



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. ”



**COMPLIANCE TO
QUALIFICATION PACK – NATIONAL OCCUPATIONAL
STANDARDS**

is hereby issued by the

GEM AND JEWELLERY SKILL COUNCIL OF INDIA
for

SKILLING CONTENT : PARTICIPANT HANDBOOK

Complying to National Occupational Standards of

Job Role/ Qualification Pack: **'Assorter' (Advanced)** QP No. **G&J/Q3603/NSQF Level 4'**

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Sincerely,



Prem Kumar Kothari

Chairman, GJSCI

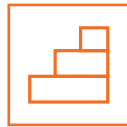
About this book

1. This Participant Handbook is designed to enable training for the specific Qualification Pack(QP).
2. Each National Occupational (NOS) is covered across Unit/s.
3. Key Learning Objectives for the specific NOS mark the beginning of the Unit/s for that NOS.
4. The symbols used in this book are described below.
5. This book is about assorting diamonds.
6. This book will introduce assorters to mining, 4Cs of diamond and it sorting steps.

Symbols Used



Key Learning
Outcomes



Steps



Tips



Notes



Unit
Objectives



Exercise

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सत्यमेव जयते
GOVERNMENT OF INDIA
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& ENTREPRENEURSHIP



N.S.D.C.
National
Skill Development
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Transforming the skill landscape

1. Introduction, Diamond Formation and Mining

Unit 1.1 - Introduction, Diamond Formation, Mining and Sources



Gem & Jewellery Skill Council of India



G&J/N3604

Key Learning Outcomes

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

1. Know the derivation of the word diamond.
2. Understand the formation of diamonds in nature.
3. Know the various properties of diamond.
4. Understand the types of sources.
5. Know the various types of diamond rough.
6. Understand the various types of mining.
7. Understand the concept of recovery.
8. Know the various historical and current sources.
9. Know the various mining companies.

Unit 1.1: Introduction, Diamond Formation, Mining and Sources

Unit Objectives

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

1. Understand the evolution of the word diamond.
2. Understand in detail the formation of diamond.
3. Understand the properties of diamond.
4. Understand the Various types of sources.
5. Know the different types of diamond rough.
6. Understand the various types of mining techniques.
7. . Understand the concept of recovery from ore.
8. Know the various traditional and current sources of diamonds.
9. Know the various mining companies.

1.1.1 The Word Diamond

Unit Objectives Diamond is derived from 'adamas' - a Greek word , Adamas in greek language means unbreakable and its lustre is called as adamantine, adamantine means unconquerable.

1.1.2 Formation of Diamonds

Formation of diamonds requires the following:

High temperature (1500 to 1800C)

High pressure (45,000 to 60,000 kilobar)

Most important, Carbon (99.95%)

Diamonds are formed at high temperature and high pressure at an approximate depths of 120 to 190 kilometres in the Earth's mantle. eclogite and peridotite are Carbon containing minerals which provide the carbon source, and the growth occurs over long period from 1 billion to 3.3 billion years (which is approx 25% to 75% of the age of the Earth). Diamonds are transported close to the Earth's surface through deep volcanic eruptions by magma, which cools into rocks termed as kimberlites and lamproites. They have form a carrot shaped structure called diamond pipes. Very few rocks in these diamond pipes have diamonds.

1.1.3 Diamond Properties

Properties of diamond:

- Chemical composition: Carbon
- Hardness: 10 on Mohs scale (Hardest Mineral on earth crust) .
- Specific gravity: 3.52.
- Refractive index (RI - it is the ratio of speed of light in air to speed of light in gem): 2.417

1.1.4 Various Types of Sources

Following are the types of sources:

1. Primary

- Once diamonds have been transported to the surface by magma through volcanic pipe, they may erupt and be distributed over a large area. A volcanic pipe which contains diamonds is known as a primary source of diamonds. For example, - dykes and veins.

2. Alluvial source

- Also known as secondary sources of diamonds include all areas where a significant number of diamonds have been eroded out of their kimberlite or lamproite block area, and accumulated because of water or wind action.
- These include alluvial deposits and deposits along existing and ancient shorelines, river beds, where loose diamonds tend to deposit because of their size and density.
- Marine source is a type of alluvial source.

1.1.5 Types of Rough Diamond

Following are the types of diamond rough:

1. Gem quality:

- These are those roughs which are used in jewellery.

2. Near gem quality:

- They are those diamonds roughs which have borderline colour and clarity and can be used both in jewellery and industry depending on market conditions.

3. Industrial:

- They are those roughs which are used for industrial purpose like cutting, polishing purpose.

1.1.6 Types of Mining

Following are the types of mining:

1. Open pit

- It is also called as surface mining.
- The ground is removed/ dug in layers to create a pit.
- Example: Big hole at Kimberley in South Africa. Measuring 1 mile in circumference and 440 yards deep.

2. Shaft

- These are Deep or underground mining.
- These are vertical stopes around the perimeter and pipe with horizontal shafts leading into pipe.

3. Alluvial

- Secondary mining is done in rivers, streams, dry beds and ocean shores.
- Primitive mining: Done with panning with pie thins and plastic buckets.
- Mechanized mining: Done with giant earth movers to help shift over burden.
- Marine mining is done in Namibia.



Fig. 1.1.6.1 Open pit mines

1.1.6 Types of Mining



Fig. 1.1.6.2 Open pit mines

1.1.6 Types of Mining



Fig. 1.1.6.3 Shaft / Underground mines