GDSN Standard Package Measurement Tolerances

Best Practice Guidelines

Issue 1, Oct-2006

Document Summary

Document Item	Current Value
Document Title	GDSN Standard Package Measurement Tolerances Best Practice Guidelines
Date Last Modified	Oct-2006
Current Document Issue	Issue 1
Status	Approved
Document Description (one sentence summary)	The purpose of this manual is to share with the GDSN trading partner community a recommended set of best practices and guidelines around the use of standard tolerances, which define allowable variations between stated (synchronized) and measured (actual) physical product dimensions of a trade item.

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Log of Changes in Issue 1

Issue No.	Date of Change	Changed By	Summary of Change
1	Oct-2006	N/A	Initial Version

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1.   Overview

1.1.   Purpose of Manual

The purpose of this manual is to share with the GDSN trading partner community a recommended set of best practices and guidelines around the use of standard tolerances, which define allowable variations between stated (synchronized) and measured (actual) physical product dimensions of a trade item. These recommendations are based on the work of approximately 25 companies that comprised the GDSN Data Accuracy Task Force. These companies spent one year conducting deep analysis of internal best practices in conjunction with an industry discovery pilot that utilized data from real life supply chains.

⚠ **Important:** The tolerances referred to in this document do not replace the need for trading partners to have the most accurate data available in order to minimize disruptions.

This manual provides clarification and recommended practices for utilizing tolerances properly in the context of maintaining accurate dimensional data for products. It also supports the recommendations identified in the *GS1 Data Quality Framework* published in 2005. It can be located on the GS1 website at:

http://www.gs1.org/productssolutions/gdsn/implementation/data_quality.html

This manual is not intended to be a technical manual, nor does it intend to provide rules for publication of data through GDSN.

GS1 Member Organizations provide excellent training and information on interpreting and applying the package measurement rules, which form the foundation for accuracy of physical dimensional data. In addition, many GS1 Member Organizations provide services to audit product data and communicate the results between trading partners. Additional details regarding the rules for package measurement can be found in the *GDSN Package Measurement Rules* which can be located on the GS1 website at:

http://www.gs1.org/services/gsmp/kc/gdsn/index.html

1.2.   Benefits and Advantages of Use

Standard tolerances allow trading partners to utilize one consistent and agreed upon definition of data accuracy for data utilized in their supply chains. Some specific benefits of using tolerances are as follows:

- Standard tolerances provide the opportunity for each trading partner to assess their internal processes, ensure that accurate data is being generated and maintained, and ensure the effective application of tolerances in downstream systems.

- Standard tolerances facilitate data accuracy, which is a business necessity for superior trading partner execution in areas of logistics, distribution, manufacturing, store operations, administration, new product introductions and customer service.

- Accurate and synchronized product dimensions enable truck and warehouse optimization, reduced reconciliations, increased productivity, improved speed to shelf, and enhanced customer service.

- Accurate data will lead the way for the next generation of business process innovations.

Adherence to the practices identified in this document is a first step to establishing and maintaining a data quality management system, as referenced in the *GS1 Data Quality Framework* which can be located on the GS1 website at:

http://www.gs1.org/productssolutions/gdsn/implementation/data_quality.html

2. Standard Tolerances for Physical Dimensions

2.1. Definition of Standard Tolerances

Physical products identified by the same GTIN have some inherent variability in gross weights and linear dimensions. This may be due to manufacturing variability, handling methods, environment (e.g. humidity) or other factors. It is expected that published physical dimensions of a trade item, therefore, may not coincide exactly with measured physical dimensions of that trade item.

- Tolerances are allowances made for deviation from a standard, or the limits within which something is allowed to deviate. For the purpose of this document, a standard tolerance is defined as follows:

  □ Standard Tolerance: An allowable variation between the stated (or synchronized) physical dimensions of a trade item and the measured (or actual) physical dimensions of a trade item, used to determine the accuracy of the stated dimensions of that trade item.

- In order to facilitate the use of standard tolerances in industry, a section has been added to the *GDSN Package Measurement Rules* including the following:

  □ Approved standard tolerances for linear dimensions and weights, for both consumer trade items and non-consumer trade items.

  □ List of predefined package types to which the standard tolerances can be applied.

  Note: The *GDSN Package Measurement Rules* can be located on the GS1 website at: http://www.gs1.org/services/gsmp/kc/gdsn/index.html

2.2. How to Apply Standard Tolerances

Standard tolerances should be applied based on the predefined package type to which a GTIN is assigned. The approved standard tolerances have been deemed acceptable by retailers and attainable by manufacturers for the groups of consumer and non-consumer package types identified within the *Standard Tolerances for Data Accuracy* section of the *GDSN Package Measurement Rules*. Dimensions of consumer and non-consumer trade items that are within the standard tolerances for their respective package types will be considered accurate.

2.3. Independence from GTIN allocation Rules

The addition of standard tolerances does not impact the GTIN Allocation rule parameters identified in the General Specification. Tolerances and GTIN allocation rules are different concepts that need to be treated as such.

- **Tolerances** relate to the allowable variation between synchronized data (passed electronically between trading partners) and observed or measured data for a given package. Synchronized data is considered to be accurate if the measured dimensions, when compared to the synchronized dimensions, are within the allowable standard tolerance for that package.

- **GTIN Allocation Rules** define the conditions under which changes to product attributes require the use of a new GTIN. These rules cover a variety of product attributes, including linear dimensions, weights, net content and others.

Therefore, standard tolerances are used to determine if the physical dimensions of a particular trade item are considered to be accurate when compared to the stated dimensions of that trade item, independent of the application of GTIN allocation rules.

3. Package Measurement Tools

3.1. Appropriate Tools for Measurement

This section is intended to provide guidance and recommend measuring devices that may be used to obtain dimensional and weight attributes in support of data accuracy within the GDSN. While trading partners are entitled to use any tool that fits their business model in order to meet the standard tolerances, digital technology is generally considered the most accurate means of measuring.

- Consider the types of products that an organization will need to measure, considering both the largest and smallest packages. Both linear and weight data attributes should be considered.

- Consider the degree of accuracy required. Refer to the GDSN Package Measurement Rules for determining the number of decimal places recommended for trade item measurements. Organizations will typically have multiple degrees of accuracy required, and equipment should be obtained to support the highest degree of accuracy required within their organization.

- As a best practice, the use of digital callipers and digital scales is recommended for performing measurements. Consider obtaining software that allows the input of serial data directly from the equipment into a PC application. The ability to directly input data from the measuring devices will eliminate potential data entry errors based on keying the data into an application.

3.2. Tool Calibration

It is the organization's responsibility to make sure that all equipment provided and used for data gathering is well maintained and calibrated.

- Measurement equipment should be certified against measurement standards traceable to international or national measurement standards at least annually.

- The measurement equipment should be identified to enable the calibration status to be determined, and should be safeguarded from adjustments that would invalidate the measurement result.

4. Procedures for Measurement & Comparison

When performing measurement of consumer or non-consumer trade items, it is appropriate to utilize a sample size that enables some degree of normalization of the measurements. Multiple samples will help to reduce errors caused by equipment, inconsistent techniques or product abnormalities.

4.1. Measurement Environment/ Preparation

The organization should create a secure environment for measurement activities that limits access to equipment to authorized persons. The environment should provide, as much as possible, consistency in terms of temperature and humidity.

In addition, the organization should prepare and utilize standard processes and procedures to obtain and report dimensional attribute data.

Additional information and recommendations regarding inspection preparation and planning are identified in the *GS1 Data Quality Framework* which can be located on the GS1 website at:

http://www.gs1.org/productssolutions/gdsn/implementation/data_quality.html

4.2. Measurement Procedures

Begin with selecting random samples of the trade item to be measured. Samples should be taken from independent sources wherever possible, including unique lots, batches, pallets (non consumer trade units) or store shelves (consumer trade units). Each sample must share the same GTIN.

Using the measurement procedures identified below, perform the measurements of all trade item dimensions accordingly.

Measurement procedures should strictly adhere to the guidelines published in the GDSN Package Measurement Rules to ensure consistency.

Following are the recommended steps for performing measurements:

4.2.1. Non-Consumer Trade Items

- Identify the natural base of the sample. Place the sample on its natural base on a smooth, flat surface.
- Utilizing the proper tool, measure the width of the trade item and record the results.
- Repeat the measurement for the trade item depth/length and height and record the results.
- Place the sample on a scale to determine its weight (gross) and record the results.

4.2.2. Consumer Trade Items

- Identify the default front of the sample.   Place the sample on a smooth, flat surface so that the default front is facing you.
- Utilizing the proper tool, measure the width of the trade item and record the results.
- Repeat the measurement for the trade item depth and height and record the results.
- Place the sample on a scale to determine its weight (gross) and record the results.

4.3. Recording Results

All measurement results must be recorded into standard forms that provide consistency and traceability of data. The preferred format is to utilize a spreadsheet to record measurements. Measurements may be recorded into a spreadsheet at the time of measurement, or they may be recorded onto a printed form and later entered into the spreadsheet. See Appendix B for a sample spreadsheet.

The spreadsheet should contain (at a minimum) the following data fields:

- Unique Case GTIN or Package GTIN, as appropriate
- GTIN description
- Linear Unit of Measure
- GTIN Declared Net Content (as appropriate)
- GTIN Depth (Length)
- GTIN Width
- GTIN Height
- Weight Unit of Measure
- GTIN Gross Weight (as appropriate)

Data should be entered at the level of accuracy stated in the GDSN Package Measurement Rules.

Additional information and recommendations regarding recording of results are identified in the *GS1 Data Quality Framework* which can be located on the GS1 website at:

http://www.gs1.org/productssolutions/gdsn/implementation/data_quality.html.

4.4. Comparison to Published Data

Once all sample measurements have been recorded, these measurements should be compared to the measurements provided through global data synchronization, referred to as published data. Published data must be made available in a spreadsheet for comparison purposes.

- For each data dimension that was measured, compute the average of the sample measurements. The formula for this average is (Sum of all Samples) ÷ (Total number of Samples).

- Record the average in a separate column in the spreadsheet.

- For each dimension, compare the average value to the published (stated) value for that attribute, and determine if the difference is within the standard tolerance.

- If the difference is within the allowable tolerance, then no additional measurements are required. If the difference is not within the allowable tolerance, then additional sampling may be necessary.

In addition to the above statistical review, it is helpful to also review those measurements that are consistently different from the published data, even if these are within the acceptable standard tolerance. Consistent differences may indicate an issue with the method of measurement or the degree of accuracy of the stated data within GDSN.

- Example: 10 measurements of a trade item are taken. 9 of the measurements are 2% over the stated data values, but the 10th measurement is 4% over the stated data.

- This may indicate one of the following possibilities:

  - The trade item has changed over time but data updates were not made

  - The trade item data is simply misstated and an internal review is required.

  - The trade item data should be changed in the system to reflect the actual measurements.

  - The 10th measurement is erroneous due to measurement error and may be ignored.

- Detailed review of the actual trade item measurements can reveal other discrepancies or patterns of data inaccuracy within internal data processes that must be addressed.

4.5. Communication of Findings

The findings resulting from the above comparisons should be summarized and communicated to internal or external partners accordingly. This will facilitate further investigation and root cause analysis of data inaccuracies in order to improve data accuracy for all trading partners.

As a general practice, all trading partners should use these communications as reminders to assess their internal processes and ensure that accurate data is being generated and maintained on a regular basis.

5. Exceptions to Standard Procedures

It is necessary for a supplier to publish accurate information for its products, as only one set of physical product dimensional attributes for a GTIN may be published. GS1 standards and GDSN

specify that a GTIN must have exactly one value for each of the following attributes: height, width, depth/length and gross weight. This implies that, except during transitional periods involving changes to a trade item, all trade items with the same GTIN should be within the industry standard tolerances of the synchronized values, regardless of the production or distribution location. (Refer to the **GS1 Business Message Standards** for Align/GDSN/Catalogue Item Synchronization for further clarification).

> **Note:** The **GS1 Business Message Standards** can be located on the GS1 website at: http://www.gs1.org/services/gsmp/kc/ecom/xml/xml_bms.html

This section of the document is intended to assist trading partners with identifying and addressing the root causes for data discrepancies in published data, so that standard tolerances can be properly applied. Discrepancies may result from having multiple forms of a product identified by the same GTIN. Common reasons for this situation include promotional products, multiple production processes, and Retailer-specific forms of a product.

5.1.   Promotional Products

Promotional Product is defined as an enhanced form of a product that is made available for a limited timeframe. A promotional product is a modified version of a base product. Example: a toothbrush is added to a tube of toothpaste.

Depending on the nature of the packaging execution, this promotion pack may or may not require a new GTIN (refer to the GTIN Allocation Rules regarding promotional products). The promotional product and the base products often co-exist in the supply chain. The promotional product may exist in limited target markets and/or available to limited trading partners.

Recommended Best Practice:

Publish the dimensions of the base GTIN. Communicate the promotional product dimensional differences to trading partners outside of GDSN, through traditional notification procedures.

5.2.   Multiple Production Processes

Products that are identified by the same GTIN can be produced in multiple facilities or on multiple production lines, resulting in some inconsistency regarding physical dimensions and weight (excluding promotional products above). The differences are primarily due to variations in raw material suppliers, manufacturing equipment, climate or other factors. GS1 Standards specify that a GTIN's weight and dimensions must be consistent (within defined industry tolerances) regardless of the production location.

Recommended Best Practices:

1. Where possible, consider modification to production processes and/or package design so that all versions of the same GTIN have minimal dimensional variation due to manufacturing equipment or process variability.

2. For versions of the same GTIN that are produced and sold regionally or to a limited number of trading partners, consider creating separate GTINs that enable the manufacturer to maintain data accuracy within the standard tolerance.

3. If multiple versions of the same GTIN must exist, use these guidelines: For versions of the same GTIN that are produced nationally, publish dimensional values for that form of the GTIN with the dominant sales volume. If no single form has dominant volume, then publish dimensional values for the "largest" and/or heaviest form of the GTIN. The largest is determined by the greatest total cubic volume of each form of the GTIN.

5.3. Retailer-Specific Forms of a Product

A supplier may produce a retailer-specific form of a GTIN that results in dimensional variations that exceed the standard tolerance. GS1 Standards specify that a GTIN's weight and dimensions must be consistent (within defined industry standard tolerances) regardless of retailer trading partner.

Recommended Best Practices:

1. For retailer-specific forms of a GTIN that are temporary, adhere to the best practices identified above under **Promotional Products**.

2. For retailer-specific forms of a GTIN that are permanent, the supplier should create a new GTIN for this product, where possible.

3. If it is not possible to create a new GTIN for a permanent retailer-specific form of a GTIN, adhere to the best practices identified above under **Multiple Production Processes**

6. Product Data Corrections and Changes

6.1. Data Error Corrections

As data errors are identified by trading partners and/or by participation in either internal or industry audits, it is necessary to examine the incorrect data and to understand the reasons why the data is incorrect. **It is important to correct the processes that generate incorrect data, not just correct the explicit data in question**. Data errors should be corrected at the source, in addition to being communicated to trading partners.

Suppliers should make every attempt to make data corrections and communicate these corrections to trading partners on a timely basis. Trading partners must recognize that while frequent data corrections may require additional administration, data corrections are necessary to maintain data accuracy and ensure efficient execution.

Retailers should consider automating data changes and corrections to ensure that trade item information is processed in a timely manner. It is recommended that, at a minimum, automation be aligned to process all data changes that fall within the standard tolerances.

6.2. Data Changes

Initial data communicated within GDSN is often based on design and specification data, not actual physical measurements. This is due to lead time requirements for data publication that result in publishing information prior to manufacturing of the products. At the earliest possible time, specification based data must be validated and updated. As trade item data is updated, changes must be communicated to trading partners, even if the new values are within the standard tolerances, to ensure that the most accurate data is being shared and used by all parties.

Products continue to undergo change throughout their lifecycle. It is important to ensure that back-end integration processes are in place to capture changes to trade item data in addition to initial trade item data population. As production lines are tweaked, marketing changes are made or process efficiencies are introduced, internal supplier systems must be updated to reflect the most current trade item data. In turn, these changes must be communicated to trading partners in a timely basis.

Suppliers should build in processes to quickly send data changes to trading partners when applicable, particularly for new products. Recipients of published data should accept and adopt data changes quickly, as long as the changes are within the standard tolerances for that particular GTIN. The process of transferring data changes is most efficient when automated.

6.3.   Timing for Publication of Data Changes

When improvements or changes are made to a trade item (referred to as a reconfigured trade item), it is important to consider the timing of communicating these changes. Often, an existing and reconfigured trade item will co-exist in the supply chain while production or distribution of the reconfigured trade item is ramped up. However, the changes must be communicated to all trading partners at the same time within GDSN.

When introducing reconfigured trade items into the supply chain, the recommendation is to publish the reconfigured trade item data values approximately two weeks prior to the "first start ship date" of the reconfigured trade item. Although some trading partners may not receive the reconfigured trade item until much later, this timing allows the changes to be communicated prior to the first receipt of the reconfigured trade item by any individual trading partner. Additional communication between the supplier and trading partners regarding these changes is encouraged to facilitate a smooth transition.

A. Appendix A: Recommended Measuring Equipment

Many type and brands of measuring equipment are available to support obtaining accurate measurement data. The table below is intended to provide a general reference to the most common types and relative degree of accuracy for measuring equipment.

Linear Measurement Equipment		
Equipment Type	Relative Degree of Accuracy	Comments
Ruler / Yardstick	Low	
Tape Measure	Low	
Digital Tape Measure	Medium	
Analog Caliper	High	
Digital Caliper	High	
Non-Contact Measurement	High	May be ultrasonic, laser or vision based
Weight Measurement Equipment		
Mechanical Scales	Low	May be spring, beam, or platform
Electronic Scales	High	
Multipurpose Measurement Equipment		
Cubing Devices	High	May be ultrasonic, laser or vision based

B. Appendix B: Sample Spreadsheet

Sample Spreadsheet for Recording Data Accuracy Trade Item Measurements

Internal Item Code	Case/ Package GTIN	GTIN description	Linear Unit of Measure	GTIN Declared Net Content	GTIN Depth (Length)	GTIN Width	GTIN Height	Weight Unit of Measure	GTIN Gross Weight	Comments
2100012345	10021000123452	Packaged Food Product	inches	16 oz	10.500	8.250	7.625	lbs	13.500	Sample entry