



TAPPI/ANSI T 572 sp-13

ISSUED – 2003
REVISED AND RECLASSIFIED AS STANDARD PRACTICE – 2008
REVISED – 2013
©2013 TAPPI

The information and data contained in this document were prepared by a technical committee of the Association. The committee and the Association assume no liability or responsibility in connection with the use of such information or data, including but not limited to any liability under patent, copyright, or trade secret laws. The user is responsible for determining that this document is the most recent edition published.

CAUTION:

This Test Method may include safety precautions which are believed to be appropriate at the time of publication of the method. The intent of these is to alert the user of the method to safety issues related to such use. The user is responsible for determining that the safety precautions are complete and are appropriate to their use of the method, and for ensuring that suitable safety practices have not changed since publication of the method. This method may require the use, disposal, or both, of chemicals which may present serious health hazards to humans. Procedures for the handling of such substances are set forth on Material Safety Data Sheets which must be developed by all manufacturers and importers of potentially hazardous chemicals and maintained by all distributors of potentially hazardous chemicals. Prior to the use of this method, the user must determine whether any of the chemicals to be used or disposed of are potentially hazardous and, if so, must follow strictly the procedures specified by both the manufacturer, as well as local, state, and federal authorities for safe use and disposal of these chemicals.

Accelerated pollutant aging of printing and writing paper by pollution chamber exposure apparatus

1. Scope

1.1. This standard practice describes a laboratory procedure for the exposure of printing and writing paper to the common atmospheric pollutant gas nitrogen dioxide at elevated levels of concentration to permit accelerated aging of such paper.

1.2. This standard practice specifies the sample preparation and conditions of exposure required to obtain information on the relative stability of paper with regard to change in mechanical strength and optical properties brought about by exposure of such paper to common atmospheric pollutant gas.

1.3. This standard practice suggests qualitative analysis methods regarding paper stability and suggests the exact life expectancy for a given paper to reach a specified set of strength or optical properties. The limit(s) of acceptability and the test methods for a specified set of properties must be defined by each end user and will determine the life expectancy of the paper to be tested.

2. Summary

2.1. In this standard practice, a specially designed pollution chamber is used to expose sheets of paper that are separately hung in the chamber. Exposure of the paper is to an elevated concentration of nitrogen dioxide gas. The gas is circulated uniformly around the external surfaces of the paper in a controlled manner and for a specified period of time. The gas reacts chemically with the ingredients of the paper and causes changes in its physical strength and in its optical properties. By comparing initial and final levels of these parameters against specified difference criteria, a measure of the stability of paper strength and optical properties is obtained.

3. Significance

3.1. This sample preparation procedure is useful for parties concerned about the influence of common atmospheric pollutant gases on the permanence of the physical strength and optical properties of various printing and writing papers.

Approved by the Standard Specific Interest Group for this Test Method



Documents
Document Sharing Hub

3.2. The procedure provides manufacturers, paper users and other interested parties with quantified rankings of paper stability that identify papers that are stable, moderately stable and unstable when exposed to common atmospheric pollutant gases over periods of time.

3.3. The stability rankings may be used for definition of the stability of paper to pollutant gas exposure, but do not define specific periods of life expectancy, as the limits of acceptable physical strength and optical properties will be different for various users of a given paper.

4. Applicable standards

4.1 TAPPI T 400 "Sampling and Accepting a Single Lot of Paper, Paperboard, Containerboard, or Related Product"

4.2 TAPPI T 402 "Standard Conditioning and Testing Atmosphere for Paper, Board, Pulp Handsheets and Related Products"

4.3 TAPPI T 511 "Folding endurance of paper (MIT tester)"

4.4 TAPPI T 524 "Color of paper and paperboard (45°/0° geometry)"

4.5 TAPPI T 1200 "Interlaboratory Evaluation of Test Methods to Determine TAPPI Repeatability and Reproducibility."

5. Apparatus

5.1. Use a test chamber of substantial internal volume, with length, depth and width dimensions being roughly equal. In research studies, a chamber of 0.6 m³ [21 ft³] was used and found to be fully adequate (1). Use a chamber that is designed to provide a very uniform, fan-propelled flow of pollutant gas (diluted in standard commercial dry air) over all surfaces of individually suspended sheets of paper. Utilize materials for construction of the components of the chamber exposed to the gas stream that are highly resistant to the corrosive nature of the pollutant gas.

5.2. Provide a control system that assures very precise flow of the pollutant gas into the chamber. Monitor and record the gas concentration in the pollution chamber with appropriate equipment and instruments.

5.3. Provide a separate and independent system to measure and control relative humidity in the test chamber by addition of steam.

5.4. Include an exhaust system in the design of the pollution apparatus that permits pollutant gas flow (volume/hr.) to be continuously removed. The amount to be removed each hour shall be equal to approximately 5% of the volume in the chamber. This is to assure that there is no buildup in the chamber of products of degradation emitted from the paper during the period of exposure.

5.5. Utilize a test chamber that will assure uniform and separated positioning of individual sheets of paper within the chamber. Its design shall be such that all paper surfaces receive a flow of gas that has uniform velocity and concentration over the surface of all sheets.

5.6. Provide safety systems in the workspace surrounding the test chamber to ensure that any gas that may escape from the system will be thoroughly and quickly removed from the workspace in a manner that is safe and environmentally sound.

6. Reagents and materials

6.1 Use high quality purified dry air for control of gas concentration in the test chamber.

6.2 Use high quality pure nitrogen dioxide gas from an industrial supplier of such gas.

7. Calibration

7.1 Provide a system for delivery of gas to the test chamber such that a flow of gas containing 50 ppm $\pm$ 2 ppm of nitrogen dioxide in dry air will be continuously delivered to the chamber.

7.2 Recalibrate the instrument with sufficient frequency to ensure continual delivery of the required gas flow.