

MODIFICATION RECOMMENDATION

FORM Clarification Mod - WFPS Voltage Regulation - MPID 248



ABSTRACT / TITLE OF MODIFICATION	Clarification Mod - WFPS Voltage Regulation - MPID 248
MODIFICATION NUMBER	MPID 248
RECOMMENDED AT GCRP MEETING NUMBER	39
LIST OF GRID CODE SECTION(S) AFFECTED BY PROPOSED MODIFICATION:	WFPS1.6.2
CURRENT GRID CODE VERSION :	5
MODIFICATION DESCRIPTION Overview THE REASON FOR THE RECOMMENDED MODIFICATION	<p>This modification aims to clarify the Voltage Regulation requirements for WFPS outlined in WFPS1.6.2. The modification introduces a requirement for the reactive power response to be zero at nominal voltage. This ensures that the voltage regulation slope passes through zero. This is the intent of this clause but at present it is not explicitly stated.</p> <p>In addition to this, the definition for voltage regulation slope setting is changed such that it is the slope of the line required to move from maximum reactive power absorption to maximum production as defined by the capability diagram in WFPS 1.4. This aims to clarify that the slope is fixed and does not vary with wind conditions. It should be noted that a WFPS should continue on this slope if it has a reactive power capability in excess of the Grid Code requirements.</p>
History of Progression through GCRPs, Working Group and/or Consultation	<p>This modification was presented at the 39th Grid Code Review Panel Meeting on 11th June 2014. The modification was approved in principal by the members subject to the following concern outlined below being recorded.</p>

<p>Summary Note of any Objections to the Recommended change from GCRP Members or Consultation Responses</p>	<p>The Renewable Generators Representative did not foresee any issues for new WFPS in complying with this modification but did raise some concerns with regard to the retrospective application of this modification on existing WFPS. It was noted that existing WFPS may have difficulty in complying with this modification in conjunction with MPID 228. Therefore compliance with this modification for existing WFPS may require more than a simple software change.</p>
<p>Outcome of any GCRP Meeting Actions Relating to the Recommended Modification</p>	<p>Concerns of the Renewable Generators Representative to be noted as above.</p>
<p>Implication of not implementing the Modification</p>	<p>The intent of the clause is for the voltage regulation slope to pass through zero ensuring that the reactive response to be zero at reference voltage. For this reason the modification will provide clarity to Users on this requirement. Omitting this line may cause ambiguity.</p> <p>Similarly, the revised definition of voltage regulation slope setting is to ensure that a fixed slope is defined between maximum and minimum reactive power capability as defined in the Grid Code.</p>

RED-LINE VERSION

WFPS1.6.2 AUTOMATIC VOLTAGE REGULATION

WFPS1.6.2.1 **Controllable WFPSs** shall have a continuously-variable and continuously-acting **Voltage Regulation System** with similar response characteristics to a conventional **Automatic Voltage Regulator** and shall perform generally as described in BS4999 part 140, or equivalent European Standards.

WFPS1.6.2.2 Under steady state conditions, the **Voltage Regulation System** shall be capable of implementing the following **Reactive Power** control modes which shall be available to the **TSO**:

- a) The **Controllable WFPS** shall be capable of receiving a **Power Factor** control (PF) set-point to maintain the **Power Factor** set-point at the **Connection Point**;
- b) The **Controllable WFPS** shall be capable of receiving a **Reactive Power** control (Q) set-point to maintain the **Reactive Power** set-point at the **Connection Point**;

- c) The **Controllable WFPS** shall be capable of receiving a **Voltage Regulation (kV) Set-point** for the **Voltage** at the **Connection Point**. The **Voltage Regulation System** shall act to regulate the **Voltage** at this point by continuous modulation of the **Controllable WFPS's Reactive Power** output, without violating the **Voltage Step Emissions** limits as set out in the IEC standard 61000-3-7:1996 *Assessment of Emission limits for fluctuating loads in MV and HV power systems*. The **Controllable WFPS's Reactive Power** output shall be zero when the **Voltage** at the **Connection Point** is equal to the **Voltage Regulation Set-point**.

A change to the **Power Factor** control (PF) set-point, **Reactive Power** control (Q) set-point or **Voltage Regulation (kV) Set-Point** shall be implemented by the **Controllable WFPS** within 20 seconds of receipt of the appropriate signal from the **TSO**, within its reactive power capability range as specified in WFPS1.6.3.

WFPS1.6.2.3 The **Voltage Regulation System Slope Setting** shall be capable of being set to any value between 1 % and 10 %. The setting shall be specified by the **TSO** at least 120 **Business Days** prior to the **Controllable WFPS's** scheduled **Operational Date**. The **Controllable WFPS** shall be responsible for implementing the appropriate settings during **Commissioning**. The slope setting may be varied from time to time depending on **Transmission System** needs. The **TSO** shall give the **Controllable WFPS** a minimum of two weeks notice if a change is required. The **Controllable WFPS** shall formally confirm that any requested changes have been implemented within two weeks of receiving the **TSO's** formal request.

WFPS1.6.2.4 The speed of response of the **Voltage Regulation System** shall be such that, following a step change in **Voltage** at the **Connection Point** the **Controllable WFPS** shall achieve 90 % of its steady-state **Reactive Power** response within 1 second. The response may require a transition from maximum **Mvar** production to maximum **Mvar** absorption or vice-versa.

GLOSSARY:

Voltage Regulation System Slope Setting

The percentage change in **Transmission System Voltage** that would cause the **Reactive Power** output of the **Interconnector** to vary from maximum **Mvar** production to maximum **Mvar** absorption or vice-versa or **Controllable WFPS** to vary from maximum **Mvar** production capability of Q/Pmax of 0.33 to maximum **Mvar** absorption capability of Q/Pmax of -0.33 or vice-versa, as per Figure WFPS1.4.

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WFPS1.6.2.2 Under steady state conditions, the **Voltage Regulation System** shall be capable of implementing the following **Reactive Power** control modes which shall be available to the **TSO**:

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- b) The **Controllable WFPS** shall be capable of receiving a **Reactive Power** control (Q) set-point to maintain the **Reactive Power** set-point at the **Connection Point**;
- c) The **Controllable WFPS** shall be capable of receiving a **Voltage Regulation (kV) Set-point** for the **Voltage** at the **Connection Point**. The **Voltage Regulation System** shall act to regulate the **Voltage** at this point by continuous modulation of the **Controllable WFPS's Reactive Power** output, without violating the **Voltage Step Emissions** limits as set out in the IEC standard 61000-3-7:1996 *Assessment of Emission limits for fluctuating loads in MV and HV power systems*. The **Controllable WFPS's Reactive Power** output shall be zero when the **Voltage** at the **Connection Point** is equal to the **Voltage Regulation Set-point**.

A change to the **Power Factor** control (PF) set-point, **Reactive Power** control (Q) set-point or **Voltage Regulation (kV) Set-Point** shall be implemented by the **Controllable WFPS** within 20 seconds of receipt of the appropriate signal from the **TSO**, within its reactive power capability range as specified in WFPS1.6.3.

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