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European Industry Guidance for Standard Case Code Labeling including Extended Product Attributes

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Document Summary

Document Item	Current Value
Document Title	European Industry Guidance for Standard Case Code Labelling for Extended Product Attributes
Date last modified	February 27th, 2015
Current Document Issue	Draft
Status	Draft
Document Description	Industry Guidance Document

Contributors

Name	Company
Katrin Recke	AIM
Christel Delberghe	Euro Commerce
Gerald Gruber	GS1 Austria
Stefanie De Rocker	GS1 Belgium
Valérie Meers	GS1 Belgium
Cedric Houlette	GS1 France
Heide Buhl	GS1 Germany
Ilka Machemer	GS1 Germany
Benedikt Hauksson	GS1 Iceland
Cassi Belazouz	GS1 in Europe
Emanuela Casalini	GS1 Italy
Loek Boortman	GS1 Netherlands
Sarina Pielaat	GS1 Netherlands
Piotr Frackowiak	GS1 Polska
Marianna Revallová	GS1 Slovakia
Matjaž Martini	GS1 Slovenia
Mats Björkqvist	GS1 Sweden
Michel Ottiker	GS1 Switzerland
John Hall	GS1 UK
Stephen Jefferies	GS1 UK

Log of changes

Change date	Section impacted	Description of changes
February 2015	All the document	Document created

1. Introduction

1.1. Purpose of this Document

The purpose of the **European Industry Guidance for Standard Outer Case code labelling for Extended Product Attributes** is to provide best practice guidelines for the industry-wide adoption of a common standard for case labelling information for FMCG finished products in the retail sector, in addition to already existing standards based on EAN-13 and ITF-14. Adoption of the standard and the guidance offered in this document are voluntary and will be determined by the trading partner relationship. In addition to providing key definitions and descriptions for core elements of case label information including the use of extended product attributes in human and machine readable formats, this document offers "how to" guidance and recommendations for implementing GS1-128 barcodes for the labelling of outer cases, for a variety of common business practices, supply chain processes and product categories. This guideline has been developed with the input and participation of many GS1 Member Organizations and three European trade associations. This document does not replace the sectors guidelines developed by GS1 In Europe:

- Global Product and Consumer Safety group (link to the document)
- Selective Distribution of Cosmetics (link to the document)
- Fruit and Vegetables (link to the document)

1.2. Why the guideline is needed now

The FMCG industry has traditionally used case level information to facilitate the flow of goods through the supply chain, from manufacturer to retail store. Current common practice in Europe is to use EAN-13 or ITF-14 barcodes at case level, which are limited to providing the GTIN, and to link them to the EDI DESADV message in combination with the pallet barcode (SSCC) in order to identify each case on a pallet. However, there is a growing recognition in the industry, triggered by individual retailer requests, that product traceability and improved warehouse automation can be achieved if trading partners are able to exchange more detailed information, both static and dynamic, directly at case level.
The GS1-128 barcode is one option which can enable the sharing of both static and dynamic product information, by encoding additional attributes within the barcode through GS1 Application Identifiers (AI's). However, as GS1-128 can only accommodate 48 characters in one symbol, including the AI's and their values, a choice needs to be made as to which AI's are most important for products in the FMCG sector, to avoid fragmented and inconsistent retailer requirements across Europe.This can only be done jointly between manufacturers and retailers.

In order to follow the best practice recommended in this document, you will need to take the following into consideration:

- Factories that use case label printers today may need to replace or upgrade them;
- Additional IT infrastructure may be needed to store and handle all GS1-128 relevant data;
- Factories that use pre-printed packaging may need to move to label printers, as the batch code and best before date usually cannot be pre-printed.

If you need more information to support the implementation, please contact your local GS1 organization.

Partners involved in the development of this document

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1.3. Scope

This guideline applies to FMCG finished trade items in the retail sector. The logistic unit (pallet or outer-case when considered as a logistic unit) is out of the scope of this document. For more information regarding the logistic unit please refer to the guidance GS1 In Europe logistic label available on the web site of GS1 in Europe (www.gs1.eu). For more information regarding a sector recommendation, please contact your local GS1 Organisation.

1.4. Development of this guideline

The introduction of new collaborative supply chain practices may trigger the need for additional human and/or machine readable information to be provided on outer cases. These requests may come from any of the participating trade associations listed above or from individual trading partners. GS1 in Europe will organize the necessary community of stakeholders to consider changes/additions to this guideline. Any changes to the guideline will be communicated throughout the industry and will respect the lead time necessary to accommodate system and procedure changes.

2. Common industry Best Practice recommendations

2.1. Outer Case Information

Case labelling formats today vary by manufacturer. One of the objectives of this guideline is to provide guidance on common formats that meet the requirements of trading partners across the supply chain. Case labelling includes core information that is applicable to all products as well as incremental information and attributes that apply to specific product categories.

## 2.2. Typical and minimum information requirements

All trade item cases should bear standard case markings containing some of the following elements of core product information.

The most frequently used attributes on outer case labels are listed below :

Data element	Definition	Product category	GS1 Application Identifier
GTIN	The GTIN is used to identify trade items. A trade item is any item (product or service) upon which there is a need to retrieve pre-defined information and that may be priced, or ordered, or invoiced at any point in any supply chain. The GTIN for fixed Measure Trade Items may be a GTIN-8, GTIN-13 or GTIN-14. The GTIN for Variable Measure Trade Item not scanned at POS is a GTIN-14 with the digit 9 in the Indicator position	All	AI (01) Format: N2+N14
Batch or Lot number	The batch or lot number associates an item with information the manufacturer considers relevant for traceability of the trade item to which the Element String is applied. The data may refer to the trade item itself or to items contained. The number may be, for example, a production lot number, a shift number, a machine number, a time, or an internal production code.	Fresh products FMCG Cosmetics	AI (10) Format: N2+X...20
Best Before Date	The Application Identifier (15) indicates that the GS1 Application Identifier data field contains a best before date. The Best Before Date on the label or package signifies the end of the period under which the product will retain specific quality attributes or claims even though the product may continue to retain positive quality attributes after this date. Best Before Date is primarily used for consumer information and may be a regulatory requirement.	Dry products e.g : cookies, soft drinks, cheese, dairy products, yogurt	AI(15) Format: N2+N6

Data element	Definition	Product category	GS1 Application Identifier
Expiration Date	The Application Identifier (17) indicates that the GS1 Application Identifier data field contains an expiration date. The expiration date is the date that determines the limit of consumption or use of a product. Its meaning is determined based on the trade item context (e.g., for food, the date will indicate the possibility of a direct health risk resulting from use of the product after the date, for pharmaceutical products, it will indicate the possibility of an indirect health risk resulting from the ineffectiveness of the product after the date). It is often referred to as "use by date" or "maximum durability date."	Dry products e.g : cookies, soft drinks, cheese, dairy products yogurt, health&beauty	AI (17) Format: N2+N6
Net Weight	These Element Strings are used to complete the identification of a Variable Measure Trade Item. They indicate the net weight of the trade item.	Variable measure products e.g : meat, poultry, cheese	AI (310X) Format: N4+N6
Packaging Date	The packaging date is the date when the goods were packed as determined by the packer.	Meat (Carcasses, cuts, etc), fruit&vegetable	AI (13) Format: N2+N6
Production Date	The production date is the production or assembly date determined by the manufacturer. The date may refer to the trade item itself or items contained	Dry products e.g : cookies, soft drinks, cheese, daily product yogurt	AI (11) Format: N2+N6
Variable Count	The Application Identifier (30) indicates that the GS1 Application Identifier data field contains the number of an item contained in a Variable Measure Trade Item and, therefore, should never be applied in isolation. The count of items field represents the quantity contained in the respective trade item. It is of variable length and may have up to eight digits	Meat, Poultry e.g: number of chicken or steak	AI(30) Format N2+N...8

The defintions, formats and rules for all these attributes are described in the GS1 General Specification www.gs1.org/genspecs.
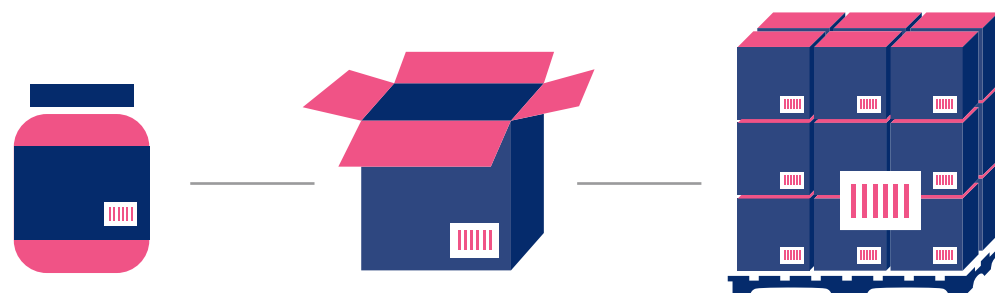
3. Use of the GS1-128 Barcode Symbology

The GS1-128 barcode symbology currently supports a wide range of data attributes including those described in this guideline.

3.1. GS1-128 Symbology Specifications

The GS1-128 barcode has been carefully designed through joint co-operation between GS1 and AIM (Association for Automatic Identification and Mobility). Use of GS1-128 barcodes provides a high degree of security and distinguishes GS1 System element strings from unrelated non-standard barcodes.
The GS1-128 symbology is a subset of the more general Code 128 symbology.Use of the Function 1 Symbol Character (FNC1) in Code 128 symbols, in the first symbol character position following the Start Character, has been reserved exclusively for the GS1 System. Code 128 is fully described in ISO/IEC 15417, Information Technology – Automatic Identification and Data Capture Techniques – Barcode Symbology Specification – Code 128 and is also covered in Section 5.4 of the GS1 General Specification.

3.2. X-Dimension

The X-dimension is the specified width of the narrowest element in a barcode symbol. The recommended X-dimension depends on scanning environment. The use of fixed scanners in General Distribution is primarly intended to facilitate automated scanning of trade items. In this environment it is essential to maintain X-dimension of 0,495mm to achieve acceptable scan rates. Scanning systems work more effectively if all barcodes have similar X-dimensions.

Symbol(s) Specied	(*) X-dimension mm (inches)			(**) Minimum Symbol Height for Given X mm (inches)			Quiet Zone		(***) Minimum Quality Specification
	Minimum	Target	Maximum	For Minimum X-dimension	For Target X-dimension	For Maximum X-dimension	Left	Right	
GS1-128	0.495 (0.0195")	0.495 (0.0195")	1.016 (0.0400")	31.75 (1.250")	31.75 (1.250")	31.75 (1.250")	10X	10X	1.5/10/660

For hand scanning applications smaller barcode symbols can be used as long as general symbology specifications are respected and usable print quality grade is achieved. Absolute minimal X-dimension in this environment is 0,25mm.
When thermal printers or other low resolution device is used for on demand printing please note that not all x-dimensions are achievable. Use table below for x-dimension refenece.

Preference	Dots Per Millimetre	Dots Per Module Width	Module Width (X-dimension) mm
200	8	2	0.250
200	8	3	0.375
200	8	4	0.500
200	8	5	0.625
300	12	3	0.250
300	12	4	0.333
300	12	5	0.417
300	12	6	0.500
300	12	7	0.583

3.3.   Barcode height

For all trade items scanned with fixed mount scanners in general distribution, the GS1 General Specifications recommends a barcode height of 31.75 mm (1.25 inches). For hand scanning environment absolute minimal barcode height is 12,70mm (0,5 inches).
For more information on GS1-128 barcode quality, see sections 5.5 of the GS1 General Specifications- Barcode production and Quality Assessment.

3.4.   Quiet Zones / Light Margins

Barcodes shall be printed with quiet zones (or light margins) at each side. The quiet zones must be at least 10 times the X-dimension (10 X) in width. Centered barcodes will help ensure the quiet zones are respected. The quiet zones are indicated by the gray arrows on the left and right side of the GS1-128 barcode.

Sweetie Sweet Cookies
GTIN-13 of this trade unit: 7612345002484
Content: 24 x 7612345002491 (GTIN-13 Consumer trade unit)
Best Before Date: 13 March 2015
Batch Number: Abc1234


(01)07612345002484(15)150313(10)Abc1234

3.5.   Symbol Placement on Cartons and Outer Cases

For cartons and outer cases, symbol placement will vary slighty in practice. However the target placement for the bottom of the barcode is 32 mm from the nature base of the item. The barcode symbol, including its Quiet Zone, should be at least 19 mm from any vertical edge to avoid damage.

3.6.   Symbol Location on shallow trays and cases

If the height of the case or the tray is less than 50 mm, making it impossible to print a full height barcode with the Human Readable Interpretation below the bars, or if the construction of the unit is such that the full symbol height can not be accommodated, the following options shall be considered in this order of preference:

- Place the Human Readable Interpretation adjacent to the symbol, outside the compulsory Quiet Zone

15400141288763
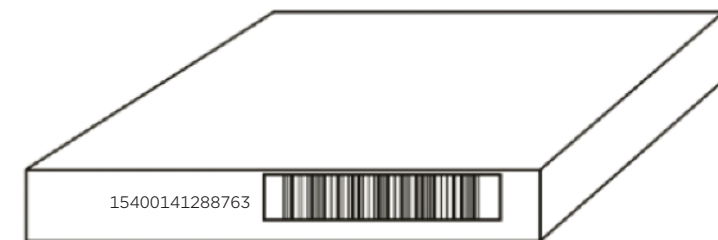
- When the height of the unit is less than 32mm, the symbol may be placed on the top of the package. The symbol shall be placed with the bars perpendicular to the shortest side, no closer than 19 mm from any edge.

3.7. Number of labels

Although at least one side of the General Distribution Scanning Item must display the barcode information, it is recommended two or more sides of the item carry a barcode with the exact same data when:
- The printing process makes this cost effective (e.g.pre-printing corrugated cartons).
- The supply chain requirements is that one symbol is always visible (e.g, pallets that are stored with either the long or short edge facing).

3.8. Add-On Symbol

For some applications, like an outer case sold as traded unit in store, the unit is already marked (or pre-printed) with an EAN-13 or ITF-14 symbol.

If the unit is already marked with a symbol, any Add-On Symbol shall be placed so as not to obscure the primary barcode. The preferred location for the Symbol in this situation is to the side of the primary barcode so that a consistent horizontal location is maintained. Maintain Quiet Zones for both symbols.

When it is possible for both parts of the data content to be represented in a GS1-128 barcode, concatenation into one symbol must be considered. Barcodes for general distribution scanning containing data essential for complete product identification (e g, trade measurements) shall always be aligned with and to the right of the other barcode.

4. Example of label on outer cases

Whilst this document does not set out to mandate a single format for all outer case labels, the following examples indicate how labels that follow the guidelines might look. The dimensions of the GS1-128 barcodes shown are for illustrative purposes only and do not correspond to the requirements addressed in this document. The information encoded in the barcode is highlighted in the Human Readable Text, in order to help you understand the application and representation.

4.1. Standard Homogeneous outer case with date and batch number

Example with GTIN, Best before date, batch number

Sweetie Sweet Cookies
GTIN-13 of this trade unit: 7612345002484
Best Before Date: 13 March 2015
Batch Number: Abc1234

(01)07612345002484(15)150313(10)Abc1234

Example with GTIN, production date and batch number

Sweetie Sweet Cookies
GTIN of this trade unit: 7612345002484
Production Date: 12 December 2014
Batch Number: Abc1234

(01)07612345002484(11)141212(10)Abc1234

Example with GTIN, packaging date, net content, var.count, batch number

Happy Pork Steaks
GTIN of this variable measure trade unit: 97612345002487
Net Content: 5,350kg
Var Count: 16 steaks
Pack Date: 15 December 2014
Batch Number: Abc1234

(01)97612345002487(13)141215(3103)005350(30)16(10)Abc1234

Note: X-module will be smaller than 0,495mm if maximal symbol width limitation of 165 mm is respected. Otherwise data must be devided in two barcode lines

Example with GTIN, expiration date, net weight, lot

Product description	**GTIN** 98032089000034 **Net Weight** 3,45 kg **Expiry** 10-09-14 **Expiry** Abc1234

(01) 9 8032089 00003 4 (3103) 003450 (17) 140910 (10) ABC456

4.1. Standard Homogeneous outer case with date and batch number

GTIN,batch number

Sweetie Sweet Cookies
GTIN of this trade unit: 7612345002484
Batch Number: Abc1234

(01)07612345002484(10)Abc1234

5. Appendix

5.1. Glossary

Human Readable Interpretation (HRI): Information that is used to replicate the structure and format of barcoded information. Human readable characters, such as letters and numbers, are encoded in the GS1-128 barcode. The parenthese that separate the Application Identifier within the HRI must not be encoded in the GS1-128 barcode. However, start, shift, stop and function characters, as well as the symbol check character, are not shown in the human readable interpretation.

Human Readable Text: Characters such as letters and numbers that can be read by humans and may or may not be encoded in GS1 barcodes and are not confined to a structure and format based on the GS1 standards (e.g a date code expressed in a national format, the brand owner's name, consumer declarations).

Global Trade Item Number (GTIN): The GS1 Identification Key used to identify trade items. The key comprises a GS1 Company Prefix, an Item Reference and Check Digit.

EDI: The conduct of business communications and management through electronic methods, such as Electronic Data Interchange (EDI) and automated data collection systems.

DESADV: Despatch advice. A message in EDI specifying details for goods despatched or ready for despatch under agreed conditions.

SSCC: Serial Shipping Container Code, the GS1 Identification Key used to identify logistics units. The key comprises an Extension digit, GS1 Company Prefix, Serial Reference, and Check Digit.

Function 1 Symbol Character (FNC1): A symbology character used in some GS1 data carriers for specific purposes.

Quiet Zone: A clear space which precedes the Start Character of a barcode and follows the Stop Character. Formerly referred to as "Clear Area" or "Light Margin".

Add-On Symbol: A barcode used to encode information supplementary to that in the main barcode.

General Distribution Scanning: Scanning environments that include barcoded trade items packaged for transport, logistic units, assets, and location tags.

5.2 Recommandation at the glance

GS1 CARTON AND OUTER CASE LABELING

PARAMETERS	GS1-128		ITF-14		EAN-13	
● X-DIMENSION mm (magnification)	min[1] 0.495 mm	max 1.016 mm	min 0.495	max 1.016	min 0.495	max 0.660
● DATA ENCODED	• GTIN • Extended Attributes[2]		GTIN		GTIN	
● HUMAN READABLE	• Human readable information shall be printedclosed to the barcode • Character height: ≥ 3 mm					
● QUAET ZONES (minimum)	10X		10X		left 11X	right 7X
● BARCODE HEIGHT (minimum)	31.75 mm min		31.75 mm min		min[3] 34.28 mm	max[3] 45.70 mm
● PRINTING METHOD	• label • direct printing		• label • direct printing		• label • direct printing[4]	
● NUMBER OF BARCODES	at least 1 symbol per case					
● PLACEMENT (minimum)	• 19 mm from any vertical edge • 32 mm from the natural base[5]		• 19 mm from any vertical edge • 32 mm from the natural base[5]		• 19 mm from any vertical edge • 32 mm from the natural base[5]	
● BARCODE WITH (including quiet zones)	max 165.10 mm[6]		min 69.55 mm	max 142.75 mm	min 55.935 mm	max 74.58 mm
● BEARER BARS	NA		Mandatory: 4.8 mm Vertical sections recommended		NA	
● RATIO	NA		between 2.25:1 et 3.0:1		NA	
● ISO QUALITY GRADE	1.5 (C)		If: X-Dim ≥ 0.635 mm : 0.5 (D) X-Dim: ≤ 0.635 mm : 1.5 (C)		1.5 (C)	

GS1-128. ITF-14, and EAN-13 are open standards. Their adoption is voluntary and will be determined by the trading partner relationship depending on the data to be encoded in the Barcode and the scanning environment. In case the carton may be scanned at Point-Of-Sale, it shall be encoded with EAN-13.

[1] If the item is too small to accomodate the minimum X-dimension, the minimum X-dimension is 0.250 mm.

[2] Extended attributes : BEST BY/USED BY, BATGH/LOT, NET WEIGHT...

[3] The Barcode height is proportional to the X-dimension.

[4] Printing EAN-13 Barcodes may be difficult on some substrates. We recommend to print the Barcode on a light background.

[5] When the height of the unit is smaller than 32 mm, the symbol may be placed on the top of the package.

[6] The GS1-128 Barcode lenght depends on the amount of the data encoded and the X-dimension. If should never exceed 165.10 mm (including quiet zones).

19 mm

32 mm

5.3. Label which could be printed and scanned, respecting all GS1 standard requirements

The following label may be printed without any alternation of the size on format A4 and may be used to estimate the space requirements for a GS1-128 barcode used in general distribution.
This example uses the features of the code_128 symbology to generate a GS1-128 barcode with minimal space requirements.
GS1 in Europe took every effort to make sure that the print will reflect the minimal requirements for both quality and dimensions. Nevertheless GS1 in Euope will not take any responsibility for any issues which may be caused while using this example.

- ■ X-Dimension (at least 0.495mm) : 0.526mm
- ■ Barcode height (at least 31.75mm) : 32mm
- ■ Quiet zone width (at least 10 x X-Dimension) : 7mm
- ■ GS1-128 barcode width (from first bar to the last bar) : ca. 14.1cm
- ■ The GS1-128 barcode (without the quiet zones) should reach a width of 14.1cm when printed
  This represents an X-Dimension of 0.526mm.
- ■ The corresponding quiet zones should reach a width of 7mm when printed

Sweetie Sweet Cookies
GTIN: 7612345002484
Best Before Date: 15th of March 2013
Batch Number: Abc1234

(01)07612345002484(15)150313(10)Abc1234

32 mm

7 mm   ca. 141 mm   7 mm

Contact GS1 in Europe locally:

GS1 Albania
+355 4 232073
info@gs1al.org
www.gs1al.org

GS1 Armenia
+374 10 272 622
gs1arm@am.org
www.gs1am.org

GS1 Austria
+43 1 505 86 01
office@gs1.at
www.gs1.at

GS1 Azerbaijan
+99412 4987405
ean@gs1az.org
www.gs1az.org

GS1 Belarus
+ 375 17 298 09 13
info@gs1by.by
www.gs1by.by

**GS1 Belgium &
Luxembourg**
+32 2 229 18 80
info@gs1belu.org
www.gs1belu.org

GS1 Bosnia-Herzegovina
+387 33 258 646
info@gs1bih.com
www.gs1bih.com

GS1 Bulgaria
+359 2 988 3139
gs1bulgaria@gs1bg.org
www.gs1bg.org

GS1 Croatia
+385 1 48 95 000
info@gs1hr.org
www.gs1hr.org

GS1 Cyprus
+357 2 889800
info@gs1cy.org
www.gs1cy.org

GS1 Czech Republic
+ 420 234 633145
info@gs1cz.org
www.gs1cz.org

GS1 Denmark
+45 39 27 85 27
info@gs1.dk
www.gs1.dk

GS1 Estonia
+372 660 5535
info@gs1.ee
www.gs1.ee

GS1 Finland
+358 75 756 3500
asiakaspalvelu@gs1.fi
www.gs1.fi

GS1 France
+33 1 409 554 10
infos@gs1fr.org
www.gs1.fr

GS1 Georgia
+995 32 29 4724
info@gs1ge.org
www.gs1ge.org

GS1 Germany
+49 221 947 14 - 0
info@gs1-germany.de
www.gs1-germany.de

GS1 Greece
+30 210 990 4260
info@gs1greece.org
www.gs1greece.org

GS1 Hungary
+36 1 412 3954
info@gs1hu.org
www.gs1hu.org

GS1 Iceland
+ 354 511 3011
info@gs1.is
www.gs1.is

GS1 Ireland
+353 1 208 0660
info@gs1ie.org
www.gs1.ie

GS1 Israel
+972 3 519 88 39
sigal@gs1il.org
www.gs1il.org

GS1 Italy
+39 02 777 2121
info@indicod-ecr.it
www.indicod-ecr.it

GS1 Kazakstan
+7 3272 756578
+7 7272 479348
info@gs1.kz
www.gs1.kz

GS1 Kyrgyzstan
+996 312 900 521
info@gs1kg.org
www.gs1kg.org

GS1 Latvia
+ 371 67830 822
gs1@gs1lv.org
www.gs1lv.org

GS1 Lithuania
+370 5 2614532
gs1@gs1lt.org
www.gs1lt.org

GS1 Macedonia
+389 2 32 54 250
gs1mk@gs1mk.org.mk
www.gs1mk.org.mk

GS1 Moldova
+373 22 211 669
info@gs1md.org
www.gs1md.org

GS1 Netherlands
+31 20 511 3820
info@gs1.nl
www.gs1.nl

GS1 Norway
+47 22 97 13 20
firmapost@gs1.no
www.gs1.no

GS1 Poland
+48 61 8504977
gs1pl@gs1pl.org
www.gs1pl.org

GS1 Portugal
+35 1 21 752 07 40
info@gs1pt.org
www.gs1pt.org

GS1 Romania
+40 21 3178031
office@gs1.ro
www.gs1.ro

GS1 Russia
+7 495 730 7103
info@gs1ru.org
www.gs1ru.org

GS1 Serbia
+381 11 3132 312
office@gs1yu.org
www.gs1yu.org

GS1 Slovakia
+421 41 565 11 85
info@gs1sk.org
www.gs1sk.org

GS1 Slovenia
+386 1 5898320
info@gs1si.org
www.gs1si.org

GS1 Spain
+34 93 252 39 00
info@gs1es.org
www.gs1es.org

GS1 Sweden
+46 8 50 10 10 00
info@gs1.se
www.gs1.se

GS1 Switzerland
+41(0)58 800 70 00
mail@gs1.ch
www.gs1.ch

GS1 Turkey
+90 312 218 20 00
gs1turkey@tobb.org.tr
www.gs1tr.org

GS1 UK
+44 20 7092 3500
info@gs1uk.org
www.gs1uk.org

GS1 Ukraine
+380 44 486 0734
ean@gs1ua.org
www.gs1ua.org

GS1 Uzbekistan
+998 71 252 6604
info@gs1uz.org
www.gs1uz.org

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GS1 in Europe
T +33 (1) 40 95 21 79
E camille.dreyfuss@gs1eu.org

www.gs1.eu