Consultation comments received on 20/009 Revision to Vehicle Gauging Standards
RIS-2773-RST Issue 2 – Format for Vehicle Gauging Data

Closing date: 06 October2021

1. Ian Johnston, DGauge Ltd
2. Richard Stainton, Network Rail
3. Mark Molyneux, RDG
4. Alexander Hastie, Alstom
5. Tim Fuller, TEFGauging
6. Ian Hills, SNC-Lavalin

Summary of comments submitted	Number	Comment categorisation key
Consulted		
Critical errors	0	CE
Editorial	0	ED
Typographical errors	0	TY
Observations	0	OB
Total returns		
Classification codes (CC)		
Document change	21	DC
No change	13	NC
Date responses published:		

No	Page	Section	Comment	Proposed revised text	By	Section	Page	Way forward	Way forward	[RSSB draft responses]
1	All		My organisation (Network Rail) does not support the standards committee approval of the publication of this document as a matter of principle for the reasons stated.		2				NC	No change, the reasons stated are not within scope of the document.
2	All		The UK Specific case is 7.4.2.9.3. Maximum lateral deviation (4.2.9.2) and pantograph gauge (4.2.10) P case For new, upgrade or renewal of the energy subsystem on existing infrastructure it is allowed to calculate the adjustment to the maximum lateral deviation, the verification heights, and pantograph gauge in accordance with the national technical rules. UK Specific case for the United Kingdom of Great Britain and Northern Ireland, applying only to the mainline network in Great Britain. And 7.3.2.2. Gauging (4.2.3.1) UK Specific case (Great Britain) ('P') For technical compatibility with the existing network it is permissible for the profile of the upper and the lower part of the unit together with the pantograph gauge to alternatively be established in accordance with the national technical rules. This specific case does not prevent the access of NTSN compliant rolling stock to the national network.	It is not clear what is intended to be the national rule for pantograph gauges. It appears to be split across. GLRT1210 - AC Energy Subsystem and Interfaces to Rolling Stock Subsystem GMRT2111- Rolling Stock Subsystem and Interfaces to AC Energy Subsystem GMRT2173 - Size of Vehicles and Position of Equipment RIS-2773-RST - Format and Methods for Defining Vehicle Gauging Data RIS-8273-RST - Assessment of Compatibility of Rolling Stock and Infrastructure - Gauging and Stepping Distances GIRT7073 - Requirements for the Position of Infrastructure and for Defining and Maintaining Clearances **Please can we have one document?**	2				NC	No change, the reasons stated are not within scope of the document. This will be considered for future revisions.
3	8	2.1.2	what is the definition of 'vehicle', whole rake or unit / car?	Clarify	1				NC	See RIR (2011) for definition
4	8	2.1.2	what are 'multiple vehicles' in this context, sub classes?	Clarify	1				NC	In this conext, multiple vehicles are elements that join together to form a train.
5	9	2.2	the version box on general sheet of the excel is confusing, is this the base excel version or the version of the document for this vehicle data?	Clarify	1				NC	It's the version for this particular vehicle.
6	9	2.2	should there not be requirements for this section?	Clarify	1				NC	This topic is guidance only.
7	9	2.3.1.2	is the maximum error + or – 1mm or always + 1mm, i.e. the cross section profile can not be smaller than the actual vehicle profile?	suggested, + or -	1				DC	Accepted document changed
8	10	2.3.1.11	what is the name of this step attribute	suggested, 'step point'	1				NC	Document not changed as the step attribute relates to the step cell in the cross section work sheet.
9	10	2.3.1.11	should the definition of the step point be move to a requirement rather than guidance	suggested, a requirement to define the step point at door centre line for each step	1				NC	No change to the document as the step attribute in the cross section is already defined as a critical point, as set out by clause 2.3.1.1, in the sheet.
10	10	G 2.3.2.3	"Bogie characteristics are not subject to body dynamic movements, but nevertheless are a crucial part of a clearance assessment exercise. Bogie dynamic movements can be defined in a separate 'Dynamic' worksheet." Care must be taken with the wording here, (and this may be a ClearRouteTM specific thing but) in ClearRouteTM bogie dynamic movements cannot be readily added as a separate dynamic "worksheet" but must be added as a separate dynamic "workbook" as if it were a separate vehicle model. Otherwise bogie dynamics will be applied to vehicle bodies and vehicle dynamics applied to bogies. Same applies to G 2.6.1.4	See comments	6			NC		No change to the document as RIS-2773-RST and the spreadsheet do permit the use of a sperate worksheet within the workbook. If user specific software requires a separate workbook this for the user to manage.

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11	10	G 2.3.3.3	Whilst 'Using stylised profiles provides flexibility for design changes and additions to vehicles, for example providing a space for body side mounted equipment' this is really not helpful in terms of future route compatibility assessment and is therefore not ideal.	Amend to read: 'Whilst using stylised profiles provides flexibility for design changes and additions to vehicles, for example providing a space for body side mounted equipment, it is not helpful in terms of future route compatibility assessment for example for subsequent fleet cascades or determining compatibility with diversionary routes.'	3				DC	Text modified as suggested.
12	11	2.4	should there not be requirements for this section?	Clarify	1				NC	No change to document as some subjects do not have specific requirements but the subject is addressed through guidance only to be helpful to the user of this standard.
13	11	2.4.1	what about articulated vehicles?	suggestion, in the case of articulated bogies the virtual bogie position should be calculated, and the cross-section distances be prescribed relating to the centre point between the real and virtual bogie	1				DC	Text modified to "The layers worksheet describes the distance, generally from the vehicle longitudinal centreline mid-way between the bogie centres, of each layer or vehicle cross-section. The distance is positive towards the front (wheelset / bogie 1) and negative towards the rear (wheelset / bogie 2)."
14	11	2.5.4	the explanation following '…Appendix A' is unnecessary. There is also no need to define a sign convention for delta. Its inclusion may lead to confusion.	Remove	1				NC	No change as the text is considered correct and may be useful to some readers.
15	11	2.5.6	Is 90m tight enough? Some part of the network are tighter.	Suggested, go down to 50m	1				NC	No change to document as this describes industry practice tigher loaction are dealt with in route compatibility assessments.
16	11	G 2.5.6	It has occurred to me that there is no similar guidance with respect to. industry practice in relation to vertical curvature. Why not?	Please clarify.	3				NC	No change to document industry practice for vertical curves, as set out in GERT 8073, is 500m
17	12	G 2.6.1.4	"Additional 'Dynamic' worksheets can be be added to define bogie movements." Care must be taken with the wording here, (and this may be a ClearRouteTM specific thing but) in ClearRouteTM bogie dynamic movements cannot be readily added as a separate dynamic "worksheet" but must be added as a separate dynamic "workbook" as if it were a separate vehicle model. Otherwise bogie dynamics will be applied to vehicle bodies and vehicle dynamics applied to bogies. Same applies to G 2.3.2.3	See comments	6			NC		No change to the document as RIS-2773-RST and the spreadsheet do permit the use of a sperate worksheet within the workbook. If user specific software requires a separate workbook this for the user to manage.
18	12	2.6.2.4	"The MBS model shall be validated against all available test results (showing sway, roll and drop as a function of installed cant)." This requirement is not worded the same as in GMRT2173 "2.2.11 Dynamic models used to derive movements and displacements for vehicle swept envelopes shall be validated to a level appropriate for the level of gauging risk." What if test results are not available, does this mean that validation is then not required. I do not think that should be the intent.	Suggest wording in RSI2773-RST is aligned with what is in GMRT2173.	6				DC	Document changed to say "The MBS model shall be validated as set out in GMRT2173"
19	12	2.6.2.8	Should this be, 'The roll trans…' rather than, 'The vehicle body roll trans…'? bogie components can have dynamics applied for example.	Clarify	1				NC	Document not changed as this clause is specific to the vehicle body.
20	13	2.6.2.10	Is it necessary to include the text in brackets? What other intermediate conditions are required?	Clarify	1				NC	No change to document as this text is considered helpful
21	13	2.6.2.11	remove 'gauging' from the i.e. section. This section is referring to the probabilistic processes MBS uses, not gauging software.	remove 'gauging'	1				DC	Accepted
22	14	2.6.3	Should have a requirement, not just guidance	Make a requirement	1				NC	Document not changed as some subjects do not have specific requirements but the subject is addressed through guidance only to be helpful to the user of this standard.
23	14	G 2.6.3.2	"If a single ruling case vehicle cannot be defined for all extreme operating conditions, ruling case vehicles for each extreme operating condition are used." Would argue that this should state "can be used" rather than "are used" as it seems to suggest that ruling cases should be used, when sometimes the use of individual vehicle models may be more appropriate.	Change wording to "can be used"	6				DC	Document changed to: "If a single ruling case vehicle cannot be defined for all extreme operating conditions, ruling case vehicles for each extreme operating condition may be useful".
24	14	G 2.6.4.8	"The track is likely to have greater irregularity (higher standard deviation values) for the slow speed cases than that for the high speed cases." Perhaps add "due to the tighter maintenance limits and controls placed on higher speed tracks"	Add the wording "due to the tighter maintenance limits and controls placed on higher speed tracks"	6				DC	Accepted

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25	14	2.6.5.2	"Installed cant shall be contained in a separate file from the track irregularity data." Having installed cant in a separate file should not be a requirement but guidance. Having it as a separate file is just how it is typically done as it is the simplest method in Vampire. However, the same effect could be achieved by having all the irregularity data and cant data in the same file it is just that more track files containing both parts would have to be generated. The only requirement is that a set level of installed cant should be set for each run.	Suggest this is reviewed and perhaps moved to guidance.	6				DC	Document changed to say "Installed cant shall be defined independently from the track irregularity data".
26	15	2.6.5.9	remove '/ wheelset' as it may cause confusion	remove '/ wheelset'	1				NC	Document not changed as this applies to vehicles that do not have bogie(s).
27	15	2.6.5.10	The words "datum point" are not required at the beginning of each bullet in 2.6.5.10 as this suggests each direction is a different datum point. There is only 1 datum point above each bogie and three different movements for each datum point	Remove the words "datum point – " from the beginning of each bullet it is confusing and unnecessary	6				DC	Accepted. "datum point -" for each bullet point removed. (BT)
28	15	2.6.5.11	"All three datum points shall be assessed at the chosen roll transform datum height." This should be correct to say "datum point movements" not "datum points" as there is only one datum point above each bogie and three different movements for each datum point. The current wording suggests there is more than one datum point above each bogie.	Change "datum points" to "datum point movements"	6				DC	Document has been changed to " All three movements shall be assessed at the chosen roll transform datum height"
29	16	2.6.5.17	what constitutes 'significant'?	suggest greater than 1mm variation in the mean + 2.12SD as being the definition in this case.	1				DC	Document changed to include new guidance clause: " the significance is determined in the context of the level of risk for the specific gauging application".
30	16	2.6.5.17	remove, 'resulting from installed cant'. It is not vehicle cant we're interested in?	remove, 'resulting from installed cant'	1				NC	Document not changed, refernce to installed cant is correct
31	16	2.6.5.18	what is this point trying to convey?	Clarify	1				NC	Document not changes as clause is considered correct.
32	16	2.6.5.19	add note stating that this is independent from the height of the roll pivot.	Add note	1				NC	Document not changed as a note is likely to casue confusion for the reader.
33	16	2.6.5.22	"Having the installed cant contained in a separate file allows cant to be applied independently of the track irregularity data. It also enables the analysis of cant effects independently of curvature. …." Having cant in a separate file does not enable the analysis of cant effects of "curvature" independently. The fact that straight track is used enables the independent effect of curvature to be analysed.	Suggest rewording the entire clause to: Having the installed cant contained in a separate file allows cant to be applied independently of the track irregularity data simplifying the number of track data files required. Straight canted track is used to enable the analysis of cant and irregularity effects independently from curvature. The effects of curvature on wheelset position (and hence body position) are added later on a case by case basis using a separate lookup table based on quasi-static curving, which also reduces the number of analysis cases significantly, and reduces the calculation time to produce the cases See 2.6.6.	6				DC	Document changed as suggested.
34	17	2.6.5.27	what constitutes 'significant'?	Clarify	1				DC	Document changed to include new guidance clause: " the significance is determined in the context of the level of risk for the specific gauging application".
35	17	2.6.5.29	cant deficiency (positive number), cant excess (negative number)		1				NC	No change as the sign convention is for the user to determine.
36	17	2.6.6.2	there is no indication within any standard on how to use gauge widening,	this point should therefore be removed	1				NC	Document not changed as this clause is there to acknowledge what actually happens and records that fact.
37	17	2.6.6.4	new and worn should be considered to capture the lateral movement to the outside and inside of the curve respectively	new and worn should be considered	1				NC	Document not changed as the purpose is to identify the condition that causes the largest lateral displacement.
38	17	2.6.6.5	remove as contradicts points 2.5.6 and 2.6.6.13	suggested mi of 50m and max of 50,000m	1				NC	Document not changed as the minimum radius is for the user to determine
39	18	2.6.6.13	Is 90m tight enough? Some part of the network are tighter.	Suggested, go down to 50m	1				NC	Document not changed as this has been industry practice for a number of years.

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40	18	G 2.6.6.18	"The use of wheelset movements, rather than bogie movements, allows the effects of individual wheelset flange contact to be analysed and thus reduce the size of the resultant swept envelope." Not convinced on this one. The movements of the bogie pivot relative to the rail centreline will always be smaller than (or the same as) the individual wheelset movements as the bogie pivot is an average of what is going on at the wheelsets. If the wheelsets on a bogie move to equal and opposite sides of the track the resultant bogie pivot lateral movement due to curvature will be roughly zero and its effect on the body will thus be roughly zero. If both wheelsets on a bogie move the same amount to the same side, then the lateral movement due to curvature on the bogie pivot will be the same as that at the wheelsets. Using the movement at the wheelsets cannot therefore lead to a reduced size of resultant swept envelope or am I missing something here? It is important to use individual wheelset movements when clearing a bogie frame where there is more than one bogie frame section (.e. treat the bogie like a miniature vehicle) but this again increases the likely movement of the bogie frame swept envelope not reduces it. I see from the guidance in G 2.6.7.6 that this is an attempt to explain this, and it is to avoid double counting if a wheelset is already in flange contact. However even if a wheelset is a flange contact the bogie pivot positions calculated in the curving analysis are still where the bogie pivots are and should thus be included. I would appreciate somebody explaining to me how they think this is used.	Needs review and discussion	6			NC		A dicusscion was held with Ian Hills to discuss this matter. It was discussed that there may be scenarios where using the average of the wheelsets' movements might not result in a smaller swept envelope. It was agreed that this issue can be reviewed as part of the document's 12-month review.
41	20	2.7.1	It is not necessary to provide both min/max values and mean/SD values but the use of the word "shall" indicates that both should be provided. Is it now a requirement to fill both sets of fields?	Needs review.	6				DC	Document changed to: a) The minimum and maximum values; or for probabilistic analysis, the mean, standard deviation and distribution,
42	20	2.7.1	Version 8 spreadsheets have altered what is required here. Bullet (e) no longer applies and instead there should be a new bullet after the current bullet (f) that reads "The cross section that applies (CS1, CS2, CS3 etc)"	Remove bullet € and add new bullet after the current bullet (f) that reads "The cross section that applies (CS1, CS2, CS3 etc)"	6				DC	Document changed to: e) Whether the tolerance applies to each worksheet (TRUE or FALSE)
43		2.8.2 2.8.3	Why does the wheelset data format deserve its own set of guidance and worked example including screenshots etc when other sections of the RIS workbook are just as complicated? This is inconsistent.	Needs review Guidance for all parts of the RIS workbooks would be good but the document would end up being very long. If this were done it would need to be an appendix.	6			NC		Noted, this will be considered for future revisions.
44	21	2.8.2.3	shows bogie movements rather than wheelset movements, should be removed or revised	Remove or revise	1				NC	No change as the table does show wheelset movements.
45	22	2.8.3.3	remove as contradicts points 2.6.7.6 and 2.8.3.2	Remove	1				DC	Document changed, clause deleted.
46	23	3.1.1	When assessing compliance of the pantograph to the encroachment limit set out in clause 5.3.1 in BS EN 50367:2012, the effects of the following shall be included in the assessment: a) Wear, which may not be even across the contact strip; and b) Tolerances, positional allowances and maintenance limits of pantograph elements. This is a repeat of GLRT1210 and is nothing to do with "Format and Methods for Defining Vehicle Gauging Data". Suggest this is out of scope of the document remit	Delete clause	2				NC	No change to document as this clause cannot be found in GLRT1210
47	23-27	Part 3	Not in the correct standard, this is guidance on how to do pantograph gauging not how the data is formatted and defined	should be in 2173 or 8073?	1				NC	Document not changed as this is within the scope of the document, see 1.1.4
48	28-34	Part 4	Not in the correct standard		1				NC	Document not changed as this is within the scope of the document, see 1.1.4
49	28	G 4.2.1	"The method to determine the swept envelope for freight wagons considering crosswind effects is to evaluate wagon movements for combinations of train speeds, …." This paragraph still refers specifically to freight and wagons where it now should be equally applicable to all vehicles.	Replace references to freight and wagons with vehicles or other more general terms as appropriate.	6			NC		Document not changed as the method set out in this document was developed specifically for freight wagons. You can do something different but all the information required is not set out in this document

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50	33	G 4.4.4	To ensure the best fit of the coefficient data when interpolating for intermediate values of β, the following procedure is used. It is best explained with an example. Suppose the CFy coefficient is required for a target value of β = 17°. The four CFy values at β = 0°, 10°, 20° and 30° are fitted as an exact cubic function of β, and this function is used to determine the CFy value for β = 17°. In general, the four function values consisting of the two tabulated β values either side of the target β value are used for the cubic fit." Previous use of this method, following advice from Terry Johnson, has shown that there could be issues with understanding how to implement the method for angles of β Between 0° and 10° And between 80° And 90° where 2 points either side are not available. Also the difference between doing a cubic fit and doing a much simpler linear fit are small. I would argue that the use of a simpler linear fit would be much more understandable and more in line with the rest of the way interpolation is done for the rest of the gauging analysis. Piecewise linear interpolation is used in many other parts of the dynamics and gauging process, e.g. for determining vehicle parameters such as stiffness and damping and for calculating gauging movements from movement tables at intermediate speeds and cants. There is arguably a bigger difference (than the difference between linear and cubic) just in determining whether a vehicle is streamlined or intermediate. If cubic interpolation is to be used then exactly what should be done at the extremes of the range should be specified to ensure that all users of the standard do it the same way. A separate email is attached further detailing this discussion with Terry. Further note: Tables have now been derived rather than equations for this	If cubic interpolation is to be used then exactly what should be done at the extremes of the range should be specified to ensure that all users of the standard do it the same way. Suggest the tabulated versions of the coefficients could be used in GMRT2173 instead of the equations to align the two methods. However, note that this may not be possible as the benchmark pantograph sways were calculated using the equations and use of tabulated coefficients may give subtly different answers. Suggest a note at least should be added to guidance explaining why tabulated versions of the coefficients are used in this standard rather than the equations of coefficients in GMRt2173.	6			NC		"If cubic interpolation is to be used then exactly what should be done at the extremes of the range should be specified to ensure that all users of the standard do it the same way." Response: Cubic interpolation still to be used. Additional clause added to guidance as follows: For intermediate values of β less than or equal 10", or greater than or equal to 80", where there are not two tabulated β values either side of the target β value, the cubic fit is based values on the coefficient values at β = 0°, 10°, 20° and 30° and β = 60°, 70°, 80° and 90° respectively. "Suggest the tabulated versions of the coefficients could be used in GMRT2173 instead of the equations to align the two methods. However, note that this may not be possible as the benchmark pantograph sways were calculated using the equations and use of tabulated coefficients may give subtly different answers." Response: This is not possible as stated; the sway values were calculated using the equations. "Suggest a note at least should be added to guidance explaining why tabulated versions of the coefficients are used in this standard rather than the equations of coefficients in GMRT2173." Response: Yes. Guidance clause added as follows: Tabulated coefficient values rather than equations are provided for this standard, as equations do not fit the tabulated data satisfactorily over the whole range of β.
51	34	G 4.6 G 4.7	These paragraphs still refer specifically to wagons where it now should be equally applicable to all vehicles.	Replace references to freight and wagons with vehicles or other more general terms as appropriate.	6			NC		No change as the method set out in this document was developed specifically for freight wagons. You can do something different but all the information required is not set out in this document
52	37	Definition: Track centreline	At the end of this definition is the following text: 'At the bogie centre positions of the vehicle' which leads me to suspect that there is some text missing.	Please clarify.	3				DC	Document changed to say "A notional reference line projected upwards, perpendicular to the plane-of-rails, from a position exactly central to the centres of the running rails".
53	35-37	Definitions	there are several superfluous terms that should be removed, e.g. clearance CLE probabilistic gauging round topped wagons etc.	Remove superfluous terms	1				DC	Document changed where superfluous definitions have been found. Probabilistic gauges changed to probablistic analysis.
54			General point - All guidance listed in the excel template (currently v8.1 issued by Barry Tan) should also be listed in the standard as guidance.		4			NC		Document not changed as this would duplicate the clauses.
55	10	G 2.3.1.10	Excel Template defines a list of standard features Step, Light, Cantrail, Waist. The point is these are defined terms in the excel template. Template needs to align with standard and this should be a fixed list to be read by software. Note "Step" not "footstep", this is the important one to get right.	Feature names (Step, Light, Cantrail, Waist) and a layer (cross-section) description are also used to clearly define the vehicle.	4				DC	Accepted
56	11	2.5	Add guidance from excel template v8.1 here	see excel template v8.1 Notes on Overthrows	4			NC		Document not changed as this would duplicate the clauses.
57	12	2.6	Add guidance from excel template v8.1 here	see excel template v8.1 Notes on Dynamics tabs	4			NC		Document not changed as this would duplicate the clauses.
58	12	2.6.2.5	There is no mention of the industry standard process to average these movements across the 2 points.	For each running condition, a statistical analysis of the body movements shall be undertaken and the results expressed as mean and standard deviation values for the lateral, vertical and roll datum points at each wheelset (for two-axle vehicles) or bogie pivot centre. It is industry practice to average the movements at each wheelset or bogie pivot centre where no significant end to end differences exist in order to simplify the data.	4				DC	Document changed to duplicate clause G 2.6.6.17 as guidance
59			Note 2.12 sd requirement has been removed, see GMRT2173 comments		4			NC		Noted
60	13	2.6.3	A requirement is needed in this section for ruling case vehicles. The standards are imported into RM software, this cant be managed if there is no requirement to comply with	The vehicle(s) models used for dynamic assessment shall be defined	4			NC		Document not changed as this is covered elsewhere in the document.

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61	14	2.6.5	Only 2.6.5.1 to 2.6.5.3 relate to inputs for installed cant, the rest are general requirements for analysis . 2.6.5.4 to 2.6.5.19 should be put in a seperate section, (not the installed cant section).	Move to 2.6.5.4 to 2.6.5.19 to a new section called dynamic analysis method	4				DC	Accepted with modification title changed to "Installed Cant - General Requirements"
62	20	2.7	Add guidance from excel template v8 here	see excel template v8.1 Notes on Tolerances	4			NC		Document not changed as this would duplicate the clauses.
63		2.3.1.2	In practice this creates a huge number of points – to define a curved roof for instance. It can be (further) approximated.	… maximum error of 10mm outside the actual profile or of 1mm inside the actual profile (measured radially)	5				NC	Document not changes as current wording is deemed appropriate.
64		2.3.2	Bogies are subjected to primary suspension movements. What about axleboxes etc which are unsprung?		5				NC	Document not changed.
65		2.5	The curve range given in the workbooks are often amended by DGauge or OBB. Please can we standardise on a range please?		5				NC	Document not changed as this can be amended on a case by case basis to be relevant for the analysis being carried out.
66		2.5	The values used by DGauge (for instance) differ from those formulae in 8073. Why I don't know, but they do. Can the worksheet include the common formula in the cells, please?		5				NC	Document not changed if the formulae are changed then the sheet does not meet the requirements of the RIS.
67		2.6.5.11	The standard should define a minimum set of combinations. This will differ for freight and passenger vehicles. This will reduce the errors calculating the difference to the standard combinations for a particular gauge. Suggest a format similar to G 4.5.4.	Combinations for Freight vehicles shall include, as a minimum, cant deficiencies of 0, 12, 25, 50, 75, 100, 125 and 150mm, and speeds of 0, 8, 32, 56, 80, 105, 121 and 145kph (up to the maximum speed of the vehicle).	5				NC	Document not changed as this needs to be done on a case by case basis.
68		G 2.6.5.21	What is a run-in section?		5				NC	Document not changed. A run-in is the start of a track file to allow the vehicle model to achieve the required initial conditions.
69		2.6.6		Include: Values for both worn and new wheel profiles should be provided.	5				NC	Document not changed as the wheel profiles and rail head profiles that cause the largest lateral displacements is whats most pertinent.
70		2.7	The tolerances are not all mandatory. There is no description of the tolerances included in the worksheet, to allow the user to add the correct values, and also when they should be included or can be ignored.		5				NC	Noted
71		2.7	The uncertainty on a particular tolerance is generally the same for any vehicle. Therefore the S curve should be standardised and included in this standard.		5				NC	Noted