

INSTITUTIONAL BUSINESS

Fueling Growth in your business



NAYARA
ENERGY

Nayara Energy (formerly known as Essar Oil Limited), is a downstream petroleum refinery of an international scale with a unique mix of young and experienced minds along with a robust foundation of best-in-class infrastructure and processes with a desire to deliver excellence at every step.

Operating India's 2nd largest single-site, ultra-modern and complex refinery with a capacity of 20MMTPA at Vadinar, which constitutes around 8% of India's total refinery capacity, delivering from crude to chemicals; Nayara Energy has an enviable industry-leading range of products designed to fuel your business growth.

With our unparalleled expertise across different sectors and industry verticals, we are constantly evolving to meet your discerning energy needs.

Agility in Operations

Our operations are combined with an agile distribution network that includes state-of-the-art facilities like ports, rail-fed inland depots, power plants, and retail networks, well connected through Indian Railways and terminal operators.

**Nayara Energy's Vadinar Refinery
is the first petroleum refinery in
India that is ISO 45001: 2018 certified.**

With an HSE standard on par with international benchmarks coupled with transparent and reliable order processing, we are geared to deliver on time and within budget.

Our integrated logistics solutions allow us to be responsive to dynamic demands. At Nayara Energy, we take the variability out of distribution and logistics and put you back in control.

Complementing our distribution is our fastest growing network of 6500+ private fuel stations, targeted to become 8200 by 2024.

Raising the Bar on Climate Change

At Nayara Energy, our commitment to sustainability covers the value chain in which we operate. We strive to maintain a balance between progress and protecting the environment. We are committed to protecting the health and safety of our employees, contractors and business partners while mitigating the environmental impact of our operations with strict compliance with various standards and requirements.



**Single Point Mooring
(SPM) system**

- > Ability to handle VLCCs 8 kms in the sea
- > Natural deep draft available throughout the year

World-class refinery

- > High complexity resulting in sustainable profitability
- > Strategic location provides natural advantage in sourcing and offtake

**Offtake via water,
road & rail**

- > 2 jetties, loading facilities and gantry allow for products offtake through multiple channels

**Institutional
Business**

- > With a customer base of over 1000 in industries like mining, road construction, power, cement, fertilizer, chemical, shipping, farming and many more.

**Pipeline network
connecting port to refinery**

- > Extensive network of pipelines help transport crude to refinery

**Fully captive
power plant**

- > Captive coal based power plants with back- up of liquid/ gas based gas turbines/ boilers boosts refinery margins by up to USD 1/ bbl

Retail sales

- > Strong network of ~6500 operational fuel stations provides reliable offtake channel

A RELIABLE BUSINESS PARTNER

Through lasting business relationships, we collaborate closely with our customers by providing products that are produced at scale and are high in quality. We are nimble and decisive - a core value when operating in dynamic market conditions.

Nayara Energy has more than 50 supply locations pan-India, catering to the needs of industrial customers.

Our products are versatile and are used in various applications, from constructing roads to generating power. We work closely with our customers to help them unlock their efficiency and success.

At Nayara Energy, we manufacture quality products in line with BIS standard such as HSD, HFHSD, LDO, MTO, LSHS, Bitumen, PMB, Petcoke, Sulphur and Fly Ash for the domestic market, spanning various verticals such as mining, infrastructure & logistics, power, cement, fertiliser, chemical, shipping, agriculture and paint.

OUR TOP CUSTOMERS

ADANI GROUP	HYUNDAI CONSTRUCTION EQUIPMENT IND.
AMBUJA CEMENTS LTD	INDIAN RAILWAYS
KAIRA DISTRICT CO-OPERATIVE MILK	INDO BAIJIN CHEMICALS P.LTD
ARCELORMITTAL NIPPON	J K CEMENT LTD
B.E.S.T MUMBAI	KANSAI NEROLAC PAINTS LTD
BERGER PAINTS INDIA LTD	MERCEDES BENZ INDIA PRIVATE LTD
BIRLA CORPORATION LTD	NIRMA LTD
CLARIANT CHEMICALS (INDIA) LTD	NUVOCO VISTAS CORPORATION LTD
DORF KETAL CHEMICALS INDIA PVT LTD	ORIENTAL CARBON & CHEMICALS LTD
ESSAR POWER GUJARAT LTD	PATEL INFRASTRUCTURE LTD
FOCUS ENERGY LTD	SAURASHTRA CEMENT LTD
GACL-NALCO ALKALIES & CHEMICALS PVT	SHREE DIGVIJAY CEMENT CO.LTD
GHCL LTD	TATA CHEMICALS LTD
GRASIM INDUSTRIES LTD	THE SINGARENI COLLIERIES
GUJARAT SIDHEE CEMENT LTD	ULTRATECH CEMENT LTD
GUJARAT STATE FERTILIZERS & CHEMICAL	HINDUSTAN ZINC LTD
HEIDELBERG CEMENT INDIA LTD	VEDANTA LTD



High-Speed Diesel (HSD)

HSD, commonly referred to as diesel or gasoil, is a straight run product with selected cracked distillates. It is produced from the fractional distillation of crude oil resulting in a mixture of carbon chains composed of saturated hydrocarbons and aromatic hydrocarbons. The sulphur level and emission standard is in line with BSVI / EURO VI grade in view of auto fuel policy by Government of India. HSD is a class B product as per PESO guidelines. It is widely used in the transportation sector. Diesel is used in diesel engines i.e. a typical internal combustion engine. HSD is used in cars, motor cycles, boats, locomotives, trains, buses and trucks. Diesel is blended with Bio Diesel as per Government directives to reduce carbon mobility as per Bio Fuel policy and marketed in India under BS VI.

Applications



HFHSD (High Flash High-Speed Diesel) or Marine Gas Oil (MGO) is used in marine shipping for bunkering.

HSD Benefits



OPERATION
Cleaner & better fuel, better combustibility with practically no ash and heavy metals



CALORIFIC VALUE
High calorific value with respect to other fuels



HANDLING
Cleaner & better to handle and store as it has better flow characteristics



AVAILABILITY
Widely available across the length and breadth of globe



ENVIRONMENT
Lower emission, relatively cleaner fuel

Specifications (IS 1460-2017)

S.No	CHARACTERISTIC	BHARAT STAGE VI
1	Appearance	clear, bright and free from sediments, suspended matter and undissolved water at normal ambient fuel temperature
2	Acidity, inorganic, mg of KOH/g	Nil
3	Acidity, total, mg of KOH/g, Max	0.20
4	Ash, percent by mass, Max	0.01
5	Carbon Residue (Ramsbottom or micro) on 10 percent residue ¹⁾ , percent by mass, Max	0.30
6	Cetane number, Min	51 ²⁾
7	Cetane index, Min	46 ²⁾
8	Pour point ³⁾ , Max:	-
	a) Winter	3°C
	b) Summer	15°C
9	Copper strip corrosion at 3 h at 50°C	Not worse than No. 1
10	Distillation, 95 percent v/v, recovery, °C, Max	360
11	Flash point, Abel ⁴⁾ , °C, Min	35
12	Kinematic viscosity, cSt, at 40°C	2.0 to 4.5
13	Total contamination, mg/kg, Max	24
14	Density at 15°C, kg/m ³	810-845 ⁵⁾
15	Total sulphur, mg/kg, Max	10
16	Water content, mg/kg, Max	200
17	Cold Filter Plugging Point (CFPP) ³⁾ Max:	-
	a) Winter	6°C
	b) Summer	18°C
18	a) Oxidation stability ⁶⁾ , g/m ³ , Max	25
	b) Oxidation stability by Rancidity meter ⁷⁾ , hours, Min	20
19	Polycyclic Aromatic Hydrocarbon (PAH), percent by mass, Max	8
20	Lubricity corrected wear scar diameter (wsd 1.4) at 60°C, microns, Max	460
21	FAME content ⁸⁾ , % v/v, Max	7.0



LDO Benefits



OPERATION

Ease of operation as compared to black oil as there is no preheat required



CALORIFIC VALUE

Better calorific value than fuel oil



HANDLING

Easy to handle as it does not require heating thus saving on power cost



STORAGE

Can be stored in both Bulk and in barrels



ECONOMICS

Lower cost, input Credit under GST regime

Light Diesel Oil (LDO)

Light Diesel Oil, or LDO is a blend of fuel oil and diesel and is a class C product as per PESO guidelines. LDO is used for non automotive purpose. It can be aligned to heating purpose and start up fuel for boilers, heaters, furnaces.

Applications

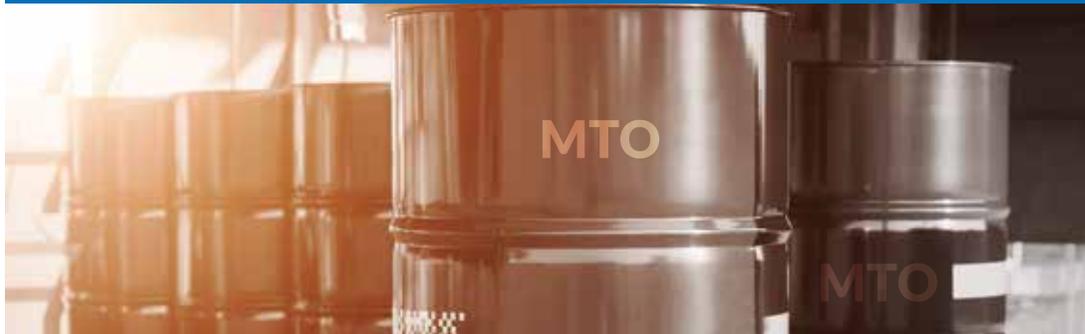
Boilers/heaters for furnace fuel

Road contractors for firing

Power plants

Specifications (IS 15770:2021)

S.No	CHARACTERISTIC	REQUIREMENTS
1	Acid number, mg KOH/gm, Max	0.5
2	Ash, percent by mass, Max	0.02
3	Carbon residue, on whole samples, percent by mass, Max	1.5
4	Pour Point, °C, Max	-
	a) Winter [November to February (both months inclusive)],	12
	b) Summer (rest of the months in a year)	21
5	Copper strip corrosion for 3 h at 100 °C	Not worse than No.2
6	Flash point, Pensky Martens ,°C, Min	66.0
7	Kinematic viscosity at 40 °C, mm ² /sec	2.5-15.0
8	Sediment, percent by mass, Max	0.10
9	Density at 15 °C, Kg/m ³	To Report
10	Water content, percent by volume, Max	0.25
11	Total sulphur, percent by mass	0.005 - 1.50 ²⁾



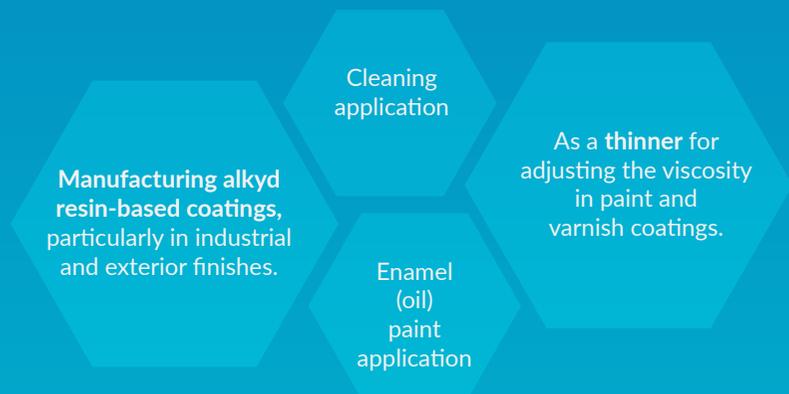
MTO - Mineral Turpentine Oil

Also known as white spirit, consists of volatile fractions derived from crude oil, containing paraffin, naphthenic and aromatic hydrocarbons in different proportions.

As a B Class product, MTO is under solvent control order as per MOPNG gazette notification. The license is issued by state government or district magistrate for acquiring storage, use & sale of MTO. Our MTO is RoHS compliant.

Applications

It is primarily used for operating low RPM engines by:



Storage & Handling

All packages should be stored under cover. Products should not be stored above 30°C, exposed to hot sun or freezing conditions. Avoid breathing harmful vapors. Avoid contact with skin and eyes. Wash thoroughly after handling storage requirements.

MTO Facilities



Production

- ▶ 30 KT per month MTO production capacity



Quality

- ▶ Stringent quality control at all stages
- ▶ State of the art quality control lab



Customer service

- ▶ Dedicated sales team for customer delight
- ▶ Support in troubleshooting

Specifications (IS 1745:2018)

S.No	TESTS	UNIT	NAYARA TYPICAL VALUE
1	Visual Appearance	...	Clear and Bright
2	Density at 15°C	kg/m ³	777.0 - 801.0
3	Saybolt Colour	...	21-27
4	Distillation IBP	°C	135 Min
5	50 percent by volume recovered	°C	To report
6	95 percent by volume recovered	°C	225 Max
7	Final Boiling Point	°C	240-245°C
8	Aromatics content	Vol %	12-20
9	Residue on evaporation (Gum content)	Wt %	0.005 Max
10	Water Content by Karl Fischer	Wt %	0.5 Max
11	Copper strip corrosion for 3 h at 50°C	...	Not worse than No.1
12	Flash Point (Abel)	°C	35 Min
13	Mercaptan Sulphur	Wt %	0.0030 Max
14	Total Sulphur	Wt %	To report



LSHS - (Low Sulphur Heavy Stock)

LSHS (grade 1) is petroleum heavy stock with low sulphur content. It is a hydrocarbon derived from petroleum refinery process. It is better over furnace oil due to low sulphur content (max 1%).

Applications

Fuel for Industrial applications in furnaces, heaters & boilers for heating purposes

Steel industry

Power plants

Pharmaceuticals

Licensing

LSHS is a C class product. PESO License / Approval is required as a C Class petroleum product to the end user.

LSHS Benefits



OPERATION

Ease of operation since in line with existing FO parameters, hence no modification needed in burner/existing processes for furnaces/boilers



CALORIFIC VALUE

10000 KCal/Kg



HANDLING

Customers need to clean existing storage facilities to remove sludge. The product is required to be heated at main tank (50* C) and service Tank (80*C-90*C) at burner tip (>105*C) for complete combustion of product.



ECONOMICS

Lower Cost compared to LDO, input Credit under GST regime

Specifications

S.No	PARAMETER	UNIT	NAYARA TYPICAL VALUE
1	Pour point	°C	27 Max
2	Flash point, PMCC	°C	66 Min
3	Kinematic Viscosity at 100°C	mm ² /s	18 Max
4	Relative density, at 15°C/15°C	—	To be reported
5	Gross calorific value	cal/gm	To be reported
6	Acidity, inorganic	—	Nil
7	Ash	% mass	0.1 Max
8	Sediment	% mass	0.25 Max
9	Sulfur, total	% mass	1.0 Max
10	Water content	% Vol	1.0 Max



Bitumen (Viscosity Grade) (VG 30, VG 40)

India has traditionally used penetration grade bitumen as a binder for road construction. To increase the lifespan of highways, reduce maintenance costs, and handle the load of today's traffic, MoRTH, in consultation with BIS, has revised from penetration grade to viscosity grade bitumen.

Applications

VG 10
Surface dressing,
Paving in very cold climate

VG 20 grade is
used for paving in
cold climates and
high-altitude
regions

VG 30
Warmer
temperature,
heavy traffic loads
& heavy duty
pavements

Due to its
water-resistant
properties, it is
also used for
roofing.

VG 40
Higher temperature
and heavy traffic
roads, Highly stressed areas
(intersections, near toll
booths and truck
parking lots)

Viscosity Grade Bitumen Facilities



**BASED ON
FUNDAMENTAL
ENGINEERING
PROPERTY**

Predictable
performance

**PERFORMS WELL
UNDER LARGER
TEMPERATURE RANGE**

Less rutting
at high
temperatures,
less cracking
at low
temperatures

**HIGHER
STRESS**

Can handle
higher
traffic,
can handle higher
axle loading
without rutting

**BETTER
MIX
DESIGN**

Better method
of choosing
binder grade

**SIMPLER &
RELEVANT
TESTS**

Lower
number
of tests,
cheaper
testing
cost

Specifications

Viscosity grading classifies bitumen on the basis of a fundamental engineering parameter.

VISCOSITY GRADE SPECIFICATION OF BITUMEN AS PER IS 73:2013 (FOURTH REVISION)

PARAMETER	UNIT	LIMIT	VG-10	VG-20	VG-30	VG-40
Suitability based on 7 day avg max air temperature	range	range	< 30	30-38	38-45	> 45
Absolute Viscosity at 60°C	min	min	800-1200	1600-2400	2400-3600	3200-4800
Kinematic Viscosity at 135°C	min	min	250	300	350	400
Flash point	min	min	220	220	220	220
Solubility in Trichloroethylene	min	min	99	99	99	99
Penetration at 25°C, 100g, 5s	min	min	80	60	45	35
Softening point (R&B)	min	min	40	45	47	50
TESTS ON RESIDUE FROM THIN FILM OVEN TEST/RTFOT						
Viscosity Ratio at 60°C		max	4	4	4	4
Ductility at 25°C	cm	min	75	50	40	25

Viscosity vs. Penetration Grading

	Viscosity Grade	Penetration Grade
Grading basis	Fundamental engineering parameter	Empirical parameter
Test temperature	Measures at both 60°C & 135°C	Measures only at 25°C
Predictability of performance	Any two VG grade bitumen will exhibit similar performance	Not predictable
Handling	Easier for mixing and compacting as resulting mix is predictable	Not predictable
Mixing	Viscosity at mixing temperature available	Not available
Operational performance	Wide range of temperatures	Narrow range
Tests	7nos. - All tests have relationship with field performance	14nos. - Many do not correlate with field performance
Testing	Faster and cheaper	Time consuming and expensive

Our Bitumen Facilities

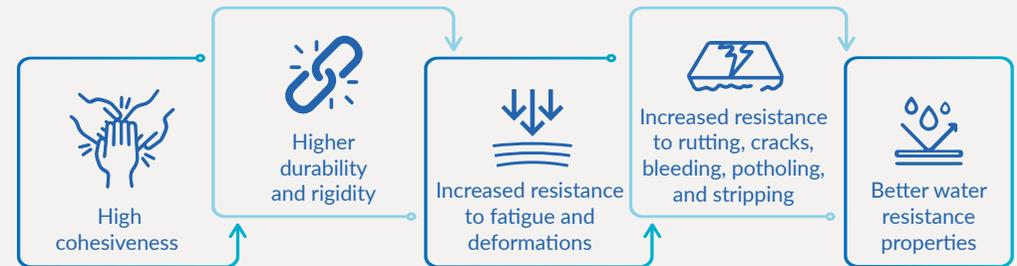
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Production
 - ▶ Nayara produces bitumen from its refinery at Vadinar and markets it in bulk. It is obtained as a residual product in petroleum refinery.
- 
Quality
 - ▶ Stringent quality control at all stages
 - ▶ State of the art quality control lab
- 
Customer service
 - ▶ Dedicated sales team for customer delight
 - ▶ Support in troubleshooting



PMB - Polymer-Modified Bitumen

PMB is modified bitumen (asphalt) combined with one or more polymer materials, (elastomeric thermoplastic polymers are used to make modified Bitumen [PMB]), which gives it more elasticity and extra strength. It's cost-effective, with regards to long term durability/ low maintenance, thereby making it a favourable material for infrastructure.

Properties



Applications

Pavements and roads that are better equipped to cope with the present traffic requirements. Future potential is good as NHAI is focusing on modified Bitumen in highways like PMB (Polymer) based in place of conventional VG-40 Grade.

Bitumen has been used as a construction material for centuries and is used in making home roofing solutions to withstand extreme weather conditions.

PMB Benefits



Lower susceptibility to temperature variations



Higher resistance to deformation at high pavement temperature, delay of cracking and reflective cracking



Better age resistance properties



Better adhesion between aggregates and binder



Higher fatigue life of mixes



Overall improved performance

Requirements of PMB

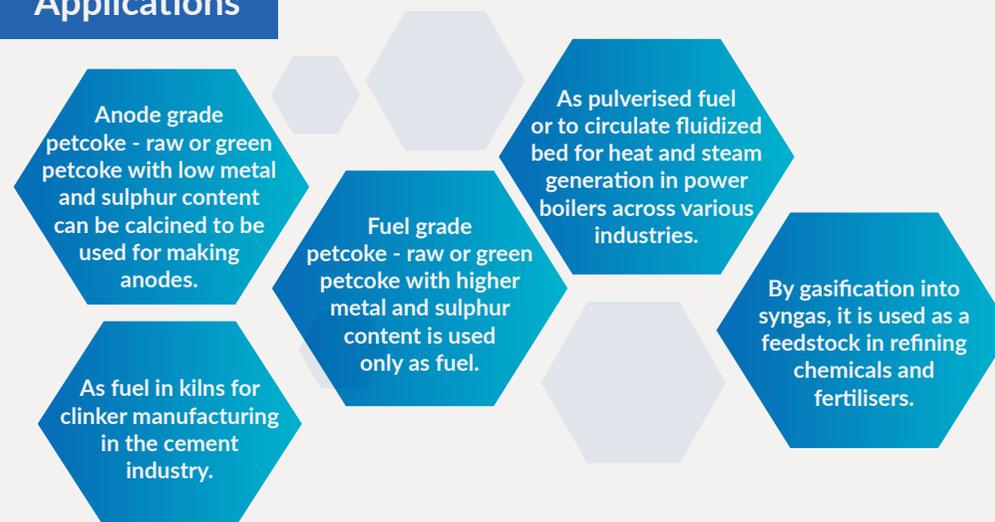
CHARACTERISTIC	GRADES AND REQUIREMENTS			METHOD OF TEST, REFTO.	
	PMB 60-10	PMB 70-10	PMB 76-10	Annex	IS/ASTM
TESTS TO BE CARRIED OUT ON ORIGINAL BINDER					
Softening point (R and B), °C, Min	60	65	70	—	IS 1205
Elastic recovery of half thread in ductilometer at 15°C, percent, Min	70	70	70	Annex A	—
Flash point, COC, °C, Min	230	230	230	—	IS 1209
Viscosity at 150°C, Pa.s, Max	1.2	1.2	1.2	—	ASTM D 4402
Complex modulus (G*) divided by Sin delta (G*/sin δ) as Min 1.0 kPa, 25 mm Plate, 1 mm Gap, at 10 rad/s, at a temperature, °C	64	70	76	Annex B	—
Phase Angle (δ), degree, Max	75	75	75	Annex B	—
Separation, difference in softening point (R&B), °C, Max	3	3	3	Annex C	—
FRAASS breaking1) point, °C, Max	-10	-10	-10	—	IS 9381
TESTS TO BE CARRIED OUT ON ROLLING THIN FILM OVEN (RTFO) RESIDUE2)					
Loss in mass, percent, Max	1.0	1.0	1.0	—	IS 9382
Complex modulus (G*) divided by Sin delta (G*/sin δ) as Min 2.2 kPa, 25 mm Plate, 1 mm Gap, at 10 rad/s at a temperature, °C	64	70	76	Annex B	—
MSCR Test					
a) Standard Traffic (S) Jnr3.2, Max 4.5 kPa-1 Jnr diff, Max 75 percent Test Temperature, °C	64	70	76	Annex D	—
b) Heavy Traffic (H) Jnr3.2, Max 2 kPa-1 Jnr diff, Max 75 percent Test Temperature, °C	64	70	76	Annex D	—
c) Very Heavy Traffic (V) Jnr3.2, Max 1 kPa-1 Jnr diff, Max 75 percent Test Temperature, °C	64	70	76	Annex D	—
d) Extremely Heavy Traffic (E) Jnr3.2, Max 0.5 kPa-1 Jnr diff, Max 75 percent Test Temperature, °C	64	70	76	Annex D	—
TESTS TO BE CARRIED OUT ON PRESSURE AGING VESSEL (PAV) RESIDUE3)					
Sin delta (G* sin δ) as Max 6 000 kPa, 8 mm Plate, 2mm Gap, at 10 rad/s at a temperature, °C	31	34	37	Annex C	—



Petcoke

Petcoke is cheaper and has a better availability than coal, increasingly making it the fuel of choice.

Applications



Specifications

GRADE	CHARACTERISTICS	APPLICATIONS
Fuel	Higher metal and volatile fraction	Heat and power generation, feedstock
Anode	Lower metal and volatile fraction	Manufacturing of anodes for aluminium
Needle	Made from highly aromatic feedstock and has a crystalline structure	Manufacturing of graphite electrodes

PARAMETER	UNIT	LIMIT
Moisture	%wt	8.0 max
Ash	%wt	1.0 max
Volatile Matter	%wt	8.0 min
Fixed Carbon	%wt	85 min
Gross Calorific Value (ADB)	Kcal/Kg	8200 min
Sulphur	%wt	6-8
HGI	—	40-60

Petcoke vs. Coal

PARAMETER	SIGNIFICANCE	PETCOKE	COAL
Carbon	Calorific value is higher with higher carbon content	Very high	Low
Fixed Carbon	Higher fixed carbon indicates longer time to burn completely	High	Low
Volatile Matter	Higher volatile matter indicates easier and faster ignition	Low	High
Ash	Higher ash indicates lower calorific value, higher heat loss and disposal issues	Very low	High
Sulphur	Higher sulphur causes corrosion and pollution	High	Low
HGI	Higher HGI indicates easier grindability	Lower	Higher

Grading Parameters

PROPERTIES	CHARACTERISTICS	APPLICATION
Sulphur	<ul style="list-style-type: none"> ▶ Corrosion ▶ Pollution 	Corrosion by sulphuric acid reduced by maintaining exhaust gas temperature above its dew point Use of lime to absorb sulphur
Metals	<ul style="list-style-type: none"> ▶ Corrosion 	Additives to prevent cold corrosion by vanadium
Combustion	<ul style="list-style-type: none"> ▶ Residence time ▶ Ignition 	Increasing residence time to ensure complete combustion Secondary fuel only during startup
Pulverization	<ul style="list-style-type: none"> ▶ Grindability 	Suitable grinding equipment

Petcoke Benefits



COST

Cheaper than many fuels on a calorific basis, capture of entire calorific value of fuel leading to higher efficiency



AVAILABILITY

Increasing supply



CALORIFIC VALUE

Reliable supplies from various refineries, high net calorific value



ASH

Lower ash with no disposal problems, lower abrasion



HANDLING

Lower quantity of fuel to be handled, lower area required for storage, non hygroscopic: doesn't absorb moisture, lower handling and transportation losses

Petcoke Facilities



Production

▶ 2 million tonnes per annum



Quality

▶ Stringent quality control at all stages ▶ State of the art quality control lab



Storage

▶ 2 silos with capacity of 1000 tons each ▶ Open storage yard
 ▶ Storage near rail siding



Logistics

▶ 24x7 road loading ▶ Integrated rake loading
 ▶ Coastal loading facilities from Bedi Port



Customer service

▶ Customized solution for shifting from other fuels
 ▶ Support in troubleshooting ▶ Dedicated sales team for customer delight



Sulphur

During the hydrogenation process of refining crude oil, Hydrogen Sulphide is released and converted to elemental sulphur. Most of the sulphur produced is used to make sulfuric acid (H₂SO₄), carbon disulphide, sulphur dioxide, and phosphorous penta-sulphide. Sulphur comes under Arms and Ammunition Act. The license is issued by District Magistrate for acquiring storage and sale of Sulphur at Domestic market.

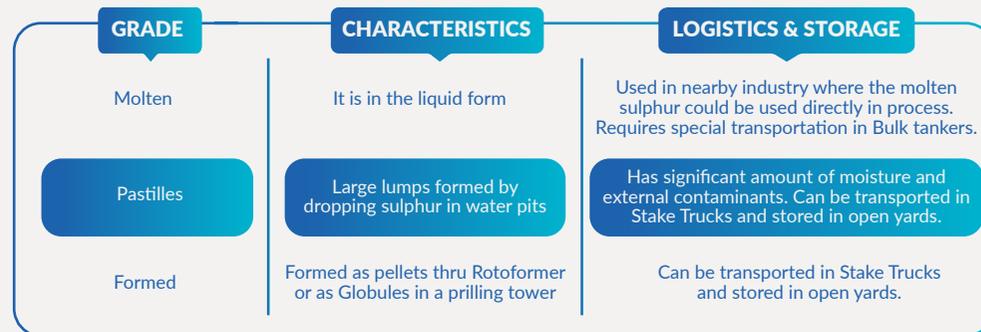
Applications



Specifications

PARAMETER	UNIT	SPECIFICATIONS
Colour	—	Bright Yellow
Moisture	% wt	0.5 max
Ash	% wt	0.05 max
Assay (on Dry Basis)	% wt	99.0 min
Carbon	% wt	0.025 max
Purity	% wt	99% min

Forms of Sulphur



Sulphur Benefits



Our Sulphur Facilities



Production

- ▶ 0.35 million tons per annum sulphur production capacity



Quality

- ▶ Stringent quality control at all stages
- ▶ State of the art quality control lab



Storage

- ▶ 5 silos with total capacity of 1800 tons
- ▶ Storage near rail siding
- ▶ Open storage yard



Logistics

- ▶ Road loading
- ▶ Rail loading from Hapa Railway Yard
- ▶ Coastal loading facilities from Bedi Port



Customer service

- ▶ Support in troubleshooting
- ▶ Dedicated sales team for customer delight

FLY ASH

Fly ash is the residue from pulverised coal combustion and is composed of fine particles of burnt fuel. It is used as a Supplementary Cementing Material (SCM) in cement, blocks, paving bricks, etc.



CONTACT US



Nayara Energy Limited

5th Floor, Jet Airways Godrej BKC, Plot No. C-68,
G Block, Bandra Kurla Complex,
Bandra East, Mumbai - 400 051,
Maharashtra, India



www.nayaraenergy.com



+91 2266 121 800



ibenquiry@nayaraenergy.com