY ELASTIC, NONSAG, NONTXIC, NONSTAINING TAPE.
 D. ELASTOMERIC JOINT SEALANT: ASTM C 920, OF BASE POLYMER, TYPE, GRADE, CLASS, AND USE CLASSIFICATIONS REQUIRED TO PRODUCE JOINTS IN SHEET METAL ROOFING AND REMAIN WATERTIGHT.
 E. EXPANSION JOINT SEALANT: FOR HOOKED-TYPE EXPANSION JOINTS, WHICH MUST BE FREE TO MOVE, PROVIDE NONSETTING, NONHARDENING, NONMIGRATING, HEAVY-BODIED POLYISOBUTYLENE SEALANT.
 F. BITUMINOUS COATING: COLD-APPLIED ASPHALT MASTIC, SSPC-PAINT 12, COMPOUNDED FOR 15-MIL (0.4-MM) DRY FILM THICKNESS PER COAT.
 2.4 ACCESSORIES
 A. SHEET METAL ACCESSORIES: PROVIDE COMPONENTS REQUIRED FOR A COMPLETE SHEET METAL ROOFING ASSEMBLY INCLUDING TRIM, COPINGS, FASCIA, CORNER UNITS, CLIPS, FLASHINGS, SEALANTS, GASKETS, FILLERS, METAL CLOSURES, AND SIMILAR ITEMS. MATCH MATERIAL AND FINISH OF SHEET METAL ROOFING UNLESS OTHERWISE INDICATED.
 1. CLEATS: FOR MECHANICALLY SEAMING INTO JOINTS AND FORMED FROM THE FOLLOWING MATERIALS:
 a. METALLIC-COATED STEEL ROOFING: 0.0250-INCH- (0.65-MM-) THICK STAINLESS STEEL OR NYLON-COATED ALUMINUM SHEET.
 b. CLIPS: MINIMUM 0.0625-INCH- (1.6-MM-) THICK, STAINLESS-STEEL PANEL CLIPS DESIGNED TO WITHSTAND NEGATIVE-LOAD REQUIREMENTS.
 c. CLOSURES: CLOSED-CELL, EXPANDED, CELLULAR, RUBBER OR CROSSLINKED, POLYOLEFIN FOAM OR CLOSED-CELL LAMINATED POLYETHYLENE; MINIMUM 1-INCH- (25-MM-) THICK, FLEXIBLE-CLOSURE STRIPS; CUT OR PREMOLDED TO MATCH SHEET METAL ROOFING PROFILE. PROVIDE CLOSURE STRIPS WHERE INDICATED OR NECESSARY TO ENSURE WEATHERTIGHT CONSTRUCTION.
 4. FLASHING AND TRIM: FORMED FROM 0.0179 INCH (0.45 MM) THICK, METALLIC COATED STEEL SHEET. PROVIDE FLASHING AND TRIM AS REQUIRED TO SEAL AGAINST WEATHER AND TO PROVIDE FINISHED APPEARANCE. LOCATIONS INCLUDE, BUT ARE NOT LIMITED TO, EAVES, RAKES, CORNERS, BASES, FAMED OPENINGS, RIDGES, FASCIAE, AND FILLERS. FINISH FLASHING AND TRIM WITH SAME FINISH SYSTEM AS ADJACENT SHEET METAL ROOFING.
 2.5 FABRICATION
 A. GENERAL: CUSTOM FABRICATE SHEET METAL ROOFING TO COMPLY WITH DETAILS SHOWN AND RECOMMENDATIONS IN SMACNA'S "ARCHITECTURAL SHEET METAL MANUAL" THAT APPLY TO THE DESIGN, DIMENSIONS (PANEL WIDTH AND SEAM HEIGHT), GEOMETRY, METAL THICKNESS, AND OTHER CHARACTERISTICS OF INSTALLATION INDICATED. FABRICATE SHEET METAL ROOFING AND ACCESSORIES AT THE SHOP TO GREATEST EXTENT POSSIBLE.
 1. STANDING-SEAM ROOFING: FORM STANDING-SEAM PANELS WITH FINISHED SEAM HEIGHT OF 1-1/2 INCHES (38 MM).
 B. GENERAL: FABRICATE ROLL-FORMED SHEET METAL ROOFING PANELS TO COMPLY WITH DETAILS SHOWN AND ROLL-FORMED SHEET METAL ROOFING MANUFACTURER'S WRITTEN INSTRUCTIONS.
 C. FABRICATE SHEET METAL ROOFING TO ALLOW FOR EXPANSION AND CONTRACTION. PROVIDE SUFFICIENT TO PREVENT LEAKAGE, DAMAGE, AND DETEIORATION OF THE WORK. FOR EXPOSED SHEET METAL WORK TO FIT SUBSTRATES WITH EXCESSIVE OIL CANNING, BUCKLING, AND TOOL MARKS, TRIM TO LINE AND LEVELS INDICATED AND WITH EXPOSED EDGES FOLDED BACK TO FORM HEMS.
 1. LAY OUT SHEET METAL ROOFING SO CROSS SEAMS, WHERE REQUIRED, ARE MADE IN DIRECTION OF FLOW WITH HIGHER PANS OVERLAPPING LOWER PANS. STAGGER CROSS SEAMS.
 2. FOLD AND CLEAT EAVES AND TRANSVERSE SEAMS IN THE SHOP.
 3. FORM AND FABRICATE GUTS, SEAMS STRIPS, CLEATS, RIDGES, EDGE TREATMENTS, INTEGRAL FLASHING AND OTHER COMPONENTS OF METAL ROOFING TO PROFILES, PATTERNS, AND DRAINAGE ARRANGEMENTS SHOWN AND AS REQUIRED FOR LEAKPROOF CONSTRUCTION.
 D. METAL PROTECTION: WHERE DISSIMILAR METALS WILL CONTACT EACH OTHER, PROTECT AGAINST GALVANIC ACTION BY PAINTING CONTACT SURFACES WITH BITUMINOUS COATING, BY APPLYING SELF-ADHERING UNDERLAYMENT TO EACH CONTACT SURFACE, OR BY OTHER PERMANENT SEPARATION AS RECOMMENDED BY FABRICATOR OF SHEET METAL ROOFING OR MANUFACTURERS OF THE METALS IN CONTACT.
 E. SHEET METAL ACCESSORIES: CUSTOM FABRICATE FLASHINGS AND TRIM TO COMPLY WITH RECOMMENDATIONS IN SMACNA'S "ARCHITECTURAL SHEET METAL MANUAL" THAT APPLY TO DESIGN, DIMENSIONS, METAL, AND OTHER CHARACTERISTICS OF ITEM INDICATED. OBTAIN FIELD MEASUREMENTS FOR ACCURATE FIT BEFORE SHOP FABRICATION.

3.4 MISCELLANEOUS MATERIALS
 A. FASTENERS: SELF-TAPPING SCREWS, SELF-LOCKING RIVETS AND BOLTS AND OTHER SUITABLE FASTENERS DESIGNED TO WITHSTAND DESIGN LOADS.
 1. EXPOSED FASTENERS: HEADS MATCHING COLOR OF SHEET METAL ROOFING USING PLASTIC CAPS OR FACTORY-APPLIED COATING.
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 C. SEALING TAPE: PRESSURE-SENSITIVE, 100 PERCENT SOLIDS, POLYISOBUTYLENE COMPOUND SEALING TAPE WITH RELEASE-PAPER BACKING. PROVIDE PERMANENTLY ELASTIC, NONSAG, NONTXIC, NONSTAINING TAPE.
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 E. EXPANSION JOINT SEALANT: FOR HOOKED-TYPE EXPANSION JOINTS, WHICH MUST BE FREE TO MOVE, PROVIDE NONSETTING, NONHARDENING, NONMIGRATING, HEAVY-BODIED POLYISOBUTYLENE SEALANT.
 F. BITUMINOUS COATING: COLD-APPLIED ASPHALT MASTIC, SSPC-PAINT 12, COMPOUNDED FOR 15-MIL (0.4-MM) DRY FILM THICKNESS PER COAT.
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 A. GENERAL: CUSTOM FABRICATE SHEET METAL ROOFING TO COMPLY WITH DETAILS SHOWN AND RECOMMENDATIONS IN SMACNA'S "ARCHITECTURAL SHEET METAL MANUAL" THAT APPLY TO THE DESIGN, DIMENSIONS (PANEL WIDTH AND SEAM HEIGHT), GEOMETRY, METAL THICKNESS, AND OTHER CHARACTERISTICS OF INSTALLATION INDICATED. FABRICATE SHEET METAL ROOFING AND ACCESSORIES AT THE SHOP TO GREATEST EXTENT POSSIBLE.
 1. STANDING-SEAM ROOFING: FORM STANDING-SEAM PANELS WITH FINISHED SEAM HEIGHT OF 1-1/2 INCHES (38 MM).
 B. GENERAL: FABRICATE ROLL-FORMED SHEET METAL ROOFING PANELS TO COMPLY WITH DETAILS SHOWN AND ROLL-FORMED SHEET METAL ROOFING MANUFACTURER'S WRITTEN INSTRUCTIONS.
 C. FABRICATE SHEET METAL ROOFING TO ALLOW FOR EXPANSION AND CONTRACTION. PROVIDE SUFFICIENT TO PREVENT LEAKAGE, DAMAGE, AND DETEIORATION OF THE WORK. FOR EXPOSED SHEET METAL WORK TO FIT SUBSTRATES WITH EXCESSIVE OIL CANNING, BUCKLING, AND TOOL MARKS, TRIM TO LINE AND LEVELS INDICATED AND WITH EXPOSED EDGES FOLDED BACK TO FORM HEMS.
 1. LAY OUT SHEET METAL ROOFING SO CROSS SEAMS, WHERE REQUIRED, ARE MADE IN DIRECTION OF FLOW WITH HIGHER PANS OVERLAPPING LOWER PANS. STAGGER CROSS SEAMS.
 2. FOLD AND CLEAT EAVES AND TRANSVERSE SEAMS IN THE SHOP.
 3. FORM AND FABRICATE GUTS, SEAMS STRIPS, CLEATS, RIDGES, EDGE TREATMENTS, INTEGRAL FLASHING AND OTHER COMPONENTS OF METAL ROOFING TO PROFILES, PATTERNS, AND DRAINAGE ARRANGEMENTS SHOWN AND AS REQUIRED FOR LEAKPROOF CONSTRUCTION.
 D. METAL PROTECTION: WHERE DISSIMILAR METALS WILL CONTACT EACH OTHER, PROTECT AGAINST GALVANIC ACTION BY PAINTING CONTACT SURFACES WITH BITUMINOUS COATING, BY APPLYING SELF-ADHERING UNDERLAYMENT TO EACH CONTACT SURFACE, OR BY OTHER PERMANENT SEPARATION AS RECOMMENDED BY FABRICATOR OF SHEET METAL ROOFING OR MANUFACTURERS OF THE METALS IN CONTACT.
 E. SHEET METAL ACCESSORIES: CUSTOM FABRICATE FLASHINGS AND TRIM TO COMPLY WITH RECOMMENDATIONS IN SMACNA'S "ARCHITECTURAL SHEET METAL MANUAL" THAT APPLY TO DESIGN, DIMENSIONS, METAL, AND OTHER CHARACTERISTICS OF ITEM INDICATED. OBTAIN FIELD MEASUREMENTS FOR ACCURATE FIT BEFORE SHOP FABRICATION.

3.4 MISCELLANEOUS MATERIALS
 A. FASTENERS: SELF-TAPPING SCREWS, SELF-LOCKING RIVETS AND BOLTS AND OTHER SUITABLE FASTENERS DESIGNED TO WITHSTAND DESIGN LOADS.
 1. EXPOSED FASTENERS: HEADS MATCHING COLOR OF SHEET METAL ROOFING USING PLASTIC CAPS OR FACTORY-APPLIED COATING.
 2. FASTENERS FOR FLASHING AND TRIM: BLIND FASTENERS OR SELF-DRILLING SCREWS WITH HEX WASHER HEAD.
 B. BLIND FASTENERS: HIGH-STRENGTH ALUMINUM OR STAINLESS-STEEL RIVETS.
 C. SEALING TAPE: PRESSURE-SENSITIVE, 100 PERCENT SOLIDS, POLYISOBUTYLENE COMPOUND SEALING TAPE WITH RELEASE-PAPER BACKING. PROVIDE PERMANENTLY ELASTIC, NONSAG, NONTXIC, NONSTAINING TAPE.
 D. ELASTOMERIC JOINT SEALANT: ASTM C 920, OF BASE POLYMER, TYPE, GRADE, CLASS, AND USE CLASSIFICATIONS REQUIRED TO PRODUCE JOINTS IN SHEET METAL ROOFING AND REMAIN WATERTIGHT.
 E. EXPANSION JOINT SEALANT: FOR HOOKED-TYPE EXPANSION JOINTS, WHICH MUST BE FREE TO MOVE, PROVIDE NONSETTING, NONHARDENING, NONMIGRATING, HEAVY-BODIED POLYISOBUTYLENE SEALANT.
 F. BITUMINOUS COATING: COLD-APPLIED ASPHALT MASTIC, SSPC-PAINT 12, COMPOUNDED FOR 15-MIL (0.4-MM) DRY FILM THICKNESS PER COAT.
 2.4 ACCESSORIES
 A. SHEET METAL ACCESSORIES: PROVIDE COMPONENTS REQUIRED FOR A COMPLETE SHEET METAL ROOFING ASSEMBLY INCLUDING TRIM, COPINGS, FASCIA, CORNER UNITS, CLIPS, FLASHINGS, SEALANTS, GASKETS, FILLERS, METAL CLOSURES, AND SIMILAR ITEMS. MATCH MATERIAL AND FINISH OF SHEET METAL ROOFING UNLESS OTHERWISE INDICATED.
 1. CLEATS: FOR MECHANICALLY SEAMING INTO JOINTS AND FORMED FROM THE FOLLOWING MATERIALS:
 a. METALLIC-COATED STEEL ROOFING: 0.0250-INCH- (0.65-MM-) THICK STAINLESS STEEL OR NYLON-COATED ALUMINUM SHEET.
 b. CLIPS: MINIMUM 0.0625-INCH- (1.6-MM-) THICK, STAINLESS-STEEL PANEL CLIPS DESIGNED TO WITHSTAND NEGATIVE-LOAD REQUIREMENTS.
 c. CLOSURES: CLOSED-CELL, EXPANDED, CELLULAR, RUBBER OR CROSSLINKED, POLYOLEFIN FOAM OR CLOSED-CELL LAMINATED POLYETHYLENE; MINIMUM 1-INCH- (25-MM-) THICK, FLEXIBLE-CLOSURE STRIPS; CUT OR PREMOLDED TO MATCH SHEET METAL ROOFING PROFILE. PROVIDE CLOSURE STRIPS WHERE INDICATED OR NECESSARY TO ENSURE WEATHERTIGHT CONSTRUCTION.
 4. FLASHING AND TRIM: FORMED FROM 0.0179 INCH (0.45 MM) THICK, METALLIC COATED STEEL SHEET. PROVIDE FLASHING AND TRIM AS REQUIRED TO SEAL AGAINST WEATHER AND TO PROVIDE FINISHED APPEARANCE. LOCATIONS INCLUDE, BUT ARE NOT LIMITED TO, EAVES, RAKES, CORNERS, BASES, FAMED OPENINGS, RIDGES, FASCIAE, AND FILLERS. FINISH FLASHING AND TRIM WITH SAME FINISH SYSTEM AS ADJACENT SHEET METAL ROOFING.
 2.5 FABRICATION
 A. GENERAL: CUSTOM FABRICATE SHEET METAL ROOFING TO COMPLY WITH DETAILS SHOWN AND RECOMMENDATIONS IN SMACNA'S "ARCHITECTURAL SHEET METAL MANUAL" THAT APPLY TO THE DESIGN, DIMENSIONS (PANEL WIDTH AND SEAM HEIGHT), GEOMETRY, METAL THICKNESS, AND OTHER CHARACTERISTICS OF INSTALLATION INDICATED. FABRICATE SHEET METAL ROOFING AND ACCESSORIES AT THE SHOP TO GREATEST EXTENT POSSIBLE.
 1. STANDING-SEAM ROOFING: FORM STANDING-SEAM PANELS WITH FINISHED SEAM HEIGHT OF 1-1/2 INCHES (38 MM).
 B. GENERAL: FABRICATE ROLL-FORMED SHEET METAL ROOFING PANELS TO COMPLY WITH DETAILS SHOWN AND ROLL-FORMED SHEET METAL ROOFING MANUFACTURER'S WRITTEN INSTRUCTIONS.
 C. FABRICATE SHEET METAL ROOFING TO ALLOW FOR EXPANSION AND CONTRACTION. PROVIDE SUFFICIENT TO PREVENT LEAKAGE, DAMAGE, AND DETEIORATION OF THE WORK. FOR EXPOSED SHEET METAL WORK TO FIT SUBSTRATES WITH EXCESSIVE OIL CANNING, BUCKLING, AND TOOL MARKS, TRIM TO LINE AND LEVELS INDICATED AND WITH EXPOSED EDGES FOLDED BACK TO FORM HEMS.
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 D. METAL PROTECTION: WHERE DISSIMILAR METALS WILL CONTACT EACH OTHER, PROTECT AGAINST GALVANIC ACTION BY PAINTING CONTACT SURFACES WITH BITUMINOUS COATING, BY APPLYING SELF-ADHERING UNDERLAYMENT TO EACH CONTACT SURFACE, OR BY OTHER PERMANENT SEPARATION AS RECOMMENDED BY FABRICATOR OF SHEET METAL ROOFING OR MANUFACTURERS OF THE METALS IN CONTACT.
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 C. SEALING TAPE: PRESSURE-SENSITIVE, 100 PERCENT SOLIDS, POLYISOBUTYLENE COMPOUND SEALING TAPE WITH RELEASE-PAPER BACKING. PROVIDE PERMANENTLY ELASTIC, NONSAG, NONTXIC, NONSTAINING TAPE.
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