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# Analysis of Free Software for Thermal Calculations



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The goal of work is to analyze the functionality and practicality of the program.

The diagram shows a room layout with a radiator and a pump. The radiator is 8000mm wide and 3300mm high. The room dimensions are 3400mm by 6000mm. The pump is 180mm high and 75mm wide. The software interface shows the following steps:

- 2 Dimensions**: Enter the dimensions of your room.
 

Width (m)	Length (m)	Height (m)
3	3	2.4
- 3 Exterior Walls**: How many exterior walls does your room have?
 

Buttons: No exterior walls, 1 exterior wall, 2 exterior walls, 3 exterior walls, 4 exterior walls
- 4 Wall Composition**: What type of exterior walls does your room have?
 

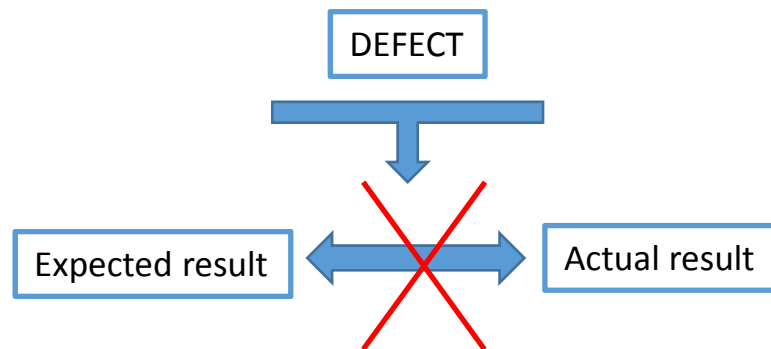
Buttons: 220mm solid brick plastered, 105mm solid brick plastered, Brick cavity wall, Insulated brick cavity wall, Timber frame wall

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## GOST R ISO/IEC 9126-93

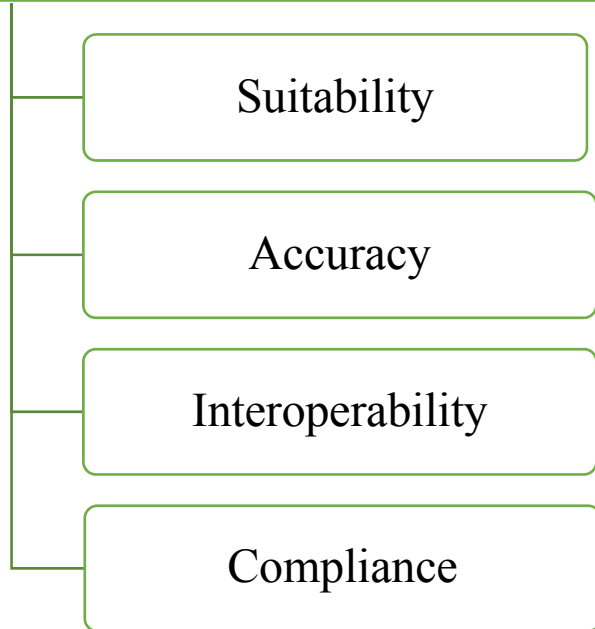
Normatively approved list of comprehensive software quality indicators by priority

Information technology. Software product evaluation. Quality characteristics and guidelines for their use

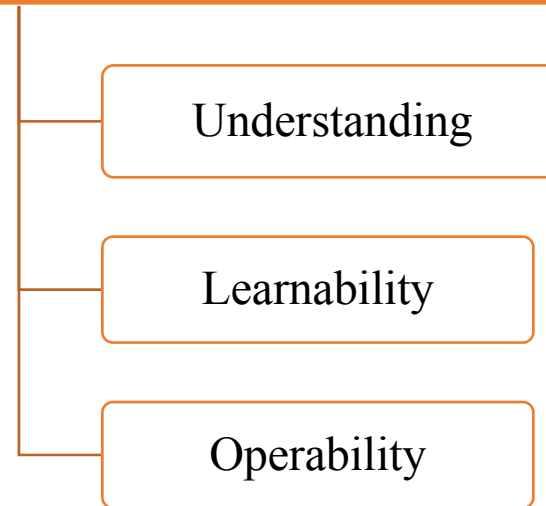


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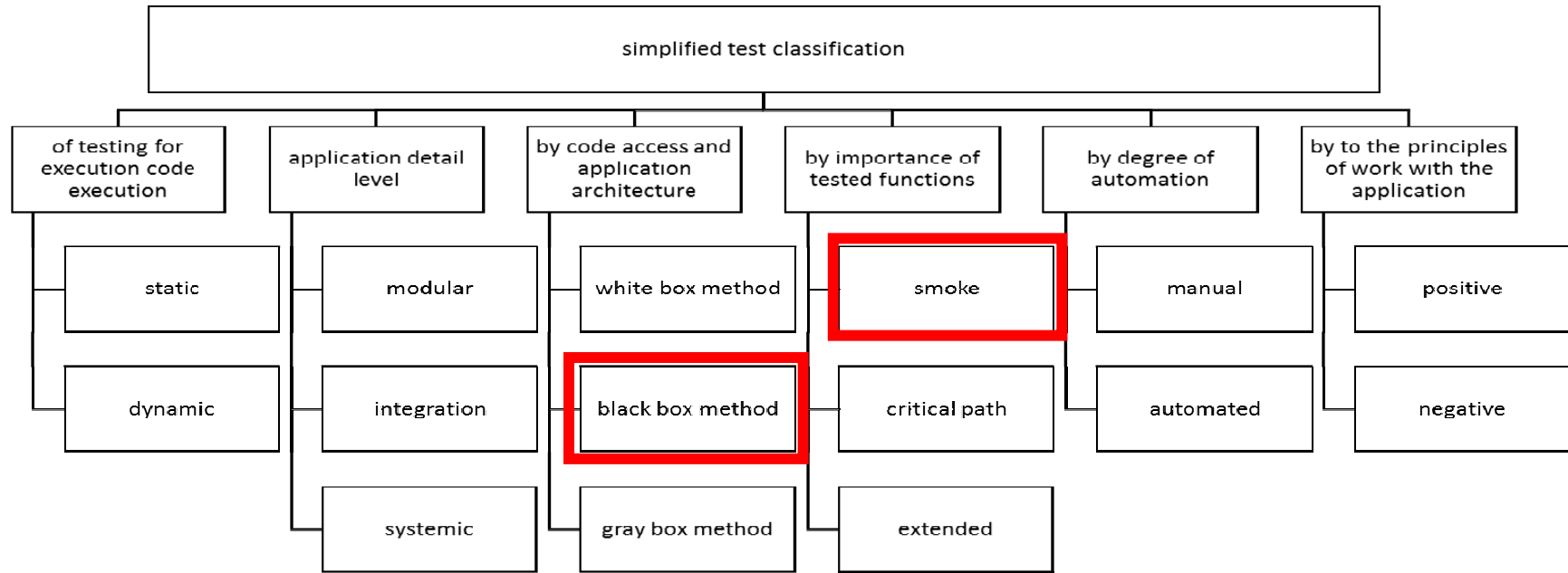
## Functional evaluation criteria



## Practicality criteria



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## Free Software for Thermal Calculations

### Kermi

### Valtec.prg V3.1.3

Online home heat loss calculation program

select a country    
 Choose a city    
 Desired room temperature, °C    
 For instance: 22 °C

**Heat loss through walls**

Facade view    
 The area of external walls, m<sup>2</sup>    
 For instance: 400 m<sup>2</sup>   
 First layer   
 First layer material    
 The thickness of the first layer, m    
 For instance: 0.7 m   
 Second layer   
 Second layer material    
 The thickness of the second layer, m    
 Third layer

Heat loss through walls, W

Расчёт теплопотерь. Этап 1 | Расчёт теплопотерь. Этап 2 | Расчёт теплопотерь. Этап 3

### Определение требуемых со

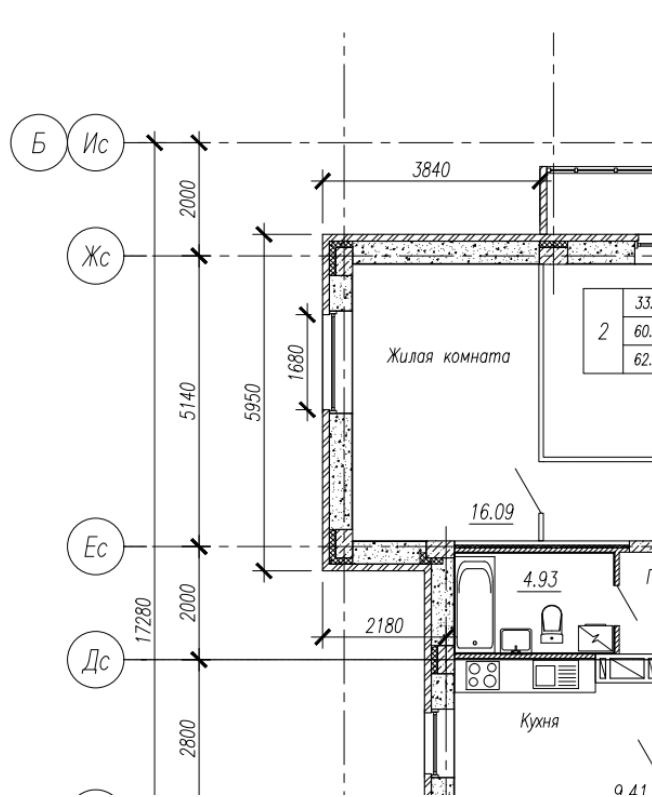
**Расчетные параметры для выбранного района строительства**

Район строительства:    
 Расчетная (для отопления) температура наружного воздуха, t °C:    
 Средняя температура отопительного периода, t °C:    
 Продолжительность отопительного периода, сут.:

**Режимы**  VALTEC  **Determining heat loss through fencing structures**

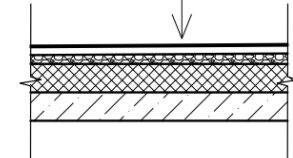
Тип здания	Температура, °C	Floor	Heat loss by group of premises, W			
			Heat loss	Infiltration	Total	
1 Жилое многоквартирное	22.000	2	Room 1	2049,87		2049,87
			Room 2	1051,07		1051,07
			Total group:	3100,94	0	3100,94
			Total on the floor:	3100,94	0	3100,94
total by object:				3100,94	0	3100,94

# Analysis of Free Software for Thermal Calculations



(А)

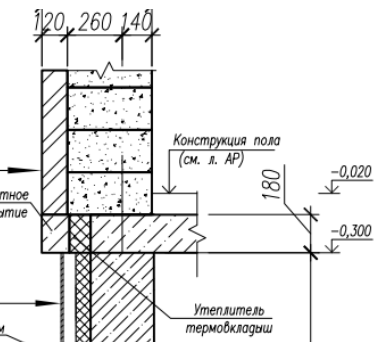
Техноласт ЭКП	- 4,2мм
Унифлекс ВЕНТ ЭПВ	- 3,5мм
Праймер битумный ТехноНИКОЛЬ N 01	
Стяжка из цементно-песчаного раствора /ГОСТ 28013/ Y=1800кг/м <sup>3</sup> , Ф5Вр 1-150 по сетке Ф5Вр 1-150 ГОСТ8478-81	- 50мм
Керамзитовый гравий, =400кг/м <sup>3</sup> ГОСТ19757-90*, для разуклонки	- 50-250мм
Утеплитель - Экструзивный пенополистирол Технониколь XPS 35-250	- 140мм
Бикрозоласт ТПП	
Железобетонная плита перекрытия	-180мм



- Декоративная штукатурка - 20 мм
- Кирпич керамический КР-р-пу 250x120x65мм  
1НФ/100/1,4/35/ГОСТ 530-2012 на М75 -120мм
- Пенобетонные блоки (ГОСТ 3136-2007)- 400 мм

- Облицовочная плитка по вертикальной направляющей
- Монолитное перекрытие - 10мм
- Воздушная прослойка - 60мм
- Утеплитель Roskwool ВЕНТИ БАТТС - 70 мм
- Монолитная стена бетон кл. В25 - 300 мм

Сталь оцинкованная S=0,55мм



# Analysis of Free Software for Thermal Calculations

Citi	t5, °C	parameter	Heat loss according to [3]	Heat loss according to "Kermi "	Difference , %	Heat loss according to "Valtec "	Difference , %
			<i>total indoors</i>	<i>total indoors</i>		<i>total indoors</i>	
Ulyanovsk	-31	A	2423.3	3086	-27	2054,0	-15,2409
Yaroslavl	-31	Б	2559.7	3086	-21	1890,0	-26,1627
Lipetsk	-27	A	2240.4	2853	-27	1880,0	-16,0881
Ryazan	-27	Б	2366.5	2853	-21	2051,0	-13,3319
Tyumen	-35	A	2606.2	3435	-32	2214,	-15,0498
Permian	-35	Б	2752.9	3319	-21	2130,0	-22,6261
Voronezh	-24	A	2103.3	2678	-27	1876,0	-10,8058
Kursk	-24	Б	2221.6	2678	-21	1875,0	-15,6018



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Citi	The difference between the calculations according to the norms and Kermi,%			The difference between the calculations according to the norms and Valtec,%			Σ
	wall	roof	floor	wall	roof	floor	
Ulyanovsk	128,0	36,5	-7,2	10,4	-20,2	-23,0	-15,2
Yaroslavl	112,5	21,6	-10,9	-11,3	-32,7	-30,2	-26,2
Lipetsk	128,1	36,5	-7,2	3,7	-13,6	-23,0	-16,1
Ryazan	112,6	21,6	-10,9	10,8	-23,1	-20,0	-13,3
Tyumen	136,0	41,3	-3,9	1,0	-25,0	-18,9	-15,1
Permian	112,6	21,6	-10,9	-5,3	-35,3	-26,6	-22,6
Voronezh	127,9	36,5	-7,2	16,8	-12,5	-19,7	-10,8
Kursk	112,4	21,6	-10,9	8,1	-21,1	-22,8	-15,6

# Analysis of Free Software for Thermal Calculations

Programs	Functionality				Usability		
	<i>Suitability</i>	<i>Accuracy</i>	<i>Interoperability</i>	<i>Compliance</i>	<i>Understandability</i>	<i>Learnability</i>	<i>Operability</i>
Kermi	2	1	0	1	2	2	2
Valtec	2	1	2	1	1	2	2

0 - does not match at all;

1 - there is compliance, but not complete;

2 - full correspondence between the real and expected behavior of the program.



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# Thank you for attention!

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