Consultation comments and responses

Document Title: AC Energy Subsystem and Interfaces to Rolling Stock Subsystem.

Document number: GLRT1210

Consultation closing date: 07 October 2022

1. Responders to consultation

No	Name	Company
1	Rob Daffern	Furrer & Frey
2	Garry Keenor	Akins
3	Robert Wilkins	Mottmac
4	Richard Ward	Angel Trains
5	Gareth Thompson	ARUP
6	Richard Stainton (For Network Rail)	Network Rail
7	Ian Barley	Siemens
8	Colin Place	AGIS Engineering
9	Anne Watters	Amey
10	Tom Palfreyman	Wsp
11	Franco Cataldo	Alstom Group
12	Simon Skinner	Powerlines

2. Summary of comments

Code	Description	Total
-	Consulted	12
CE	Critical errors	36
ED	Editorial errors	89
TY	Typographical errors	5
OB	Observations	60
-	Total comments returned	190

Classification codes for a way forward:

- DC – Document change
- NC – No change

3. Collated consultation comments and responses

No	Page	Clause	Comment	Suggestion	By	Way forward	Page	Clause	Response
1	9	2.2.1	Assume the requirement being blank is deliberate and only the guidance applies? Seems odd to have a requirement that is only a title?		1	NC	9	2.2.1	(OB) Noted. This clause only contains guidance.
2	11	3.1.1.1 G3.1.1.4	Min wire height 4040. I understand what you've done, but I believe there are several legacy vehicles taller than 3965? This could effectively prohibit steam trains on a route with 4040? Is that deliberate?	Check legacy vehicle heights. Class 37 / 47 (guess) GW steam trains?	1	DC	10	Part 3.1	(CE) Noted. Requirements have been updated to take cognisance of non vertical track. The vast majority of existing vehicles (i.e those within the gauge height) are compatible with this new wire height. The small number of out of gauge vehicles such as steam trains can be addressed through the network change process when the new minimum wire heigh is required. An assessment at a route level in accordance with RIS-8270-RST is also required to identify and resolve any technical compatibility issues with existing vehicles which may not comply.
3	12	G3.1.1.7	"approaches" is ambiguous. One engineer might think 1mm is approaching. Another might think 300mm is approaching.	Define or re-word approaching	1	DC	11	G3.1.1.11	(ED) Text has been updated to address the comment
4	12	G3.1.1.10	"uk verification proce…." This section sees to use a huge number of words. I have read it 3 times and still cant really see what its for, what value does this add?	Re word / cross ref the standard / delete. Maybe these aren't intended for OLE designers, more for other parts of the industry?	1	DC	11 and pg 31	G3.1.1.16 and Definitions	(ED) This clause is for designated bodies and sets out guidance for their assessment. A new definition for UK verification procedure has been included to improve clarity
5	12	3.1.2.1	Bullet (a). this was a csm ra. Now its just an ra. Is this deliberate? An RA could be almost nothing/cutting corners.	Re word/define if intended.	1	NC	12	3.1.2.1	(OB) Noted. This change was deliberate because the project entity is obliged to apply CSM-RA when the project is subject to an authorisation.
6	13	3.1.2.3	This seems sensible. I think it should save the industry some money.	Note	1	NC	12	3.1.2.3	(OB) Noted
7	13	3.1.2.3	Is any additional signage tied to this? The OLE is now 1.2m lower than previous mandated/the public are used to. Eg a "no horses" sign?	Consider	1	DC	13	3.1.2.8	(ED) Noted. Signage requirements are in RIS-1853-ENE. Further guidance to that effect included. This is particularly relevant in Scotland. See comment no. 162
8	13	3.1.2	The normal contact wire heights are in a nice easy table. Why are the level crossing heights spread over different clauses and text?	Convert to a table for clarity.	1	NC	12	3.1.2	(ED) Given that there is a reference to Table 1, it was felt that this would be a clearer approach that avoids concatenated table referencing.

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9	13	3.1.2.1	DOT traffic signs manual 2018 (find on google) mandates in sec 20.2.1 and .2 a minimum clearance of 600mm to a vehicle 5.03m tall. This simply means 5.6m doesn't comply.	Check 5.6m against highway standards. Resolve. (I appreciate this it easy)	1	NC	12	3.1.2.1	(OB) Noted. DMRB used for Standards for Highways also identifies minimum clearances between road and 25 kV as 600mm when the maximum safe height is 5.03m. Note that Figure 20-12 Safe height beneath cable (S2-2-54) shows that metric dimensions are expressed to one decimal place. Consequently, the difference due to imperial to metric conversion and rounding to one place are not considered to be material and have been used since metrication) The reduced value of 5.6m is a historical value and is only justified by a risk assessment and the application of the necessary safety measures.
10	13	3.1.2.1	There is no mention of bells on strings to reduce clearances. There are many of these existing below 5.6m on private roads etc. It is costing the industry mega money to raise these to 5.6 during renewals. Often for crossings which are used almost never or only in emergencies or as a back up. Are the bells still allowed if existing? A guidance note would help	Clarify position re existing low crossings with bells.	1	NC	12	3.1.2.1	(OB) Noted. The scope of this document is for new, renewed or upgraded energy subsystem that are subject to an authorisation. Existing level crossing that are not subject to an authorisation are not mandated to comply with requirements in this document. Where an authorisation is required and it is not reasonably practicable to comply with requirement in this document, the deviation process set out in the RGS code and manual can be applied (as set out in section 5.6.1).
11	13	G3.1.2.6	"uk verification proce…." This section sees to use a huge number of words. I have read it 3 times and still cant really see what its for, what value does this add? REPEAT for approx. 15 subsequent similar clauses.	Re word / cross ref the standard / delete. Maybe these aren't intended for OLE designers, more for other parts of the industry?	1	DC	12	G3.1.2.6	(OB) This clause is for designated bodies and sets out guidance for their assessment. A new definition for UK verification procedure has been included to improve clarity. See comment no. 4
12	13	3.1.3.1	Only the contact wire? What about reg arm? NS rods etc	Add other items permissible. Otherwise there should be derogations submitted for all reg arms.	1	NC	13	3.1.3.1	(CE) Further guidance on this aspect has been included in G3.1.3.4
13	14	G3.1.3.4	These extra items are not guidance, they should be part of the requirement?	Add to requirement, remove from here?	1	NC	13	G3.1.3.4	(CE) Text is to remain unchanged in order to align with the energy NTSN clause 4.2.10 for which the UK specific case 7.4.9.3 applies
14	15	Table3	Comment re D isn't at all clear what it really wants. I cant tell. A diagram would really help. One for a normal short NS and another for a CWNS. The principle is very different for a CWNS.	Check/correct and add a diagram	1	DC	15	Table 3	(CE) Noted. Definition for distance D has been included in the diagram. The distance values between the APC magnet and the neutral section centre line are a minimum so larger values can be applied. See comment 185
15	15	Table3	Vspeed value is m. it should be m/s	Correct unit	1	DC	15	Table 3	(TY) This typographical error has been corrected.
16	15	Table3	Vspeed says "to be calculated" I don't think you can calculate the speed, it is defined by the location or project surely?	Correct text.	1	DC	15	Table 3	(ED) Noted. Text has been updated to address the comment
17	15	Table3	Operation time for the VCB of 150ms is fine for modern stock. It is no good for old class 86 locos due to their tap changers. I assume they no longer run in the UK?	check	1	NC	15	Table 3	(CE) Noted. This has been checked. RSSB research project T951 proposed that, taking the worst case timings VCB opening times should be between 90 ms and 115ms. However there is some uncertainty about the reset operation of the swinging magnet receiver. Therefore the existing VCB opening time of 150 ms was adopted based on historical practice to date. See comment no. 57

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18	16	N/A?	The previous clause about unidirectional lines allowing exit magnet to be closer has removed. I cant find why I the disposition statement? Was this deliberate?	tbc	1	DC	16	3.2.2.5	(CE) Suggested change has been incorporated The previous requirement about unidirectional lines allowing exit magnet to be closer has been reinstated.
19	19	3.3.2	Direct contact is defined in the definitions section, but indirect is not	Add indirect to definitions.	1	DC	28	Definitions	(ED) Definition added.
20	20	4.1	All of part 4. As a designer I am not really sure what value this section adds. I assume it related to acceptance for nobo/debo etc and is there for good reason. Just seems out of place in a group standard. Not my field of expertise though.		1	DC	20	4.1	(OB) Noted. Part 4 provides a process for certifying the OCL and is used by certification bodies
21	24	Appx B fig1	Using the centre line is ok, but then halfD becomes critical. D or D/2 should be shown in the figure.	Clarify figure dimensions	1	DC	24	Appx B fig1	(OB) Figure has been revised to improve clarity
22	24	Appx B fig 1	Definitions. Now the uni directional line permission has been removed, A = B so why make them different letters?	Change B to A or re introduce unidirectional allowance for shorter exit spacing.	1	NC	24	Appx B fig 1	(OB) Noted. Unidirectional line permission is reintroduced (see comment 18).
23	24	Appx B fig 1	NR have previously given me DRN comments for using N.O and said there should be two full stops in the abbreviation……. They are probably right. I know, I know…. It doesn't make any difference.	Convert to symbol and key to N.O.	1	DC	24	Appx B fig 1	(ED) The normally open switch has been removed from Figure 1 to improve clarity
24	All	General	It's a very different feel to the document compared to previous. Instead of being an easy list of tech requirements it feels very word heavy. Reading between the lines I suspect its trying to make a point to someone a little outside the industry perhaps? It might make using it for compliance by normal OLE engineers quite demanding.	tbc	1	NC	All	General	(OB) Noted. Bringing together requirements, rationale and guidance together is the industry agreed format. Previously designers would be needing to refer to a separate document for guidance.
25		General	The changes to this standard make a welcome contribution to delivery of a safe and reliable contact system in a cost-effective way, and overall Atkins is happy to support the new version of this standard subject to consideration of our comments. Comments 10 and 19 are particularly important to us.		2	NC		General	(OB) Noted.

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26	13	G3.1.2.4	"These contact wire height requirements are consistent with a UK notional maximum road vehicle height of 5 m which provides an air gap corresponding to an impulse withstand of about 320 kV which is equivalent to reinforced insulation for systems with a basic impulse withstand of 200 kV." This sentence is confusing.	Suggest reword to "These contact wire height requirements are consistent with a UK notional maximum road vehicle height of 5m. This provides an air gap corresponding to an impulse withstand of about 320kV, which is equivalent to reinforced insulation for 25kV systems. "	2	DC	12	G3.1.2.4	(ED) Suggested change has been incorporated
27	13	G3.1.2.5	"Contact wire heights at public footpaths for pedestrians only…" This clause should relate to *all* footpaths, including private ones.		2	DC	12	G3.1.2.5	(ED) Text has been updated to address the comment. Making this applicable to all footpaths could also encompass footpaths crossings that are only used the workforce. New text now applies to footpath crossings for pedestrians that are accessible to members of the public.
28	13	G3.1.2.5	"In most instances, this dimension exceeds the minima set out in Table 1 unless the footpath is immediately adjacent to a structure such as a bridge or tunnel which constrains the height of the contact wire." With a footpath that does not exceed rail level - and why would it? - a minimum wire height of 4040 under all conditions will provide the 50122-1 distance in *all* instances. Statement is currently misleading as presence of a bridge or tunnel should not affect compliance.		2	DC	12	G3.1.2.5	(ED) Text has been updated to address the comment. See comment 178
29	14	3.2.1.1	"Each section insulator (SI) shall be dimensioned to permit pantograph heads with individual contact strips of a minimum width of 25 mm and pantograph heads with single strips of not less than 80 mm to pass smoothly and without losing electrical contact." This statement is confusing.	Amend to "Each section insulator (SI) shall be dimensioned to permit pantograph heads with individual contact strips of a minimum width of 25 mm and pantograph heads with single strips **with minimum width** of not less than 80 mm to pass smoothly and without losing electrical contact."	2	DC	14	3.2.1.1	(ED) Text has been updated to address the comment. To avoid use of “with” twice, the suggestion has been modified slightly.
30	16	Table 3	"Vehicle speed (m/s) 10% overspeed is added by the formula". This could be more clearly worded,	"Vehicle speed (m/s): note that 10% overspeed is added by the formula"	2	DC	15	Table 3	(ED) Suggested change has been incorporated
31	17	G3.2.2.9	"System separation sections are one of the locations where power changeover can occur routinely." This is the opposite of current UK practice - neutral sections are specifically prohibited as a location where APCO or MPCO is permitted to take place.		2	DC	17	G3.2.2.9	(ED) Neutral section are a phase separation section rather than a system separation section. Text has been deleted to avoid any misunderstanding.

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32	17	G3.2.2.13	The equation should be placed on its own row to aid readability		2	DC	16	G3.2.2.15	(OB) Suggested change has been incorporated
33	17	G3.2.2.14	"The signal after the phase separation section is placed in a location so that the train pantograph is clear of the phase separation section and re-energized, thereby mitigating the risk of a train coming to a stand without power." This statement could be clearer.	Amend to "The signal after the phase separation section is placed in a location so that the train pantograph is clear of the phase separation section and re-energized **at the point where it would come to a stand at the signal**, thereby mitigating the risk of a train coming to a stand without power."	2	DC	17	G3.2.2.16	(ED) Text has been updated to address the comment. See comment 104
34	17	3.3.3.1	On the face of it this clause appears to remove the possibility of live parts of a pantograph infringing on the 50122-1 public area dimension, subject to a CSM RA, as set out in clause 2.2.2.2 of the current standard. This will have a significant impact on costs related to adjacent bridge reconstructions or track lowerings. It is essential that this option is reinstated for pantograph live parts.		2	DC	17	3.3.1.2	(CE) Text has been updated to address the comment and now includes use of BS EN 50122-1:2022 which incorporate the possibility of using a risk assessment.
35	18	G3.3.1.6	"However, other legal obligations are also relevant to the management of safety in public areas. Consequently, mitigation measures might be needed which are additional to those set out in this document and the ENE NTSN." Could the standard add what these legal obligations are and what might be appropriate mitigation measures? At present this guidance is unhelpful and could be interpreted as meaning more onerous provisions are routinely applied.		2	DC	18	G3.3.1.5	(ED) Text has been updated to address the comment. It is not appropriate to be more specific within this RGS, the guidance is only acting as a simple prompt to help ensure a holistic approach is taken.
36	19	G3.3.1.9	"Where required, a production phase is a check for the existence of rules and procedures to confirm that the installation is installed as designed." This wording is confusing, please clarify.		2	DC	18	G3.3.1.9	(ED) Text has been updated to address the comment
37	20	4.1.3 a)	"Two NTSN compliant pantographs." This statement is confusing.	"Two **different** NTSN compliant pantographs."	2	DC	20	4.1.3 a)	(ED) Suggested change has been incorporated
38	21	G4.1.7	"as set out in 6 of the NTSN." This statement is confusing.	Amend to "as set out in **section** 6 of the NTSN."	2	DC	21	G4.1.7	(ED) Suggested change has been incorporated
39	21	G4.1.9	Typo: "For the purposes of placing the OCL…"		2	DC	21	G4.1.9	(ED) Suggested change has been incorporated

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40	22	5.6.2	Typo: "In the case where NTSN **non-**compliance is required for a new, renewed or upgraded vehicle or structural subsystem, the exemption process to be followed…"		2	NC	22	5.6.2	(TY) Given that this text is a standardised template text across all RGSs, we are currently unable to change it in this document. Feedback from policy is that the text in 5.6.2 is correct. However, it has to be read in the context with 5.6.1. If you can't comply with an NTR, seek a deviation from RSSB. If you can't comply with an NTSN seek an exemption. However, your comment is noted for future consideration.
41	24	Figure 1	The normally open switch shown in figure 1 is not an essential part of a neutral section and is not relevant to the purpose of the diagram.	It should be removed along with its mention in the key.	2	DC	24	Figure 1	(OB) Suggested change has been incorporated. See comment no. 120
42	29	Definitions	Nominal wire height definition is confusing: "...constraints include physical route features such as level crossings (increasing the contact wire height) and tunnel / overbridge (decreasing the contact wire height)"	Amend to "...constraints include physical route features such as level crossings (increasing the contact wire height) and **tunnels or overbridges** (decreasing the contact wire height)"	2	DC	29	Definitions	(ED) Suggested change has been incorporated.
43	N/A	Electrical clearances	While Atkins supports the removal of electrical clearances requirements for the reason of being a single duty holder action, the clear specification of electrical clearances is an essential part of standards going back to the original MoT blue book. It is imperative that non-VCC air gap values are clearly stated in standards. At the time of writing the clearances set out in NR standard 27715 module 4 are incorrect and subject to a long-outstanding standards challenge by Atkins. Meanwhile EPTAN002 does contain these clearances but they are buried in an appendix and not very clearly stated. It is a condition of Atkins' support for the update of 1210 in this regard that NR update or withdraw 27715 module 4, and replace it with a new standard based on EPTAN002, before 1210 v3 is published. The new standard should be reformatted to make non-VCC air gap requirements much clearer to designers.		2	NC	N/A	Electrical clearances	(OB) Noted. It is understood Network Rail will make the necessary changes.

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44	20	G4.1.1	Should this not be 'and/or' as you may need to do both? Wording suggests there is a choice between approaches when in fact the approaches are governed by whether or not the OCL is covered by an existing ISV or not.		2	NC	20	4.1.1	(OB) The assessment of the OCL can be one of two possible approaches: as i) an IC or ii) as a part of the energy subsystem using an ISV. These two approaches are mutually exclusive.
45	21	G4.1.11	It may also be used where system level changes have taken place to the OCS system that affect the current collection quality to update its ISV		2	DC	21	G4.1.11	(OB) Text has been updated to address the comment
46	20	Part 4	It is unclear what this section is adding or clarifying with regard the NTSN and associated standards. One area that is causing confusion in the UK market at the moment is the appropriate process to define whether a system level change to an OCS system requires an updated ISV. NR/L2/ELP/27715/MOD 06 ISSUE 1 Dated 3rd March 2018 outlines the governance for overhead contact system design ranges. Section 6 states: “Where system level changes are required to the design ranges, or where changes affect any of the assessed parameters required by GL/RT1210 or the Energy TSI, then the design range shall update its ISV assessment, undertaken by a Notified Body (NoBo) and a Designated Body (DeBo). To determine whether the basic design change has an implication on the interoperability the effect on the current collection quality should be assessed. If there is no consequential change to the current collection quality then this is deemed no implication and NoBo and DeBo assessments are not required.” It would be helpful to clarify who and at what level the assessment should be raised to. It is currently assumed to be Contact Systems Group but the Nobo and Debo are challenging this. It would also be helpful to include this requirement in 1210 as opposed to 27715 so that it is more visible and removes debate.		2	NC	20	Part 4	(OB) Part 4 covers the UK specific case 7.4.2.9.5 and provides a process for certifying the overhead contact line as an IC. We are aware of ongoing discussions relating to ISV certificates. Note that separately the DfT is also revising the IC modules NTSN which may clarify some of these aspects in due course.

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47	20	G 4.1.12	It would also be helpful to note that simulations can be used to justify system decisions based on prior testing and/or to assess current collection quality impact as above without requiring further testing. As it stands the NTSN is unclear and read in a literal sense suggests that all dynamic simulation work should be followed up by train testing or else it is redundant. This is not the case.		2g	DC	21	G 4.1.13	(OB) Noted. Responses to other comments have provided improved clarity with respect to the use of simulation and testing. See comment no. 187
48	N/A	Electrical clearances	Electrical clearances have been removed from the standard on the basis that clearances between OCS and infrastructure are a single duty holder action (NR to NR), and that clearances between OCS and trains are controlled by means of clause 3.1.1.1. What about the case of two railway infrastructure manager's systems interacting, e.g. an HS2 bridge over NR OCS, or an LUL bridge over NR OCS? Why has that interface between removed from the standard?		2	NC	N/A	Electrical clearances	(OB) The requirements for minimum dimensions for electrical clearance between the live parts of the energy sub system and other fixed assets (including those acting as obstacles) have been removed, as the interface between such subsystems are out of scope of the RGS. Industry representatives have indicated that requirements for other interfaces, for example between two IMs, need not be retained in RSSB standards, as this risk is managed under the process for ensuring safe integration via each organisations' management arrangements to meet the essential requirements (and to also meet obligations in accordance with UK Health and Safety legislation).
49	18	G 3.1.1.7	This clause could lead to projects specifying slab track or similar in an effort to meet it, which could significantly increase project costs. Is this clause necessary?		2	DC	11	G 3.1.1.11	(OB) Text is guidance rather than a requirement (no need for compliance), however it has been reworded to address the essence of the comment
50	17	3.3	The rationalisation of this section to only cover public areas is an improvement. However, a definition of "public area" should be provided or guidance to where it is defined in the EN provided. Note that NR EPTAN002 defines it as 'areas where the public can lawfully be'.		2	DC	30	Definitions	(ED) Suggested change has been incorporated . Definition of public area has been included.
51	17	3.3	BS EN 50122-1:2011+A1:2011 clause 5.2.1 does have a recommendation for restricted areas also. As part of the guidance (G3.3.1.8) this should be referenced.		2	NC	17	3.3	(ED) Restricted areas are considered out of scope of the UK specific case and therefore this RGS. See comment no. 169
52	17	N/A	This section contravenes NR/L2/27715 Module 4. NR should therefore update 27715 to align.		2	NC	17	N/A	(OB) Noted.

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53	18	G 3.3.15	Suggest this guidance clause is moved to after 3.3.1.7, to keep guidance related to overbridges together.		2	DC	8	G 3.3.1.6	(ED) Suggested change has been incorporated
54	12	3.1.2.1 3.1.2.2 3.1.2.3	Further values of HCW_{min} are quoted in bullets and statements in a different format to the values in 3.1.1. Not immediately obvious there are other values of HCW to consider.	Suggest that for consistency these values are either: - a) Incorporated into Table 1 and referenced or Placed into a new Table 2	3	DC	12	3.1.2.1 3.1.2.2 3.1.2.3	(ED) Text has been revised to improve clarity. See also comment no. 8 regarding placement into a new table.
55	15	3.2.2	The requirements for APC magnets are not directly written into the NTSN other than the requirement to bring the Power Consumption to 0. This section requires the use of APC Magnets where other APCO technologies such as the balise system may become a more reliable system in the future.	This section should be moved to RIS-1853-ENE. (Some following comments on the content still apply). This may include Appendix B & C as well. A more generic version should replace it that covers requirements of NTSN 14.2.16.1 & 2.	3	NC	14	3.2.2	(OB) Noted. The basis for the inclusion of APC magnet for technical compatibility with legacy rolling stock subsystems. This is in accordance the RSSB's code and manual for content in an RGS. See comment no. 17
56	16	3.2.2.3 Table 3	The value of $Receiver_{offset}$ is given as 7.75m based on the historic value for Class 86/87 units. It is know that longer values for the Class 92 (10.1m) have been in operation since this value was utilised but in general values are much shorter nowadays.	7.75 should not be used as a requirement but as a suggested value where the actual APC offsets cannot be usefully or accurately determined.	3	NC	15	3.2.2.4 Table 3	(CE) 7.75 m is a historical value and covers the vast majority of vehicles on a network basis. We know that there are units with longer values but following discussion with industry it was decided based on experience to date to retain this value.
57	16	3.2.2.3 Table 3	Value 't' of 0.150s historically has a factor of 2 applied to be 0.300s based on condition and supply voltages. Traction < 160kph historically had a value of 0.400s applied.	A factor of safety should be applied to value t or an allowance for a determination of a factor of safety.	3	NC	15	3.2.2.4 Table 3	(OB) RSSB research project T951 proposed that, taking the worst case timings VCB opening times should be between 90 ms and 115ms. However there is some uncertainty about the reset operation of the swinging magnet receiver. Therefore the existing VCB opening time of 150 ms was maintained on the basis of historical practice. See comment no. 17
58	17	G.3.2.2.12	Historically, the 4.5m/s (10mph) was assumed to give a 2.225m/s (5mph) exit speed out of the magnets. It is this secondary requirement that is the more important to be determined as compliance with does not guarantee the unit can coast through and exit with sufficient speed.	Guidance on both entry and exit speed to the magnets should be provided.	3	NC	16	G.3.2.2.14	(ED) RSSB research project T951 estimated that a typical train with an approach speed of 4 m/s to an APC sited on a worst case gradient (1:33), has exit speed of approximately 0.5 m/s. Separately, 2.225 m/s exit speed was shown to apply to gradients up to 1:75. However further work is needed to understand the applicability of these values. This aspect can be considered in a future revision.
59	17	G.3.2.2.13	The calculation is not shown clearly.	Should be displayed as per 3.2.2.3 so the calculation can be read clearly	3	DC	16	G.3.2.2.15	(ED) Text has been updated to address the comment. See comment no. 32
60	17	G.3.2.2.16	Statement needs minor clarification. I read this to mean trains 'operating' with multiple pantographs will have dedicated APC receivers, but Class 90/92 can have two pans controlled by one system (hence differing offsets) but only operating as a single pantograph.	Clarification with the additional of the term operating.	3	DC	17	G.3.2.2.18	(ED) Text has been updated to address the comment.

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61	24	B.1 Figure 1	An approach sign is shown in the key but not shown on the drawing so no guidance on this is given. Black squares indicating the in-line sectioning are not defined in the key.	Additional guidance of the position and use of approach sign is provided (even in the form of a note). In-Line insulation is defined in the key.	3	DC	24	B.1 Figure 1	(ED) Figure has been revised to improve clarity. See comment no. 121
62	26	C.1 Figure3	Within the diagram the value to show the relationship between the rail head and APC magnet is not shown therefore the vertical relationship between the APC magnet and the receiver is not fully defined. (also noted in GMRT 2111)	As per GIRT 7073 the 'Z' value of 45 +/-6mm should be included into this diagram.	3	DC	26	C.1 Figure3	(ED) Noted. The Figure has been revised to improve clarity.
63	9	2.1.1.1	The inclusion of "at any voltage in the range" in this clause appears misleading and un-necessary. This suggests that the traction system design should not be based on the principle that current draw per train should be (a) be no higher as line voltage reduces than at nominal line voltage and, more conventionally, (b) reduce with falling line voltage as per clause 7.3 in BS EN 50388-1:2022. This is also inconsistent with G2.1.1.5 which suggests that such a facility (reducing demand with reducing line voltage) is required. The reference to "as set out in … clause 7.2" also appears incorrect in that clause 7.2 in the referenced standard does not specify voltage ranges.	Update the text for clarity and consistency with the referenced standards.	3	DC	9	2.1.1.1	(ED) Text has been updated to address the comment. References to "at any voltage" has been removed and incorrect cross reference has been deleted.
64	9-10	2.2.1	The absence of information on fault duration seems to overlook the information in section 11.2 of BS EN 50388-1:2022. Even if this information is, as currently stated, not definitive, it is not clear why it is not mentioned at all.	Include reference to section 11.2 to clarify what it does provide in this context and, if applicable, what is left open. Alternatively, some or all of this information may be more appropriately included in RIS-1853-ENE which could therefore be referenced in this context.	3	NC	9	2.2.1	(ED) Noted. Given the content of EN 50388:2022 and Energy NTSN, industry felt this was no longer necessary for technical compatibility with a legacy rolling stock subsystem especially given the remote likelihood of bond failure as indicated in RSSB research project T1001.
65	23	GA 1.1	(G2.2.1.2). Not having a S/C fault duration makes it difficult for design engineers to define bonding requirements. Given this information has also been removed from 2111 what reference should be used when designing equipotentially bonded elements for rail vehicles?	Performing calculations adds cost, without data calculations cannot obviously be undertaken so add further cost given engineers will factor in a significantly conservative bond capacity into designs. Corollary, there is the chance that safety is compromised if bonding is underrated for purpose. Although it is understood that sourcing appropriate data must be challenging for it not to have been included, there would be significant benefit to moving back to guidance offered in withdrawn documents such as GM/RC2514 Iss 3 (Clauses RC003 et al).	4	NC	9	2.2.1	(ED) Noted. Given the content of EN 50388:2022 and Energy NTSN, industry felt this was no longer necessary for technical compatibility with a legacy rolling stock subsystem especially given the remote likelihood of bond failure as indicated in RSSB research project T1001

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66		2.1.8	Electrical insulation coordination (former clause 2.1.8 in issue 2). The use of the terminology 'basic', 'functional' and 'enhanced' insulation are used extensively within Network Rail standards (eg NR/L2/ELP/27715). Similarly, the UKMS design range refers to this same terminology on multiple basic design drawings and within the design manuals.	Network Rail standards to be updated to align with GLRT1210 Issue 3 and published for compliance on the same day. Network Rail EPTAN's 12-21-001-V1 and 12-21-002-V1a will also require update or incorporating into standards. UKMS drawings and manuals to be updated to align and published for compliance on the same day.	5	NC		N/A	(OB) Noted. This is a matter for Network Rail to consider.
67	11	3.1.1.1	It is unclear whether the minimum contact wire heights are design values before TMLA, track tolerances, ice loading etc or absolute values. It is also unclear if the minimum contact wire heights are dynamic or static values.	State within the guidance that these heights are absolute values and that the minimum contact wire height is in the static scenario as opposed to the maximum contact wire height which is in the dynamic scenario (with uplift).	5	DC	11	3.1.1.1	(OB) Explanation of minimum contact wire height is in definition. It applies to all conditions but where the track is level. Guidance included to further clarity that 4040 mm and 4165 mm applies on level track.
68	12	3.1.2.1	Clarify if the values for level crossings also apply to areas of hardstanding within depots which have OLE/OCS above such as loading/unloading areas in front of train maintenance sheds. Examples at Ilford Depot, Doncaster Carr Depot.	Section to be reworded to add additional definition/clarification.	5	NC	12	3.1.2.1	(OB) The requirements are only for the locations where the Railway (Interoperability) Regulations 2011 as amended and within the scope of an RGS covers the GB mainline railway as defined in the RGS code and manual. Therefore they would not include locations such as depots and maintenance sheds
69	12	3.1.2.2	The Land Reform (Scotland) Act 2003 permits horse riders to cross or spend time on most land throughout Scotland, provided they do so responsibly. Therefore any railway foot crossing in Scotland could be used by a mounted horse rider and thus requiring the 5.2m minimum contact wire height.	Additional guidance is to be provided for design within Scotland. It is suggested that if the crossing has a height or width restriction (with associated warning signage) which precludes horses being ridden over the railway then 5.2m minimum contact wire height need not apply. The asset owner would then be required to maintain the restrictions on the crossing to prevent accidental use by mounted horse riders.	5	DC	12	3.1.2.7	(CE) Suggested change has been incorporated, see G3.1.2.7 of the draft RGS
70	13	3.1.2.3	The contact wire height and public footpath crossings should consider how the users will be using the crossing and not simply utilise the minimum contact wire height value. The 3.6m standing surface dimension has been determined on the basis of the arms reach as defined in HD 60364-4-41 to which a margin of safety was added. It does not consider members of the public carrying long objects such as fishing rods or ladders which they may be doing at a pedestrian level crossing	Provide additional guidance as to the specific situations which may require a height greater than the minimum due to public behaviours. Detail the risk assessment process to be followed to justify if a higher wire height is required.	5	DC	13	3.1.2.8	(ED) Noted. This change based on other public area locations such as platforms. Generally, aspects relating to managing risk of lower wire heights are managed via organisations' safety management arrangements. Further guidance provided, see G3.1.2.8.

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71	11	3	We have been unable to undertake a full technical review of this standard as BS EN 50122-1 2022 has not be available to review alongside. At the time of writing (04/10/22) this updated standard has not been published on the BSOL online shop.	Provide a draft copy of BS EN 50122-1 2022 and extend the review period.	5	NC	11	3	(OB) Noted. BS EN 50122-1:2022 has now been published and is available on BSOL online. Extending the review period is not currently planned, however, this revision has had significant GB input and has been strongly supported by Network Rail.
72			The standard makes references to different versions of BS EN 50122-1, both the 2011 and 2022 versions. I understand why but it is confusing having to design to 2 versions of the same standard. Is the NTSN likely to be updated? Examples include contact wire at level crossings (G 3.1.2.5), provision against indirect contact (3.3.2) and definition of return conductor.		6	DC			(ED) Text has been updated to address the comment. The ENE NTSN is unlikely to be updated in time for publication of this document, but further changes can be considered in future.
73		Applicable to the standard as a whole	This standard does not include assessment of EMC type issues including electrification system harmonics and comptablity with signalling systems.	Required in a separate RIS: Electrical characteristics at harmonic frequencies that may present high system impedance at the interface with the train pantograph Not forwarded to RSSB – This comment is not relevant to the certificating OCL as an Interoperable Constituent.	6	NC		Applicable to the standard as a whole	(OB) Noted.
74	9	2.1.1.1	Maximum train current - Energy sub system shall be designed to operate with a max train current of 300A per train - Reference is made to EN50388 for train / vehicle definition, so would 'train' therefore be better described as 'Train Set'. - Is the stated 300A the continuous rating for a (undefined) number of trains in section? If the rating of the OSC is >300A continuous, does this satisfy this clause?	User term train set and add definition	6	DC	9	2.1.1.1	(ED) Suggested change has been incorporated. 300A applies to one trainset. If rating of OCL is > 300A the requirements of this clause are satisfied
75	9	2.1.1.1	Clause 7.2 of BS EN 550388-1:2022 doesn't mention voltage - it directs the reader as a note (note 2) to Annex D Annex D is an informative annex and states "In order to prevent over dimensioning of the energy subsystem, the values given in Table D.1 are given for rolling stock and not for the design of the energy subsystem for continuous load."		6	DC	9	2.1.1	(OB) Noted. Text has been updated to address the comment
76		G2.1.1.3	This is incorrect. Please see RSSB Train Performance Limitation Studies report and BR 13422	delete guidance	6	DC	N/A	N/A	(ED) Noted. Text has been deleted

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77		G2.1.1.4	This statement does not align with BS EN 50388-1 Annex D	delete guidance	6	DC	9	2.1.1.	(ED) Noted. Appendix D is informative rather than normative. The word "definite" is used instead of normative to explain that this value is not a requirement. Nevertheless the guidance text has been deleted.
78		G2.1.1.5	Not sure this is relevant?	delete guidance	6	DC	9	2.1.1	(ED) Suggested change has been incorporated
79		G2.1.1.7	This could be anything from a single vehicle to a quad headed freight train.	Used term “trainset” as defined in BS EN 50388-1	6	DC	9	2.1.1	(ED) Suggested change has been incorporated
80	11	3.1.1.1	GERT8073 states the following: *5.3.3 Application of W6a upper gauge to infrastructure* *5.3.3.1 The gauge co-ordinates shall be adjusted for horizontal and vertical curve overthrow using the following formulae: Ti = 21091/R , To = 20478/R* *5.3.3.2 The W6a upper loading gauge shall be further adjusted for dynamic movements relating to cant and wheelset movements in accordance with the values of the benchmark characteristics given in Standard Vehicle Gauge Data workbook 8073SVGD-W gauges, as follows:* *• Tare Bulk Sway – table Dynamic (1)* *• Tare Bulk Roll – table Dynamic (2)* *• Laden Bulk Sway – table Dynamic (3)* *• Laden Bulk Roll – table Dynamic (4)”* *So, the upper gauge coordinates of 3965 mm which have been applied in the GLRT1210 draft are without overthrow and must be adjusted for dynamic movement using 8073SVGD-W Gauges*. While the formaule for 5.3.3.1 is clear, it is not clear how the spreadsheet 8073SVGD-W Gauge applies to infrastructure gauge	Provide guidance on how to use 8073SVGD-W for infrastructure gauging	6	DC	10	3.1.1.3	(CE) Note that this comment has been refined following further discussion with the consultee and the text has been updated to address vertical track curvature. This issue will also be considered in a separate project to update GERT8073 which will be commencing soon.
81	11	G3.1.1.4	Does clause this need to be said? it will confuse. The 200mm / 105kV is this for permanent (non dynamic) clearances and this does not provide functional insulation? Whereas it has previously been generally accepted that as low as 150mm dynamic clearance provides functional insulation according to EN50119.	delete para	6	DC	10	G3.1.1.5	(ED) Text has been updated to address the comment

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82		G 3.1.1.10	*The following text Is repeated twice in the para "the design development phase, assessment of nominal contact wire is a sample check of design evidence (such as drawings, wire height calculation sheets) to demonstrate that nominal contact wire heights are in accordance with Table 1."*	delete repeated sentence	6	DC	11	G 3.1.1.16	(ED) Repeated text could not be identified. Note one refers to nominal contact wire height and the other to maximum and minimum contact wire heights. These checks are only needed in the absence of an IC . Text has been revised to improve clarity.
83		G 3.1.1.10	*For the production phase assessment, measurement of dynamic behaviour to identify allocation design and construction errors is not typically used for operational line speeds up to 120 km/h (ac systems). In this case, alternative methods for identifying construction errors such as measurement of the OCL geometry according to Table 1 can be used to fulfil the production phase assessment.* *Production phase assessment is not relevant, as dynamic measurements are only requirement for contact force.*	delete sentence	6	DC	11	G 3.1.1.16	(CE) This misunderstands the assessment process in Table B.1. Production phase of geometry of the OCL is not applicable if dynamic testing for construction errors is mandatory. Dynamic testing for construction errors is only mandatory for linespeeds above 120 km/h. For operational speeds up to 120 km/h, dynamic testing for construction errors is not mandatory and alternative methods of identifying construction errors as set out in point 6.2.4.5 (5) of the ENE NTSN can be used. Dynamic measurement, when carried out, are accepted if results are in accordance with point 4.2.12 (see 6.2.4.5 (4) of the ENE NTSN) For further details, see section 2.6.6 of Guide for the application of the Energy TSI dated 16 October 2014 Text has been revised to improve clarity
84		G 3.1.1.11	Production phase assessment is not relevant, as dynamic measurements are only requirement for contact force.	delete para	6	DC	11	G 3.1.1.15	(CE) This misunderstands the assessment process in Table B.1. Production phase of geometry of the OCL is not applicable if dynamic testing for construction errors is mandatory. See response to comment no. 83) Text has been revised to improve clarity.
85		G 3.1.1.12	Production phase assessment is not relevant, as dynamic measurements are only requirement for contact force.	delete para	6	DC	11	G 3.1.1.15	(CE) This misunderstands the assessment process in Table B.1. Production phase of geometry of the OCL is not applicable if dynamic testing for construction errors is mandatory. See response to comment no. 83). Text has been revised to improve clarity.
86		G 3.1.1.12	new text	In accordance with table B.1 on the ENE NTSN there is no requirement for production phase assessment of contact wire height	6	DC	11	G 3.1.1.15	(CE) This misunderstands the assessment process in Table B.1. Production phase of geometry of the OCL is not applicable if dynamic testing for construction errors is mandatory. See response to comment no. 83 Text has been revised to improve clarity
87	12	G 3.1.1.11	Does it mean that we need to run dynamic behaviour test every time? or just an assurance construction testing is enough for system that was TSI approved? The next section is not clear for me in that requirement		6	DC	11	G 3.1.1.16	(CE) No it doesn't mean dynamic testing is needed every time. In accordance with 6.2.4.5 (5) of the ENE NTSN, dynamic testing to identify construction errors is not mandatory for operational line speeds up to 120 km/h. In every other case, measurements shall be carried out in accordance with 6.2.4.5 (2) of the ENE NTSN. Text has been revised to improve clarity

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88		G 3.1.1.12	The are words missing from this clause. *A design development phase assessment for contact wire height is not carried out if the overhead contact line has been certified as an interoperability constituent or as a component of the energy subsystem using an intermediate statement of verification*	A design development phase assessment for contact wire height **shall not be** not carried out if the overhead contact line has been certified as an interoperability constituent or as a component of the energy subsystem using an intermediate statement of verification	6	NC	11	G 3.1.1.15	(CE) The design development phase is detailed in Table B.1 of Energy NTSN. Therefore only guidance is provided. There may also be circumstances when having an ISV may still necessitate a design check if the scope of the ISV does not correctly cover the relevant requirements of the NTSN.
89		G 3.1.1.13	Not relevant and outside of scope	delete para	6	DC	10	3.1.1	(CE) Suggested change has been incorporated
90	13	3.1.2.3	Possibly this question is a bit stupid: I the case we have a Farmer with rights to use a footpath (level crossing) is the requirement of just achieving the min contact wire removing the need of 5.2m?	Remove the word "public"	6	DC	12	3.1.2.3	(ED) Text has been updated to improve clarity regarding intended users.
91		G 3.1.2.5	This para provide background on how the 5.6m wire height was derived using a 200 kV impulse. If this para is read with G3.1.1.4 and G3.1.1.5 the 600m could be reduced to 112 mm if a surge arrestor is present.	The Electricity Safety, Quality and Continuity Regulations (ESQCR) and the Highways Act require conductors placed over roads to be 5.8m high. Historically the railway installed the contact wire at level crossing to a hight of 5.6 m (although it is installed lower than this in many locations). The railway has adopted this dimension where possible to avoid confusion to road users.	6	NC	12	G 3.1.2.4	(OB) Noted.
92		G 3.1.2.6	Production phase assessment is not required	In accordance with table B.1 on the ENE NTSN there is no requirement for production phase assessment of the pantograph gauge	6	DC	12	G 3.1.2.6	(CE) This misunderstands the assessment process in Table B.1. Production phase of geometry of the OCL is not applicable if dynamic testing for construction errors is mandatory. See response to comment no. 83. We have done further work to clarify this guidance
93	13	3.1.3.2	GMRT2173 - table 1 and 2 describe pantograph sway as a product of cant deficiency. While this is correct for rolling stock, from an infrastructure perspective, cant deficiency only occurs on the outside of the curve. The infrastructure designer should use the cant excess (track cant) rather than cant deficiency when determining the pantograph sway on the inside of the curve.	Provide clarity how to apply the tables for pantograph sway for the inside of the curve	6	DC	14	G3.1.3.10	(ED) Additional clarity on the pantograph sway limit values in GMRT2173 can be provided to indicate that cant excess can be considered to be the negative of cant deficiency. Cant excess can be considered to be “negative cant deficiency”. I.e. if an “outward” sway of 50 mm is generated at 100 mm of cant deficiency, it can be assumed that an “inward” sway of 50 mm will be generated at 100 mm of cant excess. This is based on the equation: Cant deficiency = Equilibrium cant – installed cant. (if cant deficiency is positive, and cant excess is negative)
94		G3.1.3.5	Gives the impression that electrical clearances take account of (i.e. include) pan sway?? Suggest this is clarified Please refer it to the mechanical pantograph graph gauge as per the NTSN Appendix D of NTSN ENE "The electrical clearance is considered by the Infrastructure Manager"	delete para	6	DC	13	G3.1.3.5	(ED) Text has been updated to address the comment.

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95		G 3.1.3.6	*"A sample check of design evidence (such as drawings, calculations) is also carried out to demonstrate that pantograph gauge designs are being applied in accordance with the design rules."* In accordance with table B.1 on the ENE NTSN there is no requirement for production phase assessment of contact wire height	delete sentence	6	NC	13	G 3.1.3.6	(CE) This misunderstands Table B.1 of the ENE NTSN. A design phase assessment against 4.2.12 is required by Table B.1 of the ENE NTSN. Agreed that no production phase of the contact wire is required. This has not been specified in the proposed text.
96	15	3.2.2.1	Automatic power control (APC) magnets shall be provided on each side of the track as shown in Appendix B, and are positioned as set out in GIRT7073. If the APC magnets are to be positioned as per GIRT7073, please remove conflicting diagram from Appendix B of this document	Automatic power control (APC) magnets can be provided on each side of the track as shown in Appendix B, and are positioned as set out in GIRT7073.	6	DC	14	3.2.2.1	(ED) Text has been updated to address the comment. In addition, appendix B has been reviewed and updated to improve clarity.
97		3.2.2.1	Phase separation for line speeds, v < 250kph It states that APC magnets shall be installed at phase separation. Why does this preclude the future use of Balises? GMRT2111 issue 3 clause G3.3.15 states G 3.3.14 An APC function will be integrated within ETCS, as set out in LOC&PAS NTSN clause 4.2.8.2.9.8(5), as the use of ETCS increases and matures. This clause is not aligned.	delete para	6	NC	14	3.2.2.1	(OB) Noted. The basis for this clause is for technical compatibility with legacy rolling stock subsystems. Balises and ETCS are not currently fitted across the GB rail network. Further consideration can be given to this aspect in the future as the use of balises becomes more prevalent across the network. At present (and in the medium term) this requirement is needed for compatibility with rail vehicles.
98	15	3.2.2.3	No mention of CEMFaW and ICNIRP limits. These values exceed limits for general public (and therefore workers at particular risk).	Add reference	6	DC	17	G3.2.2.20	(ED) Noted. Some guidance referring to GLGN1620 has been included.
99		3.2.2.4	This clause duplicates the requirement of 3.2.2.1 in a different way		6	DC	14	3.2.2.1 3.2.2.2	(CE) Noted. 3.2.2.4 and 3.2.2.1 are not mutually exclusive. 3.2.2.4 is to prevent the APC magnet being installed between the running rails such as at turnout where this can be done whilst also satisfying 3.2.2.1. Text in 3.2.2.4 has been moved to improve clarity and guidance added.
100		G 3.2.2.10	Repeat of clause 3.2.2.4 and 3.2.2.1		6	DC	14	3.2.2.1 3.2.2.2	(CE) Noted. 3.2.2.4 and 3.2.2.1 are not mutually exclusive. 3.2.2.4 is to prevent the APC magnet being installed between the running rails such as at turnout where this can be done whilst also satisfying 3.2.2.1. Text in 3.2.2.4 has been moved to improve clarity and guidance added.
101		G 3.2.2.11	confusion between train and trainset	use trainset	6	DC	16	G 3.2.2.13	(ED) Suggested change has been incorporated
102	17	G 3.2.2.12	Typo: “formulae” should read “formula”.	The formula for calculating …	6	DC	16	G 3.2.2.15	(ED) This error has been corrected.

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103	17	G 3.2.2.13	The formula quoted runs into the text immediately afterwards – needs a space inserted.	… $S_{Signal\text{-}APC} = v^2 / 2a$ where …	6	DC	16	G 3.2.2.15	(ED) Suggested change has been incorporated
104		G 3.2.2.14	this clause does not cover multiple trains in a trainset	The signal after the phase separation section is placed in a location so that a train pantograph is clear of the phase separation section and re-energized, or another pantograph on the trainset is energised.	6	DC	17	G 3.2.2.16	(ED) Text has been updated to address the comment . See comment 33
105		G 3.2.2.16	Please use traction unit to align with BS EN 50388		6	DC	17	G 3.2.2.17	(ED) Text has been updated to address the comment
106		G 3.2.2.17	Repeat of G3.2.2.8	delete	6	DC	17	3.2.2	(ED) Suggested change has been incorporated
107		G 3.3.1.4	This reads like rationale	To move different section?	6	DC	17	3.3.1	(ED) Document has been updated to remove this text
108		G 3.3.1.5	this needs to make clear that the deviations are against issue 1 & 2 of GLRT1210		6	DC	18	G 3.3.1.7	(ED) Text has been updated to address the comment
109	19	G3.3.1.9	Third line, remove space before comma.	… at the design phase, and …	6	DC	18	G3.3.1.9	(TY) This typographical error has been corrected.
110	19	G3.3.1.9	The ENE NTSN has appendices, not annexes.	… Table B.1, Appendix B of the ENE NTSN, …	6	DC	18	G3.3.1.9	(ED) Suggested change has been incorporated
111	20	4.1.1	The introductory sentence is unclear what it is trying to say, or whether (and in what circumstances) there is a requirement for OCL to be assessed. Also, the grammar is wrong in point b).	OCL which includes a UK specific case shall be assessed *[prior to entry into service, or whenever else it should happen]*. The assessment shall use one of the following approaches :a) As a component of the energy subsystem; or b) As an interoperable constituent (IC).	6	DC	20	4.1.1	(ED) Text has been updated to address the comment
112	20	4.1.2b)	Maximum lateral deviation isn't actually specified in 3.1.3; G3.1.3.7 refers the reader to the rules in the ENE NTSN.	b) Maximum lateral deviation and pantograph gauge as set out in ENE NTSN clause 4.2.9.2 and 3.1.3 of this document and	6	DC	20	4.1.2b)	(ED) Suggested change has been incorporated

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113	4.1.2		The assessment of an OCL shall include the following: a) Contact wire height as set out in 3.1.1 of this document; and b) Maximum lateral deviation and pantograph gauge as set out in 3.1.3 of this document. The LOC&PAS NTSN clause 7.3.2.16.states Pantograph contact force and dynamic behaviour (4.2.8.2.9.6) For technical compatibility with existing lines, the verification at interoperability constituent level (clause 5.3.10 and 6.1.3.7.) shall validate capability of the pantograph to collect current for the additional range of contact wire heights between 4 700 mm and 4 900 mm. Clause 6.1.43.7 states For pantographs intended to be operated on the 1 435 mm track gauge systems, the tests shall include track sections with low contact wire height (defined as between 5,0 to 5,3 m) and track sections with high contact wire height (defined as between 5,5 to 5,75 m). **Therefore the GLRT1210 is requiring the infrastructure to provide current collection performance over a range that the pantographs are now assessed**	The assessment of an OCL shall include the following: a) Contact wire height as set out in the LOC&PAS NTSN Clause 7.3.2.16 b) Maximum lateral deviation and pantograph gauge as set out in 3.1.3 of this document.	6	NC	20	4.1.2	(CE) Noted. The ENE NTSN requires infrastructure to provide current collection performance. See 6.2.4.5(3) and (4) of the ENE NTSN. GLRT1210 is only permitting the same requirements but with a pantograph that is subject to a specific case. As stated, the assessment of the pantograph as an IC is detailed in 6.1.3.7 of the LOC & PAS NTSN. Similarly the assessment for OCL as an IC is in 6.1.4 of the Energy NTSN.
114		4.1.3	This clause duplicates the NTSN clause 6.1.4.1 (2), and is considered outside the standards code	delete para	6	DC	20	4.1.3	(CE) Clause 4.1.3b has been removed as this is considered under route compatibility. Clause 4.1.3a is vital and if deleted would mean that pantographs with UK specific cases are not allowed for purposes of assessment of the overhead contact line as an IC. Note that these are not duplications because they address a specific case 7.4.2.9.5
115	20	4.1.4	This clause duplicate the NTSN clause 6.1.4.1 (3), and is considered outside the standards code	delete para	6	NC	20	4.1.4	(CE) Deleting this clause would create a gap for the measurement of the overhead contact line and would mean that pantographs with UK specific cases could not be used. Note that these are not duplications because they address UK specific case 7.4.2.9.5 in the ENE NTSN.
116	20	4.1.4a) ii)	Remove the comma.	… speed for the OCL to be achieved …	6	DC	20	4.1.4a) ii)	(TY) Suggested change has been incorporated

No	Page	Clause	Comment	Suggestion	By	Way forward	Page	Clause	Response
117		4.1.5	The clause states *The assessment process set out in ENE NTSN, section 6 for assessment of dynamic behaviour and quality of current collection, for integration into a subsystem, shall use for ENE NTSN 6.2.4.5 (3), a pantograph that:* *a) Is NTSN compliant; or* *b) Complies with UK specific cases contained within the LOC&PAS NTSN and that meets the mean contact force required by ENE NTSN 4.2.11"* *However, this does not align with* the LOC&PAS NTSN specific case for pantographs. This states *"7.3.2.16. Pantograph contact force and dynamic behaviour (4.2.8.2.9.6)* *For technical compatibility with existing lines, the verification at interoperability constituent level (clause 5.3.10 and 6.1.3.7.) shall validate capability of the pantograph to collect current for the additional range of contact wire heights between 4 700 mm and 4 900 mm."* *So when assessing the dynamic behaviour and quality of current collection contact force of the pantograph the performance is only assessed between 4,700 mm & 4,900 mm contact wire heights.* *For integration into a subsystem the same contact wire heights limits need to apply when assessing the dynamic behaviour and quality of current collection contact force of the OCL*.	The assessment process set out in ENE NTSN, section 6 for assessment of dynamic behaviour and quality of current collection, for integration into a subsystem, shall use for ENE NTSN 6.2.4.5 (3), a pantograph that complies with UK specific cases contained within the LOC&PAS NTSN for the range of contact wire heights between 4 700 mm and 4 900 mm.	6	DC	20	4.1.5	(CE) This misunderstands the purposes of test done at IC level and those at subsystem level. Clause 4.1.5 sets out assessment requirements for dynamic testing for the identification of construction errors where a pantograph contains a UK specific case but also includes assessment requirements in 6.2.4.5 (3) of the ENE NTSN. 6.2.4.5 (3) outlines the requirement to test using an IC pantograph "exhibiting the mean contact force characteristics as required by 4.2.11". This equally applies to tests using pantographs with a UK specific case. At IC level, the requirements of the ENE NTSN are to undertake a dynamic test of the representative section of the overhead contact line. This is akin to a type test. The tests at subsystem level are for a different purpose, namely to identify construction errors. Text has been revised to improve clarity
118	21	G 4.1.10	Rephrase to indicate that this is actually guidance not just a statement of how things are.	The approach set out in 4.1.1 a) should only be used where …	6	NC	21	G 4.1.10	(ED) The use of the word "should" is not permitted in accordance with RSSB house style, rules and principles
119	21	G 4.1.11	As above.	The approach set out in 4.1.1 b) should only be used where …	6	NC	21	G 4.1.11	(ED) The use of the word "should" is not permitted in accordance with RSSB house style, rules and principles
120	24	Appendix B - Figure 1	Figure 1 - remove the normally open switch. This is not relevant to the diagram, and not always provided.		6	DC	24	Appendix B - Figure 1	(OB) Suggested change has been incorporated

No	Page	Clause	Comment	Suggestion	By	Way forward	Page	Clause	Response
121	23	Appendix B - Figure 1	Position of AJ01 Approach sign for a NS still not very well expressed. The calculation of the position is not included and in Issue 2, it refers to a RSSB standards that was not very clear.		6	DC	23	Appendix B - Figure 1	(ED) Figure has been revised to improve clarity
122	24	Appendix B - Figure 1	Figure 1 - this is not reference in GLRT1210. This signs are reference in RIS 1853. Suggest the figure is transferred to RIS 1863		6	NC	24	Appendix B - Figure 1	(OB) Appendix B is referenced which contains Figure 1. Figure 1 support the requirement in clause 3.2.2.1 and therefore needs to remain in GLRT1210. However the reference to Figure 1 in Appendix B has been clarified
123	26	Appendix B Figure 3	There are now three APC magnet position drawings GIRT7073, GLRT1210 and GMRT2111. These drawings are not consistent GIRT7073 GLRT1210 Horizontal - APC magnet centre line to running rail 457±13 457+±13 Horizontal - APC magnet inside edge to running rail ≥240 Minimum 457-13-50-13 =381 Maximum 457+13-50+13 = 433 Vertical – APC magnet top to running rail 46+6 above running rail Not specified, but shown below the running rail Additionally, the GLRT1210 diagram references the train fitted APC receiver, however is something outwith the scope of an infrastructure manager. Would it be possible to point GLRT1210 to the drawing contained within GIRT1210?		6	DC	26	Appendix B Figure 3	(CE) Suggested change to be incorporated to be in GLRT1210 and GIRT7073 as appropriate to resolve any ambiguities. Note that the horizontal APC magnet inside edge to running rail dimension is greater than or equal >= 240 however the range of 381 to 433mm as calculated does not cover the same dimension. This range is the dimension from the centre line of the APC receiver to the inner edge of running rail.
124	31	Abbreviations	Add: interoperable constituent (IC), as per paragraph 4.1.1.	Interoperable constituent (IC) No definition.	6	DC	32	Abbreviations	(OB) Suggested change has been incorporated
125	31	Abbreviations	Add APC		6	DC	32	Abbreviations	(OB) Suggested change has been incorporated
126	31	Abbreviations	Add train set	train set combination of vehicles coupled together, including banking locomotives [Source BS EN 50388-1:2022 3.1.12]	6	DC	31	Definitions	(OB) Suggested change has been incorporated
127		Applicable to the standard as a whole	This standard does not include assessment of EMC issues including electrification system harmonics and compatibility with signalling systems.	Required in a separate RIS: Electrical characteristics at harmonic frequencies that may present high system impedance at the interface with the train pantograph	6	NC		Applicable to the standard as a whole	(OB) Noted.

No	Page	Clause	Comment	Suggestion	By	Way forward	Page	Clause	Response
128		4.1.4	May require analysis with a train which is not otherwise compatible with infrastructure to demonstrate. Can lead to issues such as GWEP, tested with a train with a compliant pan but neither have subsequently been operated.	Clarify that testing, where possible, should be with a train with an appropriate pan which is representative of future operation and meets requirements.	6	DC	20	4.1.4	(OB) Suggested change has been incorporated
129	9	G2.2.1.1	Whilst no definitive fault clearance time is defined within EN 50388-1:2022 cross reference to EN 50122-1:2020 in respect to Short-term conditions (<300ms) & Long-term conditions (≥700s)	Incorporate a paragraph referring the reader to EN 50122-1:2022 & EN 60479-1 in respect to maximum permissible touch voltages under Short-term earth fault conditions (<300ms)	7	NC	9	2.2.1.	(OB) Noted. Short and long term durations in relation to human safety are already covered in clause 4.2.18 of the Energy NTSN and are not repeated to avoid duplication.
130	11	G3.1.1.5	Minimum clearance for equipment/assemblies in direct contact with the Contact line (Surge Arrester), is stated as 75mm. Make it Clear to the reader its source or reference.	The minimum contact wire height with surge arresters provides a clearance of 75 mm for electrical withstand purposes (EN 50124-1:2017, Table A.2. The combination of a surge arrester and reduced air gaps will withstand a rated impulse voltage of 200 kV, for power frequency voltages up to Umax3 (in accordance with EN 50163:2004+A3:2022) and harmonic overvoltage's from a distorted 50 Hz sine wave in accordance with the value set out in EN 50388-1:2022 without the protected air gap flashing over.	7	DC	11	G3.1.1.6	(ED) Text has been updated to address the comment

131	17	3.3.1.1	Protective provisions against direct contact: As drafted reference is made to EN 50122-1:2022, clauses 5.1, 5.2 & 5.3: - In the case of a restricted area (Public areas), the 'protection clearance (Pr) is very small. For example, a 25kV AC system would have a Pr of 0,3m, which is notably lower than: • EN 50488:2021, Clause 7 which has a minimum approach distance of 500mm • EN 50110-1, Table A.1: Minimum acceptable distance in air defining the outer limit of the live working zone of 480mm (based on the nearest equivalent 3Φ system with a nominal voltage of 45kV AC phase to phase • Established GB practice for the minimum approach distance of 600mm Therefore, a design which is compliant with EN 50122-1:2022, a person can be considered as being too close to a hazardous live part (When considering the direct contact/electric shock risk). It is therefore questionable if all requirements of UK Health and Safety law would be satisfied under such an arrangement. It's not clear how setting this as value for Pr, which could be taken as an input for the development of designs, is compatible with the separate requirement later under EN 50122-1:2022, Clause 5.2.3 for clearances to be observed for persons working near to energised contact line system to be as defined in EN 50488. Clause 5.2.3 is challenging because the opening paragraph links the requirement to 'protection by clearance'. However, there are numerous points elsewhere within the standard where the electrical clearance (danger zone) content in clause 5.1.3 is referenced and used for other human safety related requirements and, some concerning indirect electric shock risk. Examples include the dimensioning of: • air gaps between live parts and exposed-conductive-parts and • air gaps between live parts and accessible conductive parts • the danger zone and the positioning of obstacles. For indirect electrical shock, typically where an air gap is separating a live part from an accessible extraneous conductive part, the air gap needs to provide basic insulation. This normally takes account of an installation's	As part of the consultation review for FprEN 50122-1:2020 the adjacent has been raised for consideration and incorporation were deemed appropriate in the public issue of EN 50122-1:2020.	7	NC	17	3.3.1	(OB) Noted. These aspects are largely outside the scope of GLRT1210 and BSI Mirror committee are of the view the new BSI foreword text is sufficient to alert users but this matter is subject to further consideration by the BSI Mirror committee.

No	Page	Clause	Comment	Suggestion	By	Way forward	Page	Clause	Response
			impulse withstand requirements (which is normally higher than the switching overvoltage value set out in EN 50122-1:2022, clause 5.1.3, Table 1. It is therefore doubtful that arrangements which are compliant with EN 50122-1:2022, clause 5.1.3, Table 1. (Based on switching over voltage alone) would be sufficient to meet all requirements of UK Health and Safety law.						
132	17	3.3.1.1	Protective provisions against direct contact: As drafted reference is made to EN 50122-1:2022, clause 5.1, The English in clause 5.1.3.1 is poor.	As part of the consultation review for FprEN 50122-1:2020 the adjacent has been raised for consideration and incorporation in the public issue of EN 50122-1:2020. The dimensions of this safety clearance margin are 0,35m for high voltage public areas, and 0.05m for high voltage in restricted areas or low voltage.	7	NC	17	3.3.1	(OB) Noted. These aspects are largely outside the scope of GLRT1210 and BSI Mirror committee are of the view the new BSI foreword text is sufficient to alert users but this matter is subject to further consideration by the BSI Mirror committee.
133	N/A	N/A	**General Statement:** Where a glossary or term entry is reproduced from another document, the source shall be given at the end of the entry. If any changes are made to the original terminological entry, this shall be indicated, along with a description of what has been modified.	N/A	7	NC	N/A	N/A	(OB) Noted. The definition format used are specific to this document and are part of a master glossary set used by RSSB. These definitions should be read in the context of this document as they may differ from those in other documents.
134	29	Definitions	The term “hazardous-live-part” is already defined in IEC 60050-195:2021, 195- 06-05.	Correct the source as follow: [SOURCE: IEC 60050-195:2021, 195- 06-05 in next document iteration.	7	NC	29	Definitions	(OB) Noted. The definition format used are specific to this document and are part of a master glossary set used by RSSB. These definitions should be read in the context of this document as they may differ from those in other documents.
135	29	Definitions	The term “return circuit” is already defined in Electropedia: IEC 60050-811:2017, 811-35-01.	Add the source: [SOURCE: IEC 60050-811-35-01 to be made in next document iteration.	7	NC	29	Definitions	(OB) Noted. See comment 134
136	29	Definitions	Rated Impulse Voltage U_{Ni} reference document EN50124-1+A2:2005 superseded.	Reference to EN 50124-1:2017 to be made in next document iteration.	7	NC	29	Definitions	(OB) Noted. See comment 134
137	29	Definitions	The term “reinforced insulation” is defined in Electropedia: IEC 60050-195 & 60050-826-12-17.	Add the source: [SOURCE: IEC 60050-195-06-09 & 60050-826-12-17 to be made in next document iteration.	7	NC	29	Definitions	(OB) Noted. See comment 134

No	Page	Clause	Comment	Suggestion	By	Way forward	Page	Clause	Response
138	32	Other References	Salient reference documents missing.	In the next iteration consider reference being made to: • IEC60479-1 Effects of current on human beings and livestock • Electricity at Work Regulations 1989 • Management of Health & Safety at Work Regulations • Construction (Design 7 Management) Regulations 2015 • The Railway (Miscellaneous Provisions) Regulations 1997 (22) • Health & Safety at Work etc Act 1974 (19) • The Occupiers Liability Act 1987 (24)	7	DC	32	Other References	(OB) Noted. Section 5.7 makes clear that users need to consider their own responsibilities to ensure health and safety and work and their duties under health and safety legislation.
139	9	2.1.1.1	See my comments on GMRT2111, I think the definition of the formation to which the 300A current applies is contradictory.	Make sure the two standards refer to the same train formation definition when defining the current limit.	8	DC	9	2.1.1.1	(ED) Text has been updated to address the comment
140	9	2.1.1.1	"…at any voltage in the range, as set out in…" this is not clear, what exactly is the range of voltages and where are they measured? Note that BS EN 50388-1:2022 clause 7.2 doesn't mention voltage at all- it's been moved to 7.3.	Define the voltage as that measured at the train pantograph, reference clause 7.3 of BS EN 50388-1:2022.	8	DC	9	2.1.1.1	(ED) Text has been updated to address the comment. See comment no. 63 and 157
141	9	2.1.1.1	Presumably the system must also be able to deliver reduced currents at lower voltages as specified in EN50388?	Specifically say this. Otherwise we have a requirement on the train which is not matched at the infrastructure.	8	DC	9	2.1.1.1	(ED) Noted. The design requirement for the energy subsystem is a minimum and therefore designing based on lower values is not permitted without a deviation. Text has been updated to improve clarity
142	9	G2.1.1.2	This clause states that the maximum train current is to support **a** train drawing 300A. Presumably this means more than one train, because 2.1.1.1 says that each train draws 300A and the power system generally supplies more than one train.	Reword as 'it can reasonably support **trains** operating'	8	DC	9	G2.1.1.2	(ED) Maximum train current deals with a single trainset and not trains. Reworded to improve clarity

No	Page	Clause	Comment	Suggestion	By	Way forward	Page	Clause	Response
143	9	G2.1.1.6	Surely to check compliance here there should at least be a definition of the train service which is allowed for? The electrification will be designed for a specific service level and it needs to be shown that at that service level, with an assumption that the maximum train current is 300A, each train has a pantograph voltage which is within the limits in EN50163. So it isn't a trivial matter to demonstrate that the system can provide the maximum train current to every train which it might feed. Note- this is a different issue to demonstrating that the infrastructure can provide 300A to one train, but that is not the requirement- the requirement is stated as **each** train.	Require a calculation demonstrating that for a specified train service, the 300A requirement can be met while the pantograph voltage remains within the limits defined in EN50163.	8	DC	9	G2.1.1.3 to G2.1.1.5	(ED) Noted. The service levels for electrification are covered by the clauses 4.2.4 of the Energy NTSN and require dimensioning based on the mean useful voltage. Text has been updated to improve clarity
144	9	G2.1.1.7	See comment 1 above (and corresponding comment on GMRT2111), I think this clause just adds to the general confusion arising from the use of terms 'train' and 'traction unit'.	Reword so there is a clear and consistent definition of the train formation to which the 300A limit applies.	8	DC	9	G2.1.1.3 to G2.1.1.5	(ED) Text has been updated to address the comment
145	15	3.2.2.2 b)	Presumably rather than just having 'a magnetic field strength', the magnetic field strength must exceed the values in Table 2 over the defined plane.	Change to 'Have a magnetic field strength which exceeds the values in Table 2 over a rectangular plane…'	8	DC	14	3.2.2.3 a)	(ED) Text has been updated to address the comment. G3.2.2.2a) now refers to the upper surface of APC magnets having "a minimum magnet field strength…"
146	15	3.2.2.3	As I understand it this forces distances A and B to be equal, was that the intention? Previously B was allowed to be as little as 7.75m + half the neutral section. For unidirectional lines, this change means the circuit breaker will be open for longer than necessary.	Confirm this is the intention or reword.	8	DC	16	3.2.2.5	(CE) Text has been updated to address the comment. The unidirectional requirement in GLRT1210 issue 2 has been reinstated. See comment no. 18
147	16	3.2.2.4	APC magnets shall not be located between any running rails- do you mean between the running rails of one track, so they cannot be underneath a train?	Clarify	8	DC	14	3.2.2.2	(ED) Text has been updated to address the comment. See comment no. 99

No	Page	Clause	Comment	Suggestion	By	Way forward	Page	Clause	Response
148	17	G3.2.2.11-15	All of these seem to me to be requirements not guidance. In what circumstance would it be acceptable to place signals so that a train might not be able to traverse a neutral section properly? How is compatibility of trains with signals at neutral sections to be demonstrated if there is no requirement on placement of signals? It's bad enough trying to deal with this issue for legacy infrastructure without perpetuating the problem for new infrastructure by issuing vague guidance instead of specific requirements.	Redefine these as requirements not guidance.	8	DC	16	G3.2.2.11-15	(OB) Noted. Text has been retained as guidance but revised to improve clarity. The interface between energy subsystem and CCS is out scope of this standard.
149	19	G3.4.3	'It is good practice to locate vulnerable OCL components in a position where they are not directly exposed to temperatures outside their intended working range'- surely this is a requirement, not just good practice?	Make this a requirement, if not already a requirement in another standard.	8	NC	19	G3.4.3	(OB) Noted. This area is currently an open point. Further consideration can be given to this area in the future.
150	20	4	There are some cases where 25kV OCL has been used for lower voltages, is it worth adding a note that where this is the case the mechanical characteristics can be read across?		8	DC	20	4	(ED) Noted. The criteria for assessment in part 4 of the RGS are in the context of certification of the 25 kV OCL and is to be used by certification bodies. For acceptance, the mechanical characteristics (i.e. mean contact force, standard deviation and uplift) shall be in accordance with 4.2.12 of the Energy NTSN. The text in this area has been revised to improve clarity.
151	24	Appendix B	Distance B is not the distance from the signal to the centre line, it's the distance from the 'Retreat Magnet' to the centre line. Also distance A is for the 'Approach magnet' not just 'magnet'.	Reword.	8	DC	24	Appendix B	(ED) Suggested change has been incorporated
152	24	Appendix B	L1 and L2 are not used elsewhere in the document, should they be referenced from G.3.2.2.11- 15?	Add reference from relevant parts of G.3.2.2.11- 15.	8	DC	24	Appendix B	(ED) Noted. The whole of Figure 1 is now referenced which includes L1 and L2.

No	Page	Clause	Comment	Suggestion	By	Way forward	Page	Clause	Response
153			Due to the changes in this Document there are a number of Network Rail line standards such as maintenance, operation etc that now contradict this. This is especially critical with Permanent Way track fixity, reference datum markers and horizontal/vertical alignment will require adherence to limited clearance locations. This gives a potential for OLE equipment to be either rejected for introduction into operation by RAMs and other stakeholders or for design/project engineers to be open to blame should anything go wrong.	Noting this is not an RSSB issued – but will be useful to confirm that all standards will be aligned.	9	NC			(OB) Noted
154			General comment - for the items that have been removed from the standard i.e. electrical clearances to structures	There should be some guidance on where these can be referenced	9	NC			(ED) Noted. Interface between energy sub system and rail vehicles in terms of clearance is now addressed using minimum contact wire height requirements and vehicle / pantograph gauging. Electrical clearances between the Energy subsystem and other subsystems are out of scope, and are determined by the Project Entity.
155			General comment	General comment - Should we be promoting industry wide consistent terminology of OCL rather than common alternatives such as OLE?	9	NC			(OB) Noted. OCL would provide consistency with NTSNs and other ENs
156	7	1.2.3	Heading is merely “Structure”, which is potentially ambiguous.	As per GM/RT2111 cl.1.2.3, suggest that this is amended to read “Structure of this document”.	9	DC	7	1.2.3	(ED) Suggested change has been incorporated
157	9	2.1.1.1	Should this read "Voltage and Frequency" as opposed to just Voltage?		9	DC	9	2.1.1.1	(ED) It only covers voltage. See above related comments no. 63 and 74. Text has been updated to improve clarity
158	11	G3.1.1.6	What deviation applications does this section refer to and what are the supporting technical and test data. (Southampton university tests ?)		9	NC	11	G3.1.1.6	(OB) Yes. The deviation applications refer to those for Cardiff intersection bridge in particular for which tests were undertaken by Southampton university.

No	Page	Clause	Comment	Suggestion	By	Way forward	Page	Clause	Response
159	12	G3.1.1.7	Is the minimum permitted dimension the contact wire height? The section refers to clearance between rail vehicles and On Track Plant (OTP). A minimum height of 4.165m is quoted in line standard NR/L2/RMVP/0200/module P301 where RRAP will not be fitted (Table 1). This corresponded to the minimum contact wire height of 4.165m at the time. Will standard NR/L2/RMVP/0200/module P301 be revised to allow RRAP to be fitted at locations with 4.04m contact wire height as opposed to 4.165m contact wire height in Figure 8.		9	NC	12	G3.1.1.9 and G3.1.1.11	(OB) Noted. This is for Network Rail to consider. Following consultation with plant stakeholders, further guidance in the RGS has been included where minimum contact wire heights of 4040mm are applied. See G 3.1.1.9 to G 3.1.1.11.
160	12	G3.1.1.13	Is the use of CuCd contact wire not recommended or is it banned from future use. The section is not very specific in regard to future use of CuCd and it could be interpreted as being at the discretion of the designer or client, especially if a scope of works is unclear. (is there evidence to support this)	Maybe use stronger wording if NOT to be used.	9	DC	10	3.1.1	(CE) G3.1.1.13 has been removed to avoid duplication of the Energy NTSN. See comment no. 89
161	12	G3.1.2	Level Crossings - No mention of farmers crossings	Specifically state which height should be used for these	9	DC	12	3.1.2	(ED) Text has been updated to address the comment. See comment no. 90
162	13	3.1.2.3	Note, in Scotland there is not distinction between footpath and bridgeway and may be followed based on the surface.	In Scotland there is no footpath option, only bridle way.	9	DC	N/A	N/A	(CE) Noted. Guidance has been included to take cognisance of lack of distinction between footpath and bridle way in Scotland. See comment no. 69
163	13	3.1.2.3	NR requirement for wire heights at footpaths level crossings is quoted in NR/L2/ELP/27715/02 cl.4.5.2 as 5.2m (as per bridleways), whereas GL/RT1210 quotes HCWmin (ie.4165mm, or 4040mm with surge arrestors).	Not a matter for RSSB, but might be worth a Standards Challenge to NR.	9	NC	N/A	N/A	(OB) Noted.
164	13	3.1.3.2	Refers to a pantograph gauge to be established using the requirement in GMRT2173.	Not one for the RSSB but… It may be wise for Network Rail to issue an industry wide pantograph gauge for any and all design staff to utilise and to remove any anomalies in various design house productions of pantograph gauges, especially when design staff are placed under intense pressure to reduce electrification costs.	9	NC	N/A	N/A	(OB) Noted.

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165	15	G3.2.2.3	This section covers the distance of APC magnets approach and exit to neutral sections. A formula is included for calculation of distances. Do these distances comply with tabulated values included in design ranges such as UKMS and do designers apply the tabulated values from accepted design ranges in place of using the GL/RT1210 formula. This section along with Appendix B refers to neutral section APC magnets to be used for power control for all neutral sections. There is no mention of carrier wire neutral sections which, presumably, do not use APC magnets. It is also unclear as to whether the formula in section G3.2.2.3 applies to carrier wire neutral sections which are substantially longer than traditional cut in insulation neutral sections which are a lot shorter.	Clarify the requirements for Different types of NS Not for RSSB – but UKMS may need to be updated to align to this.	9	NC	15	G3.2.2.4	(OB) Noted. The distance D now applies to both long and short neutral sections. The values are a minimum so company standards can have longer distances.
166	16	G3.2.2.5	Cross references GMRT2111 for further information on APC magnets, but unclear why the information on APC magnets needs to be split across the standards.	Clarify how/why the information on APC magnets is split between the two.	9	NC	16	G3.2.2.6	(OB) Noted. GMRT2111 addresses the APC receiver and GLRT1210 covers the trackside APC magnet
167	18	G3.3.1.5	These references negating the need for parapet modification.	Not for RSSB but Line standards currently have a minimum specified height for parapets above OLE. Will Network Rail be amending current line standards to reflect the fact that parapet may not need to meet a specific height.	9	NC	N/A	N/A	(OB) Noted
168	18	G3.3.1.6	This appears to contradict section G3.3.1.5 in that it states that other legal obligations are applicable to public areas and mitigation may require additional measures not included in GL/RT1210.		9	DC	18	G3.3.1.5	(ED) Text has been updated to improve clarity
169	18	G3.3.1.8	This section refers to the use of public areas protection distances being applied to all areas of the railway. It also goes on to state that protective provisions in non-public areas including for the workforce safety are determined by the project entity.	This could lead to a reduction in safety standards if a particular project applies a lower clearance value or is pressured into applying a lower clearance value to, for example, save costs or programme time. GL/RT1210 requires clear direction on clearances to remove any ambiguity. Would it be possible to Provide minimum clearances or guidance for Non Public Areas?	9	NC	18	G3.3.1.8	(CE) Noted. Minimum electrical clearances for non public areas are considered outside the scope of the RGS and therefore have been removed. However, you might wish to be aware of the revised non-public area content in BS EN 50122-1:2022, and you can seek advise from the relevant infrastructure manager.
170	20	4.1	This section does not comment about the measurement of the uplift of the contact wire which is required under 6.1.4.1 of the ENE NTSN.		9	DC	21	4.1	(ED) Noted. Text has been updated to improve clarity of the assessment process

No	Page	Clause	Comment	Suggestion	By	Way forward	Page	Clause	Response
171	24	G B.1.2	Figure 1 – No distance defined for the position of Sign AJ01		9	DC	24	G B.1.2	(ED) Figure has been revised to improve clarity
172	31	Abbreviations	A number of items are quoted as having "No definition." Ie - RIR	Update to be consistent with GMRT2111 and ensure all are added to the document.	9	DC	32	Abbreviations	(ED) Suggested change has been incorporated
173	11	3.1.1.1 & Table 1 (and G 3.1.1.4 & G 3.1.1.5)	Based on the Rationale statements presented in G 3.1.1.4 and G 3.1.1.5 the rated impulse voltage withstand of an air gap between a contact wire at a minimum height of 4165mm and a vehicle (of 105 kV) is much less than that with a minimum contact wire height of 4040mm with surge arrester(s) fitted (of 200 kV). Therefore these two arrangements do not provide an equivalent level of voltage withstand performance, and it appears that the former is too low to provide either Functional or Basic Insulation whereas the latter affords both. This inconsistency needs to be either addressed or the reason for this significant difference explained and justified in the Rationale.	Either address the inconsistency or explain and justify the reason for this significant difference in the Rationale (G 3.1.1.4 and G 3.1.1.5)	10	DC	10	3.1.1	(ED) The rationale is effectively based on two different approaches. 4165 mm is based on industry's long-term operational experience whilst 4040 mm with a surge arrester (which provides 75 mm clearance) is based on previous deviation applications and associated laboratory testing. Text has been revised to improve clarity
174	11	3.1.1.1 & Table 1 (and G 3.1.1.4)	According to the rationale statement in G 3.1.1.4 the minimum contact wire height of 4165mm is based on a '**dynamic** gauge height' of 3965mm plus 200 mm clearance, however this contradicts the previous version of GL/RT1210 (Issue 2) which states (in Clause 3.1.3.2) that the value of 3965mm is the 'standard vehicle gauge **static** height'. This could impact on the choice of clearance value (between vehicle and contact wire) as it seems that, according to GL/RT1210 Iss 2 Clause 3.1.7.4, the 200mm value may relate to a minimum *passing* electrical clearance rather than minimum static electrical clearance value which would be 270mm. This needs to be clarified and any impact on values in this Clause addressed.	Modify 3.1.1.1, Table 1 and G 3.1.1.4 in the event that 3965mm is not the dynamic gauge height.	10	DC	10	3.1.1	(CE) Noted. 200mm is a static clearance, G3.1.1.4 is revised. Dynamic gauge has been change to standard gauge. See also comment no. 80
175	11	G 3.1.1.4	The basis for the 200 mm clearance value is not provided and should be included. This was contained in the previous version of GL/RT1210 Issue 2 in Clause 3.1.7.4.	Include basis for 200 mm clearance value	10	NC	11	G 3.1.1.6	(CE) G 3.1.1.4 The use of the minimum contact wire height of 4165 mm corresponds to a static gauge height of 3965 mm, as set out in GERT8073, plus a clearance of 200 mm for electrical withstand purposes. This air gap will withstand a rated impulse voltage of approximately 105 kV (see BS EN 50124-1:2017, Table A.3). Some switching impulse voltages could exceed this value, see BS EN 50122-1:2022, Table 1.

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176	12	G 3.1.1.7 to G 3.1.1.13	Under the Guidance Clauses it is considered that it would be helpful to retain and refer to the concepts of Functional and Basic Insulation, as were present in Clause 2.1.8.1 of the previous version of GL/RT1210 (Issue 2), and state to what extent the rated impulse voltage withstand values in the rationale (G 3.1.1.4 and G 3.1.1.5) fulfill the requirements of providing these (i.e. Functional or Basic Insulation). In addition, it would be helpful to provide guidance as to the situations where provision of Functional Insulation should be sufficient, and those where provision of Basic Insulation should be considered (e.g. increased likelihood of persons being present and experiencing flashover effects, such as arcing etc); this was previously referred to in GL/GN1610 Clause G2.1.32 which stated: 'This requirement also supports the Operational Concept for the GB Mainline Railway principle 9, that the workforce is to be separated from the particular hazards associated with the electrified railway. This minimises the possibility of disruptive discharge with the associated safety and performance risks.'	Add guidance on Functional and Basic Insulation, relationship to rated impulse voltage values in rationale, and when it is appropriate to provide Functional or Basic Insulation.	10	NC	11	G 3.1.1.8 to G 3.1.1.16	(CE) Noted. Industry representatives advised (during the standard's development) that, based on their network-wide long-term experience (covering a wide variety of locations and rolling stock types, including freight, passenger and On Track Plant), a minimum air clearance of 200mm above a vehicle gauge height of 3965mm is sufficient to avoid danger arising from flashover events between live OCL and a vehicle (when static and in motion). The 200mm minimum value has been and is being used currently at a wide variety of locations on the GB mainline railway without the need for additional safety measures. The management of risk to persons (users, operating staff and third parties) including from indirect and direct contact electric shock, arising from exposed live parts due to the chosen contact wire heights, is already an inherent part of organisations' responsibility for safety management. Therefore, it has been removed. Note: The contact wire height will ordinarily be at the nominal height (4.7 m ARL) and will only move towards the minimum values where necessary, due to an infrastructure constraint which would be disproportionally expensive to change.
177	12	G 3.1.1.7 to G 3.1.1.13	Under the Guidance Clauses it is considered that it would be helpful to clarify that the surge arrester (referred to under the requirement and rationale) could be fitted to either the infrastructure or a vehicle, presuming the latter to be an acceptable approach.	Add guidance to indicate that the surge arrester could be fitted to either the infrastructure or vehicle.	10	NC	11	G 3.1.1.8 to G 3.1.1.16	(OB) Noted. Fitment to vehicles is not in scope of this RGS and would not be as effective because it could only be fitted to electric vehicles and would leave other vehicles (e.g. self-powered vehicles) unprotected.

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178	13	G 3.1.2.5	The wording in this clause is quite 'loose' and confusing. Specifically why is the word 'usually' used in the first sentence, when surely this will ALWAYS be the case if the requirement for HCWmin in Clause 3.1.1.1, Table 1, for the contact wire to be no lower than 4165mm (or 4040mm with surge arresters) is complied with? And if this is ALWAYS the case then why is the second sentence, which refers to the fact that in most instances contact wire heights are higher than the minima in Table 1, necessary to be included? Also there is a minor typo in first sentence should be 'surface' (singular) not 'surfaces'	Delete word 'usually' from first sentence and precede the sentence with 'By complying with the requirements in 3.1.1.1 Table 1…….'. Also remove second sentence completely. Change 'surfaces' in first sentence to 'surface' (singular)	10	DC	12	G 3.1.2.5	(ED) Suggested change has been incorporated
179	15	3.2.2 (& 3.2.2.1)	The requirement for automatic power control through phase separation sections to be solely by the APC magnets method seems to be a little restrictive in terms of encouraging development and introduction of other methods and taking into account currently available technology, such as this being undertaken via ETCS and TCMS (as referred to in the LOC&PAS TSI). This also perpetuates the requirement for the driver to power down before the neutral section before VCB opening, whereas it is understood that this may be table to take place automatically as part of (and just prior to) the VCB opening process if undertaken via ETCS and TCMS.	Consider permitting, in addition, alternative methods, which could be applied concurrently to a phase separation section also equipped with APC magnets.	10	NC	14	3.2.2 (& 3.2.2.1)	(ED) Noted. The scope of the RGS covers the use of APC magnets for technical compatibility with existing legacy rolling stock subsystems at a network level (and new rolling stock with the existing network). The use of ETCS is not precluded, and is covered by the NTSN. Further consideration can be given to this aspect in the future when ETCS becomes more prevalent across the GB mainline railway network.
180	17	3.3.1.1	Clearances from standing surfaces in public areas values, for 25 kV voltage level, are slightly greater in version 2022 of BS EN 50122-1 than in the 2011 version, for example 3.6m versus 3.5m. For this particular case, and any other similar cases where requirements may be more onerous, the wording 'It is permissible….to comply…' appears to be slightly inappropriate as permission would not be required to use a higher value. It also leads to a slight confusion as to what values (e.g. for clearances from standing surfaces) the RGS user is being directed to comply with.	Consider adding a statement under the subsequent supporting guidance (commencing in G 3.3.1.4) to the effect that the intention of the permission is to enable advantage to be taken of the opportunities relating to provisions for protection against direct contact, rather than to direct the RGS user to apply what might be more stringent clearance (or other) values, in the 2022 version, at this stage.	10	DC	17	G3.3.1.4	(ED) Suggested change has been incorporated, see G3.3.1.4.

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181	17	3.3.1.1	Presuming it to be the intention that, when the revised ENE NTSN (based on the revised ENE TSI currently at 2022 draft) is issued, this Clause of GL/RT1210 Issue 3 will be further updated to specify full compliance with BS EN 50122-1:2022, then why not mandate full compliance now to avoid this further update and also avoid a further step change in requirements to be accommodated by the rail electrification industry in relatively quick succession? This is noting the above comment (No 8 from WSP) regarding some more stringent values being present in the 2022 version of BS EN 50122-1 with which permission is not required to comply. To summarise, why not change this requirement from a permissive to a normative requirement.	Consider specifying full compliance with BS EN 50122-1:2022 now, as part of Issue 3, by changing 'It is permissible…to comply…' to '….protection provisions shall comply with…'	10	DC	17	3.3.1.1	(ED) Noted. The permission is in relation to the UK specific case, clause 7.4.2.9.4, which allows design in accordance with national technical rules. Clause 3.3.1.2 is the applicable normative content when the UK specific case is applied. Application of the method in 5.1.2 and Figure 1 of BS EN 50122-1:2022 would mandate applicable parts of 5.1, 5.2 and 5.3 of this standard. Clause 3.3.1.2 has been updated.
182	17	3.3.1.1	What is the justification for removal of the established permissive dispensation in Clause 2.2.2.2 of GL/RT1210 Issue 2 for a pantograph horn to enter into the (platform) standing surface clearance dimension/area subject to CSM risk assessment and it not being reasonably practicable to modify the structure etc, particularly given the additional costs that this could trigger in terms of civil works to overbridges/tunnels located adjacent to stations, or this possibly leading to a proliferation of VCC measures applied to such?	Provide/include justification for this specific removal in the Disposition Table in the Business Case for Change, and confirm that any cost increase expected to arise from this removal has been factored into the costs presented in the Business Case.	10	DC	17	3.3.1.2	(CE) See above comment 34. Updated text includes use of BS EN 50122-1-1:2022 which allows risk assessments to be done. No change to the disposition tables is needed.
183	19	G 3.4.4	The use of the word 'sympathetically' appears to be rather odd/strange and could be improved.	Consider changing to something like 'with restraint'	10	DC	19	G 3.4.4	(ED) Wording has been revised.

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184	n/a	n/a	The current suite of gauging standards are also out for consultation. Clause G A 3.4.2 refers to GLRT1210 as setting out the static electrical clearances and provision for where reduced clearances are permitted. The draft version of GLRT1210 has removed these clearance values which has brought about an inconsistency. ALSTOM (and potentially other stakeholders) use these values to support route compatibility assessment with Network Rail therefore there is value in retaining these values in GLRT1210 and also removing any inconsistency.	Reinstate clearance values from the current version of GLRT1210 (clause 3.1.7).	11	NC	n/a	n/a	(CE) Interface between energy subsystem and rail vehicles in terms of electrical clearance is now addressed in the minimum contact wire height. Other aspects of electrical clearance are considered as part of the route compatibility process and are therefore managed by the applicant and the infrastructure manager as appropriate.
185	15	3.2.2.3	Formatting of APC approach magnet distance formula is better than Issue 2. However, this formula does not result the same values stated in UKMS drawing MS/B12/B01 Sheet 2 of 3 Rev.02 Table 3.	If the formula in GLRT1210 is to be followed, recalculate and update UKMS drawing MS/B12/B01 Sheet 2 of 3 Table 3 for consistency. UKMS drawings for CWNS MS/B12/N03 (3 sheets) and MS/B12/N04 (3 sheets) also need to be updated.	12	NC	15	3.2.2.4	(ED) Noted. The distance formula in GLRT1210 gives distance that are minima. Therefore UKMS values can remain unchanged if these are bigger than those in GLRT1210. See comment 14.
186	17	G 3.2.2.13	Examples for calculation of signals to APC magnets would be useful.	Update UKMS drawing MS/B12/B01 Sheet 2 of 3 Tables 1 & 2 if not aligned with G 3.2.2.13 formula.	12	NC	16	G 3.2.2.15	(OB) Noted. See comment no. 185 and comment no. 148.
187	20	4.1.5	1. It is accepted that Clause 4.1.5 (b) is a positive move away from the ENE NTSN and any train testing will not need a NTSN compliant pantograph as per Section 6.2.4.5 (3) of ENE NTSN. 2. However, the proposal is silent on alternative contactless assessments using differing simulation technology. This version of GLRT1210 is silent on this requirement and still takes a very binary approach that above 120km/h, a physical train test is needed to support construction assurance (Section 6.2.4.5 of ENE NTSN where the OCL has a designed ISV as per GLRT1210 Section G.4.1.10). 3. No mention of GLRT1210 about the design speed. The Sectional Appendix linespeed can drive an overly complex test train procurement. For example, the MENTOR train is limited to 90mph, and if Electrification Test Train was to achieve 125mph then a bespoke test train would need to be procured and found.	1. None. 2. Simulation techniques can be used using as-built data from site to predict and simulate how a single pantograph will behave using actualised installed data. 3. It is of our view that a mix of physical train testing with interpolation of simulation using previous train testing data could be used. GLRT1210 needs to give the industry some more flexibility around ENE NTSN Section 6.2.4.5 (3) “for the Design Speed of the line”.	12	DC	20	4.1.5	(ED). This section has been revised to improve clarity 1. Noted. 2. Noted. Article 10 of the ENE NTSN states “If an innovative solution is proposed, the manufacturer….shall apply for an exemption…”. So the exemption process can be followed. This area needs further discussion and consultation within industry to understand the impact, if any, from not applying requirements in the NTSN. This issue can be considered further in a future revision. 3. Noted. RSSB are aware of ongoing discussions in this area. This area needs further discussion and consultation to understand the impact, if any, from deviating from requirements in the NTSN. This issue can be considered in a future revision.

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188	20	4	Part 4 of GLRT1210 is also silent on some guidance train testing with the OLE de-energised with suitable construction assurance in place.	Similar to the new advisory statement in Clause 4.1.5 (b), it is recommended that the committee is to provide some guidance around undertaking train testing in the accordance to ENE NTSN Section 6.1.4.1 Assessment of dynamic behaviour and quality of current collection. Contact wire uplift & Mean contact force Fm and standard deviation σmax can, if suitable, be undertaken with the OLE switched off and de-energised.	12	DC	20	4	(ED) testing with the OLE de-energised has been incorporated, see G4.1.15.
189	26	Figure 3	We suggest amending the text from 'centreline' to 'track centreline' for the dimensions of APC magnet and running edge to track centreline for clarity. Also, add note to state vertical position of APC magnet depends on the type of magnet.	Network Rail work instruction (NR/L3/ELP/27237 Issue 23 NR/OLE B04 Issue 3) provides the vertical position details for yellow, green (both above rail level) and white (below rail level) type magnets.	12	DC	26	Figure 3	(CE) Suggested change has been incorporated
190	33	LOC&PAS NTSN	Typo error.	Amend text 'ocomotive…' to 'Locomotive…'.	12	DC	33	References	(TY) This typographical error has been corrected.