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Cutting netting to shape – Determination of the cutting rate

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FOREWORD

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Draft International Standards adopted by the Technical Committees are circulated to the Member Bodies for approval before their acceptance as International Standards by the ISO Council.

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It was approved in May 1971 by the Member Bodies of the following countries :

Australia	Germany	Poland
Belgium	India	Romania
Bulgaria	Israel	South Africa, Rep. of
Canada	Italy	Sweden
Czechoslovakia	Netherlands	Switzerland
Egypt, Arab Rep. of	New Zealand	Turkey
France	Norway	U.S.S.R.

No Member Body expressed disapproval of the document.

Cutting netting to shape – Determination of the cutting rate

1 SCOPE AND FIELD OF APPLICATION

This International Standard describes a method for the determination of the cutting rate for both knotted and knotless netting, with or without regard to the general course of the netting yarn.

2 REFERENCES

ISO/R 1107, *Netting for fishing – Basic terms and definitions*.

ISO/R 1532, *Cutting knotted netting to shape ("Tapering")*.

3 PRINCIPLE

In order to determine the cutting rate C for cutting netting to shape, the following must be known :

- the total number of rows of meshes to be gained or lost;
- the number of rows of meshes at the end of which the desired taper shall be reached.

NOTES

1 In accordance with ISO/R 1532, the letters N, T, K, B used in this document designate *one* cut each in the direction indicated :

- N = one cut in the N-direction;
T = one cut in the T-direction;
K = one cut in either the N- or T-direction;
B = one cut in the AB-direction.

2 A clear distinction between "rows of meshes" and "meshes" (lost or gained) exists only in the case of the manufacture of a tapered piece of netting by hand. Here, after the first row of meshes has been knotted, meshes are lost or gained in relation to the first row when knotting the adjacent rows.

In the case of tapering machine-made netting, which is the subject of this International Standard, existing rows of meshes in both directions are severed by taper cuts. It is however admissible, for simplicity, to speak of meshes instead of rows of meshes.

For calculating the number of rows of meshes the following rule is valid :

The rows of meshes to be counted are only those that are severed by cuts belonging to the cutting rate. Rows of meshes severed by initial or final cuts not belonging to the cutting rate, for example, an N-cut for the cutting rate 1T3B or an N- or T-cut in the case of an AB-cut, do not count.

3 Whereas all K-cuts of a taper cut are executed in the direction of the larger of the two values a and b (symbol M , see below), all initial or final K-cuts that do not belong to the cutting rate will always be in the direction of the value m (the smaller of the two values a and b , see below).

For the calculations as described below, letter symbols for the number of rows of meshes (or of meshes, see Note 2) are used as follows :

M is the larger of the numerical values for a and b ;
 m is the smaller of the numerical values for a and b ;
 M' and m' are the numerical values obtained by simplification of the fraction arising from M and m (see section 4).

If the general course of the netting yarn has to be regarded for the calculation of the cutting rate, it must be known whether M is parallel to the N-direction (then N- and B-cuts are needed) or M is parallel to the T-direction (then T- and B-cuts are needed).

4 TAPER RATIO, DEFINITION AND CALCULATION

The taper ratio R is the ratio between the number of meshes counted in the T-direction and the number of meshes counted in the N-direction of the desired taper. It is written as a fraction :

$$R = \frac{\text{number of meshes counted in T-direction } (m \text{ or } M)}{\text{number of meshes counted in N-direction } (M \text{ or } m)}$$

becoming after simplification

$$\text{either } R = \frac{m'}{M'} \text{ (see 4.1)}$$

$$\text{or } R = \frac{M'}{m'} \text{ (see 4.2)}$$

When regarding the general course of the netting yarn the following is valid :

4.1 M parallel to the N-direction :

$$R = \frac{m}{M} \text{ or, after simplification, } R = \frac{m'}{M'}$$

Example

$M = 15$, parallel to the N-direction

$m = 6$

$$R = \frac{m}{M} = \frac{6}{15} \text{ or, after simplification, } R = \frac{m'}{M'} = \frac{2}{5}$$

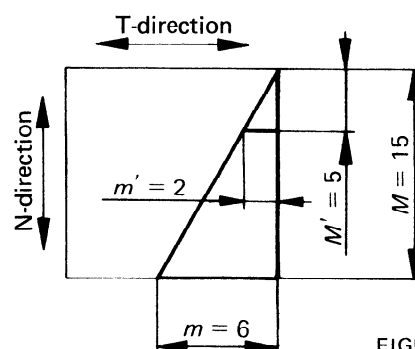


FIGURE 1

4.2 M parallel to the T-direction :

$$R = \frac{M}{m} \text{ or, after simplification, } R = \frac{M'}{m'}$$

Example

$M = 15$, parallel to the T-direction
 $m = 6$

$$R = \frac{M}{m} = \frac{15}{6} \text{ or, after simplification, } R = \frac{M'}{m'} = \frac{5}{2}$$

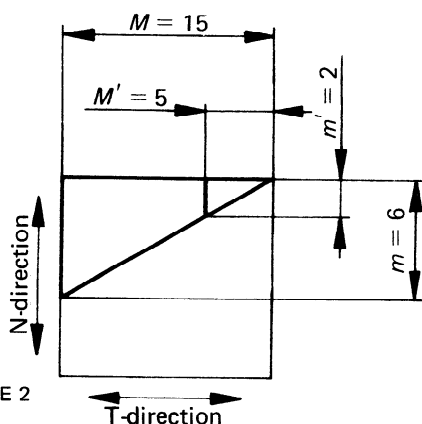


FIGURE 2

The values for M' and m' indicate the number of meshes severed by one element of the taper cut, the numerator of the fraction representing the number of meshes in the T-direction, the denominator the number of meshes in the N-direction.

Example

$R = \frac{2}{5}$ means that by any element of the desired taper cut 2 meshes are severed in the T-direction and 5 meshes in the N-direction.

5 DETERMINATION OF THE CUTTING RATE

5.1 By reading from a table

After calculation of the taper ratio, the cutting rate can be read immediately from the table on the next page.

In this table the numerators 1 to 10 of the fraction representing the taper ratio are given above the columns and the denominators 1 to 20 are indicated on the left. The desired cutting rate C is found at the intersection of the numerator column and the denominator row.

Examples

$$R = \frac{3}{5} \quad C = 1N3B$$

$$R = \frac{2}{1} \quad C = 1T2B$$

$$R = \frac{1}{1} \quad C = AB$$

5.2 By calculation

The cutting rate can be calculated either

- by means of the values M' and m' (that result from a simplification of M and m before the calculation); or
- by means of the values M and m and a simplification at the end of the calculation.

5.2.1 Using the values M' and m' the following values are obtained :

- the number of K- (N- or T-) cuts in the cutting rate : $M' - m'$.

These cuts are N-cuts, if M' is parallel to the N-direction, and T-cuts, if M' is parallel to the T-direction.

- the number of B-cuts in the cutting rate : $2 m'$.

The cutting rate is designated (see ISO/R 1532) by the formula

$$C = (M' - m') K 2 m' B$$

Examples

1 Taper ratio $R = \frac{m'}{M'} = \frac{2}{5}$, M' parallel to the N-direction (see 4.1) :

Number of N-cuts : $M' - m' = 5 - 2 = 3$

Number of B-cuts : $2 m' = 2 \times 2 = 4$

Cutting rate $C = 3N4B$

2 Taper ratio $R = \frac{M'}{m'} = \frac{5}{2}$, M' parallel to the T-direction (see 4.1) :

Number of T-cuts : $M' - m' = 5 - 2 = 3$

Number of B-cuts : $2 m' = 2 \times 2 = 4$

Cutting rate $C = 3T4B$.

5.2.2 Using the values M and m the following values are obtained :

- the total number of K- (N- or T-) cuts in the taper cut : $M - m$.

These cuts are N-cuts, if M is parallel to the N-direction, and T-cuts, if M is parallel to the T-direction.

- the total number of B-cuts in the taper cut : $2 m$.

The cutting rate is found by simplification of the fraction

$$\frac{\text{Total number of K-cuts}}{\text{Total number of B-cuts}} = \frac{M - m}{2 m}$$

After simplification, the numerator of the fraction indicates the number of K-cuts, the denominator the number of B-cuts in the cutting rate. These values correspond to the results of the calculations using $M' - m'$ and $2 m'$.

Examples

1 $M = 15$, parallel to the N-direction, $m = 6$

$$\frac{\text{Total number of N-cuts}}{\text{Total number of B-cuts}} = \frac{M - m}{2 m} = \frac{15 - 6}{2 \times 6} = \frac{9}{12}$$

$$\text{and after simplification} = \frac{3}{4}$$

Cutting rate $C = 3N4B$

TABLE — Cutting rates

Denominator of the taper ratio R	Numerator of the taper ratio R									
	1	2	3	4	5	6	7	8	9	10
	Cutting rate C									
1	AB	1T2B	2T2B 1T1B	3T2B	4T2B 2T1B	5T2B	6T2B 3T1B	7T2B	8T2B 4T1B	9T2B
2	1N2B	AB	1T4B	2T4B 1T2B	3T4B	4T4B 1T1B	5T4B	6T4B 3T2B	7T4B	8T4B 2T1B
3	2N2B 1N1B	1N4B	AB	1T6B	2T6B 1T3B	3T6B 1T2B	4T6B 2T3B	5T6B	6T6B 1T1B	7T6B
4	3N2B	2N4B 1N2B	1N6B	AB	1T8B	2T8B 1T4B	3T8B	4T8B 1T2B	5T8B	6T8B 3T4B
5	4N2B 2N1B	3N4B	2N6B 1N3B	1N8B	AB	1T10B	2T10B 1T5B	3T10B	4T10B 2T5B	5T10B 1T2B
6	5N2B	4N4B 1N1B	3N6B 1N2B	2N8B 1N4B	1N10B	AB	1T12B	2T12B 1T6B	3T12B 1T4B	4T12B 1T3B
7	6N2B 3N1B	5N4B	4N6B 2N3B	3N8B	2N10B 1N5B	1N12B	AB	1T14B	2T14B 1T7B	3T14B
8	7N2B	6N4B 3N2B	5N6B	4N8B 1N2B	3N10B	2N12B 1N6B	1N14B	AB	1T16B	2T16B 1T8B
9	8N2B 4N1B	7N4B	6N6B 1N1B	5N8B	4N10B 2N5B	3N12B 1N4B	2N14B 1N7B	1N16B	AB	1T18B
10	9N2B	8N4B 2N1B	7N6B	6N8B 3N4B	5N10B 1N2B	4N12B 1N3B	3N14B	2N16B 1N8B	1N18B	AB
11	10N2B 5N1B	9N4B	8N6B 4N3B	7N8B	6N10B 3N5B	5N12B	4N14B 2N7B	3N16B	2N18B 1N9B	1N20B
12	11N2B	10N4B 5N2B	9N6B 3N2B	8N8B 1N1B	7N10B	6N12B 1N2B	5N14B	4N16B 1N4B	3N18B 1N6B	2N20B 1N10B
13	12N2B 6N1B	11N4B	10N6B 5N3B	9N8B	8N10B 4N5B	7N12B	6N14B 3N7B	5N16B	4N18B 2N9B	3N20B
14	13N2B	12N4B 3N1B	11N6B	10N8B 5N4B	9N10B	8N12B 2N3B	7N14B 1N2B	6N16B 3N8B	5N18B	4N20B 1N5B
15	14N2B 7N1B	13N4B	12N6B 2N1B	11N8B	10N10B 1N1B	9N12B 3N4B	8N14B 4N7B	7N16B	6N18B 1N3B	5N20B 1N4B
16	15N2B	14N4B 7N2B	13N6B	12N8B 3N2B	11N10B	10N12B 5N6B	9N14B	8N16B 1N2B	7N18B	6N20B 3N10B
17	16N2B 8N1B	15N4B	14N6B 7N3B	13N8B	12N10B 6N5B	11N12B	10N14B 5N7B	9N16B	8N18B 4N9B	7N20B
18	17N2B	16N4B 4N1B	15N6B 5N2B	14N8B 7N4B	13N10B	12N12B 1N1B	11N14B	10N16B 5N8B	9N18B 1N2B	8N20B 2N5B
19	18N2B 9N1B	17N4B	16N6B 8N3B	15N8B	14N10B 7N5B	13N12B	12N14B 6N7B	11N16B	10N18B 5N9B	9N20B
20	19N2B	18N4B 9N2B	17N6B	16N8B 2N1B	15N10B 3N2B	14N12B 7N6B	13N14B	12N16B 3N4B	11N18B	10N20B 1N2B

2 $M = 15$, parallel to the T-direction, $m = 6$

$$\frac{\text{Total number of T-cuts}}{\text{Total number of B-cuts}} = \frac{M - m}{2m} = \frac{15 - 6}{2 \times 6} = \frac{9}{12}$$

$$\text{and after simplification} = \frac{3}{4}$$

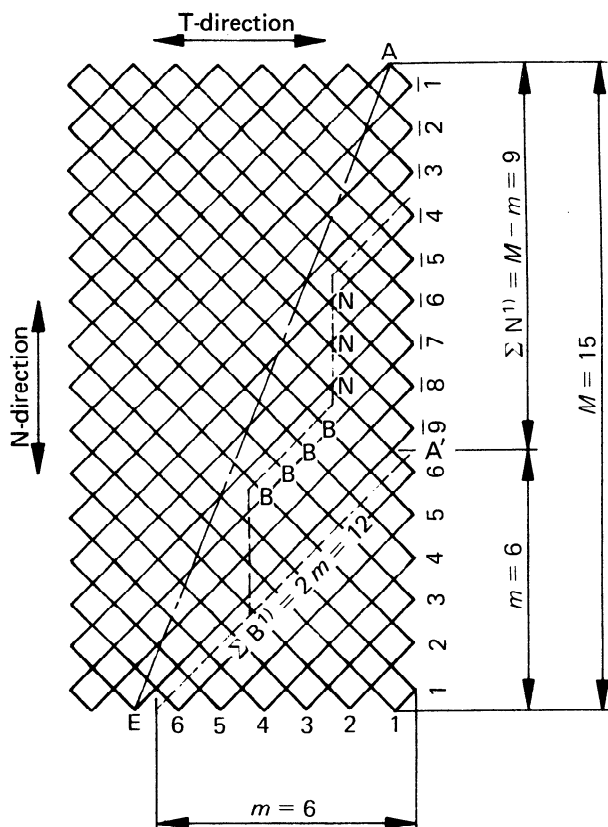
Cutting rate $C = 3T4B$

NOTE — The formulae for the number of K-cuts ($M - m$) and for the number of B-cuts ($2m$) can be explained as follows :

By any B-cut a half mesh both in the N- and T-direction is severed. $2m$ B-cuts, therefore, will sever m meshes both in the N- and T-direction. Thereby, all meshes to be lost in the direction of m are severed and furthermore m of the M meshes to be cut in the other direction. In this direction, therefore, $M - m$ meshes remain to be cut (see also Figure 3). The number of K- (N- or T-) cuts and the number of B-cuts in any element of the cutting rate is found by

$$\text{simplification of the fraction } \frac{M - m}{2m}.$$

Correspondingly this explanation is valid for the formulae $M' - m'$ and $2m'$.



1) ΣN and ΣB respectively = total number of cuts to be made in the indicated direction.

FIGURE 3

Example

$M = 15$, parallel to the N-direction, $m = 6$

$$\begin{aligned} \text{Total number of N-cuts} &= \frac{M - m}{2} = \frac{15 - 6}{2} = \frac{9}{2} \\ \text{Total number of B-cuts} &= \frac{2m}{2} = \frac{2 \times 6}{2} = 6 \\ \text{and after simplification} &= \frac{3}{4} \end{aligned}$$

Cutting rate $C = 3N4B$

6 DETERMINATION OF THE CUTTING RATE FOR FLYING MESHES

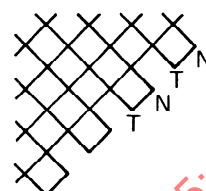
For special purposes "flying meshes" at the edges of the cut are sometimes needed.

The cutting rate for flying meshes can be read immediately from the fraction that indicates the taper ratio. The number of T-cuts is found in the numerator, the number of N-cuts in the denominator of the named fraction (see section 4).

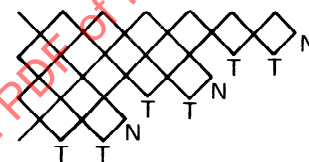
Example

$R = \frac{1}{1}$, cutting rate for flying meshes 1N1T

$R = \frac{2}{1}$, cutting rate for flying meshes 1N2T



Flying meshes obtained by 1N1T cut



Flying meshes obtained by 1N2T cut

FIGURE 4

7 SPECIAL CONDITIONS FOR KNOTLESS NETTING

In knotless netting a general course of the netting yarn cannot always be determined. In many cases, however, it is possible to determine the largest possible length of the stretched mesh in the netting. For this reason, ISO/R 1107 defines the designation of directions in knotless netting as follows :

N-direction : The direction of the longest possible mesh axis.

T-direction : The direction at right angles to the N-direction. The definition of the AB-directions is the same for both knotted and knotless netting.

For all knotless netting, where the N- and T-directions can be determined as explained above, the corresponding rules for knotted netting are valid accordingly.

If a determination of the direction is impossible, it is also impossible to discriminate between N- and T-cuts. In such cases only the number of K-cuts can be determined by means of the general formulae :

$$\text{Total number of K-cuts} = M - m$$

$$\text{Number of K-cuts in the cutting rate} = M' - m'$$