Supply Chains

Making Your Supply Chain Run Better

Gain Efficiency and Transparency with SAP® Solutions That Support GS1 Standards

SAP®

The Best-Run Businesses Run SAP™

Table of Contents

4 **Making Your Supply Chain Run Better**

5 **GS1 Standards**

6 **Challenges Facing Supply Chains**

Lack of Accurate, Consistent, and Synchronized Data

Counterfeiting

Problems with Traceability and Visibility

7 **SAP Solutions Support GS1 Standards to Improve Supply Chains**

Support for Higher-Quality and Synchronized Data

Protection Against Counterfeiting

Increased Traceability

Batch Management in SAP ERP

Other Functionality Related to Batch Management

SAP NetWeaver MDM for Global Data Synchronization

SAP Object Event Repository and SAP Event Management

A Better Way to Conduct Business

For More Information

Making Your Supply Chain Run Better

In a global economy, an efficient, effective supply chain is a must. The primary challenges to this are lack of consistent, synchronized data, the problem of counterfeiting, and visibility and traceability. SAP® solutions address these through support for GS1 standards that provide a framework to enable products, services, and information to move efficiently and securely among trading partners.

As more businesses adopt global sourcing and logistics strategies, the management of supply chains has become more complex and difficult – and, at the same time, even more important to your organization's success. Inaccurate or inconsistent data traveling through the supply chain can endanger consumers and patients, damage brands and reputations, hurt growth, and negatively affect service and profits. Improving data quality and consistency, on the other hand, can result in an immediate improvement in customer service and satisfaction, consumer and patient safety, and profits, as well as more effective recalls and reductions in counterfeiting.

By implementing GS1 standards using supply chain solutions from SAP, organizations can respond to the challenges of a global supply chain by increasing efficiency, effectiveness, and transparency.

By implementing GS1 standards using supply chain solutions from SAP, organizations can respond to the challenges of a global supply chain by increasing efficiency, effectiveness, and transparency.

GS1 Standards

GS1 standards ensure effective data exchange and act as basic guidelines that facilitate interoperability and provide structure for many industries. Originally created by manufacturers and retailers to improve the efficiency of the distribution of food and consumer goods, GS1 standards have been developed by GS1 members representing many industries and are used by millions of organizations, large and small.

Global standards support critical business processes and provide benefits for consumers and businesses, such as:

- Reduction in errors through efficient automatic identification (such as ensuring that the right medication is administered to the right patient at the right time through the right route and in the right dose, or that automotive or electrical parts are authentic)
- Efficient traceability (to improve product recall response, for example)
- Detection and removal of counterfeit products from the supply chain
- Increased productivity and cost reduction through improved supply chain efficiency (for example, globally consistent location and product identifiers, as well as bar coding and radio frequency identification [RFID])
- Improved benchmarking and management of supply cost (for example, spend analytics)
- Improved regulatory compliance, such as traceability of the chain of product custody

GS1 standards define:

- **Identification keys** to track products, pallets, containers, and so forth through the supply chain
- **Capture mechanisms** to store the identification keys, such as bar codes and RFID tags
- **Data-sharing standards** to enable trading partners to share information through purchase orders, shipping notices, master data synchronization, event messages related to product instance, and the like

EXAMPLES OF GS1 STANDARDS

- The Global Trade Item Number (GTIN) is a globally unique and unambiguous way to identify trade items (products and services) that are sold, delivered, and invoiced. GTINs identify a manufacturer's products as they move through the global supply chain to the retailer, hospital, and ultimate end user.
- The Global Location Number (GLN) uniquely and unambiguously identifies locations, business entities, and accounts, including ship tos, deliver tos, bill tos, invoice froms, pay froms, pay tos, ordered bys, sold bys, and so forth.
- The United Nations Standard Products and Services Code (UNSPSC) is a standardized product classification that supports and improves purchasing throughout an organization. The most widely adopted global classification system, the UNSPSC is used extensively in electronic catalogs, search engines, procurement application systems, and accounting systems.
- The Serial Shipping Container Code (SSCC) is a critical element when electronically exchanging information about the movement and location of logistics units. When used in conjunction with the advance shipping notice (ASN), the SSCC acts like a license plate, enabling entire cases or pallets of products (or entire truckloads) to be scanned and quickly processed through distribution centers and other receiving locations, greatly reducing the costs associated with moving and receiving products.

SAP understands the importance of these standards to our customers (and to their customers and suppliers) and has been actively involved with GS1 standards development for many years. The following sections will review why the standards matter and examine how SAP® software supports them.

Challenges Facing Supply Chains

LACK OF ACCURATE, CONSISTENT, AND SYNCHRONIZED DATA

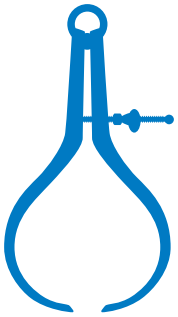
Poor and inconsistent data impacts many areas in today's extremely complex global supply chains. Most important, poor and inconsistent data negatively impacts customer or patient service and safety when the supply chain fails to deliver the right product, of the right quality, to the right consumer/patient, at the right time, and in the right place.

COUNTERFEITING

Counterfeit handbags and watches are a problem. But counterfeit prescription drugs or medical devices and unsafe products can be life-threatening problems. With the increase in extended and global supply chains and the growing use of contract manufacturing, tracking and tracing products from manufacturer to consumer or patient across complex supply chains is a huge challenge.

PROBLEMS WITH TRACEABILITY AND VISIBILITY

Traceability is especially important when food, pharmaceutical, or other products must be recalled. Recent legislation in the European Union obliges manufacturers to inform authorities and consumers of any potential risk to consumers from their products. Serialization and e-pedigree legislation in the United States (California), China, Brazil, and Turkey requires all members in the supply chain to implement safeguards that provide end-to-end transparency. In addition, many other states and countries are reviewing their own legislation on this same theme. Individual growers, producers, and manufacturers, eager to protect their brands from the harm done by tainted materials or poorly managed recalls, are boosting their own internal recall policies and methodologies. **GS1 standards can play a vital role in product recalls.** Because these standards are global, reaching from one end of the supply chain to the other, they ensure immediate access to consistent, accurate product data, which enables swift, comprehensive recalls and enhanced public safety.



SAP solutions that support GS1 standards enable the high-quality and consistent data needed for an efficient, effective supply chain. This in turn enables superior customer care and service, while also improving product safety.

SAP Solutions Support GS1 Standards to Improve Supply Chains

SUPPORT FOR HIGHER-QUALITY AND SYNCHRONIZED DATA

SAP solutions that support GS1 standards enable the high-quality and consistent data needed for an efficient, effective supply chain. This in turn enables superior customer care and service, while also improving product safety through traceability, authentication, or e-pedigree.

The Global Trade Item Number (GTIN) and Global Location Number (GLN) identifiers from GS1 are part of the fundamental infrastructure for SAP products that enable traceability and authentication. They provide a common reference for exchanging quotations, purchase orders, order acknowledgements, advance ship notices (ASNs), invoices, and rebate and chargeback transactions. Starting with the SAP ERP 6.0 application, enhancement package 2, trading partner collaboration is enabled and facilitated through electronic messages, using GS1 product identification keys for materials management, logistics execution systems, sales and distribution, retail, transportation management, and hospital management.

SAP ERP enables and facilitates trading partner collaboration through electronic messages, using GS1 product identification keys (GTIN and GLN). These two identifiers are part of the fundamental infrastructure for SAP products that enable traceability and authentication, and provide a common reference for exchanging quotations, POs, order acknowledgements, ASNs, invoices, and rebate and chargeback transactions.

Serialized and batch/lot GTINs are supported in SAP software such as the SAP Auto-ID Infrastructure offering, the SAP Event Management application, and the SAP object event repository (SAP OER).

Product and service master data is shared and synchronized among trading partners through the GS1 Global Data Synchronization Network (GDSN), which can be achieved using the SAP NetWeaver® Master Data Management (SAP NetWeaver MDM) component for global data synchronization.

The source-to-pay and order-to-cash processes are enabled by the use of GS1 electronic data interchange (EDI) messages using EANCOM or XML. SAP solutions support EDI messages with GLNs on purchase orders, order acknowledgements, ASNs, and invoices, while GTINs are maintained on vendor quotations, purchase orders, sales orders, order acknowledgements, ASNs, goods receipts, and invoices. SAP supports the United Nations Standard Products and Services Code (UNSPSC) in the SAP ERP and SAP Supplier Relationship Management applications for material and product masters, catalogs, and transactions.

PROTECTION AGAINST COUNTERFEITING

Authentication and protection against counterfeiting and diversion is provided through real-time traceability, enabled by SAP Auto-ID Infrastructure for serialization and SAP OER. The latter uses the GS1 Electronic Product Code Information Services (EPCIS) standard as the basis for event tracking (via SAP Event Management) of products as they move through the manufacturing process, to the warehouse and distribution system, to the hospital or retail store, and ultimately to the consumer or patient. Event records contain each event's product identification (GTIN) and location (GLN) to maintain a comprehensive "chain of custody" for each product.

Auto-ID and item serialization solutions from SAP can sense and respond to the real world and drive business productivity by automating data capture, as well as supporting the serialization of products and assets. With serialization, a unique serial number applies to every item. Such granular identification can enhance product visibility, improve data accuracy, and improve decision making throughout an organization's supply chain.

INCREASED TRACEABILITY

SAP addresses supply chain traceability in two ways:

- SAP Auto-ID Infrastructure facilitates the capture of serialized and nonserialized data from devices and converts the data into records that provide an end-to-end history of product transactions, using GTINs and GLNs. SAP Auto-ID Infrastructure communicates with SAP and non-SAP business applications to access business information required to validate and store read event information, and it enriches key business processes with serial data and aggregations (all the way to pallet level). This software also includes preconfigured business functionality for receiving, outbound shipments, e-kanban, and more.
- Serialized information collected by SAP Auto-ID Infrastructure (or other EPCglobal-compatible data-capture middleware) is detailed and stored in SAP OER, where it is available to applications that require visibility between sites in the enterprise, or between the enterprise and other trading partners, to support a full range of business processes.

GS1 identification numbers and data carriers, including GS1 bar codes (such as DataMatrix) and Electronic Product Code–enabled RFID tags, enable supply chain partners to accurately link the information flow of business transactions to the physical flow of products. Automatic data capture (such as reading a GLN or GTIN in a DataMatrix bar code or RFID tag on a product) replaces manual data entry, thus reducing human error and expediting the process of recording information. SAP supports GS1-128 bar codes with application identifiers (AIs), as well as Global Returnable Asset Identifiers (GRAIs), Global Individual Asset Identifiers (GIAIs), and Serial Shipping Container Codes (SSCCs).

BATCH MANAGEMENT IN SAP ERP

Legislation such as the EU General Food Traceability Regulation EC/178/2002 and the U.S. FDA Food Safety Modernization Act requires the maintenance of strict batch traceability through the manufacturing process from raw material to finished product.

Batch management in SAP ERP supports the management and processing of batches in all of an organization's business processes. The **batch record** contains all quality-relevant planned and actual data for the production of a batch. It complies with the good manufacturing practices guidelines for the pharmaceutical and food industries.

Within batch management in SAP ERP, the **batch where-used list** shows the path of the batch from its procurement to its delivery to the customer or patient, indicates how a batch was created and used in production planning through various stages, and displays the result in a list. From this list, the user also can see:

- The other batches in which a batch was used
- The other batches from which a batch was created

This is important in the case of complaints and questions about product safety when the composition of semifinished and finished products must be documented across all production levels, regardless of material type. The list contains data for all plants and facilities, but also can be restricted to specific plants or facilities.

In addition to batches, the software also displays production orders, manufacturing orders, subcontract orders, and vendor batches. This enables you to trace a batch's progress through each stage of production.

For batches in other areas, such as sales and distribution or warehouse management), the **pick-up list** shows where batches are used.

Within SAP ERP, batch data is stored via a 10-character batch ID key (with the GS1-standard 20-character batch maintained as a batch characteristic) and is assigned to a material number (which itself may have a GTIN defined for its supply source/ unit of measure combination).

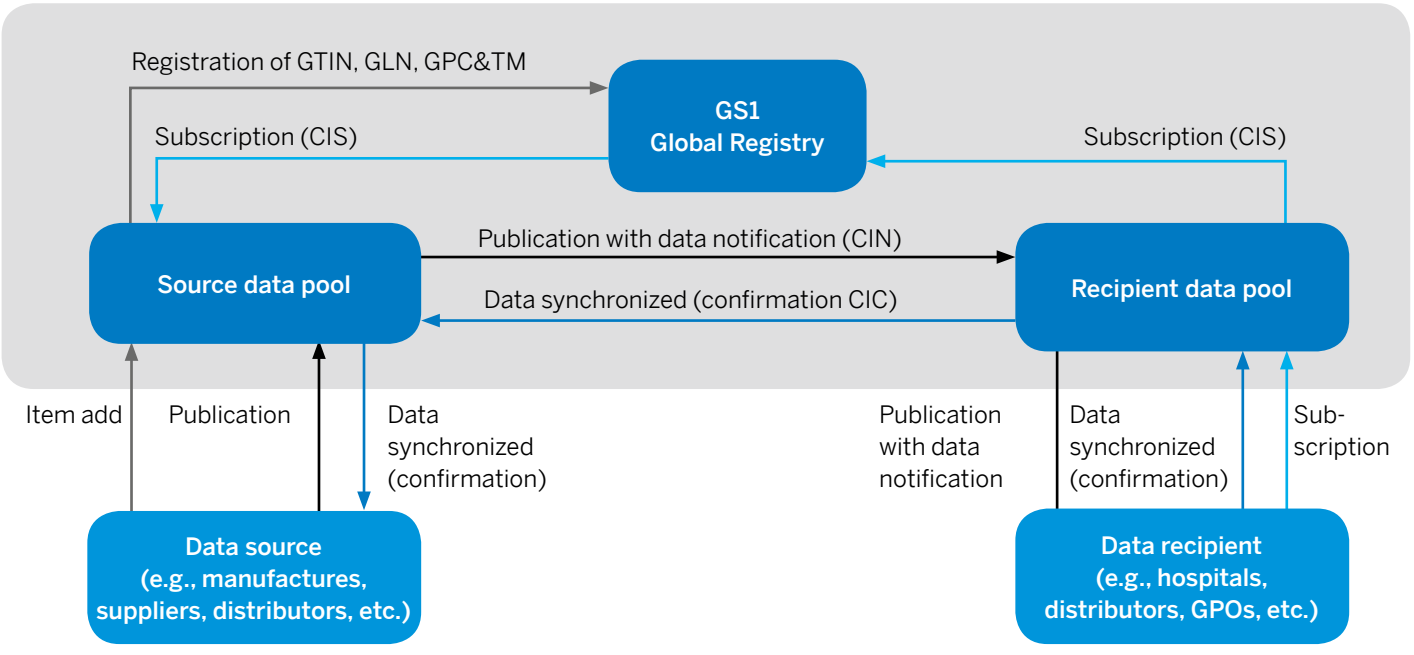
With SAP Auto-ID Enterprise application, you can maintain the batch ID as an attribute for serialized product items and have the ability to conduct a batch ID search to review the related item-serialized product distribution.

OTHER FUNCTIONALITY RELATED TO BATCH MANAGEMENT

Other types of batch-related functionality in SAP solutions include:

- **Enterprise services bundle for batch traceability and analytics (in Enterprise Services Repository):** Users can create composite applications to track and trace batches across multiple systems.
- **Outsourced manufacturing with work-in-progress (WIP) batch and batch numbers (ERP product planning, process industries, and supply network collaboration):** Batch numbers and WIP batches can be tracked in outsourced manufacturing processes, enabling batch tracking with contract manufacturers across organizational boundaries
- **Batch traceability:** In the SAP Manufacturing Execution application, users have complete traceability of product batches throughout the product lifecycle via serialized component traceability. Confirmations from manufacturing execution to production planning include the batch numbers for semifinished goods, which can be used to track where the finished goods containing specific components have been shipped.
- **Batch management cockpit:** This supports management of the following:
  - Analysis of slow-moving items and items' remaining shelf life in the warehouse
  - Availability-to-promise (ATP) check with a display of active ingredient quantities
  - Analysis by different batch characteristics (such as batch specifications that are suitable and not suitable for a customer, or which batches are provided by which suppliers)

Figure 1: Synchronizing Data Among Trading Partners (Data Sources and Data Users)



Used with permission of GS1.

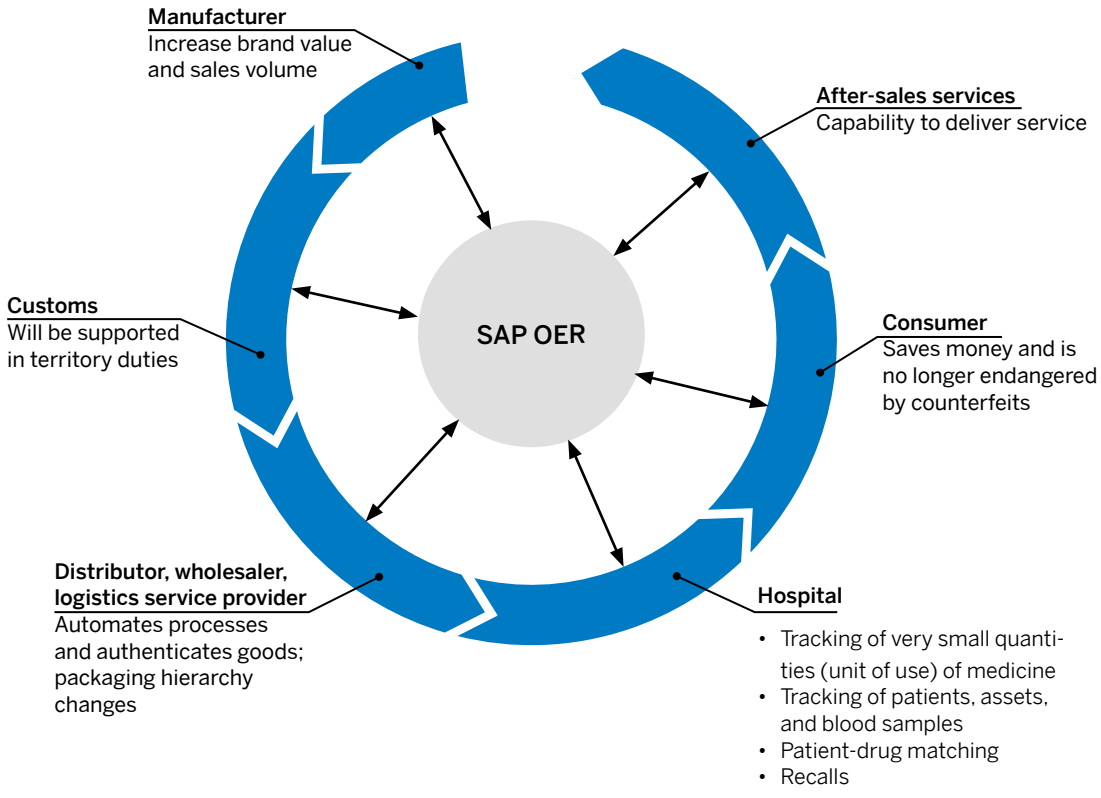
SAP NetWeaver MDM FOR GLOBAL DATA SYNCHRONIZATION

Master data is the foundation of efficient business networks. Without shared, synchronized master data, cross-organization business processes are susceptible to errors and failures that lengthen the procurement cycle and lead to excessive inventory levels and higher costs. Once your organization has location and product data standards for consistency, you need a method of synchronizing data among your trading partners (see Figure 1). This can be done using the Global Data Synchronization Network (GDSN) and SAP NetWeaver MDM for global data synchronization.

The main purpose of the GDSN is the **synchronization of product and service data;** it enables trading partners to always have the same information in their systems. Any changes made by an information source (such as a manufacturer or distributor) are made available automatically and immediately to all of their business partners.

SAP support for the GS1's GDSN enables supply chain partners to continuously synchronize data, thus improving accuracy and efficiency in their supply chains. Product and price data consistency, quality, and distribution among trading partners can all be achieved using SAP NetWeaver MDM for global data synchronization. With the SAP solution, you can enhance, transport, and communicate product and service information from either an SAP source (such as SAP ERP) or a non-SAP source to the two leading data pools, SA2 Worldsync or 1SYNC. Then, from a graphical console, you can create and manage trade item data. A sophisticated publication mechanism, using standardized protocols, predefined GS1 content, specific validation rules, and workflows, helps ensure that you and your trading partners always exchange and synchronize needed item and service data.

Figure 2: Secure Tracking and Tracing with EPCIS-Certified SAP® Object Event Repository



SAP helps to extend the reach of global data synchronization to business partners not yet connected to a data pool. Catalogs in GS1 format can be created and distributed outside the GDSN directly in a flat file (via an FTP server or e-mail), thus extending your reach to business partners who aren't yet participating in GDSN.

SAP OBJECT EVENT REPOSITORY AND SAP EVENT MANAGEMENT

SAP solutions implement GS1 standards that help prevent counterfeit pharmaceutical products. They also make excellent tools for other industries in which products also are frequently counterfeited or diverted, such as cosmetics, electronics, and automobile parts. Based on GS1 standards and EPCIS-certified, SAP Event Management uses SAP OER to make end-to-end traceability possible on a global scale (see Figure 2).

SAP OER is the centralized system of record that supports auto-ID instances across the enterprise and facilitates inter- and intraorganization tracking of serialized objects, using GS1 identification keys. Certified by GS1 EPCglobal to be fully compliant with its EPCIS standard, SAP OER integrates serialization with transactions from outside trading partners, all within an active, real-time, event-driven engine. Thus, by using SAP Event Management to define records to be maintained within SAP OER, a product and its components can be traced through its entire lifecycle – manufacturing, packing, putaway, picking, shipping, receiving, putaway, picking, issue, and selling/dispensing to a consumer or patient.

By tracking your logistics and fulfillment processes, assets, and activities using SAP Event Management, you can monitor activities across the supply chain and identify potential problems early – before they escalate. SAP Event Management provides the power and sophistication to manage every link in the extended supply chain. It can help boost business performance in important ways, including risk mitigation, increased customer safety and satisfaction, reduced costs, and more effective collaboration.

SAP Event Management supports monitoring, notification, adjustments, and analysis of business events in support of adaptive collaboration across the business network. It gives your organization the tools and framework necessary to meet your specific event-monitoring needs. The events themselves are stored in SAP OER.

A BETTER WAY TO CONDUCT BUSINESS

SAP solutions provide a better way to conduct business by using GS1 data standards and electronic messages to enable trading partners to smoothly exchange information – regardless of hardware, software, or the language that they speak. Through the use of GS1 standards, you can facilitate and enhance collaboration among your supply chain partners, provide improved customer service, and boost profitability – to the benefit of all your stakeholders.

FOR MORE INFORMATION

For more information on GS1 standards and SAP solutions to improve your supply chain, please see the following resources:

- GS1 Home Page: www.gs1.org
- SAP.com application help for GS1 compliance: www.help.sap.com/saphelp_dbm700/helpdata/EN/62/e0391eaa73b64f9ac8991ecf20b3b3/frameset.htm
- SAP Solutions in Detail – SAP Event Management: www.sap.com/lines-of-business/scm/resources
- Supply Network Traceability – SAP Solutions for Auto-ID and Serialization: www.sap.com/lines-of-business/scm/rfid-tracking-software.epx and www.sap.com/solutions/auto-id/index.epx
- BPX Community – SAP and GS1 Standards: www.sdn.sap.com/irj/bpx/gs1-standards
- SAP SDN Community – GS1: www.sdn.sap.com/irj/scn/advancedsearch?query=gs1
- GS1 Traceability: www.gs1.org/traceability
- GS1 – EPCIS: EPC Information Services Standard: www.gs1.org/gsmp/kc/epcglobal/epcis

SAP solutions implement GS1 standards that help prevent counterfeit pharmaceutical products. They also make excellent tools for other industries in which products also are frequently counterfeited or diverted, such as cosmetics, electronics, and automobile parts.

Auto-ID and item serialization solutions from SAP can **sense and respond to the real world** and drive business productivity by automating data capture, as well as supporting the serialization of products and assets.

SAP® Application Mapping to GS1 Data Standards

	Data Standards	Interface Standards	SAP® OER	SAP ERP	SAP NetWeaver® MDM for global data synchronization
Product master data	Item business message standard Party business message standard	Global Data Sync Network (GDSN) EPCIS master data	NA	NA	✓
Transactional data	GS1 XML GS1 EANCOM	AS2	NA	✓	NA
Physical event data	Electronic Product Code Information Services (EPCIS) schema	EPCIS capture EPCIS query	✓	NA	NA
Product and service classification	Global Product Classification (GPC); others, such as United Nations Standard Products and Services Code – UNSPSC and e-Class also are supported in SAP® software			✓	✓

SAP® Application Mapping to GS1 Identification Number

GS1 Identification Number	GS1 Identification Number Title	Type of Supply Chain Information	SAP® Auto-ID Infrastructure	SAP OER	SAP ERP	SAP NetWeaver® MDM for global data synchronization
GTIN	Global Trade Item Number	Trade items	✓		✓	✓
	Global Trade Item plus lot (Batch number)	Specific lot of trade item	✓		✓[1]	
	Serialized Global Trade Item Number (SGTIN)	Specific individual trade item	✓	✓		
GLN	Global Location Number	Locations and trading partners	✓	✓	✓	✓
SSCC	Serial Shipping Container Code	Logistics units	✓		✓	✓
GIAI	Global Individual Asset Identifier	Individual assets	✓	✓		
GRAI	Global Returnable Asset Identifier	Returnable assets	✓	✓		
GSRN	Global Service Relation Number	Service relationships	✓	✓		
GDTI	Global Document Type Identifier	Document types	✓	✓		
GSIN	Global Shipment ID Number	Shipment				
GINC	Global Identification Number for Consignment	Logistics units				

FOOTNOTES

1. X(20) batch number is stored in batch characteristic field.

www.sap.com/contactsap

50 110 036 (12/01) ©2011 SAP AG. All rights reserved.

SAP, R/3, SAP NetWeaver, Duet, PartnerEdge, ByDesign, SAP BusinessObjects Explorer, StreamWork, SAP HANA, and other SAP products and services mentioned herein as well as their respective logos are trademarks or registered trademarks of SAP AG in Germany and other countries.

Business Objects and the Business Objects logo, BusinessObjects, Crystal Reports, Crystal Decisions, Web Intelligence, Xcelsius, and other Business Objects products and services mentioned herein as well as their respective logos are trademarks or registered trademarks of Business Objects Software Ltd. Business Objects is an SAP company.

Sybase and Adaptive Server, iAnywhere, Sybase 365, SQL Anywhere, and other Sybase products and services mentioned herein as well as their respective logos are trademarks or registered trademarks of Sybase, Inc. Sybase is an SAP company.

All other product and service names mentioned are the trademarks of their respective companies. Data contained in this document serves informational purposes only. National product specifications may vary.

These materials are subject to change without notice. These materials are provided by SAP AG and its affiliated companies ("SAP Group") for informational purposes only, without representation or warranty of any kind, and SAP Group shall not be liable for errors or omissions with respect to the materials. The only warranties for SAP Group products and services are those that are set forth in the express warranty statements accompanying such products and services, if any. Nothing herein should be construed as constituting an additional warranty.

SAP®

The Best-Run Businesses Run SAP™