Designation: F1050/F1050M – 87 (Reapproved 2010)ε1

Standard Test Method for Determining Winding Torque and Tension of Typewriter Ribbons[1]

This standard is issued under the fixed designation F1050/F1050M; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

ε1 NOTE—Units information was editorially revised in December 2010.

1. Scope

1.1 This test method covers the determination of film ribbon cartridge wind tension and torque. The instruments described in this procedure may be used for specification acceptance, manufacturing control, product development, or research applications, or combination thereof.

1.2 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the standard.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Summary of Test Method

2.1 This test method is intended to determine the dynamic cartridge tension and torque under controlled conditions. The test equipment and test procedures are intended to simulate cartridge tensions and torque under actual end-use conditions. Although specific manufacturers have been identified for this equipment, any torque and tension measurement equipment with equivalent signal output capabilities would be suitable.

2.2 To determine the mean cartridge tension and torque, a cartridge is put on a calibrated test fixture with the ribbon looped around the center wheel of a tension head and the ribbon being driven by a variable speed motor.

2.3 The tension head allows cartridge tension to be read in grams-force and torque in ounce-force inches.

3. Significance and Use

3.1 This test method enables tension and torque comparisons between cartridges and facilitates process control.

4. Interferences

4.1 Wide variations in environmental conditions (temperature and relative humidity) could affect the cartridge wind tension with this test procedure.

4.2 Tension range requirements vary with cartridge tension techniques. For example, ratchet and paw ranges from 10 to 60 g, foam from 60 to 150 g, and wrap spring from 30 to 80 g.

5. Apparatus and Materials

5.1 *Tension Heads,* 100 and 200-g.[2]

5.2 *Test Fixture Platform,* consisting of original equipment manufacturer ribbon deck, a freely turning wheel attached to the ribbon supply side of the platform, and variable speed drive motor.

5.3 *Calibration Weights,* of 20 g and 50 g.

5.4 *Digital Applicator.* [2]

5.5 *Recorder.* [2,3]

5.6 *Speed Controller.* [4]

5.7 *Torque Measurement Drive Motor.*

6. Test Specimen

6.1 The test specimen shall be an entire ribbon cartridge that has not been disrupted since it was assembled.

[1] This test method is under the jurisdiction of ASTM Committee F05 on Business Imaging Products and is the direct responsibility of Subcommittee F05.02 on Inked Transfer Imaging Products.

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[2] The sole source of supply of the test equipment components known to the committee at this time is Tensitron Corp., 733 South Bowen Street, Longmont, CO 80501. If you are aware of alternative suppliers, please provide this information to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee,[1] which you may attend.

[3] The sole source of supply of the Tensitron G-C400 Recorder known to the committee at this time is Tensitron Corp., 733 South Bowen Street, Longmont, CO 80501.

[4] The sole source of supply of the Minarick SL-15-1 Speed Controller known to the committee at this time is Minarick Corporation, 905 East Thompson Ave., Glendale, CA 91201.

7. Identification

7.1 For the identification of ribbon cartridges, the following information is suggested:

7.1.1 Coated jumbo roll (batch) number,

7.1.2 Assembler's name or number,

7.1.3 Date and time of assembly.

8. Calibration

8.1 Calibrate the chart recorder and tension head at the start of each shift or more frequently depending upon the amount of drift encountered with the recorder.

8.2 Select and install the tension head with a range compatible with the ribbons to be tested. For example, ribbons with wrap spring or ratchet and paw tension systems may use a head with a range of 0 to 100 g. However, cartridges that use a foam pad tensioning system may require a head with 0 to 200-g range.

8.3 Once the recorder is turned on, it should be left on for the test period to minimize instrument drift.

8.4 Turn the recorder to low and set the digital display to zero by adjusting the "position" knob so that the chart recorder line reads zero.

8.5 Place a ribbon on the test fixture and ensure it is properly seated.

8.6 Pull about 2 ft of ribbon from the supply side of the cartridge.

8.7 Loop the ribbon around the center wheel of the three-wheel tension head as shown in Fig. 1.

8.8 Drape the loose ribbon between the tension head and supply side of the ribbon cartridge over the freely turning wheel so it hangs vertically from the tester. Position the wheel so that the ribbon just touches the supply side of the cartridge.

8.9 Tape a 50-g mass to the ribbon so it hangs from the free wheel. There should be no tension between the weight and the supply side of the cartridge. Set the digital display to read 50 by adjusting the "sensitivity" knob.

8.10 Turn the recorder to "low" and set it to 50 by adjusting the "position" knob.

8.11 Replace the 50-g mass with a 20-g mass. Set the digital display by adjusting the "sensitivity" knob, and set the recorder by adjusting the "position" knob. Recheck the display and recorder with 0 and 50 g. The zero and 20-g readings should be exactly correct, and the 50-g readings should be correct within 1 g.

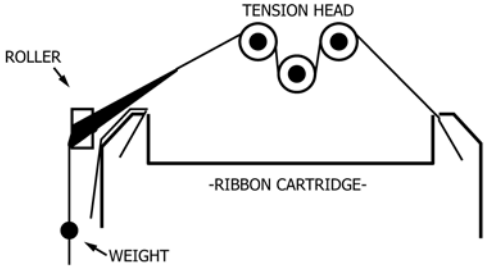

FIG. 1 Equipment Configuration

8.12 Repeat steps 8.8 through 8.10 until the proper readouts are obtained.

9. Conditioning

9.1 Although no special conditioning of cartridges is required, it would be prudent to compare only tests run under the same environmental conditions.

10. Procedure

10.1 Set the tester speed to 90 ± 10 r/min.

10.2 Place the cartridge to be tested onto the tester as in the calibration steps.

10.3 Loop the ribbon around the center wheel of the tester.

10.4 Take up the slack in the ribbon.

10.5 If a ribbon drive mechanism must be engaged after the ribbon is seated, engage the drive at this point and turn on the recorder to "low."

10.6 After the drive motor has been engaged for 5 s, let the recorder chart run until about five peaks and five valleys have been recorded. Also note the dial reading on the torque gage while the tension record is being made.

10.7 Turn off the recorder chart and disengage the ribbon drive.

10.8 Pull the cartridge off and resume testing with the next sample cartridge.

10.9 The cartridge tension is the average of the five peaks recorded.

11. Report

11.1 Report the cartridge tension in grams and torque in ounce-force inches. In characterizing tension and torque levels of cartridges, it may be prudent to check the levels at the beginning, middle, and end of ribbon.

11.2 When used for in-line process control, torque and tension are usually measured at the very beginning of assembled cartridges. The output value is compared to predetermined process control limits. These limits are based upon torque and tension limits required for proper functional performance in the end use equipment.

12. Precision

12.1 Repeatable measurements on the same cartridge and same test equipment should agree within ±5 %. This precision statement is based on the equipment listed in Section 5.

12.2 Measurements between laboratories may not be reproducible because of differences in samples and test equipment. A round-robin correlation test may be used to minimize differences between test equipment and establish agreement between laboratories.

12.3 The precision of this test method is not dependent upon the skill or experience, or both, of the operator.

12.4 The precision of this test method is not affected provided that:

12.4.1 The same test equipment is used,

12.4.2 Calibration procedures and frequency of calibration are the same,

12.4.3 The proper sample loading procedure is used, and

12.4.4 Ambient conditions are similar.

13. Keywords

13.1 film ribbons; typewriter; typewriter ribbons; winding tension; winding torque