



Dimensional Application of Control Drawing Process

1 Introduction

Note: Nothing in this standard supercedes applicable laws and regulations.

Note: In the event of conflict between the English and domestic language, the English language shall take precedence.

1.1 Purpose. This standard documents various global agreements necessary to complete control drawing/dataset development and implementation. The standard outlines how control drawing/datasets are used to communicate assembly/subassembly level dimensional requirements to vehicle assembly centers, Value Added Assemblers (VAA), and manufacturing operations. This document describes how key dimensional requirements are communicated to manufacturing, and assembly operations using Statement of Requirements (SOR) documents, Process Control Plans, assembly level Geometric Dimensioning and Tolerancing (GD&T) documents and Measurement Point (MP) files.

1.1.1 Keyword Application. The words “shall/must/required” describe an absolute requirement. Procedural steps or processes defined by these words must be followed.

The words “should/preferred/recommended” describe preferences. Procedural steps or processes defined by these words must be followed whenever there is no valid reason to do otherwise.

The words “acceptable/allowed/may/might” grant permission. The use of these words does not require or recommend the practice or procedure specified; nor do these words forbid or discourage alternative practices.

1.2 Applicability. This standard shall apply to all General Motors assembly plants, GM Joint Venture assembly plants, and Value Added Assembly sources which employ control drawings and/or control datasets.

1.3 Remarks. This standard describes the process used to develop and compile control drawings/datasets to document specific dimensional requirements for assemblies built at Vehicle Assembly Centers and/or VAAs. Control drawings/datasets identify critical component, subassembly, assembly and/or finished vehicle level dimensional requirements.

Control drawing/dataset dimensional requirements are defined by Dimensional Technical Specifications (DTS) and/or key Vehicle Technical Specifications (VTS). The specific dimensional requirements are “rolled down” from DTS and VTS to the component and assembly/subassembly level. All component and assembly/subassembly level GD&T shall be in accordance with ASME Y14.5 as amended by the GM GD&T Addendum GMW16812.

Manufacturing shall employ the dimensional requirements and tolerances specified on each control drawing/dataset to manage assembly processes to achieve DTS and/or finished Vehicle Dimensional requirements.

2 References

Note: Only the latest approved standards are applicable unless otherwise specified.

2.1 External Standards/Specifications.

ASME Y14.5

2.2 GM Standards/Specifications.

GMW3059

GMW15275

GMW16812

2.3 Additional References.

- Data Exchange Specification (DES) files
- Dimensional Technical Specifications (DTS)
- Global Dimensioning & Tolerancing (GD&T) Documents
- Measurement Point (MP) files
- Part Drawing Number 10312194
- Process Control Plans
- Statement of Requirements (SOR)
- Vehicle Technical Specifications (VTS) (ID)

(ID) = This standard is limited to internal distribution within General Motors and shall not be distributed outside this company. Contact the GM Lead Engineer for further instructions.

3 Requirements

3.1 General Requirements.

3.1.1 Dimensional Application of Control Drawings/Datasets. Dimensional requirements and tolerances specified on each control drawing/dataset provide a means for each assembly center to monitor and control the build process to ensure compliance with Control Drawing and Key Characteristic Designation System (KCDS) guidelines. Variable data measurement points and checking fixtures shall be developed by manufacturing to include all critical features as defined on each control drawing/dataset.

3.1.2 Control Drawing Guiding Principles (GP).

3.1.2.1 GP A. Control drawings/datasets document dimensional product and process monitoring requirements that apply to features geo-set ("controlled") or influenced by specific assembly processes.

3.1.2.2 GP B. Critical dimensions and tolerances are defined as instances where variation about a nominal value would affect DTS and VTS performance as well as specific vehicle dimensional requirements, such as panel fit and function.

3.1.2.3 GP C. Specific dimensional requirements are documented on control drawings/datasets at the assembly/manufacturing level where each critical feature is geo-set. Where subsequent assembly/manufacturing operations dimensionally impact those critical features, additional higher level control drawings/datasets may be necessary to achieve DTS and/or finished Vehicle Dimensional requirements.

3.1.3 Control Drawing Rules (R).

3.1.3.1 R1. Common or selective default notes and/or tolerances are not shown on control drawings/datasets. The Dimensional Engineering Global General Notes Standard (see GMW15275) outlines the use of default notes and tolerances.

3.1.3.2 R2. Control drawing/dataset dimensional requirements for critical product and process features are specified in accordance with ASME Y14.5 as amended by the GM Global Dimensioning and Tolerancing Addendum (see GMW16812).

3.1.4 Users of Control Drawings.

3.1.4.1 Virtual Analysis Group. The Virtual Analysis group makes use of control drawing/dataset specifications to assign specific tolerance values used in Variation Simulation Modeling (VSM) and Elastic Assembly Variation Simulation (EAVS) analysis models.

3.1.4.2 Dimensional Engineering Group. Dimensional Systems Engineers (DSE) make use of control drawing/dataset specifications to perform Root Sum Square (RSS) dimensional variation analysis for downstream assemblies.

3.1.4.3 Product Development Team. Product Development Teams (PDT) make use of control drawing/dataset specifications to balance decisions related to DTS.

3.1.4.4 Measurement Systems Group. The Measurement Systems group makes use of control drawing/dataset specifications to design and build Coordinate Measuring Machine (CMM) holding fixtures and hard fixtures.