



ANCHORS & FASTENERS

DEWALT
701 East Joppa Road
Towson, MD 21286
P: (800) 524-3244
www.DEWALTanchors.com

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PURE220+™ Adhesive Anchoring System and Installations into Oversized Drilled Holes

ACI 318 (-19 and -14, Chapter 17) and by reference to the 2024, 2021, 2018 or 2015 IBC respectively, requires that adhesive anchors for concrete be tested and qualified with drill hole specifications for each anchor diameter. This is because the size of the drilled hole in concrete can influence the bond strength of installed adhesive anchors.

However, there are cases where an allowance for oversizing the drill hole is desirable (e.g. repairing existing anchorage in the same location, anchor placement tolerances, ability for final adjustment of the anchoring points, unintentional mistakes). The ACI qualification standard for adhesive anchors also includes provisions for oversized drill hole specifications provided testing is conducted to determine effects of increasing the annular gap between the threaded rod or reinforcing bar and the drilled hole.

Previously, DEWALT published bond strengths for PURE220+ adhesive anchors that are based on typical standard drill hole specifications that are nominally 1/16-inch to 3/8-inch larger than the threaded rod or reinforcing bar, depending on the steel element anchor diameter (the table below is provided for baseline reference):

Typical Standard Drill Holes	Nominal common threaded rod / reinforcing bar sizes																								
	3/8"	#3	10M	1/2"	#4	5/8"	#5	15M	3/4"	#6	7/8"	#7	20M	1"	#8	25M	1 1/8"	#9	1 1/4"	#10	30M	1 3/8"	1 1/2"	#11	35M
Nominal drill bit size (in.)	7/16	1/2	9/16	9/16	5/8	11/16	3/4	3/4	7/8	7/8	1	1	1	1 1/8	1 1/8	1 1/4	1 3/8	1 3/8	1 3/8	1 1/2	1 1/2	1 1/2	1 3/4	1 3/4	1 3/4

Fortunately, additional drill hole specifications are now available for end users as DEWALT has conducted supplemental laboratory testing on PURE220+ adhesive anchors installed in holes approximately 150% larger than the nominal size of the threaded rod or reinforcing bar.

The table below provides the results of testing the adhesive anchor system in oversized holes compared with typical standard drilled holes and published hole cleaning instructions. The corresponding supplemental reduction factor derived from oversized drill hole testing is provided for guidance in the table below. Where applicable, these modification factors must be applied when calculating the bond strength capacity for the given adhesive anchor and relevant conditions.

Oversized Drill Holes (maximum sizes)	Nominal common threaded rod / reinforcing bar sizes																							
	3/8"	#3	10M	1/2"	#4	5/8"	#5	15M	3/4"	#6	7/8"	#7	20M	1"	#8	25M	1 1/8"	#9	1 1/4"	#10	30M	1 3/8"	1 1/2"	#11
Nominal drill bit size (in.)	9/16	9/16	11/16	3/4	3/4	7/8	7/8	7/8	1 1/8	1 1/8	1 1/4	1 1/4	1 1/4	1 1/2	1 1/2	1 5/8	1 5/8	1 3/4	1 3/4	1 3/4	1 7/8	2	2	2
Modification factor, <i>K_{oh}</i>	0.85	1.0	1.0	0.85	1.0	0.85	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.85	0.85	1.0	0.85	1.0	0.85	0.85	0.85	0.85	0.85

1. Results shown are based on tension tests conducted in accordance with ACI 355.4/ASTM E488 in dry uncracked normal weight concrete.
2. Holes were drilled and cleaned with a hammer-drill and standard carbide drill bit following published instructions for the [PURE220+ adhesive anchor system](#). For holes drilled using hammer-drilling, hollow drill bits (DEWALT DustX+ System) may be considered, as applicable. Holes drilled with a core-drill and diamond core bit may also be considered using this guidance (see performance data for anchors in diamond cored holes).
3. For anchor sizes larger than 1-inch (25 mm) the suggested maximum hole oversize is 1/2-inch (13 mm) larger than the nominal rod or rebar size.
4. Standard carbide drill bits and hollow drill bits must meet the requirements of ANSI B212.15; ANSI compliance for carbide bits is required by [ICC-ES ESR-5144](#).
5. See published literature for the specific adhesive anchor system for additional design and installation information which is available at [anchors.DEWALT.com](#).
6. The bond strength reduction factor for oversized drill holes, as applicable, is a supplement to all other relevant design considerations and requirements for the specific application.

PURE220+ adhesive anchors will achieve published design strengths for short-term loading conditions (e.g. seismic and wind loading) when the product is properly installed into oversized holes drilled in dry concrete. The adhesive anchors must be installed in accordance with all other published installation instructions specific to the application and conditions of the connection.