



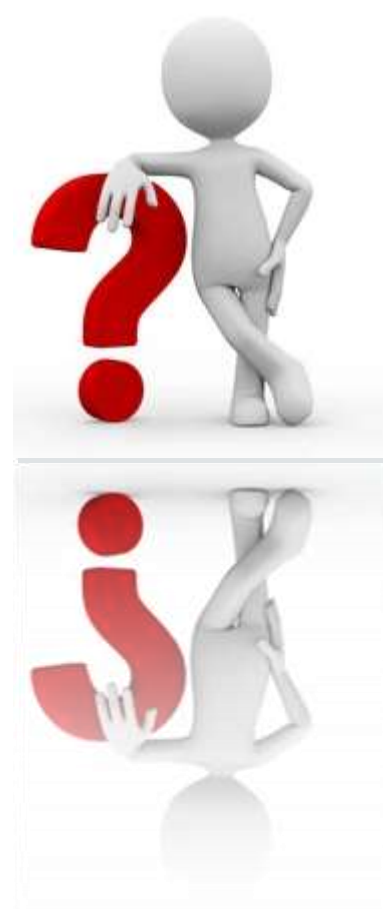
19MO611-AUTOTRONICS

UNIT 1 – INTRODUCTION EURO STANDARDS AND EQUIVALENT BHARAT STANDARDS



AUTOTRONICS

The Autotronics is referred as the modern automotive technology and also commonly known as Automotive Mechatronics. Autotronics is the combination of automobile and electronics. Also, the use of electronics science in automobile vehicles is called autotronics. The use of electronics in the automobile field makes the system safe, improved and efficient. In a vehicle almost all significant parts are featured with electronic items





EURO STANDARDS

Emission standards are the legal requirements governing air pollutants released into the atmosphere. Emission standards set quantitative limits on the permissible amount of specific air pollutants that may be released from specific sources over specific timeframes. They are generally designed to achieve air quality standards and to protect human life. Different regions and countries have different standards for vehicle emissions. Many emissions standards focus on regulating pollutants released by automobiles (motor cars) and other powered vehicles. Others regulate emissions from industry, power plants, small equipment such as lawn mowers and diesel generators, and other sources of air pollution.



Cars and commercial vehicles sold in Europe are subject to strict limits on the emission of tailpipe pollutants and from other sources on the vehicle, eg evaporative emissions from the fuelling system.

Nominally referred to as 'Euro' standards, these were introduced in 1991 with 'Euro 0' (symbolised with Arabic numerals) for passenger cars and in 1992 with 'Euro I' (symbolised with Roman numerals) for commercial vehicles (emission standards did exist before Euro 0, but this was taken as the starting point for Euro standard references).

Innovation has helped meet progressively tighter emission standards as the legislation has developed. Technologies such as variable valve timing, direct fuel injection and improved and highly sophisticated engine management systems have all played a major role.



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History and levels of Euro standards for passenger cars:

Euro standard	Introduction dates		Petrol		Diesel		Petrol & Diesel
	New approvals	All new registrations	NOx (g/km)	Mass of particles (g/km)	NOx (g/km)	Mass of particles (g/km)	Number of ultra-fine particles per km
Euro 1	1 July 1992	31 December 1992	0.97 ⁽¹⁾	-	0.97 ⁽¹⁾	0.14	-
Euro 2	1 January 1996	1 January 1997	0.5 ⁽¹⁾	-	0.9 ⁽¹⁾	0.1	-
Euro 3	1 January 2000	1 January 2001	0.15	-	0.5	0.05	-
Euro 4	1 January 2005	1 January 2006	0.08	-	0.25	0.025	-
Euro 5	1 September 2009	1 January 2011	0.06	0.0045 ⁽²⁾	0.18	0.0045	6 × 10 ¹¹ (3)
Euro 6	1 September 2014	1 September 2015	0.06	0.0045 ⁽²⁾	0.08	0.0045	6 × 10 ¹¹ (4) (5)

(1) Expressed as HC+NOx.
(2) Applicable to direct injection petrol engines.
(3) Applicable to diesel engines only.
(4) Limit of 6 × 10¹² in the case of direct injection petrol engines.
(5) Common limit of 6 × 10¹³ for direct injection petrol engines and diesel engines from September 2017/September 2018.



EQUIVALENT BHARAT STANDARD

Bharat stage emission standards (BSES) are emission standards instituted by the Government of India to regulate the output of air pollutants from internal combustion engines and Spark-ignition engines equipment, including motor vehicles.

The standards and the timeline for implementation are set by the Central Pollution Control Board under the Ministry of Environment & Forests and climate change

The standards, based on European regulations were first introduced in 2000

In 2014, Saumitra Chaudhary committee gave recommendations on Auto Fuel Vision Policy 2025 which had recommended implementation of BS-IV (2017), BS-V (2019) and BS-VI (2024) standards.

In 2016, the Indian government announced that the country would skip the BS-V norms altogether and adopt BS-VI norms by 2020

While the norms help in bringing down pollution levels, it invariably results in increased vehicle cost due to the improved technology & higher fuel prices

Currently, BS IV norms have been enforced across the country since April 2017. However, recently the Supreme Court of India ordered barring of sale of Bharat Stage IV vehicles from April 1, 2020.



TIMELINE FOR IMPLEMENTATION OF BHARAT STAGE NORMS





No sale of BS-IV vehicles

- 1.**The Supreme Court has banned the sale and registration of motor vehicles conforming to the emission standard Bharat Stage-IV in the entire country from April 1, 2020
- 2.**Bharat Stage (BS) emission norms are standards instituted by the government to regulate the output of air pollutants from motor vehicles
- 3.**SC quoted that India has the dubious distinction of having 15 out of the 20 most polluted cities in the world and thus such measure was necessary
- 4.**The problem of pollution is not limited to the NCR of Delhi but it is a problem which has engulfed the entire country especially the major cities
- 5.**BSVI compliant vehicles are going to be more expensive than BSIV compliant vehicles and people have a tendency to buy cheaper vehicle(s) even from a neighboring city.



Shift to BS-VI norms

- The country will have to shift to the cleaner Bharat- VI fuel from April 1, 2020
- The BS-IV norms have been enforced across the country since April 2017
- In 2016, the Centre had announced the country would skip the BS-V norms altogether and adopt BS-VI norms by 2020.

Major Differences in BS VI

- **Selective Catalytic Reduction Technology-** It reduces oxides of nitrogen by injecting an aqueous urea solution into the system. Hence, NO_x from diesel cars can be brought down by nearly 70%. In the petrol cars, they can be reduced by 25%.
- **Sulphur Content-** While the BS-IV fuels contain 50 parts per million (ppm) sulphur, the BS-VI grade fuel only has 10 ppm sulphur content.
- **Particulate Matter-** in diesel cars will be reduced by 80%.
- **Mandatory on-board diagnostics (OBD)-** which inform the vehicle owner or the repair technician about how efficient the systems in the vehicles are.
- **RDE (Real Driving Emission)** will be introduced for the first time that will measure the emission in real-world conditions and not just under test conditions.



EFFORTS TO CONTROL EMISSIONS

India embarked on a formal emission control regime in 1991. Here is a brief history of the country's efforts to cut vehicle emission.

1991-92: The first stage of mass emission norms came into force for petrol vehicles in 1991 and in 1992 for diesel vehicles.

1995: From April 1995, the government made fitment of catalytic converters compulsory in new petrol-fuelled passenger cars sold in the four metros of Delhi, Calcutta, Mumbai and Chennai, along with the supply of Unleaded Petrol (ULP). Availability of ULP was extended to 42 major cities and now it is available across the country.

2000-01: In 2000, passenger cars and commercial vehicles met Euro I equivalent India 2000 norms. Euro II equivalent Bharat Stage-II (BS-II) norms were in force from 2001 in four metros—Delhi, Mumbai, Chennai and Kolkata.

2002: The first auto fuel policy was announced in

August 2002. It laid down the emission and fuel roadmap up to 2010. As per the policy, four-wheelers in 13 metro cities moved to BS-III emission norms from April 2005 and the rest of the country to BS-II.

2010: BS-IV for 13 metro cities was implemented from April 2010 and the rest of the country moved to BS-III. It has now been extended to more than 50 cities.

2014: The second version of the fuel policy—Auto Fuel Policy 2025—was submitted to the oil and gas ministry. It lays down the emission and fuel roadmap up to 2025 and envisages BS-IV roll out across the country by 2017 in a phased manner, with BS-V emissions in 2021 and BS-VI from 2024. The proposal is yet to be accepted by the government and notified.



Why BS VI?

- The pro-active approach from the Government of India has made the country leapfrog from the conventional BS-IV to directly adopt BS-VI emission norms as the next level for regulatory framework in India.
- The BS-VI emission standards are much more elaborate in their scope and integrate substantial changes to existing emission standards ensuring cleaner products to the consumer.
- Besides the more stringent limits on the gaseous emission components, the particulate matter (PM) limits have also been significantly reduced along with the introduction of particle number (PN) limits.



Significance

Vehicular emission is a major contributor to the worsening air quality of Indian cities. Emission of NO_x, SO₂, CO₂ and particulate matter is taking a toll on people's health. In cities like Delhi, the PM_{2.5} level is more than 6 times the prescribed levels by WHO. These new norms will help reduce these vehicular pollution significantly.

At the BS-VI level, the gap maintained between emissions from diesel and petrol, wherein diesel cars are allowed to emit more particulate matter and nitrogen oxide, narrows.



Challenges

1. Huge Cost for automakers

Moving to BS-VI directly will require significant technological upgrades for which auto companies may have to invest heavily.

Once the research and development is over, the task of setting up full-scale production comes up. Automakers were supposed to make their models BS IV compliant by April 1, 2017. While some automakers have met the targets and updated their products, there is a huge stock of vehicles left to be sold into the market. As per the Society of Indian Automobile Manufacturers (SIAM), the companies were holding stock of around 8.24 lakh such vehicles.

2. Timeframe

Normally it takes 4 years to upgrade and here the companies have to skip the BS V altogether and upgrade directly to BS VI. Smaller bonnet cars of India may not be able to imbibe Diesel Particulate Filter in them which was supposed to be a part of BS-V upgrade.



3.Impact on buyers

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WAY FORWARD

A successful transition to BS-VI norms will be a landmark event for the country and it must be taken in a mission mode approach by all the stakeholders.

Governments should incentivize the automobile manufacturers and partner the oil companies to manage this transition.

