



Air Conditioning Metallic Lines 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 specification describes the functions, performance, validation, and shipping requirements for all metallic lines for use with liquid and gaseous refrigerants and refrigerant lubricants. All requirements of this specification must be met in order to demonstrate design validation. This specification does not include the elastomeric section of hose assemblies which is covered in GMW14319. Brazed/welded fittings, access ports, etc., are covered in GMW15787. Seal washers are covered in GMW15779.

1.2 Applicability. Automotive air conditioning systems for GM vehicles.

2 References

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

2.1 External Standards/Specifications.

None

2.2 GM Standards/Specifications.

GMW3059	GMW14327	GMW15779	GMW15787
GMW3116	GMW14573	GMW15786	GMW15862
GMW14319	GMW14872		

2.3 Additional References.

- GM1738 - Packaging and Identification Requirements.

3 Requirements

3.1 System/Subsystem/Component/Part Definition. All requirements of this specification must be met in order to demonstrate compliance with Design Validation (DV), Production Verification (PV) and In-process (IP) evaluations.

3.1.1 Appearance. Appearance and finish of parts shall be free of weld and/or braze splatter, flash, ridges, flux paste and roughness. All refrigerant connections shall have the sealing surfaces and threads free of damage, and foreign material (e.g., paint, dirt, etc.) Sealing surfaces shall be smooth and free of nicks and scratches to assure positive sealing. Specific requirements for air conditioning (A/C) refrigerant connectors are detailed in the GMW15787.

3.1.2 Content. See 3.3.2.1.

3.1.2.1 Physical Content. See 3.3.2.1.

3.1.2.2 Functional Content. See 3.1.3 and 3.2.1.

3.1.3 Ambient Environment. The metallic line shall be capable of withstanding temperature variations from -40 °C to 150 °C (-40 °F to 250 °F), 0% to 100% relative humidity (RH), and severe exposure to a corrosive environment over a period of 15 years or 241 400 km (150 000 mi).

3.1.3.1 Corrosion Resistance. The metallic line shall comply with GMW14872 (Table A1) Underhood (UH) and Underbody (UB); Salt Sprays four per cycle; Method Severe High (SH) and Severe Moderate (SM), including

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both Exposure A (Cosmetic Mass Loss Requirements) and Exposure D (Functional Mass Loss Requirements). Approval must be obtained from the GM Validation Engineer.

3.1.3.2 Abrasion Resistance. Metallic Line assemblies may require additional foam and/or plastic/nylon sleeves for protection. See detail drawing for specific requirements. When shrinkable sleeves are chosen, they must comply with GMW14327.

3.1.4 Interfaces. Not applicable.

3.1.5 Usage Definition. Not applicable.

3.2 Product Characteristics.

3.2.1 Performance Requirements.

3.2.1.1 Design Validation (DV). Metallic lines shall be tested for conformance with the following sections in Table 1.

Table 1: Test Table

Section	Test	Number of Samples
4.3.1	Leakage	12
4.3.2	Burst Pressure	6
4.3.3	Pressure cycle	6
4.3.4	Moisture	6
4.3.5	Cleanliness	6

3.2.1.1.1 Design Level Requirements. A/C metallic lines manufactured for testing to this specification for Engineering Source Approval purposes shall be completely representative of production level materials, components, processes and tooling. Any exceptions to this requirement or to any criteria referenced in 3.2.1.2.1 or 3.4.3 must be reviewed beforehand and approved by the Refrigerant Lines Bill of Material (BOM) Family Owner (BFO) and Validation Engineer.

3.2.1.2 Production Verification (PV). Metallic lines shall be tested for conformance with the sections in Table 2.

Table 2: Test Table

Section	Test	Number of Samples
4.3.1	Leakage	12
4.3.2	Burst Pressure	6
4.3.3	Pressure Cycle	6
4.3.4	Moisture	6
4.3.5	Cleanliness	6

3.2.1.2.1 Test Samples. Production test samples, produced on production representative equipment, shall be used.

3.2.1.2.2 PV Approval. PV approval shall be provided by either the appropriate GM Supplier Quality Engineer or GM Program Validation Engineer.

Table 2 defines the validation procedures that are required to confirm that the metallic lines meet the specified requirements. Each individual test shall be run with statistically based sample size, such that the reliability requirements stated in 3.2.3.2 are satisfied. Parts must be manufactured from production tooling and processes

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such that potential variations from both are evaluated. Parts to be used for Product Validation (PV) testing must be manufactured to print tolerances representing the potential manufacturing variation.

3.2.1.3 In-process (IP) Testing. These tests shall be completed satisfactorily with parts from normal production runs.

Parts shall be selected from a normal production run or 500 pieces, whichever is smaller.

Samples shall be selected at random to represent the entire production quantity.

Every six month period, the supplier shall run the tests in Table 3.

Table 3: Test Table

Section	Test	Number of Samples
4.3.2	Burst Pressure	6
4.3.4	Moisture	6
4.3.5	Cleanliness	6

3.2.1.3.1 IP Approval. IP tests are self-approved by the supplier subject to audit by GM Supplier Quality Engineering.

3.2.1.3.2 Lot Retention. In case of IP test non-conformance, the affected production lot shall be retained by the supplier until Root Cause Analysis is complete. The supplier shall then decide the disposition of the affected production lot. The supplier has three options for this retained lot:

- Scrap the lot
- Correct and certify the lot (which may mean lot testing the revised part again) based on the root cause analysis
- Ship the lot without correction if deemed to be acceptable based upon the root cause analysis

In any event, GM Supplier Quality Engineering shall be notified whenever any of these options is exercised.

3.2.1.3.3 Record Retention Records shall be maintained for one year from date of test.

3.2.1.3.4 Alternative IP Compliance. Supplier may request an exception from IP testing provided supplier can demonstrate that sufficient process controls are in place so as to make IP testing unnecessary. Approval to be provided by either GM Supplier Quality Engineering or the GM Design Responsible Engineer. The period of testing (six months) may vary depending on data shown by supplier. GM Supplier Quality Engineering or the GM Design Responsible Engineer will determine final IP period.

3.2.1.3.5 Deviations from this Standard. Deviations from the requirements of this standard shall have prior written approval from the responsible GM Refrigerant Lines BFO and Validation Engineer. Such requirements shall be specified on component drawings, test certificates, reports, etc.

3.2.2 Physical Characteristics. See 3.3.2.1.

3.2.2.1 Dimensions and Capacity. See 3.3.2.1.

3.2.2.2 Mass Properties. Not applicable.

3.2.3 Reliability.

3.2.3.1 Reliability Evaluation Point. Not applicable.

3.2.3.2 Reliability Requirements. The reliability (probability of success) for a mission of 10 years/241 400 km (150 000 mi), starting at age zero, shall be at least 99% at a confidence level of 50%. Any supplier performed laboratory testing based on vehicle-level usage data, and which suggests correlation to 10 years/241 400 km (150 000 mi) life, shall be documented and submitted to the responsible GM Validation and Supplier Quality Engineers as part of both design validation and Production Part Approval Process (PPAP).

3.2.4 Serviceability. Not applicable.

3.2.5 User System/Subsystem/Component/Part Interface. Not applicable.

3.3 Design and Construction.

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