



eni **aviation**



eni
eni.com



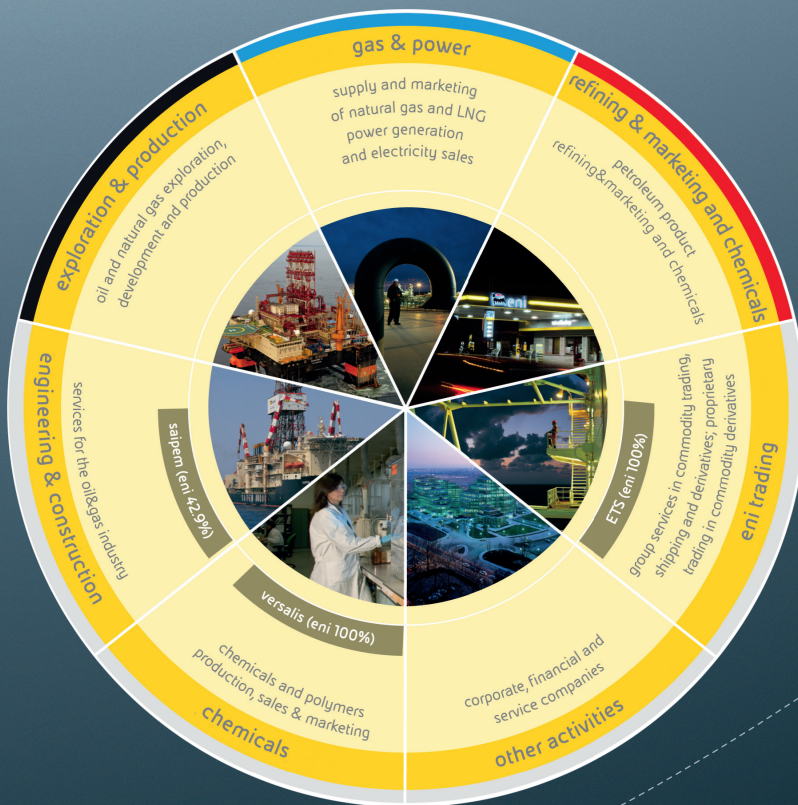
eni "open energy"

about us

eni is an integrated energy company, active in 85 countries in the world with a staff of approximately 79,000 employees. **eni** boasts a strong position in the oil&gas value chain, from the hydrocarbon exploration phase to the product marketing. Our strong presence in the gas market and in the liquefaction of natural gas, our skills in the activities, strengthened by world class skills in engineering and project management, allow us to catch opportunities in the market and to realize integrated projects.



We are a major integrated energy company, committed to growth in the activities of finding, producing, transporting, transforming and marketing oil and gas. **eni** men and women have a passion for challenges, continuous improvement, excellence and particularly value people, the environment and integrity.





eni aviation

eni has been supplying oil products to the aviation industry ever since 1961 when, on April 1 of that year, it carried out its first fuelling operation on an Alitalia DC8 plane at Fiumicino airport. Since then, its aviation business has been steadily expanding, both domestically in Italy as well as abroad. At present, **eni** serves around 50 airports around the world.

eni's activities in the aviation sector comprise principally the sale of Jet A-1 aviation fuel and the provision of technical and operating assistance and training to a wide range of operators in Italy and abroad.

eni also supplies aviation gasoline to specialised resellers on the Italian market.

eni is dedicated to creating long-term value for all of its customers and is committed to supplying only top quality products and to ensuring optimal relations with all its commercial partners by offering continual support and assistance.

eni's aviation business has achieved UNI EN ISO 9001:2008 certification for its Quality Management System (see quality mark right).

eni is also a strategic partner of the International Air Transport Association (IATA), which is the airline industry's global trade association, as well as a guarantor member of JIG (Joint Inspection Group), the leading internationally recognized forum for establishing and enhancing standards for the safe handling and quality control of aviation fuels.



where we work

eni is market leader in the sale of Jet A-1 fuel in Italy, where it has a widespread presence. Its services are available in the country's 25 principal airports.

It also has a presence at a number of key European airports, including Paris, Frankfurt, Munich, Berlin, Zurich, Geneva, Vienna, Linz and Bratislava.

Outside of Europe, **eni** serves airports in Ghana (Accra), Saudi Arabia (Jedda and Medina) and the Seychelles (Mahé). The business is in continuous expansion with additional operations expected to start up in a number of international airports.



our target

- **Airlines** operating in airports served by **eni**
- **The public sector:** direct sales to aviation units of the armed forces, fire services and police
- **General aviation:** sales to private aircraft owners and corporate fleets
- **Resellers** of aviation products supplying airlines, search and rescue and air ambulance helicopter operators, the armed forces, the Italian civil protection department, aviation clubs, operators of helicopters for aerial surveys and holders of Aviation Cards.



aviation fuels

characteristics and performance of eni products

During the second world war, aeroplane engines were developed to run on kerosene rather than aviation gasoline due to kerosene's good combustion properties and lower risk of flammability. Kerosene, which was also cheaper than aviation gasoline, underwent continuous developments to allow it to meet the growing and increasingly complex demands of the aeronautical industry. Its widespread availability and use eventually led to steps being taken to standardize its characteristics.

Aviation fuels are derived mainly from the primary distillation of crude oil. Their most significant properties are their volatility, density, freezing point, flash point and ignition point.

Aviation gasoline and Jet A-1 have maximum freezing points of - 58 °C and - 47 °C, respectively, meaning that they have to guarantee engine performance up to those temperatures.

While the flash point of kerosene is generally around 40 °C - 70 °C, **eni** does not monitor the flash point of aviation gasoline, because gasoline-air mixtures are flammable even at temperatures below 0 °C.

Ignition points are monitored for both gasoline and kerosene. For aviation gasolines, the minimum ignition point ranges roughly between 370 °C and 420 °C, while for kerosenes it varies between 200 °C and 260 °C.

Gasoline's higher volatility compared with kerosene makes it ideal for use in internal combustion engines.

Jet A1

The Jet A-1 fuel sold by **eni** meets the most stringent technical standards, thus guaranteeing both its high quality and its compliance with the requirements laid down in the relevant industry standards "**British MoD DEF STAN 91-91 and ASTM Standard Specification D1655 for Aviation Turbine Fuels - Jet A-1**".

The air forces of Nato countries use JP-8, which is identical to Jet A-1 for civil aviation, with the inclusion of special additives.



main features

	JET A- 1	
	min.	max.
properties		
Density 15°C, Kg/m ³	775	840
Total Aromatics, % v/v	-	25
Sulphur Mercaptan, %p	-	0,003
Sulphur Total, %p	-	0,3
distillation		
Initial Boiling Point, °C	report	
10% v/v at °C	-	205
50% v/v at °C	report	
90 % v/v at °C	210	
End Point, °C	-	300
Residue, % v/v	-	1,5
Loss, % v/v	-	1,5
Flash Point, °C	38	-
Freezing Point, °C	-	-47
Viscosity at -20°C, mm ² /s (CST)	-	8
Smoke Point, mm	25	-
Corrosion Copper Strip, 2h at 100°C	-	1
Thermal stability (JFTOT)	260°C	
Filter Pressure Differential, mmHg	-	25
Tube deposit rating (=Visual)	-	< 3
Existent Gum, mg/100ml	-	7
Electrical Conductivity ps/m	50	600
Visual Appearance: clear, bright and visually free		

AvGas 100LL

Avgas is a high octane aviation fuel identified by two octane numbers. The first number indicates the octane rating tested to "aviation lean" standards, which produces results similar to the ratings set out in the Motor Octane Number (MON) standard intended for gasoline for ordinary automotive use. The second number indicates the fuel's octane rating tested to the "aviation rich" standard, which aims to reproduce the demanding conditions of use in the aeronautical field, i.e. rich mixture, high temperatures and high manifold pressures. Aviation gasoline has a lower and more uniform vapor pressure than automotive gasoline, which enables it to remain in a liquid state at high altitudes and prevents the phenomenon known as vapor lock.

The product sold by **eni** is an avgas 100LL (i.e. 100 low lead) containing the antiknock additive TEL, although in smaller quantities than are present in the high lead 100/130 gasoline that it has effectively replaced. Most planes with piston engines use 100LL, although studies are currently underway internationally to develop additives with improved environmental compatibility.



characteristics	units	value			test method ASTM D
		min.	max.	tip.	
Colour			blue		2392
Density at 15 °C	Kg/m ³	report		720	1298,4052
Knock value, rich mixture supercharge rating perf number	--	130,0			909
Knock value, lean mixture, Motor Method Octane number	--	99,6			2700
Teatraethy lead	g Pb/l		0,56		3341,5059
Distillation:					86
initial boiling point	°C	report			
Fuel evaporated					
10% v/v at	°C		75		
50% v/v at	°C		105		
90% v/v at	°C		135		
final boiling point	°C		170		
residue	%(v/v)		1,5		
loss	%(v/v)		1,5		
Vapour pressure at 38°C	KPa	38,0	49,0		323,5190,5191
Freezing Point	°C		-58		2386
Oxidation stability (5 hrs aging)					873
- potential gums	mg/100ml		6		
- lead precipitate	mg/100ml		3		
Sulphur	%(m/m)		0,05		1266,2622
Water reaction					1094
- volume change	ml		±2		
Corrosion, copper strip, (2 hrs at 100°C)	--		1a		130

technological innovation: Green Jet

eni's refining division is currently in the process of converting a production site situated in Venice into a "biorefinery" for the production of innovative high quality biofuels.

The conversion project, which is one of the world's first, uses the Ecofining™ technology **developed and patented by eni/UOP** for the production of bio jet fuel from biomass.

Biomass fuel technology is currently the focus of great attention from the aviation industry in general. In fact, a number of airlines are using jet fuel produced from biomass in blends of up to 50% with JET A1 fuel on the basis of specification ASTM D7566/1655.



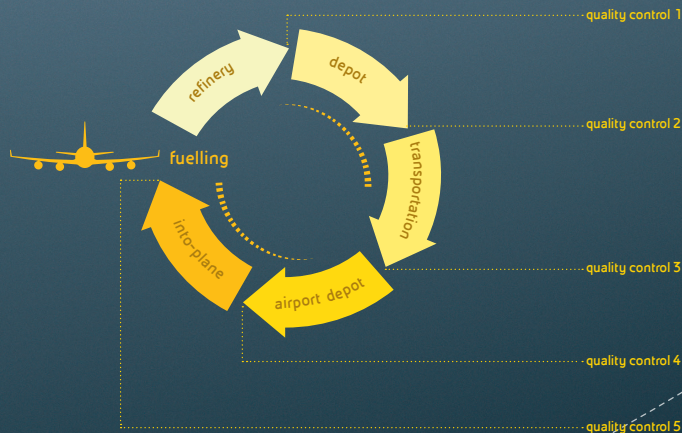
from the refinery to the aircraft

The operation of refuelling a plane is only the final step in a long series of accurate operations and checks which begins with production of Jet-A-1 fuel in **eni**'s refineries and ends when the fuel is put into a plane's fuel tank.

eni is committed to ensuring full compliance with "Aviation Fuel Quality Control & Operating Standards" (JIG/IATA standards) at all stages in product handling and distribution to ensure that its customers are supplied with a product which is entirely free of contamination of any kind and which meets the strictest international standards in the sector.

eni's careful and rigorous implementation of this process prevents contamination by the most common impurities, such as foreign matter, various sediments, surfactants and water, which are the most harmful forms of contamination for the proper functioning of aircraft engines, on-board instruments and fuel tanks.

In addition, **eni** periodically has its own qualified staff inspect all aviation fuel storage facilities to check on the performance of refuelling operations and the condition of the infrastructures, facilities and systems and equipment used. Checks are also performed on the internal documentation relating to the multitude of tasks performed daily to ensure compliance with the law, with quality standards and with health, safety and environmental regulations.



quality of products and services

eni subjects Jet-A-1 to more than 30 tests to ensure its compatibility with the standards required and only assigns the certificate of origin that will accompany the fuel on the various stages it passes through before being put into a plane's fuel tank once all of these tests have been successfully completed.

eni's laboratories are equipped with the cutting edge technologies and instrumentation required to apply the analytical protocol laid down in "**Aviation Fuel Quality Requirements for Jet A-1**".



technical assistance services

eni's specialist personnel supplies technical assistance for the entire aviation fuel chain, including Supply & Distribution, Storage and Handling at airport fuel storage depots, right up to into-plane fuelling operations. It provides this service to a large number of operators in both Italy and abroad in compliance with the stringent regulations laid down by the relevant international organizations, such as the Joint Inspection Group (JIG) and the International Air Transport Association (IATA), thus ensuring all its clients receive an excellent level of service. **eni** supplies a wide range of services to meet the needs of all sector operators. These can also be adapted to suit specific demands and requirements.

the basic service aimed principally at new operators includes:

- preliminary studies to evaluate technical and operational feasibility, and assistance with the design of facilities, systems and vehicles needed for storage and handling of Jet A-1 fuel
- initial personnel training, including classroom-based theory sessions and on the ground practical training, with a special focus on health, safety and environmental issues
- supply of Operating and Maintenance Manuals for facilities and Aircraft Fuelling Data
- insurance for fuelling operations with a maximum coverage limit of 1 billion USD
- supply of fuel handling data management software.



support to operators with existing operations includes:

- checks on compliance of existing facilities and systems and compliance of operations with standards laid down by the relevant international bodies
- delivery of refresher training courses for personnel with previous experience in the sector
- assistance and support for resolution of technical, operational and product quality issues
- design of product quality control and monitoring systems
- design and supply of systems for the overall management of storage depot and into-plane refuelling operations
- skills development training for operators and site managers, including updating of operating manuals and check lists.
- periodic inspections of operations and facilities to ensure compliance with international standards and indication of corrective actions where necessary.



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