

TECHNICAL REFERENCE · PRINT & KEEP

Casters for Ramps & Slopes: Brakes and Runaway Control

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Quick answer. Ramp casters need total-lock brakes that hold both wheel and swivel, high-grip wheel treads, and capacity sized for gravity assist: a 2,000 lb cart on a 5 degree ramp generates 175 lb of downhill force. OSHA 1910.176 and ANSI MH31.1 govern slope applications; spec swivel locks and follow the 1:12 ramp rule.

Gravity Math on Slopes

Slope	1:X Rise	Downhill Force (% of Cart Weight)	500 lb Cart	2,000 lb Cart
1°	1:57	1.7%	9 lb	35 lb
2.9° (ADA)	1:20	5.0%	25 lb	100 lb
4.8° (1:12)	1:12	8.3%	42 lb	167 lb
5°	1:11.4	8.7%	44 lb	175 lb
8.5° (1:6.7)	1:6.7	14.8%	74 lb	296 lb
10°	1:5.7	17.4%	87 lb	347 lb

OSHA and ANSI Ramp Code

Code	Max Slope	Rise:Run	Application
ADA accessibility ramp	2.9°	1:20	Public accessibility
ADA ramp (with handrail)	4.8°	1:12	Public + worker access
OSHA 1910.25 industrial ramp	18.4°	1:3	Worker-only industrial
Loading dock ramp (typical)	5-8°	1:7 to 1:11	Forklift or cart load
Hospital cart ramp	4.8°	1:12	Patient-present
Manual cart recommended max	4.8°	1:12	Safe manual push/hold



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