Who Performs Alloy Chain Inspections & How Often?

OSHA states that the employer has the responsibility to inspect and document alloy chain slings at a minimum of 12-month intervals. The employer is also required to maintain a record of the most recent thorough inspection. Failure to maintain and retain inspection records is one of the most common issues we see that can prevent a company from reaching full OSHA compliance.

All inspections shall be performed by a Designated Person with any deficiencies further examined by a Qualified Person to identify hazards and determine what additional steps need to be taken to address the hazard.

There are two industry standards that exist to provide the end-user with guidelines for inspection and criteria that warrants removal from service: OSHA 1910.184 and ASME B30.9.

Initial Inspection (Prior to Initial Use):

Best practice is to inspect the alloy chain sling upon receiving it from the manufacturer. Double-check the sling tag to make sure it's what you ordered and that the rated capacity meets all of your project specifications and lifting requirements.

Frequent (Daily or Prior to Use):

Designate a Competent Person to perform a daily visual inspection of slings and all fastenings and attachments for damage, defects, or deformities. The inspector should also make sure that the alloy chain sling that was selected meets the specific job requirements it's being used for.

However, users can't rely on a once-a-day inspection if the sling is used multiple times throughout the day. Shock loads, severe angles, edges, and excessive heat can quickly cause damage to a lifting sling, so best practice is to perform a visual inspection before any shift change or changes in lifting application.

Periodic Inspection:

A documented periodic inspection is performed by either a professional service provider, or by a Qualified person every 12 months (at a minimum) and monthly to quarterly in more severe service conditions. The following are all determining factors in scheduling the frequency of a periodic inspection:

- Frequency of use
- Severity of service conditions
- Nature of the lifts being performed
- Experience gained on the service life of wire rope slings used in similar applications

ASME provides these additional periodic inspection guidelines based on the service of the wire rope sling:

- Normal Service – Yearly
- Severe Service – Monthly to Quarterly
- Special Service – As recommended by a Qualified person

Depending on the severity of the operating environment and frequency of use, your business may decide that a more thorough inspection should occur more often than the minimum yearly requirement.

Periodic inspections are required to be documented per ASME B30.9 and records retained.

The employer is required to maintain a record of the most recent thorough sling inspection—per OSHA 1910.184, individual records are required for each sling that was inspected. Failure to maintain and retain inspection records is one of the most common issues we see that can prevent a company from reaching full OSHA compliance.

Alloy Chain Identification Tag Requirements

When using a chain for overhead lifting, the user must make sure that the chain is composed of alloy steel as opposed to carbon steel, and that the sling has an identification tag.

If the chain sling doesn't meet these requirements, the user must not use it for overhead lifting. Size for size, alloy chain has greater strength than carbon chain, and alloy is the only chain that manufacturers recommend for typical overhead lifting. If the chain is alloy, the sling identification tag will designate it as being alloy.

Per ASME B30.9 ...

Each alloy chain sling shall be marked by the manufacturer to include:

- Name or trademark of manufacturer
- Grade
- Nominal chain size
- Number of legs
- Rated load for the type of hitch(es) used and the angle upon which it is based
- Length (Reach) of the sling
- Individual sling identification (e.g., serial numbers)

If the tag is missing or illegible ...

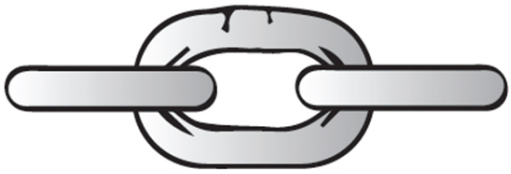
The inspector should remove the sling from service and send it to an authorized chain repair facility for current or updated certification, tagging, and testing.

Basic Alloy Chain Inspection Criteria

Whether you're doing rigging inspections in-house or working with a third-party rigging inspection service, it's very important for the inspector to understand what abuse the chain is seeing and inspect it accordingly.

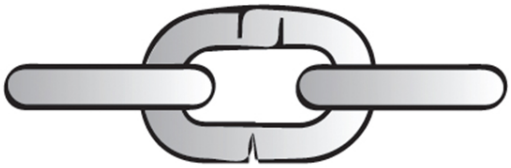
Prior to inspecting, clean chains with a non-acid / non-caustic solvent so that marks, nicks, wear, and other defects are visible. With regard to inspection criteria, chain damage typically falls into one of five categories and critical damage will be obvious to a properly trained inspector.

Wear



Localized Bending

Shearing / Cracks



Nicks or Gouges

Stretching

An alloy steel chain sling shall be removed from service if any of the following conditions are present:

- Missing or illegible sling identification
- Cracks or breaks
- Excessive wear, nicks, or gouges. Minimum thickness on chain links shall not be below the values listed in the table below:

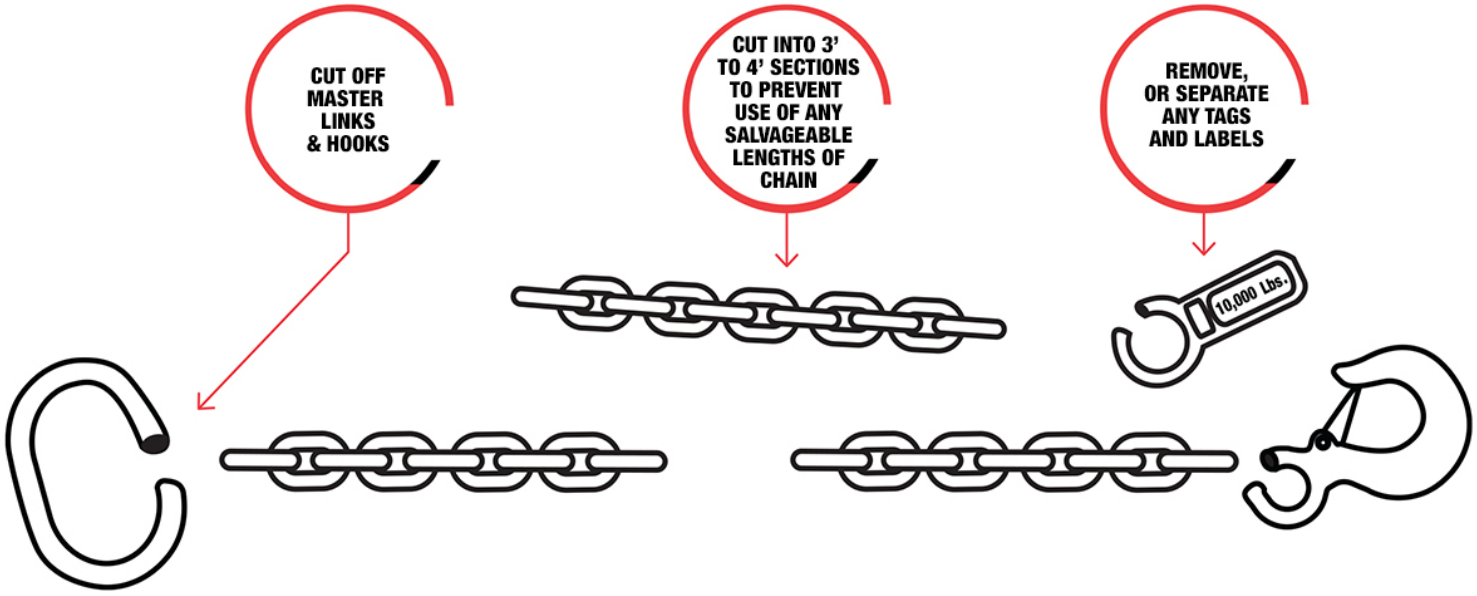
Nominal Chain or Coupling Link Size		Minimum Allowable Thickness at Any Point on the Link	
in.	mm	in.	mm
7/32	5.5	0.189	4.80
9/32	7	0.239	6.07
5/16	8	0.273	6.93
3/8	10	0.342	8.69
1/2	13	0.443	11.26
5/8	16	0.546	13.87
3/4	20	0.687	17.45
7/8	22	0.750	19.05
1	26	0.887	22.53
1-1/4	32	1.091	27.71

- Stretched chain links or fittings
- Bent, twisted, or deformed chain links or fittings
- Evidence of heat damage
- Excessive pitting or corrosion
- Lack of ability of chain or fittings to hinge freely
- Weld splatter
- For hooks, removal criteria as stated in ASME B30.10
- For rigging hardware, removal criteria as stated in ASME B30.26
- Other conditions, including visible damage, that cause doubt as to the continued use of the sling

Disposal of Damaged / Failed Chain Slings

While chain slings are ideal for lifting applications because of their strength, they're still susceptible to being damaged to the point where they are no longer safe to keep in operation. Environmental factors, such as exposure to extreme heat or chemicals, wear beyond specified tolerances, stretching, kinks or binding, and nicks or gouges in the links, can all be criteria for removal from service. Any of these factors can weaken chain slings and may increase the potential for an accident.

If the chain slings and assemblies are rejected during inspection due to damage or failure, they need to be quarantined and removed from service.



We suggest taking the following actions to help make sure that the chain sling can't be re-purposed into some type of usable assembly:

- Cut into smaller 3' to 4' sections to prevent use of any salvageable lengths of chain
- Cut off master links and hooks
- Use proper PPE when handling pieces of cut chain—cutting can leave sharp edges and metal burrs
- Remove, or separate, any tags and labels
- Place scrap into your facility's metal recycling bins and coordinate pickup or delivery

Best Practices for Maintaining Alloy Chain Slings

Often times, chain sling abuse is inherent with a given application. However, by knowing what types of applications cause premature chain wear and even sling failure, the rigger can be in a better position to know what to look for when inspecting slings.

The best way to help extend the life of a chain sling, and help to ensure that it stays in service, is to properly maintain it during and in-between each use. Inspections are easier to perform—and probably more thorough—when slings are easily accessible and organized, kept off of the ground, and stored in a cool and dry environment.

Hang your slings or keep them in a designated locker or rigging box where they are off of the ground and will not be subjected to mechanical damage, corrosive action, moisture, extreme temperatures, and kinking.

Overload / Sling Angle

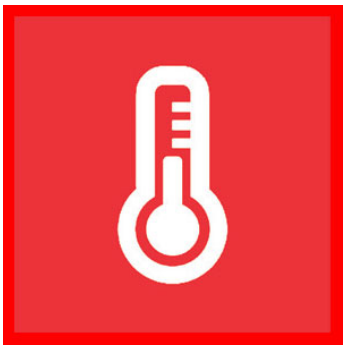
Overload normally causes chain stretch. The overload can be the result of the load itself weighing more than the sling's capacity.

Severe angles can also result in a sling being overloaded. Alloy chain sling charts have rated capacities at 30°, 45°, and 60° angles. The typical angle is 60°. Normally two, three, and four leg chains have three ratings for a specified number of pounds at 60°. The sling identification tag also states the rated capacity for the specified sling angle. Be aware that sling angles greatly affect the tension on each leg of the sling. The farther apart the legs of the sling are spread, the more tension there is on the sling legs.

A good rule of thumb is to measure the distance between the hook-up points, and have the sling legs measure at least that long. For example, if the distance between the hook-up points measures 10 feet, then the sling legs should be at least 10 feet long. This practice ensures that the two leg lengths and the distance between the hook-up points form an equilateral triangle resulting in the sling angles being 60°.

If the application dictates sling angles less than 60°...

then the user needs to choose the correct size sling to allow for the more severe angle. In any case, never use a sling at angles less than 30°. This concept for sling angles and leg lengths applies to all sling types—not just chain slings.



Temperature

In applications involving high heat, the user must pay attention to the amount of direct heat that the chain sees. Often, direct heat results in the chain turning a blueish color. The user should consult the chain manufacturer's capacity reduction charts relating to heat. In addition, be aware of any damage caused by weld splatter or molten metal being splashed on

the slings.

Temperature		Reduction of Working Load Limit	
°F	°C	While at Temperature	After Exposure to Temperature
Below 400	Below 204	None	None
400	204	15%	None
500	260	25%	5%
600	316	30%	15%
700	371	40%	20%
800	427	50%	25%
900	482	60%	30%
1000	538	70%	35%

Edge and Cut Protection

Slings in contact with edges, corners, or protrusions should be protected with a material of sufficient strength, thickness, and construction to prevent damage to the sling. Edge protection and cut protection should be used on all edges and corners—even the ones that aren't load-bearing surfaces.

Keep Your Slings Clean

Continual exposure to dust, dirt, and moisture can degrade the materials over time and shorten the life expectancy of the product. Keep your slings clean and stored in an area free of moisture to avoid excess corrosion and pitting of the links, fittings, and hardware.