

Shackles Types and Classification:

Shackle Type:

Designated the shape of the shackle: IVA (Anchor Shackle), IV B D or (Chain Shackles. This two shackle types are used for lifting and are covered by Fed Spec RR-271F. The Pin diameter is larger than the body diameter



Anchor Shackle IVA



D Shackle IVB

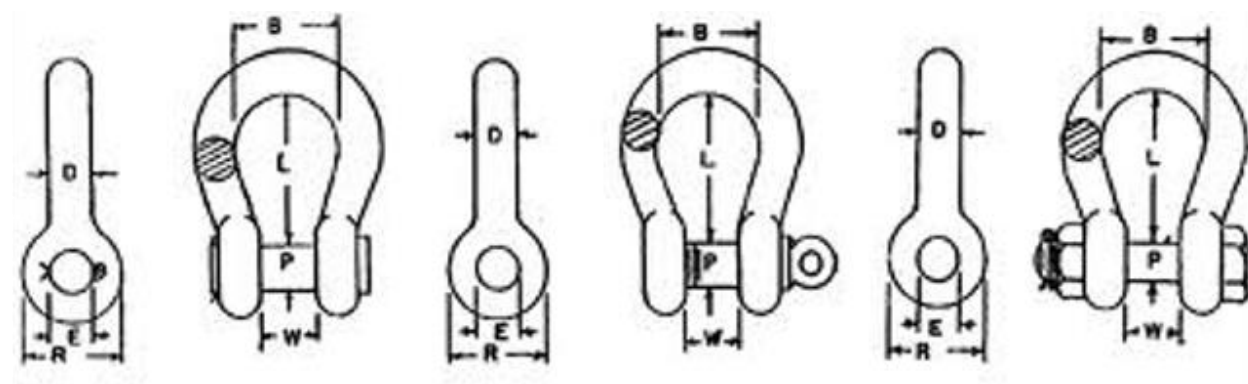
Bow Shackles: Have larger shackle body per given size and are often good for use on Bridles, usually available in Stainless Steel , are hard to find in Carbon Steel and we could not locate a heavy duty variety. The pin diameter is the same as the body diameter.



There many more shackle types, but these are the most commonly to be used in anchoring systems.

Shackle Class:

Designates the type of pin and pin to shackle body latching



Class 1 Round Pin and Cotter

Class 2 Screw Pin

Class 3 Bolt, Nut and Cotter Pin

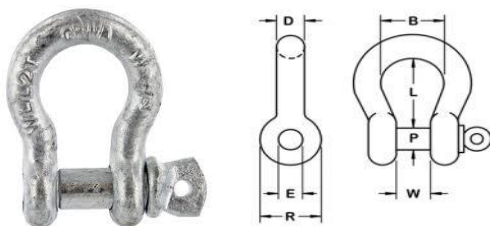
Shackle Grade:

Grade A	Regular	Carbon Steel	<ul style="list-style-type: none"> All reputable shackles should have: Size, Working Load Limit shown as permanent marking on body and pin
Grade B	Heavy Duty	Alloy Steel	<ul style="list-style-type: none"> Bodies and pins forged from alloy steel, heat treated and tempered to give greater strength and abrasion resistance Size, Working Load Limit and traceability codes shown as permanent marking on body and pin

Size	Working Load Limit (lbs)			Proof Load (lbs)		Ultimate Breaking Strength (lbs)	
	Grade A	Grade B	SS Bow shackle	Grade A	Grade B		
3/16	650	1,000		1,430	2,200	3,250	5,000
1/4	1,000	1,500	750	2,200	3,300	5,000	7,500
5/16	1,500	2,500	1000	3,300	5,500	7,500	12,500
3/8	2,000	4,000	1200	4,400	8,800	10,000	20,000
7/16	3,000	5,200	1500	6,600	11,440	15,000	26,000
1/2	4,000	6,600	2500	8,800	14,520	20,000	33,000
5/8	6,500	10,000	3000	14,300	22,000	32,500	50,000
3/4	9,500	14,000	4000	20,900	30,800	47,500	70,000
7/8	13,000	19,000	5000	28,600	41,800	65,000	95,000
1	17,000	25,000	6000	37,400	55,000	85,000	125,000

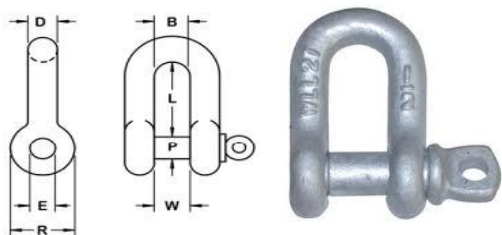
Shackle Dimensions: (inches)

Type IVA Shackle



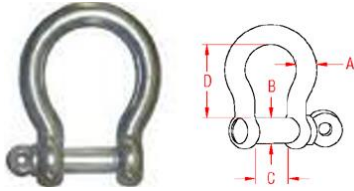
Size	D	P	E	W	L	B	R
3/16	0.18	0.240	0.312	0.375	0.750	0.562	0.625
1/4	0.24	0.300	0.406	0.469	0.875	0.75	0.875
5/16	0.30	0.365	0.469	0.531	1.031	0.812	1
3/8	0.36	0.430	0.531	0.656	1.125	0.938	1.125
7/16	0.42	0.490	0.594	0.750	1.438	1.062	1.25
1/2	0.48	0.610	0.719	0.812	1.625	1.188	1.375
5/8	0.59	0.730	0.844	1.062	2.000	1.5	1.875
3/4	0.71	0.850	0.969	1.250	2.375	1.75	2.125
7/8	0.83	0.980	1.094	1.438	2.812	2	2.375
1	0.95	1.100	1.219	1.688	3.188	2.312	2.625

Type IVB shackle



Size	D	P	E	W	L	B	R
3/16	0.18	0.240	0.297	0.375	0.875	0.562	0.625
1/4	0.24	0.300	0.406	0.469	1.125	0.75	0.875
5/16	0.30	0.365	0.469	0.531	1.250	0.812	1
3/8	0.36	0.430	0.531	0.656	1.438	0.938	1.125
7/16	0.42	0.490	0.594	0.750	1.688	1.062	1.25
1/2	0.48	0.610	0.719	0.812	1.875	1.188	1.375
5/8	0.59	0.730	0.844	1.062	2.375	1.5	1.875
3/4	0.71	0.850	0.969	1.250	2.812	1.75	2.125
7/8	0.83	0.980	1.094	1.438	3.312	2	2.375
1	0.95	1.100	1.219	1.688	3.75	2.312	2.625

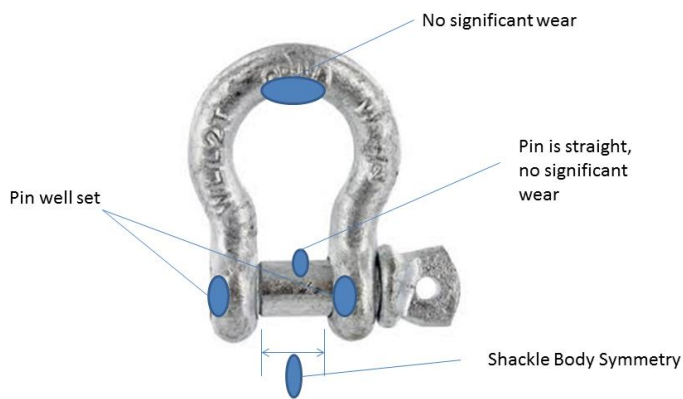
Bow Shackle



(Usually found only in SS or light duty carbon steel)

A	B	C	D	WLL (lbs)
1/4"	0.23"	0.48"	1.08"	750
5/16"	0.31"	0.67"	1.46"	1,000
3/8"	0.39"	0.79"	1.77"	1,200
15/32"	0.48"	0.94"	2.16"	1,500
1/2"	0.51"	1.04"	2.33"	2,500
5/8"	0.63"	1.25"	3.00"	3,000
3/4"	0.74"	1.50"	3.34"	4,000
7/8"	0.86"	1.72"	3.85"	5,000
1"	0.96"	1.95"	4.42"	6,000

How to inspect a shackle?



Non-Destructive Inspection of Shackles

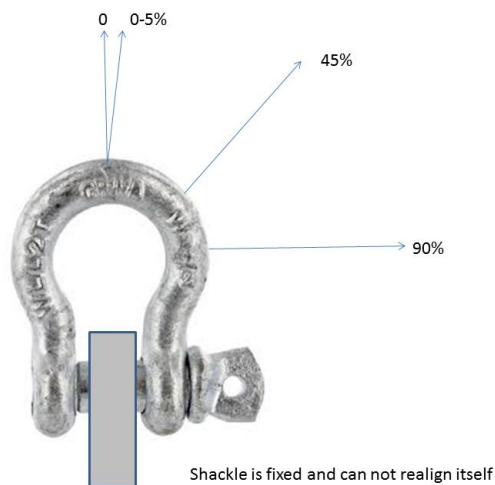
In addition to the the visual inspections other non-destructive tests on a shackle can be useful...

Bell tests

1. Hang the shackle without the pin on a string.
2. Use a metal tap the shackle.
3. Good shackle should ring. If the sound is "hollow", or dull the shackle is suspect.
4. Now do the same to the pin.

Side loading the shackle:

Shackle if side loaded does not have the same working load limit. The following table shows how a shackle WLL changes as related to the direction of the pull. An example of this could happen if a shackle is mounted on the anchor with the pin going through the shackle hole on the anchor shank. In this situation if the anchor is trapped in rocks, the shackle could get side loaded; this also is common reason for swivel failure.



Angle to the inline axis	WLL knock down factor
0-5%	0
45%	30%
90%	50%