DISCLAIMER: These Standard Operating Procedures (SOP's) are for the exclusive use of Navy Public Works Center (PWC) Norfolk. They are promulgated as guidance for their NAVFAC Commands. If intended to be used by other activities, they must be tailored to each activity's particular requirements and must be reviewed/approved by the activity's safety professionals prior to use.

---

SOP Title: Surge Comparison Testing of Motors
SOP Number: 75 Elect 09

Written by: Ted Gibson & David Lane Date: 01/ 20/ 96.
Reviewed by: _____ Date: __/__/__.
Approved by: _____ Date: __/__/__.

**Potential Energy Sources:**
1. Electrical supply (120 Vac, 480 Vac, up to 1920 Vdc).

**Tools Required:** Hard hat, safety shoes, safety glasses, work gloves, flame retardant clothing, insulated tools, multimeter, surge comparison tester, extension cord.

**References:**
1. OSHA 1910.147, The Control of Hazardous Energy (lockout/tagout).
2. PWC 5100.33E Chapter 24, Energy Control Sources.
3. OSHA 1910 Subpart I, Personal Protective Equipment (PPE).
4. PWC 5100.33E Chapter 20, Personal Protective Equipment (PPE).

**Procedures:**
1. Ensure proper PPE is worn [references (3) and (4)].
2. Verify tools are in good working condition.
3. Record the motor rating, manufacturer, and serial number.
4. Connect the surge comparison tester (SCT) ground lead to the motor frame.
4a. Verify the motor frame is solidly grounded.
4b. If the frame is not grounded, make it so.
5. Power up the SCT. Allow it to warm up for several minutes before applying test voltage to the motor.
6. Determine the final value of test voltage.
6a. 115 Vac motors... 1230 Vdc.
6b. 460 Vac motors... 1920 Vdc.
7. Connect the SCT line leads to the motor terminal leads.
8. SLOWLY increase the test voltage from zero to the final value and observe the two waveforms on the screen.
8a. The waveforms should be interpreted as follows.
8a1. If a fault condition exists, the waveform shapes of the windings being compared will be different almost immediately (see Figures).
8a2. If a defect is just developing, the waveform anomoly will appear to ‘jump’ back and forth from one waveform to the other. When this happens, the test must be stopped immediately to prevent additional damage to the windings.
8a2A. If the defect appears after the test voltage has reached half of the final value, then the motor may remain in service until the next scheduled shutdown.
8a2B. If the defect appears after the test voltage has reached one-third of the final value, the motor may remain in service until a shutdown to repair the motor may be scheduled.
8a2C. If the defect appears before the test voltage has reached one-third of the final value, the motor should be repaired as soon as possible because failure is likely.
8b. Repeat Step 8 until all windings have been compared.