



argusmedia.com

## ***ARGUS BASE OILS***

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The most up-to-date Argus Base Oils methodology is available on [www.argusmedia.com](http://www.argusmedia.com)

## Methodology overview

### Methodology rationale

Argus strives to construct methodologies that reflect the way the market trades. Argus aims to produce price assessments which are reliable and representative indicators of commodity market values and are free from distortion. As a result, the specific currencies, volume units, locations and other particulars of an assessment are determined by industry conventions.

In the base oils market, Argus publishes physical market prices in the open market, and refiners' posted prices as laid out in the specifications and methodology guide. Argus uses the trading period deemed by Argus to be most appropriate, in consultation with industry, to capture market liquidity.

In order to be included in the assessment process, deals must meet the minimum volume, delivery, timing and specification requirements in our methodology. In illiquid markets, and in other cases where deemed appropriate, Argus assesses the range within which product could have traded by applying a strict process outlined later in this methodology.

### Survey process

Argus price assessments are informed by information received from a wide cross section of market participants, including producers, consumers and intermediaries. Argus reporters engage with the industry by proactively polling participants for market data. Argus will contact and accept market data from all credible market sources including front and back office of market participants and brokers. Argus will also receive market data from electronic trading platforms and directly from the back offices of market participants. Argus will accept market data by telephone, instant messenger, email or other means.

Argus encourages all sources of market data to submit all market data to which they are a party that falls within the Argus stated methodological criteria for the relevant assessment. Argus encourages all sources of market data to submit transaction data from back office functions.

Throughout all markets, Argus is constantly seeking to increase the number of companies willing to provide market data. Reporters are mentored and held accountable for expanding their pool of contacts. The number of entities providing market data can vary significantly from day to day based on market conditions.

For certain price assessments identified by local management, if more than 50pc of the market data involved in arriving at a price assessment is sourced from a single party the supervising editor will engage in an analysis of the market data with the primary reporter to ensure that the quality and integrity of the assessment has not been affected.

### Market data usage

In each market, Argus uses the methodological approach deemed to be the most reliable and representative for that market. Argus will utilise various types of market data in its methodologies, to include:

- Transactions
- Bids and offers
- Other market information, to include spread values between grades, locations, timings, and many other data.

In many markets, the relevant methodology will assign a relatively higher importance to transactions over bids and offers, and a relatively higher importance to bids and offers over other market information. Certain markets however will exist for which such a hierarchy would produce unreliable and non-representative price assessments, and so the methodology must assign a different relative importance in order to ensure the quality and integrity of the price assessment. And even in markets for which the hierarchy normally applies, certain market situations will at times emerge for which the strict hierarchy would produce non-representative prices, requiring Argus to adapt in order to publish representative prices.

### Verification of transaction data

Reporters carefully analyse all data submitted to the price assessment process. These data include transactions, bids, offers, volumes, counterparties, specifications and any other information that contributes materially to the determination of price. This high level of care described applies regardless of the methodology employed. Specific to transactions, bids, and offers, reporters seek to verify the price, the volume, the specifications, location basis, and counterparty. In some transactional average methodologies, reporters also examine the full array of transactions to match counterparties and arrive at a list of unique transactions.

Several tests are applied by reporters in all markets to transactional data to determine if it should be subjected to further scrutiny. If a transaction has been identified as failing such a test, it will receive further scrutiny. For assessments used to settle derivatives and for many other assessments, Argus has established internal procedures that involve escalation of inquiry within the source's company and escalating review within Argus management. Should this process determine that a transaction should be excluded from the price assessment process, the supervising editor will initiate approval and, if necessary, documentation procedures.

### Primary tests applied by reporters

- Transactions not transacted at arm's length, including deals between related parties or affiliates.
- Transaction prices that deviate significantly from the mean of all transactions submitted for that day.
- Transaction prices that fall outside of the generally observed lows and highs that operated throughout the trading day.
- Transactions that are suspected to be a leg of another transaction or in some way contingent on an unknown transaction.
- Single deal volumes that significantly exceed the typical transaction volume for that market.
- Transaction details that are identified by other market participants as being for any reason potentially anomalous and perceived by Argus to be as such.
- Transaction details that are reported by one counterparty differently than the other counterparty.
- Any transaction details that appear to the reporter to be illogi-

cal or to stray from the norms of trading behaviour. This could include but is not limited to divergent specifications, unusual delivery location and counterparties not typically seen.

- Transactions that involve the same counterparties, the same price and delivery dates are checked to see that they are separate deals and not one deal duplicated in Argus records.

### Secondary tests applied by editors for transactions identified for further scrutiny

#### Transaction tests

- The impact of linkage of the deal to possible other transactions such as contingent legs, exchanges, options, swaps, or other derivative instruments. This will include a review of transactions in markets that the reporter may not be covering.
- The nature of disagreement between counterparties on transactional details.
- The possibility that a deal is directly linked to an offsetting transaction that is not publicly known, for example a “wash trade” which has the purpose of influencing the published price.
- The impact of non-market factors on price or volume, including distressed delivery, credit issues, scheduling issues, demurrage, or containment.

#### Source tests

- The credibility of the explanation provided for the outlying nature of the transaction.
- The track record of the source. Sources will be deemed more credible if they
  - Regularly provide transaction data with few errors.
  - Provide data by Argus’ established deadline.
  - Quickly respond to queries from Argus reporters.
  - Have staff designated to respond to such queries.
- How close the information receipt is to the deadline for information, and the impact of that proximity on the validation process.

### Assessment guidelines

When insufficient, inadequate, or no transaction information exists, or when Argus concludes that a transaction based methodology will not produce representative prices, Argus reporters will make an assessment of market value by applying intelligent judgment based on a broad array of factual market information. Reporters must use a high degree of care in gathering and validating all market data used in determining price assessments, a degree of care equal to that applying to gathering and validating transactions. The information used to form an assessment could include deals done, bids, offers, tenders, spread trades, exchange trades, fundamental supply and demand information and other inputs.

The assessment process employing judgment is rigorous, replicable, and uses widely accepted valuation metrics. These valuation metrics mirror the process used by physical commodity traders to internally assess value prior to entering the market with a bid or offer. Applying these valuation metrics along with sound judgment significantly narrows the band within which a commodity can be as-

sessed, and greatly increases the accuracy and consistency of the price series. The application of judgment is conducted jointly with the supervising editor, in order to be sure that guidelines below are being followed. Valuation metrics include the following:

#### Relative value transactions

Frequently transactions occur which instead of being an outright purchase or sale of a single commodity, are instead exchanges of commodities. Such transactions allow reporters to value less liquid markets against more liquid ones and establish a strong basis for the exercise of judgment.

- Exchange one commodity for a different commodity in the same market at a negotiated value.
- Exchange delivery dates for the same commodity at a negotiated value.
- Exchange a commodity in one location for the same commodity at another location at a negotiated value.

#### Bids and offers

If a sufficient number of bids and offers populate the market, then in most cases the highest bid and the lowest offer can be assumed to define the boundaries between which a deal could be transacted.

#### Comparative metrics

The relative values between compared commodities are readily discussed in the market and can be discovered through dialogue with market participants. These discussions are the precursor to negotiation and conclusion of transactions.

- Comparison to the same commodity in another market centre.
- Comparison to a more actively traded but slightly different specification commodity in the same market centre.
- Comparison to the same commodity traded for a different delivery timing
- Comparison to the commodity’s primary feedstock or primary derived product(s).
- Comparison to trade in the same commodity but in a different modality (as in barge versus oceangoing vessel) or in a different total volume (as in full cargo load versus partial cargo load).

#### Volume minimums and transaction data thresholds

Argus typically does not establish thresholds strictly on the basis of a count of transactions, as this could lead to unreliable and non-representative assessments and because of the varying transportation infrastructure found in all commodity markets. Instead, minimum volumes are typically established which may apply to each transaction accepted, to the aggregate of transactions, to transactions which set a low or high assessment or to other volumetrically relevant parameters.

For price assessments used to settle derivatives, Argus will seek to establish minimum transaction data thresholds and when no such threshold can be established Argus will explain the reasons. These thresholds will often reflect the minimum volumes necessary to produce a transaction-based methodology, but may also establish

minimum deal parameters for use by a methodology that is based primarily on judgment.

Should no transaction threshold exist, or should submitted data fall below this methodology's stated transaction data threshold for any reason, Argus will follow the procedures outlined elsewhere in this document regarding the exercise of judgment in the price assessment process.

### Swaps and forwards markets

Argus publishes forward assessments for numerous markets. These include forward market contracts that can allow physical delivery and swaps contracts that swap a fixed price for the average of a floating published price. Argus looks at forward swaps to inform physical assessments but places primary emphasis on the physical markets.

### Publications and price data

Argus base oil prices are published in the Argus Base Oils report. The price data are available independent of the text-based report in electronic files that can feed into various databases. These price data are also supplied through various third-party data integrators. The Argus website also provides access to prices, reports and news with various web-based tools. All Argus prices are kept in a historical database and available for purchase. Contact your local Argus office for information.

A publication schedule is available at [www.argusmedia.com](http://www.argusmedia.com)

### Corrections to assessments

Argus will on occasion publish corrections to price assessments after the publication date. We will correct errors that arise from clerical mistakes, calculation errors, or a misapplication of our stated methodology. Argus will not retroactively assess markets based on new information learned after the assessments are published. We make our best effort to assess markets based on the information we gather during the trading day assessed.

### Ethics and compliance

Argus operates according to the best practices in the publishing field, and maintains thorough compliance procedures throughout the firm. We want to be seen as a preferred provider by our subscribers, who are held to equally high standards, while at the same time maintaining our editorial integrity and independence. Argus has a strict ethics policy that applies to all staff. The policy can be found on our website at [www.argusmedia.com](http://www.argusmedia.com). Included in this policy are restrictions against staff trading in any energy commodity or energy related stocks, and guidelines for accepting gifts. Argus also has strict policies regarding central archiving of email and instant messenger communication, maintenance and archiving of notes, and archiving of spreadsheets and deal lists used in the price assessment process. Argus publishes prices that report and reflect prevailing levels for open-market arms length transactions (please see the [Argus Global Compliance Policy](#) for a detailed definition of arms length).

### Consistency in the assessment process

Argus recognises the need to have judgment consistently applied by reporters covering separate markets, and by reporters replacing existing reporters in the assessment process. In order to ensure this consistency, Argus has developed a programme of training and oversight of reporters. This programme includes:

- A global price reporting manual describing among other things the guidelines for the exercise of judgment.
- Cross-training of staff between markets to ensure proper holiday and sick leave backup. Editors that float between markets to monitor staff application of best practices.
- Experienced editors overseeing reporting teams are involved in daily mentoring and assisting in the application of judgment for illiquid markets.
- Editors are required to sign-off on all price assessments each day, thus ensuring the consistent application of judgment.

### Review of methodology

The overriding objective of any methodology is to produce price assessments which are reliable and representative indicators of commodity market values and are free from distortion. As a result, Argus editors and reporters are regularly examining our methodologies and are in regular dialogue with the industry in order to ensure that the methodologies are representative of the market being assessed. This process is integral with reporting on a given market. In addition to this ongoing review of methodology, Argus conducts reviews of all of its methodologies and methodology documents on at least an annual basis.

Argus market report editors and management will periodically and as merited initiate reviews of market coverage based on a qualitative analysis that includes measurements of liquidity, visibility of market data, consistency of market data, quality of market data and industry usage of the assessments. Report editors will review:

- Appropriateness of the methodology of existing assessments
- Termination of existing assessments
- Initiation of new assessments

The report editor will initiate an informal process to examine viability. This process includes:

- Informal discussions with market participants
- Informal discussions with other stakeholders
- Internal review of market data

Should changes, terminations, or initiations be merited, the report editor will submit an internal proposal to management for review and approval. Should changes or terminations of existing assessments be approved, then formal procedures for external consultation are begun.

### Changes to methodology

Formal proposals to change methodologies typically emerge out of the ongoing process of internal and external review of the methodologies. Formal procedures for external consultation regarding material changes to existing methodologies will be initiated with an

announcement of the proposed change published in the relevant Argus report. This announcement will include:

- Details on the proposed change and the rationale
- Method for submitting comments with a deadline for submissions
- For prices used in derivatives, notice that all formal comments will be published after the given consultation period unless submitter requests confidentiality

Argus will provide sufficient opportunity for stakeholders to analyse and comment on changes, but will not allow the time needed to follow these procedures to create a situation wherein unrepresentative or false prices are published, markets are disrupted, or market participants are put at unnecessary risk. Argus will engage with industry throughout this process in order to gain acceptance of proposed changes to methodology. Argus cannot however guarantee universal acceptance and will act for the good order of the market and ensure the continued integrity of its price assessments as an overriding objective.

Following the consultation period, Argus management will commence an internal review and decide on the methodology change. This will be followed by an announcement of the decision, which will be published in the relevant Argus report and include a date for implementation. For prices used in derivatives, publication of stakeholders' formal comments that are not subject to confidentiality and Argus' response to those comments will also take place.

## Argus Base Oils

Argus publishes *Argus Base Oils* once a week. A selection of forward prices are assessed daily and are made available electronically through Argus Direct and other means. The report contains global base oil prices, market commentary and information on relevant crude oil and petroleum products prices.

### General methodology

Argus surveys a wide cross-section of base oil market participants during the week via telephone, instant messenger, and through email communication. A balance is maintained in the survey between base oil sellers, buyers and trading companies. The market reporters/analysts ask market participants in the survey whether they have bought or sold any base oil, whether they have heard of any trade in base oil, and whether they have received any bids or offers for base oil. The participants are asked where they see the level of prices for base oil traded on the international spot market. Argus will contact and accept market data from all credible market sources including front and back office of market participants and brokers.

Argus publishes prices that report and reflect prevailing levels for open-market arms length transactions (please see the [Argus Global Compliance Policy](#) for a detailed definition of arms length).

### Virgin and re-refined base oils

Except where noted, prices are for virgin base oil.

### Pricing procedure

Base oil price assessments are based on two elements – a survey of market participants and a volume-weighted average of any trades in the past week which fit the standard industry specifications listed below and which Argus has been able to verify. The final price is based on an average of the survey value and the volume-weighted trade value. In the absence of transactions, the assessment will be based on the market survey. This final price is the midpoint price between the published low and high price. Argus applies editorial judgment to arrive at an intelligent assessment of the spread between the low and high price.

Information on transactions, bids and offers that lie outside the specifications of timing, size, location and quality will be taken into account but information that lies within the listed specifications of the assessment will be given most weight. Argus applies editorial judgment to the surveys and will eliminate information that appears to be 'off the consensus' in its final assessment of the price.

### Price assessment schedule

Argus Base Oils is published once a week, typically on Friday. A complete publishing schedule is available at [www.argusmedia.com](http://www.argusmedia.com).

A selection of forward prices is made available electronically to subscribers through Argus Direct and other means on the other working days of the week.

To be considered for inclusion in the assessments, trades must have been completed and other market information refer to conditions up to the times specified below. Market information reported after this time and referring to trade or market activity before this time may be considered for inclusion in the assessment.

### Currency conversion

Currencies are converted using exchange rates from Ice Data Services as of 6pm UK time on Thursday.

Base oil specifications						
	Viscosity index	Viscosity at 40°C	Viscosity at 100°C	Flash point	Sulphur content	Pour point
Group I						
Group I SN 150	95-100	28-32 cst	4.4-5.6 cst	min. 195°C	0.15-0.6%	max. -6°C
Group I SN 500	95-100	90-105 cst	9.7-12 cst	min. 210°C	0.15-0.6%	max. -6°C
Bright stock	min. 95		min. 28 cst	min. 276°C	0.15-0.6%	max. -9°C
Group II						
Group II N70	min. 83	10.9-13.6 cst	2.8-3.3 cst	min. 177°C	max. 0.015%	max. -24°C
Group II N100	95-105	18-21 cst	3.8-4.3 cst	min. 199°C	max. 0.015%	max. -12°C
Group II N150	95-110	28-32 cst	5-5.6 cst	min. 210°C	max. 0.012%	max. -12°C
Group II N220	95-110	40-46 cst	6.1-6.7 cst	min. 214°C	max. 0.015%	max. -12°C
Group II N500	95-110	95-107 cst	10-12 cst	min. 230°C	max. 0.012%	max. -12°C
Group II N600	95-110	104-120 cst	11.7-12.65 cst	min. 250°C	max. 0.025%	max. -12°C
Group III						
Group III 4cst	min. 120	19-20 cst	4.1-4.4 cst	min. 220°C	max. 0.001%	max. -12°C
Group III 6cst	min. 120	32-37 cst	5.7-6.5 cst	min. 220°C	max. 0.001%	max. -12°C
Group III 8cst	min. 120	43.8-50.1 cst	7.6-8.2 cst	min. 220°C	max. 0.001%	max. -12°C
US Naphthenic base oils						
Pale oil 60		7.83-12.00 cst	2.31-3 cst	min. 138°C	max. 0.05%	max. -43°C
Pale oil 100		19.64-20.50 cst	3.54-3.58 cst	min. 154°C	max. 0.05%	max. -34°C
Pale oil 500		91.00-99.00 cst	7.38-8.8 cst	min. 182°C	max. 0.06%	max. -12°C
Pale oil 2000		349.50-383.00 cst	13.93-25 cst	min 204°C	max. 0.55%	max. -1°C

## Asia-Pacific

### Group I

#### SN 150 ex-tank Singapore

Solvent neutral 150 (SN 150) base oil

**Basis:** delivery from storage in Singapore

**Unit:** US dollars/metric tonne

**Timing:** loading 1-30 days forward from date of assessment

**Volume minimum:** 20t

**Timestamp:** 4.30pm Singapore time on Thursday

#### SN 500 ex-tank Singapore

Solvent neutral 500 (SN 500) base oil

**Basis:** delivery from storage in Singapore

**Unit:** US dollars/metric tonne

**Timing:** loading 1-30 days forward from date of assessment

**Volume minimum:** 20t

**Timestamp:** 4.30pm Singapore time on Thursday

#### Bright stock ex-tank Singapore

Bright stock base oil

**Basis:** delivery from storage in Singapore

**Unit:** US dollars/metric tonne

**Timing:** loading 1-30 days forward from date of assessment

**Volume minimum:** 20t

**Timestamp:** 4.30pm Singapore time on Thursday

#### SN 150 fob Asia

Solvent neutral 150 (SN 150) base oil

**Basis:** fob Asia

**Location:** Singapore, Taiwan, South Korea, Japan, Thailand, Malaysia, and Indonesia

**Unit:** US dollars/metric tonne

**Timing:** loading 15-30 days forward from date of assessment

**Volume minimum:** 1,000t

**Timestamp:** 4.30pm Singapore time on Thursday

#### SN 500 fob Asia

Solvent neutral 500 (SN 500) base oil

**Basis:** for fob Asia

**Location:** Singapore, Taiwan, South Korea, Japan, Thailand, Malaysia, and Indonesia

**Unit:** US dollars/metric tonne

**Timing:** loading 15-30 days forward from date of assessment

**Volume minimum:** 1,000t

**Timestamp:** 4.30pm Singapore time on Thursday

#### Bright stock fob Asia

Bright stock base oil

**Basis:** fob Asia

**Location:** Singapore, Taiwan, South Korea, Japan, Thailand, Malaysia, and Indonesia

**Unit:** US dollars/metric tonne

**Timing:** loading 15-30 days forward from date of assessment

**Volume minimum:** 1,000t

**Timestamp:** 4.30pm Singapore time on Thursday

### Group II

N150 ex-tank Singapore Neutral 150 (N150) base oil

**Basis:** delivery from storage in Singapore

**Unit:** US dollars/metric tonne

**Timing:** loading 1-30 days forward from date of assessment

**Volume minimum:** 20t

**Timestamp:** 4.30pm Singapore time on Thursday

### N500 ex-tank Singapore

Neutral 500 (N500) base oil

**Basis:** delivery from storage in Singapore

**Unit:** US dollars/metric tonne

**Timing:** loading 1-30 days forward from date of assessment

**Volume minimum:** 20t

**Timestamp:** 4.30pm Singapore time on Thursday

### N150 fob Asia

Neutral 150 (N150) base oil

**Basis:** fob Asia

**Location:** Singapore, Taiwan, and South Korea

**Unit:** US dollars/metric tonne

**Timing:** loading 15-30 days forward from date of assessment

**Volume minimum:** 1,000t

**Timestamp:** 4.30pm Singapore time on Thursday

### N500 fob Asia

Neutral 500 (N500) base oil

**Basis:** fob Asia

**Location:** Singapore, Taiwan, and South Korea

**Unit:** US dollars/metric tonne

**Timing:** loading 15-30 days forward from date of assessment.

**Volume minimum:** 1,000t

**Timestamp:** 4.30pm Singapore time on Thursday

## Group III

### 4cst ex-tank Singapore

4cst base oil

**Unit:** US dollars/metric tonne

**Timing:** loading 1-30 days forward from date of assessment

**Volume minimum:** 20t

**Timestamp:** 4.30pm Singapore time on Thursday

### 6cst ex-tank Singapore

6cst base oil

**Unit:** US dollars/metric tonne

**Timing:** loading 1-30 days forward from date of assessment

**Volume minimum:** 20t

**Timestamp:** 4.30pm Singapore time on Thursday

### 4cst fob Asia

4cst base oil

**Basis:** fob Asia

**Location:** South Korea

**Unit:** US dollars/metric tonne

**Timing:** loading 15-30 days forward from date of assessment

**Volume minimum:** 1,000t

**Timestamp:** 4.30pm Singapore time on Thursday

### 6cst fob Asia

6cst base oil

**Basis:** fob Asia

**Location:** South Korea

**Unit:** US dollars/metric tonne

**Timing:** loading 15-30 days forward from date of assessment

**Volume minimum:** 1,000t

**Timestamp:** 4.30pm Singapore time on Thursday

### 8cst fob Asia

8cst base oil

**Basis:** fob Asia

**Location:** South Korea

**Unit:** US dollars/metric tonne

**Timing:** loading 15-30 days forward from date of assessment

**Volume minimum:** 1,000t

**Timestamp:** 4.30pm Singapore time on Thursday

## Ex-tank Singapore base oil reference prices

Assessments for ex-tank Singapore Group I SN 150, SN 600 and bright stock and Group II N150 and N500 are of term prices for base oil buyers in Asia-Pacific. The prices are provided by base oil buyers in the ex-tank market. Argus confirms any price change with market participants. Prices are updated in the Argus report when the new prices take effect. Prices are published in US dollars/metric tonne.

## Asia-Pacific SN 500 forward prices

The implied forward base oil price required to maintain its existing profit margin relative to Ice gasoil futures.

Argus assesses forward base oil prices by applying the intermonth premiums or discounts of the 30-day average of each forward month for gasoil futures to the fob Asia export SN 500 physical base oil price as published in *Argus Base Oils*.

By using a 30-day average of the gasoil price, the effects of sharp price fluctuations are reduced, and an element of historic pricing is included, reflecting the tendency for base oils prices to lag a change in fossil fuel prices. The 30-day average gasoil price is calculated using the gasoil futures settlement price published by the Intercontinental Exchange (Ice) over the 30 calendar days to the base oil forward swap assessment day.

Prices are published in US dollars/tonne.

Forward prices are published for three consecutive months and two quarters forward. The last day of publication of the first month of the forward price table will be the day before the expiry date of the front-month gasoil futures contract published by Ice.

The forward months will roll the day after the last day of publication of the first month of the forward price table. The last day of publication of the first calendar quarter of the forward strips will be the day before the expiry date of the first Ice gasoil month in a calendar quarter (January, April, July and October).

Specifications are identical to those of the SN 500 fob Asia spot price assessment.

## Asia-Pacific SN 500 forward premium to gasoil

The implied forward profitability of base oils relative to Ice gasoil futures.

Argus assesses the forward base oil premium to gasoil by comparing the physical fob Asia export SN 500 base oils price published in *Argus Base Oils* with the 30-day average of each forward month for gasoil futures.

The 30-day average gasoil price is calculated using the gasoil futures settlement price published by the Intercontinental Exchange (Ice) over the 30 calendar days to the base oil forward premium assessment day.

Prices are published in US dollars/tonne.

Forward base oil premiums to gasoil are published for three consecutive months and two quarters forward.

The last day of publication of the first month of the forward premium table will be the day before the expiry date of the front-month gasoil futures contract published by Ice.

The forward months will roll the day after the last day of publication of the first month of the forward price table.

The last day of publication of the first calendar quarter of the forward strips will be the day before the expiry date of the first Ice gasoil month in a calendar quarter (January, April, July and October).

Specifications are identical to those of the SN 500 fob Asia spot price assessment

## Crude

The crude oil price is an important indicator of the future direction of base oils prices. A comparison of the crude price with the base oils price illustrates the effect of the past week's change in price on the profitability of base oils relative to crude oil.

## Dubai crude front month

The physical price of Dubai crude for loading two months forward, as published in *Argus Crude* on the day corresponding with the base oils assessment.

Prices are published in US dollars/barrel.

See the [Argus Crude methodology](#).

## SN 500 premium to Dubai crude

The premium is published in US dollars/barrel.

The price represents the premium of SN 500 fob Asia over front-month Dubai crude.

The conversion factor used for SN 500 is 7.1 bl to a metric tonne.

## Oil products

Argus includes the benchmark price for regional gasoil to show the profitability of that product relative to base oils.

Oil products prices are taken from *Argus Asia-Pacific Products* on the day corresponding with the base oils assessment.

Oil products prices are published in US dollars/barrel.

See the [Argus Asia-Pacific Products methodology](#).

## Singapore 0.05% gasoil

Front-month swap, fob Singapore

## Gasoil premium to Dubai crude

The premium of Singapore 0.05% sulphur gasoil swaps to Dubai crude.

## SN 500 premium to gasoil

The premium of SN 500 fob Asia over Singapore 0.05% gasoil.

Prices are published in US dollars/barrel.

The conversion rate for SN 500 is 7.1 bl to a metric tonne.

## Northeast Asia

### Group I

#### SN 150 cfr northeast Asia

Solvent neutral 150 (SN 150) base oil

**Location:** China, Japan, South Korea and Taiwan

**Unit:** US dollars/metric tonne

**Timing:** delivered 15-45 days forward from date of assessment.

**Volume minimum:** 1,000t

**Timestamp:** 4.30pm Singapore time on Thursday

#### SN 500 cfr northeast Asia

Solvent neutral 500 (SN 500) base oil

**Location:** China, Japan, South Korea and Taiwan

**Unit:** US dollars/metric tonne

**Timing:** delivered 15-45 days forward from date of assessment.

**Volume minimum:** 1,000t

**Timestamp:** 4.30pm Singapore time on Thursday

#### Bright stock cfr northeast Asia

Bright stock base oil

**Location:** China, Japan, South Korea and Taiwan

**Unit:** US dollars/metric tonne

**Timing:** delivered 15-45 days forward from date of assessment

**Volume minimum:** 1,000t

**Timestamp:** 4.30pm Singapore time on Thursday.

### Group II

#### N150 cfr northeast Asia

Neutral 150 (N150) base oil

**Location:** China, Japan, South Korea and Taiwan

**Unit:** US dollars/metric tonne

**Timing:** delivered 15-45 days forward from date of assessment.

**Volume minimum:** 1,000t

**Timestamp:** 4.30pm Singapore time on Thursday

### N500 cfr northeast Asia

Neutral 500 (N500) base oil

**Location:** China, Japan, South Korea and Taiwan

**Unit:** US dollars/metric tonne

**Timing:** delivered 15-45 days forward from date of assessment

**Volume minimum:** 1,000t

**Timestamp:** 4.30pm Singapore time on Thursday

#### Group III

### 4cst cfr northeast Asia

4cst base oil

**Location:** China, Japan and Taiwan

**Unit:** US dollars/metric tonne

**Timing:** delivered 15-45 days forward from date of assessment

**Volume minimum:** 1,000t

**Timestamp:** 4.30pm Singapore time on Thursday

### 6cst cfr northeast Asia

6cst base oil

**Location:** China, Japan and Taiwan

**Unit:** US dollars/metric tonne

**Timing:** delivered 15-45 days forward from date of assessment.

**Volume minimum:** 1,000t

**Timestamp:** 4.30pm Singapore time on Thursday

### 8cst cfr northeast Asia

8cst base oil

**Location:** China, Japan and Taiwan

**Unit:** US dollars/metric tonne

**Timing:** delivered 15-45 days forward from date of assessment

**Volume minimum:** 1,000t

**Timestamp:** 4.30pm Singapore time on Thursday

## China

### Group I

#### Bright stock ex-tank east China

Bright stock base oil

**Basis:** delivery from storage in Nantong or Jiangyin

**Unit:** Chinese yuan/t, with conversion into US dollars/metric tonne

**Timing:** loading 1-30 days forward from date of assessment

**Volume:** minimum 60t

**Timestamp:** 4.30pm Singapore time on Thursday

### Group II

#### N150 ex-tank east China

Neutral 150 (N150) base oil

**Basis:** delivery from storage in Nantong or Jiangyin

**Unit:** Chinese yuan/t, with conversion into US dollars/metric tonne

**Timing:** loading 1-30 days forward from date of assessment

**Volume:** minimum 60t

**Timestamp:** 4.30pm Singapore time on Thursday

### N500 ex-tank east China

Neutral 500 (N500) base oil

**Basis:** delivery from storage in Nantong or Jiangyin

**Unit:** Chinese yuan/t, with conversion into US dollars/metric tonne

**Timing:** loading 1-30 days forward from date of assessment

**Volume:** minimum 60t

**Timestamp:** 4.30pm Singapore time on Thursday

#### Group III

### 4cst ex-tank east China

4cst base oil

**Basis:** delivery from storage in Nantong or Jiangyin

**Unit:** Chinese yuan/t, with conversion into US dollars/metric tonne

**Timing:** loading 1-30 days forward from date of assessment

**Volume:** minimum 60t

**Timestamp:** 4.30pm Singapore time on Thursday

### 6cst ex-tank east China

6cst base oil

**Basis:** delivery from storage in Nantong or Jiangyin

**Unit:** Chinese yuan/t, with conversion into US dollars/metric tonne

**Timing:** loading 1-30 days forward from date of assessment

**Volume:** minimum 60t

**Timestamp:** 4.30pm Singapore time on Thursday

### 8cst ex-tank east China

8cst base oil

**Basis:** delivery from storage in Nantong or Jiangyin

**Unit:** Chinese yuan/t, with conversion into US dollars/metric tonne

**Timing:** loading 1-30 days forward from date of assessment

**Volume:** minimum 60t

**Timestamp:** 4.30pm Singapore time on Thursday

## China domestic prices

Product and location:

- SN 150 in Daqing and Dalian in northeast China, in Yanshan in north China, and in Maoming in south China
- SN 400 in Fushun and Dalian in northeast China, and in Maoming in south China
- N150 in Gaoqiao in east China and Huizhou in south China

**Unit:** Chinese yuan/t, with conversion into US dollars/metric tonne

**Timing:** loading up to five days forward from date of publication

**Volume:** 50-500t

'High' prices refer to price offers of cargoes by individual PetroChina and Sinopec refineries in each respective region, and by CNOOC for N150 in Huizhou, south China.

'Low' prices refer to corresponding spot market bids for base oil from each refinery.

## China import price calculator

The table gives an indication of the price of imported base oils in the domestic China market.

Group I (SN 150, SN 500 and bright stock) and Group II (N150 and N500) base oils imported prices are calculated by including customs duty, VAT and the consumption tax.

Prices are published in Chinese yuan/t, with conversion into in US dollars/metric tonne.

## India

### Group I

#### SN 150 cfr India

Solvent neutral 150 (SN 150) base oil

**Basis:** delivery into India

**Location:** Mumbai

**Unit:** US dollars/metric tonne

**Timing:** delivered 15-45 days forward from date of assessment

**Volume minimum:** 1,000t

**Timestamp:** 4.30pm Singapore time on Thursday

#### SN 500 cfr India

Solvent neutral 500 (SN 500) base oil

**Basis:** delivery into India

**Location:** Mumbai

**Unit:** US dollars/metric tonne

**Timing:** delivered 15-45 days forward from date of assessment

**Volume minimum:** 1,000t

**Timestamp:** 4.30pm Singapore time on Thursday

#### SN 150 (LVI) cfr India

Solvent neutral 150 (SN 150) low viscosity index (LVI) base oil

**Basis:** delivery into India

**Location:** Mumbai

**Unit:** US dollars/metric tonne

**Timing:** delivered 15-45 days forward from date of assessment

**Volume minimum:** 1,000t

**Specification:** viscosity index 85-94

**Timestamp:** 4.30pm Singapore time on Thursday

#### SN 500 (LVI) cfr India

Solvent neutral 500 (SN 500) low viscosity index (LVI) base oil

**Basis:** delivery into India

**Location:** Mumbai

**Unit:** US dollars/metric tonne

**Timing:** delivered 15-45 days forward from date of assessment

**Volume minimum:** 1,000t

**Specification:** viscosity index 85-94

**Timestamp:** 4.30pm Singapore time on Thursday

## Bright stock cfr India

Bright stock base oil

**Basis:** delivery into India

**Location:** Mumbai

**Unit:** US dollars/metric tonne

**Timing:** delivered 15-45 days forward from date of assessment

**Volume minimum:** 1,000t

**Timestamp:** 4.30pm Singapore time on Thursday

### Group II

#### N70 cfr India

Neutral 70 (N70) base oil

**Basis:** delivery into India

**Location:** Mumbai

**Unit:** US dollars/metric tonne

**Timing:** delivered 15-45 days forward from date of assessment

**Volume minimum:** 1,000t

**Timestamp:** 4.30pm Singapore time on Thursday

#### N150 cfr India

Neutral 150 (N150) base oil

**Basis:** delivery into India

**Location:** Mumbai

**Unit:** US dollars/metric tonne

**Timing:** delivered 15-45 days forward from date of assessment

**Volume minimum:** 1,000t

**Timestamp:** 4.30pm Singapore time on Thursday

#### N500 cfr India

Neutral 500 (N500) base oil

**Basis:** delivery into India

**Location:** Mumbai

**Unit:** US dollars/metric tonne

**Timing:** delivered 15-45 days forward from date of assessment

**Volume minimum:** 1,000t

**Timestamp:** 4.30pm Singapore time on Thursday

### Group III

#### 4cst cfr India

4cst base oil

**Location:** Mumbai

**Unit:** US dollars/metric tonne

**Timing:** delivered 15-45 days forward from date of assessment

**Volume minimum:** 1,000t

**Timestamp:** 4.30pm Singapore time on Thursday

#### 6cst cfr India

6cst base oil

**Location:** Mumbai

**Unit:** US dollars/metric tonne

**Timing:** delivered 15-45 days forward from date of assessment

**Volume minimum:** 1,000t

**Timestamp:** 4.30pm Singapore time on Thursday

### 8cst cfr India

8cst base oil

**Location:** Mumbai

**Unit:** US dollars/metric tonne

**Timing:** delivered 15-45 days forward from date of assessment

**Volume minimum:** 1,000t

**Timestamp:** 4.30pm Singapore time on Thursday

### Domestic refinery prices

Group I and Group II prices are provided either directly or indirectly by Indian refiners.

**Unit:** Indian rupees/litre, with conversion into US dollars/metric tonne

The litres-to-tonnes conversion rates are listed below:

Prices are published for each of the below listed grades at Chennai and Mumbai.

Conversion factors - IOC		litres/tonne	
Group I	Factor	Group II	Factor
SN 70	1,227	N70	1,196
SN 150	1,153	N150	1,179
SN 500	1,134	N500	1,164
Bright stock	1,111		

## Mideast Gulf

### Group I

#### Bright stock ex-tank UAE

Bright stock base oil

**Location:** Sharjah, Jebel Ali and Fujairah

**Unit:** US dollars/metric tonne

**Timing:** delivered 1-30 days forward from date of assessment

**Volume minimum:** 20t

**Timestamp:** 4.30pm Singapore time on Thursday

#### SN 150 cfr UAE

Solvent neutral 150 (SN 150) base oil

**Basis:** delivery into the United Arab Emirates (UAE)

**Location:** Sharjah, Jebel Ali and Fujairah

**Unit:** US dollars/metric tonne

**Timing:** delivered 15-45 days forward from date of assessment

**Volume minimum:** 1,000t

**Timestamp:** 4.30pm Singapore time on Thursday

#### SN 500 cfr UAE

Solvent neutral 500 (SN 500) base oil

**Basis:** delivery into the United Arab Emirates (UAE)

**Location:** Sharjah, Jebel Ali and Fujairah

**Unit:** US dollars/metric tonne

**Timing:** delivered 15-45 days forward from date of assessment

**Volume minimum:** 1,000t

**Timestamp:** 4.30pm Singapore time on Thursday

### Bright stock cfr UAE

Bright stock base oil

**Basis:** delivery into the United Arab Emirates (UAE)

**Location:** Sharjah, Jebel Ali and Fujairah

**Unit:** US dollars/metric tonne

**Timing:** delivered 15-45 days forward from date of assessment

**Volume minimum:** 1,000t

**Timestamp:** 4.30pm Singapore time on Thursday

### SN 150 (LVI) cfr UAE

Solvent neutral 150 (SN 150) low viscosity index (LVI) base oil

**Basis:** delivery into the United Arab Emirates (UAE)

**Location:** Sharjah, Jebel Ali and Fujairah

**Unit:** US dollars/metric tonne

**Timing:** delivered 15-45 days forward from date of assessment

**Volume minimum:** 1,000t

**Specification:** viscosity index 85-94

**Timestamp:** 4.30pm Singapore time on Thursday

### SN 500 (LVI) cfr UAE

Solvent neutral 500 (SN 500) low viscosity index (LVI) base oil

**Basis:** delivery into the United Arab Emirates (UAE)

**Location:** Sharjah, Jebel Ali and Fujairah

**Unit:** US dollars/metric tonne

**Timing:** delivered 15-45 days forward from date of assessment

**Volume minimum:** 1,000t

**Specification:** viscosity index 85-94

**Timestamp:** 4.30pm Singapore time on Thursday

### Group II

#### N150 ex-tank UAE

Neutral 150 (N150) base oil

**Location:** Sharjah, Jebel Ali and Fujairah

**Unit:** US dollars/metric tonne

**Timing:** loading 1-30 days forward from date of assessment

**Volume minimum:** 20t

**Timestamp:** 4.30pm Singapore time on Thursday

#### N500 ex-tank UAE

Neutral 500 (N500) base oil

The primary assessment points are Sharjah, Jebel Ali and Fujairah

**Unit:** US dollars/metric tonne

**Timing:** loading 1-30 days forward from date of assessment

**Volume minimum:** 20t

**Timestamp:** 4.30pm Singapore time on Thursday

### Group III

#### 4cst ex-tank UAE

4cst base oil

**Location:** Sharjah, Jebel Ali and Fujairah

**Unit:** US dollars/metric tonne

**Timing:** loading 1-30 days forward from date of assessment

**Volume minimum:** 20t

**Timestamp:** 4.30pm Singapore time on Thursday

### 6cst ex-tank UAE

6cst base oil

**Location:** Sharjah, Jebel Ali and Fujairah

**Unit:** US dollars/metric tonne

**Timing:** loading 1-30 days forward from date of assessment

**Volume minimum:** 20t

**Timestamp:** 4.30pm Singapore time on Thursday

### 8cst ex-tank UAE

8cst base oil

**Location:** Sharjah, Jebel Ali and Fujairah

**Unit:** US dollars/metric tonne

**Timing:** loading 1-30 days forward from date of assessment

**Volume minimum:** 20t

**Timestamp:** 4.30pm Singapore time on Thursday

### Iranian export prices

Sepahan Oil provides prices for Iranian SN 500 and SN 500+ base oil, rubber process oil, slack wax and paraffin wax direct to Argus. The prices are updated in the Argus report, which includes the effective date of the prices.

**Basis:** fob Bushehr (base oils), fob Bandar Abbas (rubber process oil, slack wax, paraffin wax)

**Unit:** US dollars/tonne

**SN 500 specification:** viscosity index minimum 95; viscosity at 100°C 11-12cst; flash point minimum 230°C; pour point  $\leq$  -9°C; colour maximum 1.5

**SN 500+ specification:** viscosity index minimum 95; viscosity at 100°C 11-12cst; pour point  $\leq$  -9°C; colour maximum 1.5

**Rubber process oil specification:** viscosity at 100°C 40-45cst; flash point minimum 240°C; pour point 24°C

## Europe

Argus Base Oils includes price assessments for several grades of European base oils, published in Argus European Base Oils.

See the [Argus European Base Oils methodology](#) for more information.

#### Group I

- SN 150 fob domestic NWE
- SN 500 fob domestic NWE
- Bright stock fob domestic NWE
- SN 150 fob European export
- SN 500 fob European export
- Bright stock fob European export

#### Turkey Group I

- SN 150 cfr Gebze
- SN 500 cfr Gebze

#### Group II

- N100 fca ARA
- N150 fca ARA
- N220 fca ARA
- N600 fca ARA

#### Group III

- 4cst fca NWE
- 6cst fca NWE
- 8cst fca NWE

#### Group III (a)

- 4cst fca NWE
- 6cst fca NWE
- 8cst fca NWE

#### Group III (b)

- 4cst fca NWE
- 6cst fca NWE
- 8cst fca NWE

#### Re-refined Group I

- Re-refined SN 150 fca western Europe

### Crude

The North Sea Dated crude oil price is an important indicator of the future direction of base oils prices in the region. A comparison of the crude price with the base oils price illustrates the effect of the past week's change in price on the profitability of base oils relative to crude oil.

#### North Sea Dated

The North Sea Dated crude oil price as published in *Argus Crude* on the day corresponding with the base oils assessment. Prices are published in US dollars/barrel.

See the [Argus Crude methodology](#).

#### SN 500 premium to North Sea Dated

#### Ice Brent front month

The Ice Brent front-month contract price as published in Argus Crude on the day corresponding with the base oil assessment.

See the [Argus Crude methodology](#).

### Oil products

Argus includes the regional benchmark price of vacuum gasoil to show the price of a key feedstock for base oils and heating oil and the effect of the change in that price on the profitability of base oils and heating oil. Argus also includes the regional price of heating oil to show the profitability of that product relative to crude oil and to base oils.

Oil products prices are taken from *Argus European Products* on the day corresponding with the base oils assessment. Oil products prices are published in US dollars/tonne. See the [Argus European Products methodology](#).

#### Heating oil 0.1% barge

German grade heating oil, fob Rotterdam

#### VGO 0.5% barge

Vacuum gasoil fob Rotterdam

### VGO 2% barge

Vacuum gasoil fob Rotterdam

### Fuel oil 3.5% barge

Fuel oil fob Rotterdam

### Straight run M-100 fuel oil cargo

Russian straight-run M-100 fuel oil cif northwest Europe, standardised to Rotterdam

### Ice gasoil front month

The Ice gasoil front-month contract price as published in Argus European Products on the day corresponding with the base oil assessment.

### Oil product price premiums

The profitability of heating oil and SN 500 base oil by comparing their prices with each other and with feedstock vacuum gasoil. See the [Argus European Base Oils methodology](#) for more information.

- Heating oil premium to crude
- Heating oil premium to VGO 2%
- SN 500 premium to heating oil
- SN 500 premium to VGO 2%

### Europe SN 150 and SN 500 forward prices

The implied forward base oil price required to maintain its existing profit margin relative to Ice gasoil futures.

Argus assesses forward base oil prices by applying the intermonth premiums or discounts of the 30-day average of each forward month for gasoil futures to the fob European export SN 150 and fob European export SN 500 physical base oil prices as published in *Argus European Base Oils*.

By using a 30-day average of the gasoil price, the effects of sharp price fluctuations are reduced, and an element of historic pricing is included, reflecting the tendency for base oils prices to lag a change in fossil fuel prices. The 30-day average gasoil price is calculated using the gasoil futures settlement price published by the Intercontinental Exchange (Ice) over the 30 calendar days to the base oil forward swap assessment day.

Prices are published in US dollars/tonne.

Forward prices are published for three consecutive months and two quarters forward.

The last day of publication of the first month of the forward price table will be the day before the expiry date of the front-month gasoil futures contract published by Ice.

The forward months will roll the day after the last day of publication of the first month of the forward price table.

The last day of publication of the first calendar quarter of the forward strips will be the day before the expiry date of the first Ice gasoil month in a calendar quarter (January, April, July and October).

Specifications are identical to those of the SN 150 and SN 500 fob European export spot price assessments.

### Europe SN 150 and SN 500 forward premium to gasoil

The implied forward profitability of base oils relative to Ice gasoil futures.

Argus assesses the forward base oil premium to gasoil by comparing the physical fob European export SN 150 base oils and fob European export SN 500 base oils prices published in *Argus Base Oils* with the 30-day average of each forward month for gasoil futures.

The 30-day average gasoil price is calculated using the gasoil futures settlement price published by the Intercontinental Exchange (Ice) over the 30 calendar days to the base oil forward premium assessment day.

Prices are published in US dollars/tonne.

Forward base oil premiums to gasoil are published for three consecutive months and two quarters forward.

The last day of publication of the first month of the forward premium table will be the day before the expiry date of the front-month gasoil futures contract published by Ice.

The forward months will roll the day after the last day of publication of the first month of the forward price table.

The last day of publication of the first calendar quarter of the forward strips will be the day before the expiry date of the first Ice gasoil month in a calendar quarter (January, April, July and October). Specifications are identical to those of the SN 150 and SN 500 fob European export spot price assessments.

## Russia and FSU

Argus Base Oils includes price assessments for several grades of Russian base oils, published in *Argus European Base Oils*.

See the [Argus European Base Oils methodology](#) for more information.

### Group I

- SN 150 fob Baltic Sea
- SN 500 fob Baltic Sea
- SN 150 fob Black Sea
- SN 500 fob Black Sea

### Group III

- 4cst cpt Posin

### SN 150 cpt Naushki

Solvent neutral 150 (SN 150) base oil

**Basis:** export cargoes on a cpt Naushki basis

**Location:** Naushki (Russian-Mongolian border)

**Unit:** US dollars/metric tonne

**Timing:** delivered 1-30 days forward from date of assessment

**Volume minimum:** 300t

**Timestamp:** 4.30pm London time on Thursday

## SN 500 cpt Naushki

Solvent neutral 500 (SN 500) base oil

**Basis:** export cargoes on a cpt Naushki basis

**Location:** Naushki (Russian-Mongolian border)

**Unit:** US dollars/metric tonne

**Timing:** delivered 1-30 days forward from date of assessment

**Volume minimum:** 300t

**Timestamp:** 4.30pm London time on Thursday

## Russia domestic

Prices are based on a survey of market participants. Russian domestic base oil assessments may be suspended without notice if spot sales are suspended, refineries cease production for maintenance or prices cannot be assessed for other reasons.

Prices are published separately for each of the named refineries.

### Group I

#### Industrial oil I-20 (SN 150)

**Basis:** fca refinery, by rail from each of the refineries listed below

**Location:** Novokuibyshevsk, Ufa, Angarsk, Omsk and Yaroslavl refineries

**Unit:** roubles/metric tonne including VAT; converted to US dollars/metric tonne

**Timing:** delivered 10-30 days forward from date of assessment

**Volume minimum:** 60t

**Timestamp:** 5.30pm Moscow time on Thursday

#### Industrial oil I-40 (SN 350)

**Basis:** fca refinery, by rail from each of the refineries listed below

**Location:** Novokuibyshevsk, Ufa, Angarsk, Omsk and Yaroslavl refineries

**Unit:** roubles/metric tonne including VAT; converted to US dollars/metric tonne

**Timing:** delivered 10-30 days forward from date of assessment

**Volume minimum:** 60t

**Timestamp:** 5.30pm Moscow time on Thursday

## US

Argus Base Oils includes price assessments for several grades of US base oils, published in Argus Americas Base Oils.

See the [Argus Americas Base Oils methodology](#) for more information.

### Group I bulk export prices

- SN 150 fob US export
- SN 500 fob US export
- Bright stock fob US export
- 

### Group II bulk export prices

- N100 fob US export
- N220 fob US export
- N600 fob US export

### Domestic prices — Group I

- SN 150 fob domestic US
- SN 500 fob domestic US
- Bright stock fob domestic US

### Domestic prices — Group II

- N100 fob domestic US
- N220 fob domestic US
- N600 fob domestic US

### Domestic prices — Group III

- 4cst fob domestic US
- 6cst fob domestic US
- 8cst fob domestic US

## US naphthenic base oils

### Naphthenic domestic prices

- Pale oil 60 fob domestic US
- Pale oil 100 fob domestic US
- Pale oil 500 fob domestic US
- Pale oil 2,000 fob domestic US

### Naphthenic bulk export prices

- Pale oil 60 fob US export
- Pale oil 100 fob US export
- Pale oil 500 fob US export
- Pale oil 2,000 fob US export

## Crude

The US crude oil futures price is an important indicator of the future direction of base oil prices in the region. A comparison of the crude price with the base oil price illustrates the effect of the past week's change in price on the profitability of base oil relative to crude oil. Crude oil prices are taken from Argus reports on the day corresponding with the base oils assessment. Crude oil prices are published in US dollars/barrel and US dollars/gallon.

### Nymex WTI crude front month

The New York Mercantile Exchange (Nymex) West Texas Intermediate Light Sweet Crude front-month contract settlement price as published in *Argus Crude*. See the [Argus Crude methodology](#).

### SN 500 premium to WTI

The premium of SN 500 fob US export price over front-month WTI crude. Prices are published in US dollars/gallon and US dollars/barrel. The conversion factor used for SN 500 is 7.10 bl to a metric tonne.

### Argus Sour Crude Index (ASCI™)

The value of US Gulf coast medium sour crude as published in *Argus Crude*. See the [Argus Sour Crude Index™ methodology](#).

### SN 500 premium to ASCI™

The premium of SN 500 fob US export price over the Argus Sour Crude Index. Prices are published in US dollars/gallon and US dollars/barrel. The conversion factor used for SN 500 is 7.10 bl to a metric tonne.

## Oil products

Argus includes the regional benchmark price of vacuum gasoil to show the price of a key feedstock for base oils and heating oil and the effect of the change in that price on the profitability of base oils and heating oil. Argus also includes the regional price of heating oil to show the profitability of that product relative to crude oil and to base oils.

Oil products prices are taken from *Argus US Products* on the day corresponding with the base oils assessment.

Oil products prices are published in US dollars/gallon and US dollars/barrel.

### NYH heating oil barge

See the [Argus US Products methodology](#).

### Low sulphur vacuum gasoil 0.5% cargo

See the [Argus US Products methodology](#).

High sulphur vacuum gasoil 2% cargo See the [Argus US Products methodology](#).

### USGC 10ppm diesel 62 cargo

See the [Argus US Products methodology](#).

## Oil product price premiums

The profitability of SN 500 base oils and heating oil versus each other and versus feedstock vacuum gasoil.

### Heating oil premium to crude

The premium of New York Harbour heating oil barges to WTI crude.

### Heating oil premium to VGO 2%

The premium of New York Harbour heating oil barges over high sulphur vacuum gasoil.

### SN 500 premium to heating oil

The premium of SN 500 fob US export over New York Harbor heating oil barges.

### SN 500 premium to VGO 2%

The premium of SN 500 fob US export over high sulphur vacuum gasoil.

### US SN 500 forward prices

The implied forward base oil price required to maintain its existing profit margin relative to Nymex heating oil futures.

Argus assesses forward base oil prices by applying the intermonth premiums or discounts of the 30-day average of each forward month for US heating oil futures to the SN 500 fob US export physical base oil price as published in *Argus Base Oils*.

By using a 30-day average heating oil price, the effects of sharp price fluctuations are reduced, and an element of historic pricing is included, reflecting the tendency for base oil prices to lag a change in fossil fuel prices. The 30-day average heating oil price is calcu-

lated using the heating oil futures settlement price published by the New York Mercantile Exchange (Nymex) over the 30 calendar days to the base oil forward swap assessment day.

Prices are published in US dollars/tonne and in US dollars/gallon. Forward prices are published for three consecutive months and two quarters forward.

The conversion factor for SN 500 is 298 gallons to a metric tonne. The last day of publication of the first month of the forward price table will be the expiry date of the front-month heating oil futures contract published by Nymex.

The forward months will roll the day after expiry of the front month Nymex heating oil futures contract. The last day of publication of the first calendar quarter of the forward strips will be the expiry date of the first Nymex heating oil month in a calendar quarter (January, April, July and October).

### US SN 500 forward premium to heating oil

The implied forward profitability of base oils relative to Nymex heating oil futures.

Argus assesses the forward base oil premium to heating oil by comparing the physical SN 500 fob US export base oil price published in *Argus Base Oils* with the 30-day average of each forward month for heating oil futures.

The 30-day average heating oil price is calculated using the heating oil futures settlement price published by the New York Mercantile Exchange (Nymex) over the 30 calendar days to the base oil forward premium assessment day.

Prices are published in US dollars/tonne and in US dollars/gallon.

Forward SN 500 base oil premiums to heating oil are published for three consecutive months and two quarters forward.

The conversion factor for SN 500 is 298 gallons to a metric tonne.

The last day of publication of the first month of the forward premium table will be the expiry date of the front-month heating oil futures contract published by Nymex.

The forward months will roll the day after expiry of the front-month Nymex heating oil futures contract.

The last day of publication of the first calendar quarter of the forward strips will be the expiry date of the first Nymex heating oil month in a calendar quarter (January, April, July and October). Specifications are identical to those of the SN 500 fob US export spot price assessment.

## Americas posted prices

The grades included in each refiner's posted prices are determined independently by each refiner. See the [Argus Americas Base Oils methodology](#).

## Annex I: Posted prices - refiners by grade

### Group I base oils

ExxonMobil, HollyFrontier, Paulsboro Refining and Calumet

### Group II base oils

Excel Paralubes, Chevron, Motiva ExxonMobil, Calumet, Avista Oil and Petro-Canada

### Group II+ base oils

ExxonMobil, SK Lubricants, Motiva, Safety-Kleen and Petro-Canada

### Group III base oils

SK Lubricants, Avista Oil, Petro-Canada and Motiva

## Conversion factors - Americas spot prices

See the [Argus Americas Base Oils methodology](#).

## Arbitrage opportunities

The implied profit or loss, before freight and other costs, calculated as the difference between Argus price assessments. Each pair below is calculated as the second listed Argus price assessment less the first.

### Group I

- SN 150 fob European export-SN 150 ex-tank Singapore
- SN 500 fob European export-SN 500 ex-tank Singapore
- SN 150 fob Baltic Sea-SN 150 ex-tank Singapore
- SN 500 fob Baltic Sea-SN 500 ex-tank Singapore
- SN 150 fob European export-SN 150 (LVI) cfr UAE
- SN 500 fob European export-SN 500 (LVI) cfr UAE
- SN 150 fob Asia-SN 150 fob domestic US
- SN 500 fob Asia-SN 500 fob domestic US
- SN 150 fob European export-SN 150 fob domestic US
- SN 500 fob European export-SN 500 fob domestic US
- SN 150 fob Black Sea-SN 150 (LVI) cfr India
- SN 500 fob Black Sea-SN 500 (LVI) cfr India
- SN 150 fob Asia-SN 150 (LVI) cfr India
- SN 500 fob Asia-SN 500 (LVI) cfr India
- SN 150 fob Baltic Sea-SN 150 fob domestic US
- SN 500 fob Baltic Sea-SN 500 fob domestic US
- SN 150 fob Baltic Sea-SN 150 fob domestic NWE
- SN 500 fob Baltic Sea-SN 500 fob domestic NWE
- SN 150 fob US export-SN 150 ex-tank Singapore
- SN 500 fob US export-SN 500 ex-tank Singapore

### Group II

- N150 fob Asia-N150 fca ARA
- N500 fob Asia-N600 fca ARA
- N150 fob Asia-N100 fob domestic US
- N500 fob Asia-N600 fob domestic US
- N150 fob Asia-N150 cfr India
- N500 fob Asia-N500 cfr India
- N100 fob US export-N150 fca ARA

- N600 fob US export-N600 fca ARA
- N100 fob US export-N150 cfr India
- N600 fob US export-N500 cfr India
- N100 fob US export-N150 ex-tank Singapore
- N600 fob US export-N500 ex-tank Singapore

See the [Argus European Base Oils methodology](#) for more information on European base oils prices and the [Argus Americas Base Oils methodology](#) for more information on US base oils prices.

## Argus Base Oils daily update

A selection of forward prices are assessed daily and are made available electronically through Argus Direct and other means.

### Asia-Pacific

#### Asia SN 500 forward prices

For details of the methodology, see the Asia-Pacific section of this methodology.

#### Asia SN 500 forward premium to gasoil

For details of the methodology, see the Asia-Pacific section of this methodology.

### Europe

#### European SN 150 forward prices

For details of the methodology, see the Europe section of this methodology.

#### European SN 150 forward premium to gasoil

For details of the methodology, see the Europe section of this methodology.

#### European SN 500 forward prices

For details of the methodology, see the Europe section of this methodology.

#### European SN 500 forward premium to gasoil

For details of the methodology, see the Europe section of this methodology.

### US

#### US SN 500 forward prices

For details of the methodology, see the US section of this methodology.

#### US SN 500 forward premium to heating oil

For details of the methodology, see the US section of this methodology.