

01.03.2017 .

. . .95 29 2016 .

I.

. 1.

. 2. (1)

(2)

. 3.

1.

2.

. 4.

. 5.

/

. 7, . 2

( ) .

II.

( )

( )

. 6. (1)

1.

(2)

2

3.

. 7. (1)

2

3

(2)

. 11.

(3)

. 12, . 11 - 13.

. 8. (1)

2

3,

(2)

. 12, . 3,

. 11, . 1, 6, 7 8,

. 9.

. 6

:

1.

2,

1,

2,

3

:

2,

2;

)

)

3

)

. 13, . 6;

. 12, . 9;

2,

2,

2,

3

:

)

;

)  
 ) . 12, . 14 2, 2;  
 . 1; . 12, . 15,  
 ) . 13, . 6.  
 . 10. . 7 - 9 ;  
 1.  
 2, 1  
 ;  
 ) ;  
 ) ;  
 ) . 12, . 14 . 12, . 10; 2, 1;  
 ) . 13, . 6; . 12, . 15, . 2;  
 2.  
 2, 3 3, 2  
 ;  
 ) ;  
 ) ;  
 ) 2 3, 1 3 ; 2,  
 ) . 12, . 14 . 12, . 15, . 1;  
 ) . 13, . 6.

III.

. 11. (1)  
 , , /  
 . 4, . 16, . 1, . 23, . 1, . 26, . 1, . 1 . 29  
 5 1999 . ( , . 47  
 1999 ).  
 (2) . 1  
 . 16, . 3 4, . 18, . 19, . 24, . 4 5 . 30, . 2  
 13.  
 (3) .  
 1  
 (4) . 1, ?  
 . 37  
 (5) . 4.  
 (6) . 15,  
 (7)  
 (8) /  
 ( )  
 (9) . 1, 6, 7 8 . 15  
 . 217 7 1999 . ( , . 88 1999 ),  
 . 24, 25, 26, 27 28  
 (10) 5 1999 .  
 (11) . 16 5 1999 .  
 1. 2 3;  
 2. ;  
 3. ;  
 4. ( ( ) ),  
 ;  
 5. ;  
 6. ;  
 7. . 14;  
 8. ;  
 9. ;

10.  
11.  
(12)

(13)

(14)

5 1999

(15)

. 12.

(16)

. 11

5 1999

. 14

?

. 12. (1)

(2)

. 1

. 4

(3)

. 11,

. 6 - 10

. 2

3

. 11, . 1, 6, 7 8,

1.

2.

3.

( ),

4.

);

( /

5.

6.

7.

8.

9.

(4)

. 11

(5)

. 16, . 1, . 2, 3 4

. 11.

. 13

(6)

. 11

2 3

-07/8 2008

( . 3 2009 ).

(7)

. 6

(8)

. 7

(9)

. 9, . 1

1.

. 13;

2.

3.

. 7, . 1

3 2001

( . 46 2001 ).

(10)

. 10, . 1

(11)

. 16,

. 1

. 8 9

. 10.

(12)

1.

2.

3.

(13) . 12, . 3 5 1999

(14) . 8 - 10

(15) . 14

1.

2.

. 13. -07-2 2009 .  
( . 102 2009 . )

. 11,

1.

2. ( ) ,

3.

4. . 11;

5.

6.

7.

8.

9.

. 11, . 11, . 4 . 12, . 4 5.

. 14. (1)

3 1987 .  
( . 16 1987 . )

(2)

3 2008 .  
( . 14 2008 . ),

(3)

. 2

(4)

(5)

(6)

. 1 5

. 15. (1)

1.

2013/35/

2.

1:

2013/35/

3.

2:

2013/35/

(2)

1.

. 1

)

)

)

2.

3.

4.

5.

6.

7.

. 16, . 1;  
100 kHz 10 MHz,

8.

. 14.

IV.

. 16. (1)

. 12, . 1 2

. 6 - 10,

- 1.
- 2.
- 3.
- 4.
- 5.

. 11,

(2)

(IEEE Standard for Military Workplaces - Force Health Protection Regarding Personnel Exposure to Electric, Magnetic, and Electromagnetic Fields, 0 Hz to 300 GHz), 2014,

§ 1.

- 1. "
- 2.
- 2. "

(  
3. "

4. "

5. "

6. "

300 GHz.

)

)

)

)

7. "

2,

8. "

9. "

2,

)

)

)

)

10. "

§ 2.

2013/35/

26

2013

( L 179, 29/06/2013).

16,

1

89/391/

) (

2004/40/

§ 3.

26 2013 .

2013/35/

(

2004/40/

16, 1

. 36

( 89/391/ ) )

. 16, . 2.

§ 4.

. 36, . 2

§ 5.

7 1999 .

2000 ., . 52

2001 ., . 43

2003 ., . 37

88

( ., . 88 1999 .; . 48

2004 ., . 40

2008 ., . 24

2013 .)

1.

148

2.

151 - 154

3.

158 159

§ 6.

? "

".

1 . 6, . 1

( )

(Vm<sup>-1</sup>).  
situ),

(in

(I<sub>L</sub>)

10 MHz 110 MHz,

( ).

(IC)  
( ).

(Q)

( )

(C).

(

) ( )

( m<sup>-1</sup>).

(T).

B = 4?10<sup>-7</sup>T ( 1,25 ).

H = 1 Am<sup>-1</sup>

(S)

(Wm<sup>-</sup>

²).

( )

(Jkg<sup>-1</sup>).

( ),

(Wkg<sup>-1</sup>).

(

),

(I<sub>L</sub>),

(E),

(B),

(I<sub>c</sub>),

(H)

(S).

1, . 12, . 3 6, § 1, . 1, 7 8 2 . 6, . 2, . 7, . 1, . 8, . 1, . 9, . 1 2, . 10, . 1 2, . 11, . 11, .

0 Hz 10

MHz

A.

1 Hz ( A1)

1 Hz 10 MHz ( A2)

0 1 Hz

( 1)

( 1)

1

(B<sub>0</sub>) 0 1 Hz

	2 T
	8 T
	8 T

1 Hz 10 MHz

( 2)

2

1 Hz 10 MHz

1 Hz ≤ f < 3 kHz	1,1 Vm <sup>-1</sup> ( )
3 kHz ≤ f ≤ 10 MHz	3,8 · 10 <sup>-4</sup> f Vm <sup>-1</sup> ( )

2-1: f , (Hz).

2-2:

( ), ?2

2-3: ( . 11, . 15,

1 Hz 400 Hz

( 3)

**1 Hz 400 Hz**

1 Hz ≤ f < 10 Hz	0,7/f Vm <sup>-1</sup> ( )
10 Hz ≤ f < 25 Hz	0,07 Vm <sup>-1</sup> ( )
25 Hz ≤ f ≤ 400 Hz	0,0028 f Vm <sup>-1</sup> ( )

3-1: f , (Hz).

3-2:

3-3: ( ),  
, . 15,

1. (E) (E) . 12:
2. ( ) ( ) 1;
3. (I<sub>c</sub>) 2; 3;
4. (B<sub>0</sub>) 4.

( )  
( 1) ( 2 3) ( 2 3) . 12, . 9.  
1

**1 Hz 10 MHz**

	(E) [Vm <sup>-1</sup> ] ( )	(E) [Vm <sup>-1</sup> ] ( )
1 ≤ f < 25 Hz	2,0 · 10 <sup>4</sup>	2,0 · 10 <sup>4</sup>
25 ≤ f < 50 Hz	5,0 · 10 <sup>5</sup> / f	2,0 · 10 <sup>4</sup>
50 Hz ≤ f < 1,64 kHz	5,0 · 10 <sup>5</sup> / f	1,0 · 10 <sup>6</sup> / f
1,64 ≤ f < 3 kHz	5,0 · 10 <sup>5</sup> / f	6,1 · 10 <sup>2</sup>
3 kHz ≤ f ≤ 10 MHz	1,7 · 10 <sup>2</sup>	6,1 · 10 <sup>2</sup>

1-1: f , (Hz).

1-2: ( ) ( ) ( )

1-2: ( ) , ?2



1-3: . 11, . 15,

( )

( 2) 400 Hz  
 ( 3) 400 Hz  
 ( 2) ( 2).  
 ( A2).  
 400 Hz. . 12, . 9.

2

1 Hz

10 MHz

	$[\mu ] ( )$	$( ) [\mu ]$	$[\mu ] ( )$
1	2	3	4
$1 \leq f < 8 \text{ Hz}$	$2,0 \cdot 10^5 / f^2$	$3,0 \cdot 10^5 / f$	$9,0 \cdot 10^5 / f$
$8 \leq f < 25 \text{ Hz}$	$2,5 \cdot 10^4 / f$	$3,0 \cdot 10^5 / f$	$9,0 \cdot 10^5 / f$
$25 \leq f < 300 \text{ Hz}$	$1,0 \cdot 10^3$	$3,0 \cdot 10^5 / f$	$9,0 \cdot 10^5 / f$
$300 \text{ Hz} \leq f < 3 \text{ kHz}$	$3,0 \cdot 10^5 / f$	$3,0 \cdot 10^5 / f$	$9,0 \cdot 10^5 / f$
$3 \text{ kHz} \leq f \leq 10 \text{ MHz}$	$1,0 \cdot 10^2$	$1,0 \cdot 10^2$	$3,0 \cdot 10^2$

2-1: f , (Hz).

( ),

? 2

2-2: . 11,

( ),

. 15,

2-3: . 11, , .15,

3

**I<sub>c</sub>**

	(I <sub>c</sub> ) [mA] ( )
2,5 kHz	1,0
2,5 ≤ f < 100 kHz	0,4 f
100 kHz ≤ f ≤ 10000 kHz	40

3-1: f , (kHz).

( )

4

	AL(B <sub>0</sub> )
,	0,5 mT
(> 100 mT)	3 mT

3 . 6, . 2, . 7, . 1, . 8, . 1, . 10, . 2, . 11, . 11, . 1 . 12, . 3 6

300 GHz

100 Hz

A.

100 kHz 6 GHz

( A1)

0,3 6 GHz

( 2)

6 GHz (

A3)

**100 kHz 6 GHz**

	0,4 Wkg <sup>-1</sup>
	10 Wkg <sup>-1</sup>
	20 Wkg <sup>-1</sup>

10 g ; 10 g

1-1: ,

0,3 GHz 6 GHz

( 2)

2

**0,3 6 GHz**

	( )
0,3 <= f <= 6 GHz	10 mJkg <sup>-1</sup>

2-1: , 10 g

3

**6 GHz 300 GHz**

6 GHz <= f <= 300 GHz	50 Wm <sup>-2</sup>

3-

20 cm<sup>2</sup>

1:

$$1 \text{ cm}^2, \quad 20 \quad 50 \text{ Wm}^{-2},$$

$$6 \quad 10 \text{ GHz}$$

$$10 \text{ GHz}$$

$$68/f^{1.05} \quad ( \quad f \quad \text{GHz}),$$

1. (E)

2. (B)

1;

3. (S)

4. (IC)

5. (IL)

1;

B

. 12:

2;

2.

1;

( 1 3) (E) (B)

( )

1

**100 kHz 300 GHz**

	$[\text{Vm}^{-1}]$ (E)	$( \quad ) [\mu \quad ]$	$[\text{Wm}^{-2}]$ (S)
100 kHz $\leq f < 1$ MHz	$6,1 \cdot 10^2$	$2,0 \cdot 10^6/f$	-
1 $\leq f < 10$ MHz	$6,1 \cdot 10^8/f$	$2,0 \cdot 10^6/f$	-
10 $\leq f < 400$ MHz	61	0,2	-
400 MHz $\leq f < 2$ GHz	$3 \cdot 10^{-3} f^{1/2}$	$1,0 \cdot 10^{-5} f^{1/2}$	-
2 $\leq f < 6$ GHz	$1,4 \cdot 10^2$	$4,5 \cdot 10^{-1}$	-
6 $\leq f \leq 300$ GHz	$1,4 \cdot 10^2$	$4,5 \cdot 10^{-1}$	50

1-1:  $f$  , (Hz).  
 $[ \quad (\text{E})^2 ] [ \quad (\text{B})^2 ]$

1-2: , 1000 (S).

. 15.  
(E) (B)

1-3:

. 11,

,

. 15,

20 cm<sup>2</sup>

1 cm<sup>2</sup>,

20

50 W/m<sup>2</sup>.

1-4:

6 10 GHz

10 GHz

68/f<sup>1.05</sup>

( f

GHz),

2

	, (I <sub>C</sub> ) [mA] ( )	, (I <sub>L</sub> ) [mA] ( )
100 kHz <= f < 10 MHz	40	-
10 MHz <= f <= 110 MHz	40	100

2-1: [ (I<sub>L</sub>)<sup>2</sup>