



Component Technical Specification (CTS) - CCC Cushion Length Adjuster (CLA) System

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 provides a Component Technical Specification (CTS) for Corporate Common Components (CCC) cushion length adjuster system. The cushion length adjuster subsystem is used to provide adjustable support the occupant's legs in the thigh area. The subsystem allows the occupant to adjust the length of the seat cushion to achieve the desired level of support.

1.2 Applicability. Component Technical Specification is applicable to CCC Cushion Length Adjuster.

1.3 Remarks. Supplier will provide the cushion length adjuster component and assembly level math and Geometric Dimensioning and Tolerancing (GD&T) drawing.

2 References

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

2.1 External Standards/Specifications.

CNCA-C11-01	CNCA-C11-09	SAE J1128
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2.2 GM Standards/Specifications.

GMW3059	GMW3600	GMW14444	GMW16853
GMW3097	GMW14011	GMW14872	GMW17868
GMW3116	GMW14264	GMW15272	
GMW3172	GMW14364	GMW15325	
GMW3232	GMW14373	GMW15562 (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.

2.3 Additional References.

- CG1804, SSTS for Seat Systems (ID)
- CG2568, Appendix T HVI Seat Performance Integration (ID)
- CG4953, Seat Cushion Length Adjuster SOR Appendix G3 VCRI Template (ID)
- China Compulsory Certification Mark and Report
- Component Technical Specification (CTS)
- Geometric Dimensioning and Tolerancing (GD&T) drawing
- GM Best Practices
- Statement of Requirements (SOR)
- Subsystem Technical Specification (SSTS)

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3 Requirements

3.1 System/Subsystem/Component/Part Definition. The cushion length adjuster subsystem is used to provide adjustable support the occupant's legs in the thigh area. The subsystem allows the occupant to adjust the length of the seat cushion to achieve the desired level of support. The subsystem as defined in this document is to include all components needed to assemble the cushion length adjuster, attach the cushion length adjuster to the seat frame, and all components required to actuate the cushion length adjuster including but not limited to the cushion length adjuster mechanism, actuating handle, mounting base, fasteners to attach the subsystem to the seat frame, and upper carrier plate.

3.1.1 Appearance. The cushion length adjuster must be designed so that it complements the finished seat design and provides a quality appearance of the complete seat assembly. The cushion length adjuster shall be designed so that it does not cause appearance issues to the overall seat.

3.1.2 Content.

3.1.2.1 Physical Content. Not applicable.

3.1.2.2 Functional Content.

3.1.2.2.1 Order of Precedence, Regulatory and GM Specifications.

3.1.2.2.1.1 Regulatory.

Government and regulatory requirements shall take precedence over any specification in this CTS document unless a specific exemption has been obtained from the appropriate governing and/or approving authority(ies).

The cushion length adjuster supplier shall ensure compliance with all country specific regulations/legal requirements associated with the application of this module in all global markets. It is also the supplier's responsibility to track all changes in government documents affecting development of the comfort system and initiate updating of program specific specification. The GM Global Legal Database is one resource for government regulation documents.

3.1.2.2.1.2 Subsystem Technical Specification (SSTS).

In the event of a conflict between the text of this specification and the text of the seat SSTS (CG1804, SSTS for Seat Systems), this CTS shall take precedence. The supplier shall work with the GM Design Responsible Engineer to comprehend this requirement.

3.1.2.2.1.3 CTS.

In the event of conflict between the text of this specification and the documents cited herein, the text of this specification takes precedence. Nothing in this specification, however, supersedes applicable laws and government regulations.

3.1.2.2.2 China Compulsory Compliance.

The cushion length adjuster shall comply with the requirements of Certification Accreditation Administration of the People's Republic of China CNCA-C11-01 and CNCA-C11-09 for all parts that will be exported to or sold in the China market. The supplier is responsible for the China Compulsory Certification mark and report. The China Compulsory Certification report shall be submitted on time. The supplier is expected to be knowledgeable of all pertinent government regulations/legal requirements in these markets including but not limited to those called out in this specification.

3.1.3 Ambient Environment.

The cushion length adjuster, in all positions, shall function according to the operational requirements found in Table 1 over the full temperature range, and within the levels of function noted in Table 1. Table 1 only pertains to the *operational* requirements including retention, appearance, operational efforts and speeds of adjustment. This requirement does not permit a reduction in any other performance requirements found elsewhere in this specification including safety.

3.1.3.1 General Climate Requirements.

The anticipated operating conditions relative to temperature and humidity are listed in Table 1.

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Table 1: Interior Environmental Operating Ranges

General Climate Conditions	Requirements
Relative humidity range	(2 to 100)% RH
Maximum sun load	1100 W/m ²
UV –radiation (maximum daily)	1.5 MJ/m ²
Atmospheric pressure	(-75 to +4000) m above sea level
General contaminants to be considered	Dirt, grit, dust, grease, sand, rain, snow, cola

3.1.3.2 Interior Functional Temperatures Requirements.

The cushion length adjuster, in all positions, shall function according to the operational requirements found in this specification over the full temperature range, and within the levels of function noted in Table 2. Table 2 only pertains to the operational requirements including: 3.2.1.4.3 Operational Efforts, and 3.2.1.3.1 Cushion Length Adjuster Travel. This paragraph does not permit a reduction in any other performance requirements found in this specification, including safety.

Table 2: Interior Temperature Operating Ranges and Requirements

Range	Temperature	Operational Requirements (performed in-chamber)
Extreme Cold	-29 °C	Must Remain Operational, Return to 100% Performance upon Return to Ambient, and Suffer No Permanent Degradation
Cold Temp	-15 °C	Must Function within ± 30%
Ambient	+22 °C	Must Function to 100%
Hot Temp	+60 °C	Must Function within ± 30%
Extreme Hot	+85 °C	Must Remain Operational, Return to 100% Performance upon Return to Ambient, and Suffer No Permanent Degradation

3.1.3.3 Environmental Exposure Requirements for Durability Testing.

All durability testing shall be conducted as per the environmental exposure requirements defined in the Table 3, unless otherwise specified.

Table 3: Interior Environmental Durability Testing – Temperatures

Range	Temperature	Total Cycles
Cold Temperature	-20 °C	5%
Ambient Temperature	+22 °C	45%
Ambient Temperature +95% RH	+22 °C +95% RH	45%
Hot Temperature	+60 °C	5%

3.1.4 Interfaces.**3.1.4.1 Structural Interface.**

The cushion length adjuster shall be designed to interface with the seat structure(s) defined in the Statement of Requirements (SOR).

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3.1.4.2 Foam Interface.

Foam padding will be supported by the upper, moving portion of the cushion length adjuster. The cushion length adjuster interface to the foam shall be designed to hold the pad in a way to prevent relative motion between the pad and the cushion length adjuster surface in $\pm x$, $\pm y$, and $-z$ directions so that foam squeak is prevented. Constraining the foam will also prevent it from shifting and causing appearance and/or comfort concerns.

3.1.4.3 Trim Interface.

The upper, moving portion of the cushion length adjuster shall have a provision for attaching trim to.

3.1.4.4 Heater Mat Interface.

The cushion length adjuster shall provide a means to connect or otherwise constrain a connection for a seat cushion heater mat.

3.1.5 Usage Definition.

The reliability requirements (R Values), when specified, are to be met when testing an appropriately cushion length adjuster assembly and a trimmed and contented seat for:

- Design Validation (DV), DV is testing parts from "soft" tools to validate the design.
- Product Validation (PV), PV is testing parts from "hard" tools to validate the final product including manufacturing variation.

For more detailed definition of DV and PV refer to GMW3600.

All reliability values specified are to be demonstrated using a 50% confidence bound on the reliability estimate. The preferred reliability demonstration is to "Test to Failure", see following items:

- Test to Failure - Parts undergoing either normal or increased stresses (accelerated tests) until a failure occurs. Promotes understanding of the product's strengths and weaknesses and usually requires fewer samples than success tests.
- Success tests - Parts undergoing stresses without failure until a goal is reached. Parts are tested to one or more Customer Usages (CU); each representing 150 000 miles to 200 000 miles of equivalent test conditions (see Target Life in 3.2.3.2.1). Success testing may require more samples than test to failure. Success testing, though not preferred, is allowed, but any Weibull slope chosen > 1 must be statistically proven (no assumptions, documentation required) and agreed upon by GM Validation Engineer and GM Design Release Engineer (DRE).
- Statistical demonstration of reliability is required for critical key commodities at both DV and PV separately. For non-critical key commodities, Validation Engineering must approve any exceptions to statistical demonstration of reliability.

3.2 Product Characteristics.

3.2.1 Performance Requirements.

For performance requirements not specified elsewhere, all cushion length adjuster systems shall satisfy the performance criteria relative to the environments and loads noted in this specification. They shall remain attached and free of perceivable signs of stress, wear, degradation, warping, bunching etc. and without being damaged or exhibiting any loss of function or operation cracking, tearing, etc. for the periods specified under 3.2.3.2.1 Target Life.

3.2.1.1 Safety Requirements.

3.2.1.1.1 Regulatory Requirements.

The cushion length adjuster assembly shall satisfy all government requirements applicable in the nations and statutory regions in which vehicles are offered for sale.

3.2.1.1.2 Provide Protection against Designated General Potential Hazards.

The cushion length adjuster assembly shall be designed and built to prevent, suppress, avoid, mitigate, or control the classes of hazards identified in the following.

3.2.1.1.2.1 Mechanical.

No part of the cushion length adjuster accessible to the user shall cut, pinch, nor crush the users' extremities.

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3.2.1.1.2.2 Electrical.

The cushion length adjuster assembly components close to electrical wires shall comply with SAE J1128, GMW3097 and GMW3172.

3.2.1.1.2.3 Thermal.

- a. All seat materials subject to the requirements of Flammability of Interior Materials, as listed in GMW3232.

3.2.1.1.2.4 Chemical.

- a. Toxicity hazards including chemically toxic materials prohibited or controlled by government regulations GMW16853 and GMW3059.
- b. The supplier is to submit International Material Data Standards (IMDS) certification as part of the PPAP submission.

3.2.1.2 Cushion Length Adjuster System Content Requirements.

Note: 3.2.1.2.1 outlines the content requirements for the cushion length adjuster that may be incorporated within the system.

3.2.1.2.1 Cushion Length Adjuster Location.

The cushion length adjuster shall be located in the front portion of the seat cushion.

3.2.1.3 Cushion Length Adjuster Functional Requirements.

3.2.1.3.1 outlines the functional performance requirements for the cushion length adjuster system.

All travel ranges shall be measured at a component level unless otherwise noted.

3.2.1.3.1 Cushion Length Adjuster Travel.

- a. Total travel shall be within a tolerance of ± 1 mm of the criteria as defined in Appendix B of the sourcing eSOR.
- b. Total amount of lever actuated adjustment increments shall match the criteria as defined in Appendix B of the sourcing eSOR.
- c. Travel per adjustment increment shall match the criteria as defined in Appendix B of the sourcing eSOR.

3.2.1.3.2 Cushion Length Adjuster Strength and Ultimate Loading and Free Play.**3.2.1.3.2.1 Strength and Ultimate Loading.****3.2.1.3.2.1.1 Vertical Strength and Ultimate Vertical Strength.**

- a. The cushion length adjuster must withstand a vertical force of 1110 N in the -Z direction. The force is to be applied to the cushion length adjuster when it is in its most forward (extended) position. The force is applied through a 127 mm diameter hemispherical knee load applicator. After holding the 1110 N load, release the load and check function. Cushion length adjuster must maintain fit and function. Reapply the load and ramp to failure. Refer the Figure 1 for the load application points. Final load application points will be negotiated and agreed on between GM and the cushion length adjuster supplier prior to testing. Refer the knee load applicator is defined in GMW14373.
- b. The cushion length adjuster must withstand a vertical force of 1110 N in the -Z direction. The force is to be applied to the cushion length adjuster when it is in its most rearward (retracted) position. The force is applied through a 127 mm diameter hemispherical knee load applicator. After holding the 1110 N load, release the load and check function. Cushion length adjuster must maintain fit and function. Reapply the load and ramp to failure. Refer the Figure 1 for the load application points. Final load application points will be negotiated and agreed on between GM and the cushion length adjuster supplier prior to testing. Refer the knee load applicator is defined in GMW14373.
- c. The cushion length adjuster must withstand a vertical force of 300 N in the +Z direction. The force is to be applied to the cushion length adjuster when it is in its most forward (extended) position. The load application point and load application device is to be agreed prior to testing. After holding the 300 N load, release the load and check function. Cushion length adjuster must maintain fit and function. Reapply the load and ramp to failure. The ultimate load and failure mode is to be reported. Final load application points will be negotiated and agreed on between GM and the cushion length adjuster supplier prior to testing.
- d. The cushion length adjuster must withstand a vertical force of 300 N in the +Z direction. The force is to be applied to the cushion length adjuster when it is in its most rearward (retracted) position. The load application

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