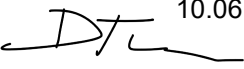


Parts Traceability Requirements

1 Document Approval

Approval of the latest revision acc. [Revision History](#) as attachment to the PIDEU Quality Agreement to suppliers.

Creator (D. Tiedemann)	Reviewer (D. Mahnecke)	Approval Quality (R. Koch)	Approval ENG (P. Jeroschewski)
 10.06.2022 Signature & Date	 10.06.2022 Signature & Date	 30.06.2022 Signature & Date	 Signature & Date

2 Revision History

Revision	Date	Change point / remarks	Changed by
V1.0	24.10.2019	Initial Version	Mahnecke
V1.1	05.11.2019	Lot size and handling added	Mahnecke
V1.2	18.12.2019	Alignment with PIDEU Quality Agreement	Mahnecke
V1.3	11.05.2022	Add sub-supplier handling chapter 3, remove generic part classification with specific RFQ traceability requirements	Tiedemann

Inhaltsverzeichnis

1	Document Approval.....	1
2	Revision History	1
3	Introduction.....	4
4	General requirements	6
4.1	Start of traceability	6
4.2	Overview of traceability	6
4.3	Archiving period	6
4.4	Obligation to document	6
4.5	Fixation element.....	6
4.6	Marking.....	6
5	Single Part Traceability	6
5.1	Deviation on requirements	6
5.2	Retrievable information	7
5.3	Traceability of sub-components.....	7
6	Lot Traceability Classification (minimum requirement)	7
6.1	Requirements specification	7
6.2	Deviation on requirements	7
6.3	Resetting of lot number.....	7
6.4	Traceability of sub-components.....	7
7	Content of bar code / DMC / QR-Code.....	8
8	DMC Requirements	8
8.1	Symbology	8
8.2	Requirements on the quality of the Data Matrix Code	8
8.3	Requirements on printed Data Matrix Codes	9
8.4	Requirements on Data Matrix Codes directly applicated on the component	9
9	QR Code Requirements	9
9.1	Symbology	9
9.2	Requirements on the quality of the Data Matrix Code	9
9.3	Requirements on printed QR Codes.....	10
9.4	Requirements on QR Codes directly applicated on the component.....	10
10	Bar Code Requirements.....	10
10.1	Permitted symbologies.....	10
10.2	Requirements on the printing process.....	10

11	Approval of marking	11
12	Appendix.....	12

3 Introduction

As supplier and integrator for safety relevant applications our company's share great responsibility for product conformance & integrity. Mitigating risks for safety critical faults as well as economic damages should be a mutual target. Within the supply chain, traceability is the key measure to do so. Requirements are given in ISO 9001 and addendum by IATF 16949.

"The organization shall control the unique identification of the outputs when traceability is a requirement and shall retain the documented information necessary to enable traceability." – ISO 9001

Target is as described in IAT16949 to limit quantity of affected customer and released field parts with quality or safety relevant issues. The risk and severity of faults are basis to define requirements for traceability. Every fault in a subcomponent that you detect will save cost exponentially compared to detection by upper integration level.

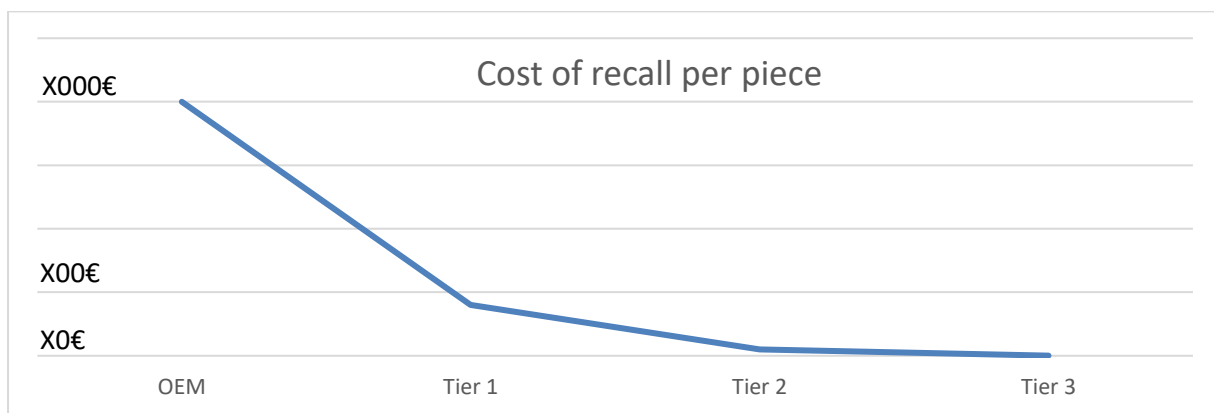


Figure 1: Recall costs per integration level

Basic requirement for PIDEU automotive BG products is single part traceability from OEM to Tier 1. Basically, Panasonic will take this requirement over to subcomponents – adaptations of this strategy needs documented, systematic risk analysis.

To argue the step to batch traceability of subcomponents in compliance to ISO9001 & IATF 16949 we define additional measures to mitigate the quality and safety risk. At this point of course the costs are a relevant indicator. The grade of subcomponents control measures gives the basis for acceptable batch sizes from Tier 2. With this systematic approach we can protect our customers from damage and our own company from critical financial loss.

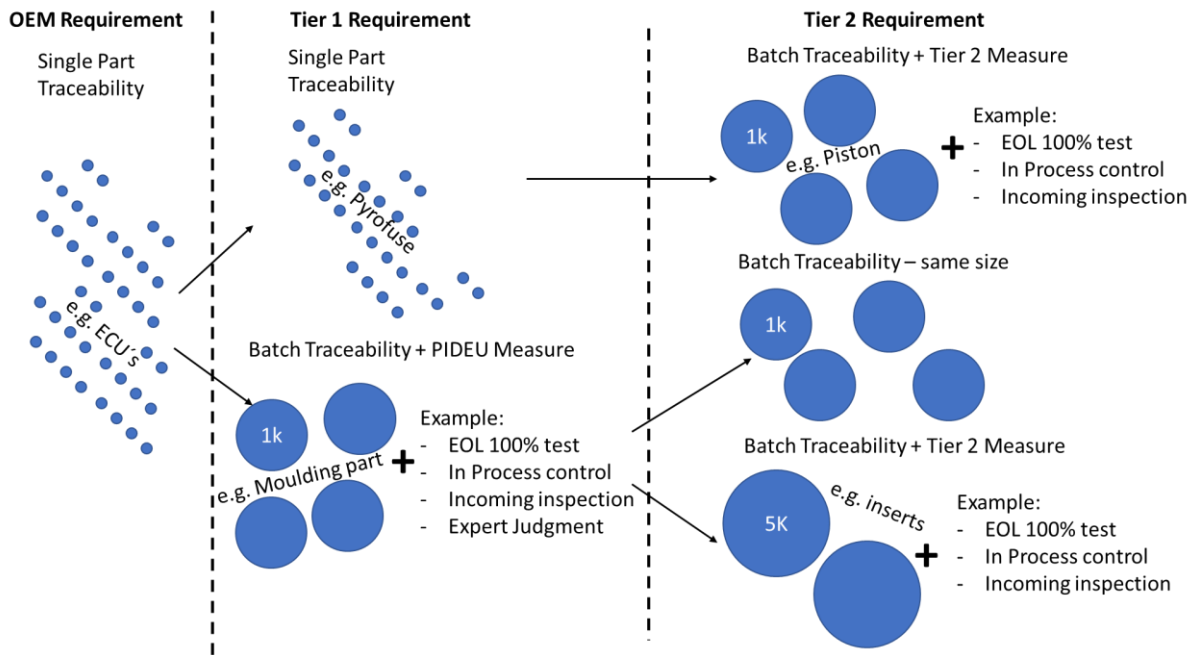


Figure 2: Decomposition of traceability requirements

We expect the same responsibility from our suppliers in their own interests as well as in ours. Receiving subcomponents in larger batches than assured to Tier 1 must need additional measures on Tier 2 level. The size of independent batches should also correlate with grade of your measures. Below table might give you an idea how to choose batch size based on defined measures.

Checking Measure	Example characteristic	Batch size	Grade of check
100% subcomponent check in production line	Electrical resistance, dimension	Large	High
100% EOL test on product level	Dimension, tightness		
Incoming Inspection of subcomponents	Mechanical strength, dimensions	Small	Low

Table 1: Correlation of batch size and checking measure

4 General requirements

4.1 Start of traceability

The supplier shall be obliged to assure traceability of their components within their scope of traceability from pre-series level onwards at the latest.

4.2 Overview of traceability

An overview of traceability data shall be presented to the PIDEU QMT department during initial sample inspection and to PIDEU SQM during audit. All recorded traceability parameters for the respective products/lots shall be made available to the QMT department upon request. Upon request, the data shall be provided within 1 working day for components which are not older than 2 years, 3 working days for older components. Data shall be provided in in electronical form.

4.3 Archiving period

The archiving period of traceability data for supplied parts shall be at least 25 years from data creation.

4.4 Obligation to document

The implementation of component marking used for single part traceability as well as the generic traceability classification shall be documented.

4.5 Fixation element

For fixation elements EN ISO 16426:2002 (D), chapter 5.2 shall be applied.

4.6 Marking

Markings by DMC or QR-Code are preferred. Wherever applicable direct marking (e.g., printing or laser marking) shall be performed.

5 Single Part Traceability

Single part traceability is requested for highly critical & core components of PIDEU systems. This request is part of the RFQ since it need to be considered in subcomponents product and/or process layout. If single part traceability is requested for supplier's component following points apply:

5.1 Deviation on requirements

If single part traceability cannot be met for any reason (e.g., no space for DMC code) supplier is obliged to inform PIDEU immediately

5.2 Retrievable information

For each part following information shall be retrievable by supplier

- a) Time of production
- b) Used subcomponents/ batches of subcomponents - only **one** subcomponent/ batch of subcomponents shall be traced to the single part
- c) Used tools/ production equipment
- d) Test results & relevant process parameters (e.g., forces, torques, temperatures)

5.3 Traceability of sub-components

For each subcomponent a written justification for decomposition of traceability requirements shall be prepared. Logic of Figure 2 and Table 1 shall be applied.

6 Lot Traceability Classification (minimum requirement)

For the given reasons in chapter 2 PIDEU assesses its complete bill of material. Based on that PIDEU requests certain specific lot size from our suppliers. If a specific lot size is requested in RFQ following points apply:

6.1 Requirement's specification

Every part is classified for traceability as defined in the Request for Quotation. These requirements shall be understood as minimum. If traceability requirements may change after RFQ phase an official document will request specific traceability size.

6.2 Deviation on requirements

Classification of generic part deviating from requested traceability size shall be sent to PIDEU during RFQ phase. All deviations need to be justified.

6.3 Resetting of lot number

For lot classified material the lot number shall be changed at:

- a) Restart of process
- b) Change of shift
- c) Change of production day
- d) Longer breaks within one shift, especially for molding processes

6.4 Traceability of sub-components

For each subcomponent a written justification for decomposition of traceability requirements shall be prepared. Logic of Figure 2 and Table 1 shall be applied.

7 Content of bar code / DMC / QR-Code

To assure traceability on PIDEU side marking with a data matrix code (DMC) or barcode shall be performed by the supplier. DMC and QR Code are preferred.

Data content must contain the part identifier (part number) and a unique serial number in case of single part classification or a lot number / date code in case of Lot traceability

At least the serial / LOT number shall be indicated as clear text. When space is limited clear text can be skipped after special approval from PIDEU.

The format of the content within the code shall be:

AAAAAAAAAAAAAAAA;SSSSSSSS;LLLLL

AAAAAAAAAAAAAAAA	Part Identifier / Part number (15 char)
SSSSSSSS	Serial / Lot Number (10 char)
LLLLL	Optional additional data (e.g., Line No., Tool No.)
1. Separation Character should be “;”. 2. Deviation from above format is possible when agreed with PIDEU. 3. Depending on available space additional information can be added by the supplier. Legibility shall not be influenced then.	

Table 2 Data Content

8 DMC Requirements

8.1 Symbology

The Data Matrix Code according to ISO/IEC 16022 with the Error correction ECC200 according to ISO/IEC16022 shall be used.

8.2 Requirements on the quality of the Data Matrix Code

- a) The legibility of the Data Matrix Code shall be proven by the supplier by means of a test report with at least class B and/or 3 (good) acc. to AIM DPM during initial sampling. The test report shall be archived until the valid retention period has expired.
- b) In addition, the supplier shall provide retention samples. It is recommended to store retention samples also at PIDEU.
- c) In the case of painted mounting parts (surfaces) special attention must be paid to ensure long term legibility.
- d) PIDEU must approve the selected space for marking to ensure easy access by the reading device and the legibility of the Data Matrix Code in particular if applied on curved surfaces or complex component geometries.

- e) When the Data Matrix Code is applied on a curved surface the radian measure of the Data Matrix Code may not exceed 5 % of the circumference and 16 % of the diameter, respectively.

Legibility	At least class B and or 3 (good) acc. ISO/IEC TR 29158 (AIM DPM)
Min. width of the smallest module	0.5 mm ¹⁾
Quiet zone	As per ISO/IEC 16022
Clear text lettering ²⁾	DIN 1451-1C3
Permitted deviation in position	Max. 10% of code size in all directions
Printing contrast	Min 55%
1) When space is limited a min. space of 0.38 mm may be used after special approval from PIDEU. 2) When space is limited clear text can be skipped after special approval from PIDEU.	

Table 3 DMC requirements

8.3 Requirements on printed Data Matrix Codes

Polyamide labels shall be used. The materials of the label may not harm the finish.

8.4 Requirements on Data Matrix Codes directly applied on the component

As a rule, legibility of lasered Data Matrix Codes can only be ensured by a high-quality camera system. Hence, the use of lasered Data Matrix Codes shall be coordinated with PIDEU. Lasered Data Matrix Codes shall be produced without residues.

9 QR Code Requirements

9.1 Symbolology

The QR Code according to ISO/IEC 18004:2015 with minimum error correction level M shall be used.

9.2 Requirements on the quality of the Data Matrix Code

- The legibility of the QR Code shall be proven by the supplier by means of a test report with at least class B and/or 3 (good) acc. to AIM DPM during initial sampling. The test report shall be archived until the valid retention period has expired.
- In addition, the supplier shall provide retention samples. It is recommended to store retention samples also at PIDEU.
- In the case of painted mounting parts (surfaces) special attention must be paid to ensure long term legibility.
- PIDEU must approve the selected space for marking to ensure easy access by the reading device and the legibility of the Data Matrix Code in particular if applied on curved surfaces or complex component geometries.
- When the QR Code is applied on a curved surface the radian measure of the Data Matrix Code may not exceed 5 % of the circumference and 16 % of the diameter, respectively.

Legibility	At least class B and or 3 (good) acc. ISO/IEC TR 29158 (AIM DPM)
Min. width of the smallest module	0.5 mm ¹⁾
Quiet zone	As per ISO/IEC 18004, min. 4 modules
Clear text lettering ¹⁾	DIN 1451-1C3
Permitted deviation in position	Max. 10% of code size in all directions
Printing contrast	Min 55%
1) When space is limited a min. space of 0.38 mm may be used after special approval from PIDEU. 2) When space is limited clear text can be skipped after special approval from PIDEU.	

Table 4 QR Code requirements

9.3 Requirements on printed QR Codes

Polyamide labels shall be used. The materials of the label may not harm the finish.

9.4 Requirements on QR Codes directly applied on the component

As a rule, legibility of lasered QR Codes can only be ensured by a high-quality camera system. Hence, the use of lasered QR Codes shall be coordinated with PIDEU. Lasered QR Codes shall be produced without residues.

10 Bar Code Requirements

10.1 Permitted symbology

The symbology specification code 128-character set B according to ISO/IEC 15417 with the check digit calculation mode as described in ISO/IEC 15417 Appendix A shall be used.

10.2 Requirements on the printing process

- The legibility of the barcode shall be proven by the supplier by means of a test report with at least class C and/or 2. (satisfactory), acc. To DIN EN ISO/IEC 15416 during initial sampling. The test report shall be archived until the valid retention period has expired.
- In addition, the supplier shall provide retention samples. It is recommended to store the samples also at PIDEU.
- The location where the sticker (barcode) is applied must be coordinated between the supplier and PIDEU to ensure easy access by the reading device and legibility in particular if applied on curved surfaces or complex component geometries.
- Provided suitability of the component material is given, the bar code may be applied directly onto the component.
- Requirements on printed bar codes

Min. width X of the smallest module	0.25 mm
Width Q of bright zone	Min. 5 mm

Min. height of barcode	The bigger value of 5 mm or 15 % of symbol length
Vertical min. distance between 2 bar codes	10 mm
Horizontal min. distance between 2 barcodes	80 mm
Clear text lettering	DIN 1451-1C3
Overprint (text on sticker)	Black, not glossy, (alternatively white is possible) resistant against wiping and scratching
Background color	White, not glossy (alternatively black is possible)
Printing contrast	Min. 40%
Adhesive side	Backside
Sticker	Polyamide

Table 5 Printed bar codes

11 Approval of marking

For approval of the marking in any case a printed sample shall be provided to PIDEU production engineering department.

12 Appendix

This audit questionnaire can be used to spot check requirements of this document. This table does not override or substitute above's requirements and should aid for supplier's self-audit or PIDEU audit.

Chapter	Checkpoint	Judgement/ Comment
4.1	Is Traceability available from pre-series onward?	
4.2	Are you able to provide data of products not older than 2 years within 1 working day?	
4.3	Demonstrate how it is assured that traceability data is stored for at least 25 years.	
4.4	Where is the marking of your components documented (e.g., drawing, instruction)?	
4.5	(For fixation elements suppliers only: Do you apply EN ISO 16426:2002 (D), chapter 5.2?)	
0	Do you apply DMC or QR code?	
5.1/6.1	Are you following required traceability class as defined in RFQ documentation?	
5.2 or	Please retrieve following information for one specific part as spot check a) Time of production b) Used subcomponents/ batches of subcomponents - only one subcomponent/ batch of subcomponents shall be traced to the single part c) Used tools/ production equipment d) Test results & relevant process parameters (e.g., forces, torques, temperatures)	
6.3	For which reasons do you change the lot number?	
5.3/ 6.4	Demonstrate the decomposition of traceability for your subcomponents.	