

CIGAR AND CIGARETTE LIGHTERS

GME2804M

1 SCOPE.

1.1 **AUTHORITY.** This Standard has been developed under the auspices of the Electrical/Electronics Subcommittee (E/E Sub), of the General Motors General Technical Committee (GTC). Specification development is by a task force consisting of representatives of GM platforms, and the engineering, supplier quality, and purchasing disciplines. This Standard was released in draft form October 1992. Formal release date is September, 1993. Revisions shall be noted in a revision history to be included as a table at the end of this document.

1.2 This Standard covers the requirements for Cigar and Cigarette Lighters for installation in GM vehicles. This document should be referenced on, and is thus an extension of engineering parts drawings covering these products. The intent of this specification is to fully define interface characteristics such that enhanced commonality and interchangeability are achievable.

1.3 **MISSION.** Cigar(ette) Lighters, when present, are provided solely as a convenience to the vehicle occupants who smoke. The intent is to provide a lighter which is usable with little distraction as possible to the driver's primary function of operating the vehicle, and is relatively safe, within the limits possible in a device intended to reach temperature in excess of 650°C (1200°F). The lighter receptacle may also be used for connection of external devices such as Radar Detectors, Cellular Phones, Trouble Lights, etc. Cigar(ette) Lighter receptacles are not intended for powering accessories drawing greater than 10 amperes. Such devices are expected to use a plug that is shaped so as to avoid damage to the receptacle mechanisms.

1.4 **CLASSIFICATION.** One class of components is covered by this specification:

Cigar(ette) Lighters - Receptacles containing thermal release and thermal overload devices, and removable heating elements designed to ignite cigars or cigarettes.

A second class of components similar in some aspects is covered by a separate specification:

Power Outlets - Receptacles which may be identical in diameter to cigar lighter receptacles, but without thermal release devices, which are intended for connecting external devices to the vehicle electrical power.

NOTE: Outlet Lighters, lighter units specially designed to work in Power Outlets, will be comprehended in future editions of this document where applicable.

2 APPLICABLE DOCUMENTS.

2.1 **ORDER OF PRECEDENCE.** In the event of a conflict between the text of this specification and the documents cited herein, the text of this specification takes precedence, except where otherwise specified below, or in a specific contract or purchase order. Nothing in this specification, however, super-

sedes applicable laws and regulations unless specific exemption has been obtained.

2.2 **GOVERNMENTAL DOCUMENTS.** Suppliers are expected to be aware of and comply with U.S. and Canadian vehicle standards and regulations where applicable as outlined in the GM Quality Standard for Purchased Material or as listed below. Requirements of other national governments may be applied under specific purchase orders or engineering part drawings.

FMVSS 302 Flammability of Interior Materials

2.3 GENERAL MOTORS DOCUMENTS.

2.3.1 **Part Drawing.** The part drawing shall show all views to clearly define dimensions not contained herein, the device part number and labeling requirements, and any parameters necessary to fully define the product.

2.3.2 **GM Materials and Process Standards.** Suppliers are expected to subscribe to GM Engineering Materials and Process Standards, as several of these standards are called out in this specification. Subscription information is contained in the GM Quality Standard for Purchased Material. At a minimum, suppliers must work to a current copy of the following standards.

GM1644	Targets for Excellence - Standard for Supplier Performance Evaluation and Reporting
GP10	Evaluation and Accreditation of Supplier Test Facilities
GM4465P	Humidity
GM4298P	Salt Spray (Mist) Testing
GM9603P	Procedure for Measuring Electrical Component Appearance
GM9610P	Automotive Environmental Cycle Tests for Electrical Components
GM9609P	Standard Practice for Specifying Electrical Component Appearance (Prelim)
GME2803M	Power Outlets and Power Points (for reference only)

2.4 INDUSTRY DOCUMENTS.

SAE J563	Six - and Twelve - V Cigar Lighter Receptacles Society of Automotive Engineers Standard SAE J563 shall be included here only to the extent of specifying non-interchangeability of 6 V and 12 V lighter plugs, and the related receptacle inside dia. Referring to the March 90 revision of SAE J563, GM shall use only 12 V lighters of the "a" type.
SAE J726	Air Cleaner Test Code

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2.5 SUPPLIER DOCUMENTS.

2.5.1 Laboratory Accreditation. All data based on laboratory testing shall be from a laboratory accredited to GM standards. (see GP10 in Reference Documents). Documents verifying accreditation shall be available for inspection.

2.5.2 Test Procedures and Forms. All tests must be accomplished in accordance with the procedures and methods outlined in this or referenced documents unless otherwise specified. Where required, specific forms shall be used.

2.5.3 Reporting Requirements. All original data shall be retained with the master file copy of any final laboratory or test report. If data is recorded on supplier developed forms, they must contain at a minimum:

- Type of Test, References, Sequence Identification,
- Start/Finish dates of each test sequence,
- Technician name (legible) and signature,
- Serial number(s) of samples involved,
- Sections of standard or specification applicable to each measurement, with deviations in set-up if applicable,
- Limits as well as measured values,
- Equipment identification, serial numbers, and calibration date,
- Supplementary comments, statistical distributions, and/or graphs may be attached if required.

2.5.4 Record Retention. The supplier shall maintain central files for reports and records associated with this product. At a minimum, all documentation associated with this specification shall be included. The files shall be available for auditing or inspection by any GM personnel including, but not limited to, representatives of product engineering, purchasing, quality, and reliability. Auditing by other agencies shall be done with the concurrence of, or request of General Motors. Unless otherwise specified, retention should be for a minimum of ten years.

2.5.4.1 Purpose of Retention. The retention of records is to meet, at a minimum, the following objectives: Evidence of compliance to requirements; Evidence of "due Care" in matters relating to requirements or product liability; Substantiate compliance with statutory or legal requirements.

2.5.4.2 Retention Methods. Retention may be in any combination of forms including hardcopy, photographic, magnetic, or electronic, provided such method preserves the useability of the information. Records must be accessible in a reasonable amount of time. Records must be protected from unauthorized access, destruction, moisture, fire, and other reasonably anticipatable hazards.

2.6 OTHER DOCUMENTS. Not Applicable

3 REQUIREMENTS.

3.1 DEFINITIONS. For purposes of this specification the following terms will be used to reference various parts.

Lighter - The complete system of components; element, receptacle, and retainer; that together implement the cigar/cigarette lighting function.

Element Assembly - An assembly of a heating element, knob, shield and other parts. Alternatively referred to as the "popout".

Receptacle Assembly - An assembly of a receptacle shell, connection provisions, thermal release, and over-temperature mechanisms that is installed in the vehicle and which receives the element. An illuminated ring may be included as part of the receptacle. Alternatively referred to as the "housing" or the "switch base".

Retainer - A separate piece or pieces (retainer shell and nut) for retaining the receptacle in the vehicle panel in which it is mounted. An alternative mounting where retention is an integral part of the receptacle is also permitted, in which case no separate retainer is used.

Outlet Lighter - An assembly of a heating element, knob, shield, thermal popout or indicating mechanism that can perform the cigar lighting function when plugged into a power outlet rather than a receptacle assembly as defined above.

3.2 FUNCTIONALITY.

3.2.1 Cigar(ette) Lighters. Lighters shall function in the following manner: A knob or button shall be provided that will, upon depression (engagement) cause an element to heat to temperatures that will cause ignition of tobacco products. Upon attaining proper temperature, indication shall be given that the element is ready for use. At no time will the heated unit be ejected from the receptacle. The heated unit is then removed by the user. When usage is complete, the user re-inserts the heated unit in the receptacle. Lighter receptacles are acknowledged to also be used as power outlets for devices under 10 amperes.

3.3 LIFE EXPECTANCY. Any device functioning as a lighter, is intended to perform its function, to this specification, for 10,000 cycles, (equivalent to 10 years). For purposes of this specification, a cycle for a lighter shall consist of engagement of the lighter, thermal release at temperature, withdrawal for at least 2 seconds, and reinsertion without engagement. The situation of reinsertion with immediate re-engagement is not unusual and is comprehended within the test requirements.

3.4 APPEARANCE. Appearance shall be in accordance with the applicable release drawings and GM9609P, Standard Practice for Specifying Electrical Component Appearance.

3.5 MECHANICAL REQUIREMENTS.

3.5.1 Mounting Orientation. These devices shall be fully functional at all orientations in the range from vertical (opening up), through horizontal, to vertical (opening down). It is not recommended, however, that this device be used with opening below horizontal.

Where rotational orientation of a illumination device is required, a keyway shall be incorporated in the retainer at 180°

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from the illumination device. The keyway shall be designed in accordance with Figure 1, and shall mate with a key or boss on the panel or light ring to which it is mounted.

NOTE: The intent of this paragraph is to fix the orientation of the keyway on the retainer, and orient the illumination device by means of a properly placed key or boss on the panel or ring.

3.5.2 Mounting Dimensions. The cigar lighter receptacle shall mount in an opening as defined by Figure 1.

3.5.3 Mounting Method. The preferred method of installation is to place retainer at rear of panel and spin receptacle into retainer from front of panel using a rubber tipped driver in accordance with Figure 2. An alternative method of inserting the receptacle and spinning the retainer on to receptacle from rear of panel may be used where the process has been proven to consistently meet torque requirements. Where the retainer is keyed to the panel or an integral lamp is used the preferred method must be used.

3.5.4 Mounting Torque. When mounted to a panel with a retainer that threads onto the outside of the receptacle, tightened with a torque of 2.0 ± 0.5 Nm shall be used. When installed to the proper torque the retainer shall not strip or jump threads. When a rotation key is incorporated, applying this torque to the non-keyed component shall not cause the key to deform and allow the keyed component to turn.

3.5.5 Mounting Retention. When mounted in metallic test panels meeting the range of dimensions listed above, the unit shall not be removable when a force of 100 N is applied in a direction to pull the receptacle out of the panel. The unit shall not push through the mounting surface nor shall any internal damage occur when a force of 220 N is applied in a direction normally toward the front of the mounting surface.

3.5.6 Actuation Forces. The force to insert, engage, disengage, and remove the element from the receptacle shall be as follows:

Force to insert element into receptacle	less than 27 N
Force to engage element	13 N to 45 N
Force to free from engagement at ambient *	less than 45 N
Force to remove element from receptacle	13 N to 36 N

* Developmental Test

Unless otherwise specified, these forces shall be the average of 3 readings taken with the element rotated 90° between each reading.

3.5.7 Eject Forces. During life the combination of retention and popout characteristics shall be such as to prohibit ejection of the element from the receptacle on being released from engagement as a result of heating.

3.5.8 Noise and Rattles. The lighter, with the element inserted into the receptacle assembly, when engaged with the bimetal, and when in the popout position, shall not exhibit any rattles or noise under vibration as specified in the Environmental Testing section of this specification.

3.5.9 Flammability. Material used in the construction of any parts covered by this specification shall meet the flammability requirements of FMVSS302.

3.5.10 Usage Forces. To meet anticipated customer usage situations, the lighter shall not be affected by the following:

3.5.10.1 Energy impacts of a 1 kg mass dropped from a distance of 100 mm, applied to the knob, while not engaged, at any location or direction.

3.5.10.2 Excessive engage force of up to 220 N, applied in the direction of engagement, shall not damage the lighter or its operation.

3.5.10.3 Side loading of the knob, in any direction, by a steady force of 110 N applied at 12 ± 1 mm from the junction of the knob and the element assembly and applied normal to the axis of the lighter. The element shall be inserted but not engaged at this time.

3.5.10.4 The knob shall be retained to the element portion of the sub-assembly such that it can withstand an axial pull of 90 N applied 10 to 15 seconds after release from heating.

3.5.10.5 The element shall properly engage and function when depressed with a force applied off-axis. The component of force normal to the lighter axis shall be one-third the measured force to engage. The force shall be applied at 30° increments around the axis.

3.5.10.6 The lighter heating element and its terminations shall be designed such that they are not damaged or degraded by the pulling force associated with removing a cigar that has adhered to the element. The element shall not be damaged by the materials normally found in tobacco products.

3.5.11 Lighter Non-Interchangeability. The lighter shall meet the requirements of Style "a" of SAE J563 for 12 Volts units.

3.5.12 Element Shield. A shield shall be provided such that the hot element cannot make contact with any surface of spherical radius 75 mm or greater. If a retractable shield is used to accomplish this requirement, the force required to retract the shield shall not be less than 2 N.

3.6 ELECTRICAL AND THERMAL REQUIREMENTS.

3.6.1 Polarity. Lighter receptacles are designed to be connected with the center terminal to battery positive, and the case or shell at vehicle ground potential.

3.6.2 Normal Voltage. The lighter assembly shall work with voltage in the range of 9 to 16 VDC according to the following:

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9.0 - 11.5 ± 0.1 VDC	Some performance degradation allowed but no damage or permanent degradation shall occur
11.5 - 15.0 ± 0.1 VDC	Must meet all specifications
15.0 - 16.0 ± 0.1 VDC	Some performance degradation allowed but no damage or permanent degradation shall occur

3.6.3 Recommended Fusing. The lighter circuit is intended to be wired and fused at a minimum of 15 amperes. When wired in combination with other devices to a common higher ampere rated fuse, adequate wire gages must be used throughout the circuit.

3.6.4 Reverse Voltage. Lighter elements shall be designed to not be damaged when a reverse polarity of -14.2 ± 0.3 Volts is applied for 30 seconds when element is engaged. Release from the engaged position is allowable at any time while meeting this requirement.

3.6.5 Over Voltage. Vehicles are known to be "jump started" with higher voltages. Lighter assemblies shall be designed to not be damaged when a voltage of 24.0 ± 0.5 Volts is applied for 30 seconds. The element is to be installed but not engaged during this time.

3.6.6 Over-Temperature Protection. Cigar(ette) lighters shall include a protective over-temperature shunt which will short the supply line to ground with a maximum impedance of 50 milli-ohms. The over-temperature shunt shall not weld shorted when subjected to five successive over-temperature cycles, and with the line fuse replaced between each cycle. Temporary welds that self clear immediately upon fuse replacement, are allowed. The circuit schematic shall be per Figure 3. The over-temperature device shall activate within 60 seconds at 13.6 vdc after engaging, and then holding, the element in the engaged position. (NOTE: This requirement will, in the future, be changed from time to temperature dependance "shall activate prior to the case exceeding a temperature of t.b.d.*C measured at the higher temperature of positions shown in Figure 4"). The over-temperature protection must be self-resetting when the case temperature, as measured above, falls below 22°C and a replacement fuse is installed.

3.6.6.1 Test temperature rise may be attained by holding element assemblies in the engaged position or by use of an alternative heat source that replicates the element in heat profile and location. The receptacle shall be horizontally mounted in an enclosed or baffled space of approximately 1000 cc. essentially free of air circulation.

3.6.7 Terminations. Unless otherwise specified by the drawing, the B+ connection to the vehicle harness shall be with a cylindrical center pin of diameter $2.92 \pm 0.10 - 0.0$ mm, configured to mate with Packard connector (Connector Body 12047699, Terminal A 12047698, Terminal B 12047697, and Cover 12047977). Ground connection is made by a normal

force contact with the retainer. A lamp socket, when included, shall have a B+ blade terminal to mate with Packard connector (tbd). The lamp socket ground shall be supplied by a normal force contact with the retainer. the center terminal, and any lamp terminals, shall be capable of withstanding axial or radial forces of 100 N, and torques of 0.25 Nm.

3.6.8 Current Draw. Lighter assemblies shall draw no more than 10.0 amps at 14.2 Volts. Current shall be monitored for the entire duration of engagement during any testing in this specification. For development purposes only, lighter receptacles shall be tested for long duration over-currents of 25 amperes using various aftermarket device plugs.

3.6.9 Parasitic Load. The lighter assembly shall draw no current in the de-energized state.

3.6.10 Isolation Resistance. With the lighter element installed but not engaged, the isolation between the positive and ground terminations shall be 20 Meg Ohms minimum when tested at 500 ± 0.5 VAC 60 Hz for 60 seconds.

3.6.11 Electromagnetic Compatibility. The lighter shall not produce any conducted or radiated emissions into the vehicle electrical system or environment other than those associated with making or breaking of DC electrical contacts.

3.6.12 Performance (Thermal Requirements). Cigar(ette) Lighters shall meet the following design criteria:

3.6.12.1 Initial Release. With the unit at a stabilized temperature of $25 \pm 5^\circ\text{C}$, the element shall release within 20 seconds of being depressed. The release time shall not exceed 25 seconds at any stabilized ambient from -20 to $+55^\circ\text{C}$. An average of three readings shall be used to determine compliance.

3.6.12.2 Heat Profile. The heated element will provide a uniform heat pattern across the face of the element. Minimum temperatures after ejection shall be:

	As Supplied	After 10,000 Cycles
After 10 s	560°C	480°C
After 20 s	480°C	410°C
After 30 s	370°C	315°C

3.6.12.3 Re-Energizing. After initial release and removal for at least 60 seconds. The element shall be capable of being reinserted and reheated to a minimum temperature of 560°C.

3.6.12.4 Knob Temperature. On initial release the knob temperature shall remain below 35°C. When re-energized once more (total of 2), with 60 second intervals between release and next engagement, the knob temperature shall remain below 60°C.

3.6.13 Lighting. Lighting, when required, may be of any combination of three types: Interior receptacle cavity illumination; Halo/Glow Ring illumination surrounding the receptacle

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cavity; or Flood lighting from other sources. This paragraph addresses only the first two types to the extent that they are controllable as part of the lighter assemblies. Illumination is normally intended to be powered from the dimmable instrument panel light circuit. For the purposes of this specification, all lighting measurements shall be made at a voltage of 12.8 ± 0.2 Volts.

3.6.13.1 Interior Cavity Illumination. When measured in accordance with GM9609P Section 4, at a position 150 mm away from and on the axis of the cavity, the intensity of the light shall be at least 10 cd/m^2 .

3.6.13.2 Halo or Glow Ring Illumination. When measured in accordance with GM9609P Section 4, at a position 150 mm away from and on the axis of the cavity, the intensity of the light shall be $0.34 - 2.23 \text{ cd/m}^2$. The color shall be specified by the release drawing using X and Y color coordinates. (Example: blue-green defined by the color coordinates: $X = 0.6754 \pm 0.52$; $Y = 0.3030 \pm 0.14$).

3.7 ENVIRONMENTAL REQUIREMENTS.

3.7.1 Vibration. The cigar lighter assembly shall withstand random vibration in each of 3 mutually perpendicular axes of 2.37 g RMS while the assembly is powered but the element is not engaged, without damage, degradation of performance, or unintended operation.

The vibration shall be 2.37 g RMS from 10 to 2000 Hz, applied for 2 hours in each axis (6 hours total) with spectral density as specified by the following:

Breakpoint Frequency	Power Spectral Density
10 Hz	$0.02 \text{ g}^2/\text{Hz}$
20	0.05
40	0.05
800	0.001
2000	0.001

Slope between breakpoints is linear when plotted log-log.

3.7.2 Shock/Drop. The cigar lighter assembly shall withstand the shock loading encountered during shipping and handling, during installation, and during normal operation.

Each separate component of the cigar lighter assembly shall, as a separate entity, withstand 30 g peak acceleration, half sine wave shocks of 11 ms duration in each of six directions along the 3 mutually perpendicular axes (18 shocks total) without damage or degradation of performance.

Each component must also be capable of withstanding a 1.0 m drop onto a solid concrete floor in the same 6 directions without any visible damage or degradation of performance.

3.7.3 Corrosion. There shall be no visible corrosion, and the unit shall continue to meet functional requirements, when sub-

jected to salt fog in accordance with GM9110P (8.3.1) for 8 hours. After exposure samples are to be gently rinsed in slowly running clean water and then allowed to air dry at room temperature before examination and testing.

Specific internal components may be exempted from the visible corrosion requirement only, on approval of the responsible GM Engineer.

3.7.4 Humidity. The cigar lighter assembly shall continue to meet functional requirements of Current draw or trip times when subjected to 4 hours of 98% RH condensing humidity at 65°C for 4 hours, followed by 50% RH for 4 hours.

3.7.5 Temperature. The unit shall be designed to withstand storage temperatures of -40°C to $+125^\circ\text{C}$, and shall operate within the range of -40°C to 85°C .

3.7.5.1 Testing shall be by elevating the samples, mounted in a suitable test panel to $+125^\circ\text{C}$ for 4 hours. Reduce temperature to $+85^\circ\text{C}$ and allow to stabilize for 2 hours. Operate lighter 5 times at 3 minute intervals, checking release time and maximum current. Lower samples to -40°C , stabilize for 4 hours, operate lighter 5 times at 5 minute intervals, checking release time and maximum current. The low temperature test need not follow immediately after the high temperature test.

3.7.6 Thermal Shock. The assembly shall continue to meet functional requirements after exposure to 10 thermal shock cycles of $+85^\circ\text{C}$ to -40°C to $+85^\circ\text{C}$ with a maximum transition time of 2 minutes and a minimum dwell time at each temperature of 30 minutes.

3.7.7 Frost. The assembly must operate when soaked at -20°C for 4 hours and then moved to a $+10^\circ\text{C}$, 95% RH condensing atmosphere. Transition time should be short enough to not let device temperature to change by more than 2°C . Functional testing should be done 10 minutes after transition, and may be done at room ambient if done within 1 minute after removing from the chamber.

3.7.8 Contaminants. These devices may be mounted in horizontal surfaces and other areas subject to spills of liquid and solid contaminants.

3.7.8.1 Nothing in this paragraph shall imply full functionality to all requirements during or following such contamination, except that the over-temperature protection shall function as specified. The over-temperature protection shall be tested after the 24 hour drying time by holding the element engaged, if possible, for one over-temperature activation. Failure to engage will constitute success by default.

3.7.8.2 The unit shall withstand the following contaminants poured over the unit in accordance with GM9110P (8.4) with the assembly mounted in a horizontal panel and the knob up.