AvSAP
Audio-Visual Self-Assessment Program

Audiovisual Formats

Film

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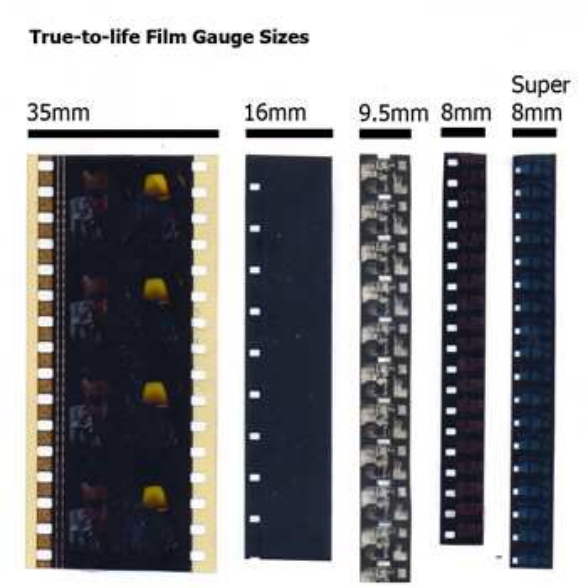
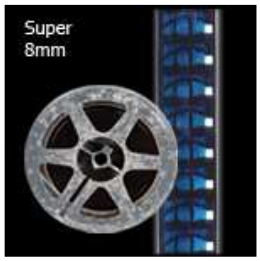


35mm

16mm

9.5mm



Super 8mm

Regular 8mm

Base/Composition

35mm

Description: This moving image format consists of photochemical emulsion (color or black and white) on translucent plastic backing with sprocket holes running down one or both sides of the film strip; the strip may contain an optical or magnetic soundtrack. The width (or "gauge") of this film format is 35mm. It is a format not very commonly found in libraries but can turn up in museums and archives.

History Thirty-five millimeter film gauge (width) was first developed in 1893 and is still in use today. Films produced before the 1950s may use flammable cellulose nitrate as their plastic base and should be treated and stored with great care. Motion picture films produced after the 1950s may use cellulose acetate or polyester as their base. Cellulose acetate has a characteristic kind of breakdown known colloquially as "vinegar syndrome." Polyester is a very stable plastic; if stored properly, films with this base can have very long viable lives.

Prone to the Following Problems Motion picture film is prone to the following problems: nitrate breakdown (if cellulose nitrate is the base), acetate breakdown/vinegar syndrome (if cellulose acetate is the base), mold, physical damage such as torn sprocket holes, damaged splices, scratches, and mag stock breakdown.

Risk Level Inherent in Format In the case of cellulose nitrate-based films, the preservation risk level is very high. Because of motion picture film's impending obsolescence, any other film base should be considered at moderate risk (NFPF, 2004).

Issues Related to Playback Each audiovisual medium requires equipment to decode the information held within it. Film is unique compared to other AV media in that the information can be seen with the naked eye; one can see the images printed on the film without an intermediary machine. However, in order to view the film as intended, a means of projection is required. The National Film Preservation Foundation's (NFPF) guide (2004) states that "for each film gauge there is a family of like-gauged equipment and supplies designed to work together. Manufacturers make the film stock with holes (known as perforations), usually along the edges, to advance the film strip through the sprockets of same-gauged cameras and projectors" (p.6). Stated simply, you must have a projector which corresponds to the film gauge you have in order to play it back. Film incurs the most physical wear through playback, typically at the beginning and end of the film. Films can become stuck in the projector or misalign with the take-up sprockets, causing sprocket holes to tear and other serious damage. For film in poor condition, projecting a film can pose a significant risk, since "projectors will inflict additional damage to films already weakened by shrinkage, tears, or decay" (NFPF, 2004, p.20). We highly recommend having a skilled technician perform a thorough inspection of the film and playback equipment prior to projecting the film.

Recommended Storage Conditions(+/- 2)

Best Temp (degrees F)	Good Temp (degrees F)
0-32º	33-54º

Back to the top of the page

16mm

Description: This moving image format consists of photochemical emulsion (color or black and white) on translucent plastic backing with sprocket holes running down one or both sides of the film strip; the strip may contain an optical or magnetic soundtrack. The width (or "gauge") of this film format is 16mm. It is a format commonly found in libraries, archives, and museums.

History The 16mm film gauge was first developed by Kodak in 1923 and is still in use today. Sixteen millimeter film is only found with acetate or polyester plastic bases. Cellulose acetate has a characteristic

kind of breakdown known colloquially as "vinegar syndrome." Polyester is a very stable plastic; if stored properly, films with this base can have very long viable lives.

Prone to the Following Problems Sixteen millimeter motion picture film is prone to the following problems: acetate breakdown/vinegar syndrome (if cellulose acetate is the base), mold, physical damage such as torn sprocket holes, damaged splices, scratches, and mag stock breakdown.

Risk Level Inherent in Format Because of motion picture film's impending obsolescence, this film format should be considered at moderate preservation risk (NFPF, 2004).

Issues Related to Playback Each audiovisual medium requires equipment to decode the information held within it. Film is unique compared to other AV media in that the information can be seen with the naked eye; one can see the images printed on the film without an intermediary machine. However, in order to view the film as intended, a means of projection is required. The National Film Preservation Foundation's (NFPF) guide (2004) states that "for each film gauge there is a family of like-gauged equipment and supplies designed to work together. Manufacturers make the film stock with holes (known as perforations), usually along the edges, to advance the film strip through the sprockets of same-gauged cameras and projectors" (p.6). Stated simply, you must have a projector which corresponds to the film gauge you have in order to play it back. Film incurs the most physical wear through playback, typically at the beginning and end of the film. Films can become stuck in the projector or misalign with the take-up sprockets, causing sprocket holes to tear and other serious damage. For film in poor condition, projecting a film can pose a significant risk, since "projectors will inflict additional damage to films already weakened by shrinkage, tears, or decay" (NFPF, 2004, p.20). We highly recommend having a skilled technician perform a thorough inspection of the film and playback equipment prior to projecting the film.

Recommended Storage Conditions(+/- 2)

Best Temp (degrees F)	Good Temp (degrees F)
0-32º	33-54º

Back to the top of the page

9.5mm

Description: This moving image format consists of photochemical emulsion (color or black and white) on translucent plastic backing with sprocket holes running down the center of the film strip between each image frame. There may be a magnetic soundtrack running down one side of the film strip. The width (or "gauge") of this film format is 9.5mm. This format is rarely found in the United States but may be found more in Europe.

History Pathe introduced this amateur film format in the early 1920s. The film format has a cellulose acetate plastic base, which has a characteristic kind of breakdown known colloquially as "vinegar syndrome."

Prone to the Following Problems This motion picture film format is prone to the following problems: acetate breakdown/vinegar syndrome (if cellulose acetate is the base), mold, physical damage such as torn sprocket holes, damaged splices, scratches, and mag stock breakdown.

Risk Level Inherent in Format Because of the rarity and obsolescence of this film format, its preservation risk should be considered very high.

Issues Related to Playback Each audiovisual medium requires equipment to decode the information held within it. Film is unique compared to other AV media in that the information can be seen with the naked eye; one can see the images printed on the film without an intermediary machine. However, in order to view the film as intended, a means of projection is required. The National Film Preservation Foundation's (NFPF) guide (2004) states that "for each film gauge there is a family of like-gauged equipment and supplies designed to work together. Manufacturers make the film stock with holes (known as perforations), usually along the edges, to advance the film strip through the sprockets of same-gauged cameras and projectors" (p.6). Stated simply, you must have a projector which corresponds to the film gauge you have in order to play it back. Film incurs the most physical wear through playback, typically at the beginning and end of the film. Films can become stuck in the projector or misalign with the take-up

sprockets, causing sprocket holes to tear and other serious damage. For film in poor condition, projecting a film can pose a significant risk, since "projectors will inflict additional damage to films already weakened by shrinkage, tears, or decay" (NFPF, 2004, p.20). We highly recommend having a skilled technician perform a thorough inspection of the film and playback equipment prior to projecting the film.

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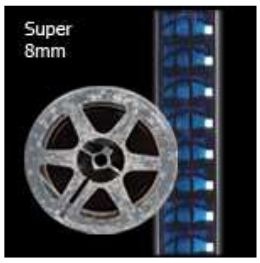
Back to the top of the page

Super 8mm



Description: This moving image format consists of photochemical emulsion (color or black and white) on translucent plastic backing with sprocket holes running down one side of the film strip; the strip may also contain a magnetic soundtrack running down one side. The width (or "gauge") of this film format is 8mm. It is a format commonly found in libraries, archives, museums, and especially home movie collections.

History The Super 8mm film gauge was first developed by Kodak in the mid 1960s and is still in use today. This film format can be distinguished from Regular 8mm film by its larger image area and smaller sprocket holes. Super 8mm film is found only with acetate or polyester plastic bases. Cellulose acetate has a characteristic kind of breakdown known colloquially as "vinegar syndrome." Polyester is a very stable plastic, and if stored properly, films with this base can have very long viable lives.

Prone to the Following Problems Super 8mm films are prone to the following problems: acetate breakdown/vinegar syndrome (if cellulose acetate is the base), mold, physical damage such as torn sprocket holes, damaged splices, scratches, and mag stock breakdown.

Risk Level Inherent in Format Because of motion picture film's impending obsolescence, this film format should be considered at moderate preservation risk (NFPF, 2004).

Issues Related to Playback Each audiovisual medium requires equipment to decode the information held within it. Film is unique compared to other AV media in that the information can be seen with the naked eye; one can see the images printed on the film without an intermediary machine. However, in order to view the film as intended, a means of projection is required. The National Film Preservation Foundation's (NFPF) guide (2004) states that "for each film gauge there is a family of like-gauged equipment and supplies designed to work together. Manufacturers make the film stock with holes (known as perforations), usually along the edges, to advance the film strip through the sprockets of same-gauged cameras and projectors" (p.6). Stated simply, you must have a projector which corresponds to the film gauge you have in order to play it back. Film incurs the most physical wear through playback, typically at the beginning and end of the film. Films can become stuck in the projector or misalign with the take-up sprockets, causing sprocket holes to tear and other serious damage. For film in poor condition, projecting a film can pose a significant risk, since "projectors will inflict additional damage to films already weakened by shrinkage, tears, or decay" (NFPF, 2004, p.20). We highly recommend having a skilled technician perform a thorough inspection of the film and playback equipment prior to projecting the film.

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Back to the top of the page

8mm

Description: This moving image format consists of photochemical emulsion (color or black and white) on translucent plastic backing with sprocket holes running down one side of the film strip; the strip may also contain a magnetic soundtrack running down one side. The width (or "gauge") of this film format is 8mm. It is a format commonly found in libraries, archives, museums, and especially home movie collections.

History The 8mm film gauge, often called Regular 8mm to distinguish it from Super 8mm, was first developed by Kodak in 1932. This film format can be distinguished from Super 8mm by its smaller image area and larger sprocket holes. Regular 8mm film is found only with an acetate plastic base. Cellulose acetate has a characteristic kind of breakdown known colloquially as "vinegar syndrome."

Prone to the Following Problems Regular 8mm film is prone to the following problems: acetate breakdown/vinegar syndrome (if cellulose acetate is the base), mold, physical damage such as torn sprocket holes, damaged splices, scratches, and mag stock breakdown.

Risk Level Inherent in Format Because of this motion picture film's obsolescence, this film format should be considered at high preservation risk (NFPF, 2004).

Issues Related to Playback Each audiovisual medium requires equipment to decode the information held within it. Film is unique compared to other AV media in that the information can be seen with the naked eye; one can see the images printed on the film without an intermediary machine. However, in order to view the film as intended, a means of projection is required. The National Film Preservation Foundation's (NFPF) guide (2004) states that "for each film gauge there is a family of like-gauged equipment and supplies designed to work together. Manufacturers make the film stock with holes (known as perforations), usually along the edges, to advance the film strip through the sprockets of same-gauged cameras and projectors" (p.6). Stated simply, you must have a projector which corresponds to the film gauge you have in order to play it back. Film incurs the most physical wear through playback, typically at the beginning and end of the film. Films can become stuck in the projector or misalign with the take-up sprockets, causing sprocket holes to tear and other serious damage. For film in poor condition, projecting a film can pose a significant risk, since "projectors will inflict additional damage to films already weakened by shrinkage, tears, or decay" (NFPF, 2004, p.20). We highly recommend having a skilled technician perform a thorough inspection of the film and playback equipment prior to projecting the film.

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Back to the top of the page

Film Base

This question may involve unspooling the film to answer. We recommend doing this only after you've looked at our "Film Handling Basics" section. Unspooling film is not without risk. If you are unable or unwilling to unspool your film and you have no supporting information which may answer this question, we recommend you click on "I Don't Know."

Film Base At-A-Glance (scroll down for more information and images)

When we talk about film base, we are talking about the plastic layer that is the carrier for the emulsion layer (the image layer) of film.

- Nitrate film is the highest preservation priority. Nitrate will often say "nitrate" along the edge of the film (see below for an image)
- Nitrate is not found in 16mm, 9.5mm, 8mm or Super 8 gauges
- The odor of nitrate film is often described as the smell of dirty socks
- Acetate film is the second-highest in preservation priority

- Acetate film is found in 35mm, 16mm, 8mm and Super 8 gauges
- Acetate film, if it is suffering from acetate decay, will often emit an vinegar odor
- Polyester film has the lowest preservation priority
- The easiest way to differentiate acetate base film from polyester base film is to hold the film up to the light (see below for an image). If the light easily passes through the film pack, the film is polyester. If it appears to be fairly opaque, the film is acetate. (Note that the **reverse** is true of magnetic audiotape)

Nitrate	Acetate	Polyester
Only found in 35mm gauge film	Most film Stock produced after 1950; some produced as early as 1930s.	Produced after 1955; sold under trade names like Chronar (Dupont), ESTAR (Kodak), and Mylar
Film stock manufactured prior to 1951	"SAFTEY" often printed on the edge of film stock	Does not tear easily; does not have cement splices
If film was manufactured after 1920 to 1950, may have the word "NITRATE" printed on the film's edge	Hold the film reel up to a light source (film pack parallel to your eyes). If light CANNOT be seen piping through the film strands, it is most likely an acetate-base film.	Hold the film reel up to a light source (film pack parallel to your eyes). If light CAN be seen piping through the film strands, it is most likely an polyester-base film.

Film Composition:

Film is composed of two layers - the emulsion layer, which supports the photosensitive material and the thicker transparent plastic base, which supports the emulsion layer. The base is generally composed of one of three types of plastic: nitrate, acetate or polyester. Bases may be identified based on a few factors. Date can be an important indicator as can film gauge. Of the three materials, nitrate is the oldest, most volatile and requires the most care in handling. A form of acetate film was introduced in 1909. It was developed to circumvent the danger of nitrate, but is subject to its own particular kind of decay.

Nitrate

Most 35mm film bases prior to the early 1950s are composed of cellulose nitrate (nitrate). Nitrate is a highly flammable material, with nitrate fires being nearly impossible to extinguish one they've started. It can ignite at relatively low temperatures - ranging from 300F to 105F in later stages of decay. In the 1920s, Kodak began labeling nitrate film by printing "NITRATE" on the edge of the film.

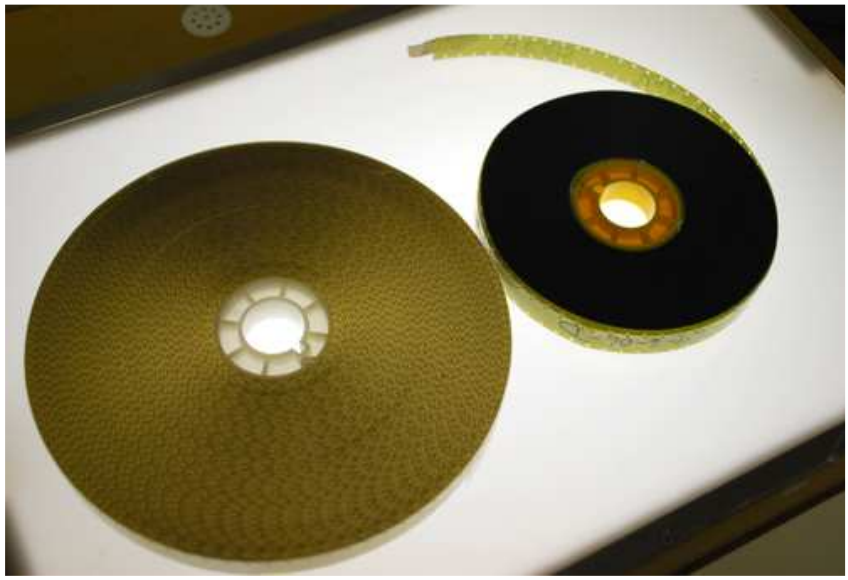
Film base clearly identified as nitrate
Still from video posted by bolexmovie: http://www.youtube.com/user/bolexmovie

Acetate

Acetate, in various chemical forms ranging from cellulose diacetate in 1909 to cellulose triacetate in the 1940s, was an improvement over nitrate in that flammability was greatly reduced. Hence, acetate films became to be known as "safety film". Manufacturers identified their film as safety by labeling it as such. The text "SAFETY" is often printed edge of early acetate film.

Safety Film
Image Courtesy of
Manuscripts Department, Wilson Library,
University of North Carolina at Chapel Hill

An additional way to identify acetate is to place the film pack parallel to a light source. If light CANNOT be seen piping through the film strands, it is most likely an acetate-base film. The film will appear opaque and light will not filter through the film pack. Acetate film can be found in a variety of gauges: 35mm, 28mm, 16mm, 9.5mm, Regular 8mm, and Super 8mm.



Polyester (left) compared to acetate (right) - Polyester is "piping" light whereas acetate looks opaque.

Polyester

Polyester is the most recently developed film base. It was developed in the mid-1950s, and continues to be the standard for film-to-film archival preservation because of its durability. It cannot be easily torn, and is chemically very stable. You can identify a polyester film base by piping light upwards through, and parallel to a horizontally-oriented film pack. If the pack appears to "pipe" light; that is, light can be seen through the film pack, the film is polyester-based.

Polyester-based film held up to a light source - notice how film appears to "glow" from the light permeating the film pack.

Back to the top of the page

Intro | Film | Video | Magnetic Audio | Grooved Disc | Grooved Cylinder | Wire | Optical | Other Media Glossary | Bibliography

This page is part of the Audiovisual Self-Assessment Program (AvSAP), an IMLS-funded audiovisual preservation assessment tool. AvSAP was designed at the University of Illinois at Urbana-Champaign Library. More information about AvSAP and a link to the program can be found here: http://www.library.illinois.edu/prescons/services/av_self_assesment_program.html