Lifting Clamp

Safety Operation Guide

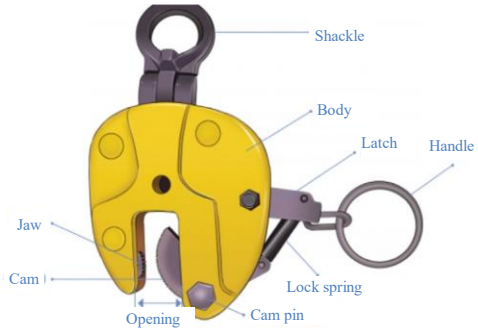
2025-외국인전담팀-236

Lifting Clamp

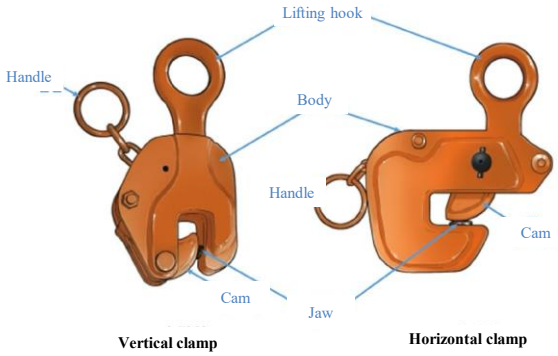
Definition A lifting device that connects hoisting equipment (e.g., cranes) with heavy objects during the transportation of materials like steel plates and structural steel

Types **Vertical type**: For transporting vertically positioned materials (e.g., steel plates and structural steel)
Horizontal type: For transporting horizontally positioned materials (e.g., beams and structural steel)

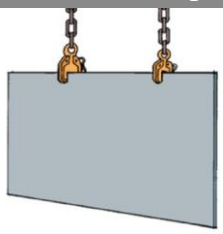
Structure of a lifting clamp



Structure of a clamp



Vertical clamp



Horizontal clamp

1 Work Procedure

Move the handle in the direction of the arrow to secure it

① Secure the clamp to the member

② Transport the member (using a crane)

③ Disassemble the clamp

2 Major Hazards

✓ Falling/Tipping hazards

• Risk of falling or tipping when heavy objects detach from the clamp

✓ Struck-by hazard

• Risk of being struck by detached clamps from heavy objects.

**Secondary accidents are frequently caused when clamps are accidentally detached from heavy objects.*

Main causes of lifting clamp detachment

•Damage to components of the lifting clamp (e.g., cam, jaw, etc.)
•Use of the lifting clamp beyond its rated load capacity
•Improper clamping position (e.g., clamping without considering the center of gravity)

•Use of clamps that are not suitable for the shape of heavy objects

Vertical clamps on horizontal members

Horizontal clamps on vertical members

3 Safety Measures

✓ Inspection and maintenance of lifting clamps

• Regularly inspect the components (e.g., cam, jaw) for damage and check their condition before use.

• Discard the clamp if damaged.

✓ Use of clamps within the rated load capacity

• Indicate the rated load capacity on the clamp.

• Use the clamp within the specified rated load range.

✓ Use of clamps suitable for the material and shape of the heavy objects properly secured at the correct position

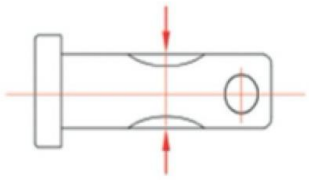
• Consider the object's center of gravity when attaching the clamp.

• Check that the jaw and cam have securely engaged the object.

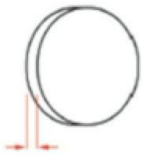
4 Key Inspections

Clamp inspection and maintenance

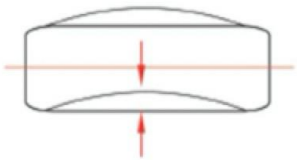
- Replace the cam pin before use if the wear is 1/20th or more of its diameter.



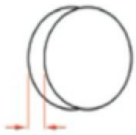
- Replace the cam pin hole if the wear is 1/20th or more of its diameter.



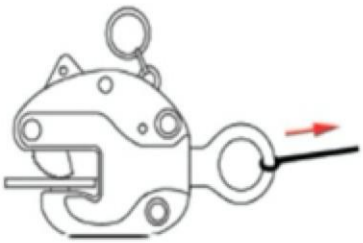
- Replace the shackle pin if the wear is 1.5 mm or more per 100 mm in length or if there is any bending deformation.



- Replace the pin hole if worn and expanded by 1/10th or more.

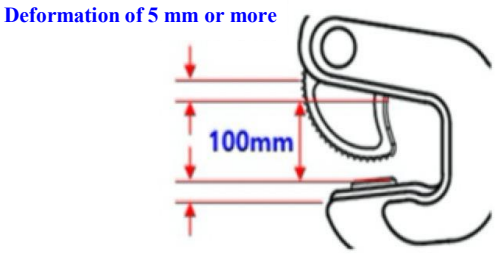


- Regularly check the cam pin for looseness or detachment.
- Replace the spring if relaxed, as it affects locking and efficiency.
- Lubricate the contact points once a week or more.
- If cracks appear in the opening or welded areas, stop use and dispose of the clamp according to standards.



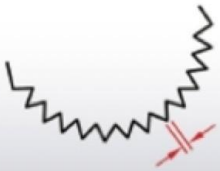
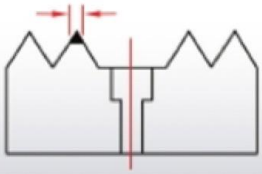
- Discard the clamp if:

1) The opening is elongated or sagged by 5 mm or more per 100 mm.



2) Each side of the body or parts is deformed due to turnover operations.

- Regularly check the jaw for cracks and ensure no foreign materials (e.g., oil or paint) are present between the jaws. Clean as needed.
- Replace if the wear of the cam and jaw reaches or surpasses the following standard.

Specifications (tons)	Wear (mm)	CAM	JAW
0.5	0.5		
1	0.8		
2	0.8		
3	1.0		
5	1.0		

5 Safety Work Guidelines

✓ Before work

- Determine the clamp specifications and quantity based on the material, thickness, weight of the members, and the rated load capacity specified by the manufacturer.
- Check the key inspection points of the clamp before work.

✓ During work

- Ensure the members are securely engaged up to the inner edge of the jaw opening.
- Secure the clamp and lock the safety latch.
- Before lifting the members, perform a final check of the clamp's operating condition and the angle of the wire rope to ensure there are no issues.
- Lift the members slightly off the floor and conduct the transport while keeping an eye on the suspended members and the clamp, ensuring they stay outside the movement radius.
- Ensure there are no people or obstacles along the transport route.
- When transporting heavy objects, use a guide rope to prevent the heavy objects from spinning.

✓ After work

- After dismantling the clamp, check for any components and operating condition issues, then store it in the designated storage area.
  - Store the clamp in a dry indoor location, free from water or humidity.
- Separate the stored clamps into usable and unusable categories.
- For clamps deemed usable after inspection, apply grease (e.g., once a week or more) and store them categorized by type and specification.
- Mark clamps that require disposal or repair as "out of service" and store them separately.
- Avoid dropping or applying impact to the clamps after use.

6 Risk Assessment (Example)

Hazards	Measures	Rules on Occupational Safety and Health Standards
Risk of falling due to selecting an inappropriate clamp for the material, type, and weight of the members, causing detachment of the members and clamp	. Select a clamp suitable for the material, type, and weight of the members.	Article 163
Risk of falling due to detachment of the members during movement if the center of gravity is not considered when attaching the clamp	. Attach the clamp, considering the center of gravity of the members.	-
Risk of falling due to detachment of the members and clamp when mechanical elements (e.g., cam, jaw, shackle pin, welded areas) are worn	. Establish clamp inspection criteria and distinguish between usable and unusable ones before work. Repair or discard unusable clamps.	Article 168
Risk of being struck by falling clamps if they slip from hands during inspection	. Inspect the clamps by securing them in a dedicated fixture (e.g., vice) to check all surfaces.	-
Risk of falling due to members detaching when not fully engaged in the clamp's opening	. When lifting members, engage them fully in the clamp's opening.	-
Risk of falling due to heavy objects detaching if the clamp's safety lock is not fully engaged	. Ensure the clamp's safety locking mechanism is fully engaged.	-
Risk of falling if the clamp slips off and detaches from the members when it's not suited to their shape	. Use a clamp suitable for the shape of the members.	-
Risk of falling if a damaged clamp is used by the next worker due to neglecting inspection after use	After work, inspect the clamp and mark unusable clamps with a "do not use" label to prevent future use. *※ Unusable clamps should be discarded or repaired and stored separately from usable clamps in a designated location.*	Article 168

Accident Case Struck by falling members due to detachment during lifting with clamps

✓ Summary

During a lifting operation using a vertical clamp for member installation at a sub-assembly workshop in a shipyard, the member detached and fell from the clamp, striking a worker below.

✓ Causes

■ Use of defective clamps

- A clamp with an excessively wide opening of 7 mm was used without confirming its condition.

■ Inadequate worker access control

- Worker access should be controlled when using a crane to prevent lifted cargo from passing over workers' heads. However, the cargo was transported over the workers' heads.

✓ Preventive Measures

■ Thorough inspections of hoisting equipment (e.g., clamps)

- Establish in-house standards for regular inspections and ensure only properly functioning clamps are used.

■ Strict control of worker access

- Control worker access in advance to prevent entry into the work area when lifting and transporting cargo with a crane and hoisting equipment (e.g., clamps).