variation in coating thickness between the sections may result. Immersion time will vary according to the relationship of the surface area of an item to its mass. The galvanizer has little control over this situation.

Combining heavy and light sections in a single component may also result in unacceptable distortion (refer to HDGASA wall chart, "Design for Hot Dip Galvanizing").

Since the time to the appearance of first rusting of the base steel is usually determined by the thinnest portion of the coating, an evaluation of galvanizing quality must take into account both the minimum thickness of the coating and its distribution. Specifications for hot dip galvanizing recognise that variations in coating thickness are inherent in the process. The minimum thickness is generally defined as an average or mean thickness of the coating on specimens tested and/or a minimum thickness for any individual specimen.

When measurements are taken to determine the uniformity and thickness of a hot dip galvanized coating, 5 or more coating thickness readings should be taken in each reference area. Reference areas should be taken approximately 100mm from the ends of the article to avoid end effects. Usually the end of an article which leaves the bath last will carry a thicker coating. This is particularly so towards the edge, where, at the time of drainage, the last few drops of zinc tend to agglomerate as a result of surface tension.

The minimum coating requirements specified in **SANS 121 / ISO 1461** for different material thicknesses and classes of work are summarized in **table 2** and **table 3.** For comparitive purposes, these tables compare thickness equivalents to the old **SABS 763** specification. **Table 4** indicates the minimum coating requirements specified in **SANS 32 / EN 10240** for different classes of coating.

Specifications do not stipulate maximum upper coating thickness limits, but **excessively thick coatings on threaded articles are undesirable. In order to ensure effective tensioning, the coating thickness on fasteners should not exceed a maximum of 65µm, this applies particularly, to high strength bolts and nuts.**

Variance in coating thickness. A requirement for a thicker coating (25% greater than the standard in **table 2**) can be requested for components not centrifuged, without affecting specification conformity.

***NOTE**: Where steel composition does not induce moderate to high reactivity, thicker coatings are not always easily achieved. Thicker coatings are more resistant to severe environmental conditions, but can be more brittle and may require special handling. The efficacy of corrosion protection of a hot dip galvanized coating (whether light or dull grey) is approximately proportional to coating thickness.*

TABLE 3

MINIMUM COATING THICKNESS ON ARTICLES THAT ARE CENTRIFUGED

		SANS 121 / ISO 1461		SABS 763	
Category and thickness/diameter (t) or (ø) mm		Local coating thickness µm*	Mean coating thickness µm*	Article Type	Thickness, µm. General Application
FASTENERS	ø ≥ 20	45	55	C1	55
	6 ≤ ø < 20	35	45	C2	45
	ø < 6	20	25		
OTHER ARTICLES (INCLUDING CASTINGS)	t ≥ 3	45	55	C1 Washers	55
				D2	45
	t < 3	35	45	C2 Washers	45

* Local coating thickness is defined as the mean of the measurements taken within a specified reference area. Mean coating thickness is the control sample number average of the local coating thickness values from each reference area.

- Thickness/diameter legend - 6 ≤ ø < 20 = diameter less than 20mm but greater and equal to 6mm.
- Where only one reference area is required according to size of the article, the mean coating thickness within that reference area shall be equal to the mean coating thickness given in the above table.

Thickness Testing

There are several methods to determine the thickness of the zinc coating on a hot dip galvanized article. The size, shape and number of pieces to be tested, will most likely dictate the methods of testing. The specified test methods are either destructive or non-destructive and are detailed in **SANS 121 / ISO 1461**. Identical methods are detailed in **SANS 32 / EN 10240**. The most practical tests are the non-destructive type, such as gauges utilising the electromagnetic principle.

1. **Electromagnetic Testing Method.**
   Instruments, which rely on electromagnetic principles are probably the most widely