

Load Restraint Technical Bulletin

Load Restraint Technical Bulletins are published by Risk Engineering of BlueScope- Health & Safety to highlight recent issues in load restraint in particular, and road transport safety in general.

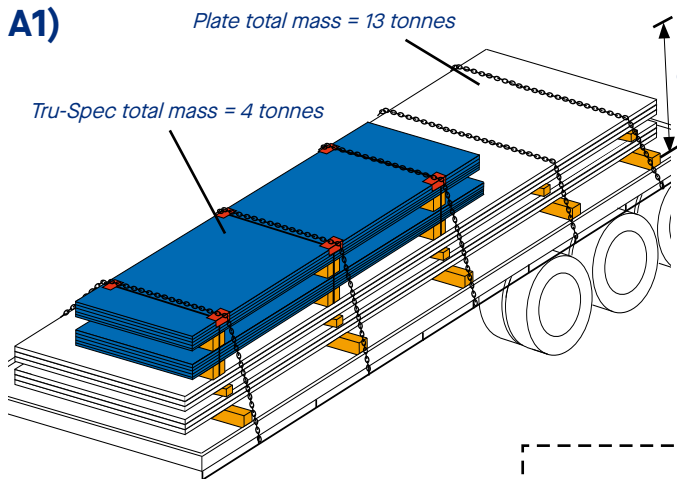
Mixed Flat Product Loads - Guide to loading and restraint requirements

Loads with mixed plate i.e. Tru-Spec, Sheet Pack, Plate are now common practice. Questions have been raised as to which guideline need to be followed for each of the scenarios. This technical bulletin aims to demonstrate the common scenarios and considerations that need to be made when choosing the restraint system. *Reference: Tru-Spec guideline LRG153-TU-Issue3, Plate guideline LRG32-PL, Light Weight Sheet Pack LRG99-SP and Sheet Pack guideline LRG23-SP.*

A) Tru-Spec + Plate

Where Tru-Spec and Plate are loaded together refer to the Tru-Spec LRG for calculating restraint requirement for the entire load.

A1)



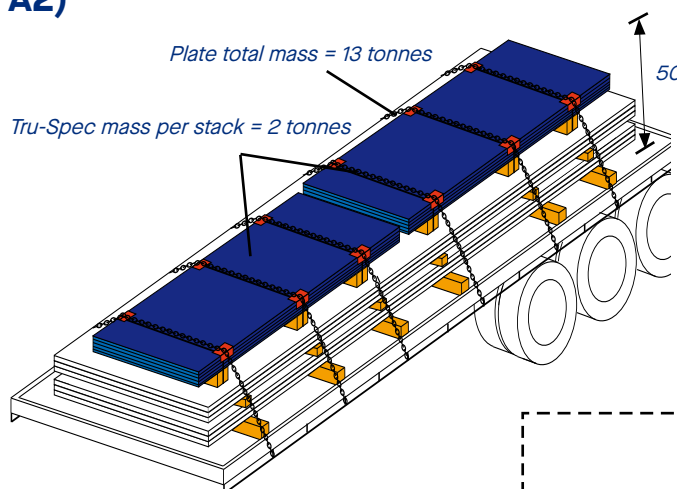
Total Mass of load = 13t + 4t = 17 tonnes

Restraint required - 5 chains

Table 1. TRU-SPEC® steel on Rubber Covered Dunnage

Stack Weight (Tonnes)	Number of Over the Top Chains Required		
	Stack Height 85 - 499mm	Stack Height 500 - 999mm	Stack Height 1000 - 1500mm
0.0 to 5.0	2	2	2
5.1 to 10.0	4	3	2
10.1 to 15.0	6	4	3
15.1 to 20.0	8	5	4
20.1 to 25.0	10	6	4

A2)



Total Mass of load = 13t + 2t + 2t = 17 tonnes

Restraint required - 5 chains divided amongst two stacks;
5 chains / 2 stacks = 2.5 chains per stack hence apply
3 chains per stack as shown in diagram above (A2).

Table 1. TRU-SPEC® steel on Rubber Covered Dunnage

Stack Weight (Tonnes)	Number of Over the Top Chains Required		
	Stack Height 85 - 499mm	Stack Height 500 - 999mm	Stack Height 1000 - 1500mm
0.0 to 5.0	2	2	2
5.1 to 10.0	4	3	2
10.1 to 15.0	6	4	3
15.1 to 20.0	8	5	4
20.1 to 25.0	10	6	4

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B) Sheet Pack + Tru-Spec

- When Sheet Pack is loaded on Tru-Spec, the two products are restrained separately. That is, Tru-Spec is restrained using the Tru-Spec LRG for the entire mass of the stack (inclusive of sheet pack mass) and the Sheet Packs are restrained using the Sheet Pack LRG.

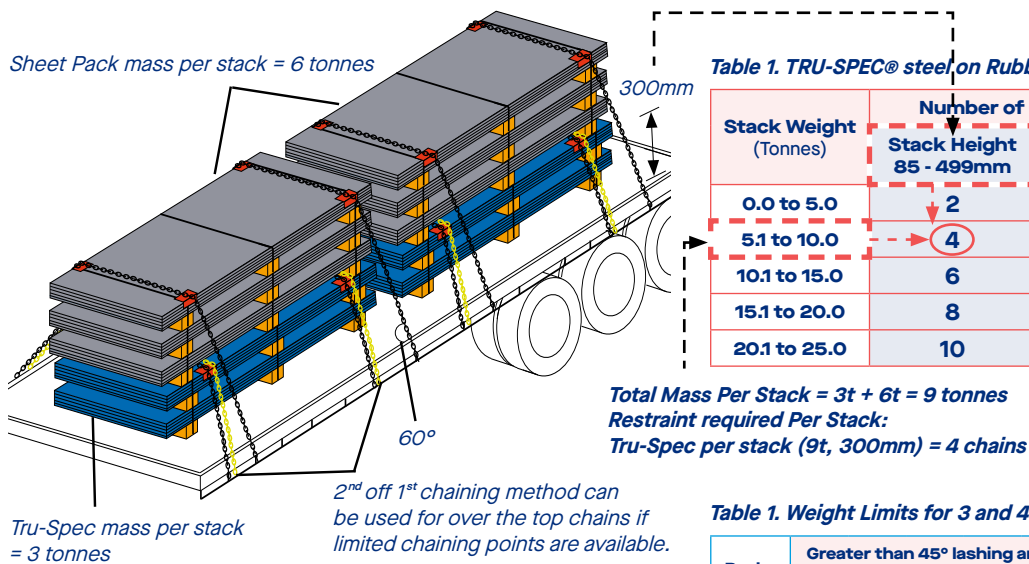


Table 1. TRU-SPEC® steel on Rubber Covered Dunnage

Stack Weight (Tonnes)	Number of Over the Top Chains Required		
	Stack Height 85 - 499mm	Stack Height 500 - 999mm	Stack Height 1000 - 1500mm
0.0 to 5.0	2	2	2
5.1 to 10.0	4	3	2
10.1 to 15.0	6	4	3
15.1 to 20.0	8	5	4
20.1 to 25.0	10	6	4

Table 1. Weight Limits for 3 and 4 Tonne Chain Systems WITH Blocking

Packs High in Stack	Greater than 45° lashing angle					30° to 45° lashing angle				
	No. of Chains					No. of Chains				
	1	2	3	4	5	1	2	3	4	5
1-3	4.2	8.4	12.6	16.8	21.0	3.0	6.0	9.0	12.0	15.0
4	2.9	5.8	8.7	11.6	14.5	2.0	4.0	6.0	8.0	10.0
5	1.9	3.8	5.7	7.6	9.5	1.3	2.6	3.9	5.2	6.5

C) Sheet Pack + Plate

- When Sheetpack is loaded on Plate, the two products are restrained separately. That is, Plate is restrained using the Plate LRG for the entire mass of the stack (inclusive of the sheet pack mass) and the Sheet Packs are restrained using the Sheet Pack LRG.

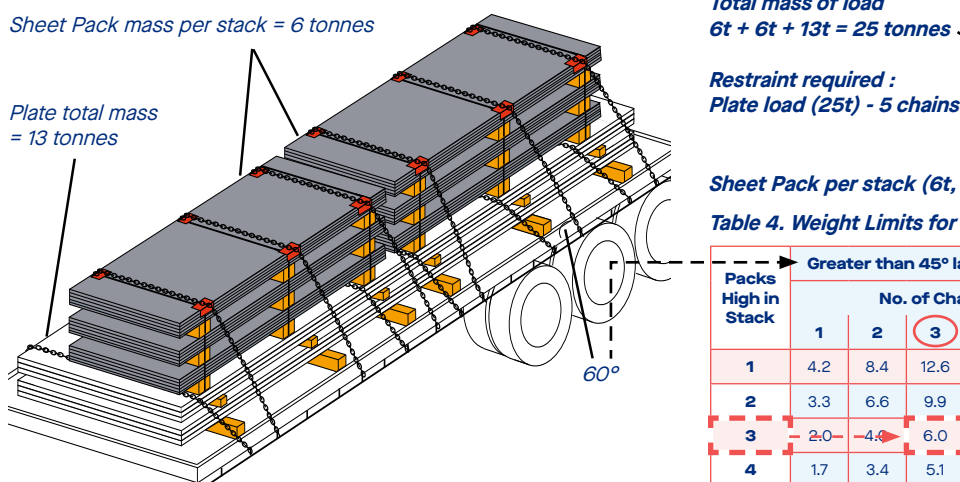


Table 1. Number of Chains Required

Stack Weight (Tonnes)	No. of Chains
0 to 10.4	Minimum 2
10.4 to 15.6	3
15.6 to 20.8	4
20.8 to 26	5
26 to 31.2	6

Table 4. Weight Limits for 3 and 4 Tonne Chain Systems NO Blocking

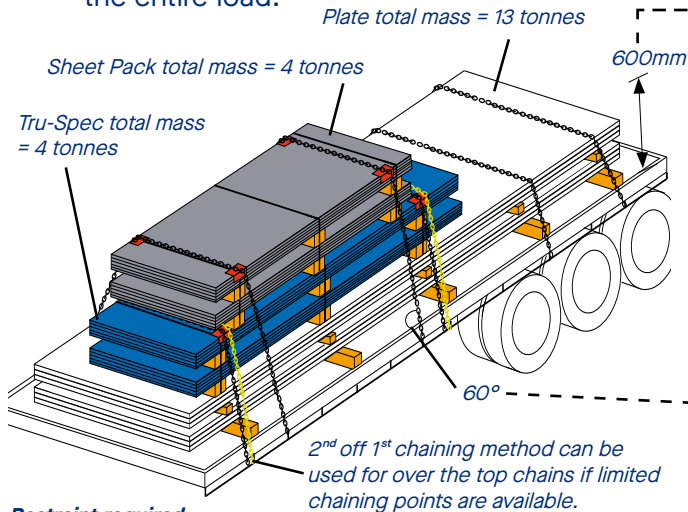
Packs High in Stack	Greater than 45° lashing angle					30° to 45° lashing angle				
	No. of Chains					No. of Chains				
	1	2	3	4	5	1	2	3	4	5
1	4.2	8.4	12.6	16.8	21.0	3.0	6.0	9.0	12.0	15.0
2	3.3	6.6	9.9	13.2	16.5	2.3	4.6	6.9	9.2	11.5
3	2.0	4.0	6.0	8.0	10.0	1.4	2.8	4.2	5.6	7.0
4	1.7	3.4	5.1	6.8	8.5	1.2	2.4	3.6	4.8	6.0

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D) Sheet Pack + Tru-Spec + Plate

- A mixed plate load like the one below should be treated with extra precaution. If Sheet Pack is sitting on top, the Sheet Pack is to be restrained using the Sheet Pack LRG, and the Tru-Spec LRG must be used over Tru-Spec and Plate for the entire mass of the load.

If Sheet Pack is configured mid-stack or on the bottom, then the Sheet Pack LRG must be used for the entire load.



Restraint required:
 Tru-Spec/Plate (21t, 600mm) - 6 chains
 Sheet pack (2 packs high, 4t stack, no blocking) - 2 chains

Table 1. TRU-SPEC® steel on Rubber Covered Dunnage

Stack Weight (Tonnes)	Number of Over the Top Chains Required		
	Stack Height 85 - 499mm	Stack Height 500 - 999mm	Stack Height 1000 - 1500mm
0.0 to 5.0	2	2	2
5.1 to 10.0	4	3	2
10.1 to 15.0	6	4	3
15.1 to 20.0	8	5	4
20.1 to 25.0	10	6	4

Total Mass of load = 13t + 4t + 4t = 21 tonnes

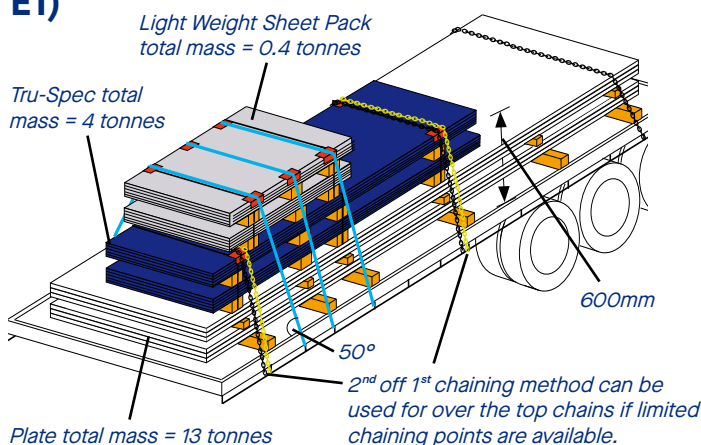
Table 3 - Weight Limits for 3 and 4 Tonne Chain Systems no Blocking

Packs High in Stack	Greater than 45° lashing angle					30° to 45° lashing angle				
	No. of Chains					No. of Chains				
	1	2	3	4	5	1	2	3	4	5
1	4.2	8.4	12.6	16.8	21.0	3.0	6.0	9.0	12.0	15.0
2	3.3	6.6	9.9	13.2	16.5	2.3	4.6	6.9	9.2	11.5
3	2.0	4.0	6.0	8.0	10.0	1.4	2.8	4.2	5.6	7.0
4	1.7	3.4	5.1	6.8	8.5	1.2	2.4	3.6	4.8	6.0

E) Light Weight Sheet Pack + Tru-Spec + Plate

In this load, the Tru-Spec LRG must be used over TruSpec and Plate for the entire mass of the load. The Light Weight Sheet Pack is restrained according to Light Weight Sheet Pack LRG.

E1)



Total Mass of load = 0.4t + 4t + 13t = 17.4 tonnes

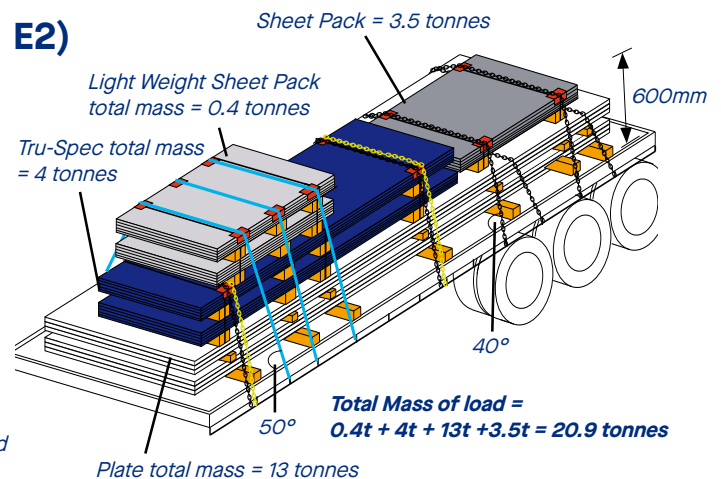
Restraint required:
 Tru-Spec/Plate (17.4t, 600mm) - 5 chains

Light WeightSheet pack (0.4t, 50°) - 3 webbings

Table 2 - Weight Limits 2 Tonne Webbing Strap

Lashing Angle	Number of Webbings			
	2	3	4	5
30° to 45°	0.2	0.3	0.4	1.5
45° to 60°	0.2	0.4	0.5	0.7
Greater than 60°	0.3	0.4	0.6	0.8

E2)



Total Mass of load = 0.4t + 4t + 13t + 3.5t = 20.9 tonnes

Restraint required:
 Tru-Spec/Plate (20.9t, 600mm) - 6 chains
 Light WeightSheet pack (0.4t, 50°) - 3 webbings
 Sheet Pack (1 pack high, 3.5t, 40°, blocking) - 2 chains

Table 1. Weight Limits for 3 and 4 Tonne Chain Systems WITH Blocking

Packs High in Stack	Greater than 45° lashing angle					30° to 45° lashing angle				
	No. of Chains					No. of Chains				
	1	2	3	4	5	1	2	3	4	5
1-3	4.2	8.4	12.6	16.8	21.0	3.0	6.0	9.0	12.0	15.0
4	2.9	5.8	8.7	11.6	14.5	2.0	4.0	6.0	8.0	10.0
5	1.9	3.8	5.7	7.6	9.5	1.3	2.6	3.9	5.2	6.5