

Table 1 Requirement for Motor Gasoline BS-IV & BS-VI Grades
(Clauses 4.1.4, 4.2.2 and 4.4)

Sl No.	Characteristic	Requirements MG BS IV Grade	Requirements MG BS VI Grade	Method of Test, IS 1448 / Annex of IS 2796 / ISO / ASTM Alternate Methods
(1)	(2)	(3)	(4)	(5)
i)	Appearance	Clear and bright. Free from un-dissolved water, foreign matter and other visible impurities	Clear and bright. Free from un-dissolved water, foreign matter and other visible impurities	Visual
ii)	Colour:			Visual
	a) MG 91	Orange	Orange	
	b) MG 95	Red	Red	
iii)	Density at 15°C, kg/m ³	720-775	720-775	[P:16] ⁹⁾ / ISO 3675 / ASTM D 4052/ISO 12185/ ASTM D 1298 / IP 160
iv)	Distillation:			[P:18] ⁹⁾ / ISO 3405 / ASTM D 86
	a) percent evaporated at 70°C (E 70°C), percent v/v:			
	1) Motor gasoline	10-45	10-45	
	2) E10	10-55 (Summer) 10-58 (Other months)	10-55 (Summer) 10-58 (Other months)	(See Note 1)
	b) percent evaporated at 100°C (E 100 °C), percent v/v	40-70	40-70	
	c) percent evaporated at 150°C (E 150 °C), percent v/v, <i>Min</i>	75	75	
	d) Final boiling point, °C, <i>Max</i>	210	210	
	e) Residue, percent by volume, <i>Max</i>	2.0	2.0	
v)	Research octane number (RON), <i>Min</i> :			[P:27] ⁹⁾ / ASTM D 2699
	a) MG 91	91	91	
	b) MG 95	95	95	
vi)	Motor octane number (MON), <i>Min</i> :			[P: 26] ⁹⁾ / ASTM D 2700
	a) MG 91	81	81	
	b) MG 95	85	85	
vii)	Gum content (Solvent washed), g/m ³ , <i>Max</i>	40	40	[P : 29] ⁹⁾ / ASTM D 381
viii)	Total sulphur, mg/kg, <i>Max</i>	50	10	P: 34 / P: 153/ ISO 20847 / ISO 20846 ⁹⁾ / ISO 13032 ⁹⁾ / ASTM D 2622/ D 3120/ D 5453/ D 7220 ASTM D 5059 ⁹⁾ / IP 224
ix)	Lead content (as Pb), g/l, <i>Max</i>	0.005	0.005	P : 39 / ASTM D 323 (wet methods) / D 5191 (dry method)/ D 6378/ EN 13016/ [Annex A] ⁹⁾ (dry method) (see Note 2)
x)	Reid vapour pressure (RVP) at 38°C, kPa , <i>Max</i> :			(see Note 1),
	a) MG (without ethanol)	60	60	
	b) Ethanol blended MG	67	67	
xi)	Vapour lock index (VLI), <i>Max</i>	Summer / (Other months)	Summer / (Other months)	Calculation : VLI = 10 x RVP + 7 x E 70°C
	a) MG (without ethanol)	750 / (950)	750 / (950)	
	b) MG (with 5 percent v/v ethanol)	900 / (1050)	900 / (1050)	
	c) E10	1050 / (1100)	1050 / (1100)	
xii)	Benzene content, percent by volume, <i>Max</i>	1	1	ASTM D 3606 (see Note 3) / ASTM D 5580 ⁹⁾ / D 6277 / D 6730/ D 6839/ ISO 22854
xiii)	Copper strip corrosion, for 3 h at 50°C, <i>Max</i>	Not more than No. 1	Not more than No. 1	[P:15] ⁹⁾ / ASTM D130
xiv)	Water tolerance of motor gasoline-alcohol blends, temperature for phase separation:			Annex-B
	a) Winter, °C, <i>Max</i>	0	0	
	b) Other months, °C, <i>Max</i>	10	10	(see Note 4)

Table 1 — (Concluded)

(1)	(2)	(3)	(4)	(5)
xv)	Engine intake system cleanliness	Report MFA used	Report MFA used	(see Note 5)
xvi)	Olefin content, percent by volume, <i>Max</i> :			[P:23] ⁹⁾ / ASTM D 1319 / D 6730/ D 6839/ ISO 22854
	a) MG 91	21	21	
	b) MG 95	18	18	
xvii)	Oxidation stability, minutes, <i>Min</i>	360	360	[P:28] ⁹⁾ / ASTM D 525 / IP 40
xviii)	Aromatics content, percent by volume, <i>Max</i>	35 ⁹⁾	35 ⁹⁾	[P:23] ⁹⁾ / ASTM D 1319 / D 5580/ D 6730 /D 6839 / ISO 22854
xix)	Oxygen content, percent by mass, <i>Max</i>	3.7	3.7	EN 1601/ IP 408/ ASTM D 4815 ⁹⁾ / D 5599 / D 6839
xx)	Ethanol content, percent by volume:			(See Notes 7 and 8) ASTM D 4815 ⁹⁾ / D 5599 / Annex C (Water extraction)
	a) Motor gasoline	5.0	5.0	
	b) E10	10.0	10.0	
xxi)	Oxygenates percent by volume, <i>Max</i>			ASTM D 4815
	a) Ethers containing 5 or more 'C' atoms per molecules such as MTBE, ETBE or TAME	15	15	
	b) Any other oxygenates	Not permitted	Not permitted	

NOTES

1 Summer shall be the period from April to July.

2 For the motor gasoline-alcohol blends, the dry vapour test method given in Annex A shall be followed.

3 It is applicable only for non-alcoholic motor gasoline.

4 In winter (Nov to Feb) it is expected that temperature may be lower than 0°C in the northern hilly region and hence phase separation shall not take place till -10 °C

5 Use of multifunctional additives (MFA) is a requirement for assuring adequate fuel system and intake system cleanliness performance in engines. Refiners/Marketers of motor gasoline have to ensure the MFA has proper credentials from internationally accepted test laboratories/ authorities, of having passed a minimum of one of the tests in each of the two categories of deposit control performance indicated below:

Deposit Type	Test No.	Test Equipment	Test Method	Pass limit (Average IVD (Weight))
a) Intake Valve Deposit (IVD)	1	BMW IVD Test	ASTM D 5500-98	100 mg/ valve, <i>Max</i>
	2	MB M102E IVD	CEC F-05-A-93	50 mg/ valve, <i>Max</i>
	3	FORD 2.3 Litre IVD	ASTM D 6201	90 mg/ valve, <i>Max</i>
	4	MB M111-IVD Test	CEC F-20-A-98	50 mg/ valve, <i>Max</i>
				Pass limit (percent Injector Flow Loss)
b) Port fuel injector deposit (PFI)	1	Chrysler PFI Test	ASTM D 5598-01	5 percent, <i>Max</i>
	2	PFI Deposit Rig	ASTM D 6421	10 percent, <i>Max</i>

Other performance tests may be added as and when they reach qualified/standard test status.

MFAs which are certified against National Generic Certification Option as per US EPA-97 final Rule (40 CFR Part 80 Certification Standards for Deposit Control Additives) can also be used by fuel refiners/Marketers at treatment levels not less than the Lower Additives Concentration (LAC) limits, as these MFAs meet the criteria for acceptance mentioned above.

6 Aromatic content relaxation and time frame, if any, for fuel processed from Assam Crude, may be guided by the notifications issued by Government of India, from time to time.

7 Corrosion inhibitors and/or stabilizing agents shall be added in case of 10 percent ethanol blended motor gasoline.

8 For routine analysis of ethanol content - ASTM D 5845 (FTIR) or Water extraction method shall be employed (see Annex C). Blending of ethanol shall be carried out at supply point of Oil Marketing Company's Depot / Terminal as per the directives of Ministry of Petroleum and Natural Gas (MoP&NG) from time to time. OMC shall ensure homogeneous blending of ethanol in motor gasoline in the range 4.5 to 5.0 percent by volume and 9.5 to 10.0 percent by volume for 5 percent and 10 percent ethanol blended motor gasoline respectively. In case ethanol is not blended, SI no xx) is not applicable.

9 In case of dispute, this method shall be the referee method

10 No external addition of silicon, chlorine based materials and metallic additives are allowed.

11 The colour of the branded motor gasoline can be decided by OMC, subject to such fuel meets all other requirements of the respective motor gasoline grade defined in the table.

12 All the test methods referred to in this standard include a precision statement. The Interpretation of results shall be based on test method and precision data of test method whenever applicable. In case of dispute the procedure described in ISO 4259 shall be used.