

## TECHNOLOGY OF CHEMICAL FIXATION OF ANCHOR FASTENERS

### USING ACRYLIC COMPOSITIONS

**Zolotova Nina**

*Ph.D. in Engineering, Associate Professor O.M. Beketov National University of Urban Economy in Kharkiv: Ukraine, orcid.org/0000-0002-1802-8584 (indicate your number, if not - delete the line) Kharkiv, str. Chornoglazivska 17, 61002.*

**Suprun Oleh**

*orcid.org/0000-0003-1259-4769 Ph.D. O.M. Beketov National University of Urban Economy in Kharkiv: Ukraine, Kharkiv, str. Chornoglazivska 17, 61002.*

**Anatoliy Onyskiv**

*Student O.M. Beketov National University of Urban Economy in Kharkiv: Ukraine, Kharkiv, str. Chornoglazivska 17, 61002.*

**Annotation.** This study is devoted to analysing the effectiveness of using acrylic compositions for anchor connections. The compositions under study, developed by specialists at the O.M. Beketov National University of Urban Economy in Kharkiv, demonstrate high performance properties. The main focus is on the technological aspects of using these compositions during anchor installation.

**Keywords:** construction, reconstruction, acrylic adhesive, concrete, anchor bolt, adhesive materials.

### Introduction

The introduction of advanced anchor bolt connection designs is crucial for optimising construction and installation work and the reconstruction of industrial facilities. These innovative systems significantly increase the strength of connections while reducing labour and material costs, duration and overall project costs.

The latest anchor solutions have significant advantages over traditional methods. They simplify and speed up the design of foundations, reduce the labour intensity and installation time of anchors, which in turn speeds up the installation of equipment. In addition, these technologies make it possible to erect foundations in a short time, even before the equipment itself arrives at the site. This ensures flexibility and efficiency at all stages of the construction process. [2,4,5].

When concreting monolithic structures, anchor bolts are installed directly into the liquid concrete mixture. After cement hydration, chemical bonding (adhesion) occurs between the cement gel and the metal surface, creating a monolithic connection. Friction forces resulting from concrete shrinkage around the rod, as well as the resistance of concrete to shear and crushing, also play an important role.

The load-bearing capacity of anchor bolts in concrete structures is ensured by two main mechanisms: adhesion and mechanical engagement.

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### **Statement and solution of the problem.**

For anchoring in existing reinforced concrete structures, where bolts are installed in pre-drilled holes, intermediate materials must be used. These materials must ensure high adhesion to both the anchor metal and the concrete base, as well as have significant shear strength. Special polymer adhesives are ideal for this purpose. In particular, acrylic adhesives developed at the O.M. Beketov National University of Urban Economy in Kharkiv demonstrate significant potential and are distinguished by their high performance characteristics. [1-3].

Acrylic adhesives are highly technological and easy to use. Thanks to their low-component composition, their preparation does not require complex procedures.

The low-component composition of acrylic eco-composites guarantees minimal preparation time for the working mixture. This significantly reduces the time between operations. The high fluidity of the adhesive ensures rapid filling of cavities in the opening, which speeds up the fixing process. In addition, the absence of complex equipment reduces the number of personnel involved in installation work.

These adhesives are characterised by low viscosity, which ensures high fluidity and effective filling of cavities. The polymerisation time is 12-24 hours, which allows you to optimise the work process.

The adhesives have high fillability, which does not reduce their strength. They can be used at ambient temperatures down to -20°C, eliminating the need for additional heating and simplifying technological processes in low-temperature conditions.

Given the above, there was a need to develop a technology for installing anchor bolts using acrylic adhesives. [6].

## Technology for installing smooth anchor bolts

The installation of smooth anchor bolts using acrylic adhesives is carried out in a clear sequence of steps. This technology ensures high precision and efficiency of work.

### Stages of installation:

1. Preparatory work: First, the mounting locations are marked, after which holes of the required diameter and depth are drilled.

2. Fixing to the equipment: Anchor bolts are attached directly to the supporting parts of the equipment.

3. Positioning the equipment: The equipment is installed in the design position, with the anchor bolts entering the prepared holes.

4. Filling with adhesive: After final installation and precise alignment of the equipment, an acrylic composition is poured into the holes.

5. Completion of fixation: After the adhesive has completely hardened (polymerised), the anchor bolts are tightened to ensure a strong and reliable connection.

When developing the technology for installing anchor fasteners, the main focus was on bolts with diameters ranging from 16 to 56 mm. This range was chosen because it is the most common for fastening industrial equipment, building structures and engineering communications.

**Conclusions:** The use of acrylic adhesives for anchor installation significantly optimises construction processes. This is achieved through a number of factors that increase productivity and reduce costs. Unlike traditional mechanical anchors, which require complex equipment and precise calibration, acrylic compositions do not require additional mechanical devices for expansion. The installation process boils down to preparing the hole, applying the adhesive, and fixing the anchor. This eliminates the risk of damage to the base and simplifies the technological sequence.

Thanks to these advantages, overall labour productivity during anchor installation increases significantly. The simplicity of the technology, the lack of need for highly specialised equipment, and the reduction in preparation time allow more work to be done in less time. This is especially important for large-scale construction projects where every minute counts.

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