

ORANGE & ROCKLAND PRIMARY METERING SWITCHGEAR
 DETAILED SPECIFICATION
 MANUAL OUTDOOR SWITCHGEAR

1. GENERAL

1.1 THE METAL-ENCLOSED SWITCHGEAR IS BASED OFF THE S&C ELECTRIC METAL ENCLOSED SWITCHGEAR DESIGN CONFORMING TO ORANGE & ROCKLAND'S PRIMARY METERING SWITCHGEAR SPECIFICATION DATED 10/1/2004

1.2 DRAWINGS

- (1) THE METAL-ENCLOSED SWITCHGEAR ASSEMBLY SHALL BE IN ACCORDANCE WITH THE PLANS AND DRAWINGS.
- (2) THE MANUFACTURER SHALL FURNISH, WITH EACH METAL-ENCLOSED SWITCHGEAR ASSEMBLY, A SET OF DRAWINGS COMPLETE WITH A BILL OF MATERIAL AND SHOWING: TYPICAL FRONT VIEWS AND OPEN SIDE VIEWS FOR EACH BAY AS WELL AS TYPICAL COMPONENTS, THEIR POSITIONS, AND AVAILABLE SPACE FOR CABLE TERMINATION; AN ANCHOR BOLT PLAN WITH DIMENSIONS; A ONE-LINE DIAGRAM; AND APPROPRIATE WIRING DIAGRAMS.
- (3) THE MANUFACTURER SHALL FURNISH A COMPREHENSIVE INSTRUCTION MANUAL COVERING INSTALLATION OF THE SWITCHGEAR ASSEMBLY AND OPERATION OF THE VARIOUS COMPONENTS.

- 1.3 THE METAL-ENCLOSED SWITCHGEAR ASSEMBLY SHALL CONSIST OF OUTDOOR SELF-SUPPORTING BAYS, CONTAINING INTERRUPTER SWITCHES AND POWER FUSES IN FEEDER BAYS WITH THE NECESSARY ACCESSORY COMPONENTS, ALL COMPLETELY FACTORY-ASSEMBLED AND OPERATIONALLY CHECKED.
 - (1) SWITCHGEAR SHALL BE IN CONFORMANCE WITH ORANGE AND ROCKLAND REQUIREMENTS
 - (2) SWITCHGEAR SHALL BE PROVIDED WITH MOUNTING PROVISIONS FOR ORANGE & ROCKLAND SUPPLIED POTENTIAL AND CURRENT TRANSFORMERS
 - (3) BAY 1 (ENTRANCE BAY) IS ORANGE AND ROCKLAND'S METERING BAY.
 - (4) BAY 2 SHALL BE BUS TAP BAY TO FEED FIRE PUMP TRANSFORMER
 - (5) BAY 3 THRU BAY 6 SHALL BE OUTGOING FUSED FEEDER BAYS CONTAINING S&C SMU-20 FUSES
 - (6) INCOMING AND OUTGOING TERMINAL PAD HEIGHTS SHALL BE AT LEAST 24" FROM THE FLOOR
 - (7) POWER FOR HEATED TO BE SUPPLIED FROM AN EXTERNAL SOURCE SUPPLIED BY THE CUSTOMER
 - (8) SWITCHGEAR SHALL BE SUPPLIED WITH ANSI CATEGORY A FEATURES

1.4 RATINGS

(1) THE RATINGS FOR THE INTEGRATED SWITCHGEAR ASSEMBLY SHALL BE AS DESIGNATED BELOW.

KV, NOMINAL	13.8
KV, MAXIMUM	15.5
KV, BIL	95
MAIN BUS CONTINUOUS, AMPERES	600
SHORT-CIRCUIT RATINGS	
AMPERES, RMS SYMMETRICAL	14,000
MVA THREE-PHASE SYMMETRICAL AT RATED NOMINAL VOLTAGE	335

THE MOMENTARY AND DUTY-CYCLE FAULT-CLOSING RATINGS OF SWITCHES, MOMENTARY RATING OF BUS, AND INTERRUPTING RATINGS OF FUSES SHALL EQUAL OR EXCEED THE SHORTCIRCUIT RATINGS OF THE METAL-ENCLOSED SWITCHGEAR.

1.5 CERTIFICATION OF RATINGS

- (1) THE MANUFACTURER OF THE METAL-ENCLOSED SWITCHGEAR SHALL BE COMPLETELY AND SOLELY RESPONSIBLE FOR THE PERFORMANCE OF THE BASIC SWITCH AND FUSE COMPONENTS AS WELL AS THE COMPLETE INTEGRATED ASSEMBLY AS RATED.
- (2) THE MANUFACTURER SHALL FURNISH, UPON REQUEST, CERTIFICATION OF RATINGS OF THE BASIC SWITCH AND FUSE COMPONENTS AND/OR THE INTEGRATED METAL-ENCLOSED SWITCHGEAR ASSEMBLY CONSISTING OF THE SWITCH AND FUSE COMPONENTS IN COMBINATION WITH THE ENCLOSURE(S).
- (3) THE INTEGRATED SWITCHGEAR ASSEMBLY SHALL HAVE A BIL RATING ESTABLISHED BY TEST ON SWITCHGEAR OF THE TYPE AND KIND TO BE FURNISHED UNDER THIS SPECIFICATION. CERTIFIED TEST ABSTRACTS ESTABLISHING SUCH RATINGS SHALL BE FURNISHED UPON REQUEST.

1.6 COMPLIANCE WITH STANDARDS & CODES

THE METAL-ENCLOSED SWITCHGEAR SHALL CONFORM TO OR EXCEED THE APPLICABLE REQUIREMENTS OF THE FOLLOWING STANDARDS AND CODES:

- (1) ANSI C37.20.3 (METAL-ENCLOSED INTERRUPTER SWITCHGEAR).
- (2) THE APPLICABLE PORTIONS OF ARTICLE 490 IN THE NATIONAL ELECTRICAL CODE, INCLUDING ARTICLE 490.21(E), WHICH SPECIFIES THAT THE INTERRUPTER SWITCHES IN COMBINATION WITH POWER FUSES SHALL SAFELY WITHSTAND THE EFFECTS OF CLOSING, CARRYING, AND INTERRUPTING ALL POSSIBLE CURRENTS UP TO THE ASSIGNED MAXIMUM SHORT-CIRCUIT RATING.
- (3) THE SWITCHGEAR MANUFACTURER SHALL PROVIDE ENCLOSURES THAT HAVE BEEN PROVEN BY UNDERWRITERS LABORATORIES, INC. TO BE IN COMPLIANCE WITH THE CATEGORY A ENCLOSURE TEST REQUIREMENTS IN ACCORDANCE WITH CONFORMANCE STANDARD ANSI C37.57. CATEGORY A ENCLOSURES ARE INTENDED TO PROVIDE A DEGREE OF PROTECTION AGAINST CONTACT WITH ENCLOSED EQUIPMENT IN GROUND LEVEL INSTALLATIONS SUBJECT TO DELIBERATE UNAUTHORIZED ACTS BY MEMBERS OF THE UNSUPERVISED GENERAL PUBLIC. CATEGORY A ENCLOSURES REQUIRE THE ADDITION OF PADLOCKABLE COVERS FOR WINDOWS AND ACCESSORIES SUCH AS AMMETERS, VOLTMETERS, KILOWATT-HOUR METERS, ETC.

2. CONSTRUCTION

2.1 TO ENSURE A COMPLETELY COORDINATED DESIGN, THE METAL-ENCLOSED SWITCHGEAR SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE MINIMUM CONSTRUCTION SPECIFICATIONS OF THE FUSE AND/OR SWITCH MANUFACTURER TO PROVIDE ADEQUATE ELECTRICAL CLEARANCES AND ADEQUATE SPACE FOR FUSE HANDLING.

2.2 ENCLOSURE CONSTRUCTION

- (1) IN ESTABLISHING THE REQUIREMENTS FOR THE ENCLOSURE DESIGN, CONSIDERATION SHALL BE GIVEN TO ALL RELEVANT FACTORS SUCH AS CONTROLLED ACCESS, TAMPER RESISTANCE, CORROSION RESISTANCE, PROTECTION FROM INGRESS OF RODENTS, INSECTS, AND WEEDS; AND THE POSSIBILITY OF ARCING FAULTS WITHIN THE ENCLOSURE.
- (2) THE ENCLOSURE OF EACH BAY SHALL BE UNITIZED MONOCOQUE CONSTRUCTION TO MAXIMIZE STRENGTH, MINIMIZE WEIGHT, AND INHIBIT CORROSION.
- (3) THE MATERIAL FOR ALL EXTERNAL SIDES OF THE ENCLOSURE AND THE ROOF SHALL BE 11-GAUGE HOT-ROLLED, PICKLED AND OILED STEEL SHEET.
- (4) EACH BAY CONTAINING HIGH-VOLTAGE COMPONENTS SHALL BE A COMPLETE UNIT IN ITSELF, WITH FULL SIDE SHEETS RESULTING IN DOUBLE-WALL CONSTRUCTION BETWEEN BAYS. TO GUARD AGAINST UNAUTHORIZED OR INADVERTENT ENTRY, SIDE AND REAR SHEETS AND THE TOP SHALL NOT BE EXTERNALLY BOLTED.
- (5) THE BASE SHALL BE A CONTINUOUS STEEL CHANNEL OF A THICKER GAUGE MATERIAL THAN USED FOR THE ENCLOSURE AND SHALL EXTEND COMPLETELY AROUND ALL FOUR SIDES OF EACH BAY.
- (6) ACCESS TO THE INTERIOR OF THE ENCLOSURE SHALL BE FROM THE FRONT ONLY, ALLOWING PLACEMENT OF THE METAL-ENCLOSED SWITCHGEAR ASSEMBLY TIGHT AGAINST A WALL OR BACK-TO-BACK TO MINIMIZE FLOOR-SPACE REQUIREMENTS.
- (7) TO GUARD AGAINST UNAUTHORIZED OR INADVERTENT ENTRY, THERE SHALL BE NO ACCESS TO HIGH VOLTAGE THROUGH SIDE OR REAR SHEETS OF THE METAL-ENCLOSED SWITCHGEAR ASSEMBLY; AND NO ACCESS TO HIGH VOLTAGE BY MEANS OF EXTERNALLY REMOVABLE PANELS.
- (8) TO GUARD AGAINST CORROSION, ALL HARDWARE (INCLUDING DOOR FITTINGS, FASTENERS, ETC.), ALL OPERATING-MECHANISM PARTS, AND OTHER PARTS SUBJECT TO ABRASIVE ACTION FROM MECHANICAL MOTION SHALL BE OF EITHER NONFERROUS METALS, OR GALVANIZED OR ZINC-NICKEL-PLATED MATERIALS. CADMIUM-PLATED FERROUS PARTS SHALL NOT BE USED.
- (9) EXTERNALLY ACCESSIBLE HARDWARE SHALL NOT BE USED FOR SUPPORT OF HIGH-VOLTAGE COMPONENTS OR SWITCH-OPERATING MECHANISMS WITHIN THE SWITCHGEAR.

2.3 DOOR CONSTRUCTION

- (1) DOORS SHALL BE CONSTRUCTED OF 11_GAUGE HOT-ROLLED, PICKLED AND OILED STEEL SHEET.
- (2) DOORS SHALL HAVE 90_DEGREE FLANGES AND SHALL OVERLAP WITH THE DOOR OPENINGS. FOR STRENGTH AND RIGIDITY, AND TO MINIMIZE EXPOSURE, THE DOOR FLANGES SHALL BE WELDED AT THE CORNERS AND SHALL BE FORMED (AT THE TOP AND BOTH SIDES AS A MINIMUM) WITH A DOUBLE BEND SO THAT THE SHEARED-EDGE FLANGES AT THE TOP AND BOTH SIDES FOLD BACK PARALLEL TO THE INSIDE OF THE DOOR.
- (3) EACH DOOR SHALL BE EQUIPPED WITH A DOOR HANDLE. THE DOOR HANDLE SHALL BE PADLOCKABLE AND, ON OUTDOOR GEAR, SHALL INCORPORATE A HOOD TO PROTECT THE PADLOCK SHACKLE FROM TAMPERING.
- (4) IN CONSIDERATION OF CONTROLLED ACCESS, TAMPER RESISTANCE, AND ARCING FAULTS, EACH DOOR OVER 40 INCHES IN HEIGHT SHALL HAVE A MINIMUM OF THREE CONCEALED, INTERLOCKING, HIGH-STRENGTH LATCHES. DOORS 40 INCHES IN HEIGHT OR LESS SHALL HAVE A MINIMUM OF TWO SUCH LATCHES.
- (5) DOORS PROVIDING ACCESS TO INTERRUPTER SWITCHES OR INTERRUPTER SWITCHES WITH POWER FUSES SHALL BE PROVIDED WITH A WIDE-VIEW WINDOW, CONSTRUCTED OF AN IMPACT-RESISTANT MATERIAL, TO FACILITATE CHECKING OF SWITCH POSITION WITHOUT OPENING THE DOOR.
- (6) DOORS PROVIDING ACCESS TO FUSES OR FUSED VOLTAGE TRANSFORMERS SHALL HAVE PROVISIONS TO STORE SPARE FUSE UNITS, REFILL UNITS, OR INTERRUPTING MODULES.

2.4 ACCESS CONTROL

ACCESS CONTROL SHALL BE PROVIDED AS FOLLOWS:

- (1) DOORS PROVIDING ACCESS TO INTERRUPTER SWITCHES WITH FUSES SHALL BE MECHANICALLY INTERLOCKED TO GUARD AGAINST:
 - (a) OPENING THE DOOR IF THE INTERRUPTER SWITCH ON THE SOURCE SIDE OF THE FUSE IS CLOSED, AND
 - (b) CLOSING THE INTERRUPTER SWITCH IF THE DOOR IS OPEN.
- (2) DOORS PROVIDING ACCESS TO INTERRUPTER SWITCHES ONLY, WHICH ARE OPERATED BY STORED-ENERGY TYPE SWITCH OPERATORS, SHALL BE MECHANICALLY OR KEY INTERLOCKED TO GUARD AGAINST OPERATING THE INTERRUPTER SWITCH IF THE DOOR IS OPEN.
- (3) DOORS AND HINGED-BOLTED PANELS PROVIDING ACCESS TO HIGH-VOLTAGE COMPONENTS SHALL BE PROVIDED WITH FLUSH-MOUNTED KEY-OPERATED SNAPLOCKS AND SHALL HAVE PROVISIONS FOR PADLOCKING.

2.5 INTERNAL PROTECTIVE SCREENS

- (1) IN ADDITION TO THE ENCLOSURE DOOR, EACH BAY OR COMPARTMENT THEREOF CONTAINING HIGH-VOLTAGE COMPONENTS SHALL BE PROVIDED WITH AN INTERNAL PROTECTIVE SCREEN, BOLTED CLOSED, TO GUARD AGAINST INADVERTENT ENTRY TO BAYS CONTAINING THESE COMPONENTS WHEN THE ENCLOSURE DOOR IS OPEN.
- (2) EACH BAY CONTAINING A CONTROL-POWER TRANSFORMER CAPABLE OF 5 KVA OR GREATER OUTPUT SHALL BE PROVIDED WITH AN INTERNAL PROTECTIVE SCREEN, BOLTED CLOSED, TO GUARD AGAINST INADVERTENT CONTACT WITH THE PRIMARY FUSE WHEN THE ENCLOSURE DOOR IS OPEN. IN SUCH CASES, THE SCREEN SHALL ALSO BE INTERLOCKED TO ENSURE THAT THE SECONDARY LOAD HAS BEEN DISCONNECTED PRIOR TO REMOVAL OF THESE FUSES.

2.6 INSULATORS

THE INTERRUPTER-SWITCH AND FUSE-MOUNTING INSULATORS, MAIN-BUS SUPPORT INSULATORS, INSULATED OPERATING SHAFTS, AND (IF APPLICABLE) PUSH RODS SHALL BE OF A CYCLOALIPHATIC EPOXY RESIN SYSTEM WITH CHARACTERISTICS AND RESTRICTIONS AS FOLLOWS:

- (1) OPERATING EXPERIENCE OF AT LEAST 15 YEARS UNDER SIMILAR CONDITIONS.
- (2) ADEQUATE LEAKAGE DISTANCE ESTABLISHED BY TEST PER IEC PUBLICATION 507, FIRST EDITION, 1975.
- (3) ADEQUATE STRENGTH FOR SHORT-CIRCUIT STRESS ESTABLISHED BY TEST.
- (4) CONFORMANCE WITH APPLICABLE ANSI STANDARDS.
- (5) HOMOGENEITY OF THE CYCLOALIPHATIC EPOXY RESIN THROUGHOUT EACH INSULATOR TO PROVIDE MAXIMUM RESISTANCE TO POWER ARCS. ABLATION DUE TO HIGH

TEMPERATURES FROM POWER ARCS SHALL CONTINUOUSLY EXPOSE MORE MATERIAL OF THE SAME COMPOSITION AND PROPERTIES SO THAT NO CHANGE IN MECHANICAL OR ELECTRICAL CHARACTERISTICS TAKES PLACE BECAUSE OF ARC-INDUCED ABLATION. FURTHERMORE, ANY SURFACE DAMAGE TO INSULATORS DURING INSTALLATION OR MAINTENANCE OF SWITCHGEAR SHALL EXPOSE MATERIAL OF THE SAME COMPOSITION AND PROPERTIES SO THAT INSULATORS WITH MINOR SURFACE DAMAGE NEED NOT BE REPLACED.

2.7 BUS

2.7.1 HIGH-VOLTAGE MAIN BUS

- (1) EACH BAY AND INTERCONNECTIONS SHALL CONSIST OF COPPER BAR CA110, SQUARE EDGE, HARD TEMPER PER ASTM B187. BOLTED COPPER-TO-COPPER CONNECTIONS SHALL HAVE SILVERED INTERFACES AND SHALL BE MADE WITH 1/2"-3 STAINLESS STEEL BOLTS WITH TWO BRASS FLAT WASHERS PER BOLT, ONE UNDER THE BOLT HEAD AND ONE UNDER THE NUT, AND WITH A STAINLESS-STEEL SPLIT LOCKWASHER BETWEEN THE FLAT WASHER AND THE NUT. THESE BOLTS SHALL BE TIGHTENED TO 35 FOOT-POUNDS TORQUE.

2.7.2 GROUND BUS

- (1) THE GROUND BUS SHALL CONSIST OF COPPER BAR CA110, SQUARE EDGE, HARD TEMPER PER ASTM B187. BOLTED COPPER-TO-COPPER CONNECTIONS SHALL HAVE SILVERED INTERFACES AND SHALL BE MADE WITH 1/2"-13 STAINLESS STEEL BOLTS WITH TWO BRASS FLAT WASHERS PER BOLT, ONE UNDER THE BOLT HEAD AND ONE UNDER THE NUT, AND WITH A STAINLESS-STEEL SPLIT LOCKWASHER BETWEEN THE FLAT WASHER AND THE NUT.

2.8 LOW-VOLTAGE COMPONENTS

- (1) ALL LOW-VOLTAGE COMPONENTS, SWITCH OPERATORS (EXCEPT THOSE INTEGRALLY MOUNTED IN THE SWITCHGEAR STILE), SOURCE-TRANSFER CONTROLS, METERS, INSTRUMENTS, AND RELAYS, SHALL BE LOCATED IN GROUNDED, METAL-ENCLOSED COMPARTMENTS SEPARATE FROM HIGH VOLTAGE TO PROVIDE ISOLATION AND SHALL BE ARRANGED TO ALLOW COMPLETE ACCESSIBILITY FOR OPERATION WITHOUT EXPOSURE TO HIGH VOLTAGE.
- (2) SPACE HEATERS SHALL BE PROVIDED IN ALL BAYS, SHALL HAVE A GROUNDED, PERFORATED, GALVANIZED STEEL GUARD.
- (3) TO PROVIDE ISOLATION FROM HIGH VOLTAGE, LOW-VOLTAGE WIRING, EXCEPT FOR SHORT LENGTHS SUCH AS AT TERMINAL BLOCKS OR AT SECONDARIES OF SENSING DEVICES, SHALL BE IN GROUNDED CONDUIT, CABLE TRAYS, OR RACEWAYS.

2.9 CABLE-TERMINATION SPACE

TO FACILITATE CABLE PULLING AND INSTALLATION OF CABLE TERMINATORS, PROVISIONS SHALL BE MADE FOR:

- (1) FULL FRONT ACCESS FOR POSITIONING AND REMOVAL OF CABLE PULLING SHEAVES.
- (2) FREE ACCESS WITHOUT INTERFERENCE FROM NONREMOVABLE STRUCTURAL MEMBERS OR FROM MECHANICAL LINKAGES BETWEEN THE INTERRUPTER-SWITCH BLADES AND OPERATING MECHANISM.

3. FINISH AND FEATURES

3.2 OUTDOOR SWITCHGEAR

3.2.1 OUTDOOR FINISH

- (1) THE ENCLOSURE FINISH SHALL CONFORM TO OR EXCEED THE APPLICABLE REQUIREMENTS OF ANSI C57.12.28.
- (2) DURING FABRICATION, THE AREAS OF STRUCTURAL PARTS WHICH MAY LATER BECOME INACCESSIBLE, SUCH AS FOLDED EDGES AND OVERLAPPING MEMBERS, SHALL BE GIVEN AN IRON-OXIDE ZINC-CHROMATE ANTICORROSION PRIMER TO ENSURE THAT ALL SURFACES ARE PROTECTED.
- (3) FULL COVERAGE AT JOINTS AND BLIND AREAS SHALL BE ACHIEVED BY PROCESSING ENCLOSURES INDEPENDENTLY OF COMPONENTS SUCH AS DOORS AND ROOFS BEFORE ASSEMBLY INTO THE UNITIZED STRUCTURES.
- (4) TO REMOVE OILS AND DIRT, TO FORM A CHEMICALLY AND ANODICALLY NEUTRAL CONVERSION COATING TO IMPROVE THE FINISH-TO-METAL BOND, AND TO RETARD UNDERFILM PROPAGATION OF CORROSION, ALL SURFACES SHALL UNDERGO A THOROUGH PRETREATMENT PROCESS COMPRISED OF A FULLY AUTOMATED SYSTEM OF CLEANING, RINSING, PHOSPHATIZING, SEALING, DRYING, AND COOLING BEFORE ANY PROTECTIVE COATINGS ARE APPLIED. BY UTILIZING AN AUTOMATED PRETREATMENT PROCESS, THE ENCLOSURE WILL RECEIVE A HIGHLY CONSISTENT THOROUGH TREATMENT, ELIMINATING FLUCTUATIONS IN REACTION TIME, REACTION RATE, AND CHEMICAL CONCENTRATIONS.
- (5) AFTER PRETREATMENT, PROTECTIVE COATINGS SHALL BE APPLIED THAT SHALL HELP RESIST CORROSION AND PROTECT THE STEEL ENCLOSURE. TO ESTABLISH THE CAPABILITY TO RESIST CORROSION AND PROTECT THE ENCLOSURE, REPRESENTATIVE TEST SPECIMENS COATED BY THE ENCLOSURE MANUFACTURER'S FINISHING SYSTEM SHALL SATISFACTORILY PASS THE FOLLOWING TESTS:

- (a) 4000 HOURS OF EXPOSURE TO SALT-SPRAY TESTING PER ASTM B 117 WITH:
 - (i) UNDERFILM CORROSION NOT TO EXTEND MORE THAN 1/32" FROM THE SCRIBE AS EVALUATED PER ASTM D 1654, PROCEDURE A, METHOD 2 (SCRAPING); AND
 - (ii) LOSS OF ADHESION FROM BARE METAL NOT TO EXTEND MORE THAN 1/8" FROM THE SCRIBE.
- (b) 1000 HOURS OF HUMIDITY TESTING PER ASTM D 4585 WITH NO BLISTERING AS EVALUATED PER ASTM D 714.
- (c) 500 HOURS OF ULTRAVIOLET ACCELERATED WEATHERING TESTING PER ASTM G 53 USING LAMP UVB-313 WITH NO CHALKING AS EVALUATED PER ASTM D 659, AND NO MORE THAN A 10% REDUCTION OF PAINT GLOSS AS EVALUATED PER ASTM D 523.
- (d) CROSSHATCH ADHESION TESTING PER ASTM D 3359 METHOD B WITH NO LOSS OF PAINT.
- (e) 160-INCH-POUND IMPACT ADHESION TESTING PER ASTM D 2794 WITH NO PAINT CHIPPING OR CRACKING.
- (f) OIL RESISTANCE TESTING CONSISTING OF A 72-HOUR IMMERSION BATH IN MINERAL OIL WITH NO SHIFT IN COLOR, NO STREAKING, NO BLISTERING, AND NO LOSS OF HARDNESS.
- (g) 3000 CYCLES OF ABRASION TESTING PER ASTM 4060 WITH NO PENETRATION TO THE SUBSTRATE.

CERTIFIED TEST ABSTRACTS SUBSTANTIATING THE ABOVE CAPABILITIES SHALL BE FURNISHED UPON REQUEST.

- (6) A HEAVY COAT OF INSULATING "NO-DRIIP" COMPOUND SHALL BE APPLIED TO THE INSIDE SURFACE OF THE ROOF STRUCTURE TO PREVENT CONDENSATION OF MOISTURE THEREON.

- (7) AFTER THE ENCLOSURES ARE COMPLETELY ASSEMBLED AND THE COMPONENTS (SWITCHES, FUSES, BUS, ETC.) ARE INSTALLED, THE FINISH SHALL BE INSPECTED FOR SCUFFS AND SCRATCHES. BLEMISHES SHALL BE TOUCHED UP TO RESTORE THE PROTECTIVE INTEGRITY OF THE FINISH.
- (8) TOUCH-UP MATERIALS -- WITH COMPLETE INSTRUCTIONS -- SHALL BE INCLUDED WITH EACH SHIPMENT OF METAL-ENCLOSED SWITCHGEAR FOR TOUCH-UP IN THE FIELD.
- (9) THE FINISH SHALL BE OLIVE GREEN, MUNSELL 7GY3.29/1.5.

3.2.2 OUTDOOR FEATURES

(1) ENCLOSURE VENTILATION

- (a) VENTILATION OPENINGS SHALL BE PROVIDED AT THE TOP AND BOTTOM ON THE FRONT AND REAR OF EACH BAY.
- (b) VENTS SHALL BE RAIN-RESISTANT AND CORROSION-RESISTANT.
- (c) EACH VENT SHALL HAVE AN INSIDE SCREEN AND BAFFLE TO EXCLUDE INSECTS AND TO PROTECT AGAINST INSERTION OF FOREIGN OBJECTS.
- (d) IN CONSIDERATION OF EXCEPTIONALLY HIGH CONCENTRATIONS OF AIRBORNE DUST, EXTERNALLY ACCESSIBLE GLASS-FIBER FILTERS SHALL BE PROVIDED.

- (2) LIFTING EYES SHALL BE REMOVABLE. SOCKETS FOR LIFTING EYES SHALL BE BLIND-TAPPED.

- (3) GASKETING AND SEALING

- (a) DOOR OPENINGS AND OPENINGS FOR HINGED BOLTED PANELS (AND BOLTED PANELS PROVIDING ACCESS TO LOW-VOLTAGE COMPONENTS) SHALL HAVE RESILIENT COMPRESSION GASKETING TO PREVENT WATER FROM ENTERING THE ENCLOSURE.
- (b) GASKET SEALS SHALL BE PROVIDED AT THE TOP AND SIDE EDGES OF ADJOINING BAYS TO PREVENT WATER ENTRY BETWEEN THE DOUBLE WALLS.
- (c) THE TOP AND BOTH SIDES OF BUS OPENINGS BETWEEN BAYS SHALL BE GASKETED WITH CHANNEL GASKETS AS AN ADDITIONAL PROTECTION AGAINST ENTRANCE OF WATER OR EXTERNAL LABYRINTHINE METAL RAINSHIELDS SHALL BE PROVIDED OVER ENCLOSURE ROOF FLANGES BETWEEN ADJACENT BAYS.
- (d) ROOFS SHALL BE WEATHER-SEALED IN PLACE WITH A SUITABLE SEALANT.

4. BASIC COMPONENTS

4.1 INTERRUPTER SWITCHES

- (1) INTERRUPTER SWITCHES SHALL HAVE A ONE-TIME OR TWO-TIME DUTY-CYCLE FAULT-CLOSING RATING EQUAL TO OR EXCEEDING THE SHORT-CIRCUIT RATING OF THE SWITCHGEAR. THESE RATINGS DEFINE THE ABILITY TO CLOSE THE INTERRUPTER SWITCH EITHER ALONE (UNFUSED) OR IN COMBINATION WITH THE APPROPRIATE FUSE, ONCE OR TWICE AS APPLICABLE AGAINST A THREE-PHASE FAULT WITH ASYMMETRICAL CURRENT IN AT LEAST ONE PHASE EQUAL TO THE RATED VALUE, WITH THE SWITCH REMAINING OPERABLE AND ABLE TO CARRY AND INTERRUPT RATED CURRENT. TESTS SUBSTANTIATING THESE RATINGS SHALL BE PERFORMED AT MAXIMUM VOLTAGE. CERTIFIED TEST ABSTRACTS ESTABLISHING SUCH RATINGS SHALL BE FURNISHED UPON REQUEST.
- (2) INTERRUPTER SWITCHES INTENDED FOR MANUAL OPERATION SHALL BE OPERATED BY MEANS OF AN EXTERNALLY OPERABLE, NONREMOVABLE HANDLE. THE HANDLE SHALL HAVE PROVISIONS FOR PADLOCKING IN BOTH THE OPEN AND CLOSED POSITIONS. INTERRUPTER SWITCHES INTENDED FOR POWER OPERATION SHALL BE OPERATED BY MEANS OF A SWITCH OPERATOR EXPRESSLY DESIGNED TO BE COMPATIBLE WITH THE INTERRUPTER SWITCH.
- (3) INTERRUPTER SWITCHES SHALL UTILIZE A QUICK-MAKE QUICK-BREAK MECHANISM INSTALLED BY THE SWITCH MANUFACTURER, WHICH SHALL SWIFTLY AND POSITIVELY OPEN AND CLOSE THE INTERRUPTER SWITCH INDEPENDENT OF THE SWITCH-HANDLE OR SWITCH OPERATOR OPERATING SPEED.
 - (a) FOR MANUALLY OPERATED INTERRUPTER SWITCHES, AND FOR INTERRUPTER SWITCHES OPERATED BY DIRECT MOTOR DRIVE SWITCH OPERATORS, THE QUICK-MAKE QUICK-BREAK MECHANISM SHALL BE INTEGRALLY MOUNTED TO THE SWITCH FRAME.
 - (b) FOR INTERRUPTER SWITCHES OPERATED BY STORED-ENERGY SWITCH OPERATORS, THE QUICK-MAKE QUICK-BREAK MECHANISM SHALL BE AN INTEGRAL PART OF THE SWITCH OPERATOR.

- (4) INTERRUPTER SWITCHES SHALL BE COMPLETELY ASSEMBLED AND ADJUSTED BY THE SWITCH MANUFACTURER ON A SINGLE RIGID MOUNTING FRAME. THE FRAME SHALL BE OF WELDED STEEL CONSTRUCTION SUCH THAT THE FRAME INTERCEPTS THE LEAKAGE PATH WHICH PARALLELS THE OPEN GAP OF THE INTERRUPTER SWITCH, TO POSITIVELY ISOLATE THE LOAD CIRCUIT WHEN THE INTERRUPTER SWITCH IS IN THE OPEN POSITION.

- (5) INTERRUPTER SWITCHES SHALL BE PROVIDED WITH A SINGLE BLADE PER PHASE FOR CIRCUIT CLOSING INCLUDING FAULT CLOSING, CONTINUOUS CURRENT CARRYING, AND CIRCUIT INTERRUPTING. SPRING-LOADED AUXILIARY BLADES SHALL NOT BE PERMITTED.

- (6) CIRCUIT INTERRUPTION SHALL BE ACCOMPLISHED BY USE OF AN INTERRUPTER WHICH IS POSITIVELY AND INHERENTLY SEQUENCED WITH THE BLADE POSITION. CIRCUIT INTERRUPTION SHALL TAKE PLACE COMPLETELY WITHIN THE INTERRUPTER, WITH NO EXTERNAL ARC OR FLAME. ANY EXHAUST SHALL BE VENTED IN A CONTROLLED MANNER THROUGH A LABYRINTHINE MUFFLER OR A DEIONIZING VENT.

- (7) INTERRUPTER SWITCHES SHALL HAVE A READILY VISIBLE OPEN GAP WHEN IN THE OPEN POSITION TO ALLOW POSITIVE VERIFICATION OF SWITCH POSITION.

- (8) TERMINALS ON INTERRUPTER SWITCHES TO WHICH CABLE WILL BE TERMINATED SHALL BE EQUIPPED WITH GROUNDING PROVISIONS. GROUNDING PROVISIONS SHALL ALSO BE PROVIDED ON THE GROUND BUS IN SUCH BAYS.

- (9) TERMINALS ON INTERRUPTER SWITCHES RATED 1200 AMPERES AND, FOR ENTRANCE-BAY APPLICATIONS ONLY, TERMINALS ON INTERRUPTER SWITCHES THAT ARE USED IN CONJUNCTION WITH FUSES RATED 600 AMPERES OR GREATER SHALL BE EQUIPPED WITH PROVISIONS FOR TWO CABLES PER PHASE.

4.2 FUSES

4.2.1 SOLID-MATERIAL POWER FUSES

- (1) SOLID-MATERIAL POWER FUSES SHALL BE OF THE SOLID-MATERIAL TYPE AND SHALL UTILIZE REFILL-UNIT-AND-HOLDER OR FUSE-UNIT-AND-END-FITTING CONSTRUCTION. THE REFILL UNIT OR FUSE UNIT SHALL BE READILY REPLACEABLE.
- (2) FOR SWITCHGEAR RATED UP THROUGH 270 MVA AT 4.16 KV, 600 MVA AT 13.8 KV, 860 MVA AT 25 KV, AND 1000 MVA AT 34.5 KV, MOUNTINGS FOR SOLID-MATERIAL POWER FUSES SHALL BE DISCONNECT STYLE. NON-DISCONNECT STYLE MOUNTINGS FOR POWER FUSES SHALL BE USED ONLY WHERE HIGHER RATINGS ARE REQUIRED.
- (3) FUSIBLE ELEMENTS SHALL BE NONAGING AND NONDAMAGEABLE SO THAT IT IS UNNECESSARY TO REPLACE UNBLOWN COMPANION FUSES FOLLOWING A FUSE OPERATION.
- (4) FUSIBLE ELEMENTS FOR REFILL UNITS OR FUSE UNITS, RATED 10 AMPERES OR LARGER, SHALL BE HELICALLY COILED TO AVOID MECHANICAL DAMAGE DUE TO STRESSES FROM CURRENT SURGES.

- (5) FUSIBLE ELEMENTS THAT CARRY CONTINUOUS CURRENT SHALL BE SUPPORTED IN AIR TO HELP PREVENT DAMAGE FROM CURRENT SURGES.

- (6) SOLID-MATERIAL POWER FUSES SHALL HAVE MELTING TIME-CURRENT CHARACTERISTICS THAT ARE PERMANENTLY ACCURATE WITH A MAXIMUM TOTAL TOLERANCE OF 10% IN TERMS OF CURRENT. TIME-CURRENT CHARACTERISTICS SHALL BE AVAILABLE WHICH PERMIT COORDINATION WITH PROTECTIVE RELAYS, AUTOMATIC CIRCUIT RECLOSERS, AND OTHER FUSES.
- (7) SOLID-MATERIAL POWER FUSES SHALL BE CAPABLE OF DETECTING AND INTERRUPTING ALL FAULTS WHETHER LARGE, MEDIUM, OR SMALL (DOWN TO MINIMUM MELTING CURRENT), UNDER ALL REALISTIC CONDITIONS OF CIRCUITY, WITH LINE-TO-LINE OR LINE-TO-GROUND VOLTAGE ACROSS THE POWER FUSES, AND SHALL BE CAPABLE OF HANDLING THE FULL RANGE OF TRANSIENT RECOVERY VOLTAGE SEVERITY ASSOCIATED WITH THESE FAULTS.

- (8) ALL ARCING ACCOMPANYING POWER FUSE OPERATION SHALL BE CONTAINED WITHIN THE FUSE, AND ANY ARC PRODUCTS AND GASES EVOLVED DURING FUSE OPERATION SHALL BE VENTED THROUGH EXHAUST CONTROL DEVICES THAT SHALL EFFECTIVELY CONTROL FUSE EXHAUST.

- (9) SOLID-MATERIAL POWER FUSES SHALL BE EQUIPPED WITH A BLOWN-FUSE INDICATOR THAT SHALL PROVIDE VISIBLE EVIDENCE OF FUSE OPERATION WHILE INSTALLED IN THE FUSE MOUNTING.
- (10) SOLID-MATERIAL POWER FUSES IN FEEDER BAYS SHALL BE EQUIPPED WITH GROUNDING PROVISIONS ON THE LOAD SIDE OF EACH FUSE AND ON THE ENCLOSURE GROUND BUS.

5. LABELING

5.1 WARNING SIGNS

- (1) ALL EXTERNAL DOORS AND HINGED BOLTED PANELS PROVIDING ACCESS TO HIGH VOLTAGE SHALL BE PROVIDED WITH "CAUTION -- HIGH VOLTAGE -- KEEP OUT" SIGNS.
- (2) ALL INTERNAL PROTECTIVE SCREENS PROVIDING ACCESS TO HIGH VOLTAGE SHALL BE PROVIDED WITH "DANGER -- HIGH VOLTAGE -- KEEP OUT -- QUALIFIED PERSONS ONLY" SIGNS.
- (3) ALL INTERNAL PROTECTIVE SCREENS PROVIDING ACCESS TO INTERRUPTER SWITCHES SHALL BE PROVIDED WITH WARNING SIGNS INDICATING THAT "SWITCH BLADES MAY BE ENERGIZED IN ANY POSITION."
- (4) ALL INTERNAL PROTECTIVE SCREENS PROVIDING ACCESS TO FUSES SHALL BE PROVIDED WITH WARNING SIGNS INDICATING THAT "FUSES MAY BE ENERGIZED IN ANY POSITION."

5.2 RATING NAMEPLATES

- (1) THE INTEGRATED SWITCHGEAR ASSEMBLY SHALL BE PROVIDED WITH AN EXTERNAL NAMEPLATE INDICATING THE MANUFACTURER'S DRAWING NUMBER AND THE FOLLOWING: VOLTAGE RATINGS (KV, NOMINAL; KV, MAXIMUM; KV, BIL); MAIN BUS CONTINUOUS RATING (AMPERES); SHORT-CIRCUIT RATINGS (AMPERES, RMS SYMMETRICAL AND MVA THREE-PHASE SYMMETRICAL AT RATED NOMINAL VOLTAGE); AND THE MOMENTARY AND FAULT-CLOSING RATINGS (AMPERES, RMS ASYMMETRICAL). WHEN THE ASSEMBLY IS UL LISTED, THE EXTERNAL NAMEPLATE SHALL INCLUDE THE UL CLASSIFICATION MARKINGS COMPRISED OF "UL" IN A CIRCLE; THE WORD "LISTED"; THE ASSIGNED CONTROL NUMBER; AND THE PRODUCT IDENTITY.
- (2) EACH INDIVIDUAL BAY SHALL BEAR A NAMEPLATE INDICATING THE RATINGS OF THE INTERRUPTER SWITCH (AMPERES, CONTINUOUS AND INTERRUPTING); THE MAXIMUM RATING OF THE FUSE IN AMPERES; AND THE CATALOG NUMBER OF THE FUSE UNITS, REFILL UNITS, INTERRUPTING MODULE, OR CONTROL MODULE. WHEN THE INDIVIDUAL BAY IS TO BE UL LISTED, THIS NAMEPLATE SHALL INCLUDE THE UL CLASSIFICATION MARKINGS COMPRISED OF "UL" IN A CIRCLE; THE WORD "LISTED"; THE ASSIGNED CONTROL NUMBER; AND THE PRODUCT IDENTITY. IN ADDITION, THE ENCLOSURE CATEGORY SHALL BE SPECIFIED.

TO THE BEST KNOWLEDGE, BELIEF AND PROFESSIONAL JUDGEMENT, THESE PLANS AND SPECIFICATIONS ARE IN COMPLIANCE WITH THE 2020 ENERGY CONSERVATION CONSTRUCTION CODE OF NEW YORK STATE.

ARCHITECT

di Domenico + Partners LLP
 Architecture
 Landscape Architecture
 Planning
 3743 Crescent Street, 3rd Floor
 Long Island City, New York 11101
 Tel 212-337-0400
 Fax 212-337-3567

CIVIL PLANNING ENGINEER

JMC Planning Engineering Landscape
 Architecture & Land Surveying, PLLC
 120 Bedford Road
 Armonk, New York 10504
 Tel 914-273-5225
 Fax 914-273-2102

MEP ENGINEER

Burns BURNS ENGINEERING, PC.
 1261 Broadway, Suite 708
 New York, New York 10001
 Tel 212-962-3503

STRUCTURAL ENGINEER

GEI GEI50
 1385 Broadway, 20th FL
 New York, New York 10018
 Tel 212-687-8282
 Consultants



MANHATTAN BEER DISTRIBUTORS
 20 DUNNIGAN DRIVE
 SUFFERN, NEW YORK

KEY PLAN

REV	DESCRIPTION	DATE
	ISSUED FOR DOB SUBMISSION	09/10/2021
	ISSUED FOR BID	10/15/2021
	ISSUED FOR PROGRESS	01/18/2022
	ISSUED FOR BID	08/30/2022
DRAWN BY : M.DIMATTIA		
CHECKED BY : B.NEMCHEK		
APPROVED BY : J.MIZRAHI		
DATE :		09/10/21
SCALE :		N.T.S.

DRAWING TITLE :
**MEDIUM VOLTAGE
 SWITCHGEAR SPECIFICATION**

DWG NUMBER :

E-905