INTEGRATED ENVIRONMENTAL SOLUTIONS

FAQ: I'm failing the criterion 3 limiting solar gain check on spaces that should not be failing. Please explain

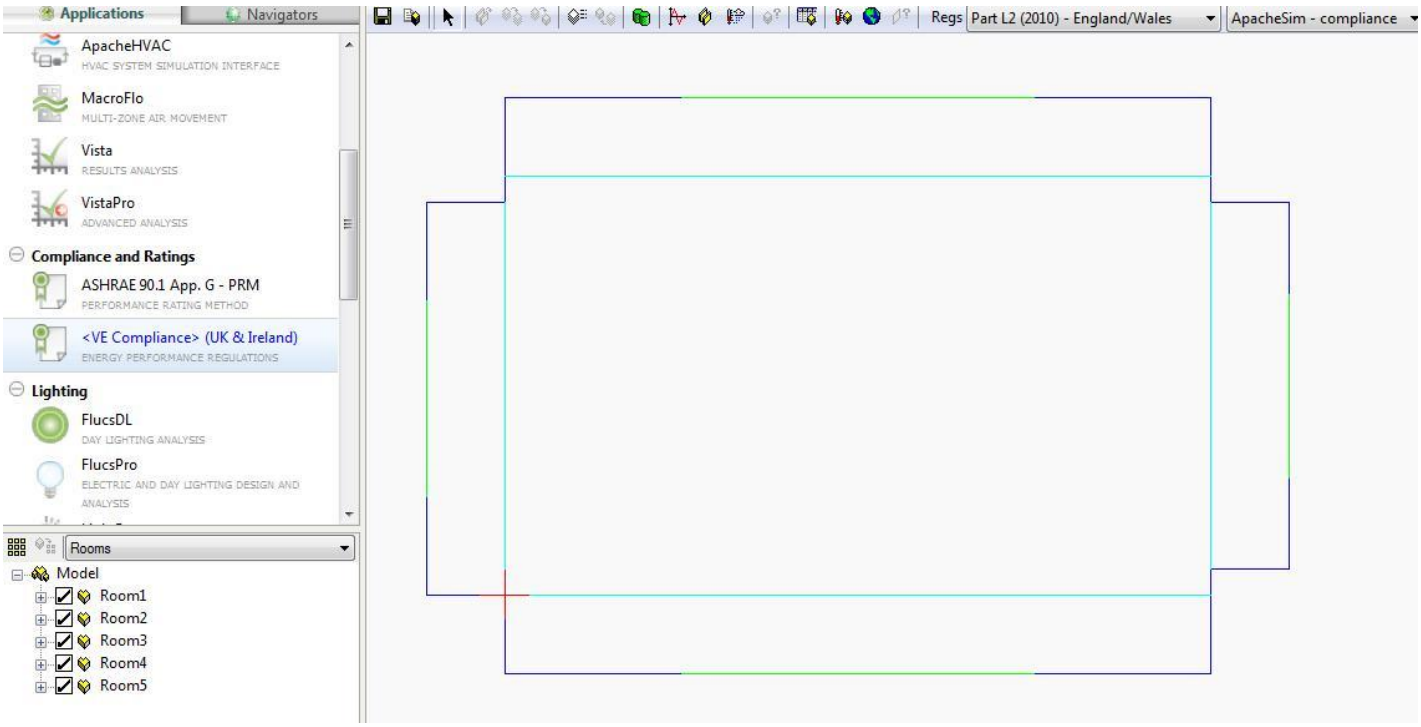
This is a common question and it is usually the result of users not being familiar with how the Criterion 3 check is performed under 2010 regulations.

For the 2010 regulations a limiting solar gain check is performed where the aggregated solar gains between April and September must be below a benchmark

Paragraphs 113 and 114 on page 29 of the 2010 NCM modelling guide go over how the solar gain limit should be calculated and how the check should be carried out by DSM software.

As stated on paragraph 113 of the guide, DSM software has pre-defined benchmarks for the 3 glazing types for each of 14 sites used for VE Compliance. You can view these benchmarks on our knowledge base here. These benchmarks were calculated using models setup as per paragraphs 110-112.

In the following example there are five rooms. As you can see the 4 rooms around the perimeter all have glazing and 100% holes connecting them to "Room 1" in the centre.



Running the criterion 3 limiting solar gain check only Room1 is failing.

Criterion 3 - solar gain check

Actual model - Criterion 3

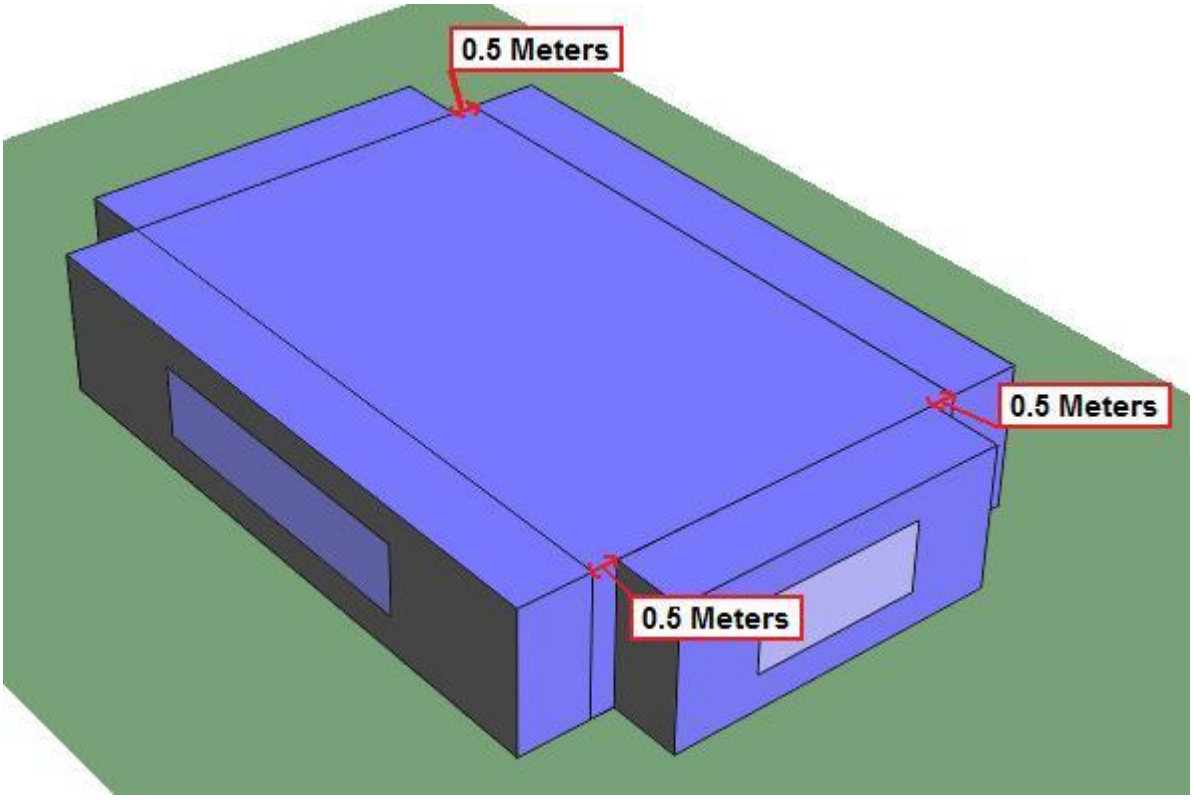
Space (included in analysis)	Floor	Glazing as % floor area	Glazing category	Predominant orientation[8]	Solar gain limit[1]		Shading data[7]			
					Pass/Fail	Solar gain / limit [2,3]	Glazing g value[4]	Internal blinds used?[5]	External shades used?[5]	Local shading devices used?[5]
Sort A-Z	Hi/Lo	Hi/Lo	Sort A-Z	Sort A-Z	Sort A-Z	Hi/Lo	Sort A-Z	Sort A-Z	Sort A-Z	Sort A-Z
Apply		40.0				1.1	0.5			
Room1	000	0	Side Lit	N/A	Fail	4.40	0.00	No	No	No
Room2	000	50	Side Lit	N	Pass	0.27	0.64	No	No	No
Room3	000	50	Side Lit	S	Pass	0.36	0.64	No	No	No
Room4	000	50	Side Lit	E	Pass	0.35	0.64	No	No	No
Room5	000	50	Side Lit	W	Pass	0.34	0.64	No	No	No

Criterion 3 check failed

Notes:

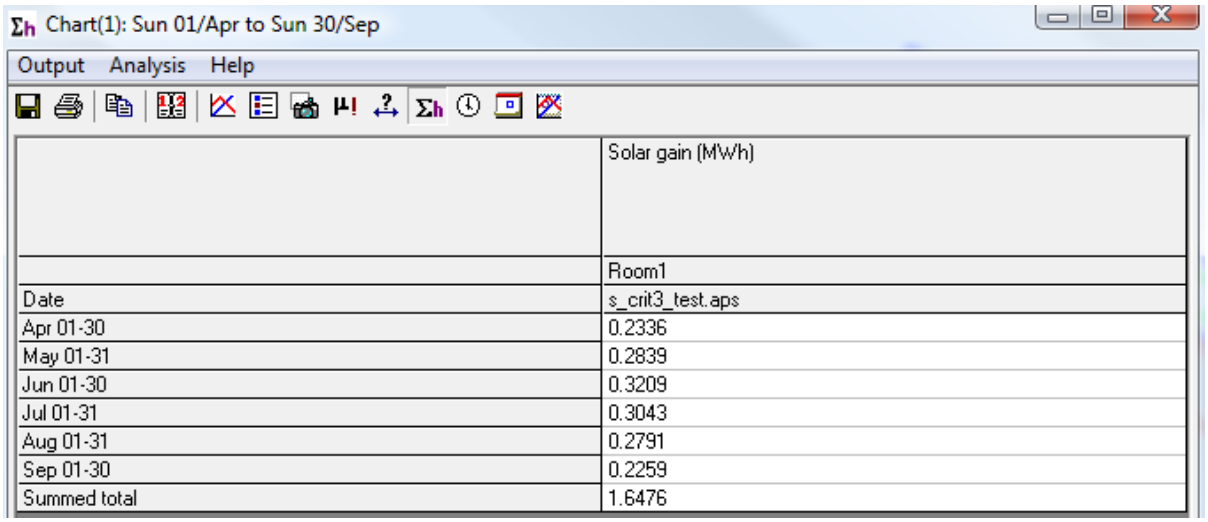
1. Criterion 3 is a check that spaces have appropriate passive control measures to limit the effects of solar gains;
2. When the Criterion 3 limit is exceeded by a small amount (with ratio < 1.3) consider the glazing specification and blinds;
3. When the Criterion 3 limit is exceeded by a small amount (with ratio > 1.5) consider glazing area, external shading, the glazing specification and blinds;
4. Glazing g value; see derived parameters in Apache>constructions; this typically ranges from 0.1 for highly reflective to 0.8 for clear glass (double glazed)-optimal solar/light is approx 0.4-0.5;
5. Shading options defined with the construction in Apache>constructions;
6. If Local shade rooms types are defined and Suncast has been utilised their impact will be included in the result;
7. If more than one glazed construction is specified for the space the largest by area is reported;

In this (extreme) example the significant level of fail for this room is not due to high solar gains experienced in the actual building but due to slightly low benchmark level resulting from a small external perimeter length.



The office is in London and has an external perimeter length of 1.5 meters, it falls in the first benchmark category so has a benchmark solar gain of **1.5m x 249.333 kWh/m = 374 kWh**

The software then calculates the solar gain for the same zone (From April to September) and compares it to the benchmark value. As you will see from the screenshot below the solar gain for Room1 is **1647.6 kWh**



	Solar gain (MWh)
	Room1
Date	s_crit3_test.aps
Apr 01-30	0.2336
May 01-31	0.2839
Jun 01-30	0.3209
Jul 01-31	0.3043
Aug 01-31	0.2791
Sep 01-30	0.2259
Summed total	1.6476

If Solar Gain/Benchmark = > 1 Fail

If Solar Gain/Benchmark= < 1 Pass

1647.6/374 = **4.40 FAIL**

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3. When the Criterion 3 limit is exceeded by a large amount (with ratio > 1.5) consider glazing area, external shading, the glazing specification and blinds;
4. Glazing g value; see derived parameters in Apache>constructions; this typically ranges from 0.1 for highly reflective to 0.8 for clear glass (double glazed)-optimal solar/light is approx 0.4-0.5;
5. Shading options defined with the construction in Apache>constructions;
6. If Local shade rooms types are defined and Suncast has been utilised their impact will be included in the result;
7. If more than one glazed construction is specified for the space the largest by area is reported;
8. Orientation & external shading strategy; shades on the north facades have little impact, shades on east & west facades need to work for low sun angles to be effective (consider vertical fins), horizontal shades on south facades work well however recess / vertical shades can also improve early & late performance.