CHAIN SLING USE, INSPECTION, AND WARNINGS

LacledAlloy G80 & 100 chain and attachments are produced to the rigorous requirements of overhead lifting. Great care has been exercised in selecting the chemistry for the forged fittings and wire used to manufacture our attachments and chain. In addition, we employ induction heat treating to our chain to maximize its strength and increase elongation characteristics. All Laclede alloy chain and attachments meet the stringent specifications as published in ASTM, NACM , ANSI B30.9 and OSHA specifications.

The alloy chain is manufactured on sophisticated, state-of-the-art equipment. The chain is inspected and tested throughout the manufacturing process to ensure quality and performance. To assure traceability, all chain is assigned a unique number (trace code) representing a lot of chain, its heat number, chemistry and physicals allowing us to track the chain back to the steel used to manufacture the chain. Grade 100 chain offers approximately 25% higher working load limit than G80.

ALWAYS OBSERVE FOLLOWING PRACTICES:

Use Only Grade 80 or G100 Chain for Overhead Lifting Applications

Do Not Overload
Know Working Load Limits and the weight of the load to be lifted; overloading can lead to rapid wear, stretching and sling failure that may cause serious injury or property damage.

Avoid Faulty Hooks
Do not tip load hooks, force or wedge hook points into loads or face hooks toward loads. Unbalanced hook ups can slip causing excess stress on lift chains and loss or damage to load.

Remove All Twist, Knots, and Kinks Before Lifting
Twist or knots in chain can impose loads in excess of rated working load limits and spin the load dangerously.

Avoid Impact Loading
Loads that are jerked suddenly when picked up can impose tension on the chain far in excess of the actual load weight. Dynamic Stress force can cause sling damage and failure.

Do Not Let Chains Come in Contact With Sharp Corners of a Load Without Protective Padding
Bending, nicks and gouges may result without use of protective padding and cribbing.

Do Not Drop or Rest Loads on Chain
Nicking and bending can result in severe chain damage.

Avoid Improper Angle of Lift
Angle of lift less than 30° can result in excessive stress being imposed on each leg of the sling resulting in chain stretching and sling failure that may cause serious injury or property damage.

Do Not Batten Down Choke Hitch Slings
Reduced hook angles may cause excessive tension of chain resulting in damage or failure.

Do Not Overheat Slings
Overheating will soften the steel, weakening the chain and potentially causing failure. Slings that are exposed to extreme temperatures (above 400° F) will have reduced working load limits.

DEFINITIONS

Working Load Limit (WLL)
The "Working Load Limit" (rated capacity) is the maximum load that shall be applied in direct tension to an undamaged straight length of chain.

Proof Test
The "Proof Test" (manufacturing test force) is a term designating the miminum tensile force which has been applied to a chain under a constantly increasing force in direct tension during the manufacturing process. These loads are manufacturing integrity tests and shall not be used as criteria for service or design purposes.

Minimum Breaking Force
The "Minimum Breaking Force" is the minimum force at which the chain during manufacturing has been found by testing to break when a constantly increasing force is applied in direct tension. Breaking force values are not guarantees that all chain segments will endure these loads. This test is a manufacturer's attribute acceptance test and shall not be used as a criterion for service or design purposes.

Overhead Lifting
The process of lifting that would elevate a freely suspended load to such a position that dropping the load would present a possiblity of bodily injury or property damage.

Elongation
When chain is overloaded, "elongation" or stretching of individual links occurs.

Overload
Any static or dynamic load in excess of "Working Load Limit."

Competent Person
A designated person, qualified by training and practical experience, and with the necessary instructions to enable the required examinations to be carried out.

Mechanical Sling
Connections are made by a mechanical means, such as a coupling link or a clevis type hook. Components are already proof tested so the final assembly does not have to be proof tested. This is the category of slings that Laclede Chain supplies.

Welded Sling
Connections between hooks, master-link, and chain are made with a welded heat-treated link. Eye- type hooks are used rather than clevis-type. The whole chain sling must be proof tested and certified if welded connections are used.

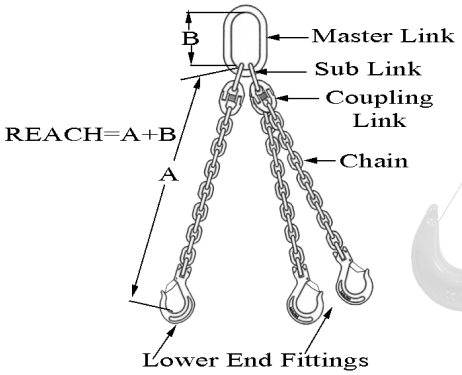
Sling Types & Symbols

DESIGNATIONS:

Example:

1/2 TOS X 10ft

Triple Type Mechanical Sling



1/2 → **Reference Diameter of Chain**

T → **Type of Sling**
examples: S=Single leg
D=Double leg
T=Triple leg
Q=Quad leg

O → **Main Attachments**
Called out as "Master Link"
examples: O=Oblong master link
S=Sling hook
G=Grab hook
F=Foundry hook

S → **End Attachments**
Called out as "Lower End Fittings"
examples: O=Oblong master link
S=Sling hook
G=Grab hook
F=Foundry hook

10ft → **Reach**

SELECTING THE PROPER SLING

DOS

1. Verify the weight of the load to be lifted.
2. Select the size and type of sling appropriate for the load.
3. Take into consideration the possibility of using multiple legged sling and the sling angle used in the lift. This would include compensating for ceiling height and elevation of lift.
4. Inspect the chain and attachments prior to your lift. Follow the inspection criteria on the last page of this document.
5. Use the established lettering system as below

TYPE


SOO SOS SOG SSS SGG SGS SOS-A SOS-B

TYPE	DESCRIPTION	TYPE	DESCRIPTION
SOO	SINGLE CHAIN WITH MASTER LINK EACH END	SSS	SINGLE CHAIN WITH SLING HOOK ON EACH END
SOS	SINGLE CHAIN WITH MASTER LINK AND SLING HOOK	SGG	SINGLE CHAIN WITH GRAB HOOK ON EACH END
SOG	SINGLE CHAIN WITH MASTER LINK AND GRAB HOOK	SGS	SINGLE CHAIN WITH GRAB HOOK AND SLING HOOK
		SOS-A	ADJUSTABLE SINGLE CHAIN WITH MASTER LINK AND SLING HOOK
		SOS-B	ADJUSTABLE SINGLE CHAIN WITH MASTER LINK AND SLING HOOK


DOS DOG DOS-B

TYPE	DESCRIPTION	TYPE	DESCRIPTION
DOS	DOUBLE CHAIN WITH MASTER LINK AND SLING HOOKS	DOS-B	ADJUSTABLE DOUBLE CHAIN WITH MASTER LINK AND SLING HOOKS
DOG	DOUBLE CHAIN WITH MASTER LINK AND GRAB HOOKS		


TOS TOG QOS QOG

TYPE	DESCRIPTION	TYPE	DESCRIPTION
TOS	TRIPLE CHAIN WITH MASTER LINK AND SLING HOOKS	QOS	QUADRUPLE CHAIN WITH MASTER LINK AND SLING HOOKS
TOG	TRIPLE CHAIN WITH MASTER LINK AND GRAB HOOKS	QOG	QUADRUPLE CHAIN WITH MASTER LINK AND SLING HOOKS

SLINGS MUST BE PROPERLY TAGGED

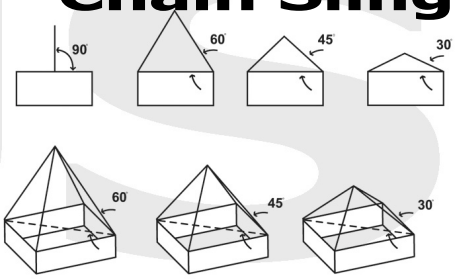
TAGS

side 1

side 2

Making your own? Laclede conveniently supplies tags where you fill in the Type, Serial No., Grade, Reach,Working Load Limit, and the Angle.

Working Load Limits for LacledAlloy Chain Sling



Grade 100 Chain Size

CHAIN SIZE								
INCH	MM	SINGLE 90	DOUBLE 60	DOUBLE 45	DOUBLE 30	TRI/QUAD 60	TRI/QUAD 45	TRI/QUAD 30
9/32	7	4,300	7,400	6,100	4,300	11,200	9,100	6,400
5/16	8	5,700	9,900	8,100	5,700	14,800	12,100	8,500
3/8	10	8,800	15,200	12,400	8,800	22,900	18,700	13,200
1/2	13	15,000	26,000	21,200	15,000	39,000	31,800	22,500
5/8	16	22,600	39,100	32,000	22,600	58,700	47,900	33,900

Grade 80 Chain Size

CHAIN SIZE								
INCH	MM	SINGLE 90	DOUBLE 60	DOUBLE 45	DOUBLE 30	TRI/QUAD 60	TRI/QUAD 45	TRI/QUAD 30
9/32	7	3,500	6,100	4,900	3,500	9,100	7,400	5,200
5/16	8	4,500	7,800	6,400	4,500	11,700	9,500	6,800
3/8	10	7,100	12,300	10,000	7,100	18,400	15,100	10,600
1/2	13	12,000	20,800	17,000	12,000	31,200	25,500	18,000
5/8	16	18,100	31,300	25,600	18,100	47,000	38,400	27,100
3/4	20	28,300	49,000	40,000	28,300	73,500	60,000	42,400
7/8	22	34,200	59,200	48,400	34,200	88,900	72,500	51,300
1	26	47,700	82,600	67,400	47,700	123,900	101,200	71,500

ASTM PROOF LOAD REQUIREMENTS

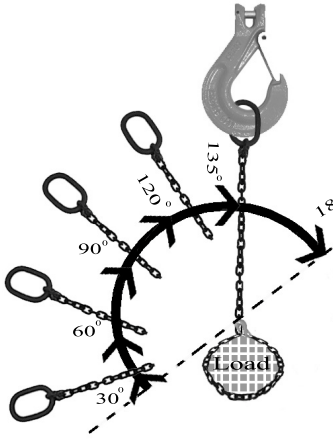
Grade 100 Alloy

G-100 CHAIN SIZE		WORKING LOAD LIMIT	SINGLE LEG PROOF TEST	DOUBLE LEG PROOF TEST	TRIPLE / QUAD LEG PROOF TEST
INCH	MM				
9/32	7	4,300	8,600	17,200	25,800
5/16	8	5,700	11,400	22,800	34,200
3/8	10	8,800	17,600	35,200	52,800
1/2	13	15,000	30,000	60,000	90,000
5/8	16	22,600	45,200	90,400	135,600
3/4	20	35,300	70,600	141,200	211,800
7/8	22	42,700	85,400	170,800	256,200

Grade 80 Alloy

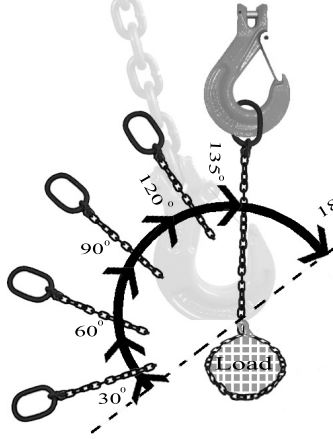
G-80 CHAIN SIZE		WORKING LOAD LIMIT	SINGLE LEG PROOF TEST	DOUBLE LEG PROOF TEST	TRIPLE / QUAD LEG PROOF TEST
INCH	MM				
9/32	7	3,500	7,000	14,000	21,000
5/16	8	4,500	9,000	18,000	27,000
3/8	10	7,100	14,200	28,400	42,600
1/2	13	12,000	24,000	48,000	72,000
5/8	16	18,100	36,200	72,400	108,600
3/4	20	28,300	56,600	113,200	169,800
7/8	22	34,200	68,400	136,800	205,200

A choked chain sling's working load limit is affected by the angle of the choke.



Grade 100 Choke Angles

Angle of choke (degree)	Rated Capacity (percent)
over 120	80
90-119	70
60-89	60
30-59	50
0-29	40



Grade 80 Choke Angles

Angle of choke (degree)	Rated Capacity (percent)
over 120	100
90-119	87
60-89	74
30-59	62
0-29	49

PROPER CHAIN CARE EXTENDS THE WORKING LIFE OF THE CHAIN:

Store Chain Slings Properly to Avoid Damage
Nicking, gouging, bending and corrosion caused when slings are run over, have loads dropped on them or exposed to corrosive environments may require repair or replacement
Chains should be stored in designated location

Store Chain Away From Heat

Oil Chain if Storing for Long Periods of Time

Remove Dirt and Grit as This Can Cause Wear

WARNING: SLINGS SHOULD NOT BE USED WHEN WORN OUT

Chain Wear Chart for Grade 80 & 100

TRADE SIZE		NOMINAL MATERIAL DIAMETER		MINIMUM ALLOWABLE THICKNESS ON LINK	
INCH	MM	INCH	MM	INCH	MM
9/32	7	0.276	7	0.239	6
5/16	8	0.312	8	0.273	7
3/8	10	0.394	10	0.342	9
1/2	13	0.512	13	0.443	11
5/8	16	0.630	16	0.546	14
3/4	20	0.787	20	0.687	17
7/8	22	0.866	22	0.750	19
1	26	1.02	26	0.887	23

WARNING: SLINGS SHOULD NOT BE USED IN EXTREME TEMPERATURES

Effect of Elevated Temperature on the Working Load Limit

TEMPERATURE	GRADE OF CHAIN			
	GRADE 80		GRADE 100	
(°F)	REDUCTION OF WORKING LOAD LIMIT **WHILE** AT TEMPERATURE	REDUCTION OF WORKING LOAD LIMIT **AFTER EXPOSURE** AT TEMPERATURE	REDUCTION OF WORKING LOAD LIMIT **WHILE** AT TEMPERATURE	REDUCTION OF WORKING LOAD LIMIT **AFTER EXPOSURE** AT TEMPERATURE
BELOW 400	NONE	NONE	NONE	NONE
400	10%	NONE	15%	NONE
500	15%	NONE	25%	5%
600	20%	5%	30%	15%
700	30%	10%	40%	20%
800	40%	15%	50%	25%
900	50%	20%	60%	30%
1000	60%	25%	70%	35%
Over 1000	OSHA 1910.184 requires all slings exposed to temperature over 1000 °F to be removed from service			

OSHA STATES:

"Slings shall be removed from service if hooks are cracked, have been opened more than 15 percent of the normal throat opening measured at the narrowest point or twisted more than 10 degrees from the plane of the unbent hook."
Code of Federal Regulations-Slings 1910.184

Laclede recommends removal if ~~any~~ distortion or bending is apparent.

Wear Guages are provided by Laclede Chain.

Laclede Wear Guages should only be used on Laclede Manufactured Chain.

SLING GUIDE

POCKET GUIDE SLING CHECK LIST

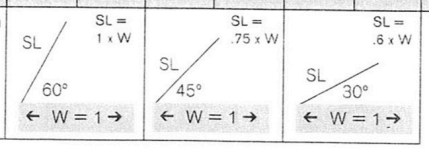
Laclede Chain Grade 100 Sling Capacities ④

LacledAlloy Grade 100 [L10]

Size in inches	SINGLE VERTICAL		DOUBLE 60°		DOUBLE 45°		DOUBLE 30°		Size in mm
	Lbs.	Kgs.	Lbs.	Kgs.	Lbs.	Kgs.	Lbs.	Kgs.	
9/32	4,300	1,950	7,400	3,400	6,100	2,750	4,300	1,950	7
5/16	5,700	2,600	9,900	4,500	8,100	3,700	5,700	2,600	8
3/8	8,800	4,000	15,200	6,950	12,400	5,650	8,800	4,000	10
1/2	15,000	6,800	26,000	11,800	21,200	9,600	15,000	6,800	13
5/8	22,600	10,300	39,100	17,750	32,000	14,500	22,600	10,300	16
3/4	35,300	16,000	61,100	27,700	49,900	22,650	35,300	16,000	20
7/8	42,700	19,400	74,000	33,500	60,400	27,350	42,700	19,400	22

Sling Length : Load Width Ratio (approx.)

Angle = SL : W
60° = 1 : 1
45° = .75 : 1
30° = .60 : 1



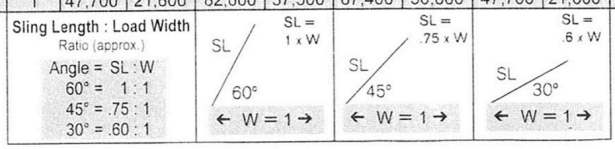
Laclede Chain Grade 80 Sling Capacities ①

LacledAlloy Grade 80 [L8]

Size in inches	SINGLE VERTICAL		DOUBLE 60°		DOUBLE 45°		DOUBLE 30°		Size in mm
	Lbs.	Kgs.	Lbs.	Kgs.	Lbs.	Kgs.	Lbs.	Kgs.	
9/32	3,500	1,600	6,100	2,750	4,900	2,250	3,500	1,600	7
5/16	4,500	2,000	7,800	3,550	6,400	2,900	4,500	2,000	8
3/8	7,100	3,200	12,300	5,500	10,000	4,500	7,100	3,200	10
1/2	12,000	5,400	20,800	9,400	17,000	7,700	12,000	5,400	13
5/8	18,100	8,200	31,300	14,200	25,600	11,600	18,100	8,200	16
3/4	28,300	12,800	49,000	22,250	40,000	18,150	28,300	12,800	20
7/8	34,200	15,500	59,200	26,850	48,400	21,900	34,200	15,500	22
1	47,700	21,600	82,600	37,500	67,400	30,600	47,700	21,600	26

Sling Length : Load Width Ratio (approx.)

Angle = SL : W
60° = 1 : 1
45° = .75 : 1
30° = .60 : 1



Laclede Chain Grade 100 Sling Capacities ⑤

LacledAlloy Grade 100 [L10]

The rigger should remember that when lifting a rigid load with 4 legs, it is quite common for only three legs to actually pick up the load. We should regard the fourth leg as a stabilizer for control purposes and not for capacity.

Size in inches	TRIPLE & QUADRUPLE 60°		45°		30°		Size in mm
	Lbs.	Kgs.	Lbs.	Kgs.	Lbs.	Kgs.	
9/32	11,200	5,050	9,100	4,150	6,400	2,950	7
5/16	14,800	6,750	12,100	5,500	8,500	3,900	8
3/8	22,900	10,400	18,700	8,500	13,200	6,000	10
1/2	39,000	17,650	31,800	14,450	22,500	10,200	13
5/8	58,700	26,650	47,900	21,750	33,900	15,400	16
3/4	91,700	41,550	74,900	33,950	53,000	24,000	20
7/8	110,900	50,250	90,600	41,050	64,000	29,050	22

WARNING: Refer to hoist & rigging equipment manufacturers' specifications for proper applications and limitations.

Laclede Chain Grade 80 Sling Capacities ②

LacledAlloy Grade 80 [L8]

The rigger should remember that when lifting a rigid load with 4 legs, it is quite common for only three legs to actually pick up the load. We should regard the fourth leg as a stabilizer for control purposes and not for capacity.

Size in inches	TRIPLE & QUADRUPLE 60°		45°		30°		Size in mm
	Lbs.	Kgs.	Lbs.	Kgs.	Lbs.	Kgs.	
9/32	9,100	4,150	7,400	3,400	5,200	2,400	7
5/16	11,700	5,350	9,500	4,350	6,800	3,100	8
3/8	18,400	8,300	15,100	6,800	10,600	4,800	10
1/2	31,200	14,150	25,500	11,550	18,000	8,200	13
5/8	47,000	21,300	38,400	17,400	27,100	12,300	16
3/4	73,500	33,400	60,000	27,250	42,400	19,300	20
7/8	88,900	40,250	72,500	32,900	51,300	23,250	22
1	123,900	56,250	101,200	45,950	71,500	32,500	26

WARNING: Refer to hoist & rigging equipment manufacturers' specifications for proper applications and limitations.

Grade 80 & 100 Chain Sling Information ⑥

Inspection Criteria

- Tag /Tag information verified
- Sling reach and/or localized elongation of chain links
- Proper chain grade markings
- Nicks
- Gouges
- Metal loss due to abrasion
- Bent links
- Distorted chain links, couplers or end fittings
- Heat damage from weld spatter or a furnace-type exposure
- Corrosion or severe pitting
- Component hinge-ability

Wear Table

Chain Size		Min. Allow.
inches	mm	Dia. (")
9/32	7	.239
5/16	8	.273
3/8	10	.342
1/2	13	.443
5/8	16	.546
3/4	20	.687
7/8	22	.750
1	26	.887

Effect of Heat on Working Load Limit

Temperature		Grade 80		Grade 100	
(°F)	(°C)	Reduction of Working Load Limit WHILE AT Temperature	Permanent Reduction of Working Load Limit AFTER EXPOSURE to Temperature	Reduction of Working Load Limit WHILE AT Temperature	Permanent Reduction of Working Load Limit AFTER EXPOSURE to Temperature
Below 400	Below 204	None	None	None	None
400	204	10%	None	15%	None
500	260	15%	None	25%	5%
600	316	20%	5%	30%	15%
700	371	30%	10%	40%	20%
800	427	40%	15%	50%	25%
900	482	50%	20%	60%	30%
1000	538	60%	25%	70%	35%
Over 1000	Over 538	OSHA 1910.184 requires all slings exposed to temperatures over 1000°F to be removed from service			

Rigger's Checklist

Rigging Procedures

- Load Weight
- Center-of-Gravity
- Pick Points (structurally OK?)
- Hitch Type
- Sling Type & Capacity
- Head Height
- Hoist Capacity
- Obstructions, Limitations, Clearances, Electrical
- Taglines, Communications, Pre-lift Mtg., Person-in-Charge
- Rigging Inspection
- Hoist Inspection
- Lift Procedures if Critical Lift
- Perform Lift
- Rigging Inspection
- Review

LACLEDE CHAIN MANUFACTURING CO. ③

Handling Tips

- Never exceed Working Load Limit
- Do not tip load hooks
- Remove all twists, knots and kinks before lifting
- Avoid jerking or creating shock loads
- Use pads to cover sharp corners
- Do not drop or rest loads on chain
- Balance loads evenly to avoid excessive forces on chain
- Keep hands, feet and other body parts from between slings and load
- Do not field repair a chain sling
- Destroy a chain sling beyond use if it's not repairable

Laclede Chain Manufacturing Company - 1-800-325-2699
Sales: 1549 Fenpark Dr. • Fenton, MO 63026
Manufacturing: 2500 E. 1st St. • Maryville, MO 64468

LCSCC 0208

INSPECT SLINGS BEFORE EACH USE FOR WEAR OR DAMAGE:

(OSHA specifies that slings shall have a thorough documented inspection by a competetent person at least once every 12 months.) code of federal regulations- slings 190.184

INSPECTION

Before Inspecting

- **Clean Chain**
- **Measure Reach of Sling Leg(s) and Compare to Tag Record**
- **Check Chain Links and Attachments for Any:**
  - Deformation or elongation
  - Nicks, gouges, excessive wear, breaks, cracks, weld splatter
  - Discolartion from excessive temperature
  - Throat Openings of hooks
- **Look for Evidence of Severe Corrosion**
- **Any Sling Which has Defective Attachments or Chain Must Be Marked and Immediately Taken Out of Service Until Repaired or Discarded.**

"The thorough inspection of alloy steel chain slings shall be performed by a competent person designated by the employer, and shall include a thorough inspection for wear defective welds, deformation and increase in length. Where such defect or deterioration is present, the sling shall be immediately removed from service."

code of federal regulations-slings 1910.184

REFERENCE MATERIAL
Valuable information that should be kept as part of any sling inspection documentation

Code of Federal Regulations 1910.184 www.osha.gov- Slings

ASME B30.9- Alloy Steel Chain Slings: Use, and Maintenance

ASME B30.40- Hooks

ASTM A 391/A 391M- Grade 80 Alloy Steel Chain

ASTM A 906/A 906M- grade 80 and Grade 100 Alloy Steel Chain Slings for Overhead Lifting

ASTM A 952/A 952M- Forged Grade 80 and Grade 100 Steel Lifting Components and Welded Attachment Links

ASTM A 973/A 973M- Grade 100 Alloy Steel Chain

Welded Steel Chain Specification- NACM