German Association
of the Automotive Industry

VDA Recommendation

Global Transport Label

VDA 4994

Version 2.0, July 2023

This non-binding VDA Recommendation provides guidelines for the labelling of packages (shipping units and individual packages) used in the automotive supply processes, taking into account modern logistics concepts. The printed labels (product tags) facilitate unambiguous and consistent recoding and tracking of the packages in the systems of all partners involved in the process, including transport companies, and allow for efficient incoming goods processes.

The specification is based on the Global Transport Label (GTL V3.0) devised by Odette, AIAG and JAMA/JAPIA and can be used in both national and international transport processes along the supply chain.

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1 Introduction

Modern supply processes for automotive parts require efficient communication between the parties involved.

The Committee Communication and Information Technologies (KIT) has developed and published recommendations for the streamlining and harmonisation of these communication processes. The recommendation regarding the use of the Global Transport Label is part of a series of publications concerning communication along the supply chain. In this document, the term "label" refers to the label attached to the transport packaging.

The data printed on labels originates from the same data pool as the information printed on dispatch advices (DESADV, VDA 4987) and shipping documents (shipment documents according to VDA 4939).

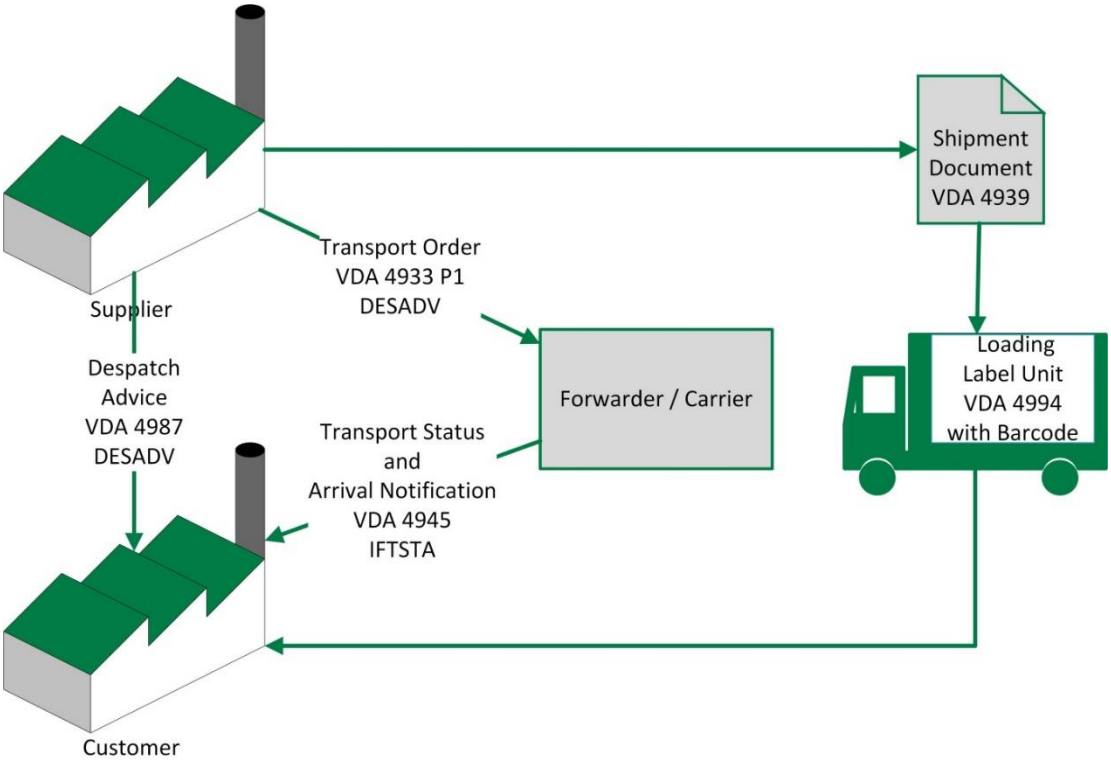


Figure 1 Relationships between the various advices, notifications, and documents

This VDA - Recommendation is in accordance with the Odette Recommendation LL08 "Global Transport Label - European Profile, Version 2".

2 Function of labels

Labels are used to identify product and shipping packages in the internal material flow and along their route from the dispatcher of the goods (normally the factory of the supplier) to the shipping company and eventually to the recipient of the goods (normally the factory of the customer). Labels allow for the unique identification of packages around the globe. In addition to the clear-text information, labels also contain machine-readable data in the form of 1D and 2D barcodes for automated handling.

Depending on the actual purpose of the package unit, the label has different control functions:

- **Product Packaging Unit (PPU)**: Examples: cardboard boxes and plastic boxes (also known as Small Load Carriers – SLC). In this case the label provides unique identification of the product, together with additional logistics data. The label generally supports the internal handling of the PPU by the supplier up to the point of consolidation into transport packaging units and by the customer[1] once the transport packaging units are broken down again.
- **Transport Packaging Unit (TPU):** Examples: pallets, loaded with PPUs and auxiliary packaging material (lids, etc.), metal containers or large load carriers (LLC). In this case, the label provides unique identification of the package unit, including details regarding its logistics and material properties. The information on the label is generally used to control consignments along single-stage or multi-stage transport chains from the supplier to the customer and to support the receipt of the goods by the customer with subsequent internal handling including storage in the customer's warehouse.

In cases where the PPU is also the TPU, the labels combine the features and functions of the above two packaging levels. This type of packaging unit is usually described as a **Simplified Loading Unit**.

3 Consignments and transport

The sender of the goods (Ship From) combines Transport Packaging Units into consignments (shipments). A consignment thus consists of all TPUs that are shipped together from the despatch point of the supplier to the designated delivery address of the customer (unloading point at the Ship To[2]. The consignment remains a unit until it is separated into its component parts, irrespective of the method of transport by which it reaches the delivery address. A consignment therefore remains intact even if it passes through one or more cross-dock points and is unloaded and re-loaded several times.

A transport includes all consignments that are transported by a freight carrier along the same transport leg to the delivery address.

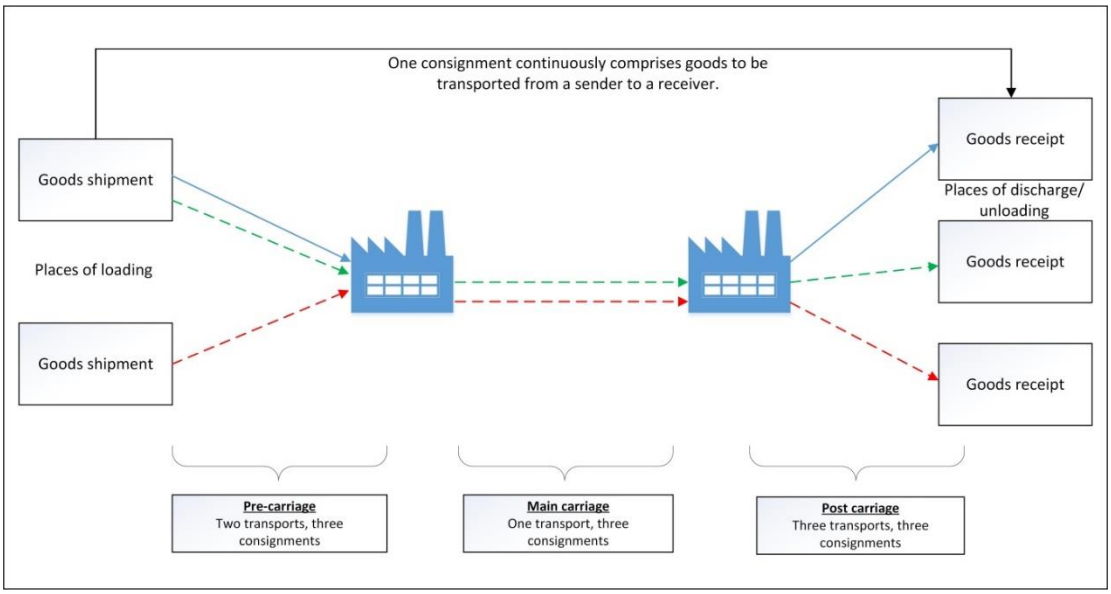


Figure 2 Relationship between consignment and transport

For cross-dock processes, it might be necessary to print additional information on the TPU labels. For details, see chapter 8.

[1] The internal packaging labels are often referred to as small load carrier SLC Labels.

[2] NAD + ST/LOC+11

4 Size, layout and application of labels

4.1 Dimensions

Labels can vary in size according to the size of the packaging unit they will be attached to and can sometimes vary according to the region of the world in which they are to be used.

The following sizes are considered to be a fairly exhaustive list:

a. A5, 210mm x 148mm - see **Fehler! Verweisquelle konnte nicht gefunden werden.**
b. Half letter 216mm x 140mm – see Figure 4
c. A6, 148mm x 105mm or 152.4mm (6 inches) x 101.6mm (4 inches)
d. SLC1: Label for small load carriers (KLTs) 210mm x 74mm
e. SLC2: Label for flat small load carriers 210mm x 42mm
   SLC 3: Label for flat small load carriers 210mm x 30mm
   Blister: Label for blisters 150mm x 25mm

As A6 and B10 are virtually identical in size, they are described together.

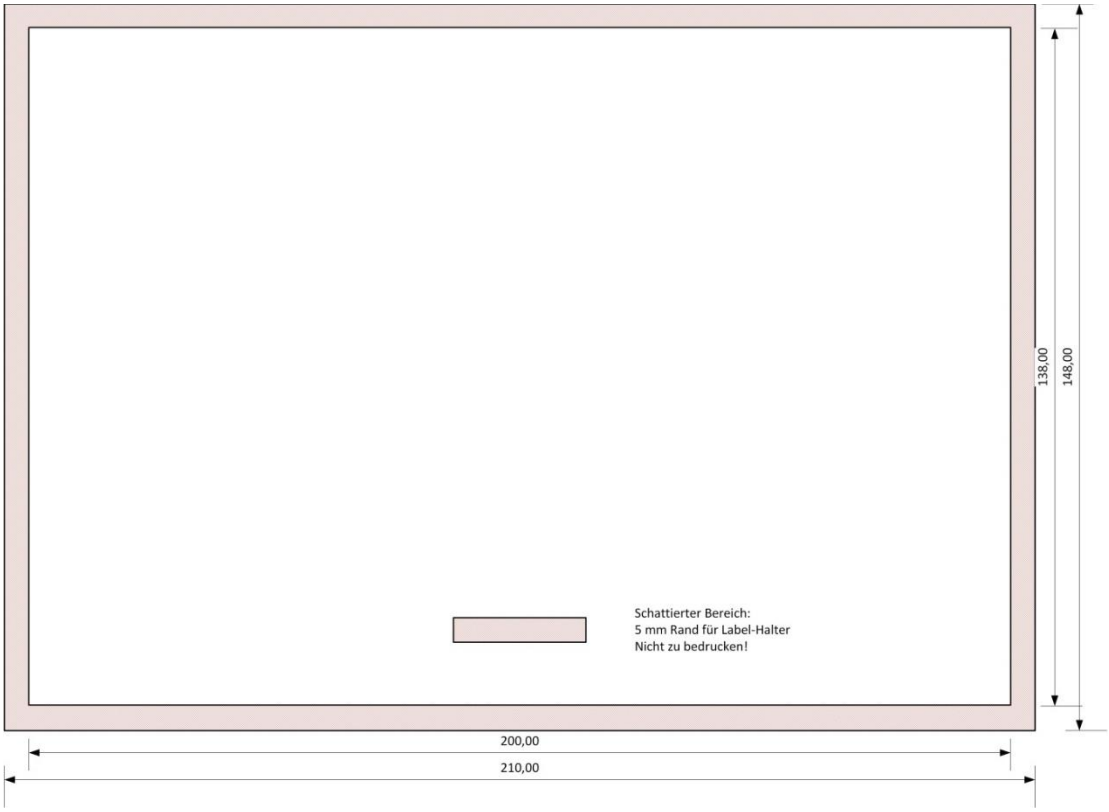


Figure 3 Label A5 size

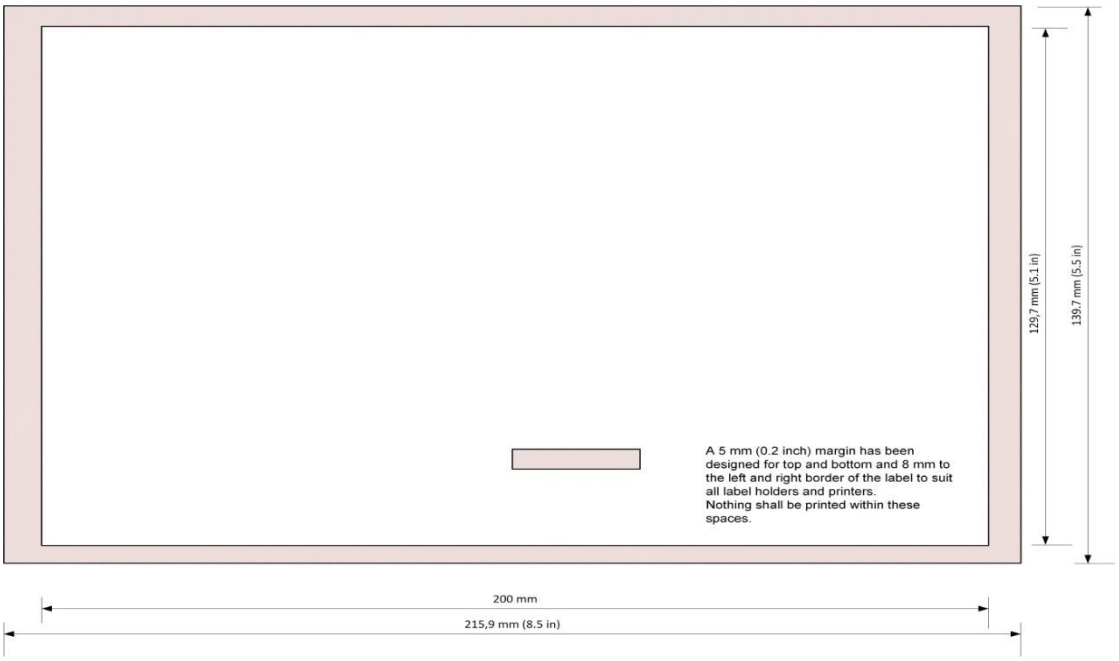


Figure 4 Label Half Letter size

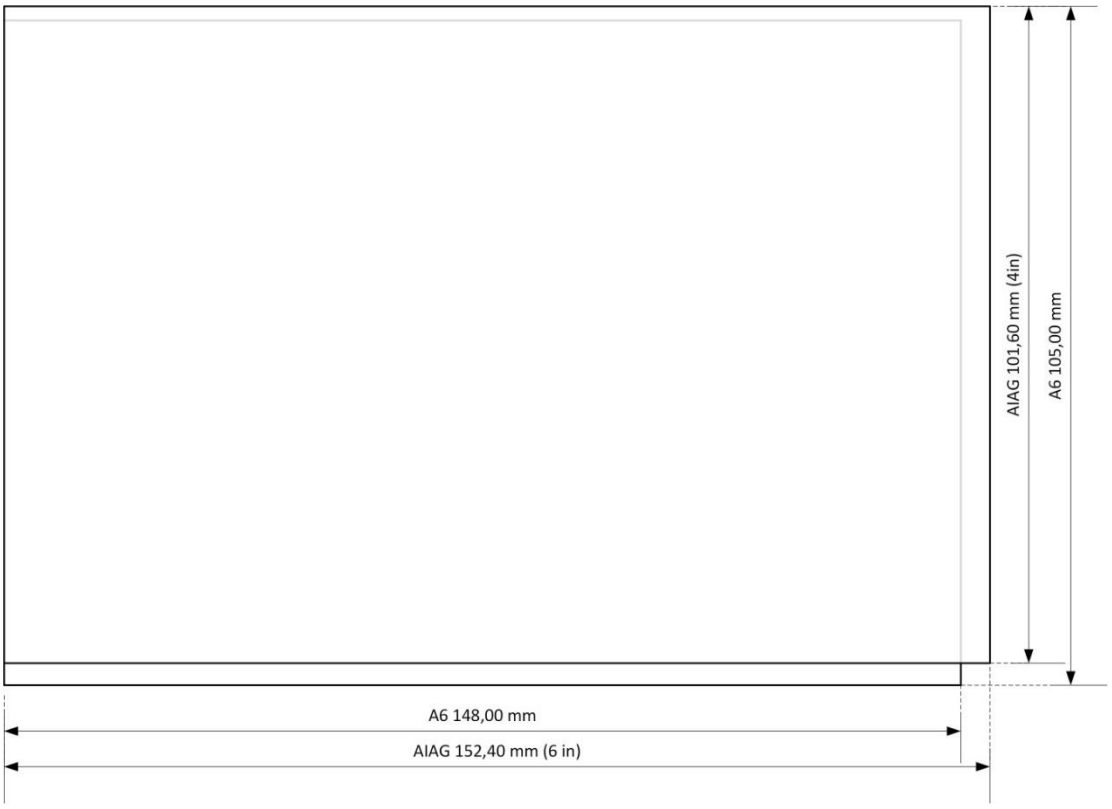


Figure 5 Label size A6/ AIAG

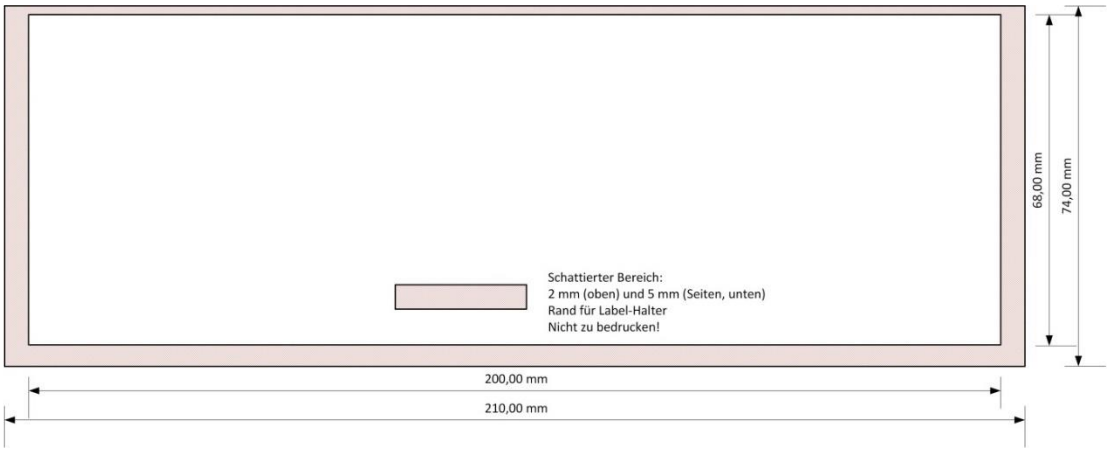


Figure 6 Label SLC size

Figure 7 Label SLC 2 size

For smaller labels, please refer to VDA 4992 - MAT Label or size A9 in the Odette recommendation for transport labels (5,2 mm x 3,7 mm).

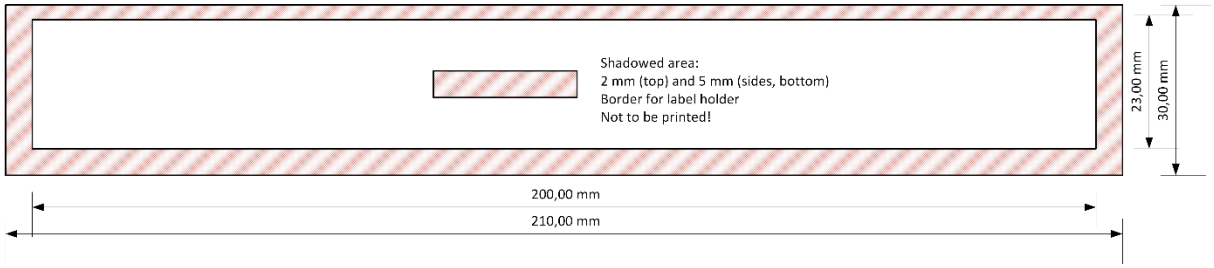


Figure 8 SLC 3 size

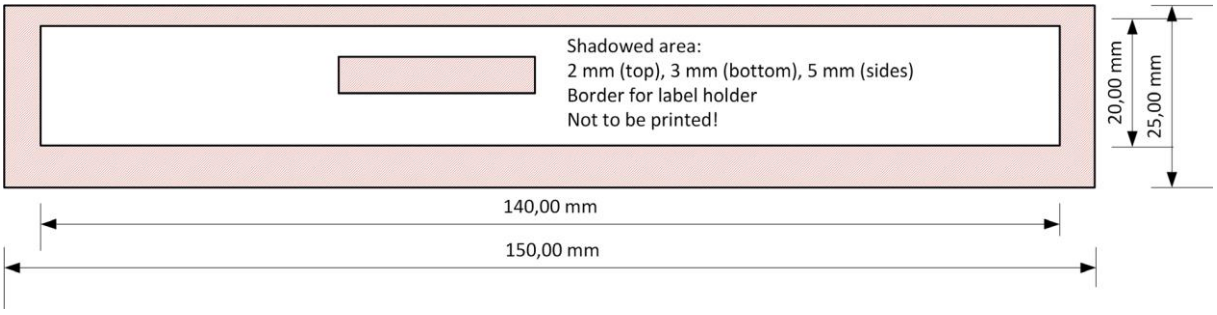


Figure 9 Blister size

For even smaller labels, please consult VDA 4992 - MAT label.

Size comparison between label sizes

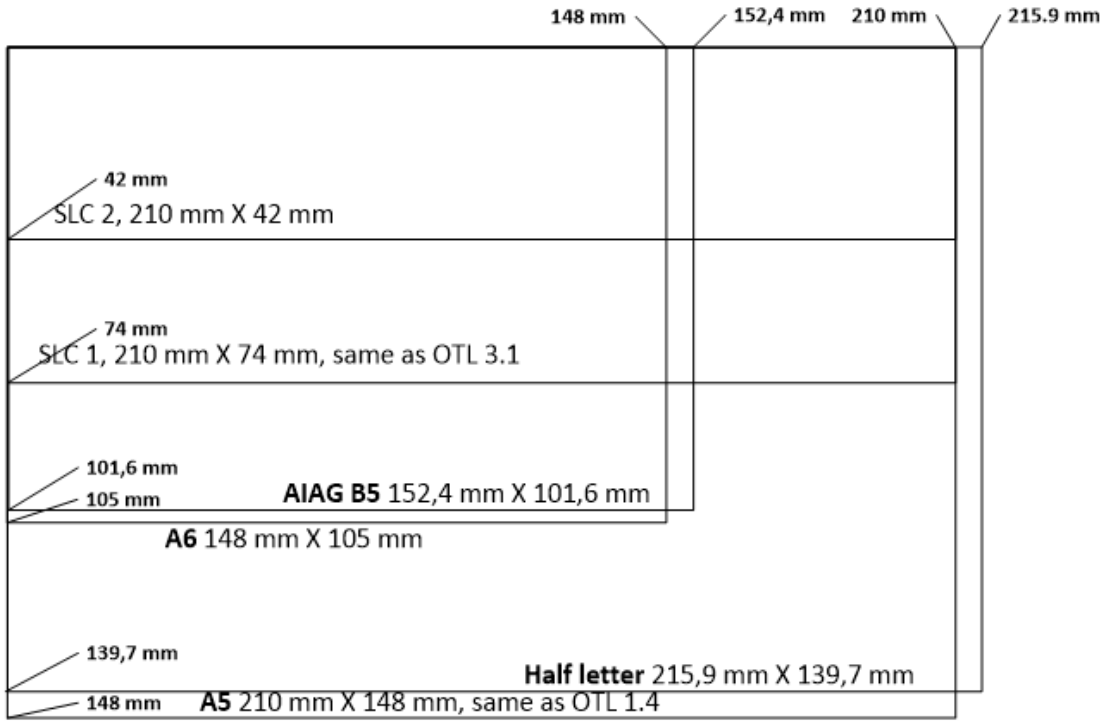


Figure 10 Comparison of sizes of different labels

4.2 Data fields on labels

The information printed on the label is divided into logical fields of data according to the applicable lay-out template.
The following information blocks are defined:

- A1 - Goods sender (ship from)
- A2 - Goods recipient (ship to)
- A3 - Label type and 2D barcode symbol
- B1 - Customer reference 1
- B2 - Customer routing information
- B3 - Logistics reference
- C - Customer's article number
- D1 - Package ID
- D2 - Customer reference 2
- E1 - Optional information as defined by supplier
- E2 - Customer reference 3

For more information, see chapter 5.

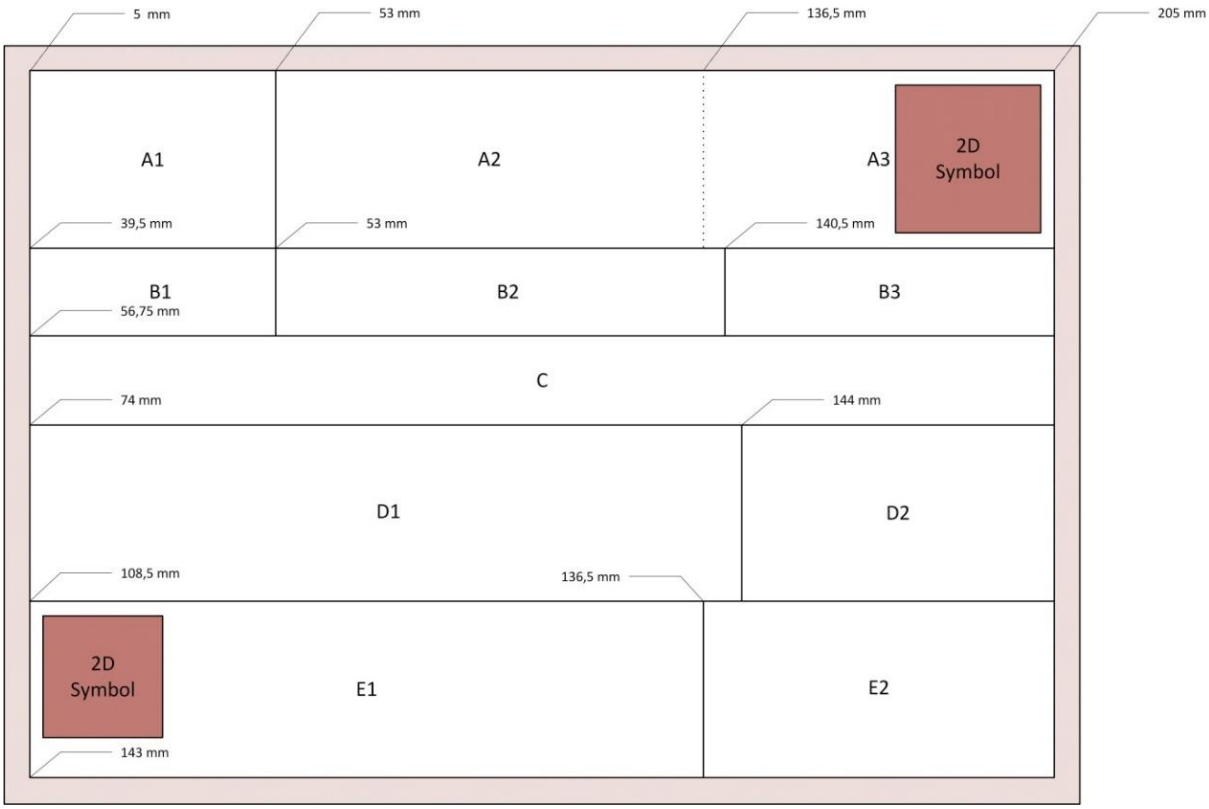


Figure 11 Dimensions and layout of data fields - label format A5

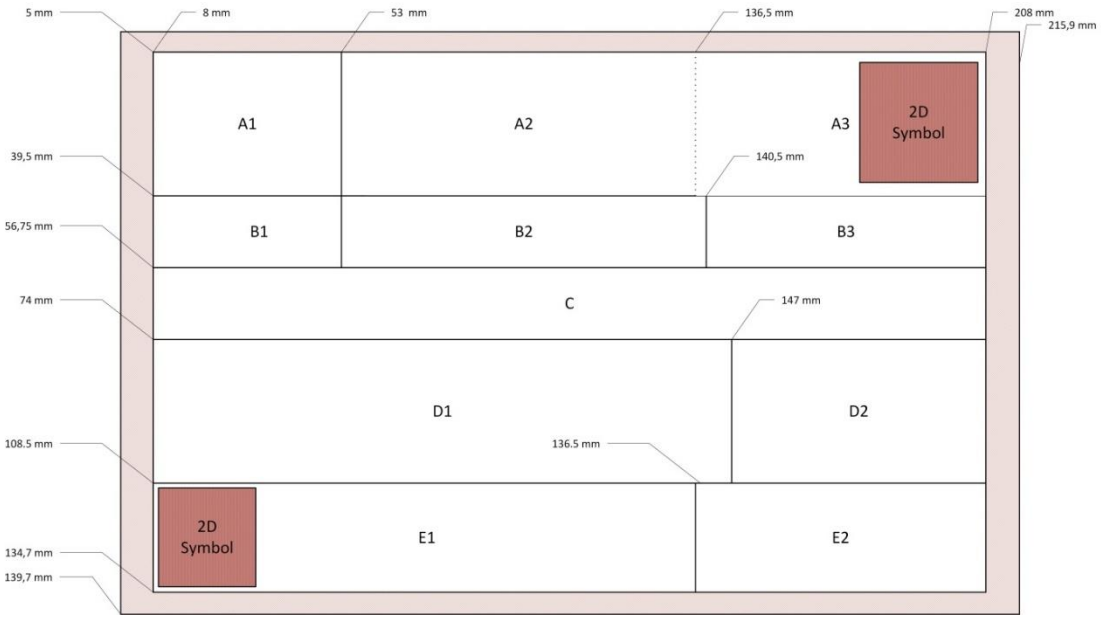


Figure 12 Dimensions and layout of data fields - label Half-Letter format

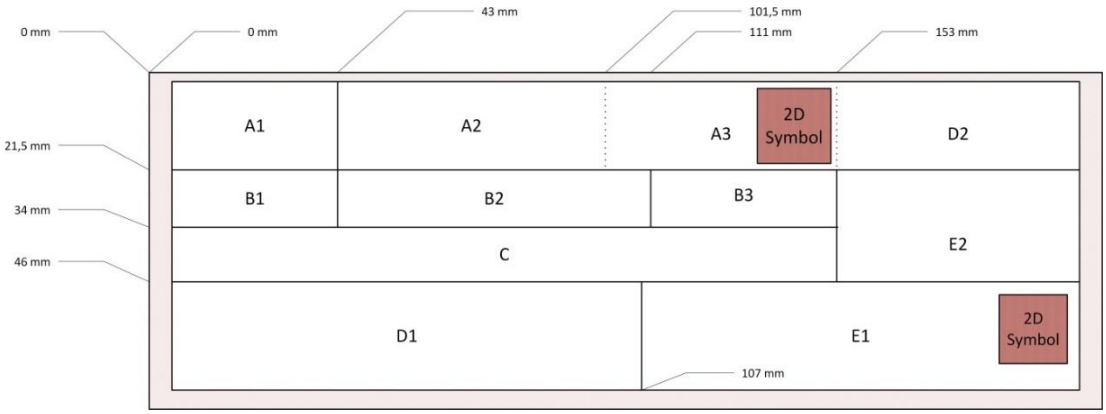


Figure 13 Dimensions and layout of data fields - label format SLC 1

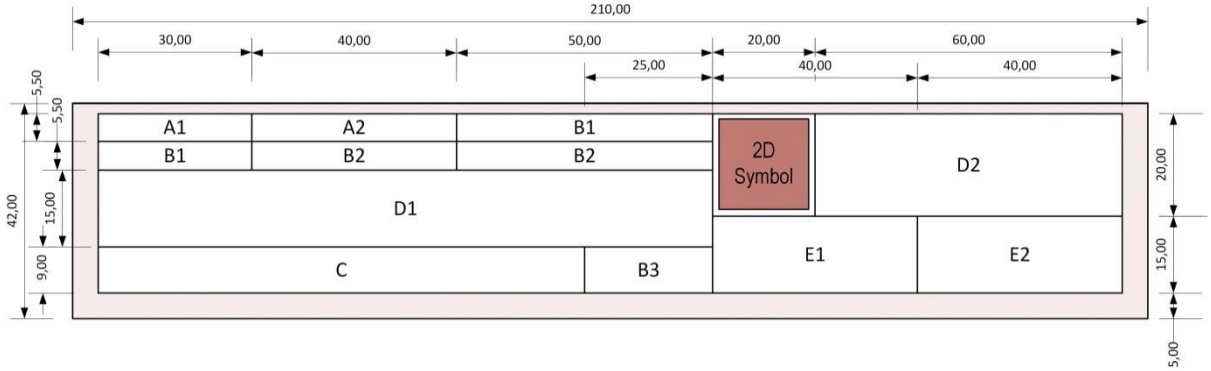


Figure 14 Dimensions and layout of label format SLC 2 (tray format)

Note: The limited format of the tray labels allows only limited information.

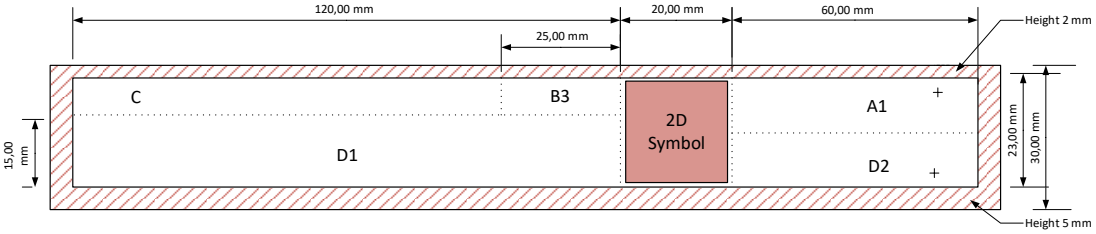


Figure 15 - Dimensions and layout of data fields - Label format SLC 3

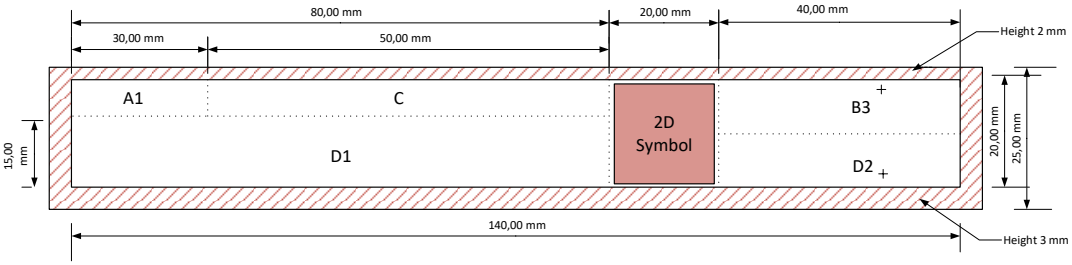


Figure 16 - Dimensions and layout of data fields - Label format Blister

Note: Due to the small size, the SLC 2, SLC 3 and Blister Label only contain a subset of the information printed on the other labels. Also, to avoid reading problems with the 2D Symbol certain lines, which separate the blocks, are not printed on SLC 2, SLC 3 and blister labels (see also examples later in this document).

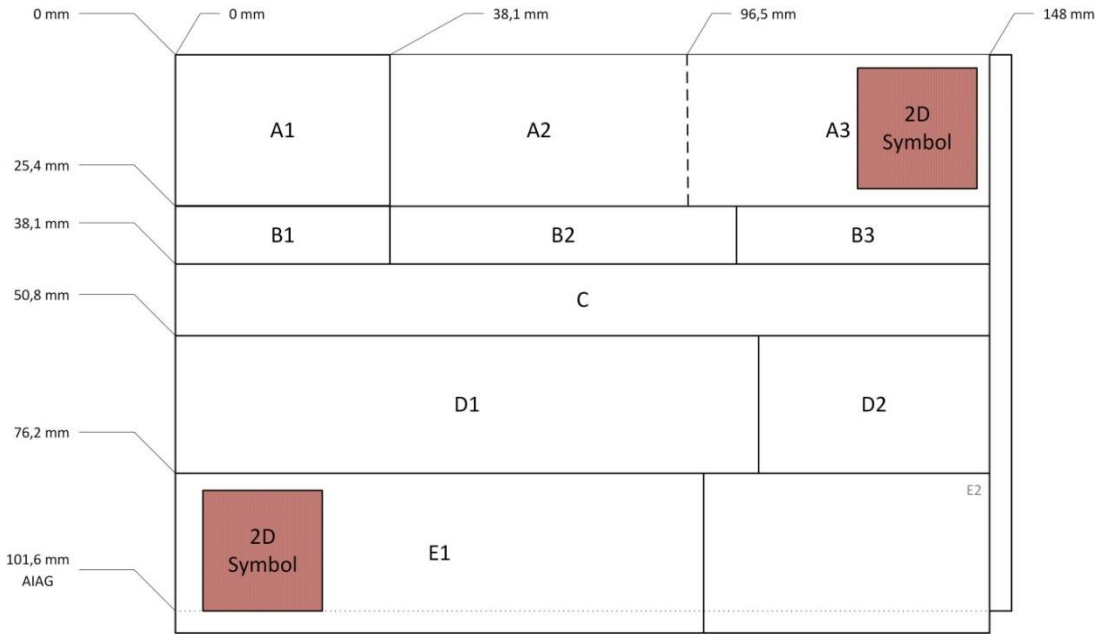


Figure 17 - Dimensions and layout of data fields - label format A6

4.3 Technical Requirements

- Insert label	= min. 120	g/m²
- Adhesive label	= min. 80	g/m²
- Combined label	= approx. 130-170	g/m²
- Carrier material	= approx. 50-90	g/m²
- Label material	= approx. 80	g/m²
- Paper	= white, machine-finished, moisture-resistant	
- Adhesive	= permanent adhesive, moisture-resistant, easy to remove	

Depending on customer requirements, insert labels might be secured with adhesive dots, or might be produced from a heavier paper.

For use with returnable containers, adhesive labels must be easy to remove without leaving behind any residue.

If the labels have to be attached to boxes without label holders, then adhesive components will need to be used (sticky labels, adhesive dots). The method to be used must be approved by the customer.

For shipments to and from North America, labels of size Half Letter or A6 or 6x4" might be used, if approved by the customer.

In principle, the labelling rules (number of labels, positioning, attachment, type of label) must be agreed bilaterally between the business partners. For trouble-free machine reading, however, the labels must be attached horizontally on the packaging.

Before applying new labels, all old (and thus invalid) labels must be removed from the packaging.

4.4 Labels for transport packaging units (TPU)

For TPUs, label format A5 landscape should be used. It can be designed as an insert label (if a suitable label frame/holder is available) or as a self-adhesive label. Depending on the type, the following specifications must be observed:

Labels for TPUs:

- Master Label for homogeneous TPU: the TPU holds individual PPUs which all contain the same article number (e.g. packed in SLCs). The individual PPUs are equipped with separate Single labels: a Single Label denominates the label on the PPU, i.e. innermost packaging unit containing the parts.
- Master Label for mixed TPU (Mixed Label): The TPU holds individual PPUs which do not all contain the same article number. The individual PPUs are equipped with separate Single Labels.
- Single Label for simplified TPU: the TPU contains only parts with the same article number but which are **not** packed in individual PPUs.

Labels applied to TPUs are also referred to as Main Labels.

4.5 Labels for small load carriers (KLTs)

For containers according to VDA small load carrier system (VDA 4500), the DIN A5 label might also be used for KLTs, provided that the label can be inserted into the label frame without having to be folded.

Instead of using folded labels, the KLT or KLT2 2 label size should be used. Please follow customer’s instructions regarding use of KLT and KLT2

The use of adhesive labels on KLTs is prohibited. Prior to returning the empty containers to the sender, all labels must be removed

5 Description of data fields:

For all text content, use font Arial Narrow, bold (alternative font: Helvetica Condensed, bold). Text must be printed in capital letters. The font size is 6 pt.

The data fields and lines must be identified with headings or titles as specified in the table below. These titles are to be printed in German. For international deliveries, the parties might agree to print the field titles in English. A reference table with translations is included in appendix 4.

The table below lists the contents of the individual fields in detail.

For details regarding the origin of the data and how it relates to the information contained in the DESADV message, see appendix 1.

A1 - Goods despatcher

Function:	Information regarding goods dispatcher and country of origin
Title:	SHIP FROM
Content:	L1: Name of goods sender L2: Name of goods sender, continued or blank L3: Town/city, L4: Country code (ISO 2 alpha code) and postal code, L5: ID (supplier number) of the ship from L6: Country of origin of goods (ISO 2 alpha code),
Example	

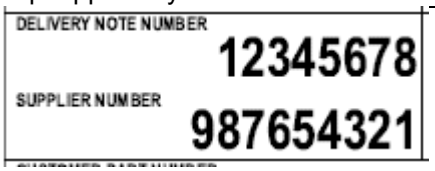
A2 - Goods recipient

Function:	Information regarding goods recipient, unloading point, storage location
Title:	SHIP TO
Content:	L1: Name of goods recipient L2: Name of goods recipient, continued or blank L3: Address of goods recipient L3: Country, postal code and town/city of goods recipient L4: Plant, unloading point, customer internal destination, separated by forward slashes "/" Note: The separating line between A2 and A3 is not printed. If the identifiers of the plant, unloading point and customer internal destination exceed the space available in A2, they may extend into field A3. There must, however, always be a blank space of at least 3mm width before the 2D symbol.
Example	

A3 - Label type and 2D barcode symbol

Function:	Identification of label type (Master, Mixed, Single) and 2D code
Title:	none
Content:	Label type codes: M = Master, MIX = Mixed, S = Single Data Matrix symbol 1 (see **Fehler! Kein gültiges Resultat für Tabelle.**) On DIN A5 and DIN A6 labels, there should be a 10mm right margin to the 2D code.
	 Note: The separating line between A2 and A3 is not printed. If the identifiers of the plant, unloading point and customer internal destination exceed the space available in A2, they may extend into field A3. There must, however, always be a blank space of at least 3mm width before the 2D symbol.

B1 - Customer reference 1

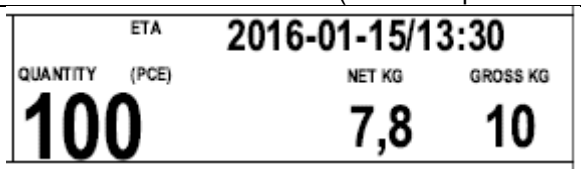
Function:	Reference data #1 of customer
Title:	DELIVERY NOTE NUMBER / SUPPLIER NUMBER
Content:	Associated delivery note number, assigned by ship from Supplier number assigned to the seller by the customer. This supplier number may differ from ship-from's identifier, depending on the numbering concept applied by the customer
Example	

B2 - Customer routing information

Function:	Details required by the customer for the internal routing of the container after receipt of the goods.
Title:	CUSTOMER ROUTING INFO
Content:	Customer-specific routing information ID and reference number(s), assigned by customer. This information is supplied as part of the call-off and does not need to be interpreted by the supplier. The data must be passed 1:1 through the IT system of the supplier for printing on the label. The customer can change the systematic or syntax of the information without the need for any adjustments in the IT system by the supplier. Point of use: Internal point of use at the customer's premises This field is only completed, if the respective information has been communicated by the customer as part of the call-off. Otherwise, the field remains blank.

Example	 Single-line version  Two-line version

B3 - Logistics reference

Function:	Logistics reference details for customer
Title:	ETA, QUANTITY, QUANTITY UNIT, NET, GROSS WEIGHT
Content:	Expected time of arrival - ETA: expected/request delivery time of the goods at the customer's premises. This field is also used for cross-dock processes, for instance to define shipping priorities. This information is only useful for labels on loading units. Quantity: Number of parts contained in package; on Master Labels: total number of parts in loading unit. Date format: CCYY-MM-DD/hh:mm QUANTITY UNIT: Quantity unit code (see **Fehler! Verweisquelle konnte nicht gefunden werden.**). The quantity unit is printed dynamically in the title. Net weight: Net weight of the parts in the package or in the loading unit, in KG, including decimal point where required. Gross weight: Gross weight of package or loading unit in KG, without decimals; if the gross weight is < 1kg, it is stated as 1kg. 3 Dates are to be given in the following format according to the example in the VDA recommendation: CCYY-MM-DD. Where the indication of times is required, they are to be separated from the date by a slash "/" and printed in a 24-hour format HH:MM (see example in the VDA Guideline).
Example	 A5 label KLT label 

[3] The decimal separator might be a full stop or a comma, as decided by the label producer. Thousand separators are not used.

C - Customer's article number

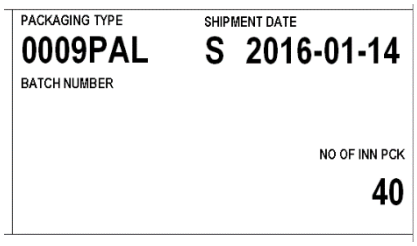
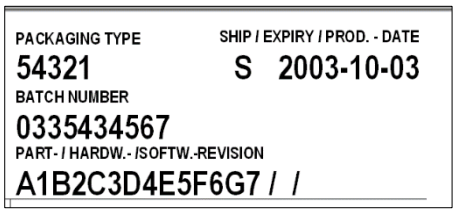
Function:	Customer's article number; safety symbol (if required): circle with triangle (see figures)
Title:	ARTICLE NUMBER
Content:	Article number: Customer-assigned article number of part. Safety symbol where applicable. Certain parts are subject to special documentation requirements. If required by the customer, packages containing such parts must be labelled accordingly. The safety symbol must be printed in the field with a blank area of 2mm to the right. The customer's part designation may be printed to the right of the heading.
	

D1- Package ID

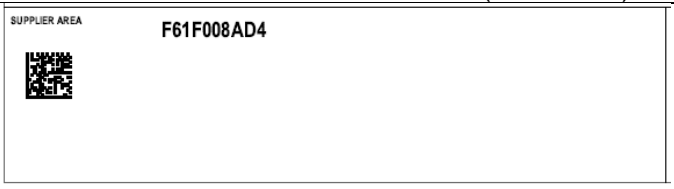
Function:	Transmission of unique package ID (license plate)
Title:	PACKAGE ID
Content:	Package ID in plain text, formatted (with spaces between IAC, CID and serial number; see also chapter 6), preceded by data identifier in brackets. Globally unique package ID in the form of a barcode, encoded according to code 128. 6 mm minimum blank area to the left and right. For details regarding the package ID, see chapter 6. For details regarding the barcode, see chapter 7.
	

Note: if Odette IDs are used, the 4 character main OSCAR code is relevant to identify the originator of the serial number (licence plate).

D2 - Customer reference 2

Function:	Reference data #2 of customer
Title:	See figure
Content:	Package type, qualified date, parts generation status, batch number On Master and Mixed Labels attached to loading units: Package type, shipping date, number of inner packages The following applies to inner packages and simplified loading units: - If there is an expiry date, it must be printed. The expiry date must be preceded by the letter "E". - If there is no expiry date, and if the shipping date is known at the time of printing the label, the shipping date should be printed. The shipping date must be preceded by the letter "S". - If none of the above dates are known or apply, the production date should be printed. The production date must be preceded by the letter "P". Dates are to be given in the following format according to the example in the VDA recommendation: CCYY-MM-DD. Where the indication of times is required, they are to be separated from the date by a slash "/" and printed in a 24-hour format HH:MM (see example in the VDA Guideline). See also chapter 8.
Example	 Field D2 on Master Label  Field D2 on Single Label

E1 - Optional information as defined by supplier

Function:	Supplier internal process data and material specific information
Title:	not defined
Content:	May be used by the supplier for internal purposes, e.g. for 2D code. On A5/A6 Labels, the symbol is aligned to the left, with a left margin of 10mm. On Labels of size 210mm x 74mm or 210mm x 42mm, the symbol is aligned to the right with a right margin of 10mm. The use of 1D barcodes is not permitted in this field. If the container is also the smallest material packaging and the MAT-label process applies and additional material specific data must be provided, then the field E1 may also contain data of the MAT-label. Some of these data can be included in the DMC as well (see table 5).
Example	

E2 - Customer reference 3

Function:	Other customer reference information
Title:	not defined
Content:	This field contains customer data that is transmitted in the PCI segment (qualifier 16 or 3) of the customer call-off. PCI+16: Maximum size: 5 lines. For each line, the customer transmits one DE 7102 in the PCI segment. In order to ensure that the code is correct, the DE 7102 must not exceed 25 characters per line. If the customer transmits more characters per line, all characters that exceed the prescribed length are lost when the label is printed. PCI+3: The customer can use all 10 x 35 characters (DE 7102) in the PCI segment. The content is printed as DMC. Note: PCI+3 is only supported in JIT delivery instructions according to VDA recommendation 4985.
	CUSTOMER DATA LINE 1 CUSTOMER DATA LINE 2 CUSTOMER DATA LINE 3 CUSTOMER DATA LINE 4 CUSTOMER DATA LINE 5 

On 210 x 42mm labels, the fields are completed as follows:

Table 1 - Field contents for SLC2 (tray) label

Block	Title	Content(s)
A1	SHIP FROM ID	Ship from unique identifier
A2	SHIP TO	Name1 of goods recipient
B1 (1)	DELIVERY NOTE	Delivery note number
B1 (2)	SUPPLIER NUMBER	Supplier number
B3	QUANTITY	Quantity per package and quantity unit
C	ARTICLE NUMBER	Customer-assigned article number The customer's part designation may be printed to the right of the heading
D1	PACKAGE ID	Package ID in plain text, formatted for printing (with spaces between IAC, CID and serial number; see also chapter 6), preceded by data identifier in brackets. Data identifier concatenated with the globally unique package ID (licence plate) in the form of a barcode, encoded according to code 128. On SLCs, the barcode has a height of 15mm. For A5 Labels, it must be minimum 17mm high. There must be a blank area of 6mm to the right and left.

D2	PACKAGE TYPE PRODUCTION DATE BATCH ENGINEERING CHANGE ID	Package type, qualifying date, engineering change ID, batch number. In case of master or mixed label on the loading unit: packaging type, date of dispatch, number of inner packagings. The following applies to inner packages and simplified loading units: - If there is an expiry date, it must be printed. The expiry date must be preceded by the letter "E". - If there is no expiry date, and if the shipping date is known at the time of printing the label, the shipping date should be printed. The shipping date must be preceded by the letter "S". If none of the above dates are known or apply, the production date should be printed. The production date must be preceded by the letter "P".
E1	Not defined.	May be used by the supplier for internal purposes, e.g. for 2D code. On DIN A5/A6 Labels, the symbol is aligned to the left, with a left margin of 10mm. On labels of size 210mm x 74mm or 210mm x 42mm, the symbol is aligned to the right with a right margin of 10mm. The use of 1D barcodes is not permitted in this field.
E2	Not defined	This field contains customer data that is transmitted in the PCI segment (qualifier 16 or 3) of the customer call-off. PCI+16: Maximum size: 5 lines. For each line, the customer transmits one DE 7102 in the PCI segment. In order to ensure that the code is correct, the DE 7102 must not exceed 25 characters per line. If the customer transmits more characters per line, all characters that exceed the prescribed length are lost when the label is printed. PCI+3: The customer can use all 10 x 35 characters (DE 7102) in the PCI segment. The content is printed as Data Matrix Code. Note: PCI+3 is only supported in JIT calls according to VDA 4985.

Table 2- EDIFACT units, ANSI units and abbreviations/codes used on labels

UN/EDIFACT	ANSI X12.3	Form DE	Form EN	Meaning
PCE / C62	PC	ST	PC	Piece
MTR	MR	M	M	Meter
CMT	CM	CM	CM	Centimetre
MMT	MM	MM	MM	Millimetre
MTK	SM	M2	M2	Square meter
MTQ	CR	M3	M3	Cubic meter
LTR	C8	L	L	Litre
LEF	X7	BL	LF	Leaf
PR	PR	PA	PA	Pair
RO	RL	RO	RO	Roll
KGM	KG	KG	KG	Kilogram
GRM	GR	G	G	Gram
KMT	DK	KM	KM	Kilometre
TNE	MP	T	T	Ton (metric)

Note: The data identifier used in the Data Matrix Code requires the unit of measure to be coded according to ANSI X12. On the other hand, on the label the unit of measure should be understandable to the human reader. The table above contains the cross references of applicable codes.

Complete labels can look like:

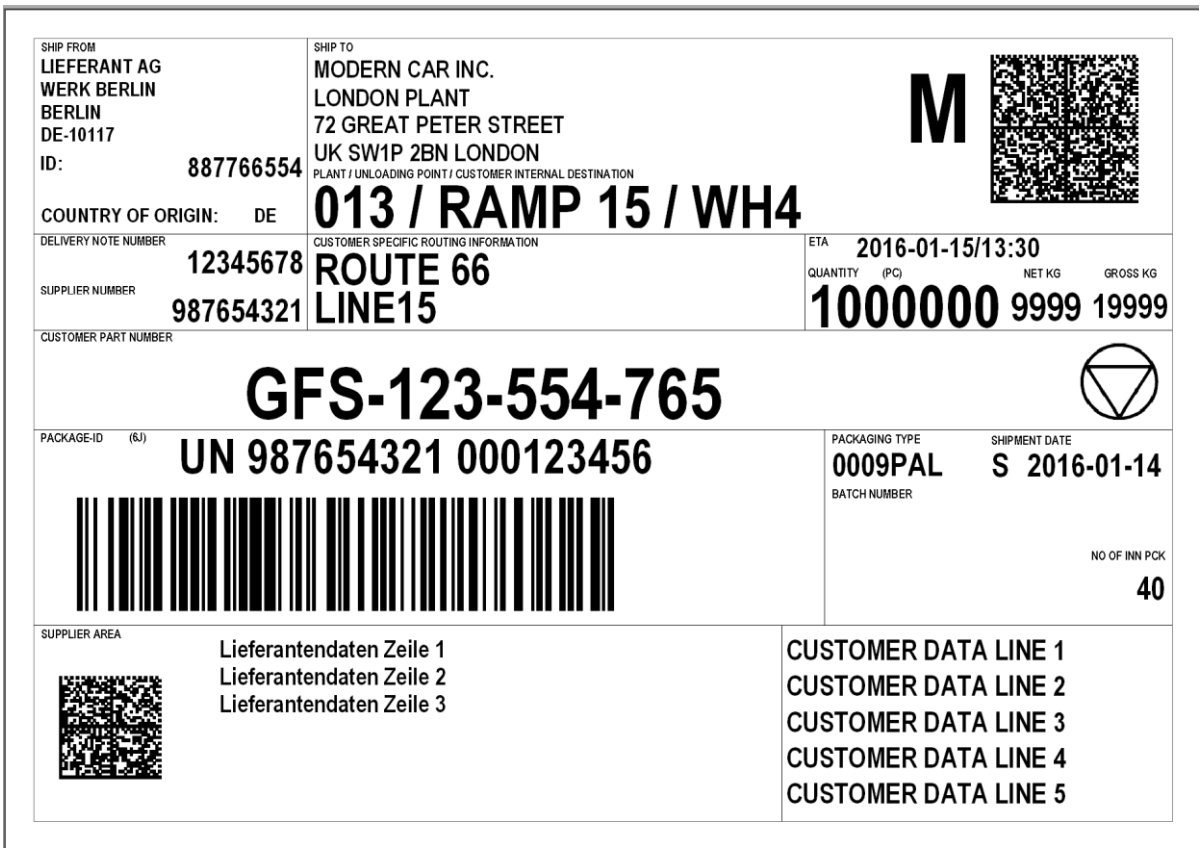


Figure 18 - A5 Master Label for homogeneous loading unit

Figure 19 A5 Mixed Label for mixed loading unit

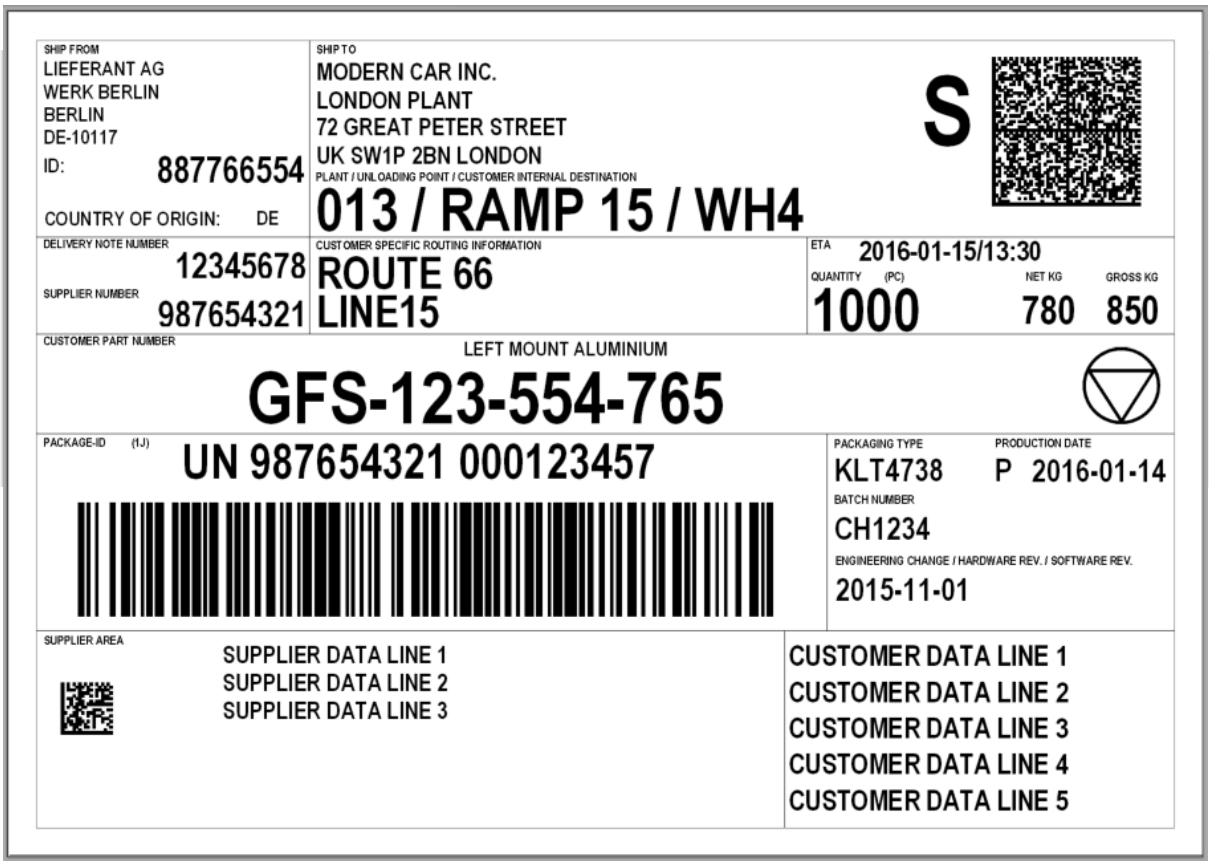


Figure 20 Label for a simplified loading unit

Figure 21 - Single Label in KLT format for inner packaging

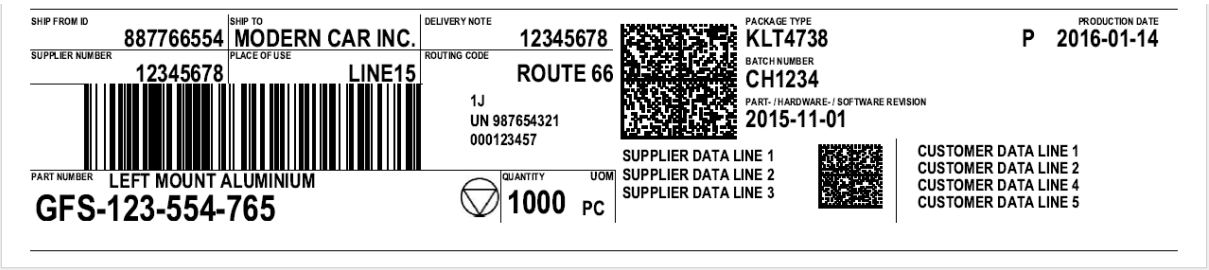


Figure 22 - Single Label in SLC2 tray format;

Remark: the separator lines left of section A2 and on top of section E1/E2 will not be printed in order to enhance readability of the DMC

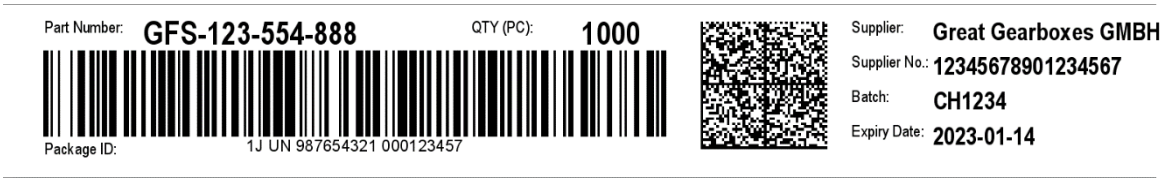


Figure 23 - Single Label in SLC3 tray format;

Note: the separating lines are not printed in the SLC3 label in order not to reduce the readability of the 2D symbols.

Figure 24 - Single Label in blister format;

Note: the separating lines are not printed in the blister label in order not to reduce the readability of the 2D symbols.

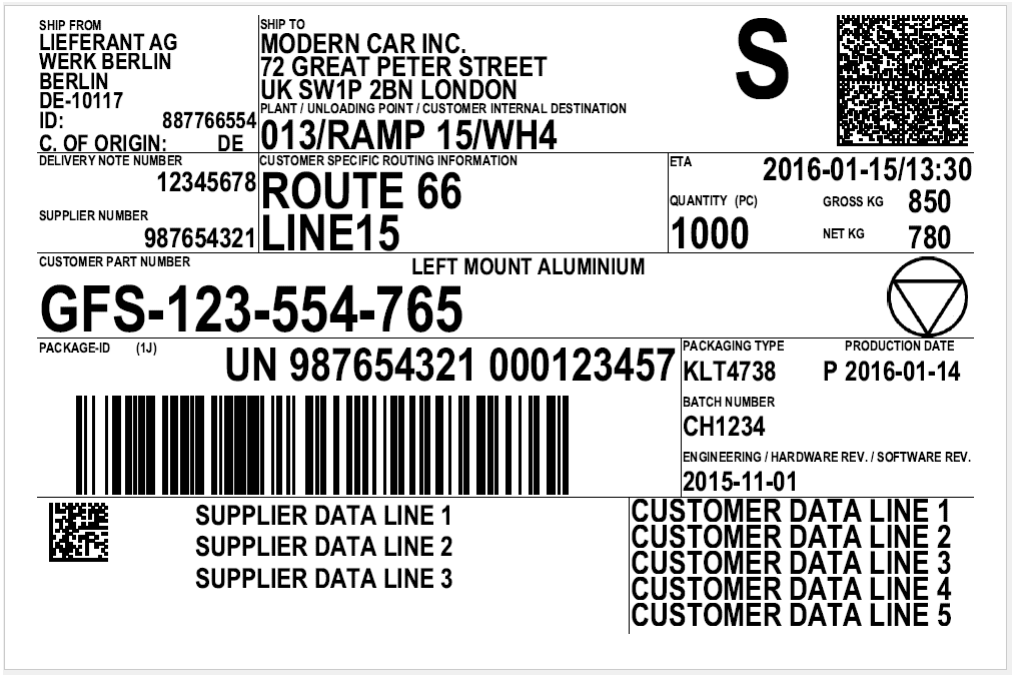


Figure 25 - Single label US 6x4"

6 Identification of packages and loading units

In the complex and often multi-stage logistics processes that prevail in the automotive industry, correct identification of the individual packages and loading units is crucial for the efficient control of the various process steps. It is therefore necessary to devise a global identification system that covers all packages and loading units.

The automotive industry has generally adopted identifiers based on ISO 17367.

A package identifier, hereafter referred to as the package ID, and the data identifier (DI) have the following structure:

Table 3- General structure of package ID

DI	IAC	CIN	SN
Data Identifier	Issuing Agency Code	Company Identification Number	Serial Number
an..2	an2	an..9	n...9
1J	UN	987654321	123345001

The data identifier (DI) is a classifying characteristic and precedes the actual barcode content. The data identifier classifies the packages into Single, Homogeneous Master, Mixed Master, see Table 4. The data identifier forms part of the barcode and is displayed on the label in brackets, preceding the package ID.

The total length of the ID including the DI shall not exceed 22 characters.

Each package ID begins with an Issuing Agency Code (IAC). This is the code of the agency or organisation that has issued the ID. For the German automotive industry, we recommend using the numbering system of Dun & Bradstreet, abbreviated as UN. For the unique identification of companies, corporate divisions and traders, Dun & Bradstreet uses the nine-digit numerical D-U-N-S code (*Data Universal Numbering System).*

The serial number of the package is devised by the despatcher of the goods. Operators in the automotive industry are generally using serial numbers and we recommend to continue using such codes. To ensure compatibility with the existing systems, the serial number should also have 9 digits (with added leading zeros, where required). Serial number must not be longer than N9.

This Recommendation does not restrict the generator of the ID in choosing an ID, provided that the package ID is a globally unique identifier.

Figure 26 Example of package ID

Table 4 - Admissible data identifiers

J	Unique package ID of a bundle in the empty packages process
1J	Unique package ID of inner packaging (Single Label)
3J	Unique package ID of JIS loading unit with compartments
4J	Unique package ID of JIS loading unit with 1...n JIS packages
5J	Unique package ID of mixed loading unit with intermediate packaging level (mixed master)
6J	Unique package ID of loading unit or intermediate packaging containing identical parts (Master Label for homogeneous loading unit)

7 Barcode, 2D code and optional RFID tag

The structure of the barcode and its conformity with the applicable standard must be verified with an IT tool. The barcode quality must be verified as follows: for code 128 according to ISO/IEC 15416; for 2D codes according to ISO/IEC 15415. These standards include test specification to determine the quality of the barcode.

To validate the barcode, the measured print quality must be minimum grade 3.0 (B). This is to ensure that the print quality does not drop below 1.5 (C) at the point of scanning (measured with an instrument aperture of 0.254mm (0.01 inch) and a light wavelength of 660nm +- 10nm).

Deviations from the quality level can be agreed bilaterally.

7.1 1D barcode

The barcode is a code 128 barcode. It contains the package ID (licence plate). In readable versions, the data identifier (1J, 5J, 6J) is omitted. Otherwise, the barcode corresponds to the readable version of the package ID. Spaces are only included to make the printed text more readable but are omitted in code 128.

The following module widths apply in Code 128 depending on the selected paper format:

A5 module width X = minimum 0.51 mm (20 mil) and maximum 0.64 mm (25 mil).
KLT1, KLT2 and KLT3 = maximum module size 0.46 mm (18 mil).

The quiet zone to the right and left edge is ten times the module size. The size of the quiet zone (X * 10) must always be guaranteed depending on the selected module width and DI.

The minimum height of code 128 for SLC 1, A6 and 6” x 4” Labels is 15mm. For A5 Labels, the minimum is 17mm. However for A5 and Half-Letter Labels, we recommend that the barcode is 20mm high.

For displaying the licence plate (Code 128), 3 character sets are available for programming the symbol characters:

- Character set A contains the standard alphanumeric keyboard and punctuation characters (without lower case letters) as well as control characters and 7 special characters.
- Character set B contains all standard alphanumeric keyboard characters including lower case letters and 7 special characters.
- Character set C contains the 100 pairs of digits 00 to 99 as well as 3 special characters. It allows numeric data to be encoded in pairs within a single barcode character. This achieves double the density of the other data.

For a numeric package ID (1J UN 123456789 123456789), character set C should be used. It is possible to change the character set within the licence plate. The printer software can be set to automatically use the required character set. For the generation of the barcode, it can be defined in the print software whether only one character set or the automatic, which always uses the compressed version with, if necessary, different character sets, should be used:

1J UN 1 Character set A;
23456789 character set C;
Character for character set change;
123456789 (package ID) Character set C

7.2 2D DataMatrix symbol

7.2.1 Symbol size

The data matrix code is a DataMatrix ECC 200 code (see also ISO/IEC 16022). The nominal height/width of the modules (x) is 0.4mm and should not exceed 0.5mm (see also **Fehler! Verweisquelle konnte n icht gefunden werden.**).

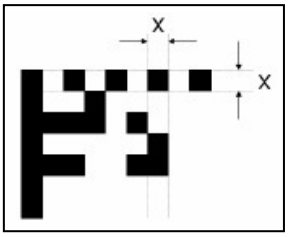


Figure 27 Module dimensions for code symbol module (x)

The blank area around the DataMatrix code must correspond to minimum twice the module widths at all sides of the code.

Based on the available area (A6 and KLT labels: 20mm x 20mm) and the minimum size of the modules (0.4mm), the matrix consists of 52 x 52 modules. The maximum size of the DataMatrix symbol is thus 304 characters (including control characters).

7.2.2 Character sets

1. Characters 0..127 are defined in accordance with ISO/IEC 646, with G0 Set and C0 Set. In C0 Set, characters 28..31 are modified and represent FS, GS, RS and US. Characters 32..127 correspond to the EDIFACT UNOB character set.
2. Characters 128..255 conform to ISO 8859-1 (also known as extended ASCII). This character set corresponds to that defined by EDIFACT UNOC.

7.2.3 Message structure according to ISO 15434

Each DataMatrix symbol contains one message whose structure is based on ISO/IEC 15434. In each DataMatrix code, the data flow might start with control character "Macro 06" (character 237), indicating that data identifiers according to ISO/IEC 15418, part ANS 10.8.2 Data Identifiers are being used. In each symbol, control character "Macro 06" replaces the ISO/IEC 15434 control sequence with preamble" [)>^{R_S}06^{G_S} [4] " preceding the data and post-amble "$^{R_S}{}^{E}O_{T.}$" at the end of the data string.

As an alternative to "Macro 06", the above control characters might be used. The separator between the data elements preceded by individual ASC data identifiers (DIs) is the Group Separator "^{G_S}" .

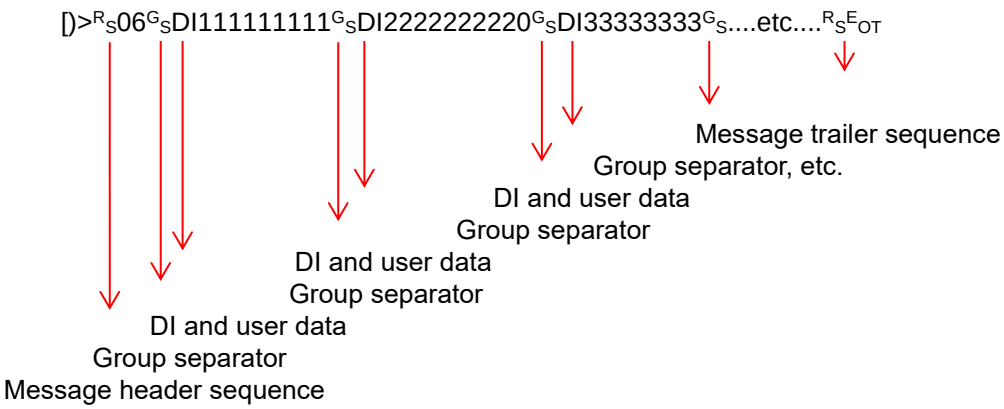
[4] ^{G_S} (hex 1D / dec 29) ^{R_S} (hex 1E / dec 30) $^{E}O_T$ (hex 04 / dec 04)

For the encoding of data in DataMatrix symbols in the form of ISO 15434 messages, it is necessary to include a message envelop consisting of a header and a trailer between which the user data is placed.

The message has the following structure:

- Message header: **[)>**$^{R}_{S}$ (string, hex 5B 29 3E 1E / dec 91 41 62 30)
- Format header: 06 (for structure with DI)
- Group Separator: $^{G}_{S}$ (hex 1D / dec 29)
- DI with user data
- Group separator
- DI with user data
- Group separator
- DI with user data
- Group separator
- .....
  etc.
- Message trailer: $^{R}_{S}$ (hex 1E / dec 30)
- Record separator: $^{E}_{OT}$ (hex 04 / dec 04)

Example of message,
with dummy user data "111111111", "22222222", "333333", etc.:



7.2.4 User data for coding in DataMatrix

The following user data must be included in the DataMatrix code:

Table 5 - User data for DataMatrix code in field A3

User data	**Source or equivalent in DESADV (VDA 4987) (V2.6, 2021-06)**	**DI**	**Comment**	**Sample data**
Identification of specification	none	12P	Identification of specification (Identifies the content version according to this document. GTL3 is a fix content until a new specification requires another fix ID). The fixed content of GTL3 must not be used by the supplier to identify the 2D symbol in the supplier area E1!	12GTL3
Specification version	none	9K	Specification version (Identifies the revision of this specification. 01 is a fix content until a new version of this document with impact to the syntax in code will be published).	9K01
Supplier number of the shipping plant	SG2/NAD+SF DE 3039	3L		3L998877665
Country of origin	SG19/ALI DE 3239	4L	Country of origin, in ISO 3166 2 alpha code	4LDE
Goods receiver ID	SG2/NAD+ST DE 3039	8V		8V0110120131
Unloading point ID	SG2/NAD+ST/LOC+11 DE 3225	2L		2L0815-12345
Storage location ID	SG2/NAD+ST/LOC+7 DE 3225	20L		20L12315
Supplier number of the ship from	SG2/NAD+SF DE 3039	V		V123456789012
Despatch advice number	SG20/RFF+AAU DE 1154	2S		2S123456789012
Point of use/consumption	SG22/LOC+159 DE 3225	22L		22LB3P234
Customer specific routing	SG20/RFF+AMU DE 1154	23L		23L050115-1420RNP

Expected delivery date	DTM+2/132 DE 2380	8D	8D followed by date and time in format CCYYMMDDHHMM and qualifier DE 2005 qualifier value in corresponding DTM segment: 2 (agreed delivery date and time) or 132 (estimated delivery date). Depending on the delivery scenario, the DESADV contains the one or the other date.	8D2015122214302
Quantity	SG17/QTY+52 DE 6060 (M label) SG12/QTY+52 DE 6060 (S label)	Q	Data identifier, followed by quantity	Q250
Measure unit	SG17/QTY+52 DE 6411 (M-Label) SG12/QTY+52 DE 6411 (S-Label)	3Q	Measure unit of the quantity qualified with DI Q, coded according to ANSI X12.3 DE 355 Unit of Measure Code - see **Fehler! Verweisquelle konnte nicht gefunden werden.**	3QPC
Gross weight	SG17/MEA+AAZ+AAB DE 6314 loading unit SG12/MEA+AAY+G DE 6314 inner package	2Q		2Q9999
Article number	SG19/LIN DE 7140	P	Customer part number	P123-234-564
Package ID	SG16/GIN+ML DE 7402 (2)	J/1J/ 5J/6J	DI + IAC + CID + SN The serial number must not be longer than 9 digits For DI - refer to Table 4	1JUN987654321123 456789
Package type	SG12/PAC DE 7065	B		B0009PAL
Used by / expiry date		14D	Format CCYYMMDDHHMM	14D201512312359
Date of manufacture	SG15/DTM+94 DE 2380	16D	Format CCYYMMDDHHMM	16D201512241600
Batch	SG15/GIR+1 DE 7402	1T		1T12345678901234 56
Hardware version	SG19/PIA+1 DE 7143 = BT	20P		20P12345
Software version	SG19/PIA+1 DE 7143 = AG	21P		21PV3R5B123
Revision/parts generation version	SG19/PIA+1 DE 7143 = EC	2P		2PEC123
Additional part number related information	SG14/PCI+17 DE 7102	23P	Format an..30	23PWerkzeug1, Nest 2

RoHS-Guideline	SG19/PIA+1 DE 7140 DE7143=X01	30P	Format an..10	30P2029/65/EU
Supplier of this item (may differ from supplier)	SG19/NAD+SE DE3039 DE 3055=16	12V	Manufacturer's D.U.N.S.-number Format n9	12V987654321
Part number, assigned by manufacturer	SG19/PIA+1 DE 7140 DE7143=MF	1P	Format an..35	1PSL105C103MAA-S
Indicator, if the container is the smallest material package	SG11/SG14/SG15.GIR+7 DE 7402 = 1 for yes, 2 for no DE 7405 = AM	33T	Y = yes, the container is the smallest material package N = no, within the container there are even smaller material packages, which are marked with separate. MAT labels.	33TY

Note: The total capacity of the DMC including control characters is 300, including control characters. One must be careful not to exceed this number.

If the customer specific data in section E2 have to be printed as a 2D DMC, the the symbol is generated as follows:

User data	**Source or equivalent in DESADV (VDA 4987)**	**DI**	**Comment**	**Sample data**
Identification of specification	none	12P	ID - CUS for customer specific data. The fixed content CUS must not be used by the supplier to identify the 2D symbol in the supplier area E1!	12PCUS
Data line 1	SG14/PCI+3 DE 7102#1	11Z		11ZABCDEFG
Data line 2	SG14/PCI+3 DE 7102#2	12Z		12Z1234567890
...	...			...
Data line 10	SG14/PCI+3 DE 7102#10	20Z		20ZXYZ12345

Also for this symbol the syntax is identified with the preamble ***[)>$^{R}_{S}$06$^{G}_{S}$*** .

7.3 RFID tags used in conjunction with smart labels

In the future, it is expected that the package ID (license plate) will not only be stored in certain processes where smart labels are used, but will also be saved on RFID transponders in order to facilitate radio frequency identification.

The main technical requirements for the use of RFID in such cases are described below, based on the general recommendation for the use of RFID in the automotive industry laid down in VDA 5500.

7.3.1 Function of passive RFID transponders

According to VDA 5500, passive RFID transponders are particularly suitable for the automated identification of packages. Their maintenance and operating costs are low, as there is no need to change the batteries, etc. Suitably sturdy transponders generally last for the entire life cycle of the return container.

7.3.2 Air interface and frequency range

The design of the air interface conforms to ISO/IEC 18000-63/ EPC class 1 Generation 2. For more details regarding valid frequency ranges and the use of passive RFID transponders in the automotive industry, please refer to VDA 5500.

7.3.3 Structure and size of memory banks

Passive RFID transponder conforming to ISO/IEC 18000-63/EPC Class 1 Generation 2 feature four logical memory banks (MB):

- MB 00 "RESERVED" – Kill- and Access-Password
- MB 01 "EPC" – Unique Item Identifier (UII)
- MB 10 "TID" – Tag Identification
- MB 11 "USER" – User Memory (UM)

The unique package ID is saved in memory bank MB 01. After writing, the memory bank is protected with a password-enabled lock or perma-lock command to prevent interference with the ID.

The precise size of the memory banks depends on the type of chip in the RFID transponder. The transponder type and the chip must be chosen based on the actual data structure to be saved on the RFID transponder (see also chapter 7.3.4). In addition, the method of coding and the volume of data must be taken into account. In the automotive industry, the most common data structure for the unique item identifier (UII) is maximum 22 alphanumerical (an) digits.

The principle rules for unique item identification based on the relevant ISO-IEC standards are described in detail in VDA 5500. In this document, we focus exclusively on codes that are typically used for the identification of packages. The globally unique package ID is saved in memory bank MB 01. The package ID is coded in the form of a 6-bit character. For package IDs with a length of 22 digits conforming to this recommendation, 224 bits (net) must be available on the transponder in memory bank MB 01. In the context of package identification according to ISO/IEC, the following Application Family Identifiers (AFIs) have been defined:

Table 6 Application Family Identifiers

AFI	Standard
A2	ISO 17365 – Supply chain applications of RFID – Transport Units
A7	ISO 17365 – Supply chain applications of RFID – Transport Units (hazardous materials)

7.3.4 Example of code according to ISO 17367

Example: (1J) UN 499774731 123456789 Text string: 1JUN**499774731123456789**

The text string is 6-bit encoded (see table xyz), and padding bits are added until the total number of UII bytes is an even number. The UII length in the PC section (header) section can thus be recorded in 16-bit words (2 bytes).

Reference ID (plain text)
1JUN**499774731123456789**

Compaction 6-bit code including <EoT>					
110001	001010	010101	001110	110100	111001
111001	110111	110111	110100	110111	110011
110001	110001	110010	110011	110100	110101
110110	110111	111000	111001	**100001**	

Split into 8-bit fragments including padding bits					
11000100	10100101	01001110	11010011	10011110	01110111
11011111	01001101	11110011	11000111	00011100	10110011
11010011	01011101	10110111	11100011	10011000	01**100000**

Hex code					
C4	**A5**	**4E**	**D3**	**9E**	**77**
DF	**4D**	**F3**	**C7**	1C	B3
D3	5D	B7	E3	98	60

PC data in MB 01 (see section 7.3.3):

UII-length of 16-bit words:	0b	***01001***	(18 bytes → #9 words)
Valid User Memory:	0b	***0***	(no user memory)
XPC:	0b	***0***	(not used – reserved)
EPC or ISO code:	0b	***1***	(ISO)
All PC bits:	0b	***01001001***	(hex 49)

Protocol Control	**AFI**
49	A2

Complete content of MB 01 (including header):

PC	**AFI**	**UII Reference ID**																
49	A2	C4	A5	4E	D3	9E	77	DF	4D	F3	C7	1C	B3	D3	5D	B7	E3	98	60

For more information, refer to VDA 5500.

Table 7 - Coding table 6-bit character encoding according to ISO 17367 Table C.1

Character	Binary value	Character	Binary value	Character	Binary value	Character	Binary value
Space	100000	0	110000	@	000000	P	010000
<EoT>	100001	1	110001	A	000001	Q	010001
<Reserved>	100010	2	110010	B	000010	R	010010
<FS>	100011	3	110011	C	000011	S	010011
<US>	100100	4	110100	D	000100	T	010100
<Reserved>	100101	5	110101	E	000101	U	010101
<Reserved>	100110	6	110110	F	000110	V	010110
<Reserved>	100111	7	110111	G	000111	W	010111
(	101000	8	111000	H	001000	X	011000
)	101001	9	111001	I	001001	Y	011001
*	101010	:	111010	J	001010	Z	011010
+	101011	;	111011	K	001011	[	011011
,	101100	<	111100	L	001100	\	011100
-	101101	=	111101	M	001101	]	011101
.	101110	>	111110	N	001110	<GS>	011110
/	101111	?	111111	O	001111	<RS>	011111

Note:

If Smart-Labels are used, the following facts should be taken into account:

RFID-tags are slim; however, they represent an obstacle for the contemporary print technology, so that the quality of the printout can be reduced considerably. Therefor they should be outside the print area. Also, the most commonly used printers have a 6 inch printing width so that labels are printed in portrait format. The RFID tags must be placed parallel to the printer head in order to be programmed correctly.

It is recommended to use a paper format that is extended by 3-4 cm (e.g. 250 x 148 mm). The RFID-tag is placed on the additional section. If the label has to be fitted into a label holder, the additional section has to be folded. A perforation or similar folding support is useful. The following pictures show an example of such a paper format.

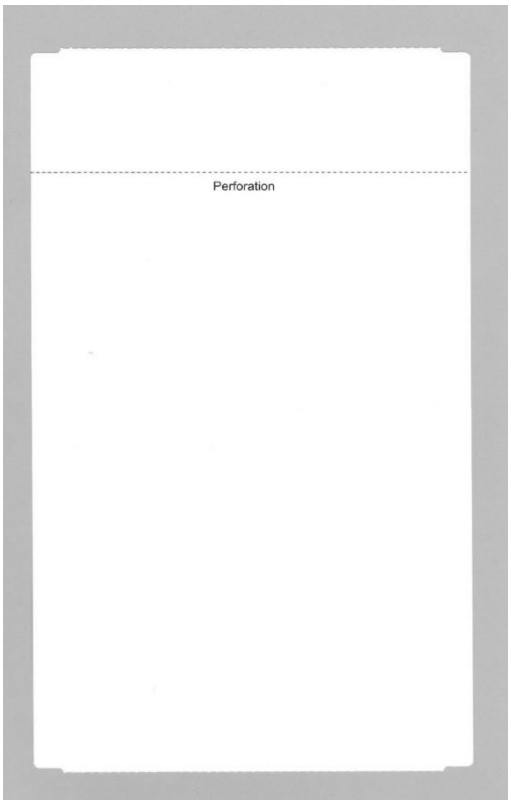


Figure 28: Smart label (front)

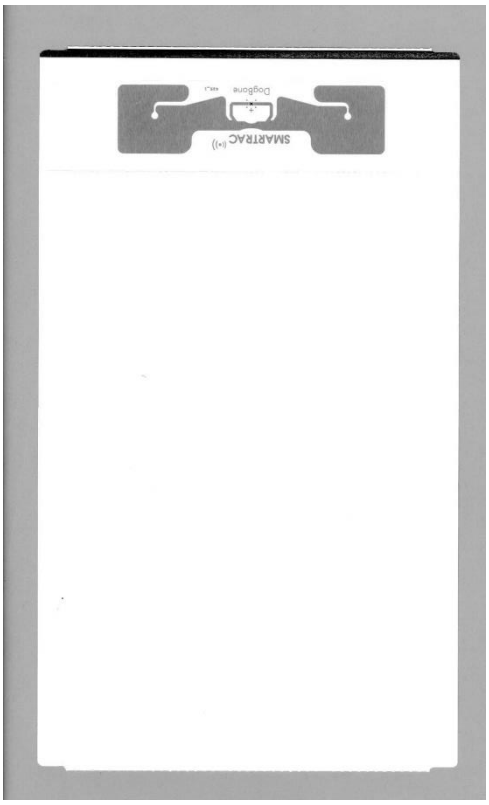


Figure 29: Smart label (rear)

8 Delivery scenarios and requirements regarding the information on the labels

Labels are used in all processes: shipment, transport, goods receipt and internal storage and routing to the place of consumption. This recommendation focuses only on scenarios in relation to customer delivery instructions, daily call-offs and just-in-time (JIT) processes. Customer delivery instructions and daily call-offs differ only as regards the frequency of the posting and transfer of the call-offs.

The following rule applies to delivery instructions and daily call-offs: each loading unit has a binding delivery date and time (arrival date/time at destination) and an unloading point, an internal routing code at the customer side might be necessary as well.

8.1 Contents of labels attached to Product Packaging Units

From the point of view of the supplier, it is important to distinguish between parts that are manufactured for a single goods recipient (normally a specific customer plant, or multiple customer plants that have the same packaging instructions and use the same article number (customer part number)), or for multiple customer plants with different packaging instructions. Sometimes, however, parts are manufactured for multiple customers, a process referred to as anonymous production. This distinction is relevant, as it determines whether the supplier can apply the final transport label to the PPU or not.

Case 1	Production for single customer and delivery to multiple recipients with identical packaging instructions and article number.
Case 2	Production for single customer and delivery to single recipient
Case 3	Production for multiple customers

Normally, the parts are produced prior to receipt of a binding call-off. As a consequence, not all information necessary for shipping is available at the time of production. Suppliers therefore often need to store the articles in containers bearing temporary labels, these labels then need to be changed upon receipt of the call-off. Apart from the inefficiency, this process can lead to errors.

In cases 1 and 2, it is possible to use PPU labels on which certain information is omitted, provided that product tracing remains possible and parts can be blocked from shipping, should there be problems in relation to their quality. For such cases, we recommend using batch numbers.

Case 1:

If the part number and the packaging instructions are identical for all recipients of the goods, a Single Label for case 1 can be used on the inner packages.

Requirements at the customer side:

- the receipt of the incoming goods and their storage is controlled on the basis of the information on the Master Label of the TPU;
- the customer does not require routing ID / point of consumption information;
- the supplier number is the same for all recipients of the goods;
- the parts can be fully traced internally by means of the package ID and/or the batch number.

In this case, the following information can be omitted on the Single Labels for the PPU.

- Goods recipient
- Despatch advice number
- Order or call-off number
- Routing/point of consumption information

Example of labels for case 1:

Figure 30 Single label case 1

Case 2:

Case 2 corresponds to case 1, whereby the supplier produces the part for a single goods recipient. The customer-side logistics references (unloading point, storage location, point of use) are always the same and known.

In this case, a Single Label for case 2 can be applied to the PPUs.

Requirements at the customer side:

- The parts can be fully traced internally by means of the package ID and/or the batch number.

In this case, the following information can be omitted on the Single Labels for the PPUs.

- Delivery note number

Example of label for case 2:

Figure 31 Single label case 2

Case 3:

In all scenarios that do not meet the requirements for cases 1 and 2, the label on the inner package must be printed and applied as part of the shipping preparation process. At this point, all necessary information is available and can be printed on the label.

The use of Single Labels (case 1 or 2) on inner packages must be agreed bilaterally between the customer and the supplier.

8.2 Cross-dock shipments

There are two types of cross-dock processes:

- The unloading point (and thus the location of performance for the supplier) is the factory of the recipient of the goods (see also figure 2). If necessary, the first cross-dock along the transport chain (consolidation point) is identified as a cross-docking point in order to provide the necessary details to the initial goods carrier.
- The unloading point is the (first) cross-docking point. Subsequently, the goods are forwarded from the cross-dock to the actual recipient and handed over to the customer/recipient of the goods.

In the first case, the parties have agreed binding routes between the consolidation centre and the subsequent routes. If necessary, the route needs to be specified in field E2 on the label in order to assist the partners in compiling the consignment.

In the second case, new consignments are produced for shipping from the cross-dock to the individual recipients of the goods. The necessary routing information can again be included in field E2.

In both cases, the customer decides on the scope and detail of the information to be included in the PCI segment of the call-offs sent to the supplier.

9 Label for shipments of empty packages

Increasing complexity of transport and delivery processes led to a need for more transparency in the empty package supply chain as well. Unique identification of transport loading units in this area can contribute to improved processes.

The project group dealing with empty packaging management developed an extension to the specification of the GTL for this purpose. In principle, labels for empty packages follow the same rules as described earlier in this document for material deliveries with the following deviations:

- The label type is marked with an E (for empty)
- The quantity field contain the volume of the TLU in m3.
- As part number – if used at all – is the part number of the empty packaging bundle stated.
- The data identifier is J.
- In section E1 the sender of the empty packaging can give additional information for internal process control, such as the bill of material of the bundle.

Figure 32: Sample empty packaging label

10 Appendices

Appendix 1 - Overview of data fields (Excel spreadsheet)

Appendix 2 - Masks for barcodes / DMC (including dimensions - See separate document)

Appendix 3 - Reference table of German and English terms

DEUTSCH	**ENGLISCH**
VERSENDER	SHIP FROM
EMPFÄNGER	SHIP TO
URSPRUNGSLAND	COUNTRY OF ORIGIN
WERK	PLANT
ABLADESTELLE	UNLOADING POINT
INTERNER BESTIMMUNGSORT	INTERNAL DESTINATION
LIEFERSCHEIN	DELIVERY NOTE
LIEFERANTENNUMMER	SUPPLIER NUMBER
KUNDENSPEZIFISCHES ROUTING	CUSTOMER SPECIFIC ROUTING
ETA (ERWARTETES EINTREFFDATUM)	ETA
MENGE	QUANTITY
NETTO	NET
BRUTTO	GROSS
SACHNUMMER DES KUNDEN	CUSTOMER PART NUMBER
PACKSTÜCK-ID	PACKAGE ID
PACKMITTELTYP	PACKAGING TYPE
VERSANDDATUM	SHIPMENT DATE
PRODUKTIONSDATUM	PRODUCTION DATE
VERFALLDATUM	EXPIRY DATE
CHARGENNUMMER	BATCH NUMBER
TEILEGENERATIONSSTAND	ENGINEERING CHANGE
HARDWARESTAND	HARDWARE REVISION
SOFTWARESTAND	SOFTWARE REVISION
LIEFERANTENSPEZIFISCHE DATEN	SUPPLIER AREA

If you notice any errors, omissions or ambiguities in these recommendations, please contact VDA without delay so that these errors can be rectified.

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