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IS 15867-1 (2010): Ferrite Cores Guide on the Limits of Surface Irregularities [LITD 5: Semiconductor and Other Electronic Components and Devices]
NATIONAL FOREWORD

This Indian Standard (Part 1) which is identical with IEC 60424-1 :1999 'Ferrite cores — Guide on the limits of surface irregularities — Part 1: General specification' issued by the International Electrotechnical Commission (IEC) was adopted by the Bureau of Indian Standards on the recommendation of the Semiconductor and Other Electronic Components and Devices Sectional Committee and approval of the Electronics and Information Technology Division Council.

The text of IEC Standard has been approved as suitable for publication as an Indian Standard without deviations. Certain conventions are, however, not identical to those used in Indian Standards. Attention is particularly drawn to the following:

a) Wherever the words 'International Standard' appear referring to this standard, they should be read as 'Indian Standard'.

b) Comma (,) has been used as a decimal marker in the International Standard while in Indian Standards, the current practice is to use a point (.) as the decimal marker.
Indian Standard
FERRITE CORES GUIDE ON THE LIMITS OF SURFACE IRREGULARITIES
PART 1 GENERAL SPECIFICATION

1 Scope
This part of IEC 60424 gives guidance on allowable limits of surface irregularities of ferrite cores.

This standard is considered as a general specification useful in the negotiation between ferrite core manufacturers and customers about surface irregularities.

2 General
Due to the method of manufacture and the physical nature of the products, ferrite cores can be expected to exhibit some degree of physical surface irregularities such as chips, ragged edges, cracks, flashes and pull-outs.

The permissible extent of these surface irregularities will depend on the type, position and size of the defect and on the function of the core. Thus, if it is required to establish limits of surface irregularities for a given series of ferrite cores, for example RM-cores, pot-cores, E-cores, U-cores and ring-cores, etc., it would be necessary to prepare a particular specification setting out in great detail the permissible extent of the various types of irregularities.

All surfaces of the core should be clean and free from loose ferrite particles or any other foreign matter. This applies mainly to the contact surfaces. Stains, discolorations, surface crazing or crystallization are acceptable if they do not affect the normal performance of the core. The irregularities described below are considered as being detectable without the use of any magnifying equipment.

3 Definitions of surface irregularities

3.1 chips and ragged edges
chips and ragged edges are areas with missing surface material and are generally caused by mechanical impact during handling (transportation, sorting, feeding, etc.) or grinding. Therefore, in almost all cases, they are located on the edges of surfaces (see figure 1).

The ragged edges should be considered as a series of small chips having a width less than 1 mm.

3.2 crack
surface irregularity which has a width much smaller than its length, and penetrates into the core. Cracks can therefore be limited by their length and their location (see figure 1)

3.3 flash
sharp feather-edge wall extending beyond the intended contour surface of the core (see figure 1)
3.4 pull-out
a pull-out is the consequence of the removal of surface layer of the core due to die "sticking". This occurs on surfaces perpendicular to the direction of the pressing action (see figure 1). NOTE - A pull-out with depth greater than 1 mm is considered as a chip.

4 Examples of Irregularities

Figure 1 shows different examples of surface irregularities on an RM-core.

Figure 1 - Examples of surface irregularities

5 Locations and functions of core parts and surfaces (see figure 2)

5.1 Mating surfaces
These surfaces are generally ground in order to limit the residual air gap between the two core halves. Consequently, irregularities on these surfaces have to be considered as major ones, and carefully evaluated with regard to their influence on the magnetic properties of the complete circuit.

5.2 Centre post
This should be considered as the most important part of the core due to its function of carrying total flux generated by the winding. The centre post of ferrite cores is generally circular (with or without a hole) or rectangular.

5.3 Outer walls or legs
The main function of the outer walls (for example pot-cores) or the outer legs (for example E-cores) is to guide the magnetic flux in a closed magnetic circuit and to form an integral geometry of the core.

5.4 Back wall, bottom and back surfaces
The back wall has the same magnetic function as the outer walls or legs; it may include wire-slots and wire-way areas (for example on RM-cores), the shapes and dimensions of which are dictated by the winding and isolation requirements.
Besides accommodating the clamping, the back surface (ground or not) serves as a reference plane for grinding the mating surface in order to achieve the required parallelism and flatness.

5.5 Wire-slot area
Lateral area of the outer walls, interfacing with the cut-out portion.

5.6 Wire-way area
This is located on the bottom (inside) surface of the back wall, running radially from the centre post to the wire-slot, centred with respect to the wire-slot.
It takes out the leads of the wound coil from inside to outside terminal.

5.7 Clamping recess area
Recess area on the back wall is to accommodate clamping clips.

Figure 2 - Location of main core parts and surfaces - Example of RM-core type
6 Area and length reference for visual inspection

Irregularities such as chips, cracks and pull-out should be compared to five simple geometries which are shown in table 1.

Such a table should be used as a reference for evaluation by operators either at the outgoing stage (core manufacturers) or at the incoming inspection (customers).

Other methods than visual inspection can be used such as computerized optical detection.

NOTE 1 - The minimum area and length considered are respectively 0.5 mm² and 1 mm.
NOTE 2 - Recommended resolutions are as follows: for area
- 0.5 mm² up to 5 mm²;
- 1 mm² from 5 mm² to 10 mm²;
- 2.5 mm² from 10 mm² to 20 mm²;
- 5 mm² from 20 mm² to 50 mm²; for length
- 1 mm from 1 mm to 5 mm;
- 2.5 mm from 5 mm to 10 mm.
Table 1 - Area and length reference for visual inspection

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Scale: 1:1

1 mm — 2 mm — 3 mm — 4 mm —
5 mm — 7.5 mm — 10 mm —
7 Limits of surface irregularities

7.1 General

In each particular specification relevant to standardized core series, generic rules for the calculation of limits should be defined for every kind of irregularity and for all core parts and surfaces.

For guidance on the limits of irregularities, refer to the sectional specifications where limits per core size are given in suitable tables after identification of irregularity types on attached figures and drawings.

7.2 Chips and ragged edges

The simplest way of performing inspection on these two types of irregularities is to compare a chip to a reference area limit and a ragged edge to a reference length.

The limits of chips are generally defined as a percentage of related mating surface of the core.

Apparent area of chip is considered as area of chip.

The ragged edge length is generally limited to a percentage of the common perimeter of the respective two surfaces.

7.3 Cracks

The limits of cracks are generally defined as a percentage of the specified core thickness. Length of crack is an estimated actual length visible on the surface.

7.4 Flash

Generally, no limit is defined but the critical places where flash is not allowed should be listed.

7.5 Pull-outs

The limits of pull-outs are generally defined as a percentage of the respective surface area.

Apparent area neglecting actual depth is considered as area of pull-out.
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