



B30.20, B30.9 & OTHER STANDARDS

Various industry standards govern the design and use of Caldwell lifting equipment. Caldwell lifting equipment is designed in accordance with these standards. Specifically, the following standards apply to Caldwell's product lines:

Product Line	Industry Standard
Strong-Bac®	ASME B30.9, B30.20, BTH-1
Mill Duty	ASME B30.20, BTH-1
Posi-Turner®	ASME B30.9, B30.20, BTH-1
Univac®	ASME B30.20, BTH-1
Rig-Release®	ASME B30.9, B30.20, BTH-1
Rig-Master®	ASME B30.9, B30.20, BTH-1
Lif-Truc™	ASME B56.1, B56.11.4, OSHA 1910.178(4)
Krane-King®	AISC CMAA 70, OSHA 1910
Caldwell®	ASME B30.9, OSHA 1910.184

The information provided on the following pages is a summary interpretation of the applicable ASME standards. Should you need additional clarification as to how the ASME standards affect your specific application and your lifting device, contact our application specialists or visit the ASME website at www.ASME.org.

KEY ASME STANDARDS

Design of Below-the-Hook Lifting Devices (BTH-1)

ASME BTH-1 designates design criteria for below-the-hook lifting devices (ASME B30.20) and serves as a guide to designers, manufacturers, purchasers, and users of these types of lifters.

All below-the-hook lifting devices shall be designed for specific rated loads and load stresses as they affect the components of the lifting device.

A design category and service class shall be designated and marked on the lifters and all quotations, drawings, and other documents relating to the lifter.

Design Category B should be designated when the conditions of the lift are not always defined or predictable, or when load conditions could be severe.

Design factors for Design Category B lifting devices shall not be less than 3.00 for limit states of yielding or buckling.

Service Class is the specified fatigue life of the lifter.

- Service Class 0 is 0 – 20,000 load cycles
- Service Class 1 is 20,001 – 100,000 load cycles
- Service Class 2 is 100,001 – 500,000 load cycles
- Service Class 3 is 500,001 to 2,000,000 load cycles
- Service Class 4 is over 2,000,000 load cycles

Cycles per Day	Desired Life (Years)				
	1	5	10	20	30
5	0	0	0	1	1
10	0	0	1	1	2
25	0	1	1	2	2
50	0	1	2	2	3
100	1	2	2	3	3
200	1	2	3	3	4
300	2	3	3	4	4
750	2	3	4	4	4
1000	2	3	4	4	4

Definitions: *Should* = a recommended procedure
Shall = a required procedure



Lifting Slings (B30.9)

Design Factor:

Lifting Slings shall be designed in accordance with the specific chapter in ASME B30.9 pertaining to that style sling.

Construction:

Synthetic Slings shall be manufactured to comply with WSTDA WB1 and (when applicable) with fittings that are at least equal in strength to that of the synthetic sling.

Wire Rope Slings shall only be constructed out of new wire rope that complies with ASTM A 1023-02 and ASTM A 586.

Alloy steel chain slings shall be manufactured to comply with ASTM A906/A906M standards.

Metal Mesh slings shall be manufactured to comply with ASME B30.9 with fittings that are at least equal in strength to that of the metal mesh.

Sharp edges shall be removed from all sling and fitting surfaces.

Marking:

Caldwell lifting slings shall be marked with, at a minimum, the following information:

- ✓ name or trademark of manufacturer
- ✓ manufacturer's model or identification number
- ✓ rated loads for the sling, including information on various hitch configurations and the corresponding angle.
- ✓ type or size of material

Load Test:

Before use, all repaired or reworked synthetic web slings shall be load tested and inspected. Proof testing of new synthetic web slings is not required.

Before use, all repaired or refurbished wire rope slings shall be tested. Testing requirements of new slings are based off the sling construction; consult the sling manufacturer or ASME B30.9 for details.

Before use, all new and repaired chain and components of an alloy steel chain sling, either individually or as an assembly, shall be proof tested.

Before use, all new and repaired metal mesh slings shall be proof tested.

*Definitions: Should = a recommended procedure
Shall = a required procedure*



Structural and Mechanical Lifting Devices (B30.20)

Design Factor:

Structural and mechanical lifting devices shall be designed according to ASME BTH-1, Design Category B, taking into consideration the load, including the weight of the lifting device. The design service class is determined by the expected fatigue life of a lifter based on the number of load cycles.

Fabrication:

- All welding shall comply with ANSI / AWS D14.1 and ASME BTH-1.
- Guards should be provided for exposed moving parts.
- Electrical equipment and wiring shall comply with ANSI / NFPA 70 and ASME BTH-1.
- Contact The Caldwell Group for information on modifications or repairs to maintain compliance with ASME standards.

Marking:

- The rated capacity shall be marked on the lifting device.
- Caldwell lifting devices shall be marked with the following information:
 - ✓ manufacturer's name and address
 - ✓ serial number
 - ✓ lifter weight, if over 100 lbs. (45 kg)
 - ✓ cold current (amps) (when applicable)
 - ✓ rated voltage (when applicable)
 - ✓ rated load
 - ✓ ASME BTH-1 Design Category
 - ✓ ASME BTH-1 Service Class
- Product Safety Labels.
 - ✓ Where possible, all lifting devices shall have labels that include the appropriate signal word, according to ANSI Z535, including the proper cautionary notice to operators against improper use.
 - ✓ When it is not possible to include the above, a label shall be affixed, referring user to the manufacturer's instruction manual for product safety information.

Load test:

Before use, a new, altered, modified or repaired lifting device should be load tested and inspected. Contact the manufacturer for information regarding the appropriate test load for the lifting device.

*Definitions: Should = a recommended procedure
Shall = a required procedure*



Vacuum Lifting Devices (B30.20)

Construction:

- Vacuum Pad Rating. The ultimate pad capacity (UPC) shall be determined by the following formulas:
Inch-Pound Method $UPC = A (Hg / 2)$

where

A = effective area of the vacuum pad, expressed in square inches, enclosed between the pad and the material when the pad is fully compressed against the material surface to be lifted.
Hg = system vacuum expressed in inches of mercury. Reductions for altitude, efficiency, consistency, and wear of vacuum source shall be considered.

2 = constant divisor

- Electrical equipment and wiring shall comply with ANSI / NFPA 70 and ASME BTH-1.
- The UPC / rated load shall be a minimum of 2 to 1 for horizontal surface lifts.
- The UPC / rated load shall be a minimum of 4 to 1 for vertical surface lifts.
- These requirements are for clean, flat, dry, non-porous material. Contact the manufacturer for other surface types.
- There shall be a vacuum reserve of sufficient size to prevent the vacuum level from decreasing more than 10% in 4 minutes without power to the vacuum generator.
- Vacuum lifting devices shall be designed according to ASME BTH-1, Design Category B, taking into consideration the load, including the weight of the lifting device. The Service Class of the lifter shall be determined by the number of load cycles required.
- All welding shall comply with ANSI / AWS D14.1 and ASME BTH-1.

Marking:

- The rated capacity, maximum width, maximum length, and minimum thickness of the load shall be marked on the lifting device. If the vacuum lifting device has shutoff valves on individual pads or groups of pads, the rated load of each pad shall also be marked. The rated capacity of pads or groups of pads with isolation values shall be labeled individually.
- Caldwell vacuum lifting devices shall be marked with the following information:
 - ✓ manufacturer's name and address
 - ✓ model number
 - ✓ serial number
 - ✓ vacuum lifting device weight
 - ✓ electrical power requirements (when applicable)
 - ✓ pressure and volume of compressed air (when applicable)
 - ✓ rated load
 - ✓ ASME BTH-1 Design Category
 - ✓ ASME BTH-1 Service Class
- Product Safety Labels.
 - ✓ Where possible, all lifting devices shall have labels that include the appropriate signal word, according to ANSI Z535, including the proper cautionary notice to operators against improper use.
 - ✓ When it is not possible to include the above, a label shall be affixed, referring user to the manufacturer's instruction manual for product safety information.
 - ✓ Isolation valves shall be marked to show proper operating positions.

Load Test:

Before use, a new, altered, modified or repaired vacuum lifting device shall be load tested and inspected. Contact the manufacturer for information regarding the appropriate test load for the lifting device.

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Shall = a required procedure*