



Statement of Requirements for All Electrical and Electronic Systems and Components

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 Statement of Requirements (SOR) describes the engineering processes, tasks, events, and deliverables for the electrical component(s) or subsystem and/or related tools (hereinafter referred to as "Product(s) to be Supplied") required of the Supplier at no charge to the Buyer except for production piece price. It is intended that this SOR along with all other attachments and reference material shall convey the Buyer's requirements to the Supplier. However, it does not preclude other requirements from being incorporated into the Product(s) to be Supplied throughout the program. This SOR provides additional requirements to GMW14375 (Summary Document for All Product Commodities).

1.2 Applicability. The Product(s) to be Supplied covered by this SOR are applicable to the vehicle programs specified in Section 8 or Appendix B.

Note: All references to "Section" or "Appendix" are not internal to this standard. They are references to other documents that are part of the SOR package for commodity being sourced of which this SOR is also a part.

1.3 Remarks. This SOR provides initial information/estimations that include but are not limited to the following:

- Program timing
- Percent volume penetrations
- Estimated part volumes
- Contact list
- Part numbers

This information is subject to change and shall be managed at the program management level and/or within the Product Development Team (PDT).

The description of the Product(s) to be Supplied is defined within the Subsystem Technical Specification(s) (SSTS) and/or Component Technical Specification(s) (CTS) and/or Component Technical Requirements and Specifications (CTRS), or in Appendix B and all other attachments and reference materials.

The Supplier assumes design responsibility from supplier selection through production, including service life, until all requirements are met. Any misinterpretation of the Buyer's design, this SOR, the SSTS, CTS and/or CTRS, or other documents shall be the responsibility of the Supplier.

The Supplier and the Buyer shall negotiate a price for quantities in addition to quantities specified in this SOR. The Supplier shall provide all updates to all SOR deliverables to the Buyer at no charge.

This SOR takes effect at supplier selection (sourcing) and will apply throughout the design, development, validation, pre-production, production, and service life phases of the program(s).

The Program(s) schedule(s) will be monitored through the Advanced Product Quality Planning (APQP) and control plan process and reviewed at meetings between representatives of the Buyer and the Supplier.

This SOR also has effect prior to supplier selection, by providing guidance for responding to the Request for Quotation (RFQ), and by setting specific, but not exclusive, requirements for information to be included in that response.

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2 References

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

2.1 External Standards/Specifications.

AEC Q100	AIAG PPAP-4	SAE J2602	USCAR25-3
AEC Q101	IEEE 802.3	USCAR21-3	USCAR38-1
AIAG FMEA-4			

2.2 GM Standards/Specifications.

GMW3059	GMW3122	GMW14375	GMW17007
GMW3089	GMW3191	GMW15267	GMW17106
GMW3103	GMW3600	GMW15841	GMW17388
GMW3104	GMW14241	GMW15920	GMW17399
GMW3110	GMW14270	GMW16592	

2.3 Additional References.

- 5-Phase Corrective Action Plan, Change Evaluation Approval Form(s) and Process(es), Electrical Design Review Requirements, Electrical Information Exchange Requirements, Incident/Observation Report Process, e.g., Electrical and Software Issue Management System (ESIMS), Problem Resolution Tracking System (PRTS), Warranty, etc. and Test Report Template as specified by the Buyer
- Appendix A "Responsible, Approves, Supports, Informed, Consults (RASIC)" of the SOR package for the commodity being sourced
- Appendix B "General Program Description" of the SOR package for the commodity being sourced
- Appendix C Connector CTS of the SOR package for the commodity being sourced
- Appendix F "Engineering Design Requirements", including Controller Development Instrumentation System Requirements, Regulatory/Certification Requirements for Radio Frequency (RF) Devices, Software/Calibration Data Management Requirements, Software Delivery Release Notes, Supplier Quality Electrical and Electronic Modules and Assemblies (CG4209) and associated Supplier Semiconductor Requirements (CG4646) spreadsheet form of the SOR package for the commodity being sourced
- Appendix G2 "Analysis Development Validation Process Tasks and Deliverables" (CG1794 and CG1796 for Global A architecture and/or CG3419 and CG3420 for Global B architecture) of the SOR package for the commodity being sourced
- CG2999 Component Software Validation Requirements Specification
- CG5050 Semiconductor Risk Mitigation Crisis Zones External Supplement to GMW15923
- CTS and/or CTRS for the commodity being sourced
- GB520X Global B Controller Area Network (CAN) Serial Data Requirements
- GB600X Global B Serial Data Diagnostic Requirements
- GB72XX Global B Serial Data Link Requirements
- Global General Service Assembly Service and Electrical (GGSE) Diagnostic Infrastructure Requirements from the SOR package for the commodity being sourced
- General Motors Record Retention Schedule (GMRRS) available at General Motors Supply Power at Uniform Resource Locator (URL) <https://gmsupplypower.covisint.com/web/portal/home>
- Section 8 of the SOR package for the commodity being sourced
- SSTs for the commodity being sourced

Note: The CG numbers in parentheses are provided primarily as a convenience to GM users of this standard to identify the templates used to create the referenced SOR appendices. The CG numbers may or may not be listed in the titles or printed on the documents in the appendices.

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3 Requirements

3.1 Order of Precedence. Reference GMW14375.

3.2 Supplier Engineering Organization and Key Corporate Personnel. Reference GMW14375.

3.3 Supplier Resource Plan and Program Support. Reference GMW14375.

3.4 Buyer Program Personnel. Reference GMW14375.

3.5 Sale of Product/Commodity to be Supplied and Developed for the Buyer to Others. Reference GMW14375.

3.6 Retention of Engineering and Manufacturing Information. For the Buyer requirements involving the retention of engineering and manufacturing information, reference GMW15920 Record Management for Supplier. In general, the Supplier, in accordance with the General Motors Record Retention Schedule (GMRRS), shall retain all engineering and manufacturing information for products supplied to GM. All information relating to GMRRS can be found on General Motors Supply Power at Uniform Resource Locator (URL) <https://gmsupplypower.covisint.com/web/portal/home> or by contacting the Buyer.

Note: Suppliers are expected to submit a data disaster recovery plan to GM.

3.6.1 Validation Information. The Supplier shall retain original validation data and provide data management that guarantees retrieval when requested by the Buyer.

The Supplier shall maintain validation reports and original validation data in data folders clearly labeled with a validation control number and validation objective/description.

The Supplier shall retain validation reports and pertinent validation data in original document form for a three (3) year period followed by a microfilmed form for the retention periods specified in Table 1.

Table 1: Validation Report and Data Retention Period

Record Type	Retention Period
1. Validation reports and pertinent original data	20 years after program close
2. Calibration records (instrument calibration schedules, instrument calibration results, technical calibration specifications)	10 years beyond current model year
3. Emission certification data	10 years
4. Heavy duty emission certification data	6 years after issuance of all certificates
5. Other	As communicated by the Buyer

A typical validation file may contain Design Failure Modes Effects Analysis (DFMEA), Analysis, Development, Validation Plan and Report (ADVP&R), calibration data, original data sheets, test traces, curves, charts, graphs, drawings, sketches, photographs, math data, and any test or regulatory reference.

Supplier validation reports and supporting data shall be available upon the Buyer's request as specified in GMW3600.

3.7 Document and Data Security. Reference GMW14375.

3.7.1 Information Security Requirements. Reference GMW14375.

3.7.2 Physical Security Requirements. Reference GMW14375.

3.7.3 Right to Audit. Reference GMW14375.

3.7.4 Special Handling for Data Link Security Access "Seed and Key". The purpose of data link security access is to restrict unauthorized intrusion and changes of software or calibration settings within the control module. Improper routines or data downloaded into a control module in the after-market could potentially damage the electronics or other vehicle components or risk the vehicles compliance to emission or security standards, thereby exposing the Supplier to legal risk. The Supplier agrees to strictly safeguard the "seed and key" disclosed

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to it by the Buyer against disclosure or use for any purpose without the express written permission of the Buyer's Leader, the responsible GM Engineering Center, or GM Global Aftersales Engineering and Service Operations.

3.8 Supplier Proposed Revisions to this SOR.

3.8.1 Proposed revisions by the Supplier to this SOR, including suggestions which may reduce cost and timing or increase customer value, shall be identified clearly in the Supplier's response to the RFQ. Should the Buyer elect to adopt some or all of any such proposed revisions, the applicable SOR will be modified accordingly and authorized by the Buyer's Leader and the Buyer's Lead Engineer in writing.

The Supplier's response to the RFQ shall be to the SOR as received by the Supplier. Should the Supplier choose to propose revisions or alternatives to the SOR received, the Supplier shall provide separate cost, timing, and technical details.

3.8.2 Supplier Exceptions/Enhancements. Supplier documented technical and SOR enhancements may result in an update of the Product(s) to be Supplied technical specifications prior to, or after supplier selection at the Buyer's discretion. The Supplier shall provide an exceptions/enhancements document as follows:

- The Supplier shall identify and document all exceptions to this SOR and all technical requirements which cannot be met
- The Supplier may identify enhancements to the technical requirements of this SOR prior to supplier selection
- This SOR shall be provided in the Supplier's response to the RFQ and shall be updated prior to supplier selection

3.9 Requirements for Electrical and Electronic Products/Commodities. All electrical and electronic systems and components shall utilize Appendix G2 "Analysis Development Validation Process Tasks and Deliverables" (CG1794 and CG1796 for Global A architecture and/or CG3419 and CG3420 for Global B architecture) of the SOR package for the commodity being sourced as the basis for electrical validation processes, procedures and deliverables.

3.9.1 Semiconductor Risk Mitigation Strategy. The Supplier shall provide information concerning Tier 2 components as required by Appendix F "Engineering Design Requirements" (Supplier Quality Electrical and Electronic Modules and Assemblies (CG4209) and associated Supplier Semiconductor Requirements (CG4646) spreadsheet form) of the SOR package for the commodity being sourced.

The supplier shall carry a 90 day buffer stock, at their facility or an alternate GM approved facility, of any semiconductor component that is produced, assembled or tested in high risk natural disaster zone as defined in document CG5050, and any other components deemed critical by the GM Lead Engineer. Except as expressly provided, Supplier is responsible for managing and paying for the logistics of buffer stock, including, but not limited to, transporting, storing, securing and maintaining the buffer stock following a First-in/First-out (FIFO) process.

3.10 Cost Management/Cost Creep. The Supplier must manage changes, both during the development and production phases of the program, to avoid cost creep. Normal design changes are contemplated within the scope of the program and will not result in price increases. Major changes would constitute a change in the scope of the program, and will be reviewed jointly for cost impacts prior to the approval of the change. A major change is defined as any change from a Vehicle Technical Specification (VTS) requirement change, which shall be communicated to Supplier by the Buyer or the Buyer's Lead Engineer, or engineering problem notification, which shall be communicated from the Supplier to the Buyer or the Buyer's Lead Engineer or from the Buyer or the Buyer's Lead Engineer to the Supplier. The Supplier will be required to provide full disclosure of price details, piece price, and tooling. No increase of any kind will be allowed without the prior written approval of the Buyer's Leader.

4 Validation

4.1 Supplier Management and Administration Tasks.

4.1.1 Program Plan and Engineering Plan. Reference GMW14375. Program imperatives shall include:

- Mass
- Piece cost
- Investment

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- Timing
- Product performance
- Buildability
- Recyclability
- Design status/schedule
- Engineering cost
- Product validation
- Tier I and Tier II supplier performance
- De-proliferation

Any additional monthly requirements for the product/commodity are listed in Section 8 of Appendix B "General Program Description" of the SOR package for the commodity being sourced.

4.1.2 Program Schedule and Engineering Deliverables. Reference GMW14375.

4.1.2.1 Engineering Tasks. Reference GMW14375. The Supplier shall assume responsibility for accomplishing and managing the release of all parts, components, and assemblies related to this SOR.

4.1.2.2 Engineering Support. Reference GMW14375 "Engineering Support" (4.1.2.2 through 4.1.2.2.5.3). **Note:** The regional requirements for engineering support are identified in "Deviations" at the end of GMW14375.

4.1.2.2.1 Supplier Resident Engineer. The Supplier shall provide a resident engineer to assume responsibility for the development and release of the Product(s) to be supplied. Where multiple programs are under contract, a resident engineer may be assigned to more than one (1) program and may be required in multiple regions. Additional resident engineering support shall be provided without additional cost when program workload(s) requires. Additional resident engineering requirements are listed in Section 8 of the SOR package for the commodity being sourced. All requirements apply to all resident engineers. A resume shall be provided in the Supplier's response to the RFQ.

The resident shall be available within two (2) weeks after the program supplier selection notification date. The resident shall conduct technical interchange meetings, in addition to scheduled design reviews and PDT meetings for the purpose of program execution.

Buyer approval of the Supplier resident engineer is required. The Buyer will provide any required training for the resident engineers relative to the Buyer's release process. The Supplier shall provide any other required training for the resident engineer.

The Supplier shall ensure that a qualified resident engineer is available at all times until vehicle production ceases or the usage for the Product(s) to be Supplied ceases. While the Buyer understands that changes in personnel are sometimes required, the Supplier must have Buyer's mutual agreement. The Supplier shall provide adequate overlap of time of the replacement such that proper transfer of background information, program knowledge and training is obtained by the replacement.

The Supplier resident engineer requirements shall continue to apply independent of changes in the Buyer's engineering location. In the event of unexpected loss of resident engineer support, the Supplier shall provide notification to the Buyer within 72 h and will provide a plan for continued uninterrupted support.

The resident engineer shall be at the Buyer's facility full-time (equivalent to the Buyer employee's standard work hours) unless negotiated with and approved by the Buyer. In this function, the Supplier's resident engineer will report to an Engineering Group Manager (EGM) or engineering supervisor responsible for the technical area.

4.1.2.2.1.1 Job Description for Resident Engineer. The general purpose of the position is to lead design activities to integrate the Product(s) to be supplied into the vehicle and assist and support the Buyer's Lead Engineer in defining requirements, evaluating design alternatives, verifying performance, resolving issues and improving processes for the Product(s) to be Supplied. Additional resident engineering requirements are listed in Section 8 of the SOR package for the commodity being sourced.

4.1.2.2.1.1.1 Key Elements.

- a. Assist with the definition of system requirements.
- b. Assume responsibility for electrical packaging on multiple programs.
- c. Direct design activities with trim group to package the Product(s) to be Supplied into vehicles.

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- d. Develop and maintain contacts with platform personnel involved in packaging.
- e. Attend required meetings to keep others informed of relevant issues and to learn latest program direction.
- f. Provide technical direction to relevant support groups and engineering groups.
- g. Perform design analysis and trade-off studies.
- h. Stay abreast of new technologies and the Buyer's competition.
- i. Resolve issues on assigned CTS or SSTs sections.
- j. Work with requirement owners.
- k. Initiate system requirement change requests.
- l. Coordinate communication meetings between Buyer and Supplier.
- m. Recommend additional testing and development as required.
- n. Determine and investigate design alternatives.
- o. Determine and investigate mechanization alternatives.
- p. Prepare project plans.
- q. Assist with the resolution of system issues and determine the root cause and resolution to verification and test incidents.
- r. Prepare and present responses to action items.
- s. Participate in design reviews.
- t. Assist with the failure mode and effects analysis process.
- u. Maintain an awareness of programs and vehicle systems.
- v. Represent the Buyer's position when communicating with the Supplier.
- w. Complete special projects.
- x. Determine improvements to the process.

4.1.2.2.1.1.2 Required Qualifications.

- a. Bachelor's degree in engineering.
- b. Experience with Buyer's vehicle and subsystem design.
- c. Experience with vehicle electrical/electronic subsystem packaging.
- d. Ability to read body layout drawings.
- e. Familiar with Design for Manufacturability (DFM), Design for Assembly (DFA), Design for Six Sigma (DFSS), training available from GM, Design Failure Mode Effects Analysis (DFMEA) and Process Failure Mode Effects Analysis (PFMEA), reference Automotive Industry Action Group (AIAG) AIAG Production Part Approval Process (PPAP) PPAP-4, AIAG FMEA-4 (or equivalent FMEA).
- f. Minimum of two (2) years' experience in design or development with the Supplier.
- g. Good written and oral communication skills. **Note:** Shall be able to clearly and concisely communicate technical information.
- h. Good interpersonal skills. **Note:** Shall work well on a team.
- i. Good organizational skills. **Note:** Shall be able to manage several projects efficiently.
- j. Ability and ambition to work under pressure to meet schedules and maintain a high level of output.
- k. Proficiency in the use of personal computers and Microsoft Office tools.

4.1.2.2.1.1.3 Preferred Qualifications.

- a. Proficiency in the use of Unix based workstations and software appropriate to the Product(s) to be Supplied.
- b. Experience with i-Logix State Mate Modeling or Rhapsody.
- c. Experience with requirement definition using structured analysis methods.
- d. Experience with electromagnetic compatibility design, development, or testing.

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4.1.2.2.1.1.4 Supervision.

- a. Buyer's Lead Engineer is responsible for all program related technical direction.
- b. Buyer's Leader is responsible for all administrative issues.

4.1.2.2.2 Local Engineering Support. In addition to the Supplier resident engineer, local engineering support shall be provided. The local engineering support is to include expertise in mechanical, electrical, and software areas. This local engineering support may be required to be resident if requested by the Buyer. The Supplier shall propose appropriate local engineering resources to support all program needs in the response to the RFQ. Additional local engineering support requirements are listed in Section 8 of the SOR package for the commodity being sourced.

4.1.2.3 Specification Development. If required, the Supplier shall develop and provide technical specifications as listed in Section 8 of the SOR package for the commodity being sourced and shall submit these specifications to the Buyer for approval. The Buyer reserves unrestricted, royalty free, right to use, modify and maintain the Supplier developed technical specifications that involve interfaces between components. The Change Evaluation Approval Form(s) and Process(es), as specified by the Buyer, shall be used to make all changes to all technical specifications developed.

4.1.3 Support Services to be provided by Supplier. Reference GMW14375.

4.1.3.1 Build Support. Reference GMW14375.

4.1.3.2 Open Items List. Reference GMW14375.

4.1.3.3 Communication of Information. Reference GMW14375.

4.1.3.3.1 Electrical Information Exchange Requirements. The Supplier shall use Buyer approved information exchange systems. The Supplier shall meet or exceed the requirements for electrical information exchange as specified by the Buyer.

4.1.3.4 Problem Notification. Reference GMW14375.

4.1.3.5 Program Review Meetings. Reference GMW14375.

4.1.3.6 Design Reviews. Reference GMW14375.

4.1.3.6.1 Electrical Design Review Requirements. The Supplier shall participate in a formal multi-disciplined Product(s) to be Supplied review meetings prior to supplier selection. The Supplier shall meet or exceed the requirements for this review as specified by the Buyer.

After supplier selection, the Supplier shall participate in formal multi-disciplined Product(s) to be Supplied review meetings. The Supplier shall meet or exceed the requirements for these reviews as specified by the Buyer.

Note: If the Product(s) to be Supplied uses multi-tiered hardware/software, the Tier 1 Supplier shall provide evidence during the design reviews with GM that code, electrical circuits, and Printed Circuit Board (PCB) layouts have been reviewed with lower tier supplier experts.

4.1.3.7 Change Management. Reference GMW14375.

4.1.3.7.1 Electrical Change Management Requirements. Throughout program development, it may become necessary to make changes to the Product(s) to be Supplied. All changes from the Buyer will be communicated in the form of requirements which may impact hardware, software, assembly processing or timing of the Product(s) to be Supplied. The Supplier and the Buyer shall propose changes using the Change Evaluation Approval Form(s) and Process(es) as specified by Buyer.

For any changes to the Product(s) to be Supplied, the Supplier shall report all impacts to the Buyer's Lead Engineer and the Buyer's Leader. If hardware is impacted, then the Supplier shall meet or exceed the requirements as specified in GMW14375 "Change Management" (4.1.3.7). This process shall be used for all changes proposed after the Structure Vehicle (SVER) Material Required Date (MRD) for the Product(s) to be Supplied. This process shall be required if changes are proposed to major electrical or mechanical parts and may be implemented between technical review/source award and SVER MRD as specified by the Buyer. The Supplier shall meet or exceed the additional hardware change management requirements listed in Section 8 of the SOR package for the commodity being sourced.

All changes in product and process from initial hardware delivery through production and service life, including changes for cost reduction, process improvement, and/or quality improvement shall be approved by the Buyer prior to implementation. The Buyer reserves the right to reject any change.

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