

Load Restraint Guideline

Chaining - 2nd off 1st Method

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This guideline describes the system of chaining required by BlueScope Steel for applying two parallel chains off one tie down point. This is typically the case for Bore Vertical Coils, Tin Plate and Slit Coils. This method ensures both chains maintain their full pretension and share the load equally in an accident.

Separate Load Restraint Guidelines give more detailed requirements for coil restraint systems.

Single Chain Method (see Diagram 1):

- Place the corner protectors on the vertical coil, just in front of the steel strapping holding the coil to the pallet.
- Pass the chain over the corner protectors to prevent damage to the coil.
- Pass the hook (or claw) around the tie down point and connect the hook **above** the coaming rail.
- Ensure that the chain fits neatly around the tie down point and coaming so that chain links can't rotate or move after tightening and lose tension.
- Tighten the chain with the load binder ("dog") firmly in the normal way. This should give an average chain tension of at least 750 kg force, with each half of the loop at about equal forces.

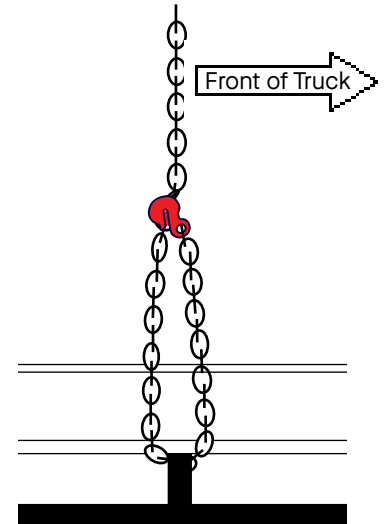


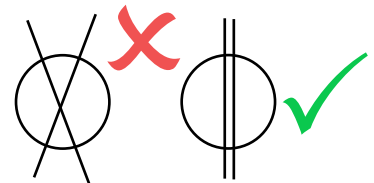
Diagram 1: Single Chain Restraint

Two Chain Method (see Diagram 2):

Testing of crossed-over restraints showed deficiencies compared to parallel chains. **Do not cross over the chains.**

Three lots of testing, plus experience from other companies have shown that the method described below, results in both chains remaining tight:

- Place the first chain and tighten as above.
- The second chain is then hooked off the first chain, on the side of the loop that does not have the hook or claw at the end. See Diagram 2.
- Ensure the hook is attached in the upwards direction (otherwise the hook may end up at a right angle to the chain and be overstressed).



- Then tighten the second chain to close to, but less than, the tension in the first chain. Initially this may mean the tension in the chain on either side of the loop may be uneven. However some movement of the chain will occur under normal driving vibration and even a small movement will quickly equalise the chain tensions. In an accident, both chains will now share the load evenly, as they tighten to their limit.

See over for more information.

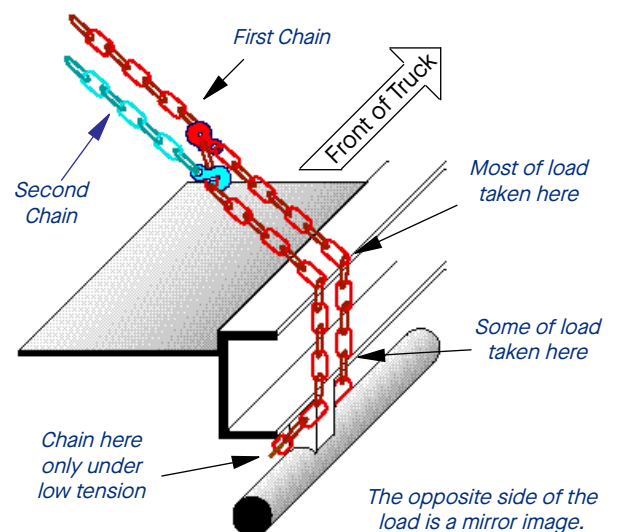


Diagram 2: Two Chain Restraint

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Background Information

Why does BlueScope Steel specify this two chain restraint system?

The Restraint Guidelines published by BlueScope Steel are designed to ensure that:

- the restraint system is legal and can be shown in court to resist the required forces which are equivalent to:
 - 80% of the weight of the load in the forward direction,
 - 50% of the weight to the side or rear, and
 - 20% upwards.
- the chains do not slip off the coil;
- the second chain can be successfully applied without the first chain losing tension;
- the restraint systems are as quick as possible to apply so that productivity can be maintained.

BlueScope Steel has designed and tested many load restraint systems for steel products. Coils bore vertical on pallets (so called “top hats”) are unusual because under sideways forces, it is the chain pre-tension which is critical; i.e. the chain tightness from “dogging down” is what counts, not the chain breaking strength.

Normally for transport chains, the average pre-tension is only about 0.75 tonnes force, even though the chain’s nominal capacity may be 3.0 or 4.0 tonnes force.

For large top hats needing two chains to hold them, there are problems getting full pre-tension from both chains at once. If the second chain is beside the first chain, then as the second chain is tightened, the first loses much of its pre-tension.

A series of full scale tests were used to prove that the “2nd off 1st” chaining method (as described on page 1) was the only way to be sure of not losing pre-tension on the first chain.

This is why BlueScope Steel is so specific that this method must be used. If other chain methods are used, the safe values in the guidelines are not correct and this could allow a dangerous situation to occur.

Common concerns about the “2nd off 1st” chain method:

Drivers and others have raised a number of concerns about the “2nd off 1st” chain method:

Q. “The Tie down points are not strong enough for two chains”

A. Not True! BlueScope Steel has studied numerous cases where chains have broken in accidents and full scale tests, in all cases the tie down point has not been significantly damaged. This is even true, where the chain has been tied to an intermediate vertical post which did not have a cross beam behind it. The breaking force of those chains was shown to be at least 5-8 tonnes, indicating that typical Australian tiedown points are much stronger than chains.

Q. “Having the second chain off the first chain is just making it into one long loop and is no better than one chain.”

A. Not True! If connected as shown, then the two chains will share the total load evenly. Each chain then only has to carry half the total. The situation is no different to towing a car with a rope. If we tie one end to each car and commence towing and then the rope breaks, we may then loop the rope around both ends so that two lengths share the load, the tension in each is halved, and the rope is less likely to break.

Q. “With ‘2nd off 1st’ chaining method if one side breaks then you will lose the load.”

A. True, but it will take twice the load to make either chain break! If the chains were connected separately as two chains then it is like towing a car with two unequal length tow ropes. The one which is shorter will end up carrying most of the load. It will break first even though the second tow rope is not fully stretched yet. After the first breaks then the second, left on its own, will also break. If they can share the load equally then the total load is higher before either chain breakage occurs.

“These guidelines are provided to you by BlueScope Steel for guidance only, and compliance with applicable laws and standards remains your responsibility. Whilst BlueScope Steel, in cooperation with transport operators, has taken considerable care to develop load restraint guidelines that are effective and comply with all requirements, BlueScope Steel makes no warranty as to the applicability of these methods in all circumstances. It remains your responsibility at all times to ensure that the methods you use are adequate for the particular situation and where appropriate you should take further precautions. The contents of these guidelines are confidential to, and the property of, BlueScope Steel, and you may only use these guidelines with permission from BlueScope Steel.”