

**BS EN 50180-3:2015**



BSI Standards Publication

# **Bushings above 1 kV up to 52 kV and from 250 A to 3,15 kA for liquid filled transformers**

Part 3: Requirements for bushing fixations

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The UK participation in its preparation was entrusted to Technical Committee PEL/36, Insulators for power systems.

A list of organizations represented on this committee can be obtained on request to its secretary.

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Published by BSI Standards Limited 2015

ISBN 978 0 580 86602 9

ICS 29.080.20

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This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 October 2015.

**Amendments/corrigenda issued since publication**

Date	Text affected
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EUROPEAN STANDARD

**EN 50180-3**

NORME EUROPÉENNE

EUROPÄISCHE NORM

October 2015

ICS 29.080.20

English Version

## Bushings above 1 kV up to 52 kV and from 250 A to 3,15 kA for liquid filled transformers - Part 3: Requirements for bushing fixations

Traversées de tensions supérieures à 1 kV jusqu'à 52 kV et de 250 A à 3,15 kA pour transformateurs immergés dans un liquide - Partie 3: Exigences relatives aux fixations de traversée

Durchführungen über 1 kV bis 52 kV und von 250 A bis 3,15 kA für flüssigkeitsgefüllte Transformatoren - Teil 3: Anforderungen an Einzelteile der Befestigung

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## European foreword

This document (EN 50180-3:2015) has been prepared by CLC/TC 36A "Insulated Bushings".

The following dates are fixed:

- latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2016-08-10
- latest date by which the national standards conflicting with this document have to be withdrawn (dow) 2018-08-10

This document supplements EN 50180-1:2015 by design details for fastenings and their components with dimensions for bushings, which are of importance for utilities concerning compatibility.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC [and/or CEN] shall not be held responsible for identifying any or all such patent rights.

EN 50180 "*Bushings above 1 kV up to 52 kV and from 250 A to 3,15 kA for liquid filled transformers*" consists of the following parts:

- *Part 1: General requirements for bushings;*
- *Part 2: Requirement for bushing components;*
- *Part 3: Requirements for bushing fixations.*

## **1 Scope**

This European Standard should be considered in factual context with EN 50180-1 only. Constructional details for fastenings and their details are supplementing EN 50180-1. This information is of importance for utilities concerning compatibility.

For a better understanding of additional information some dimension from EN 50180-1 are repeated in this European Standard.

This European Standard was extended for fastenings of bushings for a highest voltage of 52 kV.

## 2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 50180-1:2015, *Bushings above 1 kV up to 52 kV and from 250 A to 3,15 kA for liquid filled transformers — Part 1: General requirements for bushings*

EN 22768-1, *General tolerances – Part 1: Tolerances for linear and angular dimensions without individual tolerance indications (ISO 2768-1)*

EN 22768-2, *General tolerances – Part 2: Geometrical tolerances for features without individual tolerance indications (ISO 2768-2)*

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 50180-1:2015 apply.

## 4 Dimensions and designations

Permissible deviations for tolerances without specified limits: EN 22768 (series).

### 4.1 Fixations for bushings

The fixation of the bushing is made with a flange ring and a defined number of clamping paws as illustrated in Figure 1.

Example: designation A

Dimension in mm

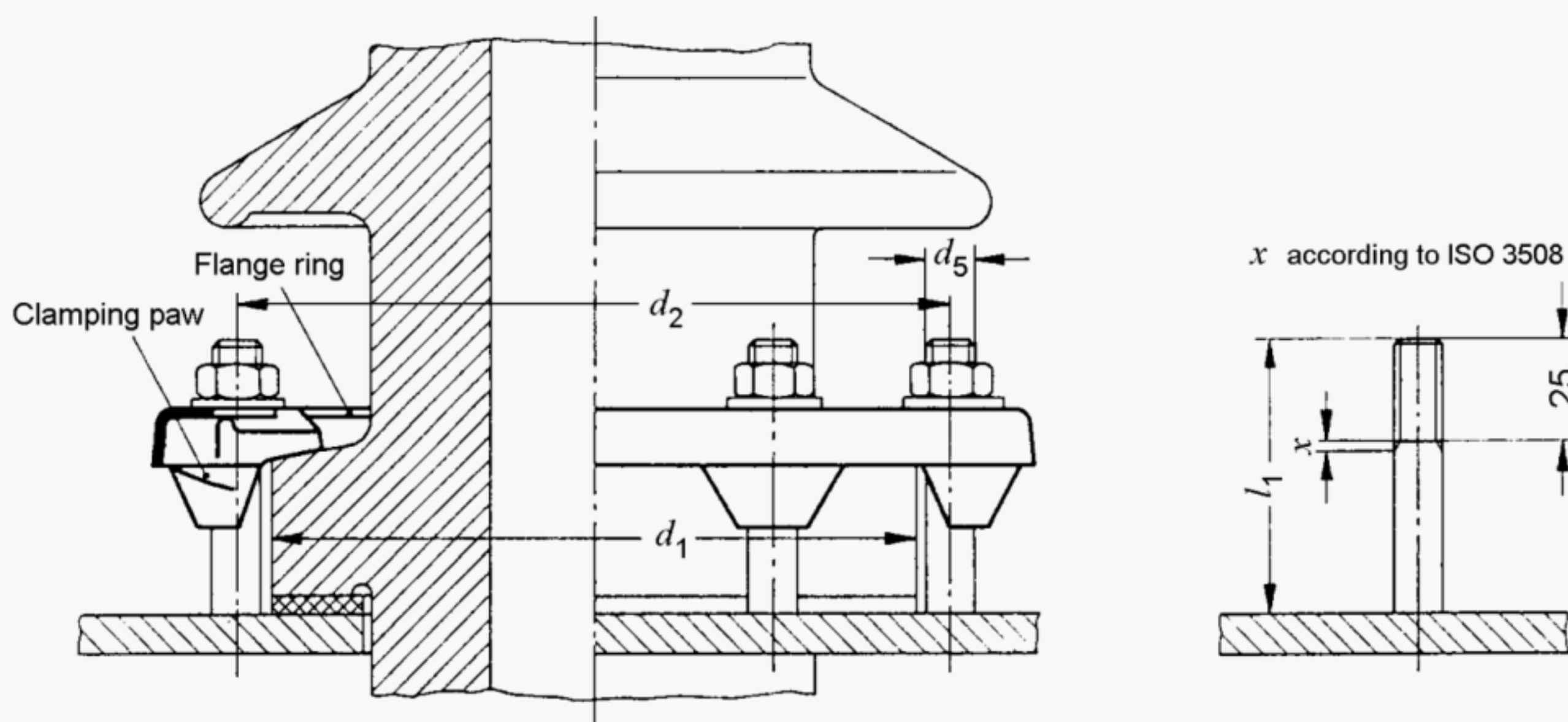


Figure 1 – Fixation with flange ring and clamping paws



**Table 1 – Dimensions for fixation components, 12 kV to 52 kV**

$d_1$	$d_2$	$d_5$	$l_1$	Flange ring	Clamping paw		Bushing
					Type	Number	
$111_{-7}^0$	$123_{-1}^{+1}$	M10	55	A	E	4	250 A
$128_{-8}^0$	$140_{-1}^{+1}$	M10	55	B	E	6	630 A
$165_{-10}^0$	$180_{-2}^{+2}$	M12	65	C	F	6	1 250 A
	$185_{-2}^{+2}$						
$185_{-11}^0$ <sup>a</sup> $183_{-7}^0$ <sup>b</sup>	$200_{-2}^{+2}$	M12	65	D	F	6	2 000 A and 3 150 A
	$205_{-2}^{+2}$						

<sup>a</sup> Tolerances for porcelains of bushings  $U_m$  12 kV to 36 kV.

<sup>b</sup> Tolerances for porcelains of bushings  $U_m$  52 kV.

Remark: Diameter  $d_2$  may deviate from EN 50180-1:2015 (Figures 4 and 5) for bushings 1 250 A to 3 150 A and  $U_m$  12 kV to 36 kV and for bushings  $U_m$  52 kV. To enable interchangeability the required diameter has to be agreed between purchaser and manufacturer.



## 4.2 Details for fixations

Designation: Flange ring A

Dimension in mm

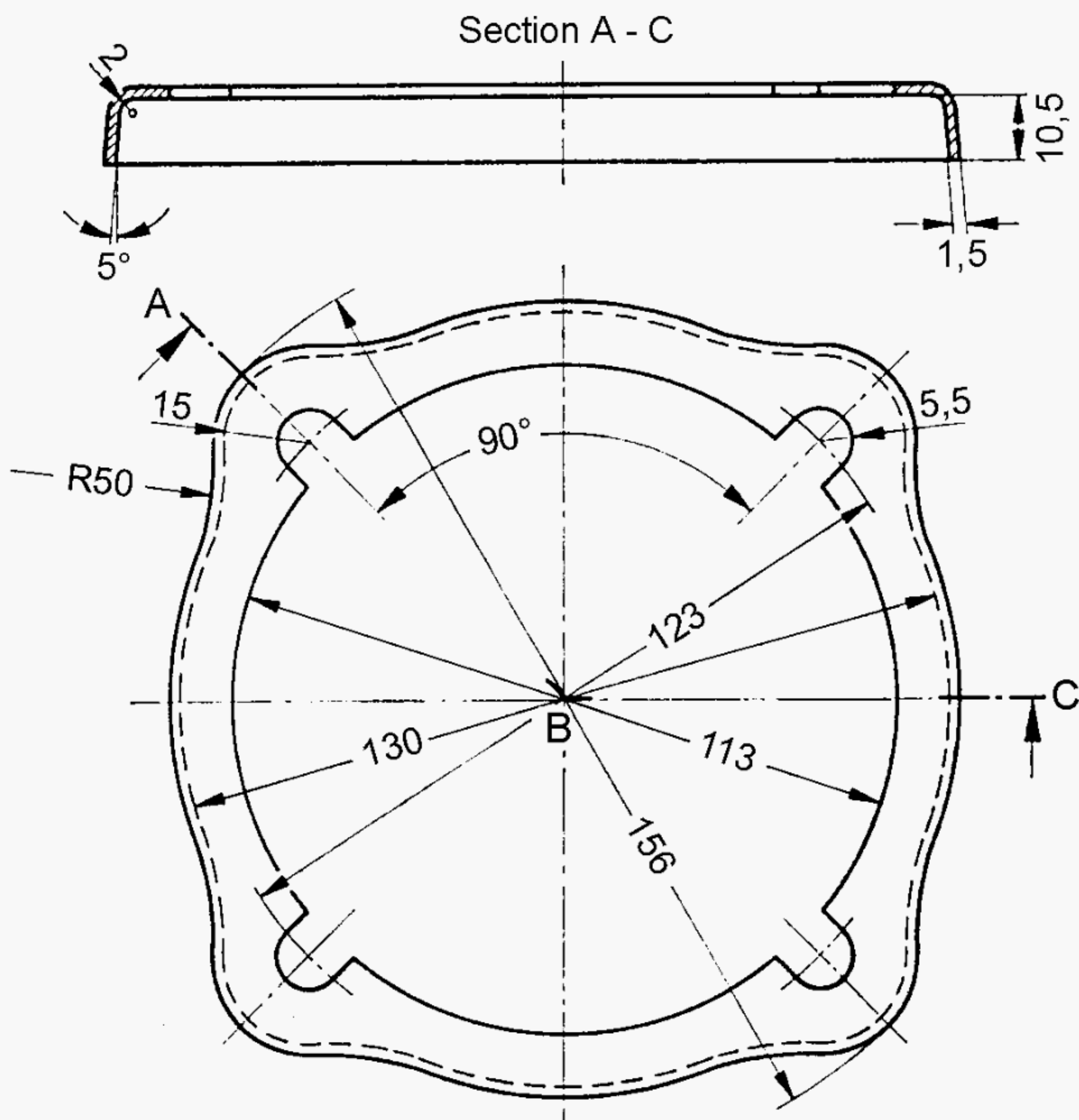


Figure 2 – Flange ring A for bushing 250 A

Designation: **Flange ring B**  
**Flange ring C**  
**Flange ring D**

Dimension in mm

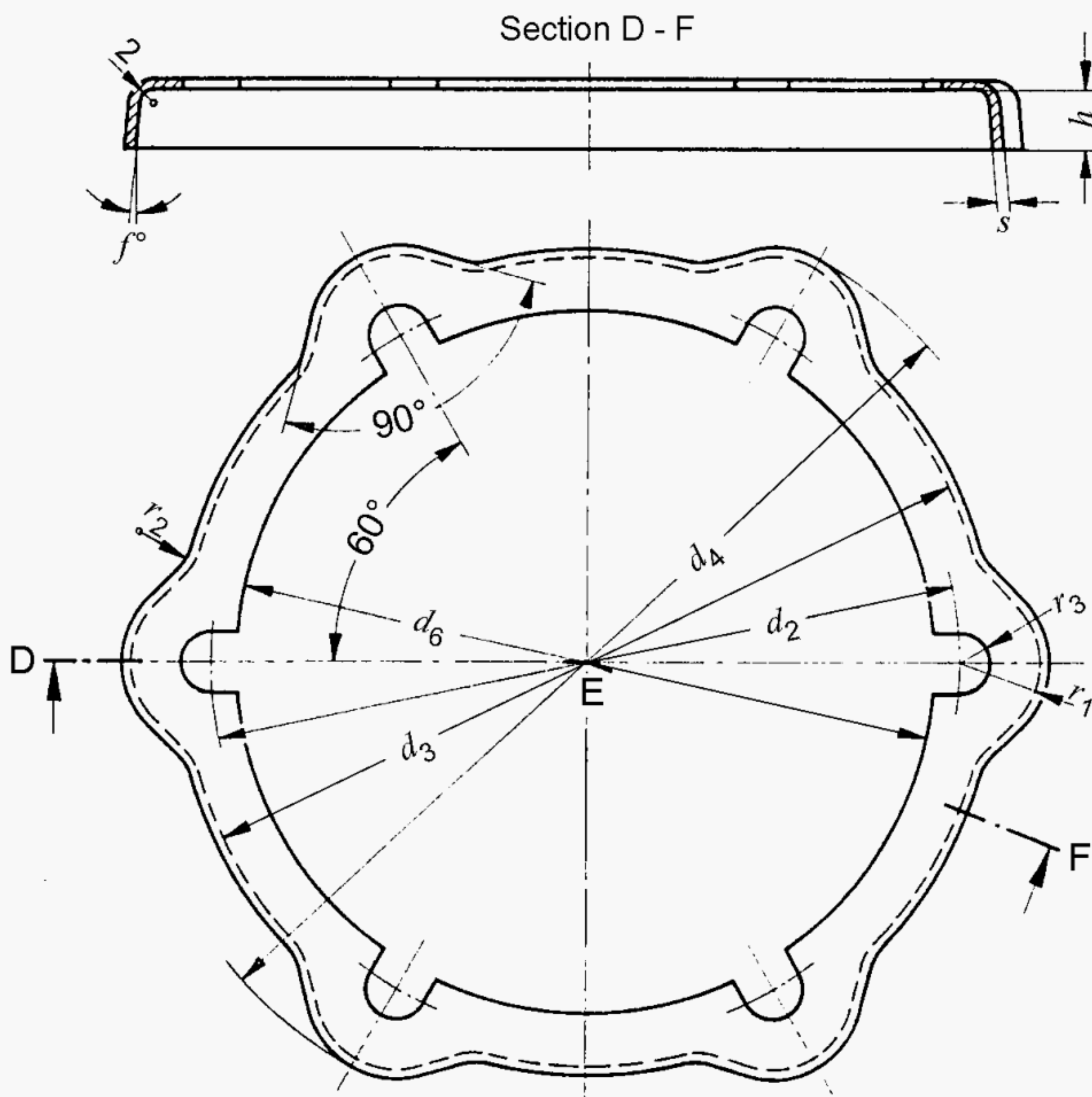


Figure 3 – Flange ring B for bushing 630 A,  
Flange ring C for bushing 1 250 A,  
Flange ring D for bushing 2 000 A and 3 150 A  
(Note: different shapes are allowed)



### Table 2 – Flange ring dimension

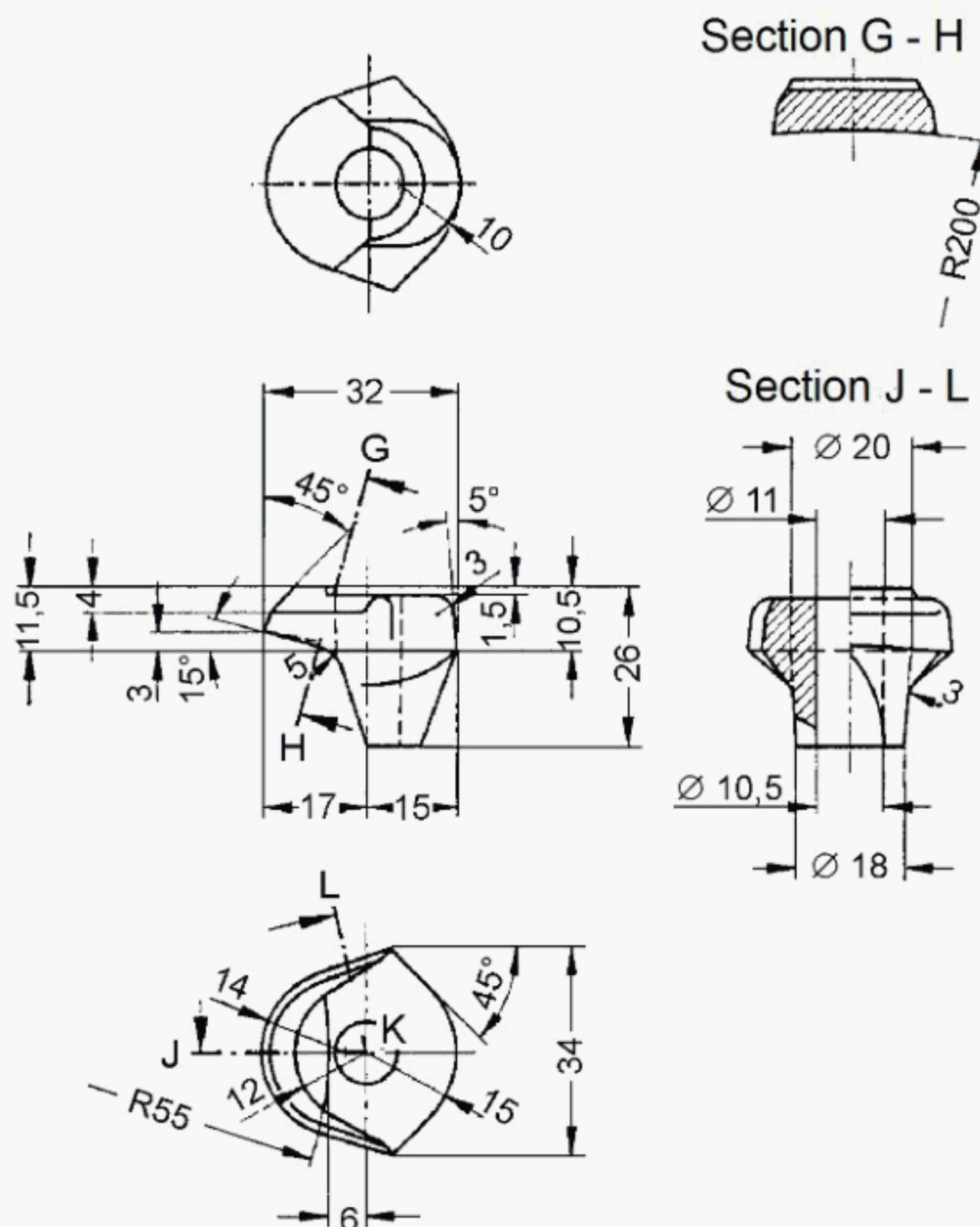
Flange ring	$d_2$	$d_3$	$d_4$	$d_6$	$f$	$h$	$s$	$r_1$	$r_2$	$r_3$
B	140	150	173	130	5°	10,5	1,5	15	10	5,5
C	180 <sup>a)</sup> 185 <sup>a)</sup>	194	222	166 <sup>a)</sup> 170 <sup>a)</sup>	9°	13	3	18	15	7
D	200 <sup>a)</sup> 205 <sup>a)</sup>	214	242	186 <sup>a)</sup> 190 <sup>a)</sup>	9°	13	3	18	15	7

<sup>a)</sup> Diameter  $d_2$  and  $d_6$  may deviates from EN 50180-1:2015 (Figure 4 and 5) for bushings 1 250 A to 3 150 A and  $U_m$  12 kV to 36 kV. To enable interchangeability the required diameter has to be agreed between purchaser and manufacturer.

### Table 3 – Material for flange rings

Flange ring	Material	
	Standard	Alternative
A	Aluminum sheet 1,5 mm	Non magnetic metal sheet 1,5 mm
B	Aluminum sheet 1,5 mm	Non magnetic metal sheet 1,5 mm
C	Aluminum sheet 3,0 mm	Non magnetic metal sheet 3,0 mm
D	Aluminum sheet 3,0 mm	Non magnetic metal sheet 3,0 mm

Dimension in mm



**Material:**

Non-corrosive material

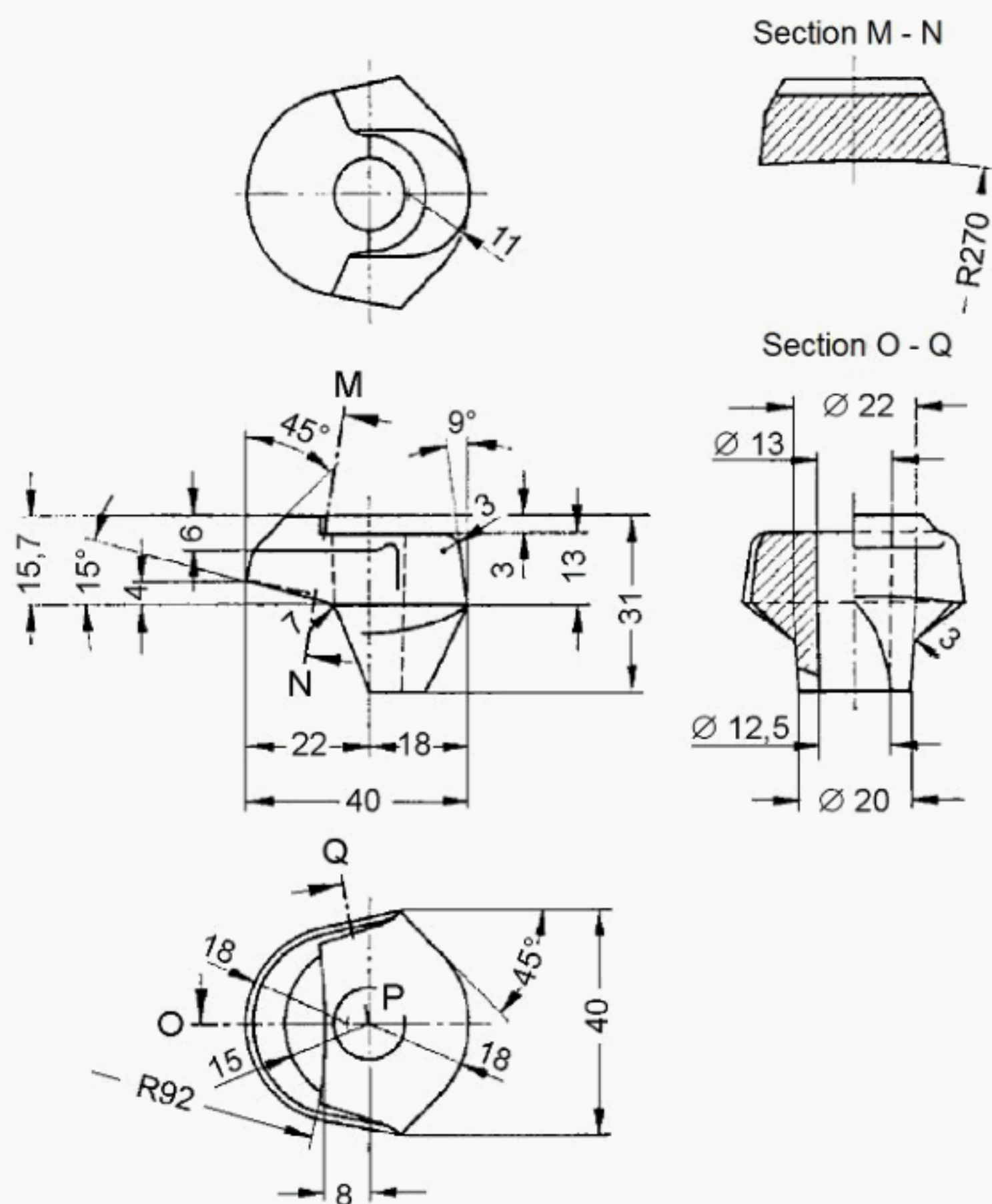
**Designation:**

Clamping paw E

**Figure 4 – Clamping paw E for bushing 250 A and 630 A, 12 kV to 36 kV**



Dimension in mm



**Material:**

Non-corrosive material

Designation: **Clamping paw F**

Figure 5 – Clamping paw F for bushing 1 250 A to 3 150 A, 12 kV to 36 kV,  
and for bushing 250 A to 3 150 A, 52 kV

## Bibliography

ISO 3508, *Thread run-outs for fasteners with thread in accordance with ISO 261 and ISO 262*







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