

LOAD RESTRAINT GUIDELINE

Circular Pipe: Non-bundled, layered

1. This guideline applies to:

- Circular hollow section pipes, non-bundled.
- High and medium friction pipe: self-coloured, varnished, tempered through and glass flake epoxy coating ($\mu=0.38^*$).

* The friction factor, determined as per EN 12195-1:2010 Annex B.1.2.

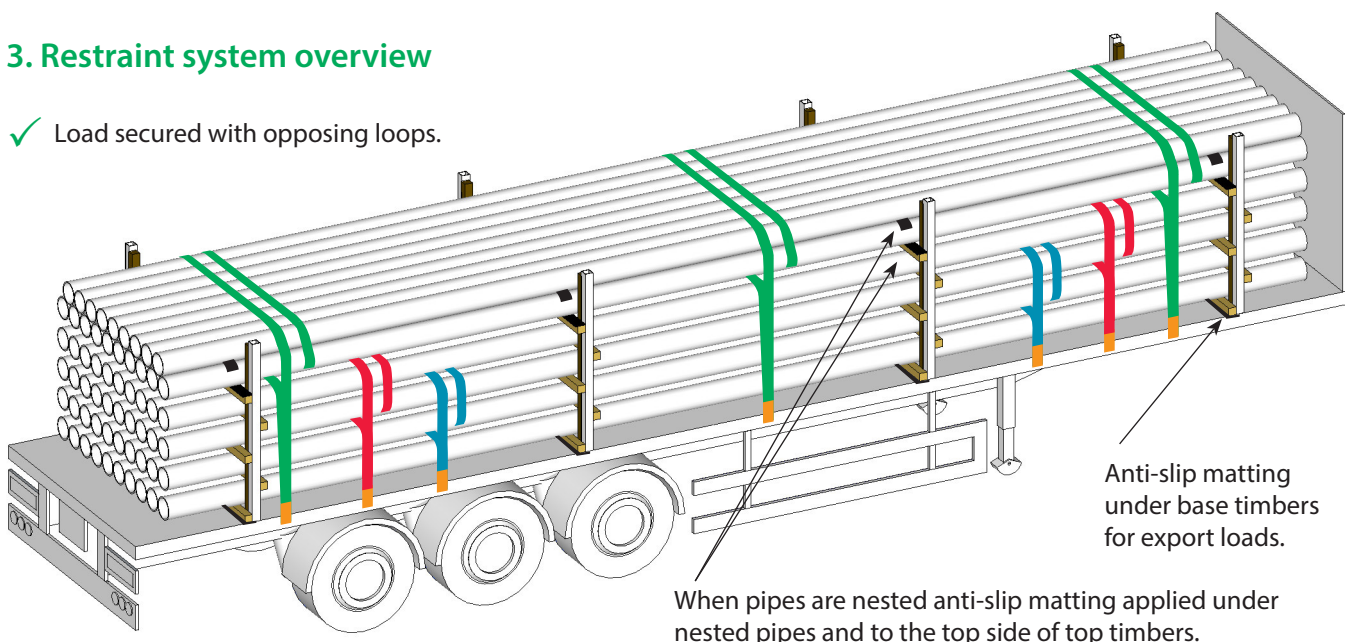
2. Essential requirements

- All restraints must be webbing straps with minimum lashing capacity of 2000 daN compliant with EN 12195-2.
- Edge protection must be fitted to all straps in contact with abrasive surfaces and sharp edges.
- Trailer headboard high enough to prevent product from sliding above it.
- When nested anti-slip matting must be applied to top side of top timbers and under nested pipes.
- Minimum of 2 pairs of goal posts or 4 pairs of side pins.
- Each pipe must be covered by 2 pairs of goal posts/side pins minimum.
- When using goal posts anti-slip matting must be used under the bottom layer of product to prevent steel on steel contact.
- Export loads must have anti-slip matting applied under base timbers.

Note: To secure some of the loads (e.g. 5 layers) long straps are required (i.e. 10 m).

3. Restraint system overview

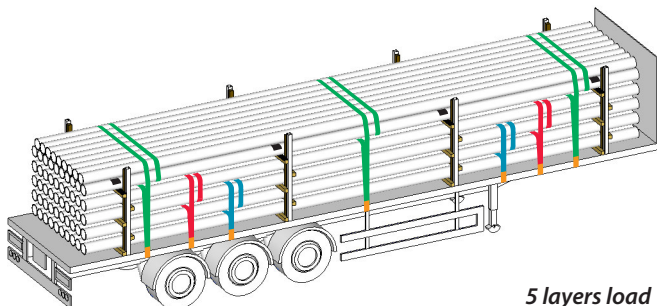
- ✓ Load secured with opposing loops.



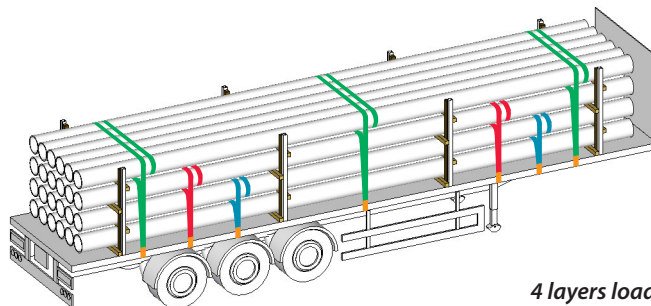
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4. Load build and strap application



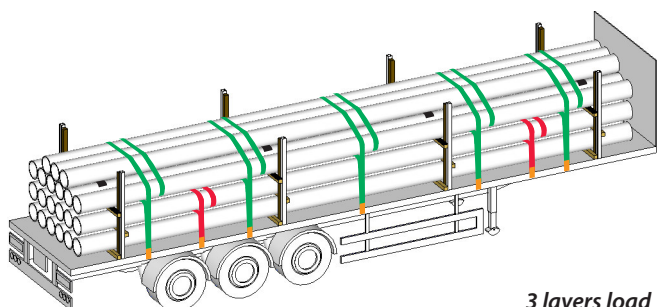
5 layers load



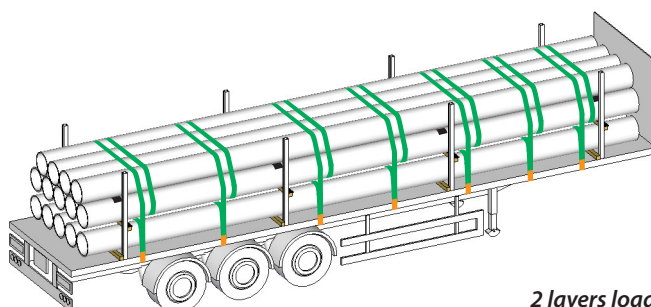
4 layers load

- ✓ 3 pairs of opposing loops applied to the top layer.
- ✓ 2 pairs of opposing loops applied to 2nd and 3rd layer.
- ✓ 2 pairs of opposing loops applied to 3rd and 4th layer.

- ✓ 3 pairs of opposing loops applied to the top layer.
- ✓ 2 pairs of opposing loops applied to 2nd layer.
- ✓ 2 pairs of opposing loops applied to 3rd layer.



3 layers load



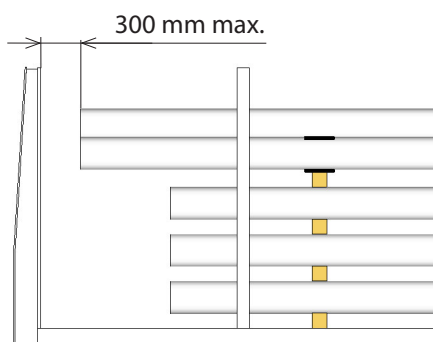
2 layers load

- ✓ 5 pairs of opposing loops applied to the top layer.
- ✓ 2 pairs of opposing loops applied to the middle layer.

- ✓ 7 pairs of opposing loops applied to the top layer.

Note: Straps quantities and distribution shown above applies to loads with or without nested top layer.

5. Nesting top layer

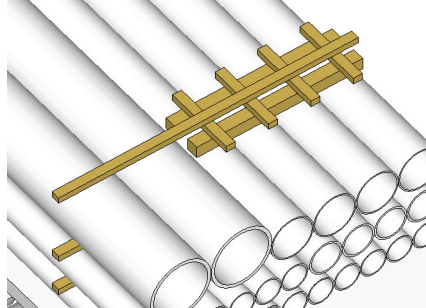
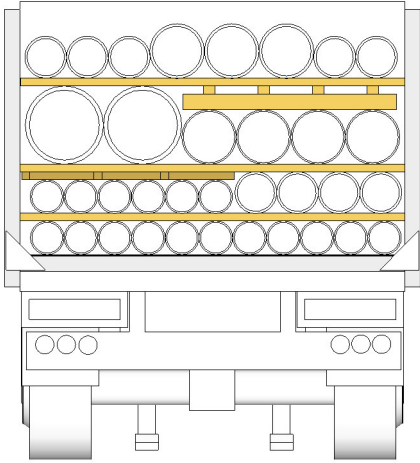


When pipes are nested in the top layer anti-slip matting must be applied under top pipes and to the top side of top timbers. Maximum distance between top layer and the headboard should be reduced to 300 mm. Headboard should be XL rated or have minimum 4 of vertical supports welded securely to the chassis frame otherwise headboard must be lashed back.

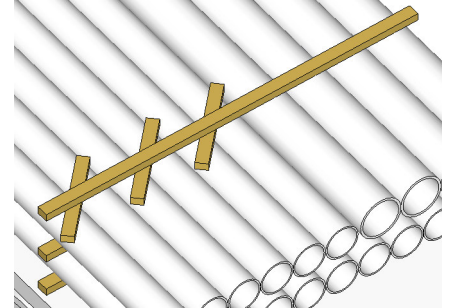
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6. Timber dunnage

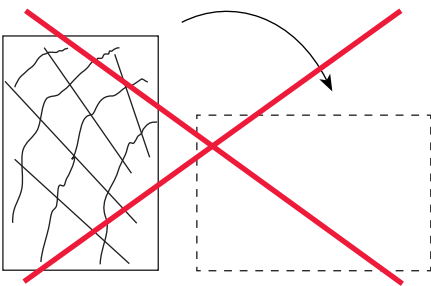


✓ Build level layers with timbers grillages.



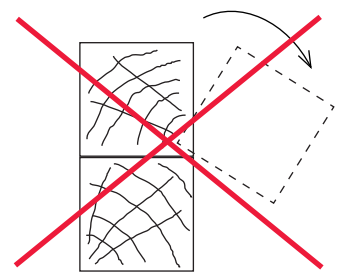
✓ Packing timber can be placed at an angle to provide clamping and prevent upper timber toppling off.

- ✓ Horizontal gaps packed with timber dunnage to ensure clamping throughout the load.
- ✓ Number and size of packing timbers must be sufficient to prevent intermediate dunnage from collapsing.
- ✓ No unblocked vertical gaps.



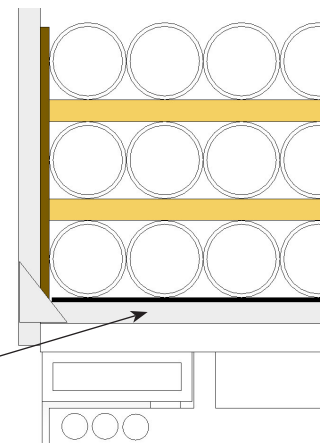
✗ Under heavy braking, rectangular dunnage on end will topple, thereby releasing tension in the restraints.

✗ Under heavy braking, upper dunnage will slide off the lower dunnage, and tension in the restraint will be lost.



7. Goal posts / side pins

- ✓ Material loaded tight against all goal posts/side pins.
- ✓ Gaps filled with packing timbers where necessary.
- ✓ Packing timbers must be secured to side posts/goal posts to prevent them from falling from the trailer during transport.
- ✓ When using goal posts, apply anti-slip matting between goal post cross member and bottom layer of product to prevent steel on steel contact.
- ✗ Do not use timbers on top of goal posts cross members - risk of toppling.



Anti-slip matting on top of steel goal post cross member



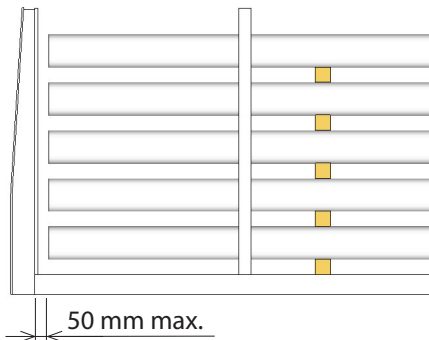
Caution: Be aware of rolling risk whilst loading and unloading pipe - apply temporary chocks as required.

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8. Headboards

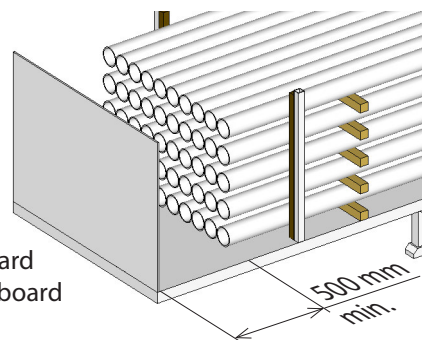
IMPORTANT NOTE: The restraint system has been designed to work either with, or without the trailer headboard, subject to the conditions below. When loaded away from the headboard a gap of at least 500 mm is required all allow the load restraint straps to tension up fully to their lashing capacity and thereby clamp the whole load securely to the trailer.



Typical plaque on a trailer with a headboard rated to EN 12642 Code XL.

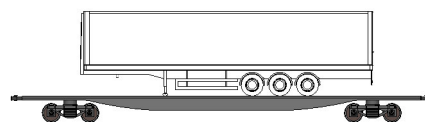
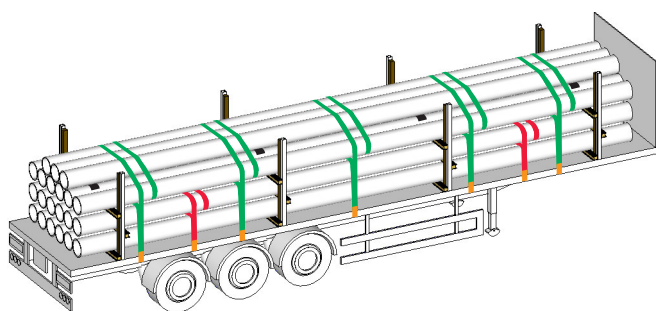
- ✓ When loaded against headboard maximum distance between the headboard and material must be 50 mm or less to avoid impact damage to the trailer in the event of an emergency braking incident.

- ✓ Trailers manufactured to EN 12642 Code XL, or approved by Tata Steel Load Restraint Engineers, can be loaded with full load against the trailer headboard to provide forward restraint (subject to axle weights).



- ✓ When loaded away from the headboard distance between material and headboard must be 500 mm or more.

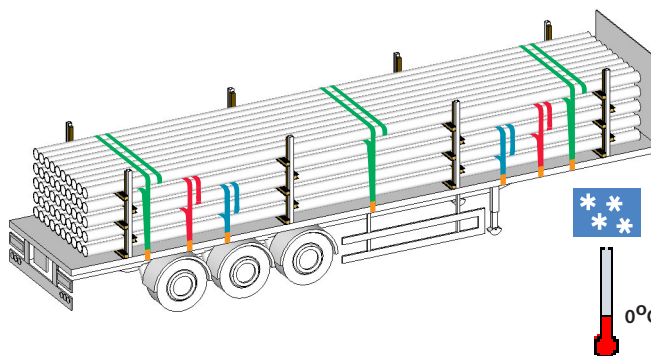
9. Intermodal transport (road and rail)



- ✓ Anti-slip matting applied to the both sides of the timbers and under each pipe (nested layer).
- ✓ Other restraint requirements remain the same.

10. Winter weather restraint

- ✓ Anti-slip matting applied to the both sides of the timbers and under each pipe (nested layer).
- ✓ Trailer deck must be clear of snow and ice before loading.
- ✓ Other restraint requirements remain the same.
- ✗ During winter weather periods flat bed trailers cannot be used for intermodal transport.



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