



INDEPENDENT
TRANSPORT
SAFETY
REGULATOR

RAIL SAFETY COMPLIANCE CODE

Data loggers

ITSR

Safe transport for NSW

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Foreword

This *Rail Safety Compliance Code – Data Loggers* has been produced by the Independent Transport Safety Regulator (ITSR) to provide railway operators with a set of minimum requirements for data loggers that are fitted in rolling stock operating in NSW. The compliance code sets out minimum requirements for the storage, access and use of data in the event of any accident or incident or for monitoring, inspection and maintenance purposes.

The compliance code has been developed in response to recommendations 36 and 37 of the Special Commission of Inquiry into the Waterfall Rail Accident (January 2005). The compliance code was originally developed in 2007 as guidance material in consultation with the rail industry as an interim measure whilst the National Transport Commission developed a national regulatory response to the Waterfall recommendations. Due to the delay in the development of a national regulatory response, ITSR has prepared this compliance code to implement and give effect to the Waterfall recommendations.

What is a compliance code?

A compliance code is approved by the Minister for Transport under section 167 of the *Rail Safety Act 2008*. It comes into effect on the day the notice of this approval is published in the *NSW Government Gazette* or on the day specified in the gazette notice.

An approved compliance code is a practical guide to achieving duties or obligations under the *Rail Safety Act 2008*.

A compliance code should be followed unless there is an alternative course of action that achieves the same or better standard of safety in railway operations.

A compliance code is developed as guidance under the *Rail Safety Act 2008*, but it does not have the same legal force as the Act or Regulations. A person or company cannot be subject to any civil or criminal proceedings (including the issue of a penalty notice) by reason only that the person has failed to comply with an approved compliance code or has otherwise contravened a compliance code.

However, in proceedings under the Act or Regulations, failure to observe a relevant approved compliance code can be used as evidence that a person or company has contravened or failed to comply with the provisions of the Act or Regulations. For example, a failure by a person to comply with a compliance code may be used as evidence that a person has failed to comply with their duty in section 8 of the *Rail Safety Act 2008* to ensure, so far as is reasonably practicable, the safety of their railway operations.

In summary, an approved compliance code

- gives practical guidance on how the required standard of rail safety can be achieved in a particular area
- should be followed unless there is an alternative course of action which achieves the same or better standard of rail safety
- can be used to support prosecution for failing to comply with or contravene the Act or Regulations.

1 Purpose and application

This compliance code provides practical guidance to rail transport operators who operate rolling stock or who allow rolling stock to operate on their rail network by setting out minimum requirements for data loggers fitted in rolling stock.

The minimum requirements have been developed with the aim that:

- rolling stock operating on the rail network are fitted with functioning, reliable and accurate data loggers
- rail infrastructure managers can take the necessary steps to ensure rolling stock operating on their rail network meet the minimum requirements of this compliance code
- in the event of an accident or incident the data logger will be capable of providing investigators with a minimum amount of accurate information
- data loggers be used effectively as a proactive safety tool to gather data, to:
 - analyse safety performance
 - facilitate condition monitoring of the rolling stock asset
 - support the rolling stock scheduled maintenance regime.

For rolling stock comprising self-propelled infrastructure maintenance vehicles, track machines or other track maintenance or inspection vehicles, this compliance code applies from 1 January 2012.

2 Definitions

Act means *Rail Safety Act 2008* and any regulations made under that Act.

Data logger means either an electronic or tape recording data or event recording device fitted within rolling stock that is capable of accurately recording certain information relating to the operation and movement of the rolling stock.

Rail infrastructure owner means a rail infrastructure owner within the meaning of the *Transport Administration Act 1988*.

Rail network means the railway lines vested in or owned by or managed or controlled by a rail infrastructure owner and includes the monorail rail network and the rail network where Perisher Blue Pty Ltd is the rail infrastructure manager.

Rolling stock has the same meaning as in the Act but excludes wagons, trailers, carriages and rolling stock that is not capable of operating at speeds in excess of 25km per hour.

Expressions and terms used in this compliance code, unless otherwise specified, have the same meaning as in the Act.

3 General requirement for rolling stock to be fitted with operational data loggers

Rolling stock operating on the rail network should be fitted with a data logger that is operating and recording data continuously during the operation and movement of the rolling stock.

For all new rolling stock commissioned after the date of this compliance code the data logger should record the information electronically.

4 Matters to be recorded by data loggers

Electronic data loggers should, as a minimum, record the following information¹:

- train speed
- distance
- time
- braking, brake pipe and brake cylinder pressure
- throttle/master controller setting
- safety devices acknowledgement, for example, acknowledgment of deadman device, vigilance device, trip gear
- headlight switch operation
- horn operation (on leading unit in case of multiple units).

Electronic data loggers fitted to all new and retrofitted rolling stock² should make provision for identifying the driver operating the controls of the train.³

Electronic data loggers fitted to all new and retrofitted rolling stock should, as a minimum, record the following information:

- train speed
- distance
- time
- throttle/master controller setting
- operation of train automatic brake⁴
- operation of the independent brake, if equipped⁵

1 For train or safety monitoring purposes the operator may wish to measure a far greater number of parameters, however, that is at the discretion of the operator.

2 A retrofit normally incorporates a change of a component or a system as part of an upgrade or enhancement program.

3 Only applicable to locomotives operated by two drivers.

4 "Operation" means "as continually monitoring and recording air pressures and voltages, where appropriate.

5 "Operation" means "as continually monitoring and recording air pressures and voltages, where appropriate.

- dynamic braking effort achieved
- release of the electro pneumatic brake (if fitted)
- operation of safety devices, for example, acknowledgment of deadman device, vigilance device, trip gear
- driver response to safety devices, for example, acknowledgment of deadman device, vigilance device, trip gear
- headlight switch operation (includes record of high and low operation)
- horn operation (on leading unit in case of multiple units includes high and low operation)
- wheel slip/slide operation (if equipped).

In addition to items listed in 4.3, operators may consider the following data being recorded by new installations:

- acceleration/deceleration rates
- door operation
- audio signals from alerting or warning devices for fire or passenger emergency alarms
- voice communications transmitted from or received to the driver's radio and intercom
- voice communications in the driver's cab
- status and operation of cab radio system
- train control data both received or transmitted
- time, speed and position of the rolling stock as determined by the satellite navigation system that is operating on that rolling stock
- cab-based forward-looking video recording.

Data loggers that record on tape should, as a minimum, record the following information:

- train speed
- distance
- time
- brake status ie brake pipe pressure or brake cylinder pressure.

5 Design requirements and crashworthiness

All data loggers should meet the following requirements:

- there should be a visible indication to confirm the data logger is operational and when not operational
- all data loggers should be capable of retaining stored data once removed from the rolling stock or in the event of power loss
- the data logger, including the memory module, should, as far as is reasonably practicable, be designed and installed so as to withstand the impact of crash or crush forces, heat, fire, vibration, moisture, smoke damage and fluid immersion or ingress (this would include spilt liquids) and from dust
- the data logger memory module should be installed within the rolling stock in a secure position such that the structure of the rolling stock will, as far as possible, provide the device protection.

6 Storage (memory) and accessibility of the data

All data obtained and/or downloaded from the data logger should be *read only* so as to prevent alteration or deletion of data.

As a minimum the data logger should be capable of recording and storing data for the last 72 hours of the rolling stock's operation.

The oldest information captured by an electronic data logger should be overwritten first.

The rolling stock operator should have documentation that specifies the source of all the recorded parameters and any signal conversion performed prior to recording the parameter and the downloading of data to other media.

7 Accuracy/validation

To ensure their accuracy the data loggers should be validated on a regular basis. This should occur not less than once per year or as per the manufacturer's recommendation, whichever occurs first.

At a minimum, the data logger validation test shall include cycling all recorded parameters and determining the full range of each parameter by reading out the recorded data. A copy of the data validation results shall be maintained with the maintenance records until the next validation test.

To avoid inaccurate reading, the data logger should be able to accept information to compensate for wheel-wear.

The wheel-wear compensation should be either recorded on the maintenance record or within the electronic data on the data logger.

The sampling rate of electronic data loggers should, as a minimum, occur once every second or when the status changes.

8 Systems and procedures for the use of recorded data

Rolling stock operators should have documented systems and procedures for the download, collection, extraction, storage and use (including disclosure) of data from the data logger which should as a minimum ensure:

- competent persons perform these tasks
- the data obtained from the data logger is protected against unauthorised disclosure, fire, electronic or magnetic interference or other sources of damage
- access to the data is only able to be obtained by those persons and positions authorised and qualified to receive, download and analyse data from the data logger
- all relevant employees or contractors of the rolling stock operator (including train crew) are trained and consulted in relation to the use of data loggers and the purpose for which data collected from such data loggers will be used by the rolling stock operator, and other organisations, including training in relation to all the requirements of this compliance code where that employee or contractor is involved in the testing, maintenance and /or repair or replacement of the data logger
- in the event of a Category A notifiable occurrence, data should be retained by the operator, by whatever means, for a minimum of seven days.

The systems and procedures must be consistent with the requirements of division 3 of part 4 (Disclosure of train safety records) of the Act.

9 Maintenance, testing and repair

The data loggers should, as a minimum, be maintained in accordance with the manufacturer's recommendations.

Rolling stock operators should have documented systems in place for the maintenance, testing and repair/replacement of data loggers.

Rolling stock operators should have documented procedures in place regarding the action to be taken by the train crew in the event that the data logger has stopped working or is malfunctioning.

Rolling stock operators with data loggers that record information on tape should have a programme in place to ensure the devices are maintained, including a requirement to ensure new tapes are installed when necessary.

Rolling stock operators should have a process in place to ensure clocks used to record time are correctly set⁶.

⁶ This would include having a means of identifying time differences due to travel across time zones or changes to daylight saving.

Data loggers rail safety compliance code

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