



QUICK GUIDE – LOAD RESPONSE

Purpose:

To check if the loads for a specific turbine or generic IEC turbine class are acceptable for the site and layout conditions.

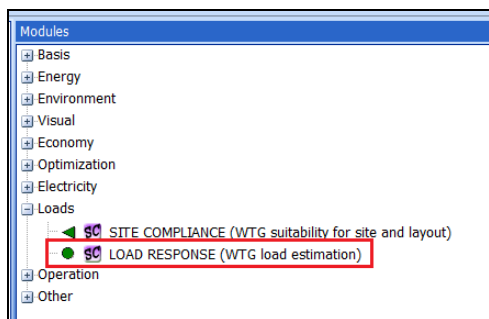
LOAD RESPONSE calculates structural wind turbine loads based on a response surface approach according to the design load cases (DLC) in IEC 61400-1 ed. 3 (2010).

Outline of Guide:

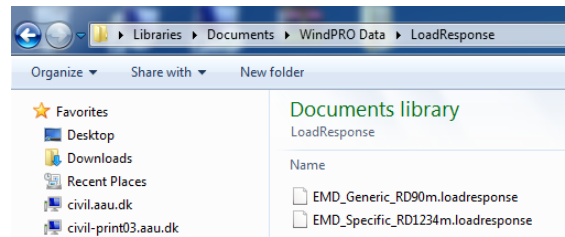
1. Installation of LOAD RESPONSE
2. Setup input data for LOAD RESPONSE
3. Calculations in LOAD RESPONSE
4. Results in LOAD RESPONSE

1. INSTALLATION OF LOAD RESPONSE

Install WindPRO 3.0 on your computer and check that you have license for LOAD RESPONSE indicated by the green circle.

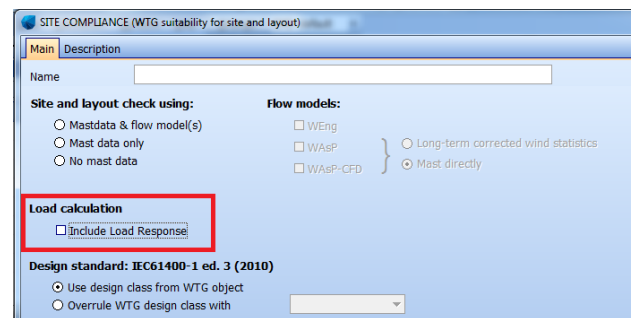


Check that one or several wind turbines are available for calculation. The response files for the individual wind turbines should be available in the folder "LoadResponse", which on a Windows PC normally is located at the path: "C:\Users\XX\Documents\WindPRO Data\LoadResponse". The wind turbines will be named "XX.loadresponse".

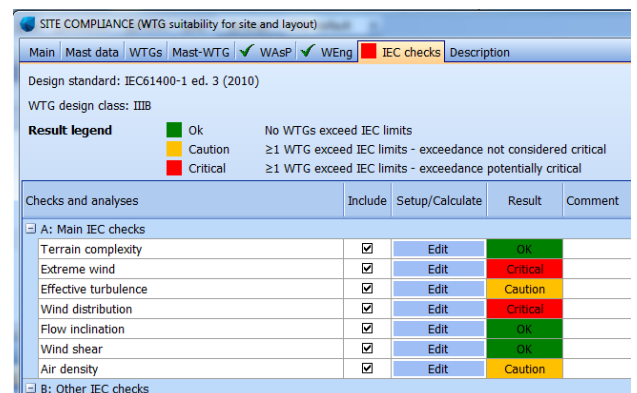


2. SETUP INPUT DATA FOR LOAD RESPONSE

Before using LOAD RESPONSE a SITE COMPLIANCE analysis must be performed. The load calculation is included on the "Main" page.



In order to determine the wind climate parameters at each WTG position a normal SITE COMPLIANCE analysis must be performed. In general all the main checks in the page "IEC checks" should be calculated.



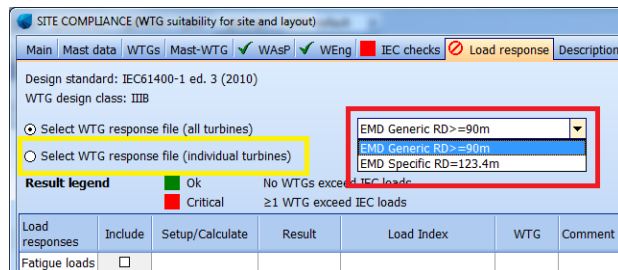
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3. CALCULATIONS IN LOAD RESPONSE

3.1 Select WTG response file

Select a specific or generic wind turbine from the dropdown menu marked by red.

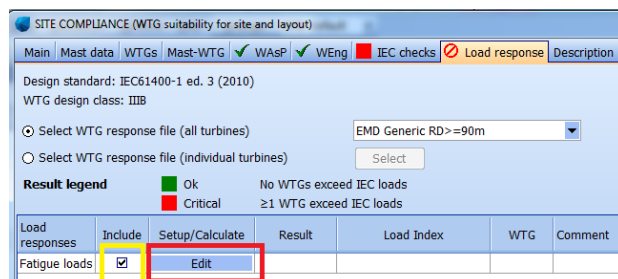
If a layout contains several types of wind turbines, this can be selected by pressing the radio button marked by yellow and press “select”.



The wind turbines in the dropdown menu corresponds each to an “XX.loadresponse” file. This file contains general information about the wind turbine and wind turbine loads for different wind climate conditions.

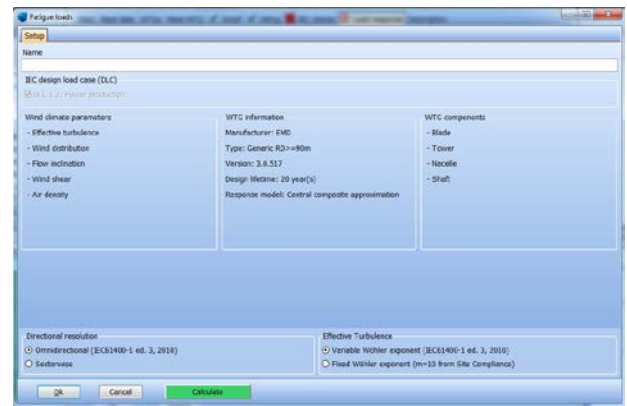
3.2 Include fatigue loads

Include the fatigue loads by pressing “include” marked by yellow and press the “Edit” button marked by red in order to setup the calculation.



3.3 Setup fatigue load calculation

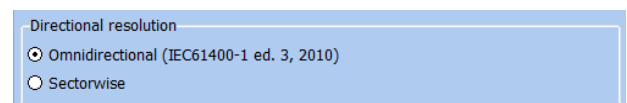
The “Setup” tab shows first the included design load cases from IEC 61400-1 ed. 3 (2010). The wind climate parameters which influence this design load case(s) are listed. The names refer to the IEC-checks in SITE COMPLIANCE. General information about the WTG is shown in the middle and the components include in the fatigue load calculations are listed to the right.



3.4 Advanced calculation settings

When wind turbines are implemented in LOAD RESPONSE pre-defined values for the advanced settings are selected. It will therefore normally not be necessary to change these. However, in the following a short description is given.

The directional resolution “Omnidirectional” or “Sectorwise” describes whether omnidirectional or sectorwise wind climate parameters should be used for the load calculation. According to IEC 61400-1 ed. 3 (2010) omnidirectional wind climate parameters should be used. However, more accurate results can be obtained by using sectorwise wind climate parameters. The sectorwise wind climate parameters are only available in WindPRO if a WASP or WEng calculation has been performed.



The effective turbulence is obtained by combining the ambient turbulence and the wake added turbulence using the Wöhler exponent. In SITE COMPLIANCE this is often done using a Wöhler exponent on m=10. In LOAD RESPONSE the effective turbulence can either be calculated using the component specific Wöhler exponent (denoted “variable Wöhler exponent”) or the Wöhler exponent used in SITE COMPLIANCE (denoted “fixed Wöhler exponent”). The first approach is recommended in IEC 61400-1 ed. 3 (2010).

