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Managing records on thermal papers

Contents

What is thermal paper?

Thermal paper is a copy paper that uses heat to produce its image. Thermal papers have been in use in various applications since the mid-1950s. Early thermal papers were used for office copying and were early precursors to modern xerox copies (the chemistry was quite different). More recently, thermal papers have been used as the print-out paper for fax machines as well as for such things as automatic ticketing machines and chart recorders (referred to here as 'modern' thermal papers).

The National Archives is concerned that thermal papers have found their way into archival collections, as many show rapid deterioration such as overall darkening, embrittlement and fading of the image.

Early thermal papers

Before the advent of the xerox process, there was a wide variety of document copying methods used in the office. Early methods included spirit duplication and photostat, both of which have proven to be fairly stable over time. Thermal papers, on the other hand, are much less stable.

The three main types of early thermal office copying papers: Thermo-Fax front-printing paper, Thermo-Fax back-printing paper and Dual Spectrum paper were manufactured by the 3M company in the United States. Thermo-Fax front-printing paper, which was in use between about 1956 and the late 1960s was the least stable. They are fairly easily recognised – the papers are quite 'rattly', tend to be quite brittle and on the reverse side they have a layer of brilliant white pigment. Examples are usually fairly dark on the image side due to deterioration of the chemical image-forming layer.

The second type, Thermo-Fax back-printing paper, used between about 1962 and the late 1960s, is harder to recognise, but papers tend to be quite thin, have a fine chemical coating on the front and have images varying from a metallic grey to red-brown. Papers were often toned yellow in colour.

The third type of thermal paper, Dual Spectrum, was a later development and was in use between about 1964 and 1969. Papers using this process are easily recognisable – on their reverse side there is a blue coloured logo printed regularly, that resembles three fanned-out leaves but represents a 'flame'.

Modern thermal papers

The more recent thermal papers that may be encountered have some similarity to those from the 1950s and 1960s but are used for quite different applications. They are commonly used in facsimile machines and as the print-out paper for digitally scanned images, including electronic whiteboard print-outs. They are also used for printing tonal images such as photographs and for computer-assisted design drawings.

These papers also have a chemical coating on their face which darkens when heated. In the copying process the image is produced through the action of a heated stylus passing over the paper.

The papers themselves are usually quite thin and have a shiny surface on the image side. They can be easily identified, as a black mark appears when the coated side is scored with a fingernail.

Preservation problems

The major preservation problem with thermal papers is that the chemical image-producing layers remain chemically active after the image is produced. In the case of the copying papers from the 1950s and 1960s, this results in the slow darkening of the image side and the embrittlement of the paper as a whole. With the more recent fax and similar papers the images tend to fade. This fading can be quite rapid and images can be entirely lost in as little as five years.

All thermal papers are also highly sensitive to light, which can greatly speed up their deterioration, whether darkening or fading. Also, any further exposure to heat can obscure the printed image by causing the surrounding coating to darken. The coating can similarly be darkened by friction if scored or rubbed against other objects.

The thermal coating can also react with solvents such as those used in some highlighters and vapours emitted by polyvinyl chloride (PVC) folders, causing damage to the image. Chemical reactions within the chemical coating of thermal papers can also affect documents stored adjacent.

Printer recommendations

If you use a printer or fax machine producing thermal copies it is recommended that you seriously consider changing to a non-thermal, plain paper copier.

Preservation recommendations

If you have historical thermal copies from the 1950s and 1960s amongst your archival records or you are producing or receiving thermal copies for archiving, a number of points need to be considered to minimise risk of image loss.

For records of permanent or long-term value

Current evidence indicates that all thermal papers are fairly unstable and cannot be considered permanent. This is especially true for the more modern papers which, even with optimum storage and handling conditions, can be expected to display significant fading in as little as five years. Papers from the 1950s and 1960s are not as unstable as this but can still be considered to be of limited permanence.

Thermal paper is, therefore, not a suitable medium for records of permanent or long-term value. To avoid loss of data in such records, photocopies of thermal paper documents should be made on permanent or archival copy paper. These photocopies should be retained as the archival copies. After the photocopies have been checked for completeness and legibility, thermal paper copies may be destroyed as a normal administrative practice.

If, for whatever reason, an original thermal paper needs to be retained, a copy should be made as a back-up, in case the original becomes illegible. The paper should then be stored in environmental conditions, i.e. not exceeding 20 °C or 50 per cent relative humidity. Extremes of temperature and humidity can cause rapid deterioration of the image. Avoid prolonged exposure to light as this can also speed up the deterioration of the image. To avoid the possible danger of thermal copies affecting other papers stored adjacent, thermal copies should be filed separately from other paper records.

For records of short-term value

Because the prospective life span of a modern thermal paper image is so short, the use of modern thermal papers is even a concern in relation to records which have only a short-term value. Therefore, if a thermal copy is required to last any longer than five years, or if it will be handled a lot, consideration should still be given to producing a copy for retention and reference. If this is not possible, the papers will require particular care if they are to last. This should include storing them away from extremes of temperature and humidity, avoiding prolonged exposure to light and storing them separately from other documents.

Warning to recipients of fax documents

Recipients of facsimile documents need to be alerted to the possible loss of information from thermal fax copies. Adding a warning – similar to the example below – to the transmission sheets used to head facsimile messages can help.

Warning

Facsimiles on thermal paper can be highly unstable. If these documents contain authorisations or other important information they should be copied to plain paper before filing or otherwise storing. Records to be retained for longer than 10 years should be copied to permanent paper.

Further information

Contact the **Agency Service Centre**.