

5 TEST CONDITIONS

5.1 Vehicle Configurations

One same vehicle can undergo different conditions that, from the dynamic behaviour point of view, are considered as different states, i.e., a fully loaded freight wagon and that same wagon in empty condition will behave differently when running.

For this reason, one single vehicle design must be tested under several configurations, where one configuration represents one state of the vehicle that differs, from the dynamic behaviour point of view, to the other configurations for the same vehicle.

5.1.1 Leading/Trailing running direction

Assessment of a vehicle must be done for each riding direction, namely, 'Leading' and 'Trailing' directions.

5.1.2 Fault modes

Note that during vehicle design and manufacturing stages, possible catastrophic failure of vehicle components assessment is addressed, and it is not considered in the scope of current Trial Protocol.

However, there may exist possible fault modes that, although not catastrophic can jeopardize the dynamic behaviour of the vehicle. Vehicle maintenance should diminish this risk and suitable maintenance plans are to be followed.

Nevertheless, possible fault modes for each vehicle should be considered and safety must be assessed under such circumstances. These fault modes are commonly, but not limited to:

- × Air spring secondary suspension failure.
- × Antiyaw damper failure.
- × Tilting system failure.
- × Others.

Occurrence of one fault mode is categorized as with low probability, being repaired before a second fault mode occurs. For this reason, occurrence of two or more simultaneous fault modes is not considered.

5.1.3 Loading conditions

Vehicle load has big influence over the dynamic behaviour of vehicles. This way, vehicles must be assessed covering worst conditions for load cases. This way, vehicles are to be tested:

- Under Design mass in working order condition, see EN15663 [3].
- Under Normal payload condition, see EN15663 [3].
- If necessary, for freight stock, under unsymmetrically loaded loads which may lead to worse conditions than the Design mass in working order and Exceptional load conditions.

Page 13 of TPM: Referred-to in para 135 of Fourth Report of Standing Criterion Committee

3 SCOPE

Guidelines given in this Trial Protocol are intended to be applied for the assessment of the dynamic behaviour of railway vehicles which either:

- Are newly developed
- Have had significant modifications in their design
- Have had changes in their operating conditions

The guidelines contained in this Trial Protocol are intended for:

1. Vehicles

All types of railway vehicles (including locomotives, passenger coaches, multiple units, freight stock) to be operated in $e = 1676$ mm track gauge; being vertical axle load up to 225 kN for non-freight stock (except for locomotives) and 250 kN for freight stock and for locomotives.

2. Infrastructure

Indian infrastructure, considering its layout and according to track Indian maintenance criteria. More information can be found on ANNEX A1.

3. Wheel-rail interface

The procedure includes the assessment of nominal new profile equivalent conicities and also high equivalent conicities to assure safety against instability.

4. Operating conditions

Assessment is performed for specific combinations of admissible speed and admissible cant deficiency.

Vehicles with a maximum admissible speed $V_{adm} \leq 60$ km/h are granted dispensation from dynamic performance assessment.

Page 14 of TPM: Referred-to in para 4 of Fourth Report of Standing Criterion Committee

4 TEST UNIT PARAMETERS

4.1 Admissible Speed and admissible Cant Deficiency

Acceptance for a vehicle will be granted for running up to a maximum operating speed, which is referred to as admissible speed V_{adm} .

Also, acceptance will be granted for running up to a maximum operating cant deficiency, which is referred to as admissible cant deficiency I_{adm} .

The vehicle will be assessed for one combination or for several combinations of admissible speed V_{adm} and admissible cant deficiency I_{adm} . Acceptance will be granted for each combination of V_{adm} and I_{adm} . Note that for acceptance V_{adm} and I_{adm} are not independently granted.

Common values for I_{adm} in India are 75mm and 100mm. Differences up to 2% in admissible cant deficiencies are not be considered, since 2% is about the difference of considering a value of gravitational constant $g = 10 \text{ m/s}^2$ or $g = 9.80 \text{ m/s}^2$.

Page 24 of TPM: Referred-to in para 137 of Fourth Report of Standing Criterion Committee

7.2.3 Multi-dimensional method

Table 7.6 details the conditions for a section to be valid under multi-dimensional method and Table 7.7 the conditions for a test Zone to be valid.

Table 7.6. Conditions for a section to be valid following the multi-dimensional analysis method.

Specific value in the SECTION of...	Zone 1	Zone 2	Zone 3	Zone 4
... curve RADIUS	Not relevant	Not relevant	$400 \text{ m} \leq R \leq 600 \text{ m}$	$250 \text{ m} \leq R < 400 \text{ m}$
... test SPEED	$\max(60 \text{ km/h}, \frac{1}{2} \cdot V_{adm}) \leq V$ and $V \leq \min(1.1 \cdot V_{adm}, V_{adm}+30\text{km/h})$		$V \leq 1.1 \cdot V_{adm}$	
... test speed VARIATION	10 km/h			
... test Cant deficiency	$I \leq 40\text{mm}$	$40\text{mm} < I \leq 1.15 \cdot I_{adm}$		
... track quality	alignment and level values below QN3 on Table 5.2.			
... length L_{ts}	$V_{adm} \leq 160 \text{ km/h}; L_{ts} = 100\text{m}$ $160 \text{ km/h} < V_{adm} \leq 220 \text{ km/h}; L_{ts} = 250\text{m}$ $220 \text{ km/h} < V_{adm}; L_{ts} = 500\text{m}$		$L_{ts} = 100 \text{ m}$	$L_{ts} = 70 \text{ m}$
... length tolerance	$\pm 20\%$. But shorter than nominal sections are only allowed if the use of negative tolerance leads to a longer total length.			

Table 7.7. Conditions of the population of test sections in a Zone to be valid.

DISTRIBUTION among a ZONE of...	Zone 1	Zone Curves		
		(Zone 2)	(Zone 3)	(Zone 4)
... specific combinations test speed, cant deficiency, curve radius	at least 3 track sections with: if $V_{adm} \leq 100 \text{ km/h}$: $V_{adm} + 5 \text{ km/h} \leq V$ if $100 \text{ km/h} < V_{adm} \leq 300 \text{ km/h}$: $1.1 \cdot V_{adm} - 5 \text{ km/h} \leq V$ if $300 \text{ km/h} < V_{adm}$: $V = V_{adm} + 25 \text{ km/h}$	At least 3 track sections: $I \geq I_{adm} \text{ \& } R \leq 350 \text{ m}$ at least 3 track sections: $I \geq I_{adm} \text{ \& } R \geq 500 \text{ m}$ at least 3 track sections: $I \geq I_{adm} \text{ \& } V \geq V_{adm}$		
... track geometric quality	Not relevant	some sections above TL90 in Table 5.1		
... minimum Total Length $\Sigma L_{ts,min}$	Not relevant			
... minum number of sections	100	200		

8 STABILITY TEST

8.1 Foreword

Because conicity has big influence over the vehicle's stability, and because wheel and rail wear commonly lead to an increase of conicity, a separate stability verification must be done for high conicity condition. That is, for each vehicle configuration as described in section 5.1, a separate high-conicity stability assessment must be performed.

However, it is worth mentioning that stability test is simpler and shorter than a whole Z1-Z2-Z3-Z4 assessment.

In addition, Section 7.2.3 in EN 14363:2016 [1] allows for the use of Simplified measuring method for performing a separate stability testing. That is, test in Stability Zone can be performed following Simplified measuring method, avoiding the need for instrumented wheelsets with high conicity wheel profile.

8.2 Stability Test Zone

Stability Test Zone is composed by at least 3 sections which are 100 m long (without overlapping) as described in Table 8.1, in which the equivalent conicity is at least the value shown in Table 8.2.

Table 8.1. Requirements for test sections in Stability Test Zone.

Speed	$\tan \gamma_e$ [-]	Length [m]
$V_{adm} \leq 100 \text{ km/h}; V \geq V_{adm} + 5 \text{ km/h}$ $100 \text{ km/h} < V_{adm} \leq 300 \text{ km/h}; V \geq 1.1 \cdot V_{adm} - 5 \text{ km/h}$ $V_{adm} > 300 \text{ km/h}; V = V_{adm} + 25 \text{ km/h}$	See Table 8.2	100

Table 8.2. Minimum equivalent conicity values for the sections of stability assessment.

Admissible Speed of the vehicle	$\tan \gamma_e$ [-]
$V_{adm} \leq 120 \text{ km/h}$	0.40
$120 \text{ km/h} < V_{adm} \leq 300 \text{ km/h}$	$0.534 - V_{adm} / 900$
$300 \text{ km/h} < V_{adm}$	0.20
If experience shows that during the real operation higher values of $\tan \gamma_e$ are reached, these values shall be increased accordingly.	

8.3 Stability Assessment method

If following the Normal measuring method, assessment is based on ΣY_{rms} .

If following the Simplified measuring method, assessment based on \ddot{y}_{rms}^+ .

In the stability test, one rms value is obtained per section (the rms value of each whole 100 m length sections).

8.4 Limit value

The limit value $\Sigma Y_{rms,lim}$ is the same as per instability analysis in zone Z1. See Table 7.14.

If Simplified measuring method is followed, limit value is:

$$\ddot{y}_{rms,lim}^+ = \frac{12 - \frac{m^+}{5}}{2}$$

Page 15 of TPM: Referred-to in para 6 of Fourth Report of Standing Criterion Committee

5.3 Track Quality Values on Indian Network

Assessment of dynamic behaviour must consider the track quality of the Indian Network. A test on a brand-new track will lead to too good results, while a test on a poorly maintained track will lead to worse results. Thus, the assessment considers the maintenance state of the network by imposing some conditions of the track used for testing and assessment. These conditions are stated in section 7.3 and are different depending on the assessment method used for the assessment (either one-dimensional, two-dimensional or multi-dimensional). An analysis of Indian's network's track data has been performed, which is explained in detail in ANNEX A1. The TL90 and TL50 values for lateral alignment standard deviation and for vertical level standard deviation obtained after such analysis are shown in Table 5.1.

Table 5.1. Lateral alignment and vertical level: TL90 and TL50 values.

Speed	TL 90				TL50	
	$\Delta y_{D1,\sigma}$		$\Delta z_{D1,\sigma}$		$\Delta y_{D1,\sigma}$	$\Delta z_{D1,\sigma}$
	min	max	min	max		
$V \leq 100 \text{ km/h}$	Preliminary values could be the same as per $100 \text{ km/h} < V \leq 110 \text{ km/h}$					
$100 \text{ km/h} < V \leq 110 \text{ km/h}$	1.70	2.36	2.55	3.45	1.37	2.04
$110 \text{ km/h} < V \leq 130 \text{ km/h}$	1.87	3.07	2.97	4.96	1.43	2.11
$130 \text{ km/h} < V \leq 160 \text{ km/h}$	Preliminary values could be the same as per $110 \text{ km/h} < V \leq 130 \text{ km/h}$					

In addition, track sections with exceptional bad track quality, viz. including a defect, shall be excluded from the analysis. A section is considered to contain a defect is the mean-to-peak values exceed the QN3 values obtained from the analysis described in ANNEX A1 and are shown in Table 5.2.

Table 5.2. Lateral alignment and vertical level: Mean-to-peak values.

Speed	Δy^0_{D1}			Δz^0_{D1}		
	QN1	QN2	QN3	QN1	QN2	QN3
$V \leq 100 \text{ km/h}$	Preliminary values could be the same as per $100 \text{ km/h} < V \leq 110 \text{ km/h}$					
$100 \text{ km/h} < V \leq 110 \text{ km/h}$	4.27	7.65	9.95	7.07	12.17	15.82
$110 \text{ km/h} < V \leq 130 \text{ km/h}$	4.26	8.87	11.53	6.85	14.45	18.79
$130 \text{ km/h} < V \leq 160 \text{ km/h}$	Preliminary values could be the same as per $110 \text{ km/h} < V \leq 130 \text{ km/h}$					

Page 18 of TPM: Referred-to in para 7(a) of Fourth Report of Standing Criterion Committee

Table 6.1. Description of Measured quantities.

Measurement magnitudes	Symbol	Number	Position	Assessment or Information
Guiding force	Y_{ij}	Instrumented wheelsets	Wheel-rail contact point, both wheels	Mandatory, for assessment
Vertical Wheel force	Q_{ij}	Instrumented wheelsets	Wheel-rail contact point, both wheels	Mandatory, for assessment
Speed	V	Once for the train consist	No mandatory position	Mandatory, needed information
Unbalanced acceleration	A_{nc}	On one Instrumented wheelset	Leading instrumented wheelset preferably	Mandatory, needed information
Carbody angular velocity	GYRO	On one carbody	Leading carbody	Mandatory, needed information

Page 21 of TPM: Referred-to in para 7(b) of Fourth Report of Standing Criterion Committee

7 ASSESSMENT

7.1 Foreword

Dynamic behaviour is performed under a global approach, seeking for approving a vehicle for running throughout wide gauge Indian track, regardless the specific track used for testing. Under such approach, assessment is managed by a statistical analysis that considers the effect of the influencing parameters (including track effects via track quality magnitudes).

Such statistical analysis is divided into separate test Zones. In each test Zone, anticipated behaviour of the vehicle faces different hazards as described in Table 7.1. Thus, a separate assessment is needed per test Zone.

Table 7.1. Test Zones and anticipated behaviour of the vehicle.

	Stability zone	Zone 1	Zone Curves ^a		
			(Zone 2)	(Zone 3)	(Zone 4)
Description	Tangent track and very low cant deficiency		Large radius curves	Small radius curves	Very small radius curves
Anticipated behaviour of the vehicle	Highest probability of unstable behaviour	Almost null quasistatic components. Large dynamic content.	Superposition of large quasistatic components and large dynamic content.	Larger quasistatic components, lower dynamic content.	

^a Zone Curves may also be referred as Zone 234 throughout the document, since Zone Curves is formed by the combination into a single Zone of Zones 2, Zone 3 and Zone 4.

Current chapter 7 concerns test zones Zone 1 and Zone Curves; Stability zone and its analysis is treated separately in chapter 8.

Statistical analysis in Zone 1 and Zone Curves is based in test sections. One test section is a portion of the test track, that has been run under certain running conditions and in which measurement magnitudes have been measured. In other words, a test Zone is a batch of test sections. After gathering together multiple sections (multiple portions of test runs), a maximum estimated value can be obtained. And, the statistical analysis can be performed by any of the following methods: i) one-dimensional method, ii) two-dimensional method, iii) multi-dimensional method.

Following chapters describe in detail, per each analysis method:

1. The conditions to be met for a single section so as to be considered valid section for the analysis
2. The conditions to be met for a test Zone (that is, for the set of valid sections as a whole) to be considered a valid test Zone for the analysis
3. The process to obtain each maximum estimated value.

Note that the conditions are different per analysis method.

Although any of the three methods can be followed, multi-dimensional method is recommended.

Page 20 of TPM: Referred-to in para 7(b) of Fourth Report of Standing Criterion Committee

Table 6.2. Description of Assessment magnitudes.

Assessment magnitudes	Symbol	Derived from Measurement magnitudes
Sum of guiding forces left and right wheel	ΣY	Y_{i1}, Y_{i2}
Derailment coefficient	(Y/Q)	Y_{ij}, Q_{ij}
Sum of guiding forces, rms value	ΣY_{rms}	Y_{i1}, Y_{i2}
Guiding force	Y	Y_{ij}
Vertical wheel force	Q	Q_{ij}
Speed	V	V
Unbalanced acceleration	A_{nc}	\ddot{y}_i
Carbody angular velocity	GYRO	GYRO

6.3 Assessment magnitudes

Assessment magnitudes are derived from measurement quantities. Table 6.2 lists assessment magnitudes along with the measurement quantities from which they are derived.

Assessment magnitudes are time varying, and position varying signals. The influence of each assessment magnitude will be characterized by specific values that magnitudes take on track sections, as it is described in 7.3. But first, assessment magnitudes need to be calculated. Processing of measurement magnitudes so as to obtain assessment magnitudes is explained in sections 6.3.1 to 6.3.5.

6.3.1 Sum of guiding forces left and right wheel ΣY

It assesses the risk of rail shifting. It is derived from the lateral force measurement of both wheels (left and right) of a wheelset. Steps for obtaining it are:

1. Lowpass 20Hz $Y_{i,1}$ and $Y_{i,2}$.
2. Add $Y_{i,1}$ and $Y_{i,2}$. Sum must be adding magnitudes in the same direction, considering sign criterion of instrumented wheelsets, see Figure 6.2.
3. Perform a 2m long moving mean with a 0.5m step.

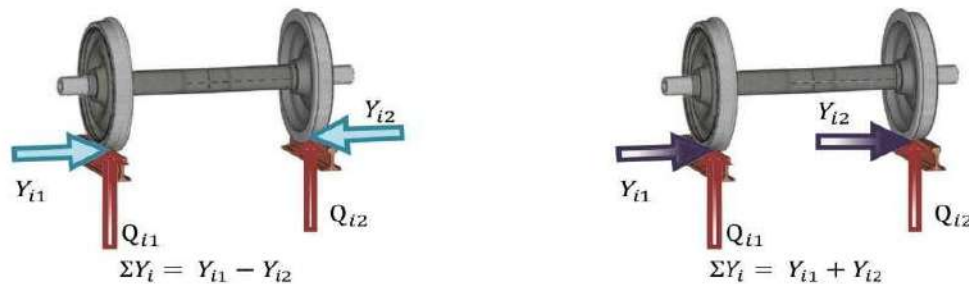


Figure 6.2. Addition of Y_{i1} and Y_{i2} to obtain ΣY_i considering sign criterion.

6.3.2 Derailment coefficient (Y/Q)

Derailment coefficient assesses the risk of flange climbing of a wheel. Steps for obtaining it are:

1. Lowpass 20Hz Y_{ij} and Q_{ij} .
2. Divide Y_{ij} by Q_{ij} .
3. Perform a 2m long moving mean with a 0.5m step.

6.3.3 Track loading forces Y and Q

Track loading is assessed by track loading forces Y and Q. Steps for obtaining them are:

1. Lowpass 20Hz Y_{ij} and Q_{ij} .

6.3.4 Sum of guiding forces left and right wheel, rms value ΣY_{rms}

It is derived from the lateral force measurement of both wheels (left and right) of a wheelset. Steps for obtaining it are:

1. Add $Y_{i,1}$ and $Y_{i,2}$. Sum must be adding magnitudes in the same direction, considering sign criterion of instrumented wheelsets, see Figure 6.2.
2. Bandpass $f_0 \pm 2$ Hz, or if f_0 is unknown, bandpass 0.4 Hz – 12 Hz.
3. Perform a 100m long moving rms value with a step of at most 10m.

6.3.5 Running conditions Speed, angular velocity and Unbalanced lateral acceleration

They describe running conditions of the test vehicle. Steps for obtaining them are:

1. Lowpass filter 1Hz.

Page 27 of TPM: Referred-to in para 7(c) of Fourth Report of Standing Criterion Committee

7.4 Assessment Method

7.4.1 Foreword

Assessment of the magnitudes is performed via a statistical analysis of the values of their characteristic values in test sections. Such population, formed by the selected characteristic values per zone, is analyzed in order to obtain the assessment value, viz. its maximum estimated value. It is each of the maximum estimated values (one per assessment magnitude) that it is compared against its limit value, regardless that some certain characteristic values may exceed the value.

There are three possible assessment methods to analyze the assessment magnitudes, namely, one-dimensional method, two-dimensional method and multi-dimensional method. All three are valid methods and fulfilling the assessment under any of them will lead to the acceptance of the vehicle¹. It is possible to fail following one method and succeed following another one. In such situation, the vehicle would be accepted, since it fulfills one of them. This process of assessment is outlined in Figure 7.2 and Figure 7.3.

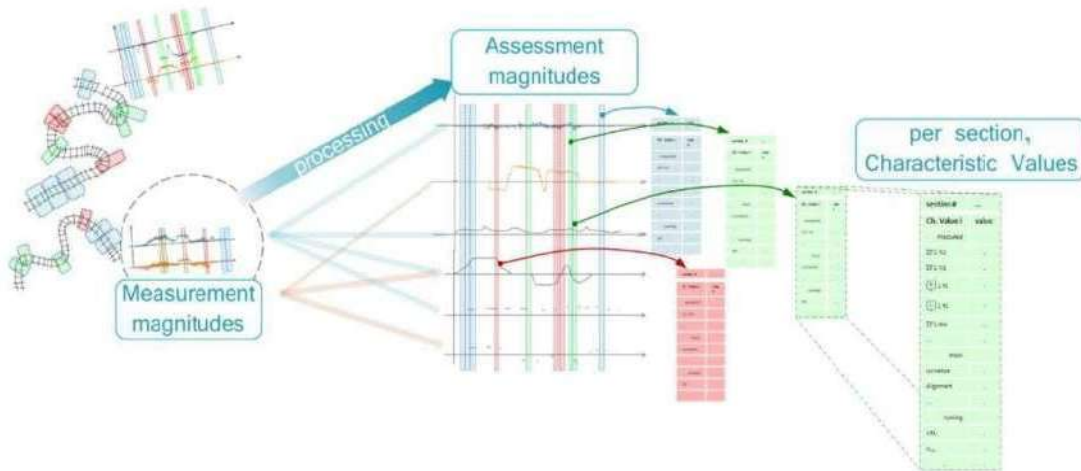


Figure 7.2. Assessment method scheme: from measurement magnitudes to characteristic values per section.

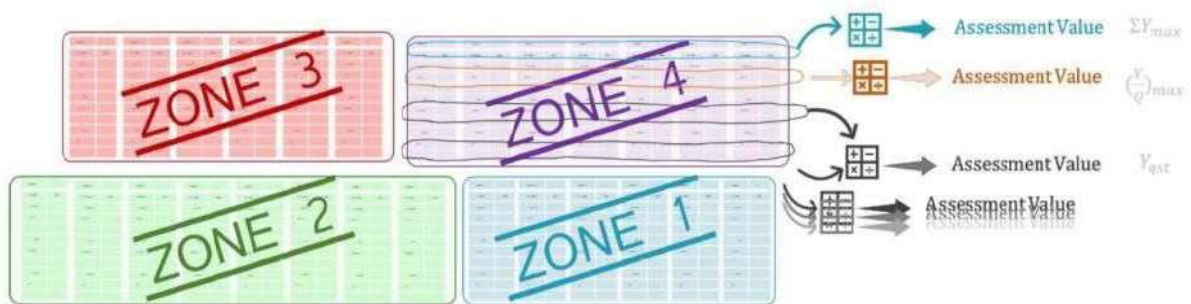


Figure 7.3. Assessment method scheme: Characteristic values of sections grouped by zones and Assessment value obtention.

For the calculation of the maximum estimated values, the following confidence intervals must be applied:

- Assessment magnitude of Safety Criterion: $PA_{\text{safety}} = 99 \%^2$
 - Assessment magnitudes of Track Loading criterion: $PA_{\text{trackloading}} = 95 \%$
- Except for Assessment of quasistatic Magnitudes for which: $PA_{\text{trackloading,quasistatic}} = 0 \%$

Page 27 of TPM: Referred-to in para 7(c) of Fourth Report of Standing Criterion Committee

7.3.3.1 Running Safety

Table 7.10. Grouping and conversion of characteristic values for Safety criterion assessment quantities.

Assessment Quantity	Symbol	From Assessment magnitude	GROUPING and conversion	
			ZONE 1	ZONE 234
Sum of guiding forces left and right wheel	ΣY_{max}	ΣY	Per wheelset, both $y_l(h_2)$ and $y_r(h_1) \cdot (-1)$	Per wheelset, $y_l(h_2)$ for left-hand curves and $y_r(h_1) \cdot (-1)$ for right-hand curves
Derailment coefficient	$(Y/Q)_{max}$	(Y/Q)	N/A	For leading wheelset, group external wheels $y_{j1}(h_2)$ for left-hand curves and $y_{j2}(h_1) \cdot (-1)$ for right-hand curves
Instability, moving rms of guiding forces	ΣY_{rms}	ΣY_{rms}	Per wheelset, Maximum values	N/A

7.3.3.2 Track Loading

Table 7.11. Grouping and conversion of characteristic values for Track Loading criterion assessment quantities

Assessment Quantity	Symbol	From Assessment magnitude	GROUPING and conversion	
			ZONE 1	ZONE 234
Quasistatic guiding force	Y_{qst}	Y	N/A	Per wheelset, group external wheels $y_{j1}(h_0)$ for left-hand curves and $y_{j2}(h_0) \cdot (-1)$ for right-hand curves
Quasistatic vertical wheel force	Q_{qst}	Q	N/A	Per wheelset, group external wheels $y_{j1}(h_0)$ for left-hand curves and $y_{j2}(h_0)$ for right-hand curves
Maximum vertical wheel force	Q_{max}	Q	Per wheelset, group all wheels $y_{jk}(h_2)$	Per wheelset, group external wheels $y_{j1}(h_2)$ for left-hand curves and $y_{j2}(h_2)$ for right-hand curves

7.4.4 Multi-dimensional method

Multi-dimensional method has been included in EN14363:2016 standard. Under the same linear regression approximation, the method models each assessment magnitude's behaviour as a function of the relevant influencing parameters. Note that bi-dimensional method can be thought of a particular case of a multi-dimensional regression with one influencing parameters.

This way, considering the specific values of the influencing parameters and the assessment magnitudes on the test sections, a linear regression model is constructed. For illustrative purposes, Figure 7.6 shows a scheme of a regression model built with two influencing parameters only because else, drawing is not possible with more influencing parameters.

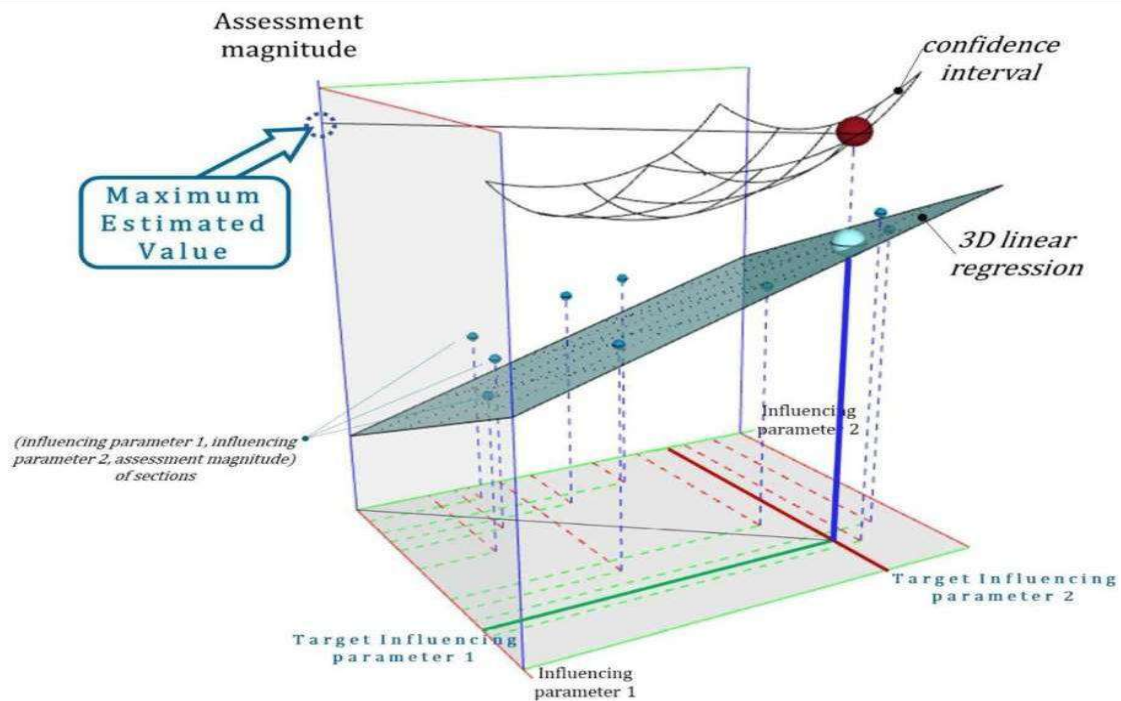


Figure 7.6. Multi-dimensional method: linear regression, confidence interval, target values and maximum estimated value

Influencing parameters are not the same for all assessment magnitudes, because each assessment magnitude is affected by different parameters. For example, lateral forces are related to lateral alignment while vertical forces are related to vertical level. Similarly, influencing parameters are different between test zones even for the same assessment magnitude. For example, cant deficiency is irrelevant in Test Zone 1, while very relevant for Test Zone 4, regardless the assessment magnitude. Assessment magnitudes and corresponding influencing parameter are listed in Table 7.12.

Table 7.12. Multi-dimensional method: Influencing parameters for each assessment magnitude.

Assessment magnitudes	Symbol	Influencing parameters		
		Zone 1	Zone curves for assessment of Zone 2	Zone curves for assessment of Zone 3 or Zone 4
Sum of guiding forces left and right wheel	ΣY_{max}	$V, \Delta y_{\sigma}^0$	$V, I, \Delta y_{\sigma}^0$	$I, 1/R, \Delta y_{\sigma}^0$
Derailment coefficient	$(Y/Q)_{max}$	N/A	$V, I, \Delta y_{\sigma}^0$	$I, 1/R, \Delta y_{\sigma}^0$
Instability, moving rms of guiding forces	ΣY_{rms}	Instability assessment not by regression. See section 8.3.		
Quasistatic guiding force	Y_{qst}	N/A	N/A	$I, 1/R$
Quasistatic vertical wheel force	Q_{qst}	N/A	N/A	$I, 1/R$
Maximum vertical wheel force	Q_{max}	$V, \Delta z_{\sigma}^0$	$V, I, \Delta z_{\sigma}^0$	$I, 1/R, \Delta z_{\sigma}^0$

Page 31-32 of TPM: Referred-to in para 7(c) of Fourth Report of Standing Criterion Committee

7.5 Target Values for influencing parameters

The assessment via Two-dimensional or Multi-dimensional methods consists on the creation of a linear regression models, from which maximum estimated value of assessment magnitudes are obtained. That is, the value predicted by the regression depends on influencing parameters' values. So, re-stating previous statement: 'The assessment via Two-dimensional or Multi-dimensional methods consists on the creation of a linear regression models, from which maximum estimated value of assessment magnitudes are obtained'; because the maximum estimated value is different for different values of influencing parameters. Figure 7.7 shows an example on a two-dimensional linear regression, where maximum estimated value is calculated for two different target values of cant deficiency. It is clear thus that target values of influencing parameters must be clearly defined for proper assessment.

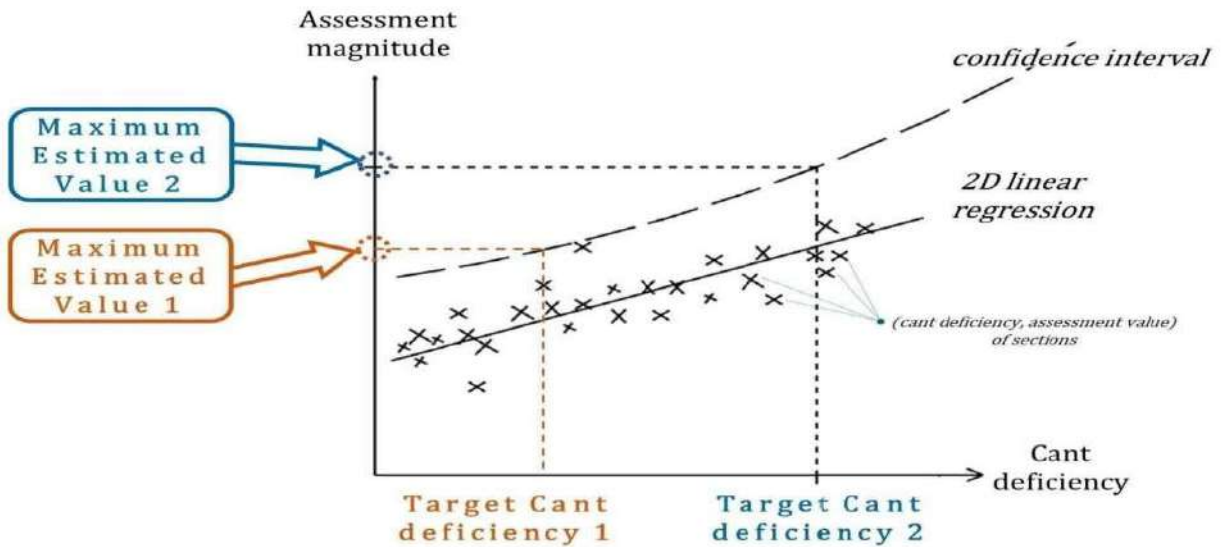


Figure 7.7. Illustration of dependence of target influencing parameters' value and obtained Maximum estimated value.

Table 7.13. Target values of influencing parameters for assessment.

Influencing parameter	Symbol		Target Value				
			Two-dimensional method	Multi-dimensional method. Assessment in...			
				Z1	Z2	Z3	Z4
Cant Deficiency	I	maximum values	$1.1 \cdot I_{adm}^a$	N/A	$1.1 \cdot I_{adm}^a$		
		quastistatic values	$1.0 \cdot I_{adm}$	N/A	N/A	$1.0 \cdot I_{adm}$	
Speed	V		N/A	$1.1 \cdot V_{adm}^b$	$1.0 \cdot V_{adm}$	N/A	N/A
Curvature	1/R		N/A	N/A	N/A	$1/500\text{ m}$	$1/350\text{ m}$
Lateral alignment	Δy_{σ}^0		N/A	TL50 (V _{adm}) ³			
Vertical level	Δz_{σ}^0		N/A	TL50 (V _{adm}) ³			
Notes for fault modes configurations:							
^a Assessment for fault modes is limited to a cant deficiency of 1.0· I _{adm} . Thus, target value for fault mode configurations is limited to 1.0· I _{adm} .							
^b Assessment for fault modes is limited to an admissible speed of 1.0· V _{adm} . Thus, target value for fault mode configurations is limited to 1.0· V _{adm} .							

Pls refer clarification to Queries on trial protocol manual by CETEST via mail dated 11.09.23

Page 34 of TPM: Referred-to in para 7(c) of Fourth Report of Standing Criterion Committee

7.9 Evaluation of test results in transition curves

Transition curves shall only be assessed with regards to Safety Criterion, and no statistical analysis shall be performed. Characteristic values shall be compared directly against limit values.

The transitions to be analyzed are those corresponding to the curves used for the statistical analysis. Each whole transition curve must be considered as a section, regardless the radius or the length; no division of the transition curve shall be performed.

Note that for $(Y/Q)_{a,max}$, the limit value in transitions is $(Y/Q)_{a,max} = 1.2$ and not $(Y/Q)_{a,max} = 0.8$.

Page 124 of TPM: Referred-to in para 7(c) of Fourth Report of Standing Criterion Committee

3 LIMIT VALUES FOR SAFETY CRITERION

3.1 Derailment coefficient Y/Q

The Office for Research and Experiments of the International Union of Railways, ORE, addressed the concern about finding maximum permissible values of lateral (Y) and vertical (Q) lateral forces and finding derailment criteria. This concern was tackled in the ORE Question C 138, of which 9 reports (RP 1 to RP9) were drafted.

Around 1980s, a set of experiments were carried out in order to investigate the values of certain parameters (Y , Q , wheel lift, and others) to correlate them with derailment situations. Experiments took place in different tracks (even in straight track with an external lateral load), over different vehicle types; and an overall analysis was completed.

Briefly summarizing (see ORE C138 for in-detail explanations), test scenarios were divided into two situations: i) 'non-derailments' and ii) 'derailments' situation². And considering the occurrences of external wheel's lateral to vertical load ratio $(Y/Q)_a$, it was observed that for 'non-derailments' distribution the Maximum estimated value of $(Y/Q)_a$ was around 0.8, and, as well, the minimum estimated value of $(Y/Q)_a$ for 'derailment' distribution was also around 0.8 (see footnote ³).

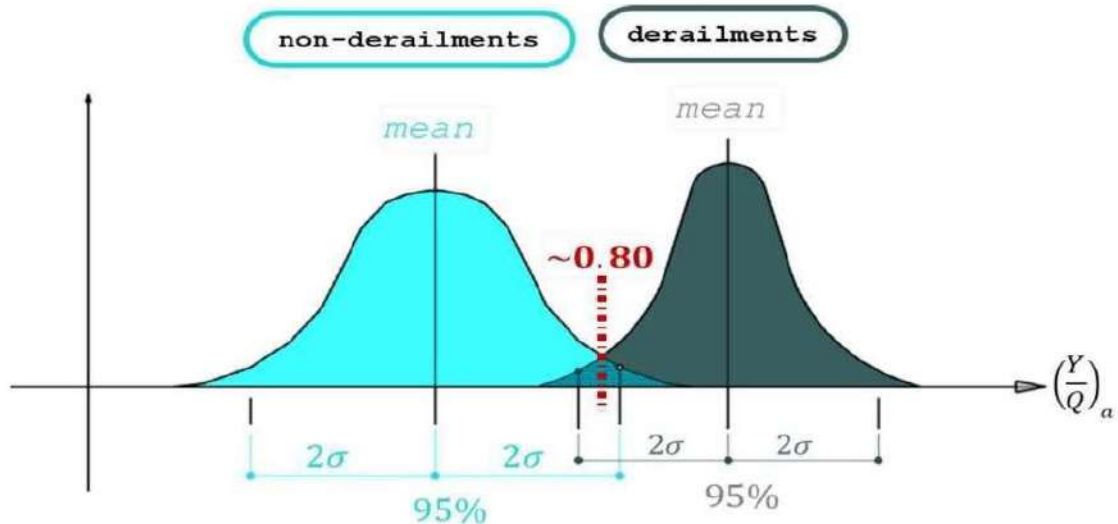


Figure 3.1. Scheme representing non-derailments and derailments occurrences.

² Note that 'derailments' situation did not imply a vehicle truly derailing! 'Derailment' or 'non-derailment' situation was defined based on a wheel lift criterion. Wheel lifts below 6 mm were considered as a 'non-derailment' situation, while wheel lift over 6 mm was considered as a 'derailment' situation.

³ Maximum estimated value and minimum estimated value calculated considering a normal distribution and a PA = 95%, so 95% confidence interval corresponds to $(\text{mean} + 2\sigma)$ for the maximum estimated value and $(\text{mean} - 2\sigma)$ for the minimum estimated value.

This way, a value of 0.8 is identified as a possible boundary between a *probably* 'non-derailment' and a *probably* 'derailment' situation. It is this 0.8 value, which is based on experimentally determined situations, that was later proposed as a limit value. In fact, ORE C138 RP9 states that "Long service experience with values approaching to 1 never resulted in derailments. Adhering to limit value $(Y/Q)_{a,max} = 0.8$ in any case provides a high degree of safety against derailment".

The value of 0.8 for derailment coefficient has been used for around 30 to 40 years and has led to safe running conditions, proving its validity with international application (a value up to 1.2 is accepted in transitions though).

In conclusion, the limit value of 0.8 is proposed also for its application in Indian network of wide gauge 1676 mm.

It should be noted however that, even if the limit value of 0.8 has remained at its value throughout the years, the methods and techniques for railway experimentation have tremendously evolved, and keep evolving, onto a more accurate and reliable technologies and devices.

Evolution of experimental techniques and devices is addressed by EN14363:2016 by clarifying that measurement uncertainty is nowadays at least as good as it was during the settlement of the limit values, and thus, nor limit values nor maximum estimated values should be altered due to it.

In addition, analysis methods have progressed too. Nowadays a confidence interval of PA = 99% is stated for Safety criteria while ORE C138 used a PA = 95%.

This way, EN14363:2016 enables the recalculation for $(Y/Q)_{a,max}$ in its section 7.6.3.2.5 in the event that the 0.8 limit value is exceeded or if $\lambda < 1.1$. This recalculated value, namely $(Y/Q)_{a,max,rec}$, leads to results which are around 20% smaller and which are more consistent with C138 data and results. Table 3.1 shows a comparison of a standard calculation and recalculated values (as in ORE C138) built from data in ⁴.

Table 3.1. Maximum estimated values for Y/Q and recalculated values, built from data in ⁴.

Standard calculation EN14363:2016 $(Y/Q)_{a,max}$	Recalculation as per 7.6.3.2.5 EN14363:2016 $(Y/Q)_{a,max,rec}$	Difference in %
0.87	0.69	- 21 %
0.99	0.80	- 19 %
0.98	0.74	- 24 %
1.09	0.83	- 24 %
0.81	0.67	- 17 %
0.92	0.79	- 14 %
0.93	0.72	- 23 %
1.04	0.81	- 22 %

In conclusion, the limit value proposed for $(Y/Q)_{a,max}$ is 0.8, and if exceeded, recalculation for obtaining $(Y/Q)_{a,max,rec}$ is possible. In transitions, limit value is 1.2.

ANNEXURE-VIII: RECORD DURATION FOR MEMORY

SN	Data Type	Record Duration	
		Crash Protected Memory as per RGS GM/RT/2472	Internal Flash Memory
1.	Short-term Data	1 Second interval for the last 72 Hrs	1 Second interval for the last 72 Hrs
2.	Long -term Data	20 Second interval for 90 Days	20 Second interval for 90 Days
3.	Faults data (along with facility to capture post-trigger and pre-trigger background information)	3 Days	120 Days
4.	Energy data	120 Days	120 Days
5.	Cab Cameras Audio & Video Recording (Single file)	60 Minutes	24 Hrs
6.	Driver-Guard Recording (Cab to Cab voice recording)	60 Minutes	24Hrs (See Note)
7.	Emergency Talk Back Unit (Driver/Guard-Passenger Voice Recording)	60 Minutes	
8.	Public Announcement done by driver/guard	60 Minutes	

Note- Memory for the total duration of 24Hrs allocated for the three types of audio data viz. Driver- Guard Recording, ETBU audio recording and Public Announcement recording to be stored in Internal Flash Memory. Since the three audio data are related to Guard's involvement for the same, the recording will continuous to record all the three types of audio data on sharing basis for 24hrs and any one of the three types of audio data can be recorded up to duration of 24hrs based on the actual usage/consumption in the train, if other type of data is not utilized currently. Otherwise, the recording length will be equally distributed among the three types of data.

ANNEXURE-IX -DESIGN DATA, CALCULATIONS AND DRAWINGS TO BE SUBMITTED BY THE SUPPLIER

A. Design data should include following particulars:

- i. **Pantograph:** Make and type, Minimum and maximum height, air pressure range, rated current capacity, weight, maximum operating speed, Lock down height, Clearance from roof.
- ii. **Vacuum Circuit Breaker:** Make and type, rated voltage and current, the maximum permissible operating voltage, rated short time current, fault clearing time, making and breaking capacity, impulse voltage withstands, number and rating of auxiliary contacts, overall dimensions and weight of the equipment.
- iii. **Transformer:** Make and type, particulars of windings with their continuous rating, permissible duty cycle, percentage impedance voltage of each winding with different combinations of windings shorted, no-load magnetisation current, transformer losses and efficiency, permissible temperature rise, details of cooling system, details of insulation of windings, weight particulars of the transformer with and without cooling equipment. Type of oil, protection provided
- iv. Details of the radiator, relays and other devices/equipment associated with the transformer.
- v. **Traction Converter:** Make and type, number of cubicles per motor coach, thermal characteristics of IGBTs/SiC, cooling system design details including air/water flow rates and arrangement of filtered air, noise level, IP level, Thermal margin with calculations.
- vi. Details of the **capacitor for DC link** as well as resonance circuit, if provided, details of the protection of power converter, the designed power loss in the converter. Type of control, weight, DC bus voltage, data sheets for power devices and their characteristic curves, details of slip-slide control
- vii. **Train Control & Management System:** Details of protocols, Software modification and interface requirements. Make and type, details of microprocessor, Complete functional description, details of faults to be displayed in driving cab and stored in permanent memory, procedure for down loading the details of faults from memory, details of fault protection, control schemes of all sub-systems including braking, details of control for converter, DC link, inverter, traction motor, braking etc. redundancy on basic unit and train level, software logic document, Circuit diagrams.
- viii. **Auxiliary converter:** Make and type, number of cubicles per motor coach, cooling system design details including air flow rates and arrangement of filtered air, noise level, configuration with details, details of the capacitor for DC link and resonance circuit, if provided, the permissible power loss, protection system, overall dimensions and weight, Capacity Calculation, load management in case of reduced auxiliary power.
- ix. **Smoothing Reactor/ Filters:** Make and type, number and rating of the coils, inductance and ripple characteristics up to 1.7 times the rated transformer secondary current, losses,

permissible increase in temperature, details of cooling system, and weight of the equipment.

- x. **Traction Motor:** The design shall include Continuous rating, One hour rating, Short term rating, gear ratio, traction motor characteristics under the environment and service conditions specified in the specifications and standards, estimated temperature rise of stator winding, air flow, ventilation to watt loss ratio, maximum designed test and service speed, details of insulation, details of the bearings, fits and clearances adopted, details of lubrications to be used in gear case and bearings, traction motor performance curves,
- xi. **Gear box assembly:** Make and type, grade of steel used, particulars of heat treatment, material and type of construction of gear box, make & type of lubrication compound of gear box. 'k' and 'p' value, particulars of gear.
- xii. **Auxiliary Machines & Blowers:** Make and type of various auxiliary machines, starting current and torque, torque speed characteristics at various voltages, continuous rating, efficiency, speed, power factor and slip of the motor, type of enclosure, details of insulation, terminals and terminals block, material of core stampings and average flux density, clearances, tolerances, details of cooling fan and bearing including size, L-10 life calculation of the bearings and weight of machines, dimensions and weight of the blower.
- xiii. **Contactors / MCB:** Make and type, rated voltage and current, making and breaking capacity, number of auxiliary contacts with control circuits voltage, magnet valve and coil details, mechanical and electrical endurance test data.
- xiv. **Lightning Arrestor:** Make and type, rated voltage, dry and wet power frequency withstand voltage, minimum power frequency spark over voltage, nominal discharge current, impulse spark over voltage, overall dimensions and weight, class.
- xv. **Master and Brake Controller:** Make and type, rated current, positions of reverser and main handle and auxiliary interlocks, and weight, details of redundancy, mechanical and electrical endurance test data.
- xvi. **Relays:** Make and type of various relays, rated current and voltage, range of setting, rated control voltage, temperature rise limit, mechanical and electrical endurance test data.
- xvii. **Compressor:** Make, type and model, number of stages, rated speed, maximum air pressure, graph showing FAD against 8, 9 and 10 kg/cm² pressures, maximum permissible temperature at inlet and exhaust ports, details of drive arrangement and coupling, lubrication requirements, overall dimensions and weight, Type of motor, KW

rating, Voltage, Rated current, Insulation class, Efficiency, Mounting, Capacity of compressor in lit / min, Noise level at 4.6 m, air intake / filter system, type of lubrication.

- xviii. **Battery Charger:** Make and type of the battery charger, capacity and rating, ripple content, load regulation, dimensions and weight
- xix. **Isolating and Programme Switches:** Make and type, rated voltage and current, short time current, description and details of interlocking arrangement, number of auxiliary contacts, mechanical and electrical endurance test data
- xx. **Auxiliary Compressor:** Make and type, capacity and pressure, speed, motor rating and working voltage, overall dimensions and weight.
- xxi. **Regenerative Brake Blending:** Make and type, functional description of complete system and individual components, regenerative braking calculations including braking effort and its speed range.
- xxii. **Control Electronics and Displays:** Details of control electronics, PCBs, Redundancy adopted at various levels, Protection level against dust, moisture, corrosion and salty atmosphere, Types of display, protection level against dust, moisture, vandalism and comparative advantages, Devices for 'Log In' journey details, Weight of Displays, Overall dimensions and features of Displays
- xxiii. **Passenger Information and Communication System:** Details of scheme and protocol, No. of amplifiers and speakers, expendability, provisions / facilities, Priorities incorporated, Number of displays per coach, Type of display LED/LCD, Display of dynamic route map and advertisement videos, Weight & size of displays
- xxiv. **Cables:** Power, control and communication cables, Source, Specifications, Properties
- xxv. **Inter vehicular couplers (combined electrical – mechanical couplers):** Details of design parameters, Protection against water ingress due to flooding conditions in Mumbai, No. of spare contacts, Weight, Overall dimensions, layout, protection against vandalism
- xxvi. **Cab Air-conditioning system design:** functional description along with equipment/system, including controls; cooling capacity curve, cooling capacity versus power curve of the compressor along with the comparison with standard curves; complete heat load calculation and air conditioning system capacity to achieve maximum possible Energy Efficiency Ratio.
- xxvii. **Roof Mounted Ventilation Unit:** Make and type of motors, starting current, continuous rating, efficiency, speed, CFM, type of enclosure, details of insulation, terminals and terminals block, Water eliminators, clearances, tolerances and weight of machines, dimensions and weight of the blower.

B. Design Calculations should include: -

- a. Weights and centre gravity of each equipment together with weight unbalance calculations etc.
- b. Adhesion calculation.
- c. System performance calculations.
- d. Gears box, analysis of stresses, selection of bearing, gear box and transmission assembly.
- e. Calculations for lateral and longitudinal equipment balancing.
- f. EP brake system, brake effort calculations.
- g. Braking distance calculations under gross load condition at maximum permissible operating speed at level track.
- h. Cooling system calculations.
- i. Tractive and braking effort vs speed curves showing balancing speed.
- j. Detailed step-wise calculations for equipment ratings and performance requirement.
- k. Curves of efficiency, power factor, frequency, slip as a function of speed.
- l. Traction Motor performance curves.
- m. Calculations for life of bearings used in Traction Motors and aux. machines.
- n. Harmonic calculations.
- o. Calculation of shaft strength for Traction and aux. Machines, calculation of moment of inertia, shaft strength etc.
- p. Reliability predictions.
- q. Acceleration, deceleration and jerk control
- r. Thermal simulation of propulsion equipment as per the requirements of specification
- s. Time and distance to achieve maximum service speed with normal and one basic unit isolation
- t. Traction converter control and switching pattern

C. Following drawings to be submitted as part of design document including dimensions and material specifications:

- a. Layout drawing for roof, underfloor, driving cab, motor and trailer coaches.
- b. Schematic diagram of power, dynamic braking, control and auxiliary circuits including multiple operation.
- c. Tractive effort transmission diagram.
- d. Brake system diagram.
- e. Drawing showing mounting arrangement of traction motor.
- f. Motor suspension arrangement.
- g. Drawings of Traction motor and drive:

S.No.	Description
1.	Traction Motor outline assembly
2.	Longitudinal section
3.	Cross-section
4.	Stator housing machined
5.	Wound stator assembly
6.	Detail of Stator Winding Overhang Support
7.	Stator coil
8.	Stator slot cross section showing Insulation details along with thickness & specification

9.	Winding diagram
10.	End shield DE
11.	End shield NDE
12.	Bearing assembly arrangement DE
13.	Bearing assembly arrangement NDE
14.	Terminal box assy.
15.	Rotor Assembly
16.	shaft machined
17.	rotor bar
18.	ventilator
19.	Mounting arrangement of TM
20.	Motor suspension arrangement
21.	Traction motor cooling duct arrangement
22.	Air inlet arrangement
23.	Air out let arrangement
24.	Motor terminal box

- h. Drawings for pantograph, pan and strips.
- i. Auxiliary machines drawing giving longitudinal and cross section details of stator winding, motor construction etc.
- j. Mounting details of major equipment.
- k. General arrangement of transformer, winding, core and auxiliaries, if any.
- l. General arrangement of circuit breaker, earthing switches, isolators, contactors, relays etc.
- m. Master controller drawing showing driving controls, cam contacts and pneumatic and mechanical connections.
- n. Transformer and power converter cooling arrangement.
- o. General arrangement for wheel slip detection and correction system.
- p. Detailed drawings of the Bogie assembly for all type of coaches.
- q. Ventilation Arrangement

Note: The items as above are indicative only. Supplier is advised to refer the relevant clauses of the specifications for submitting the details required.

ANNEXURE-X -PERFORMANCE SIMULATIONS TO BE SUBMITTED BY THE SUPPLIER

A. REF. CLAUSE 2.5.9

1. Conditions:-

- i) 16 cars loaded rake
- ii) Line Voltage 22.5 kV AC
- iii) All out run (with dwell time of 30 sec)
- iv) Maximum possible regeneration with full-service brake
- v) Gross weight of Train as per clause no. 2.5.11

2. Simulations

a. Tabulation:-

Section	Run time	RMS current of traction motor	Line current peak
6 km section on level tangent track			

b. Graphical values

- i) Time vs. Speed, Distance, Motor current, Line current, TE, BE, TR, acceleration/deceleration
- ii) Distance vs. Speed, time, Motor current, Line current, TE, BE, TR, acceleration/deceleration

c. Temperature rise of propulsion equipment with graphical presentation till stabilization.

B. REF. CLAUSE 2.9 and Chapter 2

1. Conditions:-

- i) 16 cars loaded rake
- ii) Line Voltage 22.5 kV AC
- iii) All out run (with dwell time of 30 sec)
- iv) Maximum possible regeneration with full service brake
- v) Gross weight of Train as per clause no. 2.5.11

2. Simulations

a. Tabulation:-

Section	Time	Distance	Line current	Consumed energy	Regenerated energy	% Regen
Time & distance to achieve speed of 130kmph (normal rake)						
Time & distance to achieve speed of 130kmph (one basic unit isolated)						

Time to complete one cycle of 6 km (with normal rake)						
Time to complete one cycle of 6 km (one basic unit isolated)						

b. Graphical values

- i) Time vs. Speed, Distance, Motor current, Line current, TE, BE, TR, acceleration/deceleration
- ii) Distance vs. Speed, time, Motor current, Line current, TE, BE, TR, acceleration/deceleration

C. REF. CLAUSE 2.5.11

1. Conditions:

- i) 16 cars loaded rake with one basic unit isolated conditions
- ii) 22.5 kV AC
- iii) All out run (with stop time)

2. Simulations:-

Section	Run time	RMS current of traction motor	Line current peak
6 km section of 1 in 37			

3. Graphical values

- i) Time vs. Speed, Distance, Motor current, Line current, TE, BE, TR, acceleration/deceleration
- ii) Distance vs. Speed, time, Motor current, Line current, TE, BE, TR, acceleration/deceleration
- iii) Temperature rise of propulsion equipment with graphical presentation.

D. CHARACTERISTICS AND EFFICIENCY CURVES

1. Performance curves for Motoring and regenerating.

2. Conditions

- i) 22.5 kV AC and 30 kV
- ii) Wheel dia new, half worn wheel, worn wheel

Parameters to be included in the curve:

Speed Vs Tractive effort / Braking effort, Train resistance, Line current, Traction Motor voltage, Traction motor current, Traction motor power factor, Motor frequency, slip frequency, Balancing speed.

E. EFFICIENCY CURVES FOR MOTORING AND BRAKING

1. **Conditions:** 22.5 kV AC and 30 kV

Including following:

Speed Vs. Gear efficiency, Inverter Efficiency, Converter efficiency, Transformer efficiency,
Traction Motor efficiency, Overall system efficiency.

F. TRACTION MOTOR CHARACTERISTICS AS PER IEC 60349-2/IEC 60349-4

G. CLAUSE 1.7.12(iv)– SIMULATION OF LIKELY VALUES OF HARMONIC CURRENTS.

IMPORTANT: The listed requirements as above are indicative; Supplier is advised to refer the main clauses of the Specification.

“Manufacturing-cum-Maintenance Agreement” (MCMA)

PART -I PRELIMINARY

MANUFACTURING CUM MAINTENANCE AGREEMENT

THIS AGREEMENT is entered into on this {the day
of....., 20.....}

BETWEEN

1. **THE PRESIDENT OF INDIA** represented by Principal Chief Materials Manager,Integral Coach Factory,2nd Floor, Administrative Building,Chennai: 600038(hereinafter referred to as the “Government” which expression shall, unless repugnant to the context or meaning thereof, include its administrators, successors and assigns) of One Part;
AND

2. {Name of the selected bidder} or {.....Limited} a company incorporated under the provisions of the Companies Act, 2013 and}1 having its registered office at, , as (hereinafter referred to as the “**Technology Partner**” which expression shall, unless repugnant to the context or meaning thereof, include its successors and permitted assigns and substitutes) of the Other Part. The Government and the Technology Partner shall be collectively referred to as “**Parties**” and individually as a “**Party**”.

WHEREAS:

A. The Government had resolved to procure Next Generation inter-city trains through a manufacturing-cum-maintenance contract (the “**Project**”) in accordance with the terms and conditions to be set forth in the manufacturing- cum - maintenance agreement (the “**Agreement**”).

B. The Government had prescribed the technical and commercial terms and conditions, and invited bids from the bidders for undertaking the Project.

C. After evaluation of the bids received, the Government had accepted the bid of the {selected bidder(s)/Consortium} (the “**Selected Bidder**”) and issued its Letter of Acceptance No. dated (hereinafter called the “**LOA**”) to the Selected Bidder requiring, inter alia:

- i. deliver to the Government a legal opinion from the legal counsel of the Selected Bidder with respect to the authority of the Selected Bidder to enter into this Agreement and the enforceability of the provisions thereof, within 10 (ten) days of the date of issue of LOA;
- ii. submit Performance Security within 45(forty-five) days of the issue of LoA; and
- iii. execute this Agreement within 15 (fifteen) days of the submission of Performance Security.

D. The Technology Partner has fulfilled the requirements specified in Recital (C) above.

OR

{{(C) After evaluation of the bids received, the Government had accepted the bid of the {selected bidder(s)/Consortium} (the "Selected Bidder") and issued its Letter of Acceptance No. dated (hereinafter called the "LOA").

(D) {The selected bidder/Consortium} has since promoted and incorporated the {***** Limited} a company incorporated under the Companies Act 2013 and has requested the Government to accept the company as the Technology Partner under this Agreement, which shall undertake and perform the obligations and exercise the rights of the {selected bidder/Consortium} under the LOA, including the obligation to enter into this Agreement pursuant to the LOA for executing the Project.

E. By its letter dated, the newly incorporated company has also joined in the said request of the {selected bidder/Consortium} to the Government to accept it as the Technology Partner under this Agreement, which shall undertake and perform the obligations and exercise the rights of the {selected bidder/Consortium} including the obligation to enter into this Agreement pursuant to the LOA. The Technology Partner has further represented to the effect that it has been promoted by the {selected bidder/Consortium} for the purposes hereof.

F. The Government has agreed to the said request of the {selected bidder/Consortium} and the Technology Partner, and has accordingly agreed to enter into this Agreement with the Technology Partner for implementing the Project, subject to and on the terms and conditions set forth hereinafter.

G. Further pursuant to the LOA, the Technology Partner has fulfilled the following requirements:

- i. delivered to the Government a legal opinion from the legal counsel of the Technology Partner with respect to the authority of the Technology Partner to enter into this Agreement and the enforceability of the provisions thereof, within 10 (ten) days of the date of acceptance by the Government of the request of the selected bidder/Consortium as per Clause F above;
- ii. delivered to the Government, the Confirmation Certificate executed by it and {selected bidder/Consortium/JV Members}, in original in the form attached hereto as Schedule-L;
- iii. submitted a Performance Security within 45(forty-five) days of the issue of LOA; and
- iv. executed this Agreement within 15 (fifteen) days of the submission of Performance Security.}

NOW THEREFORE in consideration of the foregoing and the respective covenants and agreements set forth in this Agreement, the sufficiency and adequacy of which is hereby acknowledged, and intending to be legally bound hereby, the Parties agree as follows:

Article 1: Definitions and Interpretation

1.1. Definitions

The words and expressions beginning with capital letters and defined in this Agreement (including those in Article 46) shall, unless the context otherwise requires, have the meaning ascribed thereto herein, and the words and expressions defined in the Schedules and used therein shall have the meaning ascribed thereto in the Schedules.

1.2. Interpretation

1.2.1. In this Agreement, unless the context otherwise requires,

- a. references to any legislation or any provision thereof shall include amendment or re-enactment or consolidation of such legislation or any provision thereof so far as such amendment or re-enactment or consolidation applies or is capable of applying to any transaction entered into hereunder;
- b. references to laws of the State, laws of India or Indian law or regulation having the force of law shall include the laws, acts, ordinances, rules, regulations, bye laws or notifications which have the force of law in the territory of India and as from time to time may be amended, modified, supplemented, extended or re-enacted;
- c. references to a “**person**” and words denoting a natural person shall be construed as a reference to any individual, firm, company, corporation, society, trust, government, state or agency of a state or any association or partnership (whether or not having separate legal personality) of two or more of the above and shall include successors and assigns;
- d. the table of contents, headings or sub-headings in this Agreement are for convenience of reference only and shall not be used in, and shall not affect, the construction or interpretation of this Agreement;
- e. the words “**include**” and “**including**” are to be construed without limitation and shall be deemed to be followed by “**without limitation**” or “**but not limited to**” whether or not they are followed by such phrases;
- f. references to “**construction**” or “**building**” include, unless the context otherwise requires, investigation, design, developing, engineering, procurement, delivery, transportation, installation, processing, fabrication, testing, commissioning and other activities incidental to the construction, and “**construct**” or “**build**” shall be construed accordingly;

- g. references to “**upgradation**” include, unless the context otherwise requires, renovation, refurbishing, augmentation, equipping (with M&Ps and other facilities) and other activities incidental thereto, and “**upgrade**” shall be construed accordingly;
- h. any reference to any period of time shall mean a reference to that according to Indian Standard Time;
- i. any reference to “hour” shall mean a period of 60 (sixty) minutes commencing either on the hour or on the half hour of the clock, which by way of illustration means 5.00 (five),6.00(six),7.00(seven) and so on being hours on the hour of the clock and 5.30(five thirty),6.30(six thirty),7.30(seven thirty) and so on being hours on the half hour of the clock;
- j. any reference to day shall mean a reference to a calendar day;
- k. reference to a “business day” shall be construed as reference to a day (other than a Sunday) on which banks in Chennai are generally open for business;
- l. any reference to month shall mean a reference to a calendar month as per the Gregorian calendar;
- m. any reference to “**quarter**” shall mean a reference to the period of three months commencing from April 1, July 1, October 1, and January 1, as the case may be;
- n. references to any date, period or Project Milestone shall mean and include such date, period or Project Milestone as may be extended pursuant to this Agreement;
- o. any reference to any period commencing “**from**” a specified day or date and “**till**” or “**until**” a specified day or date shall include both such days or dates; provided that if the last day of any period computed under this Agreement is not a business day, then the period shall run until the end of the next business day;
- p. the words importing singular shall include plural and vice versa;
- q. references to any gender shall include the other and the neutral gender;
- r. “**lakh**” means a hundred thousand (100,000) and “**crore**” means ten million (10,000,000);
- s. “**indebtedness**” shall be construed so as to include any obligation (whether incurred as principal or surety) for the payment or repayment of money, whether present or future, actual or contingent;
- t. references to the “**winding-up**”, “**dissolution**”, “**insolvency**”, or “**reorganisation**” of a company or corporation shall be construed so as to include any equivalent or analogous

proceedings under the law of the jurisdiction in which such company or corporation is incorporated or any jurisdiction in which such company or corporation carries on business including the seeking of liquidation, winding-up, reorganisation, dissolution, arrangement, protection or relief of debtors;

u. save and except as otherwise provided in this Agreement, any reference, at any time, to any agreement, deed, instrument, licence or document of any description shall be construed as reference to that agreement, deed, instrument, licence or other document as amended, varied, supplemented, modified or suspended at the time of such reference; provided that this Sub-clause (u) shall not operate so as to increase liabilities or obligations of the Government hereunder or pursuant hereto in any manner whatsoever;

v. any agreement, consent, approval, authorisation, notice, communication, information or report required under or pursuant to this Agreement from or by any Party shall be valid and effective only if it is in writing under the hand of a duly authorised representative of such Party in this behalf and not otherwise;

w. the Schedules and Recitals to this Agreement form an integral part of this Agreement and will be in full force and effect as though they were expressly set out in the body of this Agreement;

x. references to Recitals, Articles, Clauses, Sub-clauses, Provisos or Schedules in this Agreement shall, except where the context otherwise requires, mean references to Recitals, Articles, Clauses, Sub-clauses, Provisos and Schedules of or to this Agreement; reference to an Annex shall, subject to anything to the contrary specified therein, be construed as a reference to an Annex to the Schedule in which such reference occurs; and reference to a Paragraph shall, subject to anything to the contrary specified therein, be construed as a reference to a Paragraph of the Schedule or Annex, as the case may be, in which such reference appears;

y. the damages payable by either Party to the other of them, as set forth in this Agreement, whether on per diem basis or otherwise, are mutually agreed genuine pre-estimated loss and damage likely to be suffered and incurred by the Party entitled to receive the same and are not by way of penalty (the “**Damages**”); and

z. time shall be of the essence in the performance of the Parties’ respective obligations. If any time period specified herein is extended, such extended time shall also be of the essence.

1.2.2. Unless expressly provided otherwise in this Agreement, any Documentation required to be provided or furnished by the Technology Partner to the Government shall be provided free of cost in soft copy as well as in three hard copies, and if the Government is required to return any such Documentation with their comments and/or approval, they shall be entitled to retain two hard copies thereof.

- 1.2.3. The rule of construction, if any, that a contract should be interpreted against the parties responsible for the drafting and preparation thereof, shall not apply.
- 1.2.4. Any word or expression used in this Agreement shall, unless otherwise defined or construed in this Agreement, bear its ordinary English meaning and, for these purposes, the General Clauses Act, 1897 shall not apply.

1.3. Measurements and arithmetic conventions

All measurements and calculations shall be in the metric system and calculations done to 2 (two) decimal places, with the third digit of 5 (five) or above being rounded up and below 5 (five) being rounded down; provided that the drawings, engineering dimensions and tolerances may exceed 2 (two) decimal places as required.

1.4. Priority of agreements, clauses and schedules

- 1.4.1. This Agreement, and all other agreements and documents forming part of or referred to in this Agreement are to be taken as mutually explanatory and, unless otherwise expressly provided elsewhere in this Agreement, the priority of this Agreement and other documents and agreements forming part hereof or referred to herein shall, in the event of any conflict between them, be in the following order:
- a. this Agreement; and
 - b. all other agreements and documents forming part hereof or referred to herein, i.e. the Agreement at (a) above shall prevail over the agreements and documents at (b) above.
- 1.4.2. Subject to the provisions of Clause 1.4.1, in case of ambiguities or discrepancies within this Agreement, the following shall apply:
- a) between two or more Clauses of this Agreement, the provisions of a specific Clause relevant to the issue under consideration shall prevail over those in other Clauses;
 - b) between the Clauses of this Agreement and the Schedules, the Clauses shall prevail and between Schedules and Annexes, the Schedules shall prevail;
 - c) between any two Schedules, the Schedule relevant to the issue shall prevail;
 - d) between the written description on the Drawings and the Specifications and Standards, the latter shall prevail;
 - e) between the dimension scaled from the Drawing and its specific written dimension, the latter shall prevail; and
 - f) between any value written in numerals and that in words, the latter shall prevail.

1.5. Joint and several liability

- 1.5.1. If the Technology Partner has formed a Consortium of two or more persons for implementing the Project:

These persons shall, without prejudice to the provisions of this Agreement, be deemed to be jointly and severally liable to the Government for the performance of the Agreement; and

The Technology Partner shall ensure that no change in the composition of the Consortium is effected without the prior consent of the Government.

- 1.5.2. Without prejudice to the joint and several liability of all the members of the Consortium, the Lead Member shall represent all the members of the Consortium and shall at all times be liable and responsible for discharging the functions and obligations of the Technology Partner. The Technology Partner shall ensure that each member of the Consortium shall be bound by any decision, communication, notice, action or inaction of the Lead Member on any matter related to this Agreement and the Government shall be entitled to rely upon any such action, decision or communication of the Lead Member. The Government shall generally release payments to the Lead Member. If the payment is to be made to the Consortium Partner directly, the same can be done provided the Lead member takes full responsibility for performance as per the Agreement and certifies each payment invoice.

PART -II

SCOPE OF THE AGREEMENT

2. Article 2. Scope of the Agreement

2.1. Scope of the Agreement

The scope of the Agreement (the “**Scope of the Agreement**”) shall mean and include, the following, in accordance with the provisions of this Agreement, during the Agreement Period:

- a) design, manufacture, supply, testing and commissioning of the 200 number of Next Generation Intercity Trains conforming to the Specifications and Standards set forth in Schedule-A;
- b) up-gradation of the available existing infrastructure/facilities and development of additional infrastructure/facilities at nominated Manufacturing Unit site of Government's Railway Manufacturing Unit(RMU), Kazipet including operation & maintenance of the same to meet the requirement of manufacturing, testing, commissioning and supply of the Trains;
- c) up-gradation of the available existing infrastructure/facilities and development of additional infrastructure/facilities at nominated Maintenance Depot sites of Government's including operation & maintenance of the same for maintenance of the supplied Trains;
- d) comprehensive maintenance of the supplied Trains;
- e) supply, installation, testing, commissioning, maintenance and operation of Training Facility at the Maintenance Depots and Manufacturing Unit for operating (Train Operating Crew) and maintenance manpower; and
- f) any other obligations to meet the objective either implied or deemed necessary as per the Agreement.

3. Article 3: Award of Contract

3.1. The Contract

- 3.1.1. Subject to and in accordance with the provisions of this Agreement, Applicable Laws and the Applicable Permits, the Government hereby awards to the Technology Partner the right to manufacture, supply and maintain the Trains for the period specified herein (the "Contract"), and the Technology Partner hereby accepts the Contract and agrees to implement the same subject to and in accordance with the terms and conditions set forth herein.
- 3.1.2. Subject to and in accordance with the provisions of this Agreement, the Contract hereby granted shall oblige or entitle (as the case may be) the Technology Partner to the following in accordance with the provisions of this Agreement:
- a) manufacture, assemble and supply Trains to the Government;
 - b) maintain the Trains;
 - c) equip and upgrade the Manufacturing Unit;
 - d) access and use of the Manufacturing Unit for manufacturing Trains;
 - e) equip and upgrade the Maintenance Depots;
 - f) access and use of the Maintenance Depots and Washing Lines for performing its Maintenance Obligations;
 - g) perform and fulfil all of the Technology Partner's obligations under and in accordance with this Agreement;
 - h) save as otherwise provided in this Agreement, bear and pay all costs, expenses and charges in connection with or incidental to the performance of the obligations of the Technology Partner under this Agreement; and
 - i) neither assign, transfer or sublet or create any lien or Encumbrance on this Agreement nor transfer, or create encumbrance on the Manufacturing Unit, Depot Sites and Washing Lines, as the case may be, save and except as expressly permitted by this Agreement.

3.2. Agreement Period

This Agreement shall come into effect on the date hereof, and shall expire upon completion of the Maintenance Period of all Trains, unless terminated earlier in accordance with the provisions of this Agreement.

4. Article 4 {Intentionally Left Blank}

5. Article 5: Obligations of the Technology Partner

5.1. Obligations of the Technology Partner

- 5.1.1. The Technology Partner shall supply the Trains to the Government and undertake comprehensive maintenance of the same in accordance with the terms and conditions of this Agreement.
- 5.1.2. The Technology Partner shall equip, upgrade, operate and maintain the Manufacturing Unit in accordance with the terms and conditions of this Agreement;
- 5.1.3. The Technology Partner shall equip, upgrade, operate and maintain the Maintenance Depots at the Depot Sites in accordance with the terms and conditions of this Agreement.
- 5.1.4. The Technology Partner shall comply with all Applicable Laws and Applicable Permits (including renewals as required) in the performance of its obligations under this Agreement.
- 5.1.5. Save and except as otherwise provided in this Agreement or Applicable Laws, as the case may be, the Technology Partner shall, in discharge of all its obligations under this Agreement, conform with and adhere to Good Industry Practice at all times.
- 5.1.6. The Technology Partner shall, at its own cost and expense, in addition to and not in derogation of its obligations elsewhere set out in this Agreement:
 - a) make, or cause to be made, necessary applications to the relevant Government instrumentalities with such particulars and details as may be required for obtaining Applicable Permits, and obtain and keep in force and effect such Applicable Permits in conformity with Applicable Laws;
 - b) procure, as required, the appropriate proprietary rights, license permissions, statutory licenses and permissions required under the laws of the land including intellectual property rights, if any and all sorts of arrangements, agreements and permissions for materials, methods, processes, technical knowledge and scientific know-how and systems used or incorporated into the Trains, Manufacturing Unit and Maintenance Depots. The TP shall ensure that all the above aspects are free from any litigations. Non-compliance of the same will constitute an attempt to cheat and suitable measures will be taken by the Government accordingly.
 - c) make reasonable efforts to maintain harmony and good industrial relations among the personnel employed by it or its Sub-contractors in connection with the performance of its obligations under this Agreement;

- d) ensure and procure that its Sub-contractors comply with all Applicable Permits and Applicable Laws in the performance by them of any of the Technology Partner's obligations under this Agreement;
- e) always act in a manner consistent with the provisions of this Agreement and not cause or fail to do any act, deed or thing, whether intentionally or otherwise, which may in any manner be violative of any of the provisions of this Agreement;
- f) take all reasonable precautions and adopt all reasonable caution for the prevention of accidents on or around the Manufacturing Unit and Maintenance Depots along with providing all reasonable assistance and emergency medical aid to accident victims; and
- g) hand over the assets of Manufacturing Unit and Maintenance Depots as per Article 29 of this agreement to the Government upon completion of the Supply Period or Termination of this Agreement, as the case may be, in accordance with the provisions thereof.

5.2. Obligations relating to Project Agreements

- 5.2.1. It is expressly agreed that the Technology Partner shall, at all times, be responsible and liable for all its obligations under this Agreement notwithstanding anything contained in the Project Agreements or any other agreement, and no default under any Project Agreement or agreement shall excuse the Technology Partner from its obligations or liability hereunder.
- 5.2.2. The Technology Partner shall submit to the Government the drafts of all Project Agreements or any amendments or replacements thereto for its review and comments, and the Government shall have the right but not the obligation to undertake such review and provide its comments, if any, to the Technology Partner within 15 (fifteen) days of the receipt of such drafts. Within 7 (seven) days of execution of any Project Agreement or amendment thereto, the Technology Partner shall submit to the Government a true copy thereof, duly attested by a Director of the Technology Partner, for its record. For the avoidance of doubt, it is hereby agreed that the review and comments hereunder shall be limited to ensuring compliance with the terms of this Agreement. It is further agreed that any failure or omission of the Government to review and/ or comment hereunder shall not be construed or deemed as acceptance of any such agreement or document by the Government. No review and/or observation of the Government and/or its failure to review and/or convey its observations on any document shall neither relieve the Technology Partner of its obligations and liabilities under this Agreement in any manner nor shall the Government be liable for the same in any manner whatsoever.
- 5.2.3. Notwithstanding anything to the contrary contained in this Agreement, the Technology Partner shall not assign or in any manner create any sort of encumbrance, lien, mortgage, assignment or third party rights on the Manufacturing Unit, Depot Sites and Washing Lines, as the case may be, without prior written consent of the Government, which approval the Government may, in its

discretion, deny if such assignment or Encumbrance has or may have a material adverse effect **or prejudicial** on the rights and obligations of the Government under this Agreement or Applicable Laws.

- 5.2.4. The Technology Partner shall procure that each of the Project Agreements contains provisions that entitle the Government to step into such agreement, in its sole discretion, in substitution of the Technology Partner in the event of its Termination or Suspension (the “**Covenant**”). For the avoidance of doubt, it is hereby expressly agreed that in the event the Government does not exercise such rights of substitution within a period not exceeding 90 (ninety) days from the Transfer Date, the Project Agreements shall be deemed to cease to be in force and effect on the Transfer Date without any liability whatsoever on the Government and the Covenant shall expressly provide for such eventuality. The Technology Partner expressly agrees to include the Covenant in all its Project Agreements and undertakes that it shall, in respect of each of the Project Agreements, procure and deliver to the Government an acknowledgment and undertaking, in a form acceptable to the Government, from the counter party(s) of each of the Project Agreements, whereunder such counter party(s) shall acknowledge and accept the Covenant and undertake to be bound by the same and not to seek any relief or remedy whatsoever from the Government in the event of **its** Termination or Suspension.
- 5.2.5. Notwithstanding anything to the contrary contained in this Agreement, the Technology Partner agrees and acknowledges that selection or replacement of an O&M Sub- contractor and execution of the O&M Contract shall be subject to the prior approval of the Government from national security and public interest perspective, the decision of the Government in this behalf being final, conclusive and binding on the Technology Partner, and undertakes that it shall not give effect to any such selection or contract without prior approval of the Government. For the avoidance of doubt, it is hereby expressly agreed that approval of the Government hereunder shall be limited to national security and public interest perspective, and the Government shall endeavour to convey its decision thereon expeditiously. It is also agreed that the Government shall not be liable in any manner on account of grant or otherwise of such approval and that such approval or denial thereof shall not in any manner absolve the Technology Partner or its Sub-contractors from any liability or obligation under this Agreement.

5.3. Obligations relating to change in Consortium Member

- 5.3.1. In case the Technology Partner is a **Joint Venture (in short JV)** or consortium, it shall not substitute/drop any of its members during the Supply Period, except with the prior written consent or approval of the Government. Any such change may be permitted by the Government, only where:
- a) the Lead Member continues to be the Lead Member of the Consortium with minimum share of 26% in the Project;
 - b) the Technology Partner (including all Consortium Members), continue to meet the Eligibility requirements specified in the bid document as on bid opening date subject to no downgrading on the date of decision;

c) all such Consortium Members whose credentials are used to meet the Eligibility requirements towards Propulsion Equipment shall have a combined minimum share of 30% in the supply portion of the Project.

5.3.2. After completion of Supply Period, the Technology Partner may substitute/drop any of its members with prior written consent or approval of the Government. Such change may be permitted by the Government, only where the Lead Member continues to have a minimum share of 26% in the Project till the end of the Agreement Period and the Lead Member undertakes complete responsibility for comprehensive Maintenance Obligation as per the Agreement. The Lead Member shall be jointly and severally liable for the acts committed by any such **JV or any members JV or Consortiums obligations**, including but not limited to cases where a member of the Consortium leaves /is dropped or is substituted.

5.3.3. In case, the Consortium changes/alters to any other structure such as a Company or Special Purpose Vehicle (SPV), for performance of all and comprehensive Maintenance Obligations, such SPV shall be wholly and jointly responsible for all acts of the erstwhile Consortium for the tenure of the Agreement.

5.3 (A) **Obligations relating to change in Ownership**

5.3.1 (A) The Technology Partner shall not undertake or permit any Change in its constitution or Ownership, except with the prior written consent or approval of the Government.

5.3.2 (A) Notwithstanding anything to the contrary contained in this Agreement, the Technology Partner agrees and acknowledges that:

- i) all acquisitions of an equity by an acquirer, either by himself or with any person acting in concert, directly or indirectly, including by transfer of the direct or indirect legal or beneficial ownership or control of any equity, in aggregate of not less than 15% (fifteen per cent) of the total equity of the Technology Partner; or
- ii) acquisitions of any control directly or indirectly of the Board of Directors of the Technology Partner by any person either by himself or together with any person or persons acting in concert with him, shall constitute a Change in Ownership requiring prior approval of the Government from national security and public interest perspective, the decision of the Government in this behalf being final, conclusive and binding on the Technology Partner, and undertakes that it shall not give effect to any such acquisition of equity or control of the Board of Directors of the Technology Partner without such prior approval of the Government. For the avoidance of doubt, it is hereby expressly agreed that approval of the Government hereunder shall be limited to national security and public interest perspective, and the Government shall endeavour to convey its decision thereon expeditiously. It is also agreed that the Government shall not be liable in any manner on account of any such selection, appointments, replacements, grant or otherwise of such approval and that such approval or denial thereof shall not in any manner absolve the Technology Partner from any liability or obligation under this Agreement. It is further

agreed that in the event of any acquisition of shares or control in the Lead Member or its holding company by another overseas entity, which results in a Change in Ownership as set forth above, the Technology Partner shall inform the Government of such occurrence within 15 (fifteen) days thereof and seek consent of the Government under and in accordance with the provisions of this Clause 5.3 A. In the event the Government denies its consent to such Change in Ownership, a Change in Ownership in breach of this Clause 5.3 shall be deemed to have occurred.

For the purposes of this Clause 5.3.2 A:

- a) the expression “acquirer”, “control” and “person acting in concert” shall have the meaning ascribed thereto in the Securities and Exchange Board of India (Substantial Acquisition of Shares and Takeover) Regulations, 2011 or any statutory re-enactment thereof as in force as on the date of acquisition of equity, or the control of the Board of Directors, as the case may be, of the Technology Partner;
- b) the indirect transfer or control of legal or beneficial ownership of equity shall mean transfer of the direct or indirect beneficial ownership or control of any company or companies whether in India or abroad which results in the acquirer acquiring control over the shares or voting rights of shares of the said Technology Partner; and
- c) power to appoint, whether by contract or by virtue of control or acquisition of shares of any company holding directly or through one or more companies (whether situated in India or abroad) the equity of the Technology Partner, not less than half of the directors on the Board of Directors of the Technology Partner or of any company, directly or indirectly whether situated in India or abroad, having ultimate control of not less than 15% (fifteen per cent) of the equity of the Technology Partner shall constitute acquisition of control, directly or indirectly, of the Board of Directors of the Technology Partner.

5.3.3 (A) Without prejudice to the provisions of this Agreement, the Parties expressly agree that the Lead Member may, in its discretion, subscribe to the equity of the Technology Partner either directly or through a wholly owned subsidiary of the Lead Member, incorporated in India. For the avoidance of doubt, the Technology Partner expressly agrees that such subsidiary shall act on behalf of the Lead Member who shall, at all times, hold not less than 85% (eighty-five per cent) of the total paid up and subscribed share capital of such subsidiary.

5.4. Obligations relating to employment of foreign nationals

The Technology Partner acknowledges, agrees and undertakes that employment of foreign personnel by the Technology Partner and their sub-contractors shall be subject to grant of requisite regulatory permits and approvals including employment/residential visas and work permits, if any required, and the obligation to apply for and obtain the same shall and will always be of the Technology Partner and, notwithstanding anything to the contrary contained in this Agreement, refusal of or inability to obtain any such permits and approvals by the Technology Partner or any of its sub-contractors shall not constitute Force Majeure Event, and shall not in

any manner excuse the Technology Partner from the performance and discharge of its obligations and liabilities under this Agreement.

5.5. Obligations relating to employment of trained personnel

- 5.5.1. The Technology Partner shall ensure that the personnel engaged by it or by its Sub-contractors in the performance of its obligations under this Agreement are at all times appropriately qualified, skilled, experienced and trained in their respective functions in conformity with Good Industry Practice. The Government, for reasons to be specified in writing, direct the Technology Partner to remove any member of the Technology Partner's or Sub-contractor's personnel. Provided that any such direction issued by the Government shall specify the reasons for the removal of such person.

5.6. Obligations relating to branding of Trains

The Trains or any part thereof shall not be branded in any manner to advertise, display or reflect the name or identity of the Technology Partner or its shareholders, save to the extent of displaying the name or brand of the Technology Partner at two places on the interior of each Car with each such display restricted to a maximum area of one square foot.

5.7. Obligations regarding risk of loss or damage

- 5.7.1. The Technology Partner shall bear the risk of loss in relation to each Car so long it is in the possession of the Technology Partner for the performance of its Maintenance Obligations hereunder.
- 5.7.2. For the purpose of protecting the Government's interest in all Cars/Trains, under this Agreement, but which are in the possession, care or custody of the Technology Partner, the Technology Partner shall take or cause to be taken all steps necessary under Applicable Laws to protect the Government's title and to protect the Government against claims by other parties with respect thereto in accordance with the terms and provisions of this Agreement.

5.8. Obligations relating to information

- 5.8.1. Without prejudice to the provisions of Applicable Laws and this Agreement, upon receiving a notice from the Government for any information that it may reasonably require or that it considers may be necessary to enable it to perform any of its functions, the Technology Partner shall provide such information to the Government forth with and in the manner and form required by the Government.
- 5.8.2. After receiving a notice from the Government for reasoned comments on the accuracy and text of any information relating to the Technology Partner's activities under or pursuant to this

Agreement which the Government proposes to publish, the Technology Partner shall provide such comments to the Government in the manner and form required by the Government.

5.9. Website and App

The Technological Partner shall maintain a website and app of the manufacturing and maintenance of Trains to update manufacturing and maintenance progress, upgradation of facilities etc. based on the MoU between the parties about the features, requirements, review, user identity, security, newsletter covering the latest development etc.

5.10: Compliance with Tender Eligibility Criteria and Item Supply

The Technology Partner (TP) acknowledges that the Authority's acceptance of its Bid was based on specific technical credentials, performance parameters, and the "Provenness" of the Propulsion System and other Key Sub-assemblies as defined in the Clause 5.1.3 A of **Technical Eligibility Criteria of bid document** (the "Key Sub-Assemblies"/"Key Sub-Assembly"). The TP shall not deviate from the makes, designs, and core technology platforms of the Key Sub-assemblies (as listed in the Technical Bid) without the prior express written consent of the Authority.

Regulated Sub-contracting of Custom Designs

The TP is permitted to manufacture custom-designed "Key Sub-Assemblies" through a sub-contractor, subject to the following:

- **(a)** The TP shall remain the Sole Design Authority and shall be fully responsible for the Quality Assurance (QA) and Performance of the "Key Sub-Assembly".
- **(b)** Sub-contracting the manufacturing process shall **not** be used as a basis to change the "Make" of the "Key Sub-Assembly" from that which was qualified in the Bid.
- **(c)** The Authority reserves the right to audit these facilities to ensure compliance with the original Technical Eligibility standards.

Any proposal to change the make or source of a "Key Sub-Assembly" shall only be considered if the TP provides documentary evidence of significant technological advancement resulting in superior performance without any additional cost to the Purchaser.

6. Article 6. Obligations of the Government

6.1. Obligations of the Government

- 6.1.1. The Government shall, at its own cost and expense, undertake, comply with and perform all its obligations set out in this Agreement or arising hereunder.
- 6.1.2. The Government agrees to provide support to the Technology Partner and undertakes to observe, comply with and perform, subject to and in accordance with the provisions of this Agreement and Applicable Laws, the following:
- a) provide non-exclusive access to the Manufacturing Unit, Maintenance Depots and Washing Lines as per details specified in Schedule B;
 - b) provide a rail track and electrified traction lines connecting the Maintenance Depots and Washing Lines to the existing railway network of the Government;
 - c) provide manpower for maintenance of the Trains, calculated at the rate of 0.5 (zero point five) IR Staff per car forming part of the Trains under maintenance, subject to maximum provision to the extent of 100 men per shed, rest of the man power shall be deployed by the Technology Partner
 - d) provide, or cause to be provided, free electricity for traction purposes only and water at the Manufacturing Unit, Maintenance Depots and Washing Lines;
 - e) upon written request from the Technology Partner, and subject to the Technology Partner complying with Applicable Laws, provide all reasonable support and assistance to the Technology Partner in procuring Applicable Permits, required from any Governmental Instrumentality for implementation and operation of the objectives set forth in this Agreement;
 - f) not do or omit to do any act, deed or thing which may in any manner be violative of any of the provisions of this Agreement;
 - g) support, cooperate with and facilitate the Technology Partner in the implementation and operation of the Project in accordance with the provisions of this Agreement; and
 - h) upon written request from the Technology Partner and subject to the provisions of Clause 5.4, provide reasonable assistance to the Technology Partner and any expatriate personnel of the Technology Partner or its Sub-contractors to obtain applicable visas and work permits for the purposes of discharge by the Technology Partner or its Sub-contractors their obligations under this Agreement.

7. Article 7. Representations and Warranties

7.1. Representations and warranties of the Technology Partner

The Technology Partner represents and warrants to the Government that:

- a) it is duly organised and validly existing under the laws of India, and has full power and authority to execute and perform its obligations under this Agreement and to carry out the transactions contemplated hereby;
- b) it has taken all necessary corporate and other actions under Applicable Laws to authorise the execution and delivery of this Agreement and to validly exercise its rights and perform its obligations under this Agreement;
- c) this Agreement constitutes its legal, valid and binding obligation, enforceable against it in accordance with the terms hereof, and its obligations under this Agreement shall be legally valid, binding and enforceable obligations against it in accordance with the terms hereof;
- d) it is subject to the laws of India, and hereby expressly and irrevocably waives any immunity in any jurisdiction in respect of this Agreement or matters arising thereunder including any obligation, liability or responsibility hereunder;
- e) the information furnished in the Bid and as updated on or before the date of this Agreement are true and accurate in all respects as on the date of this Agreement;
- f) the execution, delivery and performance of this Agreement will not conflict with, result in the breach of, constitute a default under, or accelerate performance required by any of the terms of its Memorandum and Articles of Association {or those of the Selected Bidder/ any member of the Consortium} or any Applicable Laws or any covenant, contract, agreement, arrangement, understanding, decree or order to which it is a party or by which it or any of its properties or assets is bound or affected;
- g) there are no actions, suits, proceedings, or investigations pending or, to its knowledge, threatened against it at law or in equity before any court or before any other judicial, quasi-judicial or other authority, the outcome of which may result in the breach of this Agreement or which individually or in the aggregate may result in any material impairment of its ability to perform any of its obligations under this Agreement;
- h) it has no knowledge of any violation or default with respect to any order, writ, injunction or decree of any court or any legally binding order of any Government Instrumentality which may result in any material adverse effect on its ability to perform its obligations under this

Agreement and no fact or circumstance exists which may give rise to such proceedings that would adversely affect the performance of its obligations under this Agreement;

i) it has complied with Applicable Laws in all material respects and has not been subject to any fines, penalties, injunctive relief or any other civil or criminal liabilities which in the aggregate have or may have a material adverse effect on its ability to perform its obligations under this Agreement;

j) it shall at no time change any Consortium Member except in accordance with the provisions of Clause 5.3;

OR

j) it shall at no time undertake or permit any Change in Ownership except in accordance with the provisions of Clause 5.3A; and that the {selected bidder/Consortium Members}, together with {its/their} Associates, shall hold not less than 51% (fifty one per cent) of its issued and paid up equity at any time during the Supply Period; {and that all such Member of the Consortium whose credentials were used to meet the eligibility requirements towards Propulsion Equipment in response to the bid shall jointly hold equity not less than 30% (thirty per cent) of the total equity share capital of the Technology Partner, at any time during the Supply Period}; and that the {Lead Member/selected bidder} shall not hold less than 26% (twenty six per cent) of such equity during the Agreement Period;}

k) all assets of the Manufacturing Unit, Maintenance Depots and Washing Lines shall be handed over to the Government on the respective Divestment Date free and clear of all liens, claims and Encumbrances, without any further act or deed on its part or that of the Government;

l) no representation or warranty by it contained herein or in any other document furnished by it to the Government or to any Government Instrumentality in relation to Applicable Permits contains or will contain any untrue or misleading statement of material fact or omits or will omit to state a material fact necessary to make such representation or warranty not misleading;

m) no sums, in cash or kind, have been paid or will be paid, by it or on its behalf, to any person by way of fees, commission or otherwise for securing the Agreement or entering into this Agreement or for influencing or attempting to influence any officer or employee of the Government in connection therewith;

n) all information provided by the {Selected Bidder/Consortium Members} in response to the tender or otherwise, is to the best of its knowledge and belief, true and accurate in all material respects; and

o) all undertakings and obligations of the Technology Partner arising from the tender or otherwise shall be binding on the Technology Partner as if they form part of this Agreement.

p) The Technology Partner represents and warrants that it shall adhere to the local content requirements as per the bid. It shall provide self-certification for local content at the time of tendering and, for this contract exceeding INR 10 crore, shall ensure subsequent verification as per Article 45.16.

7.2. Representations and warranties of the Government

The Government represents and warrants to the Technology Partner that:

- a) it has full power and authority to execute, deliver and perform its obligations under this Agreement and to carry out the transactions contemplated herein and that it has taken all actions necessary to execute this Agreement, exercise its rights and perform its obligations, under this Agreement;
- b) it has taken all necessary actions under Applicable Laws to authorise the execution, delivery and performance of this Agreement;
- c) it has the financial standing and capacity to perform its obligations under this Agreement;
- d) this Agreement constitutes a legal, valid and binding obligation enforceable against it in accordance with the terms hereof;
- e) it has no knowledge of any violation or default with respect to any order, writ, injunction or any decree of any court or any legally binding order of any Government Instrumentality which may result in any material adverse effect on the Government's ability to perform its obligations under this Agreement;
- f) it has complied with Applicable Laws in all material respects; and
- g) upon the Technology Partner submitting a written request stating the credentials of its personnel, it shall enable such personnel to travel on board the Trains for the purpose of undertaking its Maintenance Obligations in accordance with the provisions of this Agreement and Good Industry Practice.

7.3. Disclosure

In the event that any occurrence or circumstance comes to the attention of either Party that renders any of its aforesaid representations or warranties untrue or incorrect, such Party shall immediately notify the other Party of the same. Such notification shall not have the effect of remedying any breach of the representation or warranty that has been found to be untrue or incorrect nor shall it adversely affect or waive any right, remedy or obligation of either Party under this Agreement.

8. Disclaimer

8.1. Disclaimer

- 8.1.1. The Technology Partner acknowledges that prior to the execution of this Agreement, the Technology Partner has, after a complete and careful examination, made an independent evaluation of the tender, Scope of the Agreement, Specifications and Standards, Site for Manufacturing Unit, Depots Washing Lines, existing structures, local conditions, physical qualities of ground, subsoil and geology and all information provided by the Government or obtained, procured or gathered otherwise, and has determined to its satisfaction the accuracy or otherwise thereof and the nature and extent of difficulties, risks and hazards as are likely to arise or may be faced by it in the course of performance of its obligations hereunder. Save as provided in Clause 7.2, the Government makes no representation whatsoever, express, implicit or otherwise, regarding the accuracy, adequacy, correctness, reliability and/or completeness of any assessment, assumption, statement or information provided by it and the Technology Partner confirms that it shall have no claim whatsoever against the Government in this regard.
- 8.1.2. The Technology Partner acknowledges and hereby accepts the risk of inadequacy, mistake or error in or relating to any of the matters set forth in Clause 8.1.1 above and hereby acknowledges and agrees that the Government shall not be liable for the same in any manner whatsoever to the Technology Partner and its Associates or any person claiming through or under any of them.
- 8.1.3. The Parties agree that any mistake or error in or relating to any of the matters set forth in Clause 8.1.1 above shall not vitiate this Agreement.
- 8.1.4. In the event that either Party becomes aware of any mistake or error relating to any of the matters set forth in Clause 8.1.1, that Party shall immediately notify the other Party, specifying the mistake or error; provided, however, that a failure on part of the Government to give any notice pursuant to this Clause 8.1.4 shall not prejudice the disclaimer of the Government contained in Clause 8.1.1 and shall not in any manner shift to the Government any risks assumed by the Technology Partner pursuant to this Agreement.
- 8.1.5. Except as otherwise provided in this Agreement, all risks relating to or arising out of the Agreement shall be borne by the Technology Partner and the Government shall not be liable in any manner for such risks or the consequences thereof.

PART III

Development and Operations

9. Article 9. Performance Security

9.1. Performance Security

- 9.1.1. The Technology Partner shall, for the performance of its obligations hereunder during the Supply Period, provide to the Government no later than 45(forty-five) days from the date issue of LoA, an irrevocable and unconditional guarantee from a Bank for a sum of **Rs 300 Crore** (Rupees Three Hundred Crore Only) in the form set forth in Schedule-C (the "Performance Security"). Until such time the Performance Security is provided by the Technology Partner pursuant hereto and the same comes into effect, the Bid Security shall remain in force and effect, and upon such provision of the Performance Security pursuant hereto, the Government shall release the Bid Security to the Technology Partner. Provided, however, that the Technology Partner may provide a Performance Security hereunder for a period of 3 (three) years and shall, no later than 60 (sixty) days prior to the expiry thereof, substitute it by a like Performance Security.
- 9.1.2. In the event the Technology Partner fails to provide the Performance Security within 45(forty-five) days of LoA, it shall pay Damages calculated at the rate of 0.25% (zero point two five per cent) of the Performance Security amount for each week or part thereof subject to a maximum of 10% of the Performance Security.
- 9.1.3. Notwithstanding anything to the contrary contained in this Agreement, in the event Performance Security is not provided by the Technology Partner within a period of 180 (one hundred and eighty) days from the date of LoA, the Government may encash the Bid Security and appropriate the proceeds thereof as Damages, and thereupon all rights, privileges, claims and entitlements of the Technology Partner under or arising out of this Agreement shall be deemed to have been waived by, and to have ceased with the concurrence of the Technology Partner, and the Agreement shall be deemed to have been terminated.

9.2. Appropriation of Performance Security

Upon occurrence of a Technology Partner Default or failure to meet any conditions specified in Para C of the Recital, the Government shall, without prejudice to its other rights and remedies hereunder or in law, be entitled to encash and appropriate from the Performance Security the amounts due to it for and in respect of such Technology Partner Default or for failure to meet any conditions specified in Para C of the Recital. Upon such encashment and appropriation from the Performance Security, the Technology Partner shall, within 15 (fifteen) days thereof, replenish, in case of partial appropriation, to its original level the Performance Security, and in case of appropriation of the entire Performance Security provide a fresh Performance Security, as the case may be, and the Technology Partner shall, within the time so granted, replenish or furnish fresh Performance Security as aforesaid failing which the Government shall be entitled

to terminate this Agreement in accordance with Article 35. Upon such replenishment or furnishing of a fresh Performance Security, as the case may be, the Technology Partner shall be entitled to an additional Cure Period of 120 (one hundred and twenty) days for remedying the Technology Partner Default or for satisfying any conditions specified in Para C of the Recital, and in the event of the Technology Partner not curing its default within such Cure Period, the Government shall be entitled to encash and appropriate such Performance Security as Damages, and to terminate this Agreement in accordance with Article 35.

9.3. Release of Performance Security

The Performance Security shall remain in force and effect during the Supply Period and shall be released upon the Maintenance Security coming into force and effect; provided, however, that the Performance Security shall not be released if the Technology Partner is in breach of this Agreement. Upon request made by the Technology Partner for release of the Performance Security along with the particulars which establish satisfaction of the requirements specified under this Clause 9.3, the Government shall release the Performance Security forthwith on such terms and conditions as it may deem fit and appropriate in the facts and circumstances of the case

9.4. References to Performance Security

References to Performance Security occurring in this Agreement for and in respect of any period prior to the delivery of the Performance Security by the Technology Partner to the Government, or in respect of any period subsequent to the expiry or release thereof, as the case may be, shall be construed solely for the purposes of calculating the amount of Damages payable by the Technology Partner, and the amount so determined shall be appropriated from the Bid Security, Performance Security or Maintenance Security, as the case may be.

10. Article 10.Manufacturing Unit

10.1. Site for Manufacturing Unit

- 10.1.1. All the Trains to be supplied against this Agreement shall be manufactured at the nominated facilities at Government's "Railway Manufacturing Unit, Kazipet" (the "Manufacturing Unit"). The details of site along with available existing infrastructure/facilities at the Manufacturing Unit whose access and right to use shall be provided to the Technology Partner for manufacture of the Trains are set forth in Schedule B.
- 10.1.2. Technology Partner can manufacture/assemble the Prototypes and upto 50% of the Trains to be supplied in the First Year as per the minimum number of Trains specified in the Supply Programme at its own manufacturing units in India and commission the same at the Government's Manufacturing Unit. Technology Partner can use IR mainline track to transport these Trains to the Manufacturing Unit at no additional cost provided the Trains are certified suitable to be hauled at minimum speed of 80 kmph.

10.2. Upgradation and development of the Manufacturing Unit

- 10.2.1. The Technology Partner shall, at its own cost and expense, undertake the upgradation and development of the Manufacturing Unit, including the provision of machinery, plant, and equipment necessary for the manufacturing/ assembly of at least **36 Trains** of 20 cars per annum and testing thereof. The Manufacturing Unit shall have the following and such other facilities as may be necessary for the said capacity:
- a) Shell Integration Activity (assembly of under frame, side wall and end wall in body jig), if required;
 - b) Assembly of the shell on bogie (given that the fully assembled bogie, in full or in partially knocked down form shall be supplied by the Technology Partner or their selected vendor(s) from their premises);
 - c) Load Testing of bogies, if required;
 - d) Cabling/wiring of the cars(the harnesses sourced from vendor(s));
 - e) assembly shops for assembling the various sub-assemblies of a Train- including toilets, illumination, seats, ventilation, panelling, amenities, etc;
 - f) paint shop, if required;
 - g) necessary testing facilities for energizing the Trains, carrying out high voltage tests and requisite function tests;
 - h) suitable warehousing facilities to stock the bought-out components;
 - i) standby power backs up facility suitable to its requirements;
 - j) an administrative office, canteen, rest rooms and staff facilities as required under Applicable Laws;
 - k) internal telecommunication infrastructure catering to basic telephony and other value added telecom services;

- l) required training facilities; and
- m) any minor construction or alteration, if required, may be carried out by the Technology Partner at its own cost and expense to meet manufacturing/assembling/testing of the Trains.

10.2.2. Technology Partner may bring integrated shell and assembled bogies from outside to undertake manufacture/assembly of the Trains. Subject to the provisions specified in Clause 10.1.2, Technology Partner shall manufacture the Trains utilising the above facilities at the Government Manufacturing Unit.

10.2.3. All provisions of Clauses 12.2.5 to 12.2.9 related to Maintenance Depots shall apply mutatis mutandis for the Manufacturing Unit also.

10.3. Obligations prior to upgradation of the Manufacturing Unit

10.3.1. No later than 45 (forty-five) days from the Appointed Date, the Technology Partner shall submit to the Government a detailed Plan about the proposed Upgradation and Development Work at the Manufacturing Unit as per Clause 10.2 above. The detailed Plan shall include designs, safety lines insurance obtained, safety from fire hazards, detailed data of machineries, equipments and personnel etc, general arrangement drawings (GAD), Layout, methodology, quality assurance procedures and development time schedule for the proposed Work.

10.3.2. The Government will provide to the Technology Partner, access to the site for the Manufacturing Unit as per Clause 10.1, within 45 (forty-five) days from the Appointed Date. The access granted by this Agreement to the Contractor shall always be subject to existing functions of the Government for and in respect of the adjacent land and other shared facilities (if any). It is expressly agreed that the access granted hereunder shall terminate automatically and forthwith, upon the completion of the Supply Period or Termination of this Agreement, whichever is earlier.

10.3.3. Before granting the access, the Government Representative and the Technology Partner shall, on a mutually agreed date and time, inspect the Manufacturing Unit and prepare a memorandum containing an inventory of the Manufacturing Unit including the vacant and unencumbered land, buildings, structures, road works, trees, plant & machineries and any other moveable or immovable property on or attached to the Manufacturing Unit. Such memorandum shall have appended thereto an appendix (the “**Appendix**”) specifying in reasonable detail those parts of the Manufacturing Unit to which access has not been granted to the Technology Partner.

10.3.4. The Technology Partner shall complete the development/upgradation of the Manufacturing Unit as per the provisions of Clause 10.2.1 above in accordance with the development time schedule so as to ensure manufacture and supply of the Prototype and series supply as per the specified time schedule. Subject to provision of timely access to the site for the Manufacturing Unit as per Clause 10.3.2 above, the Technology Partner agrees and undertakes that the required infrastructure/facilities shall be completed within the specified time schedule. In the event of delay by the Government in provision of site of Manufacturing Unit or infrastructure, as the case may be, the Technology Partner’s obligation to complete the development/upgradation of the

Manufacturing Unit along with time schedule for supply of Trains, shall be extended by a period equal to the delay hereunder.

- 10.3.5. The Technology Partner shall undertake and perform all such acts, deeds and things as may be necessary or required before commencement of up-gradation/development under and in accordance with the provisions of this Agreement, the Applicable Laws and Applicable Permits.
- 10.3.6. The Government shall provide free electricity (traction only) and water at the Manufacturing Unit for manufacture and supply of the Trains as per Good Industry Practices. Non-traction electricity supply shall be metered and charged/recovered as per actuals.

10.4. Payment

10.4.1 No separate payment shall be made by the Government to the Technology Partner for upgradation and development of the Manufacturing unit. All such Upgradation / developmental costs by the Technology Partner shall be integrated into and paid solely through the Train Price, as defined in Article 23. The Technology Partner acknowledges and agrees that the full recovery of all such Upgradation / developmental costs shall be achieved exclusively through the Train Price, as detailed under Article 23.

10.4.2 On completion of the Supply Period or Termination of this Agreement, whichever is earlier, the Project Assets at the Manufacturing Unit shall be handed over to the Government in accordance with the provisions specified in Article 29 and 36. .

10.5 Additional Use of Manufacturing Unit

10.5.1 Notwithstanding anything to the contrary contained in this Agreement, the Technology Partner may, with the prior written consent of the Government, use the Manufacturing Unit for the manufacture, assembly, or testing of components and rolling stock for third parties or any other projects.

10.5.2 The Government's consent for such additional use shall be subject to the Technology Partner demonstrating that such activities shall not:

- (a) Interfere with or delay the Supply Programme of the Trains as per Article 15;
- (b) Compromise the quality or safety standards required under this Agreement;
- (c) Require additional land or infrastructure beyond what is currently allocated, unless separately agreed upon.

10.5.3 The Technology Partner shall pay to the Government a mutually agreed "Facility Usage Fee" or revenue share for any commercial activities undertaken for third parties using the Government-provided Manufacturing Unit.

10.5.4 Any such additional use shall be governed by a separate supplemental agreement defining the commercial terms, resource allocation, and priority of the Next Generation Trains fleet over any third-party assets.

10.5.5 Priority of Project Obligations

10.5.5 Notwithstanding any permission granted for "Additional Use" under this Article 10, the Technology Partner hereby acknowledges and agrees that its primary obligation comprising the manufacturing, testing, commissioning, of the Next Generation Trains shall at all times take absolute precedence over any other activity.

- **(a)** The Technology Partner shall ensure that no resources, including but not limited to bay space, machinery, specialized tools, or personnel allocated for the Next Generation Train project, are diverted for "Additional Use" if such diversion risks the timely achievement of any Key Performance Indicator (KPI) or Milestone;
- **(b)** Any "Additional Use" shall be immediately suspended or scaled back by the Technology Partner, without any liability to the Government, if the Government determines that such use is causing, or is likely to cause, a "Material Adverse Effect" on the Supply Programme.
- **(c)** The Government's right to priority shall be non-negotiable, and the Technology Partner shall indemnify the Government against any third-party claims arising from the suspension of "Additional Use" activities in favor of the Next Generation Train project.

11. Article 11.{Intentionally left blank }

12. Article 12 Maintenance Depots

12.1. Maintenance Depot Sites

- 12.1.1. Government shall provide earmarked space and facilities in its nominated Government Depots to the Technology Partner for undertaking maintenance of the Trains under Maintenance Obligation (the “Maintenance Depot Sites”).
- 12.1.2. Details like locations, site conditions and other details with respect to each Depot Site are specified in Schedule B.

12.2. Maintenance Depot

- 12.2.1.** The Technology Partner shall, at its own cost and expense, undertake the upgradation and development of the Maintenance Depots by providing Depot Machinery & Plants and all other required facilities as per the Good Industry Practices to set up modern maintenance facilities for discharging its Maintenance Obligations under and in accordance with the provisions of this Agreement (the “Maintenance Depots”). No separate claim for the above shall be admissible.
- 12.2.2. Subject to the provisions of Clause 12.2.4 and 12.3.5, the Technology Partner shall install and operate at the Maintenance Depots, all the required maintenance infrastructure and equipment necessary for performing its Maintenance Obligations as per the Good Industry Practices. The machinery & plants and other special tools, jigs, fixtures, gauges, testing and diagnostic equipment etc. provided at the Depots shall be sufficient to undertake comprehensive maintenance of the Trains including all inspections, scheduled/unscheduled maintenance and overhauling of the Train equipment like bogies, carbody, wheels sets, traction motors etc. in depots.
- 12.2.3. Each Maintenance Depot ordinarily shall have following minimum facilities of capacity suitable for maintenance of about 50 Trains:

SN	Facilities
1	Inspection Bay with minimum 2 Lines of 16/20/24 car length
2	Covered Workshop Bay with 2/3 lines and jacks for simultaneous lifting of 4/8 car train formation and all other required facilities including EOT cranes of suitable capacity to undertake IOH and POH of the Trains.
3	Drop table to facilitate repair or replacement of bogies, wheels, traction motors, transformers etc.
4	Pit Wheel lathe
5	Train Washing and heavy cleaning facilities
6	Work and test benches
7	Material handling facilities

8	Pneumatic lines;
9	Battery charging facilities;
10	Measuring, testing and recording devices;
11	Special tools, jigs and fixtures, as necessary;
12	Training facilities
13	Hardware and software for the Maintenance Management Information System (MMIS).
14	Battery powered Rail cum Road Shunting Vehicle

- 12.2.4. The Government will provide basic civil structure with electrical fittings, EOT cranes, track, OHE, Signalling and M&Ps as per the details indicated in Schedule B.
- 12.2.5. Technology Partner shall provide all additional M&Ps, hardware and software and other requirements for the identified maintenance Depots further to the available infrastructure (Schedule-B) in order to meet the requirements indicated at Clause 12.2.3 at each of the Depot Sites.
- 12.2.6. All the above items supplied by the Technology Partner, shall be accompanied by drawings, designs and lay-outs, manuals and full operating instructions to enable them to be used by suitably skilled staff in a non-hazardous manner and to achieve the desired result in terms of accuracy and quality.
- 12.2.7. Technology Partner shall be responsible for the maintenance and operation of all such plants and machineries of the Depots which are used for maintenance of the supplied Trains including those provided by the Government like EOT or any other M&Ps as per the details indicated in Schedule B.
- 12.2.8. The Technology Partner shall be responsible for internal security, day- to- day cleaning, and housekeeping of the Depots under their control, including maintenance and operation of the Mechanical, Electrical, Pneumatic, Plumbing, and Fire- Fighting systems, so as to keep such facilities in healthy condition and in compliance with Applicable Laws. Minor repairs of civil structures, such as whitewashing, painting, patch repairs, minor plastering, tile replacement, and other routine works not affecting structural stability, shall be the responsibility of the Technology Partner. Major repairs, including any works affecting structural stability, requiring statutory approvals, involving reconstruction or replacement of significant portions of the structure, or exceeding a value of INR 50 lakhs, shall be the responsibility of the Government. The TP shall submit a detailed data of the major repairs and the needs arising, for the scrutiny and the verification by the Government to approve and sanction the funds for the major repairs.
- For the purpose of classification, only repairs arising from the same cause, defect, or deterioration shall be treated as a single repair event. Unrelated repair works shall not be clubbed together for the purpose of exceeding the monetary threshold for Major Repairs.
- 12.2.9. Technology Partner shall be responsible for internal shunting of Trains within Depot except those shunting which involves placement/withdrawal of Trains on the mainline.

12.2.10. Technology Partner shall be responsible for complete cleaning/washing of Trains at the Depot as per Good Industry Practices.

12.2.11. For the avoidance of doubt, it is clarified that the Government may utilise the facilities at Depots for maintenance of trains, other than those which are under the Maintenance Obligation of the Technology Partner, on terms and conditions as may be mutually agreed between the Parties.

12.3. Obligations prior to upgradation of the Maintenance- Depots

12.3.1. No later than 2 (two) months from the date of finalization of a Depot Site as per Clause 12.1.2 above, the Technology Partner shall submit to the Government details about all the facilities to be provided/upgraded, its general arrangement drawings, Layout, methodology, quality assurance procedures and development time schedule for completion of the Maintenance Depots duly considering the Train delivery schedule.

12.3.2. The Government will provide to the Technology Partner access to the Depot Sites as per requirements to equip, upgrade, maintain and operate the Depots. The access granted by this Agreement to the Technology Partner shall always be subject to existing functions of the Government for and in respect of the land adjacent to the Depot Sites are not obstructed. It is expressly agreed that the access granted hereunder shall terminate automatically and forthwith, upon the Termination of this Agreement for any reason whatsoever.

12.3.3. Before granting the access, the Government Representative and the Technology Partner shall, on a mutually agreed date and time, inspect the Depot Sites and prepare a memorandum containing an inventory of the Depot Sites including the vacant and unencumbered land, buildings, structures, road works, trees and any other moveable or immovable property on or attached to the Depot Sites. Such memorandum shall have appended thereto an appendix (the "Appendix") specifying in reasonable detail those parts of the Depot Sites to which access has not been granted to the Technology Partner.

12.3.4. The Technology Partner shall undertake and perform all such acts, deeds and things as may be necessary or required before commencement of upgradation work under and in accordance with the provisions of this Agreement, Applicable Laws and Applicable Permit.

12.3.5. All works related to tracks, Over Head Equipments (OHE) and Signalling for developing the Depots as per the approved Layout including maintenance thereof shall be undertaken by the Government at its own expense.

12.3.6. Government shall provide free Electricity for traction purpose only and water Supply at the Trains Depots for maintenance of the Trains as per Good Industry Practices.

12.4. Payment

- 12.4.1. No separate payment shall be made by the Government to the Technology Partner for upgradation and development or commissioning of the Maintenance Depots. All such Upgradation / developmental costs by the Technology Partner shall be integrated into and paid solely through the Train price , as defined in Article 23. The Technology Partner acknowledges and agrees that the full recovery of all such Upgradation / developmental costs shall be achieved exclusively through the Train price , as detailed under Article 23.
- 12.4.2. On completion of the Maintenance Period or Termination of this Agreement, whichever is earlier, the Project Assets at the Maintenance Depots shall be handed over to the Government in accordance with the provisions specified in Article 29 and 36.

12.5. Replacement of Depot M&Ps.

- 12.5.1. All Machinery and Plant (M&P) provided by the Technology Partner shall be replaced by the Technology Partner upon expiry of their life as defined in the Finance Code of Indian Railways and updated from time to time (the “Codal Life”), and the cost of such replacement shall be borne entirely by the Technology Partner. The Government shall provide the codal life details for all M&P at the time of handover.

The Technology Partner shall be solely responsible for the upkeep, maintenance, repair, and replacement of all M&P provided by the Technology Partner.

- 12.5.2. In respect of M&P provided by the Government, any replacement required, whether upon completion of codal life or at any time prior thereto due to failure, obsolescence, or any other reason, shall be carried out by the Technology Partner at their own cost. The ownership and salvage value of all replaced M&P shall at all times remain vested with the Government. Disposal of replaced M&P shall be undertaken by the Technology Partner strictly in accordance with Government instructions, and the Technology Partner shall not claim any adjustment of salvage value against its replacement cost.

The necessity for replacement of any M&P shall be determined through a joint inspection by the Government and the Technology Partner, supported by OEM certification wherever applicable.

- 12.5.3. Government shall be responsible for replacement of track, OHE, signalling, EoT cranes and all such other M&Ps provided by the Government.

13. Article 13: Supply of Prototype

13.1. Design of Prototype

13.1.1. Technology Partner has to use its own design for the following items for manufacture of the supplied Trains:

- i) Car body shell
- ii) Bogie

13.1.2. Deleted

13.1.3. In order to ensure satisfactory execution of the Contract, completion of works within specified targets, and quality in design, manufacturing and execution of Works, the Technology Partner shall, within 30 days of the Appointed Date, develop and submit a list of Management Plans and Design Documents. The submission plan shall consider phase-wise submission of the Plans, Designs and other documents considering the delivery schedule specified in Clause 15.1.

13.1.4. Technology Partner shall provide two sets of duly licensed simulation software along with requisite hardware, capable of simulating the performance and running characteristics of the Train and the details of the section (gradients, curvatures, speed restrictions, stoppages etc.) on which running simulation is to be done with validated results. The output of such simulation software shall include speed versus time curve, distance versus time curve, sectional running times, energy consumption, energy regeneration, specific energy consumption, emergency braking distance, attacking and exit speed for a specified length and gradient, average speed of the Train for a given length of section and for different weights of trains and different topography of the section and other features in conformity with Good Industry Practice.

13.1.5. The Government shall depute a team of experts for undertaking a review of the Designs and Drawings and for submitting a report (the “**Design Report**”) to the TP within 4 (four) weeks from the date of receiving of such Designs and Drawings. For the avoidance of doubt, it is agreed that the review and comments hereunder shall be limited to ensuring compliance with the terms of this Agreement, safety requirements and interface management with other sub-systems. It is further agreed that any failure or omission of the Government to review and/ or comment hereunder shall not be construed or deemed as acceptance of any such Designs and Drawings by the Government.

13.1.6. Pursuant to the Design Report or otherwise, the Technology Partner shall carry out such modifications in the designs as may be necessary for conforming with the Specifications and Standards.

13.1.7. The Government expressly agrees that it shall, subject to the provisions of this Agreement and Applicable Laws, maintain the confidentiality of Designs and Drawings provided to it by the Technology Partner and shall endeavour to protect the Intellectual Property rights of the Technology Partner therein.

- 13.1.8. However, the TP shall secure the said Designs and Drawings on its own prior basis under trademark, patents and designs act and adopt any other intellectual property rights and secure the same. The Government shall not indemnify the TP for any leakage or misuse of the said data that is designs and drawings upon the furnishing of the same by the TP to the Government

13.2. Tests at the Manufacturing Unit

- 13.2.1. Prior to supply of sample Next Generation Intercity Trains that conforms to the Specifications and Standards (the “**Prototype**”), the Technology Partner shall carry out, or cause to be carried out, at its own cost and expense, all Tests in accordance with Schedule-F and such other tests that the Technology Partner may consider necessary to demonstrate that the Prototype comply in all respects with the Specifications and Standards. The Technology Partner shall provide to the Government forthwith, a copy of the Technology Partner’s report on each test containing the results of such test and the action, if any, that it proposes to take for compliance with the Specifications and Standards.
- 13.2.2. The Technology Partner shall, with at least 2 (two) weeks’ notice to the Government, convey the date, schedule and type of tests that shall be conducted on the Prototype at the Manufacturing Unit and the Government shall have the right, but not the obligation, to nominate its representative to witness the tests.
- 13.2.3. The Government’s Representative shall make a report forthwith on the tests witnessed by it and provide a copy thereof to the Parties for review. The Technology Partner shall, prior to dispatch of the Prototype for delivery to the Government, ensure that defects and deficiencies, if any, are rectified and the Prototype conforms to the Specifications and Standards.
- 13.2.4. In the event of failure of any Test specified in Clause 13.2.1, the Technology Partner shall rectify the defect and conduct repeat Tests, and the procedure specified in this Clause 13.2 shall apply mutatis mutandis to such repeat Tests.

13.3. Supply of Prototype

- 13.3.1. The Technology Partner shall supply 2 (two) Prototype Trains to the Government for tests and trials to be conducted in accordance with the provisions of Clause 13.4. First Prototype Train shall be supplied within a period of 30 (thirty) months from the Appointed Date. Second Prototype shall be delivered within 60 (sixty) days of the date of delivery of the First prototype.
- 13.3.2. In the event that the Technology Partner fails to deliver the Prototype within the period specified in Clause 13.3.1, the Government may recover from the Technology Partner an amount equal to 0.5 % (zero point five per cent) of the Train Price as Damages for each and every week, or part thereof, by which the delivery of the Prototype is delayed; provided that such Damages shall not exceed 10% (ten per cent) of the Train Price.

13.4. Tests on Government's railway lines

- 13.4.1. For determining that each Prototype conforms to Specifications and Standards, the Government shall, within 120 (one hundred and twenty) days of the delivery of the Prototype, conduct, or cause to be conducted, on the Government's railway lines, the Tests specified in Schedule-F.
- 13.4.2. In the event of failure of any Test specified in Clause 13.4.1, the Technology Partner shall rectify the defect and present the Prototype for repeat Tests, and the procedure specified in this Clause 13.4 shall apply mutatis mutandis to such Tests.
- 13.4.3. The Parties agree that the Tests pursuant to Clauses 13.4.1 and 13.4.2, as the case may be, shall be conducted at the cost and expense of the Government.
- 13.4.4. In the event the Technology Partner is not satisfied with the Tests conducted by the Government, it may cause such Tests to be carried out by an independent agency and submit the results thereof to the Government. The Parties expressly agree that the Government's decision in this regard shall be final and binding on the Technology Partner. Test scheme to be mutually agreed upon
- 13.4.5. The Parties expressly agree that either Party shall notify the other Party of the date, time and place of Tests so as to afford sufficient opportunity to the other Party to witness the Tests.

Acceptance of Prototype

- 13.4.6. The Government shall, no later than 30 (thirty) days after successful completion of the Tests, communicate its acceptance of the Prototype to the Technology Partner.
- 13.4.7. Prior to accepting the delivery of Prototype, the Government may inspect the Prototype in accordance with the provisions of Clause 14.3.
- 13.4.8. The Parties expressly agree that conducting of Tests by the Government shall not relieve or absolve the Technology Partner of its obligations and liabilities under this Agreement in any manner whatsoever.

13.5. Independent Safety Assessor (ISA)

- 13.5.1. The Technology Partner shall engage an internationally recognized Independent Safety Assessor (CISA), for the audit and Safety Certification of Rolling Stock Design. The CISA should have accreditation as per ISO/IEC 17065 with experience of certifying rolling stock of operating/design speed 160/176 kmph or more against minimum 3 (three) different projects out of which at least one project must be executed in a country other than home country of such ISA. The Technology Partner shall obtain Government's prior approval before selecting such an agency so as to ensure independence and avoid possible conflict of interest between Technology Partner's ISA and Government's ISA. The audit report & certificate from this agency shall be submitted by the Technology Partner to the Government.
- 13.5.2. The Government shall also engage an Independent Safety Assessor (GISA) who shall:

- a) assess the System Assurance Requirements, Specifications and design of all safety related subsystems, which are issued as part of various tender documents, review the preliminary technical risk assessments as well as high level safety, performance and functionality criteria requirements.
- b) review the consolidated list of Project Hazards and mitigation measures thereof, identify list of unmitigated hazards to be taken care of by operating procedures;
- c) review/witness the results of relevant system and integration tests. Oscillation trials may be conducted by an Independent Agency/GISA. Oscillation trial results shall be reviewed by the GISA.
- d) GISA should also conduct final review, verification and assessment of safety acceptance of complete systems for issuing Safety Certificates to put the system in revenue operation.
- e) It shall be incumbent upon the Technology Partner to provide all the necessary information sought by ISA appointed by the Government (GISA)/Independent Agency in all phases of project including design, installation, testing and commissioning phase and assist in visits (if required) of GISA to their premises for the purpose of assessment.

13.6. Payment for Prototype

The Government shall, upon successful completion of the tests specified in Clause 13.2, pay the Train Price to the Technology Partner for supply of the Prototype. For the avoidance of doubt, the Parties agree that upon delivery of the Prototype and furnishing of a bank guarantee for a period of 180 (one hundred and eighty) days and for an equivalent amount, substantially in the form specified in Schedule-I, the Government shall make forthwith apart payment equal to 90% (ninety per cent) of the Train Price and the balance remaining shall be paid upon acceptance of the Prototype pursuant to Clause 13.5, whereupon the bank guarantee furnished hereunder shall be released. The Parties further agree that in the event of failure of the aforesaid tests, the validity of the bank guarantee shall be extended for a similar period.

14. Article 14. Delivery of Trains

14.1. Delivery of Trains

It is expressly agreed by the Parties that the Technology Partner shall, upon receiving the acceptance specified in Clause 13.5 and pursuant to the Supply Programme specified in Article 15, deliver the Trains to the Government. The period of delivery of Trains hereunder shall be deemed to commence from the date of acceptance of the first Prototype as per Clause 13.5 and shall expire upon completion of the period of supply specified in Article 15 (the "Supply Period").

14.2. Tests

Subject to the provisions of Clause 13.4.5, the Technology Partner shall, at its own cost and expense, subject each Train and its sub-systems to the Tests specified in Schedule-F and shall provide a copy of the results of such Tests along with the delivery of that Train. For the avoidance of doubt, the Parties agree that the Government shall, on a best-effort basis, ensure for the Technology Partner, use of Government's railway lines for conducting Tests that demonstrate the capacity of a Train to attain its maximum speed in accordance with the Specifications and Standards. In the event such a railway line is not arranged hereunder, such Tests shall be deemed to be waived.

14.3. Inspection by the Government

- 14.3.1. The Government or its authorised representative may inspect each Train, in accordance with the provisions of this Clause 14.3, prior to accepting its delivery and communicating the acceptance thereof for the purposes of payment of Train Price.
- 14.3.2. The Technology Partner shall notify the Government, no later than 45 (forty-five) days prior to the date of delivery of a Train, its delivery schedule for that Train. The Government may, in its discretion, nominate its representative to carry out an inspection on the scheduled date and time.
- 14.3.3. The technology partner shall provide the assistance necessary for the Government Representative to perform the inspection in accordance with the provisions of this clause 14.3. For the avoidance of the doubt the parties expressly agree that such inspection shall be completed within the period of 72 hours.
- 14.3.4. The Government Representative may submit an inspection report for each Train specifying the defects and deficiencies that shall be rectified by the Technology Partner in conformity with the Specifications and Standards (the "**Punch List**"). The Technology Partner shall, no later than the first Maintenance Schedule, rectify each item in the Punch List and notify the Government of the same. The Government may, in its discretion, inspect the Train within 30 (thirty) days