WLL Quick Reference Card

Working Load Limits for Cargo Securement • 49 CFR Part 393

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KEY REQUIREMENT: The aggregate (combined) Working Load Limit of all tie-downs securing an article must be at least **50% of the weight of the article** being secured.

CHAIN WORKING LOAD LIMITS

Size	Grade 30 (Proof Coil)	Grade 43 (High Test)	Grade 70 (Transport)	Grade 80 (Alloy)	Grade 100 (Alloy)
1/4"	1,300 lbs	2,130 lbs	3,150 lbs	3,500 lbs	4,300 lbs
5/16"	1,900 lbs	3,000 lbs	4,700 lbs	5,100 lbs	6,100 lbs
3/8"	2,650 lbs	5,400 lbs	6,600 lbs	7,100 lbs	8,800 lbs
7/16"	3,700 lbs	6,500 lbs	8,750 lbs	---	---
1/2"	4,500 lbs	9,200 lbs	11,300 lbs	12,000 lbs	15,000 lbs
5/8"	6,900 lbs	13,000 lbs	15,800 lbs	18,100 lbs	22,600 lbs
3/4"	10,600 lbs	16,200 lbs	20,200 lbs	---	---

Note: Grade 70 (Transport Chain) is the most common for cargo securement. Always verify chain grade markings.

SYNTHETIC WEB STRAP WORKING LOAD LIMITS

Width	Polyester WLL	Nylon WLL	Polypropylene WLL
1 inch	1,100 lbs	1,000 lbs	600 lbs
1-3/4 inch	1,850 lbs	1,750 lbs	1,050 lbs
2 inch	3,333 lbs	3,000 lbs	1,665 lbs
3 inch	5,000 lbs	4,500 lbs	2,500 lbs
4 inch	5,400 lbs	5,000 lbs	2,700 lbs

Note: Polyester is preferred for cargo securement (minimal stretch). Always check label for actual WLL rating.

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WIRE ROPE WORKING LOAD LIMITS

Diameter	6x19 Class	6x37 Class	Fiber Core
1/4"	1,100 lbs	1,050 lbs	900 lbs
5/16"	1,700 lbs	1,600 lbs	1,400 lbs
3/8"	2,400 lbs	2,300 lbs	2,000 lbs
7/16"	3,300 lbs	3,100 lbs	2,700 lbs
1/2"	4,200 lbs	4,000 lbs	3,500 lbs
5/8"	6,500 lbs	6,200 lbs	5,400 lbs
3/4"	9,400 lbs	8,900 lbs	7,800 lbs

CHAIN BINDER WORKING LOAD LIMITS

Chain Size	Lever Binder WLL	Ratchet Binder WLL
5/16" - 3/8"	5,400 lbs	5,400 lbs
3/8" - 1/2"	9,200 lbs	9,200 lbs
1/2" - 5/8"	13,000 lbs	13,000 lbs

Important: The WLL of the entire assembly equals the LOWEST rated component (chain, binder, or hook).

MINIMUM NUMBER OF TIE-DOWNS REQUIRED

Article Length	Minimum Tie-Downs
5 feet or less (≤1,100 lbs, won't roll)	1 tie-down
5 feet or less (>1,100 lbs or can roll)	2 tie-downs
Over 5 feet, up to 10 feet	2 tie-downs
Over 10 feet	2 + 1 for each additional 10 ft

Questions about fleet compliance and insurance?
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WLL CALCULATION EXAMPLES

Example 1: How many tie-downs needed?

Scenario: Cargo weight = 10,000 lbs. Using 4" ratchet straps (WLL = 5,400 lbs each).

Step 1: Calculate required aggregate WLL = 10,000 lbs × 50% = **5,000 lbs minimum**
Step 2: Each strap provides 5,400 lbs WLL
Step 3: 5,000 ÷ 5,400 = 0.93 → Round up = **1 strap minimum for WLL**
Step 4: BUT also need minimum number based on length!
Answer: Use at least 2 straps (length requirement) which provides 10,800 lbs aggregate WLL ✓

Example 2: Heavy equipment securement

Scenario: Excavator weight = 40,000 lbs. Using 1/2" Grade 70 chain (WLL = 11,300 lbs each).

Step 1: Required aggregate WLL = 40,000 lbs × 50% = **20,000 lbs minimum**
Step 2: Each chain provides 11,300 lbs WLL
Step 3: 20,000 ÷ 11,300 = 1.77 → Round up = **2 chains minimum for WLL**
Step 4: Heavy equipment over 10,000 lbs requires minimum 4 tie-downs
Answer: Use at least 4 chains which provides 45,200 lbs aggregate WLL ✓

TIE-DOWN ANGLE — WLL REDUCTION FACTORS

When tie-downs are not vertical, the effective WLL is reduced. The more horizontal the angle, the less effective the tie-down.

Tie-Down Angle	% of Rated WLL	Example: 5,400 lb WLL
90° (vertical)	100%	5,400 lbs effective
60°	87%	4,698 lbs effective
45° (optimal)	71%	3,834 lbs effective
30°	50%	2,700 lbs effective

Tip: 45° is the recommended optimal angle. Avoid angles less than 30° from horizontal.

IMPORTANT REMINDERS

- Always check tie-down labels/markings for actual WLL — values shown are typical
- Never exceed the WLL of any component in the securement system
- Damaged tie-downs have ZERO WLL — replace immediately
- Edge protection is required when tie-downs pass over sharp edges
- Re-inspect and tighten within first 50 miles after loading

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