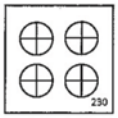
QUANTITATIVE QUALITY INDICATOR TEST PIECES

General Description

Magnaflux® Quantitative Quality Indicators (QQI) are magnetic particle test pieces with artificial defects used to verify field direction and relative strength. QQI's are also used to balance multi-directional fields and to increase productivity by minimizing magnetizing shots. The QQI indicator shims are packaged in sets of five.

QQI	Type	Description	Part number
	CX-230	Basic circular and crossed bar flaw configuration suitable for longitudinal and circular fields. Flaw depth of 30% of Shim thickness, 0.002" thick. Self-adhesive.	625551
	CX4-230	Similar to CX-230, except miniature design for small areas on test part. The four circles may be cut apart for individual use. Flaw depth of 30% of Shim thickness, 0.002" thick.	625552
	CX-430	Basic circular and crossed bar flaw configuration suitable for longitudinal and circular fields. Flaw depth of 30% of Shim thickness, 0.004" thick.	625553
	3C2-234	Used for more quantitative work, three concentric circular flaws of differing depth. Flaws depth of 20%-30%-40% of Shim thickness, 0.002" thick. Self-adhesive.	625554
	3C4-234	Used for more quantitative work, three concentric circular flaws of differing depth. Flaw depth of 20%-30%-40% of Shim thickness, 0.004" thick.	625555

Instructions

1. The QQIs are shipped with a corrosion-resistant film which must be removed before use. A solvent, such as Magnaflux SKC-S, acetone, or an adhesive remover (Goof-off or similar) may be used to remove the film. Use caution when handling the QQIs to prevent tears or distortions.
2. The QQIs must be in intimate contact with the part being evaluated. Affix the QQIs with the notches facing inward towards the part surface.
3. Apply single-sided cellophane tape to the QQIs to adhere them to the test object. It is recommended to use one of the following: Scotch Brand 191, 471, or the 600 series. Should the tape become loose and

allow the particles and solution to get between the QQI and part surface, the QQI should be carefully removed. The cellophane tape used should have the following qualities.

- Good adhesion to steel
- Be impervious to oil
- Be clear, non-fluorescent

The QQI can also be applied with a strong, permanent adhesive such as Super Glue. This should be applied evenly across the entire surface so there are no gaps or loose areas. Do not allow any glue to become attached to the flat inspection side of the QQI. If this happens, it can normally be removed with acetone.

4. Care should be taken not to cover more than about 0.100" of the indicator.
5. Use the circle or cross configuration QQIs to determine the field direction.
6. Determine where the QQIs should be placed to sufficiently monitor field strength direction.
7. Placing a Hall Effect probe adjacent to the QQI will assist in obtaining field strength measurements.

Continuous Method Instructions

1. Select the lowest level amperage and slowly increase it until the QQI pattern is visible. Upon magnetization, the portion of the cross perpendicular to the field direction will be visible and the circular QQI will have visible arcs perpendicular to the applied field direction.

Multi-Directional Instructions

1. Longitudinal and circular fields are illustrated by slowly increasing the amperage to a visible indication. Field strength for the first direction is determined by slowly increasing amperage until a satisfactory indication is present on the QQI.
2. Demagnetize the part and carefully clean the QQIs before determining the next direction of amperage. Field strength for the second direction is determined by slowly increasing the amperage until a satisfactory indication is visible on each QQI.
3. Place the selector switch in the multi-directional mode and magnetize the part at the previously recorded settings. If you can see the entire circle on the QQI, the fields are balanced. If any portion of the circle is not visible, adjust the amperage accordingly and repeat the field verification process until the magnetic fields are balanced.

Special Considerations

1. Use care when applying the magnetic particle suspension to the QQIs. Proper QQI indications may not form if excess flow is used, or if the suspension gets between the QQI and the part surface.
2. The QQIs are made of a low retentivity and high permeability material. QQIs will not hold residual fields when developing magnetic particle testing procedures.

Specifications Compliance

ASTM E709-15 (Sections 20.8.5.2 & Appendix X2)
ASTM E1444/1444M-12 (Sections 6.2.6, 7.1.2 & Annex A1-A2)
ASME BPVC (Section V, Article 7: T764.2 (b) (2))
AS 5371 Reference Standards – notched Shims for magnetic particle inspection
ENISO 9934-1 (Section 8)