

Special Specification 3060

Geogrid Base Reinforcement



1. DESCRIPTION

Use geogrid to reinforce flexible base material placed on subgrade consisting of expansive clay material. Geogrid comprises of a synthetic planar structure formed by a regular network of integrally connected polymeric tensile elements with apertures designed to interlock with the flexible base and subgrade.

2. MATERIALS

- 2.1. Furnish geogrid meeting the material requirements listed in Table 1 and the minimum geosynthetic composite stiffness from Section 2.2. The Engineer will randomly select a roll from those delivered to the project and sample a piece of geogrid from the roll. The Construction Division, Materials and Pavements Section (CST/M&P) will test the geogrid sample to determine if it meets the material requirements listed in Table 1 and Section 2.2. Allow a minimum of 10 calendar days for CST/M&P to perform all testing.

When test results fail to meet any of the minimum requirements, the Engineer will reject the roll and randomly select two additional rolls to sample and test. If either of the additional samples fails to meet any of the material requirements, the Engineer will reject the entire quantity of rolls represented by the samples tested.

Table 1
Material Requirements

Material Property	Test Procedure	Geogrid
Aperture Size, mm (in.)	Tex-621-J	25 – 51 (1.0 - 2.0)
Percent Open Area, % Minimum		70
Thickness, mm (in.) Minimum		1.27 (0.05) 1.15 (0.045) 2.54 (0.10)
MD ribs		
CMD ribs		
Junctions		90
Junction Efficiency, Minimum % of rib ultimate tensile strength, MD & CMD	175,080 (12,000)	
Tensile Modulus ¹ , Minimum @ 2% elongation ¹ , N/m (lb./ft.) MD & CMD		
Geosynthetic Composite Stiffness (K_{SGC}) ² , (kN/m) ² /mm, Minimum CMD	Section 2.2	20

1. Determined as a secant modulus without offset allowances.

2. Refer to Section 2.2 for more information in regards to the test procedure used to determine the K_{SGC} .

Note—MD and CMD do not necessarily refer to the machine (warp) and cross machine (fill) directions in the manufacturing process. They refer, for drawn products, to the more (CMD) or less (MD) highly drawn ribs where the aperture dimensions are unequal.

- 2.2. **Geosynthetic Composite Stiffness.** Provide geogrid with a minimum geosynthetic composite stiffness (K_{SGC}) of 20 (kN/m)²/mm, unless otherwise directed. K_{SGC} is a performance index that characterizes the interaction of geogrid with aggregate in a pullout box assembly. The aggregate is comprised of rounded granular particles passing the 1/4-in. sieve and retained on the No. 4 sieve. It is placed in the pullout box in three lifts and each lift is compacted to a target density of 102.5 pcf. The geogrid is placed in between the second and third lift. The assembly is placed in a loading frame, a confining pressure of 3 psi is applied, and the geogrid is pulled in tension until it breaks. The displacement of the geogrid is measured at three locations and used to determine the K_{SGC} .

K_{SGC} was developed from TxDOT sponsored research performed by the Center of Transportation Research (CTR). Additional information about the K_{SGC} is available in CTR research report FHWA/TX-13/5-4829-01-2. CST/M&P will provide a draft test procedure upon request.

- 2.3. **Packaging.** Package geogrid in rolls of the length and width shown on the plans or as approved. Package each roll in one continuous piece in a suitable sheath, wrapper, or container to protect the geogrid from damage due to ultraviolet light, moisture, storage and handling.
- 2.4. **Identification.** Identify each roll with a tag or label securely affixed to the outside of one end of the roll. List the following information on the label:
- Unique roll number, serially designated;
 - Lot or control number;
 - Name of producer;
 - Style or catalog description of product; and
 - Roll width and length.

3. CONSTRUCTION

Install geogrid in accordance with the lines and grades as shown on the plans. Do not operate tracked construction equipment on the geogrid until a minimum cover of 6 in. of flexible base backfill material is placed on the geogrid. Install the geogrid to avoid any deformation or damage to the underlying, compacted material below the geogrid. When the underlying, compacted material below the geogrid is damaged during installation, correct all areas to the satisfaction of the Engineer.

- 3.1. **Geogrid Placement.** Orient the geogrid length as unrolled parallel to the direction of roadway. Overlap geogrid sections as shown on the plans or as directed. Use plastic ties at overlap joints or as directed. When placing geogrid around corners, cutting and diagonal lapping may be required. Pin geogrid at the beginning of the backfill section as directed. Keep the geogrid taut and flat throughout backfilling but not restrained from stretching or flattening. Use a bulldozer to place the backfill material by cascading flexible base onto the geogrid with a minimum depth of six inches. Spread and shape the flexible base into a uniform layer by gradually raising the bulldozer blade over the geogrid. Sufficiently compact the unbound buffer layer placed directly above the geogrid to achieve the required density in all subsequently constructed pavement layers.
- Avoid any equipment from having direct contact with the geogrid. When approved by the Engineer, rubber tired equipment may be operated directly on the geogrid. When allowed, only operate the rubber tired equipment at a maximum of 5 mph, do not turn tires on the geogrid, do not make sudden stops and starts on the geogrid, and do not distort the geogrid to create excessive deformation waves. Correct areas with distorted and excessive deformation waves to the satisfaction of the Engineer. When directed by the Engineer, adjust the geogrid installation and construction methods to minimize any distortion and deformation waves.
- 3.1.1. **Longitudinal Joints.** Overlap longitudinal joints by a minimum of 1 ft. Space longitudinal ties 10 ft. to 20 ft. or as directed.
- 3.1.2. **Transverse Joints.** Overlap transverse joints by a minimum of 1 ft. Space transverse ties 4 ft. to 5 ft. or as directed.
- 3.2. **Damage Repair.** Remove and replace contractor damaged or excessively deformed areas without additional compensation as directed. Lap repair areas a minimum of 3 ft. in all directions. Tie each side of repair grid in at least 3 locations but do not exceed normal construction spacing. The tie spacing for odd shapes will be as directed. Repair excessively deformed materials underlying the grid as directed

4. MEASUREMENT

Geogrid base reinforcement will be measured by the square yard of roadway placement as shown in the plans with no allowance for overlapping at transverse and longitudinal joints.

5. PAYMENT

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" are paid for at the unit bid price for "Geogrid Base Reinforcement" of the type specified. This price is full compensation for furnishing, preparing, hauling and placing materials including labor, materials, freight, tools, equipment and incidentals.