	<p align="center"><b>Accreditation Criteria for the Inspection of Electrical Equipment in Quarries</b></p>	<p><b>G-24/09</b>  <b>Issue Date: 08/07/08</b>  <b>Rev No: 00</b></p>
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## 1 INTRODUCTION

- 1.1 This document has been produced by the Pakistan National Accreditation Council (PNAC) in conjunction with the PNAC Sectoral Committee for Inspection Bodies. It provides guidance to those requirements in ISO/IEC 17020 and Agreement between PNAC & IBs (F-01/13) that need interpretation when applied by Inspection Bodies carrying out inspection of Electric Equipment in quarries. It does not cover all of the requirements of ISO/IEC 17020-General criteria for the operation of various types of bodies performing inspection and Agreement between PNAC & IBs (F-01/13). Inspection Bodies are reminded of the need to comply with all of the requirements in these documents. Appeals concerning interpretation will be considered in accordance with the PNAC Appeals Procedure. Other PNAC documents may be referred to where relevant.
- 1.3 The selection of an inspection body accredited against the requirements of ISO/IEC 17020 and this publication is intended to assist the owner or user of an electrical system with an assurance of the level of competence concerning the provision of an inspection service.
- 1.4 For the purposes of this publication the term *Inspection Body* shall be taken to mean an accredited inspection body.

## 2 Inspection services covered by (ISO/IEC 17020, Clause 3.3)

- 2.1 This publication details the requirements for inspection bodies undertaking the inspection of electrical systems, in the field identified in Sub-clause 2.2, to ensure, as far as reasonably practicable, the detection of potential and actual defects, particularly those which may be a cause of danger or injury to persons or damage to property and to ascertain if the electrical system meets relevant statutory requirements, national or international standards, approved codes of practice or guidance and similar documents.
- 2.2 This publication is specific to the requirements of inspection bodies who undertake the inspection of electrical equipment and installations, operating at all voltages, in quarries. The equipment and/or installations may be permanent, temporary, portable, transportable or hand-held. Further criteria for the inspection of non-public high voltage electrical systems are given in PNAC Document G-24/11.

## 3 Independence, impartiality and integrity (ISO/IEC 17020, Clause 4)

- 3.1 Inspection bodies operating as Type A, B or C bodies as defined in ISO/IEC 17020 may be accredited for inspecting electrical systems provided that they meet the requirements of ISO/IEC 17020 and this publication.
- 3.2 *Independence*
- 3.2.1 To ensure the independence of inspection work, the reporting chain for inspection shall be separable from that of any other work undertaken.
- 3.2.2 A Type C inspection body which undertakes installation, maintenance or remedial work in conjunction with inspections shall have clearly documented procedures for each activity and shall establish adequate safeguards to ensure the integrity of the inspections. Such safeguards may include the use of alternative inspection and maintenance staff and independent auditing of inspection work.

#### 4 Organization, management and supervision (ISO/IEC 17020, Clause 6.4)

4.1 The following requirements shall apply:

For the inspection of electrical systems covered by this publication the requirements shown in Table 1 shall be met.

- 4.2 The Technical Manager in charge of, and having overall responsibility for, an inspection body seeking accreditation is to be of Category 1 status and be directly employed by the inspection body.
- 4.3 For effective supervision, the Technical Manager may delegate supervisory responsibilities to locally appointed managers.
- 4.4 In addition to management personnel there will be requirements for personnel working on site who are qualified at lower levels but who have the ability to undertake inspection tasks and duties at the level assigned to them.
- 4.5 Where sub-contracted service providers are required they shall be able to demonstrate their technical competence and ability to undertake the required tasks to the satisfaction of the technical manager.

#### 5 Personnel qualifications and competence (ISO/IEC 17020, Clause 8)

- 5.1 The requirements for qualifications, experience and training relevant to the inspections covered by this document are shown in Table 1.
- 5.2 All inspection personnel shall have a demonstrable:
- (a) understanding of relevant electrical standards including design standards and Codes of Practice;
  - (b) knowledge of methods used to maintain electrical integrity and protection;
  - (c) knowledge of any special electrical inspection and test techniques which may be required.


**Table 1 Experience category and supervision**

Personnel category	<b>Constraint I</b> All areas in field of competence	<b>Constraint II</b> Specific areas of work according to expertise & training	<b>Constraint III</b> Specific inspection tasks
1	Supervision level A	Supervision level A	Supervision level A
2	Supervision level B	Supervision level A	Supervision level A
3	X	X	Supervision level C

Qualification categories, levels of supervision and constraints of activity are defined in Appendices 1, 2 and 3.

#### 6.0 Training (ISO/IEC 17020, Clause 8.2)

6.1 The inspection body shall ensure that each member of the inspection staff receives training and can demonstrate a working knowledge of:

	<b>Accreditation Criteria for the Inspection of Electrical Equipment in Quarries</b>	<b>G-24/09 Issue Date: 08/07/08 Rev No: 00</b>
-----------------------------------------------------------------------------------	------------------------------------------------------------------------------------------	--------------------------------------------------------

- a. the relevant type(s) of electrical system(s) including design, construction, inspection, testing, operation, maintenance, significance of defects and typical problem areas;
- b. where relevant, any associated areas of technology.

## **7.0 Equipment (ISO/IEC 17020, Clauses 9.7 and 9.8)**

- 7.1 Inspection and test equipment used during an inspection shall be suitable for the locations in which it is intended to be used.
- 7.2 Test equipment used should have sufficient resolution to meet the requirements of the relevant Codes of Practice.

## **8.0 Inspection methods and procedures (ISO/IEC 17020, Clause 10)**

- 8.1 The inspection body shall make it clear to those seeking the inspection body's services where it may be necessary to close down or otherwise de-energise and isolate equipment in order to complete the inspection. The implications of such action must be considered by the inspection body and owner/ operator/user.
- 8.2 The 'Written Scheme' prepared by the operator (formerly referred to as the 'Managers Scheme') or equivalent shall be consulted when planning the inspection work.
- 8.3 Inspection staff shall comply with any regulatory or local requirements relating to such matters as site induction procedures, relevant safety procedures eg. Permits to Work, Sanctions to/for Test and/or other safety access control measures appropriate to the field of activity.
- 8.4 In particular with Type C inspection bodies, where inspection duties may run concurrently with other duties, for example maintenance work, work being undertaken shall not extend beyond that covered by the relevant safety documents which have been issued. Further work shall require the issue of additional safety documents.

## **9.0 Records (ISO/IEC 17020, Clause 12)**

- 9.1 Where integral recording facilities in inspection or test equipment are used the data shall be transferred to a secure storage facility taking due account of the effect of loss of data.

## **10 Reporting (ISO/IEC 17020, Clause 13)**


- 10.1 The following requirements shall apply:

Where inspections cannot be completed due to unavailability or non-access to any part of the installation, plant or equipment being inspected this should be stated in the report.

10.2 Where maintenance, remedial or installation work is undertaken concurrently with inspection work, the associated inspection report shall clearly define the work associated with inspection and testing in a manner of sufficient accuracy for meaningful audit trails.

## **REFERENCES**

- ISO/IEC 17020, General Criteria for the Operation of Various Types of Bodies Performing Inspection
- IAF/ILAC-A4: 2004, Guidance on the Application of ISO/IEC 17020

	<b>Accreditation Criteria for the Inspection of Electrical Equipment in Quarries</b>	<b>G-24/09 Issue Date: 08/07/08 Rev No: 00</b>
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## Appendix 1

### QUALIFICATION AND COMPETENCY CATEGORIES

#### **Category 1.**

Graduate Engineer holding membership of Pakistan Engineering Council (PEC) with at least 4 years experience in a relevant engineering discipline of which at least two years shall have been spent working within an engineering discipline associated with Inspection of Electrical Equipment in Quarries.

#### **Category 2.**

Bachelor of technology from respective Board of Technical Education with at least 5 years experience in a relevant engineering discipline of which at least two years shall have been spent working within an engineering discipline associated with Inspection of Electrical Equipment in Quarries.

#### **Category 3.**

Person having three years diploma of Associate Engineers as defined by PEC with at least 6 years of experience in a relevant engineering discipline of which at least three years shall have been spent working in an engineering discipline associated with Inspection of Electrical Equipment in Quarries.

#### **Category 4.**

Person having two years vocational technical training as defined by PEC with at least 7 years of experience in a relevant engineering discipline of which at least three years shall have been spent working in an engineering discipline associated with Inspection of Electrical Equipment in Quarries.

#### **Category 5.**


Person having three years apprenticeship training as defined by PEC with at least 9 years of experience in a relevant engineering discipline of which at least 5 years shall have been spent working in an engineering discipline associated with Inspection of Electrical Equipment in Quarries.

#### **Category 6.**

Person employed prior to the date of application for accreditation in the inspection of pressure systems with less than tradesman's apprenticeship but having minimum Matriculation qualification with a minimum of 10 years spent working with an industry associated with relevant field of inspection and has general knowledge of relevant field of inspection and its operating environment.

*Note 1: All qualifications shall be from Higher Education Commission (HEC), Inter Board Committee Chairman (IBCC) & Board of Technical Education approved Universities, Colleges & Institutes.*

*Note 2: The persons from category 1-6 shall have training on relevant standard including the ISO/IEC 17020.*

	<b>Accreditation Criteria for the Inspection of Electrical Equipment in Quarries</b>	<b>G-24/09 Issue Date: 08/07/08 Rev No: 00</b>
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## Appendix 2

### LEVELS OF SUPERVISION

Regular documented meetings of inspection personnel with their management shall be conducted to resolve specific issues and to review work undertaken.

In the Levels described below, *Supervisor* means a technical superior, however named. *Direct contact* means on the job contact at the site of operation.

#### **Level A: Occasional**

Formal, direct contact to review work with Supervisor at least annually. More frequent direct contact with Supervisor may be necessary. Authoritative technical support from personnel qualified to Category 1 or 2 to be readily available.

#### **Level B: Infrequent**


Direct contact with Supervisor at least every 3 months. Access to supervision and technically authoritative support to be available as needed.

#### **Level C: Frequent**

Direct contact with Supervisor at least weekly . Weekly supervision assumes that inspections are carried out on a regular basis. Where inspections are carried out to an irregular / infrequent timetable supervision at a level consistent with this requirement shall be applied. Authoritative technical support from personnel qualified to Category 1 or 2.

#### **Level D: Constant**

Direct daily contact with Supervisor at site of operation. Authoritative technical support from personnel qualified to Category 1 or 2 to be readily available.

	<b>Accreditation Criteria for the Inspection of Electrical Equipment in Quarries</b>	<b>G-24/09 Issue Date: 08/07/08 Rev No: 00</b>
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### Appendix 3

#### **CONSTRAINTS OF INSPECTION ACTIVITIES**

**Constraint I** All areas within their field of competence

**Constraint II** Specific areas of work as defined according to expertise and training.

**Constraint III** Specific inspection tasks as defined according to competence and experience acquired.