

NDE INFORMATION CONSULTANTS

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THE NDT Consultants Magnetic Flux Strip

These strips are useful in determining whether similar sized surface imperfections in parts will give a magnetic particle indication. Two types of strip are available with similar thicknesses but differing test flaw widths. Each has three milled slots in high- μ material as shown. For both types, the top and bottom brass plates are 0.0020-in. thick. *The high- μ steel sandwich is also 0.0020" thick.* The bottom brass layer acts as a lift-off of 0.002-in. from the part, and thus places the active steel element a small fixed but unavoidable distance above the part. The brass is nonferro-magnetic, and thus *plays no other role than protection of the slots, and lift-off.*

Type G: (General Use)

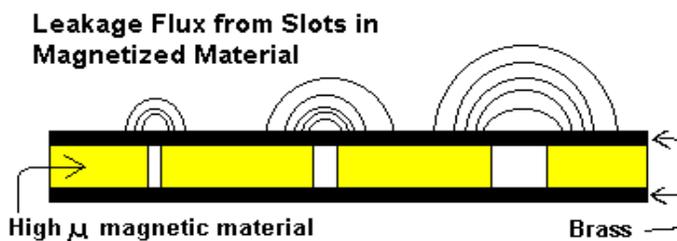
The three milled slots have widths 0.0075", 0.009" and 0.010". The strip is most sensitive when the narrowest slot is seen under MPI.

Type A: (Aerospace)

The three slots have widths 0.003", 0.004" and 0.005"

As is well known, (*Bray & Stanley - Nondestructive Evaluation - A Tool in Design, Manufacturing and Service*) in an active magnetic field, wider slots of the same depth have larger amounts of magnetic flux leakage than narrower slots, and therefore give bigger magnetic

particle indications. Use of these flux indicators enables magnetizing field levels to be set for a variety of magnetizing conditions such as internal (central) conductors, coils, yokes, cable wraps, etc.



When used in conjunction with a **hall-effect gaussmeter**, (Teslameter) measuring the tangential surface field strength, they can provide assurance that magnetizing current and field levels set by the gaussmeter do in fact provide sufficient field for MPI without the over-magnetization that often occurs when using outdated formulae such as $NI = 45000/(L/D)$.

Taking the widths of the "G" slots as twice those of the A slots, and knowing that the particle-holding ability of the leakage field from a slot is proportional to $(H_g L_g)^2$ where H_g is the *magnetic field* in the gap, (i.e. the leakage field from the imperfection) and L_g is the *width* of the slot, we see that the thinner slots provide for higher sensitivity to tighter flaws. Taking a special case where the field H_g is the same for both types, then the MFL from type G slots is roughly 4 times that from type A slots (from the L_g^2 term), and so will more easily hold powder indications.



Defect in electric seam weld of 1.75-in. steel tbg, AC magnetic flux from yoke

They are imported from UK only by NDEIC, and sold in USA in packages of 5.

Notes: The G strips have proved to be extremely popular for the detection of *residual circular flux* in oilfield tubulars, since they show that a surface imperfection of the same width and depth will give a similar indication as the one seen on the strip.

Should a brass layer peel off, it may be re-attached with super-glue.

For more information on these strips, including cost, or for any information on the magnetic techniques employed in MFL and MPI, please e-mail us, or call us, at the above addresses.