



**ATKINS**

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100034005	PWW	JAL	PWW	PWW	AUGUST 2013	NO SCALE

CHEROKEE COUNTY WATER & SEWERAGE AUTHORITY  
HOLLY SPRINGS  
DOWNTOWN SANITARY SEWER SYSTEM

**GENERATOR NOTES**

GENERATOR REQUIREMENTS:  
GENERATOR SHALL BE DIESEL POWERED WITH AN AUTOMATIC TRANSFER SWITCH AND PROVISIONS FOR AN AUTOMATIC EXERCISE CYCLE. THE CONTRACTOR SHALL SET THE ATS TRANSFER DELAY FROM UTILITY TO GENERATOR AT A 30 SECOND DELAY.  
ACCEPTABLE MANUFACTURERS: GENERAC, CUMMINS ONAN, KATOLIGHT, CATERPILLAR OR ALTERNATE ACCEPTABLE TO THE AUTHORITY.  
THE GENERATOR SUPPLIER MUST PROVIDE A LETTER TO THE CONTRACTOR AND CHEROKEE COUNTY WATER AND SEWERAGE AUTHORITY, STATING THAT THEY GUARANTEE THE UNIT WILL OPERATE THE LIFT STATION PUMPS AND OTHER ELECTRICAL DEMANDS WITH NO GREATER THAN A 20% VOLTAGE DIP. THIS LETTER MUST BE SIGNED AND DELIVERED BEFORE THE DAY OF SCHEDULED START UP.  
THE GENERATOR SET SHALL HAVE THE FOLLOWING CHARACTERISTICS: 480V, 3 PHASE, 4 WIRE, WYE CONNECTED, 60 HZ, 0.8 PF.  
THE GENERATOR SET SHALL BE CAPABLE OF STARTING AND RUNNING THE NECESSARY LOADS WITHOUT EXCEEDING THE MAXIMUM VOLTAGE AND FREQUENCY VARIATIONS SPECIFIED HEREIN, OR THE MAXIMUM TEMPERATURE LIMITATIONS OF THE ENGINE AND GENERATOR.  
ALL MATERIALS AND PARTS OF THE GENERATOR SET SHALL BE NEW AND UNUSED AND OF CURRENT MANUFACTURE FROM A FIRM REGULARLY ENGAGED IN THE PRODUCTION OF SUCH EQUIPMENT. UNITS AND COMPONENTS OFFERED UNDER THESE SPECIFICATIONS SHALL BE COVERED BY THE MANUFACTURER'S STANDARD WARRANTY ON NEW MACHINES, A COPY OF WHICH SHALL BE INCLUDED IN THE SUBMITTAL.  
THE AUTHORITY SHALL ACCEPT ONLY ENGINE DRIVEN GENERATOR SETS THAT CAN BE PROPERLY MAINTAINED AND SERVICED WITHOUT CAUSING THE AUTHORITY TO EITHER CARRY EXPENSIVE PARTS STOCK OR BE SUBJECT TO THE INCONVENIENCE OF LONG PERIODS OF INTERRUPTED SERVICE BECAUSE OF LACK OF AVAILABLE PARTS. IDENTIFY THE NEAREST LOCATION OF PERMANENT PARTS OUTLETS FROM WHICH PARTS MAY BE OBTAINED.  
THE GENERATOR SET SHALL BE CAPABLE OF PRODUCING THE REQUIRED KW (WITHOUT OVERLOAD) FOR THE DURATION OF THE POWER OUTAGE (STANDBY RATING), UNDER THE FOLLOWING AMBIENT CONDITIONS:  
A.) ALTITUDE, FEET: 1000  
B.) AMBIENT TEMPERATURE RANGE, DEGREE F: 0-110  
C.) HUMIDITY AT MAX. AMBIENT TEMP.: 80%  
THE SYSTEM SHALL BE FREE OF INJURIOUS TORSIONAL AND BENDING VIBRATIONS WITHIN A SPEED RANGE FROM 10% BELOW TO 10% ABOVE SYNCHRONOUS SPEED.  
THE ENGINE SHALL BE OF THE INTERNAL COMBUSTION TYPE EQUIPPED TO OPERATE ON NO. 2 DIESEL FUEL. PROVIDE FUEL AND OIL CONSUMPTION ESTIMATES BASED ON ENGINE MANUFACTURER'S DATA, A COPY OF WHICH SHALL BE INCLUDED IN THE SUBMITTAL.  
THE ENGINE SHALL BE EQUIPPED WITH A SUITABLE GOVERNOR TO MAINTAIN FREQUENCY WITHIN LIMITS, AS SPECIFIED BELOW, BY CONTROLLING ENGINE AND GENERATOR SPEED:  
A.) TYPE: ISOCRONOUS  
B.) STABILITY: 1/4% MAXIMUM STEADY STATE FREQUENCY VARIATION AT ANY CONSTANT LOAD FROM NO LOAD TO FULL LOAD.  
C.) REGULATION: 1/4% MAXIMUM FREQUENCY DEVIATION BETWEEN NO-LOAD STEADY STATE AND FULL-LOAD STEADY STATE.  
D.) TRANSIENT: 5% MAXIMUM FREQUENCY DIP ON MOST SEVERE MOTOR STARTING CONDITION.  
E.) TRANSIENT: 2 SECONDS MAXIMUM RECOVERY TIME FOR MAXIMUM MOTOR START.  
F.) THE MANUAL SPEED ADJUSTING CONTROL SHALL BE MECHANICAL OR ELECTRICAL IF LOCATED ON THE GENERATOR SET OR ELECTRICAL IF LOCATED IN A REMOTE CONTROL PANEL.  
LEAD-CALCIUM BATTERIES SHALL BE FURNISHED AND SHALL BE DESIGNED FOR OPERATION AT A MINIMUM AMBIENT TEMPERATURE OF 0 DEGREE F. THE BATTERIES SHALL BE CAPABLE OF A MINIMUM OF FOUR CRANK CYCLES (ROLLING) OF THE SPECIFIED PRIME MOVER AND HAVE SUFFICIENT CURRENT AVAILABLE FOR "BREAK-AWAY" CURRENTS FOR THE PARTICULAR ENGINE USED AT THE SPECIFIED WORSE CASE TEMPERATURE.  
A FLOAT TYPE BATTERY CHARGER, COMPATIBLE WITH THE BATTERIES SELECTED, SHALL BE FURNISHED WHICH SHALL MAINTAIN THE STARTING BATTERIES AT FULL CHARGE. BATTERY CHARGER SHALL BE A 5 AMP CHARGER.  
THE CHARGING SYSTEM SHALL PERMIT CHARGING FROM EITHER THE NORMAL OR THE EMERGENCY POWER SOURCE. IT SHALL HAVE A HIGH RATE AND LOW RATE CHARGING SYSTEM. A VOLTMETER SHALL INDICATE THE CHARGE RATE AND THE CIRCUIT WILL BE PROTECTED BY EITHER FUSES OR CIRCUIT BREAKERS. THE CHARGER OR CHARGING CIRCUIT SHALL BE SO DESIGNED THAT IT WILL NOT BE DAMAGED DURING THE ENGINE CRANKING, ACHIEVED, FOR EXAMPLE, BY A CURRENT LIMITING CHARGER OR A CRANK DISCONNECT RELAY. IT SHALL ALSO BE CAPABLE OF RECHARGING A DISCHARGED BATTERY IN 12 HOURS WHILE CARRYING NORMAL LOADS. THE CHARGER SHALL BE SUITABLE FOR OPERATION AT 120 VOLTS AC, SINGLE PHASE.  
THE ENGINE SHALL BE LIQUID COOLED WITH A UNIT MOUNTED RADIATOR. THE RADIATOR CAPACITY SHALL BE SUITABLE FOR OPERATION IN THE AMBIENT TEMPERATURE PLUS THE AIR TEMPERATURE RISE ACROSS THE ENGINE.  
PROVIDE AN AIR CLEANER AND SILENCER AS RECOMMENDED BY THE ENGINE MANUFACTURER AND SHALL BE LOCATED AND MOUNTED AS RECOMMENDED BY THE ENGINE  
AN EXHAUST SYSTEM OF SUITABLE SIZE, CONFIGURATION AND MATERIAL IN ACCORDANCE WITH ENGINE MANUFACTURER'S RECOMMENDATIONS SHALL CONNECT THE EXHAUST OUTLET OF THE ENGINE TO THE SILENCER. THE TYPE OF SILENCER SHALL MEET THE REQUIREMENTS OF ENGINE MANUFACTURERS AND SHALL BE CRITICAL SILENCING TYPE.  
THE EXHAUST SYSTEM AND SILENCER SHALL HAVE THE CONFIGURATION SHOWN ON THE PLANS SUBMITTED, AND SHALL BE OF SUCH SIZE THAT BACK PRESSURE ON THE SYSTEM WILL NOT EXCEED THE BACK PRESSURE PERMITTED BY THE MANUFACTURER'S RECOMMENDATION. A FLEXIBLE CONNECTION SHALL BE MOUNTED AT THE ENGINE EXHAUST OUTLET AND THE DISCHARGE END OF THE EXHAUST LINE SHALL BE PROTECTED AGAINST ENTRY OF PRECIPITATION. SCREENING OR SUITABLE LAGGING SHALL PROTECT PIPING WITHIN REACH OF PERSONNEL. ALL EXHAUST PIPING SHALL BE GAS TIGHT.  
THE FOLLOWING ENGINE PROTECTIVE DEVICES SHALL BE PROVIDED, AND AN INDICATING LIGHT SHALL BE SUPPLIED FOR USE WITH EACH DEVICE SPECIFIED:  
A.) ALARM SYSTEM FOR HIGH WATER TEMPERATURE.  
B.) ALARM SYSTEM FOR LOW OIL PRESSURE.  
C.) AUTOMATIC ENGINE SHUTDOWN FOR HIGH WATER TEMPERATURE.  
D.) AUTOMATIC ENGINE SHUTDOWN FOR LOW OIL PRESSURE.  
E.) ALARM AND SHUTDOWN SYSTEM FOR HIGH WATER TEMPERATURE.  
F.) ALARM AND SHUTDOWN SYSTEM FOR LOW OIL PRESSURE.  
G.) ENGINE OVER-SPEED AUTOMATIC SHUTDOWN DEVICE.  
H.) ENGINE FAILED TO START INDICATOR LIGHT (OVER -CRANK).  
1.) ALARM FOR LOW COOLANT LEVEL.  
A SHUNT TRIP AND UNDER-VOLTAGE TRIP SHALL BE INCORPORATED TO CAUSE THE CIRCUIT BREAKER TO OPEN SIMULTANEOUSLY WITH ANY AUTOMATIC SHUTDOWN OF THE ENGINE.  
A DUAL WALL SUB-BASE FUEL TANK SHALL BE SUPPLIED WITH THE GENERATOR SET, WHICH WILL ALLOW THE GENERATOR TO OPERATE CONTINUOUSLY UNDER PUMP LOAD FOR 36 HOURS, BUT SHALL NOT EXCEED 1,000 U.S. GALLONS. THE TANK SHALL BE CONSTRUCTED OF ALUMINIZED STEEL WITH ALL ACCESS PORTS AND VENTS LOCATED ON THE TOP HORIZONTAL SURFACE. THE TANK SHALL BE PRESSURE AND LOAD TESTED ACCORDING TO U.L. 142 AND SHALL BE U.L. LISTED. THE TANK SHALL BE CAPABLE OF SUPPORTING THE WEIGHT OF THE GENERATOR, ISOLATOR, AND ENCLOSURE, AND SHALL HAVE FOUR LIFTING EYES CAPABLE OF LIFTING THE ENTIRE GENERATOR SET PACKAGE. LOW LEVEL AND LEAK DETECTOR FLOAT SWITCHES SHALL BE PROVIDED, BOTH WIRED TO CONTROL PANEL ALARM LIGHTS, AND A TANK MOUNTED FUEL GAUGE.  
THE GENERATOR FUEL STORAGE TANK SHALL BE COMPLETELY FILLED WITH FUEL BEFORE START-UP OF THE LIFT STATION AND TOPPED OFF AFTER START-UP.  
THE GENERATOR SHALL BE EQUIPPED WITH A PERMANENT MAGNET GENERATOR (PMG) EXCITATION SYSTEM. BOTH THE PMG AND THE ROTATING BRUSHLESS EXCITER SHALL BE MOUNTED OUTBOARD OF THE BEARING.  
THE SYSTEM SHALL SUPPLY A MINIMUM SHORT CIRCUIT SUPPORT CURRENT OF 300% OF THE STANDBY RATING FOR 10 SECONDS. THE ROTATING EXCITER SHALL USE A THREE-PHASE FULL WAVE RECTIFIER ASSEMBLY WITH HERMETICALLY SEALED SILICON DIODES PROTECTED AGAINST ABNORMAL TRANSIENT CONDITIONS BY A MULTIPLATE SELENIUM SURGE PROTECTOR.

THE INSULATION SYSTEM OF BOTH THE ROTOR AND STATOR SHALL BE OF NEMA CLASS H MATERIALS AND SHALL BE SYNTHETIC AND NON-HYGROSCOPIC. FIELD WINDINGS SHALL BE ON THE ROTOR, AND THE ROTOR CORE SHALL BE SHRUNK-FIT AND KEYED TO THE SHAFT. THE STATOR WINDING SHALL USE AN OPTIMUM PITCH DESIGN TO ELIMINATE HARMONICS. UNITS RATED ABOVE 1500 KW OR 601 VOLTS OR HIGHER SHALL BE FORM WOUND. THE TEMPERATURE RISE OF BOTH THE ROTOR AND THE STATOR SHALL BE IN ACCORDANCE WITH THE APPLICABLE SECTIONS OF NEMA MG-1-22, BS-5000 PART 99, OR CSA C22.2, FOR THE TYPE OF SERVICE INTENDED. THE GENERATOR SHALL BE SELF-VENTILATED.  
LOAD CONNECTIONS SHALL BE MADE IN THE FRONT -END MOUNTED JUNCTION BOX. THE GENERATOR CONSTRUCTION WILL ALLOW CONNECTION TO THE LOAD THROUGH THE TOP, BOTTOM OR EITHER SIDE OF THE JUNCTION BOX. THE CONDUIT BOX SHALL CONTAIN TWO COMPARTMENTS: ONE TO HOUSE THE ROTATING RECTIFIER AND PMG, AND THE OTHER TO HOUSE THE CONNECTION AREA AND REGULATOR. THIS IS TO SEPARATE THE ROTATING ELEMENTS FROM THE LOAD CONNECTION AND VOLTAGE REGULATOR ADJUSTMENTS. THE GENERATOR SHALL BE EQUIPPED WITH A VOLTAGE REGULATOR TO MAINTAIN VOLTAGE WITHIN LIMITS AS SPECIFIED BELOW:  
A.) STABILITY: 1/2% MAXIMUM VOLTAGE VARIATION AT ANY CONSTANT LOAD FROM NO LOAD TO FULL LOAD.  
B.) REGULATION: 1% MAXIMUM VOLTAGE BETWEEN NO LOAD STEADY STATE AND FULL LOAD STEADY STATE.  
C.) TRANSIENT: 20% MAXIMUM VOLTAGE DIP IN MOST SEVERE MOTOR STARTING CONDITION.  
D.) TRANSIENT: 2 SECONDS MAXIMUM VOLTAGE RECOVERY TIME WITH APPLICATION OR REMOVAL OF 0.8 P.F. FULL LOAD.  
THE REGULATOR SHALL BE A SOLID-STATE TYPE USING TRANSISTORS OR SCR'S. THE UNIT SHALL INCLUDE VOLTS/HERTZ UNDERSPEED PROTECTION, 3 PHASE RMS SENSING, AND OVEREXCITATION PROTECTION. THE REGULATOR SHALL ALSO PROVIDE LOSS OF SENSING PROTECTION, REGULATOR CURRENT LIMIT, TEMPERATURE PROTECTION AND AN ENGINE UNLOADING CIRCUIT. EMI SUPPRESSION SHALL BE PROVIDED MEETING MIL-STD-461 B, PART 9 STANDARDS.  
A GENERATOR MAIN CIRCUIT BREAKER SHALL BE PROVIDED. THE INTERRUPTING CAPABILITY SHALL BE GREATER THAN THE GENERATOR SHORT CIRCUIT CAPABILITY, BUT NOT LESS THAN 30,000 SYMMETRICAL AMPERES AT 480 VOLTS. THE BREAKER CONTINUOUS CURRENT RATING SHALL BE SELECTED TO PROVIDE OVERLOAD PROTECTION FOR THE GENERATOR. MAIN CIRCUIT BREAKER SHALL HAVE GFCI PROTECTION PER NEC. THE BREAKER SHALL BE PROVIDED WITH A SHUNT TRIP DEVICE. THE GENERATOR STARTING CIRCUIT BATTERY SYSTEM WILL BE USED AS THE POWER SOURCE FOR THE SHUNT TRIP CIRCUIT. THE SHUNT TRIP COIL VOLTAGE SHALL BE SUITABLE FOR USE ON THE STARTING CIRCUIT. THE BREAKER SHALL INCLUDE 3 NORMALLY OPEN AND 3 NORMALLY CLOSED AUXILIARY CONTACTS. THE BREAKER SHALL BE A SQUARE D TYPE MA, OR ALTERNATE AS MANUFACTURED BY GENERAL ELECTRIC, MERLIN GERIN, EATON/CUTLER-HAMMER OR ALTERNATE ACCEPTABLE TO THE AUTHORITY.  
AUTOMATIC STARTING AND STOPPING CONTROLS SHALL BE FURNISHED TO START THE ENGINE AUTOMATICALLY WHEN THE NORMAL ELECTRIC POWER FAILS OR FALLS BELOW SPECIFIC LIMITS AND TO STOP THE ENGINE AUTOMATICALLY AFTER THE NORMAL POWER SUPPLY RESUMES. THE SIGNAL FOR STARTING OR STOPPING THE ENGINE SHALL BE FROM AN EXTERNAL AUXILIARY CONTACT. THE CONTROLS SHALL BE CAPABLE OF OPERATING AT 50% OF NORMAL DC SYSTEM SUPPLIED VOLTAGE.  
CRANK CONTROL AND TIME DELAY RELAYS SHALL PROVIDE AT LEAST FOUR CRANKING PERIODS. EACH CRANKING PERIOD SHALL BE FOR AT LEAST 7 SECONDS, AND THE CRANKING ATTEMPTS SHALL BE SEPARATED BY APPROPRIATE REST PERIODS. A SENSING DEVICE SHALL AUTOMATICALLY DISCONNECT THE STARTING CIRCUIT WHEN THE ENGINE HAS STARTED. IF THE ENGINE HAS NOT STARTED AT COMPLETION OF THE STARTING PROGRAM, THE OVER-CRANKING SIGNAL SHALL SO INDICATE. THE ENGINE STARTING CONTROLS SHALL BE LOCKED OUT AND NO FURTHER STARTING ATTEMPTS SHALL TAKE PLACE UNTIL THE OVER-CRANKING DEVICE HAS BEEN MANUALLY RESET.  
A SELECTOR SWITCH SHALL BE INCORPORATED IN THE AUTOMATIC ENGINE START AND STOP CONTROLS. IT SHALL INCLUDE AN "OFF" POSITION THAT PREVENTS MANUAL OR AUTOMATIC STARTING OF THE ENGINE, A "MANUAL" OR "HANDCRANK" POSITION THAT PERMITS THE ENGINE TO BE STARTED MANUALLY BY THE PUSHBUTTON ON THE CONTROL CABINET AND RUN UNLOADED; AN "Automatic" POSITION WHICH READIES THE SYSTEM FOR AUTOMATIC START OR STOP ON DEMAND OF THE AUTOMATIC LOAD TRANSFER SWITCH OR A PROGRAMMED EXERCISER.  
IT SHALL BE POSSIBLE TO START THE ENGINE MANUALLY AND RUN IT UNLOADED BY A MANUAL PUSHBUTTON ON THE CONTROL CABINET THAT CAUSES THE ENGINE TO START, RUN AND STOP THROUGH THE AUTOMATIC START AND STOP CONTROLS.  
THE FOLLOWING ENGINE AND GENERATOR INSTRUMENTS AND CONTROLS SHALL BE FURNISHED AND INSTALLED:  
A.) A.C. AMMETER  
B.) A.C. VOLTMETER  
C.) VOLTAGE ADJUSTING RHEOSTAT  
D.) BATTERY VOLTAGE METER  
E.) GOVERNOR SPEED ADJUSTING CONTROL  
F.) WATER TEMPERATURE GAUGE  
G.) OIL PRESSURE GAUGE  
H.) MANUAL START/STOP CONTROL  
1.) MANUAL -OFF -AUTO MODE SWITCH  
J.) VOLTMETER/AMMETER PHASE SELECTOR SWITCH  
K.) GENERATOR "RUN" STATUS DRY CONTACTS (SCADA USE)  
L.) COMMON ALARM DRY CONTACTS (SCADA USE)  
M.) ELAPSED TIME METER  
N.) PANEL LIGHTS  
O.) INDICATOR LIGHTS FOR ENGINE ALARM  
ALL WIRING AND INTERCONNECTIONS SHALL BE IN ACCORDANCE WITH COMMERCIAL ELECTRICAL STANDARDS. WEATHERPROOF, SOUND ATTENUATING, OUTDOOR ENCLOSURE. 14 GAUGE STEEL CONSTRUCTION. INCLUDES TWO (2) SINGLE ACCESS DOORS PER SIDE. PAINTED STANDARD ALKYL ENAMEL FINISH. THE AUTHORITY SHALL MAKE THE DETERMINATION IF THE ENCLOSURE SHALL BE SOUND ATTENUATED FOR A COMMERCIAL INSTALLATION OR RESIDENTIAL INSTALLATION. THE AUTHORITY SHALL ALSO MAKE THE DETERMINATION AS TO THE DBA LEVEL OF ATTENUATION REQUIRED AS EACH CASE MAY BE UNIQUE. 65 DBA @ 7 METERS WILL BE CONSIDERED THE STANDARD STARTING POINT FOR ATTENUATION. EXHAUST ROOF DRESS CAP, SILENCER MOUNTING BRACKETS, EXHAUST SYSTEM ASSEMBLY INCLUDING THE ABOVE MENTIONED SILENCER DESIGNED TO GO INSIDE THE ENCLOSURE WITH FLEX, ELBOW AND RAIN CAP. PAINTED STANDARD ALKYL ENAMEL FINISH. OIL AND WATER DRAINS ARE EXTENDED TO THE EXTERIOR OF THE ENCLOSURE, EACH WITH IDENTIFYING NAMEPLATE. THE ENCLOSURE SHALL BE PROVIDED WITH THE FOLLOWING ELECTRICAL ACCESSORIES:  
A.) JUNCTION BOXES FOR BATTERY CHARGER AND JACKET WATER HEATER CONNECTION.  
B.) CONNECTION FOR LOW ALARM, HIGH ALARM, LEAK ALARM, AND FUEL FILL PUMP SWITCH.  
AN ENGINE BLOCK HEATER SHALL BE PROVIDED TO KEEP THE ENGINE COOLANT AT A TEMPERATURE OF 85 DEGREE F WITH THE AMBIENT TEMPERATURE. THE HEATER SHALL BE SUITABLE FOR OPERATION AT 120 VOLTS AC, SINGLE PHASE. EXTERNAL ONLY; NO INTERNAL ELEMENTS SHALL BE INSIDE THE ENGINE.  
PROVIDE A PAINTED STEEL OR ALUMINUM "CATWALK" ALL THE WAY AROUND THE UNIT FOR SERVICE.  
THE SYSTEM SUPPLIER SHALL FURNISH 3 SETS OF OPERATING, MAINTENANCE AND PARTS MANUALS COVERING ALL COMPONENTS FOR THE GENERATOR SET. THE SUPPLIER SHALL ALSO INSTRUCT THE AUTHORITY IN OPERATION AND MAINTENANCE OF THE UNIT.  
AUTOMATIC TRANSFER SWITCH  
THE AUTOMATIC TRANSFER SWITCH SHALL BE MANUFACTURED BY GENERAC, ASCO, ZENITH OR ALTERNATE ACCEPTABLE TO THE AUTHORITY.  
THE TRANSFER SWITCH SHALL BE RATED FOR TOTAL NORMAL AND EMERGENCY SYSTEM TRANSFER FOR USE ON A 480 VAC, 3 PHASE, 4 WIRE SYSTEM.  
EACH AUTOMATIC TRANSFER SWITCH SHALL CONSIST OF A POWER TRANSFER MODULE AND A CONTROL MODULE. INTERCONNECTED TO PROVIDE COMPLETE AUTOMATIC OPERATION. THE AUTOMATIC TRANSFER SWITCH SHALL BE MECHANICALLY HELD AND ELECTRICALLY OPERATED BY A SINGLE-SOLENOID MECHANISM ENERGIZED FROM THE SOURCE TO WHICH THE LOAD IS TO BE TRANSFERRED. THE SWITCH SHALL BE RATED FOR CONTINUOUS DUTY AND BE INHERENTLY DOUBLE THROW. THE SWITCH SHALL BE MECHANICALLY INTERLOCKED TO ENSURE ONLY ONE OF TWO POSSIBLE POSITIONS, NORMAL AND EMERGENCY.  
THE AUTOMATIC TRANSFER SWITCH SHALL CONFORM TO THE REQUIREMENTS OF NEMA STANDARD ICS-2-447 AND UNDERWRITERS' LABORATORIES UL-1008 AND SHALL BE UL LISTED AS FOLLOWS:  
FOR USE IN EMERGENCY SYSTEMS IN ACCORDANCE WITH ARTICLES 700, 701, AND 702 OF THE NATIONAL ELECTRICAL CODE.  
RATED IN AMPERES FOR TOTAL SYSTEM TRANSFER INCLUDING CONTROL OF MOTORS, ELECTRIC DISCHARGE LAMPS, ELECTRIC HEATING AND TUNGSTEN FILAMENT LAMP LOADS AS REFERRED TO IN PARAGRAPH 30.9 OF UL-1008.

SENSING AND CONTROL LOGIC SHALL BE SOLID-STATE. INTERFACING RELAYS SHALL BE INDUSTRIAL CONTROL GRADE PLUG-IN TYPE WITH DUST COVERS.  
ALL PHASES OF THE NORMAL SHALL BE MONITORED LINE-TO-LINE. CLOSE DIFFERENTIAL VOLTAGE SENSING SHALL BE PROVIDED. THE PICKUP VOLTAGE SHALL BE FIELD ADJUSTABLE FROM 85% TO 100% OF NOMINAL AND THE DROPOUT VOLTAGE SHALL BE ADJUSTABLE FROM 75% TO 95% OF THE PICKUP VALUE. THE TRANSFER TO EMERGENCY WILL BE INITIATED UPON REDUCTION OF NORMAL SOURCE TO 85% OF NOMINAL VOLTAGE AND RETRANSFER TO NORMAL SHALL OCCUR WHEN NORMAL SOURCE RESTORES TO 95% OF NOMINAL. THE FOLLOWING TIME DELAYS SHALL BE PROVIDED:  
A.) A TIME DELAY TO OVERRIDE MOMENTARY NORMAL SOURCE OUTAGES. THE TIME DELAY SHALL BE FIELD ADJUSTABLE FROM 0.5 TO 6 SECONDS AND FACTORY SET AT 1 SECOND.  
B.) A TIME DELAY ON RETRANSFER TO NORMAL SOURCE. THE TIME DELAY SHALL BE AUTOMATICALLY BYPASSED IF THE EMERGENCY SOURCE FAILS AND NORMAL SOURCE IS AVAILABLE. THE TIME DELAY SHALL BE FIELD ADJUSTABLE FROM 0 TO 30 MINUTES AND FACTORY SET AT 5 MINUTES.  
C.) AN UNLOADED RUNNING TIME DELAY FOR EMERGENCY GENERATOR COOL DOWN. THE TIME DELAY SHALL BE FIELD ADJUSTABLE FROM 0 TO 5 MINUTES AND FACTORY SET AT 5 MINUTES.  
D.) A TIME DELAY ON TRANSFER TO EMERGENCY. THE TIME DELAY SHALL BE FIELD ADJUSTABLE FROM 0 TO 5 MINUTES FOR CONTROLLED TIMING OF LOAD TRANSFER TO EMERGENCY, AND FACTORY SET AT ZERO.  
THE FOLLOWING FEATURES AND ACCESSORIES SHALL BE PROVIDED:  
A.) INDEPENDENT SINGLE PHASE VOLTAGE AND FREQUENCY SENSING OF EMERGENCY SOURCE. THE PICKUP VOLTAGE SHALL BE ADJUSTABLE FROM 85% TO 100% OF NOMINAL. PICKUP FREQUENCY SHALL BE ADJUSTABLE FROM 90% TO 100% OF NOMINAL. TRANSFER TO EMERGENCY UPON NORMAL SOURCE FAILURE WHEN EMERGENCY SOURCE VOLTAGE IS 90% OR MORE OF NOMINAL AND FREQUENCY IS 95% OR MORE OF NOMINAL.  
B.) A CONTACT THAT CLOSURES WHEN NORMAL SOURCE FAILS AND ONE THAT OPENS WHEN NORMAL SOURCE FAILS, RATED 10 AMPS, 120V AC.  
C.) A WHITE SIGNAL LIGHT TO INDICATE WHEN THE AUTOMATIC TRANSFER SWITCH IS CONNECTED TO THE NORMAL SOURCE. A YELLOW SIGNAL LIGHT TO INDICATE WHEN THE AUTOMATIC TRANSFER SWITCH IS CONNECTED TO THE EMERGENCY SOURCE.  
D.) TWO AUXILIARY CONTACTS THAT ARE CLOSED WHEN THE AUTOMATIC TRANSFER SWITCH IS CONNECTED TO NORMAL AND TWO AUXILIARY CONTACTS THAT ARE CLOSED WHEN THE AUTOMATIC TRANSFER SWITCH IS CONNECTED TO EMERGENCY. RATED 10 AMPS, 120 VOLTS, 60 HZ. AC.  
E.) A TEST SWITCH TO MOMENTARILY SIMULATE NORMAL SOURCE FAILURE.  
F.) RESET SWITCH TO MANUALLY BYPASS TIME DELAY ON RETRANSFER TO NORMAL.  
G.) A PERMISSIVE START/STOP FEATURE TO PROVIDE FOR START/STOP OF THE GENERATOR FROM A REMOTE SITE REGARDLESS OF THE PRESENCE OF NORMAL UTILITY POWER.  
THE AUTOMATIC TRANSFER SWITCH SHALL BE MOUNTED IN A NEMA 4X ENCLOSURE.  
COPIES OF INSTALLATION DRAWINGS AND COMPLETE WIRING DIAGRAMS AND INTERCONNECTIONS SHALL BE FURNISHED TO THE AUTHORITY.  
EACH AUTOMATIC TRANSFER SWITCH SHALL BE FURNISHED WITH 3 SETS OF THE OPERATOR'S MANUAL PROVIDING INSTALLATION AND OPERATING INSTRUCTIONS.