

# DIN V 18599-1:2007-02 (E)

## Energy efficiency of buildings - Calculation of the net, final and primary energy demand for heating, cooling, ventilation, domestic hot water and lighting - Part 1: General balancing procedures, terms and definitions, zoning and evaluation of energy carriers

---

### Contents

|  | Page |
|--|------|
| Foreword.....  | 5    |
| Introduction .....   | 6    |
| 1 Scope .....  | 7    |
| 2 Normative references .....   | 8    |
| 3 Terms and definitions, symbols and units.....  | 9    |
| 3.1 Terms and definitions .....  | 9    |
| 3.2 Symbols, units and subscripts.....   | 14   |
| 4 Relationship between the parts of the DIN V 18599 series of prestandards .....         | 19   |
| 4.1 Input parameters from other parts of the DIN V 18599 series of prestandards .....    | 19   |
| 4.2 Output parameters for other parts of the DIN V 18599 series of prestandards .....    | 22   |
| 5 Balance calculation .....  | 22   |
| 5.1 General.....   | 22   |
| 5.2 Requirements relating to the energy balance.....                                     | 22   |
| 5.2.1 Zoning (partitioning) of the building.....   | 23   |
| 5.2.2 Determining the energy needs for each zone.....                                    | 23   |
| 5.2.3 Determining the energy needs for heating and cooling by iteration.....             | 23   |
| 5.2.4 Determining system losses, delivered and primary energy.....                       | 23   |
| 5.2.5 Times and periods .....  | 24   |
| 5.3 Energy need balance calculation .....  | 24   |
| 5.3.1 General.....   | 24   |
| 5.3.2 Energy need for lighting .....   | 25   |
| 5.3.3 Energy needs for heating and cooling .....   | 25   |
| 5.3.4 Energy needs for air handling and ventilation of residential spaces.....           | 28   |
| 5.3.5 Energy need for domestic hot water.....  | 30   |
| 5.4 Balances of energy losses due to control and emission, distribution and storage..... | 30   |
| 5.4.1 Lighting.....  | 30   |
| 5.4.2 Heating (heating systems and HVAC heating function) .....                          | 30   |
| 5.4.3 Cooling (cooling system and HVAC cooling function) .....                           | 32   |
| 5.4.4 Humidification in HVAC systems .....   | 33   |
| 5.4.5 Ventilation of residential buildings .....   | 33   |
| 5.4.6 Domestic hot water supply .....  | 34   |
| 5.4.7 Energy for other process heating or cooling requirements.....                      | 35   |
| 5.5 Balancing of delivered energy (energy use) .....                                     | 35   |
| 5.5.1 Delivered energy for lighting .....  | 35   |
| 5.5.2 Delivered energy for heating and cooling and generation losses.....                | 35   |
| 5.5.3 Delivered auxiliary energy .....   | 38   |
| 5.5.4 Delivered energy, calculated according to energy carriers .....                    | 39   |
| 5.6 Primary energy rating.....   | 40   |
| 6 Zoning of buildings.....   | 41   |
| 6.1 General description .....  | 42   |
| 6.2 Dividing a building into zones.....  | 43   |
| 6.2.1 Zoning step 1: Determining areas with the same usage .....                         | 43   |
| 6.2.2 Zoning step 2: Application of additional zoning criteria .....                     | 44   |
| 6.3 Serviced areas.....  | 46   |
| 6.4 Determination of geometric parameters .....  | 46   |
| 7 Assignment of the balance components .....   | 46   |
| 7.1 General information.....   | 47   |
| 7.2 Assignment rules.....  | 48   |
| 7.2.1 Case 1: Serviced area and zone are identical.....                                  | 48   |
| 7.2.2 Case 2: Several serviced areas in one zone .....                                   | 48   |
| 7.2.3 Case 3: Several zones in one serviced area .....                                   | 49   |

|                            |  |           |
|----------------------------|--|-----------|
| <b>8</b>                   | <b>Determination of system boundaries, areas and volumes .....</b>                                 | <b>49</b> |
| <b>8.1</b>                 | <b>Reference dimensions for determining the thermal envelope area and the gross volume ....</b>    | <b>50</b> |
| <b>8.1.1</b>               | <b>Floor plans (horizontal dimensions) .....</b>   | <b>50</b> |
| <b>8.1.2</b>               | <b>Sections (vertical dimensions) .....</b>  | <b>50</b> |
| <b>8.2</b>                 | <b>Other reference dimensions .....</b>  | <b>51</b> |
| <b>8.2.1</b>               | <b>Energy reference area .....</b>   | <b>51</b> |
| <b>8.2.2</b>               | <b>Storey height .....</b>   | <b>51</b> |
| <b>8.2.3</b>               | <b>Air volume .....</b>  | <b>52</b> |
| <b>8.2.4</b>               | <b>Characteristic length and width .....</b>   | <b>52</b> |
| <b>8.3</b>                 | <b>Input parameters for balance calculation .....</b>  | <b>52</b> |
| <b>9</b>                   | <b>Balance calculation approach .....</b>  | <b>52</b> |
| <b>9.1</b>                 | <b>General case .....</b>  | <b>53</b> |
| <b>9.2</b>                 | <b>Residential buildings .....</b>   | <b>55</b> |
| <b>9.3</b>                 | <b>Accuracy of the calculations .....</b>  | <b>57</b> |
| <b>Annex A (normative)</b> | <b>Primary energy factors .....</b>  | <b>58</b> |
| <b>A.1</b>                 | <b>General .....</b>   | <b>58</b> |
| <b>A.2</b>                 | <b>Boundary conditions for default values .....</b>  | <b>58</b> |
| <b>A.3</b>                 | <b>Calculation of the primary energy factor of area heating and district heating systems .....</b> | <b>59</b> |
| <b>Annex B (normative)</b> | <b>Conversion of the energy content of energy carriers .....</b>                                   | <b>62</b> |
| <b>B.1</b>                 | <b>Default values .....</b>  | <b>62</b> |
| <b>B.2</b>                 | <b>Deviation from default values .....</b>   | <b>62</b> |
| <b>Annex C (normative)</b> | <b>Provisions relating to calculation methods for cogeneration .....</b>                           | <b>63</b> |
| <b>C.1</b>                 | <b>General .....</b>   | <b>63</b> |
| <b>C.2</b>                 | <b>Determination of power .....</b>  | <b>63</b> |
| <b>C.3</b>                 | <b>Further provisions for selected heat generators .....</b>                                       | <b>63</b> |
| <b>Bibliography</b>        | <b>.....</b>   | <b>66</b> |

## Figures

|            |   |    |
|------------|---|----|
| Figure 1   | — Overview of the parts of DIN V 18599 .....  | 7  |
| Figure 2   | — Content and scope of DIN V 18599-1 (schematic diagram) .....  | 8  |
| Figure 3   | — Subscript system .....  | 17 |
| Figure 4   | — Example of zoning .....   | 42 |
| Figure 5   | — Building used as an example for assignment .....  | 47 |
| Figure 6   | — Reference dimensions (floor plan) .....   | 50 |
| Figure 7   | — Reference dimensions (sectional view) .....   | 51 |
| Figure 8   | — Relationships within the balance as calculated according to the DIN V 18599 series –<br>General example .....       | 53 |
| Figure 9   | — Relationships within the balance as calculated according to the DIN V 18599 series –<br>Residential buildings ..... | 55 |
| Figure A.1 | — Method of determining balances of district heating systems .....  | 60 |

## Tables

|         |  |    |
|---------|--|----|
| Table 1 | — Symbols and units .....                | 15 |
| Table 2 | — Subscripts .....                       | 15 |
| Table 3 | — Subscript and designation system ..... | 18 |
| Table 4 | — Heat sources and heat sinks .....      | 26 |

|  |    |
|--|----|
| Table 5 — Additional zoning criteria .....                           | 44 |
| Table 6 — Zoning criteria for cooling energy balances .....          | 45 |
| Table A.1 — Primary energy factors.....                              | 59 |
| Table B.1 — Conversion factors, as a function of energy carrier..... | 62 |