

Guideline to Package Management

VDA 5007

Version 3.0, September 2017



Process Description

This VDA recommendation has been devised for the following purposes:

- It provides a basis for the standardisation of existing and future container management systems.
- It serves as a guide for the design and improvement of container management systems.

It deals with the configuration of container management systems as regards the flow of materials, information and value chains for serial products and spare parts.

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1 General Content

This chapter gives general Information about the goals and limitations of the recommendation. It explains the structure of the document and gives a high level definition of the core processes.

1.1 Introduction

Automotive OEMs use and/or encourage the use of Returnable Transport Items/Returnable Packaging Items (RTI/RPI) to move parts from their suppliers to their production plants or after-sales facilities. The parts are placed in returnable packaging and often arranged in a way that facilitates movement straight to assembly line. Such packaging replaces cardboard boxes or other one way packaging, thereby helping companies to cut costs by avoiding the waste involved in the disposal of one-way packaging. It also helps to reduce the environmental footprint of the automotive industry.

The advantages of using a more robust and often specifically designed returnable packaging can include the avoidance of damage to parts while in transit and easier picking on the assembly line leading to fewer mistakes and simpler inventory management.

For ease of understanding, the term RTI will be generally used in this document to mean both RTI and RPI.

1.2 Objective of the Recommendation

This recommendation aims to define the essential preconditions to packaging management such as master data management as well as pool installation and maintenance. Furthermore it describes the core operational processes such as packaging agreement, packaging accounting and the empty packaging supply chain.

The following key questions should be answered.

- How to identify RTI's with regard to master data management
- How to install and maintain a packaging pool.
- How to connect the right packaging with the right parts on the right route?
- How to achieve proper account management?
- How to achieve transparency in the empty packaging supply chain in a multi partner environment?

Along with the packaging processes, a standardised communication process between all involved partners is described. For the empty packaging supply chain an information model is defined in the relevant chapter. Based on the information model, standard EDI messages to support the processes are defined.

As each partner has their own system solution, whether using standard or proprietary software, the focus of this recommendation is the description of common process patterns and the use of standardised messages in the information exchange between partners.

In addition to the digital exchange of structured information, each system should also provide an internet based communication platform with a human interface (portal application) to allow the visualisation of processes and information gathered from multiple sources and to cater for partners who may not support EDI communication. In case of process disruptions, such a communication platform should provide alerts in close to real time to support management by exception.

Communication has to be differentiated with regard to the contractual responsibilities of the related process owners.

Accordingly this document is structured as follows:

Table 1: Document structure

Chapter	Description
1	General Content
2	Packaging Identification and Master Data
3	Pool Planning and Maintenance
4	Packaging Agreement
5	Packaging Accounting
6	Empty Packaging Supply Chain Process
7	Annexes and Links to Further Applicable Documents

If further documents exist which detail special tasks of packaging management processes or recommendations which affect packaging management, they are mentioned in the relevant chapters. In the annexes of this document you will find a “list of Further Applicable Documents”.

1.3 Core Processes and Communication

This subchapter aims to give a high-level definition of the packaging management core processes and the related communications between the partners according to their roles.

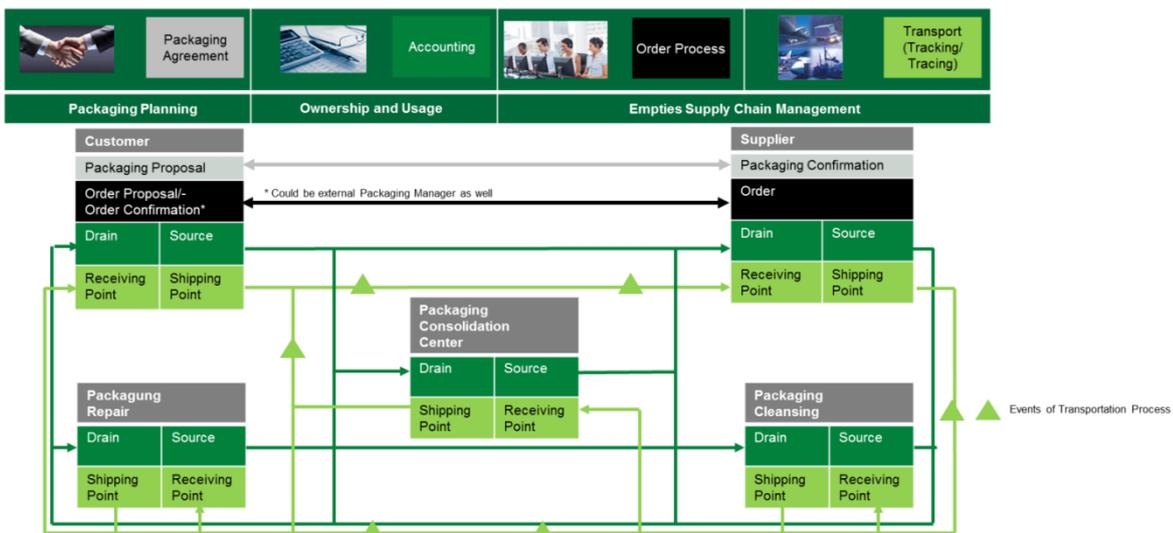


Figure 1: High level communication flow for packaging management

1.3.1 Core Process and Communication for Packaging Agreement

This process relates to the development of a packaging agreement between the customer who will

receive the goods and the supplier who will supply the goods. This is the initial process in a packaging operation. The objective of the process is to agree upon a packaging instruction for a certain part to be delivered to a certain ship to location.

In a best practice process the agreed packaging meets the following requirement:

- Best possible protection for the parts with regards to transport, storage and in-house handling
- Best possible reusability of the packaging with regards to environmental needs

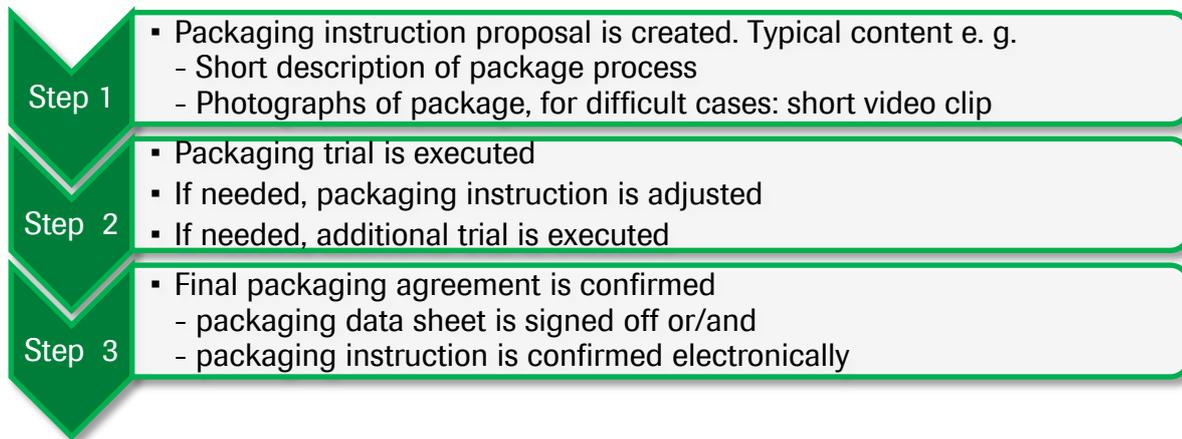


Figure 2: Communication process for packaging agreements

Further details of the packaging planning process are defined in chapter 4 Packaging Agreement

1.3.2 Core Process and Communication for Packaging Accounting

The accounting process manages the administration and ownership of the packaging and covers both regular movements resulting from standard processes and exceptional movements, which affect the value of the packaging pool e. g.

- Loss
- Damage
- Stock/Inventory differences
- Scrapping at the end of lifecycle
- Etc.

The contractual partners are the returnable packaging pool owner and the users of the returnable packaging item. The packaging pool owner will always maintain packaging accounts but a packaging user may also have their own accounting system which has to be synchronised from time to time with the owner's accounts, e.g. via stock taking procedures.

Claims and complaints handling have to be clarified between the owner of the packaging pool and the user of the packaging. These parties are usually the supplier and the customer of the parts or can be third parties who support the standard processes

Quelle	Behälter Kontebewegungen	Senke
	zero movement at account creation	
	Packaging issue at packaging source	
	Packaging receipt at packaging drain	
	Filled Packaging Issue at (Material) Source	
	Filled Packaging receipt at (Material) Drain	
	Adjustment Over Delivery based on Claims and Complaints	
	Adjustment Under Delivery based on Claims and Complaints	
	Adjustment Wrong Delivery –based on Claims and Complaints	
	Adjustments based on physical inventory	

Figure 3: Communication process for ownership of packaging materials

Further details of the packaging accounting process defined in chapter 5 Packaging Accounting.

1.3.3 Core Process and Communication for Empty Packaging Supply Chain Management

Empty Packaging Supply Chain Management aims to provide the parts supplier with the required quantity of empty packaging at the right time and at the right location according to the planned shipments of parts to the customer. In the automotive industry, two different systems for the supply of empty packaging are in place, namely the push system and the pull system.

From a general perspective, the main difference between these two systems is the contractual responsibility for securing the availability of sufficient packaging at the suppliers. In the PULL PROCESS – the receiving point initiates a packaging order towards the packaging pool manager based on its own demand planning. In the PUSH PROCESS, the packaging pool manager supplies packaging based on its own packaging demand calculation without any action being required by the supplier.

Transport steering, tracking and tracing focuses on a pure transportation process and its related process steps with dependent interfaces in multimodal transportation. The main objective is to move empty packaging from the packaging shipping point to packaging receiving point. In this case the packaging is consigned to a logistics service provider without changing the ownership of the packaging.

Contractual partners for the empty packaging supply chain management processes are:

- the packaging manager
- the shipping point
- the logistic service providers
- the receiving point (usually the supplier of parts)

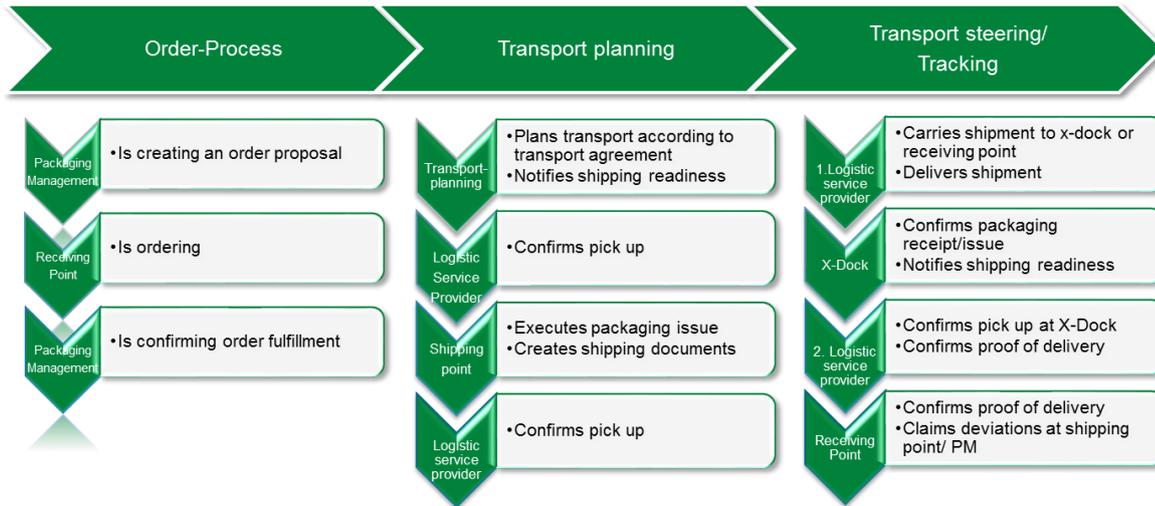


Figure 4: Communication process in the empty packaging supply chain

Further details of the empty packaging supply chain process are defined in chapter 6 Empty Packaging Supply Chain Process

1.4 Scope Definition

This sub-chapter defines the limitations of the recommendation

1.4.1 In scope

In scope of this recommendation are the essential preconditions for packaging management including assumptions and needs to support the core processes such as:

- Packaging Identification and Master Data
- Pool Planning and Maintenance

In addition, the operational processes of the day to day business such as:

- Packaging Agreement
- Packaging Accounting
- Empty Packaging Supply Chain Process

And the related communication

1.4.2 Out of scope

Out of scope of the document is the parts supply chain process using returnable packaging items because this process is already defined in other recommendations focusing on the material flow and considering packaging as a supporting part of the process descriptions and communication.

All input needed from parts management supply chain process for the packaging management process is either provided from the parts despatch advice (also referred to as Advanced Shipping Notification - ASN) or from the goods receiving process. These movements recorded in the packaging account statement of the related packaging type of the accounting partners.

For instance, the use of the Global DESADV EDI message according to the JAIF recommendation provides the ability to communicate the relevant packaging information.

2 Packaging Identification & Master data

As returnable or standardised packaging items are valuable assets of the pool owner they need to be identified in all related processes and a certain amount of specified master data needs to be in place to support the packaging related processes.

2.1 Packaging Identification

As a packaging unit may consist of one or several components, each component needs to be identified. Standardised or mutually agreed codes are used to identify the packaging type in order to support tracking and tracing of individual packaging items along the supply chain and in the production process. More and more packaging items are equipped with a unique packaging identification number. It is recommended to use identifiers containing both the type code and the serial number of individual packaging item if available. For more information, please refer to JAIF B-21 RFID recommendation.

In order to record all components belonging to a packaging unit, and to process the data according to the requirements of the actual packaging logistics, all relevant components must be specified separately.

A bundle type code may be used to simplify communication but, if a type code is assigned to a complete bundle of packaging items, it must be broken down into its individual components (see example below) and the figures related to the components must be transmitted. The packaging identification number can be transmitted in the respective messages and can be processed accordingly for accounting.

Handling Unit (Bundle)	Components	
5 GT00070	5 Pallets	226677
	75 SLC	006428
	5 Lids	006677

For the interchange of data between the partners, the package type code defined in the packaging management system must be used. If the packaging management system manages a proprietary return packaging pool of the customer, the package type code of the customer must be used in addition supplier packaging identification number can be provided.

The package type codes are to be represented in the IT systems of all partners involved in a transaction. Each IT system operator is responsible for conversion of the respective type code into a code that can be handled by his own system.

2.1.1 Packaging Types Transport Unit Level

Packaging types are differentiated as follows:



Figure 5: Examples for packaging bundle consisting of multiple components

2.1.2 Packaging Components



Figure 6: Examples for packaging components

2.1.3 Packaging Accessories / Auxiliary Packaging

Packaging accessories are packaging items used to protect the parts against damage. They include plastic or cardboard layers, spacers, separators, dividers, thermoformed plates, textile pockets (or textile dunnage), plastic bags, etc..

2.2 Packaging Master Data

Packaging master data is the key information for all packaging management related processes and, as such, a high quality in master data is essential. The parties involved in the creation of this current recommendation agreed upon the necessity to initiate a separate project for packaging master data in order to provide answers to the following questions regarding this topic:

- Which master data need to be available to support the packaging management processes?
- How to exchange (provide and update) packaging master data between companies?

For the time being, the following definitions are applicable.

Each packaging unit/packaging component must be registered with a specific set of master data. As a minimum, the first six master data items below must be considered as mandatory:

- Packaging type code
- Packaging type name
- Outer dimensions
- Inner dimensions
- Nesting dimensions (for nestable packaging only)
- Tare weight
- Maximum payload (for main packaging items only)
- Optional data: Owner of the packaging, extra load, material, conductivity, surface finish, images, folding, stackable, other properties, etc.

For further information please refer to the separate recommendation on master data management for packaging items.

3 Pool Planning and Maintenance

This chapter describes general standards regarding:

- How to plan and maintain a packaging pool?

3.1 Pool Planning

Pool planning must take into account the expected demand for all the types of packaging used, the availability of these packaging, the return of empty packaging and the replacement of packaging that have become damaged, lost, or scrapped.

The circulation stock is defined as the packaging stock that is required to maintain the flow of goods along the supply chain between supplier and customerthe involved parties.

An optimised circulation stock forms the basis of a cost efficient and effective packaging process.

In order to determine the optimum circulation stock level, the following factors must be taken into account:

- Production program
 - Product
 - Production units per time unit circulation days
 - Delivery frequency of product
 - Average cycle time including transport and transport concept (full/empty packaging)
 - Collection frequency of packaging
 - Supplier production process
 - Customer production commitment

- Reserve stock
- Type of delivery (consignment stock, JIS)
- Stock temporarily held by subcontractor

- Packaging instruction/packaging data sheet related information
 - Product
 - Packaging type
 - Quantity of parts per packaging unit
 - Internal constraints (e.g. empty packaging storage capacity, cleaning)
 - Other factors such as repairs, loss of packaging (based on experience/statistical data)

For a rough calculation of the circulation stock, the following formula might be used:

Number of packaging per working day/capacity per packaging x circulation days

3.2 Pool maintenance

In order to keep packaging available in the correct quality the following processes need to be considered during the lifecycle of packaging.

3.2.1 Cleaning

Depending on the type of parts the packaging is used for, it might be necessary to consider a cleaning process with regards to:

- Extension of cycle time
- Accounting – non available stock
- Logistics – receiving and shipping

3.2.2 Repair/Recycling

In order to manage damages of packaging a repair or recycling process has to be considered with regards to

- Extension of cycle time
- Accounting – non available stock
- Logistics – receiving and shipping

3.2.3 Scrapping

In case of non-repairable damage or at the end of packaging lifecycle a replacement has to be considered with regards to

- Accounting – deletion from stock
- Logistics – shipping to scrapping company

4 Packaging Agreement

Packaging planning is often an integral part of the new product development process. It can be a separate process, but must obviously be linked closely to the product to be packaged. Resources, and cost constraints need to be established and agreed upon.

Transport packaging needs to be matched to its logistics system. When the distribution system includes individual shipments by a small parcel carrier, the sorting, handling, and mixed stacking make severe demands on the strength and protective ability of the transport package. If the logistics system consists of uniform palletized unit loads, the structural design of the package can be designed to meet those specific needs. A package designed for one mode of shipment may not be suited to another.

In order to ensure that parts arrive in the correct condition at the production line or at the wholesale/retail partners of the automotive aftersales, a packaging agreement process must be in place.

The packaging of a specified part is to be agreed between the customer and the supplier. This agreement is documented in a packaging instruction/packaging data sheet. This document forms part of the supply contract between customer and supplier.

A separate packaging data sheet must be set up for each part number and delivery scenario (e.g. original equipment for production and after sales etc.). For the same part number, it is possible that the packaging data sheet can vary for individual ship from – ship to relationships.

The following optional information might be included:

- Short description of package process
- Photographs of package (in common picture format; attention must be paid to data size)
- For difficult processes: short video clip

Once completed, the data sheet is exchanged between customer and supplier, as it is each time it is amended, and it remains valid until it is replaced.

It is preferably exchanged electronically in a standardised structured form.

5 Packaging Accounting

This chapter covers the packaging accounting process and seeks to answer the questions:

- How to ensure proper accounting figures?
- How to handle complaints resulting in account movements?
- How to handle deviations in the account statement?

5.1 General assumptions

- A proper packaging accounting is the basis for fulfilling packaging orders economically and without any disruption. Therefore, it is essential that adjustments need to be executed as soon as they are identified.
- Packaging accounting only takes place between authorised locations of the packaging management and suppliers or process supporting third parties who are authorised to use packaging on behalf of the packaging management.
- Logistic service providers involved solely in the transportation process do not maintain packaging accounts. Transparency and steering of packaging in transit is created by the tracking and tracing of the related shipments as part of the Empty Packaging Supply Chain Process explained in chapter 6.
- All accounting partners involved have an accounting system in place that fits the process requirements.
- The accounting system has to support a straightforward view on physical stock per location and a balance per partner.
- The calculated stock level (for operational purposes) is based on the inventory stock and the recorded incoming and outgoing movements.
- A physical inventory must be conducted at regular intervals in order to adjust the accounting system.
- The account statement is communicated at regular intervals to the partners of the account holder for verification. The stock account statements are to be checked by the partners of the account holder and deviations reported within an agreed period of time.
- The data are either transmitted in the form of EDI messages or through an internet based communication platform with human interface (portal application).
- The account holder must process incoming complaints within an agreed period of time. In the case of a valid complaint, he must adjust the stock figures accordingly.

5.2 Accounting Partner Roles

For the packaging accounting process, the following partner roles are involved:

Table 2: Packaging agreement roles

Role	Description
Packaging Source	<p>Contractual provider of empty packaging (account is credited) and responsible for:</p> <ul style="list-style-type: none"> ▪ The stocktaking of locations of empty packaging under its responsibility ▪ Steering of internal or external consumption of empty packaging ▪ Reporting of empty packaging available to promise for the packaging supply chain process ▪ Exception handling in his area of responsibility <p>Can be a business unit of an OEM or an external logistics service provider</p>

	acting on behalf of an OEM.
Packaging Source for supporting activities	Contractual partner to execute special services (account is credited) on the packaging such as cleaning, repair, refurbishment and responsible for: <ul style="list-style-type: none"> ▪ The stocktaking of locations of empty packaging under its responsibility ▪ The release of packaging to the appropriate shipping point ▪ Exception handling in its area of responsibility. Can be a business unit of an OEM or an external logistics service provider acting on behalf of an OEM.
Packaging drain	Contractual receiver of the packaging (account is debited) and responsible for: <ul style="list-style-type: none"> ▪ The stocktaking of locations of empty packaging under its responsibility ▪ Steering of internal or external consumption of empty packaging ▪ Clearing of incidents occurred in its area of responsibility. Can be a business unit of a Supplier or an external logistics service provider acting on behalf of a Supplier. Can also be a logistic service provider of container management who is acting as a source and needs to be replenished or is buffering overstock
Packaging drain for supporting activities	Contractual partner to execute special services (account is debited) on the packaging such as cleaning, repair, refurbishment, scrapping: <ul style="list-style-type: none"> ▪ The stocktaking of locations of empty packaging under its responsibility ▪ Reporting when the services are completed and the packaging must be reintegrated in the flow ▪ Exception handling in its area of responsibility. Can be a business unit of a Supplier or an external logistics service provider acting on behalf of a Supplier

5.3 Account Movements

Each event resulting in an account adjustment has to be shown in the account statement as a movement type that identifies the reason or process that caused the change. This sub-chapter describes the expected events for account movements as shown in the table below. The unexpected events are defined in sub-chapter 5.5 Exception Handling as they require special treatment outside of the standard process.

Table 3: Movements resulting from a standard process step

Movement	Description
Packaging shipment	Shipping point creates outbound movement when empty packaging is despatched
Packaging receipt	Shipping point creates inbound movement based on Material ASN
Packaging stock transfer	<ul style="list-style-type: none"> ▪ Transfer from blocked stock to unrestricted stock ▪ Transfer from unrestricted stock to blocked stock

5.4 Usage fees

Where usage fees are charged, these are an important component of the packaging management. Usage fees ensure cost transparency at partner level (not parts level) and ensure that costs are borne by the party that causes them.

Usage fees are generally based on a deposit purchase/return system. Alternatively, a system based on rental fees might be implemented. Both approaches result in monetary transactions. Where a rental fee is charged, the containers are generally returned more quickly, improving the availability of containers in the exchange system.

Usage fee invoices are based on the actual movement of the containers between the partners (account statement).

Each container movement results in a posting to the respective container accounts. The fee system might include fee-free days and allowances for transport times. The posting date and the number of days in transit are used to determine the value date.

The usage fee algorithm then calculates the fee due for a container movement based on this value date.

Incorrect information or incorrect postings of container movements result in complaints. To make corrections, if necessary, it must also be possible to change the valuations.

Complaints might also trigger an adjustment of the usage fees.

The packaging management process must also cater for the inclusion of fee-free container postings.

Monthly account consolidations as well as individual statements at container posting level have become standard procedures.

5.5 Exception Handling

This sub-chapter defines general information about exception handling affecting the accounting process. The standards defined in the accounting process will support the standardised identification of events that require adjustments of the related accounts by using mutually agreed reason codes and descriptions of events. Usually the regulation of each exception event is defined in contractual agreements between the relevant parties and is therefore not subject to this recommendation.

Nevertheless, general information about exception handling which affects the accounting process is described in chapter 6.5

5.5.1 Identification of Exceptional Events

Exceptional events resulting in account adjustments may be identified in the in-house processes at the packaging accounting partner site as well as in the outbound processes of the packaging supply chain.

Exceptional events in the in-house processes could include:

- Discrepancies in stock movements from one storage location to another
- Discrepancies in movements from warehouse to the production line
- Discrepancies identified during the annual stocktaking

Exceptional events in the outbound processes of the packaging supply chain could include:

- Discrepancies between instructed and actually shipped quantity at the shipping point
- Discrepancies between advised and/or shipped and received quantities at the receiving point (something got lost during the Transport).
- Discrepancies between calculated and actual stock, identified during the annual stocktaking

Each accounting partner who identifies an exceptional event has to notify the other involved parties immediately according to the contractual agreements using the defined communication method.

For inter-company communication of discrepancies and exceptions, EDI messages can be used. Alternatively, an internet based communication platform with human interface (portal application) can be used.

In the outbound processes of the empty packaging supply chain we recommend the EDIFACT Receiving Advice message (RECADV) as the means to communicate complaints raised at the empties receiving point. Alternatively, an internet based communication platform with human interface (portal application) can be used.

In cases of exceptional events occurring during the material supply process, the method of communication of packaging discrepancies is included in the existing communication processes for inbound material.

The packaging management has to process the complaints and has to execute the necessary corrections in the related packaging accounts according to the contractual agreements.

If EDI is used to communicate exceptional events, the defined standardised information entities have to be used in order to trigger the automated synchronisation of the IT systems of the various involved partners.

5.5.2 Regulation of exceptional events

The regulation of exceptional events depends on the contractual agreements between the involved parties.

The intervals of checking and synchronization must be mutually agreed. This document does not provide any specific recommendation on check-intervals or subsequent detailed actions.

6 Empty Packaging Supply Chain Process

The following sub-chapters provide general information about the empty packaging order process, the supervision of transport and the monitoring of the entire empty packaging supply chain.

All sub-processes are shown in a process-flow diagram together with a process step description of an ideal empty packaging supply chain process.

6.1 General assumptions

The empty packaging supply chain covers the packaging order process (if used), the shipping process, the transport process and the receiving process.

Transport tracking, tracing and steering is focused on a pure transportation process and its relevant process steps. The main objective is to move shipments of empty packaging from the shipping point to the receiving point. In the described scenarios the packaging is handed over to a logistics service provider without changing the ownership of the packaging.

6.1.1 Ordering Process

As explained in the first chapter of this document the main difference between the Pull and Push process in the supply of empty packaging is the contractual responsibility for the availability of empty packaging at the receiving point (i.e. ship-to location).

6.1.1.1 Pull Process

In the classical pull process the supplier calculates the packaging demand and places a firm order with the packaging management. The supply process will only be triggered by a valid order.

Nevertheless, even in the pull process some packaging management systems will execute demand planning on behalf of the empty packaging receiver and provide a packaging order proposal as a template for the firm order. The empty packaging receiver will usually use these figures to prepare the firm order.

In some cases, based on a specific contractual agreement, the empty packaging receiver can accept the packaging order proposal by default, i.e. he is content to convert the figures of the order proposal into a firm order at a certain point in time without any further action on his side. If necessary, he can raise further orders to cover any additional demand.

6.1.1.2 Push Process

In the classical push process packaging management calculates the demand for the individual packaging receivers and supplies empty packaging based on the calculated demand without any ordering activity being required by the empty packaging receiver.

6.1.2 Transport Tracking and Tracing

In this subchapter several examples for transport concepts are shown.

The core subject for tracking and tracing is an individual shipment.

A shipment comprises a delivery of empty packaging from one shipping point to one (final) receiving point at one specified point in time.

Each shipment is identified by a unique shipment number assigned by the shipping point.

A shipment must not exceed a full truck load (or a full container load or full a railway wagon).

A shipment must not be split at any time or stage in the transport process, no matter whether the transport consists of several transport legs or not.

A transport may contain 1...n shipments.

6.1.2.1 Transport concepts

Example A: Full Truck Load (FTL) Direct Shipment



Figure 7: Example A - Direct Shipment

In Example A the transport is organised as a direct shipment from the shipping point to the receiving point without stopover. This is a common scenario when the shipment makes up a full truck load.

Example B: Less than Truck Load (LTL) Milk Run



Figure 8: Example B - Milk Run: each shipment makes up less than a truck load

In Example B a truck with several shipments to several receiving points is delivering all receiving points without stopover in a milk run.

Example C: Less than Truck Load (LTL) with one X-Dock

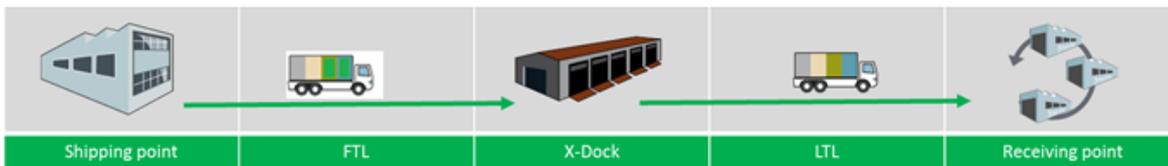


Figure 9: Example C Less than Truck Load (LTL) with one X-Dock

In example C a simple staggered transport process is shown

1. Truck picks up several shipments as consolidated transport at shipping point(s) to utilize full truck capacity. The shipments are forwarded via a X-Dock. .
2. At the X-Dock the individual shipments will be unloaded and re-consolidated as transports for the next transport leg according to the defined routes to the various receiving points.
3. Trucks pick up consolidated transports consisting of several shipments at X-Dock to utilize truck capacity to deliver each shipment to its receiving point in a milk run

Example D Less than Truck Load (LTL) with multiple X-Docks



Figure 10: Example D Less than Truck Load (LTL) with multiple X-Docks

In example D a simple staggered transport process with multiple X-Docks is shown.

1. Truck picks up several shipments as consolidated transport at shipping point(s) to utilize full truck capacity. The shipments are forwarded via a X-Dock. .
2. At the X-Dock the individual shipments will be unloaded and re-consolidated as transports for the next transport leg, i.e. to the next X-Dock.
3. Trucks pick up consolidated transports at X-Dock to utilize full truck capacity to deliver the shipments to the next X-Dock
4. At the second X-Dock the individual shipments will be unloaded and re-consolidated as transports for the final transport leg according to the defined routes to the various receiving points. Trucks pick up consolidated transports consisting of several shipments at X-Dock to utilize truck capacity to deliver each shipment to its receiving point in a milk run.

The examples provide an explanation of the general principles. In reality, different modes of transport for each transport leg are possible, more than two X-Docks can form the full transport route etc. At least at each loading/unloading event in the transport process the party in charge shall initiate a communication. Further events e.g. for real-time tracking of the transport progress en-route can be communicated.

6.2 Empty Packaging Supply Chain Partner Roles

Table 4: Partner Roles

Role	Description
Packaging Management	<p>Manager of the packaging pool. Accountable for packaging:</p> <ul style="list-style-type: none"> ▪ Pool Maintenance ▪ Accounting/Inventory and related adjustments ▪ Usage fees and their settlement ▪ Delivery process ▪ Claims Management ▪ Exception handling in his area of responsibility <p>Can be a business unit of an OEM or external service provider acting on behalf of an OEM</p>
Transport Management	<p>Is managing transport planning for packaging shipment. Accountable for:</p> <ul style="list-style-type: none"> ▪ Selecting appropriate transport mode ▪ Informing the shipping point about executable shipment ▪ Confirmation of above mentioned transport event to the predefined partners ▪ Process clearing of incidents occurred in his area of responsibility. ▪ Exception handling in his area of responsibility <p>Can be a business unit of an OEM or an external service provider acting on behalf of the packaging manager</p>
Shipping Point	<p>Is executing shipping of packaging consignments. Is accountable for:</p> <ul style="list-style-type: none"> ▪ Commissioning (if individual bundling of packaging material is necessary, this activity is part of the commissioning) Notification of transport readiness ▪ Packaging despatch ▪ Packaging account updateg ▪ Creating proper shipping documentation and handover to freight forwarder/carrier

	<ul style="list-style-type: none"> ▪ Confirmation of above mentioned transport event to the predefined partners ▪ Process clearing and initiation of exception handling in case of incidents occurred in his area of responsibility <p>Can be a business unit of an OEM or an external service provider acting on behalf of the shipping point</p>
<p>Logistic Service Provider (transport and x-docking only)</p>	<p>Type A: Is executing transport of shipments as a freight forwarder/carrier. Is accountable for:</p> <ul style="list-style-type: none"> ▪ Organization and confirmation of ordered transports ▪ Pick up at the confirmed shipping point or X-Dock including shipping documents ▪ Delivery of the shipment at X-Dock or receiving point ▪ Reporting of above mentioned transport events to the predefined partners ▪ Process clearing and initiation of exception handling in case of incidents occurring in his area of responsibility. <p>Type B: Is executing x-docking only in the empty packaging shipping process. Is responsible for:</p> <ul style="list-style-type: none"> ▪ Receiving the packaging shipment by unloading it from one carrier and allocating it directly for pickup by the succeeding freight forwarder/carrier ▪ Notifying the next freight forwarder/carrier about pick up readiness ▪ Loading the packaging shipment on the truck and handover of shipping document ▪ Confirmation of above mentioned transport event by sending/providing information to the predefined partners ▪ Process clearing and initiation of exception handling in case of incidents occurring in his area of responsibility.
<p>Receiving Point</p>	<p>Is receiving the packaging consignments. Is accountable for:</p> <ul style="list-style-type: none"> ▪ Executing the empty packaging receipt process ▪ Signing the receipt document ▪ Reporting any deviation of the actually received empty packaging shipment from the packaging management or/and shipping point with regards to accounting or shipping as a claim or complaint. <p>The function can be carried out by the party requiring the empty packages or any party acting on their behalf to fulfill this task. The receiving point can also be a business area of a packaging manager or packaging service provider or external logistics service provider executing packaging cleansing or refurbishment.</p>

6.3 Communication in the Packaging Supply Chain

In order to have full transparency in the multi-provider process of empty packaging logistics it is recommended to use, in addition to the EDI communication, a web-based communication platform with the scope of:

- Creation of full process transparency and visibility for all involved parties. The communication platform should visualise the relevant information according to the needs of each process partner. By using pre-configured filters each partner of the supply chain can focus on process

disruptions and exception handling, and standard processes can run automatically without human interaction. This decreases time consuming analysis to find the root cause of a disruption and work can start immediately to solve it.

- Another function of the communication platform might be as an EDI message generator for partners who do not support EDI communication. By adding the content of the EDI message manually or semi manually to the communication platform, the relevant EDI message can be created and provided to the predefined interfaces of the partner. This offers the opportunity that all source and target systems get the expected EDI message whether sent directly from the source system or from the communication platform.
- This concept leads to the following benefits:
- Reduction of the transport lead time as the consignment information of the upcoming workload is available to each party starting from the transport planning through to the delivery of the empty packaging.
- Possibility to accelerate a single shipment in case of emergencies as information about its physical location is accessible to all involved parties
- Monitoring of the performance of the LSPs with regards to contracted lead times and process quality. Loss or damage of packaging can be tracked to its origin.
- Reduction of manual effort due to almost 100% automated processes
- Improvement of data quality by eliminating manual process steps
- Possibility to use tracking data for the control of freight invoicing
- Reduction in the size of the packaging pool because of acceleration of the transport process and avoidance of loss of packaging due to full transparency in the process

6.3.1 Transport Monitoring Event Matrix

The matrix shown below clarifies the processes affected by the event

Table 5: Events of the Transport Process

Event	Process							
	Accounting	Tracking	Tracing	Transportplanning	Shipping point	LSP Carrier	LSP X-Dock	Receiving point
Notification of pick up readiness	no	yes	x					
Confirmation of pick up information e.g. pick up time, licence plate etc	no	yes				x		
Packaging issue at shipping point	yes	yes		x				
Packaging pick up at shipping point	no	yes			x			
Packaging receipt at X-Dock	no	yes					x	
Packaging issue at X-Dock	no	yes					x	
Packaging delivery at receiving point (proof of delivery)	yes	yes			x			
Packaging receipt at receiving point (claims or complaint)	yes	yes						x

6.3.2 Expected Events in the Course of Organising and Carrying Out a Transport (Transport Events)

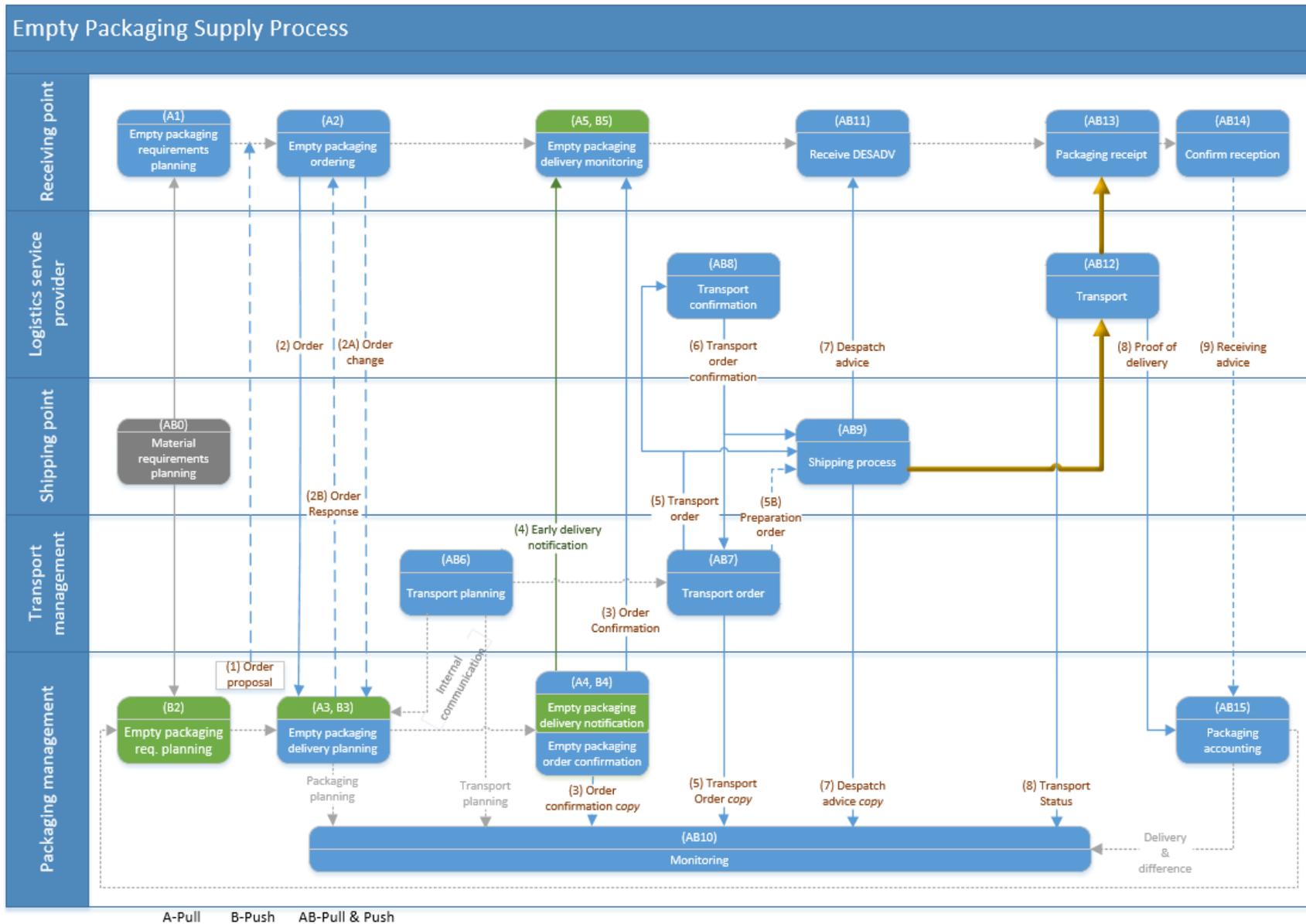
Each transport event resulting in a change of status from the tracking and tracing perspective must be communicated by the logistics service provider according to the contractual agreement between the related partners. An expected event is a normal action or process that causes a change in the transport status.

Exceptional events require special treatment outside of the standard process and are defined in sub-chapter 6.5 on Exception Handling.

6.4 Process Description Empty Supply Chain

This sub chapter shows the empty packaging supply chain - macro process flow. The different contents of the push and pull processes described in separate sub-chapters. The joint processes starting with transport planning through to the receiving of the packaging are valid for both systems.

Figure 11: Empty Package Supply Chain



6.4.1 Pull Planning

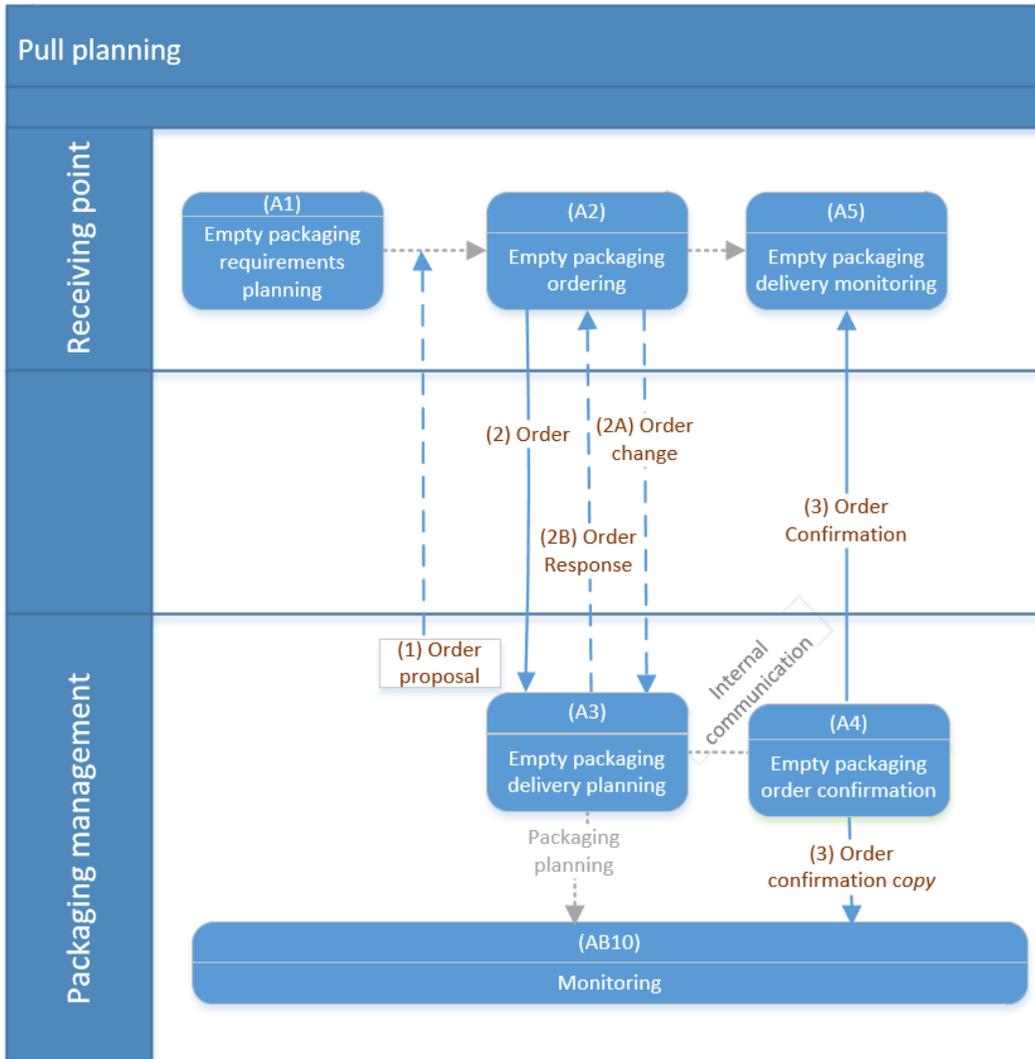


Figure 12: Pull planning process flow

Process steps	
A1	<p>Empty packaging requirements planning</p> <p>Packaging requirements are calculated by the Receiving Point, based on the forecasted material demand (A0) and the related packaging instructions, taking into account the stock available.</p> <p>Remark: In case of central packaging planning a packaging manager may send a Packaging Order Proposal (1) as guidance for the Receiving Point.</p>
A2	<p>Empty packaging ordering</p> <p>Receiving Point orders packaging from Packaging Management by sending a Packaging Order (2).</p> <p>The Receiving Point may amend the original order with a Packaging Order Change (2A), referring to the original order.</p>
A3	<p>Empty packaging delivery planning</p> <p>Delivery planning of packaging must be done according to packaging availability and according to the transport arrangements.</p> <p>An optional Packaging Order Response (2B) may be sent by the Packaging Management to inform the Receiving Point of packaging order taken into account.</p>
A4	<p>Empty packaging order confirmation</p> <p>As a result of the delivery planning a Packaging Order Confirmation (3) will be sent to the Receiving Point.</p>
A5	<p>Empty packaging delivery monitoring (dependent)</p> <p>Based on the original order and the associated order confirmation the Receiving Point can monitor the fulfilment of the demand and can take further actions if needed.</p> <p>Deviations are not described in this recommendation.</p>
Information exchange	
(1)	Packaging Order Proposal (optional)
(2)	Packaging Order
(2A)	Packaging Order Change
(2B)	Packaging Order Response
(3)	Packaging Order Confirmation

6.4.2 Push Planning

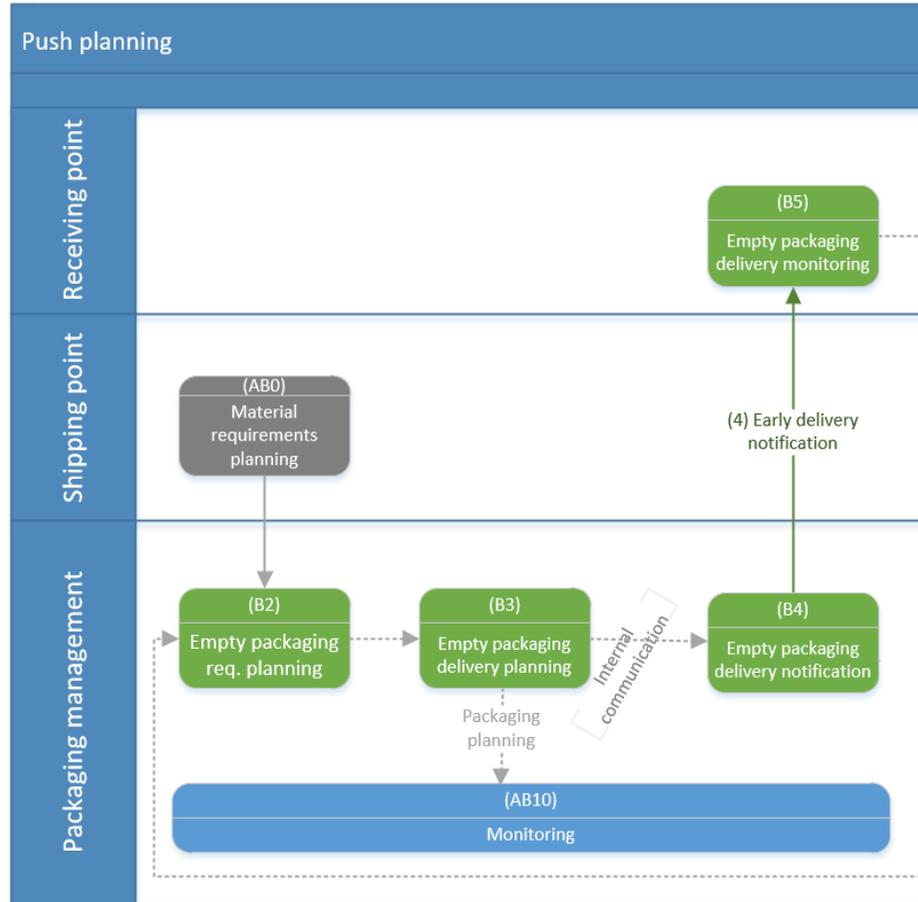


Figure 13: Push planning process flow

Process steps	
B01	The “Material Requirements Forecast” DELFOR is also used for the empty packaging requirements calculation. This document is focused on the empty packaging process only and does not include any further description of the material flow or process steps.
B2	Empty packaging requirements planning Based on the material forecast, the related packaging instructions, and actual calculated available packaging balances at the involved parties, the Packaging Management calculates the packaging replenishment.
B3	Empty packaging delivery planning Delivery planning of packaging is done according to packaging demand, the availability and according to the transport arrangements.
B4	Empty packaging early delivery notification The planned packaging delivery shall be notified to the Receiving Point by a Packaging Delivery Early Notification (4).
B5	Empty packaging delivery monitoring The Receiving Point can monitor whether the planned packaging delivery will fulfil the packaging demand at the Receiving Point.
Information exchange	
(4)	Package Delivery Early Notification

6.4.3 Packaging Transport (Pull & Push)

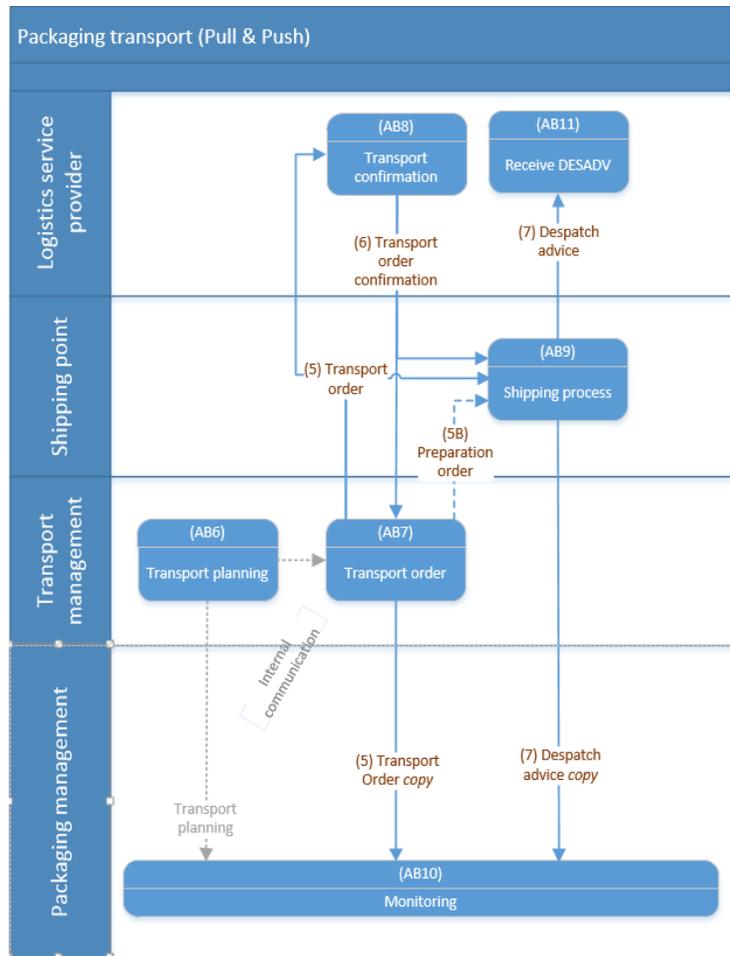


Figure 14: Packaging transport process flow

Process steps	
AB6	<p>Transport planning</p> <p>The transport planning has to consolidate the shipments within a certain period of time for a certain number of Logistic Service Providers.</p>
AB7	<p>Transport order</p> <p>A Transport Order (5) for the identified shipments will be issued and sent to the Logistic Service Provider.</p> <p>A copy is sent to the Shipping Point to ensure that the planned shipments are ready for pick-up as scheduled.</p> <p>An optional Preparation Order (5B) may be sent to an LSP in charge of preparing the packages before shipment. This order may also be included within the previous Transport Order (5).</p>
AB8	<p>Transport confirmation</p> <p>Logistics Service Provider will send a Transport Order Confirmation (6) to confirm or change the pick-up information to the shipping point and the transport management and the packaging management.</p>
AB9	<p>Shipping process</p> <p>Shipments will be prepared according to the transport order confirmation and all related contractual agreements. Packaging may be labelled with a transport label for empty packaging (see separate Odette labelling recommendation). In addition, shipment documents need to be created in order to accompany the shipment.</p> <p>Immediately after the shipment has left the shipping point, a Packaging Despatch Advice (7) for the shipment will be issued by the Shipping Point and sent to the Receiving Point. Copies of this Despatch Advice may be distributed to all partners who need this information to plan their actions in a multi-leg transport chain.</p>
Information exchange	
(5)	Packaging Transport Order
(5B)	Packaging Preparation Order
(6)	Packaging Transport Order Confirmation
(7)	Packaging Despatch Advice

6.4.4 Transport Process and Packaging Receiving

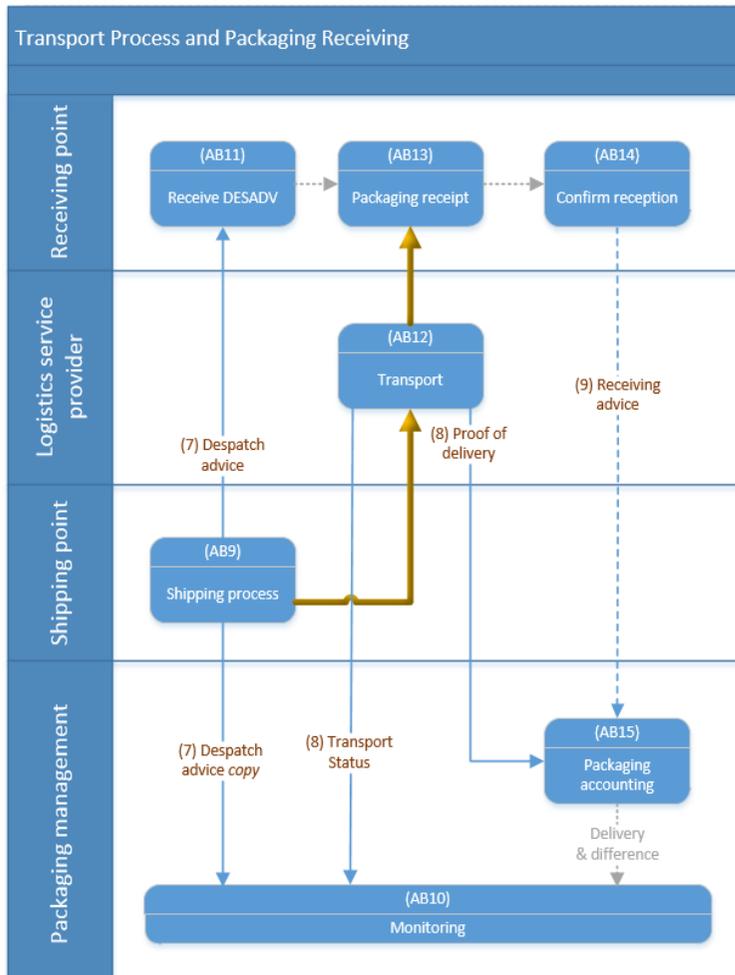


Figure 15: Transport and receiving process flow

Process steps	
AB11	Receive Packaging Despatch Advice A Packaging Despatch Advice (7) will be received by the Receiving Point. immediately after the shipment has left the Shipping Point.
AB12	Transport The transport of empty packaging will be executed by one or several Logistics Service Providers according to the transport concept (Full Truck Load or Less than Truck Load). All possible events potentially occurring during transport such as pick up at the Shipping Point, empties receipt/issue at a x-dock or delivery at the Receiving Point including quality of the shipment such as loss or damage etc. may be sent as a Transport Status message (8) to the Packaging Management according to the contractual agreement. At the end of the transport process the LSP has to send a status message as Proof of Delivery (8) to the Packaging Management.
AB13	Packaging receipt Physical reception of empty packages. The Receiving Point validates the completeness and quality of the delivered empty packages.
AB14	Confirm reception The Receiving Point has the option to confirm the reception of empty packaging by sending a Packaging Receiving Advice (9) to the Packaging Management. However, the use of Packaging Receiving Advice might be restricted to claims or complaints only.
AB15	Packaging accounting The proof of delivery from the Logistic Service Provider as well as the Packaging Receiving Advice from the Receiving Point should be used for updating the packaging accounts at the Packaging Management.
Information exchange	
(8)	Transport Status Message to confirm the status of shipments during transport and as Proof of Delivery (PoD)
(9)	Depending: Packaging Receiving Advice

6.4.5 Empty Packaging Supply Chain Monitoring

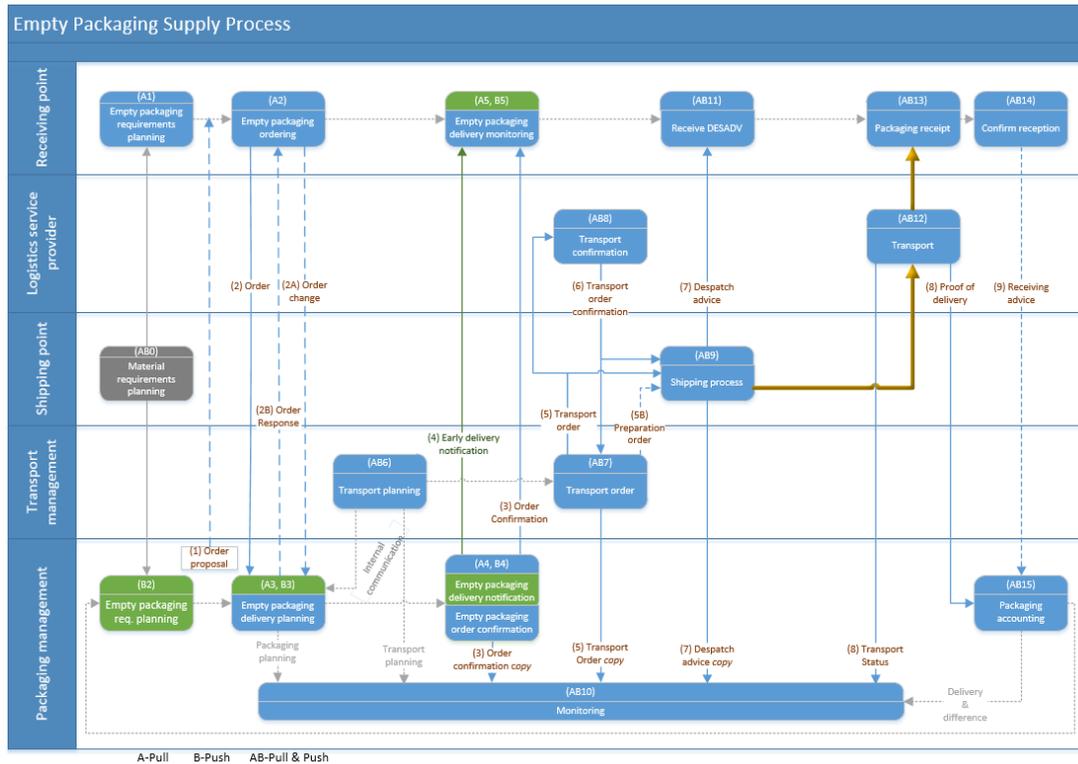


Figure 16: Empty packaging supply chain monitoring

Process steps	
AB10	<p>Monitor</p> <p>Packaging flow and transport information will be received from various process steps.</p> <p>For a complete monitoring of the empty packaging order and transport process a “platform solution” should be used to visualise the information for all parties involved in the process. This should serve as a communication platform as well as a Web EDI tool for parties who do not support full EDI communication.</p> <p>The purpose of the monitoring solution is to use information from different sources in near to real time in order to have full transparency of the empty packaging supply chain. This allows the identification of process disruptions and the definition of counter measures or corrective actions.</p>
Information exchange	
No EDI messages	

6.5 Exception Handling

This sub-chapter defines general information about exception handling in the empty packaging supply chain process. The standards defined in the process will support the standardised identification of events that require further decisions and/or actions of the related process steps by using mutually agreed reason codes and description of the event. The regulation of each event is usually defined in bilateral contracts between the acting parties and is therefore not the subject of this recommendation

6.5.1 Identification of Exceptional Events

In the empty packaging management supply chain process one has to distinguish between the ordering and the transport process.

6.5.1.1 Ordering

Exceptional events resulting from part or complete rejection of the order may be identified when processing the incoming order in the packaging management system. Exceptional events in the in-house processes include:

- Wrong packaging ID used
- No authorization to order certain packaging type or quantity
- No authorization to order packaging at all

Standardised reason codes must be used in EDI communication to inform the ordering party about the reason for rejection. Alternatively, an internet based communication platform with human interface (portal application) can be used.

The ordering party examines the rejected orders and decides whether or not further action is needed case by case according to contractual agreements.

A list of standardised reason codes can be found in chapter 7 of this document.

6.5.1.2 Transport Supervision, Tracking and Tracing

Exceptional transport events have to be reported by the LSPs immediately each time they are detected according to the contractual agreement. As the LSP is neither owner nor user of the packaging, he is not a partner of the packaging accounting process. Nevertheless, exceptional events occurring at the LSP transport or x docking process include:

- Discrepancies in the quantities of packaging against the ASN
- Discrepancies in the quality of packaging against ASN (e. g. damaged, dirty)

The reporting of the events should take place either by using the EDIFACT Transport Status message or through an internet based communication platform with human interface (portal application).

Exceptional events in the transportation process have to be compared against the original ASN message to identify the difference between the ought to be (what was loaded at the shipping point) and the as is situation at the time of the event.

Standardised reason codes must be used in EDI communication to inform the ordering party about the reason for rejection. Alternatively, the internet based communication platform with human interface (portal application) can be used.

A list of standardised reason codes can be found in chapter 7 of this document.

6.5.2 Regulation of exceptional transport events

How to execute exception handling for different cases is usually defined in individual contracts between the involved parties based on contractual rights and duties and can therefore not be described in this recommendation.

6.6 Information Model

The information model serves as template for the content of the individual EDI messages.

A detailed description is provided in the description of EDI messages.

Below listed table references the respective VDA recommendations.

Table 6: EDI messages for packaing management

VDA	Part	Version		EDIFACT	Name DE	Supported Process
4946	T1	2.0		ORDERS	Packaging order proposal	Ordering
4946	T2	2.0		ORDERS	Packaging order	Ordering
4946	T3	2.0		ORDCHG	Packaging order change	Ordering
4946	T4	2.0		ORDRSP	Packaging order confirmation	Ordering
4943	T1	2.0	Global	DESADV	Early despatch notification empties	Transport
4933	T2	1.0	Global	DESADV	Transport order empties	Transport
4933	T4	1.0	Global	DESADV	Transportorder confirmation empties	Transport
4943	T2	2.0	Global	DESADV	Despatch advice empties	Transport/ Accounting
4945		1.0		IFTSTA	Transport status report	Transport
4947		2.0	Global	RECADV	Receiving advice empties	Transport/ Accounting
4941	T1	1.0		INVRPT	Package account statement (full)	Accounting
4941	T2	1.0		INVRPT	Package account statement (short)	Accounting
4941	T3	1.0		INVRPT	Package account correction request	Accounting
4942	T1	1.0		INVRPT	Package inventory taking request	Accounting
4942	T2	1.0		INVRPT	Package inventory taking report	Accounting
4942	T3	1.0		INVRPT	Package inventory difference report	Accounting
4942	T4	1.0		INVRPT	Package inventory correction	Accounting
4942	T5	1.0		INVRPT	Package inventory accrual	Accounting