

## \_\_\_\_\_ FINISHES AND FINISHING

a. General. - The classes of finish and the requirements for finishing of concrete surfaces shall be as specified in this paragraph, paragraph \_\_\_\_\_ (Forms), and tables \_\_\_\_ (Formed surfaces) and \_\_\_\_ (Unformed surfaces) of paragraph \_\_\_\_\_ (Finish, Surface Tolerances, and Curing Schedule) or as otherwise shown on the drawings. Where finishes are not specified or shown on the drawings for a particular structure or surface, the finish shall be as specified for similar work. The Contractor shall notify the Contracting Officer before finishing concrete. Unless inspection is waived in each specific case, finishing of concrete shall be performed only when a Government inspector is present.

Concrete surface variations will be measured by the Government in accordance with subparagraph \_\_\_\_\_.d. (Structural Deviations and Surface Tolerances for Concrete Construction) where necessary to verify that concrete surfaces are within the specified tolerances. Finished concrete which is not within the specified tolerances shall be repaired in accordance with paragraph \_\_\_\_\_ (Repair of Concrete).

b. Formed surfaces. - The classes of finish for formed concrete surfaces are designated by the symbols <sup>1</sup>(F1, F2, F3, and F4). The classes of finish shall apply as follows:

<sup>1</sup>[(1) F1. - Finish F1 generally applies to formed surfaces upon or against which fill material, grout, or concrete is to be placed. Form tie rod ends on surfaces which will be in contact with fill material shall be protected from moisture if they will be below the water table or water line. Protection shall consist of recessing the tie rod ends and filling the recesses with dry pack or other approved material or by a waterproofing system approved by the Contracting Officer. Form tie rod ends on surfaces which will be in contact with concrete or form tie rod ends on surfaces which will be in contact with fill material but will be above the maximum water table elevation may be cut off flush with the formed surfaces or may be recessed without filling.

(2) F2. - Finish F2 generally applies to all formed surfaces not permanently concealed by fill material, grout, or concrete, or not required to receive finish <sup>1</sup>(F3 or F4).

(3) F3. - Finish F3 generally applies to formed surfaces, the appearance of which is considered by the Government to be of special importance, such as surfaces of structures prominently exposed to public view. After all required patching and correction of imperfections have been completed, surfaces shall be sack-rubbed as follows:

Surfaces shall be thoroughly wetted and sack rubbing shall commence while surfaces are still damp. The mortar used shall consist of 1 part cement; 2 parts, by volume, of sand passing a No. 16 screen; and enough water so that the consistency of the mortar is that of thick cream. It may be necessary to blend the cement with white cement to obtain a color that will match that of the surrounding concrete surface.

The mortar shall be rubbed thoroughly over the area with clean burlap or a sponge rubber float so as to fill all pits, bugholes, and other defects. While the mortar in the pits is still plastic, the surface shall be rubbed over with a dry mix of the above proportions and material to remove the excess plastic material and place enough dry material in the pits to stiffen and solidify the mortar so that the fillings will be flush with the surface. No material shall remain on the surface except that within the pits. Curing of the surface shall then continue as specified.

(4) F4. - Finish F4 generally applies to formed surfaces for which accurate alignment and evenness of surface are of paramount importance from the standpoint of eliminating destructive effects of water such as for suction or draft tubes.]

c. Unformed surfaces. - The classes of finish for unformed concrete surfaces are designated by the symbols <sup>1</sup>(U1, U2, and U3). Interior surfaces shall be sloped for drainage where shown on the drawings or directed. Surfaces which will be exposed to the weather and which would normally be level shall be sloped for drainage. Unless the use of other slopes or level surfaces is indicated on the drawings or directed, narrow surfaces, such as <sup>1</sup>(tops of walls and curbs), shall be sloped approximately three-eighths inch per foot of width; and broader surfaces, such as <sup>1</sup>(walks, roadways, platforms, and decks), shall be sloped approximately one-fourth inch per foot. Unless otherwise specified or indicated on the drawings, these classes of finish shall apply as follows:

<sup>1</sup>[(1) U1. - Finish U1 (screeded finish) generally applies to unformed surfaces that will be covered by fill material, grout, or concrete. Finish U1 is also used as the first stage of finishes U2 and U3. Finishing operations shall consist of sufficient leveling and screeding to produce even uniform surfaces.

(2) U2. - Finish U2 (floated finish) generally applies to unformed surfaces not permanently concealed by fill material, grout, or concrete, or not required to receive finish <sup>1</sup>(U1 or U3).

Finish U2 is also used as the second stage of finish U3. Floating may be performed by use of hand- or power-driven equipment. Floating shall be started as soon as the screeded surface has stiffened sufficiently, but before bleed water forms, and shall be the minimum necessary to produce a surface that is free of screed marks and is uniform in texture. If finish U3 is to be applied, floating shall be continued until a small amount of mortar without excess water is brought to the surface, so as to permit effective troweling.

<sup>2</sup>(At the proper interval after being struck off, the roadway slabs of concrete bridges shall be finished by wood floating or belting to produce a nonskid surface equivalent to that obtainable by use of the best modern practice in finishing pavement for highways.)

<sup>3</sup>(After the roadway surfaces of service tunnels and slabs of concrete bridges have been finished by wood floating, the surfaces shall be given a broom finish. The finish shall be applied when the water sheen has practically disappeared. The broom shall be drawn

transversely across the pavement with adjacent strokes slightly overlapping. The brooming shall be completed before the concrete is in such condition that the surface will be torn or unduly roughened by the operation. The finished surface shall have a uniform appearance and shall be free of corrugations exceeding 1/8 of an inch in depth. Brooms shall be of a quality, size, and construction, and be so operated, as to produce a surface finish satisfactory to the Contracting Officer.)

(3) U3. - Finish U3 (troweled finish) generally applies to unformed surfaces, the appearance and porosity of which is considered by the Government to be of special importance. After bleed water has disappeared and when the floated surface has hardened sufficiently to prevent an excess of fine material from being drawn to the surface, steel troweling shall be started. Steel troweling shall be performed with firm pressure so as to flatten the sandy texture of the floated surface and produce a dense uniform surface, free from blemishes and trowel marks.

<sup>1</sup>(When specified for canal and lateral linings, the finished surface shall be equivalent in evenness, smoothness, and freedom from rock pockets and surface voids to that obtainable by effective use of a long-handled steel trowel. Light surface pitting and light trowel marks will not be considered objectionable for canal and lateral linings. Where the surface produced by a lining machine meets the specified requirements, no further finishing operations will be required.)]

<sup>1</sup>d. Nonslip abrasive finish. - Nonslip abrasive finish generally applies to concrete surfaces where slipping hazards are considered probable. The abrasive material shall be crushed, ceramically bonded aluminum oxide, and shall be applied at a rate of not less than one-fourth pound per square foot. As soon as the screeded surface has stiffened sufficiently, approximately two-thirds of the material for required coverage shall be applied to the surface by a method that ensures even coverage without segregation. Floating shall be started immediately; and after the abrasive material has been embedded, the remainder of the material shall be evenly applied at right angles to the first application. A second floating shall follow immediately, after which, the operation shall be completed by steel troweling.)

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<sup>1</sup>Include as required.

<sup>2</sup>Include only for roadway slabs of bridge decks that will be covered with a sealant.

<sup>3</sup>Include only for roadway slabs of bridge decks that will not be covered with a sealant.