

Summary of Specifications, Codes, Design Values permitted, allowed Structures, and Restrictions for High Strength Steel Rebars Grade 100 [690] for concrete reinforcement

Product	DYWIDAG Grade 100 Threadbars	SAS Stressteel Grade 97 Threadbars	ASTM A615 Grade 100	ChromX® - 100ksi
<b>ASTM Standard</b>	No ASTM standard as Reinforcing Bar	No ASTM standard as a Reinforcing Bar	ASTM A615	ASTM A1035 CS & CM
<b>ICC ESR Report #</b>	ICC ESR 3367 *	ICC ESR 1163	No ICC ESR REPORT	ICC ESR 2107
<b>ICC AC Report #</b>	ICC AC 237	ICC AC 237	No ICC AC Report	ICC AC 429
<b>NYC Bulletin #</b>	No Bulletin	2016-001	No Bulletin	2015-036
<b>ICC Acceptance Approval Basis</b>	Based on AC 237 approved February 2015	Based on AC237 approved February 2015	No Acceptance Criteria	Based on AC429 approved May 2017
<b>Applicable Design Code</b>	ACI 318 -14 with ICC ESR 3367 Modifications	ACI 318 -11 with ICC ESR 1163 Modifications	ACI 318-19	ACI 318-19 ACI 318 -08, ACI 318-11 and ACI 318-14 as modified by ICC ESR 2107
<b>Permitted Seismic Design Categories (SDC)</b>	Structural elements in SDC A and B only except beams and slabs. Shall not be used in SDC C, D, E, and F	Structural elements in SDC A and B only except beams and slabs. Shall not be used in SDC C, D, E, and F	ACI 318-19	All structural elements of SDC A, B, and C. For SDC D, E, and F, limited to slab systems, foundations and structural components not designated as part of the seismic force-resisting system.
<b>Design Values</b>				
<b>f<sub>y</sub> for tension</b>	f <sub>y</sub> can be used as per AC 237 up to 100 ksi	80 ksi < f <sub>y</sub> ≤ 100 ksi	100 ksi per ACI 318-19	100 ksi
<b>f<sub>y</sub> for compression</b>		80 ksi < f <sub>y</sub> ≤ 100 ksi	80 ksi per ACI 318-19	80 ksi per ACI 318-19 Up to 100 ksi per ICC AC 429
<b>f<sub>y</sub> for shear</b>	60 ksi	60 ksi	60 ksi as per ACI 318-19	60 ksi per ACI 318-19 80 ksi per ICC AC 429
<b>f<sub>y</sub> for torsion</b>	60 ksi	60 ksi	60 ksi	60 ksi
<b>f<sub>y</sub> for lateral support to longitudinal steel and confinement by spirals</b>	100 ksi	100 ksi	100 ksi (as per ACI 318)	100 ksi (as per ACI 318)
<b>f<sub>y</sub> for lateral support to longitudinal steel and confinement by non-spiral reinforcement</b>	80 ksi	80 ksi	100 ksi (as per ACI 318)	100 ksi (as per ACI 318)



Restrictions	Dywidag Grade 100 Threadbars	Sas Stressteel Grade 97 Threadbars	ASTM A615 Grade 100	ChromX® - 100ksi
<b>Specified compressive strength of concrete</b>	Must be in the range from 6 to 12 Ksi	Must be in the range from 6 to 12 ksi	As per ACI 318	Must be in the range from 4 to 16 ksi
<b>Permitted applications as reinforcement and limitations</b>	<ol style="list-style-type: none"> <li>1) Longitudinal reinforcement for resisting flexure, axial force and shrinkage and temperature</li> <li>2) Lateral support of longitudinal bars or confinement</li> <li>3) Shear reinforcement, including shear friction</li> <li>4) Torsional reinforcement (longitudinal and transverse)</li> <li>5) Must not be used in Beams or slabs</li> <li>6) AC237 is limited to uncoated reinforcement in normal-weight-concrete with no more than 12 in. of fresh concrete placed below horizontal bars.</li> <li>7) Shall not be used in buildings assigned to SDC C, D, E, or F.</li> </ol>	<ol style="list-style-type: none"> <li>1) Longitudinal reinforcement for resisting flexure, axial force and shrinkage and temperature</li> <li>2) Lateral support of longitudinal bars or confinement</li> <li>3) Shear reinforcement, including shear friction</li> <li>4) Torsional reinforcement (longitudinal and transverse)</li> <li>5) Shall not be used in Beams or Slabs</li> <li>6) AC237 is limited to uncoated reinforcement in normal-weight-concrete with no more than 12 in. of fresh concrete placed below horizontal bars.</li> <li>7) Shall not be used in buildings assigned to SDC C, E, or F.</li> </ol>	<ol style="list-style-type: none"> <li>1) Allowed to be used in Gravity loads as per ACI 318-19</li> <li>2) Allowed to be used as confinement reinforcement in columns of special moment frames and special shear wall boundary elements by ACI 318.</li> </ol> <p>* ASTM A615 NOTE 1—Grade 100 [690] reinforcing bars were introduced in this specification in 2015. In contrast to the lower grades, which have ratios of specified tensile strength to specified yield strength that range from 1.31 to 1.5, Grade 100 [690] reinforcing bars have a ratio of specified tensile strength to specified yield strength of 1.15. Designers should be aware that there will, therefore, be a lower margin of safety and reduced warning of failure following yielding when Grade 100 [690] bars are used in structural members where strength is governed by the tensile strength of the reinforcement, primarily in beams and slabs. If this is of concern, the purchaser has the option of specifying a minimum ratio of tensile strength to actual yield strength. Consensus design codes and specifications such as "Building Code Requirements for Structural Concrete (ACI 318)" may not recognize Grade 100 [690] reinforcing bars: therefore the 125 % of specified yield strength requirements in tension and compression are not applicable. Mechanical and welded splices should meet a minimum specified tensile strength of 115000 psi [790 MPa].</p>	<ol style="list-style-type: none"> <li>1) Allowed to be used in all gravity loads as per ACI 318-19.</li> <li>2) Allowed to be used as confinement reinforcement in columns of special moment frames and special shear wall boundary elements by ACI 318.</li> </ol>



Allowed Structural Elements	Dywidag Grade 100 Threadbars	Sas Stressteel Grade 97 Threadbars	ASTM A615 Grade 100	ChromX® - 100ksi
Beam	No	No	Yes	Yes
Column	Yes**	Yes**	Yes	Yes
Moment Frame	Columns only**	Columns only**	Yes up to 80 ksi	Yes**
Slab	No	No	Yes up to 80 ksi	Yes**
Wall (including boundary elements)	Yes**	Yes**	Yes up to 80 ksi	Yes**

\* ESR 3367 does not mention what fy stress to be used in Tension. Or compression. It is mentioned only in AC 237.

\*\* Only if it is not part of a special seismic system.



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