

CHAPTER 5

BASE COURSE COMPOSITION REQUIREMENTS

5-1. Free-draining material directly beneath bound base or surfacing layer. Base courses may be made up of either granular unbound materials or bound base materials or a combination of the two. However, a cement- or lime-bound base should not be placed directly beneath bituminous pavement. Also, an unbound base course will not be placed between two relatively impervious bound layers. If the combined thickness, in inches, of pavement and contiguous bound base courses is less than 0.09 multiplied by the design air freezing index (this calculation limits the design freezing index at the bottom of the bound base to about 20 degree-days), not less than 4 inches of free-draining material should be placed directly beneath the lower layer of bound base or, if there be no bound base, directly beneath the pavement slab or surface course. The free-draining material should contain 2.0 percent or less, by weight, of grains that can pass the No. 200 sieve, and to meet this requirement it probably will have to be screened and washed. The material in the 4-inch layer must also conform with filter requirements. If the structural criteria for design of the pavement do not require granular unbound base other than the 4 inches of free draining material, the material in the 4-inch layer must be checked for conformance with the filter requirements. If it fails the test for conformance, an additional layer meeting those requirements must be provided.

5-2. Other granular unbound base course. If the structural criteria for design of the pavement require more granular unbound base than the 4 inches of free draining material, the material should meet the applicable requirements of current guide specifications for base or subbase materials. In addition, the top 50 percent of the total thickness of granular unbound base must be non-frost-susceptible and must contain not more than 5 percent by weight of particles passing a No. 200 sieve. The lower 50 percent of the total thickness of granular unbound base may be either non-frost-susceptible material, S1 material, or S2 material. If the subgrade soil is S1 or S2 material meeting the requirements of current guide specifications for base or subbase, the lower 50 percent of granular base will be omitted. An additional requirement, if subgrade freezing will occur, is that the bottom 4-inch layer in contact with the subgrade must meet filter requirements, or a geotextile fabric meeting the filter requirements must be placed in contact with the subgrade. The dimensions and permeability of the base should satisfy the base course drainage criteria given in EM 1110-3-136 as well as the thickness requirements for frost design. Thicknesses indicated by frost criteria should be increased if necessary to meet subsurface drainage criteria. Base course materials of borderline quality should be tested frequently after compaction to insure that the materials meet these design criteria.

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5-3. Use of F1 and F2 soils for base materials for roads and parking areas. A further alternative to the use of S1 and S2 base materials is permitted for roads and vehicle parking areas. Materials of frost groups F1 and F2 may be used in the lower part of the base over F3 and F4 subgrade soils. F1 materials may be used in the lower part of the base over F2 subgrades. The thickness of F2 base material should not exceed the difference between the reduced-subgrade-strength thickness requirements over F3 and F2 subgrades. The thickness of F1 base should not exceed the difference between the thickness requirements over F2 and F1 subgrades. Any F1 or F2 material used in the base must meet the applicable requirements of the guide specifications for base or subbase materials.

5-4. Filter over subgrade.

a. Granular filters. For both flexible and rigid pavements under which subgrade freezing will occur, at least the bottom 4 inches of granular unbound base should consist of sand, gravelly sand, screenings, or similar material. It should be designed as a filter between the subgrade soil and overlying base course material to prevent mixing of the frost-susceptible subgrade with the base during and immediately following the frost-melting period. This filter is not intended to serve as a drainage course. The gradation of this filter material should be determined in accordance with criteria presented in EM 1110-1-136, with the added overriding limitation that the material must be non-frost-susceptible or of frost group S1 or S2. Experience shows that a fine-grained subgrade soil will work up into a coarse, open-graded overlying gravel or crushed stone base course under the kneading action of traffic during the frost-melting period if a filter course is not provided between the subgrade and the overlying material. Experience and tests indicate that well-graded sand is especially suitable for this filter course. The 4-inch minimum filter thickness is dictated primarily by construction requirements and limitations. Greater thicknesses should be specified when required to suit field conditions. Over weak subgrades, a 6-inch or greater thicknesses may be necessary to support construction equipment and to provide a working platform for placement and compaction of the base course.

b. Geotextile fabric filters. The use of geotextile fabrics in lieu of a granular filter is encouraged. No structural advantage will be attained in the design when a geotextile fabric is used; it serves as a separation layer only.

5-5. Filter under pavement slab. For rigid pavements, all-bituminous-concrete pavements and pavements whose surfacing materials are constructed directly over bound base courses, not more than 85 percent of the filter or granular unbound base course material placed directly beneath the pavement or bound base course should be finer than 2.00 millimeters in diameter (U.S. standard No. 10 sieve) for a minimum

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thickness of 4 inches. The purpose of this requirement is to prevent loss of support by the pumping of soil through joints and cracks.