22-011 Revision to DC Energy Collection Standards

Version:	3.2		
Purpose:	Approval to proceed to consultation		
Authors:	Raj Kelkar – Lead Energy Engineer Darren Fitzgerald – Principal Electrical & Systems RST Engineer		
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Lead industry committee:	Energy Standards Committee (ENE SC)	**Date:**	27 March 2025
Lead industry committee:	Rolling Stock Standards Committee (RST SC)	**Date:**	01 May 2025
Supporting industry committee:	Traffic Operation and Management Standards Committee (TOM SC)	**Date:**	22 April 2025
Supporting industry committee:	Control, Command and Signalling Standards Committee (CCS SC)	**Date:**	10 April 2025
Supporting industry committee:	Plant Standards Committee (PLT SC)	**Date:**	15 May 2025
Supporting industry committee:	Infrastructure Standards Committee (INS SC)	**Date:**	06 May 2025

Decision

Energy Standards Committee (ENE SC) are asked to:

APPROVE that the following proposed documents relating to dc conductor rail energy subsystem are consulted on:

- GLRT1212 issue two
- RIS-1852-ENE issue one
- Withdrawal of GLGN1612 issue one

SUPPORT that the following proposed documents relating to rolling stock subsystem are consulted on:

- GMRT2113 issue two
- RIS-2716-RST issue one
- Withdrawal of GMGN2613 issue one

In approving and supporting the proposals the SC has:

DECIDED that the proposed new issues of GLRT1212 issue two and RIS-1852-ENE issue one deliver the intentions of the proposal for change

DECIDED that the proposed new issues of GLRT1212 issue two and RIS-1852-ENE issue one are in a suitable state for consultation.

DECIDED that GLGN1612 issue one can be consulted on for withdrawal

SUPPORTED that the proposed new issues of GMRT2113 issue two and RIS-2716-RST issue one deliver the intentions of the proposal for change

SUPPORTED that the proposed new issues of GMRT2113 issue two and RIS-2716-RST issue one are in a suitable state for consultation.

SUPPORTED that GMGN2613 issue one can be consulted on for withdrawal

The ENE SC is asked to:

IDENTIFY any specific organisations or individuals to be included in the consultation

Rolling Stock Standards Committee (RST SC) are asked to:

APPROVE that the following proposed documents relating to rolling stock subsystem are consulted on:

- GMRT2113 issue two
- RIS-2716-RST issue one
- Withdrawal of GMGN2613 issue one

SUPPORT that the following proposed documents relating to dc conductor rail energy subsystem are consulted on:

- GLRT1212 issue two
- RIS-1852-ENE issue one
- Withdrawal of GLGN1612 issue one

In approving and supporting the proposals the SC has:

DECIDED that the proposed new issues of GMRT2113 issue two and RIS-2716-RST issue one deliver the intentions of the proposal for change

DECIDED that the proposed new issues of GMRT2113 issue two and RIS-2716-RST issue one are in a suitable state for consultation.

DECIDED that GMGN2613 issue one can be consulted on for withdrawal

SUPPORTED that the proposed new issues of GLRT1212 issue two and RIS-1852-ENE issue one deliver the intentions of the proposal for change

SUPPORTED that the proposed new issues of GLRT1212 issue two and RIS-1852 issue one are in a suitable state for consultation.

SUPPORTED that GLGN1612 issue one can be consulted on for withdrawal

The RST SC is asked to:

IDENTIFY any specific organisations or individuals to be included in the consultation

Traffic Operation and Management Standards Committee (TOM) are asked to:

SUPPORT that the following proposed documents relating to dc conductor rail energy subsystem and rolling stock subsystem are consulted on:

- GLRT1212 issue two and GMRT2113 issue two
- RIS-1852-ENE issue one and RIS-2716-RST issue one
- Withdrawal of GLGN1612 issue one and GMGN2613 issue one

In supporting the proposal, the SC has:

SUPPORTED that the proposed new issues of GLRT1212 issue two, GMRT2113 issue two, RIS-1852-ENE issue one and RIS-2716-RST issue one deliver the intentions of the proposal for change

SUPPORTED that the proposed new issues of GLRT1212 issue two, GMRT2113 issue two, RIS-1852-ENE issue one and RIS-2716-RST issue one are in a suitable state for consultation

SUPPORTED that GLGN1612 issue one and GMGN2613 issue one can be consulted on for withdrawal

The supporting SC is asked to:

IDENTIFY any specific organisations or individuals to be included in the consultation

Control Command & Signalling Standards Committee (CCS) are asked to:

SUPPORT that the following proposed documents relating to dc conductor rail energy subsystem and rolling stock subsystem are consulted on:

- GLRT1212 issue two and GMRT2113 issue two
- RIS-1852-ENE issue one and RIS-2716-RST issue one
- Withdrawal of GLGN1612 issue one and GMGN2613 issue one

In supporting the proposal, the SC has:

SUPPORTED that the proposed new issues of GLRT1212 issue two, GMRT2113 issue two, RIS-1852-ENE issue one and RIS-2716-RST issue one deliver the intentions of the proposal for change

SUPPORTED that the proposed new issues of GLRT1212 issue two, GMRT2113 issue two, RIS-1852-ENE issue one and RIS-2716-RST issue one are in a suitable state for consultation

SUPPORTED that GLGN1612 issue one and GMGN2613 issue one can be consulted on for withdrawal

The supporting SC is asked to:

IDENTIFY any specific organisations or individuals to be included in the consultation

Plant Standards Committee (PLT SC) are asked to:

SUPPORT that the following proposed documents relating to dc conductor rail energy subsystem and rolling stock subsystem are consulted on:

- GLRT1212 issue two and GMRT2113 issue two
- RIS-1852-ENE issue one and RIS-2716-RST issue one
- Withdrawal of GLGN1612 issue one and GMGN2613 issue one

In supporting the proposal, the SC has:

SUPPORTED that the proposed new issues of GLRT1212 issue two, GMRT2113 issue two, RIS-1852-ENE issue one and RIS-2716-RST issue one deliver the intentions of the proposal for change

SUPPORTED that the proposed new issues of GLRT1212 issue two, GMRT2113 issue two, RIS-1852-ENE issue one and RIS-2716-RST issue one are in a suitable state for consultation

SUPPORTED that GLGN1612 issue one and GMGN2613 issue one can be consulted on for withdrawal

The supporting SC is asked to:

IDENTIFY any specific organisations or individuals to be included in the consultation

Infrastructure Standards Committee (INS SC) are asked to:

SUPPORT that the following proposed documents relating to dc conductor rail energy subsystem and rolling stock subsystem are consulted on:

- GLRT1212 issue two and GMRT2113 issue two
- RIS-1852-ENE issue one and RIS-2716-RST issue one
- Withdrawal of GLGN1612 issue one and GMGN2613 issue one

In supporting the proposal, the SC has:

SUPPORTED that the proposed new issues of GLRT1212 issue two, GMRT2113 issue two, RIS-1852-ENE issue one and RIS-2716-RST issue one deliver the intentions of the proposal for change

SUPPORTED that the proposed new issues of GLRT1212 issue two, GMRT2113 issue two, RIS-1852-ENE issue one and RIS-2716-RST issue one are in a suitable state for consultation

SUPPORTED that GLGN1612 issue one and GMGN2613 issue one can be consulted on for withdrawal

The supporting SC is asked to:

IDENTIFY any specific organisations or individuals to be included in the consultation

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This business case for change has been developed to support standards committees in taking decisions related to changes to standards, it includes an assessment of the predicted impacts arising from the change.

Proposed revised documents

Number	Title	Issue
GMRT2113	Rolling Stock Subsystem and Interfaces to DC Conductor Rail Energy Subsystem	2
GLRT1212	DC Conductor Rail Energy Subsystem and Interfaces to Rolling Stock Subsystem	2

Proposed new documents

Number	Title	Issue
RIS-2716-RST	Rail Industry Standard for Rolling Stock Subsystem and Interfaces to DC Conductor Rail Energy Subsystem	1
RIS-1852-ENE	Rail Industry Standard for DC Conductor Rail Energy Subsystem and Interfaces to Rolling Stock Subsystem	1

Proposed superseded documents

Number	Title	Issue
GMRT2113	Rolling Stock Subsystem and Interfaces to DC Conductor Rail Energy Subsystem	1
GLRT1212	DC Conductor Rail Energy Subsystem and Interfaces to Rolling Stock Subsystem	1
GMGN2613	Guidance on Rolling Stock Subsystem and Interfaces to DC Conductor Rail Energy Subsystem	1
GLGN1612	Guidance on DC Conductor Rail Energy Subsystem and Interfaces to Rolling Stock Subsystem	1

Summary

Background and change

GMRT2113 issue one and GLRT1212 issue one and their supporting guidance notes, GMGN2613 issue one and GLGN1612 issue one respectively, were published in September 2015 and contain requirements and guidance that were based on existing industry practice. These two Railway Group Standards (RGSs) contain the UK's National Technical Rules (NTRs). As the 750 V dc conductor rail system is not one of the target systems, there are no requirements in the Energy (ENE) or Locomotive and Passenger (LOC&PAS) National Technical Specification Notices (NTSNs) dated 1 January 2021 for the 750 V dc energy subsystem and associated aspects of the rolling stock subsystem. Consequently, the necessary requirements to provide the UK National Technical Rules (NTRs) have been included within Railway Group Standards GMRT2113 issue two and GLRT1212 issue two.

It was identified in the 60-month review of these existing RGSs that some of the requirements set out therein cannot be valid NTRs based on the three qualifying criteria (a specific case or open point in an NTSN, or for technical compatibility with a legacy subsystem). The four existing dc documents also do not follow the current RSSB style guide of requirement, rationale, and guidance, and therefore require updating to the current format, and several of the references made to other standards within them are out of date.

Post EU exit legislative changes, EN standards with Annex ZZ do not provide a presumption of conformity. However, this did not warrant any amendment to GLRT1212 or GMRT2113. There is no impact on GLRT1212 or GMRT2113 due to introduction of NTSNs.

A review and update of the Railway Group Standards (RGSs) and their associated guidance notes to align them with the Railway Standards Code was necessary. Any requirements that do not fulfil the criteria of an NTR but remain useful have been retained in a Rail Industry Standard (RIS) for the associated subsystem.

Industry impact due to changes

Impact areas	Scale of impact	Estimated value £ 000's
A. Legal compliance and assurance	Medium	£326,250 over five years
B. Health, safety and security	Low	Not applicable
C. Reliability and operational performance	Low	£8,000 over five years
D. Design and maintenance	N/A	Not applicable
E. People, process and systems	N/A	Not applicable
F. Environment and sustainability	Neutral	No benefit claimed
G. Customer experience and industry reputation	Neutral	No benefit claimed
Total value of industry opportunity =		**£334,250 over five years**

The standards change contribution to the total value of industry opportunity				
☐ None or low	☐ Minor but useful	☐ Moderate	☑ Important / essential	☐ Urgent / critical

Detail

What are the objectives associated with this change?

Objective 1 – Update the Railway Group Standards to align with the Standards Code

1.1 GMRT2113 issue one and GLRT1212 issue one contain some requirements that are out of scope of an RGS because they do not meet the criteria for NTRs.

1.2 GMRT2113 issue one, GLRT1212 issue one, GMGN2613 issue one and GLGN1612 issue one contain references to several other standards which have now been updated.

1.3 The four documents need to take account of the post-EU exit legislative changes.

Objective 2 – Update content of standards to reflect industry experience

1.4 Industry has experienced events that have resulted in the loss of shoegear due to impact with the dc conductor rail, or other elements of the infrastructure.

1.5 Studies and trials are being undertaken by operators to monitor the interface between rolling stock shoegear and the dc conductor rail.

1.6 Industry feedback and discussions have indicated that it is a challenge to establish and agree the characteristics for the existing network and the characteristics for new, renewed or upgraded assets. The requirement for the maximum allowable train current is considered not to be adequately defined by industry and the definition of train is ambiguous.

1.7 Deviation number 18-013-DEV identifies that GMRT2113 includes conflicting values for maximum voltage and range for regenerative braking, which requires addressing to support assessment.

1.8 Drafting review group discussions held to support the development of GLRT1212 issue two, GMRT2113 issue two, and their associated RISs, provided opportunity for previously unknown information on the dc interface, such as energy subsystem characteristics during fault conditions.

Objective 3 – Integrate research findings

1.9 There are three RSSB research reports with potential relevance to these dc standards, the findings from which have been incorporated in the revised documents where relevant. These are:

a. RSSB research project T1185 (2021) – 'Current limit at standstill'

b. RSSB research project OTH-PING-10 (2021) – 'Managing ice on the conductor rail'

c. RSSB research project T1214 (2022) – '21st century dc electrification infill'

2. How has the content in the standard changed to achieve the objectives?

Objective 1 – Update the Railway Group Standards to align with the Standards Code

2.1 The requirements in GMRT2113 issue one and GLRT1212 issue one that did not meet the criteria to be NTRs has been withdrawn. However, where these requirements were identified to be valid and

useful to the industry they were included, together with their relevant content from the guidance notes GMGN2613 issue one and GLGN1612 issue one, in RIS-2716-RST issue one or RIS-1852-ENE issue one respectively.

2.2 The four standards have been updated to take into account post-EU exit legislative changes.

Objective 2 – Update content of standards to reflect industry experience

2.3 The changes to GMRT2113 and GLRT1212 and creation of RIS-2716-RST and RIS-1852-ENE were informed by industry experience.

2.4 Subjects identified through Requests for Help and Deviations that identified problematic requirements and guidance for industry were reviewed and redrafted or withdrawn as necessary.

2.5 The requirement regarding the maximum total dc traction current flowing in the running rails, as is set out in GLRT1212 issue one has been removed since it is not needed to achieve technical compatibility or to mitigate a safety risk.

2.6 The requirement in GLRT1212 regarding maximum dc traction load current flowing in an across track cable also has been removed since it is not needed to achieve technical compatibility or to avoid a safety risk.

Objective 3 – Integrate research findings

2.7 The findings from the RSSB research projects given in paragraph 1.11 were considered for incorporating in the revised documents as either requirements, rationale or guidance.

3. How urgently does the change need to happen to achieve the objectives?

3.1 A necessary part of the change is to bring the requirements in GMRT2113 issue one and GLRT1212 issue one in line with the standards code and legislation. The changes to the standards are important and starting their revision was included in the RSSB Business Plan for 2023-24.

4. What are the positive and negative impacts of implementing the change?

Justification of impact, scale and quantification for the seven impact areas

A. Legal compliance and assurance

4.1 RSSB research project T1214 (2022) identifies a dc electrification cost of approximately £1,130,000 per single track kilometre (STK) in 2021, which is the equivalent of approximately £1,305,000 in 2023 when adjusted for inflation using the Bank of England Inflation Calculator.

4.2 A report published as part of RSSB research project T1214 (2022) indicates that an average infill scheme is around fifty single track kilometres. A reduction in NTRs in both the RGS will reduce the work and costs associated with Designated Body (DeBo) assessments where the Railways (Interoperability) Regulations 2011 apply to a project with the cost of assessments being around 5% of the cost in 4.1. If the revised requirements resulted in a reduction of 5% in costs associated with

assessments for new, renewed and upgraded dc electrification, this will result in a cost saving of £326,250 based on two such schemes completed in next five years.

4.3 For rolling stock, where new trains continue to be assessed for operation on dc conductor rail systems, if third-party assessments of the rolling stock dc conductor interface system take approximately twenty days, at £800 a day, then this represents approximately £16,000 per vehicle design. There are no known new, renewed or upgraded dc rolling stock fleets scheduled for introduction over the next five years however, so no benefit is claimed, but if a dc rolling stock fleet is introduced in the next five years the cost benefit to industry brought about by the change to the standards is likely to be modest.

4.4 There have been no deviations made against GLRT1212 issue one, and two made against GMRT2113 issue one in the past five years. It is therefore considered that there would be minimal savings achieved through a reduction in deviations that are required.

4.5 Revisions to the requirements and guidance are expected to result in improvements and provide greater clarity on the technical rules or their associated implementation. These changes will support duty holders in meeting their obligations under interoperability legislation; however, it is considered not proportionate to estimate or quantify the scale of the impact of such changes other than as set out in section B 'Health, safety and security'.

4.6 GLRT1212 issue two and GMRT2113 issue two include new open points as a result of information provided by Network Rail during drafting review group discussions. These open points relate to, predominantly, fault conditions and characteristics of the 750 V dc conductor rail energy subsystem. These new open points that have replaced previous requirements and will result in the need for infrastructure managers and rolling stock OEMs to collaborate and determine appropriate arrangements in the absence of standardised values and characteristics. The cost benefit associated with this change is considered to be not proportionate to estimate or quantify the scale of the impact of such changes. However, they are likely realised during assessments of the rolling stock subsystem.

B. Health, safety and security

4.7 Safety has been considered as ‘not applicable’ for this project since the change in standards for both the energy subsystem and rolling stock is not anticipated to alter safety performance. All the requirements in GLRT1212 issue two, GMRT2113 issue two, RIS-1852-ENE issue one and RIS-2716-RST issue one were existing requirements in GLRT1212 issue 1 and GMRT2113 issue one. Regarding the requirements removed altogether such as maximum running rail current, these do not affect safety.

C. Reliability and operation performance

4.8 Thirteen incidents occurred between March 2018 and March 2023 where ice on the dc conductor rail resulted in delay or cancellation of train services. This resulted in approximately 3,200 delay minutes over the five years which, at a cost of £50 per delay minute, represents a cost of £160,000 to industry. RSSB research project OTH-PING-10 (2021) identifies anti-icing products and sleet brushes for dc conductor rails that reduce the impact of snow and ice build-up on the dc conductor

rail. If the incorporation of the research findings into the dc standards were to improve dc standards and improve the operational performance of the railway by 1% per year due to a reduction in ice or snow on the conductor rail impacting vehicle power, this could be a cost saving of around £1,600 per year which is equivalent to £8,000 over five years.

D. Design and maintenance

4.9 Not applicable.

E. People, process and systems

4.10 Not applicable.

F. Environment and sustainability

4.11 RSSB research project T1236 (2022) set out to understand the criteria and mechanisms of possible emission mitigation incentivisation schemes for rail. Table 17 in the report titled 'Existing schemes and external costs' includes figures in pounds for air pollution impacts (pounds per one way journey in 2017) based on area-specific damage costs and average damage costs in 2019. Taking the figures for the Brighton to Great Malvern (Class 158, approximately 170 miles, 270 kilometres) and London Marylebone to Birmingham Snow Hill (Class 168, approximately 99 miles, 160 kilometres), the air pollution impact cost per kilometre, based on average damage costs for the two fleets, is 22 pence per kilometre.

4.12 London Bridge to Uckfield, Brighton to Ashford International and Gatwick Airport to Reading routes include unelectrified sections with dc conductor rail available until certain points, resulting in the need for diesel rolling stock to run for the entirety of these routes. Electrification of the Uckfield Branch Line between Hurst Green and Uckfield, Marshlink Line between Ashford International and Ore and the North Downs Line between Wokingham Junction, Aldershot South Junction, Shalford Junction and Reigate, would result in the capability for operators to remove diesel rolling stock fleets from these routes and use dc rolling stock fleets instead. However, no benefit is claimed on account of this standards change project as it is too complex to determine whether the change to the standards will impact the likelihood of installation of dc conductor rail electrification on these routes and therefore result in the removal of diesel fleets.

G. Customer experience and industry reputation

4.13 Media and Rail Accident and Investigation Board (RAIB) reports regarding collector shoe to conductor rail interface failures that have caused frustration to passengers, including one occasion where passengers disembarked the vehicle onto an operationally live railway, which included live 750 v dc conductor rails. However, it is not considered proportionate to quantify a value for this with respect to customer experience and industry reputation with respect to the changes to the standards and reduction in likelihood of losing collector shoes.

5. What is the contribution of this standards change in realising the value to industry opportunity?

5.1 A key quantifiable contribution of this standard to industry is supporting an improved DeBo assessment process through an improvement in NTRs. The standards change contribution to the total value of industry opportunity is £338,660 over five years categorised as important / essential.

6. What is the effort required by RSSB to make the change?

6.1 The project is being led by principal and lead technical specialists from the rolling stock and energy standards teams, supported by specialists from the risk and safety intelligence discipline, together with a project manager.

6.2 All the content in four currently published documents will be reviewed by RSSB and amended/included in revised/new standards as appropriate.

6.3 An industry working group will be established to review the content of the standards at key points as the project progresses.

7. Can RSSB deliver against industry's expected timescales?

7.1 RSSB has identified the resources needed to meet the proposed programme with a completion date of March 2026 [proposed].

8. How will the industry implement the change?

8.1 The update to the dc current collection standards will support industry with any potential new, renewed or upgraded dc conductor rail schemes that take place and support rolling stock manufacturers, rolling stock owners, infrastructure managers, suppliers and project entities in meeting their obligations as set out under RIR 2011 (as amended).

9. How will RSSB assess whether the change is achieving the objectives?

9.1 Feedback on the application of the standard from industry groups will be sought at the 12-month review and the number of enquiries to the Customer Relationship Management (CRM) portal can also indicate whether the change is achieving its objectives.

Appendix A Disposition Tables

Table A1: Disposition Table for GLRT1212 issue one

From GLRT1212 Issue One	To GLRT1212 Issue Two	To RIS-1852-ENE Issue One	Way forward	Comments	BCfC Objective
1.1.1	1.1.1 – 1.1.3		Revised	System description altered, reference to TSI replaced with reference to NTSN.	1
1.1.2			Withdrawn	To withdraw since the document now has open points.	1
1.2.1	1.2.1, 1.2.2		Revised	System description improved, reference to specific case added, clarification provided regarding usage of this document.	1
1.2.2	1.2.4, 1.2.5		Revised	Format according to latest RGS template. Text revised to reflect changes.	1
1.3	1.3		Revised	'Multifunctional' replaced by 'Energy', dates changed.	1
2.1.1	2.1.1		Revised	EN 50163 reference updated to current version.	2
2.1.2	2.1.2		No change	No comments.	1
2.1.3	2.1.3		No change	No comments.	1
2.1.4	2.1.4		Revised	Reference to EN 50388 changed to current version.	2
2.2, 2.3	2.2		Changed to open point	The current requirements have not been retained since it is not possible for project entities to ascertain short circuit fault levels and clearance times as set out in GLRT1212 issue one as they are influenced by many factors such as distance of fault from the substation, magnitude of fault current etc and these elements have become open point. Guidance added.	2
2.4	2.3		Changed to open point	The current requirements have not been retained because it is not possible for project entities to	2

From GLRT1212 Issue One	To GLRT1212 Issue Two	To RIS-1852-ENE Issue One	Way forward	Comments	BCfC Objective
				guarantee that reclosure sequence will adhere to the timings stated in the requirements and this element has become an open point. Guidance added.	
2.5.1	2.4.1		Revised	One value of current (6.8 kA) replaced with a choice between values of 2.7, 4.7 and 6.8 kA.	2
2.5.2			Withdrawn	To withdraw since now there is a choice between three values rather than one value of current.	2
2.6			Withdrawn	To withdraw since these requirements are within a single duty holder's remit, there is no basis for these requirements to be retained as a national technical rule or be transferred to a rail industry standard.	1
2.7.1	2.6.1		No change	No comments.	2
2.8			Withdrawn	To withdraw since this requirement is within a single duty holder's remit, it is not a valid national technical rule and there is no industry desire to transfer it to a rail industry standard.	1
2.9.1.1	2.7.1		Revised	Reference to requirements within BS EN 50122-1:2022 added.	2
2.9.1.2	2.7.2, 2.7.3		Revised	Split in two requirements to aid clarity.	1
2.9.2.1	2.8.1		Revised	References updated to the current version of BS EN 50122-1	2
2.10			Withdrawn	Clearance to structures to be withdrawn since being a single duty holder issue and not an interface issue. Clearance to vehicles to be withdrawn since this issue is already covered by gauging standards.	2

From GLRT1212 Issue One	To GLRT1212 Issue Two	To RIS-1852-ENE Issue One	Way forward	Comments	BCfC Objective
2.11.1		2.1.1, 2.1.2	Moved to RIS	The ENE NTSN does not have an element addressing this parameter and therefore the NTR does not need to have it. Moved to RIS based on industry consensus. Split in two requirements.	1
2.11.2		2.2.1	Moved to RIS	The ENE NTSN does not have an element addressing this parameter and therefore the NTR does not need to have it. Moved to RIS based on industry consensus The words 'The specification for' deleted.	1
2.11.3.1		2.3.1	Moved to RIS	The ENE NTSN does not have an element addressing this parameter and therefore the NTR does not need to have it. Moved to RIS based on industry consensus Topic heading changed to include words 'prohibiting the'.	1
2.11.4.1		2.4.1	Moved to RIS	The ENE NTSN does not have an element addressing this parameter and therefore the NTR does not need to have it. Moved to RIS based on industry consensus Requirement split in two parts.	1
3.1.1.1	3.1.1		No change	No comments.	1
3.1.1.2	3.1.2		No change	No comments.	1
3.1.2.1	3.2.1		Revised	Permission regarding the demonstration of ongoing compliance deleted as this is beyond the document's scope.	2
Figure 1	Figure 1		Revised	Negative conductor rail removed from drawing. Positive conductor renamed as conductor rail.	2
3.1.2.2			Moved to RIS	To move to rail industry standard since requirement about 4th conductor rail system is outside the scope of NTR.	1

From GLRT1212 Issue One	To GLRT1212 Issue Two	To RIS-1852-ENE Issue One	Way forward	Comments	BCfC Objective
3.1.3.1	3.3.1		No change	No comments.	1
3.1.3.2	3.3.2		No change.	No comments.	1
3.1.3.3	3.3.3, 3.3.4		Revised	Split in two requirements to aid clarity.	1
3.1.3.4	3.3.5 – 3.3.7		Revised	Split in three requirements to aid clarity.	1
3.1.4.1	3.4.1		No change	No comments.	1
3.1.4.2	3.4.2		No change	No comments.	1
3.2.1.1	3.5.1		No change	No comments.	1
3.2.1.2	G2.1.11		Withdrawn	As $U_{mean\ useful}$ is applicable throughout the asset's service life, this value is also applicable when general conductor rail wear is present. In view of this to avoid duplication of requirements, this requirement is to be withdrawn and additional guidance provided for clarification.	2
3.2.2.1	3.6.1		No change	No comments.	1
3.3.1.1	3.7.1		Revised	Reference to Figure 5 added.	1
3.3.1.2	3.7.2		Revised	Reference to Figure 5 added.	1
3.3.1.3	3.7.3		Revised	Reference to Figure 5 added.	1
3.3.1.4	3.7.4		No change	No comments.	1
3.4.1.1	3.8.1		Revised	Reference changed to current relevant document.	2
3.4.2	3.9.1		Revised	The words 'high conductivity' removed since not a verifiable characteristic.	2
3.4.3.1	3.10.1		No change	No comments.	1

From GLRT1212 Issue One	To GLRT1212 Issue Two	To RIS-1852-ENE Issue One	Way forward	Comments	BCfC Objective
3.4.4	3.11		Changed to open point	The current requirement has not been retained because the term 'anticipated electrical vehicle types' used therein was vague and this element has become an open point. Guidance added.	1
3.4.5.1		3.1.1	Moved to RIS	The ENE NTSN does not have an element addressing this parameter and therefore the NTR does not need to have it. Moved to RIS based on industry consensus	1
3.4.5.2		3.1.2	Moved to RIS	The ENE NTSN does not have an element addressing this parameter and therefore the NTR does not need to have it. Moved to RIS based on industry consensus	1
3.4.6.1		3.2.1	Moved to RIS	The ENE NTSN does not have an element addressing this parameter and therefore the NTR does not need to have it. Moved to RIS based on industry consensus	1
Part 4	Part 5		Revised	Changes to template text have occurred as part of updates to the RGS template.	2
Appendix A	Appendix A		Revised	Open points added.	2
Appendix B			Withdrawn	To withdraw since contents of this table duplicate information in the referenced standard BS EN 50163:2004 + A3:2022.	2
Appendix C	Figure 5		No change	No comments	2
Appendix D		3.3		To move to RIS 1852 ENE since requirements regarding 4th rail are not valid national technical rules.	1
Appendix E	Appendix B		Revised	Drawing for steel conductor rail improved.	2
Appendix F			Withdrawn	To withdraw since information in this appendix has been added in main body of the standard.	2

From GLRT1212 Issue One	To GLRT1212 Issue Two	To RIS-1852-ENE Issue One	Way forward	Comments	BCfC Objective
Appendix G	Part 4		Revised	Revised to reflect changes due to UK's exit from the EU.	1
Definitions	Definitions		Revised	Some of the definitions removed since they are not appearing in the main body of the standard. Some definitions revised.	2
Abbreviations			Withdrawn	To withdraw since not useful.	2
References			Revised	Revised to reflect change to versions of some documents. Removed some references and added some references based on the main body of the standard.	2

Table A2: Disposition table for GLGN1612 issue one

From GLGN1612 Issue One	To GLRT1212 Issue Two	To RIS-1852-ENE Issue One	Way forward	Comments	BCfC Objective
Part 1			Withdrawn	To withdraw since this document is withdrawn.	1
G2.1.1	G2.1.5		Revised	'Specification' replaced with 'requirements'.	1
G2.1.2	G2.1.7		No change	No comments.	1
G2.1.3	G2.1.8		No change	No comments.	1
G2.1.4	G2.1.9		No change	No comments.	1
G2.1.5	G2.1.6		Revised	Reference made to current version of BS EN 50163.	2
G2.1.6	G2.1.10		No change	No comments.	1
G2.2, G2.3	2.2		Revised	This element is now an open point in this document. Revised guidance provided.	2

From GLGN1612 Issue One	To GLRT1212 Issue Two	To RIS-1852-ENE Issue One	Way forward	Comments	BCfC Objective
G2.4	2.3		Revised	This element is declared as an open point in this document. Revised Guidance provided.	2
G2.5.1	G2.4.2		Revised	Revised to reflect three possible values of train set current rather than one.	2
G2.5.2, G2.5.3	G2.4.3, G2.4.5		Revised	Revised to reflect three possible values of train set current rather than one.	2
G2.6			Withdrawn	To withdraw because the associated requirements have been deleted.	2
G2.7.1	G2.5.2		No change	No comments.	1
G2.7.2	G2.5.3		No change	No comments.	1
G2.7.3	G2.5.4		No change	No comments.	1
G2.7.4	G2.5.5		No change	No comments.	1
G2.8			Withdrawn	To withdraw because the associated requirement has been deleted.	2
G2.9.1.1	G2.6.4		Withdrawn	To withdraw because it is covered by G2.6.4.	2
G2.9.1.2	G2.6.4		No change	No comments.	1
G2.9.1.3	G2.6.5		Revised	Reference made to current version of BS EN 50122-1.	2
G2.9.1.4	G2.6.6		Revised	Reference made to current version of BS EN 50122-1.	2
G2.9.1.5			Withdrawn	To withdraw because it is covered by G2.6.5.	2
G2.9.2.1	G2.7.2		No change	No comments.	1
G2.10			Withdrawn	To withdraw because the associated requirement for clearance to structures has been deleted and	2

From GLGN1612 Issue One	To GLRT1212 Issue Two	To RIS-1852-ENE Issue One	Way forward	Comments	BCfC Objective
				clearance to vehicles is already covered by gauging standards.	
G2.11.1.1		G2.1.3	Moved to RIS	The ENE NTSN does not have an element addressing this parameter and therefore the NTR does not need to have it. Moved this rationale text to RIS based on industry consensus	
G2.11.1.2		G2.1.4	Revised and moved to RIS	Reference changed to RIS-0733-CCS which has a list of signs.	2
G2.11.2.1		G2.2.2	Moved to RIS	The ENE NTSN does not have an element addressing this parameter and therefore the NTR does not need to have it. Moved this rationale text to RIS based on industry consensus	
G2.11.2.2		G2.2.3	Moved to RIS	The ENE NTSN does not have an element addressing this parameter and therefore the NTR does not need to have it. Moved this rationale text to RIS based on industry consensus	
G2.11.3.1		G2.3.2	Moved to RIS	The ENE NTSN does not have an element addressing this parameter and therefore the NTR does not need to have it. Moved this rationale text to RIS based on industry consensus	
G2.11.3.2		G2.3.3	Moved to RIS	The ENE NTSN does not have an element addressing this parameter and therefore the NTR does not need to have it. Moved this guidance text to RIS based on industry consensus	
G2.11.4.1		G2.4.2	Moved to RIS	The ENE NTSN does not have an element addressing this parameter and therefore the NTR does not need	

From GLGN1612 Issue One	To GLRT1212 Issue Two	To RIS-1852-ENE Issue One	Way forward	Comments	BCfC Objective
				to have it. Moved this rationale text to RIS based on industry consensus	
G2.11.4.2		G2.4.3	Moved to RIS	The ENE NTSN does not have an element addressing this parameter and therefore the NTR does not need to have it. Moved this guidance text to RIS based on industry consensus	
G3.1.1.1	G3.1.3		No change	No comments.	1
G3.1.1.2	G3.1.4		No change	No comments.	1
G3.1.1.3	G3.1.6		No change	No comments.	1
G3.1.1.4	G3.1.5		No change	No comments.	1
G3.1.2.1	G3.2.2		No change	No comments.	1
G3.1.2.2	G3.2.3		No change	No comments.	1
G3.1.2.3	G3.2.4		No change	No comments.	1
G3.1.2.4	G3.2.6		No change	No comments.	1
G3.1.2.5	G3.2.7		No change	No comments.	1
G3.1.3.1	G3.3.8		No change	No comments.	1
G3.1.3.2	G3.3.9		No change	No comments.	1
G3.1.3.3	G3.3.10		No change	No comments.	1
G3.1.3.4	G3.4.3		No change	No comments.	1
G3.1.3.5	G3.4.4		Revised	Reference to NR/GN/ELP/27010 deleted since it is a company standard.	2
G3.1.3.6	G3.4.5		No change	No comments.	1

From GLGN1612 Issue One	To GLRT1212 Issue Two	To RIS-1852-ENE Issue One	Way forward	Comments	BCfC Objective
G3.2.1.1	G3.5.2		No change	No comments.	1
G3.2.2.1	G3.6.2		No change	No comments.	1
G3.3.1.1	G3.7.5		No change	No comments.	1
G3.3.1.2	G3.7.6		No change	No comments.	1
G3.4.1.1	G3.8.2		Revised	Reference changed to relevant document.	2
G3.4.1.2			Withdrawn	To withdraw because it is covered by G3.8.2.	2
G3.4.2	G3.9.2		No change	No comments.	1
G3.4.3.1	G3.10.2		No change	No comments.	1
G3.4.4.1	G3.11.1		Revised	Included in G3.11.1.	2
G3.4.4.2			Withdrawn	This guidance is to be withdrawn since requirement related to this is proposed to be an open point.	2
G3.4.4.3	G3.11.2		No change	No comments.	1
G3.4.5.1		G3.1.3	Moved to RIS	The ENE NTSN does not have an element addressing this parameter and therefore the NTR does not need to have it. Moved this rationale text to RIS based on industry consensus.	
G3.4.5.2		G3.1.4	Moved to RIS	The ENE NTSN does not have an element addressing this parameter and therefore the NTR does not need to have it. Moved this guidance text to RIS based on industry consensus.	
G3.4.5.3			Withdrawn	To withdraw since not part of energy subsystem.	2
G3.4.5.4		G3.1.5	Moved to RIS	The ENE NTSN does not have an element addressing this parameter and therefore the NTR does not need	1

From GLGN1612 Issue One	To GLRT1212 Issue Two	To RIS-1852-ENE Issue One	Way forward	Comments	BCfC Objective
				to have it. Moved this guidance text to RIS based on industry consensus.	
G3.4.6.1		G3.2.2	Moved to RIS	The ENE NTSN does not have an element addressing this parameter and therefore the NTR does not need to have it. Moved this rationale text to RIS based on industry consensus.	
G3.4.6.2		G3.2.3	Moved to RIS	The ENE NTSN does not have an element addressing this parameter and therefore the NTR does not need to have it. Moved this guidance text to RIS based on industry consensus.	

Table A3: Disposition table for new content in GLRT1212 issue two and RIS-1852-ENE issue one

GLRT1212 Issue Two	RIS-1852-ENE Issue One	Way forward	Comments	BCfC Objective
Part 1		New	Based on the latest template for RGS.	
G2.1.11		New	Consideration for impact of conductor rail general wear added.	2
G2.2.1, G2.2.2		New	Guidance provided regarding short circuit fault levels being an open point.	2
G2.3.1, G2.3.2		New	Guidance provided regarding loss of line voltage and reclosure sequence being an open point.	2
2.4.1 (a) and (b)		New	Optional values for train set current added.	2
G2.4.2, G2.4.3		New	Rationale for train set current requirement	2

GLRT1212 Issue Two	RIS-1852-ENE Issue One	Way forward	Comments	BCfC Objective
G2.4.4, G2.4.5		New	Guidance provided regarding train set current requirement	2
G2.5		New	Guidance provided regarding current at standstill element, which is an open point due to not having an industry agreed position on value of this parameter.	2
G2.7.5		New	Guidance for protective provisions against electric shock at station platforms provided.	2
G3.11.1, G3.11.2		New	Guidance regarding conductor rail layout being an open point.	2
Table 4		New	Open points list	2
	Part 1	New	Template RIS text.	
	Part 2, Part 3	New	Requirements moved from GLRT 1212 Issue One. Rationale and guidance taken from GLGN 1612 Issue One	2

Table A4: Disposition table for GMRT2113 issue one

From GMRT2113 Issue One	To GMRT2113 Issue Two	To RIS-2716-RST Issue One	Way forward	Comments	BCfC Objective
1.1.1	1.1.1		No change	No comments	1
1.1.2	1.1.3		Revised	Altered to identify that open points exist within the standard.	2
1.2.1.1	1.2.1.1		Revised	Revised for clarity, where the previous version of the clause overcomplicated the intent of the standard.	1

From GMRT2113 Issue One	To GMRT2113 Issue Two	To RIS-2716-RST Issue One	Way forward	Comments	BCfC Objective
1.2.2.1	1.2.4.1, 1.2.5.1, 1.2.5.2		Revised	Updated to match the new RGS template.	1
1.3.1	1.3.1	1.5.1	Revised	New committee approval date added.	
1.3.2	1.3.2	1.5.2	Revised	New RSSB approval date added.	
2.1	2.1		Revised	Title only.	
2.1.1	2.1.1		Revised	Requirement now relates to the protection of systems only and carrying short circuit fault levels for the dc conductor rail energy subsystem. Reference to EN 50153:2014+A2:2020 moved to 2.2.1 which relates to the protection against electrical hazards for direct or indirect contact with persons.	2
2.1.2	2.1.2		Revised	Requirement revised considering withdrawal of requirement 2.1.4, which it referenced. Simplified to give permission for a single main protective bonding path between the main body and one bogie for vehicles.	2
2.1.3	2.2.3		Withdrawn	To withdraw as the maximum protective sustained short circuit fault level at the vehicle, and the reclosure strategy of track feeder circuit breakers, are now open points within the standard. This change was made as a result of the infrastructure manager advising that they are unable to guarantee that the values for current that were set out will be the maximum in all locations, and that reclosure strategies differ depending on whether an automated or manual system is employed to manage the reclosure of circuit breakers.	2

From GMRT2113 Issue One	To GMRT2113 Issue Two	To RIS-2716-RST Issue One	Way forward	Comments	BCfC Objective
2.1.4			Withdrawn	To withdraw as no method exists to measure the maximum total DC traction load current in the running rails, and the infrastructure manager cannot guarantee that it would be below 9 kA in all cases. The requirement has been withdrawn and not replaced, nor an open point added, as it was considered that this requirement provided little value with respect to rolling stock system design.	2
2.2		2.1	Revised	Title only.	
2.2.1		2.1.1	Moved to RIS	Requirement is not about the electrical or mechanical components of rolling stock current collector equipment, or the interface to the dc contactor rail, and is therefore best placed in the RIS as it does concern technical compatibility with dc conductor rail equipment (guard boards) but with heat emissions from other parts of rolling stock systems such as brake resistor fan vents or exhausts.	1
2.3			Withdrawn.	Title only.	
2.3.1			Withdrawn	To withdraw as the electrical clearance between fixed installations and rolling stock is managed by the infrastructure manager and is not assessable from a rolling stock perspective due to the clearance differing between locations.	2
3.1	3.2		Revised	Title only.	
3.1.1	3.2.1		Redrafted	For clarity only.	
3.1.2	3.2.2		Redrafted	For clarity only.	

From GMRT2113 Issue One	To GMRT2113 Issue Two	To RIS-2716-RST Issue One	Way forward	Comments	BCfC Objective
3.1.3	3.2.3		Redrafted	For clarity only.	
3.2	3.3		Revised	Title only.	
3.2.1	3.3.1		Revised	Requirement revised to reference GLRT1212 issue two, 3.4, with permission given for the maximum current value to be greater if permission is sought from the infrastructure manager. This requirement was adapted as it is considered appropriate for the energy subsystem to set out the compulsory current limits to which rolling stock needs to comply.	2
3.3			Withdrawn	Title only. Merged with new section 3.3.	
3.3.1	3.3.4		Revised	Updated reference to BS EN 50388-1:2022 clause 7.3.	2
3.4			Withdrawn.	Title only. Merged with new section 3.3.	
3.4.1	3.3.3		Revised	Updated reference to BS EN 50388-1:2022 clause 7.2.	2
3.4.2			Withdrawn	To withdraw as it's not clear how this would technically be achieved (for the driver to limit the power or current demand to half the actual train power or current) and is also a rule for a driver, not a technical requirement.	2
3.4.3			Withdrawn	To withdraw as this requirement is already necessary by the implementation of GMRT2113 Issue Two clause 3.3.3.	2
3.5			Withdrawn	Elements of this part have been included in other sections.	2

From GMRT2113 Issue One	To GMRT2113 Issue Two	To RIS-2716-RST Issue One	Way forward	Comments	BCfC Objective
3.5.1			Withdrawn	To withdraw as this is an ambiguous requirement (for rolling stock to be compliant with GLRT1212) when specific requirements for compatibility with GLRT1212 are already set out.	2
3.5.2	4.5.1		Redrafted	Reference made to traction units instead of locomotive or single vehicles.	2
3.5.3			Withdrawn	To withdraw as gapping performance, from a mechanical perspective, is an open point.	2
3.5.4	4.5.2		Redrafted	For clarity only.	1
3.5.5		3.1.1	Moved to RIS	Requirement is a basic request on a vehicle and is the responsibility of the railway undertaking to make sure all shoegear deploys and retracts at the same time. The original rationale for this requirement was so that rolling stock with retractable current collectors are operated in a configuration which is compatible with fixed equipment located on track on both ac electrified and non-electrified lines; however, a separate requirement for raising shoegear to within the lower sector vehicle gauge exists which already covers this, and therefore this requirement remains valid for the purpose of making sure either a) no single shoe is the sole source of power to the vehicle; or b) no single shoe remains lowered when it should be retracted, and that 'shoes up' is a global, train set command.	2
3.6	3.4		Revised	Title only.	

From GMRT2113 Issue One	To GMRT2113 Issue Two	To RIS-2716-RST Issue One	Way forward	Comments	BCfC Objective
3.6.1	3.4.1		Revised	Different terminology used so that it is not compulsory to provide power regeneration back into the energy subsystem.	2
3.6.2	3.4.3		Redrafted	For clarity only.	
3.6.3	3.4.4		No change	No comments.	1
3.6.4	3.4.5		Redrafted	For clarity only.	
3.6.5	3.4.6 3.4.7		Revised	Requirement revised and split into two distinct requirements to address 18-013-DEV. 3.4.7 does not provide limits over which voltage is adjustable, just the steps at which the limit shall be selected (in 50 V steps).	2
3.6.6	3.4.8		Redrafted	For clarity only, altered to a structured list.	1
3.6.7	3.4.9		No change.	No comments.	1
3.7			Withdrawn	Part withdrawn.	2
3.7.1			Withdrawn	Topic not in NTSN and not required for technical compatibility.	2
3.8	3.5		Revised	Title only.	
3.8.1	3.5.1		Revised	The intent of the requirement remains the same but it is set out differently so that the wording matches the equivalent requirement in GMRT2111.	2
4.1			Withdrawn	Title only. Merged with new sections.	
4.1.1			Withdrawn	To withdraw as the electrical clearance requirement between fixed installations and rolling stock is not assessable from a rolling stock	2

From GMRT2113 Issue One	To GMRT2113 Issue Two	To RIS-2716-RST Issue One	Way forward	Comments	BCfC Objective
				perspective. The revised requirements, in conjunction with gauging standards will facilitate clearances by defining the limits and position of each of the subsystem's assets.	
4.1.2	4.1.1		No change	No comments.	1
4.1.3	4.1.3		No change	No comments.	1
4.1.4	4.1.4		No change	No comments.	1
4.1.5	4.1.2		Redrafted	For clarity only.	1
4.2			Withdrawn	Title only. Merged with new sections.	
4.2.1	4.4.1		No change	No comments.	1
4.3			Withdrawn	Title only. Merged with new sections.	
4.3.1	4.4.2		Revised	Requirement revised to provide clarity on where a weak link shall be in the collector shoe equipment, rather than the term 'frangible joint', which has resulted in a significant change in wording enough to consider the requirement revised.	2
4.3.2	4.4.3		Redrafted	Revised term 'frangible joint' to 'weak link'.	2
4.4	4.3		Revised	Title only.	
4.4.1	4.3.2		No change	No comments.	1
4.4.2		4.1.1	Moved to RIS	Being able to secure a collector shoe into the lifted position does not provide technical compatibility between the collector shoe and dc conductor rail, rather be able to secure the collector shoe out of the way should a fault event require it.	1

From GMRT2113 Issue One	To GMRT2113 Issue Two	To RIS-2716-RST Issue One	Way forward	Comments	BCfC Objective
4.4.3	4.3.1		No change	No comments.	1
4.5	4.2		Revised	Title only.	
4.5.1	4.2.1		Revised	Updated to include new reference to GERT8073 rather than GMRT2149, which has been superseded.	2
4.6	4.6		Revised	Title only.	
4.6.1	4.6.1		Redrafted	For clarity only.	1
4.6.2	4.6.2		Redrafted	For clarity only.	1
4.6.3	4.6.4		No change	No comments.	1
4.6.4	4.6.3		Redrafted	For clarity only.	1
Part 5	Part 5		Revised	Changes to template text have occurred as part of updates to the RGS template.	2
Appendix A	Appendix A		Revised	Open points added.	2
Appendix B			Withdrawn	The summary of requirements was not considered to be useful and usable, and could result in confusion to the user of the standard.	2
Appendix C			Withdrawn	The summary of requirements was not considered to be useful and usable, and could result in confusion to the user of the standard.	2
Appendix D	Appendix B		No change	No comments.	1
Appendix E			Withdrawn	This appendix is considered to be redundant. Current collectors are not an interoperability constituent (IC) and therefore there is no practical benefit in defining current collectors, and the	2

From GMRT2113 Issue One	To GMRT2113 Issue Two	To RIS-2716-RST Issue One	Way forward	Comments	BCfC Objective
				associated assessment process, as ICs in guidance. Although engineering change verification is not applicable to 750 V dc electrification elements, GMRT2113 issue two provides for an assessment process which is similar in structure and purpose and can be used in conjunction with the engineering change process.	
Appendix F			Withdrawn	Appendix contained only a figure, which has been incorporated into the main body of the standard in G 3.4.18.	2

Table A5: Disposition table for GMGN2613 issue one

From GMGN2613 Issue One	To GMRT2113 Issue Two	To RIS-2716-RST Issue One	Way forward	Comments	BCfC Objective
G 1.1.1			Withdrawn	Clause not relevant in the context of the guidance note, therefore no longer applicable.	1
G 1.2.1			Withdrawn	Clause not relevant in the context of the guidance note, therefore no longer applicable.	1
G 1.2.2	1.2.3.2 & 1.2.3.3	1.4.1 & 1.4.2	Redrafted	Redrafted as part of front matter to standard.	1
G 1.2.3			Withdrawn	Clause not relevant in the context of the guidance note, therefore no longer applicable.	1
G 1.3.1			Withdrawn	Copyright notice, which has been superseded.	1
G 1.3.2			Withdrawn	Copyright notice, which has been superseded.	1
G 1.3.3			Withdrawn	Copyright notice, which has been superseded.	1
G 1.4.1	1.3.1	1.5.1	Revised	New committee approval date added.	
G 1.4.2	1.3.2	1.5.2	Revised	New RSSB approval date added.	
G 2.1.1			Withdrawn	Improved rationale given in its place.	1
G 2.1.2	G 2.1.8, G 2.1.9, G 2.1.10, G 2.1.12		Revised	Guidance amended for clarity and split into several parts to make it easier to read.	2
G 2.1.3	G 2.1.11		No change	No comments.	1
G 2.1.4			Withdrawn	Guidance no longer applicable as the associated requirement has been withdrawn, and this guidance may therefore be misleading.	2
G 2.1.5			Withdrawn	Guidance no longer applicable as the associated requirement has been withdrawn, and this guidance may therefore be misleading.	2

From GMGN2613 Issue One	To GMRT2113 Issue Two	To RIS-2716-RST Issue One	Way forward	Comments	BCfC Objective
G 2.1.6			Withdrawn	To move to rail industry standard since requirement about 4th conductor rail system is outside the scope of NTR.	2
G 2.2.1		G 2.1.2	No change	No comments.	
G 2.2.2		G 2.1.3, G 2.1.4	Revised	Split into two separate guidance clauses for clarity only.	2
G 2.3.1			Withdrawn	To withdraw as the electrical clearance between fixed installations and rolling stock is managed by the infrastructure manager and is not assessable from a rolling stock perspective due to the clearance differing between locations.	2
G 2.3.2			Withdrawn	To withdraw because the associated requirement for clearance to structures has been deleted and clearance to vehicles is already covered by gauging standards.	2
G 3.1.1	G 3.2.5		Revised	For clarity only.	1
G 3.1.2	G 3.2.9		No change	No comments.	1
G 3.1.3	G 3.2.10		No change	No comments.	1
G 3.1.4	G 3.2.11		No change	No comments.	1
G 3.2.1			Withdrawn	Improved rationale given in its place.	1
G 3.2.2			Withdrawn	Guidance is inaccurate as RINF is no longer freely available, therefore reference given to the infrastructure manager instead in another guidance clause.	2

From GMGN2613 Issue One	To GMRT2113 Issue Two	To RIS-2716-RST Issue One	Way forward	Comments	BCfC Objective
G 3.2.3	G 3.3.7		Redrafted	Additional information included in rationale beyond what was given in the guidance note.	2
G 3.3.1	G 3.3.9		No change	No comments.	1
G 3.3.2			Withdrawn	Guidance is inaccurate as RINF is no longer freely available, therefore reference given to the infrastructure manager instead in another guidance clause.	2
G 3.4.1	G 3.3.10		Redrafted	Rationale expanded so the intent of the requirement is clear to the reader.	1
G 3.4.2			Withdrawn	Guidance is inaccurate as RINF is no longer freely available, therefore reference given to the infrastructure manager instead in another guidance clause.	2
G 3.5.1			Withdrawn	Associated requirement withdrawn.	2
G 3.5.2	G 4.5.3		No change	No comments.	1
G 3.5.3			Withdrawn	Due to requirements being withdrawn regarding currents, this guidance has also been withdrawn following drafting review group discussions on the maximum current value when a vehicle or unit breaks a gap.	2
G 3.5.4	G 4.5.7		No change	No comments.	1
G 3.5.5			Withdrawn	Guidance is unclear with no definition for ‘split circuits’ given.	2

From GMGN2613 Issue One	To GMRT2113 Issue Two	To RIS-2716-RST Issue One	Way forward	Comments	BCfC Objective
G 3.5.6			Withdrawn	Guidance is unclear with no clear explanation of what 'mechanical protection of the cable connected to the shoegear' is implying.	2
G 3.5.7	G 4.4.9		No change	No comments.	1
G 3.5.8			Withdrawn	Requirement on conductor rail gaps withdrawn and is now an open point, therefore associated guidance is not appropriate in the context of the standard.	2
G 3.5.9			Withdrawn	Requirement on conductor rail gaps withdrawn and is now an open point, therefore associated guidance is not appropriate in the context of the standard.	2
G 3.5.10			Withdrawn	Requirement on conductor rail gaps withdrawn and is now an open point, therefore associated guidance is not appropriate in the context of the standard.	2
G 3.5.1.1	G 4.5.4		No change	No comments.	1
G 3.5.12		G 3.1.2	Revised	For clarity only.	1
G 3.6.1	G 3.4.12		No change	No comments.	1
G 3.6.2	G 3.4.13		No change	No comments.	1
G 3.6.3			Withdrawn	This aspect of the rationale is redundant as it states an obvious point.	1
G 3.6.4	G 3.4.16		No change	No comments.	1
G 3.6.5	G 3.4.17		Revised	Reference made to the infrastructure manager rather than the RINF.	2
G 3.6.6	G 3.4.15		No change	No comments.	1

From GMGN2613 Issue One	To GMRT2113 Issue Two	To RIS-2716-RST Issue One	Way forward	Comments	BCfC Objective
G 3.6.7	G 3.4.14		Converted to rationale	No comments.	
G 3.7.1.1			Withdrawn	Topic not in NTSN and not required for technical compatibility.	1
G 3.8.1			Withdrawn	Improved rationale given in its place.	1
G 4.1.1	G 4.1.5		No change	No comments.	1
G 4.1.2	G 4.1.7		No change	No comments.	1
G 4.2.1	G 4.4.4		No change	No comments.	1
G 4.3.1	G 4.4.6		Redrafted	Updated to include reference to a weak link, rather than frangible joint.	2
G 4.3.2	G 4.4.7		Revised	For clarity only.	
G 4.3.3	G 4.4.8		No change	No comments.	1
G 4.4.1	G 4.3.3		No change	No comments	1
G 4.4.2		G 4.1.2	Converted to rationale.	No comments.	
G 4.4.3	G 4.3.5		No change	No comments.	1
G 4.4.4	G 4.3.6		Revised	For clarity only.	1
G 4.5.1	G 4.2.2		No change	No comments.	1
G 4.6.1	G 4.6.5		Revised	For clarity only.	1
G 4.6.2	G 4.6.7		No change	No comments.	1
G 5.1.1			Withdrawn	Statement indicating no guidance given.	1
G A.1			Withdrawn	Statement indicating no guidance given.	1

From GMGN2613 Issue One	To GMRT2113 Issue Two	To RIS-2716-RST Issue One	Way forward	Comments	BCfC Objective
G B.1			Withdrawn	Statement indicating no guidance given.	1
G C.1			Withdrawn	Statement indicating no guidance given.	1
G D.1			Withdrawn	Statement indicating no guidance given.	1
G E.1			Withdrawn	Statement indicating no guidance given.	1
G F.1			Withdrawn	Guidance stated what the graph clearly shows and is redundant.	1

Table A6: Disposition table for GMRT2113 issue two and RIS-2716-RST issue one

GMRT2113 Issue Two	RIS-2716-RST Issue One	Way forward	Comments	BCfC Objective
1.1		New	Template RGS text.	
1.1.2		New	Information provided on the relationship between the RGS, GLRT1212, the LOC&PAS NTSN and the ENE NTSN.	2
1.2		New	Template RGS text.	
1.2.1.		New	Template RGS text plus addition of reference to RIS-2715-RST for speed conversion table.	
1.2.2		New	Template RGS text.	
1.2.3		New	Template RGS text.	
1.2.4		New	Template RGS text.	
1.2.5		New	Template RGS text.	
G 2.1.3		New	Rationale given regarding the relationship between the requirements the LOC&PAS NTSN 2021.	2
G 2.1.4		New	Rationale given for the purpose of adequate electrical protection through system bonding.	2
G 2.1.5		New	Rationale given which highlights that two bonds are typically used for ac vehicles.	2
G 2.1.6		New	Guidance given for new open point.	2
G 2.1.7		New	Converted from a part of a previous requirement and gives the historic practice for the reclosure sequence of track feeder circuit breakers.	2

GMRT2113 Issue Two	RIS-2716-RST Issue One	Way forward	Comments	BCfC Objective
G 2.1.13		New	Guidance given on historical practices which take into account 9 kA flowing in the running rails.	2
G 2.1.14		New	Guidance given on historical practices which take into account 10 kA across track cable currents.	2
2.2.1		New	New requirement which matches LOC&PAS NTSN 2021 clause 4.2.8.4 for the protection of people.	2
G 2.2.2		New	Rationale given for new requirement 2.2.1.	2
G 2.2.3		New	Guidance given for the interpretation of BS EN 50154:2014+A2:2020.	2
G 2.2.4		New	Guidance given for the interpretation of BS EN 50154:2014+A2:2020 regarding special national conditions.	2
3.1.1		New	New requirement given for maximum train current, where no fixed value is now given and reference made instead to GLRT1212.	2
3.1.2		New	New requirement giving permission for train set internal resistance to be taken into account when specifying circuit breakers and fusegear for rolling stock.	2
	G 3.1.3	New	Guidance given on providing drivers with indication for current collector position.	2
G 3.1.3		New	Rationale given for new requirement 3.1.1.	2
G 3.1.4		New	Rationale given for new requirement 3.1.2.	2
G 3.1.5		New	Guidance given on BS EN IEC 60077-3:2019.	2

GMRT2113 Issue Two	RIS-2716-RST Issue One	Way forward	Comments	BCfC Objective
G 3.1.6		New	Guidance given on an open point in the RGS.	2
G 3.1.7		New	Guidance given on good practice regarding the rate of change of current which can cause nuisance tripping in substations.	2
3.2.4		New	New requirement added to match LOC&PAS NTSN 2021 requirement 3.2.4.	2
G 3.2.6		New	Rationale given regarding requirements 3.2.1 to 3.2.3 and their relationship with the LOC&PAS NTSN 2021.	2
G 3.2.7		New	Rationale given regarding requirements 3.2.1 to 3.2.3 and their relationship with the LOC&PAS NTSN 2021, specific case 7.3.2.10.	2
G 3.2.8		New	Rationale given regarding requirements 3.2.4 and its relationship with the LOC&PAS NTSN 2021.	2
3.3.2		New	New requirement set out to record the maximum train set current in the vehicle technical file where GLRT1212 permits this to be three values.	2
G 3.3.6		New	New rationale added for requirement 3.3.1.	2
G 3.3.8		New	Rationale given regarding the relationship between the requirements and the LOC&PAS NTSN 2021.	2
G 3.3.11		New	Guidance given on the use of requirements together to provide network technical compatibility.	2
G 3.3.12		New	Guidance given on current at standstill for trainsets being an open point in the document, and the systems likely to require current when a vehicle is at standstill.	2

GMRT2113 Issue Two	RIS-2716-RST Issue One	Way forward	Comments	BCfC Objective
G 3.3.13		New	Guidance given on RSSB research project T1185 (2021).	3
G 3.3.14		New	Guidance given on RSSB research project T1185 (2021).	3
3.4.2		New	Permission given for the use of power regeneration to charge onboard traction batteries.	2
G 3.4.10		New	Rationale given as to why the requirement for power regeneration capability is needed.	2
G 3.4.11		New	Rationale given regarding requirements 3.4.3 to 3.4.5 and their relationship with the LOC&PAS NTSN 2021.	2
G 3.4.18		New	Guidance given with associated figure from previous Appendix F.	2
G 3.5.2		New	Rationale revised and improved for requirement 3.5.1.	2
G 3.5.3		New	Rationale given which indicates to the reader that non-compliance with the requirement can result in a safety risk.	2
G 3.5.4		New	Guidance given on how 3.5.1 can be technically achieved.	2
G 3.5.5		New	Guidance given which identifies that the requirement does not result in traction batteries not being able to be charged.	2
3.6		New	Title only.	
3.6.1		New	Requirement added for data collection and measurement (energy metering) to be fitted to vehicles.	2

GMRT2113 Issue Two	RIS-2716-RST Issue One	Way forward	Comments	BCfC Objective
3.6.2		New	Permission given for TCMS to be used for energy metering.	2
G 3.6.3		New	Rationale given for adding requirements for energy metering.	2
G 3.6.4		New	Rationale given regarding the relationship between the LOC&PAS NTSN 2021 and the new requirements.	2
G 3.6.5		New	Guidance given on the LOC&PAS NTSN 2021, the EN 50463 series standards and GMRT2132.	2
G 4.1.3		New	Rationale given to support requirement 4.1.1, where incompatibility with some infrastructure features may occur if the requirement is not implemented.	2
G 4.1.4		New	Guidance given on how the requirement may need to be considered regarding retractable current collectors.	2
G 4.1.5		Ne	Guidance given on typical current collector features.	2
G 4.1.6		New	Rationale given regarding requirements 4.1.1 to 4,1,4 and their relationship with the LOC&PAS NTSN 2021.	2
G 4.2.3		New	Rationale given regarding requirements 4.2.1 and its relationship with the LOC&PAS NTSN 2021.	2
G 4.2.4		New	Guidance added on the resulting damage that can be caused if the requirement is not considered.	2
G 4.2.5		New	Guidance added to provide a simpler means of meeting the requirement.	2
G 4.2.6		New	Guidance given with reference to RIS-2716-RST.	2

GMRT2113 Issue Two	RIS-2716-RST Issue One	Way forward	Comments	BCfC Objective
G 4.3.4		New	Rationale given regarding requirements 4.3.1 to 4.3.2 and their relationship with the LOC&PAS NTSN 2021.	2
G 4.4.5		New	Rationale given regarding requirements 4.4.1 and its relationship with the LOC&PAS NTSN 2021.	2
G 4.5.5		New	Rationale given regarding requirements 4.5.2 and its relationship with the LOC&PAS NTSN 2021.	2
G 4.5.6		New	Guidance given on conductor rail layouts and that information can be obtained from the infrastructure manager.	2
G 4.5.8		New	Guidance given identifying that the minimum spacing between interconnected current collectors is an open point in the RGS.	2
G 4.5.9		New	Guidance given with reference to GLRT1212 clause 3.11.1, which is an open point.	2
G 4.6.6		New	Rationale given regarding requirements 4.6.1 to 4.6.4 and their relationship with the LOC&PAS NTSN 2021.	2
G 4.6.8		New	Guidance given on the benefits of higher collector shoe contact force.	2
G 4.6.9		New	Guidance given on what the moving parts of a current collector arm are, which provides clarity for requirement 4.6.4.	2
	Part 5	New	Guidance given on dc conductor rail condition monitoring.	2, 3