



# Participant Handbook

Sector  
**Iron & Steel**

Sub-Sector  
**Steel, Sponge Iron**

Occupation  
**Electronics & Instrumentation  
Maintenance**

Reference ID: **ISC/Q1102, Version 1.0**  
**NSQF Level 3**



**Fitter –  
Instrumentation**

## Published by

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First Edition, March 2016

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Indian Iron & Steel Sector Skill Council  
Sector Skill Council Contact Details:  
Address: Royal Exchange, 6 N.S. Road, Kolkata - 700 001  
Email: info.iisssc@gmail.com  
Phone: +91 9831083024

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**Shri Narendra Modi**  
Prime Minister of India

“ Skilling is building a better India.  
If we have to move India towards  
development then Skill Development  
should be our mission. ”



## Certificate

### COMPLIANCE TO QUALIFICATION PACK – NATIONAL OCCUPATIONAL STANDARDS

is hereby issued by the

**Indian Iron & Steel Sector Skill Council**

for

**SKILLING CONTENT : PARTICIPANT HANDBOOK**

Complying to National Occupational Standards of

Job Role/ Qualification Pack: 'Fitter - Instrumentation' QP No. 'ISC/Q1102 NSQF Level 3'

Date of Issuance: April 9<sup>th</sup>, 2016  
Valid up to\*: April 10<sup>th</sup>, 2018

\*Valid up to the next review date of the Qualification Pack or the  
'Valid up to' date mentioned above (whichever is earlier)

Authorised Signatory  
Indian Iron & Steel Sector Skill Council

## About this book

This Participant Handbook is designed to enable training for the specific Qualification Pack (QP). Each National Occupational (NOS) is covered across Unit/s.

This job is all about installing, dismantling, removing, replacing a range of components down to sub-assembly level right from pick-up unit / point of measurement and linking either directly to the instrument or to the instrument panel. This also involves making suitable slot on panel and fixing instrument and its associated parts under supervision of Technician Instrumentation.

The candidate should possess basic communication, numerical and measurement abilities. Openness to learning, ability to plan and organize own work and identify and solve problems in the course of working.

Key Learning Objectives for the specific NOS mark the beginning of the Unit/s for that NOS. The symbols used in this book are described below.

## Symbols Used



Key Learning Outcomes



Steps



Exercise



Tips



Notes



Unit Objectives

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### 4.1.11 Analyzers

Infrared gas analyzers usually have two chambers, one is a reference chamber while the other chamber is a measurement chamber. Infrared light is emitted from some type of source on one end of the chamber, passes through a series of chambers that contains given quantities of the various gases in question.

#### Oxygen analyzer

Oxygen (O<sub>2</sub>) in the gas or liquid is measured by an electronic oxygen sensor. Oxygen concentration inside the protected volumes is measured by oxygen detectors in hypoxic air fire prevention systems.

Zirconia, electrochemical (Galvanic), infrared, ultrasonic and latest laser methods are used for calculating oxygen and all has its own benefits and limitations.



Fig. 4.1.41 Oxygen analyzer

#### Working of oxygen analyzer

Magnetic field is present in a calculating cell and a dumb-bell shaped wire rotates in the field. Rotation of dumb-bell is affected by the oxygen due to influence on the magnetic field. The current involved to align the dumb-bell is a compute of the oxygen cluster. Figure shows sampling system of inert gas.

A filter integrated at tap-off point perfectly removes the dust, after this gas is provided to separator through a three-way valve and a flow valve. Gas is provided to the calculating cell by keeping part it in bypassed condition after separation and filtering.

Correct flow along the computing cell is maintained by flow valve and a meter show oxygen reading content in sample. Zeroing gas or nitrogen and span gas or air is supplied by a three-way valve. 21% reading is produced by a span gas during calibration check.



### 5.1.3 Importance of maintenance activities

Routine machine maintenance is very important. There are many advantages of regular maintenance of machinery.

- Regular maintenance expands the life of machine and keeps up its looks. It also check the wear and tear of native components, as less material is unable to found in regular, very little and small-scale work than in costly, immense repairs.

- **Catch little issues before they become big problems.**

A maintenance program – whether it’s monthly, annually, or bi-annually – can help catch little concern like wear-and-tear before they conduct to major malfunctions. Maybe your hydraulics systems need an extra application of lubricant or your micro-cleaning equipment is on its way to becoming clogged.

- **Save downtime and lost revenue.**

When a machine malfunctions, it’s usually not the only piece of the puzzle that suffers. In most production lines and manufacturing facilities, parts work hand-in-hand to complete separate but related jobs; when one machine is down awaiting maintenance the others are, too. Broken machines mean you’ll likely have employees on the clock that can’t complete their objectives, too.

- **Regular attention is usually less expensive than big fixes.**

Ignorance of an ongoing issue with a machine can damage part, which can be expensive and time-consuming. The nature of heavy machinery is such that regular tune-ups can extend its parts’ lifespan by years through elimination of clogs, friction-points, and broken valves. Once these issues ignored for too long, they become unfixable.

- **It can help improve your machines’ resale value.**

It’s a well-known fact in the mechanical industry that many machines and parts are bought and sold pre-owned. When machinery costs hundreds of thousands of dollars, a well-maintained, used counterpart may only be a fraction of the cost. If you’re ever planning

## Unit 5.2: Equipments maintenance activities

## Unit Objectives

**At the end of this unit, you will be able to:**

1. Know about maintenance activities
2. Know about objectives of maintenance
3. Know about maintenance records

### 5.2.1 Equipment maintenance activities

**Objective of Good Maintenance:**

The objective of maintenance is to improve the performance of equipment by make sure that equipment performs frequently and efficiently. It also prevents breakdowns or failures and reduces losses happens due to failures.

List of maintenance objectives are:

1. It keeps plant & equipment in good condition and keeps the production at maximum.
2. Maintain equipment full efficiency with minimum usage of energy.
3. Reduces risks during operation and improves safety.
4. Improves life of equipment with lower cost of operation.
5. Optimize full resource utilization with high productivity.
6. To reduce plant and equipment breakdown hours.
7. To maintain lowest inventory and procurement of spares in time.
8. To improve plant & equipment reliability and productivity.
9. Conducts engineering works like modifications, installation, and relocation.
10. Evaluates performance, takes corrective actions and measures progress.
11. Make the system flexible for any future changes.



## 6. Calibration

Unit 6.1 – Calibration

Unit 6.2 – Calibration procedure of instruments

Unit 6.3 – Calibration tests of instruments



## Key Learning Outcomes

**At the end of this module, you will be able to:**

1. Know about calibration
2. Know about calibration standards
3. Know about calibration procedure
4. Maintenance of calibration records
5. Perform calibration of instruments
6. Know about calibration tests
7. Perform calibration tests



**Skill India**  
कौशल भारत - कुशल भारत



**Address:** Royal Exchange, 6 N.S. Road, Kolkata - 700 001  
**E-mail:** info.iisssc@gmail.com  
**Web:** www.iisssc.org  
**Phone:** +91 9831083024  
**CIN No.:** U74900WB2013NPL197827

**Price: ₹**

978-1-111-22222-45-7

