



Specification for Clutch Pedal Assembly Component

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 General Specification, along with a program specific Component Technical Specification (CTS), establishes the quantitative requirements for a clutch pedal. The functions, performance, reliability, and validation required of the subsystem are defined in this document and the program specific CTS.

1.2 Applicability. These documents can be used to specify requirements for either separate clutch pedals or a clutch pedal as part of a brake/clutch/accelerator pedal subsystem depending on program need.

1.3 Remarks. The service clutch pedal function is to transmit driver input to the clutch and clutch release system. Actuation of the clutch pedal will offer the driver to make a gearshift or a status of a non-torque transmitted situation. Actuation of the pedal also operates a sensor system to deactivate engine speed control systems, start enable on some applications, and provide other powertrain functions.

2 References

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

2.1 External Standards/Specifications.

ANSI/J-STD-001C	E/ECE/324	ISO 12103-1	SAE AMS2430T
ASTM A228	IATF 16949	J-STD-001C	UN R35
ASTM A1000			

2.2 GM Standards/Specifications.

GMW3013	GMW3116	GMW14444	GMW15335
GMW3059	GMW3172	GMW14872	GMW17000
GMW3091	GMW7293	GMW15150	
GMW3097	GMW14377	GMW15272	

2.3 Additional References.

- 5W30 Synthetic Motor Oil
- CG2397
- Electric Adjustable Pedal (EAP) Statement of Requirements (SOR)
- GM1724 – Shipping Parts Identifications Label Standards
- GM1738 – Packaging and Identification Requirements for Production Parts
- GM1797 – Shipping and Delivery Performance Requirements
- Program Specific Component Technical Specifications (CTS)
- Program Specific Subsystem Technical Specifications (SSTS)
- Statement of Requirements (SOR), Appendices E, F3, H

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3 Requirements

3.1 User System/Subsystem/Component/Part Definition. The service clutch pedal function is to transmit driver input to the clutch and clutch release system. Actuation of the clutch pedal will allow the driver to make a gearshift or a change of status of a non-torque transmitted situation. Actuation of the clutch pedal also operates a sensor system to deactivate cruise control systems, starter enable, and signals to other vehicle systems.

3.1.1 Appearance.

3.1.1.1 Appearance by Design. All components of clutch pedal assembly visible under dash shall have a quality appearance and be black and/or silver in color. For pedal arms fabricated in steel, the black coating shall have no cracking, peeling or runs. No bruises, oxidations or breakups, which could affect the function, are allowed. Plastic material components shall be free of mold marks, material flow and other visible defects. No supplier logo shall appear on a normally customer visible portion of the part. Each component must have indications for identifying the supplier, date of manufacture, material, Regular Production Option (RPO) or other GM specified code to differentiate different versions on the same application, and others as specified on the drawing. Final appearance approval shall be made by GM Engineering.

3.1.1.2 Appearance After Durability. Portions of the clutch pedal visible from below the lower dash panel area appearance shall not degrade, and wear on the pedal pad foot surface shall be < 0.5 mm after any vehicle or component test referenced in this specification.

3.1.2 Content.

3.1.2.1 Physical Content. A pedal subsystem includes these major components: Refer to program specific CTS.

3.1.2.1.1 Clutch Pedal Module Strategy. Refer to program specific CTS.

3.1.2.1.2 Clutch Pedal Bracket Materials. Refer to program specific CTS.

3.1.2.1.3 Clutch Pedal Lever Material. Refer to program specific CTS.

3.1.2.1.4 Pedal Pad Cover Material. Refer to program specific CTS.

3.1.2.1.5 Pad Lateral Foot Guide. Refer to program specific CTS.

3.1.2.1.6 Sports Pad Compatibility. Refer to program specific CTS.

3.1.2.1.7 Pushrod Attachment. Refer to program specific CTS.

3.1.2.1.8 Crash Occupant Injury Reducing Device. Refer to program specific CTS.

3.1.2.1.9 Position Adjustable Pedals. Refer to program specific CTS.

3.1.2.1.10 Lubrication. All pivots and moving joints must be lubricated for life including pre-greasing of the push rod socket by the clutch pedal supplier to minimize wear and squeak potential.

3.1.2.1.11 Clutch Pedal Position Detection. The clutch pedal shall have a lever position sensor or switch as specified by the GM Pedal Design Engineer (DE). The sensor specified will have requirements for initial and full travel outputs, linearity, and other packaging requirements.

3.1.2.2 Functional Content. The pedal subsystem shall provide these functions (or information).

3.1.3 Ambient Environment.

3.1.3.1 Operational Environment. The clutch pedal assembly shall meet all operational performance requirements (refer to 3.2.1), without loss of functions or degradation of service during and after exposure to these environments.

3.1.3.1.1 Temperature. The range encompasses the temperatures that the clutch pedal may be exposed to during its service life.

- Air temperature: (at component location): -40 °C to +66 °C

3.1.3.1.2 Pressure. The range encompasses the pressures that the clutch pedal may be exposed to during its service life.

- Atmosphere pressure: 57 kPa to 106 kPa

3.1.3.1.3 Chemicals.

3.1.3.1.3.1 Humidity. The range encompasses the range of humidity that the clutch pedal may be exposed to during its service life.

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- Relative humidity: 0% to 100%

3.1.3.1.3.2 Contaminants. Table 1 encompasses the characteristics of cleaners, fluids and contaminants that the clutch pedal may be exposed to during its service life.

3.1.3.1.3.3 Ozone. Table 2 indicates ozone levels as a function of temperature and time duration. This is an expected worst case lifetime profile. Refer to GMW14444.

3.1.3.1.3.4 Corrosive. The clutch pedal may be exposed to highly corrosive environments such as near seashores. This environment may include various temperatures, humidity, salt, dust, sand, and mud. Refer to 3.2.1.6 for test requirements.

3.1.3.1.4 Particulates. Table 3 represents the exposure profile of sand and dust that the clutch pedal may see (repeated exposure) during its service life.

Table 1: Contaminants ^{Note 1}

Contaminant	Content	Exposure Area and Time
Water, Snow, Ice	Common	Entire Assembly, 168 h
Coffee	Commercially Available	Foot Pad and Lever, 1 h
Cola	Commercially Available	Foot Pad and Lever, 1 h
Acid Rain	62% Sulfuric, 32% Nitric, and 6% Hydrochloric Acids at a pH of 3.0 and 4.0	Foot Pad and Lever, 1 h
Road Salt	Sodium Chloride (NaCl), Calcium Chloride (CaCl ₂), Calcium Magnesium Acetate (CMA)	Foot Pad and Lever, 1 h
Sand, Dust	ISO 12103-1: A2 Fine Grade Dust	Entire Assembly, 168 h
Mud, Gravel	No Test Needed	Foot Pad and Lever, Not applicable
Leaves, Mold, Fungus	No Test Needed	Foot Pad and Lever, Not applicable
Sap, Insects, Animal, Animal Waste	No Test Needed	Foot Pad and Lever, Not applicable
Brake Fluid	Commercially Available	Entire Assembly, 168 h
Engine Coolant	Commercially Available	Entire Assembly, 168 h
Air Conditioning Refrigerant	No Test Needed	Foot Pad and Lever, Not applicable
Battery Fluid	Commercially Available	Foot Pad and Lever, 1 h
Rust Proofing or Undercoating	Commercially Available	Foot Pad and Lever, 1 h
Dust Control Chemicals (Calcium Chloride, Magnesium Chloride.)	Commercially Available.	Foot Pad and Lever, 1 h
Degreasers and Cleaners	Content	Exposure Area and Time
Windshield Washer Fluid	Commercially Available	Entire Assembly, 168 h
Alcohol Base Cleanser	Commercial (10% by Volume)	Foot Pad and Lever, 1 h

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Contaminant	Content	Exposure Area and Time
Carpet Cleaner	Available at GM Dealer or from Certified Service Website	Foot Pad and Lever, 1 h
Ammonia Base Cleanser	Commercial (10% by Volume)	Foot Pad and Lever, 1 h
Vinyl Plasticizers	Armor All or Equivalent	Foot Pad and Lever, 1 h
Hand Cleanser	Commercially Available	Foot Pad and Lever, 1 h
Laundry Detergent	Commercially Available	Foot Pad and Lever, 1 h
Tire Cleaners	Commercially Available	Foot Pad and Lever, 1 h
Engine Cleaners	Commercially Available	Foot Pad and Lever, 1 h
Tar Remover	Commercially Available	Foot Pad and Lever, 1 h
Fuels	Content	Exposure Area and Time
Unleaded Gasoline	Commercially Available	Foot Pad and Lever, 1 minute
Diesel Fuel	Commercially Available	Foot Pad and Lever, 1 minute
Fuel Additives	Available at GM Dealer, or from Certified Service Website	Foot Pad and Lever, 1 minute
Lubricants	Content	Exposure Area and Time
Engine Oil	Commercially Available	Foot Pad and Lever, 1 h
Synthetic Motor Oil	Commercially Available 5W30 Synthetic Motor Oil	Foot Pad and Lever, 1 h
Transmission Fluid	Commercially Available	Foot Pad and Lever, 1 h
Differential Fluid	Commercially Available	Foot Pad and Lever, 1 h
Wheel Bearing Lube	Commercially Available	Foot Pad and Lever, 1 h
Constant Velocity Joint Lube	Commercially Available	Foot Pad and Lever, 1 h
Power Steering Fluid	Commercially Available	Foot Pad and Lever, 1 h
Transaxle, Differential Lube	Commercially Available	Foot Pad and Lever, 1 h
Multipurpose Grease	Commercially Available	Foot Pad and Lever, 1 h

Note 1: Some contaminants may come through a leaky front of dash or Heating, Ventilation, Air Conditioning (HVAC) unit.

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Table 2: Ozone Contaminants

Time: At Ambient Temperature and Ozone Concentration										
Total Time: 10 years = 87 600 h for Passenger Cars, 12 years = 105 120 h for Trucks										
Total Ozone Exposure: 27 700 P _{Clutch Pedal} for Passenger Cars, 33 324 P _{Clutch Pedal} for Trucks Location: Los Angeles, California. (Source: Purchaser Validation Center, Product Usage Measurements and Application, Los Angeles Area Ozone Data.)										
Temperature (°C)	Ozone Concentration (P _{Clutch Pedal})									
	0.00	0.01 thru 0.05	0.06 thru 0.10	0.11 thru 0.15	0.16 thru 0.20	0.21 thru 0.25	0.26 thru 0.30	0.31 thru 0.35	0.36 thru 0.40	
	Percent (%) Total Vehicle Life									% Total Time In Band
38 thru 43	0.01	0.07	0.08	0.08	0.07	0.02	0.02	0.01	0.01	0.35
32 thru 38	0.07	0.72	0.97	0.74	0.56	0.29	0.09	0.02	0.01	3.46
27 thru 32	0.92	3.32	3.03	2.34	1.13	0.35	0.07	0.01	0	11.18
21 thru 27	4.53	8.97	4.44	1.23	0.17	0.01	0	0	0	19.38
16 thru 21	10.23	16.02	1.07	0.01	0	0	0	0	0	27.34
10 thru 16	10.73	14.25	0.03	0	0	0	0	0	0	25.01
4 thru 10	4.82	7.32	0	0	0	0	0	0	0	12.13
-1 thru 4	0.38	0.76	0	0	0	0	0	0	0	1.14
Total	31.70	51.43	9.62	4.40	1.93	0.67	0.17	0.03	0.01	100

Table 3: Sand and Dust Exposure Times

Concentration (mg/m ³) ^{Note 1}	Exposure Time (h)
70	74.5
350	25.0
1600	5.0
3900	1.0

Note 1: mg/m³ = milligram per cubic meter

3.1.3.1.5 Driver Applied Forces. The clutch pedal, as installed in vehicle, may often be exposed to the operator applied load conditions to any point on any of the pedal pads during its service life:

- 668 N (150 lb) force in pedal apply direction.
- 178 N (40 lb) force in the upward direction.
- 178 N (40 lb) force in both lateral directions.
- 556 N (125 lb) force 45 degrees each side from normal in the horizontal plane.

3.1.3.1.6 Vehicle Deceleration. This is the environment that the clutch pedal may be exposed to during its service life.

- 14.7 m/s² vehicle decelerations

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3.1.3.1.7 Thermal Shock. The components of the Pedal Module (PM) may be exposed to these types of thermal shocks:

- Components at the maximum temperature (TMAX) subjected to 7 °C air conditioning air, 850 times.
- Components at -30 °C subjected to 60 °C heater air, 500 times.

The number of occurrences assumes one (1) occurrence per day for each day in ten (10) years that the ambient (outside) temperature in Phoenix exceeds 38 °C (100 °F), and one (1) occurrence per day for each day in ten (10) years that the ambient temperature in Kapuskasing is below -23 °C (-10 °F).

3.1.3.1.8 Impact. This is the environment that any of the pedals may be exposed to during its service life:

- Two hundred (200) impacts with a steel vacuum cleaner nozzle (0.2 kg moving at 0.3 m/s) to any portion of the PM, which is 50 mm or more below the lower dash panel.

3.1.3.1.9 Vibration. Refer to GMW3172.

3.1.3.1.10 Voltage. Unless otherwise agreed upon in writing by GM, all of the pedal sensors shall utilize 5 V regulated reference voltages, 0 V to 5 V outputs, and 0 V returns.

3.1.3.1.11 Electromagnetic Compatibility. The clutch pedal may be subjected to Electromagnetic Compatibility (EMC) environments per GMW3091 and GMW3097.

3.1.3.1.12 Radiation.

3.1.3.1.12.1 Total Solar Radiation. The maximum solar radiation exposure that portions of the accelerator pedal module below the dash are expected to receive per year is 18 500 g cal/cm² (775 MJ/m²).

3.1.3.1.12.2 Ultraviolet Radiation. Ultraviolet radiation is defined as wave lengths between 295 Nm and 385 Nm. The maximum ultraviolet radiation exposure for portions of the accelerator pedal below the dash per year is 826 g cal/cm² (34.6 MJ/m²).

3.1.3.2 Extreme Operating Environment (On Vehicle). The clutch pedal shall meet specified extreme environmental operational performance requirements. The clutch pedal shall not exhibit any permanent failure modes, unsafe or undesired operating modes when subjected to extreme environments listed. Undesired operating modes include incorrect driver intent output.

3.1.3.2.1 Extreme Temperature. The range encompasses the extreme temperatures that the clutch pedal may be exposed to during its service life: -54 °C to 70 °C.

3.1.3.2.2 Extreme Pressure. The range encompasses the extreme pressures that the clutch pedal may be exposed to during its service life: 20 kPa to 106.3 kPa.

3.1.3.2.3 Extreme Loads. The clutch pedal, as installed in vehicle, may be exposed to the operator applied load conditions to any point on a pedal pad during its service life:

- Apply direction: 668 N (150 lb)
- Lateral direction: 220 N

3.1.3.2.4 Extreme Voltage. Any of the clutch pedal sensors may be exposed to +16 V for 1 h and applied to any connector pin, or housing due to electrical system shorts or servicing.

3.1.3.3 Manufacturing/Shipping Environment. The clutch pedal shall perform as intended after exposure to these environments:

3.1.3.3.1 Temperature. The range encompasses the temperatures that the clutch pedal may be exposed to at the vehicle assembly or subassembly plant; or during shipping:

- Air temperature -65 °C to +48 °C

3.1.3.3.2 Pressure. The range encompasses the pressures that the clutch pedal may be exposed to at the vehicle assembly or subassembly plant, or during shipping:

- Atmosphere pressure (absolute) 20 kPa to 106 kPa

3.1.3.3.3 Loads. Any of the pedals during shipping or handling may be exposed to 334 N (75 lb) in the pedal apply direction applied anywhere on pedal pad.

3.1.3.3.4 Impact. The value encompasses the characteristics of mishandling that the clutch pedal may be exposed to at the vehicle assembly or subassembly plant.

- Impact exposure equivalent to being dropped one meter onto a concrete surface

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