Purpose of Shielded Isolation Transformer

Using shielded isolation transformer in power distribution systems

A **shielded** transformer is a ***two-winding transformer***, usually **delta–star** connected and serves the following purposes:

1. – Voltage transformation from the distribution voltage to the equipment's utilization voltage.
2. – Converting a 3-wire input power to a 4-wire output thereby deriving a separate stable neutral for the power supply wiring going to sensitive equipment.
3. – Keeping third and its multiple harmonics away from sensitive equipment by allowing their free circulation in the delta winding.
4. – Softening of high-frequency noise from the input side by the natural inductance of the transformer, particularly true for higher frequency of noise for which the reactance becomes more as the frequency increases.
5. – Providing an ***electrostatic shield*** between the primary and the secondary windings thus avoiding transfer of surge/impulse voltages passing through inter-winding capacitance.

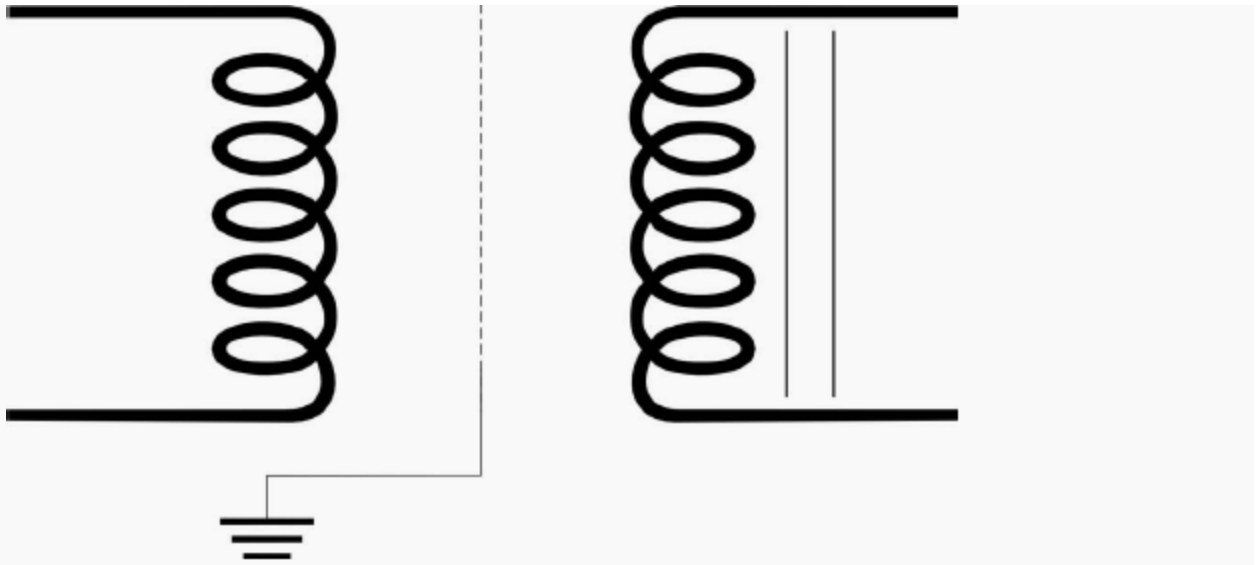

Figure 1 - Principle of a shielded two winding transformer

Figure 1 shows the principle involved in a shielded transformer. The construction of the transformer is such that the **magnetic core** forms the innermost layer, followed by the secondary winding, the electrostatic shield made of a conducting material (*usually copper*) and finally the primary winding.
Figure 2 shows this detail.
It can be seen that the high-frequency surge is conducted to ground through the capacitance between the primary winding (on the left) and the shield, which is connected to ground. Besides the shield, the magnetic core, the neutral of the secondary winding and the grounding wire from the electronic equipment are all terminated to a ground bar, which in turn, is connected to the power supply ground/building ground.

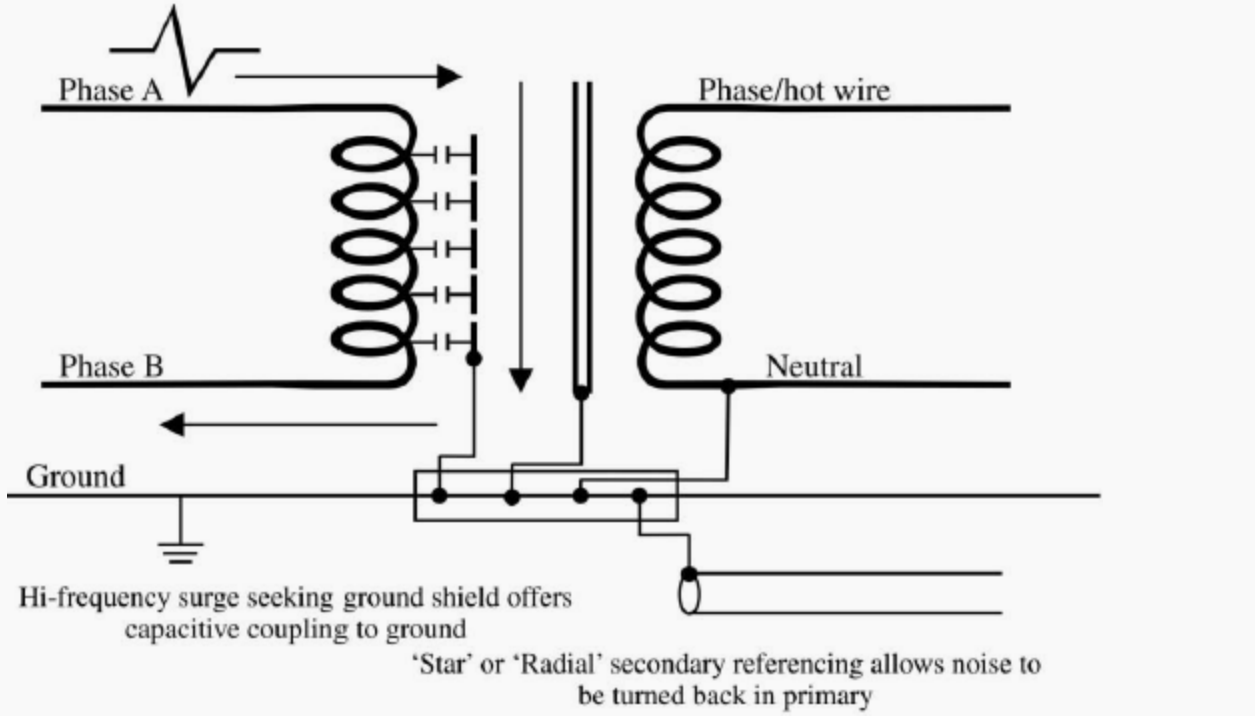

Figure 2 - Construction of a shielded two-winding transformer

It is also important that the primary wiring to and secondary wiring from the isolation transformer are routed through separate trays/conduits. If this is not done, the inter-cable capacitances may come into play negating the very purpose of the transformer.

Figure 3 shows the proper way for an isolation transformer to be wired. Note that the AC power supply wiring and the secondary wiring from the transformer are taken through separate conduits. Also, the common **ground connection** of the isolation transformer serves as the reference ground for the sensitive loads. The AC system ground electrode connection is taken through a separate metal conduit.

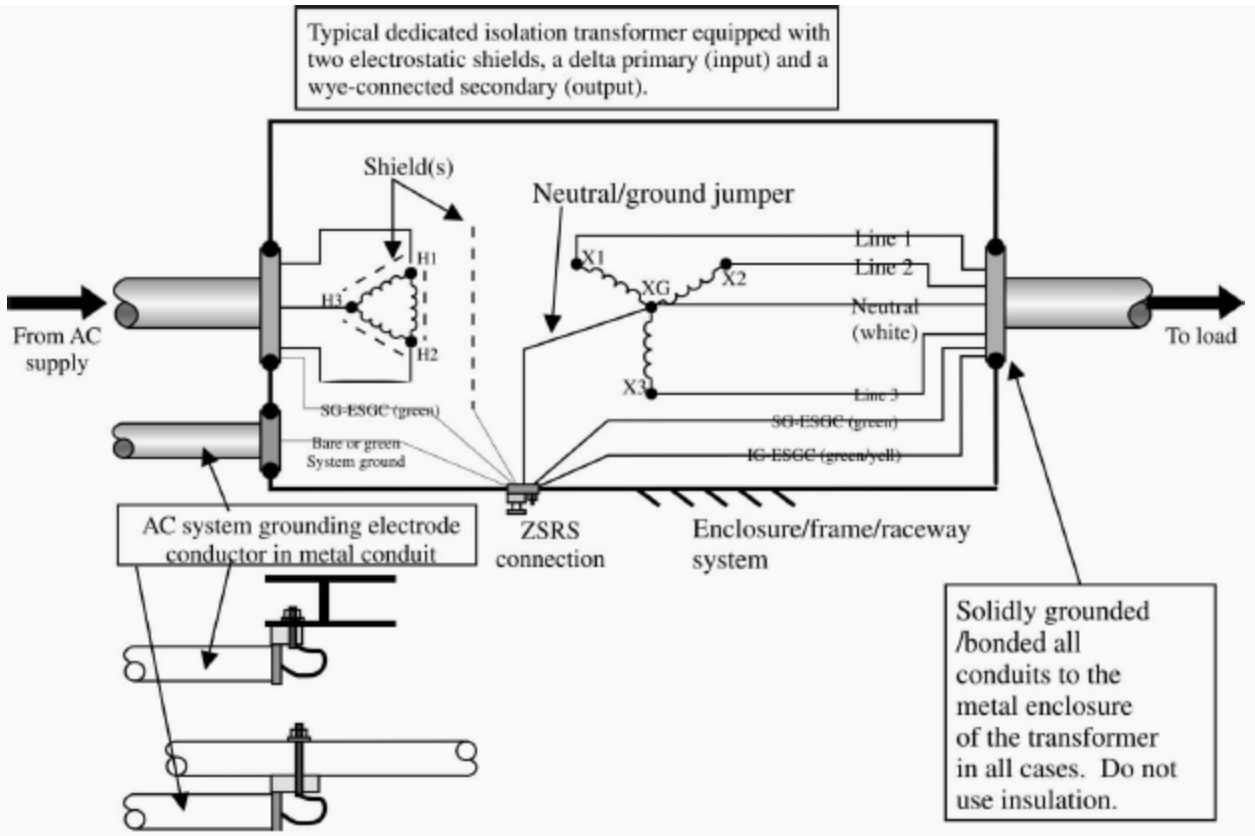

Figure 3 - Wiring/earthing of a shielded two-winding transformer

If these methods are not followed and wiring /earth connections are done incorrectly, noise problems may persist in spite of the isolation transformer.

Resource: *Practical-Grounding-Bonding-Shielding-and-Surge-Protection - G. Vijayaraghavan*

Source:

http://electrical-engineering-portal.com/purpose-of-shielded-isolation-transformer