

**THE NATIONAL GRID COMPANY plc**

**GRID CODE REVIEW PANEL**

**GRID CODE - OC5 WORKING GROUP FINAL REPORT  
INCLUSION OF CONNECTION CONDITIONS**

**1. Introduction**

- 1.1. This paper presents the final report of the OC5 working group and proposes further revisions of the wording of Grid Code OC5 to include comprehensive references of the Connection Conditions. In addition some clarification of the process leading from monitoring to testing is proposed.
- 1.2. The OC5 working group included representatives nominated by Generators and Distribution Network Operators.

**2. Background**

- 2.1. The Grid Code OC5 review group was initially set up following the acceptance of paper GCRP 00/29 at the 23 November 2000 meeting of the Grid Code Review Panel. Paper GCRP 00/29 proposed that the group would initially restrict activities to re-writing OC5 in order to clarify the text generally and rationalise common text where appropriate. The paper suggested that following this initial clarification the group could then go on to consider further issues associated with OC5.
- 2.2. Completion of the work outlined in GCRP 00/29 was reported back to the Grid Code Review Panel at the 17 May 2001 meeting (Paper GCRP 01/10). The Panel agreed that a consultation on proposed text clarification should be initiated resulting ultimately in a revision to the Grid Code (Revision 4). At the same meeting the Panel agreed that the OC5 Working Group should be reconstituted to consider the full inclusion of Connection Conditions as originally proposed in paper GCRP 00/29. Nominations for the working group were invited resulting in the working group consisting of representatives from Innogy, PowerGen, British Energy, TXU and Seeboard. The terms of reference for this second stage of work were agreed at the panel meeting on 13<sup>th</sup> September 2001 (GCRP 01/18).

**3. Proposed Revisions**

- 3.1. The Working Group has met twice to discuss and develop the proposed revision of Grid Code OC5. The scope of the revisions proposed can be summarised as follows:
  - i) full references to Generator Connection Conditions for compliance and ongoing lifetime testing (OC.5.5.3);
  - ii) addition of provisions for testing for Connection Conditions on User networks (OC.5.5.3);
  - iii) clarification of the reasons that might lead to the requirements for a request for testing to be raised (OC5.4.2 & OC5.5.1) and;
  - iv) clarification of the control system signals that might be requested where on site testing is witnessed (OC.5.5.2.2.).

- 3.2 It should be noted that the proposed changes and additions to the table in Grid Code OC.5.5.3 as required by items (i) and (ii) would not change the technical obligations placed on the Generator or the Distribution Network Operator by the Grid Code Connection Conditions. The additions proposed by items (iii) and (iv) clarify and codify established industry practice with regard to monitoring and testing.
- 3.3 Although the areas described in (iii) were not within the original scope of review agreed at the Grid Code Review Panel, the OC5 Working Group supported a re-draft of these proposals.
- 3.5 The proposed revised text of OC5 is attached as an Appendix to this paper.

#### **4 Recommendation**

4.3 The Grid Code Review Panel is invited:

- to approve the final report of the OC5 Working Group;
- to approve the attached proposals for revision of OC5 and;
- to agree that a formal consultation on the proposed Grid Code changes should be initiated.

The National Grid Company plc  
8 May 2002

## APPENDIX

### OPERATING CODE NO. 5

#### TESTING AND MONITORING

##### OC5.1 INTRODUCTION

**Operating Code No. 5 ("OC5")** specifies the procedures to be followed by **NGC** in carrying out:

- (a) monitoring
  - (i) of **BM Units** against their expected input or output;
  - (ii) of compliance by **Users** with the **CC** and in the case of response to **Frequency, BC3**; and
  - (iii) of the provision by **Users** of **Ancillary Services** which they are required or have agreed to provide; and
- (b) the following tests (which are subject to **System** conditions prevailing on the day):
  - (i) tests on **Gensets** to test that they have the capability to comply with the **CC** and, in the case of response to **Frequency, BC3** and to provide the **Ancillary Services** that they are either required or have agreed to provide;
  - (ii) tests on **BM Units**, to ensure that the **BM Units** are available in accordance with their submitted **Export and Import Limits, QPNs, Joint BM Unit Data** and **Dynamic Parameters**.

The **OC5** tests include the **Black Start Test** procedure.

##### OC5.2 OBJECTIVE

The objectives of **OC5** are to establish:

- (a) that **Users** comply with the **CC**;
- (b) whether **BM Units** operate in accordance with their expected input or output derived from their **Final Physical Notification Data** and agreed **Bid-Offer Acceptances** issued under **BC2**
- (c) whether each **BM Unit** is available as declared in accordance with its submitted **Export and Import Limits, QPN, Joint BM Unit Data** and **Dynamic Parameters**; and

- (d) whether **Generators** and **Suppliers** can provide those **Ancillary Services** which they are either required or have agreed to provide.

In certain limited circumstances as specified in this **OC5** the output of **CCGT Units** may be verified, namely the monitoring of the provision of **Ancillary Services** and the testing of **Reactive Power** and automatic **Frequency Sensitive Operation**;

#### OC5.3 SCOPE

**OC5** applies to **NGC** and to **Users** which in **OC5** means:

- (a) **Generators**;
- (b) **Network Operators**;
- (c) **Non-Embedded Customers**; and
- (d) **Suppliers**.

#### OC5.4 MONITORING

##### OC5.4.1 Parameters to be monitored

**NGC** will monitor the performance of

- (a) **BM Units** against their expected input or output derived from their **Final Physical Notification Data** and agreed **Bid-Offer Acceptances** issued under **BC2**;
- (b) compliance by **Users** with the **CC**; and
- (c) the provision by **Users** of **Ancillary Services** which they are required or have agreed to provide.

##### OC5.4.2 Procedure for Monitoring

OC5.4.2.1 In the event that a **BM Unit** fails persistently, in **NGC's** reasonable view, to follow, in any material respect, its expected input or output or a **User** fails persistently to comply with the **CC** and in the case of response to **Frequency, BC3** or to provide the **Ancillary Services** it is required, or has agreed, to provide, **NGC** shall notify the relevant **User** giving details of the failure and of the monitoring that **NGC** has carried out.

OC5.4.2.2 The relevant **User** will, as soon as possible, provide **NGC** with an explanation of the reasons for the failure and details of the action that it proposes to take to:

- (a) enable the **BM Unit** to meet its expected input or output or to provide the **Ancillary Services** it is required or has agreed to provide, within a reasonable period, or
- (b) in the case of a **Generating Unit** or **CCGT Module** to comply with the **CC** and in the case of response to **Frequency, BC3** or to provide the **Ancillary Services** it is required or has agreed to provide, within a reasonable period.

OC5.4.2.3 **NGC** and the **User** will then discuss the action the **User** proposes to take and will endeavour to reach agreement as to

- (a) any short term operational measures necessary to protect other Users and;
- (b) the parameters which are to be submitted for the **BM Unit** and the effective date(s) for the application of the agreed parameters.

OC5.4.2.4 In the event that agreement cannot be reached within 10 days of notification of the failure by **NGC** to the **User**, **NGC** or the **User** shall be entitled to require a test, as set out in OC5.5 and OC5.6, to be carried out.

#### OC5.5 PROCEDURE FOR TESTING

##### OC5.5.1 Request For Testing

OC5.5.1.1 **NGC** may at any time (although ~~it may not do so not normally~~ more than twice in any calendar year in respect of any particular **BM Unit** ~~except to the extent that it can on reasonable grounds justify the necessity for further tests or unless the further test is a re-test~~) issue an instruction requiring a **User** to carry out a test, provided **NGC** has reasonable grounds of justification based upon:

- (a) a submission of data from a **User** indicating a change in performance;
- (b) a statement from a **User** indicating a change in performance;
- (c) monitoring carried out in accordance with OC5.4.2;
- (d) notification from a **User** of completion of an agreed action from OC5.4.2.

OC5.5.1.2 The test referred to in OC5.5.1.1 and carried out at a time no sooner than 48 hours from the time that the instruction was issued, on any one or more of the **User's BM Units** ~~to should only be to~~ demonstrate that the relevant **BM Unit**:

- a) if active in the **Balancing Mechanism**, meets the ability to operate in accordance with its submitted **Export and Import Limits, QPN, Joint BM Unit Data** and **Dynamic Parameters** and achieve its expected input or output which has been monitored under OC5.4; and
- b) meets the requirements of the paragraphs in the **CC** which are applicable to such **BM Units**; and

in the case of a **BM Unit** comprising a **Generating Unit** or a **CCGT Module** meets,

- ~~b)~~ the requirements for operation in **Frequency Sensitive Mode** and compliance with the requirements for operation in **Limited**

**Frequency Sensitive Mode** in accordance with CC.6.3.3, BC3.5.2 and BC3.7.2; or

- ed) the terms of the applicable **Supplemental Agreement** agreed with the **Generator** to have a **Fast Start Capability**; or
- de) the **Reactive Power** capability registered with **NGC** under **OC2** which shall meet the requirements set out in CC.6.3.2. In the case of a test on a **Generating Unit** within a **CCGT Module** the instruction need not identify the particular **CCGT Unit** within the **CCGT Module** which is to be tested, but instead may specify that a test is to be carried out on one of the **CCGT Units** within the **CCGT Module**.

- OC5.5.1.23 (a) The instruction referred to in OC5.5.1.1 may only be issued if the relevant **User** has submitted **Export and Import Limits** which notify that the relevant **BM Unit** is available in respect of the **Operational Day** current at the time at which the instruction is issued. The relevant **User** shall then be obliged to submit **Export and Import Limits** with a magnitude greater than zero for that **BM Unit** in respect of the time and the duration that the test is instructed to be carried out, unless that **BM Unit** would not then be available by reason of forced outage or **Planned Outage** expected prior to this instruction.
- (b) In the case of a **CCGT Module** the **Export and Import Limits** data must relate to the same **CCGT Units** which were included in respect of the **Operational Day** current at the time at which the instruction is issued and must include, in relation to each of the **CCGT Units** within the **CCGT Module**, details of the various data set out in BC1.A.1.3 and BC1.A.1.5, which parameters **NGC** will utilise in instructing in accordance with this OC5 in issuing **Bid-Offer Acceptances**. The parameters shall reasonably reflect the true operating characteristics of each **CCGT Unit**.

OC5.5.2 Conduct Of Test

OC5.5.2.1 The performance of the **BM Unit** will be recorded at **NGC Control Centres** with monitoring at site when necessary, from voltage and current signals provided by the **User** for each **BM Unit** under CC.6.6.1.

OC5.5.2.2 If monitoring at site is undertaken, the performance of the **BM Unit** will be recorded on a ~~chart-suitable~~ recorder (with measurements, in the case of a **Generating Unit**, taken on the **Generating Unit** Stator Terminals / on the **LV** side of the generator transformer) in the relevant **User's Control Room**, in the presence of a reasonable number of representatives appointed and authorised by **NGC**. If **NGC** or the **User** requests, monitoring at site will include measurement of the ~~governor pilot oil/valve position~~ following control system parameters:

- a) for Steam Turbines: governor pilot oil pressure, valve position and steam pressure;
- b) for Gas Turbines: Inlet Guide Vane Position, Fuel Valve Positions, Fuel Demand Signal and Exhaust Gas Temperature
- c) for Hydro Turbines: Governor Demand Signal, Actuator Output Signal, Guide Vane Position
- d) for Excitation Systems: Generator Field Voltage and Power System Stabiliser signal where appropriate

- OC5.5.2.3 The test will be initiated by the issue of instructions, which may be accompanied by a **Bid-Offer Acceptance**, under **BC2** (in accordance with the **Export and Import Limits, QPN, Joint BM Unit Data** and **Dynamic Parameters** which have been submitted for the day on which the test was called, or in the case of a **CCGT Unit**, in accordance with the parameters submitted under OC5.5.1.23). The instructions in respect of a **CCGT Unit** within a **CCGT Module** will be in respect of the **CCGT Unit**, as provided in BC2.

## OC5.5.3

Test and Monitoring Assessment

The pass criteria must be read in conjunction with the full text under the Grid Code reference. The **BM Unit** will pass the test if the criteria below are met:

	Parameter to be Tested	Grid Code Reference	Pass Criteria <u>(to be read in conjunction with the full text under the Grid Code reference)</u>
<u>Voltage Quality</u>	<u>Harmonic Content</u>	<u>CC6.1.5 (a)</u>	<u>Measured harmonic emissions do not exceed the limits specified in the <b>Bilateral Agreement</b>.</u>
	<u>Phase Unbalance</u>	<u>CC6.1.5 (b)</u>	<u>The measured maximum negative phase sequence component of the phase voltage on the <b>NGC Transmission System</b> should remain below 1%.</u>
	<u>Phase Unbalance</u>	<u>CC.6.1.6</u>	<u>Measured infrequent short duration peaks in phase unbalance should not exceed the maximum value stated in the <b>Bilateral Agreement</b>.</u>
	<u>Voltage Fluctuations</u>	<u>CC.6.1.7 (a)</u>	<u>Measured voltage fluctuations at the <b>Point of Common Coupling</b> shall not exceed 1% of the voltage level for step changes. Measured voltage excursions other than step changes may be allowed up to a level of 3%.</u>
	<u>Flicker</u>	<u>CC.6.1.7 (b)</u>	<u>Measured voltage fluctuations at the <b>Point of Common Coupling</b> shall not exceed <b>Flicker Severity (Short Term)</b> of 0.8 Unit and a <b>Flicker Severity (Long Term)</b> of 0.6 Unit, as set out in <b>Engineering Recommendation P28</b> as current at the <b>Transfer Date</b>.</u>





Governor Compliance System	Primary, Secondary and High Frequency Response	ASA	The measured response in MW/Hz is within $\pm 5\%$ of the level of response specified in the <b>Ancillary Services Agreement</b> for that <b>Genset</b> .
	<u>Stability With Voltage</u>	<u>CC.6.3.4</u>	<u>The measured <b>Active Power</b> output under steady state conditions of any <b>Generating Unit</b> directly connected to the <b>NGC Transmission System</b> should not be affected by voltage changes in the normal operating range.</u>
	Governor <u>Standard Compliance</u>	CC.6.3.7 (a)	Measurements indicate that the Governor parameters are within the criteria set out in the appropriate governor standard (the version of which to apply being determined within CC.6.3.7).
	<u>Governor Stability</u>	<u>CC.6.3.7 (b)</u>	<u>The measured <b>Generating Unit Active Power Output</b> shall be stable over the entire operating range of the <b>Generating Unit</b>.</u>
	<u>Governor Droop</u>	<u>CC.6.3.7 (c) (ii)</u>	<u>The measured speed governor overall speed droop should be between 3% and 5%.</u>
	<u>Governor Deadband</u>	<u>CC.6.3.7 (c) (iii)</u>	<u>Except for <b>Steam Unit</b> within a <b>CCGT Module</b>, the measured speed governor deadband shall be no greater than 0.03Hz (for the avoidance of doubt, <math>\pm 0.015\text{Hz}</math>).</u>
	<u>Target Frequency</u>	<u>CC.6.3.7 (d)</u>	<u><b>Target Frequency</b> settings over at least the range 50 <math>\pm 0.1</math> Hz shall be available.</u>
	<u>Response Capability</u>	<u>CC.6.3.7 (e)</u> <u>CC.A.3.</u>	<u>The measured frequency response of each <b>Generating Unit</b> and/or <b>CCGT Module</b> which has a <b>Completion Date</b> after 1 January 2001 shall meet requirement profile contained in Connection Conditions Appendix 3.</u>
	<b>Limited High Frequency Response</b>	BC3.7.2(b)	The measured response is within the requirements of BC3.7.2. <u>i.e. the measured rate of change of <b>Active Power</b> output must be at least 2% of output per 0.1Hz deviation of <b>System Frequency</b> above 50.4Hz.</u>
	Output at reduced System Frequency	CC.6.3.3 BC3.5.1	For variations in <b>System Frequency</b> exceeding 0.1Hz within a period of less than 10 seconds, the <b>Active Power</b> output is within $\pm 0.2\%$ of the requirements of CC.6.3.3 when monitored at prevailing external air temperatures of up to 25°C.

	Fast Start	ASA	The <b>Fast Start Capability</b> requirements of the <b>Ancillary Services Agreement</b> for that <b>Genset</b> are met.
	Black Start	OC.5.7.1	The relevant <b>Generating Unit</b> is <b>Synchronised</b> to the <b>System</b> within two hours of the <b>Auxiliary Gas Turbine(s)</b> or <b>Auxiliary Diesel Engine(s)</b> being required to start.
	<b><u>Excitation System</u></b>	<b><u>CC.6.3.8(a)</u></b> <b><u>&amp;</u></b> <b><u>BC.2.11.2</u></b>	<u>Measurements of the continuously acting automatic excitation control system are required to demonstrate the provision of constant terminal voltage control of the <b>Generating Unit</b> without instability over the entire operating range of the <b>Generating Unit</b>. The measured performance of the automatic excitation control system should also meet the requirements (including <b>Power System Stabiliser</b> performance) specified in the <b>Bilateral Agreement</b>.</u>

Dynamic Parameters	Export and Import Limits, QPN, Joint BM Unit Data and Dynamic Parameters	OC5	<p>The <b>Export and Import Limits, QPN, Joint BM Unit Data</b> and <b>Dynamic Parameters</b> under test are within 2½% of the declared value being tested.</p> <p>The duration of the test will be consistent with and sufficient to measure the relevant expected input or output derived from the <b>Final Physical Notification Data</b> and <b>Bid-Offer Acceptances</b> issued under BC2 which are still in dispute following the procedure in OC5.4.2.</p>
	Synchronisation time	BC2.5.2.3	<p><b>Synchronisation</b> takes place within ±5 minutes of the time it should have achieved <b>Synchronisation</b>.</p> <p>The duration of the test will be consistent with and sufficient to measure the relevant expected input or output derived from the <b>Final Physical Notification Data</b> and <b>Bid-Offer Acceptances</b> issued under BC2 which are still in dispute following the procedure in OC5.4.2.</p>
	Run-up rates	OC5	<p>Achieves the instructed output and, where applicable, the first and/or second intermediate breakpoints, each within ±3 minutes of the time it should have reached such output and breakpoints from <b>Synchronisation</b> (or break point, as the case may be), calculated from the run-up rates in its <b>Dynamic Parameters</b>.</p> <p>The duration of the test will be consistent with and sufficient to measure the relevant expected input or output derived from the <b>Final Physical Notification Data</b> and <b>Bid-Offer Acceptances</b> issued under BC2 which are still in dispute following the procedure in OC5.4.2.</p>
	Run-down rates	OC5	<p>Achieves the instructed output within ±5 minutes of the time, calculated from the run-down rates in its <b>Dynamic Parameters</b>.</p> <p>The duration of the test will be consistent with and sufficient to measure the relevant expected input or output derived from the <b>Final Physical Notification Data</b> and <b>Bid-Offer Acceptances</b> issued under BC2 which are still in dispute following the procedure in OC5.4.2.</p>

Due account will be taken of any conditions on the **System** which may affect the results of the test. The relevant **User** must, if requested, demonstrate, to **NGC's** reasonable satisfaction, the reliability of the ~~chart~~ suitable recorders, disclosing calibration records to the extent appropriate.

#### OC5.5.4 Test Failure/Re-test

If the **BM Unit** concerned fails to pass the test the **User** must provide **NGC** with a written report specifying in reasonable detail the reasons for any failure of the test so far as they are then known to the **User** after due and careful enquiry. This must be provided within five **Business Days** of the test. If a dispute arises relating to the failure, **NGC** and the relevant **User** shall seek to resolve the dispute by discussion, and, if they fail to reach agreement, the **User** may by notice require **NGC** to carry out a re-test on 48 hours' notice which shall be carried out following the procedure set out in OC5.5.2 and OC5.5.3 and subject as provided in OC5.5.1.2,3 as if **NGC** had issued an instruction at the time of notice from the **User**.

#### OC5.5.5 Dispute following Re-test

If the **BM Unit** in **NGC's** view fails to pass the re-test and a dispute arises on that re-test, either party may use the **Disputes Resolution Procedure** for a ruling in relation to the dispute, which ruling shall be binding.

#### OC5.6 DISPUTE RESOLUTION

OC5.6.1 If following the procedure set out in OC5.5 it is accepted that the **BM Unit** has failed the test or re-test (as applicable), the **User** shall within 14 days, or such longer period as **NGC** may reasonably agree, following such failure, submit in writing to **NGC** for approval the date and time by which the **User** shall have brought the **BM Unit** concerned to a condition where it complies with the relevant requirement. **NGC** will not unreasonably withhold or delay its approval of the **User's** proposed date and time submitted. Should **NGC** not approve the **User's** proposed date or time (or any revised proposal), the **User** should amend such proposal having regard to any comments **NGC** may have made and re-submit it for approval.

OC5.6.2 If a **BM Unit** fails the test, the **User** shall submit revised **Export and Import Limits, QPN, Joint BM Unit Data** and/or **Dynamic Parameters**, or in the case of a **BM Unit** comprising a **Generating Unit** or a **CCGT Module**, the **User** may amend, with **NGC's** approval, the relevant registered parameters of that **Generating Unit** or **CCGT Module**, as the case may be, relating to the criteria, for the period of time until the **BM Unit** can achieve the parameters previously registered, as demonstrated in a re-test.

OC5.6.3 Once the **User** has indicated to **NGC** the date and time that the **BM Unit** can achieve the parameters previously registered or submitted, **NGC** shall either accept this information or require the **User** to demonstrate the restoration of the capability by means of a repetition of the test referred to in OC5.5.2 by an instruction requiring the **User** on 48 hours notice to carry out such a test. The provisions of this OC5.6 will apply to such further test.

OC5.7

## **BLACK START TESTING**

OC.5.7.1

### **General**

- (a) **NGC** may require a **Generator** with a **Black Start Station** to carry out a test (a "**Black Start Test**") on a **Genset** in a **Black Start Station** either while the **Black Start Station** remains connected to an external alternating current electrical supply (a "**BS Unit Test**") or while the **Black Start Station** is disconnected from all external alternating current electrical supplies (a "**BS Station Test**"), in order to demonstrate that a **Black Start Station** has a **Black Start Capability**.
- (b) Where **NGC** requires a **Generator** with a **Black Start Station** to carry out a **BS Unit Test**, **NGC** shall not require the **Black Start Test** to be carried out on more than one **Genset** at that **Black Start Station** at the same time, and would not, in the absence of exceptional circumstances, expect any of the other **Genset** at the **Black Start Station** to be directly affected by the **BS Unit Test**.
- (c) **NGC** may require a **Generator** with a **Black Start Station** to carry out a **BS Unit Test** at any time (but will not require a **BS Unit Test** to be carried out more than once in each calendar year in respect of any particular **Genset** unless it can justify on reasonable grounds the necessity for further tests or unless the further test is a re-test, and will not require a **BS Station Test** to be carried out more than once in every two calendar years in respect of any particular **Genset** unless it can justify on reasonable grounds the necessity for further tests or unless the further test is a re-test).
- (d) When **NGC** wishes a **Generator** with a **Black Start Station** to carry out a **Black Start Test**, it shall notify the relevant **Generator** at least 7 days prior to the time of the **Black Start Test** with details of the proposed **Black Start Test**.

OC.5.7.2

### **Procedure for a Black Start Test**

The following procedure will, so far as practicable, be carried out in the following sequence for **Black Start Tests**:

OC.5.7.2.1

#### **BS Unit Tests**

- (a) The relevant **Generating Unit** shall be **Synchronised** and **Loaded**;
- (b) All the **Auxiliary Gas Turbines** and/or **Auxiliary Diesel Engines** in the **Black Start Station** in which that **Generating Unit** is situated, shall be **Shutdown**.
- (c) The **Generating Unit** shall be **De-Loaded** and **De-Synchronised** and all alternating current electrical supplies to its **Auxiliaries** shall be disconnected.

- (d) The **Auxiliary Gas Turbine(s)** or **Auxiliary Diesel Engine(s)** to the relevant **Generating Unit** shall be started, and shall re-energise the **Unit Board** of the relevant **Generating Unit**.
- (e) The **Auxiliaries** of the relevant **Generating Unit** shall be fed by the **Auxiliary Gas Turbine(s)** or **Auxiliary Diesel Engine(s)**, via the **Unit Board**, to enable the relevant **Generating Unit** to return to **Synchronous Speed**.
- (f) The relevant **Generating Unit** shall be **Synchronised** to the **System** but not **Loaded**, unless the appropriate instruction has been given by **NGC** under **BC2**.

#### OC.5.7.2.2 **BS Station Test**

- (a) All **Generating Units** at the **Black Start Station**, other than the **Generating Unit** on which the **Black Start Test** is to be carried out, and all the **Auxiliary Gas Turbines** and/or **Auxiliary Diesel Engines** at the **Black Start Station**, shall be **Shutdown**.
- (b) The relevant **Generating Unit** shall be **Synchronised** and **Loaded**.
- (c) The relevant **Generating Unit** shall be **De-Loaded** and **De-Synchronised**.
- (d) All external alternating current electrical supplies to the **Unit Board** of the relevant **Generating Unit**, and to the **Station Board** of the relevant **Black Start Station**, shall be disconnected.
- (e) An **Auxiliary Gas Turbine** or **Auxiliary Diesel Engine** at the **Black Start Station** shall be started, and shall re-energise either directly, or via the **Station Board**, the **Unit Board** of the relevant **Generating Unit**.
- (f) The provisions of OC.5.7.2.1 (e) and (f) shall thereafter be followed.

OC.5.7.2.3 All **Black Start Tests** shall be carried out at the time specified by **NGC** in the notice given under OC5.7.1(d) and shall be undertaken in the presence of a reasonable number of representatives appointed and authorised by **NGC**, who shall be given access to all information relevant to the **Black Start Test**.

#### OC.5.7.2.4 **Failure of a Black Start Test**

A **Black Start Station** shall fail a **Black Start Test** if the **Black Start Test** shows that it does not have a **Black Start Capability** (ie. if the relevant **Generating Unit** fails to be **Synchronised** to the **System** within two hours of the **Auxiliary Gas Turbine(s)** or **Auxiliary Diesel Engine(s)** being required to start).

OC.5.7.2.5 If a **Black Start Station** fails to pass a **Black Start Test** the **Generator** must provide **NGC** with a written report specifying in



reasonable detail the reasons for any failure of the test so far as they are then known to the **Generator** after due and careful enquiry. This must be provided within five **Business Days** of the test. If a dispute arises relating to the failure, **NGC** and the relevant **Generator** shall seek to resolve the dispute by discussion, and if they fail to reach agreement, the **Generator** may require **NGC** to carry out a further **Black Start Test** on 48 hours notice which shall be carried out following the procedure set out in OC.5.7.2.1 or OC.5.7.2.2 as the case may be, as if **NGC** had issued an instruction at the time of notice from the **Generator**.

- OC.5.7.2.6 If the **Black Start Station** concerned fails to pass the re-test and a dispute arises on that re-test, either party may use the **Disputes Resolution Procedure** for a ruling in relation to the dispute, which ruling shall be binding.
- OC.5.7.2.7 If following the procedure in OC.5.7.2.5 and OC.5.7.2.6 it is accepted that the **Black Start Station** has failed the **Black Start Test** (or a re-test carried out under OC.5.7.2.5), within 14 days, or such longer period as **NGC** may reasonably agree, following such failure, the relevant **Generator** shall submit to **NGC** in writing for approval, the date and time by which that **Generator** shall have brought that **Black Start Station** to a condition where it has a **Black Start Capability** and would pass the **Black Start Test**, and **NGC** will not unreasonably withhold or delay its approval of the **Generator's** proposed date and time submitted. Should **NGC** not approve the **Generator's** proposed date and time (or any revised proposal) the **Generator** shall revise such proposal having regard to any comments **NGC** may have made and resubmit it for approval.
- OC.5.7.2.8 Once the **Generator** has indicated to **NGC** that the **Generating Station** has a **Black Start Capability**, **NGC** shall either accept this information or require the **Generator** to demonstrate that the relevant **Black Start Station** has its **Black Start Capability** restored, by means of a repetition of the **Black Start Test** referred to in OC5.7.1(d) following the same procedure as for the initial **Black Start Test**. The provisions of this OC.5.7.2 will apply to such test.

<End of OC5>