INDIAN STANDARDS FOR PETROLEUM PRODUCTS

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भारतीय मानक ब्यूरो

मानकः पथप्रदर्शकः

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IS/ISO 14001

BUREAU OF INDIAN STANDARDS

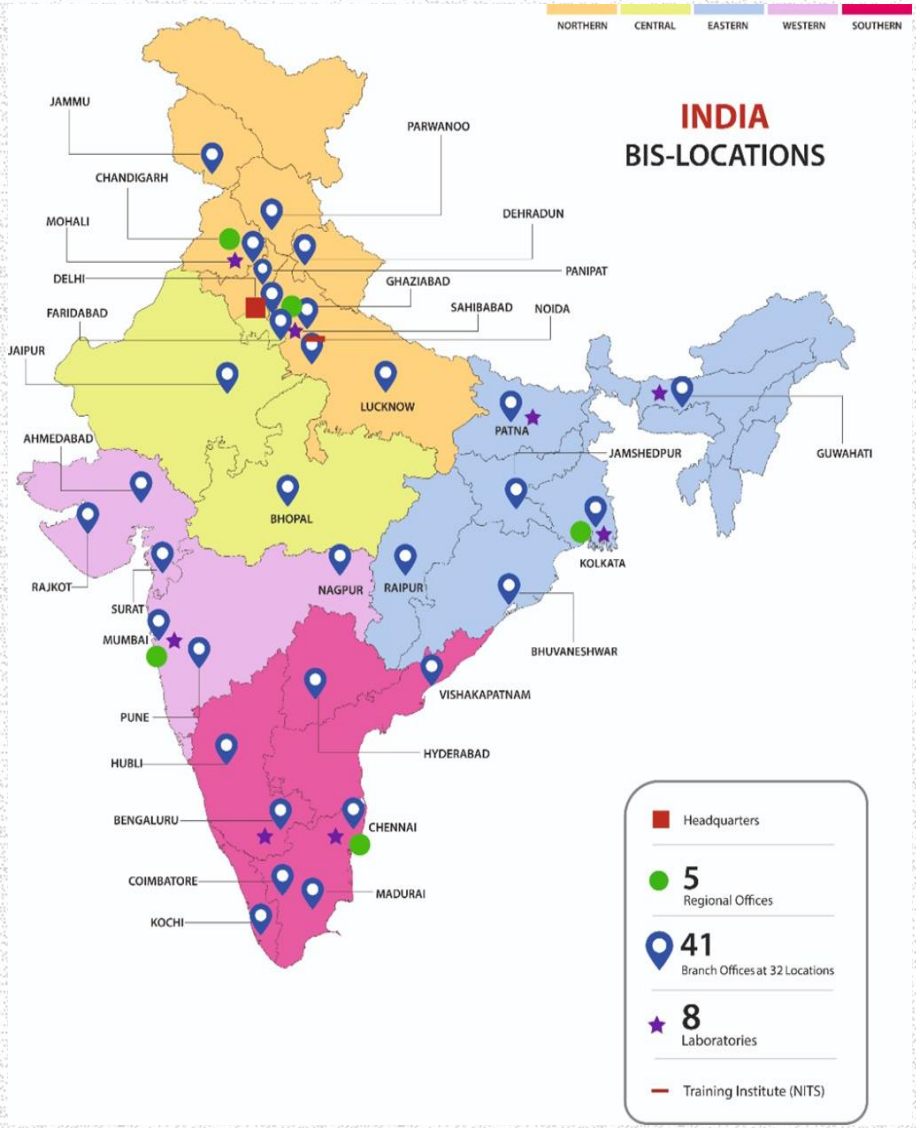
EMS

BIS website : www.bis.gov.in

BIS - STRUCTURE

- Governing Council,
- Executive Committee,
- Advisory Committees.

- Headquartered at New Delhi, with 5 Regional Offices at Delhi (Central), Kolkata (Eastern), Chennai (Southern), Mumbai (Western) and Chandigarh (Northern).
- 41 Branch Offices.
- 8 Laboratories and 3 Referral Laboratories for Hallmarking.
- National Institute of Training for Standardization (NITS).
- Total no. of employees: 1284
- No. of Technical officers: 520



MAJOR ACTIVITIES OF BIS

- Standards Formulation
- Conformity Assessment Schemes
  - Product Certification
  - Management Systems Certification
  - Hallmarking
  - Compulsory Registration
- Laboratory Services
- Consumer Affairs and Standards Promotion
- Training
- International Cooperation

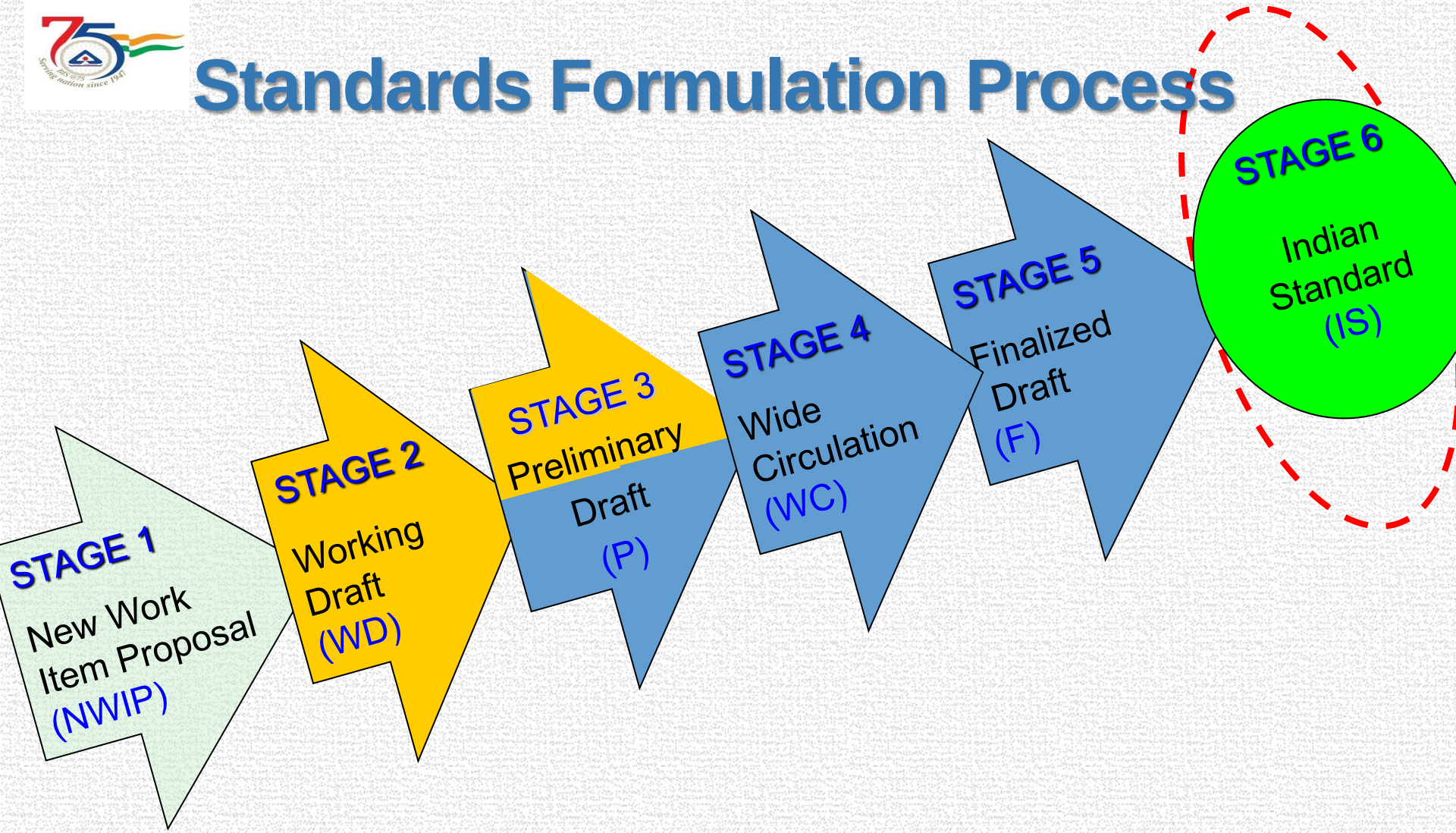
STANDARDS FORMULATION

- BIS identified 15 sectors important to Indian industry and consumers.
- Structure comprises of Division Councils (15), Technical Committees (369), Sub-Committees (199) and Panels (586).
- 21,581 Indian Standards are in force as Product Specifications, Method of Test, Systems Standards, Codes of Practices, Guidelines, Safety Standards, Terminology, Dimensions, etc.
- Encourages a culture of quality products and services in line with national priorities through mandatory or voluntary compliance.
- International best practices followed in standards development.

Standardization

- **Vital: Consensus** and approved by a recognized body
- Provides, for common and repeated use, rules, guidelines or characteristics for activities or their results, aimed at the achievement of the optimum degree of order in a given context.
- Specify requirements and/or recommendations in relation to products, systems, processes or services; describe a measurement or test method or to establish a common terminology within a specific sector.
- **Involve**
  - ✓stakeholder consultation
  - ✓scientific studies, data generation,
  - ✓Inter-laboratory correlation schemes,
  - ✓consistent work of national experts including government officers
- **National Standards provide basis for technical regulations**

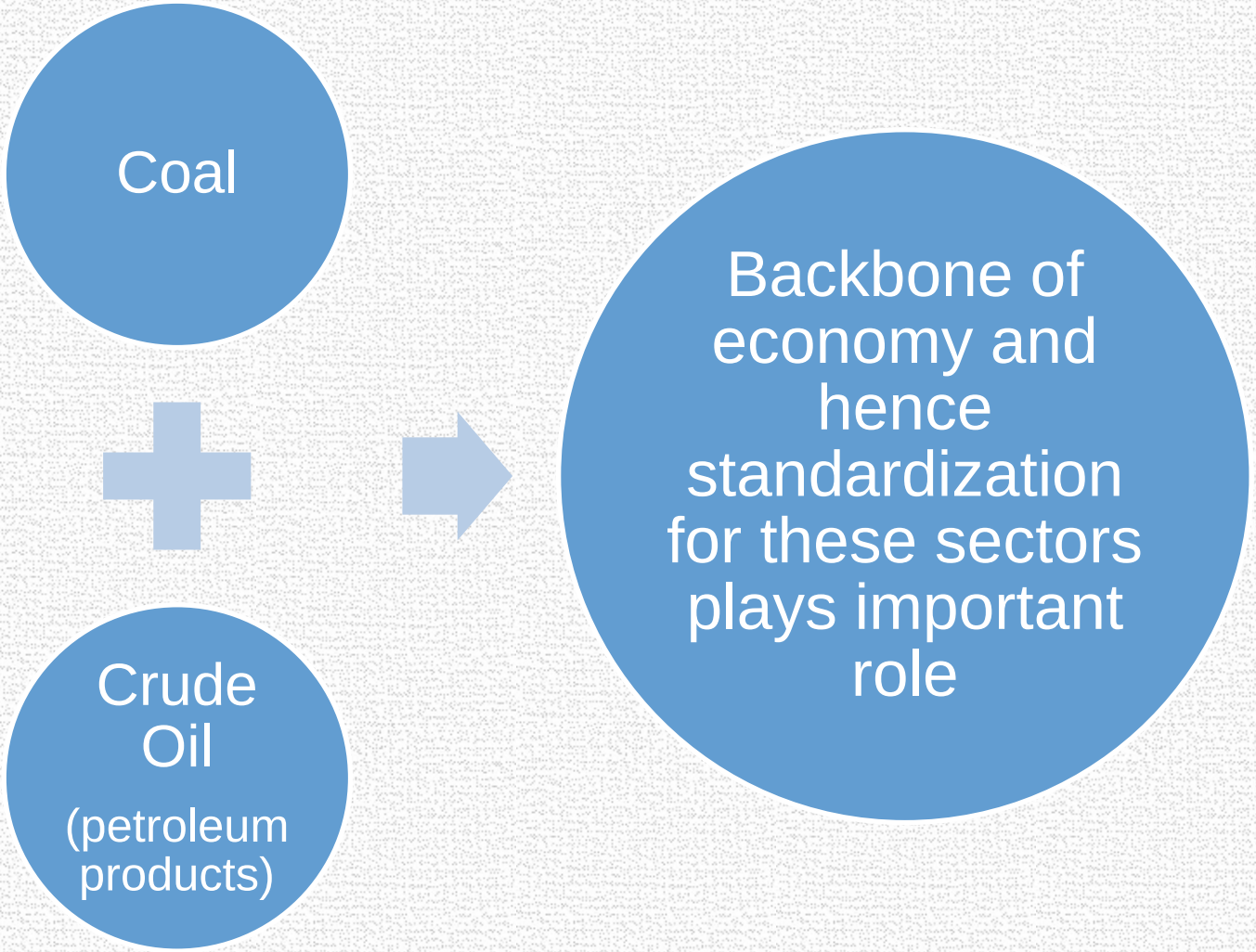
Standards Formulation Process



Stage 2-3: Building consensus among panel/ committee members

Stage 3-5: Building national consensus

Petroleum, Coal & related products Divisional Council/ Department (PCDC)



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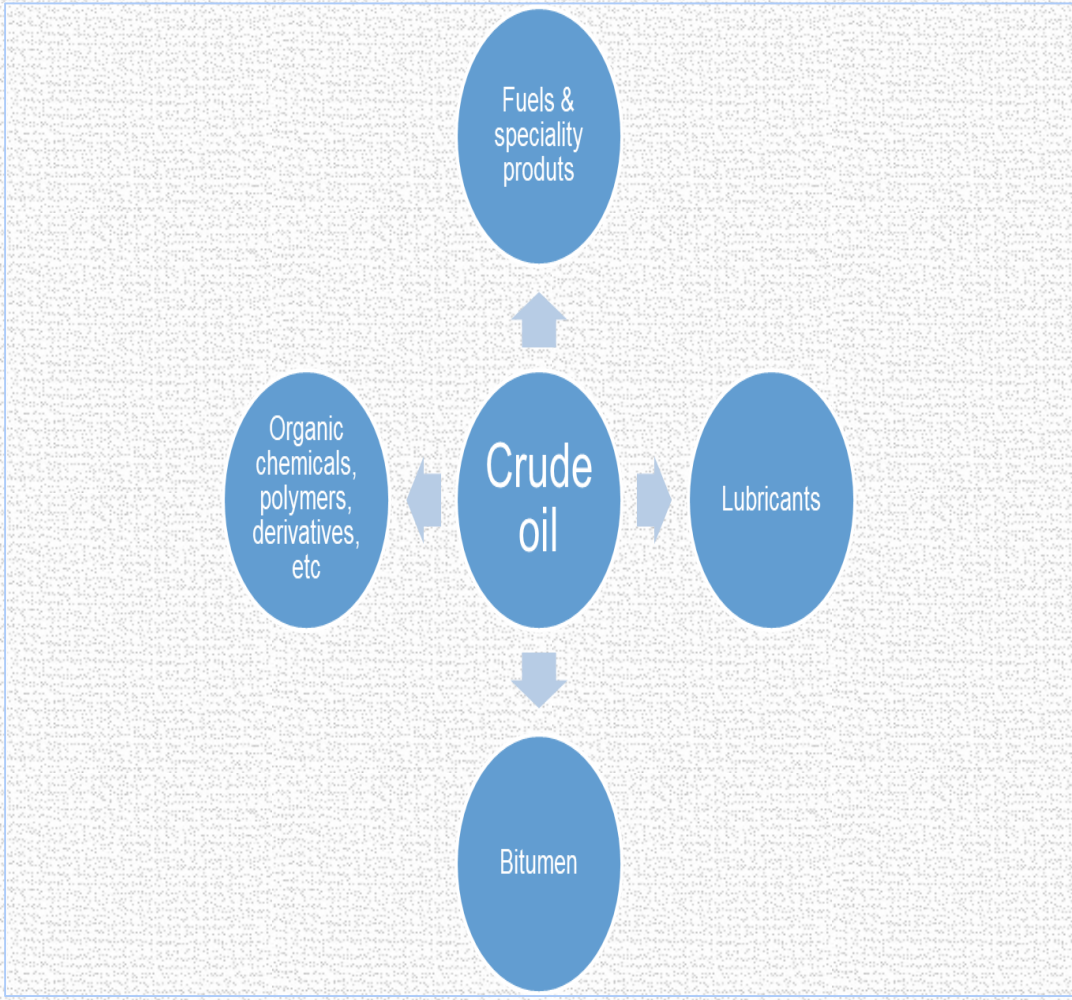
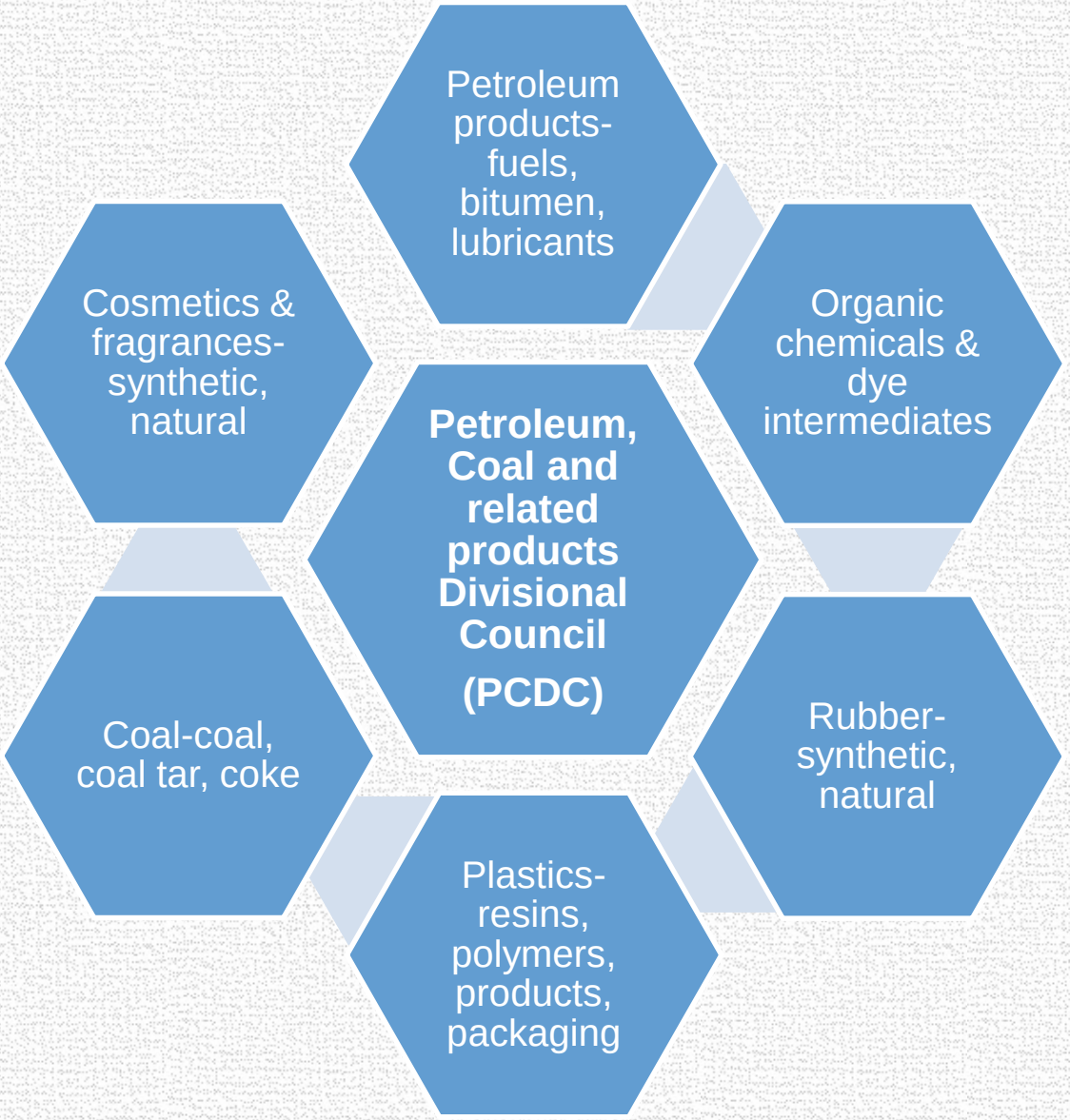
- **Crude oil** upon distillation produces
  - Petroleum products including fuels and speciality products
  - Lubricants
  - Bitumen
  - Organic chemicals & derivatives for polymers



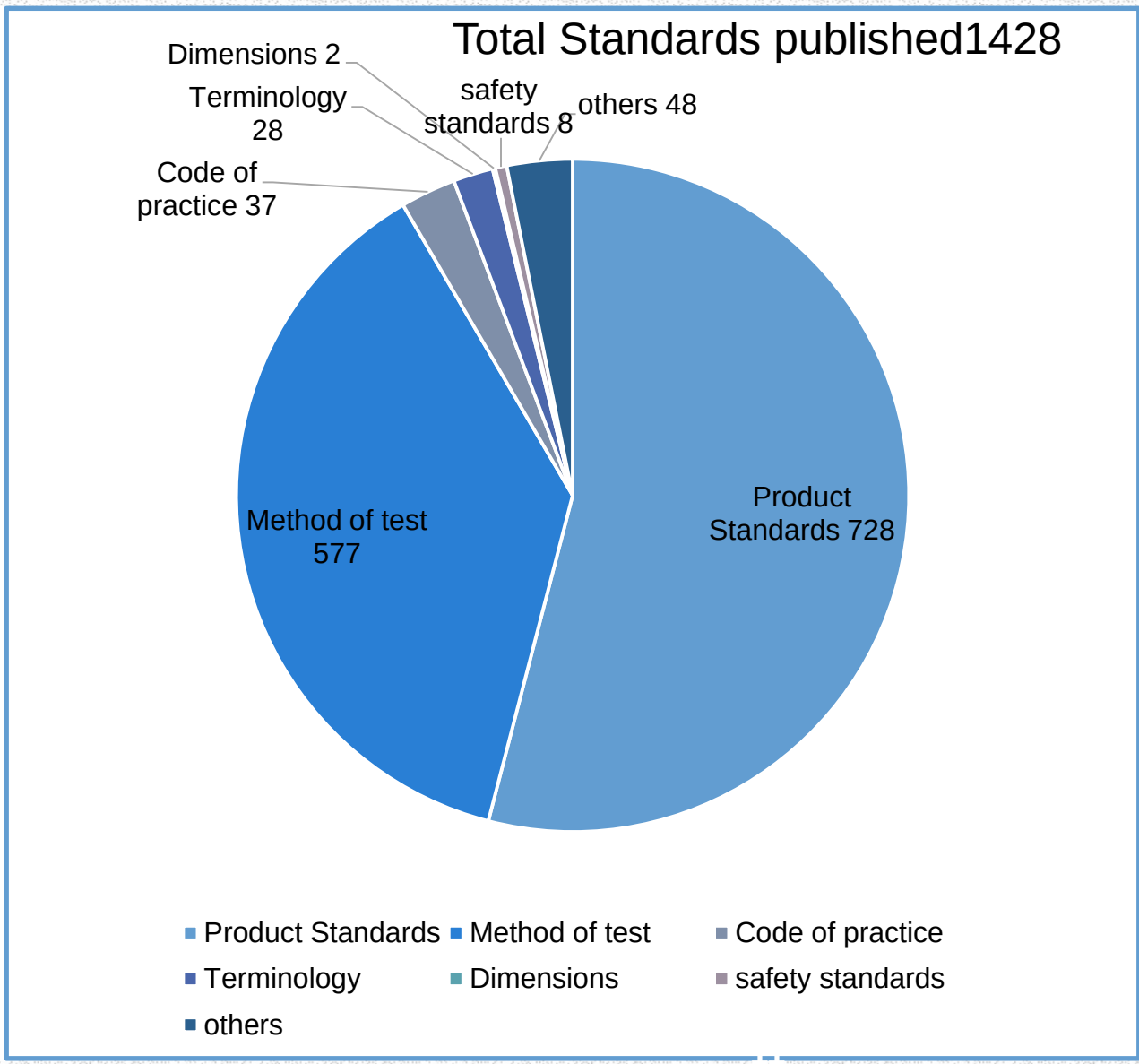
PCDC

Sectors include petroleum products, bitumen, coal, rubber, plastics, safety of toys, fragrances & flavours, cosmetics, organic chemicals and allied products, dye intermediates



PCDC- Statistics

- Manned by
  - Head of the Dept. &
  - 6 Scientific Officers
- Technical Committees
  - 15 Sectional Committees,
  - 42 Sub-committees &
  - 33 Panels
- 1177 Experts (from various stakeholder groups)



List of 15 Sectional Committees

- **PCD 01** Methods of Sampling and Test for Petroleum, its Products, Gaseous Fuels and Lubricants
- **PCD 03** Petroleum Products and Related Products of Synthetic or Biological Origin
- **PCD 06** Bitumen, Tar and Related Products
- **PCD 07** Solid Mineral Fuels and Solid Bio-fuels
- **PCD 09** Organic Chemicals, Alcohols and Allied Products
- **PCD 12** Plastics
- **PCD 13** Rubber & Rubber products
- **PCD 18** Fragrance and Flavour
- **PCD 19** Cosmetics
- **PCD 21** Plastic Containers
- **PCD 25** Lubricants and their Related PCD 26 Dye Intermediates
- **PCD 27** Methods of Sampling and Test for Plastics
- **PCD 29** Methods of Test for Rubber and Rubber Products
- **PCD 30** Safety of Toys

Standardization in Petroleum Sector

- **Petroleum, Coal and related products Division Council (PCDC)**
  - 4 of the 15 Sectional Committees deal with petroleum products, bitumen and lubricants.
    - ✓ **Methods of Sampling and Test for Petroleum, its Products, Gaseous Fuels and Lubricants Sectional Committee, PCD01**
    - ✓ **Petroleum & Their Related Products of synthesis or biological origin Sectional Committee, PCD 03**
    - ✓ **Bitumen, Tar and Related Products Sectional Committee, PCD06**
    - ✓ **Lubricants and their related products Sectional Committee, PCD25**
  - Includes members from all stakeholders like oil companies (both PSU's and private), SIAM, IIT's, CSIR-IIP, CHT, PCRA, MoPNG, MoRTH, CPCB, testing laboratories, CQAPP (defence), IAF, DGQA, DGCA, Consumer organizations, etc.

Sectional Committees for petroleum sector

- **Methods of Sampling and Test for Petroleum, its Products, Gaseous Fuels and Lubricants Sectional Committee, PCD01**
  - Formulates Indian Standards for Sampling and testing of Petroleum products, Lubricants, gaseous fuel, bio-fuel, synthetic fuels, etc., and to organize correlation schemes for evaluating the accuracy and the performance of fuel and lubricant testing engines.
    - ✓No of Subcommittees : 5, No of Panels : 2
    - ✓198 Indian Standards were published and around 12 drafts are at various stages
    - ✓Number of standards withdrawn, till now ——26
    - ✓New subjects: new instrumental test methods for biodiesel, blended fuels, leakage tendency for wheel bearing greases; DME in DME blended LPG.

Contd..

- **Petroleum and Their Related Products of synthesis or biological origin Sectional Committee, PCD03**
  - Formulates Indian Standards for petroleum products, biofuels (liquid and gas), synthetic fuels, natural gas and codes of practice for storage, handling, transport and application.
    - ✓No of Subcommittees : 3, No of Panels : 4
    - ✓58 Indian Standards are published and 11 documents under various stages
    - ✓Number of standards withdrawn, till now ––29
    - ✓20 % DME blended LPG, methanol fuel for cooking purposes, LNG for automotive purposes are under consideration

Contd..

- **Bitumen, Tar and Related Products Sectional Committee, PCD06**
  - Formulates Indian Standards for terminology, methods of sampling and test and specification for bitumen including bitumen cutback and bitumen emulsion, bitumen additives, modified bitumen, industrial bitumen, bituminous mixes.
    - ✓28 Indian Standards are published and 22 documents under various stages
    - ✓Number of standards withdrawn, till now ––21
    - ✓New subjects: trackless bitumen, test methods for recovery of bitumen from solution using rotary evaporator, determination of bitumen content in bituminous paving mixtures, etc.

Contd..

- **Lubricants and Their Related Products Sectional Committee, PCD 25**
  - Formulates Indian Standards for lubricants, bio lubricants, lubricating oils like hydraulic fluids, corrosion preventives, quenching, cutting oils, etc and codes of practice for storage, handling, transport and application
    - ✓No of Subcommittees : 3
    - ✓86 Indian Standards are published and 11 drafts are under wide circulation
    - ✓Number of standards withdrawn, till now ––1
    - ✓New subjects: Greases, transmission oils, coolants for electric vehicles, food grade & biodegradable lubricants & greases, aviation grade hydraulic fluids and base oil & reclaimed base oil

Indian Standards on Petroleum fuels

- **Liquid fuels**
  - ✓IS 1459:2018 Kerosene - Specification (*Fourth Revision*)
  - ✓**IS 1460:2017 Automotive Diesel Fuel - Specification (*Sixth Revision*)**
  - ✓IS 1593:2018 Fuel Oils - Specification (*Third Revision*)
  - ✓**IS 2796:2017 Motor Gasoline - Specification (*Sixth Revision*)**
  - ✓IS 11489:1985 Heavy Petroleum stock (HPS)
  - ✓IS 15217:2002 Fuel Oil for Diesel Generating Sets (under consideration for withdrawal, as it is no longer in use and various Govt. notifications are referring to IS 1460, instead) – Sulphur 4% max
  - ✓IS 15770:2008 Light Diesel Oil – Specification
  - ✓IS 16861 : 2018 High Flash High Speed Diesel Fuel-Specification

Contd..

- ✓**IS 1571 : 2018 Aviation Turbine Fuels Kerosine Type Jet-A - Specification (*Tenth Revision*)**
- ✓IS 1587 : 2017 Aviation Turbine Fuel High Flash Point Type - Specification (*Fourth Revision*)
- ✓IS 1604 : 2012 Aviation gasoline - Specification

➢**Gaseous fuels**

- ✓IS 4576: 2018 Liquefied Petroleum Gases - Specification (*Third Revision*)
- ✓IS 14861 : 2000 Liquefied Petroleum Gases LPG for Automotive Purposes
- ✓IS 15958 : 2012 Compressed natural gas CNG for Automotive Purposes- Specification
- ✓IS 17314 : 2019 Hydrogen Enriched Compressed Natural Gas HCNG for Automotive Purposes - Specification

Indian Standards on Biofuels

- **BIODIESEL**
  - **IS 15607 : 2016 Biodiesel B100 - Fatty Acid Methyl Esters (FAME) - Specification (*First Revision*)**
    - ✓Can be used as both blend component in IS 1460 HSD fuel and as a standalone fuel
    - ✓Can be used for automotive, heating and industrial fuel applications
    - ✓Raw material not restricted, but edible oils not permitted currently
  - **IS 1460:2017 Automotive Diesel Fuel - Specification (*Sixth Revision*)**
    - ✓Includes provision for blending upto 7% biodiesel

Contd..

- **IS 16531 : 2016 Biodiesel Diesel Fuel Blend B6 to B20 - Specification**
  - ✓Blended fuel with 6-20% biodiesel meeting IS 15607 & remaining diesel meeting IS 1460
  - ✓Can be used both for automotive, heating and industrial fuel applications
- **IS 16087 : 2016 Biogas (Biomethane) -Specification (*First Revision*) (also called as BioCNG)**
  - ✓Can be used in stationary engines, thermal and automotive applications
  - ✓Raw material organic waste and more clean fuel

Contd..

- **ETHANOL**
  - **IS 15464:2000 Anhydrous ethanol for use in automotive fuel – Specification**
    - ✓Can be used as such or as a blend both in diesel and gasoline, however, being used for blending with gasoline meeting IS 2796
    - ✓No restriction of raw materials
    - ✓Currently under revision, including requirements for 2G ethanol and creating another specification of neat ethanol fuel (E93 fuel)
  - **IS 2796:2017 Motor Gasoline- Specification (*Sixth Revision*)** includes provision for blending 5% and 10% ethanol

Contd..

- **IS 16629 : 2017** Hydrous Ethanol for Use in ED 95 Automotive Fuel – Specification
  - ✓is the main component to formulate ED95 automotive fuel for modified compression ignition engines.
- Ethanol ED95 Automotive Fuel - dropped, due to inadequate data
- **IS 16634 : 2017** E85 Fuel Blend of Anhydrous Ethanol and Gasoline – Specification
  - ✓used as a blend of anhydrous ethanol and gasoline for use in flex fuel vehicles equipped with spark ignition engines, specially designed for such fuel.
  - ✓Contain 70 to 85 volume percent of ethanol and remaining gasoline meeting IS 2796.

Contd..

- **IS 17021:2018** E 20 Fuel - Admixture of anhydrous Ethanol and Gasoline -as fuel for spark ignited engine
  - ✓ suitable for use as a fuel in the automobile spark-ignition internal combustion engines of vehicles complying with BS IV and BS VI emission norms respectively,
  - ✓ but need modification with respect to calibration of engines and emission compliance
- **IS 17586 : 2021** E12 and E15 Fuel — Admixture of Anhydrous Ethanol and Motor Gasoline — For Positive Ignition Engine Powered Vehicles — Specification
  - ✓to give flexibility to Oil Marketing Companies to manage supply and demand of Ethanol in the country

Indian Standards on Alternate fuels

Methanol

- **IS 17075: 2019** Anhydrous Methanol for Use as a Blending Component in Fuels –Specification
  - ✓Request received from NITI Aayog
  - ✓Used as a blending component in methanol based fuels,
  - ✓ Can be used in engines specially designed for captive power generation, industrial, marine, locomotive, automotive and off-road applications.

Contd..

- **IS 17076:2019** M15 Fuel Admixture of Anhydrous Methanol and Motor Gasoline as Fuel for Spark Ignited Engines Specification
  - ✓An admixture of anhydrous methanol meeting IS 17075 at 15 percent by volume and methanol free motor gasoline meeting IS 2796 at 85 percent volume,
  - ✓Can be used in vehicles equipped with spark ignition engines, stationary and industrial engines specially designed for using such fuel.

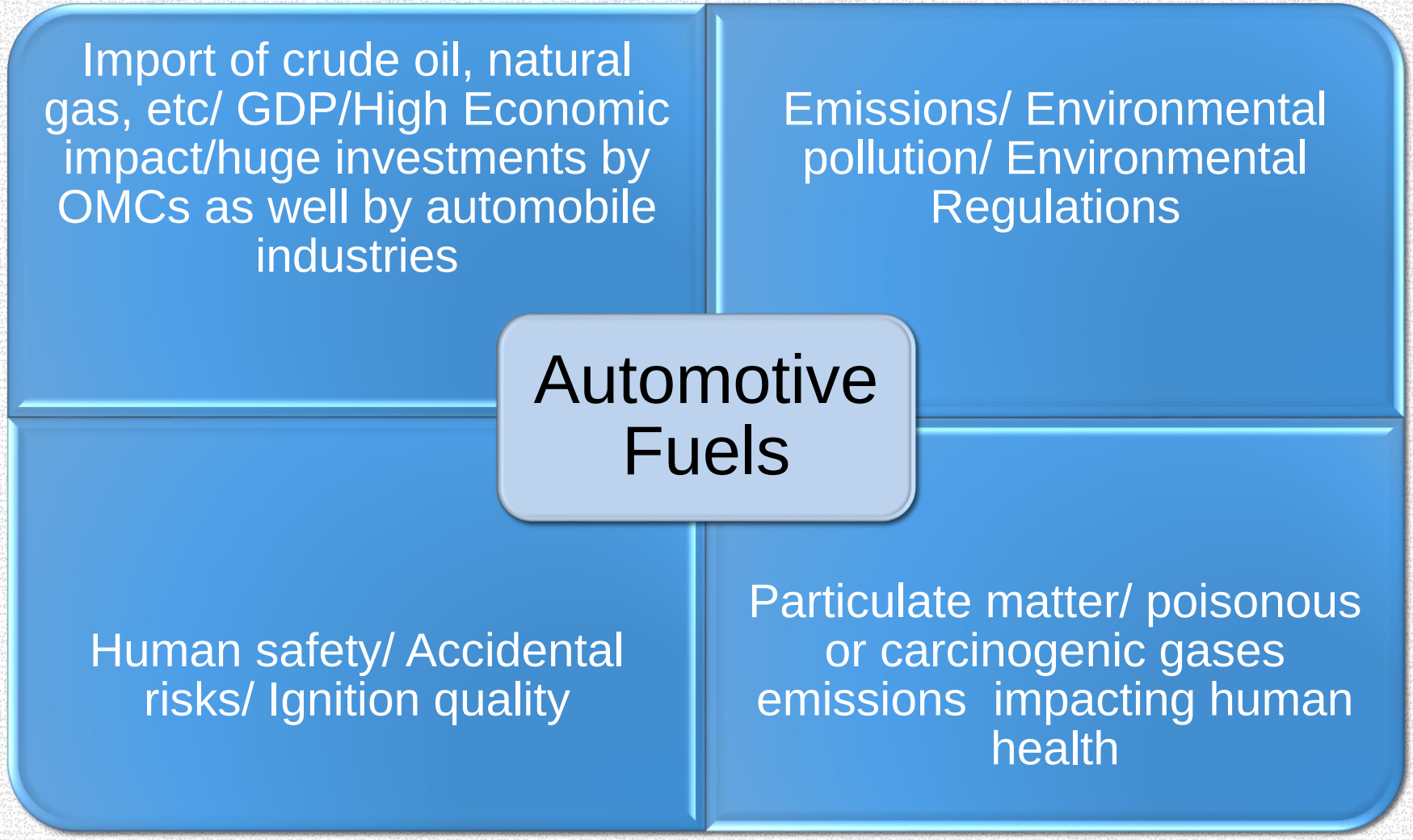
Contd..

- **IS 16704:2018/ISO 16861:2015** Petroleum Products - Fuels -Class F -Specifications of Dimethyl Ether (DME)
  - ✓ synthesized from any organic raw materials
  - ✓ used as heating fuel, industrial fuel, and to replace diesel fuel or gas oil.
- **IS 16061 [P:1]:2013/ISO 14687-1:1999** Hydrogen fuel – product specification – Part 1: All applications except proton exchange membrane (PEM) fuel cells for road vehicles
  - ✓ Can be used in vehicular, appliance or other fuelling applications
  - ✓ applies to all modes of transportation and hydrogen fuelling applications (ground, water, air and space).

Indian Standard for Biojet fuel

- **IS 17081 : 2019 Aviation Turbine Fuel (Kerosene Type, Jet A-1) Containing Synthesized Hydrocarbons — Specification**
  - ✓Specifies the requirements and test methods for synthetic blending components as well as aviation turbine fuel, kerosene type, Jet A-1 containing synthesized hydrocarbons for use in aircraft gas turbine engines designed to operate on such fuel.
  - ✓Permits blending of different synthetic blending components with conventional Jet A-1 fuel meeting IS 1571, upto 50%
  - ✓Included the requirements for synthetic blending components for indigenously developed technology of CSIR-IIP.

Importance of Indian Standards of fuels



Main regulations…

- Petroleum and petroleum products are covered under Section 2 (a) (viii) of **Essential Commodities Act of 1955**, amended from time to time.
- All orders and notifications are issued by the Ministry of Petroleum and Natural Gas in exercise of powers conferred by Section 3 of the **Essential Commodities Act**.
- Order GSR 729(E) dated 19 December, 2005 of Ministry of Petroleum and Natural Gas includes:
  - ✓(i) High Speed Diesel means any hydrocarbon oil, excluding mineral colza oil and turpentine substitute, which meets the requirements of Bureau of Indian Standards, specification no. IS 1460 and is suitable for use as fuel in compression ignition engines.
  - ✓(ii) Motor Spirit means any hydrocarbon oil, excluding crude mineral oil, which meets the requirements of Bureau of Indian Standards specification no. IS 2796.

Indian Standard for Diesel

भारतीय मानक
Indian Standard

IS 1460 : 2017

मोटर वाहन डीजल ईंधन — विशिष्टि

(छठा पुनरीक्षण)

Automotive Diesel Fuel — Specification

(Sixth Revision)

ICS 43060.01; 75.160.20

भारतीय मानक ब्यूरो
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December 2017 Price Group 5

1 SCOPE

1.1 This standard prescribes the requirements, sampling procedure and test methods for automotive diesel fuel (earlier also known as High Speed Diesel Fuel, HSD). It is applicable to automotive diesel fuel for use in diesel engine vehicles and stationary diesel engines, designed to run on automotive diesel fuel.

3.1 General

3.1.1 The material shall be clear, bright and free from sediments, suspended matter and undissolved water at normal ambient fuel temperature.

3.1.2 *Composition*

The material shall be hydrocarbon oils derived from petroleum. The use of fuel additives is permitted in order to improve the performance quality. Suitable fuel additives without known harmful side-effects are recommended in appropriate concentration to help to avoid deterioration of drivability and emissions control durability.

3.1.3 This fuel shall not contain any residuum oil.

3.1.4 Bio-diesel (Fatty Acid Methyl Ester, FAME) conforming to IS 15607 may be blended up to 7 percent (*v*/*v*) with automotive diesel fuel [*see* Table 1, Sl No. (xxi)]. Stabilizing agents, as required, shall be incorporated.

3.1.5 The use of dyes or markers is permitted.

3.2 The material shall also comply with the requirements prescribed in Table 1 when tested according to the appropriate methods prescribed in col 5 of Table 1.

IS 1460…

- ✓This Indian Standard was first published in 1959 and subsequently revised in 1968, 1974, 1995, 2000, 2005 and 2017.
- ✓Blending of biodiesel permitted upto 5% in 2002 and increased upto 7% in 2017.
- ✓Fuel specifications for BS VI emission norms included.
- ✓Oxygen content replaced with FAME content.
- ✓Distillation temperature changed to distillation recovery.
- ✓BSIV fuel specifications removed through amendment no 2 issued in 2021.

Contd..

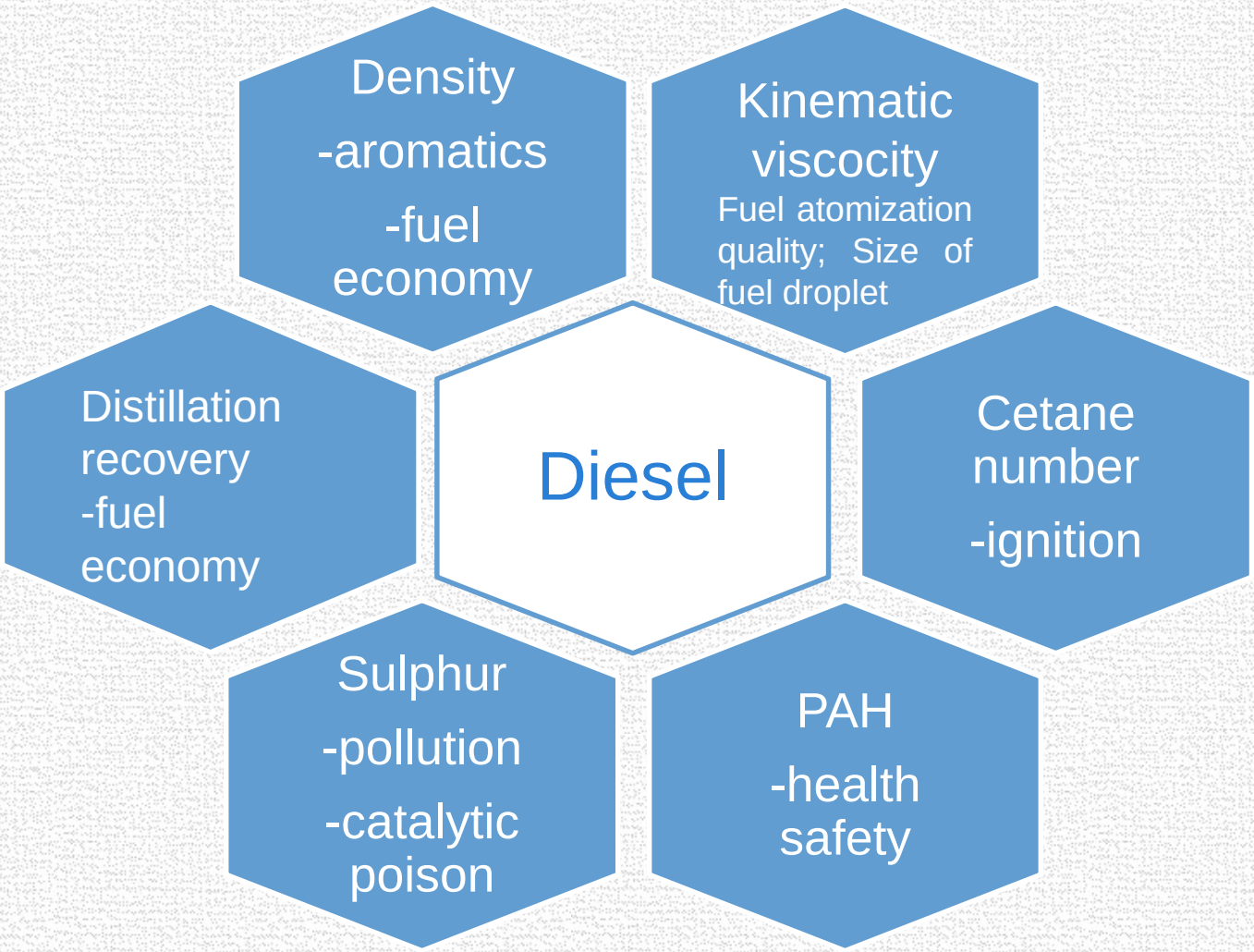
Table 1 Requirement for Automotive Diesel Fuel
(*Clauses* 3.1.4 *and* 3.2)

Sl No.	Characteristic	Requirement		Method of Test, Ref to [P :] of IS 1448/ASTM/IP/ISO Annex
		Bharat Stage IV	Bharat Stage VI	
(1)	(2)	(3)	(4)	(5)
i)	Appearance	Clear, bright and free from sediments, suspended matter and undissolved water at normal ambient fuel temperature	clear, bright and free from sediments, suspended matter and undissolved water at normal ambient fuel temperature	Visual
ii)	Acidity, inorganic, mg of KOH/g	Nil	Nil	ISO 6618/ASTM D9749)/ IP 139
iii)	Acidity, total, mg of KOH/g, *Max*	0.20	0.20	[P : 2] 9)/ASTM D664/ ASTM D974 / IP 139
iv)	Ash, percent by mass, *Max*	0.01	0.01	[P : 4] 9)/ASTM D 482/IP 4
v)	Carbon residue (Ramsbottom or micro) on 10 percent residue[1], percent by mass, *Max*	0.30	0.30	[P : 8] 9) /ISO 10370/ASTM D 524/IP 14/ASTM D 4530
vi)	Cetane number, *Min*	51[2]	51[2]	[P : 9] 9)/ASTM D 613
vii)	Cetane index, *Min*	46[2]	46[2]	ISO 42649)/ASTM D4737/ IP 380
viii)	Pour point[3], *Max*:			[P : 10] 9)/ASTM D 5949/
	a) Winter	3°C	3°C	ASTM D 5950/ ASTM D
	b) Summer	15°C	15°C	5985/ASTM D97/ASTM D7346/IP 15
ix)	Copper strip corrosion for 3 h at 50°C	Not worse than No. 1	Not worse than No. 1	[P : 15] 9)/ASTM D 130/IP 154
x)	Distillation, 95 percent *v/v*, recovery, °C, *Max*	360	360	[P : 18] 9)/ISO 3405/ASTM D 86/ASTM D 7345/IP 123
xi)	Flash point, Abel[4], °C, *Min*	35	35	[P : 20] 9)/ISO 3679/ IP170/ IP523/ EN13736
xii)	Kinematic viscosity, cSt, at 40°C	2.0 to 4.5	2.0 to 4.5	[P : 25] 9)/ISO 3104/ASTM D 445/ASTM D 7042/IP 71
xiii)	Total contamination, mg/kg, *Max*	24	24	EN 126629)/IP 440
xiv)	Density at 15°C, kg/m^3	815–845[5]	810–845[5]	[P : 16] 9) /[P : 32] / ISO 12185/ ASTM D 4052/ ASTM D 1298/IP 160
xv)	Total sulphur, mg/kg, *Max*	50	10	ISO 13032 9)/ ISO 20884/ISO 208469)/ASTM D 5453/ASTM D 2622/ASTM D 7220/[P : 34] For Bharat Stage IVgrade only
xvi)	Water content, mg/kg, *Max*	200	200	[P : 153] 9)/ASTM D 4294 ISO 12937/ASTM D 6304
xvii)	Cold Filter Plugging Point (CFPP)[3], *Max*:			[P : 110] 9)/ASTM D 6371/ IP 309
	a) Winter	6°C	6°C	
	b) Summer	18°C	18°C	
xviii)	a) Oxidation stability[6], g/m^3, *Max*	25	25	[P : 154] 9)/ASTM D 2274/ IP 388
	b) Oxidation stability by Rancidity meter[7], hours, *Min*	20	20	EN 15751
xix)	Polycyclic Aromatic Hydrocarbon (PAH), percent by mass, *Max*	8	8	EN 129169)/IP 391 /ASTM D 6591
xx)	Lubricity corrected wear scar diameter (wsd 1.4) at 60°C, microns, *Max*	460	460	P 149/ ISO 12156-1/Cor 1
xxi)	FAME content[8], % *v/v*, *Max*	7.0	7.0	Annex A9)/ASTM D7371/ EN14078

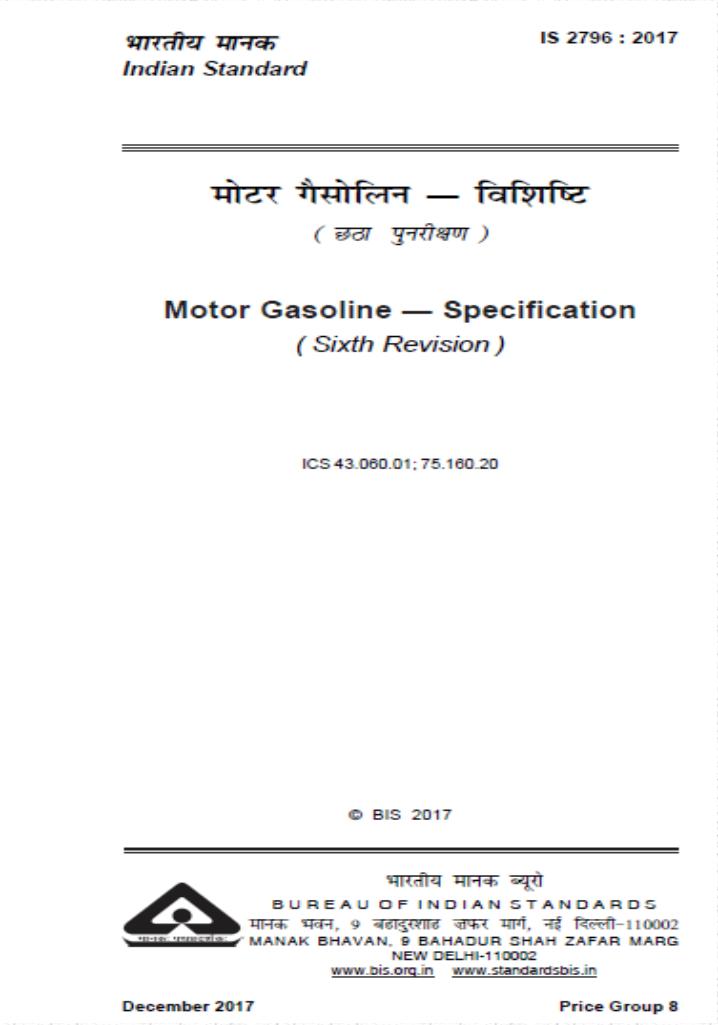
Evolution of IS 1460

Critical requirements	2000	BS II 2002	BS III 2005	BS IV 2017 [NCR-2010]	BS VI 2020 [NCR-2018]
Density at 15°C, kg/m^3	820-880	820-860	820-860	820-845	810-845
Cetane number, Min	48	48	51	51	51
Sulphur, ppm, Max	2500	500	350	50	10
Kinematic viscosity, cSt, at 40°C	2.0-5.0	2.0-5.0	2.0-4.5	2.0-4.5	2.0-4.5
PAH, % mass	-	-	11, max	11, max	8, max
Distillation recovery					
85%	350°C	350°C	-	-	-
95%	-	-	360°C	360°C	360°C

Critical requirements



Indian Standard for motor gasoline



भारतीय मानक
Indian Standard

IS 2796 : 2017

मोटर गैसोलिन — विशिष्टि
(छठा पुनरीक्षण)

Motor Gasoline — Specification
(Sixth Revision)

ICS 43.060.01; 75.160.20

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December 2017 Price Group 8

1 SCOPE

1.1 This standard prescribes the requirements and methods of sampling and test methods for two octane grades each of Motor Gasoline (earlier also known as Motor Spirit) and up to 10 percent ethanol blended motor gasoline (E10) under each of BS IV and BS VI categories suitable for use as a fuel in the automobile spark-ignition internal combustion engines of vehicles complying with BS IV and BS VI emission norms respectively.

1.2 This standard also applies to blends of motor gasoline with organic oxygenates such as alcohols and ethers.

3 GRADES

There shall be two octane grades each (RON 91 and 95) of BS IV and BS VI categories under motor gasoline and 10 percent ethanol blended motor gasoline (E10) as given below.

3.1 Motor Gasoline (Without or With 5 Percent Ethanol Blended Motor Gasoline)

a) BS IV Regular (RON 91),
b) BS IV Premium (RON 95),
c) BS VI Regular (RON 91), and
d) BS VI Premium (RON 95).

3.2 10 Percent Ethanol Blended Motor Gasoline (EBMG)

a) 10 percent EBMGBS IV Regular (RON 91),
b) 10 percent EBMG BS IV Premium (RON 95),
c) 10 percent EBMGBS VI Regular (RON 91), and
d) 10 percent EBMG BS VI Premium (RON 95).

Contd...

4 REQUIREMENTS

4.1 General

Motor gasoline shall be a refined petroleum distillate free from undissolved water, foreign matter and other visible impurities. It shall also contain 4.75 ± 0.25 percent (*v/v*) anhydrous denatured ethanol (99.5 percent *v/v*) conforming to IS 15464 in the areas where blending is required as per the directives of the Government of India apart from the suitable additives (*see* **4.1.1** to **4.1.5**) in appropriate concentration to improve the stability of motor gasoline.

The 10 percent ethanol blended motor gasoline (E10) shall contain 9.75 ±0.25 percent (*v/v)* anhydrous denatured ethanol (99.5 percent *v/v*) conforming to IS 15464 in the areas where blending is required as per the directives of the Government of India apart from the suitable additives (*see* **4.1.1** to **4.1.5**) in appropriate concentration to improve the stability of motor gasoline.

Organic oxygenates used as blending components and/ or stabilizing agents shall be as specified in **4.2.1** and the amount of such oxygenates shall comply with the limiting requirements as specified in **4.2.2.**

4.1.1 *Corrosion Inhibitors*

Suitable doses of corrosion inhibitors have to be necessarily added to ethanol to prevent corrosion, due to its hygroscopic nature.

4.1.2 *Antioxidants*

Suitable antioxidants may be added to motor gasoline and shall be added to 10 percent ethanol blended motor gasoline (E10), in sufficient concentration to meet the requirements for oxidation stability as specified in Table 1. Some antioxidants of proven chemistry are listed below (This is not an exhaustive list):

a) N, N′– disecondary – butyl-paraphenylene diamine;
b) 2,4 — dimethyl-6-tertiary butyl phenol;
c) 4 — methyl-2, 6-ditertiary-butyl phenol;
d) N, N′— di-isopropyl-paraphenylene diamine;
e) N — Normal butyl-p-aminophenol; and
f) Mixture of N, N′ — disecondary-butyl-paraphenylene diamine and disalicylidene-N-methyl dipropylene triamine.

4.1.3 *Metal Deactivators*

Suitable metal deactivators may be added to motor gasoline and shall be added in sufficient concentration for 10 percent ethanol blended motor gasoline (E10).

Contd…

4.1.4 *Dyes*

A suitable dye shall be added in such a proportion so as to satisfy the requirements for colour mentioned in Table 1, Sl No. (ii).

4.1.5 Motor gasoline multifunctional additives (MFA), other than those mentioned in **4.1.1** and **4.1.2** such as detergent/dispersant, dehazer, defoamant additives may be added in appropriate concentration to improve the quality of the fuel. Additives containing metals such as iron, manganese (MMT) shall not be used.

4.2 Organic Oxygenates

4.2.1 *Permitted Components*

The following components shall be used either singly or as mixtures as blending components or as stabilizing agents to prevent phase separation of the motor gasoline/oxygenate components of the blend:

Ethers — Methyl tertiary butyl ether (MTBE), tertiary amyl methyl ether (methoxy-2-methyl butane) TAME, ethyl tertiary butyl ether (2-ethoxy-2-methyl propane) ETBE and other ethers (R-O-R) with final boiling point not exceeding 210°C and with molecules containing five or more carbon atoms.

4.3 Other Requirements

In order to protect automotive catalyst systems, no external addition of other metal additives including lead is permitted.

5.2.2.1 *Pump marking and labelling*: Information to be marked on dispensing pumps used for delivering motor gasoline to retail consumer. It shall be clearly visible, easily legible and displayed at any point where motor gasoline or motor gasoline blended with 10 percent ethanol (E10) is made available to consumers.

To help customer to identify various grades of motor gasoline (MG), including the E10, labelling shall be used at retail outlets as given below:

a) Normal motor gasoline:
b) 10 percent ethanol blended motor gasoline (E10)

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/m³	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*, *Min*	75	75	
	d) Final boiling point, °C, *Max*	210	210	
	e) Residue, percent by volume, *Max*	2.0	2.0	
v)	Research octane number (RON), *Min:*			[P:27][9)] / ASTM D 2699
	a) MG 91	91	91	
	b) MG 95	95	95	
vi)	Motor octane number (MON), *Min:*			[P: 26][9)] / ASTM D 2700
	a) MG 91	81	81	
	b) MG 95	85	85	
vii)	Gum content (Solvent washed), g/m³, *Max*	40	40	[P : 29][9)] / ASTM D 381
viii)	Total sulphur, mg/kg, *Max*	50	10	P: 34 / P: 153/ ISO 20847 /ISO 20846[9)]/ ISO 13032[9)]/ ASTM D 2622/ D 3120/ D 5453/ D 7220
ix)	Lead content (as Pb), g/l, *Max*	0.005	0.005	ASTM D 5059[9)]/ IP 224
x)	Reid vapour pressure (RVP) at 38°C, kPa , *Max:*			P : 39 / ASTM D 323 (wet methods) / D 5191(dry method)/ D 6378/ EN 13016/ [Annex A][9)] (dry method) (*see* Note 2)
	a) MG(without ethanol)	60	60	
	b) Ethanol blended MG	67	67	
xi)	Vapour lock index (VLI),*Max*	Summer / (Other months)	Summer / (Other months)	(*see* Note 1),
	a) MG (without ethanol)	750 / (950)	750 / (950)	
	b) MG (with 5 percent *v/v* ethanol)	900 / (1050)	900 / (1050)	Calculation : VLI = 10 x RVP + 7 x E 70°C
	c) E10	1050 / (1100)	1050 / (1100)	
xii)	Benzene content, percent by volume, *Max*	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, *Max*	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, *Max*	0	0	
	b) Other months, °C, *Max*	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, *Max*:			[P : 23][6] / ASTM D 1319 / D 6730/ D 6839/ ISO 22854
	a) MG 91	21	21	
	b) MG 95	18	18	
xvii)	Oxidation stability, minutes, *Min*	360	360	[P:28][6] / ASTM D 525 / IP 40
xviii)	Aromatics content, percent by volume, *Max*	35[6]	35[6]	[P:23][6] /ASTM D 1319 / D 5580/ D 6730 /D 6839 / ISO 22854
xix)	Oxygen content, percent by mass, *Max*	3.7	3.7	EN 1601/ IP 408/ ASTM D 4815[6]/ D 5599 / D 6839
xx)	Ethanol content, percent by volume:			(*See* Notes 7 and 8) ASTM D 4815[6]/ D 5599 / Annex C (Water extraction)
	a) Motor gasoline	5.0	5.0	
	b) E10	10.0	10.0	
xxi)	Oxygenates percent by volume, *Max*			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

IS 2796….

- This Indian Standard was first published in 1964 and subsequently revised in 1971, 1995, 2000, 2008 and 2017.
- ✓Unleaded gasoline included in the second revision, in 1995 and leaded regular grade gasoline deleted in the third revision in December 2000.
- ✓Sulphur reduced from 2000ppm to 1500ppm in 1997
- ✓Restriction of lead content from 0.56 to 0.15 g/l, *Max* for 87 octane leaded grade motor gasoline in 1999.
- ✓Provision for use of Multi Functional Additives (MFA) included in 2000.

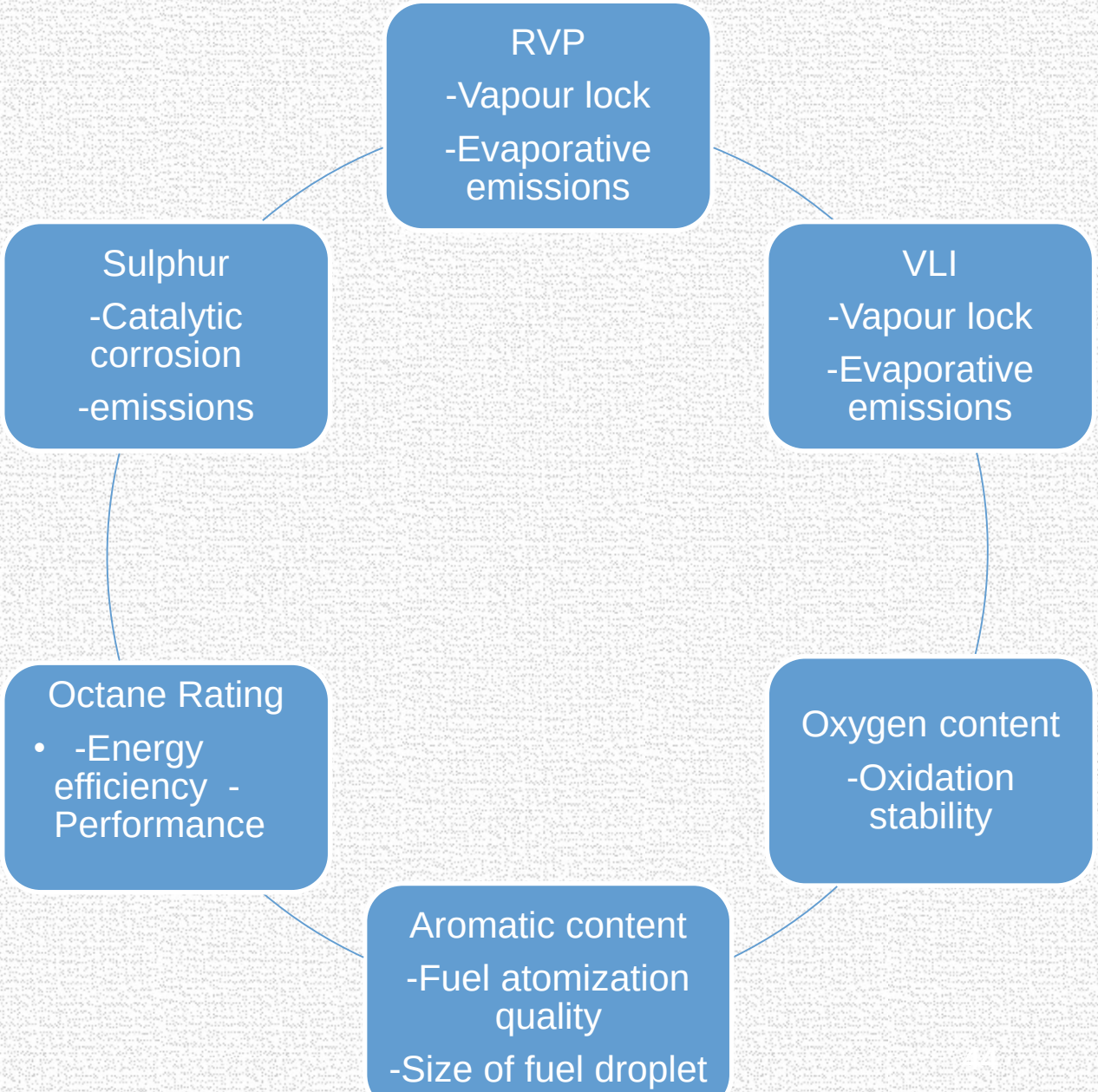
Contd…

- ✓3% methanol blending included in 1992, due to availability of excess methanol in the country and deleted in July 2005, due to its poisonous affects.
- ✓5% ethanol blending was included in July 2003 and 10% ethanol blending in 2010, for BS III fuels.
- ✓In this sixth revision, fuel specifications for BS VI emission norms included.
- ✓Currently under consideration for revision

Evolution of IS 2796

Critical requirements	2000	BS II 2002	BS III 2005	BS IV 2017 [NCR-2010]	BS VI 2020 [NCR-2018]
Density at 15°C, kg/m^3	710-770	710-770	720-775	720-775	720-775
Sulphur, ppm, Max	1000	500	150	50	10
RON	83/93	83/93	91/95	91/95	91/95
RVP, kpa	-	35-60 (35-67)	60 (67)	60 (67)	67
Olefin content, % vol	-	-	21	21	21/18
Aromatic content, % vol	-	-	42	35	35
Benzene, % vol	3 (NCR) 5 (rest)	3	1	1	1
Final Boiling point, °C	215	215	215	210	210

Critical requirements



IS 14861 : 2000

भारतीय मानक

मोटर वाहनों हेतु द्रवित पेट्रोलियम गैस
(एल पी जी) — विशिष्टि

Indian Standard

LIQUEFIED PETROLEUM GASES (LPG) FOR AUTOMOTIVE PURPOSES — SPECIFICATION

ICS 43.020;75.160.30

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

September 2000 Price Group 2

1 SCOPE

This standard prescribes the requirements and methods of sampling and test for liquefied petroleum gases for automotive use.

3 TERMINOLOGY

3.1 Liquefied Petroleum Gas (LP Gas or LPG)

The term applies to a mixture of certain light hydrocarbons derived from petroleum which are gaseous at normal ambient temperature and atmospheric pressure but may be condensed to the liquid state at normal ambient temperature by the application of moderate pressure.

4 REQUIREMENTS

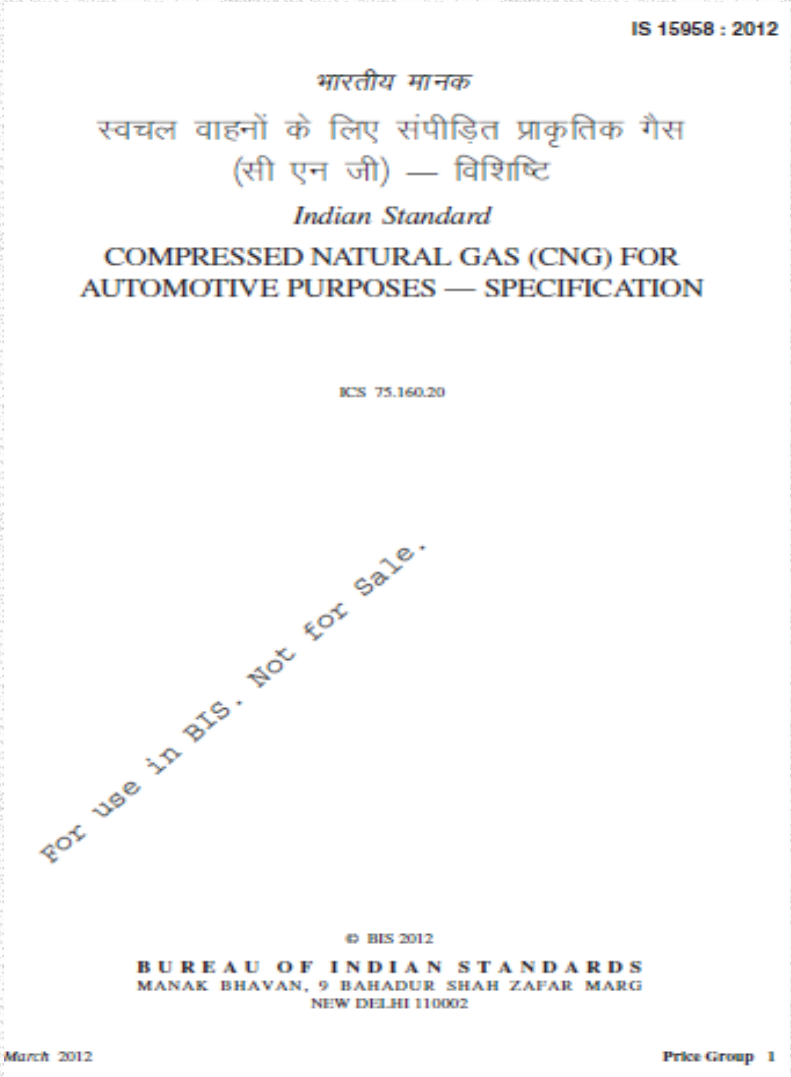
The material shall comply with the requirements given in Table 1 when tested according to appropriate methods given in col 4 of Table 1.

Table 1 Requirements for Liquefied Petroleum Gases for Automotive Purposes

(*Clause* 4)

Sl No.	Characteristic	Requirement	Method of Test, Ref to[1)]
(1)	(2)	(3)	(4)
i)	Vapour pressure at 40°C, kPa, gauge (Note 1), *Min* *Max*	 520 (Note 2) 1050	ISO 4256
ii)	C_5 Hydrocarbons and heavier, mole percent, *Max*	2.0	ASTM D 2163
iii)	Dienes (as 1:3 Butadiene), mole percent, *Max*	0.5	ISO 7941
iv)	Total volatile sulphur (After stenching) ppm, *Max*	150	ASTM D 3246
v)	Copper strip corrosion at 40°C for 1 hour, *Max*	Class 1	ISO 6251
vi)	Hydrogen sulphide	Pass the test	ISO 8819
vii)	Evaporation residue, mg/kg, *Max*	100	ISO 13757
viii)	Free water content	Nil	ASTM E 700 (Note 3)
ix)	Motor octane number (MON), *Min*	88	ISO 7941 + Annex A
x)	Odour	Unpleasant and distinctive down to 20 percent lower explosive limit (LEL)	(Notes 4 and 5)

CNG for Automotive Purposes



IS 15958 : 2012

भारतीय मानक

स्वचल वाहनों के लिए संपीड़ित प्राकृतिक गैस
(सी एन जी) — विशिष्टि

Indian Standard

COMPRESSED NATURAL GAS (CNG) FOR AUTOMOTIVE PURPOSES — SPECIFICATION

ICS 75.160.20

For use in BIS. Not for Sale.

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

March 2012 Price Group 1

1 SCOPE

1.1 This standard prescribes the requirements and the methods of sampling and test for the compressed natural gas (CNG) for automotive purposes.

1.2 This standard pertains only to compressed natural gas as it enters the fuel containers on the vehicle. CNG delivered to a fuel refueling station tend to vary sometimes with the supply composition in the vehicles. Any alteration in this respect to meet the specification requirements thus becomes the responsibility of both the supplier and the refueling station operator, who would determine the operating conditions accordingly.

4.3 Odour

Natural gas delivered to any natural gas vehicle shall be odorized similar to a level found in the local distribution (*see* IS 15319).

4.4 CNG shall be free of methanol/glycol.

4.5 The material shall also comply with the requirements given in Table 1.

5 SUPPLY OF CNG

5.1 CNG shall be supplied in accordance with the instructions given by the automotive vehicle manufacturers using CNG.

5.2 Receipt of natural gas through pipelines by the retail outlet, storage, compression and dispensing shall be done in accordance with the instructions given by the gas suppliers.

Table 1 Requirements for Compressed Natural Gas for Automotive Purposes

(*Clause* 4.5)

Sl No. (1)	Characteristic (2)	Requirement (3)	Method of Test, Ref to (4)
i)	Wobbe index[1)], MJ/ m^3, *Min*	48.8-51.0	IS 14504
ii)	Water content[1)], mg/m^3, *Max*	5.0	IS 15641 (Part 2)
iii)	Hydrocarbons (volume percent of total organic carbon present):		
	a) Methane, *Min*	90.0	IS 15130 (Part 3)
	b) Ethane, *Max*	6.0	do
	c) C_3 and higher HC, *Max*	3.0	do
	d) C_6 and higher HC, *Max*	0.5	do
	e) Total unsaturated HC, *Max*	0.5	do
iv)	Corrosive components:		
	a) Total sulphur[2)], mg/m^3, *Max*	20.0	ASTM D3246-05
	b) Oxygen, volume percent, *Max*	0.5	IS 15130 (Part 3)
v)	Carbon dioxide and nitrogen, volume percent, *Max*	3.5	do
vi)	Other species (mole percent):		
	a) Hydrogen, *Max*	0.1	do
	b) Carbon monoxide, *Max*	0.1	do
vii)	Methane number, *Min*	90.0	IS 15320

NOTE — The requirement of oil content shall be added at a later stage when the test method for the same is available.

[1)] Requirements are according to IS 15126.

[2)] Total sulphur includes the sulphur content of odorant.

Biogas (Biomethane/ Bio-CNG)

भारतीय मानक
Indian Standard

IS 16087 : 2016

बायो गैस (बायो मीथेन) — विशिष्टि

(पहला पुनरीक्षण)

Biogas (Biomethane) — Specification

(First Revision)

ICS 75.060

भारतीय मानक ब्यूरो
BUREAU OF INDIAN STANDARDS
मानक भवन, 9 बहादुरशाह जफर मार्ग, नई दिल्ली-110002
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NEW DELHI-110002
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May 2016 Price Group 1

1 SCOPE

This standard prescribes the requirements and the methods of sampling and test for biogas (biomethane) use in stationary engines, automotive (bio-CNG/bio compressed gas [CBG]) and thermal and industrial applications as supplied in cylinders and through piped network.

4 REQUIREMENTS

4.1 Biogas (biomethane) shall be free from liquids over the entire range of temperatures and pressures encountered in the storage and dispensing system, fuel containers, engine and fuel system and piped network.

4.2 The biogas (biomethane) fuel shall be free from particulate matter such as dust, dirt, etc.

4.3 Odour

Biogas (biomethane) delivered as fuel shall be odorized similar to a level found in the local distribution (*see* IS 15319).

4.4 The biogas (biomethane) for automotive application, piped network and cylinder applications shall also comply with the requirements given in Table 1 when tested in accordance with the methods given in col 4 and col 5 of Table 1.

Contd..

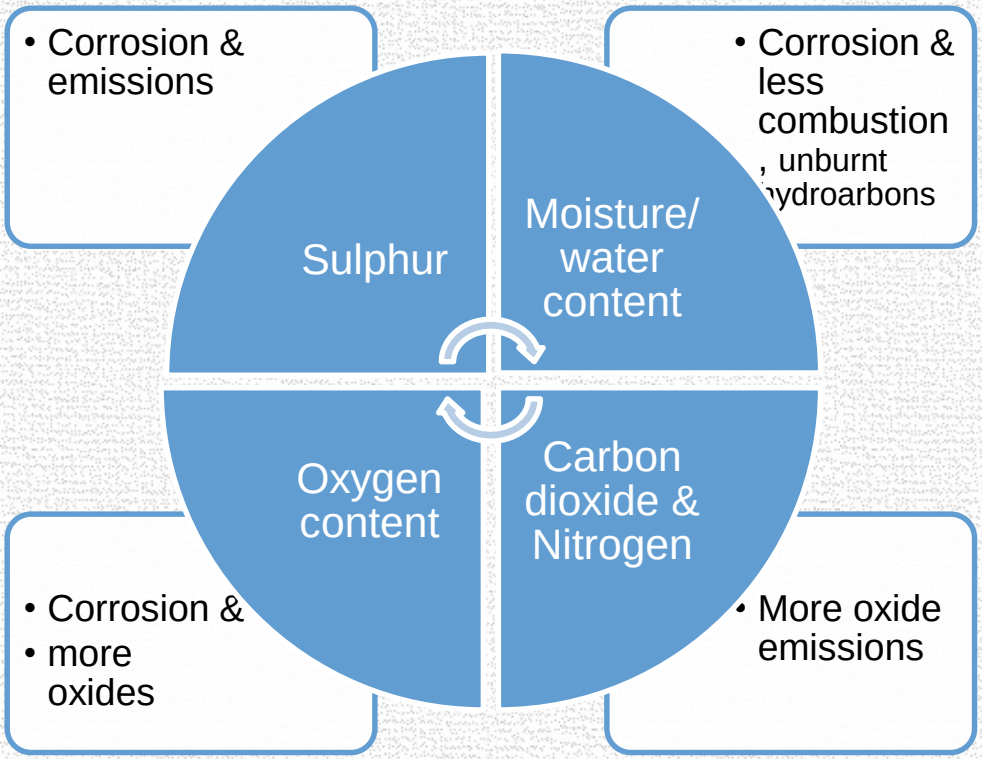
Table 1 Requirements for Biogas (Biomethane)

(*Clause* 4.4)

Sl No.	Characteristic	Requirement	Method of Test, Ref to	
			IS No.	ISO
(1)	(2)	(3)	(4)	(5)
i)	Moisture, mg/m^3, *Max*	5	15641 (Part 2)	—
ii)	Methane, percent, *Min*	90.0	5130 (Part 3)	—
iii)	Total sulphur (including H_2S), mg/m^3, *Max*	20	—	ISO 6326-3
iv)	$CO_2+N_2+O_2$, percent, *Max (v/v)*	10	15130 (Part 3)	—
v)	Only CO_2, percent, *Max (v/v)*	4	15130 (Part 3)	—
vi)	Oxygen percent, *Max*	0.5	15130 (Part 3)	—

Contd..

- In gaseous fuels, mercaptans are added to improve their odour, required for easy identification of leakage (safety aspect)
- Critical requirements



International Engagements

- Members of ISO, IEC, PASC and SARSO
- Membership Status in International Standardization Committees :
  - ✓ ISO (673)
    P member - 488, O member - 185
  - ✓ IEC (170)
    P member - 99, O member - 71
- 30 MoUs with various standards bodies and 8 MRAs/BCAs with NSBs
- Secretariat for ISO/IEC JTC 1/SC 7 Software and systems engineering; ISO/TC 34/SC 7 Food Products - Spices, culinary herbs and condiments; ISO/TC 113 Hydrometry & 2 of its Subcommittees; ISO/TC 120 Leather & its 3 Subcommittees; ISO/TC 146/SC 1 Air Quality - Stationery source emissions and ISO/TC 332 Security equipment

ISO/TC 28

- **ISO/ TC 28 Petroleum and related products, fuels and lubricants from natural or synthetic sources**

✓ Technical committee of ISO, related to petroleum products

✓Secretariat by NEN, Netherlands

✓29 participating members (p-members), including countries like India, China, USA, Russia, UK, etc. and 53 observing members, through their National Standards Body (NSBs)

✓4 Subcommittees and 12 Working groups

✓284 ISO standards published; 27 under development

✓Addresses Sustainable Development Goals (SDG's) 3, 4, 6, 7, 8, 9, 12 and 13.

Contd…

- **BIS represents India**
- ✓ As participating member (p-member)
- ✓ Through PCD01, PCD03, PCD25 Sectional Committees - National Mirror Committees(NMC's)
- ✓ Participating actively by
  - ✓ commenting on various drafts
  - ✓ Casting votes on ballots
  - ✓ Attending meetings and participating in discussions
- BIS regularly takes views from the members of the NMC's on the ballots of ISO and provides India's view on the subjects
- Nominates experts (members of NMC's) as India delegates representing BIS, India

Contd…

- Indian delegation attending regularly the biannual Plenary meetings of ISO/TC 28 and its Subcommittees
- Experts were nominated in many of the working groups
- Few projects lead by Indian experts, at ISO/TC 28
  - ✓ Revision of ISO 6249 (JFTOT method) during 2017-2019, revising the scope of the test method, making it applicable to synthetic/bio jet fuels
  - ✓ Revision of ISO 2137 ‘Petroleum products and lubricants — Determination of cone penetration of lubricating greases and petrolatum’ which was completed within a year span in 2019-2020
- Proposed formulation of ISO standard for sustainable aviation turbine fuel and few test methods related to aviation fuels.
  - Led to a ballot for creating a Working group for test methods of aviation fuels, with Convener as Indian expert
- Next meeting of ISO/TC 28 is scheduled to be hosted by India in September 2022.

Thank you

BIS website : www.bis.gov.in