

## Former Flags

### A. Former Flag Summary

The following is a short description of flags used for quality control prior to 1995. The procedures used to test data quality within specific parameters can be found below in the “Former Daily” and “Former Hourly” flag specifications. A complete description of the data quality testing is given by Snyder et al., (1985).

The former flags fall into two categories:

#### Severe where

Flag	Description
I	Data has no meaning/ignore.
N/A	Data is not available.
S	Sensor is not in service or data is out of sensor threshold.

#### Informative where

Flag	Description
H	Daily data value flagged when corresponding hourly data is severe. This flag is not set when the corresponding hourly data is N/C.
N/C	Data value is not collected by this station.
Q	All quality control could not be performed because a comparison sensor is severe. This flag is not set when the comparison sensor is N/C.
R	Data is far out of historical limits.
Y	Data is moderately out of historical limits

### B. Former Hourly Flags

The following is a short description of the hourly flags in use prior to 1995. Also included are descriptions for the flags and the criteria used to test data quality. It should be noted that the same flag may describe different situations for different weather parameters.

#### 1. Hourly Solar Radiation

Solar Radiation data is flagged based on hourly extraterrestrial radiation.

Flag	Description
S	Measured hourly solar radiation is less than or equal to $-50.00 \text{ Wm}^{-2}$ ( $-103 \text{ Ly/day}$ ) or it is equal to or greater than $4,000.00 \text{ Wm}^{-2}$ ( $8260 \text{ Ly/day}$ ).
R	The sun is more than 10 degrees above the horizon, the ratio of measured hourly solar radiation to calculated extraterrestrial radiation is greater than 1.00,

and measured hourly solar radiation is equal to or less than  $0 \text{ Wm}^{-2}$ .  
 The sun is less than 10 degrees above the horizon and the absolute value of measured hourly solar radiation is equal to or greater than  $10.00 \text{ Wm}^{-2}$  (21 Ly/day).

Y The sun is more than 10 degrees above the horizon and the ratio of measured hourly solar radiation to calculated extraterrestrial radiation is greater than 0.85.  
 The sun is less than 10 degree above the horizon and the absolute value of measured hourly solar radiation is equal to or greater than  $6.00 \text{ Wm}^{-2}$  (124 Ly/day).

## 2. Hourly Net Radiation

Hourly Net Radiation data is flagged based on theoretical extremes, measured solar radiation, and air temperature.

Flag	Description
S	Net radiation is greater than or equal to $4,000 \text{ Wm}^{-2}$ (8260 Ly/day).
R	The sun is more than 10 degrees above the horizon and net radiation is equal to or greater than 1.15 times the estimate (for a given value of solar radiation) of the maximum net radiation plus $30 \text{ Wm}^{-2}$ (62 Ly/day). The sun is more than 20 degrees above the horizon and one of the following conditions apply: (1) Net radiation is equal to or greater than 1.3 times the maximum net radiation for a given value of solar radiation; or (2) Net radiation is less than or equal to 0.6 times the estimate (for a given value of solar radiation) of a positive minimum daytime net radiation minus $30 \text{ Wm}^{-2}$ (62 Ly/day).
Y	The sun is more than 10 degrees above the horizon and one of the following conditions apply: (1) Net radiation is equal to or less than 0.7 times the estimate (for a given value of solar radiation) of a positive minimum daytime net radiation minus $20 \text{ Wm}^{-2}$ (41 Ly/day). (2) Net radiation is equal to or less than 1.25 times the estimate (for a given value of solar radiation) of a negative minimum daytime net radiation; and (3) Net radiation is equal to or greater than 1.1 times the estimate (for a given value of solar radiation) of the maximum net radiation plus $20 \text{ Wm}^{-2}$ (41 Ly/day). The sun is less than 10 degrees above the horizon and either: (1) Net radiation is greater than $-0.1 \text{ Wm}^{-2}$ (0.21 Ly/day) or (2) Net radiation is less than 1.15 times the estimate of the minimum nighttime net radiation for a given value of solar radiation.
Q	Temperature or solar radiation is severe.

### 3. Hourly Air Temperature

Hourly Air Temperature data is flagged based on extreme values.

Flag	Description
R	Temperature is less than -15°C (5°F) or greater than 60°C (140°F).
Y	Temperature is less than -10°C (4°F) or greater than 55°C (131°F).

### 4. Hourly Actual Vapor Pressure

Flag	Description
R	Actual vapor pressure is less than or equal to 0.00 kPa or actual vapor pressure is greater than 1.05 times the saturation vapor pressure.
Y	Relative humidity is less than 50 percent during an hour with 1.00 mm (0.04 in) or more of precipitation and when actual vapor pressure is 1.01 times the saturation vapor pressure.
Q	Air temperature or precipitation is severe (either or both are flagged R).

### 5. Hourly Wind Speed

Flag	Description
S	Wind speed is less than 0.447 ms <sup>-1</sup> (1 mph) or greater than 60 ms <sup>-1</sup> (135 mph).
R	Wind speed is equal to or less than 0.447 ms <sup>-1</sup> (1 mph) for three consecutive hours and the sun is at or greater than 20 degrees above the horizon.
Y	Wind speed is equal to or less than 0.447 ms <sup>-1</sup> (1 mph) for two consecutive hours.

### 6. Hourly Precipitation

Hourly Precipitation data is flagged based on extreme values and daytime cloud conditions inferred from the relationship between solar radiation and extraterrestrial radiation.

Flag	Description
Q	Solar radiation is severe.
R	Precipitation is negative, more than 100.00 mm, or is not a whole number. Measured solar radiation is greater than 75 percent of calculated extraterrestrial radiation, the sun is 10 or more degrees above the horizon and the station shows recorded precipitation (i.e., precipitation is greater than 0.0).
Y	Measured solar radiation is greater than 65 percent of calculated extraterrestrial radiation, the sun is 10 or more degrees above the horizon and the station shows recorded precipitation.

### 7. Hourly Evapotranspiration

Flag	Description
R	Net radiation, air temperature, vapor pressure, or wind speed is severe.

### C. Former Daily Flags

The following is a short description of the daily flags in use prior to 1995. Also included are descriptions of the flags and the criteria used to test data quality. It should be noted that the same flag may describe different situations for different weather parameters.

#### 1. Daily Average Solar Radiation

Flag	Description
H	One or more hourly solar radiation measurements are severe.
R	Solar radiation is equal to or less than 0.0 or solar radiation is greater than 80 percent of daily incident solar radiation, where incident solar radiation is the sum of hourly incident solar radiation divided by 24.
S	Solar radiation is equal to or greater than 4,000 $\text{Wm}^{-2}$ .

#### 2. Daily Average Net Radiation

Flag	Description
H	One or more hourly net radiation measurements are severe.
R	Net radiation is equal to or less than $-20 \text{ Wm}^{-2}$ or is more than 60 percent of the daily incident solar radiation.
S	Net radiation is equal to or greater than 6,000 $\text{Wm}^{-2}$ .

#### 3. Daily Air Temperature

Flag	Description
H	One or more hourly air temperature measurements are severe.
R	Average air temperature is far out of range of site specific historical range.
Y	Average air temperature is moderately out of range of site specific historical range. Average air temperature falls under one of the following categories: (1) Average air temperature is equal to or less than $-50 \text{ }^{\circ}\text{C}$ or equal to or greater than $100 \text{ }^{\circ}\text{C}$ . (2) Average air temperature is equal to the maximum and minimum temperatures. (3) Maximum temperature is less than minimum temperature. (4) Average air temperature is less than minimum temperature. (5) Average air temperature is greater than maximum temperature.

#### 4. Daily Vapor Pressure

Flag	Description
H	One or more hourly vapor pressure measurements are severe.
R	Average vapor pressure is equal to or less than 0 kPa; or average vapor pressure is equal to or greater than 4 kPa (40 mBars).
S	Average vapor pressure falls under one of the following categories: (1) Average vapor pressure is equal to the maximum and minimum vapor pressures. (2) Maximum vapor pressure is less than minimum vapor pressure. (3) Average vapor pressure is less than minimum vapor pressure. (4) Average vapor pressure is greater than maximum vapor pressure.

#### 5. Daily Average Wind Speed

Flag	Description
H	One or more hourly wind speed measurements are severe.
R	Average wind speed is equal to or less than $0.45 \text{ ms}^{-1}$ , or average wind speed is greater than $25 \text{ ms}^{-1}$ .
Y	Average wind speed is equal to or less than $0.5 \text{ ms}^{-1}$ , or average wind speed is greater than $15 \text{ ms}^{-1}$ .
S	Average wind speed is equal to or less than $0.447 \text{ ms}^{-1}$ .

#### 6. Daily Precipitation

Flag	Description
H	One or more hourly precipitation measurements are severe.
R	Precipitation is negative, equal to, or greater than 300 mm, or is not a whole number.
Y	Precipitation is not equal to total hourly precipitation.

#### 7. Daily Reference Evapotranspiration

Flag	Description
R	One or more hourly evapotranspiration measurements are not available or are flagged as R and could not be estimated.

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Reference:

- Snyder, R.L., Pruitt, W.O., and Dong, A. 1985. An automatic weather station network for estimation of evapotranspiration. Presented at the ICID Conference on Crop Water Requirements, Paris, France, September 11-14, 1984. International Commission on Irrigation and Drainage.