BS ISO 24016:2020

BSI Standards Publication

Jewellery and precious metals — Grading polished diamonds — Terminology, classification and test methods

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National foreword

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Jewellery and precious metals — Grading polished diamonds — Terminology, classification and test methods

Joaillerie et métaux précieux — Classification des diamants taillés — Terminologie, graduations et méthodes d'essai

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 174, *Jewellery and precious metals*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Introduction

The aim of a standard for grading unmounted polished diamonds is to set rules for determining with maximum precision and accuracy the mass, colour, clarity and cut of individual polished diamonds. On one hand, based on these four criteria - also known as "the 4C's" - the diamond trade evaluates the value of diamonds. On the other hand, some diamond grading reports may be issued based on different standards by different laboratories, potentially leading to different results for the same individual diamond. This situation damages the reputation of the whole diamond trade. Hence, the need for a unique ISO standard for grading polished diamonds.

Today, the need for an ISO standard for the grading of polished diamonds is supported by recent agreements between international and national diamond organizations with CIBJO (The World Jewellery Confederation) with the aim of adopting CIBJO's unique diamond grading and diamond nomenclature standard.

Together with ISO 18323, which sets the nomenclature for diamonds, synthetic diamonds and diamond simulants, an ISO standard for the grading of polished diamonds will strengthen the trust in the diamond industry worldwide.

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Jewellery and precious metals — Grading polished diamonds — Terminology, classification and test methods

1 Scope

This document specifies the terminology, classification and the methods that are used for the grading and description of single unmounted polished diamonds over 0,25 carat (ct).

This document applies to natural, unmounted, polished diamonds. It is not to be used for fancy coloured diamonds, synthetic diamonds, treated diamonds (other than is allowed for in 7.4), nor for assembled stones.

2 Normative references

The following document is referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 18323, *Jewellery — Consumer confidence in the diamond industry*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 18323 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
polished diamond
diamond with a defined *cut* (3.5)

3.1.1
diamond
mineral consisting essentially of carbon crystallised in the isometric (cubic) crystal system, with a hardness on the Mohs' scale of 10, a specific gravity of approximately 3,52 and a refractive index of approximately 2,42, created by nature

Note 1 to entry: The denomination "diamond" without further specification always implies "natural diamond". These two terms are equivalent and carry the same meaning.

3.1.2
treated diamond
diamond (3.1.1) having undergone any human intervention other than cutting, polishing, cleaning and setting, to permanently or non-permanently change its appearance

EXAMPLE Coating, fracture filling, heating, irradiation, laser drilling, HPHT treatment or any other physical or chemical process.

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3.1.3
synthetic diamond
laboratory-grown diamond
laboratory-created diamond
artificial product that has essentially the same chemical composition, crystal structure and physical (including optical) properties as a *diamond* (3.1.1)

Note 1 to entry: The English terms laboratory-created diamond or laboratory-grown diamond may be used synonymously with synthetic diamond. Where there is no acceptable local direct translation of the English terms laboratory grown diamond or laboratory created diamond then only the translation of the term synthetic diamond should be used.

Note 2 to entry: Abbreviations such as "lab grown", "lab created" "lab diamond" or "syn diamond" shall not be used.

Note 3 to entry: The word “laboratory” refers to the facility which produces the synthetic diamonds. This should not to be confused with a gemmological laboratory that is dedicated to the analysis, authentication, identification, classification (grading) of diamonds.

3.1.4
composite stone
assembled stone
stone constructed of two or more parts

3.2 Internal characteristics

3.2.1
bearding
tiny *feathers* (3.2.8) extending in from the girdle

3.2.2
bruise
surface percussion mark, accompanied by tiny, root-like *feathers* (3.2.8)

3.2.3
cavity
large or deep opening

3.2.4
chip
damage, usually occurring along the girdle or culet, which alters the outline of the stone

Note 1 to entry: Also to be considered as an external characteristic (see 3.3.4) depending upon depth.

3.2.5
cleavage
large *feather* (3.2.8) occurring in a plane, parallel to a crystal face

3.2.6
cloud
hazy or milky area made up of a number of very small *inclusions* (3.10)

3.2.7
crystal
mineral crystal included in a *diamond* (3.1.1)

3.2.8
feather/fracture
separation or break due to either *cleavage* (3.2.5) or fracture, often white and feathery in appearance

3.2.9
grain centre
small area of concentrated *crystal* (3.2.7) structure distortion

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3.2.10
internal graining
internal indications of irregular *crystal* (3.2.7) growth

3.2.10.1
coloured graining
graining which appears as coloured streaks

3.2.10.2
reflective graining
graining which appears as a reflective plane

3.2.10.3
whitish graining
graining which may appear as whitish streaks or may give the stone a hazy (cloudy) appearance which decreases transparency

3.2.11
indented natural
natural (3.3.6) that penetrates the stone

Note 1 to entry: Also to be considered as an external characteristic (see 3.3.15) depending upon depth.

3.2.12
knot
included *diamond* (3.1.1) crystal which reaches the surface

3.2.13
laser drilling
burning a channel with a laser between the surface of a *diamond* (3.1.1) and an *inclusion* (3.10) (generally black), the channel being used as a conduit to allow a chemical treatment of the *inclusion* (3.10) with the purpose of making the *inclusion* (3.10) less visible

3.2.14
needle
long, thin included *crystal* (3.2.7) which looks like a tiny rod

3.2.15
nick
minor damage, occurring along the girdle, the culet or facet edge, which does not significantly affect the outline of the stone

Note 1 to entry: Also to be considered as an external characteristic (see 3.3.7) depending upon depth.

3.2.16
pinpoint
very small *inclusion* (3.10); under 10x normally seen as a tiny dot, either singly or in groups or strings

3.2.17
reduced transparency
cloudy, milky, or hazy appearance of the whole or part of a *diamond* (3.1.1) due to internal features that may or may not be visible at 10x magnification

3.2.18
twinning wisp
inclusions (3.10) usually located in a plane, which occur as a result of the change in orientation of the diamond crystal structure

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3.2.19
etch channel
high-temperature magma erodes the weak area of the *diamond* (3.1.1), leaving behind tubular traces extending from the surface to the inside, with a quadrangle opening

3.3 External characteristics

3.3.1
abrasion
tiny *nicks* (3.3.7) along facet junction's or culet, producing white fuzzy lines instead of sharp facet edges

3.3.2
bruting lines
tiny lines on a girdle not displaying a feather-like appearance

3.3.3
burn mark
surface clouding caused by excessive heat, or uneven polished surface

3.3.4
chip
damage, usually occurring along the girdle or culet, which alters the outline of the stone

Note 1 to entry: Also to be considered as an internal characteristic (see 3.2.4) depending upon depth.

3.3.5
extra facet
facet located without regard for symmetry and not required by the cutting style

3.3.6
natural
part of the original *crystal* (3.2.7) surface remaining on the polished stone

3.3.7
nick
minor damage, occurring along the girdle, the culet or facet edge, which does not significantly affect the outline of the stone

Note 1 to entry: Also to be considered as an internal characteristic (see 3.2.15) depending upon depth.

3.3.8
pit
tiny opening, often looking like a white dot

3.3.9
polish line
tiny parallel lines left by polishing; fine parallel ridges confined to single facet, caused by *crystal* (3.2.7) structure irregularities; or tiny, parallel, polished grooves produced by irregularities in the scarify surface

3.3.10
pitted girdle
very rough bruted girdle surface

3.3.11
scratch
linear indentation normally seen as a fine white line across a facet

3.3.12
surface grain line
surface indication of structural irregularity which is not seen internally; may resemble faint facet-junction lines, or cause a grooved or wavy surface; often the lines cross facet junctions

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3.3.13
lizard skin
transparent concave wave texture on the surface of a polished *diamond* (3.1.1), usually parallel to the direction of the *cleavage* (3.2.5) surface

3.3.14
inscription
mark on the surface of or in a *diamond* (3.1.1)

3.3.15
indented natural
natural that penetrates the stone

Note 1 to entry: Also to be considered as an internal characteristic (see 3.2.11) depending upon depth.

3.4
naked eye
naked (unaided) eye, or visible to the eye through glasses adjusting an anomalous eyesight to normal

3.5
cut
shape (3.6), proportions, polish and symmetry of a *diamond* (3.1.1)

Note 1 to entry: The term finish encompasses polish and symmetry.

3.6
shape/form
outline of a *diamond* (3.1.1)when viewed perpendicular to the table facet

3.7
diamond loupe
achromatic and aplanatic, triplet type, 10x magnifying lens

Note 1 to entry: The frame of the loupe shall be of a neutral 'colour'.

3.8
first generation masterstone
diamond (3.1.1) that has been selected by direct comparison with the relevant masterstone in the set of masterstones originally used to establish the D to Z grades, as specified in 6.1 and equal in hue, tone and saturation to the relevant original masterstone

3.9
second generation masterstone
diamond (3.1.1) that has been selected by direct comparison with the relevant *first generation masterstone* (3.8) and equal in hue, tone and saturation to the relevant *first generation masterstone* (3.8)

3.10
inclusion
physical alteration to the interior of a *diamond* (3.1.1)

4 General

4.1 The use of the word "diamond"

It is unnecessary to note the genesis of a diamond, as the use of the word "diamond" alone and without qualification states that it is natural.

The word "diamond" alone shall not be used to describe synthetic diamonds no matter which basic material or methods are used. Products made in this way shall be clearly referred to as "synthetic diamond" and shall not be graded according to this document.

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4.2 Composite stones/assembled stones

Composite stones/assembled stones shall be clearly identified and shall not be graded.

5 Mass and measurements

5.1 Mass

The mass of a diamond shall be expressed in metric carats (ct), one carat is equivalent to 200 mg (1/5 g). The mass of a diamond shall be stated in carats to two decimal places.

NOTE It is acceptable verbally to express one-hundredth of a carat as a "point".

Mass shall be rounded upwards if the third decimal is a 9.

EXAMPLES

— 0,996 → 0,99 ct

— 0,998 → 0,99 ct

— 0,999 → 1,00 ct

Mass may be stated to three decimal places if the accuracy of the weighing equipment is accurate to this degree.

5.2 Measurements

The measurements of a diamond shall be expressed in millimetres to two decimal places.

The following measurements shall be contained in the diamond grading report (Clause 18):

— round shape: minimum diameter, maximum diameter and depth (total height);

— fancy shape: length, width and depth (total height). Length shall be the maximum measurement in the vertical line of the plotted diagram and width shall be the maximum measurement in the horizontal line of the plotted diagram.

6 Colour

6.1 General

Diamond colours shall be divided into the following three main categories (see 6.1.1, 6.1.2 and 6.1.3).

NOTE For all main categories (see 6.1.1, 6.1.2 and 6.1.3), photometric measurements intended for colour grade determination have no conclusive value at present.

6.1.1 Colourless to yellow, brown and grey (D to L)

The colour of diamond within the D to L grade range shall be determined by visual comparison with masterstones of first or second generation which is equal in hue, tone and saturation to the official CIBJO set of masterstones for determining the colour grades. The determination shall be carried out by a trained observer with normal eyesight (see 3.4) and colour discrimination, under an artificial light source, the specification for which ranges from D_{55} to D_{65} [International Commission on Illumination (CIE) standard illuminant].

The colour grade shall be described by the letter or letter range between D and L, (in capital letters) with or without the colour corresponding terms in Tables 1 and 2.

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Colour comparison shall refer to masterstones of first or second generation.

NOTE Optionally the hue of a diamond when different than yellow can be mentioned in addition to the colour grade.

6.1.2 Colourless to yellow, brown and grey (M to Z)

Those colour grades are not currently covered by the present document.

6.1.3 Other hues

Apart from those diamonds referred to in 6.1.1 and 6.1.2 there are those diamonds that are darker in tone and/or higher in saturation than the Z colour grade and diamonds with other noticeable hues or tones and these are coloured diamonds. In this category, the specific term “fancy” shall precede the colour description of a coloured diamond.

6.2 Colour grades (colourless to yellow, brown and grey)

The colour grades that shall be used are given in Table 1. The German, French, Italian, Chinese and Scandinavian equivalent terms shall be as given in Table 2.

6.3 Colour grades (other than for yellow, brown and grey)

Diamonds with colours other than yellow, brown or grey, in which the colour is not visible in the face-up position, shall be graded in accordance with the colour grading scale (see Table 1). The grade shall be described either with the letter grade or by stating the term “faint” followed by the hue, or by both.

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Table 1 — Colour grading scale

CIBJO The World Jewellery Confederation	GIA Gemological Institute of America	NOTES
Exceptional white +	D	NOTE 1 For diamonds weighing under 0,47 ct, the grades D EW+ and E EW can be combined into one grade as Exceptional White or D-E.
Exceptional white	E	
Rare white +	F	NOTE 2 For diamonds weighing under 0,47 ct, the grades F RW+ and G RW can be combined into one grade as Rare White or F-G.
Rare white	G	
White	H	
Slightly tinted white Slightly tinted white	I J	NOTE 3 Combined letter grades including and below I can be used. NOTE 4 For grades I to J the term "equivalent colour grade" can be used in conjunction with the letter grade for those diamonds that have brown or grey present.
Tinted white Tinted white	K L	NOTE 5 Combined letter grades including and below K can be used. NOTE 6 For grades K to L the term "equivalent colour grade" can be used in conjunction with the letter grade for those diamonds that have brown or grey present.
Tinted	M N O P Q R S T U V W X Y Z	NOTE 7 Combined letter grades including and below M can be used. NOTE 8 Descriptions indicating the presence of brown or grey can be given for Grades M and below with or without using the letter grades if the hue / tone description is prefixed with "light".

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Table 2 — Corresponding terms for colour grades

GIA[a]	CIBJO (The World Jewellery Confederation)								Chinese national standard		Scan.D.N	
	English		German		French		Italian					
D	Exceptional white +	D	Hochfeines Weiss +	D	Blanc exceptionnel +	D	Bianco extra eccezionale +	D	D	100	River	D
E	Exceptional white	E	Hochfeines Weiss	E	Blanc exceptionnel	E	Bianco extra eccezionale	E	E	99	River	E
F	Rare white +	F	Feines Weiss +	F	Blanc extra +	F	Bianco extra +	F	F	98	Top Wesselton	F
G	Rare white	G	Feines Weiss	G	Blanc extra	G	Bianco extra	G	G	97	Top Wesselton	G
H	White	H	Weiss	H	Blanc	H	Bianco	H	H	96	Wesselton	H
I	Slightly tinted white +	I	Leicht getöntes Weiss +	I	Blanc nuance +	I	Bianco sfumato +	I	I	95	Top crystal	I
J	Slightly tinted white	J	Leicht getöntes Weiss	J	Blanc nuancé	J	Bianco sfumato	J	J	94	Crystal	J
K	Tinted white +	K	Getöntes Weiss +	K	Légèrement teinté +	K	Bianco leggermente colorito +	K	K	93	Top cape	K
L	Tinted white	L	Getöntes Weiss	L	Légèrement teinté	L	Bianco leggermente colorito	L	L	92	Cape	L
M	Tinted	M	Getönt	M	Teinté	M	Colorito	M	M	91	Cape	M
N		N		N		N		N	N	90	Cape	N
O		O		O		O		O	<N	<90	Cape	O
P		P		P		P		P			Cape	P
Q		Q		Q		Q		Q			Cape	Q
R		R		R		R		R			Cape	R
S		S		S		S		S			Cape	S
T		T		T		T		T			Cape	T
U		U		U		U		U			Cape	U
V		V		V		V		V			Cape	V
W		W		W		W		W			Cape	W
X		X		X		X		X			Cape	X
Y		Y		Y		Y		Y			Cape	Y
Z		Z		Z		Z		Z			Cape	Z

[a] Gemological Institute of America.

6.4 Fluorescence

The fluorescence of diamond shall be determined by visual comparison with masterstones of first or second generation which is equal in hue and degree to the official CIBJO set of masterstones for determining the fluorescence. The determination shall be carried out by a trained observer with normal eyesight (see 3.4) and colour discrimination.

The degree of fluorescence shall be characterized in accordance with Table 3.

Table 3 — Description of degree of fluorescence

Degree of fluorescence	Colour of fluorescence
none or nil	optional
faint or slight	optional
medium	optional
strong	optional

The colour of fluorescence may be mentioned together with the degree of fluorescence.

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7 Clarity

7.1 General

Clarity shall be determined by a trained observer with normal eyesight (see 3.4) using a diamond loupe, under an artificial source of light, the specification of which is D55 to D65 (CIE standard illuminant).

The following aspects of the internal characteristics/inclusions and external characteristics/blemishes shall be considered when determining the clarity grade:

— size;

— nature;

— number;

— position;

— brightness/colour;

— mirrored images.

NOTE Diamonds that are beyond the P3/I3 grade are known as rejection grade and are considered as being outside the clarity grading scale.

7.2 Clarity grades

The clarity grades shall be distinguished and defined in accordance with Tables 4 and 5.

7.3 Clarity characteristics

Clarity shall be considered in accordance with Tables 4 and 5 and A.1 and A.2.

See also definitions 3.2 and 3.3.

7.4 Laser drilling

All diamonds that have been drilled with a laser shall be referred to as “Laser Drilled” in the Comment section, and can be graded. No other treated diamonds shall be graded according to this document.

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Table 4 — Clarity characteristics

<table>
<tr><td colspan="2">Flawless (FL)
FL diamonds shall be free from internal characteristics/inclusions and external characteristics/blemishes when examined with the diamond loupe.
NOTE 1 The following does not disqualify a diamond from the Flawless Grade:
— an extra facet on the pavilion which cannot be seen face up;
— naturals totally confined to the girdle, which neither thicken the girdle nor distort its outline;
— internal graining which is not reflective, white or coloured and does not significantly affect transparency.</td><td rowspan="2">Loupe Clean (LC)
LC diamonds shall be free from internal characteristics/ inclusions, when examined with the diamond loupe.
NOTE 3 The following does not disqualify a diamond from the Loupe Clean grade:
— Internal graining which is not reflective, white or coloured and does not significantly affect transparency.</td></tr>
<tr><td colspan="2">Internally Flawless (IF)
IF diamonds shall be free from internal characteristics/ inclusions and shall only possess external characteristics / blemishes, when examined with the diamond loupe.
NOTE 2 The following does not disqualify a diamond from the Internally Flawless grade:
— Internal graining which is not reflective, white or coloured and does not significantly affect transparency.</td></tr>
<tr><td colspan="3">Very Very Slightly Included/Very Very Small Inclusions (VVS)
VVS diamonds shall contain minute internal characteristics/inclusions when examined with the diamond loupe.
VVS1 diamonds shall contain minute internal characteristics/inclusions which shall be extremely difficult to observe when examined with the diamond loupe.
VVS2 diamonds shall contain minute internal characteristics/inclusions which shall be very difficult to observe when examined with the diamond loupe.</td></tr>
<tr><td colspan="3">Very Slightly Included/Very Small Inclusions (VS)
VS diamonds shall contain minor internal characteristics/inclusions when examined with the diamond loupe.
VS1 diamonds shall contain minor internal characteristics/inclusions which shall be difficult to observe when examined with the diamond loupe.
VS2 diamonds shall contain minor internal characteristics/inclusions which shall be somewhat easy to observe with the diamond loupe.</td></tr>
<tr><td colspan="3">Slightly Included/Small Inclusions (SI)
Sl diamonds shall contain noticeable internal characteristics/inclusions when examined with the diamond loupe.
SI1 diamonds shall contain noticeable internal characteristics/inclusions which shall be easy to observe when examined with the diamond loupe.
SI2 diamonds shall contain noticeable internal characteristics/inclusions which shall be very easy to observe when examined with the diamond loupe.</td></tr>
<tr><td colspan="3">Pique 1 or Included 1 (P1/I1)
P1/I1 diamonds shall contain internal characteristics/inclusions which are prominent when examined with the diamond loupe. They shall also be visible face up to the naked eye.
NOTE 4 Under certain circumstances, internal characteristics/inclusions may also be visible face up to the naked eye in higher grades.</td></tr>
<tr><td colspan="3">Pique 2 or Included 2 (P2/I2)
P2/I2 diamonds shall contain internal characteristics/inclusions which are very prominent when examined with the diamond loupe. They shall also be easily visible face up to the naked eye, slightly reducing the brilliancy of the diamond.</td></tr>
<tr><td colspan="3">Pique 3 or Included 3 (P3/I3)
P3/I3 diamonds shall contain internal characteristics/inclusions which are extremely prominent when examined with the diamond loupe. They shall also be very easily visible face up to the naked eye, reducing the brilliancy of the diamond.</td></tr>
</table>

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Table 5 — Clarity grades

LC	FL	
	IF	
VVS1		VVS
VVS2		
VS1		VS
VS2		
SI1		SI
SI2		
P1 or I1		P or I
P2 or I2		
P3 or I3		

The combined grades VVS, VS, SI, P or I may be used for diamonds weighing under 0,47 ct.

8 Cut

8.1 Cut characteristics

The cut shall be categorized by the following characteristics:

— shape: the outline of the diamond combined with the facet arrangement;

— proportions: the relationships between the various parts of a diamond and the girdle diameter;

— finish: the quality of the surface condition of a diamond, the exactness of its shape and the arrangement of the facets.

8.2 Shape

Common diamond shapes and cut are illustrated in Figure 1 a) to j). A variety of other shapes exist and these shall be clearly described in detail.

The term “brilliant” without any additional description shall only be applied to round brilliant cut diamonds.

NOTE The term “fancy shape” is generally used to describe all shapes other than round.

The various parts and the facet arrangement of a round brilliant are explained in Figure 3.

8.3 Proportions

8.3.1 Description

The proportions (see Figure 4) described in 8.3.2 to 8.3.9 shall be included in the diamond grading report of a diamond.

8.3.2 Basis for descriptions of proportions

For round diamonds, the basis for descriptions of proportions is the average of at least four measurements at different points of the diameter of the girdle.

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