GS1 Ireland

The Global Language of Business

GTIN Use Guidelines for the Irish Construction Industry

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Log of Changes

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Summary of Change

Removed referenced to Norwegian-specific processes, solutions and repositories of product data.

Included examples from Irish industry to illustrate local use cases.

Modified graphics to translate to English and improve clarity.

Updated to reflect recent GS1 standards maintenance work – including GTIN Guidelines.

Changes to the text to improve clarity.

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Table of Contents

Appendix 34

List of Tables

List of Figures

1 Introduction

GS1 is a neutral, not-for-profit, global collaborative standards organisation that brings together industry leaders, government, regulators, academia, and industry associations to develop standards-based solutions to address the challenges of data exchange. Its scale and reach - local member organisations in 116 countries, over two-million-member companies and over 6 billion transaction every day - helps ensure that there is a common language of business used globally across 25 sectors, including consumer packaged goods, transport and logistics, healthcare, construction, and DIY.

GS1's open standards are based on ISO standards. They create a common foundation for business to uniquely identify, accurately capture and automatically share information about products, locations and more. Businesses can also combine different GS1 standards to streamline processes - such as interoperability and traceability systems for supply chains. GS1 provides a common set of standards to share sustainability information widely, both for Business-to-Business (B2B) and Business-to-Customer (B2C) purposes.

Table 1 is a list of GS1 Standards based on ISO and other standards and applicable in the construction industry.

GS1 Standards and their ISO/IEC basis

GS1 Standard	ISO/IEC Standard
GTIN (Global Trade Item Number)	ISO/IEC 15459-6 & ISO/IEC 6523
GLN (Global Location Number)	ISO/IEC 6523
SSCC (Serial Shipping Container Code)	ISO/IEC 15459-1 & ISO/IEC 6523
GIAI (Global Individual Asset Identifier)	ISO/IEC 15459-4 & 5 ISO/IEC 6523
GSRN (Global Service Relationship Number)	ISO/IEC 15418
EAN/UPC barcode	ISO/IEC 15420
GS1 Data Matrix	ISO/IEC 16022
GS1 QR Code	ISO/IEC 18004
EPC Tag Data Standard	ISO/IEC 15962

Table 1: GS1 Standards as part of ISO and other bodies

The three major advantages of GS1 standards are that are globally unique, interoperable, and persistent.

Unique product identification is an important and prioritized area for the Construction industry. The purpose of a unique identification is to ensure that the flow of goods and information in the value chain becomes easier, faster, and more secure, right from the design of the building until it is handed over to the proprietor and behind.

The Global Trade Item Number (GTIN) is a globally unique identification key that uniquely identifies a product / merchandise. The GTIN is typically included in the barcode that is scanned at the checkout point in the stores but is also used in other parts of the value chain.

The purpose for the construction industry is to be able to use the GTIN for lookup against internal / external databases to retrieve and ensure uniform documentation of the individual products included in the building. The GTIN has been chosen as the identifier because it is a global standard that ensures a unique identification of all products regardless of origin, and that can be used by all parties in the value chain across functions and systems.

The guideline will focus on how a GTIN can be generated for some selected product groups, and when in the processes this can be done. The use of a GTIN and when this will be issued will vary with different product groups. Furthermore, it will describe how a GTIN can be used in documentation about the products until the handover of the building.

The original parties who developed these guidelines back in 2021, were the Norwegian organisations Statsbygg, Bane NOR, Construction City, Helse Sør-Øst RHF, Sykehusbygg HF and GS1 Norway. The project involved several other parties who contributed with input and quality assurance of the Guidelines.

This version of the Guideline describes four main categories of products:

- Made to Stock (MtS) and Made to Order (MtO)
- Ready-mixed concrete
- Precast concrete elements
- Doors and Windows

The product groups have been chosen because they represent different situations and challenges when it comes to using a GTIN. The principles for the selected product groups can be transferred to other product groups. It is the parties' intention that the Guideline will eventually include more product groups if it is considered necessary.

2 Background

Regulators and industry participants are making ever greater demands for documentation of products for Construction and Facility Management (FM). The information must be detailed and correct, and be available throughout the building's life cycle, from design to decommissioning.

This presupposes that the products have a unique common identification that is understood by everyone and is interoperable, working across functions and systems over time. The GTIN meets these requirements and is therefore chosen as the identifier.

Many products already have a GTIN, but some product categories are particularly challenging. This applies to products that are produced based on specifications for the individual project, often referred to as one-of-a-kind products. The Guideline has chosen to describe ready-mixed concrete, precast concrete elements, doors, and windows as representatives of these.

In addition, the project has chosen to describe the identification of products mentioned as Made to Stock (MtS).

The GTIN will help make it easier to collect and retrieve Maintenance Repair and Overhaul (MRO) documentation and other information about products that are part of a construction project.

In addition, the GTIN can be used in the supply chain for orders, deliveries, and settlement, and to be able to track the product from raw materials to assembly, decommissioning, and recycling. Here we would especially encourage the use of Electronic Data Interchange (EDI) for the exchange of information where possible.

The use of the GTIN can also form the basis for data collection for analysis and reporting at product level.

3 Purpose of the Guideline

The target audience for the Guideline is the Irish construction industry in general, but with the focus on manufacturers of construction products. They will be responsible to assigning GTINs to their products. Designers can then make use of these GTINs to select the appropriated products for their projects.

The guideline will be an aid for everyone who produces, maintains, and exchanges product documentation, where requirements are set for the use of a GTIN. The GTIN shall be an aid to identify the products in such a way that the GTIN can later be used as an identifier to retrieve documentation about properties of the products in internal or external registers.

The guideline is based on the demands and requirements that contracting parties make for the identification of products that are part of a Construction project. By complying with the recommendations / guidelines described in the Guideline, this will contribute to MRO information being utilised by the owner/operator of the building, or infrastructure.

4 Content of the Guideline

The guideline does not specifically describe the content of the MRO information. The GTIN is a globally unique number that identifies a product across the value chain.

This means that the same number can be used by all actors in all phases of the building's life cycle, from planning and engineering until the finished building, in the use phase, and finally in the decommissioning of the building. Some key uses:

- Lookup and obtain documentation of properties of the product, from internal or external databases.
- Can be used in the supply chain to provide a unique identification of products that are ordered, delivered, and invoiced.
- Can be used to track the product from production to assembly, reuse, and recycling.
- Can be included in BIM models and thus ensure connection to the finished building (Digital Twin).
- The use of a GTIN could form the basis for the collection of data for analysis and reporting within purchasing, service, complaints, etc. at product level.

The GTIN is an important building block on the way to more digitalisation of the construction industry. Having a GTIN for a product enable access to product information in:

- Libraries with generic BIM objects at component and building component level.
- National catalogues for product properties (Product Data Templates – PDTs).
- Common systems for identification, labelling and scanning.
- Common arrangements for the exchange of information from product databases.
- Access to "as built" information.

In all these components, the GTIN will be able to play an important role in linking information about what has been delivered by products into a project, to documentation about the product.

The content of this guideline contains five main sections, these are:

- How to obtain a licence for the right to assign a GTIN and how to do this.
- At what stage in the construction project a GTIN should be assigned to a product.
- Link between a BIM object and a GTIN from a product.
- Guideline Management.
- Appendix containing use cases, glossary and definitions.

5 How to Obtain a Licence and Assign a GTIN

To assign a GTIN, it is required that the manufacturer has a subscription to the GS1 Global Company Prefix (GCP). The GCP provides a way for GS1 Member Companies to identify trade items, logistic units, locations, parties, and assets uniquely and globally.

5.1 Obtain a GS1 Company Prefix

To obtain a subscription to a GS1 Global Company Prefix in Ireland, click the link or contact GS1 Ireland directly: Register to join GS1 Ireland

In Ireland the GCP can contain 7, 9 or 11 digits, see combination of the GCP length table below:

GCP Length	I	R	L										Check Digit
GCP 7	5	3	9	1	2	3	4	R	R	R	R	R	C
GCP 9	5	3	9	1	2	3	4	5	6	R	R	R	C
GCP 11	5	3	9	1	2	3	4	5	6	7	8	R	C

Table 2: Combination of the GS1 Ireland GCP Lengths

539 is the GS1 Ireland country code; the GCP 7, 9 and 11 allows users to create 100,000, 1000 and 10 GTIN's respectively. A check digit is a number that is used to verify the accuracy of a GS1 Identification Key, such as GTIN and GLN. A Check Digit Calculator tool is available on the GS1 Ireland website.

The GS1 Ireland Company Prefix assigned to a member company shall entitle that company to create most of the GS1 Identification Keys.

5.2 Assign a GTIN

Once an organisation has acquired a GS1 Global Company Prefix, it can assign GTINs to its products.

We recommend contacting GS1 Ireland if you want more information or assistance regarding labelling. A brief overview of this is given in Appendix D.

5.3 GTIN Management Rules

GS1 has established a global regulatory framework that describes how the manufacturer should manage its GTINs. This includes principles and guidelines which dictate when a new GTIN is required as a result of changes made to the product.

The starting points for assessing whether a change to a product entails a new GTIN or can retain the existing one are:

- Is it expected that an end customer and / or trading partner will be able to distinguish the changed or new product from previous / current products?
- Are there legal requirements that require the product to be changed?
- Does it have a significant impact on the supply chain, e.g., how the product is sent, stored, or received?

If the answer is "yes" to at least one of these questions, the existing GTIN cannot be used and a new GTIN must be assigned to the product.

It is also not permitted to reuse a GTIN that has previously been used on a product, even if the product is no longer available or has been discontinued.
More about GTIN Management Standard is described in this link: https://www.gs1.org/sites/default/files/docs/barcodes/GS1_GTIN_Management_Standard.pdf

GTIN Guideline for construction have been published. These considers the Use Phase, in connection with maintenance, subsequent use, re-use, or decommissioning, and whether this requires a new GTIN is to be removed or whether the existing GTIN can be used when changing specifications of a product. For more information, see link GTIN Management Guideline for Construction Products | GS1

6 GTIN in the Construction Industry

In principle there are two main categories to take into consideration when a GTIN needs to be assigned on a construction product, these are:

Made to Stock (MtS)	Made to Order (MtO)
Some products are produced in large series, with identical properties, dimensions, and weights, and which do not change over time. These can be produced for stock and are traditionally sold through regular retailers. They are often also catalogued internally, and / or in other databases. For these products, a GTIN can be assigned before the item is produced, and used in the planning / engineering phase, can be used for ordering, and can later be used for lookup in internal or external databases for retrieving documentation on the products	Other products are produced for one individual project, based on measurements or other defined specifications / performance descriptions, and are available in a limited number. For these products, it will often not be possible to assign a unique GTIN until later in the value chain, when all data about the product is known. These products place greater demands on documentation about the product to be registered and taken care of by the individual player during the process, as there will not always be publicly available databases for information look up over time.

Table 3: Use of GTIN for MTS and MTO Processes

In Norway, these guidelines were based on the Norsk Stegnorm processes. This is a well-known approach in their industry to describe processes, roles, and information needs. See the description below for each of the steps:

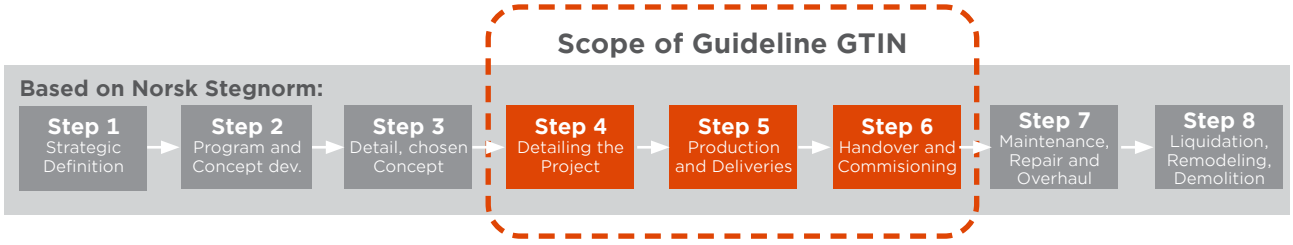


Figure 1: Scope of the Guideline in Relation to Norsk Stegnorm

The steps that were considered for both categories are listed below:

- **Step 4:** Detailing the Project.
- **Step 5:** Production and Deliveries.
- **Step 6:** Handover and Commissioning.

It follows in this document a description of these three steps for MTS and MTO construction products.

6.1 GTIN on MtS Products

This section describes Made to Stock construction products. These are usually products that are produced in a large series, with identical properties, dimensions, and weight, and that do not change over time. These can be produced for stock, and can be sold through regular retailers, or other distribution channels. For these products, a GTIN can be assigned when all the properties of the product have been decided.

GTINs can be used in the design, ordering, construction, handover, operations repurposing phases. It can be used to retrieve information from internal or external repositories including BIM Models, Product Information Management (PIM) systems and regulatory databases.

6.1.1 Step 4: Detailing the Project

Standard off the shelf products have known properties that can be obtained via commercial product catalogues or via a retailer, manufacturer, etc. It is therefore possible to include specific products in detailed design at an early stage.

! Use of a GTIN with attributes:

If a GTIN is present on the product, it can be used to obtain information about the product and its properties.
If a GTIN does not exist, and it is relevant to use this product in the project, the customer can request that the manufacturer assign a GTIN to it. The GTIN can then be used actively in the detailed design, and in all further interaction between the parties, and further on in the value chain.

6.1.2 Step 5: Production and Deliveries

6.1.2.1 Procurement:

When ordering standard off the shelf products, a GTIN can be used to identify the product. This provides a guarantee that you get what you order, as all properties of the product are known.

In the order confirmation, there is no need to exchange further information about the product, as all the properties of it are already known. We encourage the use of Electronic Data Interchange (EDI) for ordering, confirming orders, advising of shipments, receiving deliveries and invoicing.

! Use of a GTIN with attributes:

The product is identified with a GTIN in order and order confirmation.

6.1.2.2 Production:

A standard off the shelf product is produced for storage. All products with the same properties / specifications are identified with the same GTIN.

It is encouraged to assign and label products with a batch / lot number. This is an attribute of the GTIN. The number will be common to a production lot of the same product and can be useful, for example, in connection with an error in production - when using batch / lot number one will be able to retrace products that belong to the same production lot and can check if any defects also affect them. See Appendix C1 for more information on batch / lot numbers.

! Use of a GTIN with attributes:

All identical products with the same features and specifications shall be assigned the same GTIN.
The batch / lot number can be extracted as an attribute of the GTIN and labelled on the product for later tracking.

6.1.2.3 Delivery:

The delivery is documented in a delivery note. For identification purposes, it is not necessary to describe the product itself beyond GTIN and any name of the product. It may nevertheless be desirable for the product to be described with some more information to simplify reception control.

If the product has been assigned a batch / lot number, this must be included in the delivery note. It is encouraged to use the EDI Despatch Advice when sending the delivery note.

Information about what has been delivered can be registered in a document archive and included as part of documentation on the product that is included in the relevant delivery / project.

! Use of a GTIN with attributes:

GTIN, together with batch / lot number, if applicable is included in the delivery note.

6.1.3 Step 6: Handover and Commissioning

Upon delivery of the building, documentation "as built" must be made available to the proprietor / owner.

All information about the products that have been delivered and that is necessary for future use and maintenance should be stored in a document archive.

The Guideline does not provide guidelines on how this information is to be exchanged, but 3 different scenarios are described in Appendix B.

Use of a GTIN with attributes:

GTIN, together with batch / lot number, if applicable, is the key for searching in a document archive for retrieving properties / specifications about the individual product.

6.1.4 Summary for MTS Products

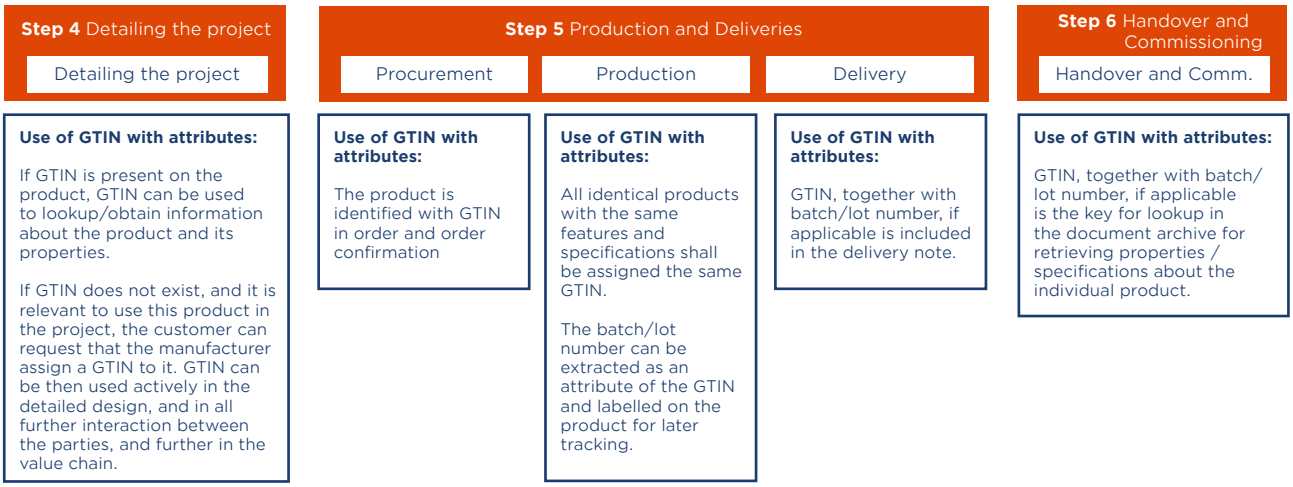


Figure 2: Summary of the Workflows for MTS Products

6.2 GTIN on MtO Products

This section describes Made to Order construction products. These are usually products / systems produced for a project / client, with specified properties, an example of this product could be a door or a window.

6.2.1 Step 4: Detailing the Project

The detailed design shall provide a basis for production based on suppliers' detailed system and product information. The material can be generated in a BIM model and a description of drawings with the contractors' calculations.

Depending on the contract/procurement route, this information can also be made in close collaboration with the subcontractors and suppliers.

6.2.2 Step 5: Production and Deliveries

This step includes ordering, production and deliveries based on the documentation produced in step 4. It is ensured that information about the product is captured so that MRO information can be prepared. It is critical to update the BIM model as per the products/information from suppliers, for both coordination and handover of the model.

6.2.3 Step 6: Handover and Commissioning

At this stage of the project, the building undergoes commissioning to verify that all systems are functioning correctly for their intended use. Concurrently, the Maintenance, Repair, and Operations (MRO) documentation is updated and interoperable with the building's Operational Management System to ensure optimal operation.

6.2.4 General Information and Process Model

The illustration below describes a generic information and process flow. The model is independent of product group, and generally describes what information is included in the various steps in the model.

- Solid black arrows are how this is currently done.
- Dotted black lines are how the information exchange can be done when the Product Data Template (PDT) work is completed, and Product Data Sheet (PDS) is used for the exchange of information.

As PDTs have not been defined, this is not discussed in more detail in the guideline beyond a description of what PDT and PDS is and how it can be used, see Appendix E.

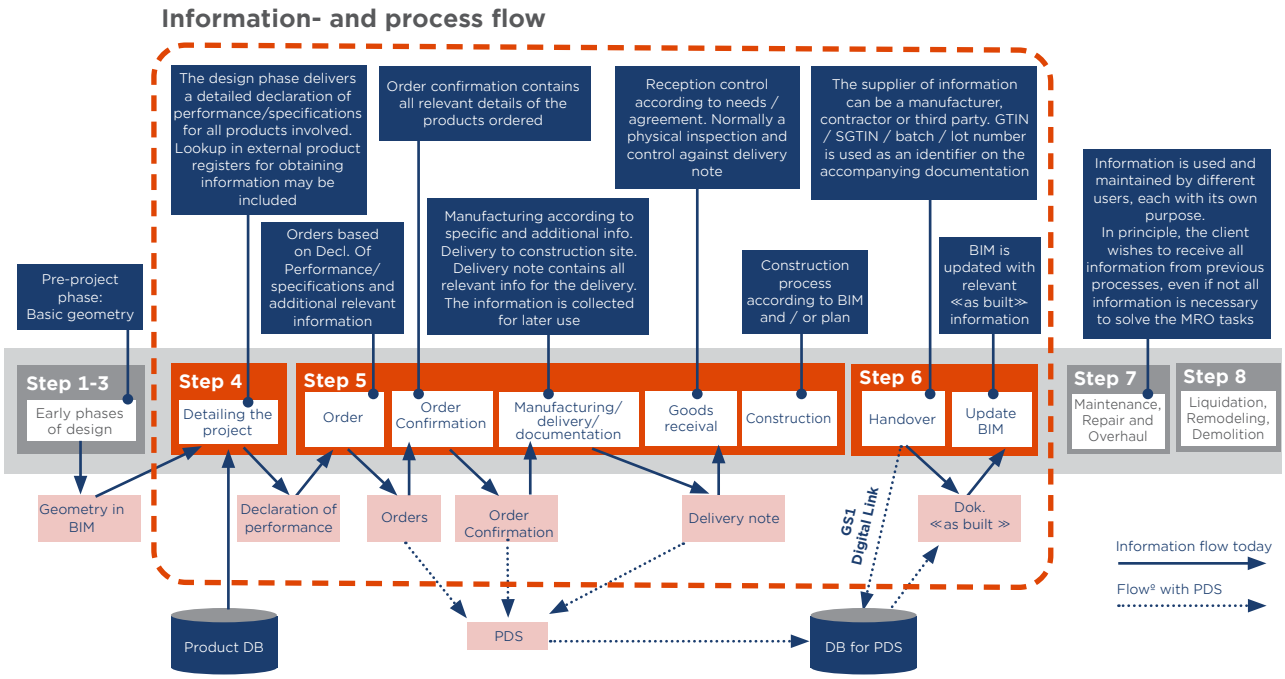


Figure 3: Model for Generic Information and Process Flow
Note: for better reading, a large version of the model can be seen in Appendix F

> It is important to put in place such a Guideline, also from a sustainability perspective. The documentation to which the GTIN standards contributes must be used throughout the building's life cycle. The GTIN standards will be able to make the daily operation of a building as resource efficient as possible and ensure an environmentally safe demolition of the building. If we know all the components of a building, we can reuse material from old building and ensure a safe treatment of the waste".
>
> **Benedicte Økland**
> CEO
> Construction City

6.3 How the GTIN can be used on Ready-mix Concrete

Ready-mix concrete (RMC) is concrete delivered in fresh (non-hardened) state to the construction site for in-situ casting.

6.3.1 Step 4: Design Detailing

Concrete in a building/construction project normally will be described by a set of requirements related to the structural and durability performance during operation / service life. Detailed requirements related to a wide variety of special applications or functions may be included, e.g., cement type, heat generation, surface texture, x-Ray protection, etc.

The most frequent design requirements include strength class and exposure class (durability). The exposure class performance implies minimum requirements (national competence) for the concrete mix design (independently of strength class), e.g. a maximum water/binder-ratio and possibly differentiated by cement type, for the design exposure environment. The strength class defines a statistically determined characteristic strength level.

The contractors may ad requirements relating to the execution of the concrete works, for the fresh or hardening state, e.g., depending on the selected casting process or season production conditions. The contractor may typically explore for tailor made properties, based on the concrete supplier's product catalogue normally sorted by strength class, exposure class, possibly also "low carbon class", EPD availability or other main characteristics.

! Use of a GTIN with attributes:

At the design stage it is normally not possible to refer or to or apply a specific GTIN on ready-mixed concrete. The list of requirements will later be enriched with execution phase properties. The GTIN should be issued when a detailed and unambiguous description (declaration) can be provided.

6.3.2 Step 5: Production and Deliveries

6.3.2.1 Procurement:

Ready-mix concrete is usually ordered from the manufacturer's product number, for example from a catalogue. Additional information must be provided or elaborated together with the concrete supplier, such as fibre addition, addition of plasticiser, retarding chemicals, maximum heat generation, etc.

In the order confirmation, the manufacturer's product number will appear (if any), together with the performance descriptions and enrichments that have appeared in the order and in any subsequent dialogue between the parties.

! Use of a GTIN with attributes:

For ready-mixed concrete, it is normally not possible for the customer to refer to or use a GTIN when ordering. It is only in the order that the product is specified with enough details that the manufacturer can subsequently generate a unique GTIN for the ordered product. In practice, this means that GTIN is not used in interaction between the parties until after the concrete has been produced.

6.3.2.2 Production:

Ready-mix concrete is produced according to performance descriptions / specifications as specified in the order and enrichments to this.

Detailed information must be recorded and taken care of for each production lot. The definition of a production lot is decided by the individual producer. For some, it may be everything that is produced on the same recipe for a given customer for a given project, while others choose further decomposition, for example, each truck load. A production lot can be identified by a batch / lot number. This is an attribute of the GTIN.

By entering a batch / lot number for each production lot, this provides opportunities for detailed documentation and subsequent tracking. See Appendix C1 for more information on batch / lot numbers.

Relevant information that must be documented for each production lot:

- Manufacturer and / or production facility. Here the Global Location Number (GLN) can be used for identification - see more info about GLN in appendix C.2.
- The GTIN of the ready-mixed concrete.
- Batch / lot number as an attribute of the GTIN.
- Product register for hazardous materials.
- Registration, Evaluation, Authorisation and Restriction of Chemical (REACH) references.
- Law / regulatory requirements, others – references.
- Requirements coming from engineering.
- Requirements coming from construction company.
- Manufacturers own declarations, others.
- Other info links (guidelines etc.).

! Use of a GTIN with attributes:

Concrete with the same properties must be identified with the same GTIN. Which properties this includes are decided by each individual manufacturer, but the Guideline recommends as a minimum that separate GTINs are to be assigned for combinations of:

- Strength class.
- Exposure class.
- Nominal upper aggregate size.
- EPD properties values or low carbon class, if relevant.
- Consistence class (es).

Variations due to admixtures / minor changes in the recipe, for example to consider casting or seasonal conditions, are captured by assigning different batch / lot numbers to the production. They may include:

- Fibres.
- Plasticiser.
- Retarding chemicals.
- Heat generation.

A GTIN, in combination with batch / lot number, if applicable, will give an unambiguous description of the product.

6.3.2.3 Delivery:
The delivery is documented in a delivery note. It describes the same info that is in the order confirmation as well as some formalities.

It must also contain the parameters / enrichments that the customer has subsequently initiated.

The ready-mix concrete must be identified with a GTIN and batch / lot number, if applicable, for the current delivery.

Use of a GTIN with attributes:

The ready-mix concrete is identified with GTIN and batch / lot number, if applicable, and is updated in the document archive along with other relevant information.

6.3.3 Step 6: Handover and Commissioning

Upon delivery of the building, documentation «as built» must be made available to the proprietor / owner. All information necessary for future use and management can be found in the document archive. This includes all GTINs, and batch / lot numbers used.

Use of a GTIN with attributes:

A GTIN and batch / lot number, if applicable, will be key for lookup in the document archive for retrieving properties / specifications of the individual product.

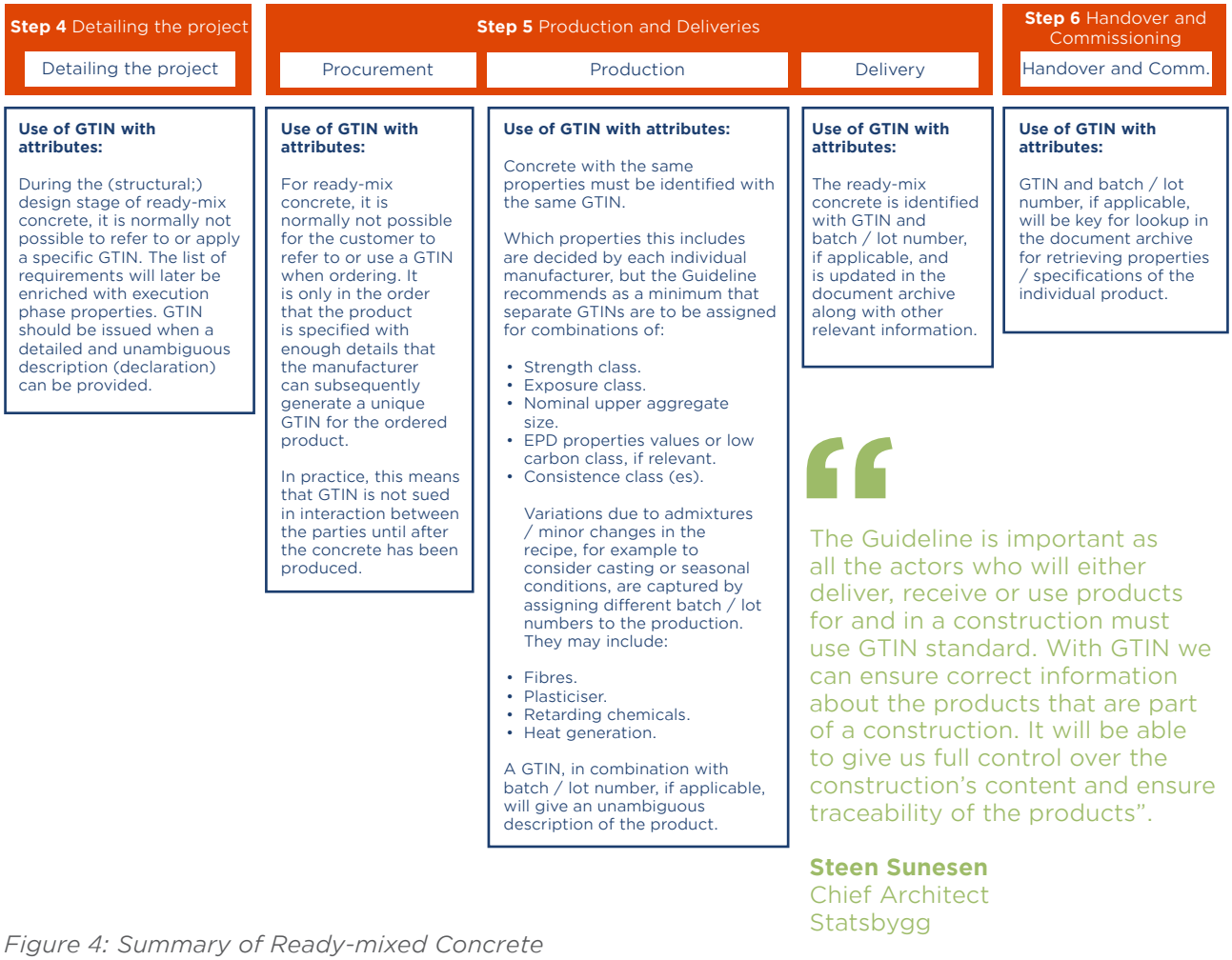


Figure 4: Summary of Ready-mixed Concrete

> The Guideline is important as all the actors who will either deliver, receive or use products for and in a construction must use GTIN standard. With GTIN we can ensure correct information about the products that are part of a construction. It will be able to give us full control over the construction's content and ensure traceability of the products".
>
> **Steen Sunesen**
> Chief Architect
> Statsbygg

6.4 How the GTIN can be used on Precast Concrete Elements

The term precast concrete elements means products that have been cast by the manufacturer, with defined properties, based on a specific specification for the individual project.

There are other concrete products with defined properties, and which are not project specific. These are mass-produced for stock and can be sold in various sales channels. Examples of this type of product can be pipe and pipe parts, troughs, slabs, curbs, guardrails etc. These products are defined in the Guideline as Made to Stock products and are described in section 6.

For precast concrete elements, it is recommended to assign a GTIN when the final specifications have been agreed with the customer / client, and an agreement has been entered. In this way assigning GTINs to products that will never be ordered is avoided.

Although there may be a significant number of different GTINs over time, this is an easy and convenient way to differentiate between different products. Each specification of a product will have its unique GTIN, where you can use the assigned GTIN to lookup in a register afterwards to retrieve the exact specifications that apply to the product.

Although a product is made with a unique specification, there may be several individuals instances of it. If there is a requirement for each instance to be able to be separated from each other, each instance can be assigned a serial number as an attribute of GTIN. Serial number is determined by the manufacturer. For the serial number to be used for practical purposes, the serial number must be physically labelled on the product. More about serial number in Appendix C.1, and labelling in Appendix D.

It is recommended to attach a batch / lot number to each production batch if the product is produced in several instances in several productions. The number is an attribute of GTIN that allows you to track a production batch throughout the value chain and can be useful if problems or complaints should occur on a product, for example to be able to identify other instances of the product with similar errors. See more information on batch / lot numbers in Appendix C.1.

If the manufacturer currently uses internal numbers of the products in dialogue with the customer, this can be continued until an agreement has been settled. Once an agreement has been settled, the products are assigned a GTIN, the customer is informed, and the GTIN can then be used in ordering.

In further collaboration, and in subsequent paragraphs, GTIN is used on the product for identification.

6.4.1 Step 4: Detailing the Project

Requirements for concrete products that are to be included in a building will normally be described as per their performance requirements at an overall level but may also contain more detailed requirements.

The most common requirements for design are related to physical dimensions, compressive strength, and exposure classes. The exposure class indicates a performance that entails minimum requirements for mix design (which may be differentiated, for example, depending on the type of cement) in the relevant environment they are exposed. By compressive strength is meant the maximum pressure the concrete can be subjected to, without breaking.

Contractors will also be able to provide enrichment / requirements in addition to the requirements / performance descriptions set by the proprietor, in dialogue with the manufacturer.

When choosing a manufacturer, the contractor will be able to use the manufacturers' product catalogues as a starting point, which will normally contain descriptions such as geometry, strength class or load capacity, durability class, low-carbon class, EPD availability, etc.

The client / owner will normally send out a tender request which the manufacturer will consider. This could lead to a clarification process that can go back and forth several times, and which ends with the manufacturer specifying the content of the request and making an offer.

In the tender / Request for Information process, a product is often identified with an internal unique identifier, assigned by the manufacturer. When an agreement has been settled, this is replaced with a GTIN, and the customer is informed.

Use of a GTIN with attributes:

The product is assigned a GTIN, provided that all properties / specifications about the product have been finally decided, and that a delivery agreement exists.

6.4.2 Step 5: Production and Deliveries

6.4.2.1 Procurement

Precast concrete elements are usually ordered on the manufacturer's product number but can now be replaced by GTIN as all properties of the product are known, and no additional information about the product is required in the order.

In the order confirmation, GTIN will identify the product. It is encouraged to use EDI when ordering and order confirmation.

Use of a GTIN with attributes:

The product is identified by the GTIN in both the order and the order confirmation.

6.4.2.2 Production

The ordered product is produced.

If there is a requirement for individual numbering, a serial number is generated and connected to the GTIN. Labelling is done according to Annex D.

It is encouraged to use batch / lot numbers to distinguish between different productions of the product.

Detailed information about the production must be compiled in a document archive, and can e.g., contain:

- A GTIN of the product.
- Serial number as an attribute of GTIN.
- Batch / lot number as an attribute of GTIN.
- Product register – references.
- REACH references.
- Law / regulatory requirements, others – references.
- Requirements coming from engineering.
- Requirements coming from construction company.
- Manufacturers own declarations, others.
- Other info links (guidelines etc.).

Use of a GTIN with attributes:

The product is identified with GTIN, and serial number if the product is serialised. Batch / lot number is linked to GTIN / serial number.

6.4.2.3 Delivery

The delivery is accompanied by a delivery note. It must contain sufficient information for goods receipt to be able to identify the product and verify that the correct product has been received. If the serial number and / or batch / lot number have been assigned on the product included in the delivery, this must be included in the documentation.

It is encouraged to use the EDI Despatch Advice when sending the delivery note if this is possible.

Information about what has been delivered must be registered in a document archive and included as part of documentation on the product that is included in the relevant delivery / project.

Use of a GTIN with attributes:

A GTIN must be specified as a product identifier and linked to the documentation. The manufacturer must register the GTIN, and the serial number and batch / lot number if applicable, in the document archive for the delivery.

6.4.3 Step 6: Handover and Commissioning

Upon delivery of the building, documentation "as built" must be made available to the client / owner. All information about the products that have been delivered and that is necessary for future use and maintenance must be found in a document archive.

The Guideline does not decide on how this information is to be exchanged, but 3 different concepts are described in Appendix B.

Use of a GTIN with attributes:

A GTIN, together with a serial number and a batch / lot number, if applicable, will be the key for lookup in the document archive for retrieving properties / specifications of the individual product included in the delivery.

6.4.4 Summary of Precast Concrete Elements

Precast Concrete elements:

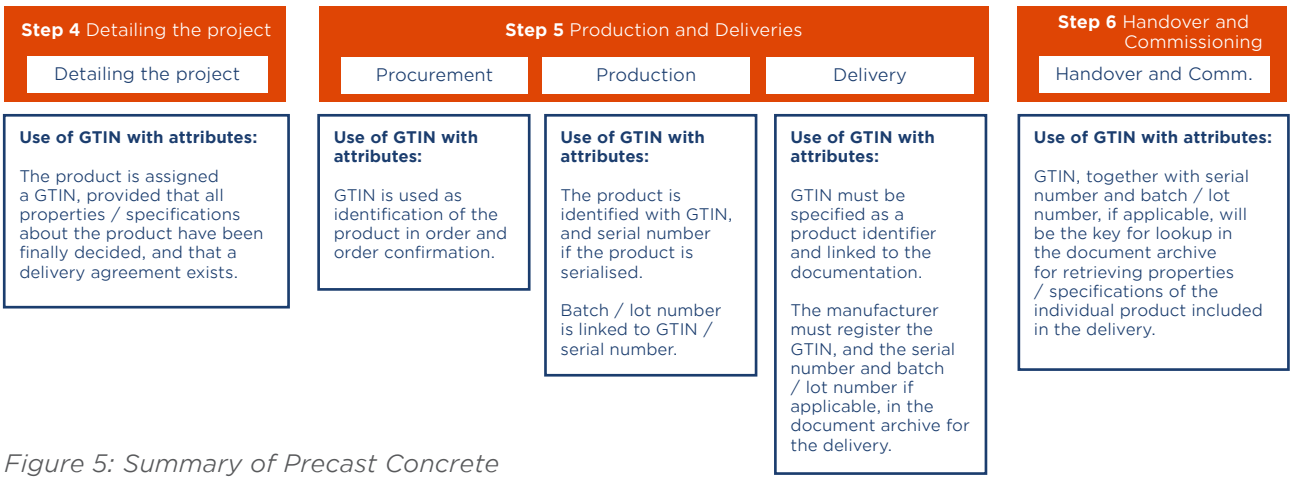


Figure 5: Summary of Precast Concrete

6.5 How a GTIN can be used on Doors and Windows

This section describes doors and windows. These are assumed to have similar handling in the value chain, in relation to what the Guideline is to describe.

Some production of doors / windows for storage may occur. These products can be assigned a GTIN when properties / specifications of the product are decided. The products can be catalogued both at the manufacturer and in other commercial databases. These products will then be included in what is referred to as MTS products and are described in section 6.
Most door / window products are based on specifications that apply to the individual building / project ("once-off").

For these, it is recommended to assign a GTIN when the final specifications have been agreed with the customer / client. This is often when final order confirmation of an order is sent. Although this methodology can lead to a significant number of different GTINs over time, this is an easy and convenient way to distinguish different once-off products.

Each specification of a product will have its unique GTIN, where you can use the assigned GTIN to lookup in an archive / catalogue to retrieve the exact specifications that apply to the product.

Although a once-off product is made based on a unique specification, there may be several individuals (instances) of it. If there is a requirement for each instance to be able to be separated from each other, each instance can be assigned a serial number. The number is an attribute that is in addition to the GTIN and is determined by the manufacturer.

For the serial number to be used for practical purposes, the serial number must be physically labelled on the product. See more information about serial numbers in Appendix C.1, and labelling in Appendix D.

It is encouraged to attach a batch / lot number to each production batch if the product is produced in several instances in several productions. The number is an additional attribute to GTIN which provides the opportunity to track a production batch throughout the value chain, and which can be useful if problems or complaints should arise on a product, for example to be able to identify other instances of the product with similar errors. See more information on batch / lot numbers in Appendix C.1.

Today's practice where the manufacturer assigns internal specific numbers of the projects and products offered, can easily be continued. In dialogue between producer and customer / client, the manufacturer's internal identification is initially used. When the order has been received and the order confirmation is to be sent, the manufacturer assigns a GTIN on the product, and links this to the internal number.

In further collaboration, and later in the supply chain, GTIN is used on the product for identification.

A GTIN can also be used when re-ordering the same product, as the manufacturer has the link between the GTIN and the internal number the manufacturer has used in its systems.

6.5.1 Step 4: Detailing the Project

When designing, the proprietor specifies services and properties that doors / windows must have. This can typically be:

- Functional requirements.
- Material and qualities.
- Door and window type, physical dimensions, fire, and sound requirements.
- Number of each.
- Form / drawings from architect / designer, with location (facade / plan).
- Standards / regulations to be complied with.

In addition, there may be specific requirements / requests from the contractor / proprietor for the delivery as:

- Progress / delivery plan.
- Packaging and labelling.
- Fastening details / fasteners.
- Requirements in connection with MRO documentation etc.

In some cases, there may be requirements for doors / windows to be individually labelled. This may, for example, apply to fire windows / doors, which are visibly signposted and sometimes must have a visible unique identification.

The client / customer will normally send out a tender request which the manufacturer will consider. This could lead to a clarification process that can go back and forth several times, and which ultimately ends with the manufacturer specifying the content of the delivery and making an offer, which the proprietor accepts or rejects.

In the tender / clarification process, products are often identified with internal unique identifiers, assigned by the manufacturer.

Use of a GTIN with attributes:

GTIN is not normally in use at this stage. If GTIN is to be used, all properties and specifications must be known by both the manufacturer and the customer / client.

6.5.2 Step 5: Production and Deliveries

6.5.2.1 Procurement

An order / call-off is normally made by referring to the relevant product, usually identified by the manufacturer's internal number.

In some cases, there may be changes in the requirements specification of the product after the design has been completed. This is registered in the order, and specifications of the product are updated.

An order confirmation is issued. This includes a full specification of the individual products to be produced and delivered.

Use of a GTIN with attributes:

If a GTIN has not been assigned for the product, the manufacturer's internal identification is used in the order. In the order confirmation, the manufacturer converts the internal identification of the product to a GTIN. This GTIN will now be used in all further interaction between the parties and will also be used in the further processes and in all documentation up to the handover of the building with associated documentation.

If there is a reorder of a product that has been assigned a GTIN, and there are no changes to the requirements specifications of the product, the GTIN can be used to reorder.

6.5.2.2 Production

The ordered product is produced according to agreed specifications. If there is a requirement for individual numbering, a serial number is generated and connected to the GTIN. The product is labelled with a serial number.

If the product is produced over time, or different production technical solutions are used, or that for other reasons it is desirable to separate different productions of the product, a batch / lot number is used to separate these.

- All produced windows and doors must be identified with GTIN. This must be included in the documentation of the product. Serial number is generated and connected to GTIN if there is a requirement for individual numbering. If the batch / lot number is assigned, this is linked to the GTIN, and also the serial number if applicable.

6.5.2.3 Delivery

The delivery is accompanied by a delivery note. It must contain sufficient information for goods receipt to be able to identify the product and verify that the correct product has been received. In practice, this is often information previously sent in the order confirmation. If the serial number and / or batch / lot number has been assigned on the product included in the delivery, this must be included in the documentation.

Normally no special control measures upon receipt other than that it is checked for external damage and that the shipment matches the delivery note.

Information about what has been delivered should be registered in a document archive and included as part of documentation on the product that is included in the relevant delivery / project.

Use of a GTIN with attributes:

GTIN must be product identifier and linked to the documentation. The manufacturer must register the GTIN, and the serial number and batch / lot number if applicable, in the document archive for the delivery.

6.5.3 Step 6: Handover and Commissioning

Upon delivery of the building, documentation "as built" must be made available to the proprietor/ owner.

All information about the products that have been delivered and that is necessary for future use and maintenance must be found in a document archive.

The Guideline does not decide in which way this information is to be exchanged, but 3 different concepts are described in Appendix B.

Use of a GTIN with attributes:

GTIN, together with serial number and batch / lot number, if applicable, will be the key for lookup in the document archive for retrieving properties / specifications of the individual product included in the delivery.

6.5.4 Summary of Doors and Windows

Doors/windows:

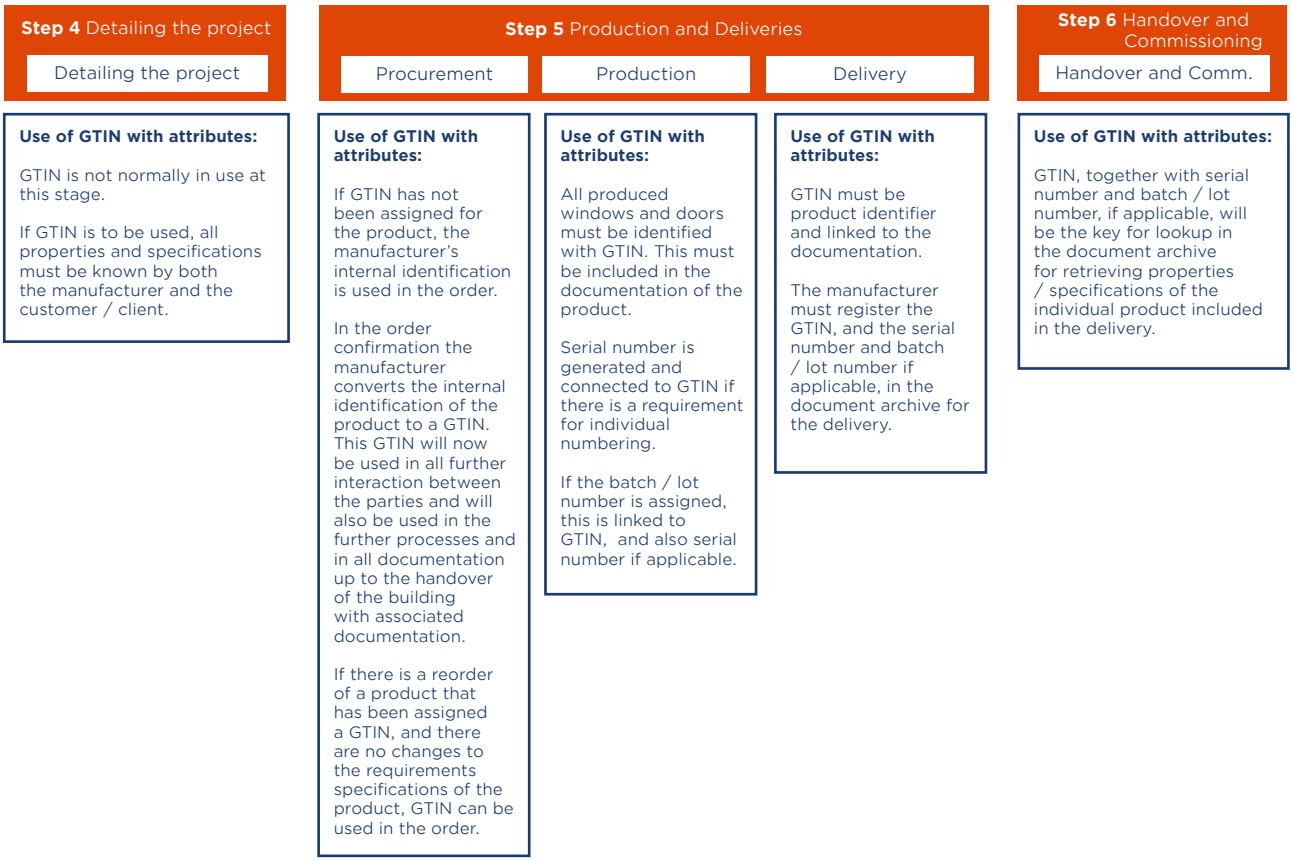


Figure 6: Summary of Doors and Windows

7 Link between BIM object and GTIN

By connecting objects in a BIM model with a GTIN, it is possible to use the model as a tool to find documentation and get an overview of where in the building different product types are located - this will streamline planning of repairs, maintenance, and other work.

There are several ways to connect BIM objects to product information, see options below:

1. The GTIN as a property of BIM objects. This ensures that each individual object instance in the model has a direct reference to the product type it represents in the physical building.

The challenge with this method is that the GTIN must be maintained in the model in addition to the product register. GTINs can be added to objects as a 'type property' of that object.

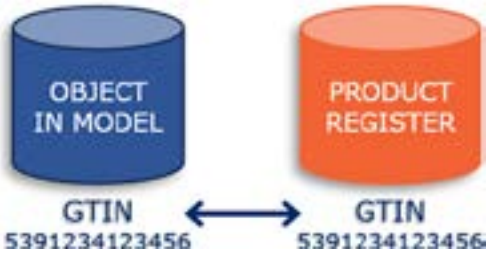


Figure 7: Identification with GTIN

2. A generic code system that that is added as a property to the BIM object, can among other things, be used to connect documentation in a product register including GTINs and product documentation. In Norway, the TFM-system (Interdisciplinary Marking System), whether it is Statsbygg's PA 0802, Standard Norway NS 3457-7, -8, -9 or other dialects, is common in many projects.

TFM coding of BIM objects is also used to track product documentation. This can be an advantage if the project still requires the use of TFM and manages to achieve good quality coding.

The challenge is that it requires high quality TFM coding.

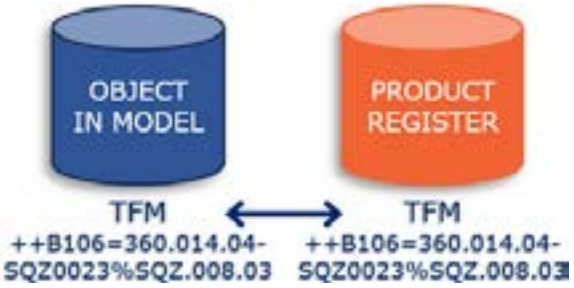


Figure 8: Identification with TFM

3. BIM software typically provide an object instance's unique model identifier, Global Unique Identification (GUID). GUID is something the software itself establishes and the code, if generated correctly, should be unique.

The challenge is that there is modelling software that changes the GUID even if the object has not been replaced. When editing a model in operation, the GUID must be preserved otherwise the link can be broken between object and documentation.

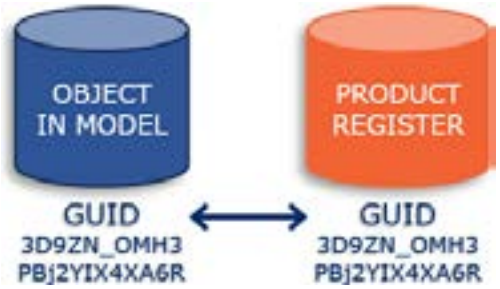


Figure 9: Identification with GUID

4. A product register or other archive solution that established a proprietary link between an object in the model and documentation. The product register automatically establishes a link when the object is linked to documentation.

The challenges is that the link is proprietary and that you lock the solution to one system unless you can export the model with the links as an open format or interface.

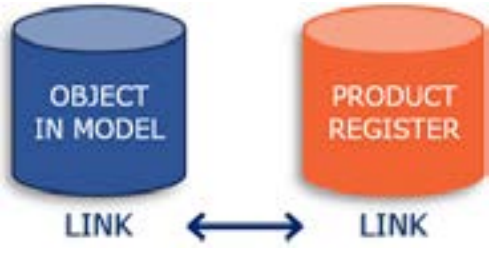


Figure 10: Identification with link

7.1 Connecting GTIN to an Object

When the GTIN is included in the product documentation, it is necessary to create a connection between the GTIN and the elements in the model for maintain product. There are a couple of strategies to accomplish this.

7.1.1.1 Attaching Identifiers to the Model during installation

The connection between the BIM object and the GTIN and its serial number is established during the installation of the product on the construction site. This is achieved by scanning the product's barcode with a scanner that is connected to a tablet, which identifies the BIM object in the model.

This approach necessitates the use of technology, specifically a barcode scanner and a tablet with the model - it also requires a disciplined approach among all project stakeholders.

One of the benefits of this method is that it allows the individual who is assembling the product on site to verify the product that has been delivered and installed, and to confirm that the connection have been made correctly.

This method can be integrated into the executive quality assurance process.

7.1.2 Attaching Identifier to the Model after installation

The connection between the BIM object and the GTIN plus its serial number is established post-installation, based on the project's product register. This method allows for a systematic work in an office environment, utilizing large screens, and can be undertaken by individual or a team.

However, this approach presents challenges, particularly in large projects where identifying used product can be difficult. It often necessitates additional site visits, and there is no guarantee that the installed product will be accessible.

This method can introduce errors and delay the handover of the BIM model to the client.

8 Guideline Management

These guidelines are based on current GS1 Standards, ISO Standards and CEN Standards. These standards are constantly being updated and added-to, so it is likely that these guidelines will have to be modified over time.

GS1 Ireland undertake to work with our members in the Construction sector in Ireland, and members of GS1 internationally, to ensure that the updated guidelines are suitable for use in Ireland.

Appendix

A: GTIN as a feature in IFC Models

GTIN in IFC 2x3 models
The vast majority of IFC models are still delivered in IFC 2x3 format (more specifically IFC2x3 TC1 or ISO / PAS 16739: 2005). Although a gradual transition to IFC4 is expected as the software is certified for IFC4 export, extensive use of IFC 2x3 models is still expected for several years to come.

In IFC 2x3, there are two properties that are defined as relevant for use with GTIN. The first is the **ArticleNumber** property under the **Pset_ManufacturerTypeInformation** property set. This can be used for the GTIN.

PropertySet Definition:

PropertySet Name	Pset_ManufacturerTypeInformation
Applicable Entities	IfcElement
Applicable Type Value	
Definition	Definition from buildingSMART International: Defines characteristics of manufactured products that may be given by the manufacturer. Note that the term 'manufactured' may also be used to refer to products that are supplied and identified by the supplier or that are assembled off site by a third party provider. This property set replaces the entity IfcManufacturerInformation from previous IFC releases.

Property Definitions:

Name	Property Type	Data Type	Definition
ArticleNumber	IfcPropertySingleValue	IfcIdentifier	Article number or reference that may be applied to a product according to a standard scheme for article number definition (e.g. UN, EAN)
ModelReference	IfcPropertySingleValue	IfcLabel	The name of the manufactured item as used by the manufacturer.
ModelLabel	IfcPropertySingleValue	IfcLabel	The model number and/or unit designator assigned by the manufacturer of the manufactured item.
Manufacturer	IfcPropertySingleValue	IfcLabel	The organization that manufactured and/or assembled the item.
ProductionYear	IfcPropertySingleValue	IfcLabel	The year of production of the manufactured item.

Figure 11: Excerpt from the IFC standard documentation for the property of GTIN in IFCx3

It is stated that this property set is applicable to all IfcElement entities, i.e., IfcElement and all entities at levels below this in the IFC hierarchy. In practice, this means all physical products (construction parts and components) in the building (e.g., gypsum boards, concrete floors, columns, beams, windows, doors, ventilation ducts, radiators, motors, dampers, pumps, valves, sensors, light fittings, sockets, switches, elevators, etc.) purchased as commodities that have a GTIN.

The other, is cases where you also want to set requirements for serial GTIN (SGTIN). IFC 2x3 has a property that is generally intended to be used for serial numbers, and this can then also be used for a serialised GTIN, i.e., the individual occurrence of one of the physical products in the building. The property is called SerialNumber and is in the property set Pset_ManufacturerOccurrence. In the cases where it is used, it is the entire SGTIN number that is to be entered here, i.e., both the GTIN number indicating the commodity and the serial part indicating the specific instance.

PropertySet Definition:

PropertySet Name	Pset_ManufacturerOccurrence
Applicable Entities	IfcElement
Applicable Type Value	
Definition	Definition from buildingSMART International: Defines properties of individual instances of manufactured products that may be given by the manufacturer.

Property Definitions:

Name	Property Type	Data Type	Definition
AcquisitionDate	IfcPropertyReferenceValue	IfcCalendarDate	The date that the manufactured item was purchased.
BarCode	IfcPropertySingleValue	IfcIdentifier	The identity of the bar code given to an occurrence of the product
SerialNumber	IfcPropertySingleValue	IfcIdentifier	The serial number assigned to an occurrence of a product
BatchReference	IfcPropertySingleValue	IfcIdentifier	The identity of the batch reference from which an occurrence of a product is taken.

Figure 12: Excerpt from the IFC standard documentation for the serial number property in IFC2x3

GTIN in IFC 4-models

The correct order to enter GTIN in IFC 4 (more specifically IFC4 ADD2 TC1 or ISO 16739-1: 2018) is not very different from IFC 2x3, but the naming differs somewhat. IFC 4 also states "Global Trade Item Number" in clear text in the standard itself.

6.4.4.9 Pset_ManufacturerTypeInformation

PSET_TYPEDRIVENOVERRIDE / IfcElement

▼ Natural language names

EN	Manufacturer Type Information

▼ Properties

buildingSMART Data Dictionary

PSD-XML

Name	Type	Description
GlobalTradeItemNumber	P_SINGLEVALUE / IfcIdentifier	EN: Global Trade Item Number — The Global Trade Item Number (GTIN) is an identifier for trade items developed by GS1 (www.gs1.org).
ArticleNumber	P_SINGLEVALUE / IfcIdentifier	EN: Article Number — Article number or reference that is be applied to a configured product according to a standard scheme for article number definition as defined by the manufacturer. It is often used as the purchasing number.
ModelReference	P_SINGLEVALUE / IfcLabel	EN: Model Reference — The model number or designator of the product model (or product line) as assigned by the manufacturer of the manufactured item.
ModelLabel	P_SINGLEVALUE / IfcLabel	EN: Model Label — The descriptive model name of the product model (or product line) as assigned by the manufacturer of the manufactured item.
Manufacturer	P_SINGLEVALUE / IfcLabel	EN: Manufacturer — The organization that manufactured and/or assembled the item.
ProductionYear	P_SINGLEVALUE / IfcLabel	EN: Production Year — The year of production of the manufactured item.
AssemblyPlace	P_ENUMERATEDVALUE / IfcLabel / PEnum_AssemblyPlace	EN: Assembly Place — Enumeration defining where the assembly is intended to take place, either in a factory or on the building site.

Figure 13: Excerpt from the IFC standard documentation for the property of GTIN in IFC4

6.4.4.8 Pset_ManufacturerOccurrence

PSET_OCCURRENCEDRIVEN / IfcElement

▼ **Natural language names**

EN Manufacturer Occurrence

▼ **Properties**

buildingSMART Data Dictionary

PSD-XML

Name	Type	Description
AcquisitionDate	P_SINGLEVALUE / IfcDate	EN Acquisition Date — The date that the manufactured item was purchased.
BarCode	P_SINGLEVALUE / IfcIdentifier	EN Bar Code — The identity of the bar code given to an occurrence of the product.
SerialNumber	P_SINGLEVALUE / IfcIdentifier	EN Serial Number — The serial number assigned to an occurrence of a product.
BatchReference	P_SINGLEVALUE / IfcIdentifier	EN Batch Reference — The identity of the batch reference from which an occurrence of a product is taken.
AssemblyPlace	P_ENUMERATEDVALUE / IfcLabel / PEnum_AssemblyPlace	EN Assembly Place — Enumeration defining where the assembly is intended to take place, either in a factory, other offsite location or on the building site.

Figure 14: Excerpt from the IFC standard documentation for the serial number property in IFC4

Since the property sets (Pset_) are not part of IFC's core model, it is entirely possible to use e.g., IFC4-based Psets in an IFC 2x3 model. Statsbygg in Norway has chosen to do this for GTIN, to avoid that the placeholder for GTIN has two different names in the two cases. You therefore use IFC4's property set where the GTIN property is called "GlobalTradeItemNumber" regardless of whether it is IFC 2x3 or IFC4 models.

B: Concepts for Deliveries and Handling of GTIN together with BIM Model

GTIN can be delivered and maintained in several ways. There are also several ways to connect objects in a model with GTIN on the product that the BIM object represents. Common to them is that both technology and method are early in development. There is not much experience in the area, and it is expected that it will develop a lot in the time ahead.

The following describes some basic concepts for connecting GTIN to BIM model. The concepts try to be solution neutral.

B.1: Concept 1 – GTIN is in a Building Owner's Product Register

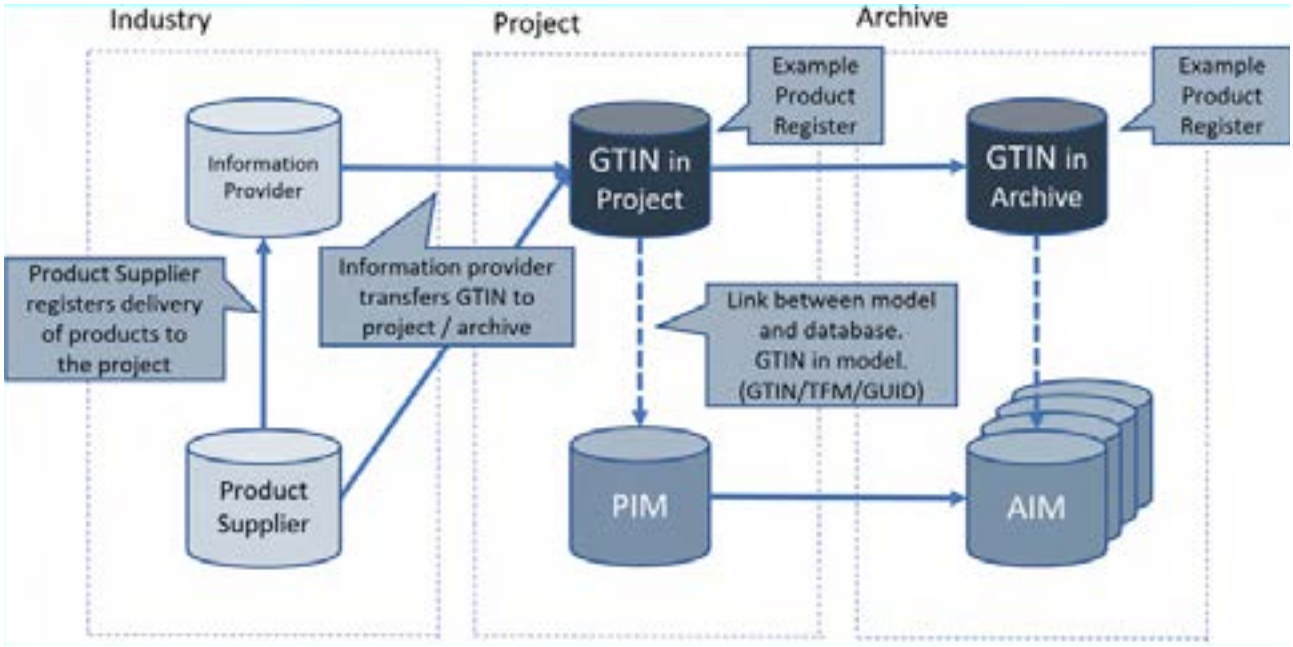


Figure 15: GTIN is in a building owner's product register
(PIM = Project Information Model, AIM = Asset Information Model)

Explanation of concept 1:

1. A GTIN is activated by the product manufacturer or product supplier.
2. GTIN is delivered to the project either directly from the product supplier or via an information supplier.
3. The project establishes its own server for receiving product documentation, including GTIN.
4. Initially the orderer and later the administrator is responsible for maintaining GTIN information.
5. Link to Project Information Model (PIM) can be made with an identifier or link between product register and objects in model. Link can be URL. Identifier can be GTIN, TFM code or another identifier e.g., GUID.
6. (Applies to both concepts 1 and 2): If GTIN is used in the model to connect to GTIN in the product register, you get a 1:1 ratio between these. At the same time, however, this means that GTIN must be maintained in both the model and product register. If TFM is used for connection, the component type or component instance is to be connected. Connecting the component types presupposes that all instances with the same generic type in TFM represent the same product type.

✓ The solution is suitable for managers who want to own and maintain the product documentation themselves and who have their own system for handling receipt, connection, and maintenance themselves.

B.2: Concept 2 – GTIN is in an External Supplier's Solution

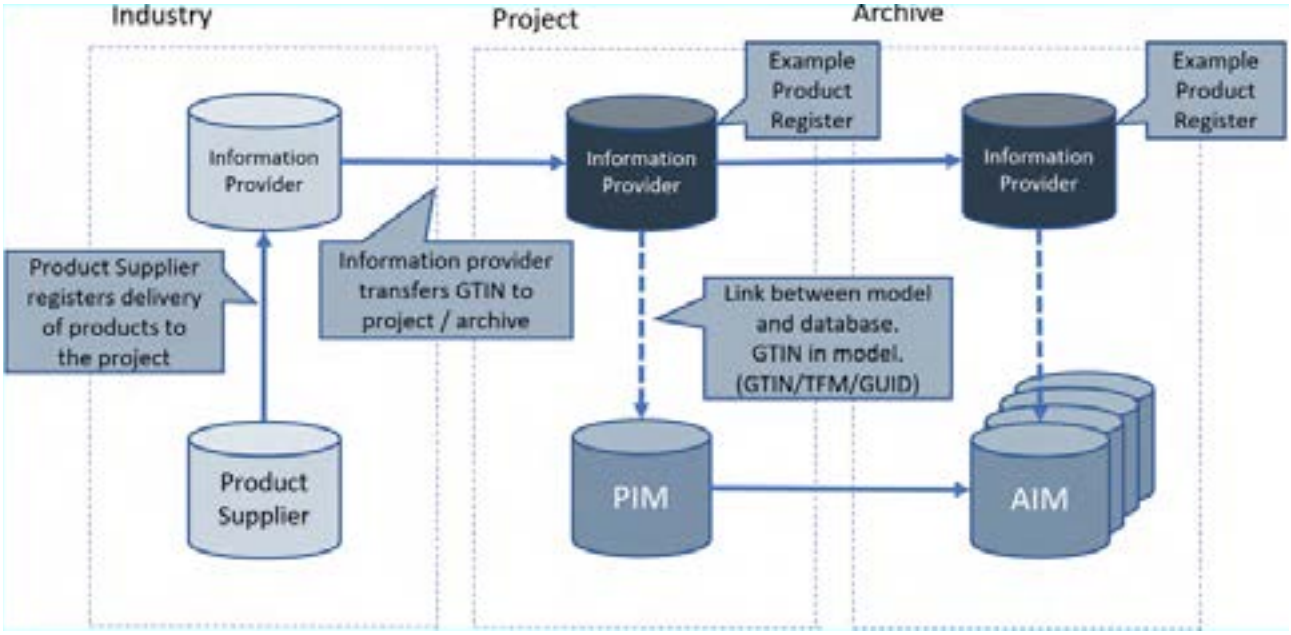


Figure 16: GTIN is in an External Supplier's Solution
(PIM = Project Information Model, AIM = Asset Information Model)

Explanation of concept 2:

1. A GTIN is activated by the product manufacturer or product supplier.
2. A GTIN is delivered to the project via an information provider.
3. The information provider owns and maintains GTIN information.
4. Link to the PIM can be made with an identifier or link between product register and objects in model. Link can be URL. Identifier can be GTIN, TFM code or another identifier e.g., GUID.

✓ The solution is suitable for managers who do not want to receive, connect, and maintain product documentation themselves.

B.3: Concept 3 – GTIN is in the BIM Model

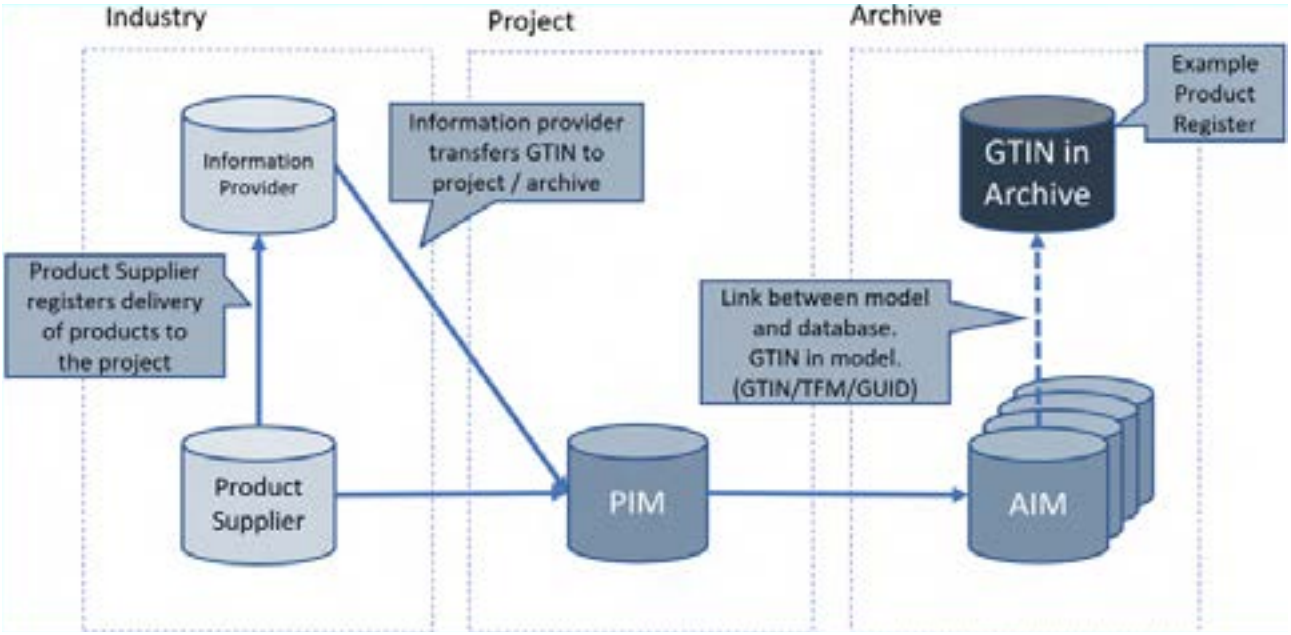


Figure 17: GTIN is in the BIM Model
(PIM = Project Information Model, AIM = Asset Information Model)

Explanation of concept 3:

1. A GTIN is activated by the product manufacturer or product supplier.
2. GTIN is delivered to the project via an information provider.
3. GTIN is registered directly on the object in the model. The model is used in the project phase as a GTIN register.

a. Method for registration of GTIN in the model can be done by reading of e.g., RFID / QR code on the product and connection to the model with a mobile device.

4. In the operational phase, GTIN in model (AIM) is linked to the product register.

✓ The solution is primarily suitable for smaller projects where a manageable number of products are delivered and where there are no resources to establish a product register or establish an agreement with the information supplier in the project phase.

C: Attributes of the GTIN, and other relevant GS1 Standards

C.1 Attributes of the GTIN

SGTIN (serialised GTIN)
In some cases, it is desirable to be able to distinguish identical products from each other. This is done through an individual numbering (serialisation) and is achieved by adding an attribute to GTIN. The attribute consists of up to 20 alphanumeric characters for free use. The attribute must be linked to a GTIN. GTIN thus becomes a SGTIN (Serialised Global Trade Item Number).
To utilise the advantage of the opportunity that lies in the serial number, this must be labelled on the physical product. See Appendix D for how this can be done.

Batch/lot number
If a product is produced in several instances in several productions, it can be useful to identify each production lot with a batch / lot number.

This makes it possible to track a production lot throughout the value chain and can be useful if there are problems or complaints about a product, where it may also apply to several instances of the same product produced in the same lot.

Batch / lot numbers can also be used to distinguish different production lots from each other, for example where production may have slightly different recipes or be produced in slightly different ways, but where it is perceived by the end user that it is the same product.

The number is an additional attribute to GTIN and must be linked to GTIN. The number is 20 alphanumeric characters and is determined by the manufacturer.

To utilise the advantage of the opportunity that lies in the batch / lot number, this should be labelled on the physical product if possible. See Appendix D for how to label.

The Guideline encourages the use of batch / lot numbers wherever possible.

C.2 GLN – Global Location Number

Global Location Number (GLN) is a global numbering system for unique identification of legal entities and physical locations. A legal entity is characterised by the fact that it has been assigned an organisation number. Examples of physical locations are warehouses, collection points and delivery addresses.

The GLN is a 13-digit number that contains the country prefix, serial number, and check digit. Apart from the country prefix, the GLN has no implicit or explicit structure. The GLN is an identification number that must only be linked to the individual location/entity. Other information is normally stored in the users' computer systems such as customer registers, supplier registers etc.

The GLN can be used in barcodes, QR Codes and RFID Tags.

GLN - structure in Ireland		
Country prefix	**Serial Number (9 digits in total)**	**Check Digit**
539	SSSSSSSSS	C
Meaning:		
539	Country prefix for Ireland	
SSSSSSSSS	Sequential Number for each GLN – includes a Global Company Prefix.	
C	Check digit, calculated according to GS1 algorithm.	

Table 4: GLN – Structure in Ireland

C.3 GS1 Digital Link

When there is a PDT for the product group, and PDS is used for exchanging information about the deliveries, this can be done via GS1 Digital Link.

GS1 Digital Link is a URL to a web page at a manufacturer, contractor, or commercial player, whereby entering the key information in a URL you can look up directly in the PDS and retrieve documentation. Key information here can be GTIN, in combination with serial number, and / or batch / lot number if applicable.

The key information can be entered in a traditional barcode, in a QR code, in a DataMatrix code or as a URL text string.

For more information on how GS1 Digital Link can be used, contact GS1 Ireland!

D: Labelling of Products

Labelling of products is intended to be able to physically identify products in an unambiguous way. Many products may seem similar, but have different properties, and which are important to be able to distinguish to use the right product in the right place.

The simplest form of labelling is to apply the GTIN, serial number and batch / lot number directly to the product. This makes it easy to read and understand, which product this is but has the disadvantage that it cannot be used in IT systems without the information having to be registered manually.

Other more digital and future-oriented solutions are to label this with a barcode, QR code, DataMatrix code or RFID tag. This enables machine readability of information about the product directly into the recipient's systems, reduces errors and can be used actively in the management of the building.

A Guideline has previously been created on how to tag a product with an RFID tag or GS1 DataMatrix code. It is available on GS1 Ireland's website, see link RFID | GS1

Note that there are certain guidelines for using a serial number if the product is to be marked with an RFID tag.

For physical labelling of products, it is highly recommended to contact GS1 Ireland!

E: What are PDTs and PDSs?
This description is based on information from the Editorial Board in SN / K 374, dated Aug. 2020.

Machine-readable product information is the basis for a digital construction industry.

To digitise the construction industry, the building material manufacturers / suppliers must offer machine-readable product information. Machine readability is ensured by developing standardised product data templates (Product Data Template - PDT) for information on properties.
By using a common data structure, the information about the properties can be shared and used by all actors throughout the life cycle of building and construction projects.

Standardised product data templates

Together with Standards Norway, the Norwegian construction industry is now developing standardised data templates for machine-readable product information. When information about the properties of specific products is entered into a data template, we get a Product Data Sheet (PDS).

The information in the machine-readable product data sheets defines the products digitally, and are the digital building blocks we need in, for example, a BIM-based process.

One data template is developed for each product group. The data template contains all relevant properties for the relevant product group or object type.
When the building material manufacturers must state the properties of their products, they must use the data template for the relevant product group and fill in the necessary information about the product.

The Norwegian work with product data templates follows international standards from CEN and ISO:

NS-EN ISO 19650-1 and NS-EN ISO 19650-2 describe rules for information management in BIM.

NS-EN ISO 23386 defines the term 'property' and describes how the properties are to be controlled to ensure machine readability and automated information exchange.

NS-EN ISO 23387 defines the data structure to be used to group the properties of products and objects in data sets so that they can meet specific information needs.

All properties are unambiguously defined and have a reference to measurement method of calculation method. All properties also have a GUID (Globally Unique Identifier) which is a unique, machine-readable identifier. The GUIDs are downloaded from the buildingSMART Data Dictionary (bSDD).

The data templates that are developed indicate the properties required by the harmonised product standards of the EU:

- These properties must be disclosed to be able to use the CE mark on the products and legally sell them.
- The data templates also indicate environmental information based on the EPD standard CEN 15804.
- This environmental information is crucial for us to be able to calculate the CO2 emissions from building materials and buildings.
- The data templates are also expanded with other information, including market data (ETIM data).
- Data templates are also developed for product groups that are not covered by harmonised standards.
- These templates must also contain environmental information and be gradually expanded with other information.

Product data structure's structure product information.

The work of developing computer templates for machine-readable product information does not involve developing new documentation requirements but structuring existing product information and making it available for digital use.

The building material suppliers must be responsible for the product information and the digital product data sheets providing correct information.

There is no requirement for the product information to be registered in closed product databases.

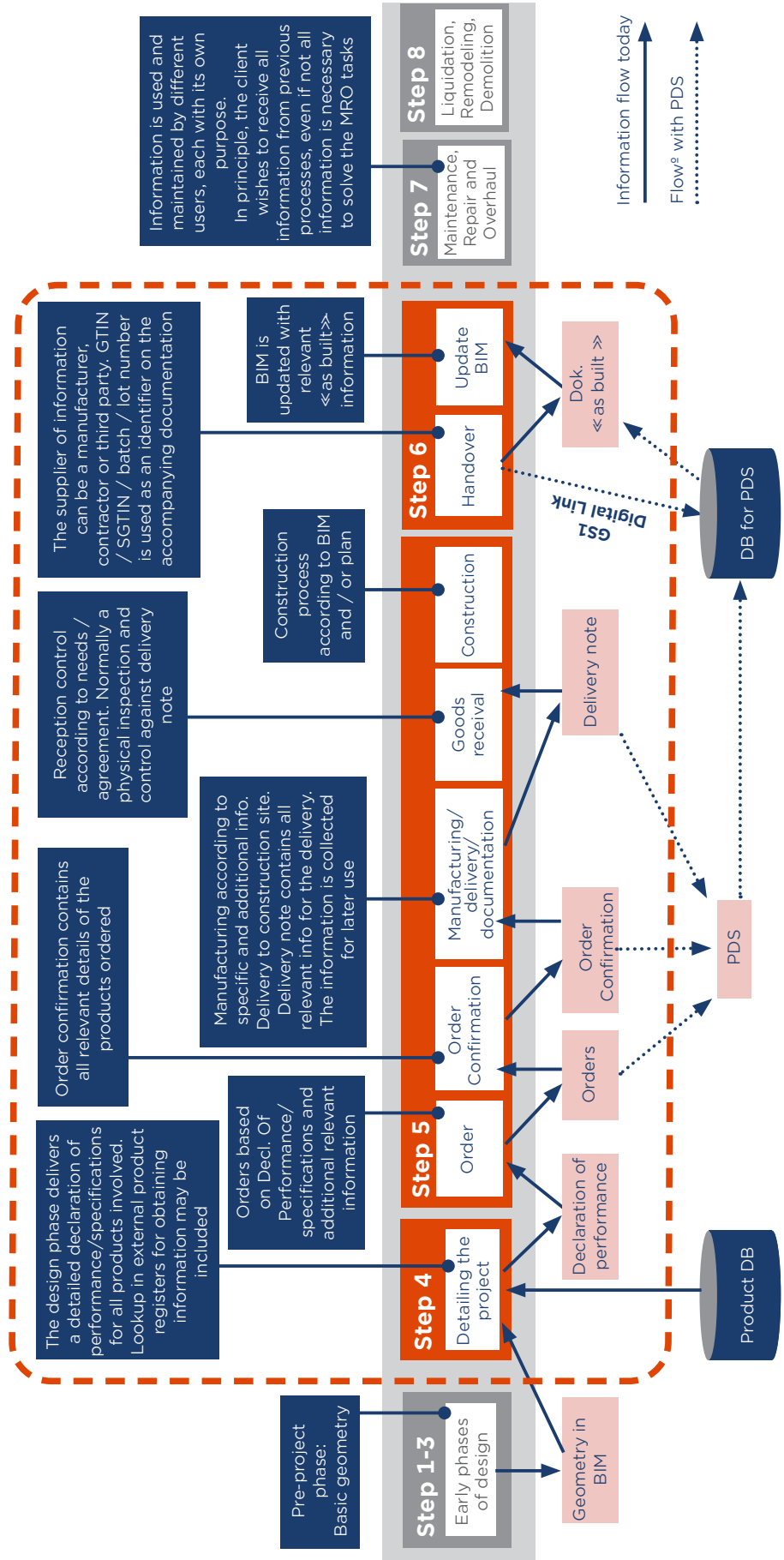
It is expected that central product databases such as National Product Data Templates, Digital Product Passport and Construction Product Regulation databases will want to provide machine-readable information to all authorised users in the construction industry and offer tools that help users in choosing the right product.
Environmental properties are important content in the product data templates.

Going forward, increasing demand for product documentation and especially information on environmental properties is expected. Consideration for the circular economy and CO2 emissions means that we must consider more product properties than before.
A link must be established between the BIM models and the environmental information of the selected products.

After completion, the BIM model from the design phase can live on as a digital twin and be maintained throughout the rest of its life cycle.

F: Model for Generic Information and Process Flow

Figure 3: Model for Generic Information and Process Flow



Explanations:

- Solid black arrows are how this currently done.
- Dotted black lines are how the information exchange can be done when the Product Data Template (PDT) work is completed, and Product Data Sheet (PDS) is used for the exchange of information.

Term	Definition/Meaning
Batch-/Lot-Number	Unique number for a production batch, as determined by the manufacturer
BIM	Building Information Modeling
Digitalt Veikart 2.0	Report from BNL with advice and recommendations to leaders in the Construction industry, which will contribute to a more efficient and sustainable Construction industry in the long run
Document Archive	Collective term for a database / archive where documentation about a product that is part of a delivery is stored. Can be a PDF, PDS, product catalogue, etc.
GLN	Global Location Number - Location number used to uniquely identify physical locations, legal entities, or various roles in a trading transaction.
Exposure Class	Durability class indicates a performance that entails minimum requirements for mix design, e.g. maximum water/binder-ratio (which may be differentiated, for example, depending on the type of cement) in the relevant exposure environment.
Strength Class	Strength class indicates the strength of the concrete.
GS1 Digital Link	Concept for being able to look up in a database for access to information, based on what is specified in a web link or Datamatrix / QR code / barcode.
GTIN	Global Trade Item Number – Unique identification of a product or service
GUID	Global Unique ID – Code generated by the system and ensures that the occurrence can be uniquely identified.
Norsk Stegnorm	A step-oriented description of the various processes that are part of the building's lifetime from need / idea arises, until it is completed. Norsk Stegnorm has been prepared by Bygg21, Norsk Eiendom, Difi and Entreprenørforeningen Bygg og Anlegg (EBA), with active participation from Statsbygg.
MRO	Maintenance, Repair and Overhaul
PDS	Product Data Sheet. Which values are related to the properties defined for a specific product according to the relevant PDT.
PDT	Product Data Template. A template to describe the characteristics that can be associated with a given product or product group.
Serial Number	An attribute of GTIN that allows you to individually identify different devices of the same product. GTIN + serial number is often referred to as SGTIN - Serialised Global Trade Item Number.
TFM	Interdisciplinary marking system. Marking system, classification and identification of systems, types, and components. Based on ISO 81346. The name "interdisciplinary marking system" comes from the original system developed by Statsbygg. New revision of the system from Standard Norway is covered by SN 3457-7, -8 and -9 as well as guidance. Informal, popular common name for these is NS-TFM.
URL	Uniform Resource Locator. Address of a web site

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