

## Dynamic Containment Excel Analysis Tool 2020

# User Guide V4

**Author:** Dean Szpyrka  
Customer Technical Policy

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### Introduction

This User Guide describes how to use the 'NGESO Dynamic Containment Analysis Tool 2020' to assess pre-qualification test results as specified in the Test Guidance for Providers wishing to enter into a contract to provide Dynamic Containment Frequency Response. The following sections are included:

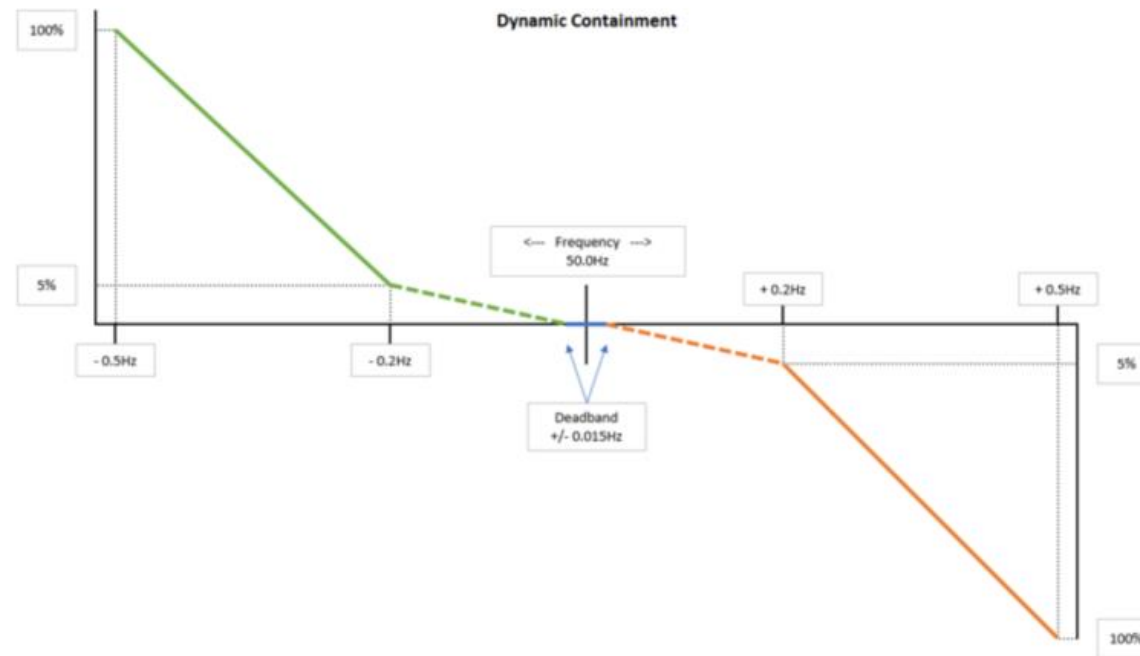
- Prepare Test Data
- Populate Excel Analysis Tool
- Analyse Results against pass criteria
- Test Report

Step	Action	Description	Examples
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**Prepare Test Data**

1	Format test data to be pasted into Tool.	It is advised to use the tool with values of every 0.05s. Tool has been designed to work for both low and high frequency and the sample tests show it working for both at the same time.	Time/s	Frequency/Hz	Active Power/MW
			0	50	0
			0.05	50	0
			0.1	50	0

2 Overall response values should be copied into the Tool. The Tool assumes that the response looks like generation i.e. Low frequency=generation increase. High frequency=generation decrease. Check response values are +ve or -ve accordingly.



Step	Action	Description	Examples
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**Populate Excel Analysis Tool**

3    General    Green cells can be edited.  
Timings/ranges may need to be altered depending on the injection profile used.

4    Clear previous test data    In the Test 1 Main, Test 2.1, 2.2, 3.1 and 3.2 data tabs, delete the previous data from 'Frequency' and 'Active Power' columns.

5    **'Test 1 Main'**    Units in this table should be the same as those in the measured test data.  
Input the Contracted response in the green cell under Maximum Contracted Response  
Check expected response values in the table are as required for the contracted response  
  
Input the data for Test 1

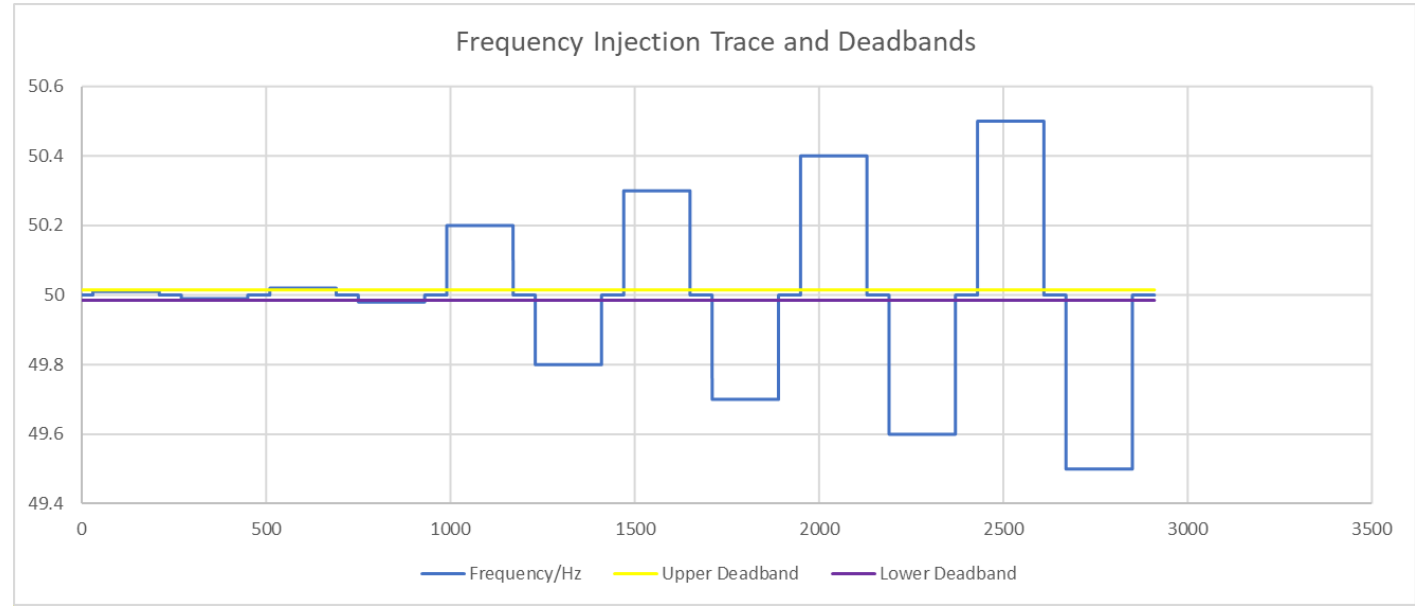
Maximum Contracted Response/MW	
High Frequency	1
Low Frequency	1

Time/s	Frequency/Hz	Active Power/MW
0.05	50	0
0.1	50	0
0.15	50	0
0.2	50	0

Step	Action	Description	Examples
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6 Check the Frequency Injection looks as expected on the 'frequency injection trace and deadbands graph'



8 **Test 1.1 – Test 1.12 tabs**  
 Check time used for each test aligns with test data  
 If the frequency changes occur at times different than the example trace given in the guidance input, this value can be changed under 'when does the frequency step occur' on the tab for each test.

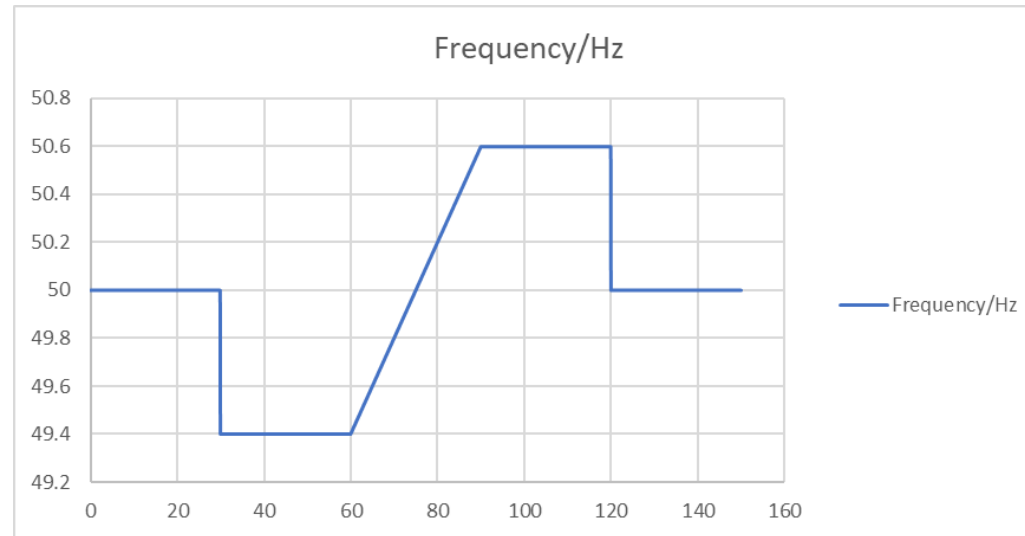
When does the frequency step occur?  
 2190

9 **Test 2.1 and 2.2**  
 Enter data in the same way as for Test 1.  
 Maximum Contracted response value should have been carried over from Test 1

Time/s	Frequency/Hz	Active Power/MW
0.05	50	0
0.1	50	0
0.15	50	0
0.2	50	0

**Step Action**      **Description**      **Examples**

10 Check the frequency trace graphs appears as expected



11 **Test 3.1 and 3.2**

Enter data again for these tests

Also input the time when the change in frequency is supposed to occur

Time/s	Frequency/Hz	Active Power/MW
0.05	50	0
0.1	50	0
0.15	50	0

When does the frequency step occur?
30

12 **Test 4**

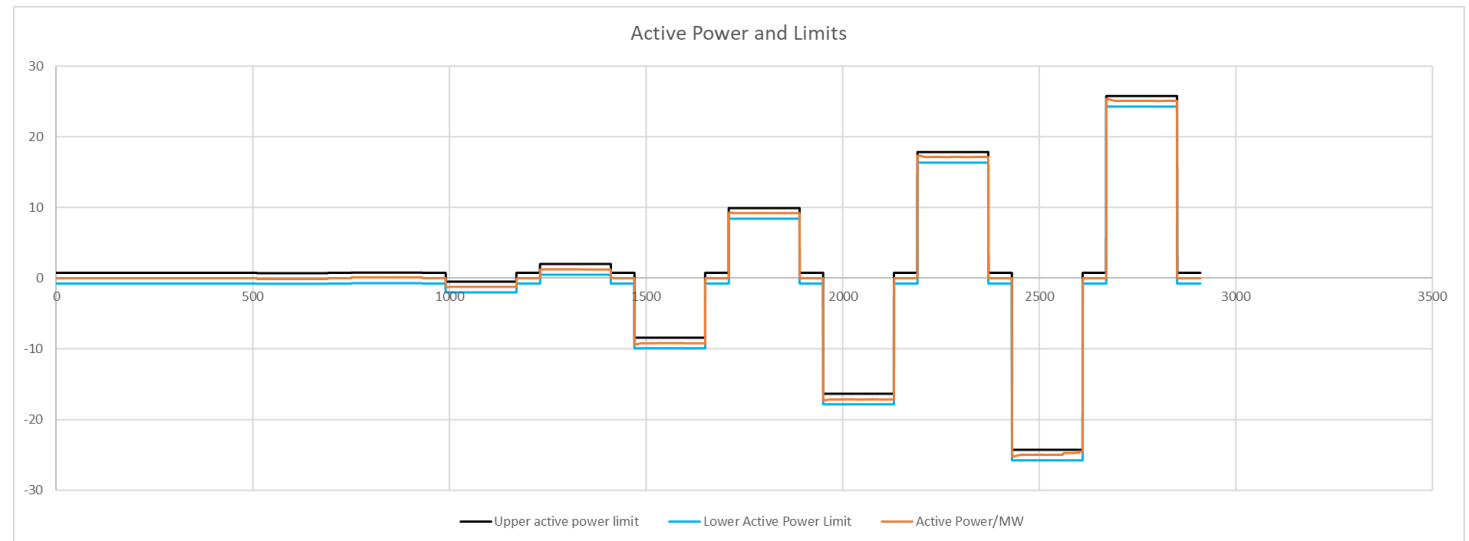
Input data on the appropriate tab

Time/s	Frequency/Hz	Active Power/MW
0	50.100	-0.022972973
0.05	50.100	-0.022972973
0.1	50.100	-0.022972973
0.15	50.100	-0.022972973

Step	Action	Description	Examples
			0.2      50.100      -0.022972973

**Analyse Results against pass criteria.**

13 **Test 1**  
 Check the active power fall within limits  
 Orange line should remain within the black and light blue lines at the peaks and troughs



For Tests 1.1 & 1.2 where there are any non-zero values these need to be explained by the ITE in the test report using the comments field.

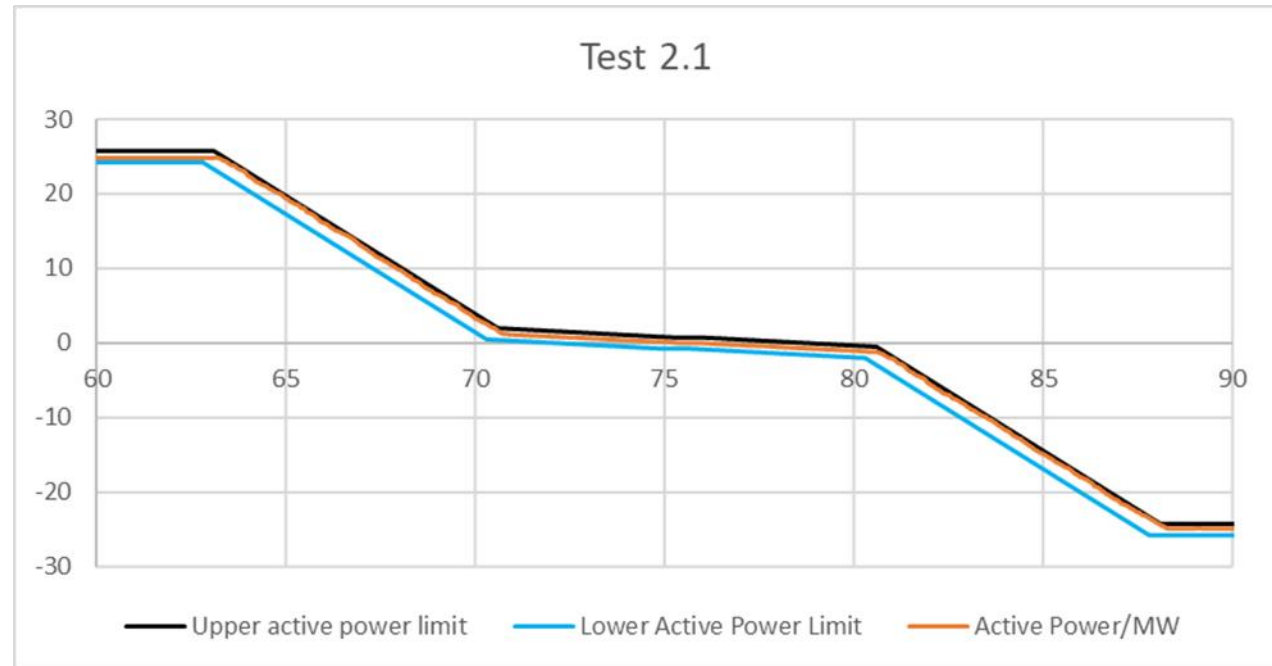
Step	Action	Description	Examples
15	For Test 1.3-1.4 Check there is a noticeable change in power in the correct direction		
16	By going through Tabs for Test 1.5-1.12, check the active power response is within the tolerance for each step graphically	Where there is an initial overshoot outside the tolerance, then the ITE can address this in the report.	
	Check that for each of Test 1.5-1.12 a response to a change in frequency occurs at $t < 0.55s$ and the maximum response for each step is reached in the required timescale.	A dotted green line is added automatically at $t + 0.55$ . A change in frequency should start to occur before this green dotted line. There are also dotted pink lines and the Active Power response should reach its desired	

Step	Action	Description	Examples
	<p>Check that this response monotonically progresses</p>	<p>point between these two. Please Note that for some tests the green lines overlap the pink lines. This criterion should only be assessed until the required response is achieved.</p>	

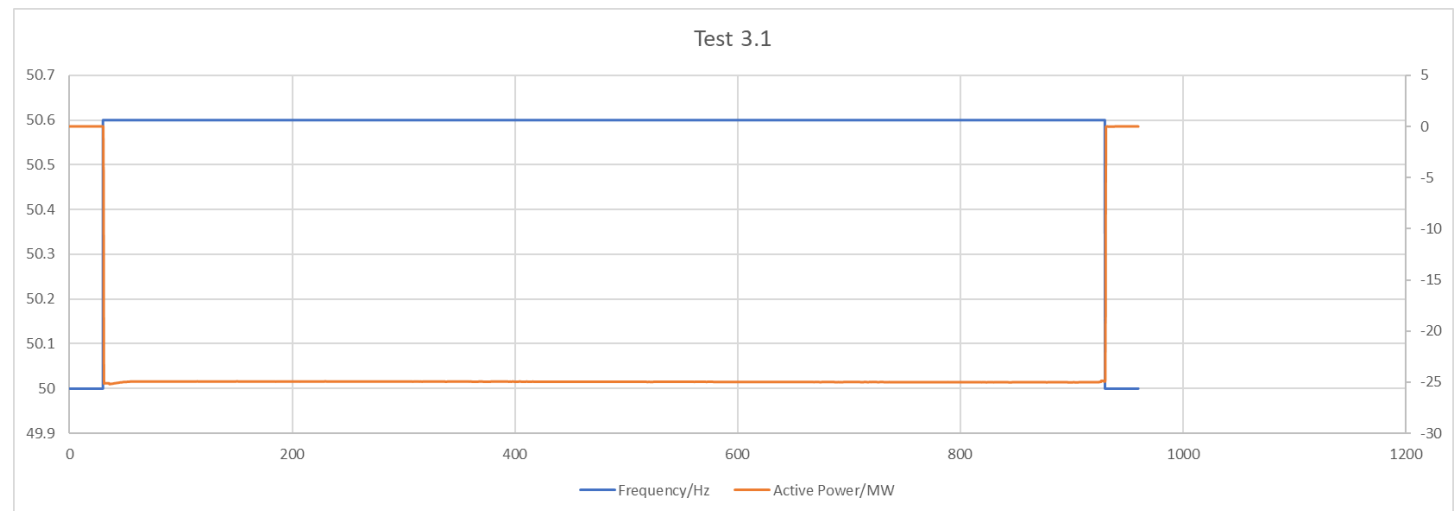


Step Action Description Examples

17 **Test 2.1 and Test 2.2**  
 Check the active power response stays within limits during the test and reaches the maximum response where required.



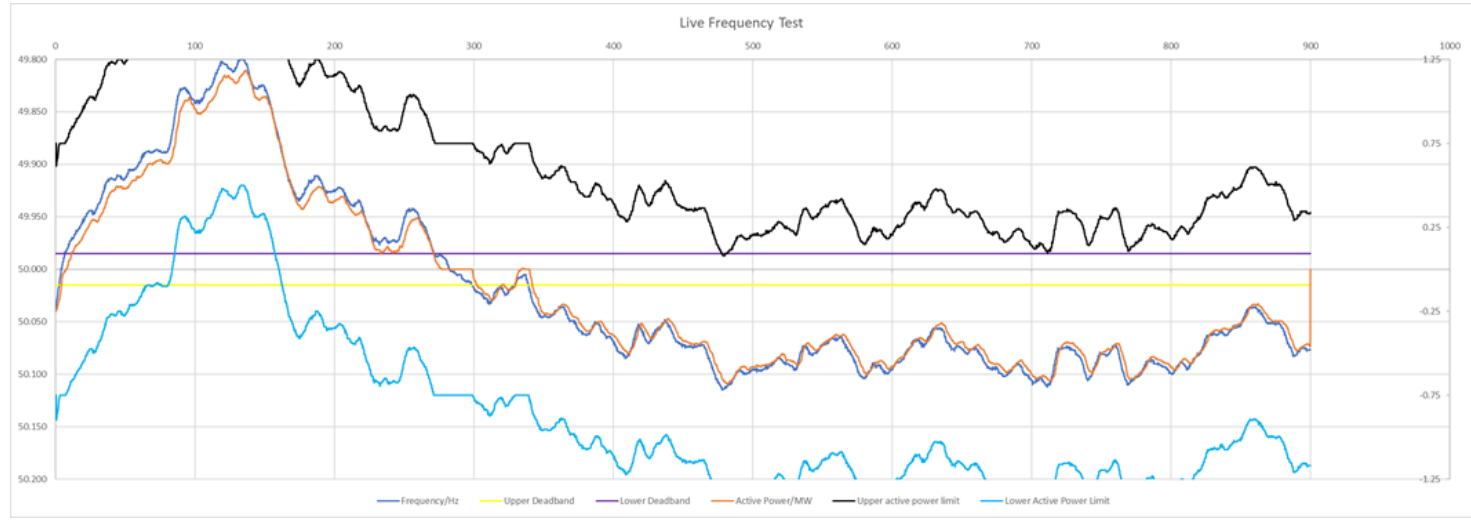
19 **Test 3.1 and 3.2**  
 Check on graphs that response is sustained for 15 minutes (900 seconds)



Step	Action	Description	Examples
20	Check the standard deviation is <2.5% of the expected active power		<div style="background-color: #0056b3; color: white; padding: 5px; display: inline-block;">Standard Deviation</div> 0

**21 Test 4** Check the active power response is consistent with the expected active power. In most cases, the frequency will remain within the range 49.8Hz-50.2Hz for Test 4. In the second Test 4 graph, the frequency axis is set to this range and reversed.

The Active Power axis should be adjusted to  $\pm 5\%$  of contracted power. This should 'overlay' frequency and active power as shown so that any inconsistencies can be easily observed.



**Test Report**

22	Write report giving feedback on test results.	See report template	Testing Guidance Appendix E
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