





Reading Sample

In this chapter, you'll review outbound processing topics that are important to know for the C_S4EWM exam. You'll walk through goods issue and wave management, and then reinforce your knowledge with key terminology, practice questions, and answers with detailed explanations.

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-  **The Authors**

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Chapter 5

Outbound Processing

5

Techniques You'll Master

- Understand the goods issue process flow between SAP S/4HANA and extended warehouse management (EWM)
- Describe stock removal strategies
- Handle exceptions and picking differences
- Understand waves for combining items
- Define settings for direct outbound deliveries in EWM
- Execute the direct outbound delivery process

Now that we've covered inbound processing, let's turn our attention to outbound processing. Section 5.2 begins with explaining the outbound process flow in EWM with the configuration required for picking strategies, storage processes in outbound processes, picking exceptions, and direct outbound deliveries. Section 5.3 focuses on wave management in outbound process and the configuration steps for wave management. After reviewing the key terminology in Section 5.4, Section 5.5 and Section 5.6 provide example questions and answers related to outbound process and wave management processes.

Real-World Scenario

Many companies must ship products they've manufactured in their plants to their distributors and customers as well as to other plants for sales orders, stock transport orders (STOs), and vendor returns. For example, your customer service team can create sales orders and then send outbound deliveries created with reference to these sales orders to your warehouses. When you need to ship, an important step is performing picking from another source location with various strategies according to your business requirements. This capability helps you enhance supply chain efficiency and customer service with processes like wave processing, picking, etc.

5.1 Objectives of This Portion of the Test

The main objective of this chapter is to learn about outbound processes, which include picking strategies, delivery processing, wave processing, direct outbound deliveries, layout-oriented storage control (LOSC), and process-oriented storage control (POSC) within an outbound process. We'll also explain the concept of stock removal indicators, combined pick execution, and pick denials to address inconsistencies through real-world scenarios.

The certification exam expects you have a good understanding of the following topics:

- Goods issue processes, including outbound delivery processing, stock removals, and POSC and LOSC
- Handling picking differences and picking denials
- The creation of direct outbound deliveries and their properties
- Wave processing techniques

Note

Outbound processing with wave picking, pick denials, outbound kitting, and staging for production covers more than 12% of the questions in the certification exam.

5.2 Goods Issue

A goods issue process usually starts with the creation of sales orders, STOs, and vendor returns by a customer service or planning team. The warehouse team creates outbound deliveries in SAP S/4HANA, which are then distributed to EWM systems, automatically or manually, for further processing. The warehouse is responsible not only for storing products efficiently but also for delivering goods to customers on time. The objective of the warehouse is that products should be picked and packed, and goods issued, efficiently. Figure 5.1 shows the sequence of documents created in a decentralized EWM system for outbound delivery processing. In the case of embedded EWM, outbound delivery request documents are not required.

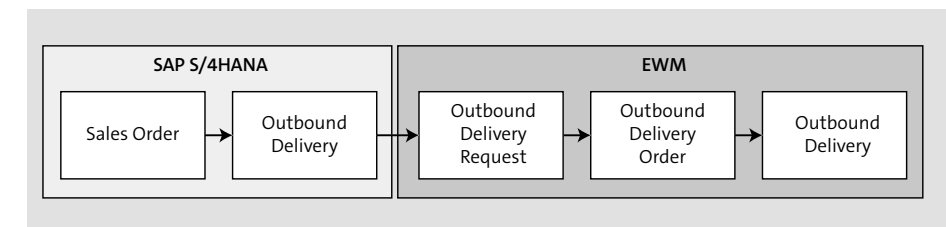


Figure 5.1 Document Flow of Outbound Process

An outbound process starts the creation of outbound deliveries for customer sales orders, STOs, production staging, subcontract component issues, and vendor returns. These outbound deliveries are replicated to EWM as outbound delivery requests, which contains all the relevant logistical data about the outbound process from the outbound delivery created in SAP S/4HANA. From the outbound delivery, the request system automatically creates an outbound delivery order in EWM, also called a *warehouse request*. Further processing in EWM (i.e., picking, packing, and staging) is performed, based on the outbound delivery order, through warehouse tasks. Once the picking and staging of stock is completed by warehouse workers and all associated warehouse tasks are confirmed, a warehouse worker can post the goods issue for the outbound delivery order. This step will create an outbound delivery in EWM, and the goods issue posting will be updated in SAP S/4HANA.

Note

In embedded EWM, an outbound delivery request is no longer required. Instead, the system directly creates an outbound delivery order in embedded EWM based on the outbound delivery created in SAP S/4HANA.

5.2.1 Documents in Goods Issue

As discussed in Chapter 1, Section 1.2, delivery types, delivery categories, item types, and item categories are crucial for goods issue processes. The mapping of SAP S/4HANA delivery type and item category with EWM delivery and item type will determine the warehouse process type. Figure 5.2 shows the EWM documents created during an outbound process.

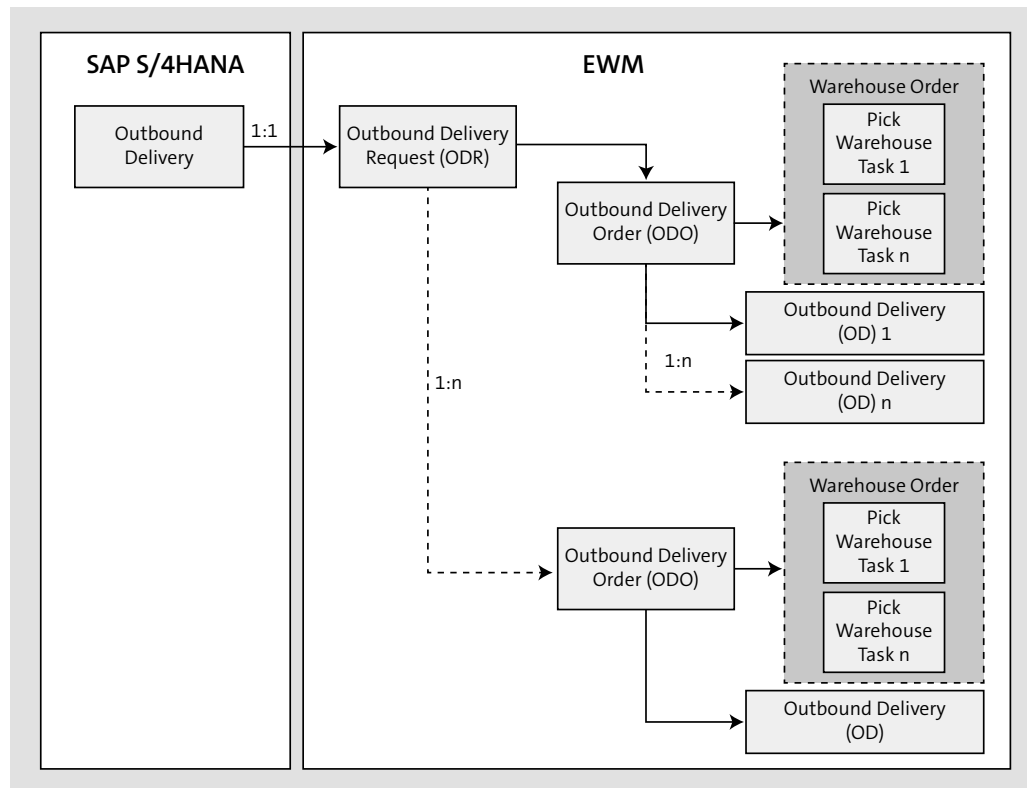


Figure 5.2 EWM Outbound Delivery Documents

In the following sections, you'll learn about the structure and important features of outbound delivery orders and outbound delivery documents used in the outbound processes in EWM.

Outbound Delivery Requests

In decentralized EWM, the outbound deliveries created in SAP S/4HANA are replicated as outbound delivery requests in the EWM system. An outbound delivery request contains all the relevant logistics data for the outbound delivery process, starting with the outbound delivery in SAP S/4HANA, for example, a sales order, an STO, etc. You don't usually work with outbound delivery requests directly, which are interim documents. No follow-on documents are created for picking like pick warehouse tasks.

Two possible actions can occur for an outbound delivery request after it is created, namely, the following:

- **Activate outbound delivery request**
Results in subsequent documents being created in EWM as outbound delivery orders. This activation normally happens in the background, after the outbound delivery from SAP S/4HANA is replicated to EWM. You can create more than one outbound delivery order for an outbound delivery request.
- **Reject outbound delivery request**
Results in setting the delivery quantity to zero in EWM and in SAP S/4HANA.

You can view an outbound delivery request document via the SAP Easy Access menu path **Logistics • SCM Extended Warehouse Management • Extended Warehouse Management • Delivery Processing • Outbound Delivery • /SCWM/ODR - Maintain Outbound Delivery Request**.

Note

Since SAP EWM 9.5, or with the use of an SAP S/4HANA-based decentralized EWM system, an outbound delivery request is optional.

Outbound Delivery Orders

Outbound delivery orders are created from outbound delivery requests through the Post Processing Framework (PPF) or are directly replicated to EWM from SAP S/4HANA. An outbound delivery order document contains additional EWM-relevant data as determined by the service profiles associated with the outbound delivery document type and document category. The outbound delivery order document is used for goods issues and for creating picking warehouse tasks for further processing.

During the creation of an outbound delivery order, the following determinations are performed for assignment warehouse parameters:

- Route determination
- Consolidation group determination
- Warehouse process type determination

Note

You can block outbound delivery orders from further processing, for instance, if the goods movement bin or warehouse process type has not been updated, by setting up a service profile for an incompleteness check.

You can maintain outbound delivery orders via the SAP Easy Access menu path **Logistics • SCM Extended Warehouse Management • Extended Warehouse Management • Delivery Processing • /SCWM/PRDO - Maintain Outbound Delivery Order**.

As shown in Figure 5.3, the outbound delivery order header contains information like the shipping office; various statuses for picking, packing, loading, and goods issues; routes received from SAP S/4HANA or SAP Transportation Management (SAP TM); means of transport and vehicles; and more.

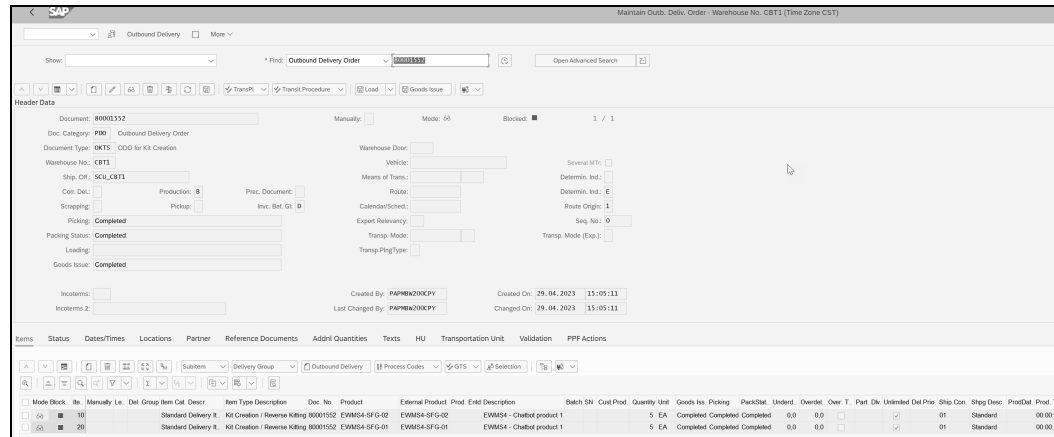


Figure 5.3 Maintaining an Outbound Delivery Order

An outbound delivery order document includes tabs for the order and for additional processing statuses at the header level. These tabs are as follows:

■ Status

The **Status** tab contains all the statuses applicable to an outbound delivery order document at the header level. The status of the outbound delivery order comes from the status profile assigned to this combination of document type and document category. Various status types are available, for example, DGI (loading), DPI (picking), DPC (packing), DGI (goods issue), etc. The status is set **1-Not Started**, **2-Partially Completed**, or **9-Completed** for the status types based on the processing status.

■ Dates/Times

The **Dates/Times** tab contains the status of the outbound delivery order document, which comes from the date/time profile assigned to this combination of document type and document category for the outbound delivery order document. Once the operation is completed, such as a departure from the yard (TOUTYARD), the system updates the status with a date and time.

■ Locations

The **Locations** tab contains locations, like a warehouse or a ship-from location, for the outbound delivery order document.

■ Partner

The **Partner** tab contains associated partner information, like a ship-to party for the outbound delivery order document.

■ Reference Documents

The **Reference Documents** tab contains references for the outbound delivery order document. Applicable reference document categories come from the reference document profiles assigned to this combination of document category and document type in the outbound delivery order document. Reference documents include SAP S/4HANA delivery documents.

■ Addnl Quantities

The **Addnl Quantities** tab contains all quantities and units of measure (UoMs) applicable for the outbound delivery document, for example, weight and volume.

■ Texts

The **Texts** tab contains all relevant text types for the outbound delivery order document. Text types for outbound delivery order documents come from the text profile assigned to the document category and document type combination of the outbound delivery order document.

■ Transportation Unit

The **Transportation Unit** tab contains the details of the transportation unit (TU) assigned to an outbound delivery order document. A TU represents the vehicle on which stocks are loaded.

■ HU

The **HU** tab contains all the handing units (HUs) created for an outbound delivery order document after all the items have been picked. You can manually create multiple HUs for an outbound delivery order for repacking into separate HUs.

■ PPF Actions

The **PPF** tab of the outbound delivery order document contains for the PPF actions triggered to create follow-on documents, for example, creating picking warehouse tasks, creating waves, or printing pick warehouse orders.

As shown in Figure 5.4, the **Items** tab of the outbound delivery order contains the information like product master, quantity, batch, expiration date, country of origin, and defined item type and item category. The outbound delivery order item level also contains important information that directs the movement of products in EWM, for example, warehouse process type, stock type, door, staging bay, goods movement bin, and consolidation group.

Like the outbound delivery order header, the item level also contains tabs like **Status**, **Dates/Times**, **Locations**, **Partner**, **Addnl. Quantities**, and **Texts**.

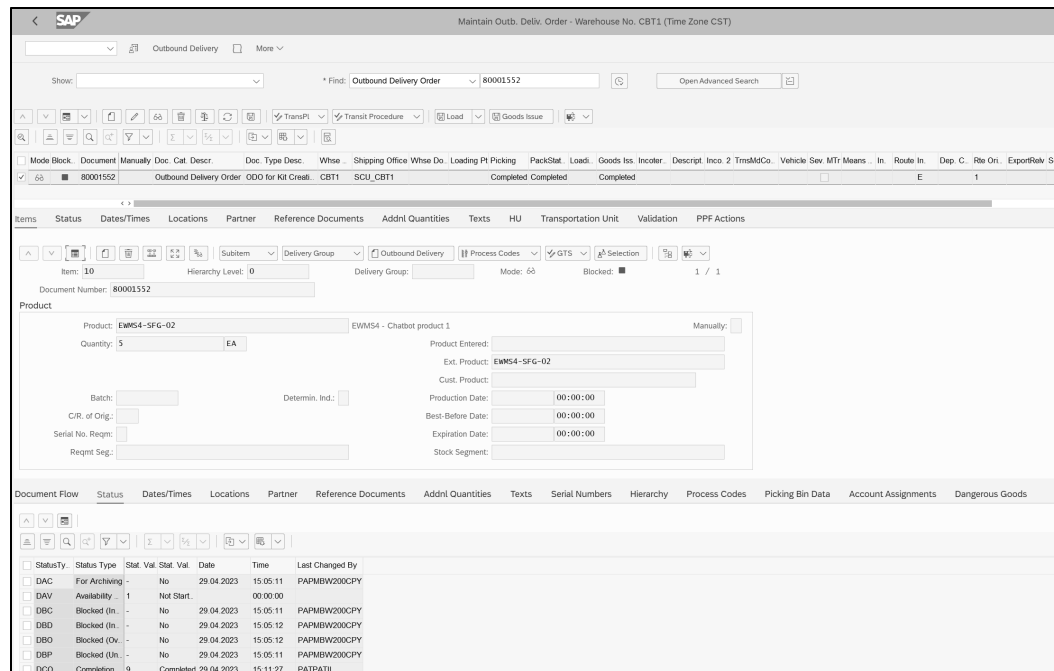


Figure 5.4 Maintaining Outbound Delivery Order Items

In addition, on the item level, an outbound delivery order has the following tabs:

- **Serial Numbers**

The **Serial Numbers** tab is a list of serial numbers for the items picked for an outbound delivery order document item if the product is relevant for serialization.

- **Process Codes**

The **Process Codes** tab provides a list of process codes applied for outbound delivery order document items to adjust delivery quantities using process codes.

- **Account Assignments**

The **Account Assignments** tab provides the information about the account assignment transferred from SAP S/4HANA for the outbound delivery, such as a work breakdown structure (WBS), a cost center, or an order.

- **Dangerous Goods**

The **Dangerous Goods** tab provides information like dangerous goods class, hazard ID, etc., if the products in a delivery line item is hazardous.

Outbound Deliveries

An outbound delivery document is created automatically in EWM once a goods issue is posted for the outbound delivery order or is created manually when you

click an outbound delivery from the outbound delivery order. This document triggers the update of goods issue in outbound delivery in SAP S/4HANA. You can also perform subsequent processes such as creation of invoice documents, print bills of lading, etc.

You can access an outbound delivery via the SAP Easy Access menu path **Logistics • SCM Extended Warehouse Management • Extended Warehouse Management • Delivery Processing • /SCWM/FD - Maintain Outbound Delivery**, as shown in Figure 5.5.

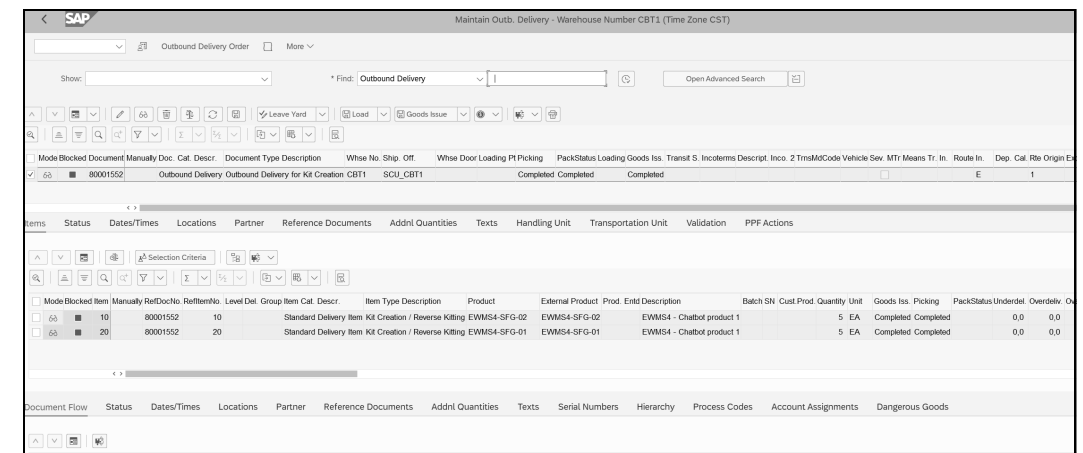


Figure 5.5 Maintaining an Outbound Delivery

Some functionalities available for an outbound delivery include the following:

- Setting and resetting loading statuses
- Setting and resetting yard statuses
- Posting and canceling goods movements
- Requesting an invoice be canceled if the document supports invoicing before goods issue

5.2.2 Stock Removal Strategies

Stock removal strategies (or stock removal rules) are used to determine the storage bins from which products should be removed from stock. As shown in Figure 5.6, the system uses data from the outbound delivery order, the warehouse product master, the hazardous substance master, and the packaging specification to determine the storage bin for picking.

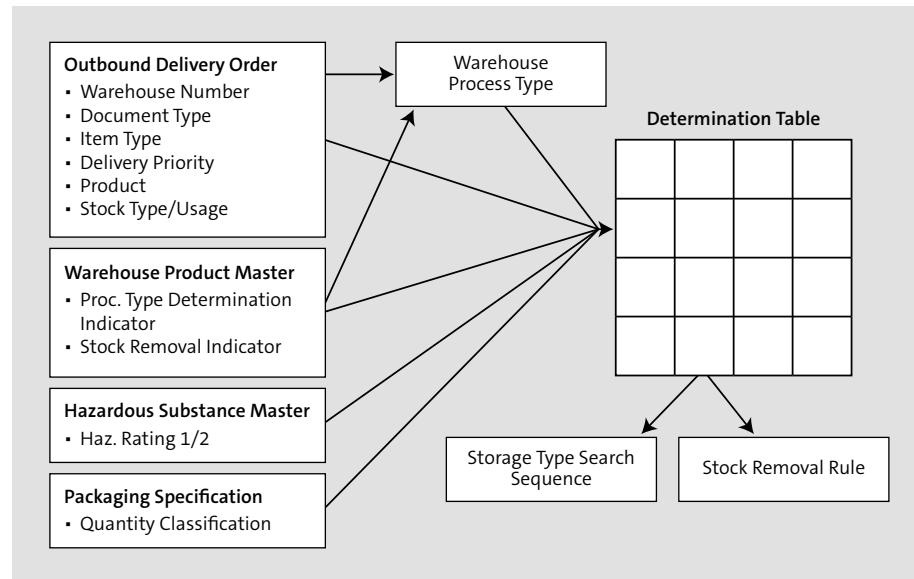


Figure 5.6 Stock Removal Strategy Determination

As shown in Figure 5.6, stock determination strategies are assigned to storage type search sequences and stock removal rules. In the following sections, we'll review the available stock removal rules and then explain the storage type determination.

Stock Removal Rules

A stock removal rule defines which information the system should use to sort quants in a storage bin to pick the products for an outbound delivery order. Stock removal rules can be used with storage type search sequences to determine the right storage bin and quant. A stock removal rule is configured via the IMG menu path **SCM Extended Warehouse Management • Extended Warehouse Management • Goods Issue Process • Strategies • Specify Stock Removal Rules**. In our example shown in Figure 5.7, the system determines the FIFO stock removal rule-based on the **WDATU** sort field (**Date and Time of Goods Receipt**).

Let's walk through the available stock removal rules:

■ First in, first out (FIFO)

FIFO is a stock removal strategy in which the goods receipt date is used as the sort field, and then, quants are sorted in ascending order based on the goods receipt date. Thus, in this stock removal rule, the stock with the earliest goods receipt date are proposed for picking from the storage type. This strategy is usually chosen for perishable goods. Two sort fields can be used in this stock removal rule:

- **WDATU**: This sort field is used for the date and time of the goods receipt.
- **WDATU_DATE**: This sort field is only the goods receipt date, without the time of day.

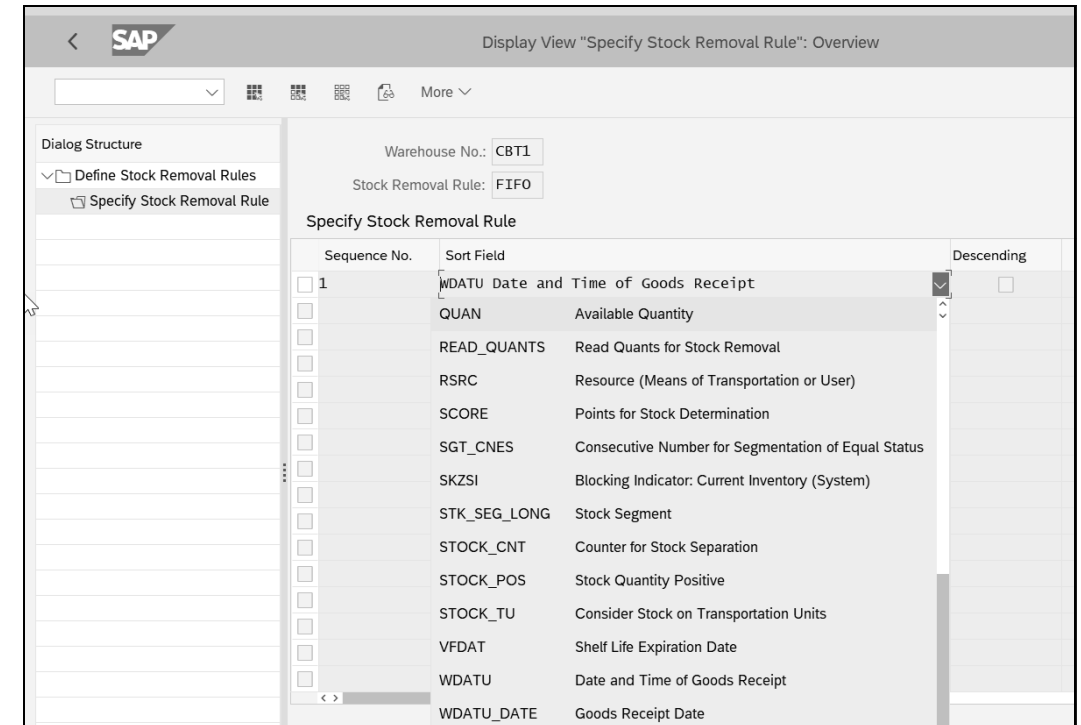


Figure 5.7 Stock Determination Rule

■ Stringent FIFO

Stringent FIFO is a stock removal strategy that picks the oldest quants, not just from a single storage type, but at the storage group level or among a group of storage types. This strategy is used when you want the system to propose picking from the oldest quant across multiple storage types. Storage type groups are configured via the IMG menu path **SCM Extended Warehouse Management • Extended Warehouse Management • Goods Receipt Process • Strategies • Storage Type Search • Definition of Groups • Define Storage Type Groups**. As shown in our example in Figure 5.8, stringent FIFO has been applied to storage group **SFIF**. This strategy will use the FIFO strategy to search for stock across all storage types assigned to storage group **SFIF**.

After defining a storage type group, storage types are assigned to the storage type group via the IMG menu path **SCM Extended Warehouse Management • Extended Warehouse Management • Goods Receipt Process • Strategies • Storage Type Search • Definition of Groups • Assign Storage Types to Storage Type Groups**. Figure 5.9 shows a list of storage types assigned to storage group **SFIF**, for which the stringent FIFO strategy is used.

Next, you can assign the storage group to a storage type search sequence via the IMG menu path **SCM Extended Warehouse Management • Extended Warehouse Management • Goods Issue Process • Strategies • Specify Storage Type Search Sequence**. Figure 5.10 shows the assignment of storage type group (**StTypeGrp**)

to storage search sequence (**Sequence No.**). This storage type search sequence is used in storage type search sequence determination.

Warehouse No.: CBT1
St. Type Group: SFIF

Storage Type Groups

Description: Strict FIFO
Stock Removal Rule: FIFO
Putaway Rules: No Putaway Rule
Check Max. Quantity:
TypeMax.Qty: Maximum Quantity

Figure 5.8 Defining a Storage Type Group

WhN	STG	Description	Ty.	
<input type="checkbox"/>	CBT1	SFIF	Strict FIFO	0010
<input type="checkbox"/>	CBT1	SFIF	Strict FIFO	0020
<input type="checkbox"/>	CBT1	SFIF	Strict FIFO	0030
<input type="checkbox"/>	CBT1	SFIF	Strict FIFO	0040
<input type="checkbox"/>	CBT1	SFIF	Strict FIFO	0050
<input type="checkbox"/>	CBT1	SFIF	Strict FIFO	0060
<input type="checkbox"/>	CBT1	SFIF	Strict FIFO	0070
<input type="checkbox"/>	CBT1	SFIF	Strict FIFO	0080

Figure 5.9 Assigning Storage Types to Storage Type Groups

Warehouse No.: CBT1
Sequence: SFIF Strict FIFO

Assign Storage Types to Storage Type Search Seq.

Sequence No.	Storage Type	StTypeGrp	TU
<input type="checkbox"/>	1	SFIF	<input type="checkbox"/>

Figure 5.10 Assigning a Storage Type Group to a Storage Type Search Sequence

■ Last in, first out (LIFO)

For some industries (or for some products), stock cannot be removed with the FIFO strategy. For example, in the building materials industry, products to be removed from stock, such as lumber, are stacked on top of stock that is already stored in the warehouse. To execute the FIFO strategy, a warehouse worker would have to remove the stock lying on top or in front of other stock to retrieve the oldest stock for stock removal. In this case, you can use LIFO strategy, and now, when the system searches for a suitable quant to remove the stock, it always suggests the last quant that was placed into inventory.

LIFO also uses the same WDATU and WDATU_DATE sort fields for sorting quants. Like stringent FIFO, you can also implement stringent LIFO with the same storage group used for stringent FIFO.

■ Shelf-life expiration date

A shelf-life expiration date removal strategy ensures that the products and batches with the shortest shelf-life are removed from stock first. In this strategy, the system sorts all the quants in the storage type in ascending order for the shelf-life expiration date field (VFDAT) and proposes the storage bin containing stock with the shortest shelf-life.

■ Partial quantities first

In this strategy, the system takes a full handling unit (HU) first or tries to remove the stock in partial HUs first, based on the required quantity. This approach helps optimize the management of stock in the warehouse. In this strategy, the number of partial HUs are kept to a minimum, and you can pick one of the following options:

- Full pallet: In this case, you may pick an HU with oldest goods receipt date.
- Partial pallet or less than full pallet: In this case, you may pick from partial pallets.

To implement this strategy, you must maintain the following settings:

- Define a stock removal rule with ascending quantity (piece) and a stock removal rule with descending quantity (standard HU). As an additional sort field, you would use the goods receipt date.
- Define quantity classifications for the warehouse in Customizing and use these to determine the stock removal rules.
- Define a packaging specification for the product or use alternative UoMs. The packaging specification or the alternative UoM is then used to determine the quantity classification.

■ Stock removal suggestion according to quantity

You can implement this strategy to remove stock based on quantity size. For example, if small quantities (cartons) are requested, then you can pick this stock from storage type A. If a large quantity (a full pallet) is requested, then you pick stock from storage type B. This strategy works on the same principle or partial quantity first. You require a packaging specification or alternative UoMs to

determine quantity classifications. The difference is that, with the help of quantity classifications, you determine different storage type search sequences rather than different stock removal rules.

■ Fixed bin

With the fixed bin strategy, the system uses the storage bins that were assigned to the product master to find stock. Fixed bins are assigned to the products by storage type using Transaction /SCWM/BINMAT, and multiple fixed bins can be assigned to the same product in the storage type.

Consider the following scenario: Several fixed bins are assigned to the same product. You perform order-based picking. If an open warehouse task exists for fixed bin 1, the system should create the next warehouse task for fixed bin 2 to avoid multiple workers trying to pick from the same bin. To implement this feature, include the **PICK_ITM (Open Stock Removal Items per Storage Bin)** sort field or the **PICK_QT (Open Quantity to Remove per Storage Bin)** sort field in your stock removal rule.

If you use fixed storage bin assignments and allow negative available quantities for a storage type, the system also considers the storage bins that do not contain any stock when determining the stock to pick. As a result, the system can create warehouse tasks for which no stock exists. You can use replenishment control to ensure that stock is always available in the storage bin at the time of picking.

■ Preferred UoM last

If you use this strategy, the system first proposes quants that do not use the preferred UoM. This strategy requires the use of stock-specific units of measure (SUoMs).

The system compares the preferred UoM in the product's material master with the alternative UoM of the quants. If these UoMs are not the same, the system proposes the quant first. When you're working with SUoMs, the alternative UoM is set automatically in the quant during goods receipt posting.

For this stock removal rule, you must perform the following tasks:

- Specify a preferred UoM as the sort criterion (sort ascending).
- Specify at least one UoM as being stock-specific for your products.
- Maintain a preferred UoM in the product material master (in SAP S/4HANA) or in the warehouse product.

Storage Type Search Sequence and Determination

A storage type search sequence contains information about the storage types in which the system searches for stock for removal and about the sequence in which the stock should be sorted. The sequence of preferred storage type groups from which the products should be removed is stored in a preference list. You can specify storage type search sequence via the IMG menu path **SCM Extended Warehouse**

Management • Extended Warehouse Management • Goods Issue Process • Strategies • Specify Storage Type Search Sequence.

Stock removal strategy input parameters are taken from the warehouse master to determine the stock removal strategies, as shown in Figure 5.11. The input parameters required are set up via the IMG menu path **SCM Extended Warehouse Management • Extended Warehouse Management • Goods Issue Process • Strategies • Determine Storage Type Search Sequence for Stock Removal**.

Warehouse Number	2	Rmvl	Whse Process Type / Group	Quantity Classif.	Stock Type / Group	Tpe	Use	HazRat1	HazRat2	Stora...	RemR
<input type="checkbox"/>	CBT1	<input type="checkbox"/>	1010			↓				PICK	FIFO
<input type="checkbox"/>	CBT1	<input type="checkbox"/>	2010			↓				PICK	FIFO
<input type="checkbox"/>	CBT1	<input type="checkbox"/>	2100			↓				PICK	FIFO
<input type="checkbox"/>	CBT1	<input type="checkbox"/>	3010			↓				0020	FIFO
<input type="checkbox"/>	CBT1	<input type="checkbox"/>	3100			↓				PICK	FIFO
<input type="checkbox"/>	CBT1	<input type="checkbox"/>	4100			↓				PICK	FIFO
<input type="checkbox"/>	CBT1	<input type="checkbox"/>	KT50			↓				PICK	FIFO
<input type="checkbox"/>	CBT1	<input type="checkbox"/>	OFTC			↓				OFTC	FIFO
<input type="checkbox"/>	CBT1	<input type="checkbox"/>	OFTP			↓				OFTP	FIFO
<input type="checkbox"/>	CBT1	<input type="checkbox"/>	OMDX			↓				OMDX	FIFO
<input type="checkbox"/>	CBT1	<input type="checkbox"/>	COMP			↓				PICK	FIFO
<input type="checkbox"/>	CBT1	<input type="checkbox"/>	COMP	KT01		↓				COMP	FIFO
<input type="checkbox"/>	CBT1	<input type="checkbox"/>	COMP	KT50		↓				COMP	FIFO
<input type="checkbox"/>	CBT1	<input type="checkbox"/>	COMP	Y320		↓				COMP	FIFO
<input type="checkbox"/>	CBT1	<input type="checkbox"/>	PICK	2010		↓				PICK	FIFO
<input type="checkbox"/>	CBT1	<input type="checkbox"/>	PICK	3010		↓				PICK	FIFO
<input type="checkbox"/>	CBT1	<input type="checkbox"/>	PICK	KT01		↓				PICK	FIFO
<input type="checkbox"/>	CBT1	<input type="checkbox"/>	PICK	KT50		↓				PICK	FIFO

Figure 5.11 Determining the Storage Type Search Sequence for Stock Removal

Let's walk through the input parameters:

■ Warehouse Number

A warehouse number is a mandatory parameter derived from a warehouse request or an outbound delivery order.

■ 2 (step picking flag)

This parameter is used for the allocation step in a two-step picking process, for example, picking products for multiple deliveries from a source bin into an intermediate storage bin as a withdrawal step and then picking products from this intermediate storage bin to a goods issue zone as an allocation step for each warehouse request. So, two warehouse tasks will be created to perform a two-step picking process.

■ Rmvl (stock removal control indicator)

Stock removal is taken from the warehouse product master. This parameter is usually used for the picking process to determine the best possible storage bin and best possible stock.

■ Whse Process Type/Group

This parameter is taken from the outbound delivery order, which is determined based on the document type, item type, process type determination, and delivery priorities.

■ Quantity Classif.

The quantity classification is taken from the packaging specification or from the alternative UoM (i.e., case, layer, or pallet).

■ Stock Type/Group

This parameter is taken from the outbound delivery group, which was determined based on the availability group from the plant and storage location.

■ Type

The type be either sales order stock or project stock. This parameter is taken from an outbound delivery order, which is derived from SAP S/4HANA outbound delivery.

■ Use (stock usage)

This parameter is taken from an outbound delivery, which is derived from an SAP S/4HANA outbound delivery.

■ HazRat1 and HazRat2 (hazard rating)

This parameter is taken from the hazardous ratings of the product in an outbound delivery order.

Various indicators influence the storage type search. If you use the stock removal control indicator from the product master, and products have different stock types or are managed in special stocks (such as sales order stock), then the number of required entries in the storage type search sequence table can be quite large. You can set up an *access strategy* to optimize the storage type search via the IMG menu path **SCM Extended Warehouse Management • Extended Warehouse Management • Goods Issue Process • Strategies • Optimize Access Strategies for Stor. Type Determination in Stock Removal**. Figure 5.12 shows an example access strategy to determine the search sequence for picking products.

Ware...	Sequence No.	2SP	RmVID	Proc. Type	QC	ST	Cat.	Use	Risk Rating 1	Hzrd Rating 2
<input type="checkbox"/> CBT1	1	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> CBT1	2	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Figure 5.12 Optimizing Access Strategies for Storage Type Determination in Stock Removal

5.2.3 Process-Oriented and Layout-Oriented Storage Control

POSC and LOSC processes are covered in Chapter 12, but in this section, we'll discuss how storage processes are used specifically in outbound scenarios.

POSC is used to map complex picking processes in EWM. Our example shown in Figure 5.13 is a hybrid scenario where we have both LOSC and POSC processes for products that are stored in a high rack storage area and that are now required to be picked for a customer shipment.

The following steps are involved:

- 1 The first step is to remove stock from high rack storage areas to pick points by cranes or robots in automated storage and retrieval system (AS/RS). This system creates two warehouse tasks; the first warehouse task with an active status removes the stock from the high rack storage area to the pick point bin.
- 2 The next step is to move the HU from pick point package station to perform packing or value-added services (VAS). This second warehouse task becomes active after the first warehouse task from the previous step has been confirmed at the pick point.
- 3 After the VAS and packing (i.e., labeling) are performed, you can conduct a visual inspection or pack the product according to customer-specific packing requirements.
- 4 When HUs are closed in the previous step, the system creates a warehouse task to move the product to the ship station. Now, you can process the final shipment and load it onto the truck.

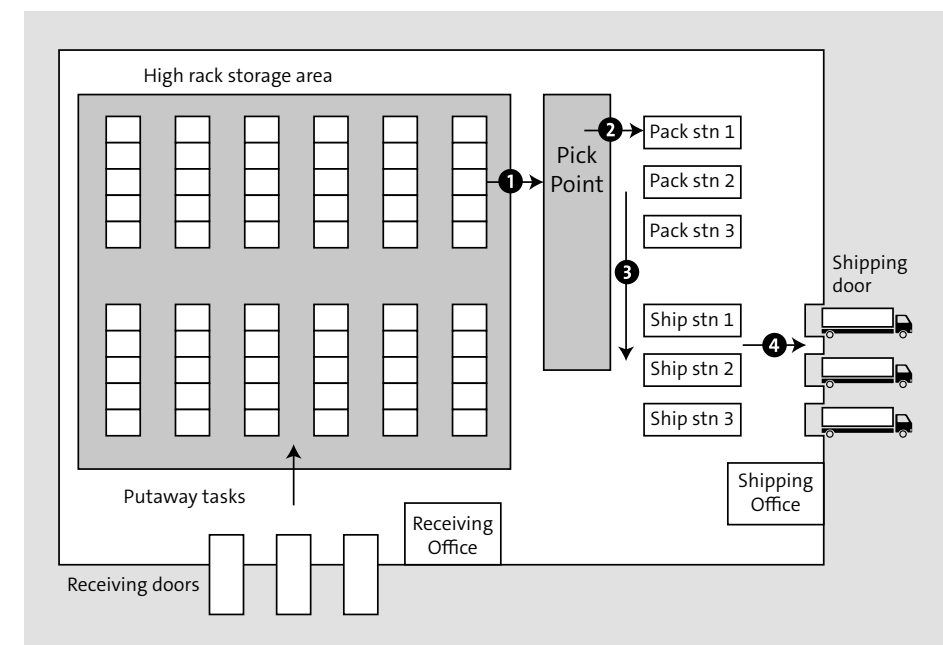


Figure 5.13 Outbound LOSC Process

5.2.4 Pick Denial: Handling Differences in Picking

In a real-world scenario, sometimes EWM cannot create a pick warehouse task for the entire quantity of an outbound delivery order. This problem may occur if insufficient stock exists in the storage bin, thus leading to a short pick or complete pick denial. Various other causes include if a storage bin lacks enough stock of a product, if a storage bin is blocked, if a storage bin is physically damaged, or if maintenance work on or near the storage bin is being conducted and thus no forklifts are allowed for picking.

Two scenarios can cause a pick denial:

- **Pick denial during warehouse task creation**

During pick task creation for an outbound delivery order, the EWM system did not find enough stock to meet the requested quantity. In this case, the system can be set up to execute a pick denial.

- **Pick denial after bin denial during warehouse task confirmation**

In this case, when you confirm the picking warehouse task with less than the requested pick quantity, there is no available stock in the warehouse. Then, the system can be set up to automatically execute a pick denial.

Let's review the key configuration steps for pick denial next:

1. **Define exception code**

Exception codes for pick denials must be defined and assigned to the internal exception codes that are predefined in an EWM system. SAP provides a list of predefined internal exception codes. Refer to Chapter 9 for the details about exception code configuration steps, for example, exception code ZCB1.

2. **Activate pick denial for warehouse**

The first step in a pick denial process is to activate pick denial for a warehouse. You can activate pick denial via the IMG menu path **SCM Extended Warehouse Management • Extended Warehouse Management • Goods Issue Process • Pick Denial • Activate Pick Denial at Warehouse Number Level**. Figure 5.14 shows the activation of a pick denial at the warehouse level.

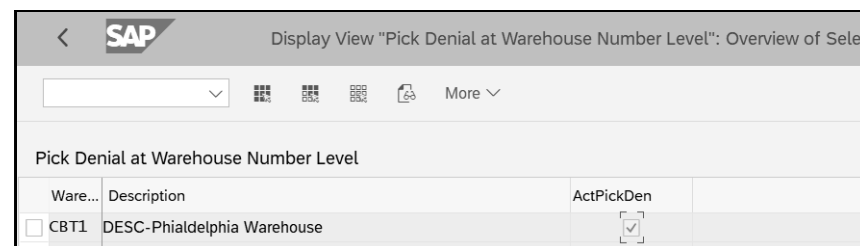


Figure 5.14 Activating Pick Denial at the Warehouse Number Level

3. **Specify pick denial at warehouse process type level**

Pick denial processing actions are configured at the warehouse process type level. You can activate pick denial processing for a warehouse process type via

the IMG menu path **SCM Extended Warehouse Management • Extended Warehouse Management • Goods Issue Process • Pick Denial • Specify Pick Denial at Warehouse Process Type Level**. Figure 5.15 shows the activation of a pick denial for warehouse process type level.

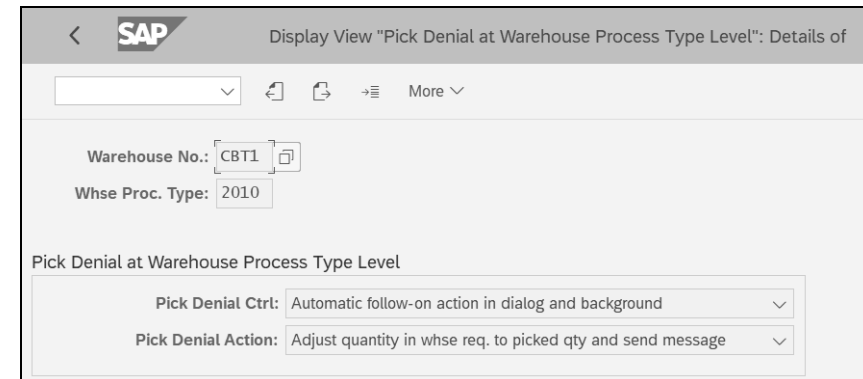


Figure 5.15 Specifying Pick Denial at the Warehouse Process Type Level

4. **Assign exception code to pick denial**

You can assign an exception code to an internal exception code via the IMG menu path **SCM Extended Warehouse Management • Extended Warehouse Management • Goods Issue Process • Pick Denial • Assign Internal Exception Codes to Exception Codes**. Figure 5.16 shows the assignment of an internal exception code that triggers a pick denial in case inconsistencies arise.

Ware...	Int.Excptn	Description	Exception Code	Description
<input type="checkbox"/> CBT1	WR01	Adjust Delivery Quantity	ZCB1	Pick Denial

Figure 5.16 Assigning Internal Exception Codes to Exception Codes

5.2.5 Direct Outbound Deliveries

In addition to the outbound deliveries created in an SAP S/4HANA system, sales orders or STOs from a sending plant are also replicated to the EWM system. An outbound delivery order also can be created directly in EWM, which in turn creates an outbound delivery in SAP S/4HANA. In many business scenarios, the outbound delivery must be created directly, such as in the following cases:

■ Pickups

Two pickup scenarios require direct outbound deliveries:

- Direct sales: A customer requests goods and picks them up on-site in your warehouse. In this case, you do not create sales order. Instead, you can directly create an outbound delivery in EWM for the requested quantity and perform picking. This document can be used for billing.
- Account assignment: In the case of internal customers, if they request goods to be picked up on-site at your warehouse location, you can create a direct outbound delivery and perform a goods issue to the account assignment.

■ Scrapping

You can create a direct outbound delivery for scrapping processes in a warehouse and perform goods issue for scrapping. This direct outbound delivery replicates to SAP S/4HANA and posts the goods issue.

■ Immediate deliveries

In the sending warehouse, let's say the truck is already loaded, and the warehouse shipper finds that additional space is available on the truck to ship other products. If they realize there's a requirement for the products at receiving, then they can create a direct outbound delivery and load the goods on the same truck. This is called a *push procedure*.

A company store can also trigger a direct outbound delivery process from a company warehouse for goods, in what is called a *pull procedure*.

■ Kit-to-stock or reverse kitting

In VAS for a kitting process, the system creates direct outbound deliveries for the components needed in the kitting process. In the case of reverse kitting, a direct outbound delivery is created for kit products.

An availability check is conducted so the system confirms whether a product can be confirmed for a direct outbound delivery created in EWM. Since direct outbound deliveries are created in EWM, the availability check is performed in the EWM system and SAP Advanced Planning and Optimization, but not in SAP S/4HANA. EWM sends the direct outbound delivery directly to the SAP S/4HANA system. Organizational data and logistics data are copied to outbound delivery orders from SAP S/4HANA. Once you enter the product and quantity, the system automatically determines the data based on the configuration.

Since this order is an outbound delivery order, no outbound delivery request is created. Also, the direct outbound delivery scenario supports non-pick-relevant items, for example, the generation of items from HUs. A direct outbound delivery also performs compliance checks using SAP Global Trade Services (SAP GTS) if the deliveries are international and thus require intrastate documentation.

Keep in mind the following constraints for direct outbound deliveries:

- You cannot use credit management in a direct outbound delivery process.
- The price determination feature in SAP S/4HANA does not provide the same functions in a direct outbound delivery.

- You cannot use configurable products for direct outbound deliveries.
- You cannot perform billing in SAP Customer Relationship Management (SAP CRM) for direct outbound deliveries.
- You can extend bills of materials (BOMs) for direct outbound deliveries.
- SAP S/4HANA does not send any messages to the EWM system.
- Kit-to-order does not support direct outbound deliveries.
- Direct outbound deliveries are relevant for back-order processing.

You can create direct outbound deliveries in EWM via the SAP Easy Access menu path **Logistics • SCM Extended Warehouse Management • Extended Warehouse Management • Delivery Processing • Outbound Delivery • /SCWM/PRDO - Maintain Outbound Delivery Order**. Before entering all the details in the delivery document, as shown in Figure 5.17, you'll need to maintain the party entitled to dispose and shipping office as default entries.

The screenshot shows the SAP 'Maintain Outb. Deliv. Order' interface. The title bar indicates 'Warehouse No. CBT1 (Time Zone CST)'. The main area is titled 'Header Data' and contains the following information:

- Document: 9000000605
- Doc. Category: PDO Outbound Delivery Order
- Document Type: ODO Direct Outbound Delivery
- Warehouse No.: CBT1
- Ship. Off.: SCU_CBT1
- Manually: X
- Mode: 60
- Blocked: 1 / 1
- Warehouse Door: []
- Vehicle: []
- Means of Trans.: []
- Route: []
- Calendar/Sched.: []
- Export Relevancy: []
- Transp. Mode: []
- Transp.PlngType: []
- Several MTR: []
- Determin. Ind.: []
- Determin. Ind.: E
- Route Origin: 1
- Seq. No.: 0
- Transp. Mode (Exp.): []
- Picking: Not Started
- Packing Status: Not started
- Loading: Not Started
- Goods Issue: Not Started

Figure 5.17 Direct Outbound Delivery

5.2.6 Cartonization Planning

Cartonization planning is used to optimize the packing of shipping HUs based on the information from the product master and outbound delivery orders. Cartonization planning creates planned shipping HUs, which are separate from regular shipping HUs. Planned shipping HUs do not exist physically, but they contain information about packaging materials and the contents to be packed. Planned shipping HUs can be created manually or automatically, and you can nest them.

With automatic cartonization, you can choose from among the following variants:

- Cartonization planning for outbound delivery orders
- Cartonization planning for waves
- Cartonization during warehouse order creation

Cartonization planning uses planned shipping HUs as templates for creating shipping HUs for picking and packing in outbound processes.

5.3 Wave Management

In EWM, *wave management* is a process where you can combine warehouse request items or split warehouse requests from outbound deliveries into waves to help pick multiple deliveries in a warehouse. You can group warehouse request items into waves to manage the process and optimize warehouse processing. This grouping of warehouse request items controls warehouse activities such as picking or posting changes. The grouping is then processed together in subsequent processes. The items assigned to a wave are similar in nature, whether they are picked from similar area or picked in similar way due to their handling requirements. Wave management releases a group of warehouse items that can be shipped at the end of the day or at an earlier time, so that they are picked and ready for shipping.

As shown in Figure 5.18, wave items are assigned independently to waves though they derive from different outbound delivery orders. This approach helps the warehouse manage warehouse request items independently and pick items in the most efficient way.

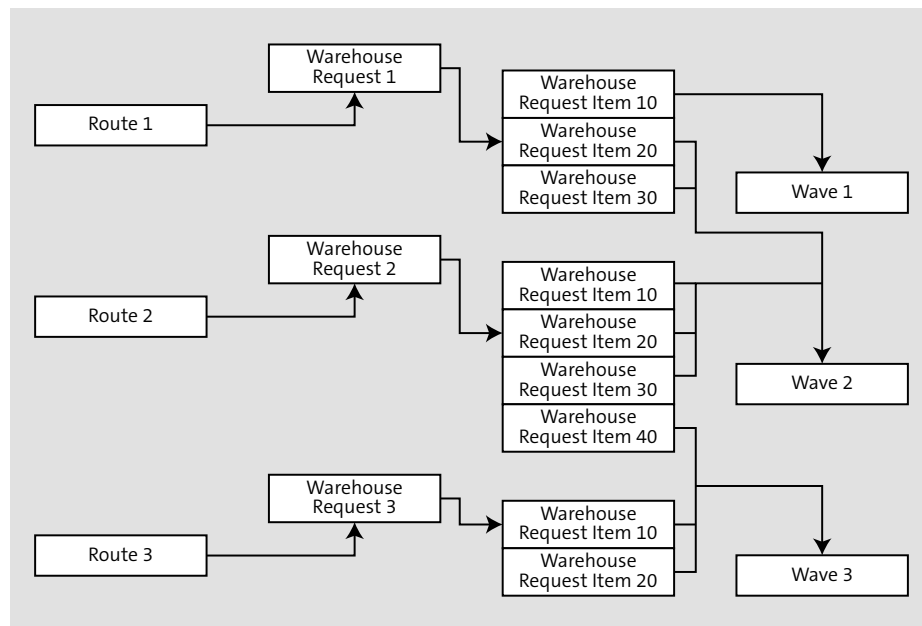


Figure 5.18 Grouping of Warehouse Request Items

You can manually create waves via the SAP Easy Access menu path **Logistics • SCM Extended Warehouse Management • Extended Warehouse Management • Work**

Scheduling • Wave Management • /SCWM/WAVE - Maintain Waves. Figure 5.19 shows a list of waves created for outbound delivery orders. For example, wave 2000000004 has been created for outbound delivery order 80001546.

Mode	Wave Template Opt.	Description	Wave Ty.	Wave Cat.	Calendar	Rise Mt.	Wave Compl.	Wave Com.	Cutoff Date	Cutoff Time	Release Date	Rise Time	2nd Rise Da.	2nd Rise T.	Pick. Compl.	Pack. Corr.	
	1	Manual Wave Template	WT01	01					28.04.2023	16:00:00	27.04.2023	08:45:00	27.04.2023	09:00:00	27.04.2023	11:00:00	27.04.2023
	1	Manual Wave Template	WT01	01					28.04.2023	16:00:00	27.04.2023	08:45:00	27.04.2023	09:00:00	27.04.2023	11:00:00	27.04.2023
	1	Manual Wave Template	WT01	01					03.05.2023	16:00:00	02.05.2023	08:45:00	02.05.2023	09:00:00	02.05.2023	11:00:00	02.05.2023

Figure 5.19 Maintaining Waves

In the following sections, we'll explore several key facets of wave management, such as wave templates, automatic wave determination, and wave processing.

5.3.1 Manage Waves with Wave Templates

Warehouse request items are grouped into waves based on the settings configured in a *wave template*, which contains parameters controlling the creation of waves for warehouse requests. Wave templates are determined using a condition technique. You can use wave templates to create waves manually, or you can release them automatically. You can assign wave items or split items from a warehouse request to existing waves based on wave templates. In automatic wave assignment, the same wave attributes can be reused for different warehouse request items that comply with the same conditions.

The following are the attributes of wave templates:

- Release method (i.e., automatic, manual, or immediate)
- Wave type that enables specific monitoring in the warehouse monitor
- Wave category, which can be used to filter for a warehouse order creation rule
- Date- and time-related data fields for determining wave completion, which includes start and end dates and times
- Calendar for defining workdays
- Capacity profiles for defining capacity limits

After a wave template is created, you can assign the wave template manually when you create manually, or a wave template can be determined automatically when the warehouse request document is created in EWM.

Wave templates are defined via the SAP Easy Access menu path **Logistics • SCM Extended Warehouse Management • Extended Warehouse Management • Work Scheduling • /SCWM/WAVETMP - Maintain Wave Templates**, as shown in Figure 5.20.

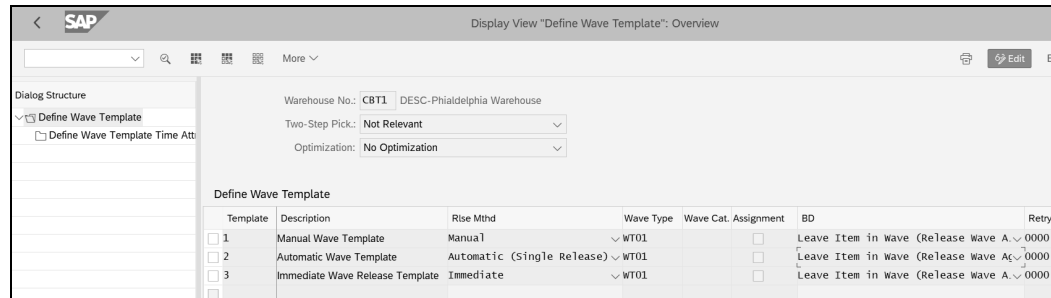


Figure 5.20 Defining Wave Templates

For each wave template, you must define several key parameters that characterize the template, such as the following:

- **Rise Mthd**
This parameter defines which method is allowed (i.e., manual, automatic, or immediate).
- **Wave Type**
This parameter is assigned to a wave template to group waves with similar characteristics.
- **Wave Cat.**
Defines the wave type that you can use as a filter value for the warehouse order creation rule.
- **Assignment**
If you set this indicator for a wave, you can also assign delivery items to the wave following wave release, until the wave cutoff date/time.
- **BD**
This parameter controls how the system proceeds if a bin denial occurs during a picking warehouse task. These options are only evaluated if no replacement warehouse task can be created for the same warehouse order. Choose one of the following actions:
 - Default: Leave the warehouse request item in the wave.
 - **A**: Remove the warehouse request item from the wave only if stock was found in alternative bins or replenishment was requested.
 - **B**: Create a warehouse task immediately in the same wave.
 - **C**: Remove the warehouse request item from the wave even if no alternative stock was found. A pick denial will not be triggered when choosing this option.

■ Retry

If you set a retry interval for a wave template, the system automatically schedules a new wave release job when a wave using the template has errors. You can specify the retry interval in minutes, and the system would schedule the new wave release job accordingly. If no retry interval exists, the system does not create a new wave release job.

Each wave template is assigned to at least one wave template option. Wave template options are time-dependent attributes assigned to a wave template. The system compares the requirements of the warehouse request with wave template options, selects the suitable wave template option, and uses the **Release Time** value for the automatic release of waves. Figure 5.21 shows the attributes to be maintained in a wave template.

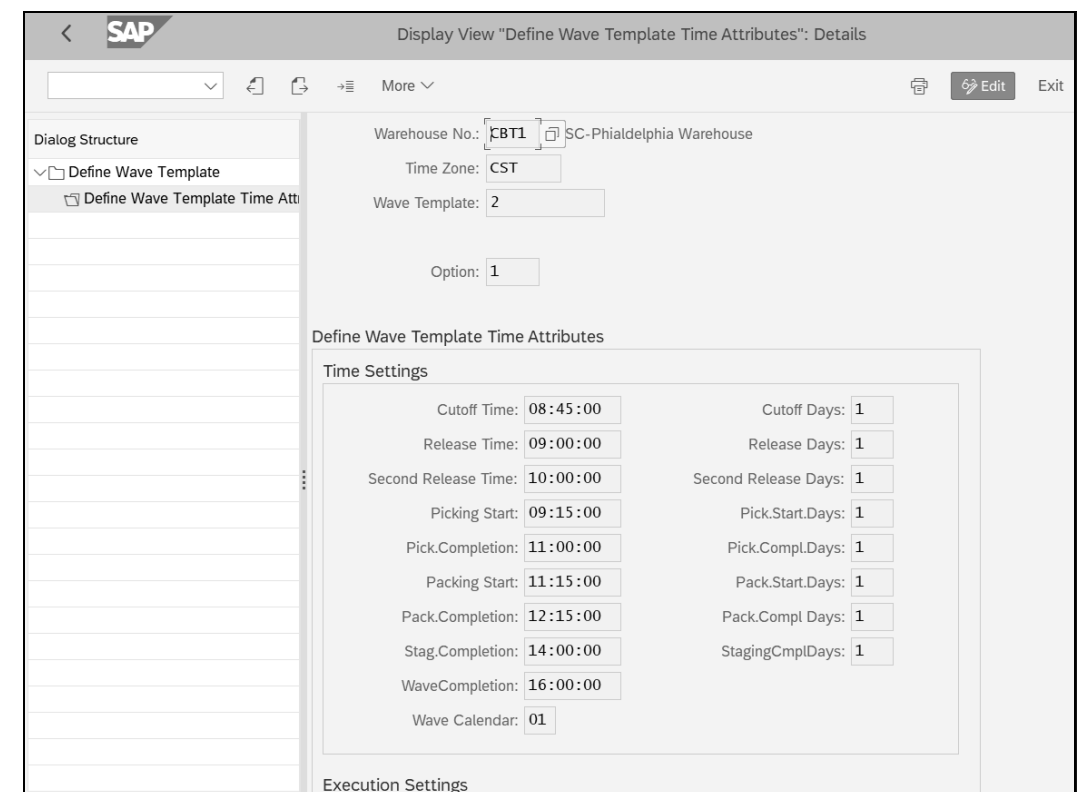


Figure 5.21 Wave Template Options

Let's walk through the key fields for wave template options:

■ Option

Assign a numeric for each option maintained. You can have more than one wave template option.

■ Cutoff Time and Cutoff Days

The first field represents the time until which you can add items to a wave, and

the second field represents the number of days before the wave completion date.

- **Release Time and Release Days**

The first field represents the time by which the wave should be released, and the second field represents the number of days before the wave completion date.

- **Second Release Time and Second Release Days**

The first field represents the second release time of a wave that is relevant for two-step picking. If automatic wave release is scheduled, a batch job is created to release the allocation step of the wave at the second release time. In the second field, the optional offset in days before the wave completion time can be used to calculate the second release time. The second release day represents the number of days before the wave completion date.

- **Picking Start and Pick.Start.Days**

The first field represents the time by which picking begins for the wave, and the second field represents the number of days before the wave completion date.

- **Pick.Completion and Pick.Compl.Days**

The first field represents the time by which picking for the wave must be completed, and the second field represents the number of days before the wave completion date.

- **Packing Start and Pack.Start.Days**

The first field represents the time by which the wave should begin, and the second field represents the number of days before the wave completion date.

- **Packing.Completion and Pack.Compl.Days**

The first field represents the time by which the wave should be completed, and the second field represents the number of days before the wave completion date.

- **Stag.Completion and StagingCmplDays**

The first field represents the time by which staging of the wave should be completed, and the second field represents the number of days before the wave completion date.

- **WaveCompletion**

Represents the time for which the completion of all processing for the wave is planned.

- **Wave Calendar**

Represents a factory calendar that defines the valid days for the wave completion date. The system uses the wave calendar to calculate the wave completion date. The default calendar of the warehouse is used to calculate the remaining dates and times of the wave.

- **Special.Act.Indicat.**

You can use the special activity indicator to override a found activity during the wave release. For example, you can specify that, for a defined time, this indicator will override the found activity PICK with the activity NPCK, which indicates that this picking procedure should be executed at night.

- **Staging Area Group and Staging Area**

Staging areas are storage sections that fall within a storage type with role D. A staging area corresponds to a storage section, while a staging area group corresponds to a storage type. Staging areas are used as interim storage for goods after unloading or before loading. You can group multiple staging areas into staging area groups.

- **Capacity Profile**

Represents the capacity (maximum weight, volume, etc.) that can be added in a single wave.

5.3.2 Automatic Wave Determination

Automatic wave determination determines the valid wave template for outbound delivery orders created in EWM. Wave templates, wave types, and wave categories will determine and create waves for outbound delivery orders. In the following sections, we'll discuss the configuration steps required for the wave determination process.

Maintaining Wave Types and Categories

You can define wave types to represent different types of waves, each with special characteristics and behaviors, via the IMG menu path **Extended Warehouse Management • Extended Warehouse Management • Goods Issue Process • Wave Management • General Settings • Maintain Wave Types**. In our example shown in Figure 5.22, we've configured a wave type with special characters and behaviors. Wave types are primarily used for accessing and filtering waves in the warehouse monitor.

Ware...	Description	Wave Type	Description
<input type="checkbox"/> CBT1	<input type="checkbox"/> C-Phialdelphia Warehouse	WT01	Wave Type 01

Figure 5.22 Maintaining Wave Types

You can define wave categories and subsequently assign any existing wave categories to wave templates or to waves via the IMG menu path **Extended Warehouse Management • Extended Warehouse Management • Goods Issue Process • Wave Management • General Settings • Maintain Wave Categories**. Figure 5.23 shows the configuration of a wave category, which is primarily used as a filter for the determination and application of wave categories.

Ware...	Description	Wave Cate...	Description
<input type="checkbox"/> CBT1	DESC-Phialdelphia Warehouse	C1	Wave Category 1

Figure 5.23 Maintain Wave Categories

Setting Up Automatic Wave Generation for Warehouse Process Types

You can specify which warehouse process require waves to be generated automatically via the IMG menu path **Extended Warehouse Management • Extended Warehouse Management • Goods Issue Process • Wave Management • General Settings • Set Automatic Wave Generation for Warehouse Process Type**. If you set this indicator for a warehouse process type, then during the creation of a warehouse request of this warehouse process type, based on the condition technique for wave template determination, either one or more waves will be automatically created for the warehouse request, or one or more warehouse request items will be assigned to an existing wave(s). Figure 5.24 shows the setup for automatic wave generation, which enables either the creation of a new wave or the assignment of a warehouse request item to an existing wave.

Ware...	Whse Proc. Type	AutoWave
<input type="checkbox"/> CBT1	1010	<input type="checkbox"/>
<input type="checkbox"/> CBT1	1011	<input type="checkbox"/>
<input type="checkbox"/> CBT1	1012	<input type="checkbox"/>
<input type="checkbox"/> CBT1	1013	<input type="checkbox"/>
<input type="checkbox"/> CBT1	1100	<input type="checkbox"/>
<input type="checkbox"/> CBT1	2010	<input checked="" type="checkbox"/>
<input type="checkbox"/> CBT1	2011	<input type="checkbox"/>
<input type="checkbox"/> CBT1	2020	<input checked="" type="checkbox"/>

Figure 5.24 Setting Up Automatic Wave Generation for Warehouse Process Types

Maintaining Wave Capacity Profiles

In a wave capacity profile, you can define capacity limits for waves in a specific wave template option. Wave capacity profiles can be accessed via the IMG menu path **Extended Warehouse Management • Extended Warehouse Management •**

Goods Issue Process • Wave Management • General Settings • Maintain Wave Capacity Profiles. Figure 5.25 shows the configuration of a wave capacity profile to limit the maximum number of warehouse requests that can be assigned to a wave template option.

Warehouse No.: CBT1
CapacProf: I2

Capacity Profile for Waves

Description: Max Item Level of 20
Maximum No. Items: 20
Maximum Weight: 0,000
Weight Unit:
Max. Volume: 0,000
Volume Unit:
Max. Capacity: 0,000
No. of Waves: 0
Error at Cap.Overr.:
Beh. Lock: Do not abort Wave Creation

Figure 5.25 Maintaining Wave Capacity Profiles

Wave Template Determination

The wave template determination can be configured via the IMG menu path **Extended Warehouse Management • Extended Warehouse Management • Goods Issue Process • Wave Management • Wave Template Determination**. Wave template determination is performed in EWM using the PPF. When the warehouse request is created, the system checks whether the warehouse process type is set for automatic wave creation. If so, then the system schedules a PPF action, which you can configure to either process immediately or via the SAP report RSPFFPROCESS. For the wave template determination, you need to maintain the following items:

- **Define a field catalog**
A field catalog is a collection of fields used for building condition tables. You can select fields of your choice to create a condition table.
- **Define a condition table**
A condition table determines the combination of fields is used for creating condition records, based on which the system determines the wave templates.

■ Define an access sequence

Condition tables are assigned to an access sequence to let the system know the sequence in which it should look at condition tables until it finds a valid condition record.

■ Define a condition type

Condition types are assigned to access sequences that look for condition tables to determine valid condition records.

■ Define a determination procedure

You can create a determination procedure consisting of one or more condition types. SAP has delivered two standard, predefined condition determination procedures (OODL and OWHN). You can define customer-specific determination procedures as needed.

■ Assign a procedure to a document type

You can assign a determination procedure to a document type via the IMG menu path **Extended Warehouse Management • Extended Warehouse Management • Goods Issue Process • Wave Management • Wave Template Determination • Assign Procedure to Document Type**. As shown in Figure 5.26, enter the determination procedure for the warehouse and save. The system uses the assigned condition determination procedure for the document type after the warehouse request is created in EWM.

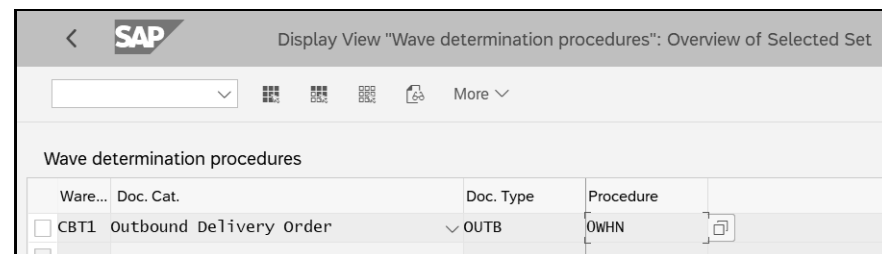


Figure 5.26 Assigning Procedures to Document Types

■ Define condition maintenance group

You can define condition maintenance group via the IMG menu path **Extended Warehouse Management • Extended Warehouse Management • Goods Issue Process • Wave Management • Wave Template Determination • Define Condition Maintenance Group**, as shown in Figure 5.27, which bundles the relevant condition tables and condition types for creating waves.

■ Maintain a condition record for wave template determination

You can maintain condition records via the SAP Easy Access menu path **Logistics • SCM Extended Warehouse Management • Extended Warehouse Management • Work Scheduling • Wave Management • /SCWM/WDGCM - Maintain Conditions for Determining Wave Templates**. Figure 5.28 shows a condition record created for a condition type; in our example, the SAP-delivered standard condition table **OWHN** has been used.

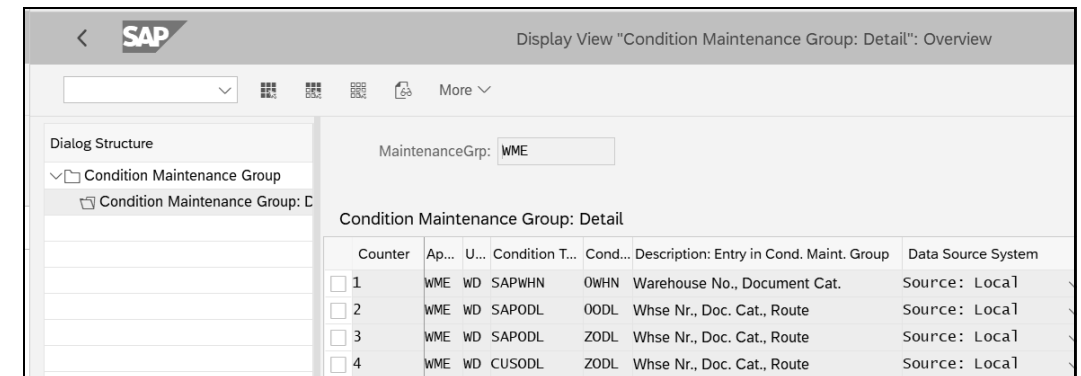


Figure 5.27 Defining Condition Maintenance Groups

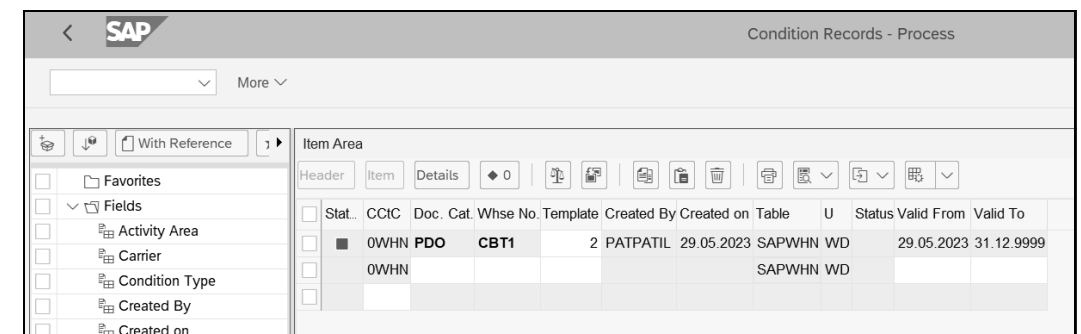


Figure 5.28 Maintaining Condition Records

5.3.3 Wave Processing

After waves have been created, you can use waves to further process the warehouse request items assigned to the wave. In the most common case, you would release a wave to create the warehouse tasks for the wave request items. You can process waves using wave processing (Transaction /SCWM/WAVE), the warehouse monitor (Transaction /SCWM/MON), or the shipping cockpit (Transaction NWBC).

The following points are important to keep in mind for wave processing:

- Waves can be locked/unlocked. This function lets you effectively block and unblock a wave from further processing.
- Waves can be merged, or you can split waves.
- A wave release action creates the warehouse tasks and subsequent warehouse orders for the warehouse request items assigned to a wave.
- Waves can be deleted. All warehouse request items are removed from the wave.

If the release strategy for the wave template is set to manual, then you must use the monitor or wave processing transaction to release the wave as appropriate.

Two-step picking is a form of optimized picking in which you remove stock from random or bulk storage areas based on total material requirements. Then, you distribute stock to picking areas based on the individual stock requirements for picking, packaging, and shipping. You can set up two-step picking via the IMG menu path **Extended Warehouse Management • Extended Warehouse Management • Goods Issue Process • Wave Management • General Settings • Set Up Two-Step Picking**. Figure 5.29 shows the two-step picking setup for a warehouse.

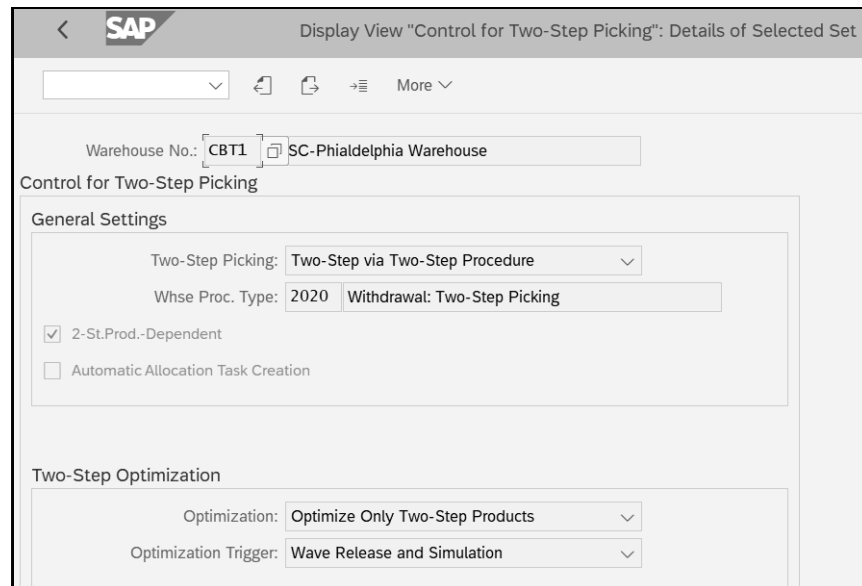


Figure 5.29 Setup for Two-Step Picking

For this capability, you can maintain the following parameters:

- Whether two-step picking is product dependent.
- Whether two-step relevance is checked during wave creation. If not, relevance for two-step picking can be set manually before wave release.
- The warehouse process type used for the warehouse tasks of the first step (withdrawal step) of two-step picking.
- Whether two-step picking should be optimized for wave items and whether it affects all products or only products relevant for two-step picking.
- Whether and when to trigger the optimization of two-step picking and whether to trigger it manually or automatically.
- Whether the warehouse tasks of the second step (the allocation step) in two-step picking should be automatically created when a withdrawal warehouse task is confirmed.

5.4 Key Terminology

The following terminology is important to know for the purposes of the exam:

- **Cartonization**
Cartonization is the process of determining the size, shape, and weight of all items that are required for shipping for an outbound delivery to determine the most efficient packing.
- **Direct outbound delivery**
In direct outbound deliveries, outbound deliveries are created in EWM and replicated to SAP S/4HANA for billing without reference to a sales order or STO. They're usually created for customer pickup, goods issues to cost centers, scrapping, etc.
- **Outbound delivery order**
An outbound delivery order is a document containing all the data required for processing in a warehouse, such as picking, packing, and shipping.
- **Outbound delivery request**
An outbound delivery request in EWM is a replica of an outbound delivery in SAP S/4HANA, the document that contains the relevant logistical data.
- **Pick denial**
A pick denial is triggered when a warehouse picker fails to find enough stock in the storage bin for the requested quantity.
- **Pick warehouse task**
Pick warehouse tasks are created for outbound delivery orders and contain information about the product, batch, quantity, and source bin from which a product can be picked.
- **Wave**
A wave is a grouping of warehouse items based on similar properties, such as picking from the same area, or the same picking process, like bulk items or small items, etc.
- **Wave templates**
Warehouse request items are grouped into waves based on the settings in a wave template. Wave templates contain control parameters used to create waves for responding to warehouse requests.

5.5 Practice Questions

These practice questions will help you evaluate your understanding of the topics covered in this chapter. The questions shown are like those found on the certification examination. Although none of these questions will be found on the exam itself, they will allow you to review your knowledge of the subject. Select the correct answers and then check the completeness of your answers in the next section.

Remember that you must select all correct answers on the exam and select only correct answers to receive credit for the question.

1. When waves are created in wave management for a warehouse in EWM, what assignment is made to the wave?
 - A. Storage bin
 - B. Outbound deliveries
 - C. Warehouse request item
 - D. Inbound deliveries
2. You want to use wave management for outbound processes in EWM. How are waves created in EWM? (There are two correct answers.)
 - A. Manually using the shipping cockpit
 - B. Automatically when an outbound delivery request is created in EWM
 - C. Automatically when an inbound delivery is created
 - D. Automatically when an outbound delivery order is created
3. In an EWM warehouse, for a stock removal process, which stock removal strategy is used based on the expiry date or shelf life of a batch?
 - A. LIFO
 - B. SLED
 - C. Next empty bin
 - D. Partial quantities
4. You want the system to create waves automatically for warehouse requests. To perform automatic wave assignment with wave templates in EWM, what do you need to set up? (There are two correct answers.)
 - A. The warehouse monitor to create automatic waves
 - B. Wave templates
 - C. Warehouse process type
 - D. Conditions for wave template assignment
5. In the wave management process, waves can be processed with different statuses. Which one is not a process status?
 - A. Unlocked
 - B. Release withdrawal
 - C. Merged
 - D. Shared

6. Which document in decentralized EWM will be replicated from an unchecked or checked SAP S/4HANA delivery document?
 - A. Outbound delivery request
 - B. Warehouse tasks
 - C. Production material request
 - D. EWM outbound delivery
7. When you process outbound delivery orders in EWM, which steps are involved? (There are two correct answers.)
 - A. Picking from the stock
 - B. Deconsolidation
 - C. Packing and staging
 - D. Unloading
8. What are the documents created for the goods issue or outbound process in SAP S/4HANA and EWM? (There are two correct answers.)
 - A. Transfer requirement
 - B. Manufacturing orders
 - C. Outbound delivery in SAP S/4HANA
 - D. Outbound delivery order
9. At times, we may end up creating delivery document types for EWM implementation for customer-specific requirements. It is mandatory to map an SAP S/4HANA document type with an EWM delivery document type. True or false?
 - A. True
 - B. False
10. You must create warehouse tasks for stock removal for outbound processes in EWM. A warehouse task requires the warehouse process type, which is assigned to the outbound delivery order. True or false?
 - A. True
 - B. False
11. Direct outbound deliveries are created for replenishment, posting inventory differences, and rearrangement processes in EWM. True or false?
 - A. True
 - B. False

12. When you process waves, their statuses can be locked, unlocked, merged, released, and which of the following?
- A. Deleted
 - B. Split
 - C. Combined
 - D. Connected
13. Let's say you must create a wave template for automatic wave assignment to warehouse request items. Which of the following do you need to maintain dates for? (There are two correct answers.)
- A. Pick start and pick completion
 - B. Wave calendar
 - C. Automatic or manual release
 - D. Warehouse task
14. The warehouse order creation process for picking waves begins with the system creating a list of warehouse requests. The next step involves grouping warehouse requests into waves and then releasing these waves to create warehouse tasks. True or false?
- A. True
 - B. False
15. To assign wave templates automatically, what do you need to maintain?
- A. Condition technique
 - B. Warehouse monitor
 - C. Warehouse request header
 - D. All of the above
16. What header information you can find in the general data of the delivery document header for inbound processing, outbound processing, posting changes, and stock transfers? (There are two correct answers.)
- A. Means of transport
 - B. Sold-from party
 - C. Route
 - D. Product and batch

17. In Transaction /SCWM/WAVE, you can perform which of the following wave processes? (There are two correct answers.)
- A. Lock waves
 - B. Release withdrawals
 - C. Share waves with other waves
 - D. Assign production material requests to waves
18. You want to create picking warehouse tasks for a warehouse request for stock removal. For this task, the system requires a stock removal indicator, which is obtained from the outbound delivery order. True or false?
- A. True
 - B. False
19. You're using POSC for outbound shipping. The process steps you can use are picking, VAS, packing, and loading. True or false?
- A. True
 - B. False
20. The system attempts to read completely qualified entries with all the parameters and indicators based on the access sequence defined in the configuration to determine the storage type for creating pick warehouse tasks. True or false?
- A. True
 - B. False
21. Which of the following are item categories and their descriptions? (There are two correct answers.)
- A. DLV: Standard delivery item
 - B. RET: Returns item
 - C. OUTB: Outbound delivery
 - D. SRPL: Replenishment
22. Cartonization planning can be performed during picking and packing or for outbound delivery orders in EWM. True or false?
- A. True
 - B. False

5.6 Practice Question Answers and Explanations

1. Correct answer: **C**
Warehouse request items are grouped under waves to control warehouse activities, for example, picking, or posting changes. These groupings are then processed together in subsequent processes, for example, for processing all warehouse request items assigned at a certain time, to create warehouse tasks. These warehouse tasks are forwarded to create warehouse orders for picking or posting changes to be performed.
2. Correct answers: **A and D**
Waves are created automatically, manually, or immediately after a warehouse request or outbound delivery order is created. Waves can be created via Transaction /SCWM/WAVE, Transaction /SCWM/MON, or via the shipping cockpit. Waves are automatically created via the PPF action after the outbound delivery order is created. You can either immediately or automatically via report RSP-PFPROCESS.
3. Correct answer: **B**
The valid stock removal strategies are FIFO, LIFO, SLED, and partial quantities first. FIFO and LIFO works based on the goods receipt date captured in the WDATU and WDATU_DATE fields. SLED works on the value in the VFDAT field for the shelf-life expiration of batches, and the partial quantities first strategy works on the basis of alternate UoMs maintained in the packaging specification.
4. Correct answers: **B and D**
You can create waves automatically by first setting the automatic wave creation indicator for the warehouse process type that is found for the warehouse request item. Then, you can create wave templates and define a condition record for wave template determination. The automatic wave creation process is triggered with a PPF action after an outbound delivery order is created.
5. Correct answer: **D**
Waves can be locked, unlocked, deleted, and merged. You can also split waves, and waves can be released via Transaction /SCWM/WAVE, Transaction /SCWM/MON, or the shipping cockpit. No option is available for sharing a wave with another wave.
6. Correct answer: **A**
An outbound delivery request is generally based on delivery processing related to the creation of sales orders within the SAP CRM application. For performance reasons, SAP CRM can be configured to suppress the replication of sales documents to the SAP S/4HANA system, which however creates an unchecked delivery in the SAP S/4HANA system. In SAP S/4HANA, the unchecked delivery is converted to a checked delivery. The checked delivery is replicated to the EWM system (outbound delivery request).
7. Correct answers: **A and C**
Pick warehouse tasks are created for outbound delivery orders to remove the stock from the source bin for picking. If the picked stock needs relabeling and repacking before they are shipped to end customers, then VAS is added as part of POSC. Also picked products are staged and packed or repacked before they are loaded onto the truck.
8. Correct answers: **C and D**
The flow of the goods issue process can start from a sales order from customer service; then during outbound delivery creation in SAP S/4HANA, these deliveries are replicated to EWM for further processing. After the goods issue is performed and the product is shipped to customer, then a billing document is created.
9. Correct answer: **A**
True. When you configure a new document type or item in EWM, these document types and items must be mapped to SAP S/4HANA delivery types and item categories, which will help in the integration between EWM and SAP S/4HANA.
10. Correct answer: **A**
True. In EWM, inbound delivery and outbound delivery orders are considered warehouse requests. These deliveries are used for further processing in EWM. To create a pick task, the warehouse process type is assigned to an outbound delivery order.
11. Correct answer: **B**
False. Direct outbound delivery orders are created in EWM without reference to sales orders or STOs. Direct outbound delivery orders can be created for goods issues to a cost center, for customer pickups, for scrapping, for kit-to-stock or reverse kitting, etc.
12. Correct answer: **A**
Waves can be locked, unlocked, deleted, and merged. You can split waves, and waves can be released via Transaction /SCWM/WAVE, Transaction /SCWM/MON, or the shipping cockpit. No option is available for sharing waves with another wave or for dividing a wave.
13. Correct answers: **A and B**
A wave template has several attributes for capturing dates and times, such as wave completion dates, pick start and completion dates, pack start and completion dates, release start and completion dates. A wave template is also assigned the factory calendar so the system can determine the valid days for the wave completion date. The release method is used to determine automatic, manual, or immediately after the wave is created.
14. Correct answer: **A**
True. The sequence of wave execution follows how the warehouse request items are grouped into a wave. When the system releases a wave, warehouse

tasks are created, and then the system determines the warehouse order creation rule from the activity area, which influences the routing. All tasks will pass the “black box” warehouse order creation process. Warehouse orders are created according to the warehouse order creation rule defined in Customizing.

15. Correct answer: **A**

Warehouse request items are grouped into waves based on the settings in the wave template. A wave template contains control parameters used to create waves for a warehouse request. Wave templates are determined using a condition technique.

16. Correct answers: **A and B**

In an outbound delivery order, the header contains information like the goods receiving and shipping office, weights and volume for the complete delivery, route information from the SAP S/4HANA delivery, means of transport, and overall status of the delivery confirmation.

17. Correct answers: **A and B**

Waves can be locked, unlocked, deleted, and merged. You can also split waves, and waves can be released via Transaction /SCWM/WAVE, Transaction /SCWM/MON, or the shipping cockpit. Thus, you can release waves, delete waves, and add warehouse request items to waves.

18. Correct answer: **B**

False. Stock removal indicators are configured in EWM. When you try to create a picking warehouse task for the EWM product master in an outbound delivery order, the system gets the stock removal indicators for that combination of warehouse, product, and party entitled to dispose.

19. Correct answer: **A**

True. POSC is the storage process used in outbound processing that involves picking, VAS, packing, staging, and loading onto the truck. The deconsolidation step is for inbound processing.

20. Correct answer: **A**

True. The system attempts to read a completely qualified entry, with all parameters and indicators; then it uses the defined access strategy. The parameters are obtained from the delivery, product master data, and packaging specifications. Then, the system looks for the access sequence maintained for the combination to determine the stock removal indicator, which contains the information about the storage type search sequence. The access sequence is configured as part of the stock removal strategy.

21. Correct answers: **A and B**

The following are valid item categories in EWM: DLV (standard delivery item), PAC (packing item), RET (return item), TXT (text item), and VAL (value item). OUTB and SRPL are document types for outbound delivery orders and replenishment.

22. Correct answer: **A**

True. Automatic cartonization is used for the documents in outbound delivery orders, waves, and warehouse order creation. Cartonization planning uses planned shipping HUs as templates for creating shipping HUs for picking and packing in an outbound process.

5.7 Key Takeaways

In this chapter, you learned about outbound processes and the documents supporting outbound processes in EWM. We covered creating warehouse requests to execute picking processes in EWM. We reviewed subprocesses used in outbound operations, such as pick denials, and described handling differences to manage exceptional scenarios in a warehouse. We covered wave determination, wave templates, and wave creation for outbound delivery orders and warehouse requests.

In the next chapter, we'll discuss production integration with EWM for staging, consumption, and goods receipt for production orders.

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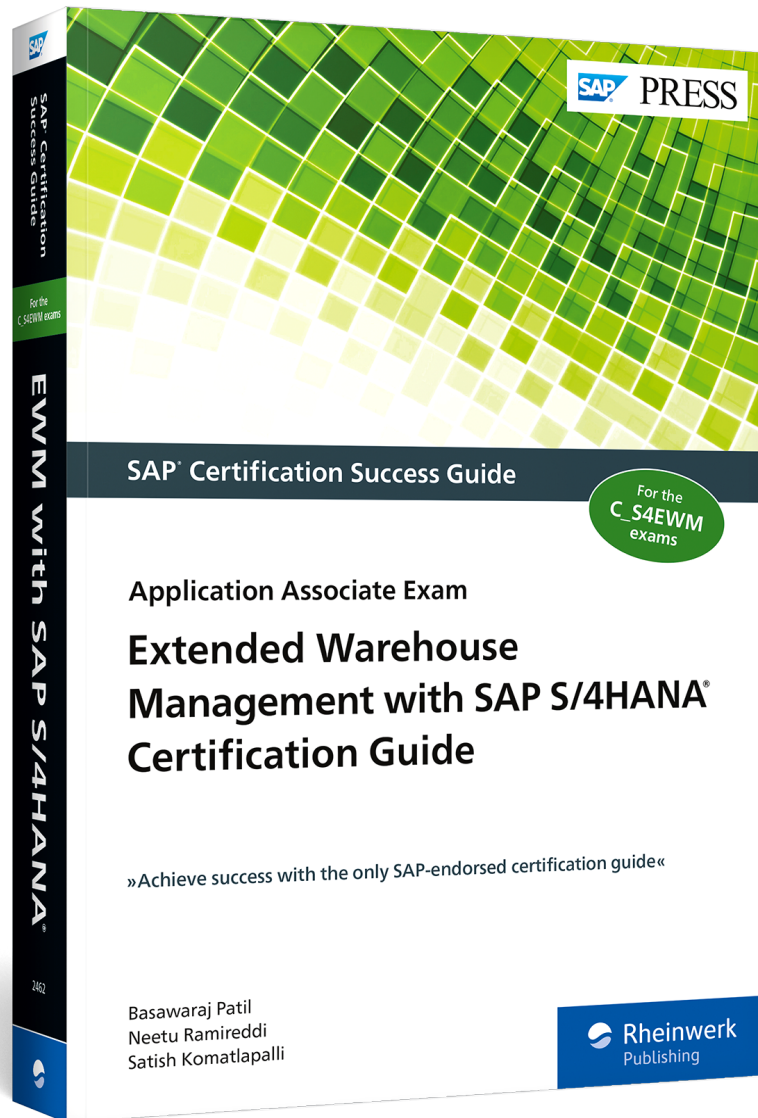
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