

INSTRUCTIONS FOR THE USE OF QQI'S (NOTCHED SHIMS)



- 1.1 Application of QQI's
 - 1.1.1 QQI's require specific handling, attachment, and care for accurate indication of magnetic field strength and direction. To select amperage settings for multi-directional magnetization, the use of QQI's mandatory.
 - 1.1.2 QQI's 0.002 in. [0.05 mm] thick shall be used on curved or complex surfaces.
 - 1.1.3 QQI's are manufactured of low carbon steel and must be protected from corrosion when not in use. They may be submerged in a solvent such as MEK or naphtha for storage. Before attaching the shim to the part, both the shim and part shall be clean and dry.
 - 1.1.4 The QQI shall be placed in intimate contact with the part with the flaw side next to the material to be examined.
 - 1.1.5 The QQI shall be securely fastened to the part by using an adhesive or tape (such as Scotch Brand 191, 471, or 600 series) that prevents the magnetic particle suspension from entering between the QQI and part. Whatever means is used to secure the QQI to the part shall not interfere with the visibility of the indications.
 - 1.1.6 Tape may be used to secure the QQI and shall have the following properties: (1) Good adhesion to steel, (2) Impervious to the suspension used, and (3) the tape shall be non-fluorescent under UV-C near ultraviolet light (for fluorescent suspensions).



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- 1.1.7 If the tape becomes loose, allowing the suspension to seep under the QQI, the tape and QQI shall be carefully removed, the QQI and the part shall be cleaned and the QQI shall be reattached.
- 1.1.8 Re-use of the QQI's is acceptable, provided they are not distorted when removed and intimate contact is achieved when replaced.
- 2.1 Determining Field Strength and Direction - Use of the circle or cross configuration shims will indicate fields in any direction.
 - 2.1.1 In developing a magnetic particle procedure, first determine the locations the QQI should be placed to ensure adequate coverage to monitor the field strength and direction, and then attach the QQI's.
 - 2.1.2 Using the continuous method, begin by starting with the amperage selection at a minimum level and increasing the amperage slowly until the QQI indications are readily observed. When magnetized, one leg of the + will be indicated perpendicular to the field direction and the circle QQI will show quadrants that are approximately perpendicular to the direction of the applied field.
 - 2.1.3 In multi-directional magnetization, longitudinal and circular fields shall be determined separately as follows:
 - 2.1.3.1 Field strength for the first direction shall be determined by slowly increasing the amperage until a satisfactory indication is observed on each QQI.
 - 2.1.3.2 Record the amperage setting and indication results.
 - 2.1.3.3 Demagnetize the part and carefully clean the shims prior to determining the amperage in the next direction.
 - 2.1.3.4 Field strength for the second direction shall be determined by incrementally increasing the amperage until a satisfactory indication is observed on each QQI.
 - 2.1.3.5 Record the amperage setting and indication results.
 - 2.1.4 Place the selector switch in the multi-directional mode and magnetize the part at the previously recorded settings. If the entire circle on the shims is observed, the fields are in balance. If any portion of the circle accordingly and repeat the field verification process until the magnetic fields are balanced.
 - 2.1.5 Use care when applying the suspension to the QQI's. Proper QQI indications may not form unless the suspension is applied in a gentle manner.



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- 2.1.6 The QQI's are made of a low retentivity and high permeability material that cannot be used for indicating residual fields when developing magnetic particle examination procedures.
- 2.1.7 In unidirectional applications, the actual field strength measurements can be obtained by placing a Hall Effect probe adjacent to the shim or at a nearby location where probe placement can easily be replicated.
- 3.1 The following QQI's are typically used to establish proper field direction and ensure adequate field strength during technique development in magnetic particle testing. The QQI's shown below may be used to ensure the establishment of fields in the unidirectional magnetization method and to ensure the establishment and field balance in the multidirectional magnetization method.
 - 3.1.1 The QQI's are available in two thicknesses, 0.002 in. [0.05 mm] and 0.004 in. [0.10 mm]. Thinner shims are used when the thicker shims cannot conform to the part surface in the area of interest.
 - 3.1.2 The QQI's are available in two sizes, 0.75 in. [19 mm] square for Figs. 1 and 2 and 0.79 in. [20 mm] square of Fig. 3. The QQI's of Fig. 3 are cut by the user into four 0.395 in. [10 mm] square shims for use in restricted areas.
 - 3.1.3 QQI's shall be low carbon steel, AMS 5062 or equivalent.
 - 3.1.4 QQI's shall be used as specified. QQI's are placed in the area(s) of interest with the notches toward the surface of the part being examined. Use enough QQI's by placing the shims in multiple areas to ensure proper field directions and strengths are obtained.

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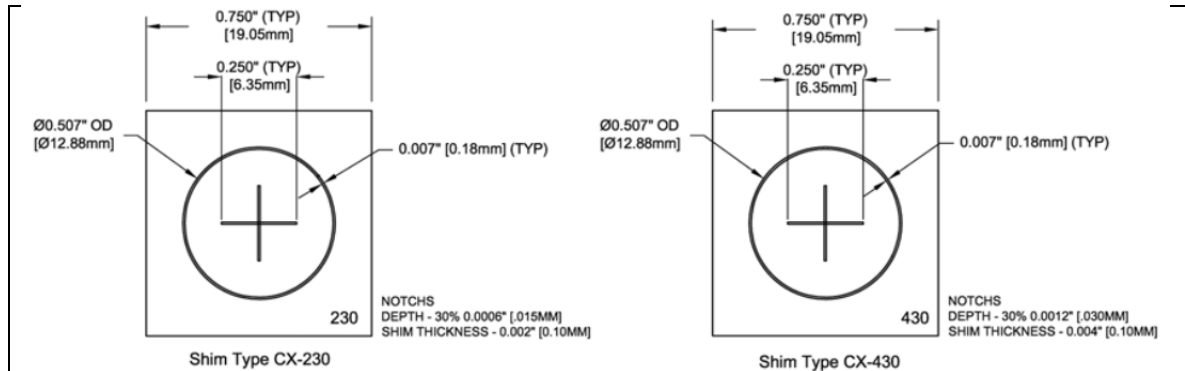


FIG 1:
Basic circular and crossed bar flaw configuration suitable for longitudinal and circular fields.

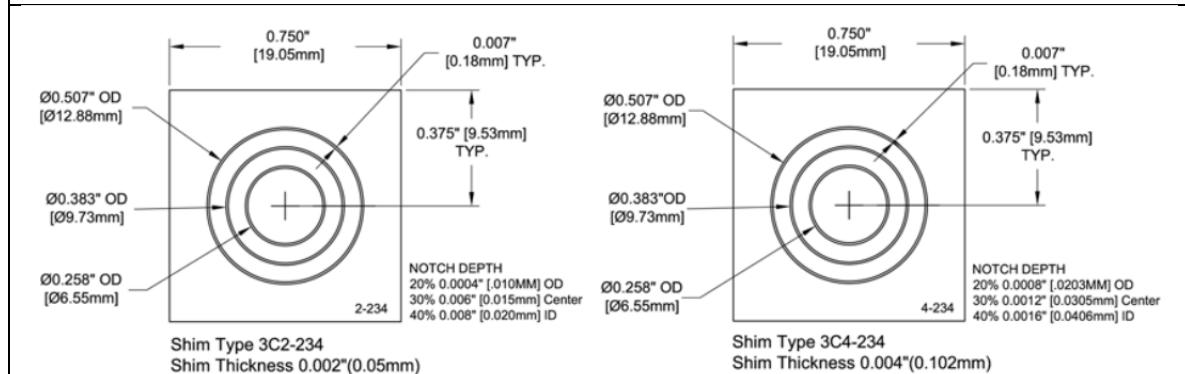


FIG 2:
These QQI's are used for more quantitative work, three concentric circular flaws of differing depths.

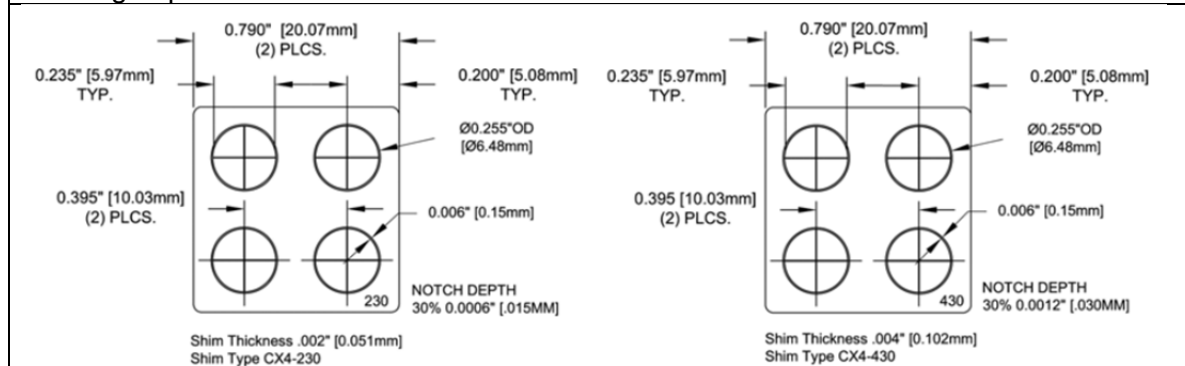


FIG 3:
Similar to CX-230, except miniature design for small areas on test part. The four circles may be cut apart for individual use