

AMIA the association of moving image archivists

Film Shrinkage Gauge Available for Loan

Loan Rules and Regulations

The AMIA film shrinkage gauge is a benefit of membership that is available for loan free of charge to any member of the Association of Moving Image Archivists. The gauge was manufactured and purchased in 1997 under the auspices of the AMIA Preservation Committee. It can be used to measure the linear shrinkage in any roll of 35mm, 16mm or regular 8mm film.

AMIA members who wish to borrow the shrinkage gauge must assume responsibility for all shipping, customs, brokerage and insurance charges both to and from the AMIA home office. The value of the gauge for insurance purposes is \$700 US.

Shipping must be made via a carrier (UPS, FedEx, Airborne Express, US Postal Service Express Mail, etc.) using a tracking system which will allow tracing the shipment if it does not arrive on time. Borrowers may either prepay the shipping or provide a valid account number for charging the cost of the shipping. No COD shipments will be permitted, except as approved by the AMIA Administrative Coordinator.

The normal maximum period of loan for the gauge is 3 weeks. Periods in excess of 3 weeks must be approved in advance by the Administrative Coordinator. Extensions of existing loans must also be approved.

Members who borrow the gauge are responsible for loss or damage while the equipment is in their possession AND IN TRANSIT. Please notify the AMIA office immediately in the event of such a problem.

Requests to borrow the gauge should be made in writing at least 2 weeks in advance of the required date of use. Requests can be sent via fax (323)463-1506, email: AMIA@amianet.org, or regular mail:

Association of Moving Image Archivists
1313 North Vine Street
Hollywood, CA 90028

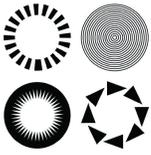
Failure to follow the stated rules and regulations could result in a suspension of borrowing privileges or other action as determined by the AMIA Board of Directors.

What Is Film Shrinkage?

"In acetate film, permanent shrinkage is caused by the loss of residual solvents, and even the gradual elimination of strains introduced during manufacture." (*The Book of Film Care*; Kodak Publication No. H-23, 1st edition, 1983, page 20; 2nd edition, 1992, page 15.

"Film shrinkage cannot be fully recovered. That fact is troublesome, because perforations are carefully placed along the length of the film and any change in their spacing can become a problem." (*The Book of Film Care*; Kodak Publication No.H-23, 1st edition, page 72; 2nd edition, page 55."

Note that though the reference to shrinkage is limited to acetate based film (and is valid for both diacetate as well as triacetate base), nitrate film is also prone to shrinkage. The only film base where shrinkage is not considered to be a critical factor is polyester base film because it is less susceptible to moisture loss and contains no residual solvents.



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In nitrate or acetate film, some dimensional change can be the result of moisture (humidity) in the storage environment and may be partially correctable. Solvent loss, however, is permanent.

Why Is Shrinkage Important?

Any form of mechanical viewing of film relies on the fact that the film is transported by sprockets engaging in perforations (sprocket holes) in the film. The ability to accurately and successively position individual frames for projection/viewing is dependent on the integrity of the mechanical sprocket and the film sprocket hole relationship. Standards pertaining to size, pitch, spacing etc. of both sprocket holes and sprockets have been promulgated to ensure projected image stability throughout all film operations, including duplication and projection. As film shrinks (or in rare cases, stretches) the relationship between sprocket holes on the film and the transport sprocket(s), claws or pins change. As the latter are invariably manufactured from metal, they will attempt to fit into standardized sprocket holes. With shrunken film there is a tendency for sprockets to enlarge, distort or tear existing holes. Or in extreme cases of shrinkage, to make new sprocket holes. The potential for irreparable damage is therefore very real when older films, or films having an unknown or less than perfect storage history are subject to viewing, screening or copying using standard commercial equipment.

In order to minimize the possibility of damage, it is important to determine the shrinkage of film documents as a first step for conservation and/or access purposes.

How Is Shrinkage Measured?

The operating principle behind the AMIA shrinkage gauge is relatively simple and is based on the ability to determine and display, in percentage terms, the difference in length between a known sample of film with 0% shrinkage and the film being evaluated. This is achieved by placing the specimen film horizontally on the base of the gauge and engaging an exact number of film sprocket holes between the two pins on the gauge base. One of the pins is not fixed, and is attached to an indicator arm, such that when the appropriate number of sprocket holes rests between both pins, the amount of shrinkage can be easily read from the dial.

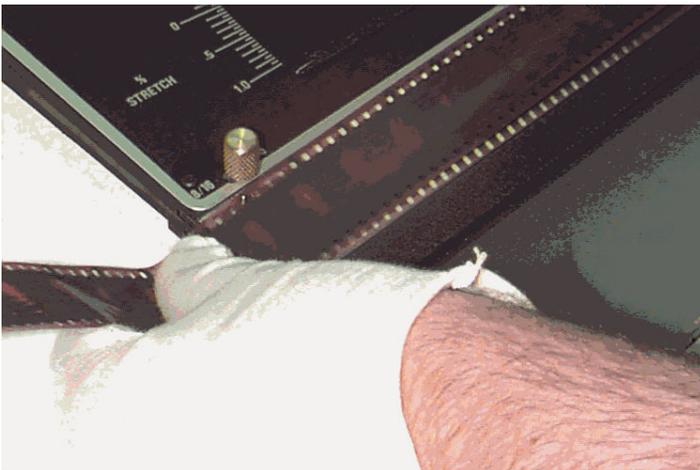
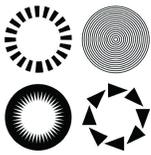


Figure 1: Select an undamaged sprocket hole and carefully place on the fixed pin.



Figure 2: After counting the proper number of holes, slide the film over the pin attached to the pivoting arm.



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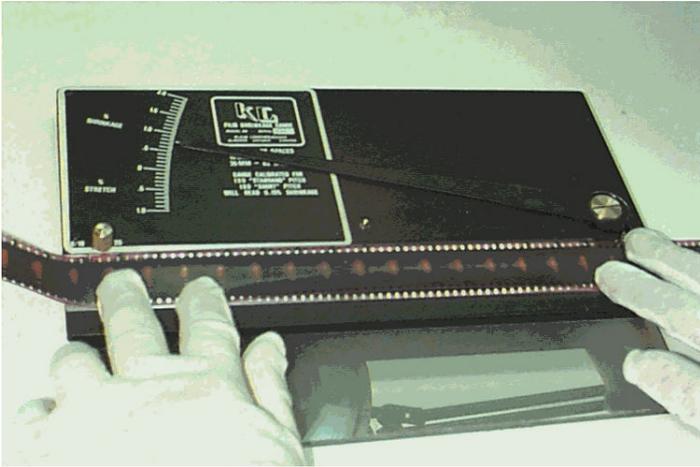


Figure 3: Read the result using the scale provided on the AMIA shrinkage gauge.

The number of sprocket holes required for an accurate reading of the gauge being evaluated is indicated on the gauge itself. This is for verification purposes, as for normal reading purposes moving the variable pin/arm, to the closest sprocket below 0% will suffice.

It is recommended that shrinkage measurements be taken at the beginning (head), end (tail) and middle of films under assessment. In the case of spliced reels of film comprising several different bases, determination of shrinkage will have to include all these different film stocks.

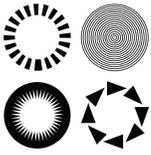
The gauge is properly calibrated for measuring ISO standard pitch film stocks. Stocks generally perforated at this pitch include positive print stocks, original reversal films, and some master positive films. Original camera negatives and sound track films usually are perforated to "short" pitch and if unshrunk will register a shrinkage level of 0.15% on the shrinkage gauge.

The gauge can be used for reading the shrinkage of three film gauges, regular 8mm, 16mm and 35mm. The brass knob on the left side of the gauge should be set to the proper gauge of the film being measured for accurate readings.



Figure 4: Be sure the proper film gauge is selected

It should be pointed out that in some cases (e.g. some diacetate stocks from the 1920's) the film being measured may actually show signs of stretch rather than shrinkage. The AMIA gauge will also successfully measure up to 1% stretch.



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How Should the Results Be Interpreted?

As a general rule, for safe film viewing on machines with sprocketed drives, such as a flatbed editing machine or commercial copying operations, 8mm or 16mm film should have a shrinkage of 0.8% or less. 35mm film should have a shrinkage of 1.0% or less. It should be noted that some equipment is more sensitive to shrinkage than others, even those of the same type, make and model can have subtle differences. Extreme caution should be exercised with films that exceed 0.5% for 8/16mm and 0.8% for 35mm when using them on equipment having sprocketed drives.

Note that this "safe" area is only an estimate or educated guess as other components of the equation, (e.g. brittleness, curvature, severe edge curl and other physical defects) will have to be considered in order to determine whether the film can safely be viewed on standard equipment. Films with a level of shrinkage higher than mentioned above should not be subjected to any form of projection with normal commercial equipment.

Shrinkage greater than the above figures would indicate special treatment, including specialized copying facility use and/or custom sprockets on viewing equipment. Video transfers using what is commonly referred to as a "film chain" telecine would also be impacted by shrunken film due to the fact these pieces of equipment generally use sprockets. However, film to video transfers using "sprocketless" drive mechanisms such as a Rank-Cintel may be successful, but the level of shrinkage should be discussed with the transfer lab before proceeding.

May 1998

AMIA Preservation Committee