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Reference

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REFERENCE 282-288

RAIL GAUGE

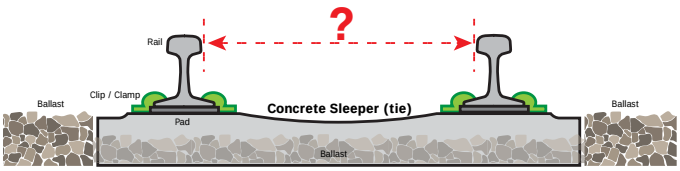
AUSTRALIAN RAILWAY GAUGES

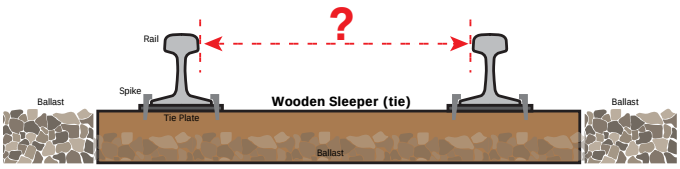
Australia's state run railways have not been known for cooperating in the past. The three railway gauges that exist are:

NARROW GAUGE (1,067mm / 3'6" [42"])

STANDARD GAUGE (1,435mm / 4'8-1/2" [56-1/2"])

BROAD GAUGE (1,600mm / 5'3" [63"])





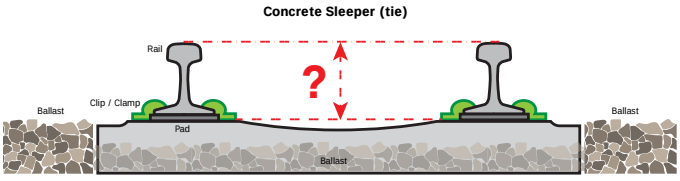
The following identifies each state or territory and their rail gauge types:

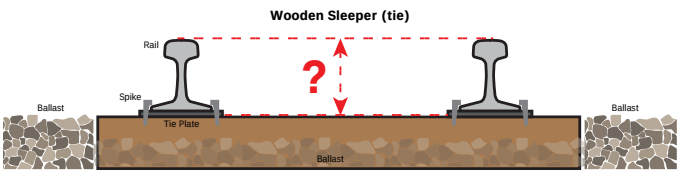
- ACT Australian Capital Territory STANDARD GAUGE (1,435mm / 4'8-1/2");
- NSW New South Wales adopted STANDARD GAUGE (1,435mm / 4'8-1/2");
- NT Northern Territory has STANDARD GAUGE (1,435mm / 4'8-1/2");
- QLD Queensland has NARROW GAUGE (1,067mm / 3'6");
- VIC Victoria chose BROAD GAUGE (1,600mm / 5'3");
- SA South Australia has all STANDARD GAUGE (1,435mm / 4'8-1/2"), BROAD GAUGE (1,600mm / 5'3") and NARROW GAUGE (1,067mm / 3'6");
- TAS Tasmania has NARROW GAUGE (1,067mm / 3'6");
- WA Western Australia has NARROW GAUGE (1,067mm / 3'6");

Today standard gauge exists nationally except in Tasmania and connects Brisbane, Sydney, Melbourne, Adelaide, Perth and Darwin. Victoria also built four NARROW(ER) GAUGE lines, one of which has been preserved as "Puffing Billy". Queensland is running high speed tilt trains on its NARROW GAUGE network.

HEIGHT OF RAIL

Devices installed between the rails (derails, hinged stops, weighing scales, etc.) should be no higher than the top of the rails. (An exception to this rule is any flexible urethane marking cone, such as a Track Clearance Marker.) Height of rail is usually measured from the top of the wooden sleeper (or tie) to the top of the rail. Do not forget the thickness of the tie plate. Put a pipe or straight piece of lumber across the rails and measure from the tie up to the underside of the pipe or board.



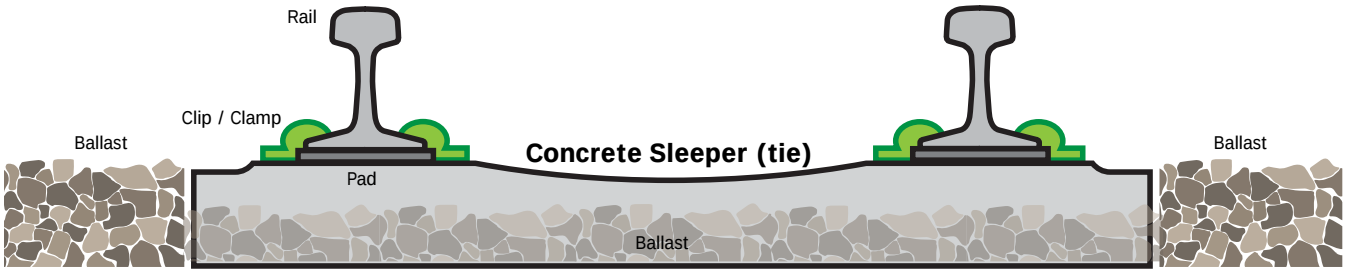


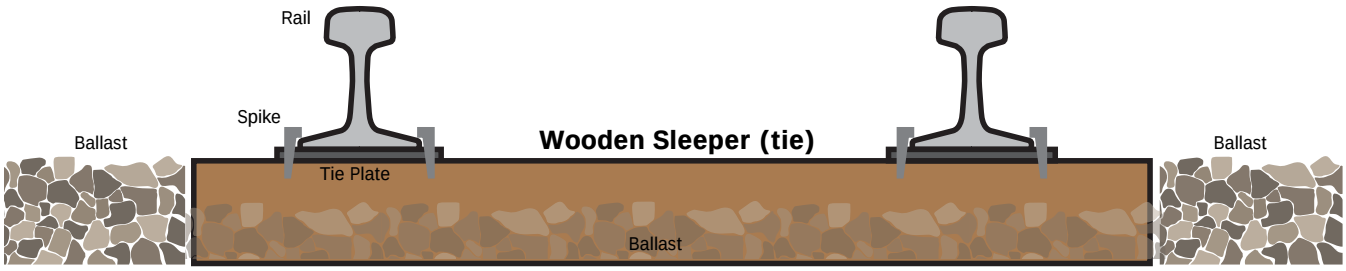
RAIL FASTENING SYSTEMS

Refers to the equipment used to fix rails to railway sleepers (or railway ties). Numerous types of systems exist today with variations around the sleeper type used:

Sleeper Density	Sleeper Material	Fastener Type	Elements of Fastening System
Hard	Concrete or Steel	Clip, Clamp or Spring	Rail, Tie Plates or Pads, Anchors, Chairs, Fasteners (spikes, screws, tensioning bolts & nuts)
Soft	Wood or Composite	Spike or Screw	

Basic rail elements and fastening:

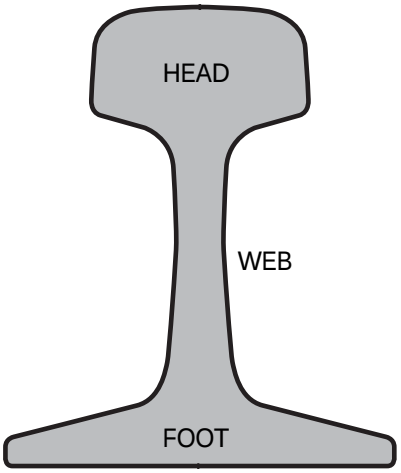




RAIL PROFILE, WEIGHT, SIZE & FASTENING

RAIL PROFILE

The cross sectional shape of railway rail is called the Rail profile, which is perpendicular to the length of the rail. The profile basically consists of three parts which are the head, web and foot.



In the past rail was made of wood, cast iron or wrought iron. Modern rail is manufactured from hot rolled steel of a specific cross sectional profile. The cross section (profile) typically approximates an I-beam but is asymmetric about a horizontal axis. The head is profiled to resist wear and to give a good ride, the foot is profiled to suit the fixing system.

Railway rails are made of very high quality steel as they are subject to very high stresses.

Larger rail, foundations and hardware allow for heavier and faster trains.

RAIL WEIGHT/SIZE

The weight of a rail per length is an important factor in determining rails strength and hence axle loads and speeds. Weights are measured in Australia in kilograms per metre:

- 30 kg/m (60 lb/yd) no longer made in Australia
- 36 kg/m (73 lb/yd) no longer made in Australia
- 41 kg/m (90 lb/yd)
- 47 kg/m (95 lb/yd) no longer conforms to Australian Standards
- 50 kg/m (101 lb/yd)*
- 53 kg/m (107 lb/yd)
- 60 kg/m (121 lb/yd)*
- 68 kg/m (137 lb/yd) iron ore railways in WA same profile different hardness*

* 50kg, 60kg & 68kg are available in head hardened.

50kg and 60 kg are the current standard, although some other sizes are still manufactured.

Some American sizes are used on northwest Western Australian iron ore railways.

Refer pages 285–287 for common rail profiles.

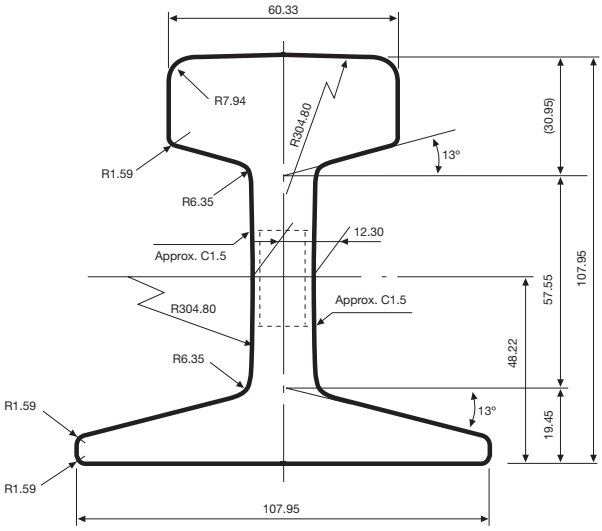
30KG, 31KG & 41KG RAIL PROFILES

Rail profiles supplied courtesy of EMRAILS – The Australian Rail Stockist.

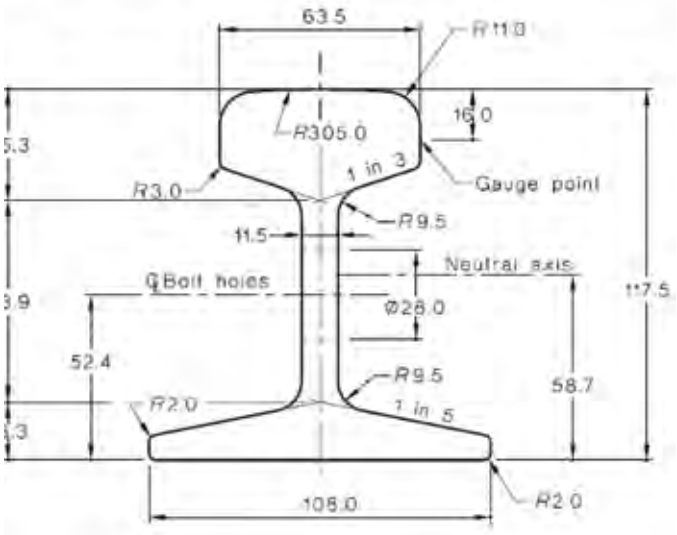
EMRAILS
THE AUSTRALIAN RAIL STOCKIST

30 KG RAIL

JIS E1101

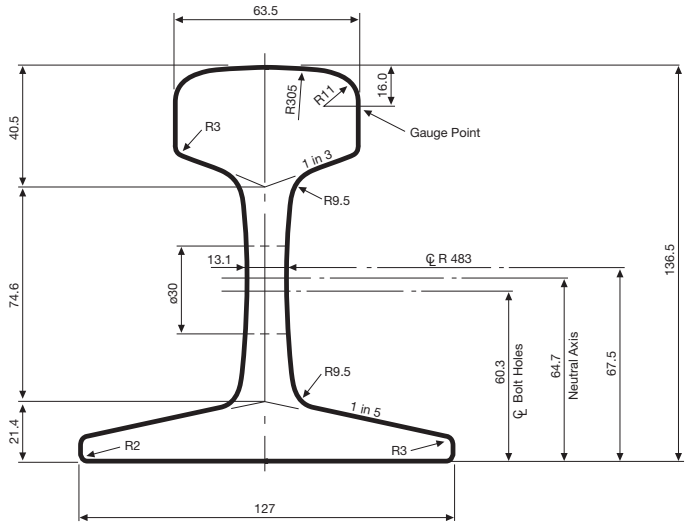


31 KG RAIL



41 KG RAIL

RT 23



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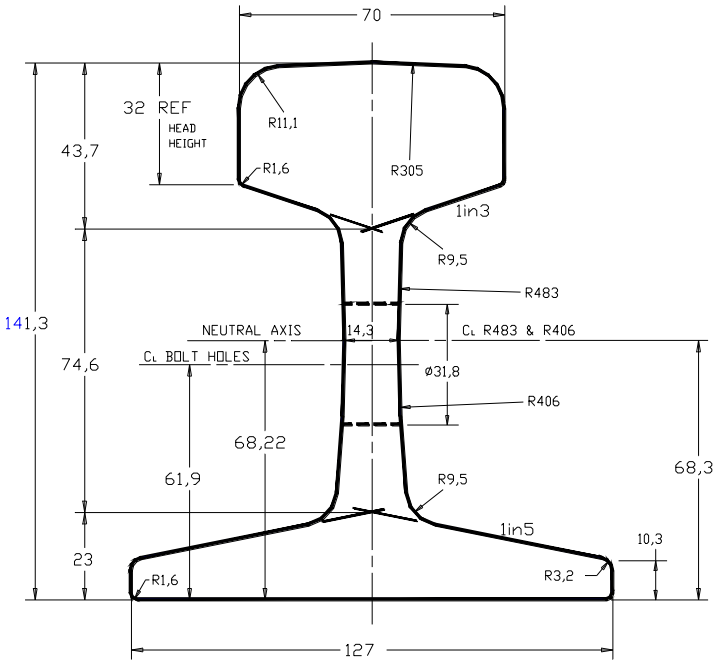
47KG & 50KG RAIL PROFILES

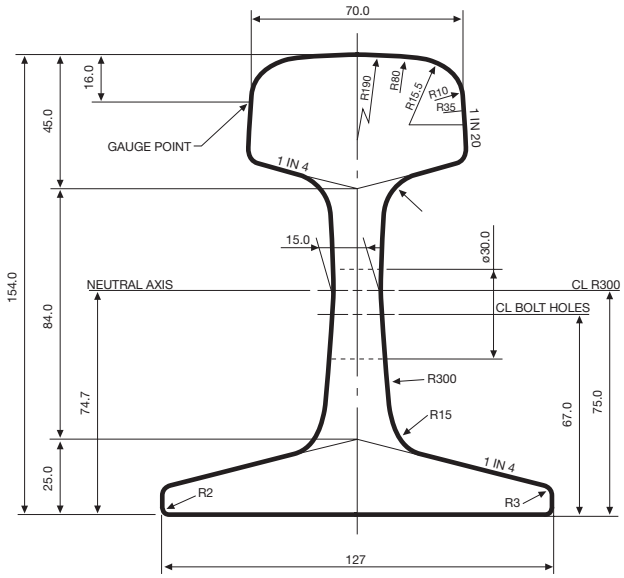
Rail profiles supplied courtesy of EMRAILS – The Australian Rail Stockist.

47 KG RAIL



50 KG RAIL

RT 23



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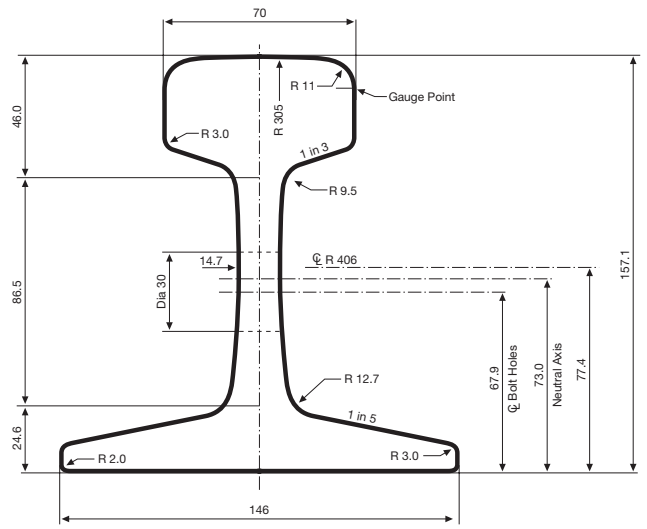
53KG & 60KG RAIL PROFILES

Rail profiles supplied courtesy of EMRAILS – The Australian Rail Stockist.

EMRAILS
THE AUSTRALIAN RAIL STOCKIST

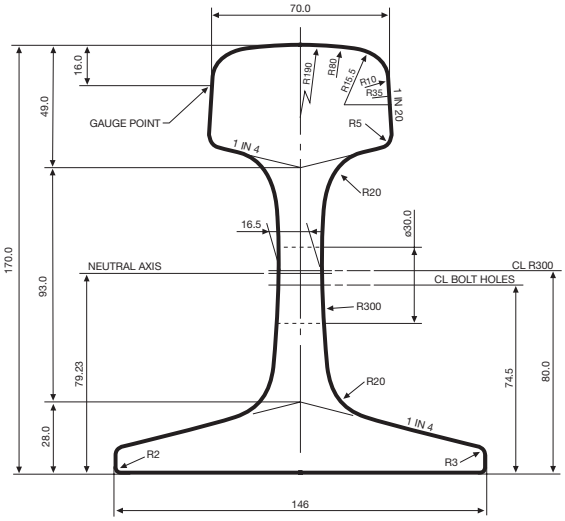
53 KG RAIL

RT 25



60 KG RAIL

RT 23

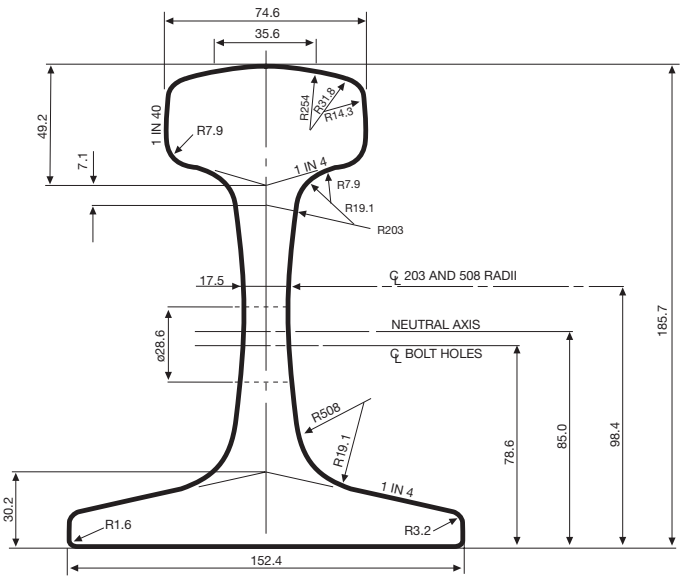


68KG RAIL PROFILE

Rail profiles supplied courtesy of EMRAILS – The Australian Rail Stockist.

68 KG RAIL

RT 19



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AUSTRALIAN RAIL HISTORY

INTRODUCTION

Australia's first rail systems were mostly built when the country consisted of sparsely settled colonies, before they combined to form a Federation of States in 1901.

Until the middle of the 1800s, people travelled around the colonies of the Australian continent by horse-drawn transport and by coastal shipping services. From 1854, when the first steam railway between Melbourne and Port Melbourne started, the railway system of the various colonies developed rapidly. Initially all track and rolling stock was imported, although by the 1880s most of the equipment was being made locally.

While the railways were operated initially by private companies, a shortage of speculation capital resulted in the continued development of the railways being undertaken by individual colonial governments. The initial purpose of the rail development was to connect the hinterland with the major export seaports which, in most cases, were the capital cities.

Planners gave little thought to connecting their railways with the other rail systems.

By Federation in 1901, all States except Western Australia were 'linked' by rail and more than 20,000 km of track had been laid. Sadly, those who envisaged a nation had not contemplated a national rail network. Three different gauges had been used.

New South Wales adopted the European standard gauge of 1435 mm, Victoria and South Australia built with the broad Irish gauge of 1600 mm, and Tasmania, Queensland, Western Australia and parts of South Australia used the narrow 1067 mm gauge. For many years, the different gauges handicapped the effective operation of interstate rail services.

In 1917, a person wanting to travel from Perth to Brisbane on an east-west crossing of the continent had to change trains six times.

The independent development of the State rail systems led to significant incompatibility problems, not only in relation to gauge but also equipment and operating practices.

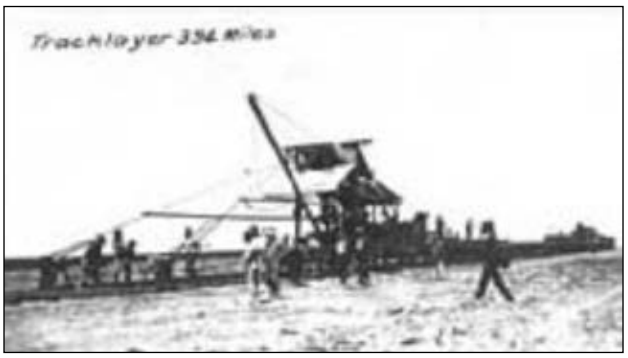
This incompatibility of the State rail systems was brought to a head during World War II when the war effort required large quantities of goods and personnel to be moved quickly throughout Australia. But it was not until June 1995 that trains could travel between Brisbane and Perth, via Sydney, Melbourne and Adelaide on a standard gauge track.

By 1970 the situation had improved sufficiently so that a passenger could remain on the same train on a journey from Perth to Sydney. Three different gauges still exist in Australia, but the state capitals are now linked by one uniform gauge.

Steam locomotion was used until the 1950s when diesel-electric locomotives began to take over. Steam locomotives were completely withdrawn in the 1970s, but tourist trips are still available on scenic routes in New South Wales, Victoria and Tasmania.

Suburban electric trains operate in Sydney, Melbourne, Brisbane and Perth.

FIRST RAILWAYS IN EACH STATE AND TERRITORY



New South Wales: In 1849, the Sydney Railway Company started building the first railway track in New South Wales between Sydney and Parramatta—a distance of 22 km. The project ran into financial difficulty and was taken over by the New South Wales colonial government. The line opened on 26 September 1855.

Victoria: The first railway line in Australia opened between Melbourne's Flinders Street Station and Port Melbourne, then called Sandridge, on 12 September 1854. Operated originally as a 1600 mm gauge, it has since been converted to a 1435 mm gauge electric light railway feeding the Melbourne tram system.

Queensland: The first railway in Queensland ran from Ipswich inland to Grandchester using the narrow 1067 mm gauge. The system was extended further to the Darling Downs before being connected with Brisbane, the capital, in 1875.

South Australia: While South Australia had a horse-drawn railway operating at the mouth of the Murray River in 1854, the first line carrying steam powered trains opened on 21 April 1856 between Adelaide and Port Adelaide. It was built by the colonial government to the then Australian 'standard' gauge of 1600 mm.

Western Australia: Commencing in 1871, a private timber railway from Lockville to Yoganup, south of Perth, was the first railway to operate in Western Australia. The first Government railway opened in 1879 between Geraldton and Northampton. In the 19th century the network in south-western Western Australia was built as 1067 mm gauge lines, but in the 20th century the eastern states were connected to Perth and Esperance with standard (1435 mm) gauge lines.

Tasmania: A railway line 72 km long opened between the Northern Tasmanian towns of Launceston and Deloraine in 1868. Built to the 1600 mm gauge, the operator was the Launceston and Western Railway Company. Subsequently, the Tasmanian Government passed an act of Parliament incorporating the Tasmanian Mainline Railway Company. This company built the mainline between Launceston and Hobart, the State capital.

Northern Territory: The completion of the Alice Springs to Darwin standard gauge rail link in January 2004 resulted in a national rail network linking all mainland State and Territory capital cities. A railway between Darwin and Pine Creek (253 km) became operational on 1 October 1889. The Australian Government took control of the Pine Creek Railway from 1 January 1911. It operated until 1 July 1918, when the line became part of the Commonwealth Railways. The former North Australia Railway linked Darwin with Birdum—a distance of 511 km—by 1929. It was never profitable and has been closed for many years.

Australian Capital Territory: A 10 km standard gauge branch line opened between Queanbeyan, NSW, and Canberra, the Australian capital, in 1914. Passenger operations commenced in 1923.

STANDARDISATION OF AUSTRALIA'S INTERSTATE TRACK GAUGE

The process standardising Australia's interstate track to a standard, 1435 mm gauge commenced in the 1930s, and was only completed in 1995.

- A standard gauge line connected Brisbane with the New South Wales system in 1930.
- Melbourne was linked to New South Wales by a standard gauge line in 1962.
- The standard gauges link between Perth and Kalgoorlie was completed in 1968.
- The Broken Hill to Port Pirie line in 1969 completed the standard gauge east-west transcontinental connection.
- Alice Springs was connected to the transcontinental line in 1980 with a line built from Tarcoola.
- Adelaide was connected to the transcontinental line in 1982 with the conversion of the line from Crystal Brook,
- Melbourne and Adelaide were linked by a standard gauge line that opened in June 1995.
- The standard gauge link between Alice Springs to Darwin was completed in January 2004

WORKING TOWARDS A SINGLE NATIONAL INTERSTATE NETWORK

In 1998, the Australian Government, in agreement with the mainland state governments, established the Australian Rail Track Corporation Ltd (ARTC) to manage and develop Australia's interstate track infrastructure as a single entity.

ARTC, which is wholly owned by the Australian Government, manages over 8,500 km of standard gauge track, primarily through direct ownership and long term leases of state owned track between Kalgoorlie in Western Australia and Acacia Ridge in southern Brisbane.

Through ARTC's ownership and lease of the interstate line, the six separate state-based arrangements which historically governed mainland interstate rail operations have been gradually replaced with a single set of common rules, operating standards and access regulations, representing a significant boost to the efficiency of freight rail in Australia.

- In 1998, the ownership of the interstate rail network between Kalgoorlie in Western Australia and Broken Hill on the NSW / South Australian border and Serviceton on the Victorian / South Australian border was transferred from the Australian National Railway Commission to the newly formed ARTC.
- In 1998, ARTC commenced a 16 year lease of the Victorian interstate network from Serviceton on the South Australian border to Albury on the NSW border.
- In 2008, Victoria extended the lease for a further 45 years to coincide with a package of improvement works on the network jointly financed by ARTC, the Victorian Government and the Commonwealth.
- In 2003, ARTC took on a 60 year lease of the NSW interstate and Hunter Valley network from the NSW Government.
- On 15 January 2010, ARTC took over a 60 year lease of the section of track between the NSW border and Acacia Ridge in Brisbane.

WORKING TOWARDS NATIONAL RAIL SAFETY REGULATION

In 2009, as part of the Government's Seamless National Economy agenda, the Council of Australian Governments (COAG) agreed to national transport regulation reforms including the establishment of a national rail safety law and national rail safety regulator.

Historically rail safety regulation has been managed by seven separate regulatory authorities, which collectively involved up to 46 pieces of state, territory and Commonwealth regulatory legislation.

To resolve this issue, the Commonwealth and State and Territory Governments agreed to establish a new single National Rail Safety Regulator (NRSR). The NRSR will help overcome inconsistent regulatory practices between the states and territories that have constrained rail transport operators across jurisdictional borders since federation.

The NRSR commenced operations on 20 January 2013, being the regulator for NSW, South Australia, Tasmania and the Northern Territory. Subject to the passage of further state legislation, it is expected that Western Australia, Victoria, Queensland and the ACT will also fall under NRSR within the next twelve months.

For more information, see the National Rail Safety Regulation and Investigation page, or the Office of the National Rail Safety Regulator.