

User's Guide for Lead Times

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Table of Contents

Chapter 1	Introduction	1-1
	Purpose.....	1-1
	Scope.....	1-1
	Definitions, acronyms, and abbreviations.....	1-2
Chapter 2	Lead-time Components	2-1
	Definition of lead time components	2-1
	Production lead time	2-1
	Purchase lead time	2-2
	Distribution lead time	2-3
	General lead time.....	2-3
	Fixed lead-time horizons	2-3
Chapter 3	Lead-time Offsetting.....	3-1
	Offsetting.....	3-2
	Offsetting from requirements date to finish date	3-3
	Lead-time elements for planned purchase orders.....	3-4
	Exceptions that modify the planned finish date.....	3-5
	Offsetting from finish date to start date	3-7
	Production orders.....	3-7
	Purchase orders.....	3-11
	Distribution orders.....	3-14
	Replanning.....	3-15
Chapter 4	Lead-time Planning.....	4-1
	Calendars.....	4-1

Calendar code.....	4-2
Availability type	4-2
Calendar usage.....	4-3
Production order lead-time.....	4-3
Purchase order lead time	4-6
Distribution order lead times	4-7
General lead times	4-9
Fixed lead-time horizons	4-9
Transportation time	4-9
Transportation time in Freight Management	4-10
Transportation time in Infor Common.....	4-12
Chapter 5 Calendar Logic.....	5-1
Time units	5-1
Planning days	5-1
Using days and hours	5-2
Conversion of hours to days	5-2
To extend the calendar	5-3

About this Guide

The purpose of this document is to describe the way order dates are offsetted in Enterprise Planning (EP) for version Infor ERP LN 6.1

Chapter 1, "Introduction," gives a brief description of the purpose and the scope of this manual.

Chapter 2, "Lead-time components," provides a list of the relevant lead-time components that are defined in ERP LN.

Chapter 3, "Lead-time offsetting," describes the lead-time offsetting process.

Chapter 4, "Lead-time planning," describes the calendar concepts, and transportation time.

Chapter 5, "Calendar logic," describes the time units, and how to extend the calendar.

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Purpose

Lead time offsetting in Enterprise Planning is crucial for correct planning results. Lead time offsetting enables a smooth coordination between sales, production, and purchase.

The purpose of this document is to describe the way order dates are offsetted in Enterprise Planning (EP) for version Infor ERP LN 6.1. This offsetting of order dates depends on a series of lead times defined in ERP LN, in the Enterprise Planning package as well as in other ERP LN packages.

Scope

The scope of this document is the lead-time planning as part of order planning (RRP). Order planning includes the simulation of orders to meet demand. Part of the simulation is the offsetting of order dates. During the simulation, requirements for an item are determined, after which planned orders with their start and finish dates are generated. In this document, the offsetting of these start and finish dates is described. The requirement date is considered as a given fact.

To determine the requirement date, or to determine other aspects such as order quantity, are outside the scope of this document.

The offsetting of an order's start and finish date involves the planning of lead times. This planning comprises first of all the definition of lead-times components. Next part is the use of those components in the order planning, and finally the offsetting of dates out of the lead times.

Because parts of the planning and offsetting are related to, or shared with, packages other than EP, this documents makes references to these packages.

Definitions, acronyms, and abbreviations

Term	Description
AT	Availability type
BP	Business Partner
CCP	Central Calendar & Periods
Distr	Distribution
EP	Enterprise Planning (package)
FM	Freight Management (package)
MRP	Materials Requirements Planning, in Infor ERP LN also called Order Planning
PUR	Purchase (module)
RRP	Resource Requirements Planning (module)
SFC	Shop Floor Control (module)
TC	Common Data (package)
TD	Order Management (package)
TI	Manufacturing (package)
WH	Warehousing (package)

Chapter 2

Lead-time Components

2

Definition of lead time components

Lead time components are mostly defined outside Enterprise Planning (EP), for example, in SFC or the Purchase module. The lead time components must present the execution level as much as possible so that during planning the lead times on execution level are reflected.

In the following sections, the relevant lead-time components are listed that are defined in ERP LN for production, purchase, distribution, and general purposes.

Production lead time

Lead time component	Package	Unit	Defined in
Average setup time	TI	min	Routing Operations (tirou1102m000)
Cycle time	TI	min	Routing Operations (tirou1102m000)
Queue time	TI	days/hrs	Routing Operations (tirou1102m000)
Wait time	TI	days/hrs	Routing Operations (tirou1102m000)
Move time	TI	days/hrs	Routing Operations (tirou1102m000)

Lead time component	Package	Unit	Defined in
Order lead time (SFC)	TI	days/hrs	Item Production Data (tiipd0101m000 / tiipd0102m000)
Planned production time	TI	hrs	Generic Item – Structure (tipcf3100m100)
Lead time offset	TI	days	Generic Item – Structure (tipcf3100m100)

Purchase lead time

Lead time components	Package	Unit	Defined in
Safety time (BP)	TD	days/hrs	Item - Purchase BP (tdipu0110m000)
Internal processing time	TD	days/hrs	Item - Purchase BP (tdipu0110m000)
Supply time (BP)	TD	days/hrs	Item - Purchase BP (tdipu0110m000)
Calculated lead time	TD	days	Item - Purchase BP (tdipu0110m000)
Supply time	TD	days/hrs	Item Purchase Data (tdipu0101m000 / tdipu0102m000)
Transportation time	TC/FM	user defined	Addresses (tccom4530m000) Distance Tables (tccom4537m000 / tccom4538m000) Route Plan Legs (fmfoc1151m000)

Distribution lead time

Lead time components	Package	Unit	Defined in
Supply time (Distribution)	EP	days/hrs	Plan Item (cprpd1100m000)
Transportation time	TC/FM	user defined	Addresses (tccom4530m000) Distance Tables (tccom4537m000 / tccom4538m000) Route Plans Legs (fmfoc1151m000)

General lead time

Lead time component	Package	Unit	Defined in
Extra lead time	EP	days/hrs	Plan Item (cprpd1100m000)
Safety time (item)	TC	days/hrs	Item Ordering Data (tcibd2500m000)
Inbound lead time	WH	days/hrs	Warehouse (whwmd2500m000) Warehouse - Item (whwmd2510m000)
Outbound lead time	WH	days/hrs	Warehouse (whwmd2500m000) Warehouse - Item (whwmd2510m000)

Fixed lead-time horizons

In addition to the lead-time components, you must define a horizon. In ERP LN, a horizon indicates a time period. In the period before the start date of the horizon, short-term, detailed planning of lead times is applied, using several lead-time components on the basis of routing data.

After the start date of the lead-time horizon, long-term planning is applied. In long-term planning, only a reduced number of lead-time components is used

to calculate lead times. Due to the limited number of lead-time components, the performance of the planning run is optimized.

Lead time horizon	Package	Unit	Defined in
Lead Time Horizon	TD	days	Item - Purchase BP (tdipu0110m000)
Start of Fixed Lead-Time Horizon (SFC)	EP	days	Items - Planning (cprpd1100m000)

For planned production orders, the **Start of Fixed Lead-Time Horizon (SFC)** field in the Items - Planning (cprpd1100m000) determines when short-term planning ends, and long-term, fixed planning begins.

For planned purchase orders, the **Lead Time Horizon** field determines the periods for short-term planning and fixed planning.

The distinction between detailed lead-time planning and fixed lead-time planning applies only to order planning. The distinction does *not* apply to master planning.

For lead-time offsetting, three dates are important:

- **Start date:** The date that a production order is started, or the material of a purchase order is ordered.
 - **Finish date:** The date that a production order is finished, or the material of a purchase order is received.
 - **Requirement date:** The date that a specific material or item is required for an order. The required material/item can be ordered by means of a purchase order, or it can be the result of a production order. The requirement date of a material can equal the start date of a production order, or can be later than the start date.
-

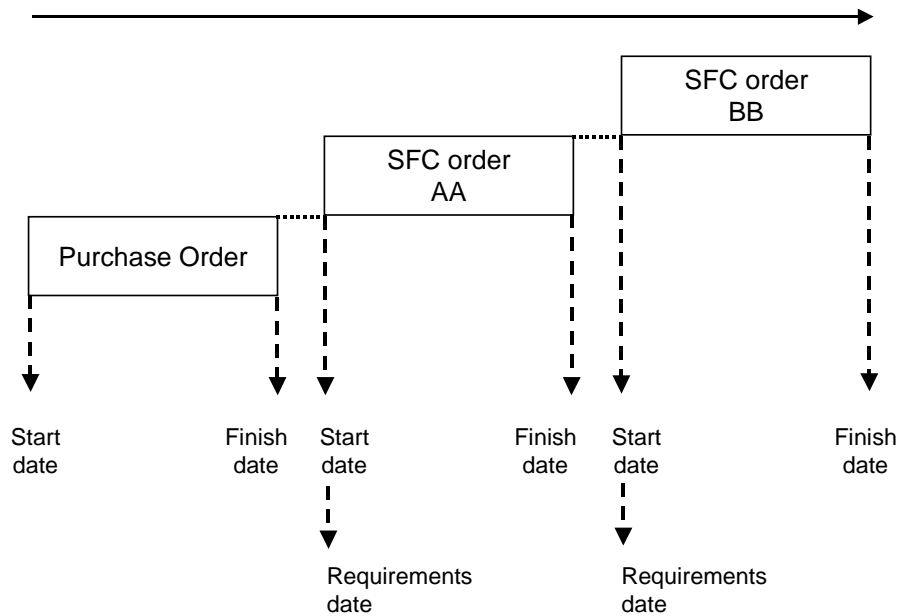


Figure 1 Sequence of orders, with start dates, finish date, and requirement dates

During the order-planning run in EP, in the Generate Order Planning (cprp1210m000) session, orders are planned backward based on the requirement date.

On plan-item level, the default supply source and the sourcing strategies determine the type of order that is created: Production order, purchase order or distribution order.

Offsetting

Lead-time offsetting refers to a technique in which a planned order receipt in one time period requires the release of that order in an earlier period. The exact moment that the order must be released depends on the lead time for the item.

The length of the order lead time is calculated backwards, from the requirement date to the start date of the order.

The offsetting can be divided into two parts:

- From the requirements date to the finish date of the order (part 1)
- From the finish date to the start date of the order (part 2)

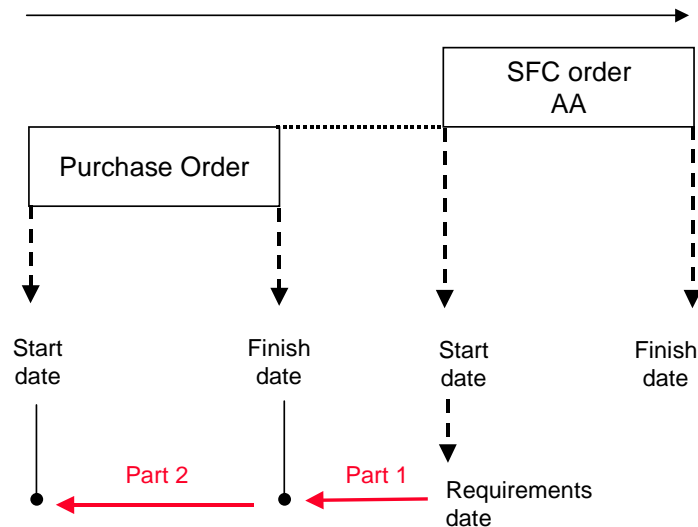


Figure 2 Order lead-time offsetting, divided into two parts

Part 1, offsetting from the requirements date to the finish date, is the same for all order types. The following section describes this type of offsetting.

Part 2, offsetting from the finish date to the start date, depends on the order type. This part of offsetting differs for production orders, purchase orders, and distribution orders. The offsetting of the different order types is described in the section “Offsetting from finish date to start date”.

Offsetting from requirements date to finish date

The following four lead time components are used to offset from the requirement date to the planned order finish date:

- Extra lead time
- Item safety time
- Warehouse inbound time
- Warehouse outbound time

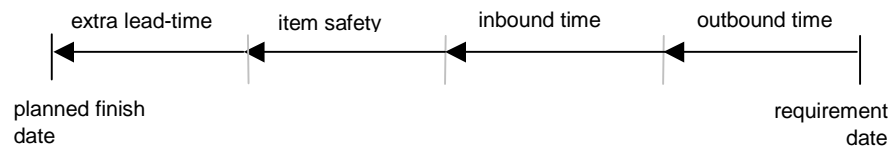


Figure 3 Four lead-time components for offsetting from requirements date to finish date

The extra lead time is defined in EP (and used in EP only) in the Items – Planning (cprpd1100m000) session. The other components are defined on general item level. To determine the inbound and outbound time, the data for the plan-item warehouse is used. The inbound and outbound time can be determined in the Warehouse – Item (whwmd2510m000) session. If the warehouse – item data does not exist, the outbound time that is defined in the Warehouses (whwmd2500m000) session is taken.

Lead-time elements for planned purchase orders

For a planned purchase order, an extra lead-time component, *business partner safety time*, is used to offset the planned order finish date. Consequently, the lead-time components list for planned purchase orders contains five elements:

- Business partner safety time
- Extra lead time
- Item safety time
- Warehouse inbound time
- Warehouse outbound time

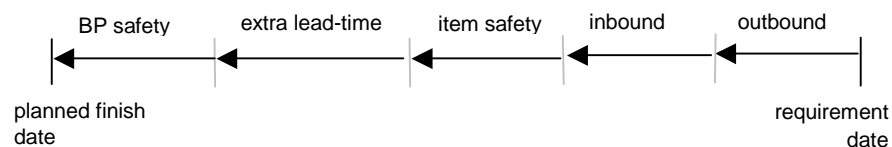


Figure 4 Lead-time components for offsetting from requirements date to finish date – Purchase orders

Note that the BP safety time is additional to the safety time defined at item (or item-warehouse) level. The BP safety time covers insecurity of the supplier, while the item safety time is meant for insecurity of internal operations.

Exceptions that modify the planned finish date

A number of exceptions can modify the planned finish date after the date is calculated, and move the date forward or backward in time:

- If you generate an order planning taking into account the time fence, the time fence moves the finish date *forward*.
- The finish date of the last firm planned or actual order can move the date *forward*.
- Fixed delivery moments can move the finish date *backward*.

The following sections discuss each of these three situations:

Time fence

If the **Generate Within Time Fence** check box in the Generate Order Planning (cprp1210m000) session is cleared, order planning recognizes the requirements within the time fence, but shifts the requirements to the end of the time fence.

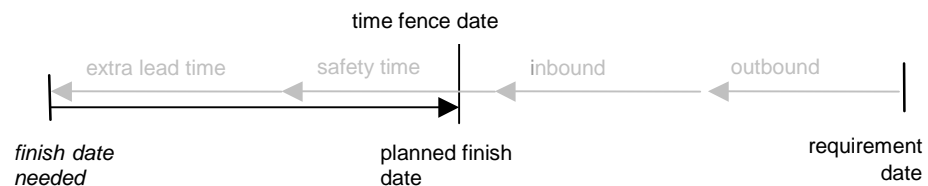


Figure 5 All orders, finish date corrected for time fence

In other words, if the **Generate Within Time Fence** check box is cleared, the requirement dates always fall beyond the time fence. If the finish date is offsetted *within* the time fence, the finish date is moved forward to the time fence date, consuming the subsequent lead times. If the requirement date equals the time fence date, even all four lead-time components are consumed.

In the previous example, a signal warns that the finish date is too late for planning extra lead time and safety time.

Plan before firm or actual orders

If the **Planned Order before Firm/Actual** check box in the EP Parameters (cprpd0100m000) session is cleared, no planned orders can finish before any actual or firm planned order is finished. Consequently, the finish date of the

planned order is moved forward to the finish date of the last firm planned order.

Note: In the following figure below, and in the subsequent figures, EP offset refers to the offset of the requirements date to the planned finish date. The EP offset consists of outbound time, inbound time, safety time, and extra lead time.

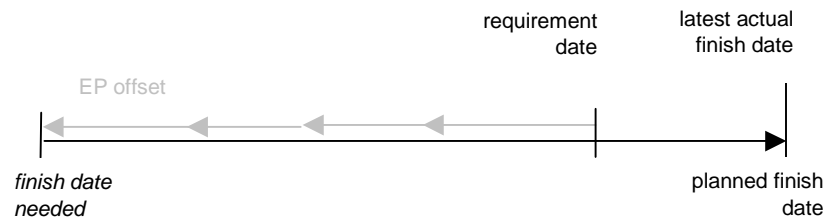


Figure 6 All orders, finish date corrected for firm/actual

If the **Planned Order before Firm/Actual** check box is cleared, the finish date is moved forward in the same way as when a time fence is involved (refer to the previous subsection, Time fence). A planned *purchase* order is not planned earlier than actual purchase orders and firm planned purchase orders. A planned *production* order is not planned earlier than SFC production orders and firm planned production orders.

Note that the correction does not apply to planned distribution orders, only for planned production orders and planned purchase orders.

Fixed deliveries

A plan item can be linked to a fixed delivery code. A fixed delivery code is used for order planning based on fixed delivery moments. If fixed deliveries are set up for the item, EP moves the calculated finish date backward to find the nearest fixed delivery moment.

You can define fixed delivery codes in the Fixed Delivery Codes (cprpd2110m00) session.

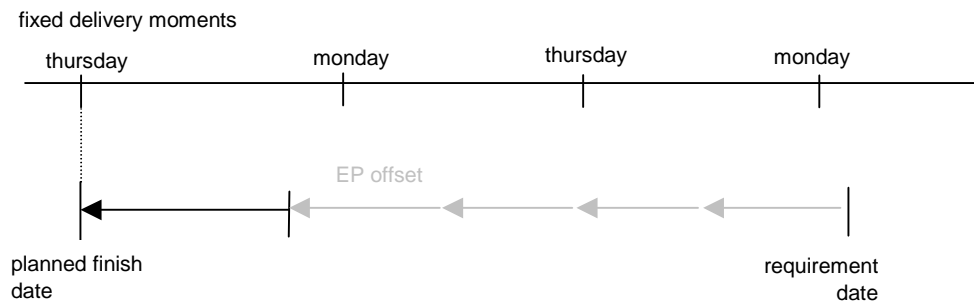


Figure 7 All orders, finish date set to fixed delivery

Offsetting from finish date to start date

The second part of offsetting, offsetting from the finish date to the start date, depends on the order type. This part of offsetting differs for production orders, purchase orders, and distribution orders. The offsetting of the various order types is described in this section.

Production orders

Three factors determine how a production order is planned/offsetted:

- **Routing planning**

If the estimated start date of the production order is *before* the date in the **Start of Fixed Lead-time Horizon (SFC)** field in the Items – Planning (cprpd1100m000) session, you deal with short term planning.

Consequently, production orders are planned in a detailed way. The production order is planned with routing, routing operations and quantity. The order lead-time is the sum of the operation lead-times.

- **Fixed order lead-time**

If the estimated start date of the production order is *after* the date in the **Start of Fixed Lead-time Horizon (SFC)** field in the Items – Planning (cprpd1100m000) session, you deal with long-term planning.

Consequently, production orders are planned in a less detailed way (to gain performance). Therefore, if the estimated start date falls after the date in the **Start of Fixed Lead-time Horizon (SFC)** field, then details are skipped. Instead, the fixed order lead-time is used to plan, without using routing and operations.

Note: The estimated start date is determined by planning backward the fixed **Order Lead Time** that is defined in the Item – Production (tiipd0101m000) session.

- **Generic items**

Sometimes, the production order involves a generic item. The generic routing has a set of possible operations. The choice of operations depends on the configuration, so in a planned order for a generic, not yet configured, demand all operations are planned. This offsetting differs from normal items.

The following sections in this chapter discuss the following three situations:

- Routing planning
- Planning with a fixed order lead time
- Planning of generic items

Routing planning

A production order consists of a series of operations. The sequence of operations is managed by the routing. One item can have multiple routings, with various sets of operations, dependent on order quantity.

In addition, you can model phantom items, which result in a network of parallel operations. The impact of phantom items on planning is described later in this chapter.

One planned operation contains the following lead-time components:

- Queue time
- Setup time
- Production run time, based on cycle time
- Wait time
- Move time.

Production time can be either quantity dependent or fixed, which is determined by the **Fixed Duration** check box.

Two options are available:

- Normal, no fixed duration (**Fixed Duration** check box is cleared)

Production time = cycle time * order quantity / routing quantity

- Fixed duration (**Fixed Duration** check box is selected)

Production time = cycle time

If you use the detailed routing information, the offsetting of two operations looks as follows:

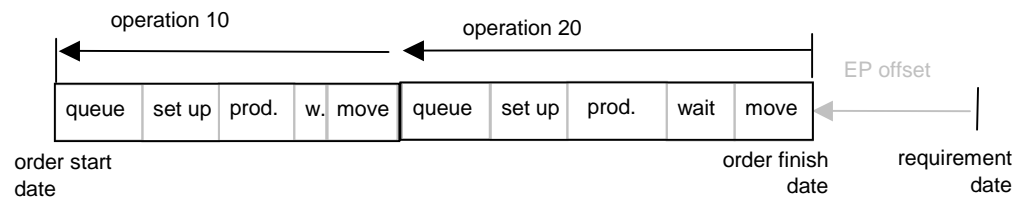


Figure 8 Production orders, offset operations

Operation overlap

The previous figure shows how you can plan two operations sequentially. Operation 20 starts when operation 10 is finished. If you use a transfer batch quantity or percentage, operation 20 can start when operation 10 is partly finished.

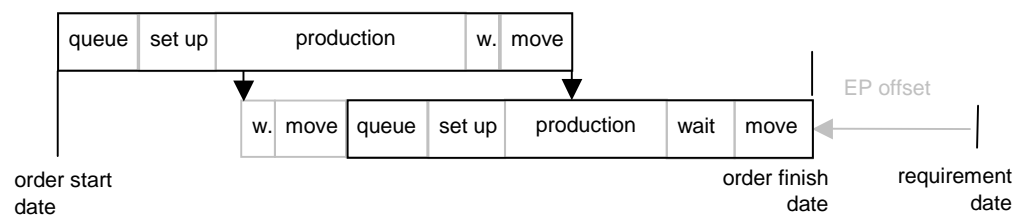


Figure 9 Production orders, operation overlap

Network of phantom operations

If item A has phantom items B and C as components, the production order contains the operations of item A, as well as of items B and C. If, for example, phantom B is required on the third operation of item A, and C is required on the second operation, the planning looks as follows:

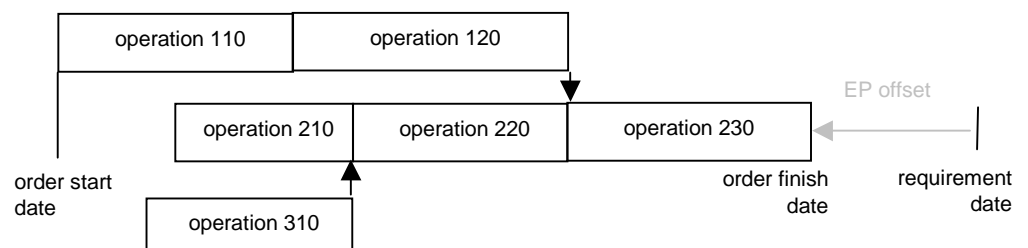


Figure 10 Production orders, network of operations

Capacity

The required capacity for a production order is derived from the operation lead times. Occupation factors indicate how many men or machines are involved in the operation. Only the setup time and the production time require capacity.

For the two types of production times, the capacity calculations are:

- Normal, no fixed duration:

Man hours = average set up * man occupation for set up + cycle time * order quantity * man occupation for production / routing quantity

Machine hours = average set up * machine occupation + cycle time * order quantity * machine occupation / routing quantity

- Fixed duration:

Man hours = average set up * man occupation for set up + cycle time * man occupation for production / routing quantity

Machine hours = average set up * machine occupation + cycle time * machine occupation / routing quantity

In the EP resource plans, either man or machine capacity is stored based on the **Critical Capacity for Planning** field in the Work Centers (tirou0101m000) session.

Planning with a fixed order lead time

If the estimated start date of the planned order is *beyond* the **Start of Fixed Lead-time Horizon (SFC)**, you deal with long-term planning so no routing planning is performed. As a result, production orders are planned in a less detailed way. In that case, the lead time equals the **Order Lead Time** that is defined in the Items - Production (tiipd0101m000) session. The estimated start date is found by offsetting the fixed order lead-time.

Note that this fixed lead-time is independent of the order quantity. The order lead time can be either defined manually or calculated automatically in the Update Order Lead Times (tirou1202m000) session.

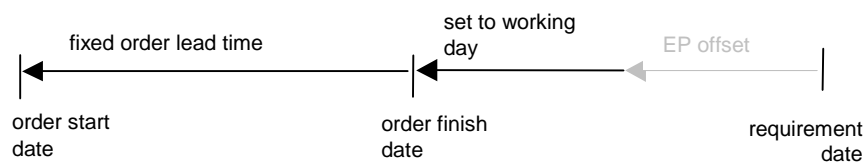


Figure 11 Production orders – planning with a fixed lead time

This figure represents the planned order lead-time offsetting when you use the fixed order lead time. Before you plan this order lead-time, the finish date is offset by outbound, inbound, safety time and extra lead time (EP offset), and then is set to the last working moment in the appropriate calendar.

Planning of generic items

The generic routing, defined in the Generic Item - Structure (tipcf3100m100) session, differs from the normal routing. Which operations are used in the routing depend on the configuration. For example, two operations might be exclusive: either operation 10 is selected, or operation 20. As a result, a sequence of operations is not required.

Therefore, the operation of a generic routing has several parameters for planning:

- Planned production time
- Planning percentage
- Lead-time offset.

For the lead time, the planning percentage is taken into account.

Operation lead time = planned production time * planning percentage

The lead-time offset is used to determine the start of the operation sequence.

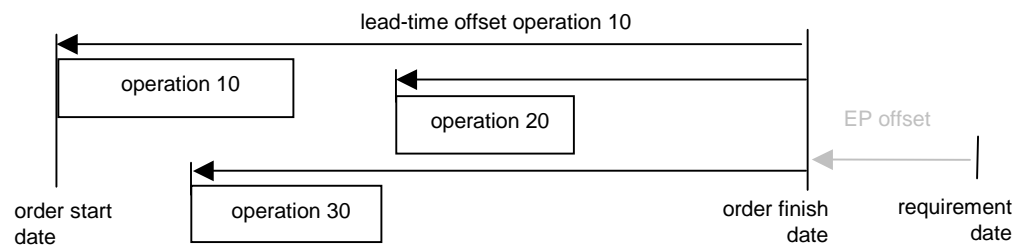


Figure 12 Planned production order for generic item

Purchase orders

The planning of a purchase order depends on the supplier choice. The supply strategy, defined in the Supply Strategy (cprpd7120m000) session, determines a supplier from the Item–Purchase Business Partners (tdipu0110m000) session.

If no supplier is found, or if the supplier cannot deliver the required quantity due to capacity constraints, EP creates a purchase order without supplier.

An item supplier has a *lead-time horizon* defined. This horizon sets a date in the future. If the estimated start date is within this horizon, the purchase order is planned at a detailed level. Otherwise, the *calculated lead time*, which is defined in the Item – Purchase Business Partners (tdipu0110m000) session, is used for planning purposes. The reason for using a calculated lead time is the same as in the case of planned production orders: To gain performance. Similar to production orders, first the start date is estimated using the calculated lead-time so that a choice can be made for detailed or rough planning.

With supplier, within lead-time horizon

If you are planning at a detailed level, the supply order lead-time consists of the following lead-time components:

- Item supplier processing time
- Supply time
- Transportation time (from business partner to warehouse)
- Supplier safety time

The supplier safety time is already part of the EP offset, which determines the planned order finish date. The planned finish date is the planned arrival date as communicated with the supplier. The offset of the order start date is then determined by transportation time, BP supply time, and internal processing time.

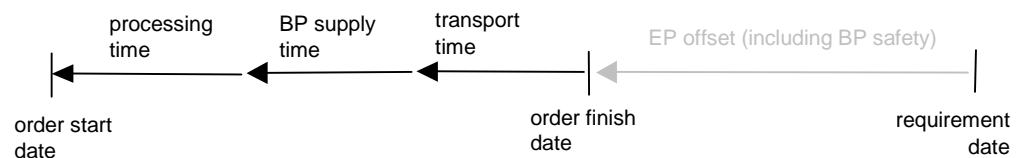


Figure 13 Purchase with supplier, within lead-time horizon

Transportation time

Transportation time is the time to deliver the goods from the ship-from BP address to the receiving warehouse. The transportation time is calculated either by means of Freight Management or by means of the distance tables in Common:

- If Freight Management (FM) is implemented, then FM tries to plan the shipment by means of a route. Also loading and unloading time is included. If no route is found, the distance tables in Common are used.
- If FM is not implemented, the distance tables are used to find a shipping time. The distance tables are based on the transport category. The transport category is linked to the carrier (defined per item supplier, or linked to the BP). If no carrier can be found, the shipping time is selected by means of the transport category **Not Applicable**.

With supplier, outside lead-time horizon

If the estimated planned order start date (the requirement date minus EP offset and calculated lead-time) falls outside the supplier's lead-time horizon, the start date is planned using the calculated lead-time. The calculated lead time is the sum of processing time, BP safety time, supply time, and transportation time, calculated in days. If one of the detailed components is defined in hours, it is converted to days using the average hours per day in the Standard Calendar (tcccp0140m000) session. The availability type that deals with the BP safety time, supply time, and internal processing time for the purchase order is defined in the Purchase Parameters (tdpur0100m000) session. The availability type that deals with carrying goods (transportation time) is defined in the COM Parameters (tccom5000m000) session.

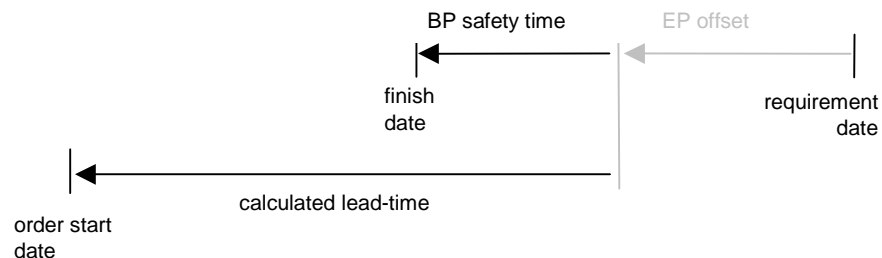


Figure 14 Purchase with supplier, outside lead-time horizon

Without supplier

If no valid supplier is found, only the supply time from the item purchase data is used. This supply time is a substitute for BP supply, internal processing and transportation time.

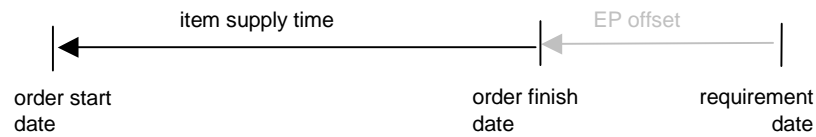


Figure 15 Purchase without BP

Distribution orders

Distribution planning is based on supplying relationships, defined in the Supplying Relationships (cprpd7130m000) session. Similar to purchase planning, first a supplying source (warehouse cluster) is chosen, after which the distribution order is planned.

The lead time of the distribution order can be planned in two ways:

- If the carrier is filled for the supplying relationship, transportation time is used.
- Without a carrier, the supply time from the supplying resource is planned.

Transportation time

If a carrier is provided in the supplying relationships, transportation time is planned between the addresses of the supplying warehouse and the receiving warehouse. The logic is the same as for planned purchase orders.

Remark: If no distance is defined for the addresses, the calculated transport time is zero (no warning is given).

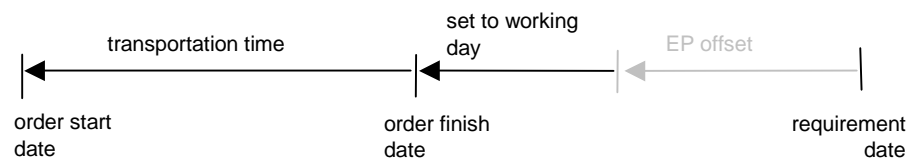


Figure 16 Distribution orders with carrier

Supply time

If no carrier is provided, the supply lead-time of the Supplying Relationships (cprpd7130m000) session is used instead. The supply resource is used to link to the calendar.

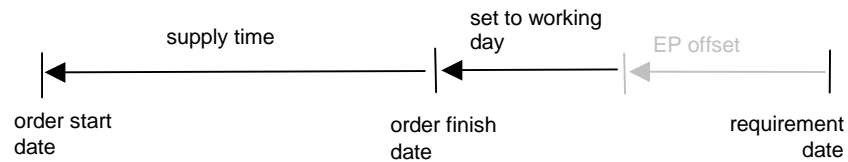


Figure 17 Distribution orders without carrier

Replanning

For orders that are already planned in Enterprise Planning (Planned Orders (cprp1100m000) session), replanning can be performed. To replan, use the **Replan** button in the Planned Order – Line (cprp1110s000) session. Replanning works in the same way as lead-time planning described in this chapter. However, replanning can be performed forward as well as backward. Therefore, three different calculations exist:

- Planning backward during the order planning run (normal planning)
- Replanning backward
- Replanning forward

The figures in this chapter reflect backward planning. For forward planning, the start date is specified, while the planned finish date is calculated. Because the requirement date is not relevant in forward planning, item safety time, outbound lead-time, inbound lead time, and extra lead time are not planned.

In this chapter, the “Calendars” section describes the calendar concept. The next section, “Calendar usage”, describes how to perform planning for each order type, and which calendar is used. The transportation time concept is quite comprehensive and, therefore, is described separately in the last section, “Transportation time”.

Calendars

The lead times are planned based on the calendar working hours which you can find in the Calendars and Periods (CCP) module, in the Calendar Working Hours (tcccp0120m000) session. Working hours are generated for a combination of calendar code and availability type. The following two fields identify the calendar:

- **Calendar Code**
Specifies the period (start date and end date) and the available days, linked to a resource.
- **Availability Type**
Defines the type of activity, for example, production, transport, and maintenance, the start date and end date of the work hours, the efficiency factor, and the capacity percentage.

As a result, using various availability types, a resource can perform multiple activities.

Note: The term *calendar* in this document is used to refer to the combination *calendar code* - *availability type*.

Calendar code

A calendar code can be defined at several levels:

Resource	Package	Session
Company	TC	Companies (tcomm1170m000)
Enterprise Unit	TC	Enterprise Units (tgbrg0530m000)
Buy-from Business Partner	TC	Buy-from BPs (tccom4520m000)
Department	TC	Departments (tcmcs0565m000)
Warehouse	WH	Warehouses (whwmd2500m000)
Resource	EP	Resource (cprpd2100m000)

The calendar code is often related to the resource that performs the operation: The work center, warehouse, department, business partner. If no resource can be found for offsetting, the calendar code is searched for on global level: on enterprise unit level or on company level.

Which calendar is used for planning purposes depends on which levels the calendar is specified. ERP LN checks all levels to determine which calendar must be used. For example, if a calendar is required for an activity on a resource, ERP LN first searches for the calendar that is defined for the resource. If no calendar code is found, the department level, the enterprise unit level, and finally the company level are successively checked. If all resources use the same calendar, you only must specify the calendar code on the company level.

Availability type

The availability type relates to the type of activity, and is defined by package or module:

- Routing Parameters (tirou0100m000)
- Purchase Parameters (tdpur0100m000)
- Sales Order Parameters (tdsls0500m400)
- Warehouse Master Data Parameters (whwmd0500m000)
- Common Parameters (tccom5000m000)

In addition, EP needs some general availability types. General availability types are required for offsetting that is not directly related to an operational activity, for example, in case of horizons. General availability types are defined in:

- Enterprise Planning Parameters (cprpd0100m000)
-

- Scenario - Availabilities (cprpd4160m000). For every scenario, you can link an availability type to a calendar code.

To be more specific, the sequence for selecting the availability type by scenario is:

- 1 Check the Scenario - Availabilities (cprpd4160m000) session for the availability type of the given calendar.

If not found:

- 2 Use the **Default Availability Type** field in the EP Parameters (cprpd0100m000) session.

Calendar usage

The following tables list the lead-time components, the calendar and availability type that are used to plan the lead times. In addition, the calendar selection logic is described in the subsequent subsections.

Production order lead-time

Lead time components for <i>detailed planning</i>	Sequence to find calendar code:	Sequence to find availability type (AT):
Queue time	1 Resource	1 AT by Scenario
	2 Department	2 Routing Parameters
	3 Enterprise unit	
	4 Company	
Average setup time	1 Resource	5 AT by Scenario
	2 Department	6 Routing Parameters
	3 Enterprise unit	
	4 Company	
Production time	1 Resource	1 AT by Scenario
	2 Department	2 Routing Parameters
	3 Enterprise unit	
	4 Company	
Wait time	-	-

Lead time components for <i>detailed</i> planning	Sequence to find calendar code:	Sequence to find availability type (AT):
Move time	1 Resource 2 Department 3 Enterprise unit 4 Company	1 AT by Scenario 2 Routing Parameters

Lead time components for <i>fixed</i> planning	Sequence to find calendar code:	Sequence to find availability type (AT):
Order lead-time (SFC)	1 Enterprise unit 2 Company	1 AT by Scenario 2 EP Parameters
Lead time offset	1 Resource 2 Department 3 Enterprise unit 4 Company	1 AT by Scenario 2 Routing Parameters

Lead time components for <i>generic</i> item planning	Sequence to find calendar code:	Sequence to find availability type (AT):
Planned production time	1 Resource 2 Department 3 Enterprise unit 4 Company	1 AT by Scenario 2 Routing Parameters

The lead-time components in these tables refer to planned production orders in EP as well as to SFC production orders. However, for SFC production orders, the first step in the sequence to find a calendar code or an availability type is always skipped. For example, in case of a SFC production order, the calendar code for the planned production time is first searched for on the department level. The resource level is skipped. For planned orders in EP, the calendar code is first searched for on the resource level.

Routing planning

When you plan with routing operations, each operation is linked to a work center. All lead times, except wait time, use the work center to find the calendar. Wait time is not linked to any calendar and, therefore, directly subtracted from the finish date.

Retrieval of a calendar can require several steps if no calendar is defined on a detailed level.

Calendar retrieval by work center:

- 1 Resource calendar in the Resource (cprpd2100m000) session
- 2 Calendar of the department related to work center in the Departments (tcmcs0565m000) session
- 3 Enterprise unit of the department in the Enterprise Units (tgbrg0530m000) session
- 4 Company calendar in the Companies (tcemm1170m000) session

The first step is specific for EP, while the rest is analogous to lead-time offsetting for SFC orders in Infor Manufacturing.

Fixed order time

If you use a fixed order lead-time, no routing, and therefore no work centers, are involved. The calendar of the enterprise unit is used instead.

Calendar retrieval by item:

- 1 Enterprise unit of the plan item (cprpd1101m000). The enterprise unit is taken from the default warehouse of the plan item.
- 2 Company calendar (tcemm1170m000).

The fixed order lead-time horizon itself is planned forward from the current date (date of order planning run) and uses the same calendar.

Generic routing

Both lead-time offset and production time use the work center calendar. The logic of calendar selection is the same as for Routing planning.

Purchase order lead time

Lead time component	Sequence to find calendar code:	Sequence to find availability type (AT):
(detailed planning: with supplier, within lead-time horizon)		
Internal processing time	1 Purchase Office 2 Company	Purchase Parameters
Supply time (BP)	1 Ship-from BP 2 Buy-from BP 3 Company	Purchase Parameters
Transportation time (<i>transport part</i>)	1 Means of Transport 2 Buy-from BP of Carrier 3 Company	COM Parameters
Transportation time (<i>loading/unloading</i>)	1 Address 2 Company	COM Parameters
Lead time component	Sequence to find calendar code:	Sequence to find availability type (AT):
(fixed planning: with supplier, outside lead-time horizon)		
Calculated lead-time (BP)	Company	Purchase Parameters
Lead time component	Sequence to find calendar code:	Sequence to find availability type (AT):
(no supplier)		
Supply time (item)	Company	Purchase Parameters

Planned purchase orders are planned in exactly the same way as *actual* purchase orders (the same algorithm is used). A purchase order can be planned in three ways:

- With supplier, within lead-time horizon

- With supplier, outside lead-time horizon
- Without supplier

The lead-time horizon is planned forward from the current date, in other words, the date of the order planning run, using the company calendar.

With supplier, within lead-time horizon

The internal processing time, the time required to ship an order, uses:

- 1 Purchase office calendar and, if this calendar is not defined:
- 2 Company calendar

Supply time and supplier safety time do have a three-level fall-back mechanism:

- 1 Ship-from business partner calendar
- 2 Buy-from business partner calendar
- 3 Company calendar

For transportation time, refer to the last section of this chapter, Transportation time.

With supplier, outside lead-time horizon

To plan the calculated lead-time, you can use the company calendar.

Without supplier

If no supplier is present, you can use the company calendar to plan the item supply time.

Distribution order lead times

Lead time component	Sequence to find calendar code:	Sequence to find availability type (AT):
(with carrier)		
Transportation time (<i>transport part</i>)	Means of Transport Buy-from BP of Carrier Company	COM parameters
Transportation time (<i>loading/unloading</i>)	Address Company	COM parameters

Lead time component (without carrier)	Sequence to find calendar code:	Sequence to find availability type (AT):
Supply time (Distribution)	Resource	AT by Scenario
	Department	Routing Parameters
	Enterprise unit	
	Company	

To plan a distribution order, you always use a supplying relationship. If a carrier is linked to the supplying relation, to perform the order offset, you can use transportation time. Otherwise, the supplying relationship supply-time is used.

Transportation time

For transportation time, refer to the last section of this chapter, “Transportation time”.

Supply time

For the planning of supply time, you can use the calendar of the supplying relationship’s work center just as for planned production orders:

- 1 Resource calendar in the Resource (cprpd2100m000) session
- 2 Calendar of department related to work center in the Departments (tcmcs0565m000) session
- 3 Enterprise unit of department in the Enterprise Units (tgbrg0530m000) session
- 4 Company calendar in the Companies (tcemm1170m000) session

If no work center is defined, the item enterprise unit calendar is used:

- 1 Enterprise unit of plan item in the Items – Planning (cprpd1100m000) session
 - 2 Company calendar in the Companies (tcemm1170m000) session
-

General lead times

Lead time component	Sequence to find calendar code:	Sequence to find availability type (AT):
Safety time (BP)	1 Ship-From BP 2 Buy-From BP 3 Company	Purchase Parameters
Safety time (item)	1 Enterprise unit 2 Company	1 AT by Scenario 2 EP Parameters
Extra lead time	1 Enterprise unit 2 Company	1 AT by Scenario 2 EP Parameters
Inbound lead-time	1 Warehouse 2 Company	Warehouse Parameters
Outbound lead-time	1 Warehouse 2 Company	Warehouse Parameters

Safety time and extra lead time use the calendar by means of the plan item:

- 1 Enterprise unit of plan item in the Items – Planning (cprpd1100m000) session
- 2 Company calendar in the Companies (tcecm1170m000) session

Warehouse inbound and outbound times are linked to the (item-) warehouse data of the planned order. The warehouse calendar is used to calculate inbound and outbound times.

Fixed lead-time horizons

Calendar and availability type are used to attach specific dates to a horizon.

Lead-time horizon	Calendar	Availability type
Lead-time horizon (BP)	Company	Purchase Parameters
Start of fixed lead-time horizon (SFC)	Enterprise unit	AT by Scenario / EP Parameters

Transportation time

Transportation time, one of the lead-time components that is used in purchase orders and distribution orders, can be determined in several ways, depending on whether Freight Management is implemented:

- If Infor Freight Management is implemented, transportation time is determined by means of Freight Management.
- If Freight Management is *not* implemented, the distance tables in Infor Common are used to determine the transportation time.

Addresses

To calculate the transportation time, two addresses, an origin address and a destination address, are always involved. Which addresses are used depends on the order type:

- For distribution orders, the addresses of the sending warehouse (the origin address) and the receiving warehouse (the destination address) are involved.
- For purchase orders, the business partner address (the origin address) and receiving warehouse address (the destination address) are involved.

Carrier

For distribution orders, a carrier is always involved. For purchase orders, a carrier is optional. If travel time is planned for a carrier, the carrier's calendar is retrieved indirectly by means of the business partner.

Calendar retrieval by carrier:

- 1 Calendar on the *ship-from* BP role, in the Business Partners (tccom4500m000) session, of the business partner that is filled as carrier buy-from BP, in the Carriers (tcpcs0580m000) session.
- 2 Calendar on the *buy-from* BP role, of the business partner that is filled as carrier buy-from BP.
- 3 Company calendar in the Companies (tccom1170m000) session

For all lead times, the availability type for carrying goods, defined in the Common Parameters (tccom5000m000) session, is used.

Transportation time in Freight Management

If Freight Management is implemented, transportation time is determined by means of Freight Management. The transportation time that is used in Freight Management consists of five parts:

- 1 Wait time at the sending address
Addresses – Freight Management (fmfmd0110m000) session
 - 2 Load time at the sending address
Addresses – Freight Management (fmfmd0110m000) session
-

- 3 Travel time (refer to “Travel time”, later in this chapter)
- 4 Wait time at the receiving address
Addresses – Freight Management (fmfmd0110m000) session
- 5 Unload time at the receiving address
Addresses – Freight Management (fmfmd0110m000) session

Wait time and load time are planned on the address calendar that is determined in the Addresses (tccom4530m000) session. Travel time is planned on the calendar that is linked to the carrier.

Travel time

Travel time, which is one of the five parts of transportation time in Freight Management, can be determined in three ways:

- 1 In the Route Plans (fmfoc1150m000) session
- 2 In the Standard Routes (fmlbd0150m000) session
- 3 By means of the carrier

The following sections describe describe each of these methods in detail:

Route plan

Neither the distribution order nor the purchase order specifies a route plan. Instead, the origin address and the destination address must be determined for the order. Using the Route Plan (fmfoc1150m000) session, the origin address and the destination address must be found in the Route Plan Legs (fmfoc1151m000) session. The two addresses do not need to be in the same leg. However, the leg with the origin address must always precede the leg that contains the destination address. For example, the origin address is in the second leg of the route plan, and the destination address is in the fifth leg.

The **Carrier Selection Criterion** field in the Freight Planning Parameters (fmlbd0100m000) session determines which of the available route plans is chosen:

- Cheapest
- Fastest
- Shortest

You can retrieve the travel time by means of the Route Plan Legs (fmfoc1151m000) session:

- 1 The distance of a leg is divided by the average speed of a Transport Means Group.
-

- 2 If no distance is specified, the leg travelling time is taken instead.

The calendar is retrieved by means of the carrier.

Standard route

Similar to route plans, all standard routes that match the origin address and the destination address are selected. For a route plan, you can define a sequence of ZIP codes in the ZIP Codes by Standard Route (fmlbd0151m000) session, and a sequence of areas in the Areas by Standard Route (fmlbd0152m000) session. The **Search Sequence Standard Route** field in the Freight Planning Parameters (fmlbd0100m000) session determines whether ZIP codes or areas are used. The addresses must match either the ZIP code or the area reference address.

The travel time is calculated for the total distance of the standard route sequence. The distances are retrieved by means of the distance tables in Infor Common, as is described in the following subsection. The distances are based on the transport category:

- 1 Transport Means Group (TMG) of the standard route. Refer to the Transport Means Groups (fmfmd0150m000) session.
- 2 TMG of the order's carrier. Refer to the Transport Means Groups by Carrier (fmfmd0152m000) session.
- 3 TMG of standard route carrier
- 4 Carrier
- 5 TMG of the item. Refer to the Items – Freight Management (fmfmd1100m000) session.

The calendar is retrieved by means of the carrier.

Carrier

The travel time is retrieved by means of the Infor Common distance tables; the calendar is retrieved from the carrier.

The transport category is retrieved from:

- 1 Carrier
- 2 Transport Means Group (TMG) of the item

Transportation time in Infor Common

If Freight Management is *not* implemented, the distance tables in the Common package are used to determine the transportation time.

The distance tables in Common are defined per transport category, between cities or between ZIP codes.

Distance Table by City

Edit View Group Tools Specific Help

Transport Category: Transport by Road

Country From	State From	City From	Country To	State To	City To
NL	OV	RIJ	NL	GE	APD
NL	OV	ZWOLLE	NL	GE	APD
NL	UT	'T VEEN	NL	NH	ZAANDAM
NL	UT	030	NL	NH	AMSTERDA
NL	UT	030	NL	NH	SCHIPHOL
NL	UT	030	NL	UT	AMERSFOO
NL	UT	UT	IND	AP	HYD
NL	ZH	RDAM	ESP		BARCA
USA	MI	GR	USA	IL	CHICAGO
USA	WA	KIRKLAND	USA	WA	SEATTLE
USA	WA	SEATTLE	USA	AA	ANCHORAG
USA	WA	SEATTLE	USA	WA	KIRKLAND

The time distances in these tables are expressed in variable time units. Conversion factors (refer to the Conversion Factors (tcibd0103m000) session) and the Time Unit for Seconds in the COM Parameters (tccom5000m000) session are used to plan it on the calendar.

Another parameter in the COM Parameters (tccom5000m000) session, **Priority Distance Tables**, determines how the ZIP code and city tables are used:

- City
- ZIP code
- Both, city first
- Both, ZIP code first.

The transport category is retrieved from the carrier. If no carrier is present, the transport category **Not Applicable** is used.

Time units

Planning days

Several lead times can be defined in days. Because calendars are defined in hours/minutes, you must specify how the lead-time days are calculated over the calendar. The rule in ERP LN 6.1 is that lead times in days are planned as working day, which means that the available time on a day is one day of lead time.

Example of planning backward; the calendar runs from 8:00 to 17:00:

- Planning one day backward from 11:55 sets the start date on 8:00 (start of the day)
- Planning one day backward from Tuesday 7:55 sets the start date on Monday 8:00
- You work from Monday to Friday, planning two days backward from Monday 13:15 sets the start on Friday 8:00

Planning forward is just the opposite. The calendar runs from 8:00 to 17:00:

- Planning one day forward from 11:55 sets the start date on 17:00 (end of the day)
 - Planning one day forward from Monday 17:05 sets the end date on Tuesday 17:00
 - You work from Monday from Friday, planning two days forward from Friday 13:15 sets the end on Monday 17:00
-

You can also plan zero (0) days. This sets the dates to the nearest working moment. Therefore, if you plan:

- Zero (0) days backward/forward from 13:00 Monday, nothing happens because this time is already the working moment
- Zero (0) days backward from Monday 18:00, the date is set to Monday 17:00
- Zero (0) days forward from Monday 18:00, the date is set to Tuesday 8:00

Using days and hours

The list of available time units consists mostly of hours and days. The granularities week and month are not supported to avoid problems with converting them into days. Therefore, in the lists of lead-time components in Chapter 2, “Lead-time components”, you mostly find days and hours.

The only exception is the definition of distances. In the distance tables by city and ZIP code, the time distance’s unit is user definable. Unit conversion factors are used to calculate the length in seconds. The lead time is then planned in seconds on the calendar, similar to the planning of hours.

Conversion of hours to days

In general, the lead times defined in days are planned as days, and lead times defined in hours are planned as hours. Still, you must convert hours into days in a number of situations. The situations related to EP are:

- The calculation of the calculated lead-time in the Item Purchase BP (tdipu0510m000) session
- The calculation of the order lead-time to determine the economic order quantity in the Optimize Lot Sizing (cpao3200m000) session
- The cumulative lead-time calculation in the Check Horizons (cprpd1200m000) session

To carry out the conversion, you can also use the average basic day capacity of the availability type involved. Because each lead time is linked to an availability type, an availability type is always involved.

The basic day capacity is derived from the working times defined in the Standard Calendar (tcccp0140m000) session:

$$\text{The total number of working hours defined} / \text{number of weekdays with working times}$$

To extend the calendar

The lead times are planned by means of the calendar working hours. The calendar working hours are generated for the period between the calendar start date and the calendar end date.

If planning must be performed outside the start/end period of the calendar, to extend the calendar, you can use the information from the Standard Calendar (tcccp0140m000) session. For each lead time, an availability type is involved. The working times defined for the availability type is used to extend the calendar. If the availability type is not defined in the calendar, a warning appears.

