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Standard Terminology for Anchors and Fasteners in Concrete and Masonry¹

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1. Scope

1.1 This terminology covers standard terminology for anchors and fasteners installed in structural members made of concrete or masonry.

1.2 This terminology does not cover terms relating to the mechanical properties of the materials used for fabricating anchors, nor does it cover their use.

1.3 The terms are listed alphabetically. Compound terms appear in the natural spoken order.

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Terminology

adhesive anchor, *n*—anchor placed into a hole in the base material, and which derives its holding strength from a chemical adhesive placed between the wall of the hole in the base material and the embedded portion of the anchor.

allowable load, *n*—capacity assigned to an anchor in accordance with allowable-stress design procedures.

anchor, *n*—cast-in-place or post-installed fastening device installed in the base material for the purpose of transferring loads to the base material.

anchor loading: axial, *n*—load applied concentrically with the anchor longitudinal axis.

anchor loading: bending, *n*—flexure induced in the anchor by application of a shear load at a distance from the surface of the base material.

anchor loading: combined, *n*—axial and shear loading applied simultaneously (oblique loading).

¹ This terminology is under the jurisdiction of ASTM Committee E06 on Performance of Buildings and is the direct responsibility of Subcommittee E06.13 on Structural Performance of Connections in Building Construction.

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anchor loading: shear, *n*—load applied parallel to the surface of the base material and perpendicular to the anchor's longitudinal axis.

anchor spacing, *n*—distance between anchors measured centerline to centerline.

attachment, *n*—structural element (fixture) external to the surface of the base material, and which transmits loads to the anchor.

base material, *n*—material in which anchor is installed, such as concrete or masonry.

bond failure, *n*—failure mode characterized by loss of bond either between the anchor and adhesive or between the adhesive and the base material.

breakout failure, *n*—anchor failure mode characterized by cone failure or edge failure.

cast-in-place anchor, *n*—anchor installed in formwork prior to placement of concrete.

characteristic value, *n*—the 5 % fractile (value with a 95 % probability of being exceeded, with a confidence of 90 %).

clamping force, *n*—compression force transmitted to the base material as a result of preload in the anchor.

closed crack, *n*—condition of a crack in an unloaded test member. See **hairline crack**.

concrete batch, *n*—a mixture of specific amounts of cement, fine and coarse aggregate, water, and when utilized, admixtures, prepared and placed at a specific time and cured in a specific manner.

confined tension test, *n*—test setup such that the reaction force is transferred into the base material in close proximity to the anchor to force a specific type of failure mode.

connection, *n*—attachment of load-bearing element to concrete or masonry base materials using anchors.

cracked concrete, *n*—for testing purposes, a test member having one or more cracks, each of which is approximately uniform in width through the depth of the member.

DISCUSSION—Only one crack is permitted in the area of influence of the test anchor.

critical edge distance, *n*—minimum anchor edge distance, measured from the anchor centerline to the edge of the member, at which the full anchor capacity can be obtained without edge breakout failure or splitting failure.

critical spacing, *n*—minimum anchor spacing, measured centerline to centerline of the anchors, at which the full anchor capacity can be obtained without influence from adjacent anchors.

cure time, *n*—the length of time required for a grouted anchor or an adhesive-bonded anchor to develop its specified strength.

diamond core bit, *n*—non-percussion drill bit, usually utilizing a hollow cylindrical pipe or tube with a diamond-impregnated matrix at the end that is used to drill in the base material.

displacement, *n*—movement of anchor relative to the structural member.

DISCUSSION—For tension tests, displacement is measured parallel to the anchor axis; for shear tests, displacement is measured perpendicular to the anchor axis.

displacement-controlled expansion anchor, *n*—a post-installed anchor that derives its holding strength by expansion against the side of the drilled hole through movement of an internal plug in the sleeve or through movement of the sleeve over an expansion element (plug). Once set, the anchor does not expand further under load.

drill, *n*—electric-, hydraulic-, or air-powered tool for boring holes into the base material, using rotary action, often supplemented by percussion or hammering.

drill bit, *n*—solid-shaft, carbide-tipped bit, usually with spiral flutes, used to drill holes in the base material.

edge distance, *n*—perpendicular distance from the centerline of the anchor to the edge of the structural member in which anchor is installed.

effective embedment depth, *n*—the overall depth through which the anchor transfers force to or from the surrounding base material, measured from the surface: for adhesive-bonded anchors measured to the deepest point of the anchor; for cast-in-place anchors measured to the upper surface of the direct bearing element; for undercut and sleeve anchors measured to the bottom of the expansion mechanism; for expansion anchors measured to the farthest point of contact between the expansion mechanism and surrounding material.

elongation, *n*—increase in length of the anchor under loading resulting from axial strain of the anchor material.

embedment depth, *n*—distance measured from the surface of the base material to the farthest point of the embedded end of the anchor. For torque-controlled expansion anchors, the measurement is performed before torque is applied.

expansion anchor, *n*—post-installed anchor that derives its capacity predominately from frictional forces generated by mechanical expansion of the anchor against sides of hole.

expansion sleeve, *n*—outer part of expansion anchor, which is forced outward by its center part as a result of applied torque or impact, to bear against the sides of the predrilled hole.

failure mode, *n*—failure mechanism during load application to anchor.

fastener, *n*—see **anchor**.

fatigue test, *n*—test involving repeated loading cycles, usually in excess of 2×10^6 cycles.

fixture, *n*—see **attachment**.

flush installation, *n*—anchor that is installed so that its top is flush with the surface of the structural member and does not protrude beyond the surface.

follow-up expansion, *n*—movement of an expansion anchor during tension loading, whereby the expansion sleeve remains stationary and further expands as the anchor body moves axially in response to the load application.

gel time, *n*—the time after mixing at which an adhesive begins to increase in viscosity and becomes resistant to flow.

grout, *n*—pourable mixture of a cementitious or polymeric binder and water, possibly also containing fine aggregates, coarse aggregates, or both.

grouted anchor, *n*—anchor installed in the base material using grout.

hairline crack, *n*—a crack in an unloaded test member resulting from tension loading of the member.

DISCUSSION—Hairline cracks in test members are required for qualification testing of anchor systems where anchors are installed in hairline cracks. They are created by loading a test member in tension to create a crack and then removing the tension which results in the crack closing to hairline width.

insert, *n*—pre-designed and prefabricated cast-in-place or post-installed anchors specifically designed for the attachment of bolted or slotted connections.

installation torque, *n*—specified torque applied to an anchor during its installation.

linear variable differential transformer (LVDT), *n*—a device for measuring movements that utilize a sliding core within a variable magnetic field.

DISCUSSION—Some units are powered with alternating current and require external modulators, while others are powered with direct current and have built-in modulators.

load-controlled undercut anchor, *n*—a post-installed anchor that derives its tensile holding strength by the mechanical interlock provided by installing the anchor by tensioning, which causes the sleeve to expand into the predrilled undercut.

Manufacturer's Printed Installation Instructions (MPII), *n*—instructions for correct anchor installation under all covered installation conditions as approved and supplied in product packaging by the manufacturer of the anchor system.