

SCREW ANCHOR (SACH) MECHANICAL ANCHORS

Screw Anchor for temporary or permanent attachment to cracked and uncracked concrete

SIZES: 3/8" - 3/4"

CODES: IBC, FL, LA

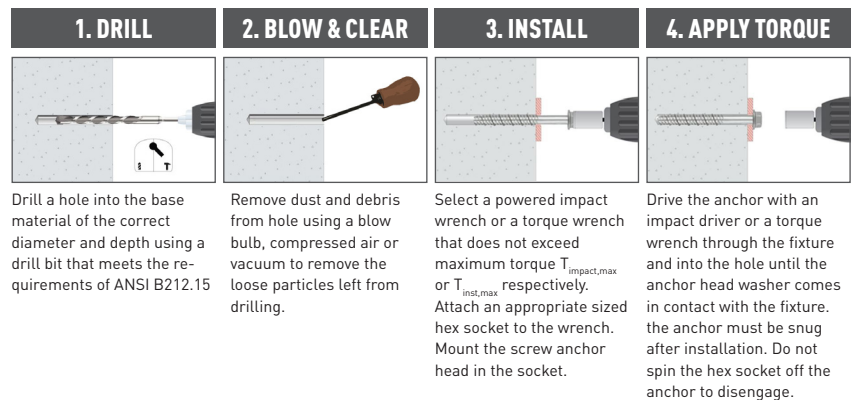
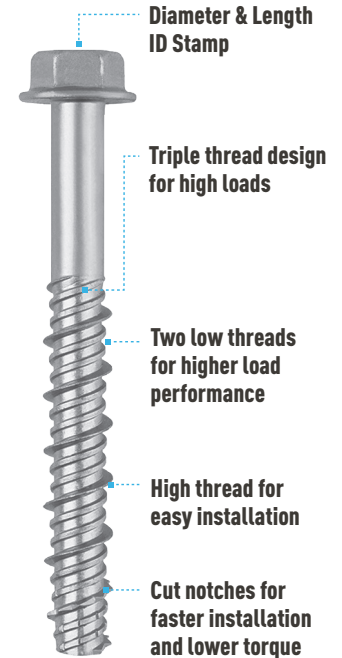
DRILL CONDITIONS: Dry

BENEFITS:

- No special drill bit required; install using standard-sized ANSI tolerance drill bits
- Code evaluated to IBC/IRC in accordance with ICC-ES AC193 and ACI 355.2 for cracked and uncracked concrete
- Approved for use in wind and seismic applications
- Fully removable for temporary anchoring or applications where fixtures may need to be moved (e.g. formwork, bracing)
- Suitable for closer edge distance or tight spacing applications

APPLICATIONS

- Structural fixings in cracked and uncracked concrete
- Formwork and fixing
- Racking and shelving
- Attaching railings, handrails, ledgers and sill plates
- Fixings of steel beams, channels, boilers, signals, stadium seatings, façade substructures, etc.



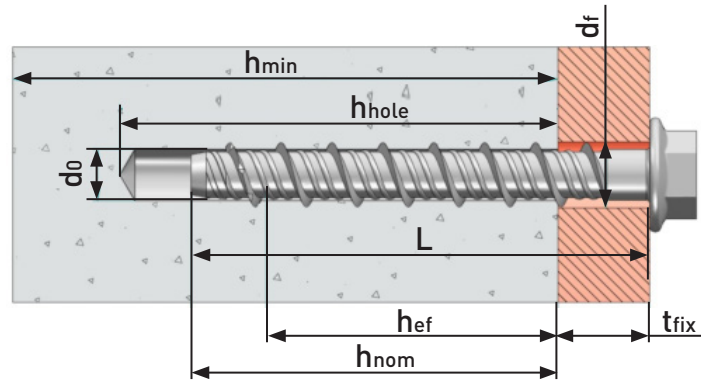
ESR-4419 provides design information for load factor and characteristic resistance (LRFD), however allowable stress design (ASD) is still in use by some users. Translation of LRFD to ASD values is possible, however it is dependent on the levels of dead load and live load. Dead load is defined in the ACI 318 Building Code Requirements for Structural Concrete as "the weights of members, supported structure and permanent attachments that are likely to be present on a structure in service". Live load is defined in ACI 318-14 as "load that is not permanently applied to a structure, but is likely to occur during the service life of the structure (excluding environmental loads)". Examples of live loads are traffic on a walkway and non permanent loads associated with usage of a structure. Live load values are stipulated in the building code for various loading conditions and parts of structures.

To facilitate the translation of LRFD characteristic values to ASD values, a scenario of dead load and live load level is used to conservatively address the most common application as follows: 30% dead load; 70% live load. ACI 318-14 Equation (5.3.1b) provides a conversion factor of 1.48 which is divided into the LRFD characteristic resistances and multiplied by a Φ factor (according to the failure type) to determine an equivalent ASD load.

It is the responsibility of the user to select the appropriate ASD values based on the example loadings shown in this document or alternative dead versus live loading that may be applicable to the specific design.

The ASD values are provided in the following tables for tension and shear for different concrete strengths. Other installation and design provisions in ESR-4419 must be followed.

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Parameter	Symbol	Unit	Nominal Anchor Diameter							
			3/8"		1/2"		5/8"		3/4"	
Drill bit diameter	d_0	in (mm)	3/8 (9.5)	3/8 (9.5)	1/2 (12.7)	1/2 (12.7)	5/8 (15.9)	5/8 (15.9)	3/4 (19.1)	3/4 (19.1)
Nominal embedment depth ¹	h_{nom}	in (mm)	2-1/2 (64)	3-1/4 (83)	3 (76)	4-1/4 (108)	3-1/4 (83)	5 (127)	4 (102)	6-1/4 (159)
Effective embedment depth	h_{ef}	in (mm)	1.85 (47)	2.49 (63)	2.21 (56)	3.27 (83)	2.36 (60)	3.85 (98)	2.97 (75)	4.89 (124)
Minimum hole depth	h_{hole}	in (mm)	2-3/4 (70)	3-1/2 (89)	3-3/8 (86)	4-5/8 (117)	3-5/8 (92)	5-3/8 (137)	4-3/8 (111)	6-5/8 (168)
Maximum fixture clearance Hole diameter	d_f	in (mm)	1/2 (12.7)	1/2 (12.7)	5/8 (15.9)	5/8 (15.9)	3/4 (19.1)	3/4 (19.1)	7/8 (22.2)	7/8 (22.2)
Maximum installation torque	$T_{inst,max}$	ft lb (Nm)	35 (47)	50 (68)	45 (61)	65 (88)	85 (115)	100 (136)	115 (156)	150 (203)
Maximum impact wrench torque rating	$T_{impact,max}$	ft lb (Nm)	380 (515)	380 (515)	380 (515)	380 (515)	380 (515)	380 (515)	380 (515)	380 (515)
Minimum concrete thickness	h_{min}	in (mm)	4 (102)	4-3/4 (121)	4-3/4 (121)	6-3/4 (171)	5 (127)	7 (178)	6 (152)	8-1/8 (206)
Critical edge distance	c_{ac}	in (mm)	4 (102)	5 (127)	4-1/2 (114)	5 (127)	3-3/4 (95)	7 (178)	4-1/2 (114)	8 (203)
Minimum edge distance	c_{min}	in (mm)	1-1/2 (38)	1-1/2 (38)	1-3/4 (44)	1-3/4 (44)	1-3/4 (44)	1-3/4 (44)	1-3/4 (44)	1-3/4 (44)
Minimum spacing	s_{min}	in (mm)	3 (76)	3 (76)	3 (76)	3 (76)	4 (102)	4 (102)	4 (102)	4 (102)
Minimum overall anchor length ²	l_{anch}	in (mm)	2-3/4 (70)	3-1/2 (89)	3-1/4 (82)	4-1/2 (114)	3-1/2 (89)	5-1/4 (133)	4-1/4 (108)	6-1/2 (165)
Torque wrench size	S_w	in	9/16	9/16	3/4	3/4	15/16	15/16	1-1/8	1-1/8
Maximum fixture thickness ⁶	t_{fix}	in (mm)	L-2.5 (L-64)	L-3.25 (L-83)	L-3 (L-76)	L-4.25 (L-108)	L-3.25 (L-83)	L-5 (L-127)	L-4 (L-102)	L-6.25 (L-159)

- 1) The embedment depth, h_{nom} , is measured from the outside surface of the concrete member to the embedded end of the anchor.
- 2) The listed minimum overall anchor length is based on anchor sizes commercially available at the time of publication compared with the requirements to achieve the minimum nominal embedment depth and possible fixture attachment.
- 3) Caution: holes in metal fixtures to be mounted should match the diameter specified in the table below.
- 4) Caution: oversized holes in base material will reduce or eliminate the mechanical interlock of the threads with the base material and reduce the anchor's load capacity
- 5) Caution: reuse of the anchor to achieve listed load values is not recommended
- 6) "L" is the length of the anchor; i.e. SACH12600-EXT has a length of 6".

Customer Service & Technical Assistance

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CRACKED CONCRETE

Nominal anchor diameter (in)	Nominal embed. H _{nom} (in)	Minimum Concrete Compressive Strength									
		f _c = 2,500 psi		f _c = 3,000 psi		f _c = 4,000 psi		f _c = 6,000 psi		f _c = 8,000 psi	
		T _{allowable ASD} Tension (lb)	V _{allowable ASD} Shear (lb)	T _{allowable ASD} Tension (lb)	V _{allowable ASD} Shear (lb)	T _{allowable ASD} Tension (lb)	V _{allowable ASD} Shear (lb)	T _{allowable ASD} Tension (lb)	V _{allowable ASD} Shear (lb)	T _{allowable ASD} Tension (lb)	V _{allowable ASD} Shear (lb)
3/8	2-1/2	939	1,012	1,029	1,108	1,188	1,280	1,455	1,567	1,680	1,810
	3-1/4	1,467	1,580	1,607	1,730	1,855	1,965	2,272	1,965	2,624	1,965
1/2	3	1,415	1,632	1,461	1,787	1,537	2,064	1,650	2,528	1,735	2,919
	4-1/4	2,207	3,779	2,418	3,779	2,792	3,779	3,420	3,779	3,949	3,779
5/8	3-1/4	1,353	1,458	1,483	1,597	1,712	1,844	2,097	2,258	2,421	2,607
	5	2,820	5,163	3,089	5,163	3,587	5,163	4,369	5,163	5,045	5,163
3/4	4	1,911	4,115	2,093	4,508	2,417	5,206	2,960	5,772	3,418	5,772
	6-1/4	4,037	5,772	4,422	5,772	5,106	5,772	6,254	5,772	7,221	5,772

- 1) Allowable load values are calculated using a conversion factor, α, from factored design strengths.
- 2) Tabulated allowable load values assume 30% dead load and 70% live load, with controlling load combination 1.2D + 1.6L.
Calculated weighted average for the conversion factor, α = 1.2*(0.3) + 1.6*(0.7) = 1.48.

UN-CRACKED CONCRETE

Nominal anchor diameter (in)	Nominal embed. H _{nom} (in)	Minimum Concrete Compressive Strength									
		f _c = 2,500 psi		f _c = 3,000 psi		f _c = 4,000 psi		f _c = 6,000 psi		f _c = 8,000 psi	
		T _{allowable ASD} Tension (lb)	V _{allowable ASD} Shear (lb)	T _{allowable ASD} Tension (lb)	V _{allowable ASD} Shear (lb)	T _{allowable ASD} Tension (lb)	V _{allowable ASD} Shear (lb)	T _{allowable ASD} Tension (lb)	V _{allowable ASD} Shear (lb)	T _{allowable ASD} Tension (lb)	V _{allowable ASD} Shear (lb)
3/8	2-1/2	1,492	1,607	1,634	1,760	1,887	1,953	2,311	2,116	2,669	1,953
	3-1/4	2,330	1,965	2,552	1,965	2,947	1,965	3,609	1,965	4,167	1,965
1/2	3	1,948	2,098	2,134	2,298	2,464	2,653	3,018	2,947	3,485	2,947
	4-1/4	3,116	3,799	3,414	3,799	3,942	3,799	4,828	3,799	5,575	3,799
5/8	3-1/4	1,911	2,058	2,093	2,254	2,417	2,603	2,960	3,188	3,418	3,681
	5	3,981	5,165	4,361	5,165	5,036	5,165	6,168	5,165	7,122	5,165
3/4	4	2,698	5,772	2,955	5,772	3,412	5,772	4,179	5,772	4,826	5,772
	6-1/4	5,699	5,772	6,243	5,772	7,209	5,772	8,829	5,772	10,195	5,772

- 1) Allowable load values are calculated using a conversion factor, α, from factored design strengths.
- 2) Tabulated allowable load values assume 30% dead load and 70% live load, with controlling load combination 1.2D + 1.6L.
Calculated weighted average for the conversion factor, α = 1.2*(0.3) + 1.6*(0.7) = 1.48.

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