

Film Dimensions Committee Report

By E. K. CARVER, Committee Chairman

THE REPORT that follows is much longer than that which the Film Dimensions Committee ordinarily has given. One reason is that it leads up to a discussion of progress toward international standards, as information on this matter has not been widespread through the Society's ordinary channels of communication. Another reason for a lengthy report is that we wish to discuss a situation concerning 16mm film, a field wherein so many people are engaged that they seldom get together in the manner that happens with those who use 35mm film. Accordingly, the committee has sent out several circular letters and desires to make a relatively long public report in an effort to reach everyone that may be interested.

A questionnaire was sent out in March, 1952, to some thirty manufacturers of 16mm film equipment, and the results have been studied. It appears from the replies to the questionnaire that we have not sufficiently emphasized the fact that the proposed change in standard dimensions will not make the present film narrower in width than the film formerly used in cameras or other equipment.

You will remember that the standards are written to describe the film "immediately after cutting and perforating." Although it was very clear in the minds

of those who wrote the early standards that these standards referred to widths at the time of slitting, nevertheless there has been the tendency among equipment manufacturers to interpret them to mean the maximum and minimum widths of film that would ever be encountered under any circumstances. The manufacturers of equipment soon learned by experience that film would often be found considerably narrower than the standards. This fact was properly interpreted to be due to the shrinkage of the film. Whenever equipment manufacturers found film to be wider than the standards, they assumed that the film was improperly slit. They did not fully realize that film swells at high humidity and that film, even though properly slit, might swell under high humidity conditions so that its width would be greater than standard.

One reason why this swelling effect was not better known was because of the rapidity of shrinkage which occurred with the old type of high-shrink film. As soon as the package was opened (or even before this in case it was not adequately, hermetically sealed in a metal container) the film started to lose residual solvents and to shrink. This loss of solvents was more rapid at high humidities. Under most circumstances, therefore, the increase in width due to absorption of moisture from the air was more than counterbalanced by the decrease in width caused by loss of solvents to the air. For this reason it was rarely found in practice that film would be

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wider than the original slit width and, therefore, manufacturers of equipment began to consider that the standards represented the maximum that they would ever encounter. There was a tendency, therefore, to construct film gates and other equipment so that they would pass film with a width of 0.630 in. (16.0 mm) but of no greater width. They felt that any film which exceeded this width must be nonstandard film.

During the past ten or fifteen years film manufacturers have found means to improve the shrinkage characteristics of film and can be expected to make further improvements. Severe conditions which might cause the older type of film to shrink about 1% would cause the newer type of film to shrink only 0.2 to 0.4%. The present film often reaches the camera with no shrinkage whatever. There is not much difference, however, between the amount of swell due to absorption of moisture that occurs with the newer type of film and that which formerly occurred with the older type of film. It thus has become much more common to find the newer type of film wider than standard. Since much of the equipment has been constructed so as not to accept film with a width appreciably greater than 0.630 in., complaints have arisen that the film was slit too wide.

These complaints forced the film manufacturers to change the setting of their slitting knives from about the middle of the standard tolerances down to a point near the narrowest tolerances allowed. Accidental variations in slitting meant that some of the film was slit narrower than the allowed tolerances but no complaints were ever received for that reason. Complaints were still received, however, on film which appeared to be too wide at high humidities. The slitting knives were set still closer to the bottom tolerance. This practically eliminated complaints from film which was too wide but did not introduce any complaints or any difficulties from film which was too narrow. This was true

even though a large fraction of the film fell below the "standard" width.

An investigation was undertaken to find out what the widths have formerly been at the time the film was actually used. Statistical studies were made on many samples of film purchased on the open market and of film at the end of its useful life. Measurements were also made in 16mm film exchanges of the regular, professional distribution systems. The various measurements showed clearly that the newer type film even with a reduced slitting width typically would reach the customer with a greater width than old type film. However, the width was not great enough so that one could expect any more trouble at high humidities than have been previously encountered.

The present attempt to change the standard for slitting 16mm film, therefore, is merely an attempt to recognize in a formal manner the changes which the film manufacturers have been forced to make in order to avoid complaints and to give the customer film as near the old width as possible. We call this an effort to maintain the "status quo," which is what the ultimate user often needs.

The Film Dimensions Committee is anxious to make sure that all of the equipment manufacturers thoroughly understand this problem. If these manufacturers were to misinterpret the new standard and reduce the dimension of film gates, then we would be in serious trouble. Complaints of film jamming would increase. Pressure would be put on the manufacturers of film to reduce the width of their film. Competition would force some of them to do so, and then there would be pressure put on the standardizing bodies to reduce the standard width again to conform to the width actually in use. One change would follow another, leading to chaos.

Three methods have been proposed to revise the standard to take care of the above problem. One of them was

simply to change the slitting dimensions, i.e., the dimension A in the Standard, from 0.629 in. \pm .001 to 0.628 in. \pm .001. Objections were raised to this method of changing the standard because it was felt that many people would consider that this meant a true reduction in width of film as it is used and would, therefore, reduce the width of the projector gates, camera gates, printer gates, etc., with the results described above.

In order to avoid this difficulty, it was proposed that the Standard for dimension A be written 0.6285 in. \pm .0015. This way of writing the dimension would lay claim to the greatest width of the previous standard, namely, 0.630 in., and yet would permit film manufacturers to reduce their slitting width as much as required so that their low-shrink film would not exceed the width of the high-shrink film as previously manufactured. This idea was rejected because some members of the Committee felt that it would make it appear as if the change might be intended to permit less accuracy in slitting width than heretofore.

For the above reasons the Film Dimensions Committee finally agreed to recommend two standards. The old standard was to be kept the same as previously except that an asterisk was to be inserted above dimension A referring to the statement "For low-shrink film dimension A should be 0.628 in. \pm .001 and dimension E, 0.0355 in." A definition for low-shrink film was included in the standard. The above method appeared to our Committee to take care of the difficulty in a fairly practical way, and this is the standard that is being recommended to ASA.

On the 9th and 10th of June at a meeting of Technical Committee No. 36 (Cinematography) of the International Standards Organization (ISO) this matter was further discussed. The three propositions as outlined above were placed before the Committee. The members of the Committee were unanimous in

agreeing that some actual change in slitting should be adopted. The British delegates were insistent that their standards body would never accept different standards for high-shrink and low-shrink film and that they could not accept the increase in tolerance. The only one of the three proposals which they would accept was the reduction in the standard as outlined in the first of the above propositions with an additional statement somewhat as follows:

"Experience shows that it is common for film to expand when exposed to high relative humidity. Allowance should be made for this factor in equipment design and in no case should the equipment design fail to accommodate a film width of 0.630 in., 16.00 mm."

Rather than see the matter deadlocked, the American group as well as the French and German groups agreed to this modification. Most of us felt that all three proposals were identical in actual content and that any one of them would be satisfactory as an International Standard although we still preferred our own choice for the American Standards.

The actual standards covered by the work of the Committee are: PH22.5, 16mm Double Perforation; PH22.12, 16mm Single Perforation; and PH22.93, 35mm Low-shrink Film. These have been submitted by this Committee to the Standards Committee of the Society. It might be mentioned that the standards for 35mm low-shrink film intended to be used as camera raw stock do not call for a narrowing of the width, nor for other changes that seem quite logical from the point of view of shrinkage alone. The reason for this is that no changes have been made, however logical they may seem, without consulting the people in the trade who are using the film every day. This policy of considering the needs of the user is very desirable in simplifying the procedures and in preventing what might possibly be unnecessary or undesirable changes