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ASTM A354 Quenched and tempered alloy bolts, studs, and other externally threaded fasteners.

ASTM A354 covers the chemical and mechanical requirements of quenched and tempered alloy steel bolts, studs, and other externally threaded fasteners 4" and under in diameter. Two strength levels, grades BC and BD are summarized below. This specification is unrestricted in its configuration and can be a headed bolt, bent bolt, or threaded rod.

A354 Grades

BD	Grade BD bolts are higher in strength than grade BC, and equal in strength to ASTM F3125 grade A490 bolts. Unlike A490 however, the A354 standard is unrestricted in its configuration. Also, since A490 bolts are for structural use and do not exceed 1-1/2" in diameter, A354 grade BD should be considered for anchor bolts, threaded rods, other styles of headed bolts, and bolts larger than 1-1/2" diameter where similar mechanical properties are desired. A354 grade BD does not require a magnetic particle test like A490, except when called out as a supplemental requirement.
BC	Lower in strength than BD. Should be considered in lieu of F3125 grade A325 bolts when configuration and size conflicts occur with A325 as described above for grade BD and A490 bolts.

A354 Mechanical Properties

Grade	Size	Tensile, ksi, min	Yield, ksi, min	Elong %, min	RA %, min	Hardness, HRC
BC	1/4 - 2-1/2	125min	10-	16	50	26-36
	Over 2-1/2	115min	99	16	45	22-33
BD	All Sizes	150-173	130	14	40	33-38

A354 Chemical Properties

Element	All sizes of Grade BC, Grade BD through 2-1/4" diameter.	Grade BD over 2-1/4"
Carbon, %	0.30 to 0.53	0.35 to 0.53
Manganese, % min	0.60	0.60
Phosphorus, % max	0.035	0.035
Sulfur, % max	0.040	0.040
Boron, % max	0.003	0.003
Nickel, % min		0.40
Chromium, % min		0.40
Molybdenum, % min		0.15
Other Alloying Elements	*	*

*steel is considered to be alloy when the maximum range given for manganese exceeds 1.65 % or a definite minimum quantity for any of the following elements is specified or required within the limits of the recognized field of constructional alloy steels: chromium, molybdenum, nickel, or any other alloying element added to obtain a desired alloying effect.

Additional Requirements, Grade BD, Diameters above 2-1/4"

Charpy Impact	20ft-lbs minimum @ -4F
Cross Sectional Hardness	Equidistant hardness readings shall be taken across the diameter of the fastener through the threaded section. Reading shall be no further apart than 1/4" . No reading shall be outside the acceptable range given above, and no reading shall be greater than +/- 3 HRC points from the average mid-radius hardness value.

A354 Recommended Hardware

Grade	Finish	Nut	Washer
BC	Plain	A563C Heavy Hex	F436
	Galvanized	A563DH Heavy Hex	F436
BD	All Finished	A563DH Heavy Hex	F436
* Nuts of other grades and styles having specified proof load stresses greater than the specified grade and style of nut are acceptable.			



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