INTERNATIONAL STANDARD

IEC 62317-4

First edition
2005-09

Ferrite cores – Dimensions –

Part 4:
RM-cores and associated parts

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CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

FERRITE CORES – DIMENSIONS –

Part 4: RM-cores and associated parts

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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International Standard IEC 62317-4 has been prepared IEC technical committee 51: Magnetic components and ferrite materials.

This international standard cancels and replaces the second edition of IEC 60431 published in 1983, its amendment 1 (1995), and its amendment 2 (1996). This international standard constitutes a technical revision of IEC 60431.

The main changes with respect to the previous edition of IEC 60431 are listed below:

– low-profile RM-cores at present defined in IEC 61860 are added to this standard.

IEC 61860 will eventually be replaced by IEC 62317-9 which is under consideration. IEC 62317-9 will not include the low-profile RM-cores.

The text of this standard is based on the following documents:

FDIS	Report on voting
51/833/FDIS	51/839/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

IEC 62317 consists of the following parts, under the general title *Ferrite cores – Dimensions*:

Part 1: General (under consideration)
Part 2: Pot cores (under consideration, currently available as IEC 60133)
Part 3: Half pot cores (under consideration, currently available as IEC 62323)
Part 4: RM-cores and associated parts
Part 5: EP-cores (under consideration, currently available as IEC 61596)
Part 6: ETD-cores (under consideration, currently available as IEC 61185)
Part 7: EER-cores
Part 8: E-cores
Part 9: Planar cores
Part 10: PM-cores (under consideration, currently available as IEC 61247)
Part 11: EC-cores (under consideration, currently available as IEC 60647)
Part 12: Uncoated ring cores (under consideration, currently available as IEC 61604)

The committee has decided that the contents of this publication will remain unchanged until the maintenance result date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

- reconfirmed;
- withdrawn;
- replaced by a revised edition, or
- amended.

A bilingual version of this publication may be issued at a later date.

FERRITE CORES – DIMENSIONS –

Part 4: RM-cores and associated parts

1 Scope

This part of IEC 62317 specifies the dimensions that are of importance for mechanical interchangeability for a preferred range of RM-cores and low-profile RM-cores made of ferrite, and the locations of their terminal pins on a 2,54 mm printed wiring grid in relation to the base outlines of the cores. It also specifies the test conditions and clamping forces to be used for inductance measurement.

The general considerations that the design of this range of cores is based upon are given in Annex A.

2 Normative references

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

IEC 60097:1991, *Grid system for printed circuits*

IEC 60205:2001, *Calculation of the effective parameters of magnetic piece parts*

3 Primary standards

Compliance with the following requirements ensures mechanical interchangeability of complete assemblies and wound coil formers.

3.1 Pin locations and base outlines

These shall be as shown in Figure 6 and Figure 8 (for power applications), in which the base is viewed from the pin side, i.e. from the underside of the printed wiring boards.

The pins shall fit into holes according to IEC 60097, the nominal hole diameter being:

– 1 mm when the shortest distance between pins is 2,54 mm;

– 1,3 mm when the shortest distance between pins is $2{,}54\sqrt{2}$ mm or more.

3.2 Dimensions of RM-cores

The dimensions of RM-cores shall be as given in Table 1 and the low-profile RM-cores shall be as given in Table 2.

3.3 Shape of coil former and pin numbering

When the coil former is viewed from the pin side, the pins shall be numbered in a clockwise direction. Pin 1 shall be a corner pin, or the pin immediately to the right of a corner, and closest to the base outline.

For asymmetrical arrangements, pin 1 shall be at the side with the largest number of pins. The coil former shall show an asymmetry which shall preferably be visible (or detectable) when the assembled inductor is held with the pins downwards. This asymmetry shall clearly indicate pin 1. For pin numbering of recommended core patterns and for recommended asymmetrical pin arrangements, see 3.1.

NOTE It is not required that the pin numbers be marked on the coil former.

3.4 Effective parameter values

The effective parameter values for cores having the dimensions given in 3.2 and 3.5 are as shown in Table 3 and Table 4.

3.5 Spring recess

RM-cores shall have recesses which allow the core halves to be held together by two spring clamps snapping into these recesses. The recesses consist of a flat spring rest and a locking ridge. The dimensions are given in Table 5; the profile of this spring recess is not defined but the limit dimensions shall be complied with.

3.6 Stud recess

Those RM-cores with centerpost holes may have recesses for the fixed part of the adjusting device with dimensions in accordance with Table 6. These dimensions are not mandatory for manufacturers who supply cores with the fixed part of the adjusting device attached.

The dimensions specified in Table 1 are illustrated in Figure 1.

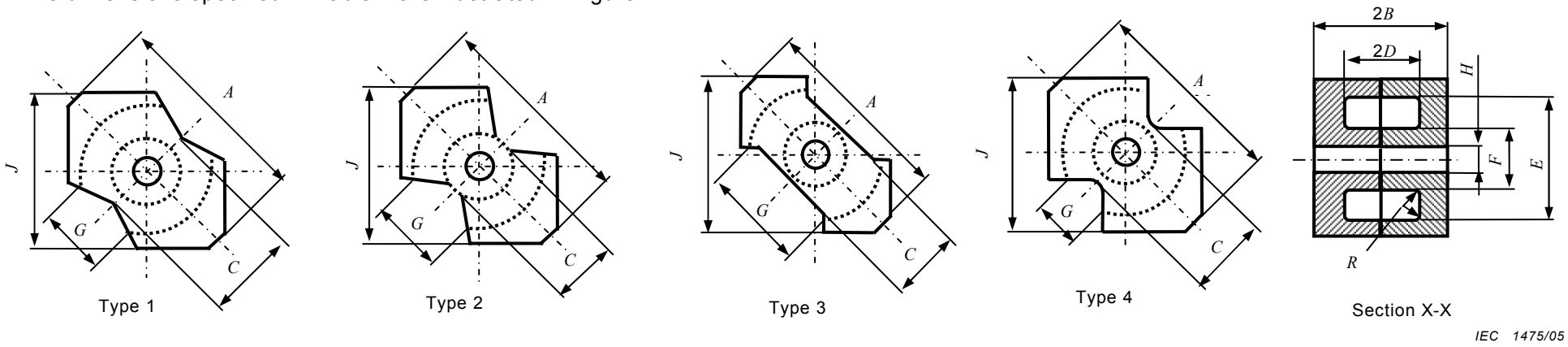


Figure 1 – Dimensions of RM-cores

Table 1 – Dimensions of RM-cores

Size	*A* mm		*B* mm		*C* mm		*D* mm		*E* mm		*F* mm		*G* mm	*H* [a] mm		*J* mm		*R* mm	Type
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Min.	Max.	Min.	Max.	Max.	
RM 4	10,6	11,8	5,15	5,25	4,40	4,60	3,50	3,70	7,95	8,35	3,70	3,90	5,80	2,0	2,1	9,40	9,80	0,3	3
RM 5	14,0	14,9	5,15	5,25	6,40	6,80	3,15	3,35	10,2	10,6	4,07	4,90	6,00	2,0	2,1	11,8	12,3	0,3	3
RM 6-S	17,2	18,3	6,15	6,25	7,80	8,20	4,00	4,20	12,4	12,9	6,10	6,40	8,40	3,0	3,1	14,1	14,7	0,3	1
RM 6-R	17,2	18,3	6,15	6,25	7,00	7,40	4,00	4,20	12,4	12,9	6,10	6,40	8,40	3,0	3,1	14,1	14,7	0,3	4
RM 7	19,5	20,3	6,65	6,75	6,95	7,25	4,20	4,45	14,75	15,4	6,95	7,25	9,30	3,0	3,1	16,5	17,2	0,3	2
RM 8	22,3	23,2	8,15	8,25	10,6	11,0	5,40	5,65	17,0	17,7	8,25	8,55	9,50	4,4	4,6	18,9	19,7	0,3	3
RM 10	27,2	28,5	9,25	9,35	13,0	13,5	6,20	6,50	21,2	22,1	10,5	10,9	10,9	5,4	5,6	23,6	24,7	0,3	3
RM 12	36,1	37,4	12,2	12,3	15,6	16,1	8,40	8,70	25,0	26,0	12,3	12,8	12,9	-	-	28,7	29,8	0,3	3
RM 14	40,8	42,2	14,4	14,5	18,4	19,0	10,4	10,7	29,0	30,2	14,4	15,0	17,0	5,4	5,6	33,5	34,7	0,3	3
RM 14A	40,8	42,2	15,0	15,1	18,4	19,0	10,4	10,7	29,0	30,2	14,4	15,0	17,0	-	-	33,5	34,7	0,3	3

[a] Solid centerpost cores are available for each size.

The dimensions specified in Table 2 are illustrated in Figure 2.

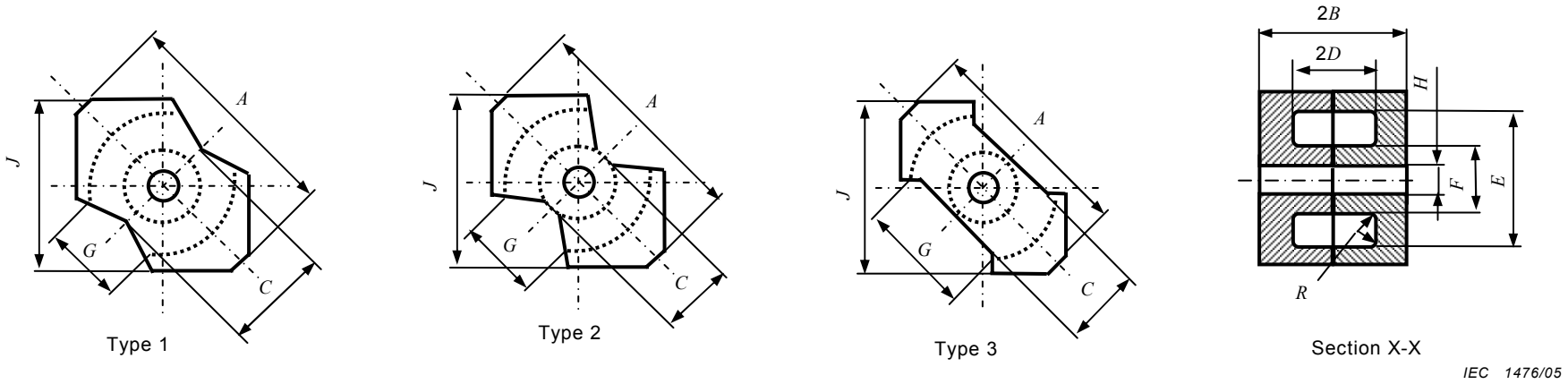


Figure 2 – Dimensions of low-profile RM-cores

Table 2 – Dimensions of low-profile RM-cores

Size	*A* mm		*B* mm		*C* mm		*D* mm		*E* mm		*F* mm		*G* mm	*H* [a] mm		*J* mm		*R* mm	Type
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Min.	Max.	Min.	Max.	Max.	
RM 4/8	10,6	11,8	3,80	3,90	4,40	4,60	2,15	2,35	7,95	8,35	3,70	3,90	5,8	2,0	2,1	9,40	9,80	0,3	3
RM 5/8	14,0	14,9	3,80	3,90	6,40	6,80	1,80	2,00	10,2	10,6	4,70	4,90	6,0	2,0	2,1	11,8	12,3	0,3	3
RM 6/9	17,2	18,3	4,40	4,50	7,80	8,20	2,25	2,45	12,4	12,9	6,10	6,40	8,4	3,0	3,1	14,1	14,7	0,3	1
RM 7/10	19,5	20,3	4,80	4,90	6,95	7,25	2,35	2,60	14,75	15,4	6,95	7,25	9,3	3,0	3,1	16,5	17,2	0,3	2
RM 8/11	22,3	23,2	5,70	5,80	10,6	11,0	2,95	3,15	17,0	17,7	8,25	8,55	9,5	4,4	4,6	18,9	19,7	0,3	3
RM 10/13	27,2	28,5	6,40	6,50	13,0	13,5	3,35	3,55	21,2	22,1	10,5	10,9	10,9	5,4	5,6	23,6	24,7	0,3	3
RM 12/17	36,1	37,4	8,30	8,40	15,6	16,1	4,50	4,75	25,0	26,0	12,3	12,8	12,9	5,4	5,6	28,7	29,8	0,3	3
RM 14/20	40,8	42,2	10,15	10,25	18,4	19,0	5,55	5,85	29,0	30,2	14,4	15,0	17,0	5,4	5,6	33,5	34,7	0,3	3

[a] Solid centerpost cores are available for each size.

Table 3 – Effective parameter and A_{min} values for RM-cores

Size	with hole O no hole Ø	C_1 mm^{-1}	C_2 mm^{-3}	l_e mm	A_e mm^2	V_e mm^3	A_{min}[a)] mm^2
RM 4	O	1,889 4	$172{,}74 \times 10^{-3}$	20,7	10,9	226	8,04
	Ø	1,633 0	$116{,}54 \times 10^{-3}$	22,9	14,0	321	11,3
RM 5	O	1,021 0	$49{,}866 \times 10^{-3}$	20,9	20,5	430	14,8
	Ø	0,943 15	$39{,}774 \times 10^{-3}$	22,4	23,7	530	18,1
RM 6-S	O	0,897 83	$29{,}592 \times 10^{-3}$	27,2	30,3	830	23,4
	Ø	0,816 68	$23{,}099 \times 10^{-3}$	28,9	35,4	1 020	30,7
RM 6-R	O	0,821 49	$25{,}728 \times 10^{-3}$	25,7	31,3	810	23,4
	Ø	0,740 34	$19{,}737 \times 10^{-3}$	27,8	37,5	1 040	30,7
RM 7	O	0,720 27	$17{,}389 \times 10^{-3}$	29,8	41,4	1 240	32,3
	Ø	0,672 53	$14{,}509 \times 10^{-3}$	31,2	46,4	1 450	39,6
RM 8	O	0,685 47	$13{,}238 \times 10^{-3}$	35,5	51,8	1 840	40,0
	Ø	0,607 35	$9{,}650\,5 \times 10^{-3}$	38,2	62,9	2 410	55,0
RM 10	O	0,504 94	$6{,}021\,9 \times 10^{-3}$	42,3	83,9	3 550	66,0
	Ø	0,455 90	$4{,}634\,7 \times 10^{-3}$	44,8	98,4	4 410	90,0
RM 12	Ø	0,384 35	$2{,}623\,1 \times 10^{-3}$	56,3	147	8 250	125
RM 14	O	0,382 77	$2{,}185\,7 \times 10^{-3}$	67,0	175	11 700	146
	Ø	0,363 24	$1{,}916\,8 \times 10^{-3}$	68,8	189	13 000	170
RM 14A	Ø	0,351 03	$1{,}766\,7 \times 10^{-3}$	69,7	199	13 900	170
a) See 2.2 of IEC 60205 for the definition of A_{min}.							
NOTE The manufacturers may indicate in their catalogues more precise values than those given in the above table.							

Table 4 – Effective parameter and A_{min} values for low-profile RM-cores

Size	with hole O no hole Ø	C_1 mm^{-1}	C_2 mm^{-3}	l_e mm	A_e mm^2	V_e mm^3	A_{min}[a)] mm^2
RM 4/8	O	1,363 7	$117{,}98 \times 10^{-3}$	15,8	11,6	182	8,04
	Ø	1,205 0	$82{,}549 \times 10^{-3}$	17,6	14,6	257	11,3
RM 5/8	O	0,748 38	$34{,}487 \times 10^{-3}$	16,2	21,7	352	14,8
	Ø	0,703 79	$28{,}484 \times 10^{-3}$	17,4	24,7	430	18,1
RM 6/9	O	0,656 34	$20{,}781 \times 10^{-3}$	20,7	31,6	655	23,4
	Ø	0,610 85	$16{,}976 \times 10^{-3}$	22,0	36,0	791	31,2
RM 7/10	O	0,528 24	$12{,}220 \times 10^{-3}$	22,8	43,2	987	32,3
	Ø	0,501 64	$10{,}529 \times 10^{-3}$	23,9	47,6	1 140	39,6
RM 8/11	O	0,479 06	$8{,}726\,5 \times 10^{-3}$	26,3	54,9	1 440	39,5
	Ø	0,436 89	$6{,}699\,3 \times 10^{-3}$	28,5	65,2	1 860	55,4
RM 10/13	O	0,359 49	$4{,}109\,9 \times 10^{-3}$	31,4	87,5	2 750	66,2
	Ø	0,333 60	$3{,}331\,6 \times 10^{-3}$	33,4	100	3 340	89,9
RM 12/17	O	0,295 78	$2{,}227\,5 \times 10^{-3}$	39,3	133	5 220	99,9
	Ø	0,279 06	$1{,}883\,9 \times 10^{-3}$	41,3	148	6 120	125
RM 14/20	O	0,263 67	$1{,}409\,7 \times 10^{-3}$	49,3	187	9 920	146
	Ø	0,253 40	$1{,}261\,1 \times 10^{-3}$	50,9	201	10 200	170
a) See 2.2 of IEC 60205 for the definition of A_{min}.							
NOTE The manufacturers may indicate in their catalogues more precise values than those given in the above table.							

4 Derived standards

Parties interested in making or using RM-cores may find it desirable to lay down local standards for everyday use. These may show the dimensions in greater detail than Clause 3, and may correspond to the state of art in that area. When doing so, care should be taken not to exclude any other type of RM-core which meets the IEC primary standard and which also meets the requirements of the user.

When a national standard is prepared, the relevant national standardization body is strongly requested to insert a note stating that:

a) the standard is in accordance with the dimensional standard of this part of IEC 62317 but that more details are given in order to promote the practical use of the standard;

b) other solutions are possible within the framework of this part of IEC 62317 and should not be excluded if such cores and formers are functionally interchangeable with those according to the national standard.

The dimensions specified in Table 5 are illustrated in Figure 3.

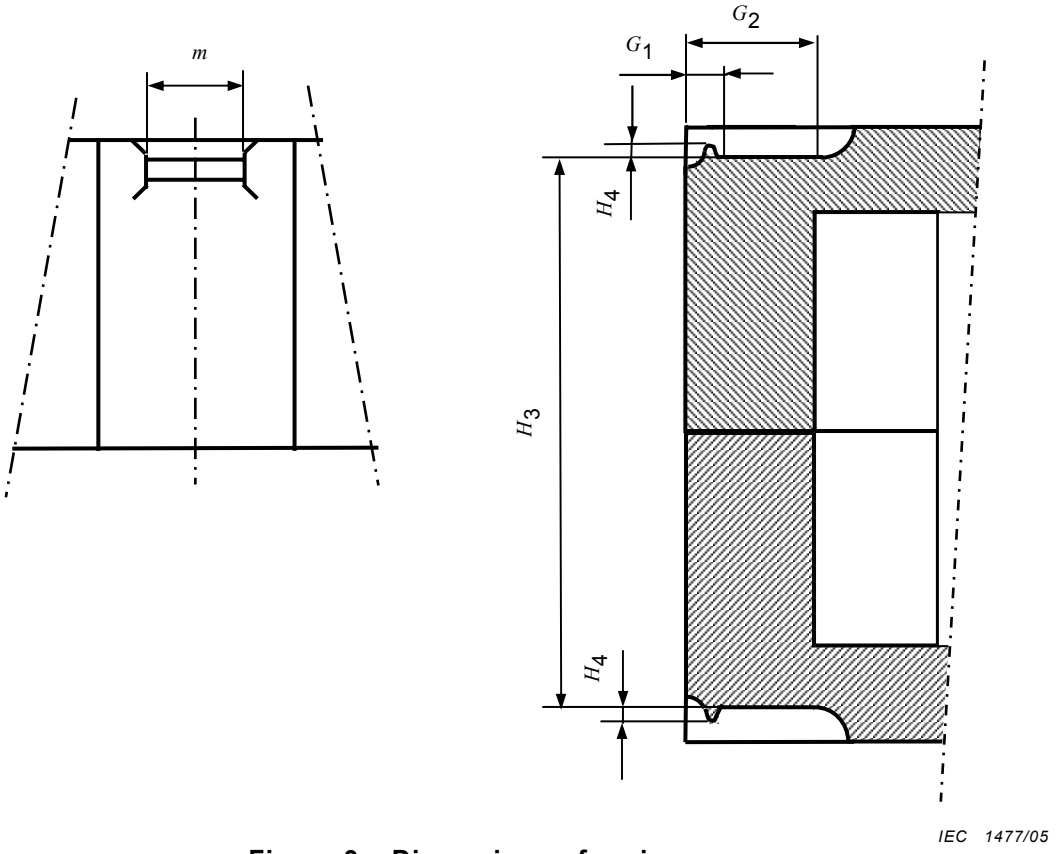


Figure 3 – Dimensions of spring recess

Table 5 – Spring recess

Size	H_3[a)b)] mm		H_4 mm		G_1[a)c)] mm	G_2[a)d)] mm	m mm
	Min.	Max.	Min.	Max.	Max.	Min.	Min.
RM 4	8,75	9,25	0,05	0,15	1,0	1,65	2,5
RM 5	8,75	9,25	0,05	0,15	1,0	1,65	2,5
RM 6	10,09	10,59	0,10	0,20	1,3	2,2	2,5
RM 7	11,09	11,59	0,10	0,20	1,3	2,2	3,3
RM 8	14,05	14,55	0,10	0,20	1,3	2,2	5,0
RM 10	15,95	16,45	0,15	0,25	1,3	2,25	5,0
RM 12	21,4	21,9	0,15	0,25	1,3	3,5	5,0
RM 14	25,55	26,05	0,15	0,25	1,3	3,6	5,6
RM 14A	26,8	27,3	0,15	0,25	1,3	3,6	5,6

a) Dimensions G_1 and G_2 define the boundaries of the flat spring rest.

b) In particular cases, the design of the spring may require the tolerance on H_3 to be smaller.

c) The form of the locking ridge is not prescribed but it shall be essentially uniform over the width m in order not to hinder the correct application of the spring. The outer side may be of any form facilitating the introduction of the spring into the recess; the inner side may be of any form but shall not protrude through a flat plane making an angle of 120° with the flat spring rest and containing its boundary defined by dimensions G_1.

d) The inner side of the spring recess may be of any form but it shall not protrude through a flat plane making an angle of 120° with the flat spring rest and containing its boundary defined by dimension G_2.

The dimensions specified in Table 6 are illustrated in Figure 4.

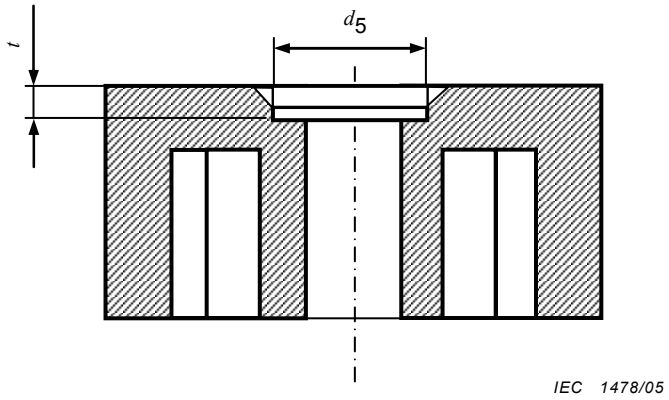


Figure 4 – Dimensions of stud recess

Table 6 – Stud recess

Size	d_5 mm	t mm	
	Min.	**Min.**	**Max.**
RM 4	3,0	0,4	0,7
RM 5	3,0	0,4	0,7
RM 6	4,3	0,7	1,0
RM 7	4,3	0,7	1,0
RM 8	6,0	0,7	1,0
RM 10	7,6	0,8	1,1
RM 14	7,6	0,8	1,1

5 Main dimensions for coil formers

5.1 RM-cores for primary standard

The dimensions specified in Tables 7 and 8 are illustrated in Figure 5.

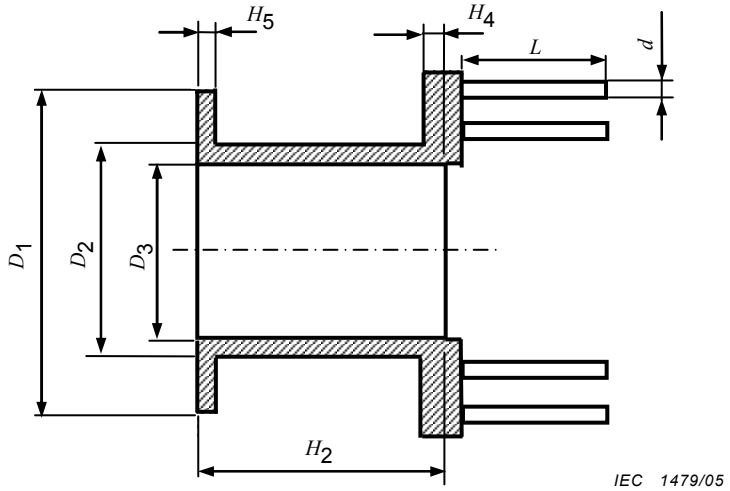


Figure 5 – Main dimensions of coil formers for RM-cores

Table 7 – Main dimensions of coil formers for RM-cores

Size	D_1 mm		D_2 mm		D_3 mm		H_2 mm		H_4 mm	H_5 mm	L mm	d mm	
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Max.	Max.	Min.	Min.	Max.
RM 4	7,65	7,85	4,75	4,95	4,00	4,15	6,65	6,85	0,80	0,50	3,90	0,50	0,60
RM 5	9,90	10,1	5,75	5,95	5,00	5,15	5,95	6,15	0,80	0,55	4,50	0,50	0,60
RM6-R	12,1	12,3	7,20	7,30	6,50	6,60	7,70	7,85	0,80	0,55	4,80	0,58	0,62
RM6-S	12,1	12,3	7,25	7,45	6,50	6,60	7,70	7,85	0,90	0,55	4,30	0,50	0,60
RM 7	14,4	14,66	8,00	8,30	7,30	7,60	8,10	8,25	0,80	0,55	6,6	0,78	0,82
RM 8	16,7	16,9	9,75	9,95	8,70	8,90	10,4	10,65	1,05	0,65	5,00	0,60	0,70
RM 10	20,8	21,0	12,3	12,50	11,1	11,3	12,0	12,25	1,05	0,70	5,35	0,60	0,70
RM 12	24,5	24,7	14,2	14,5	13,0	13,3	16,25	16,5	1,05	0,75	6,00	0,75	0,85
RM 14	28,6	28,8	16,6	16,80	15,2	15,4	20,2	20,5	1,05	0,85	6,10	0,75	0,85

Table 8 – Main dimensions of coil formers for low-profile RM-cores

Size	D_1 mm		D_2 mm		D_3 mm		H_2 mm		H_4 mm	H_5 mm	L mm	d mm	
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Max.	Max.	Min.	Min.	Max.
RM 4/8	7,65	7,85	4,75	4,95	4,00	4,15	4,05	4,20	0,80	0,50	3,90	0,50	0,60
RM 5/8	9,90	10,1	5,75	5,95	5,00	5,15	3,35	3,50	0,80	0,55	4,50	0,50	0,60
RM 6/9	12,1	12,3	7,20	7,30	6,50	6,60	4,25	4,40	0,90	0,55	4,80	0,58	0,62
RM 7/10	14,4	14,66	8,00	8,30	7,30	7,60	4,45	4,60	0,80	0,55	6,60	0,78	0,82
RM 8/11	16,70	16,9	9,75	9,95	8,70	8,90	5,55	5,70	1,05	0,65	5,00	0,60	0,70
RM10/13	20,8	21,0	12,3	12,5	11,1	11,3	6,35	6,50	1,05	0,70	5,35	0,60	0,70
RM12/17	24,5	24,7	14,2	14,5	13,0	13,3	8,65	8,80	1,05	0,75	6,00	0,75	0,85
RM14/20	28,6	28,8	16,6	16,8	15,2	15,4	10,75	10,9	1,05	0,85	6,10	0,75	0,85

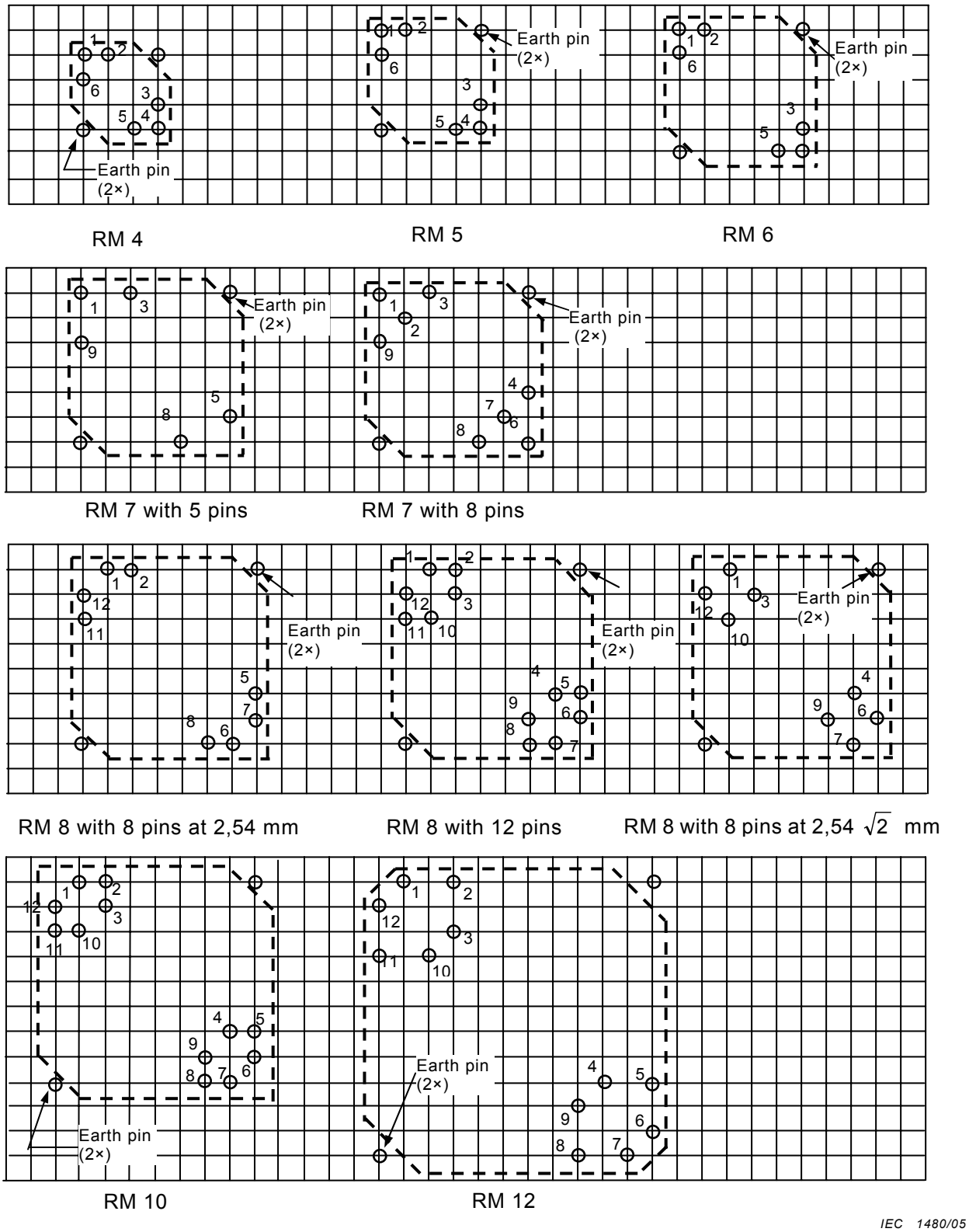
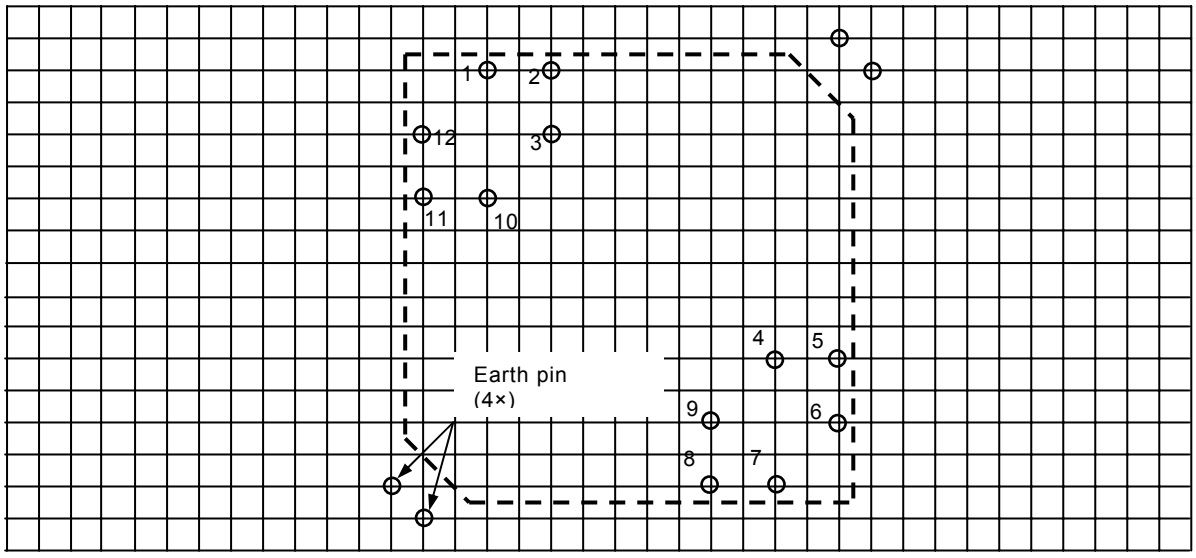


Figure 6 – Pin locations and base outlines viewed from the underside of the board



RM 14 IEC 1481/05

Figure 6 – Pin locations and base outlines viewed from the underside of the board
(*continued*)

NOTE To obtain an asymmetrical arrangement, one pin may be omitted on one side from a symmetrical arrangement. For RM 7, the 5-pin version has an asymmetrical arrangement.

For the other cores, omit:

- for RM 4, RM 5 and RM 6 with 5 pins: No. 4 pin;
- for RM 8 with 11 pins: No. 6 pin;
- for RM 10 with 11 pins: No. 9 pin;
- for RM 12 with 11 pins: No. 10 pin;
- for RM 14 with 10 pins: No. 5 and No. 8 pins.

5.2 RM-cores intended particularly for power applications

These coil formers are intended for use with cores RM 6-S, RM 8, RM 10, RM 12 and RM 14A, all without centre holes. Each is provided with 12 terminal pins except for the RM 6-S coil former, which has only eight.

Figure 7 shows the features specific to this format and the corresponding dimensions are given in Table 9.

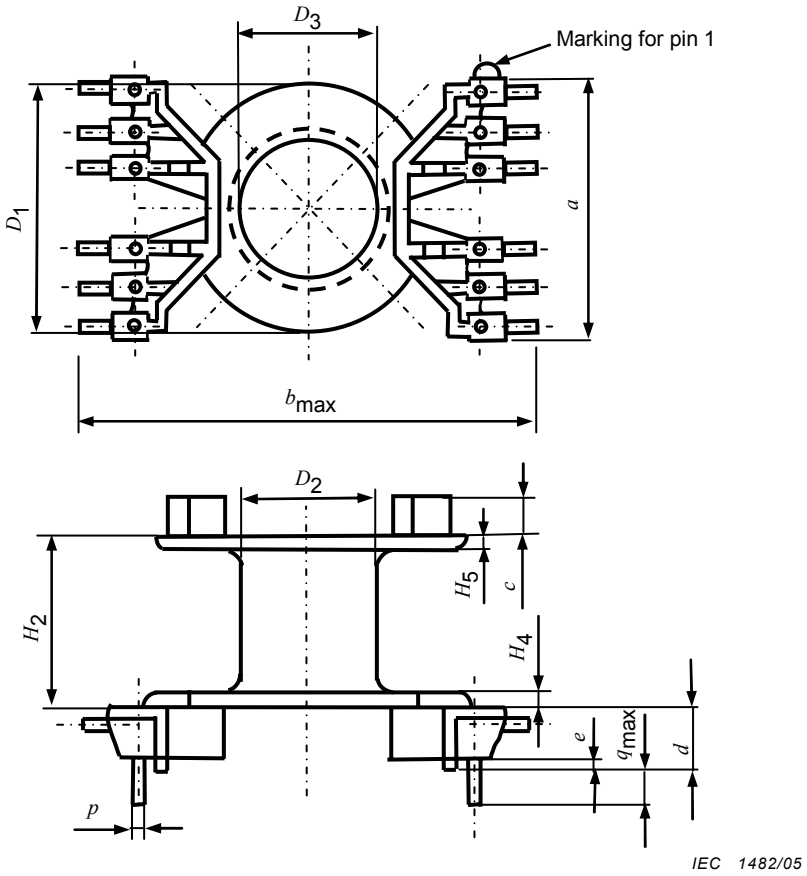


Figure 7 – Dimensions of specific features

Table 9 – Dimensions of specific features

Size	D_1 mm		D_2 mm		D_3 mm		H_2 mm		H_4 mm	H_5 mm
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Max.	Max.
RM 6-S	12,1	12,3	7,25	7,45	6,50	6,60	7,70	7,95	1,05	0,60
RM 8	16,7	16,9	9,75	9,95	8,70	8,90	10,4	10,65	1,20	0,75
RM 10	20,8	21,0	12,3	12,5	11,1	11,3	12,0	12,25	1,30	0,80
RM 12	24,5	24,7	14,2	14,5	13,0	13,3	16,25	16,5	1,30	0,80
RM 14A	28,6	28,8	16,6	16,8	15,2	15,4	20,2	20,5	1,40	0,90

Size	a mm	$b_{max.}$ mm	c mm	d mm	e mm	p mm	$q_{max.}$ mm
RM 6-S	16,0	24,9	2,2	2,6	0,3	0,63	3,8
RM 8	23,5	29,9	2,5	3,1	0,3	0,63	3,8
RM 10	23,3	39,4	3,1	3,45	0,3	1,0	3,8
RM 12	28,4	45,2	3,2	3,7	0,3	1,0	4,2
RM 14A	31,4	48,4	4,0	4,4	0,3	1,0	4,2

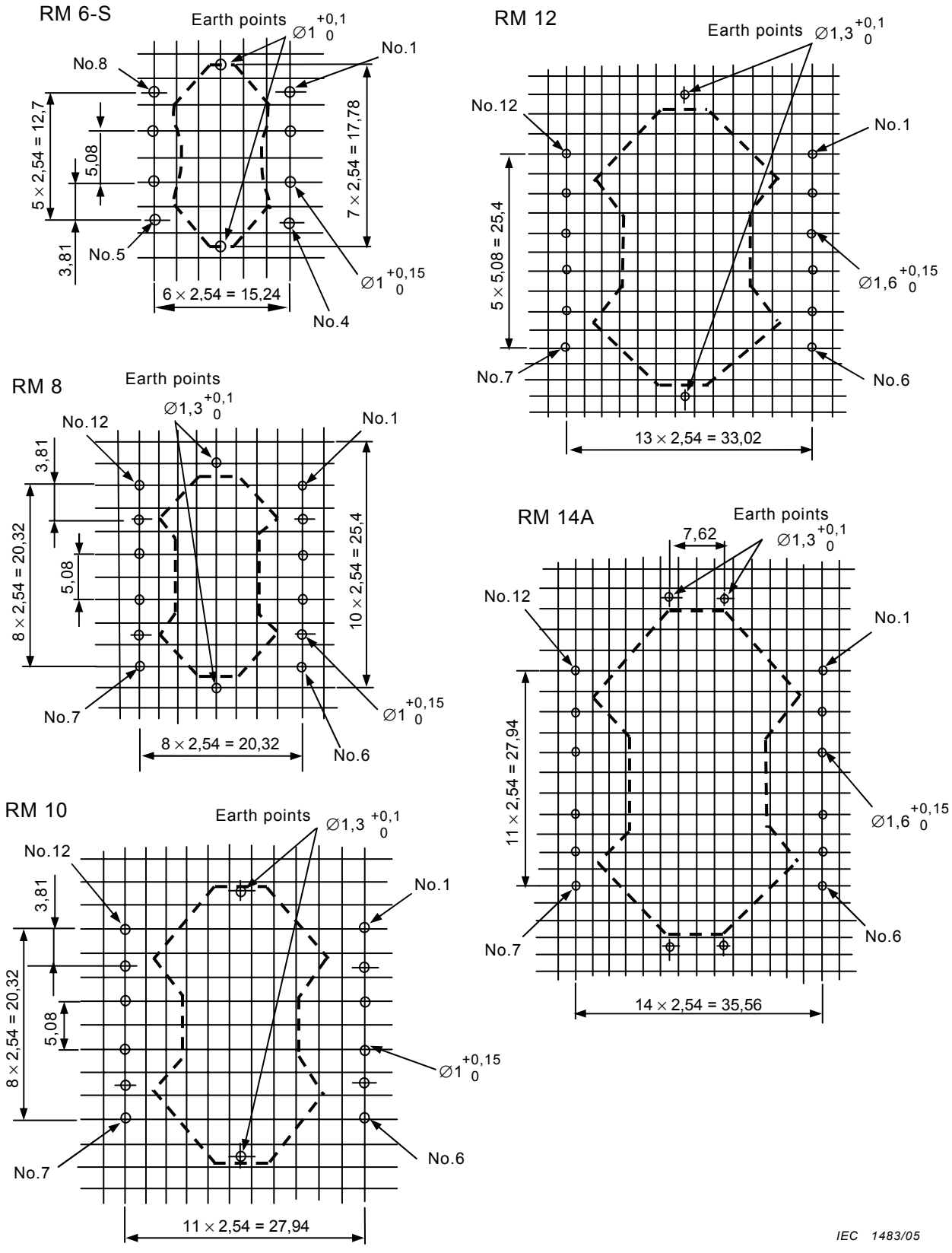


Figure 8 – Pin locations and base outlines viewed from the underside of the board

Annex A
(informative)

RM-core design

A.1 General

The design of RM-cores standardized by the IEC is based on the following considerations:

a) RM-cores are especially suited for use on printed wiring boards, because it is possible to solder the wire leads of the coils directly to the pin terminations moulded in the coil former. Normally, these pins should remain within the outline of the core base.

b) RM-cores are primarily used for inductors and tuned transformers, but they can also be used for broad-band transformers and in switched mode power supply applications.

   For RM-cores which are used for fixed inductors and untuned transformers, where the adjuster hole is unnecessary, a solid centre pole (no hole) construction may be used. This gives a higher effective permeability and, in particular, more efficient operation than the corresponding cores with a hole, an important consideration for power applications.

   Cores up to and including RM 10 are specified for both forms of construction, whilst RM 12 and RM 14A are specifically intended for applications requiring a solid centre pole.

   The counterpart to RM 14, with an adjuster hole, is a taller core RM 14A with solid centre pole, whose essential advantage is a thicker base, to permit greater values of A_e and A_{min} to be achieved, while enabling the ratio A_e/A_{min} to be maintained almost unchanged.

c) The base areas are square with cut-outs for the terminal pins in two opposite corners. The winding space is annular.

A.2 Pin locations and base outlines

In order to provide for the largest possible number of pins, the shortest distance between pin centres of 2,54 mm should be chosen. This can be safely handled by modern soldering techniques for miniature printed wiring. The result is a maximum of 6 pins on the smallest cores (e.g. base dimensions 10 mm × 10 mm) and up to 12 pins for a large core (base dimensions 20 mm × 20 mm). If the maximum number of pins is not required, the shortest distance between pin centres can be increased to $2{,}54\sqrt{2}$ mm by omitting certain pins.

When the pins are placed on the primary grid, the sides of the core base are located at half grid spacing (except for RM 10). This allows the neighbouring pins of adjacent cores when placed side by side to be located on parallel grid lines which are 2,54 mm apart.

A.3 Design considerations and dimensions

The range of base sizes is compatible with 4, 5, 6, 7, 8, 10 and 14 printed wiring modules of 2,54 mm.

Further aspects of the design are:

– a maximum wall height to thickness ratio of 5:1;

– a thickness of the core base sufficient to accommodate the wires terminated on the pins of the coil former;

– an adjuster hole diameter in accordance with IEC 60133.

Within these limitations, and assuming acceptable core heights and reasonable cut-out dimensions, the optimum inner and outer diameters of the winding space can be calculated with regard to the qualities R_{dc}/L and hysteresis loss.

For this calculation, currently used wall thicknesses for the coil formers have been taken into account, for example for RM 6 a flange thickness of approximately 0,5 mm and a cylinder wall thickness of approximately 0,3 mm. The effect of cut-outs on the optimum dimensions of a core may be considerable; the calculation has been based on cut-outs which suit most practical applications.

A.4 Practical considerations

The cut-outs should preferably reach the centre boss so that the inner terminating wire can easily be led out.

In order to obtain adequate adjuster performance, the tightened tolerance on the centre hole in accordance with IEC 60133 should be used. For some sizes like RM 5, the adjuster performance may still be inadequate and a further tightening of the tolerance should then be considered by the manufacturer.

Annex B
(normative)

Guidance for measuring clamping forces relevant to RM-core tests

B.1 Test conditions and clamping forces

In order to ensure a good repeatability of the measurements, specially on A_L values with or without air-gaps, the clamping forces and the relevant clamping procedure are specified.

B.2 Clamping procedure

For every electrical test, the core set should be assembled with the appropriate measuring coil. During the measurements, a specified clamping force is applied in order to limit the parasitic air-gap and ensure a good contact between the mating surfaces.

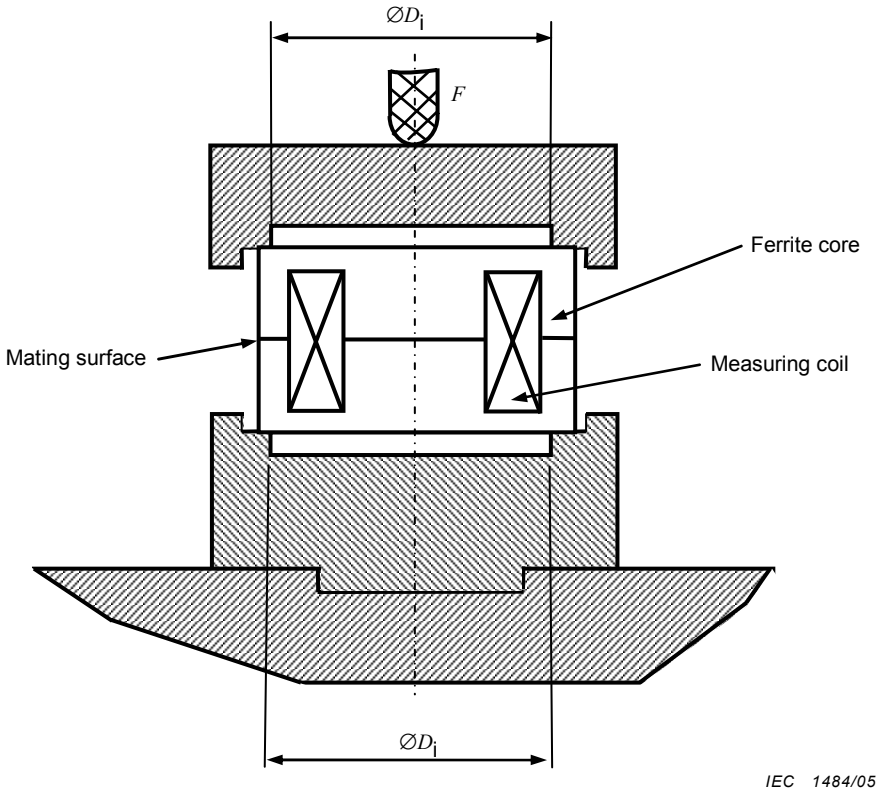


Figure B.1 – Mounting device

Table B.1 gives the typical inner diameters D_i for the design of mounting devices, as illustrated in Figure B.1, and gives the recommended minimum and maximum clamping forces to be applied during the different electrical tests for each RM-core type.

Table B.1 – Inner diameters and recommended clamping forces

Size	Inner diameter D_i mm	Clamping force F N	
	Typical	Min.	Max.
RM 4	8	10	15
RM 5	10	15	25
RM 6	12	25	35
RM 7	15	30	40
RM 8	17	45	55
RM 10	21	45	55
RM 12	25	45	55
RM 14	29	45	55

NOTE For measurement of tanδ, hysteresis constant, and THD_F, the measurements are sensitive to mechanical stress, and reduced clamping pressures are recommended, 0,2 N/mm^2, with a relative tolerance of ± 10 %, with force applied only in a direction perpendicular to the mating surface.

Bibliography

IEC 60133:2000, *Dimensions of pot-cores made of magnetic oxides and associated parts*

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