



Design Factors for E'GRID Products: The Efficiency of Bodkin Joints

1: Introduction:

In many applications of geogrids, for example segmental panel walls and wrap-around steep slopes, it is necessary to join lengths of geogrid together. Therefore, the efficiency of the joint in transmitting load is a key factor in design. Integral uniaxial geogrids, such as the E'GRID range, can, uniquely, be joined by "bodkins" – specially shaped joint bars.

2: Test Method



Fig. 1: Test Specimen

The international standard test for joint strength in geotextiles and geogrids is ISO 10321. In this standard the sample length should include at least one transverse bar between the joint and each jaw of the test machine. However, because of the length of each pitch of E'GRID Uniaxial Geogrids this requirement would lead to total sample lengths that are longer than can be accommodated in most commercially available test machines. Therefore, for these tests, samples of the form shown in Fig. 1 with 10 ribs under load were used.

With this sample form the eccentricity of the joint is exaggerated by the short lower section of the sample. To mitigate this the tests were carried out at a speed of 2% per minute rather than the higher speed of 20% per minute called for in the standard.

To calculate Joint Efficiency, the factor normally called for in design calculations. Tensile tests of un-jointed samples with 10 ribs under load were carried out in accordance with ISO 10319 except that the speed used was 2% per minute.

3: Bodkin Shape:

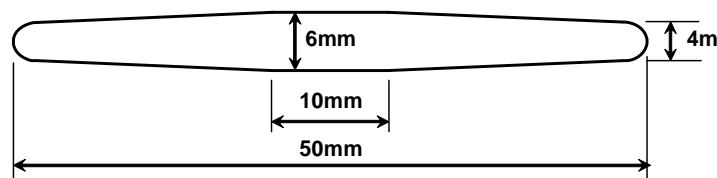


Fig. 2: E'GRID Bodkin 5046

The shape of bodkin required depends on many factors associated with the details of the manufacture of a particular integral geogrid. Bodkins that are suitable for use with a product range from one manufacturer are unlikely to be suitable for use with another manufacturer's products. Many different thicknesses and shapes of bodkin were tried with the E'GRID range of products and the optimum was found to be the shape and size shown in Figure 2.

A sample under test with this shape is shown in Fig. 3



Fig. 3: Sample under test

4: Test Results:

Product	Connection Efficiency
E'GRID 50R	97%
E'GRID 65R	96%
E'GRID 90R	97%
E'GRID 110R	92%
E'GRID 130R	91%
E'GRID 170R	91%

The results of tests carried out on the full range of E'GRID Uniaxial Geogrids are given in the table above

5: Conclusion:

A safe value for use in design for the Efficiency of Bodkin Joints in E'GRID Uniaxial Geogrids made with the E'GRID EGB 5046 Bodkin is:

90%

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