

## Y-6 AC Yoke Operating Instructions



The Y -6 is an articulated leg magnetic yoke providing a portable means of creating magnetic fields for the detection of surface cracks. Application of magnetic particles is optional by either the dry powder or wet method.

### ***Description:***

The unit consists of a "C" shaped core of laminated, transfer iron upon which the magnetizing coil is wound. These components are housed in a non-magnetic shell that carries the lead in cable and the operating switch. Each leg off the "C" core has two movable joints permitting contouring to fit various part geometry's. The 115V yoke is equipped with a ten foot line cable having a standard three prong grounding plug. The 230 V version has a line cord without a plug.

### ***Electrical Connections:***

The Y-6 yoke is constructed for use in connection with a 110/120 volt, 60 Hz. alternating current supplies. The yoke will draw approximately 3.6 amperes when in contact with a steel plate and approximately 4.5 amperes in air. The Y-6 yoke can also be used on a 50 Hz, 110/120 volt supply. Refer to the MAGNAFLUX data plate on the yoke for correct line voltages and frequency.

The Y-6 yoke may also be constructed for operation on a 220/240 volt 50 or 60 Hz. alternating current supply. The line currents in this case will be one half of what they are for the 110/120 volt yoke. Refer to the MAGNAFLUX data plate on the yoke for correct line voltages and frequency.

Caution should be observed whenever the Y-6 is being energized continuously for a long period of time; overheating may result. Indications of overheating include the Y-6 will become too warm to hold comfortably as the heat will fatigue the hand. Normally operation is intermittent. The Y-6 is rated for a 33% duty cycle, with a maximum on time of 80 seconds.

### ***Principle of Operation:***

With the yoke connected to a suitable source of alternating current, depressing the switch creates an intense magnetic field between the legs of the unit. When applied to ferromagnetic materials, cracks or similar surface discontinuities occur across the magnetic field causing leakage fields. These leakage fields indicate the presence of cracks when magnetic particles are dusted on the surface.

Depending upon the degree of contact with the test surface, magnetic yokes have a characteristic leakage field around each leg that becomes visible in the presence of magnetic particles and that tends to obscure indications in the immediate vicinity. This area will increase in size on rough surfaces, which results in poor contact between the legs of the yoke and the area tested. For this reason, best indications will be obtained midway between the legs where the magnetic field forms a regular pattern.

The effective magnetic field of a yoke can be described as a multiplicity of invisible lines of force extending across the gap between the legs. When the yoke is applied to a steel plate, the magnetic flux is closed and the magnetic field enters the plate making its passage between the legs of the yoke at and very near the surface. A surface crack across this field cuts the magnetic circuit; the two sides of the crack become opposite poles of a magnet and a leakage field will occur in the air above the crack. Magnetic particles are attracted by this leakage field and mark its location.

The field of an AC yoke does not penetrate deeply to reliably detect subsurface discontinuities. If subsurface discontinuity detection is required contact Magnaflux for recommendations.

### ***Operation:***

The operation of the yoke is comparatively simple. The legs are positioned and placed against a part or area to be tested (the more intimate the contact the better the results). Legs should be positioned at right angles to the direction of suspected cracks. Depress the switch. As an example, when testing for longitudinal surface cracks in a weld, the yoke would be positioned so that the legs straddle the weld. If the direction of a possible defect is not known, two inspections should be made in the area turning the yoke approximately 90 degrees for the second inspection.

Using the powder spray bulb, the area between the legs of the yoke is dusted lightly with Magnaflux powder and inspected closely for cracks or other indications. Current should remain "on" (continuous method) for the inspection time. This process is repeated until the entire area of the part is inspected.

The method described should be adhered to if maximum sensitivity is to be obtained. Experience with different types of parts and/or surfaces will indicate the extent of the area in which good indications can be obtained.

Because of its portability, dry powder is generally recommended for use with the yoke, especially with A.C. Operation. It is particularly good for application to rough or unfinished surfaces such as forgings or



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castings where increased mobility of particles floating in air and on the part, due to the A.C. field, is an advantage.

The wet method has greater sensitivity for locating fine cracks. Hand spray guns or aerosol cans are available for use with the wet method of particle application for yoke inspection.

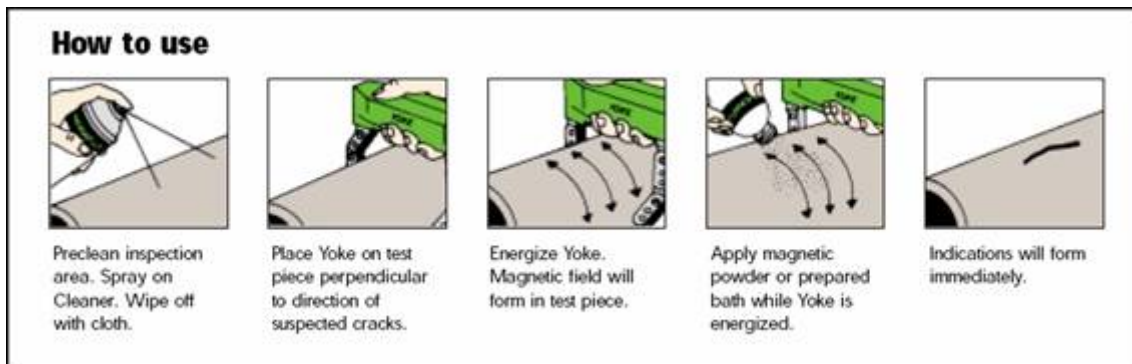
For extreme sensitivity, MAGNAGLO<sup>®</sup> fluorescent magnetic particles are available in dry powder form to be mixed with liquid vehicles for wet method application. Black light from portable UV lamps is used to fluoresce the MAGNAGLO<sup>®</sup> particles producing brilliant yellow-green indications at defects.

### ***Interpretation:***

After an indication has been formed, it must be correctly interpreted or identified. Size, shape, appearance, location and direction of the indication as well as knowledge of the history of the part all assist the experienced inspector in correct interpretation.

### ***Evaluation***

The most important part of the inspection is the decision as to whether a part with a known discontinuity is acceptable, can be repaired, or must be rejected. This depends on how the discontinuity affects the serviceability of the part. Many parts with indications are acceptable.



### ***Demagnetization***

Demagnetization is accomplished in two principle ways. Either the part is held within an alternating magnetic field while exciting current is gradually reduced to zero value, for example when using a variable voltage power supply, or the part is slowly withdrawn from the field which in effect accomplishes the same result.

In cases where demagnetization is necessary, our Y-6 yoke can usually be used to obtain a satisfactory level of demagnetization. As applied to yoke operation, the second method described above is approximated by placing the part across the poles while the current is flowing and slowly withdrawing it from the field to a distance of at least eighteen inches before turning off the magnetizing current.

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