

## Technical Note No. 21

# TOLERANCE, FIT AND APPEARANCE OF CLADDING



## Introduction

Lack of understanding of building tolerances is a major source of conflict on site. It increases construction costs and can lead to poor quality buildings or even failures if corrective measures are ill-conceived. This Technical Note discusses the issue of tolerance as it relates to cladding, in order to improve levels of understanding and awareness of how to achieve satisfactory fit and appearance. The guidance given in this Technical note is based on the principles described in BS 5606 and BS 6954.

## Definitions

Fit is not merely being able to, for instance, insert one component within another, but also requires that the assembly functions as intended. Satisfactory fit is rarely achieved by accident - it is the result of good planning by all participants. This requires an understanding of some fundamental concepts, which are defined and described below.

## Deviation

*The difference between a specified nominal value and an actual measured value.*

There are two types of deviation.

## Induced deviations

*The inevitable result of variations in the manufacturing process and the inability of human operatives and instrumentation to measure with absolute precision.*

Induced deviations are permanent and whilst the design needs to take account of their presence at the time of construction, it is not

necessary to allow for further induced deviations in service.

## Inherent deviations

*Inevitable inaccuracies due to the physical properties of materials.*

Inherent deviations are post-installation dimensional changes and movements in both the structure and the cladding. Sources of inherent deviations include moisture and thermal movement, elastic deformations, concrete creep and shrinkage and foundation settlement. Guidance on estimation of inherent deviations is given in BRE Digests 227-9.

Cladding can absorb inherent deviations through allowing freedom of movement, by incorporating discontinuities and designing some fixings to slide. Alternatively, fixings and panels can be designed to resist the forces induced by restraining movement.

Conversely, movement of the structure may in some instances have to be limited to a level that can be accommodated by the cladding fixings and joints.

## Tolerance

*Tolerances define the limits of induced deviation for which allowance should be made in design, and within which actual sizes are acceptable.*

Tolerances therefore describe how much variability is allowable; not how much is present which is termed deviation (see above). Tolerances may be specified with equal deviation either side of the stated size but can also be specified as the maximum deviation from an absolute maximum or minimum value.