National Bureau of Standards

REPORT

A team of June 25, 1954 (Reference 1,283) view of the Commercial Building in Louisville, Kentucky, requested a field examination and advice by National Bureau of Standards for examination relative to the extent of cracking and scaling required to maintain ten-hour fire rating of a recent fire resistant perlite-gypsum concrete roof deck at the Kentucky A. P. S. Battery, Mullin, Ky. The examination reported on began at 2 P.M. on June 25 with Mr. A. W. Goodwin, Ass. Engineer, W. R. F. Meteor, Resident Engineer, James E. Peterson, Ass. Engineer, and P. W. Hartman from the N.C. Louisville district present. A lift track with suitable facilities and ladder was available and a detailed examination of nine roof sections was made from the platform provided. Sections of the perlite-gypsum concrete were taken from one of the rooves which were showing signs of disintegration.

It was evident from the materials observed that an excessively wet mix of gypsum and valued perlite aggregate had been depleted in the form for the deck slab. The proportions of the dry were re-amounted. To ensure adequate proportion of gypsum from the mix two sheets by a layer of gypsum with little aggregate, while above this layer was a region with increasing proportion of perlite with increased distance from the bottom of the deck slab. There was also evidence that in some places the mixing operation had not been properly done as shown by nodules of gypsum without perlite.

About 32 panels were reported to have cracks and had been marked with marks for attention. Many others had about amounts of cracking. Without making a test that survey, it was estimated that about 75 to 85 panels would need some repairs. About 55 of the panels were reported to be in need of major repair or amount of the broken concrete condition and poor quality of the gypsum concrete.

The panels which have few cracks and the gypsum concrete of which is of reasonably good quality can be repaired by making 1/4-in. deep horizontal grooves along the crack and filling the grooves with gypsum plaster. Cracks less than 1/16-in. wide do not require grooving and filling. The panels which have signs of disintegration of the gypsum concrete require more extensive repair than the grooving and filling of the cracks.
Inasmuch as many of the older cracks are either below or alongside of the base, it is recommended that the grooving of the crack be deep enough to expose some of the wire fabric casing which encased the bottom flanges of the base iron. This would permit the latter filling the crack to engage the wire casing in a manner to support the fire-resistant of the submarine.

A method for the repair of panels which show signs of disintegration is suggested by the sketch hereon. Holes would be drilled into the slabs from below at 16 in. centers so as to expose main strands of the wire fabric reinforcement. No. 16 gage galvanized wire would be doubled and looped over the strands of the reinforcement, or in lieu of ties No. 12 gage wire hooks. Two-by-two-in. mesh wire fabric would be tied to the soffit of the damaged slabs and furred down at least 1/2 inch to provide for embedment of the wire fabric in plaster. Three fourths inch thick setted gypsum plaster applied to the bottom of the deck slab, when so reinforced by wire fabric, will be sufficient to support the vermicrete gypsum concrete and provide cover to the base iron to give two-hour rating for the assembly. The plaster mix should be 1 part gypsum cement extra fibred to 2 parts by weight of clean sharp sand. The scratch coat should be applied as thick as will adhere. The second coat should be applied as soon as it will stay in place, preferably before the scratch coat has set and given a sand float finish.

It is suggested that the vermicrete-gypsum concrete of the rear deck be dried until it contain not to exceed 10 percent by weight of free water before repairs are begun. The drying might be expedited by the use of artificial heat and mechanical air circulation. Precautions must be taken to prevent the temperature at automatic sprinklers exceeding 110°F at any time and should not exceed 100°F for any extended number of days. If blasts of steam air from heating equipment are to be directed towards sprinklers, the ratings of such sprinklers should be intermediate (210°F) or hard (300°F).

U.S. N. W.

W. A. Mitchell, Consultant
National Bureau of Standards

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Built-up Roofing in Place

Double #18 Ga. Wire Ties 16" O.C. to Fabric

2" by 2" Mesh Galv. Wire Fabric

4'x6' Flat Sheets

3/4" Gypsum Plaster

1/8" from Bottom of Slab

Suggested Method for Repair of Roof Slab

Gentile Air Force Base

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