

Environmental technology for people and the planet,
for the generations to come

INDUSTRIAL FUEL OIL

ING OIL

Pyrolysis Oil

- High calorific value — 10,000 kcal/kg
- Competitive price — at least 30% lower
- Low sulfur content — 0.02–0.03 wt%
- Sufficient lubricity
- Low pollutant emissions in use
- Low corrosiveness



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Why ING OIL?

A pyrolysis fuel oil that delivers a higher calorific value than Bunker C at a lower price — with neutral acidity, stable viscosity and a sulfur content an order of magnitude below heavy oil.

01 High calorific value at a competitive price

10,000 kcal/kg — higher than kerosene, Bunker C and Hi-Sene — at roughly 30% below the price of Bunker C.

02 High-quality fuel oil

Neutral acidity	No risk of nozzle or oil-pump corrosion from high acidity.
Sufficient lubricity	Viscosity high enough that machine wear is not a concern.
Homogeneity	Centrifugal separation and mixing secure thermal stability during heating.

03 Long-term, stable mass production

CURRENT OUTPUT

24 t / day
600 t / month

FROM JUNE 2021

60 t / day
1,500 t / month • **18,000** t / year

Item	Kerosene	Bunker C	Hi-Sene	Pyrolysis fuel oil “ING OIL”
Advantages	Cheaper than diesel	High calorific value	Clean, high calorific value, lubricity	Clean, high calorific value, cheaper than Bunker C and Hi-Sene
Disadvantages	Low calorific value	Environmentally harmful (high sulfur)	Costly compared with heavy oil	High pour point
Calorific value (kcal/kg)	8,420	9,360	9,050	10,000
Acidity (pH 1–14)	Neutral	Neutral	Neutral	Neutral (6–7)
Viscosity (mm²/s at 50 °C) 70 or above = lubricating	10 or less	80–380	10–20	50
Price per liter (Jan 2020)	KRW 800	KRW 710	KRW 800	30% below Bunker C
Sulfur (wt%) reference: 0.5 or less	0.02 or less	0.5–3.5	0.2	0.02 or less

※ ING OIL can be used in existing heavy-oil-fired facilities without any modification of the equipment.

ING OIL is **pyrolysis oil**

A liquid industrial fuel recovered from waste plastics and vinyl — not burned, not buried.

01 Green New Deal · New & Renewable Energy

Classified as renewable energy under the Korean *Act on the Promotion of the Development, Use and Diffusion of New and Renewable Energy*.

02 Pyrolysis oil

A liquid industrial fuel oil produced by thermally cracking waste synthetic resin in an oxygen-free, low-temperature environment — breaking long, high-molecular carbon chains into short, low-molecular ones.

03 ING OIL production flow



Sorting of waste



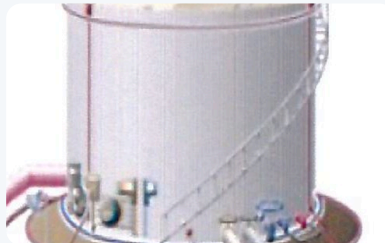
Industrial boiler



Power plant



Compression baling of waste



Pyrolysis oil storage tank



Sales & delivery



Cracking device — dual fuel



Slag



Mixed asphalt

Industrial boilers

Drop-in replacement for Bunker C in existing heavy-oil-fired boilers — no equipment modification required.

Power generation

Fuel for power plants, with a calorific value above that of conventional heavy fuel oil.

Asphalt plants

Burner fuel for mixed-asphalt production; the residual slag is itself reused as an asphalt aggregate.

Quality standards

Reference limits applied to recovered fuel oil in Korea and abroad.

01 Domestic and overseas quality standards

Item	Unit	Republic of Korea			Overseas		
		Wastes Control Act Vacuum distillation	Petroleum Act Kerosene No.1 (heating oil)	Petroleum Act Diesel	USA	UK	Japan premium heavy-oil substitute
Residual carbon	wt%	0.15	0.15	0.15	—	—	4.0
Water & sediment	vol%	0.5 (emulsified 15)	—	0.02	—	3.0	0.3
Ash	wt%	0.05	0.02	0.02	—	0.4–1.0	0.05
Sulfur	wt%	0.2	0.1	30	—	0.5–0.9	0.5
Metals — Cadmium	mg/kg	1	—	—	2	—	—
Metals — Lead	mg/kg	1	—	—	100	500–1,000	—
Metals — Chromium	mg/kg	1	—	—	10	—	—
Metals — Arsenic	mg/kg	1	—	—	5	—	—
Flash point	°C	40 or above	40	40	38	—	60

“—” indicates that no limit is specified in the standard concerned.

02 How ING OIL measures up

NET HEAT OF COMBUSTION 10,148 kcal/kg	SULFUR < 0.020 mass%	ASH 0.004 mass%	WATER < 0.05 mass%
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Measured values for ING OIL, certified by the Korea Petroleum Quality & Distribution Authority (K-Petro). Full test report on the following page.

Certificate of test

Korea Petroleum Quality & Distribution Authority (K-Petro), Petroleum Technology R&D Center.

01 Test report summary

Test item	Unit	Result	Test method
Net heat of combustion	cal/g	10,148	KS M 2057:2006
Gross heat of combustion (bomb calorimeter)	cal/g	10,787	KS M 2057:2006
Sulfur (ED-XRF spectrometry)	mass%	< 0.020	KS M ISO 8754:2003
Elemental analysis — H	mass%	11.84	ASTM D5291-16
Elemental analysis — C	mass%	73.66	
Water	mass%	< 0.05	KS M 0010:2016
Flash point (Pensky-Martens closed cup, method A)	°C	< 40.0	KS M ISO 2719:2016
Ash	mass%	0.004	KS M ISO 6245:2008
Kinematic viscosity (40 °C)	mm ² /s	6.887	KS M ISO 3104:2008
Pour point (automatic air pressure method)	°C	27	ASTM D6749-02(2012)
Copper strip corrosion (100 °C, 3 h)	—	1	KS M ISO 2160:2012



Korea Petroleum Quality & Distribution Authority (K-Petro), Petroleum Technology R&D Center. Report No. TSC2020-1029E · Sample: Ing-Oil No.2.

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