QC Rad V3 Flag Key

The following describes the QC flags included in the output of the "QC_Rad3" code. The "Daily files and All File" section are the values set in the daily and "all" output files for the QC flags themselves. The "Summary File" section describes the columns included in the daily summary test failures file "QC_Rad3.asc".

In general, for the QC flags themselves –

Flag Value:	Related to Type test:
5-6	Global Physical Limits (PP)
3-4	2nd level User Configurable/Global Extremely Rare (ER) and Global Comparisons. Also LW Tc and Td tests
1-2	1st level User configurable tests and non-definitive tests

[Non-definitive means that while a comparison test may fail, it is unknown WHICH of the values compared might be the "bad" one.]

The tests and flags are set restrictively in descending order. In other words, if a value fails a PP limit, then the ER and UC tests are not performed, as the data will always fail these tests, too. Thus, the QC flag reflects the largest test failure value.

The QC flag values are used in conjunction with the configurable ability to set measurement values to a "bad data" value of "-999.0", depending on the level of the value of the QC flag. Practically, any value that fails the PP tests should be set to "bad value". Thus, as a minimum for QC'd output, "Qlim" should be configured to "1" and "Qclim" configured to "4" in the configuration file "QC_Rad1.cnf". For analysis and testing to set the user configurable limits, "Qlim" can be set to "0" so that no input data values are set to "bad data". For more restrictive settings, Qclim can be set to either "2" or "0", and Qlim can be set to "2."

NEW: The QCRad3 code includes capability for correcting for IR loss in the diffuse and global irradiances. The "Dflg" and "Gflg" variables in the output indicate what if any type of correction was applied as such:

none/full moist/full dry/detector moist/det dry correction value is (0/1/2/3/4)

Daily Files and All File:

QC1 - QC6
-1 - missing data or test not possible
0 - OK
2 - too high (UC)
3 - too low (ER)
4 - too high (ER)
5 - too low (PP)
6 - too high (PP)
8 - fail Rayleigh Limit test (QC2)
9 - "tracker off" (QC2 and QC3)

<div style="border:1px solid black; padding:5px; float:right">

QC1 – Global SW
QC2 – Diffuse SW
QC3 – Direct SW
QC4 – Upwelling SW
QC5 – Downwelling LW
QC6 – Upwelling LW

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NOTE: If QC1, QC2, or QC3 flag value is set to "10" or greater, then that SW value was either "missing" or tested "bad" and the value was replaced by adding or subtracting the other two SW components to calculate the value. This calculated value is then tested just as the original value would have been, and might then be set to "bad" if the testing is not passed. The second digit (<10 value) represents the "normal" test flagging as described herein.

QC7 - GSW/Sum test [non-definitive]
-1= test not possible
0 = ok
1 = $Z < 75$; GSW/Sum < 0.92, or GSW/Sum > 1.08, Sum > 50 Wm^{-2}
2 = 93 > Z > 75 and Sum > 50; GSW/Sum < 0.85, or GSW/Sum > 1.15, Sum > 50 Wm^{-2}

QC8 - Dif/GSW test [non-definitive]
-1= test not possible
0 = ok
1 = $Z < 75$; Dif/GSW > 1.05, GSW > 50 Wm^{-2}
2 = 93 > Z > 75; Dif/GSW > 1.10, GSW > 50 Wm^{-2}

QC9 – SWup vs Sum SW test
-1= test not possible
0 = ok
1 = Sum or GSW > 50; SWup > C_9 * Sum+25 Wm^{-2}, $T_a >= T_{snw}$
2 = Sum or GSW > 50; SWup > C_{10} * Sum+25 Wm^{-2}, $T_a < T_{snw}$
3 = Sum or GSW > 50; SWup > D_9 * Sum+30 Wm^{-2}, $T_a >= T_{snw}$
4 = Sum or GSW > 50; SWup > D_{10} * Sum+30 Wm^{-2}, $T_a < T_{snw}$
5 = Sum or GSW > 50; SWup > Sum or GSW+25; Swup "bad"
6 = Sum and GSW > 50; SWup > Both Sum and GSW+25; Swup "bad"

QC10 - LWdn to T_a test
-1= test not possible
0 = ok
1 = LWdn < C_{11} *sigma*T_a^4
2 = LWdn > sigma* T_a^4+C_{12}
3 = LWdn < D_{11}*sigma*T_a^4
4 = LWdn > sigma* T_a^4+ D_{12}

QC11 - LWup to T_a test
-1= test not possible
0 = ok
1 = LWup < sigma*$(T_a-C_{13})^4$
2 = LWup > sigma*$(T_a+C_{14})^4$
3 = LWup < sigma*$(T_a-D_{13})^4$
4 = LWup > sigma*$(T_a+D_{14})^4$

QC12 - LWdn to LWup test
-1= test not possible
0 = ok
1 = lwdn < lwup-C_{15}
2 = lwdn > lwup+C_{16}
3 = lwdn < lwup- D_{15}
4 = lwdn > lwup+ D_{16}

QC13 – LWdn T_c vs T_a
-1= test not possible
0= OK
3= T_c < T_a - C17
4 = T_c > T_a + C17
5= T_c < T_{avg} - 15
6 = T_c > T_{avg} + 15

QC14 – LWdn T_d vs T_a
-1= test not possible
0= OK
3= T_d < T_a - C17
4 = T_d > T_a + C17
5= T_d < T_{avg} - 15
6 = T_d > T_{avg} + 15

QC15 – LWup T_c vs T_a
-1= test not possible
0= OK
3= T_c < T_a - C17
4 = T_c > T_a + C17
5= T_c < T_{avg} - 15
6 = T_c > T_{avg} + 15

QC16 – LWup T_d vs T_a
-1= test not possible
0= OK
3= T_d < T_a - C17
4 = T_d > T_a + C17
5= T_d < T_{avg} - 15
6 = T_d > T_{avg} + 15

<u>QC17 – LWdn T_c vs T_d</u>
-1= test not possible
0= OK
3= (T_c - T_d) < C18
4= (T_c - T_d) > C19

<u>QC18 – LWup T_c vs T_d</u>
-1= test not possible
0= OK
3= (T_c - T_d) < C18
4= (T_c - T_d) > C19

<u>QC19 – T_a testing</u>
-1= test not possible, (no T_a)
0= OK
3 = T_a > Tmax or T_a < Tmin
4 = T_a more than T_{avg} +/- 20 K

Summary File, total fails per day (only if test possible, restrictive)

PQC (PP) and EQC (ER)
QC#   Represents
1 -   GSW too low
2 -   GSW too high
3 -   Dif too low
4 -   Dif too high
5 -   DirN too low
6 -   DirN too high
7 -   SWup too low
8 -   SWup too high
9 -   LWdn too low
10 -   LWdn too high
11 -   LWup too low
12 -   LWup too high

CQC (CL)
QC#   Represents
1 -   GSW too high
2 -   Dif too high
3 -   DirN too high
4 -   SWup too high
5 -   LWdn too low
6 -   LWdn too high
7 -   LWup too low
8 -   LWup too high
9 -   SWup too high (normal gnd cover)
10 -   SWup too high (snow cover)
11 -   LWdn too low (vs T_a)
12 -   LWdn too high (vs T_a)
13 -   LWup too low (vs T_a)
14 -   LWup too high (vs T_a)
15 -   LWdn too low (vs LWup - C_{15})
16 -   LWdn too high (vs LWup + C_{16})
17 -   LW T_c or T_d fails vs T_a+/-Limit or T_{avg}+/-15.0
18 -   LW (T_c-T_d) fails
19 - T_a fails

NQC

QC#	Represents
1 -	GSW/Sum fail
2 -	Dif/GSW fail
3 -	Fail "tracker off" test
4 -	SWup < Sum (or GSW)
5 -	LWdn to T_a too low
6 -	LWdn to T_a too high
7 -	LWup to T_a too low
8 -	LWup to T_a too high
9 -	LWdn < LWup - D_{15}
10 -	LWdn > LWup + D_{16}

TotQC: total data it was possible to test this way

Tot#	For
1 -	PQC1&2, EQC1&2, CQC1
2 -	PQC3&4, EQC3&4, CQC2
3 -	PQC5&6, EQC5&6, CQC3
4 -	PQC7&8, EQC7&8, CQC4
5 -	PQC9&10, EQC9&10, CQC5&6
6 -	PQC11&12, EQC11&12, CQC7&8
7 -	NQC1
8 -	NQC2
9 -	NQC4, CQC9&10
10 -	NQC5&6, CQC11&12
11 -	NQC7&8, CQC13&14
12 -	NQC9&10, CQC15&16
13 -	CQC19

(Use TotN for CQC17&18)