

## Hose Gauge Evaluation Procedure

1. **Scope**—The Gauge Evaluation Procedure Task Force was formed by the Non-Hydraulic Hose Committee to develop a gauge evaluation procedure to be used when evaluating the capability of gauges used for hose measurement. The use of a standard method for gauge evaluation will help users easily compare equipment capability. The information provided in this recommendation is based on the methods used to produce the data presented in SAE J1759 and J2605.
2. **References**
  - 2.1 **Applicable Publications**—The following publications form a part of this specification to the extent specified herein. Unless otherwise indicated, the latest version of SAE publications shall apply.
    - 2.1.1 SAE PUBLICATIONS—Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.
 

SAE J1759—SAE Hose Measurement Study, Issued 2000-10. Summary of a GR&R study completed using plug gauges, PI tapes, and calipers.

SAE J2605—SAE Non-Contact Hose Measurement Study 1, Issued 2001-8. Summary of a GR&R study completed using the LOTIS QC-20 Hose Measurement Device.
    - 2.2 **Related Publication**—The following publication is provided for information purposes only and is not a required part of this document.
      - 2.2.1 AIAG PUBLICATION—Available from Automotive Industry Action Group, Suite 200, 262 Lahser Road, Southfield, MI 48034.
 

(MSA) Manual-Measurement Systems Analysis Manual
  3. **Procedure**—The following procedure enumerates the important features of a gauge capability study and is modeled after SAE J1759 and J2605. This procedure is to be used for equipment that provides variable output data.
    - 3.1 Metric measurement shall be used.
    - 3.2 Clearly define the types of hoses the study will include. Ideally, the study should include a range of parts, i.e., straight, curved, material, etc.

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- 3.3 Define what dimensions or features the study will include, i.e., inside diameter, outside diameter, wall thickness, wall thickness variation, etc. Use the same tolerance levels as previous studies to simplify comparisons.
- 3.4 The study must include 3 operators, 3 test locations, and 3 different gauges (one at each testing location). Minimum of 3 sets of parts with 10 samples in each set. The parts are transferred from location to location to complete the study. Clearly mark which end of the hose is used for the measurement and the depth at which the measurement is taken, if applicable.
- 3.5 Select one of the test locations to perform the GR&R calculations.
- 3.6 Use standard GR&R calculations (AIAG using the Anova method):
- Compute the average GR&R over the 3 test locations - each location provides GR&R for one system and 3 operators for each measurement similar to SAE J1759.
- Compute the GR&R from each location/system and measurement – Use this data to compute an average GR&R.
- Compute a composite GR&R using the results from the first operator from each test location/system. This is useful as an additional measure of gauge capability (more stringent because it includes any gauge offsets between systems).
- 3.7 The study must include a **detailed** test procedure with sufficient detail that any operator that has been trained to use the specific equipment can duplicate the study.
- 3.8 The study should reference any previous or similar gauge studies like SAE J1759 and J2605.
- 3.9 The study can include both electronic and manual recording of data.
4. **Conclusion**—The use of the procedures outlined in this document will allow gauging equipment users to compare results between different gauging methods and equipment from different gauge manufacturers.

DEVELOPED BY THE SAE NON-HYDRAULIC HOSE COMMITTEE