INTERNATIONAL STANDARD ISO 1684-1975/AMENDMENT 2

Published 1982-07-15

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION•МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ•ORGANISATION INTERNATIONALE DE NORMALISATION

Wire, bar and tube drawing dies — Specifications
AMENDMENT 2

Amendment 2 to International Standard ISO 1684-1975 was developed by Technical Committee ISO/TC 29, *Small tools*, and was circulated to the member bodies in March 1981.

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

Austria	India	Poland
Belgium	Israel	Romania
Brazil	Italy	South Africa, Rep. of
Czechoslovakia	Japan	Sweden
Egypt, Arab Rep. of	Korea, Dem. P. Rep. of	United Kingdom
France	Korea, Rep. of	USA
Germany, F. R.	Mexico	USSR
Hungary	Netherlands	

No member body expressed disapproval of the document.

Cover page and page 1

Modify the title as follows :

"Wire, bar and tube drawing dies with hardmetal (carbide) core — Specifications".

Page 1

Clause 1

Modify the first sentence as follows :

"This International Standard, relating to wire, bar and tube drawing dies with hardmetal (carbide) core, lays down the main dimensions for a certain number of tool types, and specifies the codified designation of dies and the marking."

UDC 621.778.073 **Ref. No. ISO 1684-1975/A2-1982 (E)**

Descriptors : tools, mechanical drawing, designation, marking, dimensions.

Printed in Switzerland Price based on 1 page

INTERNATIONAL STANDARD 1684

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

Wire, bar and tube drawing dies — Specifications

Filières d'étirage et de tréfilage — Spécifications

First edition — 1975-03-15

UDC 621.778.073 : 003.62 **Ref. No. ISO 1684-1975 (E)**

Descriptors : tools, die plates, mechanical drawing, designation, marking, dimensions.

Price based on 14 pages

FOREWORD

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO Member Bodies). The work of developing International Standards is carried out through ISO Technical Committees. Every Member Body interested in a subject for which a Technical Committee has been set up has the right to be represented on that Committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work.

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.

Prior to 1972, the results of the work of the Technical Committees were published as ISO Recommendations; these documents are now in the process of being transformed into International Standards. As part of this process, Technical Committee ISO/TC 29 has reviewed ISO Recommendation R 1684 and found it technically suitable for transformation. International Standard ISO 1684 therefore replaces ISO Recommendation R 1684-1970 to which it is technically identical.

ISO Recommendation R 1684 was approved by the Member Bodies of the following countries :

Australia	Ireland	Spain
Czechoslovakia	Israel	Sweden
Egypt, Arab Rep. of	Italy	Thailand
France	Japan	Turkey
Germany	Netherlands	United Kingdom
Greece	Poland	U.S.S.R.
Hungary	Portugal	Yugoslavia
India	South Africa, Rep. of	

The Member Bodies of the following countries expressed disapproval of the Recommendation on technical grounds :

Austria	Switzerland
Belgium	U.S.A.*

The Member Bodies of the following countries disapproved the transformation of ISO/R 1684 into an International Standard :

Austria
Germany

* Subsequently, this Member Body approved the Recommendation.

Printed in Switzerland

CONTENTS

Wire, bar and tube drawing dies — Specifications

1 SCOPE AND FIELD OF APPLICATION

This International Standard, relating to wire, bar and tube drawing dies, lays down the main dimensions for a certain number of tool types, and specifies the codified designation of dies and the marking. Details not indicated are left to the discretion of the manufacturers or should be specified in national standards.

NOTE — It may be supplemented later by the standardization of several special profiles.

This International Standard includes, in annex A, a comparison of bearing and bore dimensions for various types of drawing dies, and, in annex B, a terminology, in several languages, for characteristic elements of pellets and cases.

Dimensions of hard metal rough pellets intended to be used in dies of application groups A to F are laid down in ISO 2804.

2 DESIGNATION

A short designation of an ISO tool is provided in the following order :

2.1 Reference letters of application :

Wire drawing dies for steel	A
Wire drawing dies for non-ferrous metal	B
Bar drawing dies for steel	C
Bar drawing dies for non-ferrous metal	D
Tube drawing dies for steel	E
Tube drawing dies for non-ferrous metal	F
Shaped drawing dies for steel of square and flat section	L
Shaped drawing dies for non-ferrous metal of square and flat section	N
Hexagon bar drawing dies for steel	R
Hexagon bar drawing dies for non-ferrous metal	S

2.2 Reference letters for the shape of the case :

Cylindrical shape	Z
Conical shape	K

2.3 Diameter of pellet . . . . . d_2 in mm

2.4 Diameter of case . . . . . d_3 in mm

2.5 Dimensions of bearing or bore

A to F : Diameters of bearing	d_1 in mm
L and N : Boring section	$a \times b$ in mm
R and S : Hexagon size	a in mm

NOTE — For countries using the inch system of measurement, the converted inch dimensions given in 2.3 to 2.5 can be substituted for the metric dimensions in the designation.

2.6 Drawing angle[1] (in degrees) or radius[2] (in mm) 2α

2.7 Mark . . . . . ISO

Examples of codified designations :

— For steel wire A, of cylindrical shape Z, diameter of pellet $d_2 = 14$ mm, diameter of case $d_3 = 28$ mm, diameter of bearing $d_1 = 3{,}5$ mm and drawing angle $2\alpha = 16°$:

AZ 14/28/3.5/16[1] ISO

— For non-ferrous metal bars D, of conical shape K, diameter of pellet $d_2 = 25$ mm, diameter of case $d_3 = 75$ mm, diameter of bearing $d_1 = 9$ mm, radius of the generator circle of the toric surface, R :

DK 25/75/9/99/R[2] ISO

— For non-ferrous metal of square and flat section N, of cylindrical shape Z, diameter of pellet $d_2 = 45$ mm, diameter of casing $d_3 = 100$ mm, boring section $a \times b = 15$ mm × 15 mm and drawing angle $2\alpha = 20°$:

NZ 45/100/15 × 15/20 ISO

1) Where the bore profile is not specified, the user must supply details of the material to be drawn (for example : mild steel up to 0,4 % carbon; copper; aluminium alloys, etc.) together with the method of drawing (for example : dry or wet drawing; push-pointing; floating or fixed mandrels, etc.).

2) To replace the conical surface of the top angle 2α by a toric surface, angle 2α in the designation should be replaced by the symbol "99" accompanied by the radius value, in millimetres, of the generator circle of the toric surface.

3 MARKING

Wire, bar and tube drawings dies conforming to this International Standard shall carry the following details on their cases :

3.1 On the entry side

— manufacturer's trademark;

— short designation[1] of the type of bar or wire drawing dies (Reference letter according to 2.1);

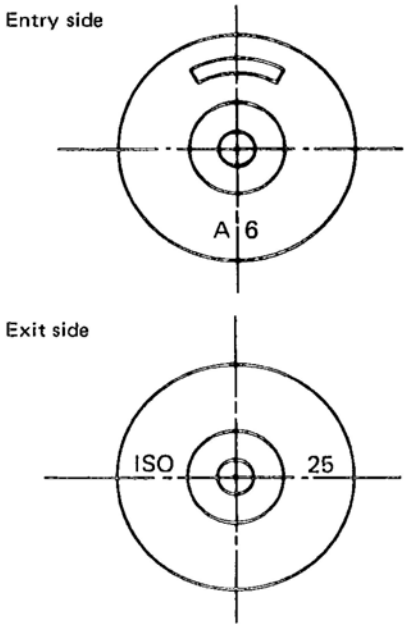
— dimensions of bearing or bore according to 2.5.

3.2 On the exit side

— the mark "ISO";

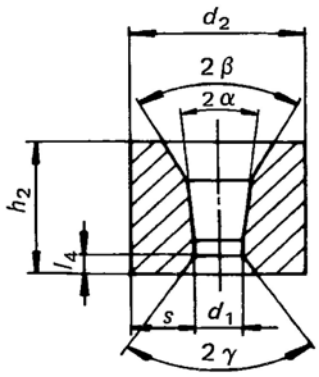
— the diameter of the pellet d_2.

Example :

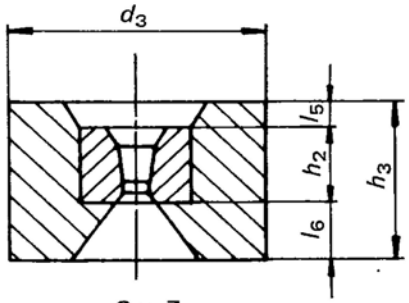


1) The short designations can be completed by adding details or special requirements.

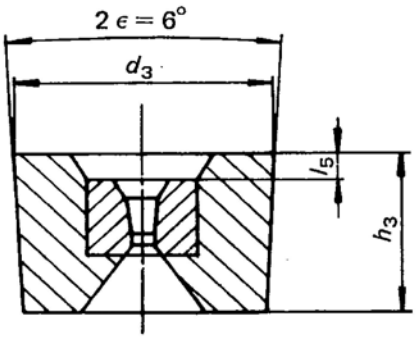
4 WIRE DRAWING DIES FOR STEEL (CODE-LETTER A) AND WIRE DRAWING DIES FOR NON-FERROUS METAL (CODE-LETTER B)



Pellet



Case Z



Case K

Dimensions in millimetres

Pellet										Case			
d_2	h_2	Form A			Form B			l_4	2β	2γ	d_3	h_3	l_5	l_6[3]
		d_1		s[1]	d_1		s[1]							
		min.	max.	min.	min.	max.	min.	max.						
8	4	0,1	1	3,5	0,1	1,5	3,25	1	90°	90°	28	12	3	5
10	8	0,2	2	4	0,2	2,5	3,75	2				16		
12	10	0,3	3	4,5	0,3	3,5	4,25	2,5				20		7
14	12	0,4	4	5	0,4	4,5	4,75	3	60°	75°	28[2]	22	3	7
											43			
16	13	0,5	5	5,5	0,5	6	5	3,5			43	25	4	8
20	17	1,5	6,5	6,75	1,5	8	6	4,5	60°	60°	43	32	5	10
25	20	2,5	9	8	2,5	10,5	7,25	5			53	35		
											75[2]			
30	24	3,5	12	9	3,5	13	8,5	6			75	40	6	

1) $s_{min} = \frac{d_2 - d_{1\,max}}{2}$

2) The value 28 instead of 43 is more particularly recommended for wire drawing of copper wire.
The value 75 instead of 53 is more recommended for wire drawing of steel wires of higher resistance.

3) Only for information.

NOTES

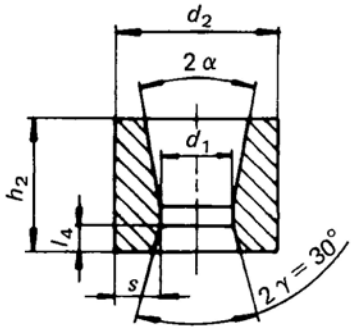
1 $d_{1\,min}$ = minimum and preferable diameter of bearing at the first application.

2 $d_{1\,max}$ = maximum diameter of bearing which is recommended for drawing steel wire having a tensile strength up to 90 hbar in the drawn condition and for drawing wires of non-ferrous metal having a tensile strength up to 60 hbar in the drawn condition.

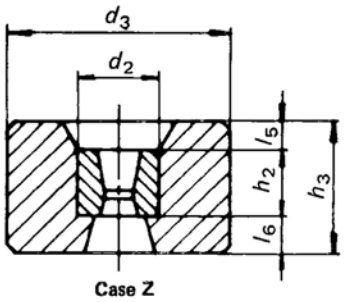
3 The diameter of bearing d_1 required by the user should be chosen within the limits $d_{1\,max}$ and $d_{1\,min}$. The tolerance of bearing should be specified by the user.

4 The case may be of straight (code-letter Z) or tapered form (code-letter K). When a tapered form is required, an included angle of $2\epsilon = 6°$ will be provided, in which event d_3 is the diameter of the larger end of the taper.

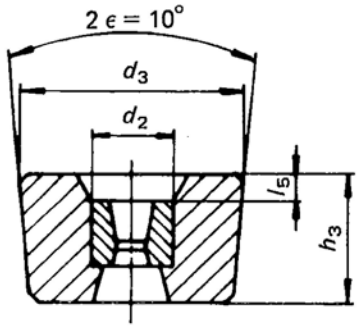
5 BAR DRAWING DIES FOR STEEL (CODE-LETTER C)



Pellet



Case Z



Case K

Dimensions in millimetres

Pellet							Case					
d_2	h_2	d_1 min.	d_1 max.	s[1] min.	l_4[2] min.	l_4[2] max.	d_3	h_3	l_5 min.	l_5 max.	l_6[3] min.	l_6[3] max.
30	24	9	13	8,5	2,4	4,8	100	45	5	9	12	16
35		12	16	9,5								
40		15	19	10,5								
45	25	18	22	11,5	2,5	5,0	100	50	5	9	16	20
50		21	25	12,5			150					
55	27	24	28	13,5	2,7	5,4		55			19	23
60	27	27	31	14,5	2,7	5,4	150	55	5	9	19	23
65		29	34	15,5								
70	30	32	37	16,5	3,0	6,0		60			21	25
75	30	35	41	17,0	3,0	6,0	150	60	5	9	21	25
80		39	45	17,5			200					
85	33	43	49	18,0	3,3	6,6		65			23	27
90	33	47	53	18,5	3,3	6,6	200	65	5	9	23	27
100	35	51	61	19,5	3,5	7,0					21	25

1) $s_{min} = \frac{d_2 - d_{1\,max}}{2}$

2) $l_4 = 0{,}1$ up to $0{,}2\,h_2$

3) Only for information.

NOTES

1 $d_{1\,min}$ = minimum and preferable diameter of bearing at the first application.

2 $d_{1\,max}$ = maximum diameter of bearing which is recommended for drawing steel bars having a tensile strength up to 90 hbar in the drawn condition with a drawing angle 2α up to and including 20°.

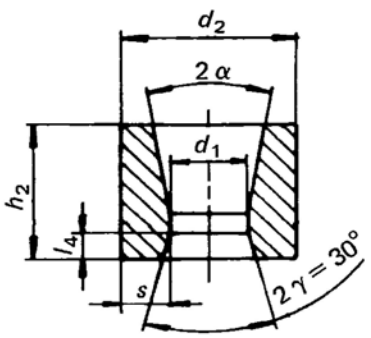
3 Dies for drawing steel bars with $d_{1\,max}$ exceeding 61 mm are outside the scope of this International Standard.

4 The diameters of bearing d_1 required by the user should be chosen within the limits $d_{1\,max}$ and $d_{1\,min}$, except when the drawing angle 2α exceeds 20°. The tolerance of bearing should be specified by the user.

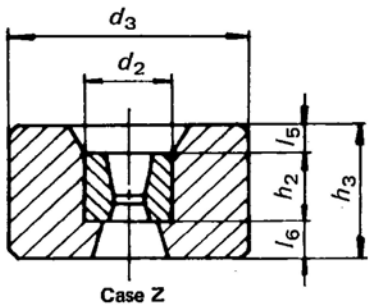
5 The case may be of straight (code-letter Z) or tapered form (code-letter K). When a tapered form is required, an included angle of $2\epsilon = 10°$ will be provided, in which event d_3 is the diameter of the larger end of the taper.

6 For use on multiple draw benches a case diameter d_3 of 125 mm may be supplied for pellet diameters d_2 of 50, 55 and 60 mm and a case diameter d_3 of 175 mm for pellet diameters d_2 of 80 and 85 mm.

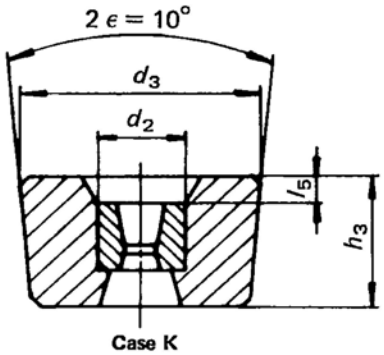
6 BAR DRAWING DIES FOR NON-FERROUS METAL (CODE-LETTER D)



Pellet



Case Z



Case K

Dimensions in millimetres

Pellet							Case					
d_2	h_2	d_1 min.	d_1 max.	s [1] min.	l_4 [2] min.	l_4 [2] max.	d_3	h_3	l_5 min.	l_5 max.	l_6 [3] min.	l_6 [3] max.
25	20	9	12	6,5	2,0	4,0	75	40	5	9	11	15
30	24	11	14	8,0	2,4	4,8	100	45			12	16
35		13	18	8,5								
40	24	17	21	9,5	2,4	4,8	100	45	5	9	12	16
45	25	20	25	10,0	2,5	5,0		50			16	20
50		24	28	11,0			150					
55	27	27	32	11,5	2,7	5,4	150	55	5	9	19	23
60		30	36	12,0								
65		34	40	12,5								
70	30	38	44	13,0	3,0	6,0	150	60	5	9	21	25
75		42	48	13,5								
80		46	52	14,0			200					
85	33	50	56	14,5	3,3	6,6	200	65	5	9	23	27
90		54	60	15,0								
95		58	64	15,5								
100	35	62	68	16,0	3,5	7,0	200	65	5	9	21	25
105		65	72	16,5			250					

1) $s_{min} = \frac{d_2 - d_{1\,max}}{2}$

2) $l_4 = 0{,}1$ up to $0{,}2\,h_2$

3) Only for information.

NOTES

1 $d_{1\,min}$ = minimum and preferable diameter of bearing at the first application.

2 $d_{1\,max}$ = maximum diameter of bearing which is recommended for drawing non-ferrous metal bars having a tensile strength up to 80 hbar in the drawn condition with a drawing angle 2α up to and including 25°.

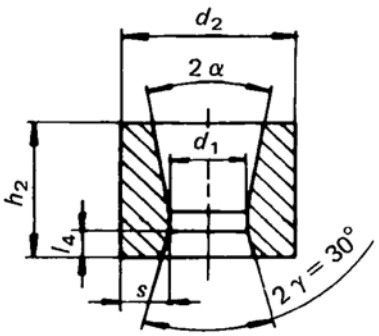
3 Dies for drawing non-ferrous metal bars with $d_{1\,max}$ exceeding 72 mm are outside the scope of this International Standard.

4 The diameter of bearing d_1 required by the user should be chosen within the limits $d_{1\,max}$ and $d_{1\,min}$ except when the drawing angle 2α exceeds 25°. If the drawing angle is considerably smaller than 25°, the dimension $d_{1\,max}$ can be increased by up to 1 mm. The tolerance of bearing should be specified by the user.

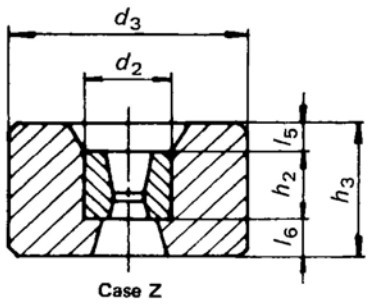
5 The case may be of straight (code-letter Z) or tapered form (code-letter K). When a tapered form is required, an included angle of $2\epsilon = 10°$ will be provided, in which event d_3 is the diameter of the larger end of the taper.

6 For use on multiple draw benches a case diameter d_3 of 125 mm may be supplied for pellet diameters d_2 of 50 and 55 mm and a case diameter d_3 of 175 mm for pellet diameter d_2 of 80 mm.

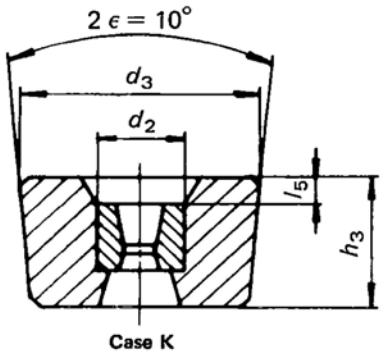
7 TUBE DRAWING DIES FOR STEEL (CODE-LETTER E) AND TUBE DRAWING DIES FOR NON-FERROUS METAL (CODE-LETTER F)



Pellet



Case Z



Case K

Dimensions in millimetres

Pellet							Case					
d_2	h_2	d_1 min.	d_1 max.	s 1) min.	l_4 2) min.	l_4 2) max.	d_3	h_3	l_5 min.	l_5 max.	l_6 3) min.	l_6 3) max.
25	20	10	12	6,5	2,0	4,0	75	40	5	9	11	15
30	24	11	14	8,0	2,4	4,8	100	45			12	16
35		13	18	8,5								
40	24	17	22	9,0	2,4	4,8	100	45	5	9	12	16
45	25	21	26	9,5	2,5	5,0		50			16	20
50		24	30	10,0			150					
55	27	28	34	10,5	2,7	5,4	150	55	5	9	19	23
60		32	38	11,0								
65		36	42	11,5								
70	30	40	45	12,5	3,0	6,0	150	60	5	9	21	25
75		43	50									
80		48	55				200					
85	33	53	58	13,5	3,3	6,6	200	65	5	9	23	27
90		56	62	14,0								
95		60	67									
100	35	65	70	15,0	3,5	7,0	200	65	5	9	21	25
105		68	75				250					
110	38	73	78	16,0	3,8	7,6		70			23	27
120	38	74	88	16,0	3,8	7,6	250	70	5	9	23	27
130	40	84	97	16,5	4,0	8,0	300	75			26	30
140		93	106	17,0								
150		102	115	17,5								

1) $s_{min} = \frac{d_2 - d_{1\,max}}{2}$

2) $l_4 = 0{,}1$ up to $0{,}2\,h_2$

3) Only for information.

NOTES

1 $d_{1\ min}$ = minimum and preferable diameter of bearing at the first application.

2 $d_{1\ max}$ = maximum diameter of bearing which is recommended for drawing steel tubes having a tensile strength up to 90 hbar and for drawing non-ferrous tubes having a tensile strength up to 80 hbar in the drawn condition with a drawing angle 2α up to and including 40°.

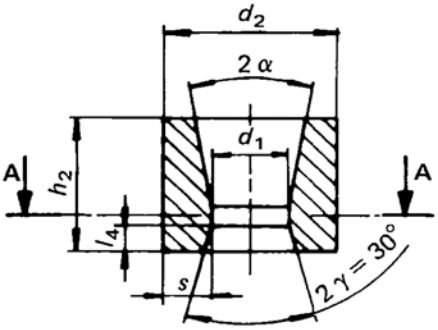
3 Dies for drawing steel tubes with $d_{1\ max}$ exceeding 115 mm are outside the scope of this International Standard.

4 The diameters of bearing d_1 required by the user should be chosen within the limits $d_{1\ min}$ and $d_{1\ max}$ except when the drawing angle 2α exceeds 40°. If the drawing angle 2α is considerably smaller than 40°, $d_{1\ max}$ may be increased by up to 1 mm. The tolerance of bearing should be specified by the user.

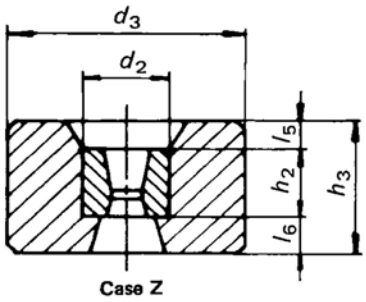
5 The case may be of straight (code-letter Z) or tapered form (code-letter K). When a tapered form is required, an included angle of $2e = 10°$ will be provided, in which event d_3 is the diameter of the larger end of the taper.

6 For use on multiple draw benches, a case diameter d_3 of 125 mm may be supplied for pellet diameters d_2 of 50, 55, 60 and 65 mm and a case diameter d_3 of 175 mm for pellet diameters d_2 of 80, 85, 90, 95 and 100 mm.

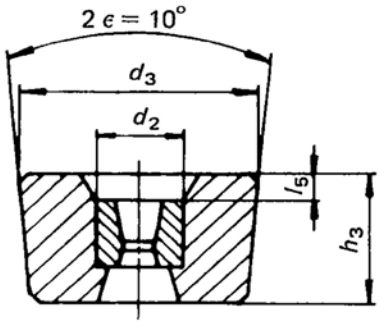
8 SHAPED DRAWING DIES FOR STEEL OF SQUARE AND FLAT SECTION (CODE-LETTER L) AND HEXAGON BAR DRAWING DIES FOR STEEL (CODE-LETTER R)



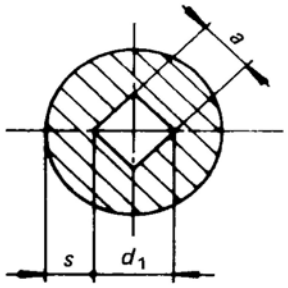
Pellet



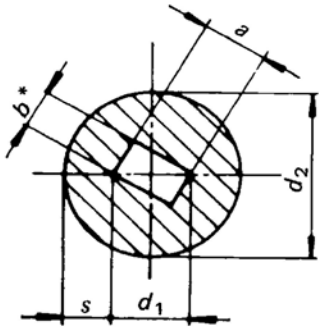
Case Z



Case K

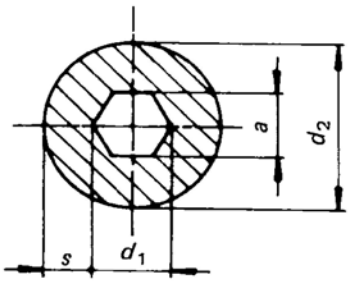


Form L



Form L

$^*b < a$



Form R

Sections A-A

Dimensions in millimetres

Pellet										Case					
d_2	h_2	Form L			Form R			l_4 2)		d_3	h_3	l_5		l_6 3)	
		a		s 1) 3)	a		s 1) 3)								
		min.	max.	min.	min.	max.	min.	min.	max.			min.	max.	min.	max.
16	13	1	5	4,45	1	5	5,10	1,3	2,6	43	25	4	—	—	8
20	17	4	6	5,75	4	7	5,95	1,7	3,4		32	5	—	—	10
25	20	5	7	7,50	6	9	7,30	2,0	4,0	75	40	5	9	11	15
30	24	6	9	8,65	8	11	8,65	2,4	4,8	100	45	5	9	12	16
35		8	11	9,70	10	13	10,00								
40		10	13	10,80	12	16	10,75								
45	25	12	15	11,90	15	19	11,55	2,5	5,0	100	50	5	9	16	20
50		14	18	12,25	18	21	12,90			150					
55	27	17	20	13,35	20	24	13,85	2,7	5,4		55			19	23
60	27	19	22	14,45	23	27	14,40	2,7	5,4	150	55	5	9	19	23
65		21	24	15,55	26	29	15,75								
70	30	23	27	15,90	28	32	16,55	3,0	6,0		60			21	25
75	30	26	29	17,00	31	35	17,30	3,0	6,0	150	60	5	9	21	25
80		28	31	18,10	34	37	18,65			200					
85	33	30	33	19,15	36	40	19,40	3,3	6,6		65			23	27
90	33	32	35	20,25	39	43	20,15	3,3	6,6	200	65	5	9	23	27
100	35	36	40	21,70	42	48	22,30	3,5	7,0					21	25

1) $s_{min} = \frac{d_2 - d_{1\,max}}{2}$

2) $l_4 = 0{,}1$ up to $0{,}2\,h_2$

3) Only for information.

NOTES

1 a_{min} = minimum and preferable bore dimension at the first application.

2 a_{max} = maximum bore dimension which is recommended for shaped drawing dies for steel of square and flat section and hexagon bar drawing dies for steel having a tensile strength up to 90 hbar in the drawn condition with a drawing angle 2α up to and including 20°.

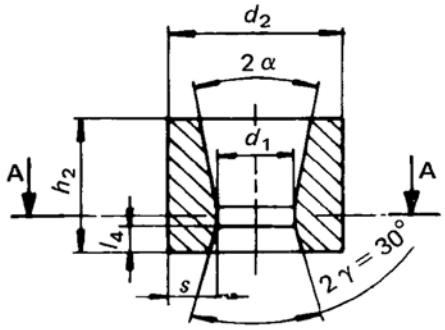
3 Shaped drawing dies for steel of square and flat section, the dimensions a of which exceed 40 mm, and hexagon bar drawing dies for steel, the dimensions a of which exceed 48 mm, are outside the scope of this International Standard.

4 The bore dimension a required by the user should be chosen within the limits a_{max} and a_{min} except when the drawing angle 2α exceeds 20°. The tolerance of bearing should be specified by the user.

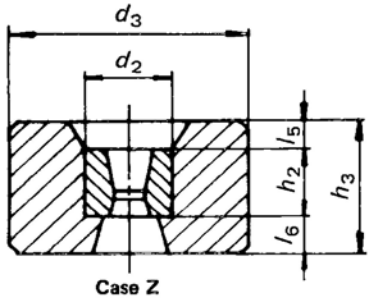
5 The case may be of straight (code-letter Z) or tapered form (code-letter K). When a tapered form is required, an included angle of $2e = 10°$ will be provided, in which event d_3 is the diameter of the larger end of the taper.

6 For use on multiple draw benches, a case diameter d_3 of 125 mm may be supplied for pellet diameters d_2 of 50, 55 and 60 mm and a case diameter d_3 of 175 mm for pellet diameters d_2 of 80 and 85 mm.

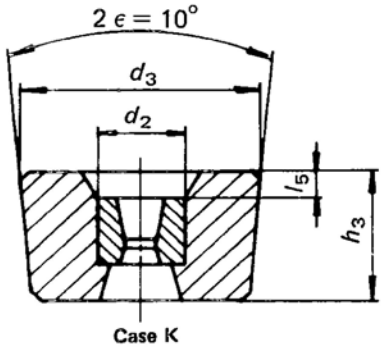
9 SHAPED DRAWING DIES FOR NON-FERROUS METAL OF SQUARE AND FLAT SECTION (CODE-LETTER N) AND HEXAGON BAR DRAWING DIES FOR NON-FERROUS METAL (CODE-LETTER S)



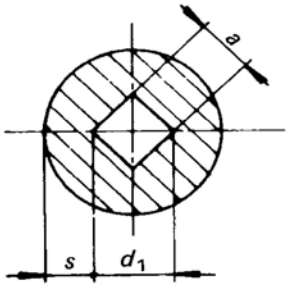
Pellet



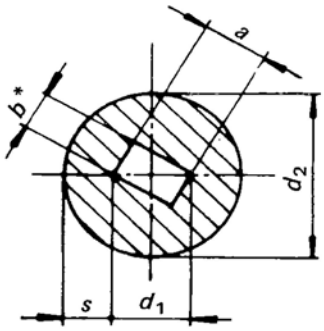
Case Z



Case K

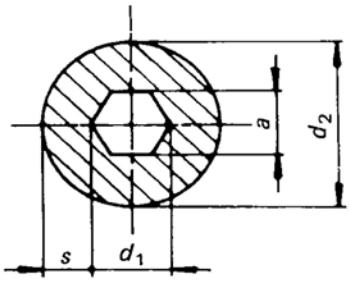


Form N



Form N

$^*b < a$



Form S

Sections A-A

Dimensions in millimetres

Pellet										Case					
d_2	h_2	Form N			Form S			l_4 2)		d_3	h_3	l_5		l_6 3)	
		a		s 1) 3)	a		s 1) 3)								
		min.	max.	min.	min.	max.	min.	min.	max.			min.	max.	min.	max.
16	13	1	5	4,45	1	5	5,10	1,3	2,6	43	25	4	–	–	8
20	17	4	7	5,05	4	7	5,95	1,7	3,4		32	5	–	–	10
25	20	6	8	6,85	6	10	6,75	2,0	4,0	75	40	5	9	11	15
30	24	7	10	7,95	9	12	8,10	2,4	4,8	100	45	5	9	12	16
35		9	12	9,00	11	15	8,85								
40		11	14	10,10	14	18	9,60								
45	25	13	17	10,50	17	21	10,40	2,5	5,0	100	50	5	9	16	20
50		16	19	11,55	20	24	11,15			150					
55	27	18	22	11,95	23	27	11,90	2,7	5,4		55			19	23
60	27	21	25	12,30	26	31	12,10	2,7	5,4	150	55	5	9	19	23
65		24	28	12,70	29	34	12,90								
70	30	27	31	13,10	32	38	13,10	3,0	6,0		60			21	25
75	30	30	33	14,15	36	41	13,85	3,0	6,0	150	60	5	9	21	25
80		32	36	14,55	39	43	15,15			200					
85	33	34	38	15,60	41	45	16,50	3,3	6,6		65			23	27
90	33	36	41	16,00	43	48	17,30	3,3	6,6	200	65	5	9	23	27
100	35	39	45	18,20	46	53	19,40	3,5	7,0					21	25

1) $s_{min} = \frac{d_2 - d_{1\,max}}{2}$

2) $l_4 = 0{,}1$ up to $0{,}2\,h_2$

3) Only for information.

NOTES

1 a_{min} = minimum and preferable bore dimension at the first application.

2 a_{max} = maximum bore dimension which is recommended for shaped drawing dies for non-ferrous metal of square and flat section and hexagon bar drawing dies for non-ferrous metal having a tensile strength up to 60 hbar in the drawn condition with a drawing angle 2α up to and including 25°.

3 Shaped drawing dies for non-ferrous metal of square and flat section, the dimensions a of which exceed 45 mm, and hexagon bar drawing dies for non-ferrous metal, the dimensions a of which exceed 53 mm, are outside the scope of this International Standard.

4 The bore dimension a required by the user should be chosen within the limits a_{max} and a_{min}, except where the drawing angle 2α exceeds 25°. The tolerance of bearing should be specified by the user.

5 The case may be of straight (code-letter Z) or tapered form (code-letter K). When a tapered form is required, an included angle of $2\epsilon = 10°$ will be provided, in which event d_3 is the diameter of the larger end of the taper.

6 For use on multiple draw benches a case diameter d_3 of 125 mm can be supplied for pellet diameters d_2 of 50, 55 and 60 mm and a case diameter d_3 of 175 mm for pellet diameters d_2 of 80 and 85 mm.

ANNEX A

COMPARISON OF THE DIMENSIONS OF BEARING AND BORE FOR VARIOUS TYPES OF DRAWING DIES

Dimensions in millimetres

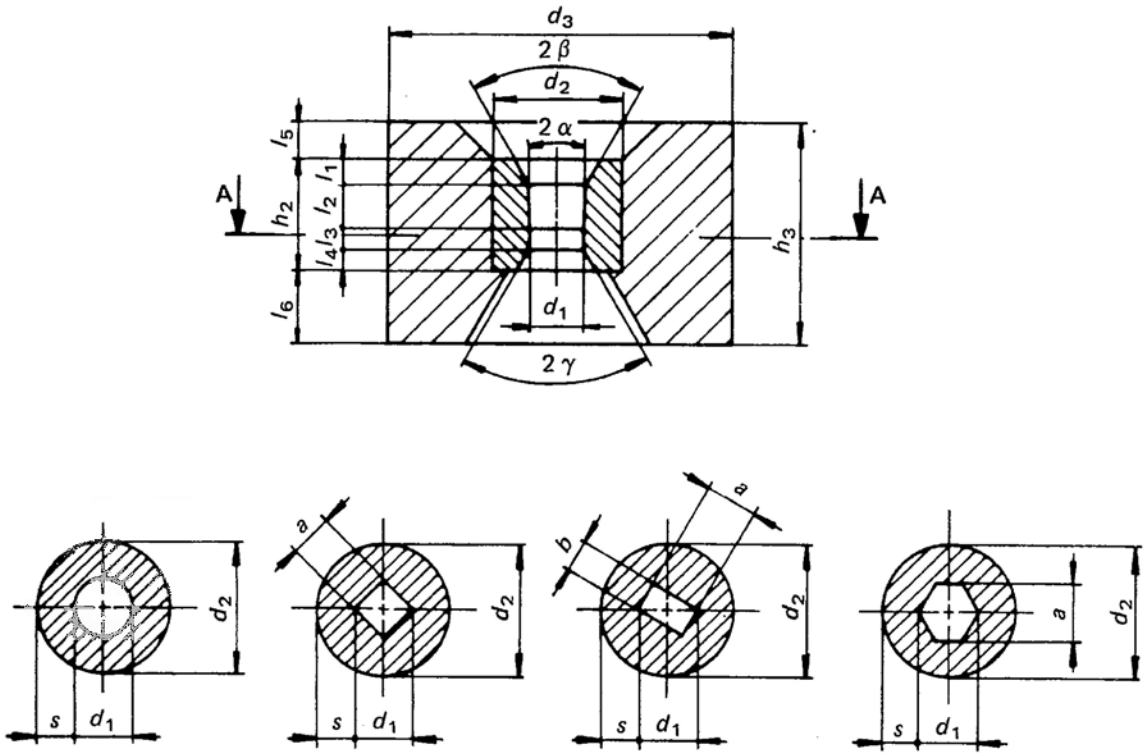
d_2	h_2	FORM C		FORM D		FORM E/F		FORM L		FORM R		FORM N		FORM S	
		2 α max. = 20°		2 α max. = 25°		2 α max. = 40°		2 α max. = 20°		2 α max. = 25°		2 α max. = 25°		2 α max. = 25°	
		$d_{1\ max.}$	$d_{1\ min.}$	$d_{1\ max.}$ [1]	$d_{1\ min.}$	$d_{1\ max.}$ [1]	$d_{1\ min.}$	$a_{max.}$	$a_{min.}$	$a_{max.}$	$a_{min.}$	$a_{max.}$	$a_{min.}$	$a_{max.}$	$a_{min.}$
16	13	–	–	–	–	–	–	5 (7,1)	1 (1,4)	5 (5,8)	1 (1,2)	5 (7,1)	1 (1,4)	5 (5,8)	1 (1,2)
20	17	–	–	–	–	–	–	6 (8,5)	4 (5,7)	7 (8,1)	4 (4,6)	7 (9,9)	4 (5,7)	7 (8,1)	4 (4,6)
25	20	–	–	12	9	12	10	7 (9,9)	5 (7,1)	9 (10,4)	6 (6,9)	8 (11,3)	6 (8,5)	10 (11,5)	6 (6,9)
30	24	13	9	14	11	14	11	9 (12,7)	6 (8,5)	11 (12,7)	8 (9,2)	10 (14,1)	7 (9,9)	12 (13,8)	9 (10.4)
35	24	16	12	18	13	18	13	11 (15,6)	8 (11,3)	13 (15,0)	10 (11,5)	12 (17,0)	9 (12,7)	15 (17,3)	11 (12,7)
40	24	19	15	21	17	22	17	13 (18,4)	10 (14,1)	16 (18,5)	12 (13,8)	14 (19,8)	11 (15,6)	18 (20,8)	14 (16,2)
45	25	22	18	25	20	26	21	15 (21,2)	12 (17,0)	19 (21,9)	15 (17,3)	17 (24,0)	13 (18,4)	21 (24,2)	17 (19,5)
50	25	25	21	28	24	30	24	18 (25,5)	14 (19,8)	21 (24,2)	18 (20,8)	19 (26,9)	16 (22,7)	24 (27,7)	20 (23,1)
55	27	28	24	32	27	34	28	20 (28,3)	17 (24,0)	24 (27,7)	20 (23,1)	22 (31,1)	18 (25,5)	27 (31,2)	23 (26,6)
60	27	31	27	36	30	38	32	22 (31,1)	19 (26,9)	27 (31,2)	23 (26,6)	25 (35,4)	21 (29,7)	31 (35,8)	26 (30,0)
65	27	34	29	40	34	42	36	24 (33,9)	21 (29,7)	29 (33,5)	26 (30,0)	28 (39,6)	24 (33,9)	34 (39,2)	29 (33,5)
70	30	37	32	44	38	45	40	27 (38,2)	23 (32,5)	32 (36,9)	28 (32,3)	31 (43,8)	27 (38,2)	38 (43,8)	32 (36,9)
75	30	41	35	48	42	50	43	29 (41,0)	26 (36,8)	35 (40,4)	31 (35,8)	33 (46,7)	30 (42,4)	41 (47,3)	36 (41,6)
80	30	45	39	52	46	55	48	31 (43,8)	28 (39,6)	37 (42,7)	34 (39,2)	36 (50,9)	32 (45,3)	43 (49,7)	39 (45,0)
85	33	49	43	56	50	58	53	33 (46,7)	30 (42,4)	40 (46,2)	36 (41,6)	38 (53,8)	34 (48,2)	45 (52,0)	41 (47,3)
90	33	53	47	60	54	62	56	35 (49,5)	32 (45,3)	43 (49,7)	39 (45,0)	41 (58,0)	36 (50,9)	48 (55,4)	43 (49,7)
95	33	–	–	64	58	67	60	– –	– –	– –	– –	– –	– –	– –	– –
100	35	61	51	68	62	70	65	40 (56,6)	36 (50,9)	48 (55,4)	42 (48,5)	45 (63,6)	39 (55,2)	53 (61,2)	46 (53,1)
105	35			72	65	75	68								
110	38					78	73								
120	38					88	74								
130	40					97	84								
140	40					106	93								
150	40					115	102								

1) If the drawing angle 2 α lies considerably under 25° (dies type D) and 40° (dies type E and F), $d_{1\ max}$ can be increased by up to 1 mm.

NOTE – The values in brackets for the types L, N, R, S correspond to the diagonal sizes based on an exact calculation.

ANNEX B

FRENCH, ENGLISH, GERMAN AND ITALIAN TERMINOLOGY



Sections A-A

Filières de tréfilage et d'étirage Terminologie des éléments caractéristiques des noyaux et des montures		Wire, bar and tube drawing dies Terminology of characteristic elements of pellets and cases	Ziehsteine u. Ziehringe Terminologie der Hauptabmessungen von Kern und Fassung	Filiere per trafilatura Terminologia degli elementi caratteristici dei nuclei e della montatura
	Filière Noyau Monture	Die Pellet Case	Ziehstein Kern Fassung	Filiera Nucleo Montatura o Armatura
d_1	diamètre de calibrage	diameter of bearing	Ziehholdurchmesser	diametro del cilindro di calibratura
d_2	diamètre du noyau	diameter of pellet	Kerndurchmesser	diametro del nucleo
d_3	diamètre de la monture	diameter of case	Fassungsdurchmesser	diametro della montatura
h_2	hauteur du noyau	height of pellet	Kernhöhe	altezza del nucleo
h_3	hauteur de la monture	height of case	Fassungshöhe	altezza della montatura
l_1	longueur du cône d'entrée	length of entry angle	Länge der Eingangsöffnung	lunghezza del cono di entrata
l_2	longueur du cône de réduction	length of drawing angle	Länge des Ziehkegels	lunghezza del cono di riduzione
l_3	longueur de la partie calibrante	length of bearing	Führungslänge	lunghezza del cilindro di calibratura
l_4	longueur du cône de sortie	length of exit angle	Länge der Ausgangsöffnung	lunghezza del cono di uscita
l_5	longueur d'entrée de la monture	length of entry opening of the case	Länge der Eingangsöffnung in der Fassung	lunghezza del cono di entrata relativa alla montatura
l_6	longueur du cône de sortie de la monture	length of exit angle of the case	Länge der Ausgangsöffnung in der Fassung	lunghezza del cono di uscita relativa alla montatura
s	épaisseur de paroi du noyau	wall thickness of the pellet	Wanddicke des Kernes	spessore del nucleo
$a \times b$	dimensions d'alésage sur plats $a > b$	bore dimension across flat $a > b$	Ziehholinnenmasse für Flachabmessungen $a > b$	dimensione dell'alesaggio per piatti $a > b$
2α	angle du cône de réduction	drawing angle	Ziehkegelwinkel	angolo del cono di riduzione
2β	angle du cône d'entrée	angle of entry cone	Eingangsöffnungswinkel	angolo del cono di entrata
2γ	angle du cône de sortie	exit angle	Ausgangsöffnunfswinkel	angolo del cono di uscita