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(www.rst.gov.ru)

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12	19
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()	22
()	31
()	32
()	42
()	43
()	44
	46

5.4

5.5

5.6

5.7

5.8

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— (DAC), (TCG) (DGS, AVG).

6.2

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55725

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35° 55°;

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[1].

6.3

55724 ([2] [3]).

6.4

6.5

7

7.1

7.1.1

7.1.2

7.1.3

7.1.4

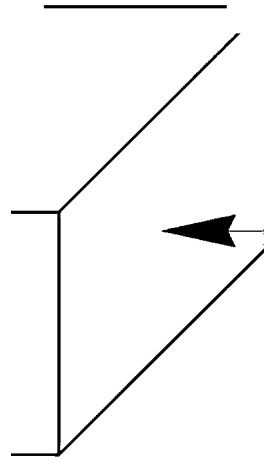
7.2

7.2.1

7.2.2

7.2.3

1.

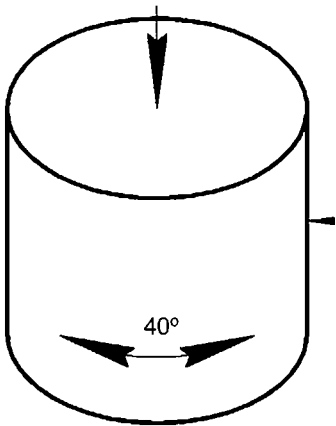


1—

7.2.4

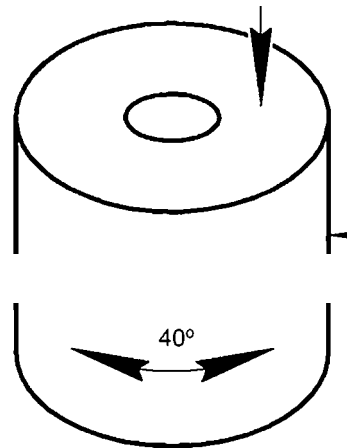
35° 45°

2.



—

2—



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45° 55°

30
7.2.5

(,) -

(1)

45° 55°

3.

3

$$f = 2,5 \quad = 12$$

4.
m = 5.

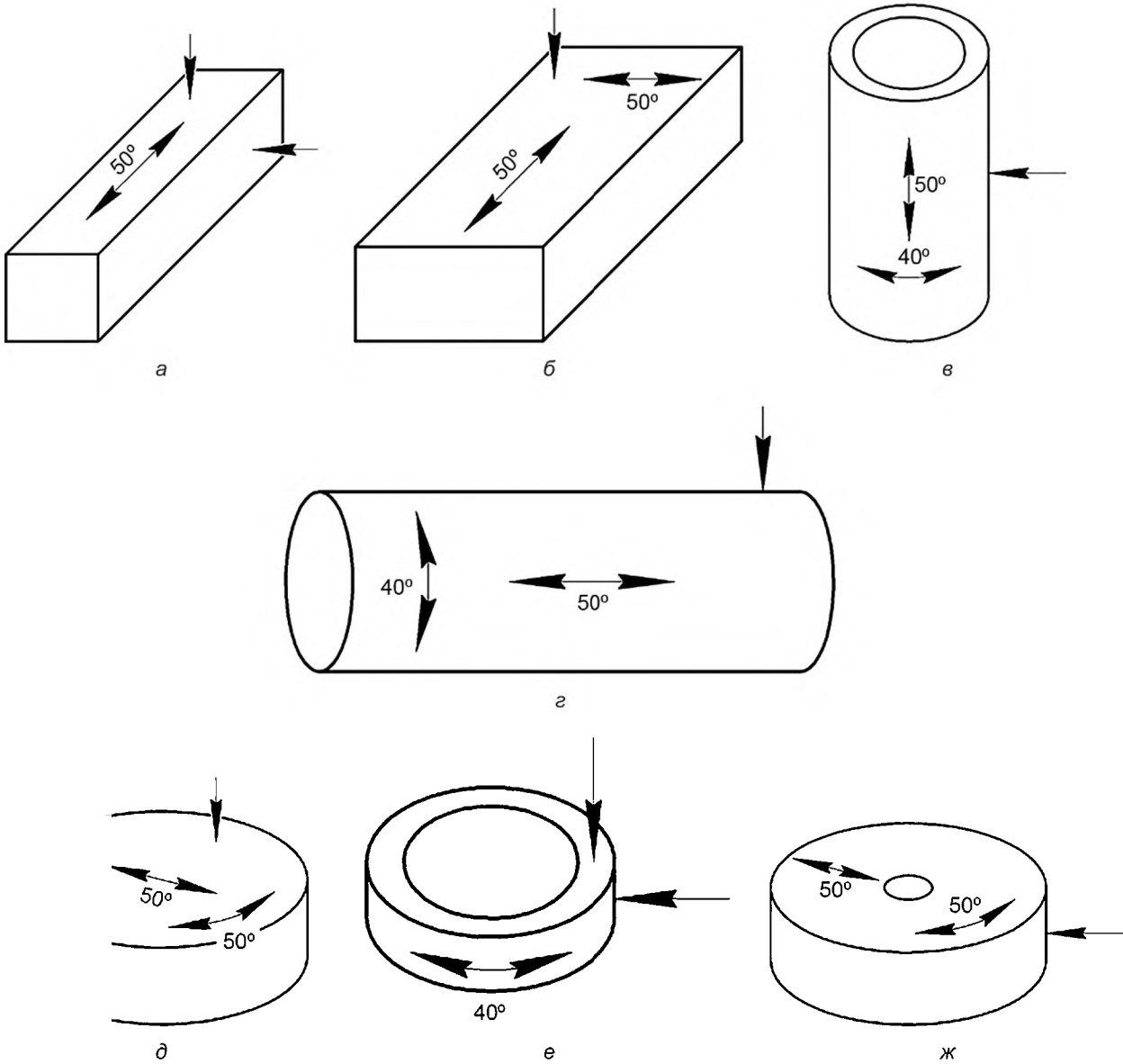
7.3

7.3.1

7.3.2

1

$$H \leq D_H \frac{1 - \sin \alpha}{2}$$

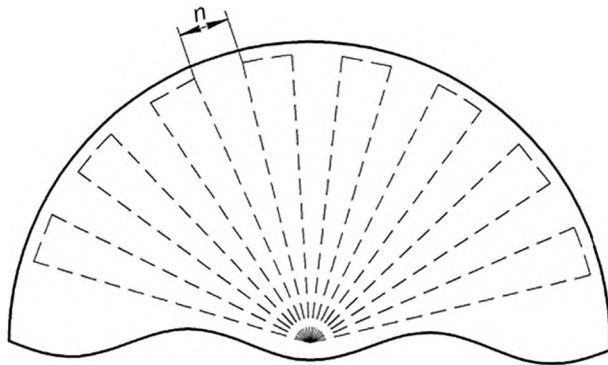


7.3.3

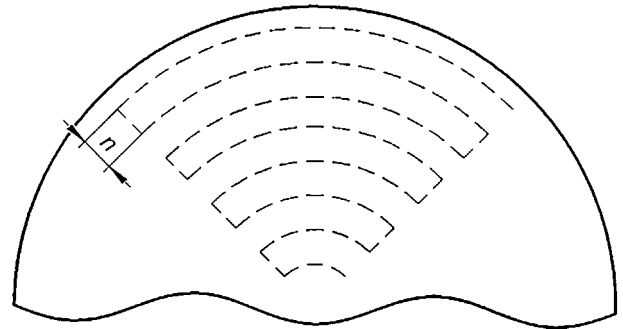
2

(3)

7.5.3—7.5.5,



а — сканирование по радиусу



б — сканирование перпендикулярно к радиусу

4—

7.3.4

2

2

7.3.5

2

7.3.6

2

7.4

7.4.1

7.4.2

Ra 3,2 Rz 20 2789;

Ra 6,3 Rz

40

2789.

7.4.3

4

7.4.4

1:50.

7.5

7.5.1

8.4.

7.5.2 , -

7.5.3

PC

7.5.4 -

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,

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(2).

-

7.5.5

,

,

7.6

7.6.1 -

9

24507.

7.6.2

-

1.

7.6.3 12

2,5 - 300 -

7.6.4 18 25

1,25 -

300

7.6.5 (

) S_o

7.7

7.7.1 :

- 2,0 2,5 ;

-

5

1— -

		- 4 -		
		- 6		

- ;
 - ;
 - , PC ;
 - ,
 7.7.3 , fD 12 30 • .

7.8

7.8.1 -

7.8.2 -

0,2

50 * 50 ,

50

50

7.8.3 -

4 ,

7.8.4 -

4 ,

4 ,

7.8.5 ,

12 .

7.8.6 -

12 ,

7.8.7 -

4 ,

7.8.8 -

8

8.1

8.1.1 , , , -

8.1.2 -

8.1.3 (, -

), -

8.1.4 , .

8.2

8.2.1

8.2.2

8.2.2.1

-3 55724, 1 (. [2]), 2 (. [3]).

«0»

8.2.2.2

1

8.2.2.3

1

8.2.3

8.2.4

8.2.4.1

8.2.4.2

2°.

8.2.4.3

2°.

8.2.5

16811.

8.3

8.3.1

8.3.2

«0» (

)

8.3.3

«0»

8.3.4

300 / .

8.3.5

8.3.6

(. 9.13, 9.14).

8.4

8.4.1

25 %

6

8.4.2

25 %

8.4.3

7.5.

8.5

8.5.1

8.5.2

8.5.3

8.6

8.7

8.7.1

8.7.2

9

9.1

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-

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= 2₀),

9.2

(.).

9.3

9.4

9.5

9.6

9.7

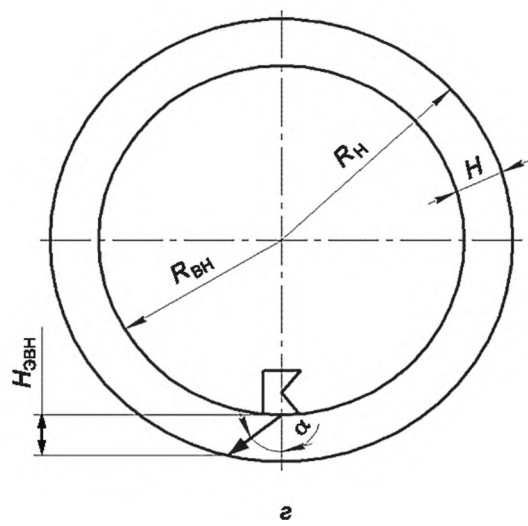
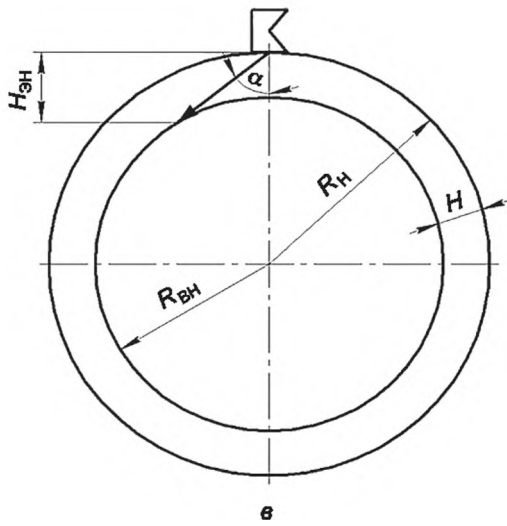
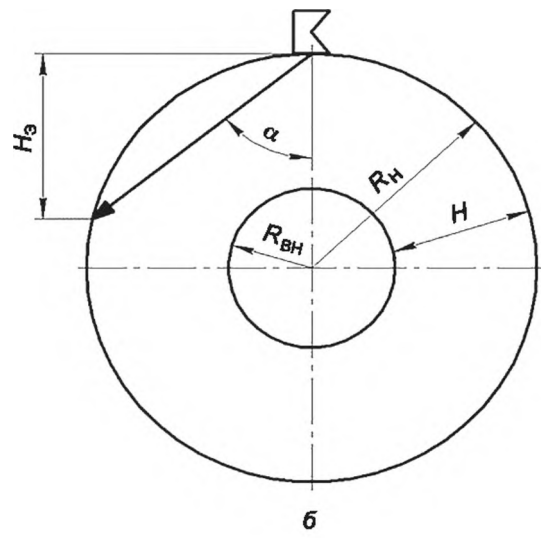
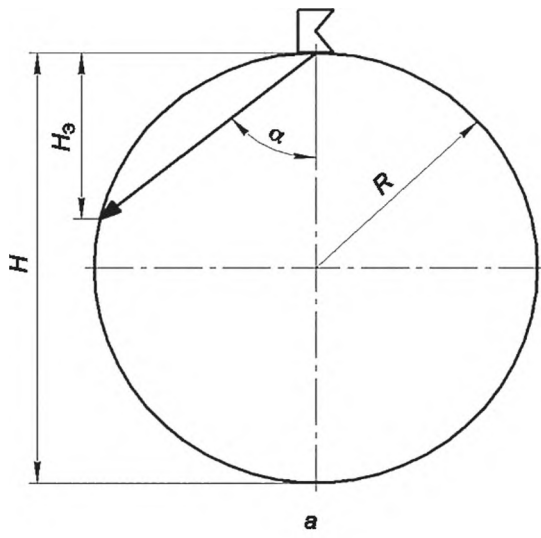
9.8

9.9

S_0
 S_1
 S_n

6 ($S_n = 0,5S_0$

9.10									
9.11									
9.12	(3),						(4)	(5)	-
				5					
				$= 2R \cos^2$					(4)
				$= 2R_H \cos^2$					(5)
9.13							(6)	(7)	-
				5					
				$= \cos \alpha R_H \cos \alpha - J R_{RH} - R_{RH}^2 (\sin \alpha)^2$		/1'			(6)
				$\sim_{on} = \cos \alpha \sqrt{R_H + R_H \sin \alpha}$		$\sqrt{R_{RH} \cos \alpha}$			(7)
9.14	$> /-/$								-
	S_o								S_o
9.15								2	-
-									-
-									-
-									-



5 —

10

10.1

10.1.1

10.1.2

10.2

10.2.1

50 100 /

10.2.2

PC

10.2.3		PC	-
10.3			-
10.3.1			-
10.3.2			-
10.3.3			-
10.3.4	<i>h</i> .		<i>h</i> -
			-
		$h = \cos$,	(8)
		$= \sin$.	(9)
10.3.5	x_R	<i>h</i>	2 3, -
10.3.6			1, -
10.3.7	\wedge		-
10.3.8			-

2 —

h

		<i>h</i>
5	($R_{BH} < R_H \sin \alpha$)	$R_H^2 - (r \sin \alpha)^2 + (R_H - r \cos \alpha)^2$
5	($R_{BH} > R_H \sin \alpha$)	$ r - R_H \cdot \cos \alpha + 2 \cdot R_{BH} \cdot \cos \arcsin \frac{ R_{BH} \sin \alpha }{MBH} ^2 + (R_H - \sin \alpha)^2$
5	($R_{BH} < R_H \sin \alpha$)	$on \ ?_{RH}^2 \sin^2 \alpha + (R_{RH} \cos \alpha + r)^2 - R_{BH}^2$
5	($R_{BH} > R_H \sin \alpha$)	$c / (R_H \sin \arcsin \dots) + 2 \cdot ft. \cos \arcsin \dots$

3 —

x_R

		x_R
5	$\cos \alpha < R^{\wedge}$ ($R_{BH} < R_H \sin \alpha$)	$0,0175 \cdot \arcsin$
5	$\cos \alpha > /?$	$0,0175 \cdot R \cdot \frac{2 R^{\wedge} - 2 R_H \cdot h + h^2 - 2}{2 \cdot (\wedge -)}$
5	($R_{BH} > R_H \sin \alpha$)	$ R_H \cdot \cos \alpha - R_{BH} \cdot \cos(\arcsin \frac{M_{\cdot f}}{R_{BH}} \sin \alpha) \cdot \sin \alpha$ $0,0175 \cdot (\arcsin \dots)$ $r - R_H \cos \alpha - R_{BH} \cdot \cos(\arcsin \dots) \cdot \sin \alpha] - R_H \sin \alpha$ $+ARCSIN$ $KUKH-)$
5	($R_{BH} < R_H \sin \alpha$)	$0,0175 R_{BH} \arcsin \frac{S \cdot n^{\wedge}}{R_{BH} + h}$
5	($R_{BH} > R_H \sin \alpha$)	$0,0175 \cdot (\arcsin \dots) = \dots$ $r - R_H \cos \alpha - R_{BH} \cdot \cos(\arcsin \dots) \cdot \sin \alpha$ $+ \arcsin \dots$

-

11.3.2

11.3.3

11.4

11.4.1

- « » —

« » —

« » —

- « » —

11.4.2

11.4.3

11.5

11.6

11.7

12

12.1

12.2

12.3

12.4

12.5

()

$$\Lambda_0 - \Lambda < \Lambda_1' \quad (11)$$

$$\Lambda \bullet \text{ " } \Lambda_0' \quad (12)$$

$$\Lambda - \Lambda < \Lambda_1' \quad (13)$$

$$\Lambda \sim > \Lambda_0' \quad (14)$$

« »)

6.

30 %.

50 %.

13

13.1		12.1.001	12.1.002.	
13.2				-
	[4].			
13.3			18	-
,	,	,	,	
.				
13.4				
	12.1.004.			
13.5	,		,	
	12.1.003.			
13.6				-
[5].				
13.7				
13.8				
13.9				
13.10				

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.1

7,

.2

150

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.5

.6

.7

10.2.1,

.8

9.1.

2

.9

2

10

10

. 10

$e = \sqrt{Lsina}$

(.1)

(.).

()

.1

.1.1

.1.2

.1.3

.1.4

.1.5

.1.6

$$w = \frac{D^2 f}{r^4} \cdot \cos \alpha$$

(.1)

(.2)

.1.7

.1.8

.1.9

.1.10

.1.11

.1.12

.1.13

.1.14

A_R

$$= 101 \wedge$$

(.4)

.2

.2.1

.2.1.1

30 .
37 , . . ,
= 67 + 6 = 73 .

30 + 37 = 67 .
6 ;

.2.1.8

.2.1.9

$\wedge = 5$

(-5)

$\wedge h = 6h^h$

(-6)

5 —

, / ;

5 —

, / .

(.1)

(.2)

(.1) (.2)

100 .

-2.

« -2, - 44 ».

$S_0 = 5^2,$
 $0,02 / .$

20 .

(.1) (.2),

100

2 .

-2

= 20 + 2 = 22 .

.2.1.10

5

.2.1.11

.1.2.2.

.2.2

.2.2.1

.2.2.2

A_s

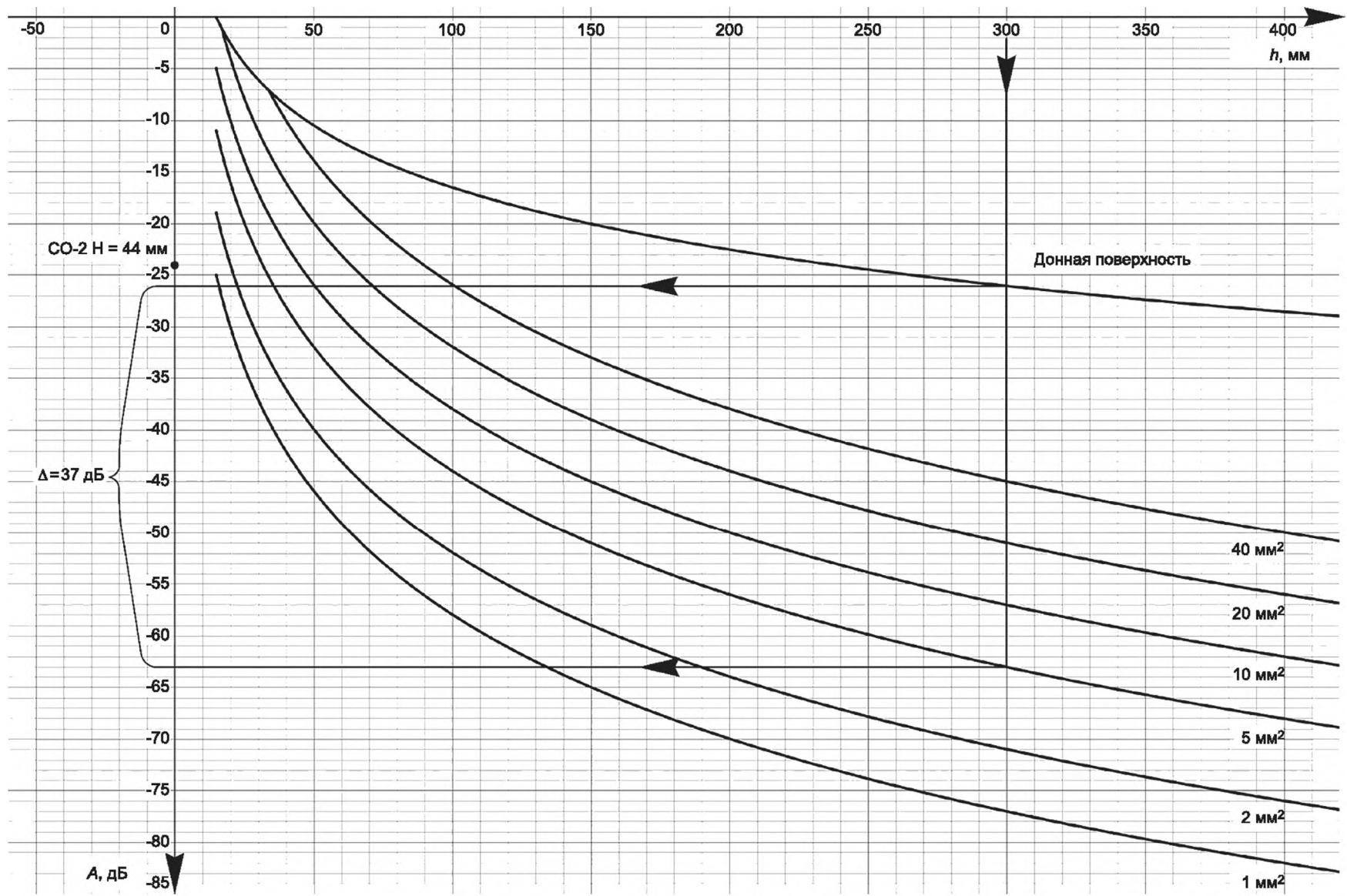
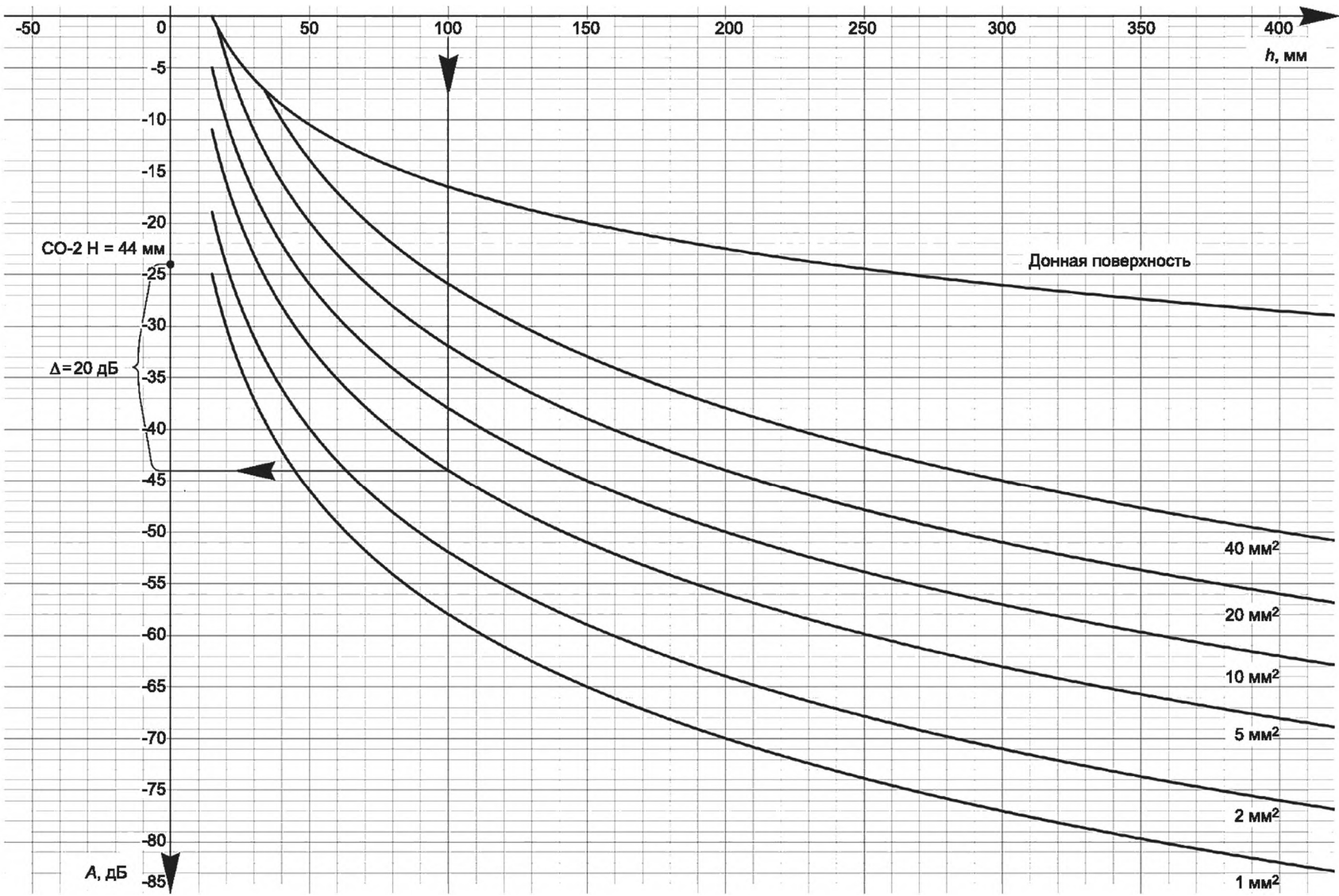


Рисунок Б.2 — Пример настройки уровня чувствительности фиксации A_0 по опорному сигналу $A_{оп}$ от донной поверхности $A_{дон}$



А, дБ

-2,

44

.2.2.3

.2.2.4

20 %

.2.2.5

.2.2.6

A_R

.2.2.7

.2.2.8

$\wedge=2\#$

$\langle 7 \rangle$

.3.1

.3.1.1

.3.1.2

.3.2

.3.2.1

(, -2),

3

$$5 = \frac{-20 \lg \wedge - 1}{\wedge} \quad (8)$$

.3.2.2

2

()

8

$$5 = \wedge \quad 1 - \wedge \quad (9)$$

1 —

2 —

.3.3

.3.3.1

2,

45°.

.4,

.4.

1

8

$$\frac{A_i}{5f} = \frac{6}{2} \quad (.10)$$

1 — ;
 2 — ;
 .3.3.2

5

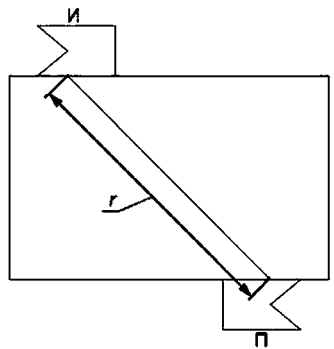
$$\delta_H = 5r \cos \alpha \quad (.11)$$

.4

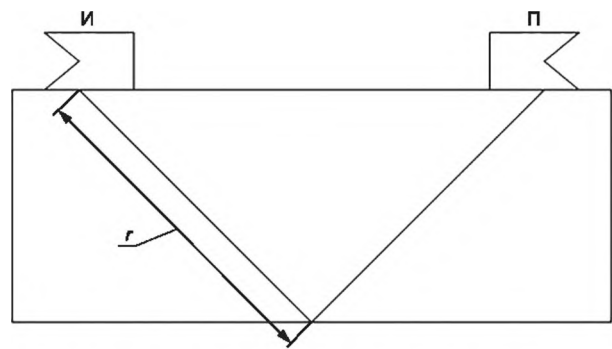
.4.1

10 11

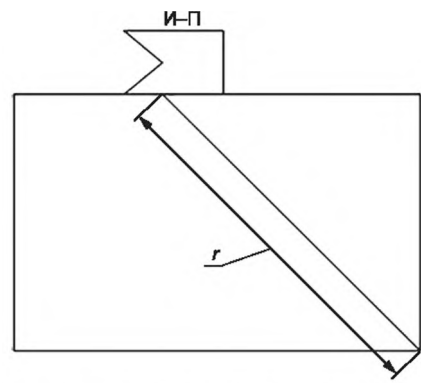
51



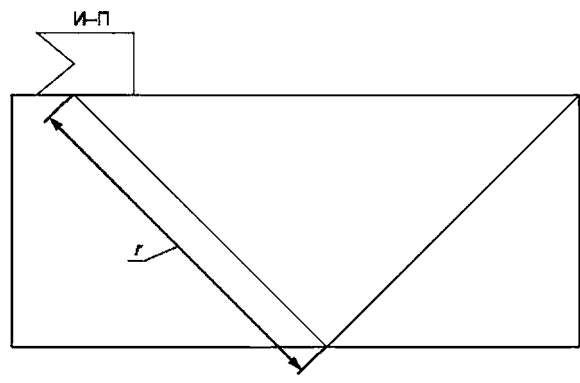
а — получение A_1 методом прохождения



б — получение A_2 методом прохождения



в — получение A_1 методом отражения



г — получение A_2 методом отражения

.4 —

.4.2

$$S_1 = 20^2 \cdot 0,02 = 800$$

$$200 \cdot 0,02 = 4$$

$$200 \cdot 5 = 1000$$

$$\& = 14$$

$\& = 18 - 4 = 14$,

200

« /200».

.4.3

20 % 80 %

.4.4

S ,

.4.2,

A_s ;

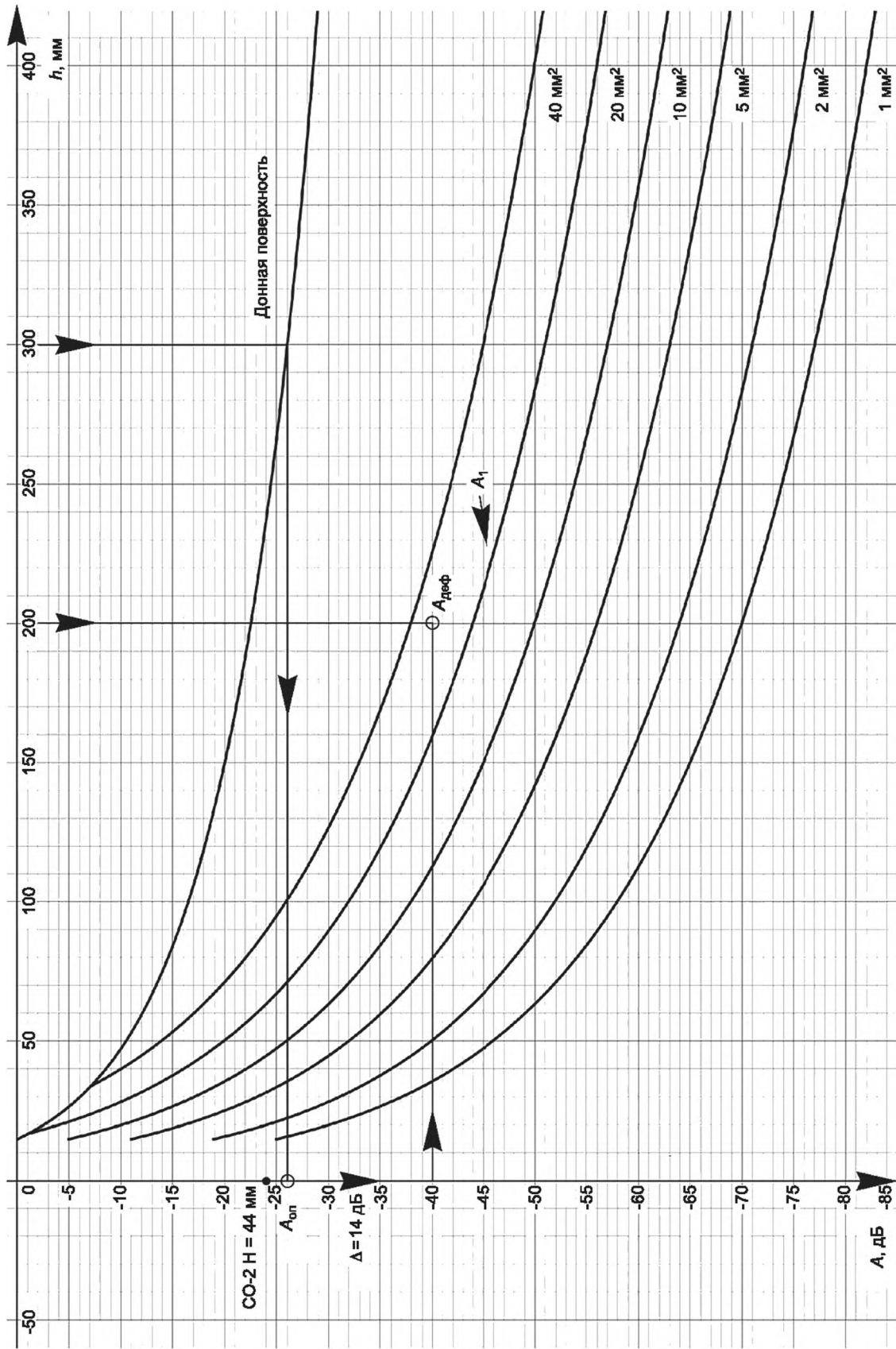
$$S_{\Pi} = S \cdot 10 \left(\frac{\quad}{20} \right), \quad (.12)$$

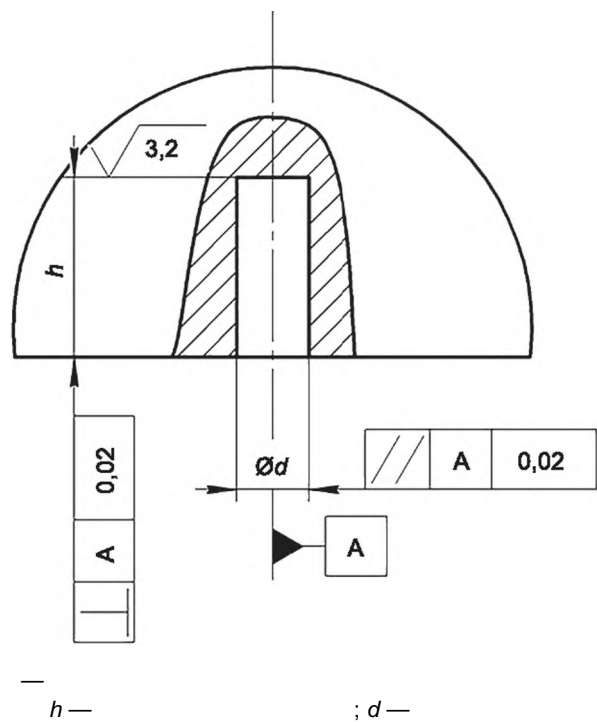
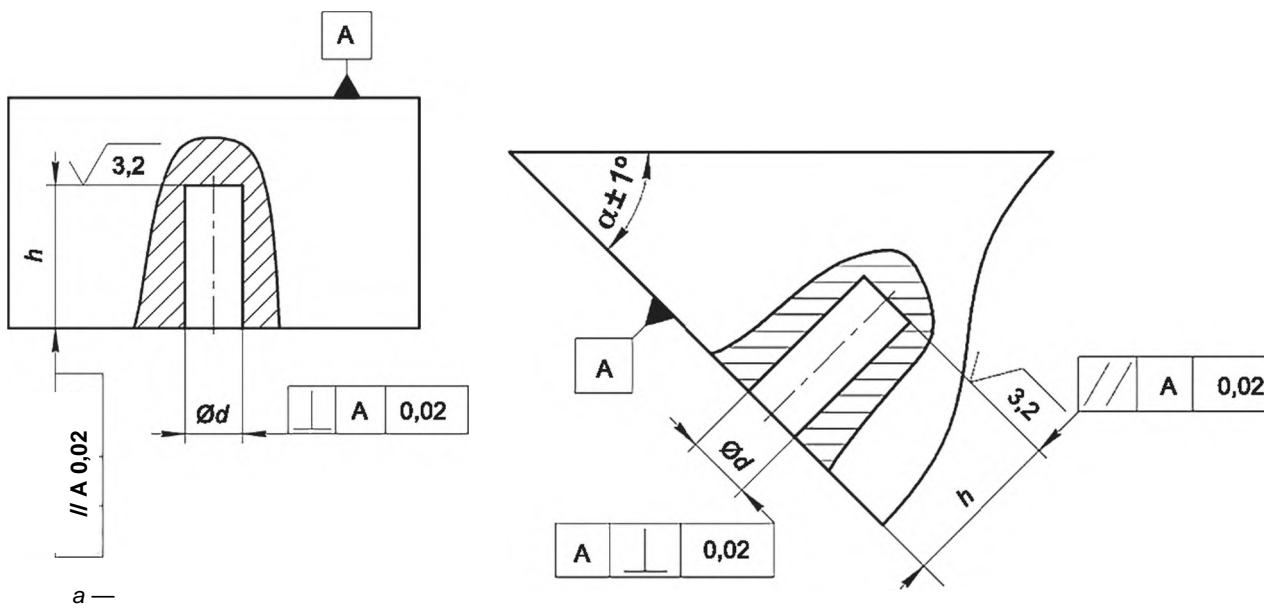
S_{Π} —

S —

“ ^ ” “ AS’

20 % 80 %





.1 —

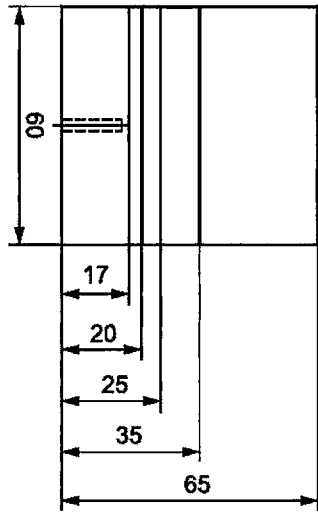
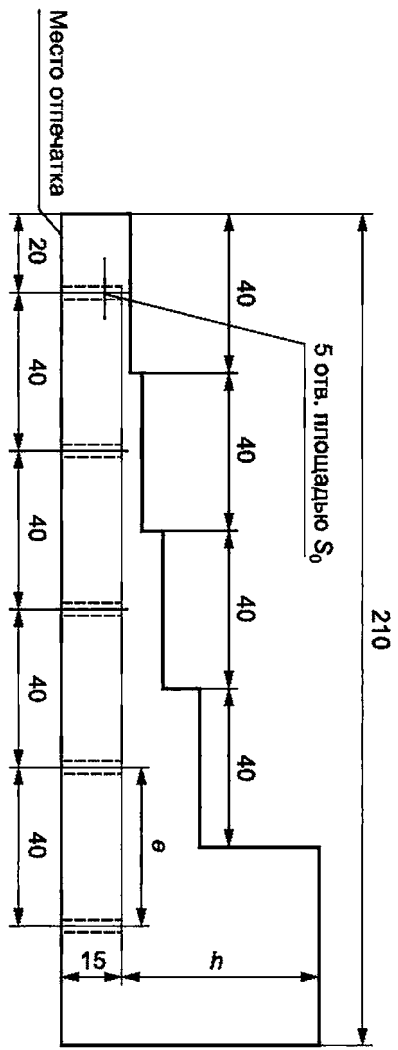
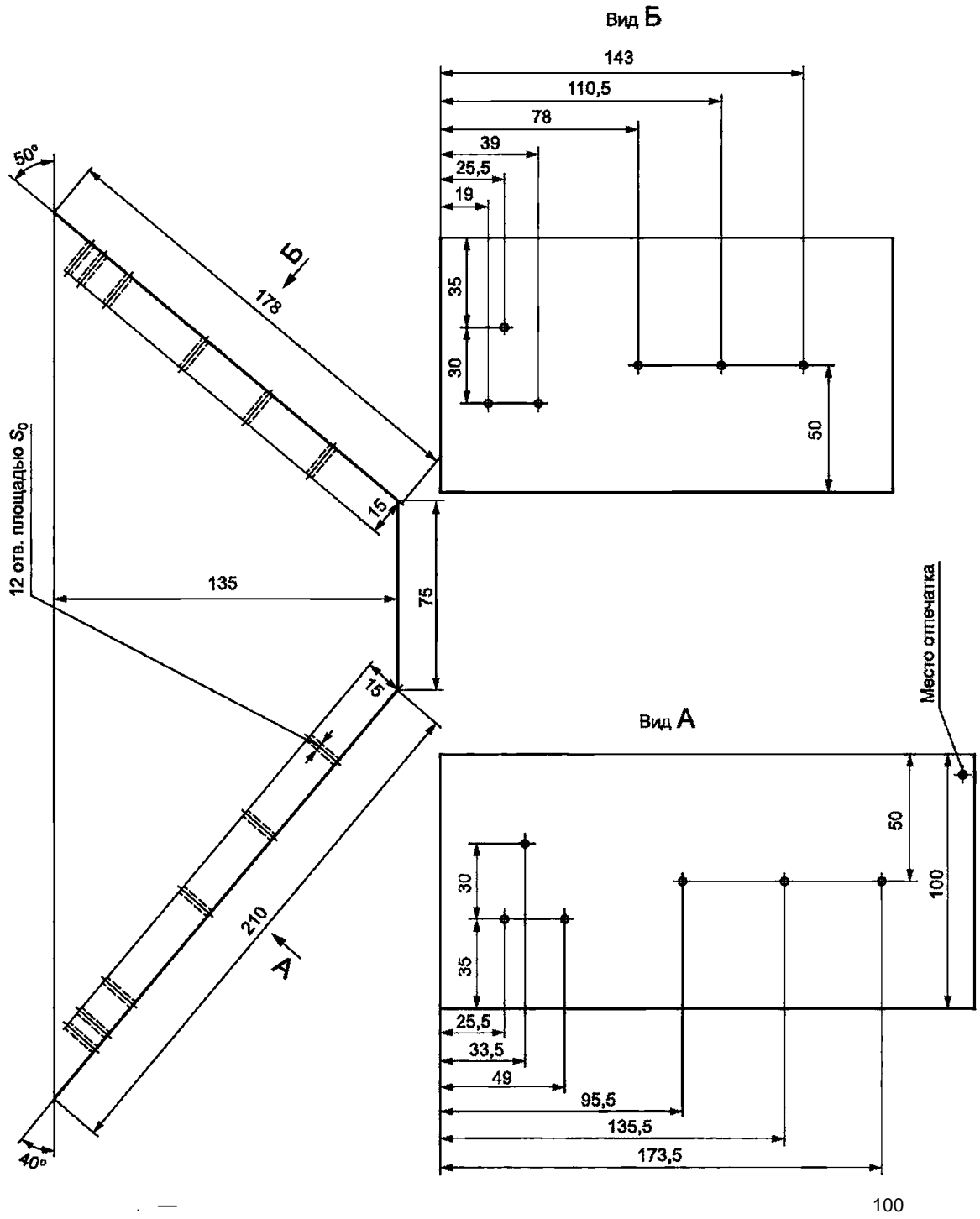


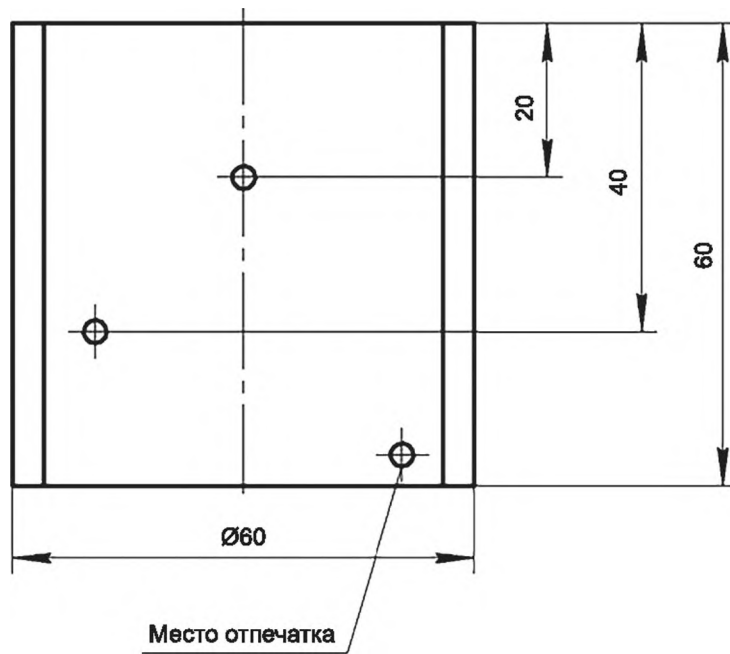
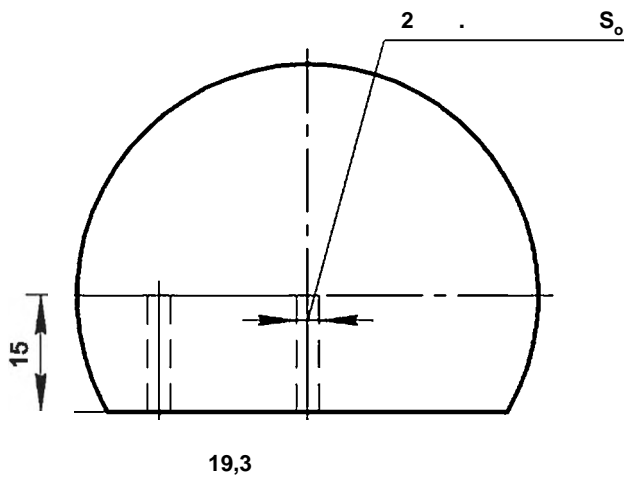
Рисунок Г.2 — Пример многоступенчатого НО для настройки прямых ПЭП и контроля изделий толщиной до 50 мм по плоским поверхностям



1.7.3

1.7.4

1



.4—

80

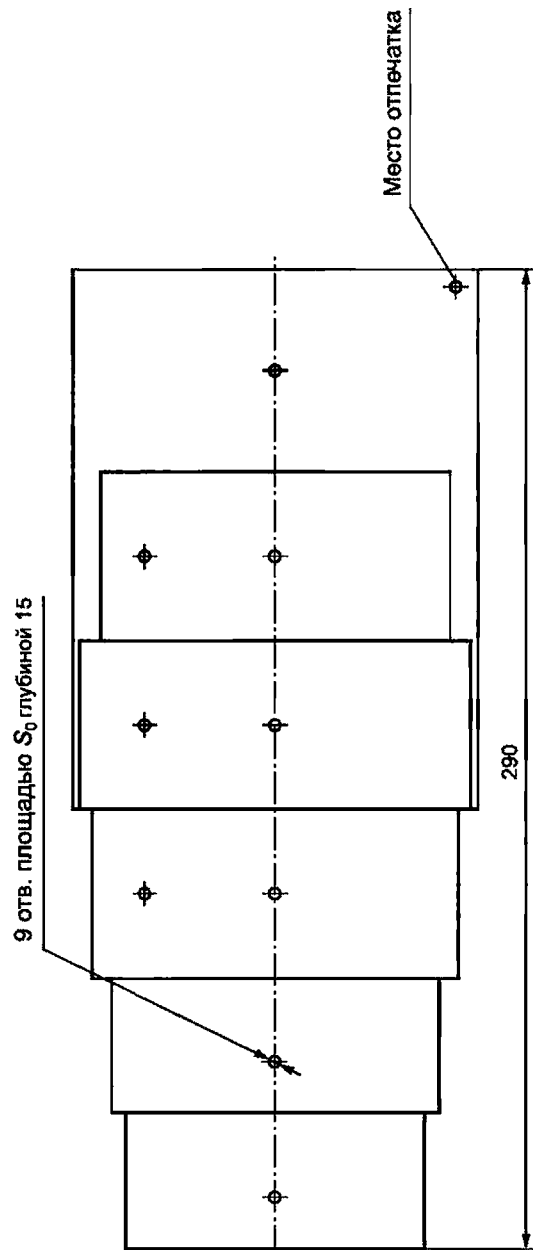
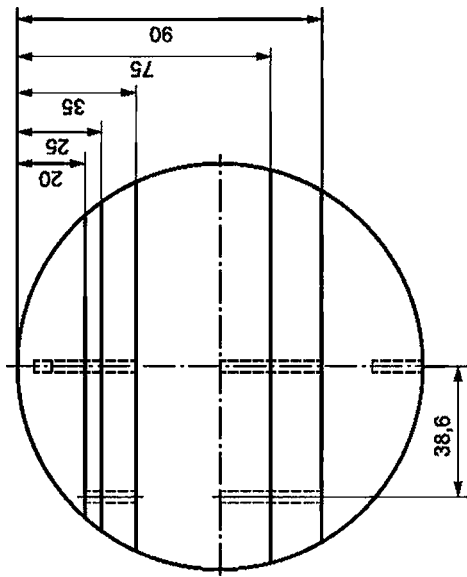
.1.7.5

.1.7.6

.1.7.7

2

.1.7.8



.1.7.9

.1.7.10

.1.7.11

.2

.2.1

.2.1.1

S_0

6

.2.1.2

S_0

0

$$W=20\log^{\wedge} \dots$$

(.4)

S_{nff0}

0

12

.2.1.3

.2.2

.2.2.1

.2.2.2

.2.2.3

1

2

.2.2.4

2

.6.

.2.2.5

.2.2.6

12

.2.2.7

$$[\text{'H02''H01} \frac{(\wedge 2 - 1 - 2 - 1}{2 \wedge 1) +} - \frac{2 - \wedge 402 \wedge 401}{\text{'H02-'H01}} - \wedge 2 - 1'] \wedge 5)$$

1

2

01

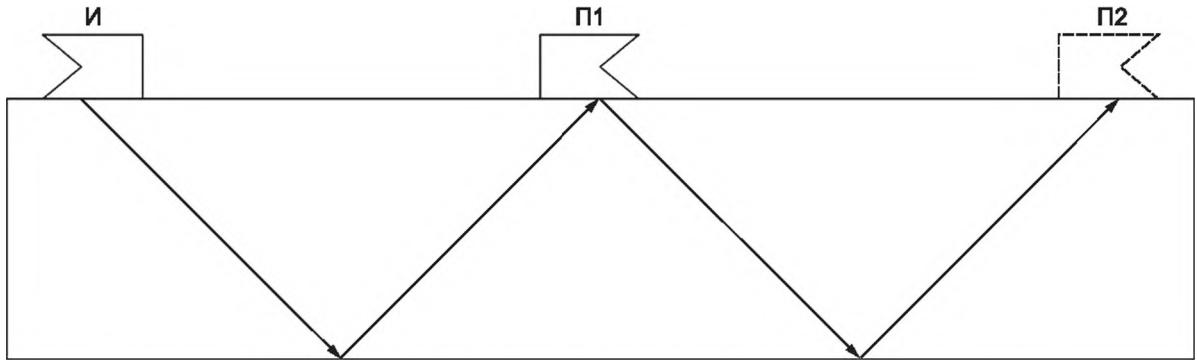
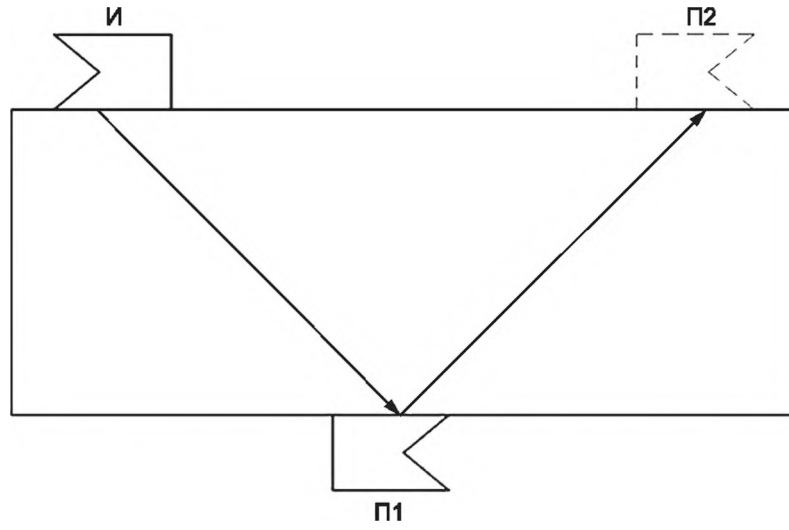
02

1

$\wedge 2$

$\wedge 1$

02



б — измерение однократно отраженного и трехкратно отраженного прошедшего сигнала

— ; 1 — ; 2 —
 .6 —

- .2.2.8 7.8.3,
- .2.2.9 7.8.4 7.8.7, (, 7.8.5),
- .2.2.10 (.).
- .2.3**
- .2.3.1 —
- .2.3.2
- .2.3.3 S
- .2.3.4 S₀, S₀, 0,
- .2.3.5 (.4),

()

.1

S_1

S_0

0

24507.

.2

.1

(

S_0

)

S_0

S_0

S_1

(

S

),

.1—

S_0

			S_0 , 2
2,5) 17 / (< 100	3
		100 < <400	5
		>400	10
		<70	3
		70 < < 150	5
		150 < <200	10
		200 < < 250	20
2,5) 17 / (>250	40
		<300	5
		300 < /- < 400	10
		>400	20
		<70	3
		< 100	5
		100 < <200	20
	200 < < 300	40	
	> 300	70	

()

.1

.2

.4

.5

.6

.7

0,5

5²

7²

10²

4

S_{Op}

()

.1

.1.1

.1.2

.2

.2.1

.2.2

.2.3

Sen

(.1)

.2.4

.2.5

.2.6

.2.7

.3.1

L_0

.2

(.2).

.3.3

.1 —

L_0/r

L_{ygn}

2	0,15
4	0,21
6	0,26
8	0,3
10	0,32
12	0,35

.2 —

L_0/r

-

2	0,13
4	0,18
6	0,22
8	0,25
10	0,28
12	0,3

$$\alpha = 2\text{tg}(\arcsin|\alpha|) \quad (.2)$$

.3.4 — 2 2 .

.3.5 (.2)

.3.6

B2SN — L_0 : = 12 ,
f= 2 . , = 150 , - $\alpha = 8$. -
 , — 8 = 0,3; - 5,9 / . .1 ,
 , $L_0/r = 0,15$; $L_0 = 22,5$. ,
 L_0 22,5 .

.3.7

L_0 α, α . (.)

.3.8

(.2) (.) h -
 $r = \frac{L_0}{\cos \alpha}$ (.4)

. .9

, L_0 , , S_r

- [1] 22232-2:2020 2. (Non-destructive testing — Characterization and verification of ultrasonic test equipment — Part 2: Probes)
- [2] 2400:2025 N« 1 (Non-destructive testing — Ultrasonic testing — Specification for calibration block No. 1)
- [3] 7963:2022 2 (Non-destructive testing — Ultrasonic testing — Specification for calibration block No. 2)
- [4] 15 2020 . 903) (
- [5] « » (26 2020 . 461) -

621.74:006.354

19.100

: , ,

18.12.2025. 02.02.2026. 60 847 .
. . . . 5,58. . . . 4,74.

« »