Load Restraint Technical Advice

TRU-SPEC® & Laser Plate on K&S Intermodal Flat Racks

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Load Restraint Advice for:

- TRU-SPEC® & Laser Plate steel packs, transported on road via **KT or KHS Intermodal Flat Racks** that meet **ALL** the specifications below;
  - Pack width: 1200 mm - 1800 mm
  - Pack length: 1.8 m - 12 m
  - Minimum pack steel thickness 48 mm
- TRU-SPEC® or Laser Plate steel packs wrapped in VCI paper.

Certification:

This load restraint system has been certified as meeting the Performance Standards in the NTC's Load Restraint Guide (3rd edn, 2018) by Transport Safety Manager, RPEng (1465).

Essential Requirements:

- All restraints must be 8 mm transport chain with a minimum 3.8 tonnes lashing capacity to Australian Standard AS/NZS4344.
- Product stacks are to be a minimum of 250 mm and a maximum of 1500 mm above the deck of the base. (Fig. 1)
- Only rubber covered timber dunnage is to be used, including base dunnage. Rubber must be attached to the timber & covering at least 90% of two opposing faces. (Fig. 2)
- Position the packs single file on the centre line of the base longitudinally and laterally. (Fig. 3)
- Wider packs **MUST** be placed below narrow packs. (Fig. 4)
- Maximum nominal pack width difference **MUST NOT** exceed 300 mm for any stack. (Fig. 4)
- Align dunnage vertically when packs are stacked on top of one another. Packs **MUST NOT** be able to bend. (Fig. 5)
- Place edge protectors between the plate packs and the chains.
- The minimum number of chains **MUST** comply with Table 1.
- **For uneven pack lengths:**
  - Place all restraints over the highest pack in a stack and add extra dunnage to stop packs from bending or damage.
  - Add an extra belly wrapped chain for every 1.5 m span of longer packs. (Fig. 6 & 9)
  - Add extra cross over chains to accommodate the mass of uneven pack lengths as per Table 1. (Fig. 8 & 9)
- **Do NOT** load packs if the packaging has visible faults such as broken or loose straps.

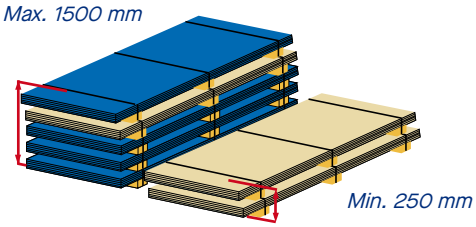


Fig. 1: TRU-SPEC® or Laser Plate steel packs strapped and covered with VCI paper.

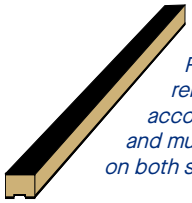


Fig.2: Dunnage must be rebated on the underside to accommodate steel strapping and must be covered with rubber on both sides.

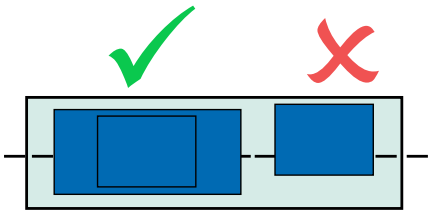


Fig. 3: Place packs on the bases so that the mass is centred.

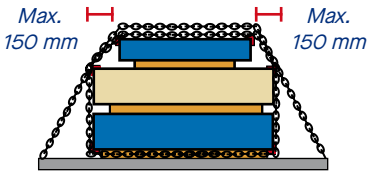


Fig. 4: Packs may be different widths, but wider pack must be on the bottom.

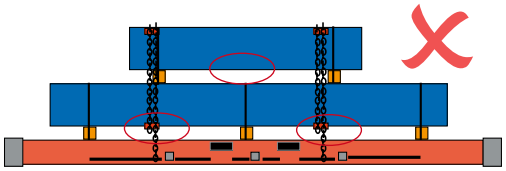


Fig. 5: Avoid misalignment of bearers and chains. Packs MUST not bend.

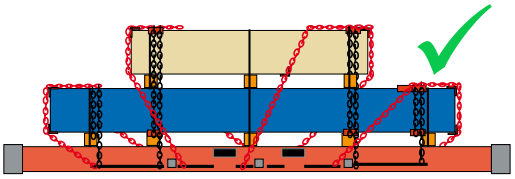


Fig. 6: Bearers vertically aligned, extra belly wrapped chain for longer packs and extra cross over chains to secure the uneven length packs.

Chain & Loading Configurations:

- Restraints are to be placed near dunnage to prevent damage and packs bending.
- Insert additional dunnage where required. Additional dunnage does not need to be strapped to the pack.
- All cross over chains **MUST** be anchored to a fixed (vertical) anchor point on the KT & KHS bases. Belly wrapped chains can be secured along the horizontal load bars. (Fig. 7)
- Apply cross over chains to the lower section of packs based on the full weight of the stack, then add additional cross over chains to cover the mass of shorter packs placed above, as per Table 1. (Fig. 8 & 9)
- Cross over chains **MUST** be placed on both ends i.e. front and rear of the stacks. Fig. (8 & 9)
- All chains **MUST** be hooked above the deck of the base to maintain a 3.8 tonne chain system.

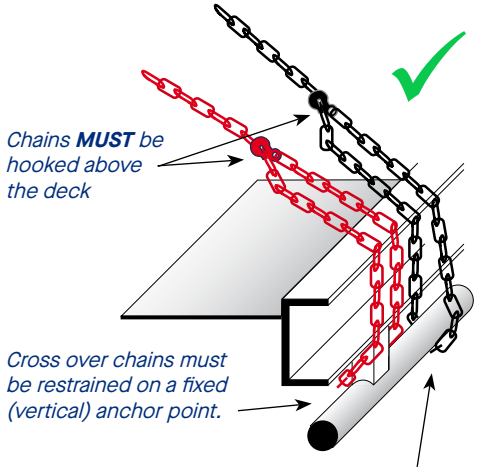


Fig. 7: Belly wrapped and cross over chain arrangement

Rear Stack:

- 4 off - 2.4 m Packs 3 tonnes each

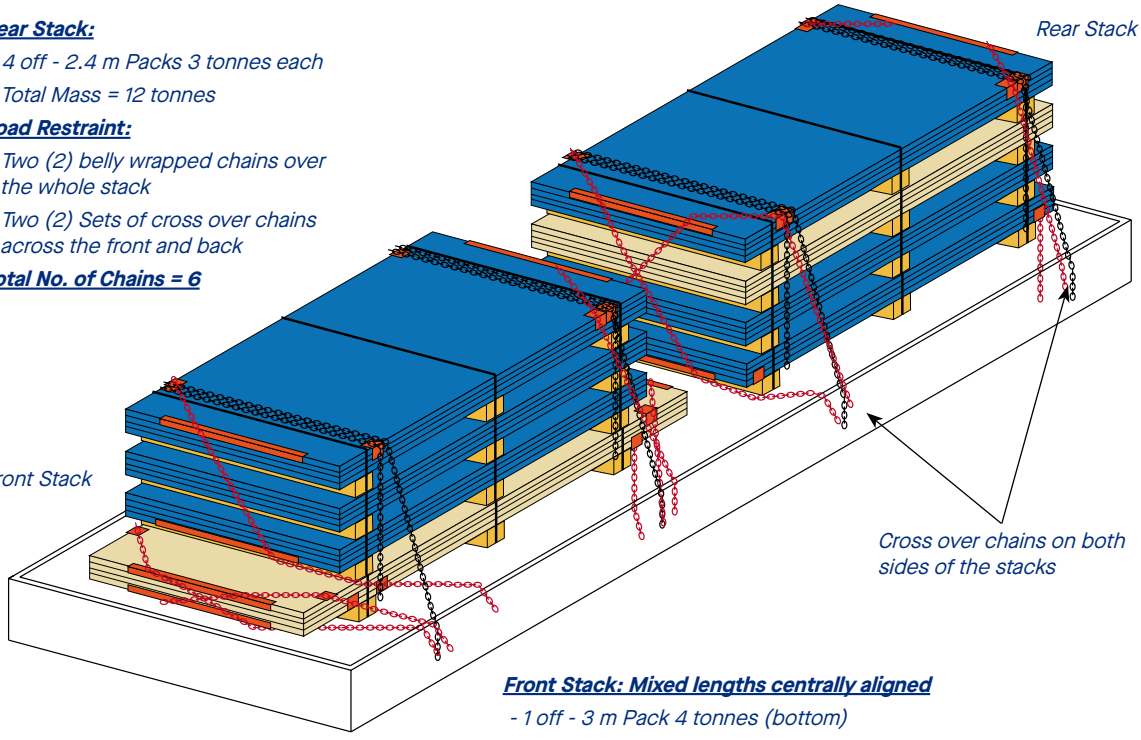
- Total Mass = 12 tonnes

Load Restraint:

- Two (2) belly wrapped chains over the whole stack

- Two (2) Sets of cross over chains across the front and back

Total No. of Chains = 6



Front Stack: Mixed lengths centrally aligned

- 1 off - 3 m Pack 4 tonnes (bottom)

- 3 off - 2.4 m Packs 2 tonnes each

- Total Mass = 10 tonnes

Load Restraint:

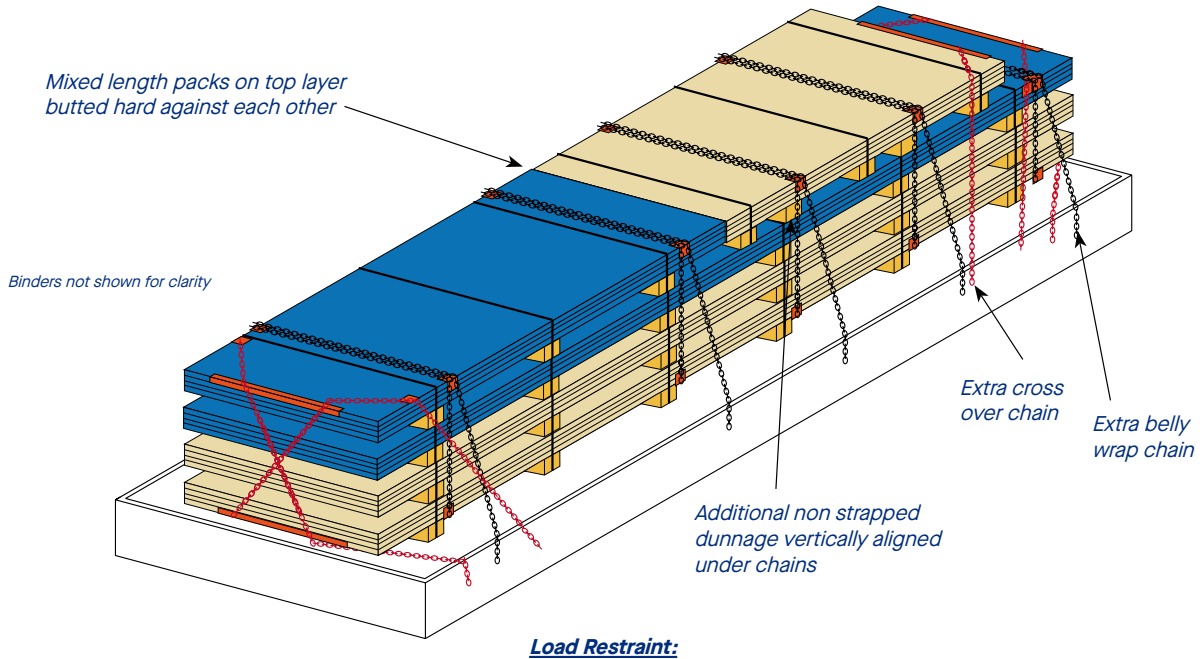
- Two (2) belly wrapped chains over the whole stack

- One (1) Set of cross over chains across the 2.4 m packs to accommodate 6 tonne as per Table 1

- Two (2) Sets of cross over chains across the 3 m pack to accommodate for 10 tonnes of mass as per Table 1

Total No. of chains = 8

Fig. 8: Load Restraint example - 22 tonnes



Mixed length stack front aligned:

- *3 off - 6 m packs 4 tonnes each*
- *1 off - 3 m pack 2 tonnes each*
- *1 off - 2.4 m pack 1.5 tonnes butted hard against 3 m pack*
- *Total Mass =15.5 tonnes*

Load Restraint:

- *Four (4) belly wrapped chains*
- *Two (2) sets of cross over chains*
- *Additional One (1) belly wrapped for longer pack*
- *Additional One (1) cross over chain for top 2.4 m packs to accommodate 3.5 tonnes of mass as per Table 1*

Total No. of Chains = 10

Fig. 9: Load Restraint example: Payload = 15.5 tonnes

Load Restraint Requirements

Table 1 - Chains for TRU-SPEC® & Laser Plate steel on rubber covered dunnage

Stack Weight (Tonnes) *Round weight up to the nearest 100 kg*	**Minimum Number of Chains**	
	Belly Wrapped Chains	**Cross Over Chains** *Number required front & rear*
0.0 to 8.5	2	1
8.6 to 13.0	2	2
13.1 to 16.0	4	2
16.1 to 19.0	6	2
19.1 to 21.0	8	2
21.1 to 24.0	10	2

Assumptions: Friction μ_s = 0.39, μ_d = 0.31, Chain tension T_p = 750 kgf, T_f = 3800 kgf