



Disc Brake Pad Assembly Technical Specification

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 document provides the standard technical requirements for the brake pad assembly. This document must only be used when invoked by a program-specific technical specification. Paragraphs referencing program-specific technical specifications shall imply the program document created from template CG1292.

Note: The program-specific technical specification may include additional program-specific requirements that are not referenced in this document and may supercede any requirements included in this document. In the case of any conflicts between this document and the program-specific technical specification, the program-specific technical specification takes precedence.

1.2 Applicability. Brake pad assembly of front and rear axle for the complete vehicle range.

1.3 Remarks. The disc brake pad reacts to the brake apply system, brake caliper, brake rotor, and knuckle to provide the vehicle with smooth, safe deceleration performance under all driving conditions.

2 References

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

2.1 External Standards/Specifications.

AISI 301	EKB1107	JIS D4417	SAE J2694
AISI 304	GB5763	JIS D4421	SAE J2725
EKB1101	ISO 11014	SAE 1050	SAE J3079-2
EKB1103	ISO 15484	SAE J840	VDA 309
EKB1104	ISO/PAS 22574	SAE J866	
EKB1105	JASO C458-86	SAE J2598	

2.2 GM Standards/Specifications.

GMW3059	GMW14924	GMW15392	GMW17379
GMW3359	GMW14925	GMW15632	GMW17427
GMW4700	GMW15386	GMW16331	GMW17590
GMW14591			

2.3 Additional References.

- Architectural Homeroom Program Statement of Requirements (SOR)
- Best Practice BRAKES-105; Decoupled Lining Development (DLD) (ID)
- CG1292: Disc Brake Pad Assembly Program Technical Specification
- CG1984: Validation Cross Reference Index (VCRI) (ID)
- CG3856: Requirements Table for GMW15392
- GM Approved Lining List
- Vehicle Equipment Safety Commission Regulation 3

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June 2018

Page 1 of 10

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3 Requirements

3.1 System/Subsystem/Component/Part Definition. The disc brake pad assembly transforms braking clamp force into friction and braking torque.

3.1.1 Appearance. The appearance requirements will be included in the Architectural Homeroom Program Statement of Requirements (SOR).

3.1.1.1 Brake Pad Corrosion. Except for the friction surface, the brake pad must meet the requirements listed in GMW15392

3.1.1.2 Visual Inspection. When received at the caliper assembler, the brake pads must meet ISO/PAS 22574:2007(E) in the as-supplied, unused condition.

3.1.1.3 Surface Cracks. No cracks > 20 mm long are allowed along the perimeter of the brake lining material after any dynamometer or vehicle tests or found in vehicle durability hardware. Minimum crack dimensions are 0.1 mm wide and 0.5 mm deep.

3.1.2 Content.

3.1.2.1 Physical Content. The disc brake pad assembly includes the lining material, the under layer, the backing plate, lining wear indicator, noise insulator, and corrosion coatings. The lining material must be prequalified to the Decoupled Lining Development (DLD) Best Practice BRAKES-105 and shall be on the GM Approved Lining List. The supplier shall work with the GM Design Responsible Engineer (DRE) to comprehend this requirement. The disc brake pad drawings shall be provided by the Caliper Supplier.

3.1.2.2 Functional Content.

3.1.2.2.1 Pad Assembly. Brake pad assembly shall meet the performance requirements as specified in GMW15392 and CG3856 in addition to the requirements in GMW15394 and CG1292. All testing in GMW15394 and in CG1292 is the responsibility of the pad supplier.

3.1.3 Ambient Environment. The ambient and operating environments for the pads are defined in the GMW15392.

3.1.3.1 Shipping. Pad assemblies shipped by air could be exposed to a temperature of -50 °C and to a pressure of 16.7 kPa (125 mmHg).

3.1.4 Interfaces. The brake pad will interface with other components as defined in the program technical specification. See program brake corner and brake component (i.e., rotor, caliper, electronic wear sensor and bearing) technical specifications, as required for interfaces.

3.1.4.1 Driver Information.

3.1.4.1.1 Mechanical Lining Life Indicator. A lining wear sensor is required to provide the driver with an indication of impending lining wear out, as specified in GMW17590. The mechanical lining life indicator height shall be set according to the requirements in CG3856.

3.1.4.1.2 Electronic Lining Life Indicator. Reference GMW17379.

3.1.5 Usage Definition. Not applicable.

3.2 Product Characteristics. See program CG1292 for exceptions to the requirements in this section.

3.2.1 Performance Requirements. Brake pad assembly shall meet the performance requirements, as specified in GMW15392 and CG3856. Also, see the program technical specification for the Validation Cross Reference Index (VCRI) table (CG1984).

3.2.1.1 Design Validation (DV) Testing. All DV parts shall be manufactured from an approved manufacturing location on production representative tooling using production processes, including a typical batch or mix size of friction product. All DV parts shall be uniquely numbered, measured for key dimensions, and measured for ambient (22 °C ± 2 °C) compressibility, per SAE J3079-2 without noise insulators.

3.2.1.2 Product Validation (PV) Testing. PV parts shall be manufactured from all manufacturing plants on production tooling using production processes, including a typical batch or mix size of friction product. All PV parts shall be uniquely numbered, measured for key dimensions, and measured for ambient (22 °C ± 2 °C)

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June 2018

Page 2 of 10

compressibility per, SAE J3079-2 with noise insulators. SAE J3079-2 compressibility without insulators should be collected on a sufficient number of samples to ensure DV to PV correlation (minimum 30 pieces).

3.2.2 Physical Characteristics.

3.2.2.1 Dimensions and Capacity. Reference pad drawing and CG1292.

3.2.2.1.1 Backing Plate.

3.2.2.1.1.1 Parallelism. Reference 3.2.2.1.2.2.

3.2.2.1.1.2 Flatness. The flatness of the backing plate shall be controlled such that the final pad assembly meets the flatness requirements in 3.2.2.1.2.3.

3.2.2.1.1.3 Surface Finish. The surface finish after final backing plate preparation before lining molding shall be as specified on the pad drawing.

3.2.2.1.1.4 Corrosion Protection. The backing plate shall include corrosion protection via Zinc-Nickel plating per GMW4700 Type B, Ferritic Nitrocarburizing, or equivalent process to be approved by GM engineering.

3.2.2.1.1.5 Retention Features. Pads intended for use on vehicles with race track capability and police vehicles, or vehicles using semi-met linings, shall have mechanical retention features for the friction material, or shall sufficiently demonstrate through applicable dynamometer development tests that friction puck structural integrity is maintained as agreed by the DRE and Bill of Materials (BOM) Family Owner (BFO).

3.2.2.1.2 Final Pad Assembly. Including final grind, paint, and without noise insulator.

3.2.2.1.2.1 Lining Area and Thickness. The final pad assembly shall meet the minimum lining area and thickness, as specified on the pad drawing.

3.2.2.1.2.2 Parallelism. The inboard and outboard surfaces of the pad shall be parallel, as specified on the pad drawing. The upper limit shall be < 150 microns, or 1.2 microns/mm tangential friction puck length – whichever is larger. This is a Documentation Required (DR) Quality Characteristic that shall be monitored at a minimum of three (3) samples per press batch of friction material.

3.2.2.1.2.3 Flatness. The flatness on the lining friction and bonded insulator surfaces shall be flat as specified on the pad drawing. The upper limit shall be < 100 microns, or 1 micron/mm tangential friction puck length – whichever is larger. This is a DR Quality Characteristic that shall be monitored at a minimum of three (3) samples per press batch of friction material.

3.2.2.1.2.4 Gradient. The gradient on the backing plate surface at any location where the noise insulator is bonded shall be < 0.002 microns/mm in the area called out on the drawing for flatness. This shall be assessed with optical holography, or other high fidelity surface profile measurement equipment as agreed by the BFO.

3.2.2.1.2.5 Profile. The profile of the pressure plate after friction material bonding shall be controlled as shown on the drawing.

3.2.2.1.2.6 Abutment span. The painted pressure plate overall tangential span at abutment contact and (where applicable) plate “ear” height dimensions shall be controlled to a minimum of ± 0.08 mm. This is a DR Quality that shall be monitored at a minimum of three (3) samples per press batch of friction material.

3.2.2.1.2.7 Electronic Wear Sensor. For programs utilizing electronic pad wear sensors, reference GMW17379 for wear sensor attachment geometry. The pressure plate attachment shall be positioned such that the radial location of the pad wear sensor head is within the swept area of the friction puck at $1.5 \times$ RSS stack. Reference Figure 1.

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June 2018

Page 3 of 10



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