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1) « 1.0—2012 (8).
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 « , 30 2009 . 384- -
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 , 50.13330.2012 « 23-02-2003 « -
 » 51380 31607. -
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Федеральное агентство
по техническому регулированию
и метрологии

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Buildings and constructions. The calculation of thermal protection of walls with reflective insulation

—2016—06—01

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745—2014

618—73

25380—2014

31607—2012

51380—99

50.13330.2012

23-02-2003

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3.10 1* (). : ,

3.11 () , 1* (). : , ,

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4.1

4.1.1

4.1.1.1 ()

Ro. ° / .

$$Ro = 1/cu + R\ll 1/ . \quad (1)$$

« =8.7 / (°) (50.13330.2012. 4); . / (2°),

R, - . 2° / ;

„ =23 / (2-) (50.13330.2012. 6). . / (),

4.1.1.2 R*. 2 / . -

R, = I (/) + Ran. (2)

50.13330.2012, ; i-ro . / (°),

Ran - . 2 / .

Ran 1.

4.1.1.3 Ran

$$Ran = (t1. " T2an) / Q . \quad (3)$$

Ti, n-

t2, *-

Q -

. / 2,

25380.

4.1.1.4

1 .

»:

Q.

1 2 -

0.«

$$Q - * \ll Q \ll .$$

(4)

Chan -

» -

4.1.1.5

1.*. 2».

$$= /_4 \quad is - +$$

(5)

2R -

R3 -

I* -

I« -

1 -

ft... }•C/Bt		
*		
0.01	0.13	0.15
0.02	0.14	0.15
0.03	0.14	0.16
0.05	0.14	0.17
0.1	0.15	0.18
0.15	0.15	0.18
0.2-03	0.15	0.19

4.1.1.6

(2)

$$\& \frac{|_{-1}+273}{i 100} (\frac{-2}{100} \frac{273}{100})$$

(6)

$$1 + \frac{I}{-I_4} \dots$$

(7)

$$I (2 - 4);$$

$$I (2 - 4);$$

$$I (2 - 4).$$

2.

	0.23-0.34
	0.34-0.4
141	0.3
	0.5
	0.63-1.09
	5155
	535
	4.95
	4.6
	5.52
	0.1
	0.13
	4.49
	4.06
	4.14
	4.37
	4.95
	4.83
	4.14
	5.16
	3.61
	5.52
	4
	5.16
	5.1-5.3
	4.9
	5.41
	5.52
	5.23
	4.69

4.1.1.7

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(8)

Ai -

. / (°);

. / (°).

4.1.1.8.

+ ()
ti* - »

3.

4.1.1.9

R. =

$$\frac{273}{100 J} \left(\frac{273}{100 J} + 273 \right)$$

$$+ \frac{4 * 12. .}{\sqrt{1 + 16} , - , 2 } ;$$

(9)

4.1.2

4.1.2 1

4.1.1.9

(9).

4.1.1.1-

745. 618.

4.1.2.2

4.1.2.1

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(tt. - - -)

| * | 8 (6 | | | | | | | | | |
|----|--------------|--------|--------|--------|-------------|-----------|--------|--------|--------|--------|
| | 1 | 2 | i | 5 | 7 | to | 11 | 14 | 20 | 25 |
| 1 | 0.0233 | 0.0244 | 0.0337 | 0.0488 | 0.0628 | 0.0814 | 0.0930 | 0.1116 | 0.1396 | .1628 |
| 2 | 0.0232 | 0.0293 | 0.0394 | 0.0577 | 0.0741 | 0.0968 | 0.1100 | 0.1310 | 0.1639 | 5.1932 |
| 3 | 0.0234 | 0.0331 | 0.0440 | 0.0648 | 0.0832 | 0.1090 | 0.1237 | 0.1467 | 0.1833 | 5.2162 |
| 4 | 0.0239 | 0.0355 | 0.0474 | 0.0697 | 0.0895 | 0.1173 | 0.1334 | 0.1578 | 0.1968 | 5.2303 |
| 5 | 0.0244 | 0.0372 | 0.0500 | 0.0733 | 0.0942 | 0.1233 | 0.1407 | 0.1663 | 0.2070 | 5.2407 |
| 6 | 0.0248 | 0.0388 | 0.0523 | 0.0765 | 0.0983 | 0.1286 | 0.1468 | 0.1738 | 0.2163 | 5.2518 |
| 7 | 0.0250 | 0.0402 | 0.0544 | 0.0795 | 0.1021 | 0.1334 | 0.1521 | 0.1806 | 0.2250 | 5.2637 |
| 8 | 0.0252 | 0.0417 | 0.0562 | 0.0823 | 0.1056 | 0.1377 | 0.1568 | 0.1868 | 0.2332 | 5.2758 |
| 9 | 0.0254 | 0.0430 | 0.0578 | 0.0848 | 0.1087 | 0.1417 | 0.1611 | 0.1925 | 0.2407 | 5.2870 |
| 10 | 0.0256 | 0.0442 | 0.0593 | 0.0872 | 0.1116 | 0.1454 | 0.1651 | 0.1977 | 0.2477 | 5.2966 |
| 11 | 0.0260 | 0.0453 | 0.0606 | 0.0893 | 0.1143 | 0.1488 | 0.1691 | 0.2025 | 0.2540 | 5.3039 |
| 12 | 0.0264 | 0.0463 | 0.0618 | 0.0913 | 0.1168 | 0.1519 | 0.1730 | 0.2070 | 0.2598 | 5.3093 |
| 13 | 0.0269 | 0.0472 | 0.0629 | 0.0932 | 0.1191 | 0.1549 | 0.1768 | 0.2111 | 0.2651 | 5.3136 |
| 14 | 0.0274 | 0.0480 | 6 6.16 | 6 4 | 0.1212 | 0.1577 | 0.1804 | 0.2149 | 0.2700 | 5.3173 |
| 15 | 0.0279 | 0.0488 | 0.0651 | 0.0965 | 0.1233 | 0.1605 | 0.1838 | 0.2186 | 0.2745 | 5.3210 |
| 16 | 0.0284 | 0.0495 | 0.0663 | 0.0980 | 0.1253 | 0.1632 | 0.1869 | 0.2221 | 0.2788 | 5.3254 |
| 17 | 0.0288 | 0.0502 | 0.0675 | 0.0995 | 0.1272 | 0.1659 | 0.1899 | 0.2255 | 0.2828 | 5.3302 |
| 18 | 0.0293 | 0.0509 | 6 6 | 6 1 | 0.1290 | 0.1685 | 0.1926 | 0.2287 | 0.2867 | 5.3353 |
| 19 | 0.0297 | 0.0516 | 0.0699 | 0.1022 | 0.1308 | 0.1710 | 0.1952 | 0.2319 | 0.2905 | 5.3405 |
| 20 | 0.0302 | 0.0523 | 0.0709 | 0.1035 | 0.1326 | 0.1733 | 0.1977 | 0.2349 | 0.2942 | 5.3454 |
| 21 | 0.0307 | 0.0530 | 0.0718 | 0.1047 | 0.1344 | 0.1754 | 0.2001 | 0.2379 | 0.2979 | 5.3499 |
| 22 | 0.0312 | 0.0538 | 0.0725 | 0.1059 | 0.1361 | 0.1774 | 0.2024 | 0.2408 | 0.3015 | 5.3541 |
| 23 | 0.0317 | 0.0545 | 0.0732 | 0.1070 | 0.1377 | 0.1792 | 0.2047 | 0.2436 | 0.3051 | 5.3580 |
| 24 | 0.0322 | 0.0552 | 0.0738 | 0.1082 | 0.1392 | 0.1809 | 0.2070 | 0.2463 | 0.3085 | 5.3616 |
| 25 | 0.0326 | 0.0556 | 0.0744 | 0.1093 | 0.1407 | 0.1826 | 0.2093 | 0.2489 | 0.3117 | 5.3652 |
| 26 | 0.0329 | 0.0564 | 0.0751 | 0.1105 | 0.1420 | 0.1843 | 0.2116 | 0.2514 | 0.3147 | 5.3587 |
| 27 | > 52 16.0569 | 0.0569 | 0.0757 | 0.1116 | 0.1432 16.1 | 0.1875 59 | 0.2139 | 0.2537 | 0.3176 | 5.3722 |
| 28 | 0.0334 | 0.0573 | 0.0764 | 0.1128 | 0.1444 | 0.1875 | 0.2163 | 0.2560 | 0.3203 | 5.3757 |
| 29 | 0.0336 | 0.0578 | 0.0772 | 0.1139 | 0.1455 | 0.1891 | 0.2186 | 0.2583 | 0.3230 | 5.3792 |
| 30 | 0.0337 | 0.0582 | 0.0779 | 0.1151 | 0.1465 | 0.1907 | 0.2210 | 0.2605 | 0.3256 | 5.3826 |

4.1.2.3

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(1 -) =

$$\left(1 - \frac{C}{C_0}\right)$$

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| | |
| | $\frac{1}{1 - \frac{C_{2,2,2}}{C_0}} = \frac{1}{1 - \frac{C_{1,2,2}}{C_0}}$ |
| | $\frac{1}{1 - \frac{C_{2,2,2}}{C_0}} = \frac{1}{1 - \frac{C_{1,2,2}}{C_0}}$ |
| | $\frac{1}{1 - \frac{C_{2,2,2}}{C_0}} = \frac{1}{1 - \frac{C_{1,2,2}}{C_0}}$ |
| | $\frac{1}{1 - \frac{C_{2,2,2}}{C_0}} = \frac{1}{1 - \frac{C_{1,2,2}}{C_0}}$ |

4.1.2.4

$Q^{*,*}$

$$Q_{min} = \frac{1}{\frac{1}{C_{1,2,2}} + \frac{1}{C_{2,2,2}} - \frac{1}{C_0}} \left[\left(\frac{r_{1,2,2} + 273}{100} \right)^n - \left(\frac{r_{2,2,2} + 273}{100} \right)^n \right] \cdot \left[1 - \left(1 - \frac{C_{2,2,2}}{C_0} \right)^n \left(1 - \frac{C_{1,2,2}}{C_0} \right)^n \right] \quad (10)$$

4.1.2.5

$$Q_{min} + LK_m \quad (11)$$

5

5.1

5.1.1

$$\frac{1}{1 - \frac{C_{2,2,2}}{C_0}} = \frac{1}{1 - \frac{C_{1,2,2}}{C_0}} \quad (5)$$

5.1.2

$$\frac{1}{1 - \frac{C_{2,2,2}}{C_0}} = \frac{1}{1 - \frac{C_{1,2,2}}{C_0}} \quad (10)$$

5.1.3

$$R_{en} = 0.5 \quad (2-4)$$

5.1.4

$$R_{en} = 0.5 \quad (11)$$

5.1.6

(10).

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| | 1 * | 1 « . |
|--------|--------|-------|
| 0.005 | 13.5 | 74.0 |
| 0.0075 | 20.25 | 55.5 |
| 0.009 | 200 | 41.0 |
| 0.010 | 27.00 | 37.0 |
| 0.012 | 32.40 | 31.0 |
| 0.014 | 37.80 | 26.5 |
| < | 43.20 | 23.1 |
| 0.020 | 54.00 | 18.0 |
| 0.025 | 67.50 | 15,0 |
| 0.030 | 81.00 | 12,0 |
| 0.050 | 135.00 | 7.4 |
| 0.080 | 216.00 | 4.6 |
| 0.100 | 270.00 | 3.7 |
| 0.120 | 324,00 | 3.1 |
| 0.150 | 405.00 | 2.5 |
| | 540.00 | 1.8 |

()

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8 (°), 0,041 (*) 5 , 1.3 -25 4 0,21
 0.7 (°) f. = 20°C, -2 ° .

(°) , 4.9 (°) 2 1 4.14 (°) 0.14
 « = — « » = 15,9 - 12,65 = 3,25 ° . (5):

/? » = 0.115 ° / , f « = 20°C, = 17.34 ° .
 $R_{\text{faartap}} \frac{0.013}{0.21} = 0,062 \text{ } ^\circ /$ 15.9 ° .
 ff.n = 0.14 ° / 2.. = 12.65 ° .
 $\frac{0.04}{0.041} = 0.976 \text{ } ^\circ /$ = -9,98 ° .
 $* \gg = \frac{0.51}{0.7} = 0.729 \text{ } ^\circ /$ = -26.88 ° .
 $R = 0.05 \text{ } ^\circ$, $L = -28 \text{ } ^\circ$.
 $/? = 2.07 \text{ } ^\circ / \cdot U - -28 \text{ } ^\circ$.

=15.9-12,65=3.25 ° .

„ = „ - * « • =

. / ². (10):

$$\frac{15,9+273}{100} \cdot \frac{12,65+273}{100} = \frac{4,2}{5,76} \cdot \frac{4,14}{5,76} = 9,3.$$

. / ². (8):

$$R = \frac{0,05 \cdot 3,25}{3,99 + 9,3} = 0,24. \quad (11):$$

$$R_o = 2,17 \text{ } ^\circ / \quad (5)$$

$$\Delta = T_{\text{lain}} - T_I = 16,09 - 10,78 = 5,31.$$

(10)

():

$$Q_{prt9} = \frac{16,09 + 273}{100} \left(\frac{10,78 + 273}{100} \right)^{1.1} \frac{0,5}{5,76} \frac{4,14}{5,76} = 2,01.$$

4,14 0,5 5,76

(8):

$$R = \frac{5,31}{0,05} = 106,2$$

(11):

$$R = \frac{5,31}{2,01 + 7,95} = 0,53.$$

$$R = 2,46$$

0,53

(5)

$$R = 16,55 - 6,21 = 10,24.$$

(10)

$$Q = \frac{16,55 + 273}{100} \left(\frac{6,21 + 273}{100} \right)^{1.1} \frac{0,5}{5,76} \frac{4,14}{5,76} = 3,29.$$

4,14 0,5 5,76

(8):

$$R = \frac{0,0877}{0,05} = 1,754$$

(11):

$$R = \frac{10,24}{3,29 + 17,92} = 0,48.$$

0,48

$$R = 16,48 - 6,92 = 9,56.$$

(10):

$$Q_{pt4Jf\$} = \frac{16,48 + 273}{100} \left(\frac{6,92 + 273}{100} \right)^{1.1} \frac{0,5}{5,76} \frac{4,14}{5,76} = 3,01.$$

4,14 0,5 5,76

(8):

$$R = \frac{9,56}{0,05} = 191,2$$

(11):

$$R = \frac{9,56}{3,01 + 15,86} = 0,5.$$

$$R = 0,5$$

$$R = 4,14$$

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0,5

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| 1 | | | | | | | | | | |
|---------|--------|-----------------|------------------------|---------|----|---------|-------|--------------------------|------|-------------------|
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-°) | *
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X»,
4 *) | W.
% | | K (*) | | S.
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24)
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,
K (-) |
| 1 | 10 | 1.34 | 0.049 | | | | | | | |
| 2 | 10-12 | 1.34 | 0.041 | 2 | 10 | 0.052 | 0.059 | 0.23 | 0.28 | 0.05 |
| 3 | 12-14 | 1.34 | 0.040 | 1 | 10 | 0.044 | 0.050 | 0.23 | 0.28 | 0.05 |
| 4 | 14-15 | 1.34 | 0.039 | 1 | 10 | 0.043 | 0.049 | 0.25 | 0.30 | 0.05 |
| 5 | 15-17 | 1.34 | 0.038 | 2 | 10 | 0.042 | 0.048 | 0.26 | 0.30 | 0.05 |
| 6 | 17-20 | 1.34 | 0.037 | 2 | 10 | 0.041 | 0.047 | 0.27 | 0.32 | 0.05 |
| 7 | 20-25 | 1.34 | 0.036 | 1 | 10 | 0.040 | 0.046 | 0.29 | 0.34 | 0.05 |
| 8 | 25-30 | 1.34 | 0.036 | 2 | 10 | 0.038 | 0.044 | 0.31 | 0.38 | 0.05 |
| 9 | 30-35 | 1.34 | 0.037 | 2 | 10 | 0.038 | 0.044 | 0.34 | 0.41 | 0.05 |
| 10
6 | 35-38 | 1.34 | 0.037 | 2 | 10 | 0.040 | 0.046 | 0.38 | 0.45 | 0.05 |
| 11 | 15-20 | 1.34 | 0.033 | 2 | 10 | 0.035 | 0.040 | 0.278 | 0.32 | 0.05 |
| 12 | 20-25 | 1.34 | 0.032 | 2 | 10 | 0.034 | 0.039 | 0.030 | 0.35 | 0.05 |
| 13 | 25-33 | 1.34 | 0.029 | 1 | 2 | 0.030 | 0.031 | 0.30 | 0.31 | 0.005 |

| 14 | CVXOU | | | | | | | | | |
|----|---------|------|-------|---|---|-------|-------|------|------|-------|
| | 35-45 | 1.34 | 0.030 | 1 | 2 | 0.031 | 0.032 | 0.35 | 0.36 | 0.005 |
| 15 | 180 | 0.84 | 0.038 | 2 | 5 | 0.045 | 0.048 | 0.74 | 0.81 | 0.3 |
| 16 | 140-175 | 0.84 | 0.037 | 2 | 5 | 0.043 | 0.046 | 0.68 | 0.75 | 0.31 |
| 17 | 80-125 | 0.84 | 0.036 | 2 | 5 | 0.042 | 0.045 | 0.53 | 0.59 | 0.32 |
| 18 | 40-60 | 0.84 | 0.035 | 2 | 5 | 0.041 | 0.044 | 0.37 | 0.41 | 0.35 |
| 19 | 25-50 | 0.84 | 0.036 | 2 | 5 | 0.042 | 0.045 | 0.31 | 0.35 | 0.37 |
| 20 | 85 | 0.84 | 0.044 | 2 | 5 | 0.046 | 0.05 | 0.51 | 0.57 | 0.5 |
| 21 | 75 | 0.84 | 0.04 | 2 | 5 | 0.042 | 0.047 | 0.46 | 0.52 | 0.5 |
| 22 | 60 | 0.84 | 0.036 | 2 | 5 | 0.04 | 0.045 | 0.4 | 0.45 | 0.51 |
| 23 | 45 | 0.84 | 0.039 | 2 | 5 | 0.041 | 0.045 | 0.35 | 0.39 | 0.51 |
| 24 | 35 | 0.84 | 0.039 | 2 | 5 | 0.041 | 0.046 | 0.31 | 0.35 | 0.52 |
| 24 | 30 | 0.84 | 0.04 | 2 | 5 | 0.042 | 0.046 | 0.29 | 0.32 | 0.52 |
| 24 | 20 | 0.84 | 0.04 | 2 | 5 | 0.043 | 0.048 | 0.24 | 0.27 | 0.53 |
| 24 | 17 | 0.84 | 0.044 | 2 | 5 | 0.047 | 0.053 | 0.23 | 0.26 | 0.54 |
| 24 | 15 | 0.84 | 0.046 | 2 | 5 | 0.049 | 0.055 | 0.22 | 0.25 | 0.55 |
| 25 | 26 | 2.0 | 0.048 | 1 | 2 | 0.049 | 0.050 | 0.44 | 0.44 | 0.001 |
| 26 | 30 | 2.0 | 0.049 | 1 | 2 | 0.050 | 0.050 | 0.47 | 0.48 | 0.001 |

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