# Notes on NEN 5060(2018)

As noted by Van der Sluys in 2016-08\_Errata\_NEN5060, Appendix E of the 2008 version of the norm contained several errors in the equations for the conversion of the solar irradiation data to vertical and sloped surfaces. In the revised version of the norm, NEN 5060(2018),these errors seem to be partially corrected in the Appendix D of this document.

Here, we briefly discuss the errata mentioned by Van der Sluys, and what has, or has not, changed in the NEN 5060(2018) document. We discuss the issues in the same order as presented by Van der Sluys.

## “Positie van de zon”

1. **E.1.5 “Zonshoogte” (D.1.6)**: Van der Sluys noted that the sign of the second term needs to be changed. In the updated norm the sign remains unchanged.

Some small other changes are made in the equation for the “solar height”:

(12-T\_s) has been changed into (12.5 – T\_s). (NOTE MRJ: The source and meaning of the constant is unclear)

1. **E.1.3 “Tijdverschuiving”(D.1.3)**: Van de Sluys noted that the sign of the second term should be changed.

In the updated norm this has been corrected by adding a minus sign for locations on the east hemisphere (location De Bilt changed from 5.18 degrees to -5.18 degrees)

An additional change in the equation is the deletion of the third term t\_eq/60. The term has been moved to E.1.4 “zonnetijd” (D.1.4).

1. **E.1.2 “Tijdvereffening”(D.1.2)**: Van der Sluys noted that the agruments of the cosines needed to be given in radians instead of degrees.

In the updated norm this has been corrected.

1. **E.1.1 “Declinatie” (D.1.1)**: Van der Sluys noted that -0.139 should be 0.1398, and +3.7872 should be 3.7372.

In the updated norm the first has been changed, the second remains unchanged.

## “Invalshoek van het zonlicht”

Van der Sluys noted that in E.2.2 (D.2.2) the equation for cos(\theta) needed an additional sin(\beta) in the fourth line.

In the updated norm this has been corrected. The suggestion to use an easier equation has been ignored.

## “Berekening van diffuse straling”

1. E.2.4 (D.2.3) F\_1 & F\_2: Van der Sluys noted that not angles were properly converted to radians.

In the updated norm this has been corrected.

1. E.2.4 (D.2.3) \psi\_H: Van der Sluys noted a missing factor of 1/50.

In the updated norm the presented model has been changed such that this term is not present anymore.

1. E.2.4 (D.2.3) table E.2 (table D.2): Van der Sluys noted some incorrect values in the table.

In the updated norm all values in the table have changed due to the changes made in the model.

As mentioned above, the model for the diffuse insolation has changed in the updated norm. Further research needs to be done to see which model is better, and whether we need to adapt the used model according to the new updated norm.

## Data related to NEN 5060

The discussion of the errata in the NEN 5060-2008 norm by Van der Sluys does not concern the provided data. If only the data is used, and the formulas are based on other sources the

Next to the data in the pdf-document an additional 3 excel-spreadsheets (NEN5060-A2,B2 and C2) are provided. The data is based on climate-data of the years 1986 until 2005, from the weather-station “De Bilt” in the Netherlands.

Spreadsheet A2 contains hour-data of a representative year. The year has been built-up from complete representative months taken from different years of the used set, for example, January is taken from 2003, February is taken from 2004 and March from 1992.

The sheet contains 17 columns of hourly data:

|  |  |
| --- | --- |
| Y | Year of the used data |
| M | Month of the used data |
| D | Day |
| H | Hour |
| GG [W/m2] | Global irradiation |
| GD [W/m2] | Diffuse irradiation |
| GB [W/m2] | Direct irradiation |
| GN [W/m2] | Direct normal irradiation |
| T [0.1 C] | Temperature (droge bol) |
| RV [%] | Relative humidity |
| H [0.1 g/k] | Absolute humidity |
| PS [Pa] | Pressure |
| U [0.1 m/s] | Windspeed |
| D [degr] | Wind direction |
| N [0.1 x -] |  |
| R [0.1 x mm] | rainfall |
| h [kJ/kg] |  |