

General Approach for Tape Casework

1 Introduction

The most common types of tape evidence received in the FBI Laboratory are duct tape, vinyl electrical tape, and packaging tape. Masking tape and clear office tape are also received but are usually analyzed first by the Questioned Documents Unit (QDU).

Forensic tape examinations involve either (1) determining if a material is a pressure sensitive adhesive (PSA) to include its type or chemical composition (e.g., styrene-butadiene), (2) comparing two (or more) tape samples to determine if they can be differentiated, or (3) developing a probable source (e.g., manufacturer, brand, point of sale).

2 Scope

This procedure describes general guidelines for Chemistry Unit caseworking personnel who analyze tape evidence submitted to the FBI Laboratory. Separate, detailed standard operating procedures exist that cover sample processing and acquisition of both physical and chemical compositional data on PSA tape evidence.

3 Equipment/Materials/Reagents

Not applicable.

4 Standards and Controls

Not applicable.

5 Collection and Preservation Considerations

When tape is used, pieces are torn or cut from the source roll; a physical reconstruction (i.e., end match, physical fit) is possible between pieces and/or with the free end of the source roll of tape. Therefore, the potential for an end match between torn or cut tape specimens should be considered before selecting a collection method. Care must be taken to preserve the condition of all tape ends.

Whenever feasible, tape should be submitted to the FBI Laboratory still adhered to the original substrate. This will minimize the potential for loss of valuable trace evidence, latent fingerprints, or contact impressions. If it is not reasonable to submit the substrate to which the tape is

adhered, it can be manually removed and placed adhesive side down on a clean, colorless piece of plastic sheeting (e.g., transparency film, Kapak[®] tubular rollstock). The tape should not be distorted or torn during this removal process. If the tape is cut during removal, it is imperative to document and initial each cut. A method that produces a unique pattern (e.g., use of pinking shears) should be employed. Once adhered to plastic sheeting, tape specimens can be packaged in cardboard boxes, paper bags, manila envelopes, or sealable plastic bags. Partially-consumed rolls of tape should be packaged separately.

6 Considerations for Other Forensic Examinations

Some tape examinations can be destructive to materials or latent prints adhered to the tape surfaces. Therefore, in general, analysis of the tape construction and chemical composition should be the last examinations conducted.

7 Procedure

Conduct a critical review of the contributor's request and the item(s) received. As applicable, recommend additional examinations that could be probative and determine the logical sequence for the requested forensic examinations.

In a comparison examination, establish if any differences are detected between two (or more) samples after subjecting them to the same rigorous analytical testing. A comprehensive analytical scheme, unless sample size or condition prohibits it, includes visual and microscopical examinations to assess physical characteristics and instrumental examinations to assess organic composition and inorganic/elemental composition of the backing, adhesive, and reinforcing fibers (if applicable). When practicable, orthogonal techniques should be used. Figures 1-3 outline the analytical approach for comparison examinations of PSA tapes. Each analytical technique depicted is described in a Paints and Polymers Standard Operating Procedure (P&P SOP). When a fabric, fiber, or glass filament reinforcement is present within the tape construction (displayed as "Reinforcement Analysis" in Figure 1), these analyses are conducted and reported by forensic examiners in other units.

For source determinations, examine the specimen(s) in question for manufacturer markings (e.g., product information printed on either the tape backing or the roll core) that would provide useful sourcing information. If no such markings are found, analyze the material using some or all of the methods outlined in Figures 2 and 3. Compare the results to known reference samples maintained in the FBI Laboratory to yield information regarding the product grade or manufacturer. Sourcing of tape based solely on analytical examination is limited to duct tape specimens. For sourcing examinations of duct tape, it is up to the discretion of the P&P examiner as to whether fiber examination of the fabric reinforcement will be requested.

8 Sampling

Due to the wide variety of examination requests, numbers of samples submitted, and conditions of the samples submitted, P&P examiner discretion will determine the appropriate sample(s) to examine on a case-by-case basis. For indistinguishable samples, as determined by a discretionary number of analytical examinations, an option is to take an individual sample, assign a new item identifier (e.g., Item 1-1), specifically list the item in the item inventory, and discuss it independently in the *Laboratory Report*. Record the decision criteria used for determining the sample(s) selected in the case notes. If the complexity of the case warrants discussion of the sample(s) selection with another P&P examiner, also record this discussion in the case notes.

9 Calculations

Not applicable.

10 Measurement Uncertainty

Not applicable.

11 Limitations

- a. Sample size, type, and condition can preclude conducting certain examinations.
- b. Sourcing capabilities of certain types of tape is limited. This is directly related to the number of manufacturers and distributors of a particular type of tape.

12 Safety

Take standard precautions for the handling and disposal of chemicals and sharps. Use universal precautions when handling potentially biohazardous materials. Refer to the most current revision of the *FBI Laboratory Safety Manual* and appropriate Safety Data Sheet(s) for further details.

13 References

ASTM E3260, Standard Guide for Forensic Examination and Comparison of Pressure Sensitive Tapes. ASTM International, West Conshohocken, PA.

FBI Laboratory Safety Manual

Hobbs, A. Use of a database for significance assessment and sourcing of duct tapes. In: *Proceedings of the American Academy of Forensic Sciences Annual Meeting*, Seattle, WA, February 20-25, 2006, 102.

Johnston, J. *Pressure Sensitive Adhesive Tapes*. Northbrook, IL: Pressure Sensitive Tape Council, 2000.

Kee, T.G. The characterization of PVC adhesive tape. *Proceedings of the International Symposium on the Analysis and Identification of Polymers*, FBI Academy, Quantico, VA, July 31- August 2, 1984, 77-85.

Keto, R.O. Forensic characterization of black polyvinyl chloride electrical tape. *Proceedings of the International Symposium on the Analysis and Identification of Polymers*, FBI Academy, Quantico, VA, July 31- August 2, 1984, 77-85.

Maynard, P., et al. Adhesive tape analysis: establishing the evidential value of specific techniques. *J. Forensic Sci.* 2001; 46(2): 280-287.

Mehltretter, A.H., Bradley, M.J. Forensic analysis and discrimination of duct tapes, *Journal of the American Society of Trace Evidence Examiners*, 2012, 3(1): 2-20.

Mehltretter, A.H., Bradley, M.J., Wright, D.M. Analysis and discrimination of electrical tapes: Part I. Adhesives, *J Forensic Sci.*, 2011, 56(1): 82-94

Mehltretter, A.H., Bradley, M.J., Wright, D.M. Analysis and discrimination of electrical tapes: Part II. Backings, *J Forensic Sci.*, 2011; 56(6): 1493-1504

Merrill, R., Bartick, E.G. an approach to the forensic analysis of black plastic tape. Unpublished manuscript, 1992.

Satas, D. Ed. *Handbook of Pressure Sensitive Adhesive Technology*, 2d ed., NY: Van Nostrand Reinhold, 1989.

Seymour, R.B., Carraher, Jr., C.E. *Polymer Chemistry: An Introduction*, 2d ed. NY: Marcel Dekker, 1988.

Smith, J. The forensic value of duct tape comparisons. *Midwestern Association of Forensic Scientists, Inc. Newsletter*, 27(1), January 1998, 28-33.

Figure 1: Analytical Scheme for Examination and Comparison of Tapes

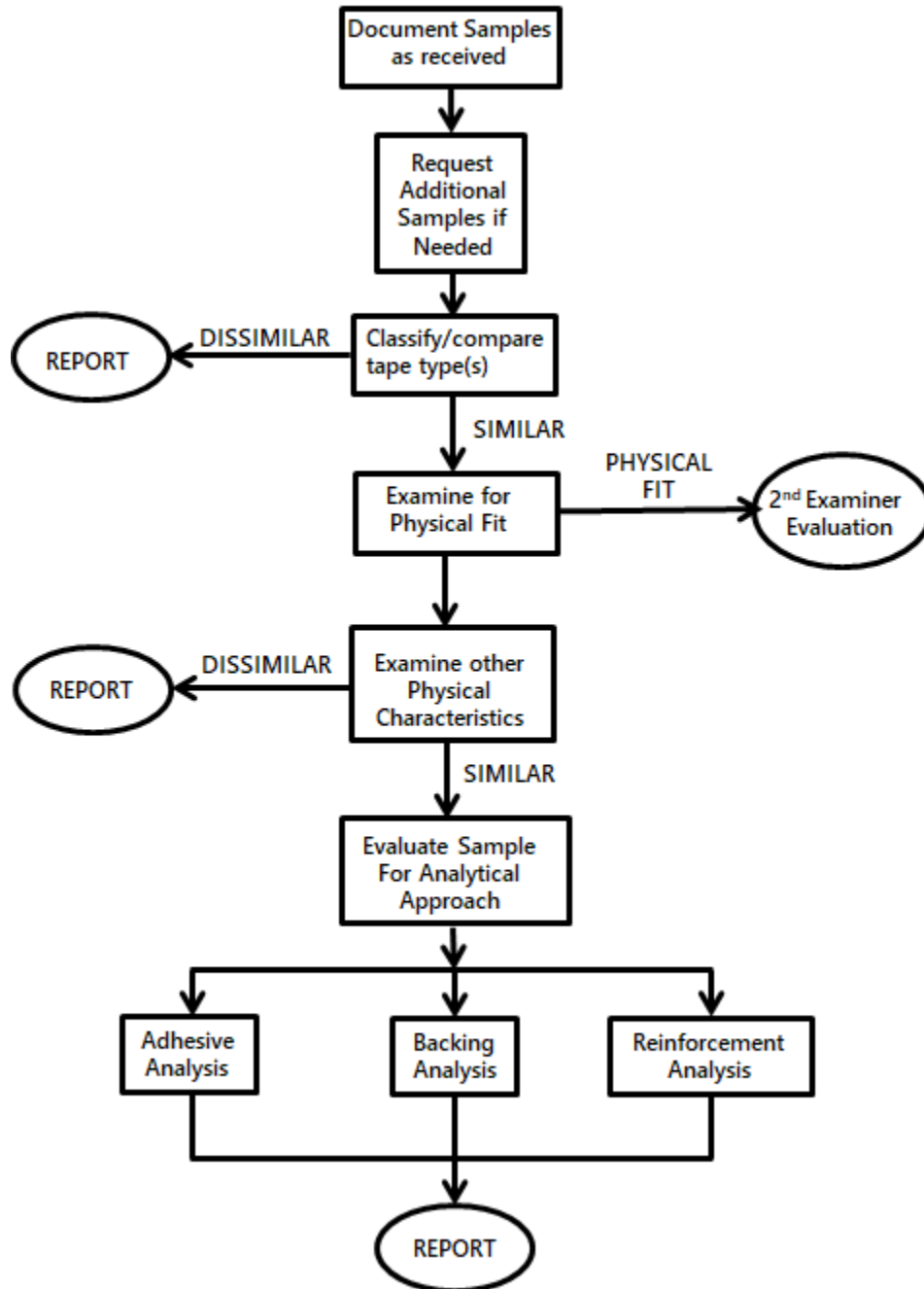


Figure 2: Analytical Scheme for Tape Adhesives Analysis

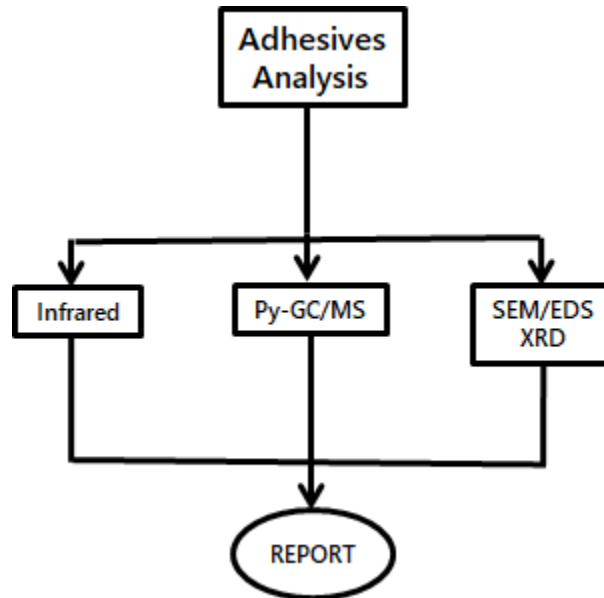
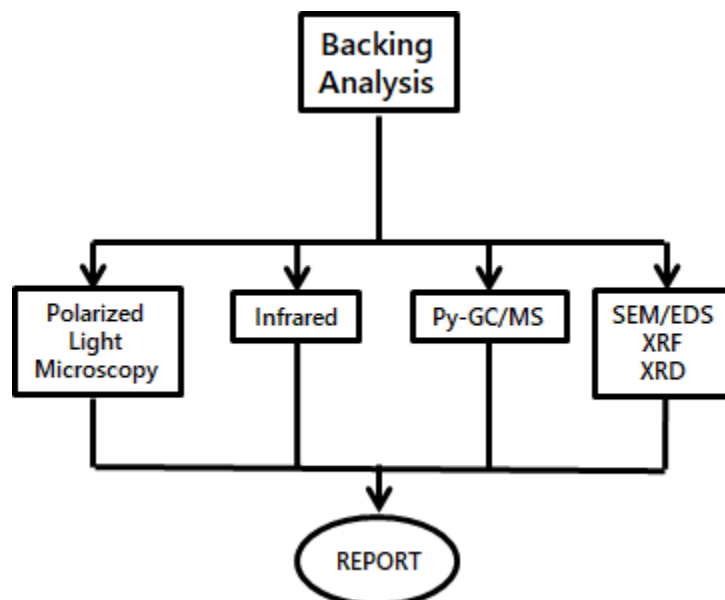


Figure 3. Analytical Scheme for Tape Backing Analysis



Rev. #	Issue Date	History
4	09/18/18	Updated Section 1, Introduction and revised Scope to describe who document applies to; Removed Calibration and Types of Tape Evidence sections and renumbered. Updated Sections 5, 6, 7 and 8 for clarity.
5	04/06/21	Minor edit to address “tape” as “pressure sensitive adhesive (PSA) tape” throughout. Changed “report of examination” to “ <i>Laboratory Report</i> ” in Section 8. Edited Figures 1&2 and added Figure 3 to align with new ASTM standard guide E3260 for tape analysis and edited text to refer to these figures. Added the new ASTM standard (E3260) to the references. Removed QA approval line.

Approval

Redacted - Signatures on File

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