HONEYWELL EDP

GENERAL BULLETIN

SERIES 200

PUNCHED CARD SPECIFICATIONS FOR HONEYWELL CARD EQUIPMENT

SUBJECT:

General specifications for punched card stock, including dimension requirements and testing methods, for use with the following Honeywell card equipment:

- Type 123 Card Reader
- Type 223 Card Reader
- Type 214-1 Card Punch
- Type 214-2 Card Reader-Punch

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FOREWORD

The specifications set forth in this publication are to be used only as a broad reference to the required characteristics of punched cards. The characteristics specified herein are based upon the general requirements contained in the following proposed industry specifications:

ASA Proposed Specification X3.2/76

ASA Proposed Specification X3.2/71

EIA Proposed Specification SP 789

These industry specifications are generally well known and accepted by the punched card and/or paper manufacturing industries. Since individual manufacturers are familiar with the detailed testing methods and procedures contained in the industry specifications, a general reference will suffice when discussing card requirements.

Certain requirements included in this publication may differ to some extent from requirements stated in the referenced specifications. Where this occurs, the variance is usually due to a particular requirement of the card devices listed. In any such instance, the requirements listed in this publication will apply.

The specific testing methods and procedures listed herein are standards of the card and paper manufacturing industry. For example, the words "TAPPI Method ..." refer to a standard method of the Technical Association of the Pulp and Paper Industry. Where testing procedures are prescribed they are to be performed by the manufacturer. (The equipment used (e.g., MIT testing instrument) is well known to each manufacturer. The methods and procedures are listed to enable Honeywell customers to specify their card requirements more accurately.

A more detailed specification will be made available to Honeywell customers upon request.

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PUNCHED CARD SPECIFICATIONS FOR HONEYWELL CARD EQUIPMENT

BASIC REQUIREMENTS

Standard 80-Column Card

Unless otherwise stated, the following requirements shall apply to 80-column cards (refer to Figure 1).

DIMENSIONS

In determining the degree to which the specifications in this paragraph are met, measurements should be made in accordance with the methods outlined under "REQUIRED TEST METHODS."

Thickness: 0.0070" ± 0.0004"

Height: 3.257 inches (maximum)
3.247 inches (minimum)

Base Length: 7.380 inches (maximum)
7.370 inches (minimum)

Corner Angles: 90 degrees, ± 5 minutes

CORNER CUTS

Diagonal

The diagonal corner cut shall remove 0.250" ± 0.016" from the long edge and 0.433" ± 0.016" from the short edge of the card to form a reference angle of 60° to the long edge of the card. The preferred location of this cut is at the upper left corner of the card; alternatively; at the upper right corner of the card.

Other

Preferably, all corners other than the diagonally cut corner shall be square; alternatively, they may be rounded to a nominal radius of 0.250 inches. The edge of the rounded corner shall fall between two concentric arcs. The center of the arcs is located 0.242" ± 0.000" from the long edge and 0.250" ± 0.000" from the short edge of the card. The inner arc shall be 92° and shall have a radius of 0.242"; the outer arc shall have a radius of 0.272". (See Figure 2.)

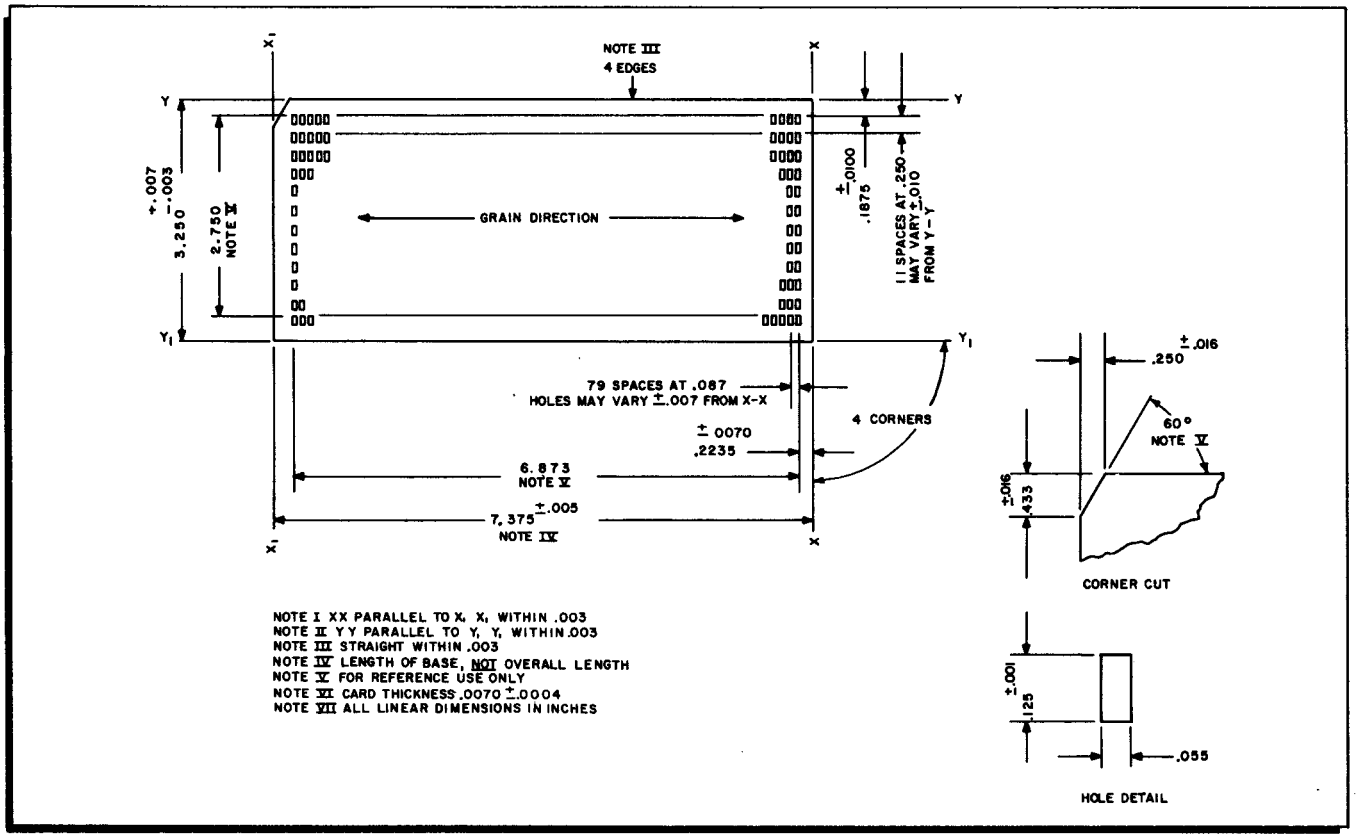

Figure 1. Card Specifications - Standard 80-Column Card

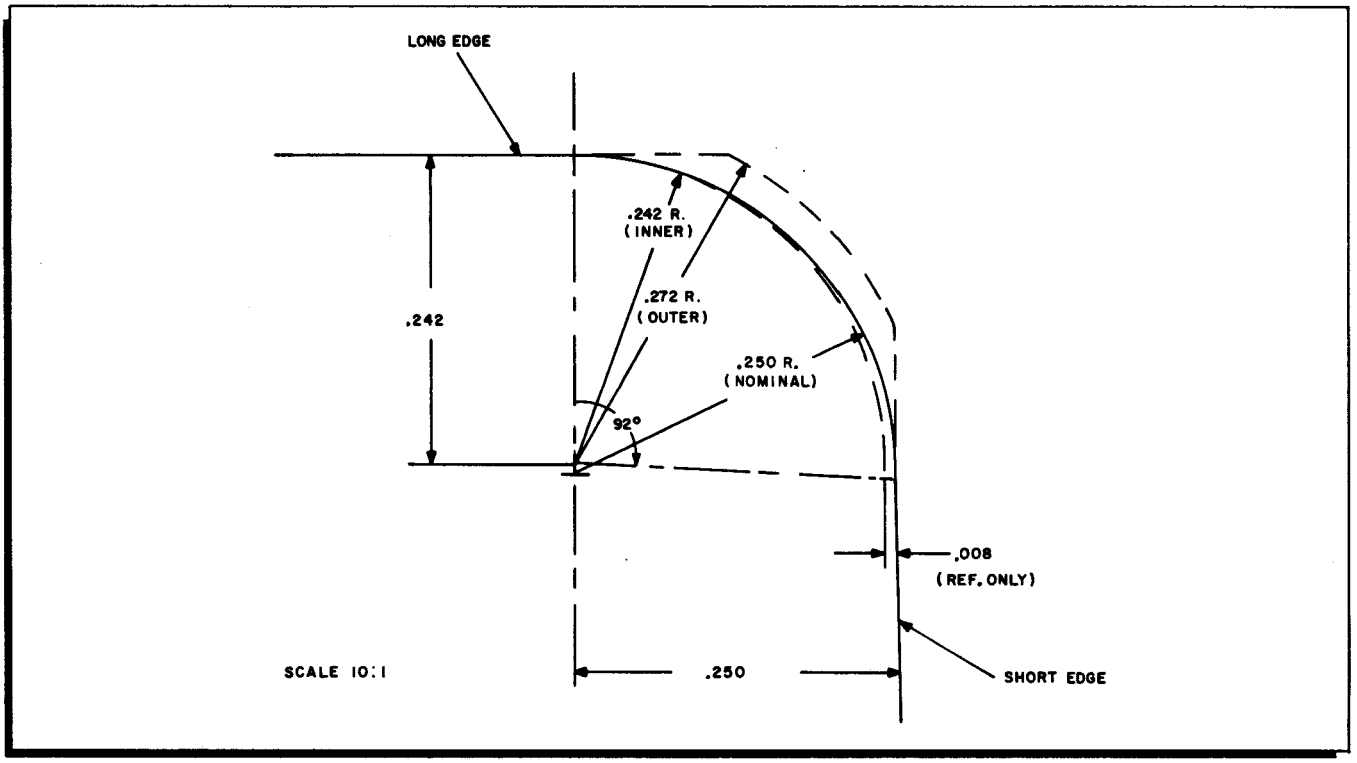

Figure 2. Rounded Corner Dimensions

EDGE REQUIREMENTS

Condition

All edges shall be smooth and free from burrs.

Straightness

The straightness of each shall be such that the entire edge shall fall between two straight, parallel lines 0.003" apart.

Parallelism

Opposite edges shall be parallel within 0.003".

Irregular Right-Hand Edges

The requirements for condition and straightness of the right-hand edge only may be waived for cards with irregular right-hand edges, provided that the card has a clean-cut reference edge located between rows 6 and 7, or between rows 7 and 8 as shown in Figure 3.

GRAIN DIRECTION

The grain of the card stock shall be in the direction of the card length.

PUNCHED HOLES

The shape, size, and location of holes in the standard card shall be as described in Figure 1 which shows the allowable variations in hole locations after they are punched. Subsequent variations in the temperature and relative humidity of the storage environment will result in expansion or contraction of the cards. At the time these cards are read, the maximum allowable variation from the nominal hole locations shown in Figure 1 shall be ± 0.018" in the horizontal and vertical direction.

51-Column Card

The specifications for 51-column cards are identical to those of 80-column cards with the exception of base length, which is specified as a nominal 4.852 inches.

Cards With Vertical Scores

A vertical score, defined as a series of in-line cuts in the card to facilitate later detachment of a stub portion of the card, is allowable provided that the score is located at least 1.62 inches from the right-hand edge of the card but situated outside the central 0.75-inch area of the card as shown in Figure 4.

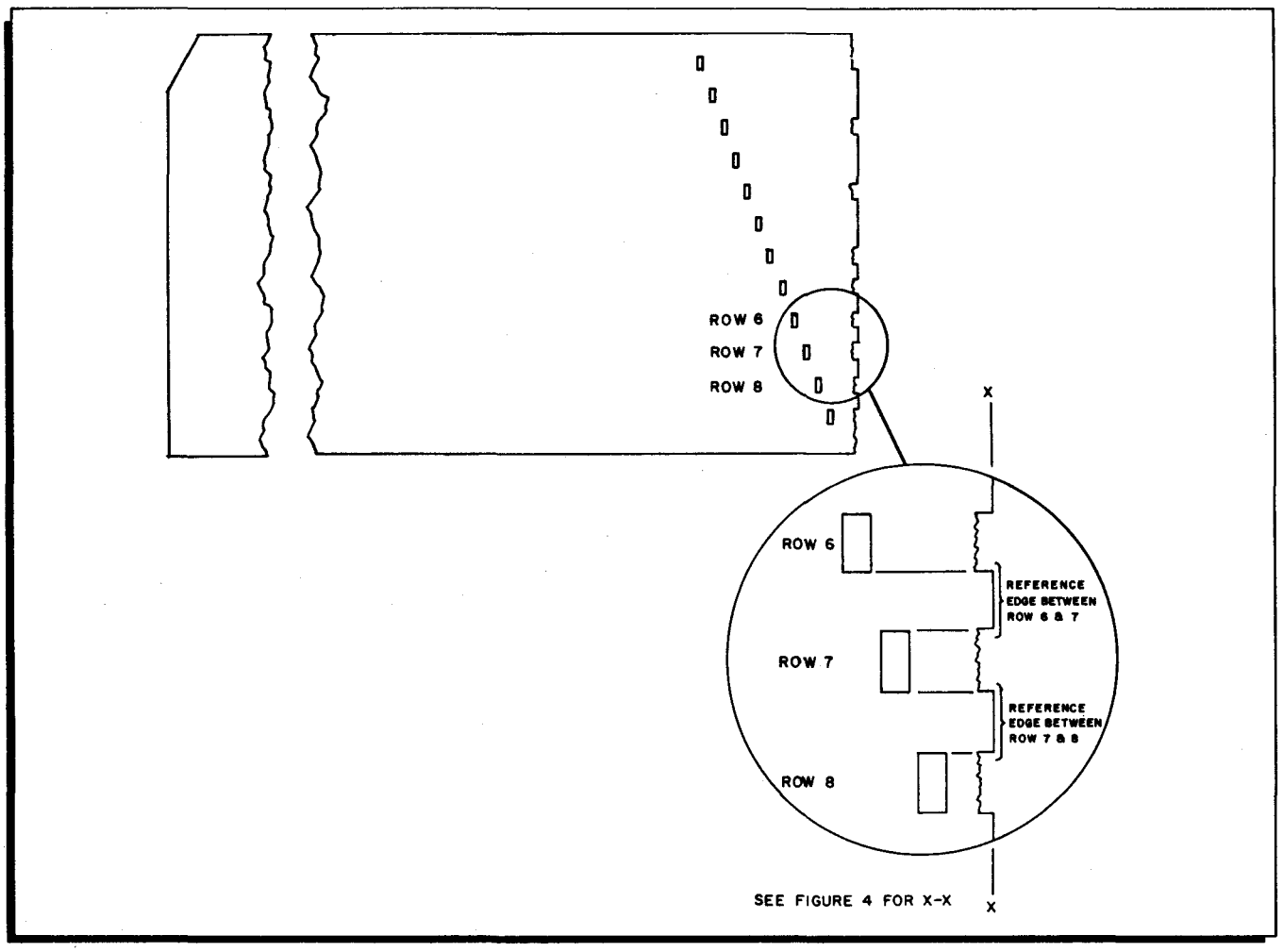

Figure 3. (51 or 80 Column) Card - Reference Edge Selection

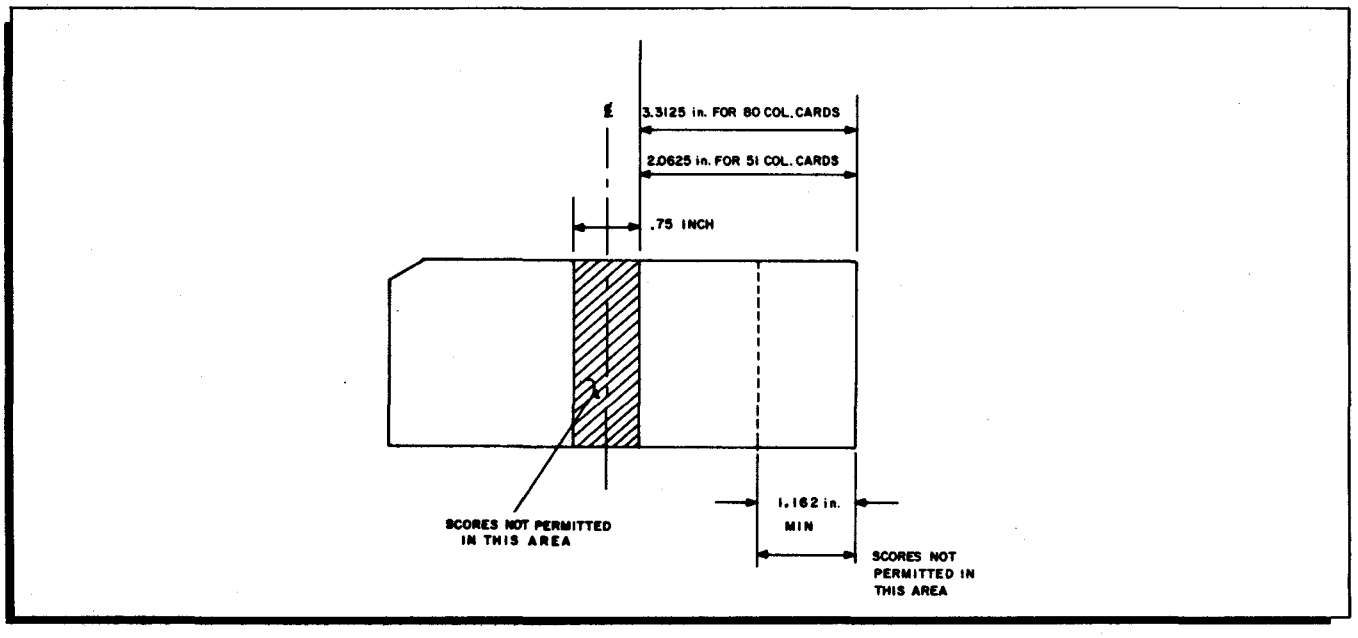

Figure 4. Vertical Scoring - Allowable Areas

DETAILED REQUIREMENTS

In determining whether the requirements of this section are met, refer to the section entitled "REQUIRED TEST METHODS."

Paper Requirements

COMPOSITION

The paper used in the standard card shall be 100% chemical wood fiber; no ground wood shall be allowed.

BASIC WEIGHT

The paper shall weigh 99 ± 5% pounds per ream of 500 24" x 36" sheets.

BURSTING STRENGTH

The minimum bursting strength shall be 55 pounds.

STIFFNESS

The minimum stiffness in the grain direction shall be 17.0 gram-centimeters. In the cross direction minimum stiffness shall be 8.0 gram-centimeters.

INTERNAL TEARING RESISTANCE

The minimum resistance to tear in each direction shall be 125 grams.

RETENTION OF FOLDING ENDURANCE AFTER ACCELERATED AGING

After accelerated (heat) aging for 72 hours at 105° C., the MIT folding endurance retention in the grain direction shall not be less than 25% of the original average folding endurance and never less than 25 double folds.

ASH

The ash content shall not exceed 2.0%.

HYDROGEN ION CONCENTRATION

The pH by the hot extraction method shall not be below 5.0.

FRICTIONAL CHARACTERISTICS

The static coefficient of friction shall be between 0.30 and 0.45. The kinetic coefficient of friction shall not be less than 75% of the static coefficient of friction.

EXPANSION AND CONTRACTION

Maximum expansion and contraction with changes in relative humidity between 20% and 75% (up or down) shall be 0.25%, (grain) direction; and 0.70%, cross direction.

WRITING QUALITY

The surface of the paper shall be suitable for writing on with pen and ink.

Printing Requirements

If printing is required, it shall be legible, without excess ink, and it shall cause no embossment or distortion of the card. The printing shall be accurately registered so that the columnar characters are properly aligned. The ink shall be non-blocking when dry, and it shall not transfer to the feed rolls of data processing machines.

Defects

Cards shall be free from holes, transparent areas, slime spots, or other brittle areas and may not contain residual chemicals, fuzz, loose dust, or abrasive materials that will cause excessive wear of data processing equipment.

Curl

The maximum curl of cards, when at equilibrium with any relative humidity between 20% and 75%, shall not exceed the following values when tested in accordance with the method prescribed in the REQUIRED TEST METHODS section of this bulletin:

1. Axis of curl parallel to the grain of the paper: 0.12".
2. Axis of curl at right angles to the grain of the paper: 0.25".
3. Axis of curl diagonal to the grain of the paper: 0.25".

REQUIRED TEST METHODS

The methods discussed in this section are to be used whenever tests are made to determine the qualifications of any given card stock in regard to Honeywell specifications.

Testing Methods

CONDITIONING

Unless otherwise specified, tests for physical requirements shall be performed on cards conditioned at 50% ±2% relative humidity and 73° ±3.5°F. by TAPPI method T 402 m.

CURL OF CARDS

This test is performed at 20% ±2% relative humidity and at 75% ±2% relative humidity and

$73^{\circ} \pm 3.5^{\circ}F$. A deck of 10 cards is laid on a smooth, horizontal surface with the wire side of the paper up. A similar deck is laid on a smooth, horizontal surface with the felt side of the paper up. After 24 hours the cards are examined and, if necessary, the deck is turned so that the concave side of the deck is up. A straightedge, weighing 2.5 ±0.1 grams, is placed across the two high points of the deck of cards. The amount of curl is then measured from the bottom of the straightedge to the low point of the top card of the deck. The test is preferably performed with separate decks at 20% and 75% relative humidity, though the deck used at 20% relative humidity may later be used at 75% relative humidity. The cards tested at 75% relative humidity may not, however, be used later to perform the test at 20% relative humidity.

COMPOSITION

The fiber composition shall be determined by TAPPI method T 401 m.

BASIC WEIGHT

Weight shall be determined by TAPPI method T 410 m.

THICKNESS

Thickness shall be determined by TAPPI method T 411 m.

BURSTING STRENGTH

Bursting strength shall be determined by TAPPI method T 403 m.

STIFFNESS

Stiffness shall be determined by TAPPI method T 489 m.

RETENTION OF FOLDING ENDURANCE AFTER ACCELERATED AGING

Folding endurance shall be determined by TAPPI method T 423 m. Method II (MIT testing instrument). Accelerated heat aging shall be in accordance with TAPPI method T 453 m.

INTERNAL TEARING RESISTANCE

Tearing resistance shall be determined by TAPPI method T 414 m.

ASH

Percent of ash content shall be determined by TAPPI method T 413 m.

HYDROGEN ION CONCENTRATION

Hydrogen Ion concentration shall be determined by TAPPI method T 435 m, Procedure 2, Hot Extraction.

COEFFICIENT OF FRICTION

The instrument for performing this test shall consist of a smooth, level, metal plate to support the cards; a 3" x 3" 1000-gram weight; a 1000-gram capacity Chattilon push-pull gauge calibrated for horizontal use; and a motor-driven mount for the gauge which can advance the gauge horizontally and steadily at the rate of 3 feet per minute. The bottom of the weight shall have a smooth, clean rubber surface.

In performing the test, eleven properly conditioned 3 1/4" x 7 3/8" cards, which have been handled by their edges only, are laid flat on the metal plate with the left end of the cards against a stop. The top card is advanced to the right about 2 inches, and the weight is placed on the cards, near the right end, so that it is supported by all cards. The gauge is then advanced toward the left so that it pushes against the weight in the direction of the long axis of the cards. A reading is taken when the weight and the top card begin to move. This reading, in grams, divided by 1000 is the static coefficient of friction. Ten successive readings are taken by sequentially placing the top card on the bottom of the deck and repeating the procedure. If, as the movement of the weight and the top card continues, there is a change in the reading, the new reading, in grams, divided by 1000 is the kinetic coefficient of friction.

EXPANSION AND CONTRACTION

Expansion and contraction tests are made by exposing cards sequentially to 20%, 75%, and 20% relative humidity at 73°F. Tolerance for humidity and temperature control is ±2% relative humidity and ±3.5°F. These cards are allowed to remain fully exposed for at least two hours at each humidity level. At the end of each two-hour exposure period, the cards are measured with a precision of ±0.0005". The percent expansion is calculated from the difference between the original measurement at 20% relative humidity and that made at 75% relative humidity. The percent contraction is calculated from the difference between the measurement at 75% relative humidity and the final measurement at 20% relative humidity. If the relative humidity, as measured with a wet and dry bulb psychrometer, is not exactly 20% and 75%, corrections are applied assuming a straight-line relationship between relative humidity and card dimensions.

WRITING QUALITY

A clean, unhandled sample of the paper shall be written upon in a normal manner on both wire and felt sides, using a good grade of commercial fountain pen ink (such as Schaeffer's Skrip permanent blue black No. 22 ink) in a pen with a firm, medium point (such as Esterbrook point No. 9668). The written material shall be dry to the touch within ten seconds after writing. The lines or characters shall be clear-cut and legible, without excessive feathering or spreading. A suitable ink can also be prepared by dissolving 2 grams of Crimson Red CI-31 or 2 grams of Acid Green L, CI-666 in 100 cc. of distilled water heated to approximately 100°F. The

surface tension of the ink should be tested at $73^{\circ} \pm 1^{\circ}$F. using a Traube stalagmometer (such as Fisher Scientific No. 5-945). Reduce the surface tension by adding a wetting agent (such as 25% solution of clear Aerosol OT, approximately 2 drops) until 105-110 drops fall while the level of the liquid descends from the upper to the lower encircling marks.

CARD DIMENSIONS

All measurements shall be made between parallel anvils having flat contacting surfaces between 3/16" and 3/4" long and contacting pressures between 20 and 40 grams.

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