ISO

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION

ISO RECOMMENDATION
R 491

CUTTING AND PERFORATING DIMENSIONS FOR 35 mm MOTION-PICTURE RAW STOCK FILM

1st EDITION
July 1966

For each individual country the only valid standard is the national standard of that country.

Printed in Switzerland

Also issued in French and Russian. Copies to be obtained through the national standards organizations.

BRIEF HISTORY

The ISO Recommendation R 491, *Cutting and Perforating Dimensions for 35 mm Motion-Picture Raw Stock Film* was drawn up by Technical Committee ISO/TC 36, *Cinematography*, the Secretariat of which is held by the American Standards Association, Inc. (ASA).

Work on this question by the Technical Committee began in 1948 and led to the adoption of a Draft ISO Recommendation (No. 71) which was circulated to all ISO Member Bodies in 1955.

In that same year, the Technical Committee decided to withdraw this Draft and to prepare a more comprehensive document. This work led to the adoption of a second Draft ISO Recommendation (No. 636) in 1961, which was circulated to all ISO Member Bodies in November 1963 and approved by the following Member Bodies:

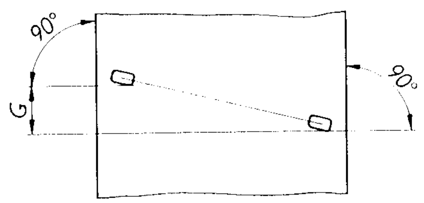
Belgium	Germany	Romania
Brazil	Greece	Spain
Bulgaria	Hungary	Sweden
Canada	Italy	Switzerland
Chile	Japan	United Kingdom
Colombia	Korea, Rep. of	U.S.A.
Czechoslovakia	Netherlands	
Denmark	New Zealand	

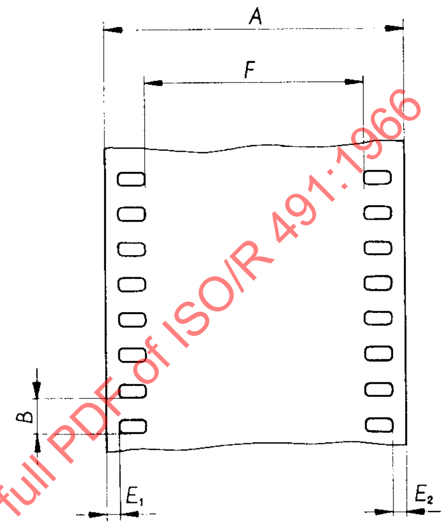
Two Member Bodies opposed the approval of the Draft: France, U.S.S.R.

The Draft ISO Recommendation was then submitted by correspondence to the ISO Council which decided, in July 1966, to accept it as an ISO RECOMMENDATION.

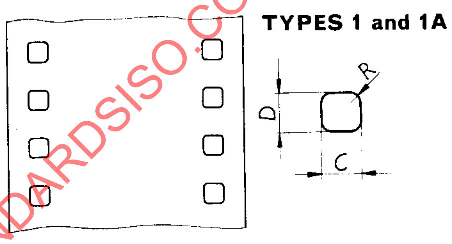
ISO Recommendation R 491 July 1966

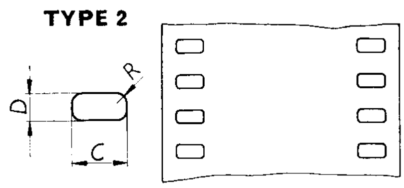
CUTTING AND PERFORATING DIMENSIONS FOR 35 mm MOTION-PICTURE RAW STOCK FILM

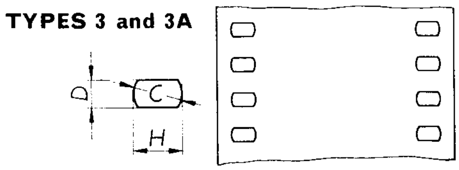


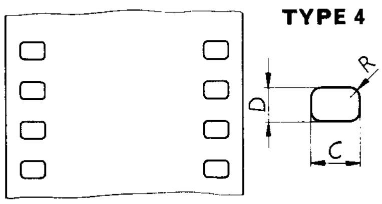


TYPES OF PERFORATIONS









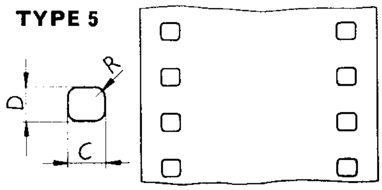


TABLE 1. — **Dimensions in millimetres**

Dimension	TYPE 1(1)	TYPE 1A(1)	TYPE 2	
A	34.975 ± 0.025	34.975 ± 0.025	34.975 ± 0.025	
B	4.75 ± 0.01	(4) 4.74 ± 0.01	4.75 ± 0.01	
C	(5) $2.800^{+0.005}_{-0.015}$	(5) $2.800^{+0.005}_{-0.015}$	(5) $2.800^{+0.005}_{-0.015}$	
D	1.98 ± 0.01	1.98 ± 0.01	(5) $1.850^{+0.015}_{-0.005}$	
(2) (E_1-E_2)	0.10 max.	0.10 max.	0.10 max.	
F	25.37 ± 0.05	25.37 ± 0.05	25.37 ± 0.05	
G	0.025 max.	0.025 max.	0.025 max.	
H	—	—	—	
R	0.50 nominal	0.50 nominal	0.33 nominal	
(3) L	475.0 ± 0.4	(4) 474.0 ± 0.4	475.0 ± 0.4	

Dimension	TYPE 3	TYPE 3A	TYPE 4	TYPE 5
A	34.975 ± 0.025	34.975 ± 0.025	34.975 ± 0.025	34.975 ± 0.025
B	4.75 ± 0.01	(4) 4.74 ± 0.01	4.75 ± 0.01	4.75 ± 0.01
C	(5) $2.800^{+0.005}_{-0.015}$	(5) $2.800^{+0.005}_{-0.015}$	1.98 ± 0.01	1.98 ± 0.01
D	(5) $1.850^{+0.015}_{-0.005}$	(5) $1.850^{+0.015}_{-0.005}$	1.98 ± 0.01	(5) $1.850^{+0.015}_{-0.005}$
(2) (E_1-E_2)	0.10 max.	0.10 max.	0.10 max.	0.10 max.
F	25.37 ± 0.05	25.37 ± 0.05	26.65 ± 0.05	26.65 ± 0.05
G	0.025 max.	0.025 max.	0.025 max.	0.025 max.
H	2.08 nominal	2.08 nominal	—	—
R	—	—	0.33 nominal	0.33 nominal
(3) L	475.0 ± 0.4	(4) 474.0 ± 0.4	475.0 ± 0.4	475.0 ± 0.4

These dimensions apply to raw stock film immediately after cutting and perforating.

(1) This type of perforation is recognized as preferred and should replace types 2 and 3 in the future.
(2) Difference between E_1 and E_2.
(3) Dimension L represents the length of any 100 consecutive perforation intervals.
(4) These dimensions are for low-shrink film base and may be used for the reasons given in Annex B.
(5) These millimetre dimensions are shown with unequal tolerances so that a nominal value is expressed such that no digit other than zero occurs beyond the one-hundredth millimetre place; the maximum and minimum values, nevertheless, are the same as those for the inch dimensions.

TABLE 2. — **Dimensions in inches**

Dimension	TYPE 1 (1)	TYPE 1A (1)	TYPE 2	
A	1.377 ± 0.001	1.377 ± 0.001	1.377 ± 0.001	
B	0.1870 ± 0.0004	(4) 0.1866 ± 0.0004	0.1870 ± 0.0004	
C	0.1100 ± 0.0004	0.1100 ± 0.0004	0.1100 ± 0.0004	
D	0.0780 ± 0.0004	0.0780 ± 0.0004	0.0730 ± 0.0004	
(2) $(E_1 - E_2)$	0.004 max.	0.004 max.	0.004 max.	
F	0.999 ± 0.002	0.999 ± 0.002	0.999 ± 0.002	
G	0.001 max.	0.001 max.	0.001 max.	
H	—	—	—	
R	0.020 nominal	0.020 nominal	0.013 nominal	
(3) L	18.70 ± 0.015	(4) 18.66 ± 0.015	18.70 ± 0.015	

Dimension	TYPE 3	TYPE 3A	TYPE 4	TYPE 5
A	1.377 ± 0.001	1.377 ± 0.001	1.377 ± 0.001	1.377 ± 0.001
B	0.1870 ± 0.0004	(4) 0.1866 ± 0.0004	0.1870 ± 0.0004	0.1870 ± 0.0004
C	0.1100 ± 0.0004	0.1100 ± 0.0004	0.0780 ± 0.0004	0.0780 ± 0.0004
D	0.0730 ± 0.0004	0.0730 ± 0.0004	0.0780 ± 0.0004	0.0730 ± 0.0004
(2) $(E_1 - E_2)$	0.004 max.	0.004 max.	0.004 max.	0.004 max.
F	0.999 ± 0.002	0.999 ± 0.002	1.049 ± 0.002	1.049 ± 0.002
G	0.001 max.	0.001 max.	0.001 max.	0.001 max.
H	0.082 nominal	0.082 nominal	—	—
R	—	—	0.013 nominal	0.013 nominal
(3) L	18.70 ± 0.015	(4) 18.66 ± 0.015	18.70 ± 0.015	18.70 ± 0.015

These dimensions apply to raw stock film immediately after cutting and perforating.

(1) This type of perforation is recognized as preferred and should replace types 2 and 3 in the future.
(2) Difference between E_1 and E_2.
(3) Dimension L represents the length of any 100 consecutive perforation intervals.
(4) These dimensions are for low-shrink film base and may be used for the reasons given in Annex B.

ANNEX A

UNIFORMITY OF PERFORATIONS

The dimensions given in this ISO Recommendation represent the practice of film manufacturers in that the dimensions and their tolerances are for film stock immediately after perforation. The punches and dies themselves are made to tolerances considerably smaller than those given, but since the film is a plastic material, the dimensions of the slit and perforated film stock never agree exactly with the dimensions of the slitter knives, punches and dies. Film can shrink or swell due to loss or gain in moisture content, or can shrink due to loss of solvent or plasticizer. These changes invariably result in changes in the dimensions during the life of the film. The change is generally uniform throughout a roll.

The uniformity of pitch, hole size and margin (dimensions B, C, D, E_1 and E_2) is an important variable affecting steadiness. Variations in these dimensions from roll to roll are of little significance compared to variations from one sprocket hole to the next. Actually, it is the maximum variation from one sprocket hole to the next within any small group of consecutive perforations that is important.