

NOTES

COAT ALL DUCTILE IRON PIPE AND FITTINGS PER SPECIFICATIONS BELOW.

1.1 REFERENCES

A. ASTM INTERNATIONAL:

- 1. ASTM D4060 – STANDARD TEST METHOD FOR ABRASION RESISTANCE OF ORGANIC COATINGS BY THE TABER ABRASER.
- 2. ASTM D4263 – STANDARD TEST METHOD FOR INDICATING MOISTURE IN CONCRETE BY THE PLASTIC SHEET METHOD.
- 3. ASTM D4541 – STANDARD TEST METHOD FOR PULL-OFF STRENGTH OF COATINGS USING PORTABLE ADHESION TESTERS.
- 4. ASTM F1869 – STANDARD TEST METHOD FOR MEASURING MOISTURE VAPOR EMISSION RATE OF CONCRETE SUBFLOOR USING ANHYDROUS CALCIUM CHLORIDE.

B. AMERICAN WATER WORKS ASSOCIATION STANDARDS:

- 1. AWWA C110 – DUCTILE-IRON AND GRAY-IRON FITTINGS.
- 2. AWWA C116 – PROTECTIVE FUSION-BONDED EPOXY COATINGS FOR THE INTERIOR AND EXTERIOR SURFACES OF DUCTILE-IRON AND GRAY-IRON FITTINGS FOR WATER SUPPLY SERVICE.
- 3. AWWA C213 – FUSION-BONDED EPOXY COATING FOR THE INTERIOR AND EXTERIOR OF STEEL WATER PIPELINES.
- 4. AWWA C222 – POLYURETHANE COATINGS FOR THE INTERIOR AND EXTERIOR OF STEEL WATER PIPE AND FITTINGS.

C. SOCIETY FOR PROTECTIVE COATINGS STANDARDS:

- 1. SSPC-PA2 – PAINT APPLICATION SPECIFICATION NO. 2, MEASUREMENT OF DRY COATING THICKNESS WITH MAGNETIC GAGES.
- 2. SSPC-SP1 – SOLVENT CLEANING.
- 3. SSPC-SP2 – HAND TOOL CLEANING.
- 4. SSPC-SP3 – POWER TOOL CLEANING.
- 5. SSPC-SP5 – WHITE METAL BLAST CLEANING.
- 6. SSPC-SP6 – COMMERCIAL BLAST CLEANING.
- 7. SSPC-SP7 – BRUSH-OFF BLAST CLEANING.
- 8. SSPC-SP10 – NEAR-WHITE BLAST CLEANING.
- 9. SSPC-SP13 – SURFACE PREPARATION OF CONCRETE.

1.2 COATING MATERIALS

A. TYPE 11 – MULTI-USE EPOXY:

- 1. CURE: AMINE OR POLYAMIDE.
- 2. MINIMUM VOLUME SOLIDS: 70 PERCENT.
- 3. MAXIMUM VOC CONTENT: 2.4 LBS PER GALLON.
- 4. MINIMUM ADHESION TO STEEL, ASTM D4541: 500 PSI.
- 5. ABRASION RESISTANCE, ASTM D4060 (CS17, 1KG, 1000 CYCLES): 102 MG MAXIMUM LOSS.
- 6. MANUFACTURER:
 - a. TENNECO COMPANY INC., SERIES 141 EPOXOLINE.
 - b. PGG INDUSTRIES, AMERLOCK 2.
 - c. ICI DEVOE, BAR-RUST 233H.
 - d. CARBOLINE COMPANY, CARBOGUARD 890, CARBOGUARD 891.
 - e. LVVWD APPROVED EQUAL.

B. TYPE 15 – FUSION BONDED EPOXY:

- 1. FACTORY APPLIED SINGLE COMPONENT POWDERED EPOXY.
- 2. IMMERSION SERVICE: NSF STANDARD 61.
- 3. IN ACCORDANCE WITH AWWA C116 AND C213.
- 4. VOLUME SOLIDS: 100 PERCENT.
- 5. VOC CONTENT: 0.0 LBS PER GALLON.
- 6. MINIMUM ADHESION TO STEEL AND IRON, ASTM D4541: 2500 PSI
- 7. ABRASION RESISTANCE, ASTM D4060 (CS17, 1KG, 5000 CYCLES): 100 MG MAXIMUM LOSS.
- 8. LIQUID EPOXY: FOR FIELD REPAIR OF DAMAGED COATING, 100 PERCENT SOLIDS EPOXY RECOMMENDED BY THE POWDER EPOXY MANUFACTURER. APPLY THREE COATS MINIMUM TO PROVIDE DFT OF 15 MILS.
- 9. MANUFACTURER:
 - a. 3M SCOTCHKOTE 134 AND 206N FUSION-BONDED EPOXY.
 - b. LVVWD APPROVED EQUAL.

C. TYPE 20 – ALIPHATIC POLYURETHANE:

- 1. IN ACCORDANCE WITH AWWA C222.
- 2. MINIMUM VOLUME SOLIDS: 66 PERCENT.
- 3. MAXIMUM VOC CONTENT: 2.5 LBS PER GALLON.
- 4. MINIMUM ADHESION TO STEEL, ASTM D4541: 1500 PSI.
- 5. ABRASION RESISTANCE, ASTM D4060 (CS17, 1KG, 1000 CYCLES): 102 MG MAXIMUM LOSS.
- 6. MANUFACTURER:
 - a. PPG INDUSTRIES, AMERSHIELD.
 - b. TNMEC COMPANY INC., SERIES 1074, ENDURA-SHIELD II.
 - c. ICI DEVOE, DEVTHANE 379.
 - d. CARBOLINE COMPANY, CARBOTHANE 134 HG.
 - e. LVVWD APPROVED EQUAL.

1.3 PREPARATION FOR COATING

- A. GENERAL: ALL SURFACES TO RECEIVE PROTECTIVE COATINGS SHALL BE CLEANED AS INDICATED PRIOR TO APPLICATION OF COATINGS. THE CONTRACTOR SHALL EXAMINE ALL SURFACES TO BE COATED, AND SHALL CORRECT ALL SURFACE DEFECTS BEFORE APPLICATION OF ANY COATING MATERIAL. ALL MARRED OR ABRADED SPOTS ON SHOP-PRIMED AND ON FACTORY-FINISHED SURFACES SHALL RECEIVE TOUCH-UP RESTORATION PRIOR TO ANY COATING APPLICATION. SURFACES TO BE COATED SHALL BE DRY AND FREE OF VISIBLE DUST.

- B. CARE SHALL BE EXERCISED NOT TO DAMAGE ADJACENT WORK DURING BLAST CLEANING OPERATIONS. SPRAY PAINTING SHALL BE CONDUCTED UNDER CAREFULLY CONTROLLED CONDITIONS. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR AND SHALL PROMPTLY REPAIR ANY AND ALL DAMAGE TO ADJACENT WORK OR ADJOINING PROPERTY OCCURRING FROM BLAST CLEANING OR COATING OPERATIONS.
- C. PROTECTION OF PAINTED SURFACES: CLEANING AND COATING SHALL BE COORDINATED SO THAT DUST AND OTHER CONTAMINANTS FROM THE CLEANING PROCESS WILL NOT FALL ON WET, TACKY-COATED SURFACES.

1.4 PROTECTION OF SURFACES NOT SCHEDULED TO BE COATED

- A. PROTECT SURROUNDING AREAS AND SURFACES NOT SCHEDULED TO BE COATED FROM DAMAGE DURING SURFACE PREPARATION, CLEANING, AND APPLICATION OF COATINGS.
- B. PROTECT NUTS AND THREADED PORTION OF ALL BOLTS FROM DAMAGE AND COATING DURING SURFACE PREPARATION AND APPLICATION OF COATINGS TO ADJACENT SURFACES.
- C. UNLESS DIRECTED OTHERWISE, DO NOT APPLY ANY COATINGS TO STAINLESS STEEL UNLESS DIRECTED OTHERWISE, AND EXCEPT FOR FIELD REPAIR OF DAMAGED COATING, DO NOT APPLY COATINGS TO SURFACES THAT ARE FACTORY COATED WITH FUSION-BONDED EPOXY.
- D. ALL MACHINED SURFACES, COUPLINGS, SHAFTS, BEARINGS, NAMEPLATES ON MACHINERY, AND OTHER SURFACES NOT TO BE PAINTED SHALL BE REMOVED, MASKED OR OTHERWISE PROTECTED. DROP CLOTHS SHALL BE PROVIDED TO PREVENT COATING MATERIALS FROM FALLING ON OR MARRING ADJACENT SURFACES. THE WORKING PARTS OF ALL MECHANICAL AND ELECTRICAL EQUIPMENT SHALL BE PROTECTED FROM DAMAGE DURING SURFACE PREPARATION AND COATING OPERATIONS. IMMEDIATELY REMOVE COATINGS THAT FALL ON SURROUNDING AREAS AND SURFACES NOT SCHEDULED TO BE COATED.

1.5 SURFACE PREPARATION STANDARDS

- A. THE FOLLOWING REFERENCED SURFACE PREPARATION SPECIFICATIONS OF THE SOCIETY OF PROTECTIVE COATINGS SHALL FORM A PART OF THIS SPECIFICATION:
 - 1. SOLVENT CLEANING (SSPC-SP1): REMOVAL OF OIL, GREASE, SOIL, SALTS, AND OTHER SOLUBLE CONTAMINANTS BY CLEANING WITH SOLVENT, VAPOR, ALKALI, EMULSION, OR STEAM.
 - 2. HAND TOOL CLEANING (SSPC-SP2): REMOVAL OF LOOSE RUST, LOOSE MILL SCALE, LOOSE PAINT, AND OTHER LOOSE DETRIMENTAL FOREIGN MATTER, BY HAND CHIPPING, SCRAPING, SANDING, AND WIRE BRUSHING.
 - 3. POWER TOOL CLEANING (SSPC-SP3): REMOVAL OF LOOSE RUST, LOOSE MILL SCALE, LOOSE PAINT, AND OTHER LOOSE DETRIMENTAL FOREIGN MATTER, BY POWER TOOL CHIPPING, DESCALING, SANDING, WIRE BRUSHING, AND GRINDING.
 - 4. WHITE METAL BLAST CLEANING (SSC-SP5): REMOVAL OF ALL VISIBLE RUST, OIL, GREASE, SOIL, DUST, MILL SCALE, PAINT, OXIDES, CORROSION PRODUCTS AND FOREIGN MATTER BY BLAST CLEANING.
 - 5. COMMERCIAL BLAST CLEANING (SSPC SP6): REMOVAL OF ALL VISIBLE OIL, GREASE, SOIL, DUST, MILL SCALE, RUST, PAINT, OXIDES, CORROSION PRODUCTS, AND OTHER FOREIGN MATTER, EXCEPT THAT STAINING SHALL BE LIMITED TO NO MORE THAN 33 PERCENT OF EACH SQUARE INCH OF SURFACE AREA.
 - 6. BRUSH-OFF BLAST CLEANING (SSPC-SP7): REMOVAL OF ALL VISIBLE OIL, GREASE, SOIL, DUST, LOOSE MILL SCALE, LOOSE RUST, AND LOOSE PAINT.
 - 7. NEAR-WHITE BLAST CLEANING (SSPC-SP10): REMOVAL OF ALL VISIBLE OIL, GREASE, SOIL, DUST, MILL SCALE, RUST, PAINT, OXIDES, CORROSION PRODUCTS, AND OTHER FOREIGN MATTER, EXCEPT THAT STAINING SHALL BE LIMITED TO NO MORE THAN 5 PERCENT OF EACH SQUARE INCH OF SURFACE AREA.
 - 8. SURFACE PREPARATION OF CONCRETE (SSPC-SP13): STANDARD GIVES REQUIREMENTS FOR SURFACE PREPARATION OF CONCRETE BY MECHANICAL, CHEMICAL, OR THERMAL METHODS PRIOR TO THE APPLICATION OF BONDED PROTECTIVE OR LINING SYSTEMS.
 - 9. MARGINALLY PREPARED SURFACES (MAINTENANCE): REMOVE VISIBLE OIL, GREASE, DIRT, DUST, MILL SCALE, RUST, PAINT, OXIDES, CORROSION PRODUCTS, AND OTHER FOREIGN MATTER IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.

1.6 SURFACE PREPARATION OF DUCTILE OR CAST IRON

- A. PREPARE DUCTILE OR CAST IRON SURFACES IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
- B. ENSURE SURFACES ARE CLEAN, DRY, AND FREE OF OIL, GREASE, DIRT, DUST, AND OTHER CONTAMINANTS IN ACCORDANCE WITH SSPC-SP1.

1.7 INSPECTION

- A. SURFACE TEMPERATURE: MEASURE TEMPERATURE OF SURFACE TO BE COATED, WITH INSTRUMENTS APPROVED BY ENGINEER, WHICH IS ACCURATE TO WITHIN 1 DEGREE F. THROUGH THE RANGE BEING TESTED.
- B. HUMIDITY/DEW POINT: FOR HUMIDITY, DEW POINT AND TEMPERATURE DETERMINATION PROVIDE A SLING PSYCHROMETER, WITH U.S. DEPARTMENT OF COMMERCE WEATHER BUREAU PSYCHOMETRIC TABLES OR EQUIVALENT.
- C. DRY FILM THICKNESS:
 - 1. PROVIDE A DRY FILM GAUGE AND CALIBRATION BLOCKS FOR PAINT THICKNESS TESTING WITH AN ACCURACY OF PLUS/MINUS 0.25-MILS.
 - 2. INSTRUMENTS AND METHODS IN ACCORDANCE WITH SSPC-PA2.
- D. HOLIDAY TESTING:
 - 1. PERFORM TEST WITH SPONGE/LOW VOLTAGE HOLIDAY DETECTOR FOR COATINGS ON EXPOSED FERROUS METAL.
 - 2. DO NOT EXCEED THE VOLTAGE ON HOLIDAY DETECTORS RECOMMENDED BY THE MANUFACTURER OF THE COATING SYSTEM.
 - 3. FOR COATINGS BETWEEN 10 MILS AND 20 MILS DFT, ADD A NON-SUDSING TYPE WETTING AGENT TO THE WATER BEFORE WETTING THE DETECTOR SPONGE ON HOLIDAY DETECTOR.
 - 4. ON COATINGS GREATER THAN 20 MILS DFT, USE A HIGH VOLTAGE HOLIDAY DETECTOR.
 - 5. FOR LOCATIONS WHERE HOLIDAYS ARE FOUND, PREPARE SURFACE TO BE COATED AND APPLY COATING FOLLOWING THE APPROPRIATE SECTIONS ABOVE.
 - 6. IF MORE THAN 25 PERCENT (TO THE LIMITS OF THE SANDED EDGES) OF THE AREA COVERED BY THE COATING REQUIRES REPAIR, BLAST CLEAN THE ENTIRE SECTION AFFECTED AND APPLY COATING ACCORDING TO THE APPROPRIATE SECTION ABOVE.
 - 7. NO PINHOLES OR OTHER IRREGULARITIES WILL BE PERMITTED IN THE FINAL COATING.

GROUNDING AND BONDING PER SPECIFICATION BELOW.

1.1 SUMMARY

- A. POWER SYSTEM GROUNDING.
- B. INSTRUMENTATION SYSTEM GROUNDING.
- C. ELECTRICAL EQUIPMENT AND RACEWAY GROUNDING AND BONDING.

1.2 SYSTEM DESCRIPTION

- A. GROUND EACH SEPARATELY DERIVED ELECTRIC SYSTEM TO THE MAIN GROUNDING LOOP WITH SEPARATE GROUNDING CONDUCTOR WITH SIZE AS SHOWN ON THE DRAWINGS.
- B. PROVIDE AN ISOLATED INSTRUMENTATION/CONTROL SYSTEM-GROUNDING CONDUCTOR FROM MAIN GROUNDING LOOP.
- C. BOND TOGETHER: NEUTRAL TO GROUND WHERE ELECTRICAL POWER SOURCE IS DERIVED (TRANSFORMER SECONDARY), ENCLOSURES, EXPOSED NON-CURRENT CARRYING METAL PARTS OF ELECTRICAL EQUIPMENT, METAL RACEWAY SYSTEMS, CABLE TRAYS, GROUNDING CONDUCTOR IN RACEWAYS AND CABLES, RECEPTACLE GROUND CONNECTORS, AND BUILDING PERIMETER GROUND LOOP.

1.3 SUBMITTALS

- A. INDICATE LAYOUT OF GROUND RING, LOCATION OF SYSTEM GROUNDING ELECTRODE CONNECTIONS AND ROUTING OF GROUNDING ELECTRODE CONDUCTOR.
- B. SUBMIT RESULTS OF THE GROUND SYSTEM RESISTANCE TESTS.

PART 2 –PRODUCTS

2.1 MANUFACTURERS

- A. LYNCOLE XIT GROUNDING.
- B. SUPERIOR GROUNDING SYSTEMS.
- C. LIGHTNING ELIMINATORS & CONSULTANTS.
- D. OWNER APPROVED EQUAL.

2.2 MATERIALS

- A. ENHANCED GROUNDING ELECTRODES:
 - 1. CONSIST OF 2-INCH NOMINAL DIAMETER HOLLOW COPPER TUBE:
- A. PERMANENTLY CAP TUBE ON TOP AND BOTTOM.
- B. PROVIDE AIR BREATHER HOLES IN TOP OF TUBE AND PROVIDE DRAINAGE HOLES IN BOTTOM OF TUBE FOR ELECTROLYTE DRAINAGE INTO SURROUNDING SOIL.
- 2. FILLED AT FACTORY WITH NON-HAZARDOUS CALSOLYTE-TYPE SUBSTANCE TO ENHANCE GROUNDING PERFORMANCE.
- 3. MINIMUM OF 10 FEET LONG FOR BOTH A STRAIGHT (VERTICAL) OR WHEN APPROVED BY OWNER, L-SHAPED (HORIZONTAL) INSTALLATION.
- 4. STRANDED NO. 4/0 AWG GROUND WIRE: CADWELDED TO SIDE OF ROD FOR ELECTRODE CONDUCTOR CONNECTION.
- 5. PROVIDE CLAMPING "U-BOLT" WITH PRESSURE PLATE ON TOP END OF TUBE FOR TESTING AND TEMPORARY CONNECTIONS. REMOVE U-BOLT AND CADWELD ONCE TESTING IS COMPLETE AND APPROVED BY THE OWNER.
- 6. PROVIDE SELF-CONTAINED GROUND ROD(S) USING NON-HAZARDOUS CHEMICALLY ENHANCED GROUNDING UNLESS OTHERWISE INDICATED ON DRAWINGS.
- 7. OPERATE BY HYGROSCOPICALLY EXTRACTING MOISTURE FROM AIR TO ACTIVATE ELECTROLYTIC CHEMICALS.
- 8. ENHANCED GROUNDING ELECTRODE SYSTEM:

A. UL LISTED.

- B. 100 PERCENT SELF-ACTIVATING/SEALED AND MAINTENANCE FREE, REQUIRING NO CHEMICAL OR WATER SOLUTIONS TO BE ADDED.
- 9. BACKFILL MATERIAL:

- A. NATURAL VOLCANIC, NON-CORROSIVE SPECIAL FORM OF BENTONITE CLAY GROUT BACKFILL MATERIAL THAT CONTAINS NO CARBON FILLERS. XIT #BNC OR OWNER APPROVED EQUAL.

- B. ABSORB APPROXIMATELY 14 GALLONS OF WATER PER 50 POUND BAG FOR OPTIMAL 30 PERCENT SOLIDS DENSITY.

- C. PH VALUE 8-10 WITH MAXIMUM RESISTIVITY OF 3 OHMS PER METER AT 30 PERCENT SOLIDS DENSITY.

- B. GROUNDING WELLS: FLARED CONCRETE PIPE SECTION WITH CAST OR IRON COVERS AS AVAILABLE FROM: ENHANCED ELECTRODE MANUFACTURER; JENSEN PRECAST, OWNER APPROVED EQUAL OR IN ACCORDANCE WITH DRAWINGS.

- C. GROUNDING GRID CONDUCTOR: STRANDED COPPER CONDUCTOR WITH GREEN THW INSULATION OF SIZE SHOWN ON DRAWINGS.

- D. GROUNDING CONDUCTOR LOCATED IN BUILDING FOUNDATION, EQUIPMENT FOUNDATIONS, AND DUCT BANK CONCRETE: BARE STRANDED COPPER CONDUCTOR OF SIZE SHOWN ON DRAWINGS.

E. SUPPLEMENTAL GROUNDING ELECTRODES:

- 1. FOR GROUNDING ELECTRODES IN MANHOLES, PULLBOXES AND SUPPLEMENTAL INSTALLATIONS, USE 3/4 INCH X 10 FEET – 0 INCHES COPPER-CLAD STEEL GROUND ROD AS INDICATED ON DRAWINGS.
- 2. FOR CONNECTIONS THAT ARE NOT BURIED OR PLACED IN CONCRETE, PROVIDE CABLE-TO-ROD GROUND CONNECTOR AS MANUFACTURED BY BURNDY, TYPE "GAR," TYPE "GD," OR TYPE "GKP-W" – DEPENDING ON APPLICATION.
- 3. FOR INSTALLATIONS OTHER THAN MANHOLES AND PULLBOXES, PROVIDE GROUNDWELL AS DESCRIBED ABOVE AND INSTALL IN ACCORDANCE WITH THE DRAWINGS.

F. MECHANICAL CONNECTORS:

- 1. HIGH COPPER ALLOY AND SUFFICIENTLY RIGID TO RESIST DEFORMATION WHEN TORQUED TO MANUFACTURERS SPECIFICATIONS.
- 2. FLUSH MOUNTED GROUNDING PADS: TWO-HOLE LUGS WITH EXOTHERMIC CONNECTION TO EQUIPMENT GROUND WIRE.

PART 3 –EXECUTION

3.1 INSTALLATION

- A. PROVIDE UNINSULATED TAPS FROM MAIN GROUNDING LOOP(S) FOR GROUNDING EACH PIECE OF POWER DISTRIBUTION, CONTROL, AND TELEMETRY EQUIPMENT IN QUANTITY AND SIZE SHOWN ON DRAWINGS OR SPECIFIED, WHICHEVER IS GREATER.
 - 1. UNLESS OTHERWISE DETAILED, MAKE TAPS FROM MAIN LOOP(S) WITH EXOTHERMIC WELDS.
 - 2. TERMINATE AT FLUSH MOUNTED GROUNDING PADS AS DETAILED ON DRAWINGS.
- B. PROVIDE SEPARATE, INSULATED EQUIPMENT GROUNDING CONDUCTOR IN FEEDER AND BRANCH CIRCUIT RACEWAYS OR CABLE ASSEMBLIES. TERMINATE EACH END ON GROUNDING LUG, BUS, AND BUSHING. IN ADDITION, FOR GROUNDING ROTATING EQUIPMENT SKIDS, MOTOR FRAMES, TRANSFORMER CASES, ELECTRICAL GEAR ENCLOSURES, AND INDOOR/OUTDOOR ELECTRICAL EQUIPMENT ENCLOSURES, PROVIDE INDIVIDUAL FLUSH GROUNDING PADS FOR CONNECTION TO THE FACILITY GROUND LOOP. PROVIDE COMPRESSION TYPE CONNECTORS AND 600 VOLT GREEN THW STRANDED COPPER (#2 AWG OR AS INDICATED ON THE DRAWINGS) TO CONNECT EQUIPMENT TO GROUNDING PADS.

- A. CONNECT GROUNDING ELECTRODE CONDUCTORS TO NEAREST GROUNDING WELL USING AN EXOTHERMIC CONNECTION TO THE INTERCONNECTING LOOP BETWEEN GROUNDING WELLS.
- B. SUPPLEMENTARY GROUNDING ELECTRODE: USE EFFECTIVELY GROUNDED REINFORCING BAR WITHIN BUILDING FOUNDATION.
- C. USE MINIMUM #6 AWG COPPER CONDUCTOR FOR TELEMETRY COMMUNICATIONS SERVICE GROUNDING CONDUCTOR. LEAVE 10 FEET SLACK CONDUCTOR WITHIN TERMINAL CABINET.
- D. DO NOT EXTEND BARE OR INSULATED GROUNDING CONDUCTOR UP THROUGH FINISHED CONCRETE FLOOR OR THROUGH FOUNDATIONS AND WALLS WITHOUT A FLUSH CONNECTOR.
- E. GROUNDING AND GROUNDED CONDUCTORS TO BE IDENTIFIED AT ALL VISIBLE POINTS.

3.2 FIELD QUALITY CONTROL

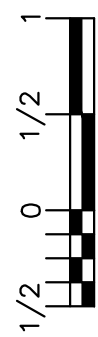
- A. INSPECT GROUNDING AND BONDING SYSTEM CONDUCTORS AND CONNECTIONS FOR TIGHTNESS AND PROPER INSTALLATION.

B. GROUND SYSTEM MEASUREMENTS AND TESTING:

- 1. GROUND SYSTEM MEASUREMENT EQUIPMENT: THE GROUNDING SYSTEM COMPONENTS AND SOIL RESISTIVITY MEASUREMENTS SHALL BE BY EQUIPMENT SPECIFICALLY DESIGNED FOR THAT PURPOSE. THE GROUNDING SYSTEM MEASUREMENTS SHALL BE BY AEMC 4500 DIGITAL STORAGE METER OR EQUIVALENT. AT NO TIME SHALL ANY GROUND SYSTEM MEASUREMENT BE GREATER THAN 2 OHMS. THE MEASUREMENTS WILL BE TAKEN AT ALL GROUND TEST WELLS AND AT EACH MAJOR EQUIPMENT POINT (I.E., TRANSFORMER, MCC, SWITCHGEAR LINE-UP).
- 2. CONTINUITY MEASUREMENTS: ASSEMBLE AND MEASURE THE SITE GROUND GRID FOR CONTINUITY BEFORE EACH GROUND CONDUCTOR IS ATTACHED. EACH GROUND CONDUCTOR THAT ATTACHES TO THE GRID SHALL BE TESTED FOR CONTINUITY BEFORE AND AFTER THE GRID CONNECTION WITH THE VALUES RECORDED FOR APPROVAL BY THE OWNER. AS A MINIMUM, THE FOLLOWING GROUND GRID CONDUCTORS SHALL BE TESTED: PUMP SKIDS; MOTORS; MCCS; SWITCHGEAR; TRANSFORMERS; HVAC EQUIPMENT; ANTENNA POLES; ENCLOSURES; STRUCTURAL STEEL; BRIDGE CRANE; TRANSFER EQUIPMENT; GENERATOR EQUIPMENT; UPS.
- 3. SOIL RESISTIVITY MEASUREMENTS: MEASURE SITE SOIL RESISTIVITY WITH 4-POINT FALL-OF-POTENTIAL METHOD. THE LENGTH AND SPACING OF THE TEST RODS SHALL BE DEPENDENT ON THE LENGTH AND DIAMETER OF THE GROUNDWELL ROD AND SHALL BE AS RECOMMENDED BY THE EQUIPMENT MANUFACTURER. THE 4-POINT MEASUREMENT TEST SHALL BE SET PERFORMED AT FOUR LOCATIONS AT THE SITE TO ENSURE AN ACCURATE MEASUREMENT.
- 4. GROUNDWELL RESISTANCE TESTING: INSTALL AND TEST THE GROUNDWELLS BEFORE ATTACHING THE GROUND GRID CONDUCTOR. DE-ENERGIZE THE ELECTRICAL SYSTEM PRIOR TO DETACHING THE GROUND GRID CONDUCTOR IN THE EVENT THE GROUNDWELLS RESISTIVITY TESTS WERE NOT CONDUCTED BEFORE THE GROUNDWELL WAS CONNECTED TO GROUND GRID. DO NOT DETACH THE GRID CONDUCTOR IF THE ELECTRICAL SYSTEM IS ENERGIZED. THE GROUNDWELLS SHALL BE TESTED BY THE 3-POINT, 62 PERCENT METHOD WHERE THE SPACING OF THE "POTENTIAL" AND "CURRENT" ELECTRODES ARE DEPENDENT ON THE LENGTH AND DIAMETER OF THE GROUNDWELL ROD AND SHALL BE AS RECOMMENDED BY THE EQUIPMENT MANUFACTURER. THE ELECTRODE TEST POINTS SHALL BE NUMEROUS ENOUGH SO AS TO DEVELOP A VALID 62 PERCENT GRAPH WITH THE EFFECTIVE RESISTANCE AREAS BOTH OVERLAPPING AND SEPARATING.

- C. USE OR FABRICATE TEMPLATES OR FRAMES AND RECOMMENDED BOLTS TO HOLD GROUNDING PLATES FLUSH TO CONCRETE FLOOR AND PAD ELEVATIONS DURING POUR AND FINISHING OPERATIONS.

VERIFY SCALE



BAR REPRESENTS ONE AND ONE-HALF INCHES ON ORIGINAL

SCALE

AS SHOWN

NOTES 1

DRAWN BY: CHRISTOPHER G. BLANK

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