



# Western Instruments

Established 1965

## ***Castrol Strips vs. QQI's***

### **Introduction**

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Castrol Strips, or Flexible Magnetic Flux Indicators, are specifically addressed in the BS 6072 Specification, while QQI's (Quantitative Quality Indicators) are specifically addressed in ASTM-E 1444, and ASME Section V. Castrol Strips and QQI's were developed for the same applications, but have evolved into very different tools for the same application. Both QQI's and Castrol Strips are used to check if an induced field will detect a certain orientation (direction) of defect, and to determine the sensitivity or size of a detectable defect.

### **Applications**

QQI's should be permanently attached to a work piece for MPI Test Procedure Development, as they are very delicate. They are applied to the work piece with anaerobic glue (Super Glue) to achieve an intimate contact, and as they are extremely thin and flexible, can conform to almost any surface geometry. Consider QQI's as an Engineer's or Laboratory tool.

Castrol Strips are more robust than QQI's, as they are over 3 times thicker. Therefore, Castrol Strips are very suitable for use in the field or factory floor, by a Technician to check his defect sensitivity. While Castrol Strips can be used for procedure development they are far more suited to repeated use. Furthermore, Type G Castrol Strips are the best suited for field operations, while Type A are more similar to QQI's with the disadvantage of not being as flexible.

### **Differences**

While manufacturers may promote these tools for identical applications, they both have significant differences that will affect their suitability to Laboratory and Field environments.

- Specifications outline that Test Pieces can not be coated, which is due to a variety of factors. Castrol Strips have a protective non-ferrous Coating, while QQI's are basically a 0.05mm (0.002") foil.
- Specifications have different applications and differ in the testing environment. ASME dictates Pressure Equipment with typically hot rolled surfaces, while Pratt and Whitney's Specifications are for Aviation Engines with refined Surface Finishes. Each application differs, Castrol Strips are more suited to ASME Applications while QQI's are better for Aviation applications.

- Some specifications imply intimate contact of the *Shim* with the workpiece. QQI's are a delicate foil that can be made to follow complex surface profiles, while Castrol Strips are fairly robust and quite ridged. This dictates single use for the QQI's while Castrol Strips should can be carried by every MPI Technician for repeated use on the work site.
- QQI's have Etched Notches of a fixed width, while Castrol Strips have slots that are the full thickness of the central foil.
- The thickness of QQI's vary, and the notch depth varies between 20 and 40% of the shim thickness. The slots on Castrol Strips have various widths through the ferrous layer.
- Castrol Strips have varying slot widths, and two QQI's have varying depths of etched indications (CXT-2-234 & CXT-4-234). These variations can be used to establish thresholds for the amount of field required to detect a defect of a given size.

If one or the other reference tool is not covered in a given specification, it should be pointed out that all industry specifications permit substitutions if 'Agreed upon by the Buyer and the Seller'. Such compromises can benefit both parties.

With access to numerous specifications (current and retired), literature, and industry pioneers, the 'shims' described and shown in numerous specifications as Type B, C, and R, originated in Japan, and were simply compiled and improved upon as the QQI's known today.

## **Conclusion**

It has been outlined above that QQI's belong in the lab for procedure development and perhaps used later as training aids. Type G (Type 2) Castrol Strips belong with every inspector, so if ever a test comes into question it can be quickly checked. Furthermore, one product is not better than the other as they both have a place.