



Determination of Push-on and Pull-off Forces of Small Diameter Hoses

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. These tests shall be used to determine the push-on and pull-off forces of hoses with inside diameters ≤ 35 mm. In the case of hoses with a change in cross section, e.g., widening at one (1) end, these tests must be performed on the respective hose ends.

1.1.1 Summary of Test Method.

1.1.1.1 Push-on Force. Hose specimens are pushed onto a mandrel using a tensile testing machine and the maximum force measured.

1.1.1.2 Pull-off Force. Hose specimens are pulled from a mandrel using a tensile testing machine and the maximum force measured.

1.2 Applicability. Hoses with an inside diameter ≤ 35 mm with a requirement to measure the push-on and pull-off forces.

1.3 Remarks. None.

2 References

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

2.1 External Standards/Specifications.

ISO 7500-1

2.2 GM Standards/Specifications.

None

3 Resources

3.1 Facilities.

3.1.1 Calibration. The test facilities and equipment shall be in good working order and shall have a valid calibration label.

3.1.2 Alternatives. Alternative test facilities and equipment may also be used. However, all measuring variables as specified in this standard shall be determined correctly with respect to their physical definition.

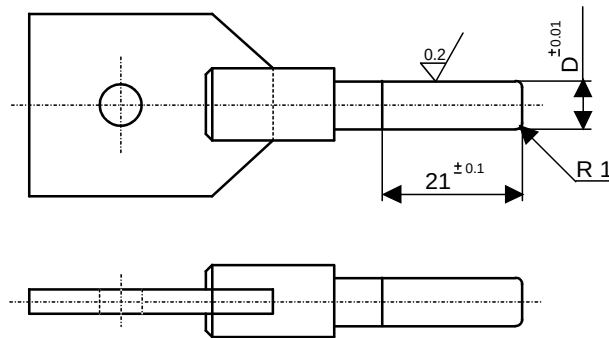
3.2 Equipment.

3.2.1 Test Equipment.

3.2.1.1 Suitable tensile testing machine to ISO 7500-1 Class 1.

3.2.1.2 Steel mandrels with chrome plated surfaces, of appropriate diameters for testing the push-on and pull-off forces (see Figure 1 and Figure 2).

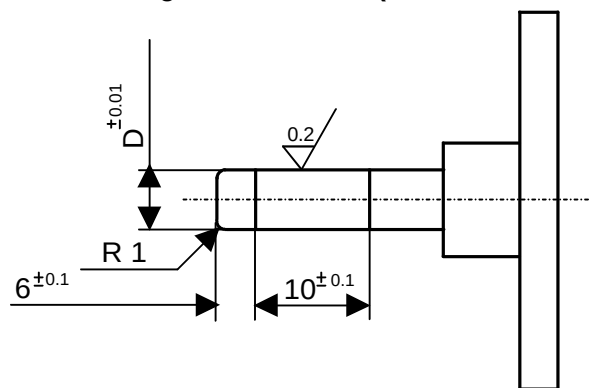
Figure 1: Mandrel for Testing Pull-off Force (all dimensions are in millimeters)



Note: Required mean roughness value $R_a = 0.2 \mu\text{m}$.

Note: Maximum roughness value $R_{\text{max}} = 1.0 \mu\text{m}$.

Figure 2: Mandrel for Testing Push-on Force (all dimensions are in millimeters)



Note: Required mean roughness value $R_a = 0.2 \mu\text{m}$.

Note: Maximum roughness value $R_{\text{max}} = 1.0 \mu\text{m}$.

3.2.1.2.1 Hoses with Nominal Inside Diameter ≥ 5 mm. For these hoses, the diameter of the test mandrels shall be 1 mm larger than the nominal inside diameter of the hose. In the case of hoses with nominal inside diameters between full millimeter steps, the hose nominal inside diameter shall be rounded down to the next full or half millimeter. For example:

- For hoses with a nominal inside diameter of 7.3 mm, round down to 7.0 mm, plus 1 mm larger than the nominal inside diameter of the hose, equals a required test mandrel to be a diameter of 8.0 mm.
- For hoses with a nominal inside diameter of 6.8 mm, round down to 6.5 mm, plus 1 mm larger than the nominal inside diameter of the hose equals a required test mandrel to be a diameter of 7.5 mm.

3.2.1.2.2 Hoses with Nominal Inside Diameter < 5 mm. For hoses with a smaller inside diameter, it shall be rounded up or down to the next full or half millimeter. The test mandrel shall be 0.5 mm larger accordingly. For example:

- For hoses with a nominal inside diameter of 4.2 mm, round down to 4.0 mm, plus 0.5 mm larger than the nominal inside diameter of the hose, equals a required test mandrel to be a diameter of 4.5 mm.
- For hoses with a nominal inside diameter of 4.3 mm, round up to 4.5 mm, plus 0.5 mm larger than the nominal inside diameter of the hose, equals a required test mandrel to be a diameter of 5.0 mm.

3.3 Test Vehicle/Test Piece. The hose sections shall be used as test pieces.

3.3.1 Test Material. The hose sections used to determine push-on force shall have a length of approximately 40 mm, and those used to determine pull-off force shall have a length of 50 mm minimum. For initial sample approval and arbitration purposes, a minimum of five (5) test pieces from at least three (3) complete components shall be tested. For routine quality control, a minimum of three (3) test pieces are required.