Tolerances	**Published Date: 20/04/2009**

Whenever a structure is built from smaller pieces, the way they fit together is important. To ensure that the pieces can be erected into the correct place without clashing with adjacent ones, tolerance is built in. This can be viewed as an assumption that pieces will be made wrongly, but only by a specified, limited, amount.

To rationalise these tolerances, agreed values are included in British Standards and also in many job-specific specifications. It is important to be aware what tolerances a project is using, as this information is required to be made clear from drawing through manufacture to erection stages.

The basic concrete tolerances are set out in BS8110: Part 1, clause 6.2.8, where they are referred to as 'permissible deviations'. However it is widely acknowledged that precast concrete, particularly architectural, can and is made to finer tolerances. The relevant tolerances for cladding panels are set out in BS8297: 2000 clause 9.3, table 11 (reproduced below). Unless agreed otherwise, these also form the basis of Trent Concrete's own Standard Manufacturing Specification.

		Target size	**Permissible deviation**
a) Length and height		< 3 m	± 3 mm
		3 m to 6 m	± 5 mm
		6 m to 9 m	± 8 mm
		9 m to 12 m	± 10 mm
b) Thickness		< 500 mm	± 3 mm
		500 mm to 750 mm	± 5 mm
c) Straightness or bow i.e. deviation from the intended line		< 3 m	6 mm
		3 m to 6 m	9 mm
		6 m to 12 m	12 mm
d) Squareness i.e. the difference in length of the two diagonals			3 mm per 2 m of diagonal up to a maximum of 9 mm
e) Twist i.e. any corner should not be more than the dimension stated from the plane containing the other three corners		**Length of longer side**	
		< 3 m	6 mm
		3 m to 6 m	9 mm
		6 m to 12 m	12 mm
f) Openings	i) Within one unit (size)		± 6 mm
	ii) Within one unit (location) a) With structural or cover implications b) Without structural or cover implications		 ± 6 mm ± 12 mm
	iii) Formed by several units eg spandrels mullions etc		± 8 mm
g) Anchors and inserts	i) Isolated insert or group of inserts		± 6 mm
	ii) Individual insert relative to others in a group		± 3 mm
	iii) Non-structural cast-in items		Twice the above

Unit tolerances will also have an effect on joint width. If units have a large tolerance then the joint width must be great enough to accommodate these and still be wide enough for the sealant to work. This is particularly true if units are between two fixed points thus not allowing any shuffling to minimise errors.