

Calculation of the ppm complaint rate for production material



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The ppm complaint rate is calculated by taking all deliveries (incl. initial samples) into account. Hidden defects in metallurgical structures during processing of blank castings and forgings are ignored for ppm purposes.

1. Calculation formula:

$$\text{ppm} = \frac{\text{Inspected defective units}}{\text{units supplied}} \times 1,000,000$$

2. Definitions:

2.1. ppm
Parts per million.

2.2. Units
The base unit of measure in which orders are placed (e.g. item, kilogram, meter, liter, etc.). The sum total of all base units of measure is used. No separate calculations are carried out for different base units of measure.

2.3. Inspected defective units
Inspected defective units are components which deviate from specification (concept specification, drawing, regulations, etc.) or where a deviation exists in the accompanying documentation (e.g. initial sample inspection report, factory inspection certificate, etc.).

Relevance for ppm purposes is assessed using the criteria set out in the annex hereto.

Account must be taken of all units found to be non-compliant at the following locations:

- Incoming goods inspection
- Warehouse
- Production
- Assembly
- Test stand
- Dispatch
- OEM (0 km)
- Field failures

Compliance with deadlines and volumes and Q-notifications for logistics is ignored for ppm purposes.

2.4. Units supplied
Number of units supplied during the period under review.

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Annex: PPM relevance and counting method

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| Decision | Procedure | Description | Counting method | Examples | ppm relevant |
|----------|---|---|---|--|--------------|
| Sort | Sorting is charged to the supplier (e.g. at MTU or supplier's premises) | Units which deviate from specification. After sorting, a decision can be made on further use (scrapping, reworking or use by applying for a deviation permit). | Number of units to be sorted. Number of defective units once sorting is complete. Where return deliveries are made to the supplier, the defective quantity must be reported to RRPS under the 8D system promptly once sorting is complete. The quantity of relevance for ppm purposes must then be amended as per the actual number of units. | <ul style="list-style-type: none"> • Outside diameter too large • Inside diameter too small • Surface too rough • Corroded parts | Yes |
| Scrap | Scrapping at the supplier's cost | Units which deviate from specification and which cannot be reworked or approved under a deviation permit. | Number of units actually scrapped. An estimate of the quantity of relevance for ppm purposes may be made prior to scrapping / return delivery in non-contentious cases in which the entire return consignment has been scrapped for cost reasons. | <ul style="list-style-type: none"> • Outside diameter too small • Inside diameter too large • Corroded parts • Mixed screw/bolt sizes • Claim involving low-value parts | Yes |
| Rework | Reworking at the supplier's cost | Units deviating from specification but which are in compliance with specification after reworking. | Number of units actually reworked. Where return deliveries are made to the supplier, the defective quantity must be reported to RRPS under the 8D system promptly once reworking is complete. The quantity of relevance for ppm purposes must then be amended as per the actual number of units. | <ul style="list-style-type: none"> • Outside diameter too large • Inside diameter too small • Surface too rough • Corroded parts • Cleaning of contaminated parts | Yes |
| Misc. | Accompanying documentation | Units comply with specification, accompanying documentation is missing or incorrect. | One (1) unit | <ul style="list-style-type: none"> • Initial sample inspection report missing/incorrect • Factory inspection certificate missing/incorrect | Yes |
| Misc. | Initial sample / Requalification made subject of a complaint | Units which deviate from specification. | Number of units deviating from specification; max. ten (10) units. | | Yes |

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|---|--|---|--|--|---------------|
| Misc. | Deviation permit application submitted by supplier prior to receipt of goods by MTU | Units deviating from specification and covered by a deviation permit application submitted by the supplier. | No ppm relevance. | <ul style="list-style-type: none"> • Outside diameter too large • Inside diameter too small • Surface too rough • Corroded parts • Unlabeled/unmarked parts | No |
| Misc. | Deviation permit application submitted by supplier/MTU following receipt of goods by MTU | Units deviating from specification and covered by a deviation permit application. | Number of units deviating from specification. The quantity of relevance for ppm purposes is allowed to differ from the quantity given in the deviation permit application. Statistical calculation of the quantity of relevance for ppm purposes is permitted. | <ul style="list-style-type: none"> • Outside diameter too large • Inside diameter too small • Surface too rough • Corroded parts • Unlabeled/unmarked parts | Yes |
| Misc. | Deviation permit application submitted by MTU for unmachined parts | Unmachined parts deviating from specification and where the fault is able to be found in MTU Manufacturing. | <p>Parts which are usable without being reworked are counted as one (1) unit in the ppm calculation.</p> <p>Number of units actually reworked or scrapped are included in the ppm calculation.</p> | <p>Metallurgical disaggregations:</p> <ul style="list-style-type: none"> • Blowholes • Gas cavities • Porosity | Yes |
| Voluntary declaration by the supplier (incl. field) | Sorting, reworking, replacement or scrapping at the supplier's cost | Units deviating from specification and for which MTU still has no official complaint (QL notification). | <p>Voluntary declarations made by suppliers are not included in the ppm calculation. Declarations, in writing, as part of a Q-notification, of other material numbers affected counts as a voluntary declaration if made within 24 hours.</p> <p>Exception: Where potentially defective components have already been assembled or the production process has been hindered, these are counted in the ppm calculation at the rate of one (1) unit per voluntary declaration.</p> | | No Yes |
| Misc. | Wrong delivery, incorrect component marking | In case of wrong deliveries / incorrect component markings caused by the supplier | Units in direct access of the assembly line are ppm relevant. Stock and incoming goods are counted as one (1) unit in the ppm calculation. | <ul style="list-style-type: none"> • Supplier delivers wrong part number • Wrong- or missing component marking | Yes |