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Magnetic Particle
Inspection**

Electrical System Checks

Changes in the performance of the electrical system of a magnetic particle inspection unit can obviously have an effect on the sensitivity of an inspection. Therefore, the electrical system must be checked when the equipment is new, when a malfunction is suspected, or every six months. Listed below are the verification tests required by ASTM E-1444-07.

Ammeter Check

It is important that the ammeter provide consistent and correct readings. If the meter is reading low, over magnetization will occur and possibly result in excessive background "noise." If ammeter readings are high, flux density could be too low to produce detectable indications. To verify ammeter accuracy, a calibrated ammeter is connected in series with the output circuit and values are compared to the equipment's ammeter values. Readings are taken at three output levels in the working range. The equipment meter is not to deviate from the calibrated ammeter more than ± 10 percent or 50 amperes, whichever is greater. If the meter is found to be outside this range, the condition must be corrected. It should be noted that when measuring half-wave rectified current, the readings should be doubled.

Shot Timer Check

When a timer is used to control the shot duration, the timer must be calibrated. ASTM E-1444-07 requires the timer be calibrated to within ± 0.1 second. A certified timer should be used to verify the equipment timer is within the required tolerances.

Quick Break Test

A quick break circuit is primarily used in three-phase, full-wave rectified systems to ensure longitudinal magnetic fields maintain their strength to the end of a component. Quick break circuits cause the current to abruptly collapse or drop to zero at the end of the activation cycle. By doing this, low frequency eddy currents are produced close to the surface of a component. These eddy currents help extend the usable longitudinal field to the ends of the component. To determine if a quick break system is functioning properly, an oscilloscope is often used. By observing the sine wave of the current, it can be determined if current drops abruptly when the circuit is interrupted.

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