



hot dip galvanizing after fabrication. When this test is applied, its scope and limitations should be well understood and no attempt should be made to draw undue inference from the test results.

Adhesion of the Coating

Adhesion is concerned with the practical conditions of transportation, erection and service. The hot dip galvanized coating should be sufficiently adherent to withstand handling consistent with the nature and the thickness of the coating in normal use of the article, without peeling or flaking. Bending or forming, other than mild straightening after hot dip galvanizing, is not considered to be normal handling.

When certain grades of steel or very heavy steel sections are hot dip galvanized, coatings may occur, which are thicker than usual. The galvanizer has limited control over the development of thicker coatings. Thick coatings are a function of the chemical composition of the steel or the longer immersion time required for massive items. Heavy hot dip galvanized coatings, usually greater than 250mm thick, may be more brittle than a typical coating. Consequently, application and interpretation of the

standard adhesion tests must take this into account. The requirements for transportation, handling and erection should be evaluated against the additional corrosion protection afforded by the thicker coating.

Testing Adhesion

Testing adhesion is not necessarily a true measure of the adhesive strength of the metallurgical bonding of the hot dip galvanized coating to the base steel. It serves, however, as an indicator of the adhesive properties of the coating.

Paring Test. This simple but effective test is conducted by cutting or prying the hot dip galvanized coating with a sharp knife. Considerable pressure is exerted in a manner tending to remove a portion of the coating. Adherence is considered satisfactory when it is possible to remove only small particles of the coating.

It should not be possible to peel any portion of the coating in the form of a layer so as to expose the underlying iron or steel in advance of the knife point. Although not mentioned in **SANS 121 / ISO 1461**, this test has shown practical significance as a test for adhesion.

For compliance with **SANS 32 / EN 10240**, the most popular test is cold flattening in accordance

with **SANS 8492 / ISO 8492**. Test pieces not less than 40mm in length are flattened between parallel flat platens as shown in **table 6**. No cracking or flaking of the coating shall occur on the surface away from the cut surface.

Appearance

The ability of a hot dip galvanized coating to meet its primary objective of providing corrosion protection should be the chief criteria in evaluating the coating's acceptability.

The basic finish requirements of the hot dip galvanized coating are that it be:

- relatively smooth,
- continuous,
- free from gross imperfections,
- free from sharp points (that can cause injury), and
- free from uncoated areas^c.

The above points are of particular importance when a subsequent organic coating (duplex coating) is to be applied. Smoothness and lack of roughness achieved by mechanically wiped products, such as continuously galvanized sheeting or wire, are not to be used as the criteria for accessing batch hot dip galvanized products. Roughness and smoothness are relative terms where the end use of the product must be the determining factor in setting tolerances.

The hot dip galvanized coating should be continuous to provide optimum corrosion protection. Handling techniques for hot dip

^c To be essentially free from uncoated areas is best described in **SABS 763 4.3.2 b)**. "The area of an individual bare spot or thin area shall not exceed 5mm². The combined area of bare spots or thin areas shall not exceed 25mm² per metre of length or per square metre of surface of an article."

TABLE 6. DEGREE OF FLATTENING FOR TESTING COATING ADHERENCE FOR TUBES	
Tube type	Distance between platens
Square	75% of side
Rectangular tube	75% of shorter side
Round ≤ 21.3mm	85% of outside diameter
Round > 21.3 ≤ 48.3mm	80% of outside diameter
Round > 48.3 ≤ 76.1mm	75% of outside diameter
Round > 76.1 ≤ 114.3mm	70% of outside diameter
Round > 114.3mm	65% of outside diameter