



BRAZIL





BRAZIL

1. Introduction:

Brazilian emissions regulation for light vehicles is based on American limits and procedures while for heavy duty vehicles and motorcycles it is based on European limits and procedures.

Diesel engines are only permitted for vehicles with load capacity of 1000 kg or greater, or for vehicles classified as off-road, which need to meet special technical requirements.

In the country there is an emissions official laboratory, belonging to CETESB, and several others from OEMs, suppliers of fuel injection systems and after-treatment systems, as well as research centers.

2. Vehicle categories

Category	Sub-category	Gross Vehicle Weight (kg)	Curb Weight (kg)	Reference Mass (kg)	Test Procedure	Alternative Procedure	Observation
Motorcycles		-	-	-	ECE R40 or WMTC	-	-
Light Vehicles	Passenger Cars and Variations	≤ 3856 kg	≤ 2720 kg	≤ 1700 kg	FTP75	-	-
	Commercial Vehicles and Off-road	≤ 3856 kg	≤ 2720 kg	≤ 1700 kg	FTP75	ESC ETC ELR	-
				> 1700 kg			
Heavy Duty Vehicles	Truck and Bus	> 3856 kg	> 2720 kg	-	ESC ETC ELR	FTP75	Alternative method for engine Otto and GVW ≤ 4536 kg
Equipments and Implements	Agricultural	-	-	-	NRSC	-	-
	Road Construction Equipment	-	-	-	NRSC	-	-

3. Emission limits

3.1. Limits for light vehicles

Category	Sub-category	Reference Mass (kg)	Fuel	Application Date	PROCONVE Phase	CO (g/km)	HC (g/km)	NMHC (g/km)	NOx (g/km)	CHO (g/km)	PM (g/km)	CO idling (%)	HC Evaporated SHED method (g/test)	Base Regul.
Light Vehicle	Passenger Car	≤1700 kg	Gasoline	In force	L5	2	-	0.05	0.12	0.02	-	0.5	1,5 / 2,0 *	Tier 2 Bin 9
				Jan/2014	L6	1.3	-	0.05	0.08	0.02	-	0.2	1,5 / 2,0 *	Tier 2 Bin 7
				New models Jan/2015 Other models	L6	1.3	-	0.05	0.08	0.02	-	0.2	1,5 / 2,0 *	Tier 2 Bin 7
			Ethanol	In force	L5	2	-	0.05	0.12	0.02	-	0.5	1,5 / 2,0 *	Tier 2 Bin 9
				Jan/2014	L6	1.3	-	0.05	0.08	0.02	-	0.2	1,5 / 2,0 *	Tier 2 Bin 7
				New models Jan/2015 Other models	L6	1.3	-	0.05	0.08	0.02	-	0.2	1,5 / 2,0 *	Tier 2 Bin 7
			Diesel	In force	L5	2	-	0.05	0.25	-	0.05	-	-	Tier 2 Bin 10
				Jan/2013	L6	1.3	-	0.05	0.08	-	0.025	-	-	Tier 2 Bin 7
			NCG	In force	L5	2	0.3	0.05	0.12	-	-	0.5	-	Tier 2 Bin 9
				Jan/2014	L6	1.3	0.3	0.05	0.08	0.02	-	0.2	-	Tier 2 Bin 7
				New models Jan/2015 Other models	L6	1.3	0.3	0.05	0.08	0.02	-	0.2	-	Tier 2 Bin 7
	Light Commercial	≤1700 kg	Gasoline	In force	L5	2	-	0.05	0.12	0.02	-	0.5	1,5 / 2,0 *	Tier 2 Bin 9
				Jan/2014	L6	1.3	-	0.05	0.08	0.02	-	0.2	1,5 / 2,0 *	Tier 2 Bin 7
				New models Jan/2015 Other models	L6	1.3	-	0.05	0.08	0.02	-	0.2	1,5 / 2,0 *	Tier 2 Bin 7
			Ethanol	In force	L5	2	-	0.05	0.12	0.02	-	0.5	1,5 / 2,0 *	Tier 2 Bin 9
				Jan/2014	L6	1.3	-	0.05	0.08	0.02	-	0.2	1,5 / 2,0 *	Tier 2 Bin 7
				New models Jan/2015 Other models	L6	1.3	-	0.05	0.08	0.02	-	0.2	1,5 / 2,0 *	Tier 2 Bin 7
			Diesel	In force	L5	2	-	0.05	0.25	-	0.05	-	-	Tier 2 Bin 10
				Jan/2012 Jan/2013**	L6	1.3	-	0.05	0.08	-	0.03	-	-	Tier 2 Bin 7
			NCG	In force	L5	2	0.3	0.05	0.12	-	-	0.5	-	Tier 2 Bin 9
				Jan/2014	L6	1.3	0.3	0.05	0.08	0.02	-	0.2	-	Tier 2 Bin 7
				New models Jan/2015 Other models	L6	1.3	0.3	0.05	0.08	0.02	-	0.2	-	Tier 2 Bin 7
	> 1700 kg		Gasoline	In force	L5	2.7	-	0.06	0.25	0.04	-	0.5	1,5 / 2,0 *	Tier 2 Bin 9
				Jan/2014	L6	2	-	0.06	0.25	0.03	-	0.2	1,5 / 2,0 *	Tier 2 Bin 9
				New models Jan/2015 Other models	L6	2	-	0.06	0.25	0.03	-	0.2	1,5 / 2,0 *	Tier 2 Bin 9
			Ethanol	In force	L5	2.7	-	0.06	0.25	0.04	-	0.5	1,5 / 2,0 *	Tier 2 Bin 9
				Jan/2014	L6	2	-	0.06	0.25	0.03	-	0.2	1,5 / 2,0 *	Tier 2 Bin 9
				New models Jan/2015 Other models	L6	2	-	0.06	0.25	0.03	-	0.2	1,5 / 2,0 *	Tier 2 Bin 9
			Diesel	In force	L5	2.7	-	0.06	0.43	-	0.06	-	-	Tier 2 Bin 9
				Jan/2012 Jan/2013**	L6	2	-	0.06	0.35	-	0.04	-	-	Tier 2 Bin 9
	> 1700 kg		NCG	In force	L5	2.7	0.5	0.06	0.25	-	-	0.5	-	Tier 2 Bin 9
				Jan/2014	L6	2	0.5	0.06	0.25	0.03	-	0.2	-	Tier 2 Bin 9
				New models Jan/2015 Other models	L6	2	0.5	0.06	0.25	0.03	-	0.2	-	Tier 2 Bin 9

* Alternative limit for VTSHED test, according to procedure CFR Vol.40 P.86

** Jan/2012 as defined by TAC postponing PROCONVE P7 and Jan/2013 as defined in the Resolution CONAMA 415/2009

3.2. Limits for heavy duty vehicles

Category	Sub-category	Fuel	Application date	PROCONVE phase	CO (g/kWh)	HC (g/kWh)	NMHC * (g/kWh)	NOx (g/kWh)	CH ₄ (g/kWh)	PM (g/kWh)	Opacity (m ⁻¹)	NH ₃ Average (ppm)	Test Cycle	Base Regul.
Heavy duty vehicle	Trucks and buses	Diesel	In force	P5	2,1	0,66	-	5	-	0,1 / 0,13 **	0,8	-	ESC/ELR	Euro III
			Hom. date < 2009		5,45	-	0,78	5	-	0,16 / 0,21 **	-	-	ETC	
			In force	P6	1,5	0,46	-	3,5	-	0,02	0,5	-	ESC/ELR	Euro IV
			Hom. date ≥ 2009		4	-	0,55	3,5	-	0,03	-	-	ETC	
		NCG	Jan/2012	P7	1,5	0,46	-	2	-	0,02	0,5	25	ESC/ELR	Euro V
					4	-	0,55	2	-	0,03	-	25	ETC	
			In force	P5	5,45	-	0,78	5	1,6	-	-	-	ETC	Euro III
			In force	P6	4	-	0,55	3,5	1,1	-	-	-	ETC	Euro IV
			Hom. date ≥ 2009											
			Jan/2012	P7	4	-	0,55	2	1,1	-	-	25	ETC	Euro V

* THC results are accepted as long as the results are below the NMHC limit

** For engines with cylinder capacity < 0,75 dm³ and nominal speed >3000 rpm

3.3. Limits for motorcycles

Category	Engine Displacement	Application Date	PROMOT Phase	CO (g/km)	HC + NOx (g/km)	HC (g/km)	NOx (g/km)	CO idling (%)	HC idling (ppm)	HC Evaporated SHED method hot phase (g/test)	CO ₂ (g/km)	Test Cycle	Base Regu
MT 2W, 3W and 4W	≤ 50cc	In force	M3	1.0	1.2	-	-	-	-	-	-	ECE R40	Euro 3
		Jan/2014	M4	1.0	-	0.8	0.15	-	-	-	Inform	ECE R40	Euro 3 ¹
	> 50cc and < 150cc	In force	M3	2.0	-	0.8	0.15	2.0	400	-	-	ECE R40	Euro 3
		Jan/2014	M4	2.0	-	0.8	0.15	2.0	400	-	-	WMTC	Euro 3 ¹
	Vmax. < 130 km/h	Jan/2016	M4	2.0	-	0.56	0.13	2.0	400	1	Inform	WMTC	Euro 4
	> 50cc and < 150cc	In force	M3	2.0	-	0.8	0.15	2.0	400	-	-	ECE R40	Euro 3
		Jan/2014	M4	2.0	-	0.3	0.15	2.0	400	-	-	WMTC	Euro 3 ¹
	Vmax. ≥ 130 km/h	Jan/2016	M4	2.0	-	0.25	0.17	2.0	400	1	Inform	WMTC	Euro 4
	≥ 150cc	In force	M3	2.0	-	0.3	0.15	2.0	400	-	-	ECE R40	Euro 3
		Jan/2014	M4	2.0	-	0.3	0.15	2.0	400	-	-	WMTC	Euro 3 ¹
	Vmax. < 130 km/h	Jan/2016	M4	2.0	-	0.56	0.13	2.0	400	1	Inform	WMTC	Euro 4
	≥ 150cc	In force	M3	2.0	-	0.3	0.15	2.0	400	-	-	ECE R40	Euro 3
		Jan/2014	M4	2.0	-	0.3	0.15	2.0	400	-	-	WMTC	Euro 3 ¹
	Vmax. ≥ 130 km/h	Jan/2016	M4	2.0	-	0.25	0.17	2.0	400	1	Inform	WMTC	Euro 4

3.4. Off-road vehicles

Category	Sub-category	Power (kW)	Fuel	Application date	PROCONVE phase	CO (g/kWh)	HC + NOx (g/kWh)	PM (g/kWh)	Base Regul.
Machinery and equipment	Agricultural	130 ≤ P ≤ 560	Diesel	AT - Jan/2017	MAR-I	3,5	4	0,2	Euro III A
		75 ≤ P < 130		AT - Jan/2017	MAR-I	5	4	0,3	Euro III A
		37 ≤ P < 75		AT - Jan/2019	MAR-I	5	4,7	0,4	Euro III A
		19 ≤ P < 37		AT - Jan/2019	MAR-I	5,5	7,5	0,6	Euro III A
Machinery and equipment	Road construction equipment	130 ≤ P ≤ 560		NM - Jan/2015	MAR-I	3,5	4	0,2	Euro III A
				AT - Jan/2017					
		75 ≤ P < 130		NM - Jan/2015	MAR-I	5	4	0,3	Euro III A
				AT - Jan/2017					
		37 ≤ P < 75		NM - Jan/2015	MAR-I	5	4,7	0,4	Euro III A
				AT - Jan/2017					
		19 ≤ P < 37		AT - Jan/2017	MAR-I	5,5	7,5	0,6	Euro III A

* NM - New Models (new releases)

**AT - All Types (models already in the market)

3.5. Emission of crankcase gases

Zero emissions for light and heavy duty vehicles.

4. Other regulations

4.1. Durability

4.1.1. Light vehicles

80,000 km or 5 years, except Diesel engines. Deterioration factors as specified below.

Engine	Family/engine (units/year)	CO	HC/NHMC	NOx	CHO	HC (evap)	PM
Otto	≤ 15000	1,2	1,2	1,1	1,1	1,1	-
	> 15000	Use of real DF from vehicle aging					
Diesel *	≤ 15000	1,1	1,1	1,1	-	-	1,1
	> 15000	Use of real DF from vehicle aging					

* DF for diesel vehicles will be applied from Jan/2013

4.1.2. Heavy duty vehicles

There are no Deterioration Factors for engines of heavy duty vehicles, but manufacturer must assure the durability of the engines as specified below.

Engine	Gross Vehicle Weight (ton)	Application	Observation
Diesel	≤ 16	In force	160.000km or 5 years
	> 16	In force	160.000km or 5 years
		Jan/2015	500.000km or 7 years, for vehicles with GVW > 16 ton.

4.1.3. Motorcycles

10,000 km, without time definition, for motorcycles, tricycles and quads with engines of no more than 50cc and a maximum speed not exceeding 50 km/h.

18,000 km, without time definition, for motorcycles, tricycles and ATV (All Terrain Vehicles) with maximum speed below 130 km/h.

30,000 km, without time definition, for motorcycles, tricycles and ATV (All Terrain Vehicles) with maximum speed equal or above 130 km/h.

Engine	Family/engine (units/year)	Application	CO	HC	NOx	HC (evap)
Otto	≤ 10000	Jan/2014	1,2	1,2	1,2	1,2
	> 10000		Use of real DF from vehicle aging			

* DF for mopeds, motorcycles, tricycles and quads will be applied from Jan/2014

4.2. EGR

EGR should be operational until an altitude of 1000 m.

4.3. OBD

4.3.1. Light vehicles

OBDB-BR2 is compulsory for light vehicles with Otto cycle engines. The system must monitor the functioning of sensors and valves of the fuel supply system, ignition system and vehicle emissions control, as well as the deterioration of the catalyst. OBD-BR2 thresholds are according to chart below.

Vehicle	Reference mass (kg)	HC * (g/km)	NMHC ** (g/km)	CO (g/km)	NOx (g/km)
Light vehicle	≤ 1700	0,75	0,3	4,11	0,75
	> 1700	1,25	0,5	8,22	1,5

* Only NCG vehicles

**Except NCG vehicles

Mandatory OBD for diesel light vehicles from Jan/2015. Requirements to be defined.

4.3.2. Heavy duty vehicles

Mandatory OBD from Jan/2012. The system must monitor the engine management functions which impacts on pollutant emissions, warn the driver about failures and reduce engine power in case of failures that persist for more than two consecutive days.

4.4. Fuel consumption

The vehicle labeling program is voluntary and divides vehicles into six categories, based on shadow projected area. Vehicles in each category are ranked with scores from "A" to "E". Fuel consumption, which is measured in FTP75 and Highway driving cycles, is calculated as a function of the fuel energy, allowing comparisons between ethanol and gasoline.

4.5. Other

Mandatory requirement to make available from Jan/2013, replacement active elements for after-treatment systems. Requirements to be defined.

5. Control requirements

5.1. Emissions Conformity of Production

Presentation of a statistical report with emissions results for light vehicles, motorcycles and engines for heavy duty vehicles. Report is required for sales volume exceeding 1000 units per semester, for light vehicles and motorcycles, and 100 units per semester for engines.

Category	Average Emissions in Previous Semester	Sample	Observation
Light vehicle	$x_i \leq 1,0 Li$	0,40%	x_i = average of pollutant which is nearest to limit Li = Pollutant limit
	$x_i \leq 0,8 Li$	0,30%	x_i = average of pollutant which is nearest to limit Li = Pollutant limit
	$x_i \leq 0,6 Li$	0,20%	x_i = average of pollutant which is nearest to limit Li = Pollutant limit
	$x_i + k * si \leq Li$	0,10%	x_i = average of pollutant which is nearest to limit Li = Pollutant limit k = statistical factor (see regulation) si = standard deviation of the pollutant
Heavy duty vehicle (engine)	-	0,30%	-
	$x_i + k * si \leq Li$	0,10%	x_i = average of pollutant which is nearest to limit Li = Pollutant limit k = statistical factor (see regulation) si = standard deviation of the pollutant
Motorcycles, tricycles and ATV	-	3 a 5	-

The OBD-BR2 also needs a compliance check, but only when requested by the responsible agencies. It consists in a random choice of a vehicle for test. If the sample vehicle does not meet the regulated requirements, another 4 vehicles, which can be run up to 10,000 km before the test, are taken. If at least 3 vehicles comply with all test requirements, the production is considered in conformity.

5.2. In-use vehicle emissions inspection

Performed only in some states. Intervals defined by each state.

Vehicle	Fuel	Model Year	Altitude (m)	Idling and 2500 rpm		Opacity (Free Acel.) (m ⁻¹)		Obs.
				CO revised (%)	HC revised (ppm)	Natural aspirated or Turbo with LDA *	Turbo	
Light and Heavy duty vehicles	Gasoline and Flex	≤ 1979	-	6.0	700	-	-	Dilution factor ≤ 2,5 Adopt 1,0 if < 1
		1980 - 1988	-	5.0	700	-	-	
		1989	-	4.0	700	-	-	
		1990 - 1991	-	3.5	700	-	-	
		1992 - 1996	-	3.0	700	-	-	
		1997 - 2002	-	1.0	700	-	-	
		2003 - 2005	-	0.5	200	-	-	
		≥ 2006	-	0.3	100	-	-	
	Ethanol	≤ 1979	-	6.0	1100	-	-	
		1980 - 1988	-	5.0	1100	-	-	
		1989	-	4.0	1100	-	-	
		1990 - 1991	-	3.5	1100	-	-	
		1992 - 1996	-	3.0	700	-	-	
		1997 - 2002	-	1.0	700	-	-	
		2003 - 2005	-	0.5	250	-	-	
		≥ 2006	-	0.5	250	-	-	
	NCG	≤ 1979	-	6.0	700	-	-	
		1980 - 1988	-	5.0	700	-	-	
		1989	-	4.0	700	-	-	
		1990 - 1991	-	3.5	700	-	-	
		1992 - 1996	-	3.0	700	-	-	
		1997 - 2002	-	1.0	700	-	-	
		2003 - 2005	-	1.0	500	-	-	
		≥ 2006	-	1.0	500	-	-	
	Diesel	≤ 1996	≤ 350	-	-	1.7	2.1	Valid only for vehicles whose limits were not declared by the manufacturer
		1996 - 1999		-	-	2.1	2.1	
		≥ 2000		-	-	1.7	1.7	
		≤ 1996	> 350	-	-	2.5	2.8	
		1996 - 1999		-	-	2.8	2.8	
		≥ 2000		-	-	2.3	2.3	
Motorcycles and tricycles	Gasoline 4T and Ethanol 4T	≤ 2002	-	7.0	3500	-	-	Dilution factor ≤ 2,5 Adopt 1,0 if < 1 CO=3,5% and HC=2000ppm for vehicles 2009 to 2013, which did not pass the limits at homologation
		2003 - 2009	-	6,0 (< 250 cc)	2000	-	-	
			-	4,5 (≥ 250 cc)		-	-	
		≥ 2010	-	2,5 (< 250 cc)	600 (< 250 cc)	-	-	
			-	2,0 (≥ 250 cc)	400 (≥ 250 cc)	-	-	

* LDA is a control device of the fuel injection pump to adjust the fuel quantity to the turbocharger pressure.

5.3. Monitoring of emissions on public roads

Only black smoke, for diesel powered vehicles. It is not allowed smoke emissions of density greater than 2 of Ringelmann scale, for more than 5 consecutive seconds.

5.4. Audit concerning fuel consumption declaration

Tests are performed to determine the vehicle coast-down. Then laboratory tests are performed to measure fuel consumption. Difference between the declaration and result verified cannot exceed 10%.

6. Fuels

6.1. Reference fuel

6.1.1. Gasoline

Property	Requirement								Unity	Test Method
	Phase L5				Phase L6 (2014)					
	Gasoline A		Gasoline C		Gasoline A		Gasoline C			
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.		
Aspect	Clear and free of water or suspended particles				Clear and free of water or suspended particles				-	ABNT NBR 14954 ASTM D 4176
Anhydrous Ethanol	none		21	23	none		21	23	% v/v	ABNT NBR 13992
Specific mass at 20°C	719.5	757.9	735	765	720	758	735	765	kg/m ³	ANBT NBR 7148, 14065 ASTM D 1298, 4052
Distillation										
Initial point	30	40	-	-	30	40	-	-	°C	ANBT NBR 9619 ASTM D 86
10% vol. evaporated	45	60	-	-	45	60	-	-		
50% vol. evaporated	90	110	-	-	90	110	-	-		
90% vol. evaporated	160	190	-	-	149	170	-	-		
End point	195	215	-	-	195	213	-	-		
Residue	-	2	-	-	-	2	-	-	% v/v	
MON	-	-	82	85	-	-	82	-	-	ASTM D 2700
RON	-	-	93	98	-	-	93	-	-	ASTM D 2699
Vapor pressure at 37,8°C	-	-	54	64	-	-	54	64	kPa	ABNT NBR 14149, 14156 ASTM D 4953, 5190, 5191, 5482
Washed gums	-	5	-	5	-	4	-	4	mg/100ml	ABNT NBR 14525 ASTM D 381
Induction time at 100°C	-	-	1000	-	-	-	1000	-	minutes	ANBT NBR 14478 ASTM D 525
Copper corrosion (3h 50°C)	-	1	-	1	-	1	-	1	Class	ABNT NBR 14359 ASTM D130
Sulfur	-	500	-	400	-	50	-	50	mg/kg	ABNT NBR 6563, 14533 ASTM D 1266, 2622, 3120, 4294, 5453, 7039
Lead	-	0.005	-	0.005	-	0.005	-	0.005	g/l	ASTM D 3237
Phosphorus	-	-	-	-	-	0.005	-	0.005	g/l	ASTM D 3231
Benzene	-	-	-	-	-	1	-	1	% v/v	ABNT NBR 15289, 15441 ASTM D 3606, 5443, 6277
Aromatics hidrocarbon	-	51.3	-	40	-	35	-	-	% v/v	ABNT NBR 14932
Olefins hidrocarbon	-	25.7	-	20	-	15	-	-	% v/v	ASTM D 1319
Saturated hidrocarbon	-	-	-	-	-	note	-	-	% v/v	

6.1.2 Ethanol

Property	Requirement				Unity	Test Method
	Anhydrous		Hydrous			
	Min.	Max.	Min.	Max.		
Aspect	Clear and free of impurities		Clear and free of impurities		-	Visual
Color	colorless		colorless		-	Visual
Total acid	-	30	-	30	mg/l	ABNT NBR 9866 ASTM D 1613
Electrical conductivity	-	500	-	500	μS/m	ABNT NBR 10547
Specific mass at 20°C	-	791,5	807,6	811	kg/m ³	ABNT NBR 5992, 15639 ASTM D 4052
Alcoholic content	99,6	-	95,1	96	% v/v	ABNT NBR 5992, 15639
	99,3	-	92,6	93,8	% m/m	
Hydrogen potential (pH)	-	-	6	8	-	ABNT NBR 10891
Aldehydes	-	60	-	60	mg/l	Gaseous chromatography
Higher alcohols content	-	500	-	500	mg/l	Gaseous chromatography
Ester content	-	100	-	100	mg/l	Gaseous chromatography
Ethanol content	98	-	95,1	-	% v/v	ASTM D 5501
Water	-	0,4	-	4,9	% v/v	ABNT NBR 15531 ASTM E 203
Evaporation residue	-	5	-	5	mg/100ml	ABNT NBR 8644
Sulfate	-	4	-	4	mg/kg	ABNT NBR 10894
Sodium	-	2	-	2	mg/kg	ANBT NBR 10422

6.1.3 Diesel

Property	Requirement				Unity	Test method
	Phases P6 (Euro V) and		Phases P7 (Euro V) and			
	S50		S10			
	Min.	Max.	Min.	Max.		
Aspect	Clear and free of impurities		Clear and free of impurities		-	ABNT NBR 14954 ASTM D 4176
Color ASTM	-	3	-	3	-	ABNT NBR 14483 ASTM D 1500
Sulfur	-	50	-	10	mg/kg	ASTM D 2622, 5453
Distill. - 50% vol. recovered	245	-	245	-	°C	ABNT NBR 9619
Distill. - 95% vol. eecovered	345	350	345	350		ASTM D 86
Distill. - End point	-	370	-	370		EN/ISO 3405
Specific mass at 20°C	835	845	829	834	kg/m³	ABNT NBR 7148, 14065 ASTM D 1298, 4052 EN/ISO 3675
Flash point	38	-	55	-	°C	ABNT NBR 7974, 14598 ASTM D 56, 93, 3828 EN/ISO 2719
Viscosity at 40°C	2,5	3,5	2,3	3,3	mm²/s	ABNT NBR 10441 ASTM D 445 EN/ISO 3104
Cold Filter Plugging Point	-	3	-	-5	°C	ABNT NBR 14747 ASTM D 6371 EN/ISO 116
Cetane number	51	54	52	54	-	ASTM D 613 EN/ISO 5165
Carbon residue	-	-	-	0,2	% m/m	ABNT NBR 15586 ASTM D 4530 EN/ISO 10370
Ramsbotton Carbon residue on 10% of the final distillation.	-	0,2	-	0,23	% m/m	ABNT NBR 14318 ASTM D 189, 524 EN/ISO 6615, 4262
Aromatics hidrocarbon	3	6	3	6	% m/m	ASTM D 2425, 5186 EN/ISO 12916
Ash	-	0,01	-	0,01	% m/m	ABNT NBR 9842 ASTM D 482 EN/ISO 6245
Copper corrosion (3h at 50°C)	-	1	-	1	Class	ABNT NBR 14359 ASTM D 130 EN/ISO 2160
Water	-	200	-	200	mg/kg	ABNT NBR 11348 ASTM D 6304 EN/ISO 12937
Water and sediments	-	0,05	-	0,05	% v/v	ABNT NBR 14647 ASTM D 1796
Neutralization index	-	0,02	-	0,02	mg KOH/g	ABNT NBR 14248 ASTM D 974
Oxidation stability	-	2,5	-	2,5	mg/100ml	ASTM D 2274, 5304 EN/ISO 12205
Lubricity at 60°C	-	460	-	400	µm	EN/ISO 12156

6.1.4 Natural gas

Property	Requirement								Unity	Test method
	Light vehicles		Heavy duty vehicles							
			Type GR		Type G23		Type G25			
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.		
Wobbe index	48	50	-	-	-	-	-	-	MJ/m³	ABNT NBR 15213 ISO 6976
Methane	86	-	84	89	91,5	93,5	84	88	% mol.	ABNT NBR 14903 ASTM D 1945 ISO 6974
Ethane	-	10	11	15	-	-	-	-	% mol.	-
Other inert components free of nitrogen and hydrocarbons heavier than ethane	-	3	-	1	-	-	-	-	% mol.	-
Other inert components and hydrocarbons heavier than ethane	-	-	-	-	-	1	-	1	% mol.	-
Nitrogen	-	2	-	-	6,5	8,5	12	16	% mol.	-
Sulfur	-	10	-	10	-	-	-	-	mg/m³	ASTM D 5504 ISO 6326-5

6.2. Commercial fuels

6.2.1. Gasoline

Property	Requirement								Unity	Test Method
	In force				Jan/2014					
	Comum		Premiun		Comum		Premiun			
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.		
Color	Colorless to yellowish, without coloring				Colorless to yellowish, without coloring				-	Visual
Aspect	Clear and free of impurities				Clear and free of impurities				-	ABNT NBR 14954 ASTM D 4176
Content of Anhydrous Ethanol	According to current regulation				According to current regulation				% v/v	ABNT NBR 13992
Specific mass at 20°C	Inform		Inform		Inform		-	-	kg/m ³	ANBT NBR 7148, 14065 ASTM D 1298, 4052
Distillation									°C	ABNT NBR 9619 ASTM D 86
10% vol. evaporated	-	65	-	65	-	65	-	65		
50% vol. evaporated	-	80	-	80	-	80	-	80		
90% vol. evaporated	-	190	-	190	-	190	-	190		
End point	-	220	-	220	-	215	-	215		
Residue	-	2	-	2	-	2	-	2	% v/v	
MON	82	-	-	-	82	-	-	-	-	ASTM D 2700
IAD (MOM+RON)/2	87	-	91	-	87	-	91	-	-	ASTM D 2699, 2700
Vapour pressure at 37,8°C	-	69	-	69	-	69	-	69	kPa	ABNT NBR 14149, 14156 ASTM D 4953, 5190, 5191, 5482
Washed Gums	-	5	-	5	-	-	-	-	mg/100ml	ABNT NBR 14525 ASTM D 381
Induction period at 100 ° C	360	-	360	-	480	-	480	-	minutes	ANBT NBR 14478 ASTM D 525
Copper corrosion (3h at 50°C)	-	1	-	1	-	-	-	-	Class	ABNT NBR 14359 ASTM D130
Sulfur	-	1000	-	1000	-	50	-	50	mg/kg	ABNT NBR 6563, 14533 ASTM D 1266, 2622, 3120, 4294, 5453, 6920, 7039, 7212
Benzene	-	1	-	1.5	-	1	-	1	% v/v	ASTM D 3606, 5443, 6277
Lead	-	0.005	-	0.005	-	0.005	-	0.005	g/l	ASTM D 3237
Phosphorus	-	-	-	-	-	0.2	-	0.2	mg/l	ASTM D 3231
Silicon	-	-	-	-	Inform		Inform		mg/kg	ICP-AES
Aromatics hidrocarbon	-	45	-	45	-	35	-	35	% v/v	ABNT NBR 14932, MB 424
Olefins hidrocarbon	-	30	-	30	-	25	-	25	% v/v	ASTM D 1319
Saturated hydrocarbon	-	-	-	-	Inform		Inform		% v/v	

The blend of ethanol in commercial gasoline is from 20 to 25% in volume.

6.2.2. Etanol

Property	Requirement				Unity	Test method
	Current phase					
	Anhydrous		Hydrous			
	Min.	Max.	Min.	Max.		
Aspect	Clear and free of impurities		Clear and free of impurities		-	Visual
Color	Orange, after coloring		Colorless		-	Visual
Total acidity	-	30	-	30	mg/l	ABNT NBR 9866
Electrical conductivity	-	350	-	350	μS/m	ABNT NBR 10547
Specific mass at 20°C	-	791,5	807,6	811	kg/m³	ABNT NBR 5992, 15639 ASTM D 4052
Alcoholic content	99,6	-	95,1	96	% v/v	ABNT NBR 5992, 15639
	99,3	-	92,5	93,8	% m/m	
Hydrogen potential (pH)	-	-	6	8	-	ABNT NBR 10891
Ethanol content	98	-	94,5	-	% v/v	ASTM D 5501
Water	-	0,4	-	4,9	% v/v	ABNT NBR 15531, 15888 ASTM E 203
Methanol	-	1	-	1	% v/v	chromatography
Evaporation residue	-	5	-	5	mg/100ml	ABNT NBR 8644
Washed gums	-	5	-	5	mg/100ml	ASTM D 381
Hydrocarbon content	-	3	-	3	% v/v	ABNT NBR 13993
Chloride	-	1	-	1	mg/kg	ABNT NBR 10894
Sulfate	-	4	-	4	mg/kg	ASTM D 7328, 7319
Iron	-	5	-	5	mg/kg	ANBT NBR 11331
Sodium	-	2	-	2	mg/kg	ABNT NBR 10422
Copper	-	0,07	-	-	mg/kg	ABNT NBR 11331

Anhydrous ethanol is used only for addition to gasoline.

6.2.3. Diesel

Property	Requirements								Unity	Test Method
	Introduction Jan/2013		Current		Current		Current			
	S10		S50		S500		S1800			
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.		
Aspect	Clear and free of impurities		Clear and free of impurities		Clear and free of impurities		Clear and free of impurities		-	Visual
Color	Colorless to yellowish, without biodiesel Brown or orange, with biodiesel		Colorless to yellowish, without biodiesel Brown or orange, with biodiesel		Colorless to yellowish, without biodiesel Brown or orange, with biodiesel		Red		-	Visual
Color ASTM	-	3	-	3	-	3	-	3	-	ABNT NBR 14483 ASTM D 1500, 6045
Biodiesel content	According to current regulation		According to current regulation		According to current regulation		According to current regulation		% v/v	ABNT NBR 15568 EM 14078
Sulfur	-	10	-	50	-	500	-	1800	mg/kg	ABNT NBR 14533 ASTM D 2622, 4294, 5453, 7039, 7212, 7220
Distill. - 10% vol. recovered	180	-	Inform		Inform		Inform		°C	ABNT NBR 9619 ASTM D 86
Distill. - 50% vol. recovered	245	295	245	310	245	310	245	310		
Distill. - 85% vol. recovered	-	-	-	-	-	360	-	370		
Distill. - 90% vol. recovered	-	-	-	360	Inform		Inform			
Distill. - 95% vol. recovered	-	370	-	-	-	-	-	-		
Specific mass at 20°C	820	850	820	850	820	865	820	880	kg/m ³	ABNT NBR 7148, 14065 ASTM D 1298, 4052
Flash point	38	-	38	-	38	-	38	-	°C	ABNT NBR 7974, 14598 ASTM D 56, 93, 3828
Viscosity at 40°C	2	4.5	2	5	2	5	2	5	mm ² /s	ABNT NBR 10441 ASTM D 445
Cold Filter Plugging Point	0 - 12, changing for month and region		0 - 12, changing for month and region		0 - 12, changing for month and region		0 - 12, changing for month and region		°C	ABNT NBR 14747 ASTM D 6371
Cetane number or Derivated cetane number	48	-	46	-	42	-	42	-	-	NBR 14759 ASTM D 613, 4737, 6890, 7170
Ramsbotton Carbon residue on 10% of the final distillation	-	0.25	-	0.25	-	0.25	-	0.25	% m/m	ABNT NBR 14318 ASTM D 524
Ash	-	0.01	-	0.01	-	0.01	-	0.01	% m/m	ABNT NBR 9842 ASTM D 482
Copper corrosion (3h at 50°C)	-	1	-	1	-	1	-	1	Class	ABNT NBR 14359 ASTM D 130
Water	-	200	Inform		-	-	-	-	mg/kg	ASTM D 6304 EN/ISO 12937
Total contaminacion	-	24	Inform		-	-	-	-	mg/kg	EN 12662
Water and sediments	-	0.05	-	0.05	-	0.05	-	0.05	% v/v	ASTM D 2709
Aromatics hidrocarbon	-	11	Inform		-	-	-	-	% m/m	ASTM D 5186, 6591 EN/ISO 12916
Oxidation stability	-	2.5	Inform		-	-	-	-	mg/100ml	ASTM D 2274, 5304
Neutralization index	Inform		Inform		-	-	-	-	mg KOH/g	ABNT NBR 14248 ASTM D 974
Lubricity at 60°C	-	520 (ASTM) 460 (ISO)	-	520 (ASTM) 460 (ISO)	-	520 (ASTM) 460 (ISO)	-	520 (ASTM) 460 (ISO)	µm	ASTM D 6079 ISO 12156
Electrical conductivity	25	-	25	-	-	-	-	-	pS/m	ASTM D 2624, 4308

The biodiesel content in diesel is defined by the ANP and is currently 5%.

6.2.4. Biodiesel

Property	Requirements		Unity	Test Method
	Min.	Max.		
Aspect	Clear and free of impurities		-	Visual
Specific mass at 20°C	850	900	kg/m ³	ABNT NBR 7148, 14065 ASTM D 1298, 4052 EN/ISO 3675, 12185
kinematics viscosity at 40 °C	3	6	mm ² /s	ABNT NBR 10441 ASTM D 445 EN/ISO 3104
Water content	-	500	mg/kg	ASTM D 6304 EN/ISO 12937
Total contamination	-	24	mg/kg	EN 12662
Flash point	100	-	°C	ABNT NBR 14598 ASTM D 93 EN/ISO 3679
Ester content	96.5	-	% m/m	ABNT NBR 15764 EN 14103
Carbon residue	-	0.05	% m/m	ABNT NBR 15586 ASTM D 4530
Sulfated ash	-	0.02	% m/m	ABNT NBR 6294 ASTM D 874 EN/ISO 3987
Sulfur	-	50	mg/kg	ASTM D 5453 EN/ISO 20846, 20884
Sodium + Potassium	-	5	mg/kg	ABNT NBR 15553, 15554, 15555, 15556 EN 14108, 14109, 14538
Calcium + Magnesium	-	5	mg/kg	ABNT NBR 15553, 15556 EN 14538
Phosphorus	-	10	mg/kg	ABNT NBR 15553 ASTM D 4951 EN 14107
Copper corrosion (3h at 50°C)	-	1	Class	ABNT NBR 14359 ASTM D 130 EN/ISO 2160
Cetane number	Inform		-	ASTM D 613, 6890 EN/ISO 5165
Cold Filter Plugging Point	-	19	°C	ABNT NBR 14747 ASTM D 6371 EN 116
Acidity index	-	0.5	mg KOH/g	ABNT NBR 14448 ASTM D 664 EN 14104
Free glycerol	-	0.02	% m/m	ABNT NBR 15341, 15771 ASTM D 6584 EN 14105, 14106
Total Glycerol	-	0.25	% m/m	ABNT NBR 15344 ASTM D 6584 EN 14105
Mono, di, triacylglycerol	Inform		% m/m	ABNT NBR 15342, 15344 ASTM D 6584 EN 14105
Methanol or Ethanol	-	0.2	% m/m	ABNT NBR 15343 EN 14110
Iodine index	Inform		g/100g	EN 14111
Oxidation Stability at 110 °C	6	-	hours	EN 14112

6.2.5. Natural gas

Property	Requirements						Unity	Test Method
	North		Northeast		Others			
	Min.	Max.	Min.	Max.	Min.	Max.		
Higher calorific power	34000	384000	35000	43000	35000	43000	kJ/m ³	ABNT NBR 15213 ASTM D 3588 ISO 6976
Wobbe index	40500	45000	46500	53500	46500	53500	kJ/m ³	ABNT NBR 15213 ISO 6976
Metane number	Inform		65	-	65	-	-	ISO 15403
Metane	68	-	85	-	85	-	% mol.	ABNT NBR 14903 ASTM D 1945 ISO 6974
Ethane	-	12	-	12	-	12	% mol.	
Propane	-	3	-	6	-	6	% mol.	
Butane and heavier	-	1.5	-	3	-	3	% mol.	
Oxygen	-	0.8	-	0.5	-	0.5	% mol.	
Inert (N2 + CO2)	-	18	-	8	-	6	% mol.	
CO2	-	3	-	3	-	3	% mol.	
Sulfur	-	70	-	70	-	70	mg/m ³	ASTM D 5504 ISO 6326-3, 6326-5, 19739
Hydrogen sulphide gas (H2S)	-	10	-	13	-	10	mg/m ³	ASTM D 5504, 6228 ISO 6326-3
Water dew point at 1 atm	-	-39	-	-39	-	-45	°C	ASTM D 5454 ISO 6327, 10101-2, 10101-3, 11541
Hydrocarbon dew point at 4,5 MPa	-	15	-	15	-	0	°C	ISO 6570
Mercury	Inform		-	-	-	-	µg/m ³	ISO 6978-1, 6978-2

6.2.5. Arla 32 (Urea Solution)

Property	Requirements		Unity
	Min.	Max.	
Solubility in water	Unlimited		-
Aspect	Clear and colorless		-
Smell	Odorless or slight odor of ammonia		-
Crystallization point	- 11,5 °C		°C
Viscosity at 25°C	1,4		mPa s
Thermal conductivity at 25°C	0,57		W/m K
Specific heat at 25°C	3,4		kJ/kg K
Superficial tension	65	-	mN/m
Urea	31,8	33,2	% m/m
Alkalinity with NH ₃	-	0,2	% m/m
Biuret	-	0,3	% m/m
Insoluble	-	20	mg/kg
Aldehyde	-	5	mg/kg
Phosphate	-	0,5	mg/kg
Aluminum	-	0,5	mg/kg
Calcium	-	0,5	mg/kg
Iron	-	0,5	mg/kg
Copper	-	0,2	mg/kg
Zinc	-	0,2	mg/kg
Chromium	-	0,2	mg/kg
Nickel	-	0,2	mg/kg
Magnesium	-	0,5	mg/kg
Sodium	-	0,5	mg/kg
Potassium	-	0,5	mg/kg
Density at 20 °C	1087	1093	kg/m ³
Refractive index at 20 °C	1,3814	1,3843	-

7. Trends

Emissions of CHO from diesel vehicles
IBAMA has asked manufacturers and importers of light and heavy duty vehicles with diesel engines to inform typical values of CHO emissions.

NOx emissions of light vehicles in the Highway cycle

IBAMA has asked manufacturers and importers of light vehicles to inform typical values of NOx emission on Highway cycle.

Biofuels

Diesel: Increase of biodiesel content in diesel fuel from 5% today to 10% or more. Tests in progress.

New emissions limits

Next emission stage for heavy duty vehicles should be based on Euro VI. To keep the current gap, next step should be implemented when Europe moves to Euro VII.

Heavy duty engines durability

Government will focus on the durability guarantee for heavy duty vehicles. First step is the definition of a procedure to calculate emissions DF (Deterioration Factors).