

Laboratory

The Automotive Research Association of India, S. No. 102, Vetal Hill,  
Off.Paud Road, Kothrud, Pune, Maharashtra

Location 1: S. No. 102, Vetal Hill, Off.Paud Road, Kothrud, Pune, Maharashtra  
Location 2: Plot No. E1/1, MIDC Chakan Industrial Area, Phase-III,  
Village Nighoje-Mahalunge, Kharabwadi, Taluka-Khed, Pune, Maharashtra

Accreditation Standard ISO/IEC 17025: 2005

Certificate Number TC-5085

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Sl.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection
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**CHEMICAL TESTING**

LOCATION 1				
I.	PETROLEUM AND PRODUCTS			
1.	Hydraulic Brake Fluid	Appearance & Colour	IS 8654-2001(RA 2016)	0.5 % to 10 % Max
		Water content (%m/m)	IS 8654-2001(RA 2016) SAEJ1703-(2012) SAEJ1704-(2012) FMVSS 116-(2018)	
		Equilibrium Reflux Boiling point (ERBP)	IS 8654-2001 (RA 2016) SAEJ1703-(2012) SAEJ1704-(2012) FMVSS 116-(2018)	170 °C to 300 °C
		Wet Equilibrium Reflux Boiling point (Wet ERBP)	IS 8654-2001(RA 2016) SAEJ1703-2012 SAEJ1704-(2012) FMVSS 116-(2018)	100 °C to 220 °C
		Evaporation Test	IS 8654-2001(RA 2016) FMVSS 116-(2018)	5 % to 99 %
		Stability High Temperature Chemical	IS 8654-2001(2016) SAEJ1703-2012 SAEJ1704-(2012) FMVSS 116-(2018)	Change in ERBP Upto 10 °C Upto 10 °C
		Corrosion Test	IS 8654-2001(RA 2016) SAEJ1703-(2012) SAEJ1704-(2012) FMVSS 116-(2018)	0.01 mg/cm <sup>2</sup> to 2 mg/cm <sup>2</sup>

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		pH	IS 8654-2001(RA 2016) SAEJ1703-(2012) SAEJ1704-(2012) FMVSS 116-(2018)	5 to 13
		Water tolerance	IS 8654-2001(RA 2016) SAEJ1703-(2012) SAEJ1704-(2012) FMVSS 116-(2018)	Bubble flow time 2 sec to 60 sec
		Fluidity and appearance	IS 8654-2001(RA 2016) SAEJ1703-2012 SAEJ1704-(2012) FMVSS 116-(2018)	Bubble flow time 2 sec to 60 sec
		Compatibility	IS 8654-2001(RA 2016) SAEJ1703-(2012) SAEJ1704-(2012) FMVSS 116-(2018)	Visual Appearance
		Resistance to Oxidation	IS 8654-2001(RA 2016) SAEJ1703-(2012) SAEJ1704-(2012) FMVSS 116-(2018)	Change in mass 0.01 mg/cm <sup>2</sup> to 2 mg/cm <sup>2</sup>
		Effect on rubber	IS 8654-2001(RA 2016) SAEJ1703-(2012) SAEJ1704-(2012) FMVSS 116-(2018)	Diameter change 0.01 mm to 5 mm Hardness change Upto 15 IRHD Volume change 0.05 % to 25 %
2.	Antifreeze Coolant	Density	IS 5759-2006 (RA 2018) ASTM D1122-2016 JISK 2234-2006	1.100 g/cm <sup>3</sup> to 1.150 g/cm <sup>3</sup>

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		Water content	ASTM D1123-1999(2015) IS 5759-2006 (RA 2018) JISK 2234-2006 ASTMD 4377-(00)2006	0.5 % m/m to 10 % m/m
		pH Value	ASTM D1287-2011 IS 5759-2006(RA 2018) JISK 2234-2006	5 to 12
		Boiling Point	IS 5759-2006(RA 2018) JISK 2234-2006 ASTM D1120-2011	100 °C to 200 °C
		Foaming Properties	IS 5759-2006(RA 2018) JISK 2234-2006 ASTM D4921-95 (2006)	Upto 10 ml
		Reserve Alkalinity	IS 5759-2006(RA 2018) JISK 2234-2006 ASTM D1121-2011	0.2 ml to 25 ml of 0.1N HCl
		Corrosion Property of Cast Aluminum at Heat Transfer Surface	IS 5759-2006(RA 2018) JISK 2234-2006	0.05 mg/cm <sup>2</sup> to 10 mg/cm <sup>2</sup>
		Glassware Metal Corrosion Property	IS 5759-2006(RA 2018) JISK 2234-2006	0.005 mg/cm <sup>2</sup> to 6 mg/cm <sup>2</sup>
		Circulating Corrosion Property	IS 5759-2006(RA 2018) JISK 2234-2006	0.005 mg/cm <sup>2</sup> to 6 mg/cm <sup>2</sup>

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II.	<b>RUBBER AND RUBBER PRODUCT</b>			
1.	<b>Rubber</b>	Polymer identification by FT-IR Spectrometer	ASTM D3677-2010e1 AIS-066-2004	Wave No. 4000 cm <sup>-1</sup> to 400 cm <sup>-1</sup>
		Flammability/Burning Behavior	SAEJ369:2007 FMVSS 302-2018 ISO 3795-1989(E) IS 15061:2002 (2017) (Annex. A)	Upto 600 mm/min
III.	<b>PLASTICS &amp; PLASTIC PRODUCTS</b>			
1.	<b>Plastic</b>	Polymer identification by FT-IR Spectrometer	ASTM D3677-2010e1 AIS-066-2004	Wave No. 4000 cm <sup>-1</sup> to 400 cm <sup>-1</sup>
		Flammability/Burning Behavior	SAEJ369:2007 FMVSS 302-2018 ISO 3795-1989(E) IS 15061:2002 (2017) (Annex. A)	Upto 600 mm/min
IV.	<b>ATMOSPHERIC POLLUTION</b>			
1.	<b>Vehicle</b>			
	<b>4 wheeler, 3 wheeler and 2 wheeler vehicles</b>	<b>A) Tailpipe emissions</b>	MoRTH/CMVR/TAP/115-116 (Issue4, Amendment 8) GSR 493(E), GSR 400(E), GSR 77(E), GSR 720(E), GSR 686(E), GSR 853(E),	
		CO		10 mg/km to 20 g/km
		HC		0.6 mg/km to 5 g/km
		NOX		1 mg/km to 2 g/km
		CH4		0.6 mg/km to 1 g/km

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		CO2	GSR 284(E), GSR 589(E), GSR 786(E), GSR 84 (E), GSR 515 (E), GSR 111(E), GSR103(E), GSR431(E), GSR487(E), GSR498(E), GSR99(E), GSR412(E), GSR682(E), GSR629(E), GSR889(E), GSR954 (E), GSR290(E), GSR490(E)	1 g/km to 500 g/km
		Fuel Consumption (calculated from CO, HC, CO2)	GSR 515 (E), GSR 111(E), GSR103(E), GSR431(E), GSR487(E), GSR498(E), GSR99(E), GSR412(E), GSR682(E), GSR629(E), GSR889(E), GSR954 (E), GSR290(E), GSR490(E)	2 km/l to 30 km/l
		Particulate Matter	GSR99(E), GSR412(E), GSR682(E), GSR629(E), GSR889(E), GSR954 (E), GSR290(E), GSR490(E)	0.000001mg/km to 0.5 g/km
		Particulate Number	GSR99(E), GSR412(E), GSR682(E), GSR629(E), GSR889(E), GSR954 (E), GSR290(E), GSR490(E)	1x10 <sup>6</sup> to 9x10 <sup>15</sup> number/km
		<b>B) Idling Emission Measurement</b>	GSR518(E), GSR1461(E), GSR400(E), GSR84(E), GSR103(E), GSR498(E), GSR99(E), GSR412(E), GSR 682(E), GSR 954 (E), GSR 889(E),	
		CO	GSR518(E), GSR1461(E), GSR400(E), GSR84(E), GSR103(E), GSR498(E), GSR99(E), GSR412(E), GSR 682(E), GSR 954 (E), GSR 889(E),	Upto 10%
		HC	GSR518(E), GSR1461(E), GSR400(E), GSR84(E), GSR103(E), GSR498(E), GSR99(E), GSR412(E), GSR 682(E), GSR 954 (E), GSR 889(E),	Upto10000 ppm (V)(C6)
		<b>C) Free Acceleration Smoke</b>	GSR99(E), GSR412(E), GSR 682(E), GSR 954 (E), GSR 889(E),	0.001 m <sup>-1</sup> to10 m <sup>-1</sup>
		<b>D) Crankcase emissions</b>	GSR 889(E),	Qualitative

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		<b>E) Evaporative emissions (HC) (Volume of SHED Facility is 87.48±13</b>	R83-07(Except Type VI), R-101, R40, R47 ADR79/05 (Except Type VI) EEC70/220, (EC)715/2007, (EU)2017/1151, (EU)2017/1154, (EU)2017/1347 (Except Type VI), GTR02, 97/24/EC (Chapter5), (EU)168/2013 supplemented by (EU)134/2014 and (EU)44/2014, (EU)2018/295 CARB 2001 for EVAP only, Colombian Decree 910, Indonesian Decree 141of 2003, TRIAS31-J044(1)-01, TRIAS31-J044(2)-01, EPA CFR 40 Part86-Sub Part E&F (Only for 2W), GB15744-2008, GB20998-2007, GB14621-2011, GB14622-2007	0.01 g/test to 30 g/test
2.	Engine	<b>A) Pollutants (measured on steady state cycles and transient test cycles)</b>	MoRTH/CMVR/TAP/ 115-116 Issue 4 Amendment 5, R-49-02 to R 49-06, 88/77/EEC as amended 2001/27/EC, 2005/55/EC as amended	10 mg/kWh to 25 g/kWh 10 mg/kWh to 25 g/kWh
		CO		10 mg/kWh to 25 g/kWh
		HC		10 mg/kWh to 25 g/kWh

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		NOX	2005/78/EC, (EU) no.	10 mg/kWh to 25 g/kWh
		CH <sub>4</sub>	595/2009 as amended by	10 mg/kWh to 10 g/kWh
		Particulate Matter	(EU) no.	4 mg/kWh to 2 g/kWh
		NH <sub>3</sub>	133/2014, AIS 137 Part-4,	0.1 ppm to 1000 ppm
		CO <sub>2</sub>	AIS 137 Part-7 ADR80/03, 97/68/EC as amended 2012/46/EU, R 96-04, 2000/25/EC as amended 2014/43, 40 CFR Part 89Sub-Part E, 40 CFR Part 86 Sub-Part N, GSR 286(E), GSR 83 (E), GSR 853(E), GSR 686(E), GSR 284(E), GSR 589(E), GSR276(E), GSR720(E), GSR 84(E), GSR 412(E), GSR 889(E), GSR 498(E), 2015, GSR	10 mg/kWh to 1000 g/kWh
		Particulate Number	412(E) 2016, GSR 201(E)	1 X 10 <sup>6</sup> to 9X 10 <sup>15</sup> Number /kWh
		B) Measurement of Engine Power	R-85-00 (for CI & SI engines only), 80/1269/EEC as amended 1999/99/EC, R 120-01, ADR30/01, IS14599:1999. AIS 137 Part-5, Part-7	2 kW to 20 kW 15 kW to 150 kW 22 kW to 220 kW 25 kW to 250 kW 50 kW to 500kW
		B) Measurement of visible Pollutant (Smoke density)	UNECE-R24-03, 72/306/EEC as amended by	0.001 m <sup>-1</sup> to 10 m <sup>-1</sup>

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Convenor

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			2005/21/EC, 77/537/EEC as amended by 97/54/EEC, GSR 103(E), IS 8118:1998, 40 CFR Part 86 Sub Part I, AIS 137 Part-5, Part-7	
3.	Off-road diesel Engines (Agricultural Tractor engines, Genset engines, CEV engines)	Emission of pollutants from diesel engines i) Power	80/1269/EEC as amended by 1999/99/ EC, ECER-120 Rev.1, ECER- 24 Rev 2 amend. 3, ADR30/012006 MoRTH/CMVR/TAP/ 115-116 Issue 4 Amendment -1 (Part IV), Central Pollution Control Board, GSR771(E), GSR232(E)	15 kW to 150 kW
		ii) Free acceleration, Full load & 80%Smoke	77/537/EEC as amended by 97/54/EC MoRTH/ CMVR/TAP/115-116 Issue 4 Amendment -1 (Part IV), Central Pollution Control Board, GSR 771(E), GSR232(E), ISO 8178-3:1994	0.1 % to 100 % (0.001 m <sup>-1</sup> to 10 m <sup>-1</sup> )
		iii) Pollutants (measured on steady state cycles) CO,	97/68/EC as amended by 2012/46/EU (for Non-Road Steady Cycle only), 2000/25/EC as amended by 2014/43/EU, ECE R-96	CO: 0.01g/kWh to 25 g/kWh



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		HC,  NOx,  Particulate Matter	Rev3 Amend.1 (Annex4A, for Non-Road Steady Cycle only), MoRTH/CMVR/TAP/115-116; Issue 4 Amendment -1 Part XV, Sub- Part A, (Agri Tractors Stage III A and CEV Stage III), Central Pollution Control Board, GSR 771(E), GSR232 (E), ISO 8178-1:2006, ISO 8178-4:1996	HC: 0.01g/kWh to 25 g/kWh  NOx:0.01g/kWh to 25 g/kWh  PM:0.004g/kWh to 2 g/kWh

**CHEMICAL TESTING**

<b>LOCATION 2</b>			
<b>I.</b>	<b>ATMOSPHERIC POLLUTION</b>		
<b>1.</b>	<b>Vehicle</b>	<b>Emission Test From Temperature -10°C to 30°C.</b>	
		A) Tail pipe emissions	

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		CO	MoRTH/CMVR/TAP/115-116(Issue 4, Amendment 5,7,8)	10 mg/km to 35 g/km
		HC		0.6 mg/km to 5 g/km
		NOX		1 mg/km to 2 g/km
		CH <sub>4</sub>	GSR400(E), GSR84(E), GSR103(E), GSR498(E), GSR99 (E), GSR412(E), GSR682(E), SO 1072(E), GSR954(E), GSR889(E)	0.6 mg/km to 1 g/km
		CO <sub>2</sub>		1 g/km to 500 g/km
		Fuel Consumption (calculated from CO, HC, CO <sub>2</sub> )	R 83-07 Rev5: Supplement 6 to the 07 series of amendments, R-101 (Rev3Amendment6)	2 km/l to 30 km/l
		Particulate Matter		0.000001 mg/km to 0.5 g/km
		Particulate Number		1x10 <sup>6</sup> to 9x10 <sup>15</sup> number/km
		B) Idling Emission Measurement	ADR79/05	Upto 9.99 %
		CO		Upto 20000 ppm(V)(C6)
		HC	EEC70/220lastamendedby 2006/96/EC, (EC)715/2007	0.001 m <sup>-1</sup> to 10 m <sup>-1</sup>
		C) Free Acceleration Smoke		
		D) Crankcase emissions	(EU) 2016/646, (EU)2017/1151, (EU) 2017/1154, (EU)2017/1347	Qualitative
		E) Evaporative emissions (HC) (Volume of SHED facility is 46.89 to 54.45 m <sup>3</sup> )		0.01 g/test to 13 g/test

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**ELECTRONICS TESTING**

<b>LOCATION 1</b>				
I.	<b>EMC TEST FACILITIES</b>			

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1.	Motor Vehicles (2/3 Wheelers)	Radiated Emissions (In ALSE chamber)	CISPR 12:2009 AIS004(Part 1)/1999 AIS004(Part 3)/2009 (Annex 2 & 3) ECE R-10 Rev.05 (Annex 4 & 5) 97/24/EC Chapter 8 (Annex 2 & 3) SANS 20010:2010 (Annex 4 & 5)	30 MHz to 1000 MHz Upto 90 dB $\mu$ V
		Radiated Immunity (In ALSE chamber)	ISO 11451-2:2015 AIS004 (Part 3)/2009 (Annex 4) ECE R-10 Rev.05 (Annex 6) 97/24/EC Chapter 8 (Annex 4) SANS 20010:2010 (Annex 6)	20 MHz to 2000 MHz 30V/m
2.	Vehicle Electronic Systems/ Sub-systems	Radiated Emissions (In ALSE chamber)	AIS:004(Part 1)/1999 AIS004 (Part 3)/2009 (Annex 5 & 6) ECE R-10 Rev.05 (Annex 7 & 8) 97/24/EC Chapter 8	30 MHz to 200 MHz Upto 90 dB $\mu$ V  200 MHz to 1000 MHz Upto 90 dB $\mu$ V

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			(Annex 5 & 6) SANS 20010:2010 (Annex 7 & 8) CISPR 25 edition 4.0:2016	150 kHz to 30 MHz Upto 90 dB $\mu$ V
3.	ISM Equipment	Radiated Emissions (In ALSE chamber)	CISPR 11:2016 CISPR 32:2015	30 MHz to 1000 MHz Upto 90 dB $\mu$ V
4.	Vehicle Electronic Systems/ Sub-systems	Radiated Immunity (In ALSE chamber/ BCI/Strip-Line)	AIS004:Part 3/2009 (Annex 7) ECE R-10 Rev.05 (Annex 9) 97/24/EC Chapter 8 (Annex 7) SANS 20010:2010 (Annex 9)	200 MHz to 2000 MHz, 30 V/m (ALSE Method)
			ISO 11452-2 second edition 2004 (ALSE) SAE J1113-21:2005 (with ground Ref. plane method only)	200 MHz to 3100 MHz, 100 V/m
			ISO 11452-4 fourth edition 2011 (BCI)	1 MHz to 400 MHz, 200 mA
			ISO 11452-5 second edition 2002 (Strip line)	100 kHz to 400 MHz, 200 V/m
5.	Vehicle Electronic Systems/ Sub-systems operating on vehicle battery supply	Conducted Emissions	CISPR 25 edition 4.0:2016	150 kHz to 108 MHz Upto 110dB $\mu$ V

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<b>Sl.</b>	<b>Product / Material of Test</b>	<b>Specific Test Performed</b>	<b>Test Method Specification against which tests are performed</b>	<b>Range of Testing / Limits of Detection</b>
<b>6.</b>	<b>ISM Equipment</b>	Conducted Emissions	CISPR 11:2016 CISPR 32:2015	150kHz to 30MHz Upto 90dB $\mu$ V
<b>7.</b>	<b>Vehicle Electronic Systems/ Sub-systems operating on vehicle battery supply</b>	Immunity to conducted transient disturbances on power supply lines Test pulse 1 (12/24 V system) Test pulse 2a (12/24 V system) Test pulse 2b (12/24 V system) Test pulse 3a & 3b (12/24 V system) Test pulse 4 (12/24 V system) Load dump test pulse (12/24 V system)	ISO 7637-2:2011(E) AIS004:Part 3/2009 (Annex 8) ECE R-10 Rev.05 (Annex 10) SANS 20010:2010 (Annex 10)  ISO 16750-2:2012 (For Load dump)	Upto 12 V/24V DC, 50 A
		Immunity to coupled transient disturbances on lines other than power supply lines  Positive and negative test pulse (fast/slow) (12 V and 24 V system)	ISO 7637-3:2016	Upto 12 V/24VDC, 50 A

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		Conducted transient emissions on power supply lines	ISO 7637-2:2011(E) AIS004:Part 3/2009 (Annex 8) ECE R-10 Rev.05 (Annex 10) SANS 20010:2010 (Annex 10)	Upto 12/24 V DC, 50 A
		Electrostatic Discharge (Air and Contact Discharge)	ISO 10605:2008 IEC 61000-4-2:2008 SAE J1113-13:2011	Upto 25 kV
		Immunity to narrowband radiated electromagnetic energy. Portable/Handy transmitters	ISO 11452-9:2012	28 MHz to 1950 MHz Net power up to 50W
		Superimposed alternating voltage. Slow decrease and increase of supply voltage. Discontinuities in supply voltage Withstand voltage	ISO 16750-2:2012	Upto 12/24V DC, 16 A
		Insulation resistance Test Voltage	ISO 16750-2:2012	100 VDC to 500 VDC 1 MΩ to 10 MΩ
		Immunity to magnetic fields	ISO 11452-8:2015	Frequency DC-150kHz Amplitude 1000A/m (Uniformed field area:30cm x 30cm x 30cm)

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8.	ISM equipment	Radiated Immunity	IEC 61000-4-3 Edition 3.2:2010 IS 14700 (Part 4/Sec 3): 2008	80MHz to 2000 MHz Upto 10V/m Field Uniformity Area 0.6m x 0.6m
		Burst on power/ signal lines	IEC 61000-4-4:2012 IS 14700 (Part 4/Sec 4): 2008	Upto 4kV
		Surge on power supply	IEC 61000-4-5:2014	Upto 4kV (1.2/50 $\mu$ s)
		Conducted RF immunity on Power lines	IEC 61000-4-6:2013	Upto 10Vrms
		Power frequency magnetic field	IEC 61000-4-8:2009, IS 14700 (Part 4/Sec8): 2008	Upto 30A/m
		Power fail simulation	IEC 61000-4-11 Edition 2.0:2017	0%, 40%, 70%, 100%
II.	ENVIRONMENTAL TEST FACILITY			
1.	Vehicle Electronic Systems/ Sub-systems and other Components	Thermal Shock Test/Rapid change of temperature with prescribed time of transfer. Rapid Temperature Cycling	IEC 60068-2-14 Na:2009 IS 9000(Part 14/Sec 1): 1988 SAE J1455:2017 JASO D 001:1994 ISO 16750-4:2010(E) JSS 55555:2012	0.5m x 0.6m x 0.45m (-) 40 °C to 150 °C Transfer Time < 10 sec.
		Cold Test Low Temperature	IEC 60068-2-1:2007 IS 9000(Part 2):1977 JSS 55555:2012	0.95 m x 0.95 m x 1.0 m Ambient to -50 °C
		Dry Heat Test High Temperature Test	IEC 60068-2-2:2007 IS 9000(Part 3):1977 JSS 55555:2012	0.95m X 0.95m X 1m Ambient to 150 °C



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		Composite temperature/humidity cyclic test Tropical Exposure	IEC 60068-2-38:2009 IS 9000(Part 6):1978 JSS 55555:2012	0.95m X 0.95m X 1m 50 °C to 150 °C. 30 % to 98 % RH for Temperature Range (25 °C to 55 °C) Max. Ramp Rate:5 °C/min.
		Damp Heat, cyclic (12 h + 12h cycle)	IEC 60068-2-30:2005 IS 9000(Part 5/Sec 2):1981	
		Damp Heat, Steady State	IEC 60068-2-78:2012 IS 9000(Part 4):2008 JSS 55555:2012	
		Temperature Cycling	ISO 16750-4:2010(E)	0.95m X 0.95m X 1m 50 °C to 150 °C. Max. Ramp Rate:5 °C/min
		Thermal Cycling Change of temperature with specified change of temperature	SAE J1455:2017 IEC 60068-2-14 Nb:2009 IS 9000(Part 14/Sec 2):1988	
		Vibration Testing Sine and Random	JIS D 1601:1995 IEC 60068-2-64:2008 SAE J1455:2017 SAE J1211:2012 IS 9000 (Part VIII):2003 IEC 60068-2-6:2007 ISO 16750-3:2012 JASO D 001-94	Frequency: 5 Hz to 2000 Hz Velocity:1800 mm/sec. X, Y Axis 30 G (Bare Table). Z Axis 82 G (Bare Table).
		Mechanical Shock	JASO D 001-94 IEC 61373:2013 IEC-60068-2-27:2008 JSS55555:2012	100 g, 6 ms and 50 g, 11ms with a mass of 1 kg

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		Combined Temperature and Vibration Test	ISO 16750-3:2012 IEC 60068-2-64:2008	Frequency:5 Hz to 2000 Hz; Velocity:1800 mm/sec. Z Axis-40 g Temperature: (-) 50°C to 150°C Max. ramp rate 5 °C/min Humidity:30 to 95% r.h. Chamber Size:0.95 x 0.95m x 1m

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**MECHANICAL TESTING**

LOCATION 1				
I.	<b>MECHANICAL PROPERTY OF METELS</b>			
1.	<b>5<sup>th</sup> wheel coupling and mounting plate</b>	Static test-1 Limit of deformation width under specified load Static test-2 Separation of coupling pin under specified load	AIS 091/Part 1,2009 & ECE R 55,2018 Annexure 6 Clause No.3.7.2.2	25 KN to 250 KN
		Dynamic test Number of cycles for test pass or fail Horizontal force Vertical force	AIS 091/Part 1,2009 & ECE R 55,2018 Annexure 6 clause No.2.2 and 3.7.3.1	20 kN to 220 kN 50kN to 500 kN
2.	<b>5<sup>th</sup> Wheel King Pin</b>	Dynamic test Number of cycles for test pass or fail Load	AIS 091/Part 1,2009 & ECE R 55,2018 Annexure 5 clause 8 Annexure 6 clause No.2.2 and 3.9	25 KN to 250 KN
3.	<b>Metals and Alloys</b>	Axial Fatigue Number of cycles for test pass or fail Load Fatigue life estimation (S-N Curve)	ASTME 466-15	25 kN to 250 kN 5 kN to 25 kN

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4.	Ferrous & Non-Ferrous	Residual Stress Measurement (Normal stress)	SAE HS 784:2003	2θ angle Scanning range:10° to 163°
II.	PERFORMANCE/DURABILITY/SAFETY TEST			
1.	Vehicle Installation testing: Horn Installation	Horn Installation Testing Sound Level Voltmeter	IS 15796-2008 ECE R28; amendment 3 supplement 3 Rev2	80 dBA to 125 dBA 12 V to 30 V
2.	Vehicle Installation testing: Windscreen Wiping	Wind Screen wiping system test Angle of the tangent from the eye ellipse Temperature Linear dimension	AIS 045-2004 IS 15802:2008 IS 15804:2008	5° to 180°  (-) 20 °C to 55 °C 10 mm to 3000 mm
3.	Vehicle Installation testing: Rear View mirror installation test	High speed test	AIS 002:2001 (Cl. No. 4.2) AIS 002 (Part 1) (Rev. 1): 2011 AIS 002 (Part 2) (Rev. 1):2011	Upto 80 %of max speed of the vehicle or 160 kmph whichever is less
		Field of vision test	ECE R46 Rev 4, 03 series of amendments SANS:20046-2006	
4.	Automotive component testing: Pneumatic tyres for commercial vehicles diagonal and radial ply	Dimensional check	IS 15636-2005	150 mm to 450 mm
		Section width of tyre Tyre outer diameter	AIS 110 ECE R No. 54 amendment No.2 Rev No.2 SANS:20054-2007	500 mm to 1600 mm

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		Load/Speed Performance Test	IS 15636-2005 AIS 110-2009 ECE R No. 54 Amendment No.2 Rev No.2 SANS:20054-2007	20 °C to 40 °C 32 km/h to 96 km/h 1. 200 kg to 10000 kg 2. 200 kg to 5000 kg 100 kPa to 1000 kPa
		Endurance Test	IS 15636-2005 ECE R No. 54 SANS:20054-2007	20 °C to 40 °C 80 km/h to 90 km/h 1. 200 kg to 10000 kg 2. 200 kg to 5000 kg 100 kPa to 1000 kPa
		Tyre Strength Test	IS 15636-2005 AIS 110-2009	10 kPa to 180 kPa 50 (±) 1.5 mm/minute 100 kg to 10000 kg
		Tread-Wear-Indicators	IS 15636-2005 AIS 110-2009 ECE R No. 54 Amendment No.2 Rev No.2 SANS:20054-2007	1 mm to 5 mm
		Markings	IS 15636-2005 AIS 110-2009 ECE R No. 54 Amendment No.2 Rev No.2 SANS:20054-2007	5 mm to 50 mm
5.	Driver's forward Field of Vision	Driver's forward Field of Vision	AIS 021-2011 Amendment 1 EEC 77/649	1° to 6°

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Sl.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection	
6.	Pneumatic tyres for two wheeled-vehicles-under speed capability of 150km/h	Dimension test	IS 15627:2005	50 mm to 300 mm	
		Section width of tyre		150 mm to 700 mm	
		Diameter of tyre	IS 15627:2005	0.8 mm (+0.60/-0.0) mm	
		Tread wear indicators	IS 15627:2005	20 °C to 40 °C	
		Endurance test		IS 15627:2005	20 km/h to 200 km/h
					20 kg to 2000 kg
					10 kPa to 300 kPa
Load Speed Performance test		IS 15627:2005	20 °C to 40 °C		
			50 km/h to 350 km/h		
			50 kg to 2000 kg		
Plunger test		IS 15627:2005	10 kPa to 300 kPa		
			150 kPa to 300 kPa		
7.	Signaling Devices for Motor Vehicle having more than	Vehicle Installation testing: Installation Requirements of Lighting and Light	IS 15627:2005	50 (±) 1.5 mm/minute	
				100 kg to 2000 kg	
				5 mm to 50 mm	

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	<b>Three Wheels, Trailer and Semi-Trailer excluding Agricultural Tractor and Special Purpose Vehicle</b>	Presence Number Arrangement Position Geometric Visibility Orientation Electrical connection Tell-tale Other requirements	AIS 008 (Rev. 1):2010 ECE R48.03, Rev4, amendment 01	1 m to 30 m ( $\pm$ ) 1mm 0.5 m to 5 m ( $\pm$ ) 1 mm  2° to 180° ( $\pm$ ) 2°  5 s to 150 s
8.	<b>Signaling Devices for L Category Vehicles, their Trailers and Semi-Trailers</b>	Vehicle Installation testing: Installation Requirements of Lighting and Light Number Arrangement Position Geometric Visibility Orientation Electrical connection Tell-tale Other requirements	AIS 009-2001 ECE R53 ECE R74	Upto 30 m ( $\pm$ ) 1mm Upto 5 m ( $\pm$ ) 1 mm  Upto 180° ( $\pm$ ) 2°  Upto 150 s ( $\pm$ ) 1 s
9.	<b>Safety Belt Assembly</b>	Dynamic test using Bungee Sled Facility after all the specified Pre-conditioning such as Retractor durability, Buckle Durability, Dust Test, Salt Spray test	Cl.4.4.2,5.5.2of IS-15140:2003 Cl.6 of ECE16-07-07 series of amendments Cl.6 of ADR4/05 Cl.6 of SANS20016:2009	'g' Level 29 $\pm$ 3g within specific Corridor, Speed 50 $\pm$ 1 kmph, Manikin fwd displacement between 40 mm to 200 mm at Pelvic level 50 mm to 500 mm at Torso level
10.	<b>Safety Belt</b>	Tensile strength after	Cl.No4.2,4.3,5.2,5.4of	Upto 100 KN

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	<b>Assembly: Webbing or Straps/Rigid Parts</b>	various conditioning such as Room/Cold/Heat/Light/Water Abrasion	IS 15140:2003 Cl.No.6.2,6.3,7.4,7.5 of ECE16-07-Cl.6 of ECE16-07-07 series of amendments Cl.6 of ADR4/05 Cl.No.6.2,6.3,7.4,7.5 of SANS20016:2009	
		Elongation	Cl.No.4.3.5,5.4.3 of IS 15140:2003	Upto 40 mm
		Energy Absorptivity	Cl.No.4.3.6,5.4.4 of IS 15140:2003	Work Load Ratio>50, Work/Length Nm/m>500
		Width under Load	Cl.No 4.3.1.2,5.4.1 of IS 15140:2003 Cl.No.6.3.1.2,7.4.3 of ECE16-07-Cl.6 of ECE16-07-07series of amendments Cl.6 of ADR4/05 Cl.No.6.3.1.2,7.4.3 of SANS 20016:2009	Upto 50 mm
11.	<b>Safety Belt Assembly-2 Point Static/ 3 Point Static</b>	Micro Slip test	Cl.No.4.2.3.1 and 5.2.8 of IS 15140:2003 Cl.No.:7.3 of ECE 16-07-Cl.6 of ECE16-07-07series of amendments Cl.6 of ADR 4/05	1000 cycles, Strap Slip up to 50 mm



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			Cl.No.7.3 of SANS 20016:2009	
12.	Safety Belt	Buckle Release Force Measurement Test	Cl.No.4.4.2.10.c) and 5.5.3 of IS 15140:2003 Cl.No.6.2.2.5 and 7.8 of ECER 16-07-Cl.6 of ECE 16-07-07 series of amendments Cl. 6 of ADR 4/05 Cl.No.6.2.2.5 and 7.8 of SANS 20016:2009	Upto 500N
		G Lock Test	Cl.No.4.2.5.3 and 5.3.2 of IS 15140:2003 Cl. No. 7.6.1,7.6.2, 6.2.5.3.1.1, 6.2.5.3.1.2 of ECER 16-07-Cl.6 of ECE16-07-07 series of amendments Cl.6 of ADR 4/05 Cl. No. 7.6.1,7.6.2, 6.2.5.3.1.1,6.2.5.3.1.2 of SANS 20016:2009	Upto 200 mm 0.45 g to 5 g

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		Manual Belt Adjuster Force Measurement Test	Cl.No.4.2.3.3 and 5.2.6 of IS 15140:2003 Cl.No.6.2.3.4 and 7.5.6 of ECER16-07-Cl.6 of ECE16-07-07 series of amendments Cl.6 of ADR4/05 Cl.No.6.2.3.4 and 7.5.6 of SANS 20016:2009	Upto 500 mm Upto 500 N
		Retractor Retraction Force Measurement Test	Cl.No.4.2.5.2,4.2.5.3 and 5.3.4 of IS 15140:2003 Cl.No.7.6.4 of ECER16-07Cl.6 of ECE16-07-07 series of amendments Cl.6 of ADR4/05 Cl.No.7.6.4 of SANS 20016:2009	Upto 2000 mm Upto 110 N
		Retractor Tilt Lock Test	4.2.5.3.a.3,4.2.5.3. a.4 and 5.3.2.5 of IS 15140:2003 Cl.No.6.2.5.3.1.3 and 6.2.5.3.1.4 of ECER 16-07-Cl.6 of ECE 16-07-07 series of amendments Cl.6 of ADR 4/05 Cl.No.6.2.5.3.1.3 and 6.2.5.3.1.4 of	Upto 40°

**Birendra Prasad Murmu  
Convenor**

**N. Venkateswaran  
Program Manager**

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			SANS 20016:2009 Cl.No.7.2.3.2 of AIS 072:2011	
13.	Seats (Seats and their Anchorages)	Dynamic test (Resistance to Inertia Effects) Using Bungee Sled Facility	Cl.5.1,5.3 of IS 15546:2005 Cl.6.3 of ECE17-08- Supplement 4 to the 08 series of amendments Clause 4.2.3,4.3.3 of AIS-023 Cl.6.3 of Appendix A of ADR 3/03 Cl.6.3 of SANS 20017:2004	'g' Level 0 to 50g, Pulse Width 0 to 100 ms
14.	Seats	Luggage Retention test Using Bungee Sled Facility	Cl.5.15 of ECE17-08- Supplement 4 to the 08 series of amendments Cl.No.5.9 of IS 15546:2005 Cl.5.15 of Appendix A of ADR3/04 Cl.5.15 SANS 20017:2004	'g' Level 24±4 g Within Specific Corridor, Speed 48 to 50 kmph, Seat Back and Head Restraint Movement wrt R Point Upto 200 mm
15.	Cabins & their attachments of Commercial Vehicles of Category N	Frontal Impact Test (Test A) using Pendulum Impact Test Rig	Cl.5.2 of AIS 029/2004  Cl.5.2 of ECER 29.02 Supplement 1 to the series 02 of amendments	3000 mkgf for vehicles weighing ≤ 7.0 tons 4500 mkgf for vehicles weighing > 7.0 tons 29.4 kJ for vehicles weighing ≤ 7.0 tons 44.1 kJ for vehicles weighing > 7.0 tons

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Sl.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection
			Cl.5.1.2 of ECER 29.03 03 series of amendments	29.4kJforvehicles weighing<=7.0tons 55kJforvehicles weighing>7.0tons
16.	Driver/Passenger/ Seat Airbag Modules	Static Airbag Deployment Test after temperature conditioning (Exclusion:Sun Load Simulation and Pressure Measurement)	SAEJ1630-JAN2011	Temperature Conditioning from-35°C to +90°C, Programmable Firing Current Pulse up to 5A
17.	Strength of Superstructure of Large Passenger Vehicles	Full Vehicle Rollover	Cl.7.1.1,Cl.8 of AIS 031/2004 incl. Amd.1, Cl.5.1toCl.5.3 of ECER66.01	Rate of Tilting≤5deg./sec Intrusion of vehicle superstructure into residual space
18.	Child Restraint Systems(CRS)			
19.	Complete CRS	Resistance to Corrosion	Cl.No.7.1.1of AIS 072:2011 Amd.#1,2 Cl.7.1.1 of ECE R44.04	50±0.5hrs;Annex-4; Visual Inspection
		Energy Absorption	Cl.No.7.1.2 of AIS 072:2011 Cl.7.1.2 of ECE R44.04	Head form drop, 2.75kg (±) 0.05kgfrom 100-0 (+) 5mm; Peakkg≤60

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		Overturning Test	Cl. No.7.1.3 of AIS 072:2011 Cl.7.1.3 of ECE R44.04	Manikin head Movement Upto 300 mm
20.	Complete Child Restraint System /Buckle assemblies, retractors, Adjusters and lock-off devices	Resistance to Temperature	Cl.7.1.5 of AIS 072:2011 Cl.7.1.5 of ECE R44.04	(-) 30to (+) 180 °C Visual Inspection
		Area	Cl.No.7.2.1.2 of AIS072:2011 Cl.No.7.2.1.2of ECE R44.04	Upto100 mm
21.	CRS Child Parts: Buckle	Durability	Cl.No.7.2.1.7 of AIS 072:2011 Cl. No.7.2.1.7 of ECE R44.04	5000 cycles; Operational check
		Opening Force under no-load	Cl. No. 7.2.1.8 of AIS 072:2011	Upto 500N
		Opening Force under load	Cl. No. 7.2.1.8 of ECE R44.04	Upto 500N
		Strength	Cl.No.7.2.1.9 of AIS 072:2011 Cl. No. 7.2.1.9 of ECE R44.04	Upto 100KN
		Operating Force	Cl. No. 7.2.2.4 of AIS 072:2011 I.No.7.2.2.4 of ECE R44.04	Upto 50N
22.	CRS Child Parts: Adjusting Devices	Resistance to Temperature	Cl.7.1.5 of AIS 072:2011 Cl.7.1.5 of ECE R44.04	(-) 30 to (+) 180°C Visual Inspection
		Micro slip test for- Adjuster not directly mounted on CRS	Cl.No.7.2.2.5 of AIS 072:2011 Cl.7.2.2.5 of ECE R44-04	1000 cycles, Strap Slip Upto 50mm

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		Micro slip test for- Adjuster directly mounted on CRS	Cl.No.7.2.2.6 of AIS 072:2011 Cl.7.2.2.7 of ECE R44-04	5000 Cycles; strapslip $\leq$ 25mm
23.	CRS Child Parts: Automatic Locking Retractors/ Emergency Locking Retractors	Retractor Durability	Cl.No.7.2.3.2.6 of AIS 072:2011 Cl.No.7.2.3.2 of ECE R44-04	40000 Cycles; Operational Check
		Tilt Lock	Cl.No.7.2.3.2 of AIS 072:2011	Upto 40°
		G lock Test	Cl.No.7.2.3.2 of ECE R44-04	Up to 200 mm 0.45 g to 5 g
		Retraction Force Measurement Test	Cl.No.7.2.3.2.1 and 7.2.3.2.5 of AIS0 72:2011 Cl.No.7.2.3.2.1 and 7.2.3.2.5 of ECE R44-04	Upto 2000 mm Upto 110 N
		Dust Test	Cl.no.8.2.4.5 of AIS 072 Cl.no.8.2.4.5 of ECER44-04	Visual Inspection Operational check
24.	CRS Child Parts Straps	Width	Cl.7.2.4.1 of AIS 072:2011 Cl.7.2.4.1 of ECE R44-04	Upto 100 mm
		Strength after room conditioning	Cl.7.2.4.2 of AIS 072:2011 Cl. 7.2.4.2 of ECE R44-04	Upto100 KN
		Strength after special conditioning	Cl.7.2.4.3 of AIS 072:2011 Cl.7.2.4.3 of ECE R44-04	
25.	CRS Child Parts Lock-Off devices	Micro slip:Class B devices	Cl.7.2.5.3 of AIS 072:2011 Cl.7.2.5.3 of ECE R44-04	60cycles; strapslip $\leq$ 25mm
26.	Complete Child Restraint System	Dynamic Test	Cl.7.1.4 of AIS 072:2011 Cl.7.1.4 of ECE R44.04	Forward Impact: 50-2+0kmph; g'levelwithin specific corridor; Manikin Chest Acceleration:resultant $\leq$ 55g; Peak Upwards $\leq$ 30g;

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				Head forward & upward movement within limits Rearward impact: 30-2+0kmph; 'g' level within specific corridor; Manikin Chest Acceleration: ≤55g; Peak Upwards ≤55g; Head forward & upward Movement within limits
27.	BIW+Seat	Seat Belt Anchorage Test	IS 15139/2002 Cl No. 4.5; ECER 14 Rev.07/2012 cl. 6.1 to 6.4 excluding ISO FIX anchorages; ADR 05/5 year 2006 Amendment 1-Cl.6.4 only SANS 20014:2004	Upto 20.25 kN for 3 point belts  Upto 33.37 kN for 2 point belts
28.	Automotive Seats	Dimensional measurements of head restraint Height Width Gap	IS 15546/2005 Cl. 4.4, 4.5, 4.6.1 ECE regulation no R 17, Revision 08/2009 CL. 5.5, 5.7, 5.10 ADR 03/3 year 2006 Amendment 1-Cl. 6.6 & 6.7 SANS 20017:2004	Upto 1100 mm Upto 300 mm Upto 80 mm
		Width Depth Back Rest Height Torso Angle Longitudinal adjustment Arm Rest Height Arm Rest Width	AIS 023/2205 Cl 4.2.1, 4.2.2, 4.3.1, 4.4.1, 4.4.2, 4.5.1 (Component Level dimensions)	Upto 500 mm Upto 500 mm Upto 1, 200 mm Upto 25 Degree Upto 100 mm Upto 300 mm Upto 70 mm

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		Head restraint performance test Moment Force R point Deflection of HR	IS 15546/2005 Cl. 4.7, reference standards ECE regulation no R17, Revision 08/2009 Cl 5.12 ADR 03/3 year 2006 Amendment 1-Cl.6.4 SANS 20017:2004 AIS023/2005 Cl No 4.2.3	Upto 560 Nm Upto 1335N less than 102 mm
		Seat Back Strength test Moment about Rpoint	IS 15546/2005 Cl. 4.3.1 reference standard ECE regulation no R17, Revision 08/2009 Cl 6.2 ADR 03/3 year 2006 Amendment 1-Cl.6.2 SANS 20017:2004 AIS023/2005 Cl No 4.2.3	Upto 795 Nm
		Energy Dissipation test Deceleration of Head Form	IS 15546/2005 Cl. 4.2.2, 4.2.3 ECE regulation No. R17,08/2009 Cl 5.5.2 ADR 03/3 year 2006 Amendment 1-Cl.6.8 SANS 20017:2004 AIS 023/2005 Cl. No.4.2.3	Upto 250g continuously for more than 3 milliseconds.
		Seat Static Strength test Load Displacement	i) AIS 023/2005 Cl. 5.0	Upto 35 kN 50 mm to 400 mm
		Seat Anchorage test Load	i) AIS 023/2005 Cl. 7.0	Upto 40kN



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Sl.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection
29.	Automotive vehicle testing 2W, 3W, 4W, Agricultural Tractor, Automotive Trailer, Construction Equipment Vehicles (CEV) & their derivatives	Verification of weights of vehicles	IS 11825:1986	Upto 60000 kg
30.	Automotive vehicle testing 2W, 3W, 4W & their derivatives	Constant Speed Fuel Consumption Evaluation		
		2 Wheelers and their derivatives	IS 10881:1994	0.4 L/hr to 60 L/hr.
		3 & 4 Wheelers and their derivate	IS 11921:1993	0.06 L/hr to 60 L/hr.
31.	Automotive vehicle testing 2W, 3W, 4W & their derivatives, Automotive Trailer,	Brake Performance Evaluation		
		Speed i) 4 Wheelers and their derivatives, Automotive Trailer	71/320/EEC or ECE R13 IS 11852:2001 ADR 31/01, 31/02, 31/03, 35/00, 35/01, 35/02, 35/03, 35/04	Upto 140 km/h (Speed limit on N-CAT Test Track is=150 km/h)

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Sl.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection
	Construction Equipment Vehicles (CEV), Agricultural Tractor and Trailer combination	ii) 2 & 3 Wheelers and their derivate	93/14/ EEC IS 14664:1999 ADR 33/00	
		iii) Construction Equipment Vehicles (CEV)	Central Vehicle Motor Rule No-96	
		iv) Braking System and Performance Requirements for the Combination of Agricultural Tractor and Trailer combination	AIS043 Amd.03-2005	
32.	Automotive vehicle testing 2W, 3W, 4W & their derivatives	Gradeability Evaluation	AIS003-1999 IS 13988-2002	7°,10.2°,15°,25°& 30°
33.	Steering Equipment for Automotive vehicle testing for 4W, Agricultural tractors, Automotive trailer & Construction Equipment Vehicles (CEV)	Torque Angle Steering Equipment for 4 wheeler & Agricultural tractors, Automotive trailer	70/311/EEC or ECE R79 IS 11948-1999 AIS 042:2017 AIS 113	250 Nm 1250°
34.	Automotive vehicle 4W, Agricultural tractors & Construction Equipment	Turning Circle Diameter evaluation	IS 12222:2011 IS 11859:2004	70m

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Sl.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection
35.	<b>Vehicles (CEV)</b> <b>Automotive vehicle</b> <b>2W, 3W, 4W,</b> <b>Construction Equipment</b> <b>Vehicles (CEV) &amp; their derivatives</b>	Speedo meter Calibration Speed i) 4 Wheelers and their derivatives & Construction Equipment Vehicles (CEV) ii) 2 & 3 Wheelers and their derivate	97/39/EEC or ECE R39, IS 11827-1995, 2008 2000/7/EEC IS 11827-1995, 2008	Upto 140 km/h (Speed limit on N-CAT Test Track is 150 km/h)
36.	<b>Automotive Vehicles 4W</b>	Coast Down Test Speed	IS 14785-2000 TAP-115/116	Upto 140 km/h (Speed limit on N-CAT Test Track is 150 km/h)
37.	<b>Automotive Vehicles</b> <b>2W, 3W, 4W,</b> <b>Construction Equipment</b> <b>Vehicles(CEV) &amp; Agricultural Tractor their derivatives</b>	Max. Speed Test Speed i) 4 Wheelers and their derivatives ii) 2 Wheelers and their derivatives iii) 3 Wheelers and their derivate iv) Agricultural Tractor	ECE/68, IS 11877:1986 95/1/EEC, IS 10278:2002 95/1/EEC AIS 116	Upto 150 km/h (Speed limit on N-CAT Test Track is 150 km/h)
38.	<b>Automotive Vehicles</b> <b>2W, 3W, 4W,</b> <b>Agricultural</b>	Permissible Sound Level Test i) 4 Wheelers and their derivatives	IS 3028-1998 70/157/ EEC, ECE R51, ADR 83/00	30 dB(A) to 130 dB(A)

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Sl.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection
	<b>Tractor &amp; their derivatives</b>	ii) 2 Wheelers and their derivate	IS 3028-1998, ECE R41, ADR 83/00	
		iii) 3 Wheelers and their derivate	IS 3028-1998, ADR 83/00	
		iv) Agricultural Tractor By stander Noise and OEL Noise level	AIS 115 (Part 2) AIS 115 (Part 1)	
<b>39.</b>	<b>Automotive Vehicles 4W &amp; their derivatives</b>	Internal Sound Level	AIS 020, IS 12832:1989	30 dB(A) to 130 dB(A)
		Hood Latch Tests	IS 14226:1995	120 km/h
<b>40.</b>	<b>Automotive Vehicles 2W, 3W, 4W&amp; their derivatives except for two and three wheeled vehicles below 500 cc.</b>	External projection-Performance Requirements	IS 13942:1994	10 mm to 10000 mm
<b>41.</b>	<b>Automotive Vehicles of category M1 and L7-M</b>	The Arrangement of Foot Controls of Vehicles	AIS 035	30 mm to 500 mm
<b>42.</b>	<b>Automotive Vehicles of category "L1 &amp; L2"</b>	Identification of Controls, Tell-Tales, Indicators, Control Location & Operations Requirements	AIS 126 Amd.01-2017	Visual

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Sl.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection
43.	Automotive Vehicles of category L, M, N, A and C	Identification of Controls Tell-Tales and Indicators	AIS 071 (Part1& Part2) Amd.01-2015	Visual
44.	Automotive Vehicles- passenger cars	Wheel Guards For Passenger Cars- Performance Requirements	IS 13943:1994 Amd.01-2016	10 mm to 2000 mm
45.	Automotive Vehicles of vehicle category M1 & N1	Temporary-Use Spare Wheel/Tyres and Run Flat Tyres Speed	AIS-110:2009 Amd.01-2013	Upto 80 km/h
46.	Automotive vehicles-Fully Built Bus, FullyBuilt School Bus & Sleeper Coaches	Physical/Dimensional and Other verification of Buses (Bus Code)	AIS-052 (Rev.1):2008 Amd.08	10 mm to 20000 mm
		Physical/Dimensional and Other verification of School Buses	AIS-063:2005 Amd.09	10 mm to 20000 mm
		Specific Constructional Requirements for Sleeper Coaches	AIS-119 (Rev 1):2016	10 mm to 20000 mm
47.	Automotive vehicles-Other than 2W & 3W	Measurement of Ground Clearance	IS 9435-2004	30 mm to 500 mm
48.	Automotive vehicles-Category	Physical/Dimensional and Other verification of	AIS 056 Rev. 01	10 mm to 20000 mm

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Sl.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection
	<b>N2 &amp; N3 Vehicles</b>	Truck Cabin Ventilation System for Category N2 & N3 Vehicles		
		Physical/Dimensional and Other verification for Construction and Approval of Truck Cabs & Truck Bodies	AIS-093 (Rev.1) and Amd. 1 and 2	10 mm to 20000 mm
49.	<b>Automotive vehicles-Category M &amp; L Vehicles</b>	Constructional and Functional Requirements for Road Ambulances	AIS-125 (Part 1) and Amd 1 & 2	10 mm to 20000 mm
50.	<b>Pneumatic tyres for passenger car vehicles diagonal and radial ply</b>	Dimensional check	IS 15633-2005	
		Section width of tyre	AIS 110	100 mm to 400 mm
		Tyre outer diameter	ECE R 30 amendment No.2 Rev No.3 ADR 23 SANS:20030-2007	200 mm to 1000 mm
		Load/Speed Performance Test	IS 15633-2005 AIS 110 ECE R 30 amendment No.2 Rev No.3 ADR 23 SANS:20030-2007	20 °C to 40 °C/ 30 °C 100 km/h to 350 km/h 200 kg to 2500 kg 100 kPa to 500 kPa
		Endurance Test	IS 15633-2005	20 °C to 40 °C 80 km/h to 90 km/h 200 kg to 10000 kg 100 kPa to 1000 kPa
			IS 15633-2005	50 (±) 1.5 mm/minute

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		Bead Unseating Resistance Test for Tubeless Tyre	AIS 110	100 kg to 3000 kg 10 kPa to 180 kPa
		Tyre Strength Test	IS 15633-2005 AIS 110	50 (±) 1.5 mm/minute 100 kg to 10000 kg 100 kPa to 500kPa
		Tread-Wear-Indicators	IS 15633-2005 AIS 110 ECE R 30 amendment No.2 Rev No.3 ADR 23 SANS:20030-2007	1.0 mm to 5 mm
		Markings	IS 15633-2005 AIS 110 ECE R 30 amendment No.2 Rev No.3 ADR 23 SANS:20030-2007	5 mm to 50 mm
III.	<b>RUBBER AND RUBBER PRODUCT</b>			
1.	Rubber	Durometer Hardness Rubber:Shore A Plastic:Shore D	ASTM D2240-2015	20 Shore A & D to 90 Shore A & D
		Hardness (IRHD) Micro & Normal	ASTM D1415-2006 (2012)	30 IRHD M &N to 95 IRHD M &N
IV.	<b>PLASTICS &amp; PLASTIC PRODUCTS</b>			
1.	Plastic	Durometer Hardness Rubber:Shore A	ASTM D2240-2015	20 Shore A & D to 90 Shore A & D

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		Plastic:Shore D Hardness (IRHD) Micro & Normal	ASTM D1415-2006 (2012)	30 IRHD M &N to 95 IRHD M &N
V.	<b>NOISE AND VIBRATION</b>			
1.	Automotive porous materials such as foams, fibers, boards scrims, blankets	Flow resistivity	ISO 9053-1991 and ASTM C-522-2003	1000 to 1000000 (N.s/m <sup>4</sup> )
2.	Automotive porous material such as foam, fibers, dash panel, carpet, seats, headliners, jute	Normal incidence sound absorption coefficient measurement using impedance tube	ISO 10534-2-1998, ASTM E-1050-2012	100 Hz to 6300 Hz (0.05 to 1)
3.	Automotive sound package materials such as floor carpet, dash panel, headliner, hood insulator Non-Automotive building acoustic materials such as PU foam, Rockwool Glass wool, Curtains, ceiling tiles	Random incidence sound absorption coefficient measurement using Reverberation chamber	ISO 354-2003 and ASTM C-423-17	125 Hz to 5000 Hz (0.05 to 1)
4.	Automotive sound Package materials	Sound transmission loss measurement	ISO 10140-2-2010/ ASTM E 90-09	125 Hz to 5000 Hz (6 dB to 70 dB)



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	such as Floor Carpet, Dash Panel, Headliner, Glass Panel, Sheet Metal etc. Non-Automotive Building Acoustic Materials Such as Drywall Partitions, Glass Partitions, Roofing Systems, Doors, Windows	using reverberation chambers		
5.	Horn	Measurement of sound level	IS 1884:1993	80 dBA to 125 dBA
		Sound spectrum	ECE R-28-Rev. 2 (Amendment 3, Supplement 3 to original version of the regulation)	80 dBA to 125 dBA (1.6 KHz to 4 KHz)
		Endurance		1 sec ON/4 sec (3 sec) OFF
		Vibration test	SANS:20028-1972	10 to 55 Hz, 0.75 mm 3 hrs
		Corrosion Resistance Test		25 °C to 55 °C 1 hrs to 1000 hrs.
		Damp Heat Test (Cycling test)		25 °C to 55 °C 80 % to 95 % RH 7 cycles (24 hrs. one cycle)
		Water Spray Proof Test		Precipitation of 2.54 mm of water per minute at 45° spray angle, 4 rev/min, 6 hrs.

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Sl.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection
		Temp Stability Test		70°C/55°C for 4hrs/16hrs and -10°C for 2 hrs
		Insulation Resistance test		50 °C to 60 °C, 95 %RH 48 hrs, 500 V dc
		Current Draw Test		At rated voltage current measurement Upto 15A
		Operating Voltage Range Test		From 5 Vdc to 30 Vdc
		High Voltage test		AC 240 V rms, frequency between 40 HZ to 60 HZ for 5 seconds
		Continuous operation test		80 dBA to 125 dBA
		Dust Test		At interval of 15min., 2 sec. dust agitation, 5hrs test duration
VI.	AUTOMOTIVE COMPONENTS			

**Laboratory**

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Sl.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection
1.	Safety Glass	Dimensional check (thickness) (Laminated and Toughened)	IS 2553 (Part II)-1992	1 mm to 25 mm
		Fragmentation Test (Toughened)	ECE R-43-01 supplement 2 to the 01 series of amendments	40 nos to 400 nos.
		Mechanical Strength/Impact Resistance test (Laminated & Toughened)	SANS:20043-2005	(-) 15°C, 60°C & Ball weight:227g, Height of drop:1.5 to 12 m
		Penetration (Laminated)		Ball weight 2260g, Height of drop:1.5 to 12m
		Resistance to high temperature (Boil test)		60 ° C to 100 ° C
		Temperature and humidity (Laminated)		30 ° C to 180 ° C 95%RH
		Head form (Laminated)		Weight of Head Form 10 kg, Height of drop:4 m
		Resistance to radiation (Laminated)		750 W (±) 50 W
2.	Door Hinges & latches	Longitudinal load test for Hinges & latches	IS 14225-1995	100 kgf to 30000 kgf
		Transverse load test for Hinges & latches	ECE R-11-03 supplement 03 to the 03 & 04 series of amendments SANS:20011-1981	
3.	Rear View Mirror	Radius of curvature	AIS 001, Rev 01, Part1 and Part 2-2011	100 mm to 2000 mm

**Birendra Prasad Murmu  
Convenor**

**N. Venkateswaran  
Program Manager**

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Sl.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection
		Co-efficient of reflection	ECE R 81-Amendment 1 Supplement 2 to the 00 series of amendments.	2.5 % Upto 100 %
		Impact test	ECE R-46, Rev3, Supplement 4 to the 02 series of amendments.	2 ° to 60 °
		Bending test	ADR 14, 2006 Amendment 1	At 25 Kg Load
4.	LPG Pressure Regulator, LPG solenoid valve, Gas air mixer	Tests for Class 1, Class 2 (A) and Class 3	ECE R-67-04	
		Over Pressure		1000 kPa to 10000 kPa
		External Leakage		1000 kPa to 10000 kPa (-) 40 °C to 120 °C
		High temperature		1000 kPa to 10000 kPa (-) 40 °C to 120 °C
		Low temperature		1000 kPa to 10000 kPa (-) 40 °C to 120 °C
		Seat leakage		1000 kPa to 10000 kPa
		LPG compatibility		Weight loss <5% Volume change 20% Max.
		Corrosion resistance		25 °C to 55 °C test temp. 1 hrs to 1000 hrs. 500 g to 10 kg
		Resistance to dry heat.		50 °C to 150 °C temp.
		Creep.		1000 kPa to 10000 kPa 30 °C to 120 °C
		Temperature cycle.		(-) 40 °C to 120 °C
5.	Electrical Fuse	Electrical Fuse Test	AIS 026:2002	5 Amp. to 13.5 Amp.

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Sl.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection
			Clause No.12 (c) AIS 028:2015 Clause No.4.3.3	10 sec to 70 min.
6.	CNG Pressure Regulator, CNG Solenoid Valve, CNG Gas Air Mixer	Hydro-static strength. Leakage Excess Torque Resistance Electrical over voltages. Vibration Resistance Acceleration Frequency Range Sweep Time Resonance frequency Corrosion resistance Brass Material compatibility. Insulation resistance. Minimum opening voltage. Pressure impulse. Water jacket freezing.	ISO 15500:Part 9-2016, Part 6-2016, Part 11-2015 Part 2-2016 IS 15712-2006; IS 15713-2006; IS 15714-2006	5 MPa to 100 MPa 5 MPa to 30 MPa 3 kg-m to 14 kg-m 9 Volts DC to 18 Volts DC, for 3 minutes 1.5g, 10Hz to 500 Hz 10 minute 500Hz Qualitative (Sodium Chloride concentration in distilled or deionized water 50 g/l., 35°C test temp. for 144 hrs or 500 hrs.) Exposure to Ammonia air mixer at 34°C for 10 days. 10 kΩ to 240 kΩmin. 8 to 16 V DC at 0.75 times WP 1 MPa to 20 MPa (-) 10 °C or (-) 40 °C

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Sl.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection
7.	CNG Rigid piping and connections	Burst Pressure Test	AIS 028-2002 Clause No.3.1.1 IS 15716-2006	10 MPa to 100 M Pa
		Corrosion Resistance Test	ASTM B117-2007	25 °C to 55 °C test temp. 1 hrs to 1000 hrs. 500 g to 10 kg
8.	LPG Rigid piping and connections	Pressure Test	AIS 026:2002 Clause No.9 (a)(i).	10 kg/cm <sup>2</sup> to 100 kg/cm <sup>2</sup>
9.	Wheel Rim	Radial Fatigue test	IS 9436-1980	500 kgf to 3000 kgf
		Corner Fatigue test	IS 9438-1980	500 kg-m to 3000 kg-m
10.	Hydraulic brake hose	Visual examination	IS 7079:2008	Within 1 sec.to 10 sec.
		Constriction test		Pressure 0.5 Mpa to 2 Mpa Rotational speed 100 rpm to 900 rpm Whip life of min1-100HRS.
		Whip test		10 MPa to 100 MPa
		Pressure test		10 MPa to 100 MPa
		Burst test		10 N to 4000 N
		Tensile test		(-) 20 °C to (-) 50 °C
		Cold bend test		Burette:0.5 cc to 10 cc 1 MPa to 30 MPa
		Expansion test		25 °C to 55 °C test temp. 1 hrs to 1000 hrs. 500 g to 10 kg
		Salt spray test		10 pphm to 100 pphm
Ozone resistance test				

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Sl.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection
		Brake fluid compatibility		50 °C to 120 °C
		Hot Impulse Strength Test		1 MPa to 11 MPa; 30 °C to 150 °C
		Water Absorption Test		30 °C to 85 °C
11.	Anti-theft devices (Device to prevent unauthorized use)- Locks the steering	Torque test for key	AIS 075-2005 ECE R 18:Rev 3, 03 series of amendments ECE R 116 Rev 2	0.5 Nm to 2.45Nm
		Lock Bolt strength test	AIS 075-2005 ECE R 18:Rev 3, 03 series of amendments ECE R 116 Rev 2	10 Nm to 300 Nm
		Wear Producing test	AIS 075-2005 ECE R 18:Rev 3, 03 series of amendments ECE R 116 Rev 2	5 Nm to 50Nm
12.	Anti-theft devices (Device to prevent unauthorized use)	Torque test for key (component level and vehicle level)	AIS 074 ECE R 62; amendment 01 corrigendum 1 ECE R 116 Rev 2	0.5 Nm to 2.45 Nm

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		Lock Bolt strength test (component level and vehicle level)	AIS 074 ECE R 62; amendment 01 corrigendum 1 ECE R 116 Rev 2	10 Nm to 200 Nm
13.	Metallic-Fuel Tank for 4 Wheelers	Leakage test	IS 12056:1987 Cl. No 4.1, AIS 104, Cl. No. 4.1.1	10 g to 100 g/min when inverted for 5 minutes for Tractor 10 g to 100 g/min (PTO power up to 75kW) 10 g to 100 g/min (PTO power above 75kW)
		Pressure test	IS 12056:1987 Cl. No. 4.3 ECE R 34-2001 Cl. 6.1 AIS 104, Cl. No. 4.1.3	Qualitative (No mechanical failure of tank.)
		Vent Size (diameter)	IS 12056:1987 Cl. No. 4.2	1 mm to 10 mm (vehicles Upto 6000 Kg)/ 1mm to 2 mm (vehicles above 6000 Kg)
14.	Metallic-fuel tank for 2 and 3 W	Leak Tightness Test	IS 14681:1999 Cl. No 3.1, EEC 97/24 Ch.VI Annex-1 Cl. No. 1.3	10 kPa to 600 kPa
		Leakage Test	IS 14681:1999 Cl. No 3.2, EEC 97/24 Ch.VI, Annex-1 Cl. No. 1.3	10 ml/minute to 100 ml/minute



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Sl.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection
15.	Non-Metallic fuel tank for 2 and 3W	Permeability Test	IS 14681:1999 CI No 4.1 EEC 97/24 Ch.VI, Cl. No. 2.1.1	20 g/day
		Leak Tightness Test	IS 14681:1999 CI No 3.1 EEC 97/24 Ch.VI, Annex-I Cl. No. 1.3	5 kPa to 50 kPa
		Leakage Test	IS 14681:1999 CI No 3.2 EEC 97/24 Ch.VI, Annex-I Cl. No. 1.3	1 ml/minute to 100 ml/minute at the end of 5 minutes
		Shock Test	IS 14681:1999 CI No 4.2 EEC 97/24 Ch.VI, Cl. No. 2.2	(-) 10 °C to (-) 20 °C
		Mechanical Strength Test	IS 14681:1999 CI No 4.3 EEC 97/24 Ch.VI, Cl. No. 2.3	25 °C to 60 °C 0.1 kg/cm <sup>2</sup> to 0.5 kg/cm <sup>2</sup>
		Fuel Resistance Test	IS 14681:1999 CI No 4.4 EEC 97/24 Ch.VI, Cl. No. 2.4	(±) 25 %
		Fire Resistance Test	IS 14681:1999 CI No 4.5 EEC 97/24 Ch.VI, Cl. No. 2.5	0.1 mm/s to 0.80 mm/s
		High temperature test	IS 14681:1999 CI No 4.6 EEC 97/24 Cl. No. 2.6	30 °C to 70 °C

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**MECHANICAL TESTING**

LOCATION 2				
<b>I.</b>	<b>PERFORMANCE/DURABILITY/SAFETY TEST</b>			
<b>1.</b>	<b>Seats and their Anchorages</b>	Dynamic test (Resistance to Inertia Effects) (Using Bending bar sled test facility)	Cl. 5.1, 5.3 of IS 15546:2005 Cl. 6.3 of ECE 17.08 Cl. 4.2.3, 4.3.3 of AIS-023 Cl. 6.3 of Appendix A of ADR 3/03 Cl. 6.3 of SANS 20017:2004	'g' Level Upto 50g, Pulse Width Upto 150 ms
<b>2.</b>	<b>Seats</b>	Luggage Retention test (Using Bending bar sled test facility)	Cl. 6.3 of ECE 17.08 Cl. No. 5.9 of IS15546:2005 Cl.5.15 of Appendix A of ADR 3/03 Cl.5.15 SANS 20017:2004	'g' Level 24 (±) 4g Within Specific Corridor, Speed 49 kmph to 50 kmph, Seat Back Movement wrt R Point Upto 200 mm

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Sl.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection
3.	Ambulance Stretcher	Dynamic test (Resistance to Inertia Effects) (Using Bending bar sled test facility)	Clause 5.0 of AIS-125 (Part 1) including Amendment No. 2	'g' Level 10 ( $\pm$ ) 2g Within Specific Corridor
4.	Tests on Crash Test Dummies			
A.	Hybrid-III 50%tile dummy	Head drop Test	Annex 7 of AIS-098 including Amendment No. 2	Resultant Acceleration 225 g to 275 g, Lateral Acceleration ( $\pm$ ) 15 g,
			Cl. 2.0 and Annex 10 of ECE 94.03	Unimodal Oscillation < 10%
B.	Eurosid-II Dummy		Annex 3(B) of AIS-099 including Amendment No. 2 Annex 6 of ECE 95.03	Resultant Acceleration 100 g to 150 g
C.	Hybrid-III 50%tile dummy	Neck Flexion Test	Annex 7 of AIS-098 including Amendment No. 2 Cl. 2.0 and Annex 10 of ECE 94.03	Velocity 6.89 m/s to 7.13 m/s, Acceleration 29 g max, Rotation 64 to 78°, Moment 88.1 Nm to 108.4 Nm
		Neck Extension Test		Velocity 5.94 m/s to 6.19 m/s, Acceleration 22g max, Rotation 81 to 106°, Moment 52.9 Nm to 80 Nm

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D.	Eurosid-II Dummy	Neck Test	Annex 3(B) of AIS-099 including Amendment No. 2 Annex 6 of ECE 95.03	Velocity 3.3 m/s to 3.5 m/s, Pendulum Velocity within specified corridor, Head Flexion Angle 49 to 59°, Fore and Aft angle 26.8 to 32.5°
E.	Hybrid-III 50%tile dummy	Thorax Impact Test	Annex 7 of AIS-098 including Amendment No. 2 Cl. 2.0 and Annex 10 of ECE 94.03	Velocity 6.59 m/s to 6.83 m/s, Chest Deflection 63.5 mm to 72.6 mm, Pendulum Force 5.16 kN to 5.9 kN, Internal Hysteresis between 69 % to 85 %
		Knee Impact Test	Annex 7 of AIS-098 including Amendment No. 2 Cl. 2.0 and Annex 10 of ECE 94.03	Velocity 2.07 m/s to 2.13 m/s, Pendulum Force 4.715 kN to 5.782 kN
		Knee Slider Impact Test	Annex 7 of AIS-098 including Amendment No. 2 Cl. 2.0 and Annex 10 of ECE 94.03	Velocity 2.7 m/s to 2.8 m/s, Femur Force 1.26kN to 3.1 kN, Displacement 10.2 mm to 17.8 mm
		Hip Joint Range of Motion Test	Annex 7 of AIS-098 including Amendment No. 2 Cl. 2.0 and Annex 10 of ECE 94.03	Rate of Torque between 5 °/s to 10 °/s, Femur Angle between 40° to 50°, Torque Upto 203 Nm

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Sl.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection
		Upper Foot Impact Test	Annex 7 of AIS-098 including Amendment No. 2 Cl. 2.0 and Annex 10 of ECE 94.03	Velocity 6.6 m/s to 6.8 m/s, lower tibia bending momentum about the y-axis(My) between 95 Nm to 145 Nm
		Lower Foot Impact Test Without Shoe		Velocity 4.3 m/s to 4.5 m/s, Impactor Acceleration between 245 g to 345 g
		Lower Foot Impact Test With Shoe		Velocity 6.6 m/s to 6.8 m/s, Tibia Compressive Force between 2.8 kN to 3.8 kN
F.	Eurosid-II Dummy	Rib Module Test	Annex 3(B) of AIS-099 including Amendment No. 2	Velocity 3.96 m/s to 4.04 m/s, Rib Deflection 46 mm to 51 mm
			Annex 6 of ECE 95.03	Velocity 1.98 m/s to 2.02 m/s, Rib Deflection 23.5 mm to 27.5 mm
		Lumbar Spine Impact Test	Annex 3(B) of AIS-099 including Amendment No. 2 Annex 6 of ECE 95.03	Velocity 2.97 m/s to 3.03 m/s, Rib Deflection 36 mm to 40 mm Velocity 5.95 m/s to 6.15 m/s, Pendulum velocity within specified corridor, Head Flexion Angle 45 to 55°, Fore and Aft angle 26.7 to 34.2°

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		Shoulder Impact Test	Annex 3(B) of AIS-099 including Amendment No. 2 Annex 6 of ECE 95.03	Velocity 4.2 m/s to 4.4 m/s, Pendulum Acceleration 7.5 g to 10.5 g
		Abdomen Impact Test	Annex 3(B) of AIS-099 including Amendment No. 2 Annex 6 of ECE 95.03	Velocity 3.9 m/s to 4.1 m/s, Peak Abdomen Force 2.2 kN to 2.7 kN, Max Pendulum Force between 4.0 kN to 4.8 kN
		Pelvis Impact Test	Annex 3(B) of AIS-099 including Amendment No. 2 Annex 6 of ECE 95.03	Velocity 4.2 m/s to 4.4 m/s, Pubic Force 1.04 kN to 1.64 kN
5.	Passenger vehicles category of M1 and N1, including vehicles equipped with electric power train	Full Frontal Collision (Crash) Test	Cl. 7 of IS 11939:1996 (RA 2012) Cl. 5.1 of AIS-096 including Amendment No. 4 Cl. 5.1 of ECE 12.04 Cl 10.2.2, 10.2.3 and 10.2.4 of ADR 10/00 SANS 20012:1994/ECE R12:1994 Rev 3	Speed between 48.3 kph to 53.1 kph, Total Vehicle Mass Upto 3500 kg
		Offset Frontal Collision (Crash) Test	Cl. 5.2 of AIS-098 including Amendment No. 2 Cl. 5.2 of ECE 94.03 Cl. 5.1 of ADR 73/00 SANS 20094:2009/ECE R94:2007 Rev1	Speed 56 kph to 57 kph, Total Vehicle Mass Upto 3500 kg

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		Lateral Collision (Crash) Test	Cl. 5.2 of AIS-099 including Amendment No. 2 Cl. 5.1 of ECE 95.03 Cl. 5.1 of ADR 72/00	Speed 49 kph to 51 kph, Total Vehicle Mass Upto 3500 kg
		Rear Impact (Crash) Test	Cl. 5.0 of AIS-101 including Amendment No. 1	Speed between 35 kph to 38 kph, Total Vehicle Mass 3500 kg
6.	Front & Rear Bumpers of vehicle (Vehicle testing)	Vehicle Impact Test	Cl. No. 4.2 of IS 15901-2010 Annex-3 Cl. No. 2.7.5 & 2.8.4 of ECE 42.00	Speed: min.:4km/h for center impact min.:2.5km/h for corner impact
7.	Interior fittings	Head Form Impact Test (Using Occupant Impact test Rig)	Annex-4 Cl. No. 1.4.2 & 2.1 of ECE 21.01 Annex-B, Cl. No. B-1.4.2 & B-2.1 of IS 15223:2002 Appendix A, Annex-4 Cl. No. 1.4.2 & 2.1 of ADR 21 SANS 20021:1993	Velocity: min. 24.1 Km/h Deceleration: 80g
		Impact Test (Pendulum Impactor) (Using Universal Launcher-Pedestrian test facility)	Annex-4 Cl. No. 1.4.2 & 2.1 of ECE R 21.01 Annex-B, Cl. No. B-1.4.2 & B-2.1 of IS 15223:2002 Appendix A, Annex-4 Cl. No. 1.4.2 & 2.1 of ADR 21 SANS 20021:1993	Velocity: min. 24.1 Km/h Deceleration: 80g & 3 milliseconds
8.	Steering control	Body Block Test	Cl. No. 5.2 of ECE R 12.04,	Velocity: min. 24.1 Km/h

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	assembly	(Using Occupant Impact test Rig)	Cl. No. 6.1 of IS 11939:1996 (RA 2012) Cl. No. 5.2 of AIS 096 Appendix-A Cl.No. 5.2 of ADR10 SANS 20012:1994	Force:11150 N Deceleration:120 g
9.	Steering control assembly	Body Block Test  (Using Universal Launcher-Pedestrian test facility)	Cl. No. 5.2 of ECE R 12.04, Cl. No. 6.1 of IS 11939:1996 (RA 2012) Cl. No. 5.2 of AIS 096 Appendix-A Cl.No. 5.2 of ADR10 SANS 20012:1994	Velocity:min. 24.1 Km/h Peak Horizontal Force: 11150 N Methods: ↗ Tri-axial Load Cell ↗ Accelerometers
		Head Form Test  (Using Universal Launcher-Pedestrian test facility)	Cl. No. 5.3 of ECE R 12.04, Cl. No. 8.1 of IS 11939:1996 (RA 2012) Cl. No. 5.3 of AIS 096 Appendix-A Cl.No. 5.3 of ADR10 SANS 20012:1994	Velocity:min. 24.1 Km/h Deceleration:80 g & 3 Milliseconds Max.Acceleration:120 g
10.	Pedestrian safety			



**Laboratory**

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<b>A.</b>	<b>Front structure of Passenger cars</b>	Pedestrian Child head form test	Cl. 5.2. & 7.3 of AIS 100 Appendix-5 Cl.4 & Cl. 5.2 of ECE 127.02 Cl. 5.2. & 7.3 of GTR-9 Amendment 1	HIC≤1000 & HIC≤1700 Child Head form test area. Speed-9.7 (±) 0.2 m/s. Mass 3.5 (±) 0.07Kg Impact Angle-50° (±) 2 ° Target accuracy- (±) 10mm Temperature-20 (±) 4°C Humidity-40 (±) 30%
		Pedestrian Adult head form test	Cl. 5.2. & 7.4 of AIS 100 Appendix-5 Cl.5 & Cl. 5.2 of ECE 127.02 Cl. 5.2. & 7.3 of GTR-9 Amendment 1	HIC≤1000 & HIC≤1700 Adult Head form test area. Speed-9.7 (±) 0.2 m/s. Mass 4.5 (±) 0.1Kg Impact Angle-65° (±) 2 ° Target accuracy- (±) 10mm Temperature-20 (±) 4°C Humidity-40 (±) 30%

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		Pedestrian Upper leg form test	Cl. 7.1.2 & Cl 5.1 of AIS 100 Appendix-5 Cl.2 & Cl. 5.1.2 of ECE 127.02 Cl. 7.1.2 & Cl 5.1 of GTR-9 Amendment 1	Sum of Impact forces < 7.5kN, Bending moment < 510Nm, Speed 11.1 (±) 0.2 m/s. Mass 9.5 kg (±) 0.1 kg. Target accuracy-Vertical plane-±2 ° Lateral and vertical tolerance (±) 10mm
		Pedestrian Lower leg form test	Cl. 7.1.1 & Annex 5 Cl. 5.1 of AIS 100 Appendix-5 Cl.1 & Cl. 5.1.1 of ECE 127.02 Cl. 7.1.1 & Annex 5 Cl. 5.1 of GTR-9 Amendment 1	Dynamic Knee bending < 19°, Knee Shear Displacement < 6mm, Tibia Acceleration < 250g, Speed 11.1 (±) 0.2 m/s Mass-13.4 (±) 0.2 kg Target accuracy- Horizontal plane-(±) 2 ° Longitudinal plane-(±) 2 ° Lateral plane- (±) 2 ° About Vertical axis- (±) 5 ° Lateral and vertical tolerance (±) 10mm
<b>II.</b>	<b>MECHANICAL PROPERTIES OF METALS</b>			
<b>1.</b>	<b>Ferrous &amp; Non-Ferrous</b>	Tensile test at room temp. (Offset YS, Upper & Lower YS, UTS, % Elongation)	ASTM E8/ E8M-2016a	For YS, UTS, MoE: Load: 1 kN to 100 kN For Elongation: 1 % to 80 %
		Modulus of Elasticity	ASTM E111-2017	

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		Rockwell Hardness	IS 1586 (P.1):2012	30 HRBW to 100 HRBW 25 HRC to 65 HRC
2.	Carbon steels and Alloy steel	Inclusion Content of Steel	IS 4163:2004	100X By Comparison with standard Diagram
		Grain size analysis (Ferritic-untwinned Grain Size)	IS 4748:2009	100X By Comparison with standard Diagram Grain size 00-10
		Depth of decarburization	ASTM E1077-2014	100X (5 µm to 1200 µm)
3.	5 <sup>th</sup> wheel coupling and mounting plate	a) <u>Static test-1</u> Limit of deformation width under specified load b) <u>Static test-2</u> Separation of coupling pin under specified load	AIS 091/Part1,2009 & ECE R 55,2018 Annexure 6 clause No.3.7.2.2	Load: 50 kN to 500 kN
		<u>Dynamic test</u> Number of cycles for test pass or fail Horizontal force and vertical force	AIS 091/Part 1,2009 & ECE R 55,2018 Annexure 6 clause No.2.2 and 3.7.3.1	Horizontal force = 20 kN to 220 kN Vertical force = 50kN to 500 kN
4.	5 <sup>th</sup> Wheel King Pin	<u>Dynamic test</u> Number of cycles for test pass or fail	AIS 091/P 1,2009 & ECE R 55,2018 Annexure 5 clause 8 Annexure 6 clause No.2.2 and 3.9	Load: 50 kN to 500 kN
5.	Metals and Alloys	<u>Axial Fatigue Test:</u> Number of cycles for test pass or fail Fatigue life estimation (S-N Curve)	ASTME466-15	Load: 20 kN to 90 kN

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<b>III.</b>	<b>METALLOGRAPHY TEST</b>			
1.		Microstructure analysis by Optical Microscope and Scanning Electron Microscope	AML/TP/020 (Ref. ASM ATLAS Vol. 9,11,12)	50X to 1000X
		Evaluation of Elements by Energy Dispersive Analysis (EDS) on SEM	AML/TP/038 (Ref. ASM ATLAS Vol. 9, 11, 12)	Qualitative analysis of Elements B,C,N, O,F, Na, Mg, Al, Si, P, S, Cl, K, Ca, Ti, V, Cr, Mn, Fe, Co, Ni,Cu,Zn,Br, Sr,Zr,Nb, Mo,Rh,Ag, Cd,Sn,Sb, Ba,W,Pt,Au, Pb when present at % level
<b>IV.</b>	<b>PLASTICS &amp; PLASTIC PRODUCTS</b>			
1.	<b>Plastic Materials</b>	Tensile test of plastics (Room temp.) (YS, TS & Elongation)	ASTM D638-2014	50 N to 100 kN Elongation Range: 1 % to 100%
		Flexural strength of Plastics (Room Temp.)	ASTM D790:2017	50 N to 100 kN
<b>V.</b>	<b>RUBBER &amp; RUBBER PRODUCTS</b>			
1.	<b>Rubber Materials</b>	Compression Set Test for Rubber	ASTM D395-16 Test Method B	Deflection: Upto 25% Temp:50 °C to 200 °C
		Tensile strength of rubber	ASTM D412-16 Method A	50 N to 1000 N

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**PHOTOMETRY TESTING**

LOCATION 1				
I.	<b>LIGHT SOURCES (ELECTRIC LAMP)</b>			
1.	<b>Head lamp</b>	Light distribution and Colour Measurement in a) driving beam, b) passing beam	AIS 010 (Part 1, 2 and 4)- Rev. 1-Dec. 2010 AIS 010 (Part 5)- Rev. 1-Dec. 2010 ECE R-112 (Oct. 2008), ECE R 113 (July 2009) ADR 46/00 2006	1 lx to 300 lx 0.001 co-ordinates to 0.5 co-ordinates (x and y)
2.	<b>Stop lamp</b>	i) Light distribution ii) Colour measurement iii) Illumination area	AIS 010 (Part 3)- Rev. 1-Dec. 2010 AIS 010 (Part 5)- Rev. 1-Dec. 2010 AIS 012 (Part 6)- Rev. 1-Dec. 2010 ECE R-50 (Oct. 2008) ECE R-7 (Mar. 2009) ADR 53/00 2006 ADR 49/00 2006 ADR 60/00 2006 SANS 20050-2007 SANS 20007-2002	1 cd to 1000 cd 0.001 co-ordinates to 0.5 co-ordinates (x and y)
3.	<b>Front Position (side) lamps and Front end-outline marker lamps</b>			
4.	<b>Front position (side) lamps incorporated in head lamps</b>			
5.	<b>Rear Position (side) lamps and Rear end-outline marker lamps</b>			

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<b>6.</b>	<b>Direction indicator</b>	i) Light distribution ii) Colour measurement iii) Illumination area	AIS 010 (Part 3)- Rev. 1-Dec. 2010 AIS 010 (Part 5)- Rev. 1-Dec. 2010 AIS 012 (Part 5)- Rev. 1-Oct. 2011 ECE R-50 (Oct. 2008) ECE R-6 (Mar. 2009) ADR 6/00 2005 ADR 53/00 2006 SANS 20050-2007 SANS 20006-2003	1 cd to 1000 cd 0.001 co-ordinates to 0.5 co-ordinates (x and y)
<b>7.</b>	<b>Reverse lamp</b>	i) Light distribution ii) Colour measurement iii) Illumination area	AIS 010 (Part 3)- Rev. 1-Dec. 2010 AIS 010 (Part 5)- Rev. 1-Dec. 2010 AIS 012 (Part 7)- Rev. 1-Oct. 2011 ECE R-50 (Oct. 2008) ECE R-23 (Oct. 2008) ADR 53/00 2006 ADR 1/00 2005 SANS 20050-2007 SANS 20023-2012	1 cd to 1000 cd 0.001 co-ordinates to 0.5 co-ordinates (x and y)
<b>8.</b>	<b>Front Fog lamp</b>	i) Light distribution ii) Colour	AIS 012 (Part 1)- Rev. 1-Oct. 2011 AIS 010 (Part 5)- Rev. 1-Dec. 2010 ECE R-19 (Mar. 2009)	1 cd to 1000 cd 0.001 co-ordinates to 0.5 co-ordinates (x and y)

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9.	Rear fog lamp	i) Light distribution ii) Colour measurement iii) Illumination area	AIS 012 (Part 2)- Rev. 1-Oct. 2011 AIS 010 (Part 5)- Rev. 1-Dec. 2010 ECE R-38 (Oct. 2008) ADR 52/00 2006	1 cd to 1000 cd 0.001 co-ordinates to 0.5 co-ordinates (x and y)
II.	LUMINARIES			
1.	Number plate lamp	i) Luminance distribution ii) Gradient of Luminance	AIS 010 (Part 3)- Rev. 1-Dec. 2010 AIS 010 (Part 5)- Rev. 1-Dec. 2010 AIS 012 (Part 4)- Rev. 1-Oct. 2011 AIS 62(Dec. 2004) ECE R-50 (Oct. 2008) ECE R-4 (July 2008), ADR 53/00 2006 ADR 48/00 2006 SANS 20050-2007 SANS 20004-2012	1 cd/m <sup>2</sup> to 1000 cd/m <sup>2</sup>
2.	Filament lamp Test	i) Electrical measurements i) Photometric measurements ii) Colour measurement	AIS 034 (Part 1)- Rev. 1-Dec. 2010 ECE R-37 (Oct. 2009) ADR 51/00 2006 SANS 20037-2007	1 lm to 5000 lm 0.1 VDC to 30 VDC 0.01 A to 10 A 0.001 co-ordinates to 0.5 co-ordinates (x and y)

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III.	<b>GLASSES/MIRRORS</b>			
1.	<b>Reflex Reflector and Warning Triangle.</b>	i) Photometric Measurement (Co-efficient of Luminous Intensity) ii) Colour measurement	AIS 057-Rev. 1-Dec. 2010 AIS 22 (May 2001), ECE R27(Feb. 2007) ECE R3(Feb 1998) ADR 47/00 2006 SANS 20027-1998 SANS 20003-2005	1 mcd/lx to 50000 mcd/lx 0.001 co-ordinates to 0.5 co-ordinates (x and y)
2.	<b>Safety Glass</b>	i) Light Transmission ii) Optical distortion iii) Image Separation	IS 2553 (Part II) ECE R-43 (Aug. 2007), SANS 20043-2005 ABNT NBR 9503 ABNT NBR 9504	1 % to 100 % 0.4 Minutes to 8 Minutes of arc Visual