

( ) ,  
INTERSTATE COUNCIL FOR STANDARDIZATION, METROLOGY AND CERTIFICATION  
(ISC)

**34819—**  
**2021**

1.0 «  
 1.2 «  
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 1 «  
 » ( « »)  
 2 332 «  
 »  
 3 ( -  
 24 2021 . 146- )

( 3166) 004—97	( 3166) 004—97	
	BY KZ KG RU TJ UZ	« »

4 2022 . 28- 34819—2021 20  
 1 2022 .

5  
 ( )  
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1	.....	1
2	.....	1
3	.....	2
4	.....	6
4.1	.....	6
4.2	.....	9
5	.....	9
5.1	.....	9
5.2	.....	10
5.3	.....	15
5.4	.....	16
5.5	.....	17
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(    )	.....	42
(    )	.....	45

( )	.....	49
( )		
	.....	50
( )		
	.....	51
	.....	53

Light devices. Light requirements and test methods

— 2022—07—01

1

1000 . ( / ) , -  
- ;  
- ( , , ) ;  
- ;  
- ;  
- , , - ;  
- ;  
- ;  
- . — IEC 60598-2-22.

2

:  
8.023 . -  
8.332 .  
15150 , . -  
16962.1 ( 68-2-1—74) . -  
IEC 60598-2-22 . 2-22. .

(www.easc.by)

**3**

3.1

3.2

3.3

3.4

3.5

1  
 $180 \left( \dots \cdot 1 \dots \right)$   
 2  
 $\dots \left( \dots \cdot 16 \dots \right)$   
 3  
 $180 \left( \dots \cdot 1 \dots \right)$   
 3.6

1  
 $270 \left( \dots \cdot 1 \dots \right)$   
 2  
 $180 \left( \dots \cdot 16 \dots \right)$   
 3  
 $B_Q \left( \dots \cdot 1 \dots \right)$   
 3.7

3.8

3.9 : , -

3.10 : , -

3.11 — . .1 : , -

/ , — , , , , , -

( , 60°). , , , , , -

3.12 : , , -

3.13 : , , -

3.14 , : , , -

3.15  $R_{L\sigma}$  %: ( 1931 ). , -

1 , , , , , -

2 , , - , , , -

3.16 , %: , , -

300 , 3.17 : , , -

3.18 : , , -

— 1000 1000 , — -

3.19 : , , -

3.20 ( ): , , -

3.21 : , , -

— . .1 : , -

20° , 20 , -

3.22

3.23

100,

3.24

3.25

3.26

3.27

3.28

3.29

3.30

3.31

1

2

3.32

3.33

3.34

3.35

3.36



3.37 : , -

3.38 : , -

— : -

3.39 - : -

3.40 : -

3.41 | : -

3.42 : , -

— , -

3.43 : -n , -

3.44 : ,

3.45 : ,

3.46 : ,

3.47 : ( )

( ). — -

3.48 : , -

10 % , -

3.49 : -

— .1 -

3.50 : -

3.51 : ,

3.52 : -

- : — ; -

- ; — -

- , — -



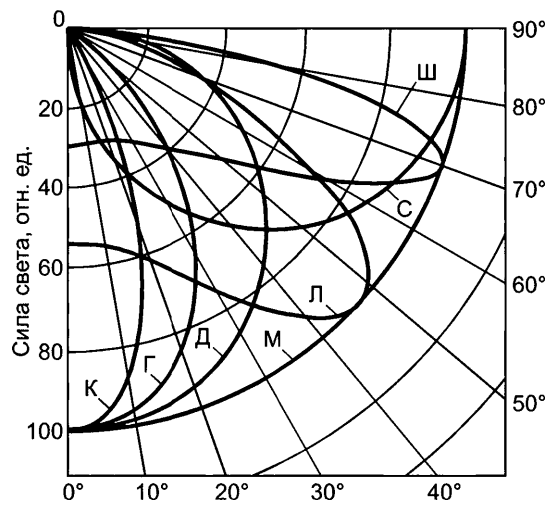
2 —

		*	
		0° — 15°	^
		0° — 30°	2 < < 3
		0° — 35°	Δ 25
		35° — 55°	τ φ
		55° — 85°	1,5 < < 3,5
		0° — 90°	^1.3 ^min > '2^
		70° — 90°	> 1,3 /0 < 0,7/

\*

—/0—

: /min' / — -



1 —

4.1.2

4.1.3

4.1.4

4.

3

2,

7

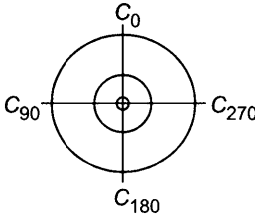
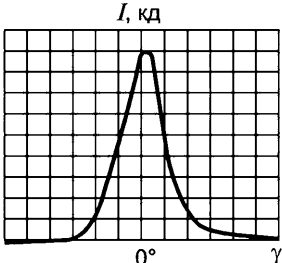
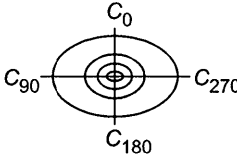
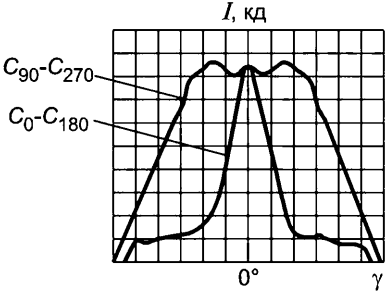
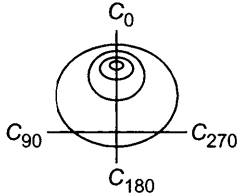
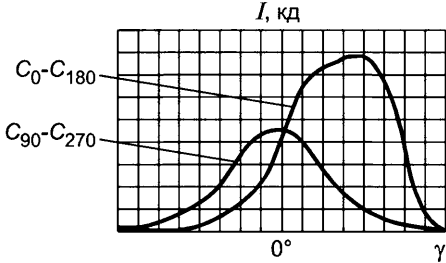


4.2

4.2.1

5.

Т а б л и ц а 5 — Классификация прожекторов по типу кривой силы света

Тип кривой силы света прожектора	Кривая силы света в координатах $C, \gamma$	Кривая силы света в меридиональных плоскостях
Круглосимметричная		
Симметричная, с двумя плоскостями симметрии $C_0-C_{180}$ и $C_{90}-C_{270}$		
Асимметричная с одной плоскостью симметрии $C_0-C_{180}$		

4.2.2

$2_{10}$

- $2_{10} < 30^\circ$ ;
- $30^\circ < 2_{10} < 80^\circ$ ;
- $2_{10} > 80^\circ$ .

5

5.1

5.1.1

5.1.1.1

4.1.1.

4.1.1.

5.1.1.2

- 300 —

-100 —

5.1.1.3

5.1.1.4

5.1.1.5

80° 90°

**5.1.2**

5.1.2.1

5.1.2.2

**5.2**

**5.2.1**

5.2.1.1

3.

4.

4.2.1.

4.2.2.

$R_a$

6.

6—

	$70 < R_a < 80$		$80 < R_a < 90$		$90 < R_a < 100$	
	<4500	>4500	<4500	>4500	<4500	>4500
-	120	125	100	105	90	95
( )	125	130	120	125	100	105
-	130	135	125	130	110	115
1						
2	0,85.					
	0,85.					

5.2.1.2

7.

5.2.1.3

8.

7—

	5		8			
	-	/ ,	-	, / ,	-	, / ,
	,	,	,	,	,	,
	14 21	50	18	45	70	65
	28 35	55	36 58	50	100 250	70
	14 21	55	18	50	70	70
	28 35	60	36 58	55	100 250	75
	14 21	55	18	55	70	75
	28 35	65	36 58	60	100 250	80
	39 80	60				

1	40°	,	,	,	-
		,	0,95.	,	-
2	0,9.	,	,	,	,
	0,9.				,

8—

	,	, / ,
	70 150	50
	250 400	55
	400	60
	70 150	60
	250 400	65
	400	70
	70 150	65
	250 400	70
	400	75

1  
40°

8

0,95.

0,9.  
2

0,9.

5.2.1.4

9.

9 —

-	70	150	.	65	
	250	400	.	70	
	400			70	
	70	150	.	75	
	250	400	.	80	
	400			80	
-	70	150	.	85	
	250	400	.	90	
	400			90	
1	40°				
2	0,9.				
	0,9.				

**5.2.2**

5.2.2.1

10.

10 —

		70 < R <sub>a</sub> < 80		80 < R <sub>a</sub> < 90		90 < R <sub>a</sub> < 100	
		„ < 4500	7 > 4500	<4500	7 > 4500	<4500	>4500
-	25	—	—	90	100	80	85
	25			100	105	90	95
)	25	—	—	95	105	85	90
	25			115	120	100	105



10

		, / ,					
		70 < R <sub>a</sub> < 80		80 < R <sub>a</sub> < 90		90 < R <sub>a</sub> < 100	
		<sub>11</sub> < 4500	<sub>11</sub> > 4500	<sub>11</sub> < 4500	~4500	<4500	- 4500
	25	-	-	105	110	95	100
	25			125	130	110	115
( ) - 25	95			100	80	85	
25	90			95	75	80	
1							-
2	0,85.						,
3					0,85.		-

5.2.2.2

11.

11—

	5		8			
	, / ,	, / ,	, / ,	, / ,	, / ,	
-	14 21 .	50	18	45	30	
-	28 35 .	55	36 58 .	50		
-	14 21 .	55	18	50	35	
-	28 35 .	60	36 58 .	55		
-	14 21 .	55	18	55	40	
-	28 35 .	65	36 58 .	60		
-	39 80 .	60				
1	40°					-
			0,95.			-
2	0,9.					,
		0,9.				,

5.2.2.3

12.

12 —

		70	100	.		60	
		250	400	.		65	
		70	100	.		65	
		250	400	.		70	
	-	70	100	.		70	
		250	400	.		75	
1	40°				0,95.		-
2	0,9.						-
							0,9.

5.2.3

5.2.3.1

13.

13 —

		70 < R <sub>g</sub> < 80		80 < R <sub>g</sub> < 90		90 </? < 100	
		< 4500	7 > 4500	< 4500	11 > 4500	< 4500	> 4500
-	( ) -	125	130	120	125	105	110
-	/	90	95	85	90	70	75
-	-						
-	-						

5.2.3.2

14.

14 —

	( ) -	70	150	.	75
		250	600	.	85

5.2.3.3

15.

15 —

	-	70 150 .	60
	( )	250 400 .	65

5.2.4

5.2.4.1

16.

16 —

( $2_{10} < 30^\circ$ )	65
( $30^\circ < 2_{10} < 80^\circ$ )	85
( $2_{10} > 80^\circ$ )	95

5.2.4.2

17.

17 —

( $2_{10} < 30^\circ$ )	65
( $30^\circ < 2_{10} < 80^\circ$ )	75785 <sup>*</sup>
( $2_{10} > 80^\circ$ )	75785 <sup>**</sup>
* **	50 150 . 250 .

5.3

5.3.1

- 80 % —
- 70 % —
- 60 % —

-

-

-

-

10 %.

5.3.2

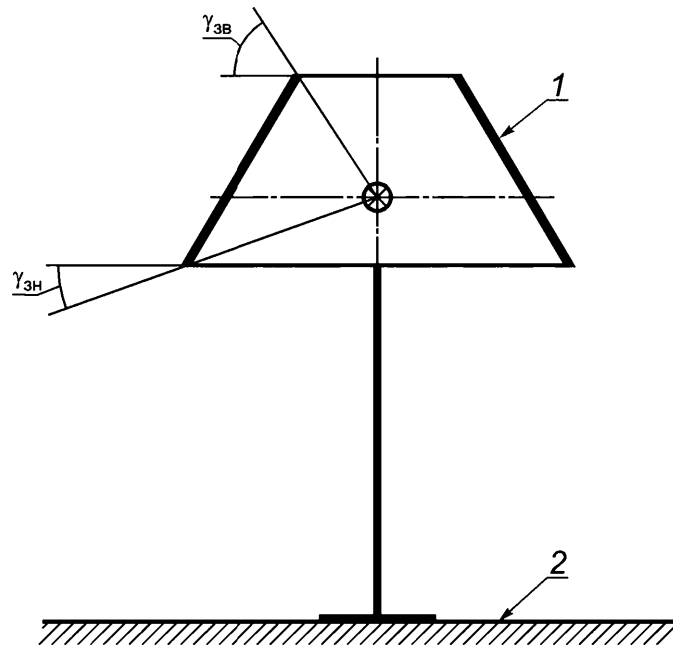
- 80 % —
- 70 % —
- 65 % —

-

-

-





1 — ; 2 —

2 —

**5.4.3**

5.4.3.1

- 60° 90° —
- 0° 90° —

5000 / 2.

5.4.3.2

- 3500 — 60° 120° , / 2, :
- 3000 — ;
- 2500 — ;

**5.5**

5.5.1

19.

19 —

2700	27251145
3000	30451175
3500	34651245
4000	39851275
4500	45031243
5000	50281283
5700	56651355
6500	65301510

34819—2021

5.5.2

:

- 95 —

- 90 —

- 85 —

- 80 —

- 70 —

5.5.3

6 %.

5.5.4

15150,

±200 —

20 % —

95 %

5.6

5.6.1

- 5 % —

- 10 % —

- 15 % —

5.6.2

:

- 20 % —

6

6.1

6.1.1

(25±2) °C,

84

107

80 %,

6.1.2

V(k)

8.332.

6.1.3

15

5 %.

6.16.

6.1.4

5 %

45°

0°

6.1.5

( )

8.023, [1].

6.1.6

6.2

6.2.1

6.2.1.1

( )

( , )

( , )

( , (3) )

6.2.1.2

6.2.1.3

)

(

- 10 —  
- —  
- —

/,

,<sup>2</sup>

1 %,

6.2.2

6.2.2.1 ( )

6.2.2.2

),

- 0° 90° —

- 90° 180° —

- 0° 180° —

90° 90°

6.2.2.3

5°

10 %.

6.3.3 6.3.4

10 %

6.2.2.4

- 0° 360° —

- 90° 90° —

- 180° 90° 90° 180° —

- 180° 180° —

6.2.2.5

10°

6.2.2.6

10 %.

0° 180° 90° 270°

0° 180° 90° 270°

0° 180° 90° 270°

6.2.3

6.2.3.1





6.3

6.3.1

6.3.1.1

[1], [2]

0,9,

[2];

1:4

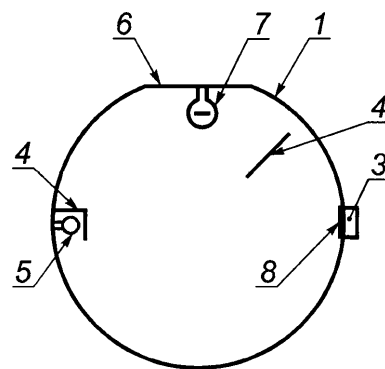
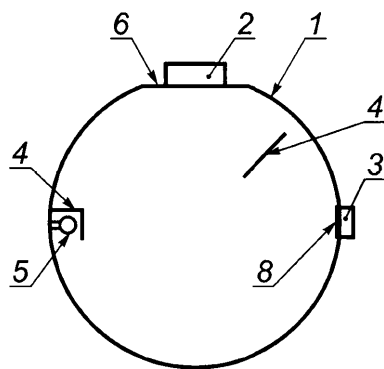
1:2—

6.3.1.2

1/3

36)

6.3.2.1.



б — для измерительной лампы

1—

; 2—

; 7—

3—

; 3—

; 8—

; 4—

; 5—

**6.3.2**

6.3.2.1

6.2

$$= \int_{C=0}^y j^2 / (C \cdot y) \sin y \, dy \quad (2)$$

$I(\dots)$

$$= 2 \int_0^y j^2 / (y) \sin y \, dy \quad (3)$$

6.3.2.2

(2) (3)

6.3.2.3

**6.3.3**

6.3.3.1

[3].

6.3.3.2

6.3.3.3

$$= R^2 \int_{C=0}^y J^2(\dots) \sin y \, dy \quad (4)$$

$R$

$(\dots)$

(4)

6.3.2.2.

6.3.3.4

**6.4**

, %,

$$= 2iUL \cdot 100 \% \quad (5)$$

—  
—

6.3.2.1

(2)

(3),

/2.

1.

6.5

$$= \hat{\lambda}_i \tag{6}$$
  
 / — , 6.2, ;
   
 / — , / , .

6.6

6.2, 80° 90°

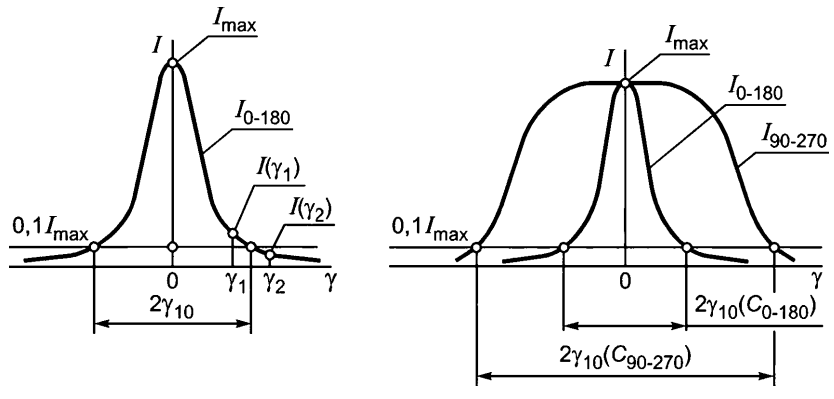
6.7

6.2 2 10, 10 % ( . 4 )

$$Y_{10} = Y_i + \frac{\hat{\lambda}_i \hat{Y}_i}{\hat{Y}_2 - \hat{Y}_1} (Y_2 - Y_1) \tag{7}$$

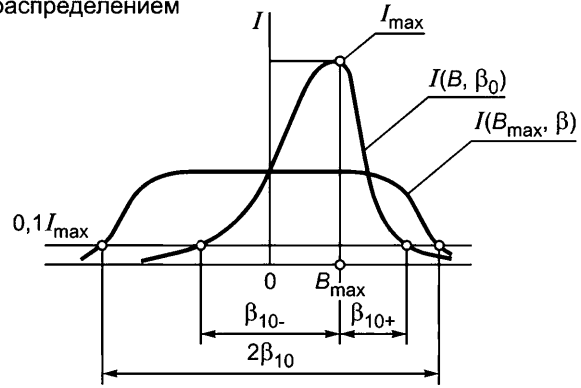
$$\frac{I_{max}}{I(Y_i)} \frac{I(\hat{Y}_2)}{Y_i} = \frac{0.1 \hat{\lambda}_i (0.5 \hat{\lambda}_i)^2 - 0.2 \hat{\lambda}_i \hat{Y}_i}{I(\hat{Y}_2) - I(\hat{Y}_1)}$$
  
 ( . 46) (7).

10( 0- 180) ( ^9 - ^27 )
   
 , (3 ( . 4 ), S\_max'
   
 (3\_{10+} 10- (7)



а – для прожекторов с круглосимметричным светораспределением

б – для прожекторов с симметричным светораспределением



( )

4 —

6.8

6.8.1

( . 5 ).

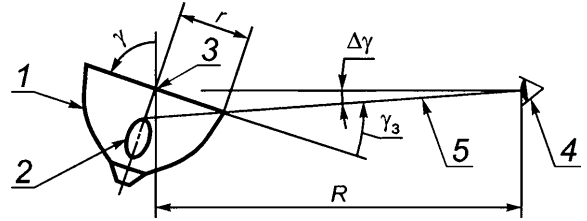
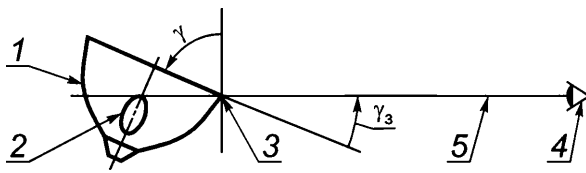
( . 5 ).

( . 56 ).

(8) 1 (9) 2.

$\beta_3 = 90^\circ -$  (8)

$\beta_3 = 90^\circ - +$  (9)



( 1)

( 2)

1— ; 2— ; 3— ; 4— ; 5—

5—

, °;

$$= \text{arctg} \frac{\Delta y}{R \sin \gamma}$$

10

R — ( R ), ;

6.8.2

6.8.3

6.9

6.9.1

5.4.2.1

15°.

6.9.2

L

450

550 <sup>2</sup> [3].

$$\frac{L_{\max}}{L}$$

6.9.3

L/

450 550 <sup>2</sup> [3],

L, / <sup>2</sup>,

(in

" / = 1

$L_j$  — / - , / <sup>2</sup>. ( ) ;

6.9.4

6.2.

$L_{max}$

$L_{max}/L$

$L$  , / <sup>2</sup> ,

4

(12)

/ — , , ;

6.9.5

( , ) ,

, , <sup>2</sup>.

( ' °

101 113)

$L$  — , / <sup>2</sup> ;

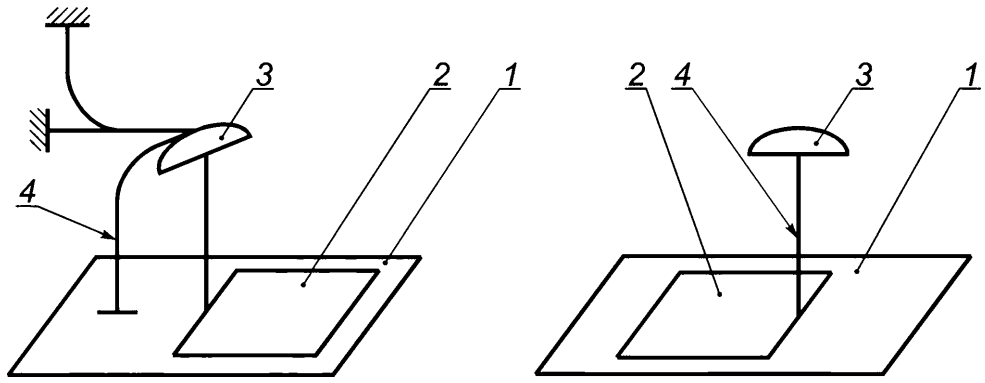
6.10

6.10.1

6.10.2

150

6.10.3



1— ; 2— ; 3— ; 4—  
6—

6.10.4

6.10.5

6.10.6

( )

(14)

6.11

6.11.1

6.11.2

0 °C 40 °C;  
80 %;  
80 120

( 7 ).

$$r_y = 7 - t_{gy} \quad (15)$$

$h$ —



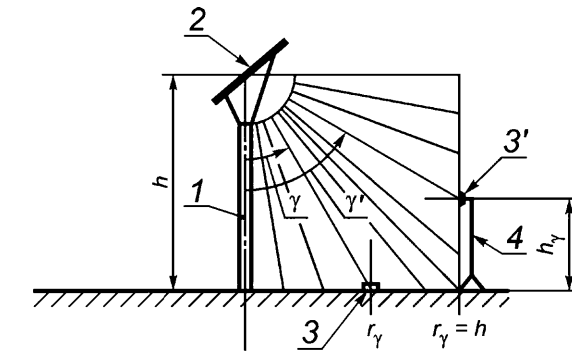
6.11.3

$\alpha = 45^\circ$   
 $45^\circ$

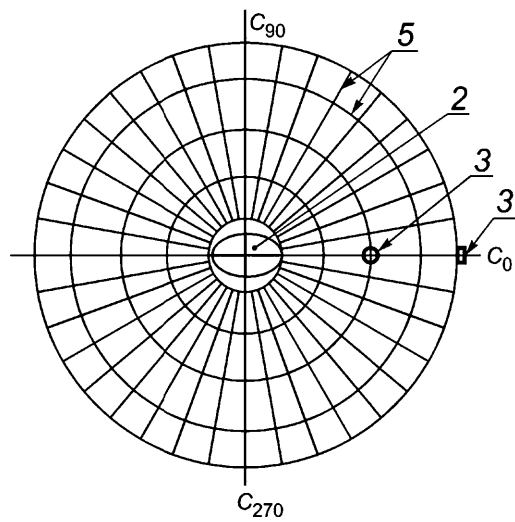
76).

$h$ ,

$h_y$  -  
 $h$  ( ) -



а - вид сбоку



1—

; 2—

; 3 3'—

; 4—

; 5—

7—

$l$ , ,

$$h_y = h(1 - \text{ctg } \alpha), \quad (16)$$

$h$ —

$\gamma$

6.11.4

( , )

( , ) -  
 ( )

$l$ ( , ), ,

$$f(\theta) = \cos \theta \quad \theta < 45^\circ, \tag{17}$$

$$f(\theta) = \sin \theta \quad \theta > 45^\circ. \tag{18}$$

**6.12**

6.12.1

, >

6.12.2

6.12.3

**6.13**

, |

=^;

(20)

—

—

**6.14**

6.14.2.

6.14.1

6.14.2

6.14.1

780

380—

X, Y, Z—

$$= \int_A J_x(X)P(X)dX; Y = \int_A J_y(X)P(X)d2i; Z = \int_A J_z(X)P(X)dX, \tag{22}$$

P(X) —

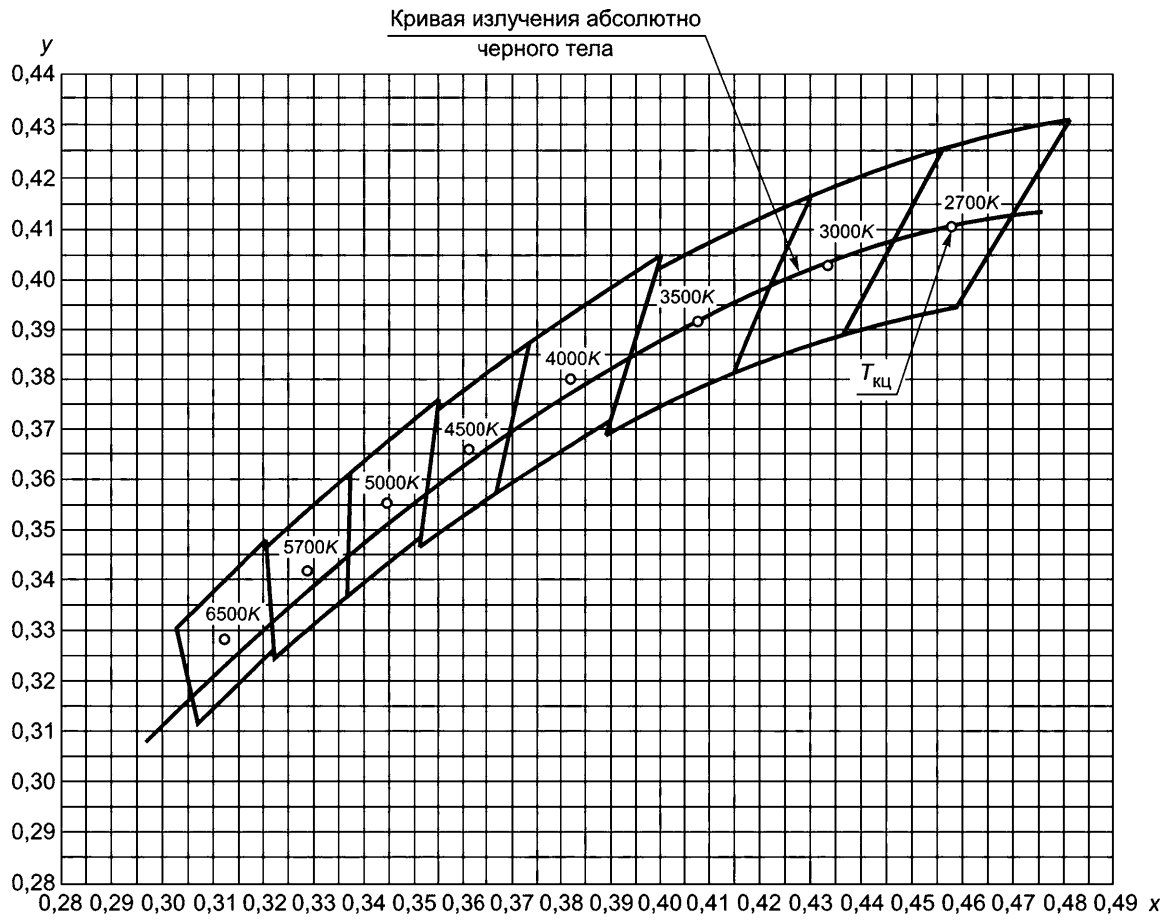
, , z—

6.14.3

1931

1931

[4] ( 8)



8 —

1931 .  
(

2500—7100 )

.1

6.15

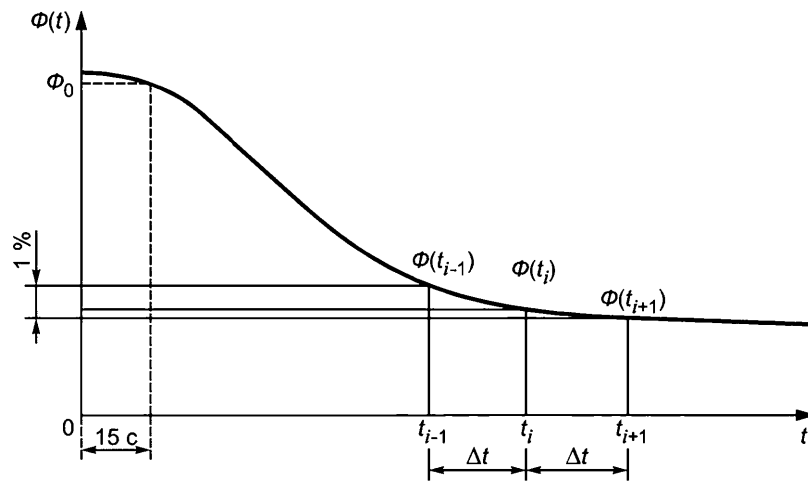
[1], [5] [6].

6.16

20  
Af

5 15 ,

( . . . 9).



9—

(23),

, %,

$$6 = \sim 100 \%$$

(24)

6.17

16962.1,

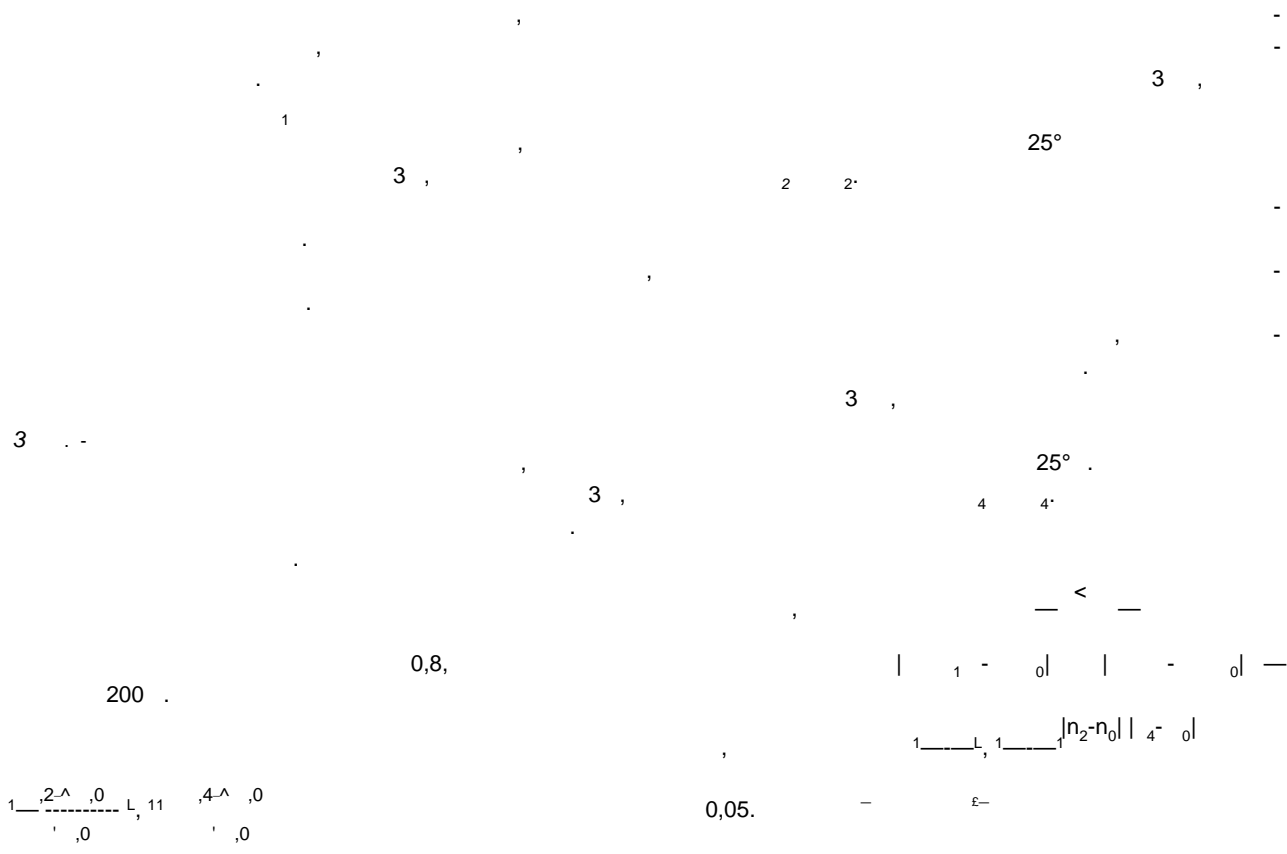
1 . . .).

( 0' 1 . . . )

( 0' . . . )

25° ,  
3 ,

0 0'



6.18  
6.18.1

$$= \frac{1}{2} \cdot 100\%, \quad (25)$$

$0_{min}$  —

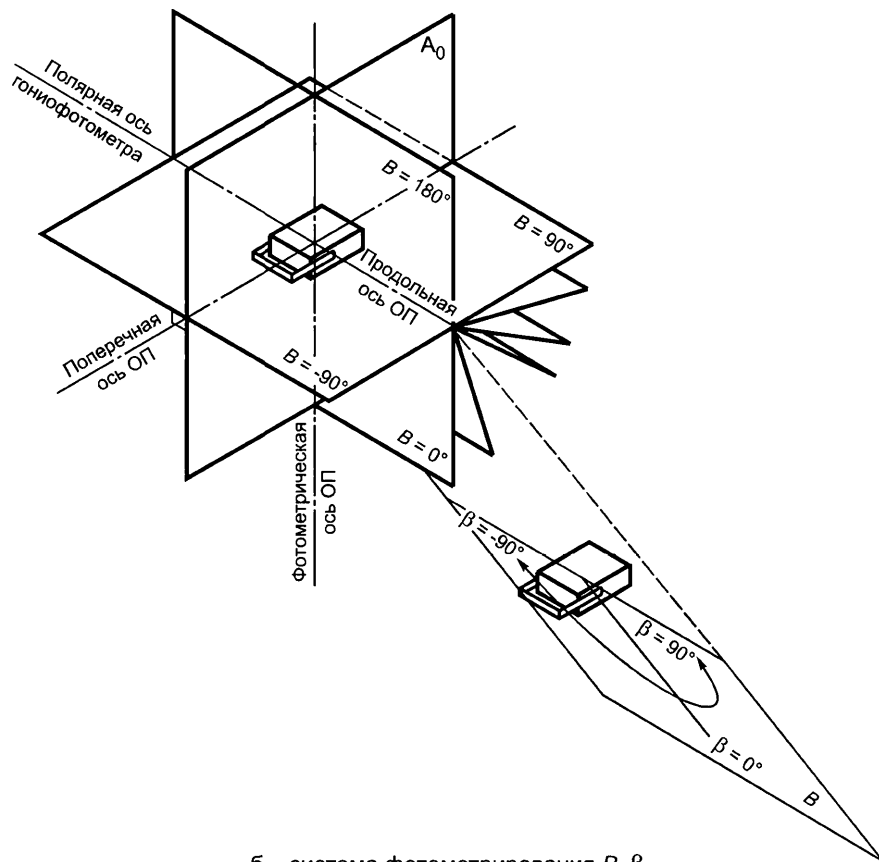
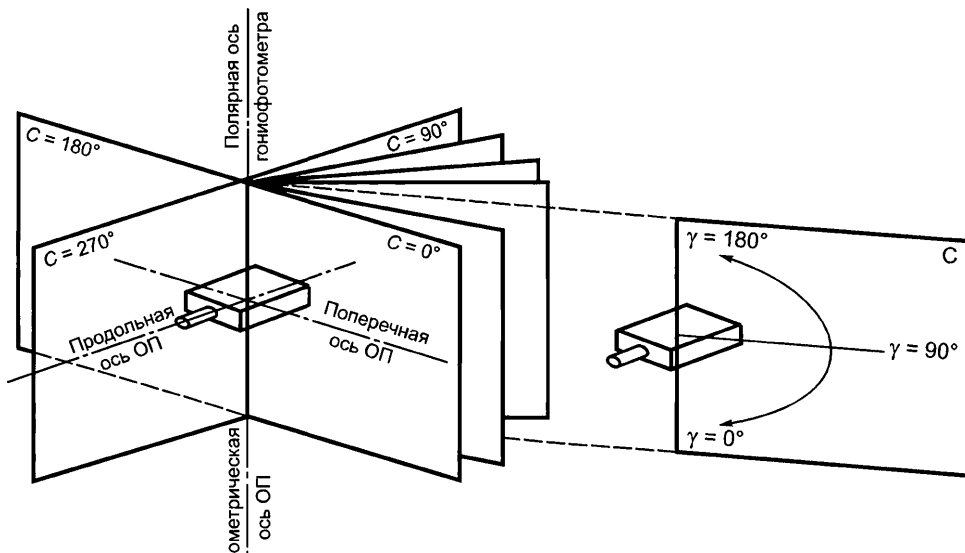
$$= 7/ (0 - \dots) \quad (26)$$

6.18.2

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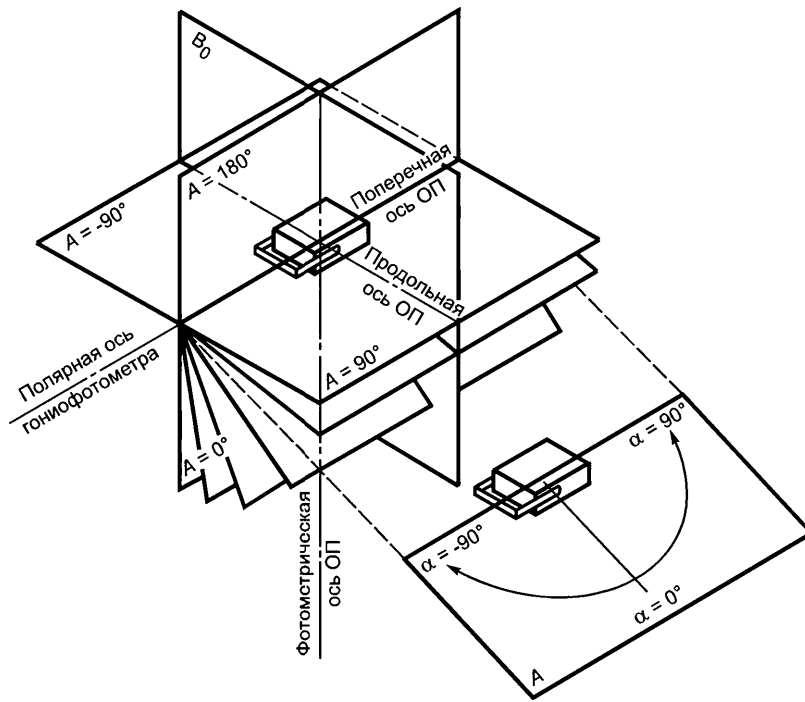
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б – система фотометрирования  $B, \beta$

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$\gamma_3$  ( . . . . .) .1)

$h$  /  $l$

$\gamma_3$  °;

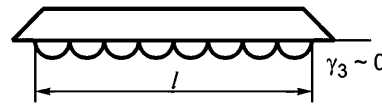
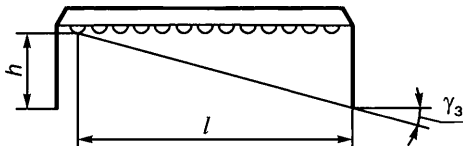
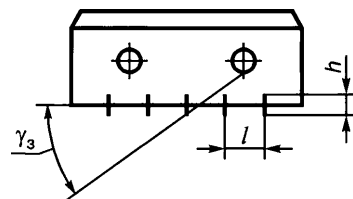
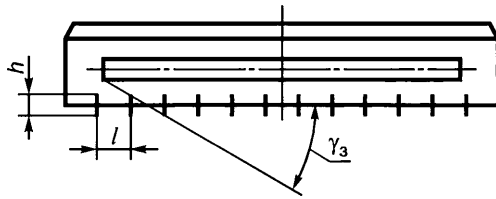
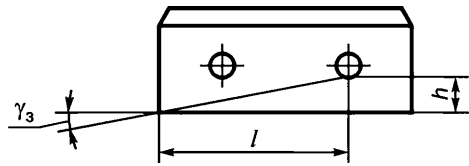
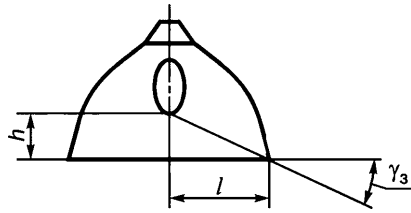
$$= \dots \arctg \frac{180 h}{\dots}$$

( .1)

$h$  —

$l$  —

$h$



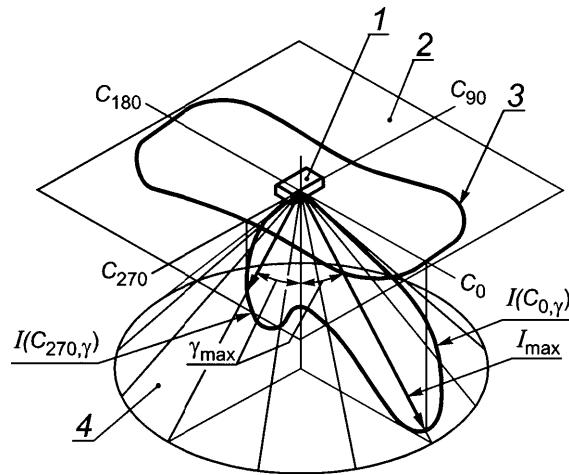
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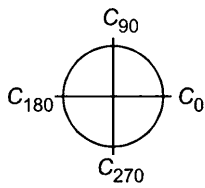


1 — ; 2 — ; 3 — ; 4 —

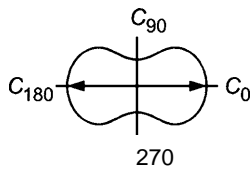
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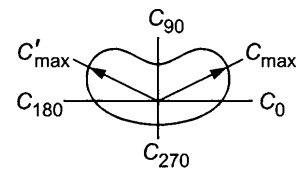
.2.



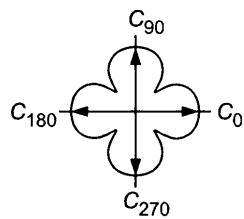
а – круглосимметричная



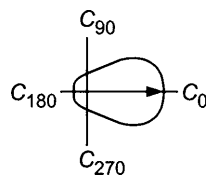
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в – боковая



г – многолучевая



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	+	+	+	+	+	+	+	+
	(5.1.1.1)	(5.1.1.1)	(5.1.1.1)	(5.1.1.1)	(5.1.1.1)	(5.1.1.1)	(5.1.1.1)	(5.1.2.2)
	+	—	+	—	—	—	+	+
	(5.1.1.1)		(5.1.1.1)				(5.1.1.1)	(5.1.2.1)
	—	—	—	—	—	—	—	+
								(5.1.2.2)
	—	—	—	—	—	—	+	—
							(5.1.1.4)	
	—	—	—	—	—	—	+	—
							(5.1.1.5)	
	(5.2.1)	—	+	—	—	—	+	+
			(5.2.2)				(5.2.3)	(5.2.4)
	(5.3.1)	—	+	—	—	—	+	—
			(5.3.2)				(5.3.3)	
	(5.4.1)	+	—	+	—	—	—	—
		(5.4.1)		(5.4.2.4)				
-	—	—	+	—	+	+	—	—
			(5.4.2.1)		(5.4.3)	(5.4.3)		
**	—	+	—	+	—	—	+***	—
		(5.1.1.2)		(5.1.1.2)				

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**	—	+ (5.1.1.2)	—	+ (5.1.1.2)	—	—	—	—
** -	—	+ (5.1.1.2)	—	+ (5.1.1.2)	—	—	—	—
-	(5.5.1)	(5.5.1)	(5.5.1)	(5.5.1)	—	—	+ (5.5.1)	(5.5.1)
*	(5.5.2)	(5.5.2)	(5.5.2)	(5.5.2)	—	—	+ (5.5.2)	(5.5.2)
*	+ (5.5.3)	+ (5.5.3)	+ (5.5.3)	+ (5.5.3)	—	—	+ (5.5.3)	+ (5.5.3)
-	(5.6)	(5.6)	(5.6)	(5.6)	—	—	—	—

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	1—200000 / 2	±8%
	1—250000	±10 %
	1—200000	±8%
	1—250000	±8%
	1—200000	±8%
-	380—780	±0,3
	1600—16000	±5
	: 0,004...0,734 : 0,005...0,834	±0,006

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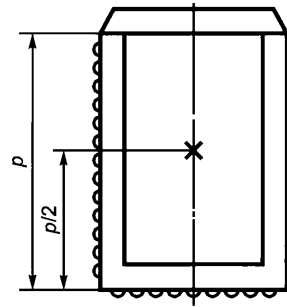
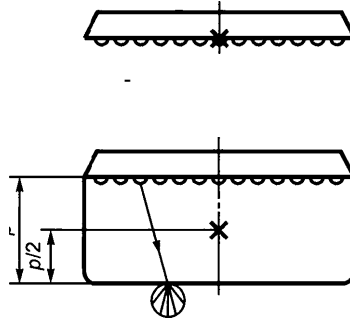
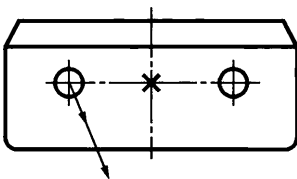
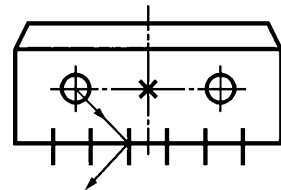
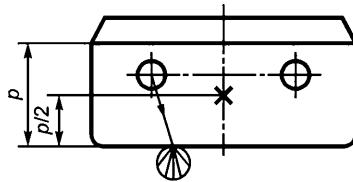
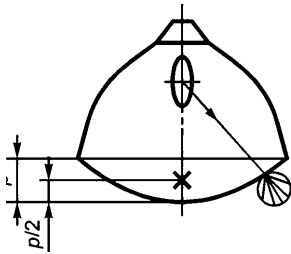
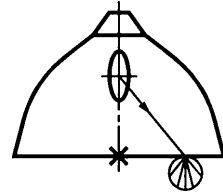
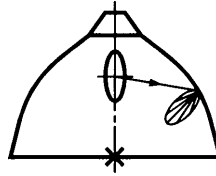
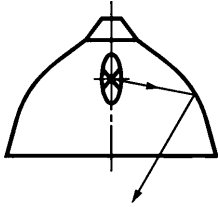
.2.

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	380 780
	±0,3
	2
	±0,006
	:
2000 3000	150
3000 4000	200
4000 5000	250
5000 6000	300
6000 7000	350
—	-

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(0° < < 180°)

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	/		/		/
0°	7	65°	70	130°	6
5°	7	70°	69	135°	4
10°	7	75°	70	140°	2
15°	9	80°	70	145°	2
20°	12	85°	70	150°	1
25°	17	90°	72	155°	1
30°	25	95°	69	160°	1
35°	37	100°	69	165°	1
40°	46	105°	65	170°	1
45°	55	110°	54	175°	1
50°	59	115°	32	180°	1
55°	64	120°	19		
60°	69	125°	11		

.2 2

(0° < < 90°)

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	0°	10°	20°	30°	40°	50°	60°	70°	80°	90°
0°	319	319	319	319	319	319	319	319	319	319
5°	332	332	332	337	337	326	326	326	326	326
10°	313	313	308	313	313	313	319	319	326	326
15°	319	326	313	313	302	289	284	289	308	313
20°	326	326	302	289	284	272	261	240	257	284
25°	337	332	302	278	254	234	231	212	202	240
30°	349	332	289	272	243	193	195	185	169	213

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	0°	10°	20°	30°	40°	50°	60°	70°	80°	90°
35°	361	332	278	254	202	171	161	178	144	179
40°	391	349	272	222	186	160	134	148	126	158
45°	385	337	267	226	182	138	131	126	107	131
50°	438	349	261	209	164	147	103	104	96	107
55°	491	373	254	193	161	127	106	83	80	90
60°	598	415	224	168	150	128	120	78	68	76
65°	651	450	224	154	131	116	97	65	58	62
70°	610	421	224	155	126	97	85	61	44	45
75°	272	248	130	80	85	72	69	47	27	27
80°	71	71	35	27	27	40	32	30	16	16
85°	18	18	18	13	13	13	8	8	8	8
90°	11	11	11	8	10	8	6	6	4	4

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3

$$3 = 0,$$

$$0^\circ < < 90^\circ$$

$$90^\circ < < 90^\circ.$$

	, / ,						
	0°	15°	30°	45°	60°	75°	90°
-90°	0	0	0	0	0	0	0
-80°	2	2	2	1	1	0	0
-70°	26	25	22	15	8	2	0
-60°	119	115	99	70	35	9	0
-50°	589	569	493	348	174	45	0
-40°	970	937	811	574	287	74	0
-30°	1164	1124	973	688	344	89	0
-20°	1236	1194	1034	731	366	95	0
-10°	1333	1288	1115	789	394	102	0
0°	1357	1311	1135	803	401	104	0
10°	1309	1264	1095	774	387	100	0
20°	1212	1171	1014	717	359	93	0
30°	1067	1030	892	631	315	82	0
40°	873	843	730	516	258	67	0

[3]	, / ,						
	0°	15°	30°	45°	60°	75°	90°
50°	507	489	424	300	150	39	0
60°	114	110	95	67	34	9	0
70°	35	34	30	21	10	3	0
80°	2	2	2	1	1	0	0
90°	0	0	0	0	0	0	0

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Microsoft Office Excel

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+ 1 — : ( /<sub>0</sub>, /<sub>1</sub> ..., 1 ) ( 0, 1 ..., )

$$= 2 \int_{Y=Yo} J(y) \sin y dy. \quad (.1)$$

$$= 2 \left[ \frac{\sin^{m+1} Y_0 + m \sin^m Y_0}{2} + \sum_{l=1}^{m-1} \sin^l Y_0 \right] \quad (.2)$$

lj —  
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= Y<sub>0</sub> r

= 90°, — 0 = 90°, = 180°, , 0 = 0°, = 180°, — 0 = 0°,  
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Y	1,	sin	1 sin	Y	1,	sin	/sin
0°	110	0,000	0,0	95°	370	0,996	355,2
5°	110	0,087	3,7	100°	350	0,985	326,6
10°	140	0,174	11,9	105°	325	0,966	289,0
15°	180	0,259	29,1	110°	305	0,940	256,7
20°	220	0,342	57,1	115°	270	0,906	203,6
25°	255	0,423	93,7	120°	250	0,866	171,5
30°	295	0,500	145,3	125°	215	0,819	124,0
35°	320	0,574	191,3	130°	185	0,766	87,8
40°	340	0,643	234,9	135°	145	0,707	50,8
45°	360	0,707	279,4	140°	110	0,643	26,9
50°	385	0,766	330,0	145°	75	0,574	11,2
55°	400	0,819	364,1	150°	35	0,500	2,1

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Y	/,	sin	/sin	Y	1,	sin	/sin	
60°	410	0,866	387,7	155°	15	0,423	0,3	
65°	420	0,906	407,8	160°	5	0,342	0,0	
70°	420	0,940	412,2	165°	5	0,259	0,0	
75°	425	0,966	421,0	170°	5	0,174	0,0	
80°	415	0,985	410,7	175°	5	0,087	0,0	
85°	405	0,996	399,7	180°	5	0,000	0,0	
90°	390	1,000	381,5	—				
							6466	
							= 2 £	3546

3546 .

$$(V_{00}, I_{01}, \dots, \wedge \wedge 1, \dots, \wedge \wedge)' + 1 + 1 - \dots \quad (0, 1, \dots, \dots)$$

0

$$= J J / (C, y) \sin y dy dC. \quad (.)$$

$$= 0 = ?$$

$$= \frac{\wedge 00 \pm \wedge 20 \pm fpm \pm ?}{4} + 2 \sum_{j=1}^{-1} (fjP + ) \sum_{j=1}^{-1} (*0j + fnj) + \sum_{j=1}^{-1} \sum_{j=1}^{-1} Yfu \quad (.4)$$

$f. = I; \sin ; = \dots, = \dots -$ , ; , .  
 $= 90^\circ;$  ;  $= 0 = 0^\circ, = 180^\circ;$  —  $= 0 = 0^\circ,$   
 $90^\circ - 270^\circ)$  (  $= 0^\circ = 90^\circ,$   $0^\circ - 180^\circ -$   
 $90^\circ - 270^\circ)$  (  $= 0^\circ = 180^\circ$

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Y	1, ,									
	0°	10°	20°	30°	40°	50°	60°	70°	80°	90°
0°	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400
5°	1350	1380	1350	1300	1310	1290	1260	1300	1355	1350
10°	1380	1415	1340	1290	1340	1310	1245	1185	1200	1230

.2

Y	$1, \dots$									
	0°	10°	20°	30°	40°	50°	60°	70°	80°	90°
15°	1495	1570	1330	1275	1215	1135	1090	1095	1030	1020
20°	1630	1660	1455	1380	1400	1000	880	855	785	795
25°	1850	1835	1440	1220	1075	1125	710	650	645	600
30°	1835	1800	1380	1135	875	690	775	495	510	510
35°	1775	1700	1485	1115	720	600	535	460	460	460
40°	1960	1840	1165	865	815	485	375	585	405	415
45°	1815	1695	1075	695	510	660	390	355	370	355
50°	1980	1790	960	620	495	465	395	485	345	315
55°	2260	1885	980	630	475	445	375	330	250	250
60°	2455	1875	905	620	505	375	275	260	225	250
65°	2115	1525	725	565	475	380	275	215	205	170
70°	1325	1065	680	525	445	340	310	160	130	105
75°	590	460	350	280	195	285	195	145	65	65
80°	195	155	95	65	60	65	75	90	35	55
85°	95	80	40	40	30	25	20	25	15	35
90°	0	20	20	20	10	10	10	10	10	25

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Y	$f = / \sin \dots$									
	0°	10°	20°	30°	40°	50°	60°	70°	80°	90°
0°	0	0	0	0	0	0	0	0	0	0
5°	118	120	118	113	114	112	110	113	118	118
10°	240	246	233	224	233	227	216	206	208	214
15°	387	406	344	330	314	294	282	283	267	264
20°	557	568	498	472	479	342	301	292	268	272
25°	782	776	609	516	454	475	300	275	273	254
30°	918	900	690	568	438	345	388	248	255	255
35°	1018	975	852	640	413	344	307	264	264	264
40°	1260	1183	749	556	524	312	241	376	260	267
45°	1283	1199	760	491	361	467	276	251	262	251
50°	1517	1371	735	475	379	356	303	372	264	241
55°	1851	1544	803	516	389	365	307	270	205	205
60°	2126	1624	784	537	437	325	238	225	195	217
65°	1917	1382	657	512	430	344	249	195	186	154
70°	1245	1001	639	493	418	319	291	150	122	99
75°	570	444	338	270	188	275	188	140	63	63
80°	192	153	94	64	59	64	74	89	34	54
85°	95	80	40	40	30	25	20	25	15	35
90°	0	20	20	20	10	10	10	10	10	25

.4.

$$\prod_{i=1}^{n-1} (f_{i0} + f_{ij_m})^* = \prod_{j=1}^{n-1} (f_{0j} + f_{nj}) \quad (25);$$

$$\prod_{i=1}^{n-1} (f_{i0} + f_{ij_m})^* = \prod_{j=1}^{n-1} (f_{0j} + f_{nj}) \quad (19410);$$

$$\prod_{i=1}^{n-1} (f_{i0} + f_{ij_m})^* = \prod_{j=1}^{n-1} (f_{0j} + f_{nj}) \quad (51506);$$

(.4) 932 3730

.4

$$\prod_{i=0}^n (f_{i0} + f_{ij_m})^* = \prod_{j=0}^n (f_{0j} + f_{nj}) \quad (f_{00}, f_{11}, \dots, f_{11})$$

$$\arg f_{00} = 90^\circ, \arg f_{11} = 180^\circ; \quad \arg f_{00} = 0^\circ, \arg f_{11} = 90^\circ;$$

$$Y = \frac{J(r)^{27}}{Y_m^{10}} \quad (.5)$$

$$Y = \frac{Y - Y_n}{1 - Y - Y_n} \quad (.6)$$

$$\arg f_{00} = 90^\circ; \quad \arg f_{11} = 90^\circ, \arg f_{22} = 180^\circ; \quad \arg f_{00} = 0^\circ, \arg f_{11} = 180^\circ;$$

$$z = \frac{-if/}{mI-1} = 1; \quad (-7)$$

$$f_{00}, f_{11}, f_{22} \quad (-8)$$

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		2700	3000	3500	4000	4500	5000	5700	6500
	x	0,4578	0,4338	0,4073	0,3818	0,3611	0,3447	0,3287	0,3123
		0,4101	0,4030	0,3917	0,3797	0,3658	0,3553	0,3417	0,3282
-	x	0,4813	0,4562	0,4299	0,4006	0,3736	0,3551	0,3376	0,3205
		0,4319	0,4260	0,4165	0,4044	0,3874	0,3760	0,3616	0,3481
	x	0,4562	0,4299	0,3996	0,3736	0,3548	0,3376	0,3207	0,3028
		0,4260	0,4165	0,4015	0,3874	0,3736	0,3616	0,3462	0,3304
	x	0,4373	0,4147	0,3889	0,3670	0,3512	0,3366	0,3222	0,3068
		0,3893	0,3814	0,3690	0,3578	0,3465	0,3369	0,3243	0,3113
	x	0,4593	0,4373	0,4147	0,3898	0,3670	0,3515	0,3366	0,3221
		0,3944	0,3893	0,3814	0,3716	0,3578	0,3487	0,3369	0,3261

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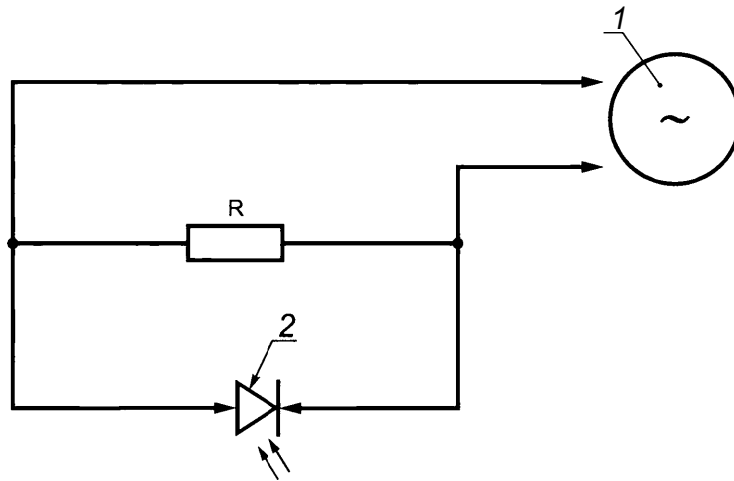
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, °C	W	
+25		7" ,0
*	"1	7" ,1
+25	2	^ ,2
*	"	,3
+25	4	" ,4

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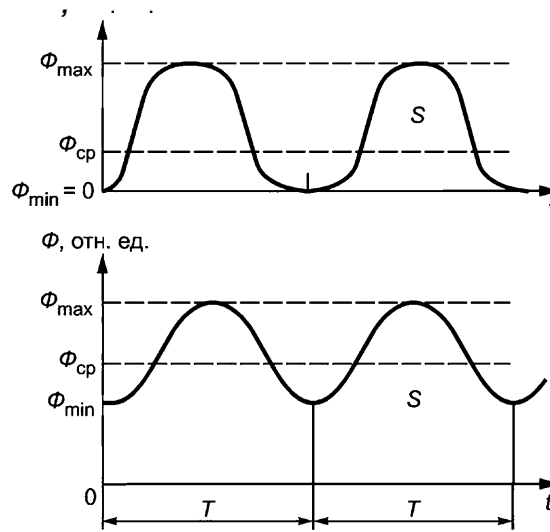
« = > ~ '' 100%, ( .1)

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$$= \frac{1}{1} S/T, \quad (.2)$$

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S—



,  $\Phi_{\min}$  —

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- [1] 8.971—2019 . , -  
.
- [2] 55702—2020 .
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