

Quality (PPM): Quality Metric for Parts per Million

Quality (PPM) refers to the defect rate of delivered parts, expressed in parts per million (Parts Per Million). In industrial procurement, the metric is a standard measure for making suppliers' delivery quality objectively comparable. It is frequently incorporated into supplier evaluations, escalation levels and contract targets and is therefore a central control instrument in procurement quality management.

Key facts

- PPM stands for Parts Per Million and indicates how many defects occur per one million delivered parts.
- Calculation is typically the number of defective parts divided by the total quantity, multiplied by 1,000,000.
- Common target values in practice range, depending on the industry, from below 500 to below 10 PPM.
- PPM values are frequently incorporated into supplier evaluations, scores and contract clauses.
- The validity of the metric depends heavily on clean data sources such as incoming goods and complaint data.
- In addition to delivery PPM, customer complaints (field PPM) are often considered as a separate metric.

Definition: Quality (PPM)

Quality (PPM) is a metric for measuring the defect quality of goods and components, relating to one million delivered units. It condenses inspection results, complaints and scrap into a single, directly comparable value.

Basis of Calculation

The most common formula is: defect quantity divided by the total ordered delivery quantity, multiplied by 1,000,000. If 1.2 million screws are delivered in a year and 60 parts are rejected, this results in a value of 50 PPM. What is decisive is that numerator and denominator are collected consistently – for example, only via incoming goods inspection or including defects from production.

- Numerator: rejected or sorted-out part quantity
- Denominator: total quantity delivered or inspected in the period under review
- Factor of 1,000,000 for normalisation

Distinction from Other Quality Metrics

PPM describes the defect frequency but says nothing about the severity, cause or cost of a defect. For this, supplementary metrics such as complaint rate, scrap costs or First Pass Yield are necessary. Material traceability also plays a role, so that defects can be clearly assigned to a batch or supplier.

Significance for Technical Procurement

For buyers, PPM is an objective negotiation and control instrument. The metric translates quality into a language that can be compared with price, delivery reliability and delivery time within the supplier portfolio.

Supplier Evaluation and Sourcing

In supplier evaluation systems, PPM often carries a weighting of 20 to 40 per cent in the overall score. In supplier acquisition and in qualification criteria for new suppliers, the historical PPM value serves as hard evidence of process capability. Suppliers who can demonstrate low PPM values thereby also improve their chances in tenders and volume commitment agreements.

Contractual Anchoring

Many procurement contracts contain PPM target values with agreed escalation levels, such as a warning, a special sorting inspection (sorting action at the supplier's expense) or contractual penalties. A clear definition of the measurement method in the contract is important in order to avoid disputes. Legal statements on defect rights should always be examined on a case-by-case basis.

Methods and Approach for PPM Measurement

Reliable PPM values require a structured approach from data collection to root cause analysis. Only if defects are systematically documented is the metric suitable for steering purposes.

Data Sources and Collection

Typical data sources are incoming goods inspections, measurement records, 8D reports and complaint management systems. Ideally, these are fed directly from ERP or quality management systems, for example via item master records and posting documents linked through Material Requirements Planning (MRP). A solid material availability check (ATP) also prevents quality problems from being concealed by substitute procurement.

Defect Classification and Delimitation

Not every raised issue is a genuine quality defect: short deliveries, incorrect deliveries and transport damage should be recorded separately. A uniform defect classification – such as critical, major, minor – increases comparability across suppliers and plants.

Root Cause Analysis with the Supplier

If the value exceeds agreed limits, a structured reconciliation process with the supplier is customary, often in the 8D report format. In addition, a supplier feasibility review can reveal whether the intended processes can sustainably deliver the required quality.

Key KPIs Surrounding Quality (PPM)

PPM rarely stands alone. In combination with further metrics, a robust picture of supplier performance emerges.

Key Metrics in Combination

In addition to delivery PPM, on-time delivery, complaint resolution time and quality costs are particularly

relevant. Together, these metrics show whether a problem is episodic or systemic.

- Delivery PPM (based on incoming goods)
- Field PPM (defects at the end customer, often only visible months later)
- Quality costs (sorting, rework, freight costs)
- Response time to complaints

Interpretation and Guideline Values

In practice, values below 500 PPM are considered good for many series deep-drawn and machined parts, while automotive-critical components often require values in the single-digit range. However, guideline values must always be related to the part class, manufacturing process and risk potential – blanket thresholds lead to incorrect conclusions.

Risks and Controls in Handling PPM

PPM is only as valuable as the data quality behind the metric. Faulty collection or one-sided interpretation lead to wrong supplier decisions.

Typical Measurement Errors and Biases

Common sources of error: small batch sizes, which statistically produce hardly meaningful PPM values; unclear delimitation between purchased-part defects and production defects; double counting of the same defect in incoming goods and production. Even in the risk analysis prior to supplier selection, the measurement methodology should therefore be clearly defined.

Control Mechanisms in the Procurement Process

Effective controls include regular data reconciliation between procurement, quality management and production, defined escalation paths and periodic audits at critical suppliers. A supplier change should only be considered once improvement measures have demonstrably failed – because every change carries its own quality risks during the ramp-up phase.

Documentation and Traceability

Complete traceability of materials down to batch number is a prerequisite for assigning defects and making corrective actions effective. Without clean traceability, costly demarcation problems up to and including recalls loom in the event of a defect.

Current Developments in PPM Control

Digitalisation and rising quality demands are changing how PPM values are collected and used.

Automated Data Collection

Modern ERP and quality solutions record inspection results directly at incoming goods and calculate PPM values almost in real time. E-procurement in procurement also creates seamless electronic documents that make it easier to assign complaints to purchase orders and make the small-order process more visible from a quality perspective.

Preventive Rather than Reactive Control

The trend is moving from downstream complaint handling towards preventive quality assurance: process

capability studies, should-costing and clean-sheet calculations are increasingly used to identify unrealistic quality requirements in advance. Those who recognise early that a price is only achievable with a reduced inspection depth avoid later PPM outliers.

Typical metrics

Delivery PPM: < 500 PPM

typical guideline value for standard parts in series production

Delivery PPM critical parts: < 10 PPM

common for safety-relevant automotive components

On-time delivery: > 98 %

supplementary metric alongside PPM for supplier evaluation

Complaint response time: < 48 hours

frequently agreed first response in the 8D process

PPM share in the supplier score: 20–40 %

typical weighting in supplier evaluation systems

Practical Example

A medium-sized mechanical engineering company with around 400 active suppliers had no uniform quality measurement – complaints were spread across email, telephone and Excel. After introducing structured PPM collection, it became apparent within a year that three suppliers were significantly above the agreed target value of 500 PPM.

- Uniform defect classification and recording of all complaints in the ERP system
- Monthly PPM evaluation per supplier with escalation levels in the framework contract
- Special sorting inspection with two suppliers, in each case at the supplier's expense
- Replacement of one supplier after six months of recurring issues with three qualified alternatives from supplier acquisition

Conclusion

Quality (PPM) is one of the most practically relevant metrics for making delivery quality objectively measurable and comparable. Its value, however, depends significantly on clean data collection, a uniform defect definition and consistent root cause analysis. For buyers, its use is particularly worthwhile in combination with further performance metrics such as on-time delivery and quality costs. Those who anchor PPM targets contractually and improve them together with the supplier reduce not only defect costs but also the risk of supply failure. In short: PPM should not be a control instrument for mere collection, but a shared control instrument for quality improvement.

Frequently asked questions

What does PPM mean in procurement?

PPM stands for Parts Per Million and indicates how many of one million delivered parts are defective. The metric is used in industrial procurement to objectively assess delivery quality. Typical target values range, depending on the industry, from single digits to several hundred PPM.

How is the PPM value calculated?

The PPM value is calculated as the number of rejected parts divided by the total ordered delivery quantity, multiplied by 1,000,000. It is important to have a uniform definition of whether only incoming goods inspections are included or also defects from production. Only with consistent collection is a comparison across suppliers and periods possible.

Which PPM values are good?

There is no universally good value, as the assessment depends on the component, the manufacturing process and the safety risk. For many standard parts, values below 500 PPM are considered acceptable in practice, while safety-critical automotive components often require single-digit values. The decisive factor is comparison with the agreed target value and the industry standard.

What happens if the agreed PPM value is exceeded?

Many procurement contracts define escalation levels, such as a written warning, a special sorting inspection at the supplier's expense or contractual penalties. In the long term, loss of A-supplier status or the initiation of a supplier change may follow. It is important that the measurement method is clearly defined in the contract.

What is the difference between delivery PPM and field PPM?

Delivery PPM measures defects detected at incoming goods or in one's own production. Field PPM records defects that only occur at the end customer after the component has been installed and are therefore often more costly. Both metrics should be collected separately, as they have different causes.

How can PPM values be actively reduced?

Key success factors are a structured root cause analysis with the supplier, for example in 8D format, as well as clear quality agreements already at the issuance of new enquiries. A supplier feasibility review before order placement also uncovers weaknesses in process capability at an early stage. In addition, regular audits and material traceability down to batch number are helpful.