

CODES AND STANDARDS

HANDRAILS

ADA Handrail Height: 505.4 Handrail Height. Top of gripping surfaces of handrails shall be 34" (865mm) minimum and 38" (965mm) maximum vertically above walking surfaces, stair nosings, and ramp surfaces. Handrails shall be at a consistent height above walking surfaces, stair nosings, and ramp surfaces.

Handrail Clearance: It is believed a consensus as to what clearance should be required has been reached by most standards committees and regulatory bodies. The traditional clear space between a wall or other surface and a handrail of 1 1/2" has been accepted as the most beneficial space. The following codes and standards specify a wall clearance of 1 1/2" minimum.

Handrail Dimensions: The Life Safety Code and ICC/ANSI A.117.1-03 similar requirements for handrail size as described below:

Circular Cross Section. Handrails shall have a circular cross section with an outside diameter of 1 1/4" (32MM) minimum and 2" (51mm) maximum, or shall provide equivalent grasp ability.

Non-Circular Cross Section. Handrails with other shapes shall be permitted provided they have a perimeter dimension of 4" (100mm) minimum and 6 1/4" (160mm) maximum, and provided their largest cross-section dimension is 2 1/4" (57mm) maximum.

ICC/ANSI A117.1-03 The *Americans with Disabilities Act* adopted by Congress in 1992 required handrails to be 1 1/4" minimum and 1 1/2" maximum. However, the *US Architectural and Transportation Barriers Compliance Board published the ADAAG Manual - A Guide to the Americans with Disabilities Act Accessibility Guidelines - Section 4.26.2 Size and Spacing of Grab Bars and Handrails* of the ADAAG manual states in part, "Standard IPS pipe designed by 1 1/4" to 1 1/2" inches is acceptable." (1.66" To 1.90" outside diameter)

Fasteners and strength. Pull-out Values for 3/8" stud. Handrail thread-lock fastener engineered test data pull-out values for removal of threaded fasteners = 1509 lbs. **Pull-out Values for 1/4" - 20 Bolt.** 265lbs (120 kg) ultimate tensile load in 1/2" drywall. 306 lbs (162 kg) ultimate tensile load is 5/8" drywall. 925 lbs (420 kg) ultimate tensile load in concrete block. 1,283 lbs (583 kg) ultimate tensile load in steel plate. Toggle is a registered trade mark of Mechanical Plastics Corporation.

BARRICADES

2005 Elevator Employees' Safety Handbook 4.3 Escalator/Moving Walk Barricades

- Barricades shall be positioned to completely surround the escalator/moving walk from public access.
- Barricades shall be positioned to surround, from public access, floor opening created when equipment access plate (s) are removed.
- Barricades shall be a minimum of 42" (1067mm) high.
- Barricades shall be securely attached to the balustrades, handrails and/or floor.
- All sections shall be connected.
- A system shall be in place to keep the barricade rigid.

ESCALATOR Step Skirt Clearances

A17.1.2005 - 8.6.8.2 Step to Skirt Clearance. Clearances shall be maintained in compliance with the applicable codes. Alternatively, the clearance on either side of the steps and between the steps and the adjacent skirt guard shall not exceed 4mm (0.16in.) (B44-94 = 5.0 mm) and the sum of the clearances on both sides shall not exceed 7mm (0.28in.) (B44-94 = 6.0mm.)

Anti-Slide Devices

ASME A17.1-2005 - 6.1.3.3.12 ...These devices shall consist of raised objects fastened to the decks. ...They shall be spaced not greater than 2000 mm (78 in.) apart ...The height shall be not less than 50 mm (2 in.). There shall be no sharp corners or edges.

Nominal Size inches	Imperial Allowable Minimum Diameter	
	For ropes with ROUGE	For Normal wear conditions
3/8	0.363	0.352
7/16	0.424	0.410
1/2	0.484	0.469
9/16	0.545	0.527
5/8	0.605	0.586
11/16	0.666	0.645
3/4	0.727	0.703
1	0.969	0.938

ELEVATOR WIRE ROPE GAUGES

ASME A17.1-2005 - 8.11.2.1.3 (cc)(3) On any type of elevator, the suspension, compensation and governor ropes shall be replaced when their actual diameter is reduced below the value shown in *Table 8.11.2.1.3(cc)(3)*.

Nominal Size mm	Metric Allowable Minimum Diameter	
	For ropes with ROUGE	For Normal wear conditions
6 mm	5.813	5.625
8 mm	7.750	7.500
9.5 mm	9.203	8.906
10 mm	9.688	9.375
11 mm	10.656	10.313
13 mm	12.594	12.188
16 mm	15.500	15.000
19 mm	18.406	17.813
22 mm	21.313	20.625

TABLE OF HANDRAIL WEIGHTS

HANDRAILS	ACTUAL WEIGHTS	SHIPPING WEIGHTS
ROUND	STAINLESS, BRASS OR BRONZE	
Any size	1.1 lbs / foot (0.50 kg / 30.48 cm)	2.1 lbs / foot (0.95 kg / 30.48 cm)
Spacer	Any size add 0.4 lbs (0.18 kg) per spacer	
EXTRUDED	STAINLESS, BRASS OR BRONZE	
Any size	1.62 lbs / foot (0.73 kg / 30.48 cm)	2.48 lbs / foot (1.13 kg / 30.48 cm)
Spacer	Any size add 0.58 lbs (0.26 kg) per spacer	*Spacer is for Extruded & Solid Flat
SOLID FLAT	STAINLESS, BRASS OR BRONZE	
1.5" wide	2.36 lbs / foot (1.07 kg / 30.48 cm)	2.45 lbs / foot (1.11 kg / 30.48 cm)
2" wide	3.05 lbs / foot (1.38 kg / 30.48 cm)	3.14 lbs / foot (1.42 kg / 30.48 cm)
3" wide	4.33 lbs / foot (1.97 kg / 30.48 cm)	4.42 lbs / foot (2.00 kg / 30.48 cm)
4" wide	5.80 lbs / foot (2.63 kg / 30.48 cm)	6.63 lbs / foot (3.13 kg / 30.48 cm)
6" wide	7.98 lbs / foot (3.62 kg / 30.48 cm)	9.07 lbs / foot (4.12 kg / 30.48 cm)
8" wide	11.60 lbs / foot (5.26 kg / 30.48 cm)	13.26 lbs / foot (6.26 kg / 30.48 cm)
10" wide	14.76 lbs / foot (6.70 kg / 30.48 cm)	15.12 lbs / foot (6.84 kg / 30.48 cm)

METRIC CONVERSION
Kilograms to Pounds (Formula: 1kg = 2.205 lbs)
Pounds to Kilograms (Formula: 1 lb = 0.4535 kg)
Liters to Gallons (Formula: 1 L = 0.264 gallons)
Gallons to Liters (Formula 1 gal = 3.7879 L)
Feet to Meters (Formula: 1 ft = 0.3049 m)
Meters to Feet (Formula: 1 m = 3.28 ft)