INTERNATIONAL STANDARD 3820

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Cinematography — Sprockets for 8 mm Type S motion-picture film — Dimensions and design

Cinématographie — Tambours dentés pour film cinématographique 8 mm *type S — Dimensions et construction*

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FOREWORD

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It has been approved by the member bodies of the following countries :

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Cinematography — Sprockets for 8 mm Type S motion-picture film — Dimensions and design

1 SCOPE AND FIELD OFAPPLICATION

This International Standard lays down the dimensions and specifies requirements for the design of sprockets used with 8 mm Type S motion-picture raw stock or processed film.

2 REFERENCE

ISO 1700, *Cinematography — 8 mm Type S motion-picture raw stock film — Cutting and perforating dimensions.*

3 DIMENSIONS AND CHARACTERISTICS

3.1 The teeth shall be equally spaced at an index angle of $360/N$ degrees, where N is the number of teeth. A suitable tolerance for the index angle is ± 1 minute of arc for sprockets having 12 to 24 teeth and ± 30 seconds of arc for sprockets having 25 to 84 teeth.

3.2 The root diameter D is computed from the equation :

$$D = N \times \frac{P}{\pi} - T$$

where

P is the perforation pitch;

N is the number of teeth;

T is the film thickness.

The root diameters in table 1B were derived using a value for T of 0,15 mm (0.006 in). If optimum working conditions are desired with film materials of other thicknesses, table 1B should be recomputed.

3.3 The minimum value of R_1, as depicted in figure 1, has been chosen as 3,96 mm (0.156 in). This is an arbitrary choice, but seems appropriate for 8 mm equipment. The shape of the film path as the film leaves the root of the sprocket tooth is determined by film stiffness, set, and tension, as well as by the shape and location of rollers or guides.

For the specified tooth shape, the film has been allowed to slip back over the root circle a distance of 0,046 mm (0.001 8 in) measured at the pitch line [film thickness assumed to be 0,15 mm (0.006 in)], by the time the contact point between film and tooth has reached the assumed working height, H, of 0,66 mm (0.026 in) (measured radially from the root circle).

This analysis applies to the feed sprocket, for which the sprocket pitch is generally greater than the perforation pitch, and the film must slip in the direction opposite to the direction of motion. The direction of the friction force between the film and root surface is such as to assist the feed or the driving action. Of the total 0,046 mm (0.001 8 in) accommodation provided at each tooth for film slippage, approximately 0,013 mm (0.000 5 in) is allocated to the combined tolerance of perforation pitch and sprocket tooth pitch (shorter than average perforation pitch combined with longer than average tooth pitch). An additional 0,008 mm (0.003 in) is allocated for, and corresponds approximately to, the distortion resulting from 0,58 N (56,7 gf) of contact loading. The remaining 0,25 mm (0.001 0 in) corresponds to 0,6 % of film shrinkage. It should be noted that a combination of 1,16 N (113,4 gf) of load and approximately 0,4 % shrinkage with pitch tolerances is about equivalent. By this procedure the values of X_T are determined. As shown in figure 3, X_T is the distance measured perpendicular to the radial line intersecting the root of the tooth from a point on the tooth which is 0,66 mm (0.026 in) above the root circle.

3.4 The minimum values of R_2 (see figure 1) have been computed for the same X_T and the same accommodation of 0,046 mm (0.001 8 in) assuming a displacement function proportional to the square of time (see annex, reference 2). These values of R_2 are set out in tables 1A and 1B. For the exit film paths corresponding to larger values of R_1 or R_2 including a straight tangent path, the accommodation of 0,046 mm (0.001 8 in) for film slippage takes place in less than 0,66 mm (0.026 in) of the working height (or more accommodation results at the same height). The accommodation takes place more slowly for the exit path defined by minimum values of R_2; therefore, these are recommended where maximum uniformity of motion is desired.

3.5 The desired tooth shape can be generated by a hob corresponding to the basic rack specified by K_H and B_H as tabulated (see table 3 and figure 4). If the first hob covers the range of N from 12 to 24, inclusively, and the second hob covers the range of N from 25 to 84, inclusively, no deviations in tooth shape from the ideal greater than 0,003 05 mm (0.000 12 in) will occur.

3.6 The tooth width at the base, dimension W, allows ample material for rounding off the tip while preserving the 0,66 mm (0.026 in) working height. In some instances some additional height is available. The value chosen does not limit the angle of wrap on the sprocket as a wider tooth