DIMENSIONAL TOLERANCES FOR PAVERS

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Summary

This paper discusses dimensional tolerances for pavers and suggests a new approach to specifying these tolerances in terms of its end use as well as those specified in the standards laid down by the regulatory authorities in the country in which the pavers are to be used.
Four classes of pavements are identified and tolerances proposed for each end use.In particular the special requirements of aircraft pavements are discussed and the results of extensive monitoring at a project at Trondheim Airport are given for the rectangular pavers used there.

Introduction

The manufacturers of pavers have to produce their products within the given criteria of the standards for the country in which they will be used. These standards typically define type of aggregates that may be used , compressive strength and dimensional tolerances.
The dimensional tolerances for length, width and depth of pavers have been determined by the manufacturers themselves to allow for the economical use of the moulds used in making the pavers. Typically these tolerances are : length ± 2mm, width 2mm and thickness 3mm. Thus the plan dimensions of pavers from a new mould would probably be 198mm x 98mm and as the mould progressively wears the final permissable dimensions of the paver would be 202mm x 102mm . Of greater importance to the end user of pavers is the tolerance of the pavers which achieve the correct width of joints between pavers. It is therefore suggested that it is the joint width tolerance which is the most important criterion. For the purpose of this paper we shall term this the 'use tolerance'.

'Use Tolerances'

In specifying 'use tolerances' the differing requirements of various types of pavements are recognised and for this reason four types of pavements are identified.They are :-

Type 1. Areas for use by pedestrians only.
Type 2. Areas for use by low speed light vehicles.
Type 3. Areas for use by heavy vehicles.
Type 4. Aircraft and heavy industrial pavements.

It would not be difficult to to specify dimensional tolerances for the classes of pavements identified if all pavers were rectangular. However, it is considered by the author that for shaped pavers the most important criterion is that the units should fit together with correct joint widths.

The proposals for 'use tolerances' given in this paper are intended for all interlocking pavers having an even joint width on all sides.
Proposed specified joint widths for the classes of pavements given above are set out as follows:

Type1. - For pedestrian areas where the structural performance of the pavers is not critical, joint widths should be between 2mm and 4mm with an allowable maximum of 5% of joints between 1 - 2mm and 4 - 5mm

Type2. For areas used by low speed light vehicles, joint widths should be between 2mm and 3.5mm with an allowable maximum of 5% of joints between 1.5-2mm and 3.5 - 4mm.

Type 3.and Type 4. For heavy duty pavements, i.e aircraft pavements, where the pavers and the laying sand contribute to the total pavement structure, the width of joints should be between 2mm and 3mm with an allowable maximum of 5% of the joints being between 1.5-2mm and 3-3.5mm.

For all nominal 80mm thick pavers, rectangular and shaped, the proposed permitted thickness variation is :-

Type 1 pavements - 4mm
Type 2 pavements - 3mm
Type 3 & 4 Type pavements - 2mm

It is recognised that it may be difficult to produce pavers to satisfy the requirements for class 3 & 4 situations, The author has found however that it has been possible to achieve these tolerances on several sites in Norway. With the co-operation of manufacturers, they have generally been able to deliver pavers according to the stricter requirements when they have been advised in advance of production.
On a recent project at Trondheim Airport - Vaernes, the manufacturer was able to satisfy the new requirements without serious problems for an area of 20,000m^2.
Construction details of the pavement are given in Appendix A, together with the measurement control records for the pavers used on this site.

Conclusions

1. It is possible to achieve the proposed stricter paver tolerances to satisfy the requirements of more uniform joint widths.

2. It is essential that the manufacturer is advised in advance of the more onerous ti dimensional tolerances requirements as he will probably be able to solve the problem by dedicating a set of moulds to a particular project.

3. By passing the problem to the manufacturer, progress may be made in extending the use of pavers to applications such as high speed roads or even runways.

APPENDIX A

Construction details for aircraft pavement at Trondheim Airport - Vaernes.

Base : Crushed rock having an estimated California Bearing Ratio (CBR) of 90-95%. (Laying tolerance of +/- 15mm)

Laying course sand : Crushed rock sand of good quality (0-8mm)

Jointing sand : Natural dry sand 0 - 2mm

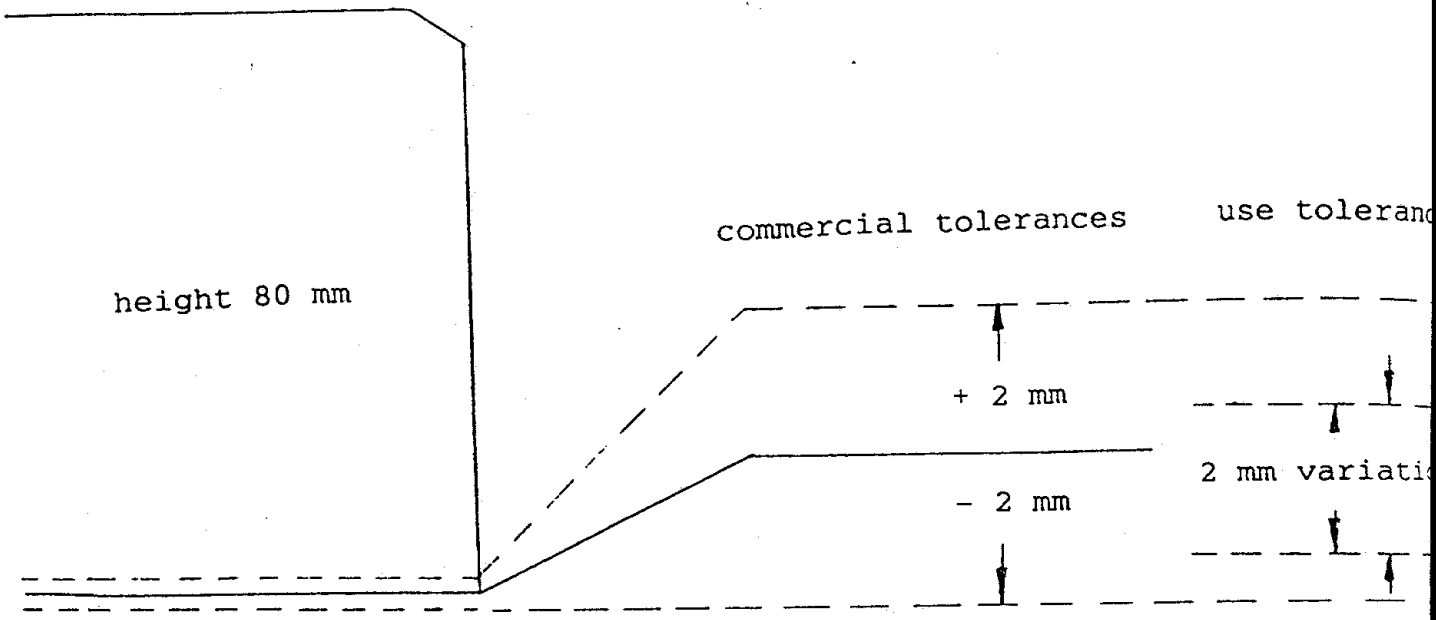
Pavers sealed with a liquid pre-polymer sealer

Pavers manufactured according to tolerances for Type 4 pavements.

Measurement Control for pavers at Trondheim Airport - Vaernes

Date	Number	Length (mm)	Width (mm)	Thickness (mm)
11.08.93	1	198	98	78.5
	2	198	98	79
	3	198	98	79
13.08.93	1	198	98	78
	2	198	98	79
	3	198	98	78.5
16.08.93	1	198	98	78
	2	198	98	78
	3	198	98	78
17.08.93	1	198	98	78.5
	2	198	98	78.5
	3	198	98	79
08.09.93	1	198	98	79
	2	198	98	78
	3	198	98	78
09.09.93	1	198	98	78
	2	198	98	78.5
	3	198	98	78
10.09.93	1	198	98	78
	2	198	98	78
	3	198	98	78.5
13.09.93	1	198	98	79
	2	198	98	78.5
	3	198	98	79
14.09.93	1	198	98	78
	2	198	98	78
	3	198	98	78.5
15.09.93	1	198	98	79
	2	198	98	79.5
	3	198	98	78
16.09.93	1	198	98	79.5
	2	198	98	79

	3	198	98	79
04.10.93	1	198	98	78.5
04.10.93	2	198	98	79.5
	3	198	98	78.5
05.10.93	1	198	98	79
	2	198	98	79
	3	198	98	78
06.10.93	1	198	98	78.5
	2	198	98	78.5
	3	198	98	78.5
12.10.93	1	198	98	78
	2	198	98	79
	3	198	98	79
13.10.93	1	198	98	79
	2	198	98	79
	3	198	98	78
14.10.93	1	198	98	78
	2	198	98	79
	3	198	98	79
18.10.93	1	198	98	78
	2	198	98	79
	3	198	98	78.5



COMMERCIAL TOLERANCES AND USE TOLERANCES