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ARGUS POLYMERS

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The most up-to-date Argus Polymers Methodology and Specification Guide is available on
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 indicators of commodity market values, free from distortion. As a result, the specific currencies, volume units, locations and other particulars of an assessment are determined by industry consensus to facilitate seamless bilateral trade and Argus mirrors these industry conventions. In illiquid markets and time periods,

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 when and where possible. 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. Should the number of entities providing market data repeatedly fall to a level that assessment quality may be affected, supervising editors will review the viability of the assessment.

For certain price assessments identified by local management, should more than 50pc of the market data upon which the assessment is based come from a single entity during any assessment period (defined as the minimum period covered, such as a day for a daily assessment), then 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 utilize 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 obtains, 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 analyze all data submitted to the price assessment process. This data includes transactions, bids, offers, volumes, counterparties, specifications and any other information that contributes materially to the determination of price. This high level of care applies regardless of the methodology employed. Specific to transactions, bids, and offers, reporters seek to verify the price, the timing, 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 certain price assessments identified by local management, 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 arms-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.
- Transaction details that are reported by one counterparty differently than the other counterparty.
- Any transaction details that appear to the reporter to be illogical or to stray from the norms of trading behavior. 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 submitting the data. 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 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 assessed, 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 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 center.
- Comparison to a more actively traded but slightly different specification commodity in the same market center.
- Analysis of prices in forward markets for physically deliverable commodity that allow extrapolation of value into the prompt timing for the commodity assessed.
- 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).

Throughout this methodology, Argus will explain, in more detail and on a market by market basis, the criteria and procedures that are used to make an assessment of market value by applying intelligent judgment.

Throughout this methodology, Argus will explain, in more detail and on a market by market basis, the criteria and procedures that are used to make an assessment of market value by applying intelligent judgment.

Publications and price data

Argus polymer prices are published in Argus Polymers. Subsets of these prices appear in other Argus market reports and newsletters in various forms, such as Argus Ethylene and Argus Propylene. The price data is 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 histori-

cal database and available for purchase. Contact your local Argus office for information.

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. If transaction information is submitted in error, and the company submitting informs Argus of the error within 24 hours of the original submission, Argus will make best efforts to correct the price data. After 24 hours, Argus will review both the material effect that the correction will have on the price data and the amount of time that has elapsed from the date of the published price data before deciding whether to issue a correction.

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. Included in this policy are restrictions against staff trading in any energy commodity commodities 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 arm's length transactions (please see the [Argus Global Compliance Policy](#) for a detailed definition of arms length).

Consistency in the assessment process

Argus recognizes 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 program of training and oversight of reporters. This program 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 indicators of commodity market val-

ues, free from distortion and representative of spot market values. 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 physical 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
- 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 analyze 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 in the relevant Argus report and include a date for implementation. In addition, publication of stakeholders' formal comments that are not subject to confidentiality and Argus' response to those comments will also take place. These formal comments should be published in a manner described by management but must be available to all market participants and stakeholders.

Updates to methodology

The Argus Polymers methodology is constantly updated and revised. The latest available methodology (which may supersede the one you are reading) is available at www.argusmedia.com

Publication schedule

Argus Polymers is a weekly report on the global polymer markets. The report is published every Thursday, with the exception of some public holidays. For a full list of non-publication dates, see Argus' [publication schedule](#).

Units

Polymer prices are per metric tonne, unless otherwise stated.

US

Contract prices

Contract price assessments reflect a negotiated contract price for general-purpose grades meeting the US polymer specifications listed below, delivered east of the Rocky Mountains during the named month. Assessments are based on validated contract prices negotiated between buyer and seller. In the absence of validated prices, Argus assesses the change in the contract price from the previous month, and derives each price by applying that change to its assessment of the previous month.

Contract prices are published for each of the specifications listed below.

Timing

Argus publishes an assessment of the monthly contract price from the third publication of the month in question until the first publication of the following month, when the final monthly contract price assessment is typically made. The second publication of the following month republishes the final monthly contract price assessment.

In the event that the monthly contract has not settled by the first publication of the following month, the final monthly price assessment will be published in the second publication of the month.

The final monthly contract price assessment is not an average of the previous assessments for the month in question.

Export prices

Export price assessments are for bagged material on an FAS (free-alongside-ship) Houston basis. Assessments are for a volume equivalent to at least one railcar (unbagged), meeting the quality specifications listed below, delivered to buyer up to 30 days from the date of publication, and under export-only conditions.

Export prices are published for HDPE injection, HDPE BM, HDPE HMW film, LDPE liner film, LLDPE butene, PVC pipe.

Specifications

PP homo

Polypropylene homopolymer – injection molding

Material with a melt flow rate in the range 5-30.

PP copolymer

Polypropylene block co-polymer

Material with a melt flow rate in the range of 2-30

LDPE liner film

Low density polyethylene (LDPE) – liner film contract price

Material with a melt index of 0.2-4.

LLDPE butene

Linear low density polyethylene (LLDPE) butene-1

Blown film, butene-grade linear with a melt index of 0.8-2.

LLDPE hexene

LLDPE hexene-1 Film

Hexene-grade linear with a melt index of 0.75-1

LLDPE octene

LLDPE octene-1 Film

Octene-grade linear film with a melt index of 0.4 to 0.85.

HDPE BM

High density polyethylene – blow molding grade

General purpose blow molding HDPE resin with a melt index of 0.22-0.4.

HDPE injection

HDPE IM – high density polyethylene, injection molding grade

General purpose injection molding HDPE resin I with a melt index of 4-20.

HDPE HMW Film

High density polyethylene high molecular weight film

General purpose high molecular weight film with a high load melt index (HLMI) of 6-10.

PVC pipe

Polyvinyl chloride – pipe grade

General purpose rigid extrusion pipe-grade PVC, K-value of 65-68.

PS crystal

General purpose polystyrene (GPPS)

General purpose crystal grades material with a melt index of 1-20.

PS high impact

High impact polystyrene (HIPS)

General purpose high-impact rubber modified polystyrene with a melt flow index of 2 to 20.

Northwest Europe

Polymer contract price assessments

Argus assesses a monthly contract price range for Europe. There is no one single contract price; independent producers and consumers agree the monthly contract price on an independent arms length basis. Argus surveys participants on the change in contract price from month to month and confirms with them indicative price ranges. The different polymer grades are not assessed in isolation and the premiums and discounts between different polymer grades are used in the assessment process.

Argus publishes a contract price range, in most circumstances no wider than €50/t. There is not a single contract price as each buyer/seller negotiates individually. The contract is typical of the major markets in Germany, Benelux and France, and is based on "general purpose grades" and does not allow for any surcharges associated with more advanced grades. The price assessment does not cover break-bulk activities and does not reflect the geographic variations across the smaller European markets (Spain and Italy typically have lower pricing).

Timing

Argus publishes an assessment of the monthly contract price from the third publication of the month in question until the first publication of the following month, when the final monthly contract price assessment is typically made. The second publication of the following month republishes the final monthly contract price assessment.

In the event that the monthly contract has not settled by the first publication of the following month, the final monthly price assessment will be published in the second publication of the month.

The final monthly contract price assessment is not an average of the previous assessments for the month in question.

General specifications

Although specifications have been included below, most polymer grades are selected by performance criteria rather than measured specification. These values are a guide only.

Terms: gross (before any discounts are applied)

Delivered mid-northwest Europe

Load size: "full load deliveries" – typically a 20-25t load depending on local regulations

Specifications

LDPE liner film

Low density polyethylene (LDPE) – liner film contract price

Material within a melt flow index of 0.3-4 and density of 918-920 kg/m³.

LLDPE butene

LLDPE – Butene – Linear Low Density Polyethylene

Blown Film: Butene-grade linear with a melt flow index of 0.8-1, and density of 918-925 kg/m³.

HDPE BM

High Density Polyethylene – Blow Molding Grade

Specification: medium molecular weight material with a melt flow rate of 0.22-0.4, with a typical density of 950-960 kg/m³.

HDPE injection

HDPE IM – high density polyethylene, injection molding grade

Material with a melt flow rate of 4-8, with density of 950-960 kg/m³.

Main use is crates and boxes.

HDPE HMW film

High Density Polyethylene High Molecular Weight Film

Uni-modal grade with a high load melt index (HLMI) of 8-10.

PVC Pipe

Polyvinyl chloride – pipe grade

Specification: rigid extrusion-grade suspension PVC, K-value of 66-68.

PP homo

Polypropylene homopolymer – injection molding grade

Material with a melt flow index of 5-30.

PP raffia

Polypropylene raffia grade

Material with a melt flow rate of 3.5 (with no additives).

PP copolymer

Polypropylene block co-polymer

Material with a melt flow index in the range of 2-30.

PS crystal

General purpose polystyrene (GPPS/PS Crystal)

GGPS material with a melt flow index of 1-20.

PS high impact

High impact polystyrene (HIPS)

Material with a melt flow index of 2 - 20.

Asia-Pacific

Argus assesses Asian spot prices in the range within which polymers could have traded based on confirmed deals, bids and offers throughout the week before the day of publication. Market information is gained through conversations with buyers, sellers, traders, shippers and other informed industry sources. All trades are based on "general purpose grades".

Timing

Delivered 5-35 days forward from assessment date

Cfr China spot

China's main ports are mainly located in three regions:

- east China: Shanghai, Ningbo, Nanjing and Qingdao
- south China: Xiamen, Fuzhou, Shenzhen, Huangpu, Guangzhou, Shantou
- north China: Tianjin and Dalian

Argus assessment mainly cover these three regions. PVC cfr prices are based on monthly offers from Taiwan, Japan, South Korea and the US.

Price assessments are for trade of at least 100,000t

Argus generally maintains a \$20-50/t assessment range for polyethylene, polypropylene, polystyrene and polyvinyl chloride cfr China price assessments. Assessment ranges can be widened by \$10-20/t when the market is in wide discussion or large volume transactions are concluded out of the mainstream range.

Ex-works China spot

Ex-works China spot prices include a 17pc value-added tax.

The Chinese domestic market consists of the following regions:

- east China: Shanghai, Zhejiang, Jiangsu
- south China: Guangdong and Fujian
- north China: Tianjin, Beijing, Hebei and Shandong
- northeast China: Liaoning, Jilin and Heilongjiang
- west China: Xinjiang, Gansu and Shaanxi
- southwest China: Sichuan and Chongqing.

Assessments are for trade of at least 5,000t

Import parity China spot current

Import parity China spot prices (\$/t) are ex-works (Yn/t) adjusted for the currency exchange rate, VAT, tariff, clearance cost. Value-added tax is 17pc in China and the import tariff is 6.5pc for major origins. Clearance cost is at Yn100/t. In that case, the formula is: ex-works adjusted (import parity) = (ex-works-100)/(exchange rate * 1.17 * 1.065)

Cfr southeast Asia spot

Price assessments include deliveries to major ports in Indonesia, Vietnam, Malaysia, Thailand and the Philippines.

Cargoes must be for at least 15 metric tonnes or a full load of a container at least 20-feet long.

Polyethylene cargoes originating outside southeast Asia are subject to import duty of between 3pc and 15pc in Indonesia, Malaysia, Thailand and the Philippines. Prices for non-dutiable material generally establish the high end of the assessment and prices for dutiable material generally establish the low end of the assessment.

Specifications

LDPE liner film

LDPE – low density polyethylene

Material within a melt flow index of 0.2-4 and density of 910-925 kg/m³.

LLDPE butene

LLDPE – butene – linear low density polyethylene

Butene-grade linear with a melt flow index of 0.1-2.5 and density of 910-925 kg/m³.

HDPE BM

High density polyethylene – blow molding grade

Material with a melt flow rate of 0.1-0.4 with a typical density of 940-960 kg/m³

HDPE injection

HDPE IM – high density polyethylene, injection molding grade

Injection mold material with a melt flow rate of 2-20 with density of 940-960 kg/m³.

HDPE HMW film

HDPE FM – high density polyethylene – film grade

HDPE Film grade: material with a melt flow rate of 0.1-0.4 and density between 940-960 kg/m³.

PP raffia

Polypropylene raffia grade

Material with a melt flow rate of 1-4 with no additives.

PP copolymer

Polypropylene block co-polymer

Polypropylene block co-polymer: material with a melt flow index of 2-30.

PS crystal

General purpose polystyrene (GPPS/PS Crystal)

Material with a melt flow index of 1-20.

PP high impact

High impact polystyrene (HIPS)

Material with a melt flow index of 2-20.

PVC pipe

Polyvinyl chloride – pipe grade

Rigid extrusion-grade suspension PVC, K-value of 66-68.

Ethylene based PVC exported from northeast Asia and the US.

Carbide-based PVC in domestic market.