



Fig. 2. Union of specimens of old and new concrete. a) Surface not treated; b) surface scored; c) surface scored and covered with mortar; d) surface brushed 4 h after compaction; e) surface brushed 4 h after compaction and covered with mortar.

of the hardening of concrete at low temperatures and does not affect the end results.

The test data are confirmed also by the character of fracture of the composite beam (Fig. 2). The least data on cohesion were obtained for a joint where the surface of the old concrete was not treated. The character of such fracture of the specimen also indicates union of the old and new concrete, i.e., the fracture occurred along the contact plane. The best results were obtained for specimens where the surface of the old concrete was brushed 4 h after compaction. The character of the fracture of this specimen indicates good union of the concrete in the contact zone. A good union occurred also for the brushed surface covered with mortar, which is also confirmed by the test data (Fig. 2).

On analyzing the character of the concrete fractures presented in Fig. 2 only for temperature  $-10^{\circ}$  we see that the use of brushing for treating the surface of the old concrete gives better results than the use of scoring. It is explained by the creation of a better developed contact surface with a greater area by a brush than in the case of using scoring.

#### CONCLUSIONS

1. Cohesion in the working joint of a monolithic structure when pouring concrete on a frozen foundation can be provided by using an addition of sodium nitrite to the concrete.
2. The magnitude of cohesion in the joint at negative temperatures is within approximately the same strength limits of a monolith as at positive temperatures and depends on the type of preparation of the foundation and methods of treating the joint.
3. The use of brushing of the surface of freshly-poured concrete during its setting period gives better results with respect to cohesion of concretes than the use of scoring.
4. Data from the laboratory experiments indicate the expediency of using the method of pouring concrete with sodium nitrite on a frozen concrete foundation at individual installations.

#### LITERATURE CITED

1. Provisional Instructions on Winter Concreting without Heating Foundations at Hydraulic Construction Projects in the Far North, VU-4-70 [in Russian], Informénergo, Moscow (1971).
2. B. V. Mikhailov and V. N. Lemekhov, "Thermal regime and quality of block joining when pouring concrete on an unheated concrete foundation," Beton Zhelezobeton, No. 10 (1959).
3. K. Dorsh, Hardening and Corrosion of Cements [in Russian], Stroiizdat, Moscow (1966).

#### ERRATA

In the journal Hydrotechnical Construction, No. 10, third line from the top should be: "...thirteen locks and ..."