

# DIN EN 15316-4-3:2007-10 (E)

## Heating systems in buildings - Method for calculation of system energy requirements and system efficiencies - Part 4-3: Heat generation systems, thermal solar systems

---

<b>Contents</b>		<b>Page</b>
Foreword .....		4
Introduction .....		6
1	Scope .....	7
2	Normative references .....	7
3	Terms and definitions .....	7
4	Symbols and abbreviations .....	10
5	Principle of the method .....	11
5.1	Building heat requirements influence the energy performance of a thermal solar system ..	11
5.2	The thermal solar system influences the energy performance of the building .....	12
5.3	Performance of the thermal solar system .....	12
5.4	Heat balance of the heat generation sub-system, including control .....	12
5.5	Auxiliary energy .....	16
5.6	Recoverable, recovered and unrecoverable thermal losses .....	16
5.7	Calculation periods .....	16
6	Thermal solar system calculation .....	16
6.1	Calculation procedures .....	16
6.2	Method A - using system data (results from system tests) .....	17
6.2.1	General .....	17
6.2.2	Definition of heat use applied to the thermal solar system .....	17
6.2.3	Output from thermal solar system .....	18
6.2.4	Auxiliary energy consumption of thermal solar system auxiliaries .....	20
6.2.5	System thermal losses .....	20
6.2.6	Recoverable losses .....	20
6.3	Method B - using component data (results from component tests) .....	20
6.3.1	General .....	20
6.3.2	Definition of heat use applied to the thermal solar system .....	21
6.3.3	Output from thermal solar system .....	22
6.3.4	Auxiliary energy consumption of thermal solar system auxiliaries .....	25
6.3.5	System thermal losses .....	25
6.3.6	Recoverable losses .....	26
6.3.7	Determination of reduced operation time of non-solar heat generator(s) .....	27
Annex A (informative)	Examples on determination of thermal performance of thermal solar systems .....	28
A.1	General .....	28
A.2	Solar domestic hot water preheat system .....	28
A.2.1	General .....	28
A.2.2	Determination of the heat use to be applied .....	29
A.2.3	Determination of system data .....	29
A.2.4	Determination of X, Y and thermal solar system output .....	29
A.2.5	Determination of the auxiliary energy consumption .....	30
A.2.6	Determination of the thermal losses of the thermal solar system .....	30
A.2.7	Determination of the recoverable losses of the thermal solar system .....	30

<b>A.3</b>	<b>Solar combisystem .....</b>	<b>31</b>
<b>A.3.1</b>	<b>General .....</b>	<b>31</b>
<b>A.3.2</b>	<b>Determination of the heat use .....</b>	<b>31</b>
<b>A.3.3</b>	<b>Determination of system data .....</b>	<b>32</b>
<b>A.3.4</b>	<b>Determination of X, Y and thermal solar system output .....</b>	<b>32</b>
<b>A.3.5</b>	<b>Determination of the auxiliary energy consumption .....</b>	<b>33</b>
<b>A.3.6</b>	<b>Determination of the thermal losses of the thermal solar system .....</b>	<b>34</b>
<b>A.3.7</b>	<b>Determination of the recoverable losses of the thermal solar system .....</b>	<b>34</b>
<b>A.3.8</b>	<b>Determination of the reduction of auxiliary energy consumption of the back-up heater ....</b>	<b>35</b>
<b>Annex B (informative) Informative values for use in the calculation methods .....</b>		<b>36</b>
<b>B.1</b>	<b>System type coefficients .....</b>	<b>36</b>
<b>B.2</b>	<b>Thermal solar system default values .....</b>	<b>36</b>
<b>B.2.1</b>	<b>General .....</b>	<b>36</b>
<b>B.2.2</b>	<b>Typical values .....</b>	<b>37</b>
<b>B.2.3</b>	<b>Penalty values .....</b>	<b>38</b>
<b>B.3</b>	<b>Storage tank capacity correction coefficient fst .....</b>	<b>38</b>
<b>B.4</b>	<b>Reference temperature ref .....</b>	<b>39</b>
<b>B.5</b>	<b>Solar irradiance on the collector plane and incidence angle modifier .....</b>	<b>40</b>
<b>B.6</b>	<b>Thermal losses of the solar storage tank .....</b>	<b>41</b>
<b>B.7</b>	<b>Thermal losses of the distribution between the thermal solar system and the back-up heater .....</b>	<b>41</b>
<b>B.8</b>	<b>Recoverable part of system losses .....</b>	<b>41</b>
<b>Annex C (informative) Product classification .....</b>		<b>42</b>
<b>C.1</b>	<b>Solar collectors .....</b>	<b>42</b>
<b>C.2</b>	<b>Solar hot water heaters .....</b>	<b>42</b>
<b>C.3</b>	<b>Storage tanks .....</b>	<b>42</b>
<b>Annex D (informative) Savings calculation .....</b>		<b>44</b>
<b>Bibliography .....</b>		<b>45</b>