

PART 1 GENERAL

1.1 References

- .1 NETA Acceptance Testing Specifications, 2017 (ATS-2017)

1.2 Testing Report

- .1 Prepare an overall inspection and test report that details all investigations and tests.
- .2 The Contractor shall furnish paper copies in the hard-copy O&M Manuals and electronic copies on CD for the electronic (soft-copy) O&M Manual.
 - .1 The electronic copies of the report, including the test forms, shall be provided in PDF format.
 - .2 The Microsoft Word version of the completed test forms provided to the Contractor shall also be included on the CDs.
- .3 The report shall be neat and organized. Any omissions, inconsistencies, or incomplete work identified by the Contract Administrator shall be corrected and incorporated into the report in the appropriate section, and completely resubmitted.
- .4 A draft of each report shall be completed and sent to the Contract Administrator for review a maximum of one month after the completion of the inspections at the Site.
- .5 The final report shall be submitted a maximum of two weeks after the Contractor receives the mark-up of the draft report from the Contract Administrator.
- .6 The report shall include the following:
 - .1 Summary of project.
 - .2 Testing Equipment.
 - .3 Detail the type, manufacturer, model, and last calibration date of all testing equipment.
 - .4 Description of equipment tested.
 - .5 Description of all tests.
 - .6 Typed inspection forms including:
 - .1 Identification of the testing organization.
 - .2 Equipment identification.
 - .3 Humidity, temperature, and other conditions that may affect the results of the tests/calibrations.
 - .4 Date of inspections, tests, maintenance, and/or calibrations.
 - .5 Identification of the testing technician.
 - .6 Indication of inspections, tests, maintenance, and/or calibrations performed and recorded, along with charts, and graphs as applicable. All measurements and readings taken

shall be noted for inclusion in the report. Where repairs are made, measurements and readings before and after the repair shall be included.

- .7 Indication of expected results, when calibrations are to be performed.
- .8 Indication of “as-found” and “as-left” results, as applicable.
- .7 Itemized list of all repaired deficiencies which shall include:
 - .1 Detailed description of the deficiency.
 - .2 The cost associated with the deficiency repair.
- .8 Itemized list of all un-repaired deficiencies encountered which shall include:
 - .1 Detailed description of the deficiency.

PART 2 PRODUCTS

- .1 Not Used

PART 3 EXECUTION

3.1 Scope Of Testing

- .1 .1 Flood Pump Motor MTR-F01 (existing),
- .2 .2 Flood Pump Motor MTR-F02 (existing),
- .3 .3 Flood Pump Motor MTR-F03 (existing),

3.2 Inspection, Testing And Maintenance Procedures

- .1 General
 - .1 All tests are based on NETA (International Electrical Testing Association) standard ATS-2017. Where manufacturer’s specifications, tolerances, and/or published data are not available, refer to the appropriate tables in ATS-2017.
 - .2 Torque all accessible bolted electrical connections. Additional requirements apply as specified.
 - .3 Utilize the existing drawings for reference while performing the specified electrical inspection work. Where the existing installation deviates from that shown on the drawings, mark-up the drawings with red pen as required to reflect the installation. Include the marked-up drawings in the report.
 - .4 The scope of required drawing checks is limited to the equipment and components that are part of the electrical inspection work.
 - .5 Any repairs made that affect the accuracy of the drawings shall be marked up on the drawings.
 - .6 Drafting of drawings is not required.
 - .7 All inspection values, readings, corrections, and assessments shall be clearly recorded for inclusion within the report.

- .8 Where corrections or repairs are made, record both as found/as left test readings on the inspection sheet. If space is not provided on the inspection form, record the readings in the Note fields or on a separate sheet.
- .2 Inspection Forms
 - .1 The inspection forms to be completed by the Contractor are provided for reference in PDF format.
 - .2 Microsoft Word form templates will be provided prior to the work being initiated.
 - .3 Make appropriate print-outs of the inspection forms and utilize for entry of data and test results on site.
 - .4 Utilizing the Microsoft Word form templates, enter the data recorded manually into the forms electronically.
 - .5 Complete the inspection forms in the entirety and include them in the report.
 - .6 Submit electronic PDF copies of the inspection forms.
 - .7 The scope of work required in the specifications is in no way limited by the inspection forms, or spaces provided. Provide additional pages, documents, and forms as required to provide a complete report.
 - .8 The inspection forms may be updated during the Work by the City or Contract Administrator. Utilize the latest forms provided.
 - .9 Perform insulation resistance temperature correction calculations utilizing the following:
 - .1 To correct to 20°C, utilize Table 260805-1.
 - .2 To correct to 40°C, utilize Table 260805-2.

Table 260805-1: Insulation Resistance Correction Factors (20 °C)		
Measured Temperature (°C)	Oil Immersed Insulation	Solid Insulation
-10	0.125	0.25
-5	0.18	0.32
0	0.25	0.40
5	0.36	0.50
10	0.50	0.63
15	0.75	0.81
16	0.80	0.85
17	0.85	0.89
18	0.90	0.92
19	0.95	0.96
20	1.00	1.00
21	1.08	1.05
22	1.16	1.10
23	1.24	1.15
24	1.32	1.20
25	1.40	1.25
30	1.98	1.58
35	2.80	2.00
40	3.95	2.50
45	5.60	3.15
50	7.85	3.98
55	11.20	5.00
60	15.85	6.30

Table 260805-2 Insulation Resistance Correction Factors (40 °C)		
Measured Temperature (°C)	Oil Immersed Insulation	Solid Insulation
-10	0.03	0.10
-5	0.04	0.13
0	0.06	0.16
5	0.09	0.20
10	0.13	0.25
15	0.18	0.31
16	0.19	0.33
17	0.21	0.34
18	0.22	0.36
19	0.24	0.38
20	0.25	0.40
21	0.27	0.42
22	0.29	0.44
23	0.31	0.46
24	0.33	0.48
25	0.35	0.50
30	0.50	0.63
35	0.71	0.79
40	1.00	1.00
45	1.41	1.26
50	2.00	1.59
55	2.83	2.00
60	4.00	2.52

- .3 Perform winding resistance temperature correction calculations utilizing the following:

.1
$$R_C = R_M \frac{T_C + T_K}{T_M + T_K}$$

- .2 Where, RC = Resistance at corrected temperature.
RM = Resistance at measured temperature.
TC = Temperature to correct to in °C.
TM = Measured temperature in °C.
TK = Temperature Resistance Constant
(234.5 °C for copper, 226.0 °C for aluminum)

3.3 Motors, Induction, AC, 600 V

- .1 Inspection and testing shall consist of the following:
- .1 Note the equipment nameplate data for inclusion in the report.
 - .2 Inspect physical and mechanical condition.
 - .3 Inspect anchorage, alignment, and grounding.
 - .4 Inspect air baffles, filter media, cooling fans, slip rings, brushes, and brush rigging. Air baffles and filter media should be clean. Cooling fans should operate. Slip ring wear and brushes should be within manufacturer's tolerances for continued use. Brush rigging should be intact.
 - .5 Clean the unit.
 - .6 Inspect bolted electrical connections for high resistance using a low-resistance ohmmeter. Compare bolted connection resistance values to values of similar connections. Investigate values which deviate from those of similar bolted connections by more than 50 percent of the lowest value.
 - .7 Verify the application of appropriate lubrication and lubrication systems.
 - .8 Verify the absence of unusual mechanical or electrical noise or signs of overheating.
 - .9 Perform a rotation test to insure correct shaft direction.
 - .10 Perform insulation-resistance tests in accordance with ANSI/IEEE Standard 43. Test voltage shall be in accordance with manufacturer's published data or 500 Vdc.
 - .1 Where possible, test each winding separately. Ground all windings not under test.
 - .2 Ensure all cables and accessories are disconnected during the test.
 - .3 For motors <= 150kW (200 HP), the test duration is to be one (1) minute. Calculate the dielectric absorption ratio.
 - .4 For motors > 150kW (200 HP), the test duration is to be ten (10) minutes. Calculate the dielectric absorption ratio and polarization index.
 - .5 Correct test results to 40 °C.

- .6 Investigate readings below 100 megaohms. Investigate dielectric absorption ratios less than 1.4 and polarization index ratios less than 2.0 for Class B insulation and Class F insulation.
- .11 Where it is not possible to perform an insulation resistance test separately on each winding, perform a winding resistance test on each winding using a low- resistance ohmmeter.
- .12 Measure running voltage and current and evaluate relative to load conditions and nameplate full-load amperes. Utilize a true RMS meter.
- .13 Perform insulation-resistance test on insulated bearings in accordance with manufacturer's published data, if applicable.
- .14 Perform resistance tests on resistance temperature detector (RTD) circuits. RTD circuits should conform to design intent and/or machine protection device manufacturer's specifications.

END OF SECTION