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भारतीय मानक ब्यूरो

जड़े हुए हीरों की ग्रेडिंग - भाग 1 - हीरा परीक्षण और ग्रेडिंग प्रयोगशाला की योग्यता के लिए सामान्य आवश्यकताएं

Draft Indian Standard

Grading of Mounted diamonds - Part 1 - General requirements for competence of a diamond testing and grading laboratory

ICS 39.060

Precious Metal Sectional Committee, MTD 10.	Last date of comment: 26/08/2025

Foreword

(*Formal foreword clause will be added later*)

There are a number of diamond testing and grading laboratories existing in major gem and diamond testing centres in India such as Mumbai, Surat, Jaipur, Delhi, Chennai, etc. To enhance consumer confidence while transacting valuable material like diamonds, their certification by a credible laboratory, manned by well qualified and experienced manpower along with the necessary equipment has become a necessity today. Therefore, it is extremely important to formulate/ lay down minimum acceptable protocols to be followed for certification. This would enhance the credibility of certification resulting in consumers transacting with greater degree of confidence.

Further BIS has already formulated standard IS 15766 (Part 1 & 2) for Grading of polished diamonds which is for grading of loose diamonds. However, the diamonds are largely purchased by the consumer in a condition where they are already mounted on a jewellery. It was thus felt necessary to formulate a standard specifying grading of cut and polished diamond, mounted in jewellery.

The standard is being formulated in two parts

Grading of Mounted diamonds - Part 1 - General requirements for competence of a diamond testing and grading laboratory
Grading of Mounted diamonds - Part 2 – Classification and test method

Grading of Mounted diamonds - Part 1 - General requirements for competence of a diamond testing and grading laboratory

1. SCOPE

The purpose of this document is to specify the minimum requirements which a laboratory shall comply with and demonstrate its competency to carry out identification and grading of diamonds when mounted in jewellery, along with their disclosure in consistent and clear terms.

The procedure below should not be construed as laying down exhaustive law/ guidelines for operation of a testing laboratory. All regulatory and statutory requirements (applicable from time to time) shall always be complied with.

2. REFERENCES

The standards listed in Annex A contain provisions, which through references in this text constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of these standards.

3.TERMINOLOGY

For the purpose definition given in IS 15677 PART 1 & MTD/10/28297 (Jewellery — Consumer confidence in the diamond industry) shall apply.

4. MANAGEMENT REQUIREMENT

4.1 A gemmological laboratory shall ensure that it is impartial, and all its personnel employed are free from any conflict of interest on account of undue commercial, financial and other internal or external pressures, which might influence their quality of work or technical judgment. The gemmological laboratory shall not engage in any activity that may compromise the trust in its independence of judgment and integrity in relation to its testing and reporting. The owner of the laboratory or testing personnel or gemmologist(s) shall not be engaged in any type of trading activities or manufacturing of gemstones / jewellery.

4.2 Customer information i.e., 'Know Your Customer' (KYC) is to be captured for all customers / depositors of samples. In case of companies / firms, registration details shall be captured through PAN card of company or GST Number. In case of individuals, a valid photo ID proof (PAN / Aadhar card) and Mobile number shall be captured as minimum requirement. Also, in view of the confidentiality of Aadhar/PAN card data, laboratories shall strive to keep such data secure.

4.3 The samples collected must be recorded under a reference or identification number. The information about depositor or owner of the stones / samples should remain anonymous to the technical staff, till the sample(s) are tested and returned to the customer / depositor, along with the report. Preferably during the testing procedure, customer's information may not be revealed to the technical staff.

4.4 The depositor may interact with the laboratory management for any clarification(s) through authorised official(s) about the test results and should be prohibited from directly contacting the technical staff.

4.5 Testing and internal calibrations of equipment shall be performed and/or supervised by technically qualified staff, designated by the management or the laboratory in-charge.

4.6 Technical staff shall be appointed to manage the quality of the work carried out in the gemmological laboratory. This official shall ensure that all test protocols are adhered to, that quality and due diligence systems are followed at all the stages of certification and that the staff is aware of their quality related responsibilities and due diligence protocols at all the times.

4.7 A due diligence system of protocol that ensures the quality of the work carried out by the gemmological laboratory shall be available to the staff and the contents of the same should be effectively tutored and communicated to the staff. These protocols shall cover all aspects of the gemmological laboratory functions, including receipt of goods, weights and measures, inventory control, work distribution, instrument maintenance and operation, results analysis and report nomenclature. A standard operating procedure/manual explaining the same shall also be prepared for transparency and future upgradation whenever necessary.

4.8 The gemmological laboratory shall establish and maintain procedures for identification, collection, indexing, access, filing, storage, maintenance and disposal of quality and technical records.

4.9 Technical staff carrying out testing procedure and test results should sign the worksheets manually or digitally, provided they are authorized by the management/Head of the Laboratory.

4.10 Signature of Authorised signatory shall be recorded on issued test reports.

4.11 Gemmological laboratory providing testing facility away from its permanent facility/at customer facility is given at **Annex B.**

5 TECHNICAL REQUIREMENTS

Many factors determine the correctness and reliability of the tests, grading and/or internal calibrations performed by a gemmological laboratory. These factors include contributions from:

a) human factors
b) environmental conditions
c) equipment
d) trackability and traceability of the results

5.1 Personnel

5.1.1 The gemmological laboratory management shall ensure the competence of all who operate specific equipment, perform tests and/or internal calibrations, evaluate results, and authorising personnel.

5.1.2 As a minimum requirement, the technical staff (grader / gemmologist) must possess a gemmological qualification / experience as per clauses 5.1.3 to 5.1.6.

5.1.3 For Diamond Grading personnel: Minimum qualification of 10th level of school education, and Professional diamond grading qualification course of minimum 240 hours. Further the technical staff (grader) must possess an experience of at least 2 years in the diamond grading field.

5.1.4 For Diamond Screening / Identification, where Artificial Intelligence (AI) based screening equipment are used and do not require technical expertise: Minimum qualification of 10thlevel of High school education, and Basic diamond grading course of minimum 30 hours / gemmological qualification. Further the technical staff must be trained for a minimum period of 3 months.

5.1.5 Authorising personnel for Diamond Identification, where AI based equipment are not used and interpretation of results is based on research and analyses of the spectra or the growth patterns:

For identification of diamonds (authorising personnel)			
Minimum years of experience / Minimum Qualification	Two	Four	Seven
Postgraduate in Science with diploma in gemmology such as (FGA) Gem-A) / (GG/GD/GCS/GPP) GIA / SSEF / Gubelin / AIGS / GIT / GII / IGI / IDI / IIGJ / GTL or any equivalent qualification recognized by GJEPC.	Same field of Testing	Similar field of Testing	
Graduate in Science with diploma in gemmology such as (FGA) Gem-A) / (GG/GD/GCS/GPP) GIA / SSEF / Gubelin / AIGS / GIT / GII / IGI / IDI / IIGJ / GTL or any equivalent qualification recognized by GJEPC.	-N/A-	Same field of Testing	Similar field of Testing
Graduate in any Discipline with diploma in gemmology such as (FGA) Gem-A) / (GG/GD/GCS/GPP) GIA / SSEF / Gubelin / AIGS / GIT / GII / IGI / IDI / IIGJ / GTL or any equivalent qualification recognized by GJEPC, or ITI/Equivalent	-N/A-	-N/A-	Same field of Testing
Accurate colour vision is to be ascertained for all gemmological staff.			

5.1.6 Other Gemmological staff carrying out testing procedures on various spectrometers and imaging equipment: Graduate in Science, if data interpretation is performed, and Graduate in any stream if data collection is performed, plus Professional gemmological qualification, such as (FGA) Gem-A) / (GG/GD/GCS/GPP) GIA / SSEF / Gubelin / AIGS / GIT /

GII / IGI / IDI / IIGJ /GTL / GSI or any equivalent course recognized by GJEPC, and with minimum experience/training of 2 years in the same field.

5.2 Environmental conditions

5.2.1 The laboratory should be operated under the following environmental conditions:

a) Proper lighting condition (6000 - 6500 k)
b) Safety and security (e.g. CCTV Camera, Security Personnel, etc)
c) Cushion flooring (to avoid breakage of Stones)
d) Colour (neutral) on the walls and furniture, and comfortable workstations for staff
e) Temperature and Humidity conditions to be maintained per the standard requirement of the instrumentation being used.

5.3 Equipment

5.3.1 The gemmological laboratory shall have all equipment required to carry out all specific tests to meet the specific requests / services made by the depositor.

5.3.2 All gemmological laboratories issuing reports for mounted diamonds must use the instruments listed in Table 1, usage of some of which are mandatory, while the others are optional.

Table 1: List of instruments recommended for a gemmological laboratory (elementary) to carry out basic identification of diamonds

(*Clause 5.3.2*)

S. No.	Instrument name	Mandatory or Optional
(1)	(2)	(3)
1.	Diamond Screening Equipment - imaging or spectrometer based***(refer clauses A.1.4 to A.1.6)***	Mandatory
2.	Long-wave and short-wave ultraviolet lamps	Mandatory
3.	Weighing balance (up to three decimal points)	Mandatory
4.	Gemmological microscope (with magnifications of up to at least 45x)	Mandatory
5.	Fibre optic light source	Optional
6.	Measurement gauge (mm)	Mandatory
7.	Grading lamp (diffused white light - colour temperature of 6000K)	Mandatory
8.	Photography equipment	Mandatory

5.3.3 Detection of diamonds based on the screening with imaging instruments or spectrometers using automatic interpretation as listed in Table 1 are subject to “referral diamonds” or “non-diamonds”. These “referral diamonds” or “non-diamonds” shall be tested with additional instruments as given in table 2 for conclusive identification.

5.3.4 For diamond screening and verification, instruments listed in ASSURE Directory 2.0 released by Natural Diamond Council may be used.

5.3.5 There are other diamond screening and verification instruments available in the market for use, however, their performance on accuracy and consistency is not established.

Therefore, these instruments may be used after establishing their performance. It will be responsibility of individual laboratories to establish the performance of an instrument under use to be fit for intended use, based on parameters like repeatability, accuracy, reproducibility, etc.

5.3.6 Table 2 lists the additional instruments which are required to further establish “referral diamonds”, “non-diamonds” and presence or absence of treatments.

Table.2: List of additional instruments recommended for a gemmological laboratory (advanced) to carry out advanced identification of diamonds, including establishing the nature of referral diamonds, non-diamonds and treatments

(*Clause 5.3.6*)

S. No.	Instrument	Optional or Mandatory	Purpose
(1)	(2)	(3)	(4)
1.	Infra-red spectrometer (FTIR) with microscope	Optional	Basic identification. *Refer clause A.1.3*
		Mandatory	If a laboratory establishes the nature of referral and non-diamonds.
2.	Laser Raman Spectrometer (LRS) with Photoluminescence (PL) measurement kit*	Optional	1. Basic identification. *Refer clause A.1.3* 2. If laboratory is using FTIR with microscope to establish nature of non-diamonds.
		Mandatory	1. If a laboratory establishes the nature of referral diamonds as natural or laboratory grown. 2. If a laboratory reports on HPHT treatment*.
3.	EDXRF	Optional	Basic identification. *Refer clause A.1.3*
		Mandatory	If a laboratory reports on glass filling in diamonds.

5.3.7 The laboratory shall have all the equipment listed in Table.3 to precisely carry out the grading process.

Table.3
(*Clause 5.3.7*)

S.No.	Instrument name	Mandatory or Optional	Purpose
(1)	(2)	(3)	(4)
1.	Weighing balance (up to three decimal points)	Mandatory	Basic grading
2.	Measurement gauge (mm)	Optional	Only if, type of setting allows measurements
3.	Colour Grading lamp (diffused white light - colour temperature of 6500K) with limited UV, enclosed in open box with neutral interior grey walls	Mandatory	Basic grading
4.	10x Loupe/tweezer / shade card / neutral white holders for various types of jewellery items	Mandatory	Basic grading
5.	Gemmological microscope (10x magnification shall be used for clarity Grading)	Mandatory	Basic grading

5.3.8 In case of inability of laboratories to detect for HPHT treatment., the following limitation statement shall be used in reports
"Due to mounting limitation origin of the colour of diamonds not determined."

5.3.8 Maintenance of equipment

5.3.8.1 All instruments must be optimized for their operation and validated.

5.3.8.2 A record is to be maintained of the last service performed and due date of the next service schedule.

5.3.9 Calibration standards and reference samples

5.3.9.1 Calibrations are to be done on the available instruments from competent calibration laboratory/within a gemmological laboratory for appropriate metrological traceability. Given below is list of calibrated or reference samples which a gem laboratory may use:

5.3.9.2 Calibrated Reference weights calibrated by competent calibration laboratory to be used to calibrate/conduct intermediate check on weighing scales/balances (up to three decimal points).

5.3.9.3 Standard reference samples provided and/or suggested by the manufacturer of spectrometers and/or screening machines shall be used to calibrate the machines as per defined protocol, if CRM/BND is not available for the same.

5.3.9.4 All diamonds should be cleaned to remove all surface contaminants before measurement and grading processes.

5.4 Trackability and Traceability of the Technical records

5.4.1 Each of the results reported in the final report should be traceable. The gemmological laboratory shall have quality control procedures for monitoring the validity of results, retesting, replicate testing, reproducibility of tests, grading and internal calibrations (Intermediate checks) undertaken.

5.4.2 All the tests performed and observational features used to reach to the conclusion should be recorded in detail, either manually or digitally. It is recommended that details of every sample being tested at the laboratory, should be recorded in such a way that the sample can be identified and traced in the future.

5.4.3 Copies of reports, working notes, etc. shall be retained in a secure manner at least for 5 years, or longer if required.

ANNEX A
(Clause 2)
LIST OF REFERRED STANDARD

IS No.	Title
IS 15766 (Part 1):2007	Grading of polished diamonds: Part 1 classification

ANNEX B
REQUIREMENT FOR GEMOLOGICAL LABORATORIES PROVIDING TESTING FACILITY OF DIAMONDS MOUNTED IN JEWELLERY AT CUSTOMER FACILITY (MOBILE LABORATORY)

B-1 Impartiality and Confidentiality

B-1.1 In accordance with the Impartiality Clause, all laboratory employees must sign an Impartiality and Confidentiality Agreement prior to conducting mobile lab activities. Allotment of grader for mobile lab activities shall be on rotational basis.

B-2 Infrastructure Requirements

B-2.1 The site must provide CCTV camera surveillance and a dedicated space for lab personnel to operate securely and efficiently & shall provide neutral environment for colour grading.

B-3 Equipment Requirements

B-3.1 For grading purposes, a microscope and basic screening equipment shall be available on-site. These instruments shall be capable of distinguishing between natural and laboratory-grown diamonds.

B-3.2 Verification of the equipment used for testing at customer facility shall be undertaken and records for which shall be retained.

B-4 Manpower Allocation

B-4.1 Graders are to be assigned for each mobile lab event based on the quantity of items specified by the depositor. Allotment of grader for mobile lab activities shall be on rotational basis.

B-4.2 Laboratory shall identify and authorised personnel to perform testing at customer facility including senior grader to be send for quality checks.

B-5 Grading of Solitaire Diamonds in Jewellery

B-5.1 Solitaire diamonds up to 2.99 carats (individual stone weight) that are studded in jewellery can be graded on-site.

B-5.2 Solitaire diamonds above 2.99 carats must be sent to the permanent facility for grading.

B-6 Screening of Solitaire Diamonds in mounted jewellery

B-6.1 Single Solitaire diamonds up to 0.70 carats mounted in jewellery can be screened on-site.

B-6.2 Any solitaire diamond above 0.70 carats mounted in jewellery shall be screened at the permanent facility.