

SECTION 8
DISABLED TRAINS & DEFECTIVE
VEHICLES

Disabled trains and defective vehicles

This Section is to be read in conjunction with RIC Network Rules NTR 414 & 416.

When any *train* suffers a partial or complete failure such that it cannot complete its journey under its own power, it is classified as a disabled train.

When a vehicle on a train, including a *locomotive*, becomes defective, the *vehicle* must be repaired, made safe to travel or removed from the train.

Removing a disabled train

Unless it is an emergency, before an assisting locomotive or train is used to rescue a disabled train, the *Operator's representative* of the assisting and disabled trains must be consulted to determine if there are any specific operating instructions and/or restrictions which must be adhered to, to safely affect the rescue of the train. The following instructions/restrictions must be used as a guide in rescuing some specific train types.

Any disabled train which must be assisted by another train or locomotive(s) to clear the section, the *Operator's representative* must ensure it is safe to travel before being assisted from a section. If the disabled train is amalgamated with a similar type of train or locomotive/s, normal operating procedures will apply.

An XPT power car cannot be coupled with its emergency coupler to a vehicle fitted with a combined coupler such as Millennium, Tangara, Xplorer or Endeavour. The diaphragm end of an XPT Power car or an XPT trailer car can be coupled to vehicles with a conventional coupler or to vehicles such as Millennium, Tangara, Xplorer or Endeavour using the emergency coupler.

Any electric or diesel multiple unit train may be used to assist any similar type train.

Disabled self propelled passenger trains

An *electric multiple unit* train which is disabled owing to the failure of all compressors may assist the assisting train or locomotive in powering, provided that constant communication is available between the train crews.

The *air brake* system, where compatible, must be connected and working throughout the entire train. The driver at the front of the train should have full control of the *automatic air brake* and be in radio contact with the driver of the assisting train or locomotive. If a Tangara or double deck train is assisting a different type of train, the brakes must be released by moving the brake handle in one movement to the release position, that is the graduated release feature must not be used.

A Tangara, Millennium, Xplorer or Endeavour train **must not under any circumstances** be coupled to other diesel self propelled trains as the couplers of these trains are not compatible with the coupler or emergency coupler of a Tangara, Millennium, Xplorer or Endeavour.

Disabled locomotive hauled freight and passenger trains

If the *air brake* is compatible, it must be connected and working throughout the entire train. The driver at the front of the train should have full control of the *automatic air brake* and be in radio contact with the driver of the assisting train or locomotive.

If a train has been divided, had vehicles detached or remarshalled, a brake pipe continuity test must be carried out.

If one or more of the last three vehicles have been changed then a brake holding test must also be carried out. On freight trains, the *end of train marker* (EOTM) must be relocated to the last vehicle.



WARNING

When coupling to vehicles fitted with buffers, gangway beams, diaphragms, etc., care must be taken to ensure that there is adequate clearance between these items and brake coupling cocks.

 *Assisting with a passenger train*

When a train is assisted by a self propelled passenger train, restrictions will apply depending upon the type of train that is assisting and the load of the disabled train. When emergency couplers are used to enable different types of trains to be coupled together, speed and other restrictions will apply.

When an **electric multiple unit passenger train**, with conventional couplers, is used to assist a disabled train from the section, the maximum train tonnage that may be hauled or assisted in the rear is shown in the table below. Refer to **TOC General Instruction pages, Section 10 Locomotive & Rolling Stock Data** and the train consist form for vehicle masses. Refer to **TOC General Instruction pages, Section 1 Route standards or location section pages for ruling grades**.

Ruling grade of line	The assisting electric train can move (tonnes)		
	8 cars	4 cars	2 cars
1 in 100 rising	780	390	195
1 in 80 rising	612	306	153
1 in 60 rising	388	194	97
1 in 50 rising	336	168	84
1 in 40 rising	220	110	55
1 in 30 rising	100	50	25

Note: Other combinations of assisting electric train cars can be calculated by adding the respective tonnages. For example, a six car train on a 1 in 50 grade can haul 168 + 84 = 252 tonnes. A twelve car train can haul 3 x 390 = 1170 tonnes on a 1 in 100 grade.

The maximum number of electric cars that can be used to assist a disabled train is 16 cars.

When an electric multiple unit train is attempting to assist a disabled train and the disabled train has not moved after applying maximum power for 5 seconds, the driver must shut off power and wait 2 minutes before re-applying power. If, after 3 attempts, the assisting train is unable to move the disabled train, alternative arrangements must be made.

A **Tangara or Millennium** train must not be used to haul a disabled train if the mass of the disabled train exceeds the mass of the assisting **Tangara or Millennium** train.

An **XPT** train must not be used to haul a defective train without authorisation from XPT Maintenance Centre staff. An XPT train must not be used to assist any other train in the rear.

An **Xplorer or Endeavour** train must not be used to assist any train other than another Xplorer or Endeavour train.

 *Assisting a disabled train from the front*

A disabled train may be hauled from the section by attaching the assisting train or locomotive/s at the front of the disabled train in the direction of travel. The draw strength of any vehicle in the combined train consist must not be exceeded.

Hauling a disabled passenger train

Wherever possible, a disabled **Tangara, vintage, historical or steam hauled train** should be hauled rather than assisted in the rear from a section.

Maximum speed when hauling a disabled train

When a disabled train is being hauled and the driver at the front of the train has full control of the automatic air brake of both the assisting and disabled trains, emergency couplers are not being used and when no other restrictions apply to any of the vehicles on the train, the train may travel at normal speed.

 *Assisting a disabled train from the rear*

When assisting a disabled train from the rear, refer to RIC Network Rule **NTR 424 Propelling trains**.

An **XPT** train must not be used to assist a disabled train from the rear.

Assisting a disabled passenger train from the rear.

Where practicable, a disabled **Tangara** train should only be assisted in the rear by another Tangara train. A disabled Tangara train may be assisted in the rear by another train using the emergency coupler, to the first suitable location where it can be stowed or remarshalled to allow the disabled Tangara to be hauled.

An **Xplorer** or **Endeavour** train must not be used to assist a disabled train in the rear unless the disabled train is another Xplorer or Endeavour train, provided that at least 50% of traction motive power of the combined trains is available. Combined Xplorer/Endeavour trains may travel at *normal speed*.

Disabled **diesel self-propelled trains**, other than Xplorer or Endeavour must only be assisted in the rear to the first suitable location where the train can be remarshalled to allow the diesel self-propelled train to be hauled.

Before a **vintage, historical or steam hauled train** is assisted from the rear, such a movement must be authorised by the Operator and the Track Access Provider.

A disabled **locomotive hauled passenger train** (except XPT power cars) must only be assisted in the rear to the first suitable location where the train can be remarshalled to allow it to be hauled.

When assisting a disabled passenger train from the rear with one or more locomotives, or with a locomotive hauled train, refer to the TOC manual **General Instruction Pages, Section 2, Locomotive Operations, Assisting (Banking) Locomotives** for restrictions in vehicle masses.

Maximum speed when assisting a disabled train from the rear

When a disabled train is being assisted from the rear and the driver at the front of the train has full control of the automatic air brake of both the assisting and disabled trains, the train may travel at normal speed, providing there are no other restrictions applying to the vehicles on the train and/or emergency couplers are not being used.

When a disabled train is being assisted from the rear and the driver at the front is only able to operate the *emergency cock* at the front of the train, or an emergency coupler is being used to couple the two trains, the maximum speed must not exceed **25 km/h**.

When a disabled train is being assisted from the rear and the automatic air brake of both the assisting and disabled trains is controlled by the driver of the assisting train only, that is the driver at the front of the train cannot control the air brake or operate the emergency cock, the speed of the train must not exceed **10 km/h**. There must be full radio communication between the driver of both trains.

When an electric or diesel multiple unit train is being assisted from the rear by a locomotive hauled train, the speed of the train must not exceed **25 km/h**.

 *Using an emergency coupler*

When using an emergency coupler, refer to RIC Network Rule **NTR 416 Disabled trains**.

If trains are coupled using an **emergency coupler**, the speed of the train must not exceed **25 km/h**.

Some train types are not fitted with a conventional knuckle type automatic coupler, but are equipped with an emergency coupler that will enable the train to couple to other types of vehicles with conventional type automatic couplers. Trains requiring emergency couplers include: Tangara, Millennium, XPT, Xplorer, Endeavour, or other self-propelled diesel trains.

When using an emergency coupler, the automatic air brake must be used at all times. The following equipment must not be used: locomotive independent brake (including independent release), dynamic or regenerative brake, or electro-pneumatic (EP) brake.

Where possible when assisting a disabled multiple unit train, the brake pipe pressure of the locomotive on the assisting train should be reduced to a pressure compatible with that of the disabled train.

Due to weight restrictions and manual handling requirements, the strength of an emergency coupler is limited. The driver of the assisting train must limit the amount of tractive effort required to move the train in order to minimize impacts or unnecessary force through the emergency coupler.

 Using an emergency coupler (continued)**WARNING:**

Care must be taken when coupling trains with emergency couplers to vehicles that are fitted with buffers, broad buffer beams or diaphragm plates. These vehicles must not be coupled together unless there is adequate clearance around the emergency coupler to accommodate coupler swing on tight curves.

When an emergency coupler is used to assist a train in the rear, the train shall only be assisted to the first suitable location where the train can be remarshalled or the vehicle detached.

XPT trains shall not be assisted from the rear with an emergency coupler, except in the case of a propelling shunting movement at a maximum speed of 10km/hr.

 Assisting disabled track maintenance vehicles***Assisting a disabled track maintenance vehicle with a locomotive or train***

A locomotive or train may be used to assist a disabled track maintenance vehicle using an approved towing device, emergency coupler, or automatic couplers. A disabled track maintenance vehicle may be assisted in the rear by a locomotive or train fitted with a compatible coupler.

Where possible, the disabled vehicle must have main reservoir air supply, and have an operable emergency parking brake.

 Defective air brake

This Clause is to be read in conjunction with RIC Network Rule **NTR 404 Using brakes**.

The air brake should be operational on every vehicle of a train. However, it is permissible to cut out a certain number of brakes on a train as detailed below.

The brake pipe must be continuous throughout the consist and all intermediate brake pipe coupling cocks open.

The air brake on a vehicle or bogie must only be cut out where it is not practical to repair the vehicle.

If the brakes are cut-out, the vehicle must be appropriately identified or ticketed. The *Operator* must ensure that train operating personnel and maintenance personnel are informed of any brake cut-outs.

If the defect occurs on the last vehicle of a passenger train and the vehicle is conveying passengers, the passengers must be relocated to other cars, and a qualified worker must travel in the last vehicle, and be prepared to apply the handbrake or spring parking brake. The train may travel up to a maximum speed of **25 km/h** to the first suitable location and the train remarshalled or the defective vehicle repaired or detached.

Freight trains

The maximum number of vehicles with inoperative or cut-out brakes must not exceed 1 in 10 or the total unbraked mass of the train with brakes cut-out must not exceed 10 per cent of the train load (excluding working locomotives), whichever is most restrictive. Vehicles with inoperative or cut-out air brakes must be repaired as soon as practicable.

For multipack vehicles with shared brake equipment, one triple valve cut-out is counted as 2-1/2 vehicles (2-1/2 platforms on a 5-pack) or 1-1/2 vehicles (1-1/2 platforms on a 3-pack) and the total mass is taken as half the total vehicle mass. On vehicles with shared brake equipment, ie master/slave combination, if the triple valve is cut-out on the master vehicle this will count as 2 vehicles with brake cut-outs.

A freight train should be marshalled such that a vehicle with operative air brake is placed on each side of an unbraked vehicle and an unbraked vehicle must not be one of the last three vehicles on the train.

If the brakes on one of the last three vehicles on the train is found to be inoperative or has to be cut-out enroute, the train may travel at a maximum speed of **50 km/h** to the first suitable location and the train remarshalled, the defective vehicle repaired or detached. If the vehicle with defectives brakes is the last vehicle on the train, an emergency towing chain must be attached between the last and second last vehicles.

Defective air brake (continued)**Locomotive hauled passenger trains**

A locomotive hauled passenger train must not leave a maintenance centre with any air brake inoperative.

One vehicle in 10 may be cut-out enroute, if necessary, or the total unbraked mass of the train must not exceed 10 per cent of the total train mass (excluding locomotives), whichever is the more restrictive.

If the defect occurs on the second last or third last vehicle, the train may continue at a maximum speed of **50 km/h** to the first suitable location and the train remarshalled, the defective vehicle repaired or detached.

If the last vehicle is a freight vehicle, an emergency towing chain must be attached between the last and second last vehicles and the train proceed at a speed not exceeding **50 km/h**.

Electric multiple unit trains

An electric multiple unit train must not leave a maintenance centre with any air brake inoperative.

If a brake fault occurs enroute, a train may continue in service at normal speed provided not more than one bogie in eight bogies is cut-out **and** no two bogies on either end car are cut out.

If more than one bogie in eight, but no more than one bogie in 4, are cut-out the train must be worked out of service at a speed not exceeding **80 km/h**.

If more than one bogie in four, but not more than three bogies in eight, are cut out, the train must be worked out of service at a speed not exceeding **25 km/h**.

If more than three bogies in eight are cut out, the train must be considered as disabled, and must not be moved until it has been attached to another train or locomotive.

If a failure of the electro-pneumatic brake system occurs, and the defect can not be repaired, the EP brake must be switched off and the automatic air brake used to control the train.

Diesel multiple unit and XPT type trains

A diesel multiple unit or XPT train must not leave a maintenance centre with any air brake inoperative.

If a brake fault occurs enroute, a train may continue in service at normal speed provided not more than one bogie in eight bogies is cut-out **and** no two bogies on either end car are cut out.

If more than one bogie in eight, but no more than one bogie in 4, are cut-out the train must be worked out of service at a speed not exceeding **80 km/h**.

If more than one bogie in four, but not more than three bogies in eight, are cut out, the train must be worked out of service at a speed not exceeding **25 km/h**.

If more than three bogies in eight are cut out, the train must be considered as disabled, and must not be moved until it has been attached to another train or locomotive.

If a failure of the electro-pneumatic brake system occurs, and the defect cannot be repaired, the EP brake must be switched off and the automatic air brake (XPT, Xplorer or Endeavour) or straight air brake (other diesel multiple unit trains) used to control the train.

If a failure also occurs in the straight air brake system and the defect cannot be repaired (diesel multiple unit trains), the train must be worked out of service at a maximum speed of **25 km/h** using the brake pipe emergency cock as an emergency brake.

An XPT train consisting of 2 power cars and 5 or more trailer cars may continue in service at normal speeds provided that not more than 1 power car bogie or up to 2 trailer car bogies are cut out. If more than 1 power car bogie or up to 2 trailer car bogies are cut out, the train must be worked out of service at a speed not exceeding **25 km/h**.

 Defective air brake (continued)***Braking problems when descending steep grades***

Where a driver has difficulty in recharging the brake pipe on a train, the train must be brought to a stand before releasing the brakes.

Where the vehicles in the train are fitted with grade control valves, these valves must be placed in the next holding position before proceeding. If valves are in 'EX' they shall be placed in 'IP', if in 'IP' they shall be placed in 'HP'.

If there is any doubt with regard to the braking performance of the train, the train is not to proceed. The train must be brought to a stand, the handbrakes applied and assistance sought.

Locomotives

Where a locomotive has an automatic air brake fault which prevents the operation of the automatic air brake throughout the train, the train must have the handbrakes applied and the defective brake valve must be cut-out. The train must be assisted out of the section in accordance with RIC Network Rule **NTR 416 Disabled trains**.

 Defective brake pipe

Where the brake pipe on a vehicle is broken and brake pipe pressure cannot be maintained for the operation of the automatic air brake, the disabled train must be removed from the section either with the assistance of another train or by dividing the train. The defective vehicle must be detached from the train at the first suitable location.

Locomotive hauled freight and passenger trains

When assisting a train with a defective brake pipe from the rear, the adjacent brake pipe *coupling cocks* on the two vehicles either side of the defective vehicle must be closed. The train must then be worked at a speed not exceeding **25 km/h** to the first suitable location where the defective vehicle can be detached or repaired.

Where the disabled train is conveying passengers and the defective vehicle cannot be detached they must be detrained at the first suitable location.

Where the disabled train is to be divided, the defective vehicle becomes the last vehicle on the train. The brake pipe coupling cock on the rear of the second last vehicle must be closed and the air brake on the defective vehicle released. An emergency towing chain must be used between the defective vehicle and the second last vehicle.

Where a disabled passenger train, has to be divided, all passengers must be moved into cars in front of the defective vehicle. A Passenger Train Guard or qualified worker must travel in the last car and be prepared to apply the internal handbrake or spring parking brake. Effective communication must be maintained between the qualified worker and the train crew.

Electric or Diesel multiple unit trains

Where the defective vehicle is either the leading or rear car, and the hand brake or all spring parking brakes do not operate on that car, then the train is a total failure and must only be moved with the assistance of a locomotive or another train.

Where the defective vehicle cannot be detached, all passengers must be detrained at the next suitable location. The train must then be worked out of service.

This type of train usually has a main reservoir pipe and therefore the train may complete its trip providing the electro-pneumatic (EP) brake is working on the entire train. In the event of an EP brake failure, the driver must operate the train from the end which will give control of the automatic brake on the greatest number of cars. The Passenger Train Guard or qualified worker must ride in the end car at the opposite end of the train and be prepared to apply the automatic air brake, handbrake or spring parking brake when requested by the driver.

The speed of the train must not exceed **25 km/h**.

Where the disabled train is to be divided, the defective vehicle becomes the last vehicle on the train. The brake pipe coupling cock on the rear of the second last vehicle must be closed and the air brake on the defective vehicle released. An emergency towing chain must be used between the defective vehicle and the second last vehicle.

 Defective main reservoir pipe on passenger trains

Where the defective vehicle is either the leading or rear vehicle, and the hand brake or spring parking brake does not operate on that vehicle, then the train is a total failure and must only be moved with the assistance of a locomotive or another train.

Where the defective vehicle is either the leading or rear vehicle, and has a working handbrake then the train can continue as normal and be worked out of service.

Vehicle air springs, where fitted, are supplied from the main reservoir pipe. In the event of a main reservoir supply failure, one or more air springs may deflate and may have to be isolated. Refer to **Defective air springs** for operating conditions:

Trains with the complete vehicle main reservoir pipe isolated and with no air in the bogie air springs, but the brake pipe is continuous throughout the train, may travel at a normal speed but in accordance with that permitted for defective air springs.

 Defective handbrake or parking brake

This Section is to be read in conjunction with Network Rule **NTR 404 Using brakes**.

Electric and diesel multiple unit trains.

Where a defective vehicle is a non-terminal car, the train may continue in service until it returns to a maintenance centre.

Where a defective vehicle is a terminal car, and it has one spring parking brake operable, the train may continue in service until it returns to a maintenance centre.

Where a defective vehicle is a terminal car that is not permanently coupled, and does not have a fully operable handbrake or spring parking brake, the train is considered to be a total failure and therefore may only be moved when attached to an assisting locomotive or train.

Where a defective vehicle is a permanently coupled terminal car with no fully operable handbrake or spring parking brake, the train may continue in service until it returns to a maintenance centre.

An Xplorer or Endeavour train which has more than one in four bogie spring parking brakes inoperable, is considered to be a total failure.

Where the spring parking brake or automatic air brake on a vehicle is locked on, the vehicle may be dragged clear of the section with the approval of the owner/operator before the brakes are released and isolated.

 Defective air springs

Where an electric multiple unit train (except a Tangara train) has a defective air spring on one bogie of one or more cars, the train may continue its journey at a speed not exceeding **65 km/h**. The train must then be *worked out of service*.

Where an electric multiple unit train (except a Tangara train) has a defective air spring on both bogies of one or more cars, the train must proceed at a speed not exceeding **25 km/h** to the nearest suitable platform where all passengers must be detained. The train must then be worked out of service.

Where a Tangara train has any or all of the air springs defective, the train may continue its journey at a speed not exceeding **65 km/h**.

Where a Millennium train has any or all of the air springs defective, the train may continue its journey at a speed not exceeding **80 km/h**.

When an XPT, Xplorer or Endeavour train has any or all of the air springs defective, the train may continue in service at a speed not exceeding **100 km/h**.

Defective wheels

Serious damage can occur to the track when wheels of locomotives or vehicles skid or when scale builds up on the wheel due to sticking brakes. Train crews, shunter/examiners and vehicle maintenance staff must make every effort to ensure that brakes are utilised/maintained correctly.

If a locomotive or vehicle with flat spots (*skidded wheels*) or scale (*scaled wheels*) on its wheels is detected in service, depending on the severity of the case, it may be kept marshalled on a train, **provided** that the wheels have been inspected and certified fit to run by the Operator's representative.

The Operator's representative may be the train driver, the Operator's maintenance personnel or any other person nominated by the Operator as being suitably qualified to assess the situation.

The locomotive or vehicle must operate in accordance with the instructions below.


Precautions

When it is suspected that the wheels have flats or there is a build-up of scale on the wheels on any locomotive or vehicle, the train must be stopped at the first suitable safe location.

All the wheels on the vehicle in question must be inspected to determine the extent of the wheel skid or the amount of scale build-up. If the length of the wheel skid is not greater than 100mm, or the scale build-up is less than 15mm: the train may be driven at a speed not exceeding that specified below to the nearest suitable location, in order to clear the section **and** the defective locomotive or vehicle detached.

If there is any doubt as to the class of skid or scale condition, the more severe condition must be reported.

Permissible speeds for scale build up on wheels


Scale class	Scale height	Maximum speed
3	Surface scale up to 1 mm →	Normal operation after checking brakes
4 (i)	Over 1 mm and up to 5 mm →	25 km/h only to clear the section
4 (ii)	Over 5 mm and up to 10 mm →	15 km/h only to clear the section
4 (iii)	Over 10 mm and up to 15 mm →	5 km/h only to clear the section
5	Over 15 mm →	 WARNING: The vehicle must not be moved until it has been examined, the defect adequately rectified and certified fit to travel by a qualified worker

Notes:

- The brakes on any vehicle with the exception of a light locomotive or single self powered vehicle, which has experienced wheel scale build-up must be isolated before the vehicle is allowed to travel.
- Once a locomotive or vehicle has been removed from the section because of wheel scale the affected wheels must be descaled to at least the equivalent of a class 3 condition before re-entering traffic.
- Vehicles having suffered class 4 or 5 scale build-up must have all wheel treads and flanges checked by a qualified worker for evidence of thermal cracking, before re-entering traffic. If cracks are detected the appropriate action must be in accordance with the Operator's maintenance procedures.

Defective wheels (continued)

Permissible speeds for wheel skid length

Skid class	Length of wheel skid	Maximum speed
1	Single skid less than 25 mm →	Normal operation after checking brakes
2	Single skid between 25 mm and 40 mm or multiple class 1 skids on the same wheel →	80 km/h operation
3	Single skid between 40 mm and 60 mm or multiple class 2 skids on the same wheel →	40 km/h only to clear the section
4	Single skid between 60 mm and 100 mm or multiple class 3 skids on the same wheel →	25 km/h only to clear the section
5	One or more skids over 100 mm or multiple class 4 skids on the same wheel. →	 Warning: The vehicle must not be moved until it has been examined, the defect adequately rectified and certified fit to travel by a qualified worker

Notes:

- The qualified worker is a qualified mechanical maintenance person attached to an operator's rolling stock maintenance depot/breakdown crew.
- The brakes on any vehicle with the exception of a light locomotive or single self powered vehicle, which has experienced wheel skid flats, must be isolated before the vehicle is allowed to travel.
- Two or more locomotives with class 3 or 4 skids cannot be operated in multiple when being transferred for wheel turning purposes, unless all wheels have been adequately repaired to the equivalent of a class 3 (dressed) condition.
- Locomotives with class 3 or 4 skids cannot work a train for the purposes of transfer for wheel turning purposes, unless all wheels have been adequately repaired to the equivalent of a class 3 (dressed) condition.

Permissible travel distances and speeds after clearing the track section due to wheel skids

Skid class	Maximum distance	Maximum speed
Class 3 [dressed]	1000 km	80 km/h
Class 4 [welded & dressed]	1000 km	40 km/h
Class 5 [welded & dressed]	1000 km	40 km/h
Class 3	500 km	25km/h
Class 4 [dressed]	500 km	25 km/h
Class 4	50 km	25 km/h

Notes:

- In the case of class 3 and 4 skids the edges of the skid may be dressed by grinding to reduce the severity of the skid to the next lowest category
- In the case of Class 4 and 5 skids the flat may be built up by welding and dressed by grinding to reduce the severity to the equivalent of a Class 3 (dressed) skid.
- A speed limit of **40 km/h** is applicable to Class 4 and 5 weld repaired skids to ensure against wheel fracture in the weld area.

Defective wheels (continued)

Thermal cracks

Thermal cracks are usually transverse, across the wheel tread, and, if allowed to grow without corrective action, can develop to the point where the wheel will fracture.

Many shallow thermal cracks can be removed by machining but extra care must be used to ensure that the crack has been completely eliminated in the operation. If thermal cracks are found on a wheel, then the vehicle's brake system should be checked for evidence of dragging brakes (sticking brakes).



Warning:

If there is the slightest doubt as to the severity of the Thermal Crack, always report the higher classification. (For example, if the defect description falls between a Class 2 and 3 Thermal Crack, then a Class 3 Thermal Crack would be reported).

Permissible speeds for wheels with thermal cracks

Thermal crack class	Crack length & location	Permissible operation
1	Up to 10 mm long on the tread surface within area 30 mm from wheel gauge face and 12 mm from rim face. ⇒	Normal operation after checking brakes
2	Between 10 and 30 mm long on the tread surface within area 30 mm from wheel gauge face and 12 mm from rim face ⇒	Normal operation after checking brakes. Condition of wheels to be monitored.
3	Between 30 and 40 mm long on the tread surface within area 30 mm from wheel gauge face and 12 mm from rim face ⇒	<p>Locomotives and passenger vehicles: Normal operation after checking brakes. Wheels to be turned within 14 days.</p> <p>Electric multiple unit vehicles: Normal operation after checking brakes. Wheels to be inspected every 14 days.</p> <p>Freight vehicles: Vehicle to be worked out of service for repairs.</p>
4	Over 10 mm long and within 30 mm from the flange face or within 12 mm from the rim face. ⇒ OR Over 40 mm long on the tread surface within area 30 mm from wheel gauge face and 12 mm from rim face	Vehicle may continue to its scheduled destination and/or transferred to the nearest repair location at a maximum speed of 40 km/h providing the brakes are isolated (passenger and freight) or the use of independent brake kept to an absolute minimum (locomotives).

Notes:

- If there is the slightest doubt as to the severity of the thermal crack, always report the highest classification. (For example, if the defect description falls between a Class 2 and 3 thermal crack, then a Class 3 crack must be reported).

 Defective axle box bearings

Where a defective or hot axle box bearing is detected the train must be stopped to avoid further damage and the possibility of a seized bearing, screwed off journal or derailment.

Where the axle box is overheating but it is still possible to continue the journey, the vehicle must be detached at the first suitable location. The train must not exceed **25 km/h** and the axle box must be inspected at every opportunity (at least every 5 kilometres).

Where the axle box is excessively hot that it is unsafe to move the vehicle, the train must not be moved.

 Defective drawgear

Where the coupler or drawgear of a vehicle is found to be defective enroute, an emergency towing chain can be attached between the defective vehicle and the adjacent vehicle/locomotive.

The emergency towing chain must be at least 16 mm high tensile chain.

If the trailing load behind the towing chain exceeds the maximum allowable trailing load listed below, then the train must be divided and the defective vehicle hauled as the last vehicle to the first suitable location where it can be detached.

Emergency towing chain

An emergency towing chain must only be used to move a defective vehicle or vehicles where the drawgear is broken or defective and in the case where the last vehicle is defective and the automatic air brakes have been cut out or the handbrake is defective.

The towing chain must not be used if the trailing load behind the towing chain exceeds the limits in the following table:-

Ruling Grade	Maximum trailing load for towing chain
1 in 30	255 tonnes
1 in 33	255 tonnes
1 in 40	265 tonnes
1 in 50	320 tonnes
1 in 60	375 tonnes
1 in 66	400 tonnes
1 in 70	420 tonnes
1 in 75	445 tonnes
1 in 80	465 tonnes
1 in 90	510 tonnes
1 in 100	550 tonnes
1 in 110	590 tonnes
level	1000 tonnes

Refer to **TOC General Instruction pages, Section 1 Route standards or location section pages** for ruling grades.

 *Transferring defective vehicles*

This Section is to be read in conjunction with RIC Network Rules **NTR 414 Defective vehicles**.

Vehicles not to be moved

Vehicles with defects such as excessively hot axle bearings or Class 5 wheel skids or Class 5 scale must not be moved until they have been inspected by a qualified worker and repaired or made safe to move. The qualified worker is a qualified mechanical maintenance person attached to an operator's rolling stock maintenance depot/breakdown crew. In either case that person shall have rolling stock maintenance experience.

A pony bogie may be used to transfer such vehicles.

Pony bogies

The A and B type pony bogies are designed to enable locomotives or vehicles with broken axles, seized axle boxes, loose tyres, fractured wheels, bent axles, seized pinions, screwed off journals, etc., to be returned to a repair centre. The equipment required to support a fractured wheel, loose tyre, seized pinions, etc., is different to the equipment required to temporarily replace a broken axle or screwed off journal. The pony bogie wheel and axle sets are common to both types of pony bogies.

A specialised Millennium type pony bogie is used for recovery of Millennium trains.

Defective locomotives, or loaded freight vehicles, supported by pony bogies must be accompanied by a qualified worker, and that qualified worker must take every opportunity to examine the assembly and bearings. The maximum speed at which the locomotive and loaded freight vehicles is to travel is **15 km/h**, reduced to **8 km/h** over points and crossovers.

Empty freight and empty passenger type vehicles supported by pony bogies can travel unaccompanied and travel at **20 km/h**, reduced to **10 km/h** over points and crossovers.