

SECTION 4
TRAIN MARSHALLING

Train marshalling

Marshalling involves making up the vehicle consist of a train.

There are a number of marshalling restrictions that apply to freight trains to ensure safe and reliable operation.

Loaded vehicles should be marshalled immediately behind the locomotive(s), where possible. The position of a vehicle within a train is also determined by:

- the draw capacity
- brake equipment type
- main reservoir hoses (where fitted)
- type of vehicle (e.g. wooden body)
- vehicle destination
- dangerous goods
- length difference between adjacent vehicles
- independent brake ('B' wagons)

The overall length of a train includes all locomotives whether powering, off line, dead attached or banking.

Draw capacity

The draw capacity of a vehicle is determined by the:

- coupler
- draftgear
- or underframe strength

whichever is the weakest link, and is listed for each vehicle type in **Section 10 Locomotives And Rolling Stock Data pages**.

Length restrictions due to brake type

The brakes on a train apply and release due to changes in pressure in the brake pipe. These pressure changes are less definite the further the vehicle is from the locomotive(s). To ensure that the brakes on vehicles operate correctly towards the rear end of a train, operating limits have been determined based on the brake equipment sensitivity. Less sensitive equipment must be marshalled towards the front of a train where the pressure change is more prominent.

When a train is being marshalled at its point of origin, remarshalled or has vehicles attached enroute the **brake type** listed in **Section 10 Locomotives And Rolling Stock Data pages** must be checked against the following table to ensure these limits are not exceeded. The train length includes all locomotives on the train.

Brake type	Allowable vehicle position in train
B1	Any position in the first 900 metres of train
B2 & B3	Any position in the first 1500 metres of train
B4	Any position in train

In the **brake type** column of the **Section 10 Locomotives And Rolling Stock Data pages**, ●● indicates that the vehicle is a two piped vehicle and is fitted with a main reservoir pipe and that the brake system is recharged from the main reservoir pipe. In some areas, restrictions on train load are applied to single pipe vehicles, that is vehicles not having main reservoir pipe recharging the brake system.

Trailing tonnage table

The trailing tonnage table indicates the trailing load permitted to be hauled behind a vehicle according to its draw capacity.

The trailing load is determined from the draw capacity of the vehicle and the ruling grade on the route the train is travelling.

Vehicles with light draw capacity shall be marshalled towards the rear of the train or towards the centre in the case of a push / pull train providing it complies with other marshalling restrictions listed below.

The tonnages given below are inclusive of the mass of the vehicle being assessed.

DRAW CAPACITY	GRADES 1 : X																					
	MN	30	33	35	40	45	48	50	55	60	66	70	72	75	77	80	85	90	95	100	110	120
	TRAILING LOAD TONNES																					
0.05	94	103	109	123	136	144	150	163	175	190	200	205	212	216	223	235	246	257	267	288	308	
0.10	189	206	217	245	273	289	299	325	351	380	400	409	423	433	447	469	492	513	534	576	615	
0.15	283	309	326	368	409	433	449	488	526	571	600	614	635	649	670	704	737	770	802	863	923	
0.20	377	412	435	491	545	577	598	651	701	761	800	819	847	866	893	939	983	1026	1069	1151	1230	
0.25	471	515	543	613	681	722	748	813	877	951	999	1023	1059	1082	1117	1173	1229	1283	1336	1439	1538	
0.30	566	618	652	736	818	866	898	976	1052	1141	1199	1228	1270	1299	1340	1408	1475	1540	1603	1727	1845	
0.35	660	721	760	858	954	1010	1047	1138	1227	1331	1399	1433	1482	1515	1563	1643	1720	1796	1871	2015	2153	
0.40	754	823	869	981	1090	1155	1197	1301	1403	1522	1599	1637	1694	1731	1787	1877	1966	2053	2138	2302	2460	
0.45	849	926	978	1104	1227	1299	1347	1464	1578	1712	1799	1842	1906	1948	2010	2112	2212	2310	2405	2590	2768	
0.50	943	1029	1086	1226	1363	1443	1496	1626	1753	1902	1999	2047	2117	2164	2233	2347	2458	2566	2672	2878	3075	
0.55	1037	1132	1195	1349	1499	1588	1646	1789	1929	2092	2199	2251	2329	2381	2457	2581	2703	2823	2940	3166	3383	
0.60	1131	1235	1304	1472	1635	1732	1795	1952	2104	2282	2399	2456	2541	2597	2680	2816	2949	3079	3207	3454	3690	
0.65	1226	1338	1412	1594	1772	1876	1945	2114	2279	2473	2599	2661	2753	2813	2903	3051	3195	3336	3474	3742	3998	
0.70	1320	1441	1521	1717	1908	2021	2095	2277	2455	2663	2798	2865	2964	3030	3127	3286	3441	3593	3741	4029	4305	
L 0.75	1414	1544	1629	1860	2044	2165	2244	2439	2630	2853	2998	3070	3176	3246	3350	3520	3687	3849	4009	4317	4613	
0.80	1509	1647	1738	1962	2181	2309	2394	2602	2805	3043	3198	3275	3388	3463	3573	3755	3932	4106	4276	4605	4921	
0.85	1603	1750	1847	2085	2317	2453	2543	2765	2981	3234	3398	3479	3600	3679	3797	3990	4178	4363	4543	4893	5228	
M1 0.90	1697	1853	1955	2207	2453	2598	2693	2927	3156	3424	3598	3684	3811	3896	4020	4224	4424	4619	4810	5181	5536	
0.95	1791	1956	2064	2330	2589	2742	2843	3090	3331	3614	3798	3889	4023	4112	4244	4459	4670	4876	5078	5468	5843	
1.00	1886	2059	2173	2453	2726	2886	2992	3253	3507	3804	3998	4093	4235	4328	4467	4694	4915	5132	5345	5756	6151	
1.05	1980	2162	2281	2575	2862	3031	3142	3415	3682	3994	4198	4298	4447	4545	4690	4928	5161	5389	5612	6044	6458	
1.10	2074	2265	2390	2698	2998	3175	3292	3578	3858	4185	4398	4503	4658	4761	4914	5163	5407	5646	5879	6332	6766	
1.15	2169	2368	2499	2820	3135	3319	3441	3741	4033	4375	4597	4707	4870	4978	5137	5398	5653	5902	6146	6620	7073	
1.20	2263	2470	2607	2943	3271	3464	3591	3903	4208	4565	4797	4912	5082	5294	5360	5632	5898	6159	6414	6907	7381	
1.25	2357	2573	2716	3066	3407	3608	3740	4066	4384	4755	4997	5117	5294	5410	5584	5867	6144	6416	6681	7195	7688	
M2 1.30	2451	2676	2824	3188	3543	3752	3890	4228	4559	4945	5197	5321	5505	5627	5807	6102	6390	6672	6948	7483	7996	
1:35	2546	2779	2933	3311	3680	3897	4040	4391	4734	5136	5397	5526	5717	5843	6030	6336	6636	6929	7215	7771	8303	
1.40	2640	2882	3042	3434	3816	4041	4189	4554	4910	5326	5597	5731	5929	6060	6254	6571	6882	7185	7483	8059	8611	
1.45	2734	2985	3150	3556	3952	4185	4339	4716	5085	5516	5797	5935	6141	6276	6477	6806	7127	7442	7750	8346	8918	
1.50	2829	3088	3259	3679	4089	4330	4488	4879	5260	5706	5997	6140	6352	6493	6700	7040	7373	7699	8017	8634	9226	
1.55	2923	3191	3368	3802	4225	4474	4638	5042	5436	5896	6197	6345	6564	6709	6924	7275	7619	7955	8284	8922	9534	
1.60	3017	3294	3476	3924	4361	4618	4788	5204	5611	6087	6396	6549	6776	6925	7147	7510	7865	8212	8552	9210	9841	
1.65	3111	3397	3585	4047	4497	4763	4937	5367	5786	6277	6596	6754	6988	7142	7370	7744	8110	8468	8819	9498	10149	
1.70	3206	3500	3694	4169	4634	4907	5087	5529	5962	6467	6796	6959	7199	7358	7594	7979	8356	8725	9086	9785	10456	
1.75	3300	3603	3802	4292	4770	5051	5237	5692	6137	6657	6996	7163	7411	7575	7817	8214	8602	8982	9353	10073	10764	
H 1.80	3394	3706	3911	4415	4906	5196	5386	5855	6312	6847	7196	7368	7623	7791	8040	8449	8848	9238	9621	10361	11071	
1.85	3489	3809	4019	4537	5043	5340	5536	6017	6488	7038	7396	7573	7835	8007	8264	8683	9094	9495	9888	10649	11379	
1.90	3583	3912	4128	4660	5179	5484	5685	6180	6663	7228	7596	7777	8046	8224	8487	8918	9339	9752	10155	10937	11686	
1.95	3677	4015	4237	4783	5315	5629	5835	6343	6838	7418	7796	7982	8258	8440	8710	9153	9585	10008	10422	11225	11994	
2.00	3771	4117	4345	4905	5451	5773	5985	6505	7014	7608	7996	8187	8470	8657	8934	9387	9831	10265	10690	11512	12031	
2.05	3866	4220	4454	5028	5588	5917	6134	6668	7189	7798	8196	8391	8682	8873	9157	9622	10077	10521	10957	11800	12609	
2.10	3960	4323	4563	5150	5724	6062	6284	6830	7364	7989	8395	8596	8893	9090	9380	9857	10322	10778	11224	12088	12916	
2.15	4054	4426	4671	5273	5860	6206	6433	6993	7540	8179	8595	8801	9105	9306	9604	10091	10568	11035	11491	12376	13224	
2.20	4149	4529	4780	5396	5997	6350	6583	7156	7715	8369	8795	9005	9317	9522	9827	10326	10814	11291	11759	12640	13532	
2.25	4243	4632	4888	5518	6133	6495	6733	7318	7890	8559	8995	9210	9529	9739	10050	10561	11060	11548	12026	12951	13839	
2.30	4337	4735	4997	5641	6269	6639	6882	7481	8066	8750	9195	9415	9740	9955	10274	10795	11395	11805	12293	13239	14147	
2.35	4431	4838	5106	5764	6405	6783	7032	7644	8241	8940	9395	9619	9952	10172	10497	11030	11551	12061	12560	13527	14454	
2.40	4526	4941	5214	5886	6542	6927	7182	7806	8416	9130	9595	9824	10164	10388	10720	11265	11797	12318	12827	13815	14762	
X 2.45	4620	5044	5323	6009	6678	7072	7331	7969	8592	9320	9795	10029	10376	10604	10944	11499	12043	12574	13095	14103	15069	
2.50	4714	5147	5432	6131	6814	7216	7481	8132	8767	9510	9995	10233	10587	10821	11167	11734	12289	12831	13362	14390	15377	

 Main reservoir

Some vehicles are fitted with a main reservoir pipe and hoses. The main reservoir may be used to recharge the air brake system on the vehicle and/or operate pneumatic equipment such as air operated doors or a pneumatic discharge system.

On trains containing vehicles with a main reservoir pipe, these vehicles should be marshalled together and coupled to the locomotive(s) or to any other vehicles with main reservoir hoses, which are already attached to the locomotive(s).

Where main reservoir hoses are duplicated at each end of a vehicle, all hoses should be coupled and all coupling cocks opened:

- ◆ between locomotives
- ◆ between the rear locomotive and the first vehicle
- ◆ and between the vehicles

On some sections of descending steeply graded track, operating restrictions may apply to the total train length/mass of loaded trains in the case where the main reservoir equipped vehicles are not marshalled at the front of the train.

 Wooden bodied vehicles

A locomotive hauled train conveying wooden-bodied vehicles at either end of the consist must be worked as a block train unless both terminal vehicles are steel strengthened or they are unoccupied for the duration of the journey

A self propelled train containing wooden-bodied vehicles (such as CPH railcars) must be worked as a block train unless such vehicles are fitted with approved hazard warning lights at each terminal end and approved impact resistant barriers on the front and rear windows.

 Locomotive hauled passenger cars on freight trains

Locomotive hauled passenger cars may be marshalled empty anywhere on a freight train, within normal marshalling restrictions, and operated under the same conditions as a freight vehicle.

If a passenger vehicle is the last vehicle on a train, an approved end of train marker must be fitted to the rear of that vehicle.

 Test accommodation and crew cars

Test accommodation vehicles or crew cars may be marshalled anywhere within a train consist as determined by the operator or staff travelling on those vehicle(s) and with agreement of the Track Access Provider.

 Vehicles under test

Vehicles or trains under test shall require the approval of the Track Access Provider.

 Dangerous goods

All vehicles containing dangerous goods must be labelled in accordance with the provisions of the Australian Dangerous Goods Code (ADG Code).

Shunting of vehicles containing or carrying dangerous goods shall be in accordance with Safeworking Rules.

Separation between dangerous goods on rail wagons and marshalling of rolling stock containing dangerous goods must comply with the provisions of Division 9.2 and Table 9.3 of the ADG Code and any regulations, provisions or exemptions to that code as approved by the Competent Authority.

A copy of Exemption No EXEM2000/65 issued on 29 January 2001, by the NSW Environment Protection Authority on behalf of the Competent Authorities Panel follows page 4 of this section.

Also shown, are supporting notes that explain the above exemption and its application to train operations on the NSW network

 *Dangerous goods (continued)***NOTES:**

1. This exemption covers acceptable alternate methods of working. Any operator not wishing to use this exemption must comply with the existing provisions of the Australian Dangerous Goods Code.
2. Notwithstanding that permitted under Exemption Parts 6 and 7, it is a requirement of the Rail Infrastructure Corporation that a copy of Dangerous Goods Documentation as specified in Division 11.1 of the ADG Code, including Emergency Information, be provided to Metra staff at Sydney Train Control, phone No (02) 9379 4242, or (02) 9379 3141, facsimile No (02) 9379 4482 or (02) 9379 4436.

 *Dangerous Goods Exemption No EXEM2000/65 - Explanatory Notes*

Exemption Part 1 – Not applicable to train operations.

Exemption Part 2 - When a rail wagon is transporting any quantity of dangerous goods in a freight or bulk container as part of a journey involving the import or export of the dangerous goods by sea, it is permitted for the freight or bulk container to be placarded in accordance with the International Maritime Dangerous Goods Code, provided full details of the dangerous goods involved is included on the train manifest.

Exemption Part 3 - When a rail wagon is transporting any quantity of dangerous goods in a freight container it is permissible to placard only the freight container, provided it is placarded in accordance with the ADG Code and the dangerous goods on the wagon is listed on the train manifest.

NOTE: In this case, containers carrying dangerous goods are not permitted to be transported in open wagons or in the well of well wagons unless the dangerous goods placard is visible from both sides of the wagon.

Exemption Part 4 - The marshalling of dangerous goods bulk tank wagons, (which do not contain dangerous goods Classes 1, 2.1, 2.3 and 5.2 or dangerous goods of Packing Group I), is permitted against locomotives or Guard's van, however, on the RIC network, the marshalling of any dangerous goods bulk tank wagons against passenger carrying vehicles, **is not** permitted.

Exemption Part 5 – It is permissible to treat a load as a packaged load for vehicle separation purposes when a rail wagon used for the transport of dangerous goods in bulk, whether as a bulk wagon or when transporting a bulk freight container, is nominally empty but not free from dangerous goods residue. That is, Note (iii) associated with table 9.3 of the ADG Code may be applied, provided the bulk wagon or container is placarded in accordance with the ADG Code and the details of the dangerous goods involved are included on the train manifest.

Exemption Part 6 – When a train is transporting dangerous goods it is permissible for the train to **not** carry dangerous goods shipping documentation in the driver's cab, provided the train manifest contains, for each type of dangerous goods to be transported, the following information. Information shall include the proper shipping name, the Class and any Subsidiary Risk, the UN Number, the Packing Group designator (if any), the aggregate quantity and the wagon number on the train where the dangerous goods is loaded. Also provision must be made for the Train Manifest to be updated when the attachment or detachment of vehicles loaded with dangerous goods occurs and all the dangerous goods information required by Division 11.1 of the ADG Code must be readily available from a central location provided by the train operator.

Exemption Part 7 – When a train is transporting dangerous goods it is permissible to **not** carry the dangerous goods emergency information in the driver's cab provided, the initial actions to be taken in the event of a suspected dangerous goods emergency, are incorporated in the train operator's Emergency Safeworking Instructions, carried in the locomotive. Compliance with Exemption Part 6 is also a requirement in this case.

Exemption General Conditions

- The above exemptions shall remain in effect until the sixth edition of the ADG Code ceases to have effect in the jurisdiction; and
- The above exemption is subject to the condition that a copy of Exemption No EXEM2000/65 is available at a central location provided by the train operator, for reference whenever that operator is using a train for the transport of dangerous goods to which this exemption applies; and
- A copy of Exemption No EXEM2000/65 is to be made available for inspection by an authorised officer at a central location provided by the train operator, whenever that operator is using a train for the transport of dangerous goods to which this exemption applies.

**NSW ENVIRONMENT PROTECTION AUTHORITY
NSW ROAD & RAIL TRANSPORT (DANGEROUS GOODS) ACT 1997**

In accordance with Section 32 of the Road & Rail Transport (Dangerous Goods) Act 1997, members of the Australasian Railway Association Inc are granted an exemption from certain provisions of the Rail Transport (Dangerous Goods) (NSW) Regulations (the Regulations) with respect to the sixth Edition of the *Australian Code for the Transport of Dangerous Goods by Road and Rail* (the ADG Code).

EXEMPTION Part 1

For this part of the exemption, the relevant provisions are Regulations 4.7, 4.9, 4.10, 4.11 and 4.12 of the Regulations where those Regulations require compliance with subclauses 4.4.3 and 4.8.3 of the ADG Code which refers to the *ARA Rolling Stock Manual* published by the Australasian Railway Association.

This part of the exemption is subject to the condition that a tank that forms part of a rail tank vehicle may be hydraulically tested and visually inspected at intervals prescribed in the:

1. *Railways of Australia Manual of Engineering Standards and Practices* (dated September 1992) until it is superseded by the *National Code of Practice on Railway Rolling Stock* as published from time to time by the Commonwealth Department of Transport and Regional Services; and
2. *National Code of Practice on Railway Rolling Stock* as published from time to time (when it is published).

EXEMPTION Part 2

For this part, the relevant provisions are Regulations 7.7, 7.8 and 7.9 of the Regulations:

- Where those Regulations require compliance with Divisions 7.4 and 7.5 of the ADG Code; and
- When a rail wagon is transporting any quantity of dangerous goods in a freight or bulk container as part of a journey involving the import or export of the dangerous goods by sea.

This part of the exemption is subject to the conditions that:

- 1 The freight or bulk container is marked in accordance with the International Maritime Dangerous Goods Code; and
- 2 Full details of the dangerous goods in the container are included on the train manifest or shipping documentation.

EXEMPTION Part 3

For this part, the relevant provisions are Regulations 7.7, 7.8 and 7.9 of the Regulations:

- Where those Regulations require compliance with subclauses 7.7.1, 7.7.7, 7.7.8 and 7.7.9 of the ADG Code with respect to the placarding of rail wagons; and
- When a rail wagon is transporting any quantity of dangerous goods in a freight container.

This part of the exemption is subject to the conditions that:

- 1 The freight container is marked in accordance with the ADG Code; and
- 2 Details of the dangerous goods on those wagons are included on the train manifest or shipping documentation.

EXEMPTION Part 4

This part of the exemption applies when:

- Regulations 9.13 and 9.14 of the Regulations require compliance with Division 9.2 and Table 9.3 of the ADG Code with respect to the separation of rail wagons; and
- A rail tank wagon is transporting dangerous goods in bulk.

This part of the exemption:

- 1 Applies only to the separation of the rail tank wagon from
 - (a) a locomotive in power,
 - (b) a guard's van; and
 - (c) a vehicle carrying passengers; and
- 2 Is subject to the conditions that:
 - (a) The rail tank wagon is constructed in accordance with Clause 4.8.3 of the ADG Code (as modified by Part 1 of this Exemption); and
 - (b) The rail tank wagon is not transporting:
 - (i) dangerous goods of Classes 1, 2.1, 2.3 and 5.2, or
 - (ii) dangerous goods of Packing Group I.

EXEMPTION Part 5

For this part of the exemption, the relevant provisions are Regulations 9.13 and 9.14 of the Regulations:

- Where those Regulations require compliance with Division 9.2 and particularly Table 9.3 of the ADG Code with respect to the separation of rail wagons; and
- When a rail wagon is used for the transport of dangerous goods in bulk, whether as a bulk wagon or when transporting a bulk freight container; and
- When the wagon or freight container is nominally empty and is not free from dangerous goods.

This part of the exemption is subject to the conditions that:

- 1 The bulk wagon or freight container is marked in accordance with the ADG Code; and
- 2 The bulk wagon or wagon with the freight container is separated as required for a wagon carrying these dangerous goods in packages
- 3 Details of the dangerous goods on those wagons are included on the train manifest or shipping documentation.

EXEMPTION Part 6

For this part of the exemption:

- 1 The relevant provisions are Regulations 11.3 and 11.4 of the Regulations where those provisions refer to the requirement that the train driver is to have dangerous goods shipping documentation while the train is transporting dangerous goods; and
- 2 The exemption is subject to the conditions that:
 - (a) The train manifest contains, for each type of dangerous goods to be transported, the proper shipping name, the Class and any Subsidiary Risk, the UN Number, the Packing Group designator (if any), the aggregate quantity and the wagon number on the train where the dangerous goods are loaded; and
 - (b) Provision is made for the Train Manifest to be updated when the attachment or detachment of vehicles loaded with dangerous goods occurs; and
 - (c) All of the information required by Division 11.1, and particularly subclause 11.1.1, of the ADG Code is available from a central location provided by the rail operator, whenever the train is transporting dangerous goods.

EXEMPTION Part 7

For this part of the exemption:

- 1 The relevant provisions are Regulations 11.7 and 11.8 of the Regulations where those provisions refer to the requirement to have the emergency information in the driver's cab of a train transporting dangerous goods; and
- 2 The exemption is subject to the conditions that:
 - (a) Initial actions to be taken in event of a suspected dangerous goods emergency are incorporated in the rail operator's Emergency Safe Working Instructions carried in the cabin of the locomotive; and
 - (b) The rail operator has immediate access to all relevant information; and
 - (c) Details of the dangerous goods on each wagon in the train are included on the train manifest or shipping documentation.

Exemption general conditions

General conditions relating of this exemption are as follows:

1. The exemption will remain in effect until the sixth edition of the ADG Code ceases to have effect in the jurisdiction; and
2. The exemption is subject to the condition that a copy of this exemption is available at a central location provided by the rail operator, whenever the rail operator is using a train transporting dangerous goods to which this exemption applies; and

3. A copy of this exemption is to be made available for inspection by an authorised officer at a central location provided by the rail operator, whenever a train is transporting dangerous goods in any transport operation to which this exemption applies; and
4. The exemption applies to operations throughout Australia in accordance with a decision of the Competent Authorities Panel on 30 October 2000 pursuant to the provisions of Regulation 15.10(1)(c) of the Regulations.

For the purposes of this exemption:

- ❖ *The Rail Transport (Dangerous Goods) (NSW) Regulations are identical (other than with respect to NSW administrative requirements) to the Commonwealth Rail (Dangerous Goods) Rules published in the ADG Code.*
- ❖ *“Train manifest” means:*
 - *A list of the rolling stock that makes up a train; and*
 - *A system that provides information meeting the shipping documentation and emergency information requirements of Chapter 11 of the ADG Code.*

LISA CORBYN
Director-General

per **ALAN RITCHIE**
Manager Dangerous Goods
by delegation

Date: 29 January 2001