

Standard Methods for Testing

Fei Cui (Jadeite Jade)

for Hong Kong

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Foreword

This **Standard Methods for Testing Fei Cui (Jadeite Jade) for Hong Kong** presents the recommended standard methods for testing of Fei Cui (Jadeite Jade) for gemstone identification and verification purposes in Hong Kong. This Standard has been issued and is published by the Gemmological Association of Hong Kong Limited (GAHK).

This Standard has been prepared by a group of local gemmologists, academia and gemstone and jewellery associations representatives. To ensure its acceptance as a consensus document in Hong Kong, a draft version of this standard was widely circulated to interested parties in the gemstone and jewellery industry through the members of the Task Force for Gemstone Testing (established under the Accreditation Advisory Board of the Hong Kong Accreditation Service) and their opinions sought. A number of useful comments were received, and these have been taken into account in finalizing this Standard. All such contributions are gratefully acknowledged.

Those working in the Gemstone industry are encouraged to comment at any time to the GAHK on the contents of this standard, so that improvements may be made to future editions.

Introduction

While international guidelines and requirements exist for testing and identifying diamonds, pearls and other gemstones, there have been, until now, no commonly accepted specifications and procedures on testing Fei Cui (Jadeite Jade) which local gemmologists, gemstone laboratory personnel, traders and manufacturers might adopt as standard practice. In the past, complaints have been made by purchasers of Fei Cui (Jadeite Jade) regarding the imprecise wording and lack of consistency in the data presented and test results reported in certificates issued by local laboratories. This has resulted not only in the loss of creditability of local gemstone testing, but also has made the consumer wary of purchasing Fei Cui (Jadeite Jade).

In an effort to strengthen the confidence of those wishing to buy Fei Cui (Jadeite Jade) and to enhance the credibility of the local gemstone testing industry, this document is issued with a view to regularizing the following:

- [1] The practice and methodology of Fei Cui (Jadeite Jade) testing,
- [2] The technical specifications to be set and the formats and contents to be used when issuing Fei Cui (Jadeite Jade) test reports or test certificates, and
- [3] The definition and nomenclature of Fei Cui (Jadeite Jade).

This version **Standard Methods for Testing Fei Cui (Jadeite Jade) for Hong Kong (2006)** supersedes the previous version **Standard Method for Testing Jadeite Jade for Hong Kong (2004)** with immediate effect.

Language

In the text, English and Chinese are used together for the definition of Fei Cui (Jadeite Jade). The English language version remains the definitive version.

Fei Cui (Jadeite Jade)

Definition of Fei Cui (Jadeite Jade):

Fei Cui (Jadeite Jade) is a granular to fibrous polycrystalline aggregate. It is composed of Jadeite as major mineral. It may consist of other minor minerals such as Omphacite, Kosmochlor, Amphibole and Feldspar.

Major Physical Properties of Fei Cui (Jadeite Jade) :

Crystal Habit:	Polycrystalline, granular to fibrous
Common Colour:	Colourless, White and green, yellow, reddish orange, brown, grey, black, light purplish red, violet, blue, pink and etc. with different tone.
¹ Lustre :	Glassy luster to greasy luster
Cleavage :	Jadeite has two directions of perfect cleavages , the polycrystalline crystal aggregate may show minute glistening surface.
¹ Mohs' Hardness:	6.5 – 7.
² Specific Gravity:	3.34 (+0.06, -0.09)
Optical Nature:	Anisotropic polycrystalline aggregate.
Refractive Index:	1.666 – 1.680 (±0.008) , by spot method (distance vision method) normally read as 1.66 °
Ultraviolet Fluorescence:	None to faint, white, green, and yellow.
Absorption Spectrum:	437 nm absorption line; absorption line(s) approximately at 630 nm , 660nm and 690 nm are observed on green jadeite jade coloured by chromium.
Magnification:	Spots 、 needle 、 glistening 、 Fibrous (texture) to Granular (texture) 、 solid inclusion °

Notes:

¹The test for luster and Mohs' Hardness are not included in the scope of the Standard Methods for Testing Fei Cui (Jadeite Jade) for Hong Kong

² The standard testing method of Determination of Specific Gravity is not applicable on mounted Fei Cui (Jadeite Jade).

Type of Fei Cui (Jadeite Jade)

Type	Known as	Definition
Natural Fei Cui (Jadeite Jade)	Type A	Refers to natural Fei Cui (Jadeite Jade) which is not subject to any form of chemical treatment ¹
Chemically Treated and resin Impregnated Fei Cui (Jadeite Jade)	Type B	Refers to Fei Cui (Jadeite Jade) which is chemically treated and resin impregnated.
Dyed Colour Fei Cui (Jadeite Jade)	Type C	Refers to Fei Cui (Jadeite Jade) which is dyed with colour.
Chemically Treated, Resin Impregnated and Dyed Colour Fei Cui (Jadeite Jade)	Type B+C	Refers to Fei Cui (Jadeite Jade) which is chemically treated, resin impregnated and dyed with colour.

Notes:

¹To polish natural Fei Cui (Jadeite Jade) with colourless wax, which does not cause any damage on the crystalline structure of the jadeite jade, shall not be classified as a chemical treatment.

STANDARD TEST METHOD 1

SHAPE AND CUT IDENTIFICATION OF FEI CUI (JADEITE JADE)

1.1 SCOPE

This Standard describes the method of identifying the shape and cut of Fei Cui (Jadeite Jade).

1.2 APPLICATION

The shape and cut apply to items made from Fei Cui (Jadeite Jade) as received by the laboratory for testing.

1.3 DEFINITIONS

There are no standard terms or wordings for describing the shape and cut of a piece of Fei Cui (Jadeite Jade).

1.4 APPARATUS

Not applicable

1.5 TEST ITEM

The identification of the shape and cut is a single unit test for a whole piece of test items in its entirety. Sampling of a number of test items to represent a batch of Fei Cui (Jadeite Jade) products shall not be permitted.

1.6 PROCEDURES

1. The test Fei Cui (Jadeite Jade) shall be cleaned scrupulously with a lint-free cloth.

2. The test Fei Cui (Jadeite Jade) shall be examined

carefully with unaided eyes.

3. The shape and cut of the test Fei Cui (Jadeite Jade) shall be identified and recorded.

1.7 EXPRESSION OF RESULTS

Not Applicable

1.8 TEST REPORT

The report shall affirm that the test was carried out in accordance with this Standard. The Shape and Cut identification should be reported as far as possible with other Fei Cui (Jadeite Jade) test results such as polariscope examination, measurement of dimensional & weight, identification of transparency, identification of colour, examination of fluorescence, Chelsea colour filter examination, determination of specific gravity & refractive index, infrared spectrum examination, magnification examination and spectroscopic examination. In general, the test report shall include but not be limited to the following:

- (a) Identification number of the Fei Cui (Jadeite Jade) item.
- (b) Date of test.
- (c) Standard method of Shape and Cut identification
- (d) Name of person carrying out the test.
- (e) Name and signature of person responsible for testing.

STANDARD TEST METHOD 2

MEASUREMENT OF DIMENSIONS OF FEI CUI (JADEITE JADE)

1.1 SCOPE

This Standard describes the method of measuring the dimensions of Fei Cui (Jadeite Jade).

1.2 APPLICATION

The measurement of dimensions applies to items made from Fei Cui (Jadeite Jade) as received by the laboratory for testing.

1.3 DEFINITIONS

Dimensions: The length, width and thickness of the test item.

1.4 APPARATUS

The following apparatuses are required:

1. Calibre : A calibre with a unit in millimetre, a resolution of 0.01 mm and an accuracy of at least 0.1mm.
2. Electronic gauge: An electronic gauge with a unit in millimetre, a resolution of 0.01 mm and an accuracy of at least 0.1 mm.
3. Steel rule: A steel rule with a unit in millimetre, a resolution of 0.5 mm and an accuracy of at least 1 mm.

1.5 TEST ITEM

The measurement of dimensions is a single unit test for a whole piece of test item in its entirety. Sampling of a number of test items to represent a batch of Fei Cui (Jadeite Jade) products shall not be permitted.

1.6 PROCEDURES

- 1.The electronic gauge shall be set to zero before the measurement is taken and should be tested before use.
- 2.The test Fei Cui (Jadeite Jade) shall be cleaned

scrupulously with a lint-free cloth.

- 3.The dimensions of the Fei Cui (Jadeite Jade) including the length, width, thickness, inner and outer diameter (if appropriate) shall be measured using an electronic gauge or calibre. The dimensions measured shall be recorded to at least 1 decimal place.

A steel rule shall only be used for test items with dimension measurement 150mm or over. The dimensions measured shall be recorded to at least 1mm.

- 4.For test items that are hollow, the maximum outer diameter and the maximum inner diameter (if any) shall also be measured and recorded.

1.7 EXPRESSION OF RESULTS

Express the length, width and thickness of the Fei Cui (Jadeite Jade) measured.

1.8 TEST REPORT

The report shall affirm that the test was carried out in accordance with this Standard. The measurement of dimensions should be reported as far as possible with other Fei Cui (Jadeite Jade) test results such as polariscope examination, shape and cut identification, measurement of weight, identification of transparency, identification of colour, examination of fluorescence, Chelsea colour filter examination, determination of specific gravity & refractive index, infrared spectrum examination, magnification examination and spectroscopic examination. In general, the test report shall include but not be limited to the following:

- (a) Identification number of the Fei Cui (Jadeite Jade) item.
- (b) Date of test.
- (c) Standard method of measurement of dimensions.
- (d) Name of person carrying out the test.
- (e) Name and signature of person responsible for testing.

STANDARD TEST METHOD 3

MEASUREMENT OF WEIGHT OF FEI CUI (JADEITE JADE)

1.1 SCOPE

This Standard describes the method of measuring the weight of Fei Cui (Jadeite Jade).

1.2 APPLICATION

The measurement of weight applies to items made from Fei Cui (Jadeite Jade) as received by the laboratory for testing.

1.3 DEFINITIONS

Weight: The vertical force exerted by a mass as a result of gravity.

Mounted Fei Cui (Jadeite Jade): Fei Cui (Jadeite Jade) set singly, or in a group or cluster, on a piece of jewellery.

1.4 APPARATUS

The following apparatus is required:

1. Balance: A balance with a unit in carat, a resolution of 0.001 carat and an accuracy of at least 0.01 carat;

or

2. Balance (for items weighing 200 carats and over): A balance with a resolution of 0.01 carat and an accuracy of at least 0.1 carat.

1.5 TEST ITEM

The measurement of dimension is a single unit test for a whole piece of test items in its entirety. Sampling of a number of test items to represent a batch of Fei Cui (Jadeite Jade) products shall not be permitted.

1.6 PROCEDURES

1. The electronic balance shall be switched on and be tared to zero.
2. The test Fei Cui (Jadeite Jade) shall be cleaned scrupulously with a lint-free cloth.

3. The test Fei Cui (Jadeite Jade) shall then be placed centrally on the pan of the electronic balance.

4. For Fei Cui (Jadeite Jade) with a weight of less than 200 carats, the weight measured shall be recorded to the nearest 0.01 carat, using a balance as defined in 1.4.1.

For Fei Cui (Jadeite Jade) with a weight equal to or above 200 carats, the weight measured shall be recorded to the nearest 0.1 carat using a balance as defined in 1.4.2.

5. For a mounted Fei Cui (Jadeite Jade), the total weight of the whole setting shall be measured and recorded following the same procedures as described in 1-4.

1.7 EXPRESSION OF RESULTS

Not Applicable

1.8 TEST REPORT

The report shall affirm that the test was carried out in accordance with this Standard. The measurement of weight should be reported as far as possible with other Fei Cui (Jadeite Jade) test results such as polariscope examination, shape and cut identification, measurement of dimensions, identification of transparency, identification of colour, examination of fluorescence, Chelsea colour filter examination, determination of specific gravity & refractive index, infrared spectrum examination, magnification examination and spectroscopic examination. In general, the test report shall include but not be limited to the following:

- (a) Identification number of the Fei Cui (Jadeite Jade) item.
- (b) Date of test.
- (c) Standard method of measurement of weight.
- (d) Name of person carrying out the test.
- (e) Name and signature of person responsible for testing.

STANDARD TEST METHOD 4

IDENTIFICATION OF TRANSPARENCY OF FEI CUI (JADEITE JADE)

1.1 SCOPE

This Standard describes the method of identifying the degree of transparency of Fei Cui (Jadeite Jade).

1.2 APPLICATION

The transparency identification applies to items made from Fei Cui (Jadeite Jade) as received by the laboratory for testing.

1.3 DEFINITIONS

Degree of transparency:

Transparent	Capable of transmitting light with little or no blur-out
Translucent	Capable of transmitting and diffusing light, but an object viewed through the test Fei Cui (Jadeite Jade) cannot be distinguished
Opaque	Incapable of transmitting light

Mounted Fei Cui (Jadeite Jade): Fei Cui (Jadeite Jade) set singly, or in a group or cluster, on a piece of jewellery.

1.4 APPARATUS

The following apparatus is required:

A bright light source.

1.5 TEST ITEM

The identification of transparency is a single unit test for a whole piece of Fei Cui (Jadeite Jade) item in its entirety. Sampling of a number of Fei Cui (Jadeite Jade) items to represent a batch of Fei Cui (Jadeite Jade) products shall not be permitted.

1.6 PROCEDURE FOR IDENTIFICATION OF THE TRANSPARENCY OF FEI CUI (JADEITE JADE)

1. The test Fei Cui (Jadeite Jade) shall be cleaned scrupulously with a lint-free cloth

2. The major portion of the test Fei Cui (Jadeite Jade) shall be shined through by a bright light source.

3. The degree of transparency of the major portion of the test Fei Cui (Jadeite Jade) shall be identified and recorded.

1.7 EXPRESSION OF RESULTS

Not Applicable

1.8 TEST REPORT

The report shall affirm that the test was carried out in accordance with this Standard. The identification of transparency should be reported as far as possible with other Fei Cui (Jadeite Jade) test results such as polariscope examination, shape and cut identification, measurement of dimensions and weight, identification of colour, examination of fluorescence, Chelsea colour filter examination, determination of specific gravity & refractive index, infrared spectrum examination, magnification examination and spectroscopic examination. In general, the test report shall include but not be limited to the following:

- (a) Identification number of the Fei Cui (Jadeite Jade) item.
- (b) Date of test.
- (c) Standard method of identification of transparency
- (d) Name of person carrying out the test.
- (e) Name and signature of person responsible for testing

STANDARD TEST METHOD 5

IDENTIFICATION OF COLOUR OF FEI CUI (JADEITE JADE)

1.1 SCOPE

This Standard describes the method of identifying the colour of Fei Cui (Jadeite Jade).

1.2 APPLICATION

The colour identification applies to items made from Fei Cui (Jadeite Jade) as received by the laboratory for testing.

1.3 DEFINITIONS

Hue: Hue is the basic impression of a colour.

Tone: The relative impression of lightness or darkness of the object of its colour.

Saturation: The strength, purity or intensity of the hue.

1.4 APPARATUS

The following apparatus is required:

A day-light equivalent reflected light source.

1.5 TEST ITEM

The identification of colour is a single unit test for a whole piece of test item in its entirety. Sampling of a number of test items to represent a batch of Fei Cui (Jadeite Jade) products shall not be permitted.

1.6 PROCEDURES

1. The test Fei Cui (Jadeite Jade) shall be cleaned scrupulously with a lint-free cloth.
2. The test Fei Cui (Jadeite Jade) shall be placed against a white background and shined with a day-light equivalent reflected light.
3. For a Fei Cui (Jadeite Jade) that is green in colour in its entirety, the “tone” and “saturation” shall be identified and recorded first. The combination of the identified “saturation” and “tone” shall be expressed as the equivalent “Colour Prefix” according to Table 1. For instance, for a Fei Cui (Jadeite Jade) that is “low” in “saturation” and “light” in “tone”, it shall be described as “pale”.

4. The Colour Prefix, Saturation & Tone Relationship is summarized in Table 1

5. The hue of the test Fei Cui (Jadeite Jade) shall then be identified and recorded. The wordings must be selected from the Table of Hue for Green Jadeite (Table 2) shown below.

6. For a Fei Cui (Jadeite Jade) that is non-green in colour in its entirety, only the “hue” shall be recorded.

7. The identification of colour shall be recorded as “Colour Prefix” plus “Hue”.

8. If the test item has more than one colour in appearance, where green is the dominant colour, the description of the item shall be recorded as “green” **with** “other colour”.

If the test item has more than one colour in appearance, where green is not the dominant colour, the description of the item shall be recorded as “green” **in** “other colour”.

If the test item has more than one colour in appearance, where there is no green colour in any portion, the description of the item shall be recorded as “the dominant colour” **with** “other colour”.

8. The distribution of colour shall be described as :
1. Even
 2. Uneven
 3. Patches
 4. Veins
 5. Spots

Note :

Colour Prefix	Saturation	Tone
Pale	Low	Light
Light	Moderate	Light
N/A	Moderate	Medium
Bright	Strong	Light to Medium
Intense	Strong	Medium to Dark
Deep	Moderate	Dark
Dark	Low	Dark

Table 1 – The Colour Prefix, Saturation & Tone Relationship Table

Hue
Yellowish Green
Green
Bluish Green

Table 2 –Table of Hue for Green Jadeite

1.7 EXPRESSION OF RESULTS

Not Applicable

1.8 TEST REPORT

The report shall affirm that the test was carried out in accordance with this Standard. The identification of colour should be reported as far as possible with other Fei Cui (Jadeite Jade) test results such as polariscope examination, shape and cut identification, measurement of dimensions and weight, identification of transparency, examination of fluorescence, Chelsea colour filter examination, determination of specific gravity & refractive index, infrared spectrum examination, magnification examination and spectroscopic examination. In general, the test report shall include but not be limited to the following:

- (a) Identification number of the Fei Cui (Jadeite Jade) item.
- (b) Date of test.
- (c) Standard method of identification of colour
- (d) Name of person carrying out the test.
- (e) Name and signature of person responsible for testing

STANDARD TEST METHOD 6

FEI CUI (JADEITE JADE) POLARISCOPE EXAMINATION

1.1 SCOPE

This Standard describes how a polariscope should be used to detect whether the test Fei Cui (Jadeite Jade) is isotropic, anisotropic or polycrystalline.

1.2 APPLICATION

The polariscope examination applies to items made from Fei Cui (Jadeite Jade) as received by the laboratory for testing.

The polariscope serves only as a reference for the identification of Fei Cui (Jadeite Jade) on its authenticity.

1.3 DEFINITIONS

Isotropic: Isotropic materials exhibit the same optical properties in all directions through the material. Cubic crystals and amorphous materials are optically isotropic.

Anisotropic: Optically anisotropic materials exhibit different optical properties in different directions through the material. All crystal structures other than those in the cubic crystal system are optically anisotropic.

Polycrystalline: Substances which consist of many aggregated crystals. Polycrystalline materials possess no overall exterior crystal form.

1.4 APPARATUS

The following apparatus is required:

A polariscope.

1.5 TEST ITEM

The polariscope examination is a single unit test for a whole piece of test item in its entirety. Sampling of a number of test items to represent a batch of Fei Cui (Jadeite Jade) products shall not be permitted.

1.6 PROCEDURES

1. The test Fei Cui (Jadeite Jade) shall be cleaned scrupulously with a lint-free cloth.
2. The analyser and the polarizer shall be set in the

extinction position before the test commences.

3. The test Fei Cui (Jadeite Jade) shall be placed on the polarizer.
4. The test Fei Cui (Jadeite Jade) shall be rotated by 360°.
5. The observer shall look through the upper polarizing filter to observe the polarization effects.

Note:

Polariscope examination is not applicable to mounted Fei Cui (Jadeite Jade).

1.7 EXPRESSION OF RESULTS

Observations	Conclusions
Stone remains dark through 360°	Isotropic – amorphous or cubic
Stone goes light and dark 4 times through 360°	Anisotropic - uniaxial or biaxial
Stone stays light through 360°	Polycrystalline
Stone shows anomalous extinction effect	Strain anisotropy, often in otherwise isotropic material

1.8 TEST REPORT

The report shall affirm that the test was carried out in accordance with this Standard. The polariscope examination test result should be reported as far as possible with other Fei Cui (Jadeite Jade) test results such as shape & cut identification, measurement of dimensional & weight, identification of transparency, identification of colour, examination of fluorescence, Chelsea colour filter examination, determination of specific gravity & refractive index, infrared spectrum examination, magnification examination and spectroscopic examination. In general, the test report shall include but not be limited to the following:

- (a) Identification number of the Fei Cui (Jadeite Jade) item.
- (b) Date of test.
- (c) Standard method of polariscope examination
- (d) Name of person carrying out the test.
- (e) Name and signature of person responsible for testing.

STANDARD TEST METHOD 7

DETERMINATION OF REFRACTIVE INDEX OF FEI CUI (JADEITE JADE)

1.1 SCOPE

This Standard describes the method of determining the refractive index of Fei Cui (Jadeite Jade).

1.2 APPLICATION

The determination of refractive index applies to items made from Fei Cui (Jadeite Jade) as received by the laboratory for testing.

The refractive index may be used for the identification of Fei Cui (Jadeite Jade) on its authenticity.

1.3 DEFINITIONS

Refractive Index (RI): It is the ratio of the velocity of propagation of an electromagnetic wave in vacuum to its velocity in the medium.

The absolute index of refraction for a given medium is defined as: $n = c/v$

where c is the speed of light in a vacuum and v is the speed of light in the medium.

1.4 APPARATUS

The following apparatuses are required:

1. Refractometer: A total internal reflection refractometer with internal or external scale graduated as RI values (ranging from 1.40 to 1.80)
2. Contact liquid: Contact liquid with RI between 1.79 and 1.81. Its composition shall be methylene iodine saturated with sulphur and carbon di-iodide (or name as di-iodomethane)

1.5 TEST ITEM

The determination of refractive index is a single unit test for a whole piece of test item in its entirety. Sampling of a number of test items to represent a batch of Fei Cui (Jadeite Jade) products shall not be permitted.

1.6 PROCEDURES

1. The test Fei Cui (Jadeite Jade) shall be cleaned scrupulously with a lint-free cloth.
2. The best-polished side of the Fei Cui (Jadeite Jade) item shall be used.
3. A very small drop of contact liquid shall be dipped between the test item and the top surface of the hemicylinder. The test item shall be in optical contact with the contact liquid.
4. The long direction with the length of the hemicylinder shall be aligned if the spot is elongated.
5. If the image of the test Fei Cui (Jadeite Jade) extends more than three to four scale divisions:
 - i. The Fei Cui (Jadeite Jade) should be lifted straight up and the hemicylinder should be wiped off;
 - ii. The amount of liquid on the test Fei Cui (Jadeite Jade) could be reduced by touching it to the metal stage;
 - iii. The test Fei Cui (Jadeite Jade) shall be returned gently to the hemicylinder; and
 - iv. These steps shall be repeated until the spot covers only three to four scale divisions.

1.7 EXPRESSION OF RESULTS

One of the readings shall be observed:

- 50/50 Reading – This most accurate spot reading is generally found on well polished surfaces. The reading at the point where the spot is exactly half light and half dark shall

be taken.

- **Blink Reading** – This is the second most accurate spot reading. The reading at the point where the spot blinks abruptly from light to dark shall be taken.
- **Average Reading** – This least accurate spot reading is usually the result of poor polish, a slightly irregular surface, or too much contact liquid used. The spot lightens gradually over a wide range of the refractometer scale. The average reading of the last completely dark spot and the first completely light spot shall be taken.

1.8 TEST REPORT

The report shall affirm that the test was carried out in accordance with this Standard. The determination of refractive index should be reported as far as possible with other Fei Cui (Jadeite Jade) test results such as polariscope examination, shape and cut identification, measurement of dimensions and weight, identification of transparency, examination of fluorescence, Chelsea colour filter examination, determination of specific gravity, infrared spectrum examination, magnification examination and spectroscopic examination. In general, the test report shall include but not be limited to the following:

- (a) Identification number of the Fei Cui (Jadeite Jade) item.
- (b) Date of test.
- (c) Standard method of determination of refractive index.
- (d) Name of person carrying out the test.
- (e) Name and signature of person responsible for testing

STANDARD TEST METHOD 8

DETERMINATION OF SPECIFIC GRAVITY OF FEI CUI (JADEITE JADE)

1.1 SCOPE

This Standard describes the method of determining the specific gravity of Fei Cui (Jadeite Jade).

1.2 APPLICATION

The specific gravity determination applies to items made from Fei Cui (Jadeite Jade) as received by the laboratory for testing.

The specific gravity may be used for the identification of Fei Cui (Jadeite Jade) on its authenticity.

1.3 DEFINITIONS

Specific Gravity (SG): It is the mass of a unit volume of Fei Cui (Jadeite Jade) compared with the mass of the water in the same volume of the Fei Cui (Jadeite Jade) under test expressed without any dimensional unit.

$$\text{Specific gravity} = \frac{m_a}{m_a - m_l}$$

where

m_a is the weight in air (in carat)

m_l is the average weight in water (in carat)

Mounted Fei Cui (Jadeite Jade): Fei Cui (Jadeite Jade) set singly, or in a group or cluster, on a piece of jewellery.

1.4 APPARATUS

The following apparatuses are required:

1 Balance: A balance with a unit in carat, a resolution of 0.001 carat and an accuracy of 0.01 carat.

2. Balance (for item with a weight of equal to or over 200 carat): A balance with a unit in carat, a resolution of 0.01 carat and an accuracy of 0.1 carat.

3. Hydrostatic attachment: An attachment whereby the Fei Cui (Jadeite Jade) item can be hanged.

4. Water container: A container or beaker made in glass for holding sufficient amount of distilled water.

1.5 TEST ITEM

The determination of specific gravity is a single unit test for a whole piece of test item in its entirety. Sampling of a number of test items to represent a batch of Fei Cui (Jadeite Jade) products shall not be permitted.

1.6 PROCEDURES

1. The test Fei Cui (Jadeite Jade) shall be cleaned scrupulously with a lint-free cloth

2. The Fei Cui (Jadeite Jade) item shall be weighed using an electronic balance. The weight measured shall be taken to 0.01 carat and recorded as "weight in air, m_a ."

3. The hydrostatic attachment with sufficient distilled water shall be set up near the pan of the electronic balance.

4. The item shall then be placed on a wire basket and fully immersed in water. The basket shall not touch the bottom of the beaker and air bubbles shall not be allowed to be trapped on the surfaces of the item or the basket. The completely immersed item shall be weighed to 0.01 carat and its mass recorded as "weight in water".

5. Step 4 shall be repeated three times and the average m_l shall be calculated.

Note:

SG examination shall not be applied on mounted Fei Cui (Jadeite Jade).

For an item with a weight of equal to or over 200 carats, all the records shall be expressed to the

nearest 1 decimal place using the balance as defined in 1.4.2.

1.7 EXPRESSION OF RESULTS

The specific gravity of the item shall be calculated using the weight in air (m_a) and average weight in water (m_l) using the following equation:

$$\text{Specific gravity} = \frac{m_a}{m_a - m_l}$$

1.8 TEST REPORT

The report shall affirm that the test was carried out in accordance with this Standard. The determination of specific gravity should be reported as far as possible with other Fei Cui (Jadeite Jade) test

results such as polariscope examination, shape and cut identification, measurement of dimensions and weight, identification of transparency, examination of fluorescence, Chelsea colour filter examination, determination of refractive index, infrared spectrum examination, magnification examination and spectroscopic examination. In general, the test report shall include but not be limited to the following:

- (a) Identification number of the Fei Cui (Jadeite Jade) item.
- (b) Date of test.
- (c) Standard method of determination of specific gravity.
- (d) Name of person carrying out the test.
- (e) Name and signature of person responsible for testing.

STANDARD TEST METHOD 9

EXAMINATION OF FLUORESCENCE OF FEI CUI (JADEITE JADE)

1.1 SCOPE

This Standard describes the method of examining the fluorescence of Fei Cui (Jadeite Jade).

1.2 APPLICATION

The fluorescence examination applies to items made from Fei Cui (Jadeite Jade) as received by the laboratory for testing.

1.3 DEFINITIONS

Fluorescence: Fluorescence is the general term used to describe the emission of visible light by a substance whilst it is being excited by radiation of shorter wavelengths and higher energy.

1.4 APPARATUS

The following apparatus is required:

Ultraviolet radiation lamp: An ultraviolet radiation lamp with the wavelength of approximately 365nm (Long Wave) and 254nm (Short Wave).

1.5 TEST ITEM

The determination of fluorescence is a single unit test for a whole piece of test item in its entirety. Sampling of a number of test items to represent a batch of Fei Cui (Jadeite Jade) products shall not be permitted.

1.6 PROCEDURES

1. The test Fei Cui (Jadeite Jade) shall be cleaned scrupulously with a lint-free cloth.
2. The test Fei Cui (Jadeite Jade) shall be placed in a black box with a non-reflective black background.
3. The observer shall wait for a few second to let the eyes adopt to the dark environment of the black box before observation.
4. The test Fei Cui (Jadeite Jade) shall be placed as close to the ultraviolet radiation source as possible.
5. The long-wave ultraviolet radiation shall be

switched on. The strength of fluorescence shall then be observed and recorded.

6. If the strength of fluorescence is classified as medium or strong, the colour observed shall also be recorded.

7. Step 4 to 6 shall be repeated by using short-wave ultraviolet radiation.

1.7 EXPRESSION OF RESULTS

The strength of fluorescence shall be classified into 4 grades:

1. Strong
2. Medium
3. Faint
4. None/ Inert

1.8 TEST REPORT

The report shall affirm that the test was carried out in accordance with this Standard. The examination of fluorescence should be reported as far as possible with other Fei Cui (Jadeite Jade) test results such as polariscope examination, shape and cut identification, measurement of dimensions and weight, identification of transparency, Chelsea colour filter examination, determination of specific gravity & refractive index, infrared spectrum examination, magnification examination and spectroscopic examination. In general, the test report shall include but not be limited to the following:

- (a) Identification number of the Fei Cui (Jadeite Jade) item.
- (b) Date of test.
- (c) Standard method of examination of fluorescence.
- (d) Name of person carrying out the test.
- (e) Name and signature of person responsible for testing

STANDARD TEST METHOD 10

CHELSEA COLOUR FILTER EXAMINATION

1.1 SCOPE

This Standard describes the method of using a Chelsea Colour Filter to detect whether the test Fei Cui (Jadeite Jade) is with indication of dye.

1.2 APPLICATION

The Chelsea Colour Filter examination applies to items made from Fei Cui (Jadeite Jade) as received by the laboratory for testing.

The Chelsea Colour Filter test shall be used as a reference only for the identification of Fei Cui (Jadeite Jade) on its authenticity.

1.3 DEFINITIONS

Not applicable

1.4 APPARATUS

The following apparatuses are required:

1. A Chelsea Colour Filter.
2. An intense light source: Tungsten light or equivalent.

1.5 TEST ITEM

The Chelsea Colour Filter examination is a single unit test for a whole piece of test item in its entirety. Sampling of a number of test items to represent a batch of Fei Cui (Jadeite Jade) products shall not be permitted.

1.6 PROCEDURES

1. The test Fei Cui (Jadeite Jade) shall be cleaned scrupulously with a lint-free cloth
2. The Fei Cui (Jadeite Jade) item shall be placed against a white background and illuminated with an intense white light source.
3. The intensity of the light shall be adjusted based on the depth of colour of the test Fei Cui (Jadeite Jade). A lighter colour Fei Cui (Jadeite Jade) shall be illuminated with a lower-intensity light source.
4. The Chelsea Colour Filter shall be placed between the observer and the test Fei Cui (Jadeite Jade).

5. Any colour observed under viewing through the Chelsea Colour Filter in the test Fei Cui (Jadeite Jade) shall be recorded.

Note:

The reaction of colour change observed could be influenced by the size, shape and transparency of the test Fei Cui (Jadeite Jade), as small, light-colour or opaque test Fei Cui (Jadeite Jade) shall give a weaker reaction.

Results depend also upon the relative concentration of different colouring elements if more than one is present in the test Fei Cui (Jadeite Jade).

Depending on the type and amount of colouring agent, every test Fei Cui (Jadeite Jade) reacts a little bit differently.

1.7 EXPRESSION OF RESULTS

Not Applicable

1.8 TEST REPORT

The report shall affirm that the test was carried out in accordance with this Standard. The Chelsea Colour Filter examination should be reported as far as possible with other Fei Cui (Jadeite Jade) test results such as polariscope examination, shape and cut identification, measurement of dimensions and weight, identification of transparency, determination of specific gravity & refractive index, examination of fluorescence, infrared spectrum examination, magnification examination and spectroscopic examination. In general, the test report shall include but not be limited to the following:

- (a) Identification number of the Fei Cui (Jadeite Jade) item.
- (b) Date of test.
- (c) Standard method of Chelsea Colour Filter examination.
- (d) Name of person carrying out the test.
- (e) Name and signature of person responsible for testing.

STANDARD TEST METHOD 11

FEI CUI (JADEITE JADE) SPECTROSCOPIC EXAMINATION

1.1 SCOPE

This Standard describes the method of using a spectroscope to identify whether the test Fei Cui (Jadeite Jade) is natural or dyed.

1.2 APPLICATION

The spectroscopic examination applies to items made from Fei Cui (Jadeite Jade) as received by the laboratory for testing.

The spectroscopic examination may be used for the identification of Fei Cui (Jadeite Jade) on its authenticity.

1.3 DEFINITIONS

Not Applicable

1.4 APPARATUS

The following apparatus is required:

A diffraction grating spectroscope or a prism spectroscope with an observable range from 400 – 700nm.

1.5 TEST ITEM

The spectroscopic examination is a single unit test for a whole piece of test item in its entirety. Sampling of a number of test items to represent a batch of Fei Cui (Jadeite Jade) products shall not be permitted.

1.6 PROCEDURES

Transmission method:

- 1.The test Fei Cui (Jadeite Jade) shall be cleaned scrupulously with a lint-free cloth.
- 2.The test Fei Cui (Jadeite Jade) shall be fixed in the appropriate position in the spectroscope where light beam shall be allowed to pass through.
- 3.The intensity of the light source shall be adjusted with regard to the transparency and the colour intensity of the test Fei Cui (Jadeite Jade). For a

light-coloured or transparent test Fei Cui (Jadeite Jade), a lower-intensity light shall be used, while for a dark-coloured or translucent test Fei Cui (Jadeite Jade), a higher intensity light shall be used.

4.The height of the spectroscope shall be adjusted where it may be necessary to have the test Fei Cui (Jadeite Jade) as close as 1cm or as far as 5cm from the spectroscope.

5.For a spectroscope with slit, the slit shall be closed completely at first, then be opened just enough to make the full spectrum visible which in turn eliminate the strong, dust caused horizontal lines.

6.The slide tube shall be used to adjust the focus of the spectrum.

7.The spectrum of the test Fei Cui (Jadeite Jade) in different positions shall be observed until the maximum absorption is found.

Reflection method:

1.The test Fei Cui (Jadeite Jade) shall be cleaned scrupulously with a lint-free cloth.

2.The light source shall be shined from an angle so that the light shall be reflected off the surface of the test Fei Cui (Jadeite Jade).

3.The position of the spectroscope shall be adjusted so the reflected light can enter the spectroscope.

4.For a spectroscope with a slit, the slit shall be closed completely at first, and then opened just enough to make the full spectrum visible which in turn eliminates the strong, dust caused horizontal lines.

5.The slide tube shall be used to adjust the focus of the spectrum.

6.The spectrum of the test Fei Cui (Jadeite Jade) in different positions shall be observed until the maximum absorption is found.

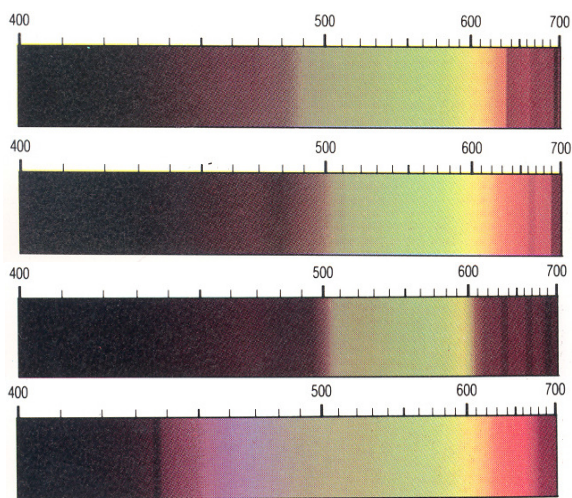
Note:

The quality of the spectrum could be affected by the cut, shape, size, transparency of the test Fei Cui (Jadeite Jade), the light source and any dust or dirt in the slit of the spectroscope.

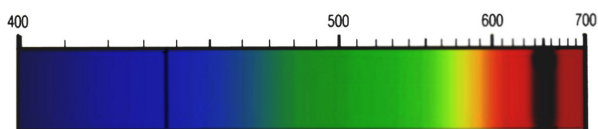
1.7 EXPRESSION OF RESULTS

The following spectra show some examples of the absorption spectrum of Natural Green Fei Cui (Jadeite Jade).

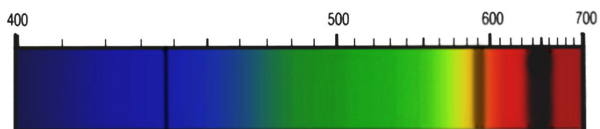
Absorption line(s) is/ are observed at the red spectrum:



The following spectra show examples of the absorption spectrum of dyed Fei Cui (Jadeite Jade):



Green-dyed Fei Cui (Jadeite Jade) spectrum



New resin impregnated & dyed Fei Cui (Jadeite Jade) spectrum

1.8 TEST REPORT

The report shall affirm that the test was carried out in accordance with this Standard. The spectroscopic examination should be reported as far as possible with other Fei Cui (Jadeite Jade) test results such as polariscope examination, shape and cut identification, measurement of dimensions and weight, identification of transparency, determination of specific gravity & refractive index, examination of fluorescence, infrared spectrum examination, magnification examination and Chelsea Colour Filter examination. In general, the test report shall include but not be limited to the following:

- (a) Identification number of the Fei Cui (Jadeite Jade) item.
- (b) Date of test.
- (c) Standard method of spectroscope examination.
- (d) Name of person carrying out the test.
- (e) Name and signature of person responsible for testing.

STANDARD TEST METHOD 12

FEI CUI (JADEITE JADE) MAGNIFICATION EXAMINATION

1.1 SCOPE

This Standard describes the method of magnification examination to examine the surface and internal characteristics of the test Fei Cui (Jadeite Jade).

1.2 APPLICATION

The magnification examination applies to items made from Fei Cui (Jadeite Jade) as received by the laboratory for testing.

1.3 DEFINITIONS

Internal and External Characteristics:

1. Texture:

Type	Texture	Description
Fine Grain	Fibrous	Mostly not easily observed by naked eyes
Medium Grain	Granular & Fibrous	Mostly seen by naked eyes
Coarse Grain	Granular	Mostly very obvious grain sizes

2. Surface:

- Iron-staining
- Glistening
- Pit
- Orange peel
- Micro crack
- Groove

1.4 APPARATUS

The following apparatus is required:

A binocular microscope with a magnification of at least 10X.

1.5 TEST ITEM

The magnification examination is a single unit test for a whole piece of test item in its entirety. Sampling of a number of item items to represent a batch of Fei Cui (Jadeite Jade) products shall not be permitted.

1.6 PROCEDURES

1. The test Fei Cui (Jadeite Jade) shall be cleaned scrupulously with a lint-free cloth.
2. The Fei Cui (Jadeite Jade) item shall be placed on the stone-holder under the microscope.
3. The test Fei Cui (Jadeite Jade) shall be illuminated from the side.
4. The test Fei Cui (Jadeite Jade) shall be observed in all directions under a low magnification.
5. The observer shall look for signs of fracture, fracture luster and cleavage under a higher magnification.
6. The surface and internal characteristics of the test Fei Cui (Jadeite Jade) shall then be recorded for further analysis.

1.7 EXPRESSION OF RESULTS

Not Applicable

1.8 TEST REPORT

The report shall affirm that the test was carried out in accordance with this Standard. The magnification examination should be reported as far as possible with other Fei Cui (Jadeite Jade) test results such as polariscope examination, shape and cut identification, measurement of dimensions and weight, identification of transparency, determination of specific gravity & refractive index, examination of fluorescence, infrared spectrum examination, spectroscopic examination and Chelsea Colour Filter examination. In general, the test report shall include but not be limited to the following:

- (a) Identification number of the Fei Cui (Jadeite Jade) item.
- (b) Date of test.
- (c) Standard method of magnification examination.
- (d) Name of person carrying out the test.
- (e) Name and signature of person responsible for testing.

STANDARD TEST METHOD 13

FEI CUI (JADEITE JADE) INFRARED SPECTRUM EXAMINATION

1.1 SCOPE

This Standard describes the method of using an infrared spectrometer to verify the composition of the test Fei Cui (Jadeite Jade).

1.2 APPLICATION

The infrared spectrum examination applies to items made from Fei Cui (Jadeite Jade) as received by the laboratory for testing.

The infrared spectrum examination may be used for the identification of Fei Cui (Jadeite Jade) on its authenticity.

1.3 DEFINITIONS

Polymer Impregnation: A carbon-hydrogen bonded organic solid substance generally called polymer is impregnated in liquid form into a gemstone and solidified inside to improve the gemstone's transparency, clarity, colour distribution and saturation; but the gemstone's luster is detracted.

1.4 APPARATUS

The following apparatus is required:

A Fourier Transform Infrared Spectrometer (FTIR).

1.5 TEST ITEM

The infrared spectrum examination is a single unit test for a whole piece of test item in its entirety. Sampling of a number of test items to represent a batch of Fei Cui (Jadeite Jade) products shall not be permitted.

1.6 PROCEDURES

1. Any sample shall be removed from the sample holder of the spectrometer so that the beam part is clear.
2. A sample spectrum profile against a background spectrum profile that measures the response of the spectrometer without any sample placed shall be collected first.
3. The test jadeite jade shall be cleaned scrupulously

with a lint-free cloth before placing into the spectrometer.

4. For jadeite jade that is relatively thick, low transparency, mounted or wherever the transmittance method is not applicable, the reflectance method of infrared spectrum examination shall be used. The test jadeite jade shall be detected by using the probe of the spectrometer under this method.
5. For jadeite jade that is relatively thin, either the transmittance or reflectance method of infrared spectrum examination could be used. The test jadeite jade shall be installed through the sliding door of the spectrometer when using the transmittance method.
6. After placing the test jadeite jade in the appropriate place and orientation, at least 3 points shall be checked randomly. The spectrum profile shall then be collected.

Note:

For the surface of a jadeite jade that is less than 20mm in all dimensions, a 1-point random check shall be considered adequate.

The background spectrum shall be used to remove the effects caused by the instrument and atmospheric conditions, so that the peaks and troughs in the final spectrum profile shall be due solely to the sample divides the sample spectrum profile.

1.7 CALCULATION AND EXPRESSION OF RESULTS

Interpretation of the spectrum:

Transmittance Method:

The presence of a very intense group of peaks (strong absorption) between 2850cm^{-1} and 3100cm^{-1} , with apparent absorption maxima at approximately 2940cm^{-1} , 3025cm^{-1} , 3060cm^{-1} and 3080cm^{-1} , is the indication of polymer impregnation. (See Table A)

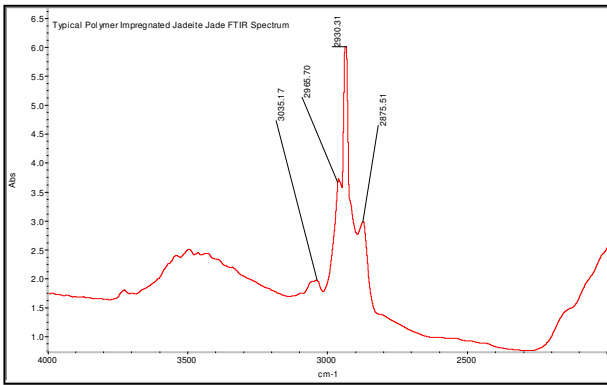


Table A: Spectrum of a typical polymer impregnated jadeite jade, transmittance method.

Reflectance Method:

The presence of a group of peaks and troughs at either 5900cm^{-1} or 4680cm^{-1} , with apparent absorption maxima at approximately 5985cm^{-1} , 5918cm^{-1} or 4681cm^{-1} and 4618cm^{-1} , is the indication of polymer impregnation. (See Table B)

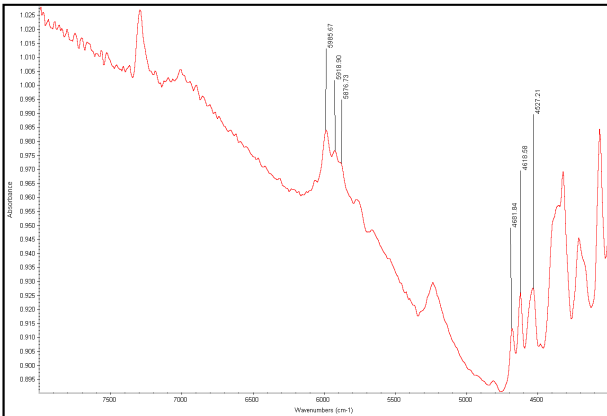


Table B: Spectrum of a typical polymer impregnated jadeite jade, showing groups of peaks and troughs at both 5900cm^{-1} or 4680cm^{-1} using reflectance method.

The test jadeite jade shall be identified as no polymer detected only if all the checking(s) do not show any indication of polymer impregnation.

1.8 TEST REPORT

The report shall affirm that the test was carried out in accordance with this Standard. The infrared spectrum examination should be reported as far as possible with other Fei Cui (Jadeite Jade) test results such as polariscope examination, shape and cut identification, measurement of dimensions and weight, identification of transparency, determination of specific gravity & refractive index, examination of fluorescence, magnification examination, spectroscopic examination and Chelsea Colour Filter examination. In general, the test report shall include but not be limited to the following:

- (a) Identification number of the Fei Cui (Jadeite Jade) item.
- (b) Date of test.
- (c) Standard method of infrared spectrum examination.
- (d) Name of person carrying out the test.
- (e) Name and signature of person responsible for testing.

Appendix 1 - Chinese Version of Definition of Fei Cui (Jadeite Jade)

附錄 1 - 硬玉質翡翠的定義之中文譯本

硬玉質翡翠

定義：

硬玉質翡翠為粒狀至纖維結構的多晶質集合體，其礦物組成主要為硬玉，可含其他次要礦物如綠輝石、鈉鉻輝石、閃石類礦物及長石類礦物。

Appendix 2 – Chinese Version of Major Physical Properties of Fei Cui (Jadeite Jade)

附錄 2 - 硬玉質翡翠的主要物理特性之中文譯本

主要物理特性:

結晶狀態：	為粒狀至纖維結構的多晶質集合體
常見顏色：	無色、白色、各種色調的綠色、黃、紅橙、褐、灰、黑、淺紫紅、紫、藍、粉紅等。
¹ 光澤：	玻璃光澤至油脂光澤。
解理：	硬玉具兩組完全解理，多晶質集合體可見微小的解理面閃光，稱為“翠性”。
¹ 摩氏硬度：	6.5 - 7。
⁻² 比重：	3.34 (+0.06, -0.09)-。
光性特徵：	非均質多晶質集合體。
折 射 率：	1.666 - 1.680 (±0.008)，由點測法(遠視法)觀察常為 1.66。
紫外螢光：	無至弱，白、綠、黃。
吸收光譜：	437 nm 吸收線；鉻致色的綠色翡翠具有 630 nm，660nm，690 nm 吸收線。
放大檢查：	點狀、針狀、片狀閃光（翠性），纖維交織結構至粒狀纖維結構，固體包體。

註

¹光澤及硬度的測試並不屬於香港標準硬玉質翡翠測試方法的範圍內

²比重測試方法不適用於已鑲起的硬玉質翡翠

Appendix 3 – Chinese Version of Types of Fei Cui (Jadeite Jade)

附錄 3 - 硬玉質翡翠類別之中文譯本

硬玉質翡翠可分為以下類別：

名稱	行內名稱	定義
天然硬玉質翡翠	A 玉	無經過化學處理的天然硬玉質翡翠 ¹
經化學處理及注入樹脂硬玉質翡翠	B 玉	經化學處理及注入樹脂的硬玉質翡翠。
經染色處理硬玉質翡翠	C 玉	經染色處理的硬玉質翡翠。
經化學處理注入樹脂及染色硬玉質翡翠	B+C 玉	經化學處理、注入樹脂及染色的硬玉質翡翠。

註：

¹沒有破壞天然硬玉質翡翠本身的結晶結構的無色蠟的拋光過程，將不視為化學處理的一種。

Glossary 詞彙表

Anisotropic 各向異性	Micro Crack 微小裂紋
Anomalous Extinction 異常消光	Mounted 鑲嵌
Bright 鮮	Opaque 不透明
Dark 深	Orange Peel 橙皮紋
Deep 暗	Pale 淡
Even 均勻	Patches 塊狀
Fibrous (texture) 纖維狀 (結構)	Polycrystalline 多晶質
Granular (texture) 粒狀 (結構)	Pit 小坑洞
Glistening 翠性	Spots 點狀
Groove 溝漕	Transparent 全透明
Isotropic 各向同性	Transparency 透明度
Iron-Staining 鐵滲	Translucent 半透明
Intense 濃	Uneven 不均勻
Light 淺	Vein 脈狀