TECHNICAL REPORT

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Grading polished diamonds — Terminology and classification

Diamants taillés — Terminologie et classification

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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 main task of technical committees is to prepare International Standards, but in exceptional circumstances a technical committee may propose the publication of a Technical Report of one of the following types:

— type 1, when the required support cannot be obtained for the publication of an International Standard, despite repeated efforts;

— type 2, when the subject is still under technical development or where for any other reason there is the future but not immediate possibility of an agreement on an International Standard;

— type 3, when a technical committee has collected data of a different kind from that which is normally published as an International Standard ("state of the art", for example).

Technical Reports of types 1 and 2 are subject to review within three years of publication, to decide whether they can be transformed into International Standards. Technical Reports of type 3 do not necessarily have to be reviewed until the data they provide are considered to be no longer valid or useful.

ISO/TR 11211, which is a Technical Report of type 1, was prepared by Technical Committee ISO/TC 174, *Jewellery*.

This standardization of terminology and classification of polished diamonds is conducted within ISO/TC 174/WG 2. This working group was set up to clarify questions on specific aspects of polished diamonds. The results of this working group have been submitted to ISO/TC 174 for consideration. However, a full agreement on certain aspects has not yet been achieved. In particular, agreement is needed on the question of proportion, and further work is required for test methods and concerning the colour of fancy coloured diamonds. ISO/TC 174/WG 2 is continuing its discussion on these and other related matters.

This Technical Report is subject to further consideration, and members of WG 2 and others have already provided relevant proposals. Its adoption will give members of the industry the opportunity to discuss and comment on the conclusions the working group has reached so far. Moreover, ISO/TC 174 intends to review this Technical Report regularly in the light

of technological advances and the availability of more data, with the ultimate objective of converting it into an International Standard.

Annexes A and B form an integral part of this Technical Report.

Introduction

This Technical Report applies to polished diamonds and was compiled by the following:

Confédération internationale de la bijouterie, joaillerie, orfèvrerie, des diamants, perles et pierres (CIBJO)

Gemological Institute of America (GIA)

International Diamond Council (IDC)

Scandinavian Diamond Nomenclature (Scan.D.N.)

Grading polished diamonds — Terminology and classification

1 Scope

This Technical Report specifies the terminology and classification to be used for the grading and description of polished diamonds.

This Technical Report shall only be used for natural, unmounted, polished diamonds. It shall not be used for synthetic diamonds, treated diamonds (other than is allowed for in 3.3), or for assembled stones (see 3.5).

A terminology and classification for the colour of fancy coloured diamonds (see 5.1.2) is in the course of preparation.

Test methods concerning the technical application of this terminology and classification are in the course of preparation.

2 Description of a polished diamond

A description of a polished diamond as defined in clause 3 shall be established by grading its criteria in accordance with the rules specified in the following clauses and shall contain

— mass (weight) (4.1),

— shape (7.2),

— measurements (4.2),

— proportions (7.3),

— clarity (clause 6),

— plot of inclusions and blemishes (see 6.2),

— colour (5.1),

— long-wave UV fluorescence (5.4),

— finish (7.4),

— comments (if applicable).

The contents of a complete standard report are given in annex B.

3 Definitions

For the purposes of this Technical Report, the following definitions apply.

3.1 diamond: A natural mineral consisting essentially of carbon crystallized in the isometric (cubic) system. Its Mohs' scale hardness is 10; its specific gravity approximately 3,52; and its refractive index, n_D, is 2,417.

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.

3.2 synthetic diamond: A man-made reproduction of diamond which has essentially the same chemical composition, crystal structure, optical, and physical properties as its natural counterpart. It is forbidden to use the word "diamond" alone to describe synthetic diamonds that have either partly or wholly crystallized, or recrystallized, due to human intervention, no matter which basic material or methods are used. Products made in this way must be clearly referred to as "synthetic diamond".

3.3 treated diamond: A diamond which man has treated, other than by cutting and polishing, with the intent of changing the diamond's appearance by coating, filling or any other physical or chemical treatment.

NOTES

1 All diamonds which man has drilled with a laser should be referred to as "clarity grade influenced by laser drilling treatment".

2 Any other treated diamonds, including those which have been coated or filled by man, cannot be graded.

3.4 treated colour: The natural colour of a diamond that has been altered by artificial means.

NOTE 3 Those stones that owe their colour to artificially produced irradiation or any other form of treatment should only be described by their colour hue, for example "yellow treated colour". The term "fancy" should not be used.

3.5 assembled stone: A stone constructed of two or more parts where at least one is diamond, whether natural, synthetic or treated. It must be clearly identified and shall not be graded.

3.6 colour: The relative absence (colourlessness), or presence of hue.

3.7 fluorescence: The degree of luminescence of a diamond when viewed under a long-wave ultraviolet (UV) light source with a wavelength of 365 nm.

3.8 clarity: The relative degree to which a diamond is free from internal characteristics/inclusions and external characteristics/blemishes.

3.9 cut: This is categorized by the shape, proportions and finish of a diamond.

4 Mass (weight) and measurements

4.1 Mass (weight)

The standard unit of mass for diamonds is the metric carat, which is equivalent to 200 mg (1/5 g). It is acceptable to orally express one-hundredth of a carat as a "point". The international standard abbreviation for carat is ct. The mass of a diamond shall be stated in carats to two decimal places.

If the mass is determined with an accuracy of three decimal places, it is rounded upwards if the third decimal is a 9, for example:

0,996 → 0,99 ct

0,998 → 0,99 ct

0,999 → 1,00 ct

4.2 Measurements

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

The following measurements are mentioned.

Round shape: minimum diameter, maximum diameter and depth (total height).

Fancy shape: length, width and depth (total height).

5 Colour

5.1 General

Colour refers to the relative absence (colourlessness) or presence of hue.

Diamond colours can be divided into the following two main categories.

For both main categories, photometric measurements intended for colour grade determination have no conclusive value at present.

5.1.1 Colourless to light yellow, light brown and light grey (D to Z)

The colour of diamond within the D to Z grade range is determined by visual comparison with a series of masterstones/comparison stones which themselves are a derivation of those orginally used to establish the D to Z grades described in 5.2. The determination is carried out by a trained observer with normal eyesight 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].

A colour grade shall be described by the letter or letter range between D and Z, or the letter range between D and Z together with the descriptions mentioned in the colour corresponding terms in tables 1 and 2.

5.1.2 All other colours

The general term commonly referred to as "fancy colour" is used to describe naturally coloured yellow, brown and grey diamonds, darker in tone and/or higher in saturation than the "Z" masterstone and all other naturally coloured diamonds with a noticeable hue.

In this category, the specific term "fancy" may precede the colour description of a naturally coloured diamond with the respective combination of hue, tone and saturation noticeable when it is face up.

5.2 **Colour grades** (colourless to light yellow, light brown and light grey)

The colour grades to be used are given in table 1.

For the corresponding terms in German, French and Italian, and the Scandinavian terms, see table 2.

Table 1 — GIA colour grades

GIA	Colour corresponding table	
D	D Exceptional White +	Colourless
E	E Exceptional White	
F	F Rare White +	
G	G Rare White	Near Colourless
H	H White	
I	I Slightly tinted white	
J	J	
K	K Tinted white	Faint Colour
L	L	
M	M	
N	N	
O	O	Very Light Colour
P	P	
Q	Q	
R	R	
S	S	
T	T Tinted	
U	U	Light Colour
V	V	
W	W	
X	X	
Y	Y	
Z	Z	

Descriptions indicating the presence of brown or grey may be included for Grades I and below.

Combined letter grades including and below M on the D to Z scale may be used as well as a two grade letter range above M.

For diamonds weighing under 0,47 ct, the combined grades as indicated by the dashed lines D and E "exceptional white", F and G "rare white" may be used.

5.3 Corresponding terms for colour grades

The corresponding terms in German, French and Italian, and the Scandinavian terms are given in table 2, under the responsibility of the organizations listed in the introduction.

5.4 Fluorescence

Fluorescence describes the degree of luminescence of a diamond when viewed under a long-wave ultraviolet light source with a series of masterstones, which themselves are a derivation of those originally used to establish the fluorescence degrees listed below.

The degree of fluorescence is characterized as follows:

none, faint, medium, strong.

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

6 Clarity

6.1 General

Clarity is the relative degree to which a diamond is free from internal characteristics/inclusions and external characteristics/blemishes, when viewed by a trained observer with normal eyesight using achromatic and aplanatic × 10 magnification, under an artificial source of light, the specification of which is D_{55} to D_{65} (CIE standard illuminant).

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

size, nature, number, position, brightness/colour.

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

Table 2 — Corresponding terms for colour grades

GIA	CIBJO/IDC			Scan.D.N
	German	French	Italian	
D	D Hochfeines Weiss +	D Blanc exceptionnel +	D Bianco extra eccezionale +	D River
E	E Hochfeines Weiss	E Blanc exceptionnel	E Bianco extra eccezionale	E River
F	F Feines Weiss +	F Blanc extra +	F Bianco extra +	F Top Wesselton
G	G Feines Weiss	G Blanc extra	G Bianco extra	G Top Wesselton
H	H Weiss	H Blanc	H Bianco	H Wesselton
I	I Leicht getöntes Weiss	I Blanc nuancé	I Bianco sfumato	I Top Crystal
J	J	J	J	J Crystal
K	K Getöntes Weiss	K Légèrement teinté	K Bianco leggermente colorito	K Top Cape
L	L	L	L	L Top Cape
M	M	M	M	M Cape
N	N	N	N	N Cape
O	O	O	O	O Cape
P	P	P	P	P Cape
Q	Q	Q	Q	Q Cape
R	R	R	R	R Cape
S	S	S	S	S Cape
T	T Getönt	T Teinté	T Colorito	T Cape
U	U	U	U	U Cape
V	V	V	V	V Cape
W	W	W	W	W Cape
X	X	X	X	X Cape
Y	Y	Y	Y	Y Cape
Z	Z	Z	Z	Z Cape

6.2 Clarity grades (see figure 1)

The clarity grades are distinguished and defined as follows.

Flawless (FL)

FL diamonds are free from internal characteristics/inclusions and external characteristics/blemishes when examined under × 10 magnification.

NOTE 4 The following do not disqualify a diamond from the Flawless Grade:

a) an extra facet on the pavilion which cannot be seen face up;

b) naturals totally confined to the girdle, which neither thicken the girdle nor distort its outline;

c) internal graining which is not reflective, white or coloured and does not significantly affect transparency.

Internally Flawless (IF)

IF diamonds are free from internal characteristics/inclusions and only possess external characteristics/blemishes when examined under × 10 magnification.

NOTE 6 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.

Loupe Clean (LC)

LC diamonds are free from internal characteristics/inclusions when examined under × 10 magnification.

NOTE 5 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.

Very Very Slightly Included/Very Very Small Inclusions (VVS)

VVS diamonds contain **minute** internal characteristics/inclusions when examined under × 10 magnification.

VVS1 diamonds contain **minute** internal characteristics/inclusions which are extremely difficult to observe when examined under × 10 magnification.

VVS2 diamonds contain **minute** internal characteristics/inclusions which are very difficult to observe when examined under × 10 magnification.

Very Slightly Included/Very Small Inclusions (VS)

VS diamonds contain **minor** internal characteristics/inclusions when examined under × 10 magnification.

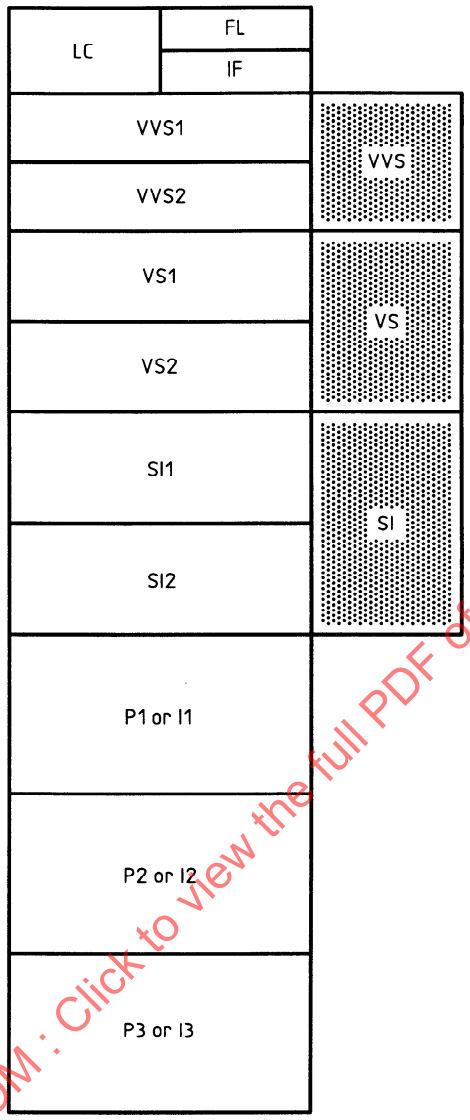
VS1 diamonds contain **minor** internal characteristics/inclusions which are difficult to observe when examined under × 10 magnification.

VS2 diamonds contain **minor** internal characteristics/inclusions which are somewhat easy to observe under × 10 magnification.

Slightly Included/Small Inclusions (SI) SI diamonds contain **noticeable** internal characteristics/inclusions when examined under × 10 magnification. SI1 diamonds contain **noticeable** internal characteristics/inclusions which are easy to observe when examined under × 10 magnification. SI2 diamonds contain **noticeable** internal characteristics/inclusions which are very easy to observe when examined under × 10 magnification.
Included or Piqué Included or piqué diamonds contain internal characteristics/inclusions which are prominent, very prominent to extremely prominent when examined under × 10 magnification. They are also visible, easily visible to very easily visible face up with the unaided eye and may affect brilliancy. Under certain circumstances, internal characteristics/inclusions may also be visible face up to the unaided eye in higher grades.
Included 1 or Piqué 1 (I1 or P1) I1 or P1 grade diamonds contain internal characteristics/inclusions which are prominent when examined under × 10 magnification.
Included 2 or Piqué 2 (I2 or P2) I2 or P2 grade diamonds contain internal characteristics/inclusions which are very prominent when examined under × 10 magnification.
Included 3 or Piqué (I3 or P3) I3 or P3 grade diamonds contain internal characteristics/inclusions which are extremely prominent when examined under × 10 magnification.

6.3 Clarity characteristics

See annex A.



NOTE — The shaded grades may be used for diamonds weighing under 0,47 ct.

Figure 1 — Diagram of clarity grades

7 Cut

7.1 Cut characteristics

Cut is categorized by the following characteristics.

a) Shape: the outline of the diamond combined with the facet distribution.

b) Proportions: the relationships between the various parts of a diamond and the girdle diameter.

c) Finish: the quality of the surface condition of a diamond, the exactness of its shape and the arrangement of the facets.

7.2 Shape

Common diamond shapes are illustrated in figure 2.

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 diamonds with a brilliant cut.

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 indicated in figure 3.

7.3 Proportions

The following proportions (see figure 4) are involved in the description of a diamond.

7.3.1 Average girdle diameter, used as a basis for descriptions of proportions

The average girdle diameter is the average of the minimum and maximum diameter for rounds, or width for fancy shapes.

7.3.2 Table size (percentage)

The table size is the average size of the table facet, expressed as a percentage of the average girdle diameter.

7.3.3 Crown height (percentage) and/or crown angle (degrees)

The crown height is the average distance from the upper girdle plane to the table facet, expressed as a percentage of the average girdle diameter.

The crown angle is the average angle formed where the bezel/upper main facet and upper girdle plane meet, expressed in degrees.

7.3.4 Pavilion depth (percentage) and/or pavilion angle (degrees)

The pavilion depth is the average distance from the lower girdle plane to the culet facet, expressed as a percentage of the average girdle diameter.

The pavilion angle is the average angle formed where the pavilion/lower main facet and lower girdle plane meet, expressed in degrees.

7.3.5 Girdle thickness (percentage or description)

The thickness of the girdle is expressed

a) as a percentage of the average girdle diameter, noting the minimum and maximum and/or the average percentage; or

b) noting the minimum, maximum or average thickness using the following applicable descriptions:

extremely thin, knife edge,

very thin,

thin,

medium,

slightly thick,

thick,

very thick,

extremely thick.

A description of the nature of the girdle is noted if it is not bruted, as follows:

faceted,

polished.

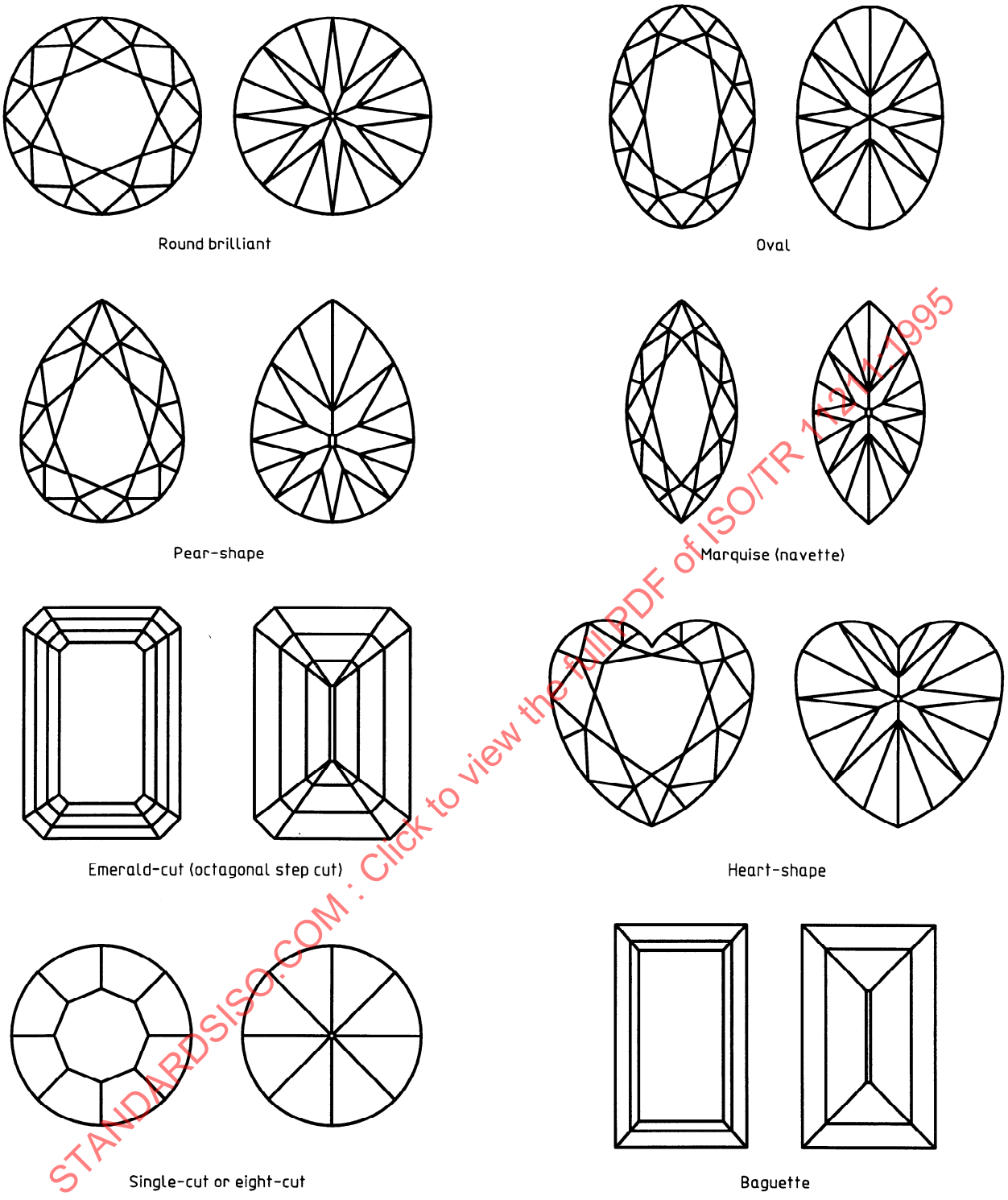
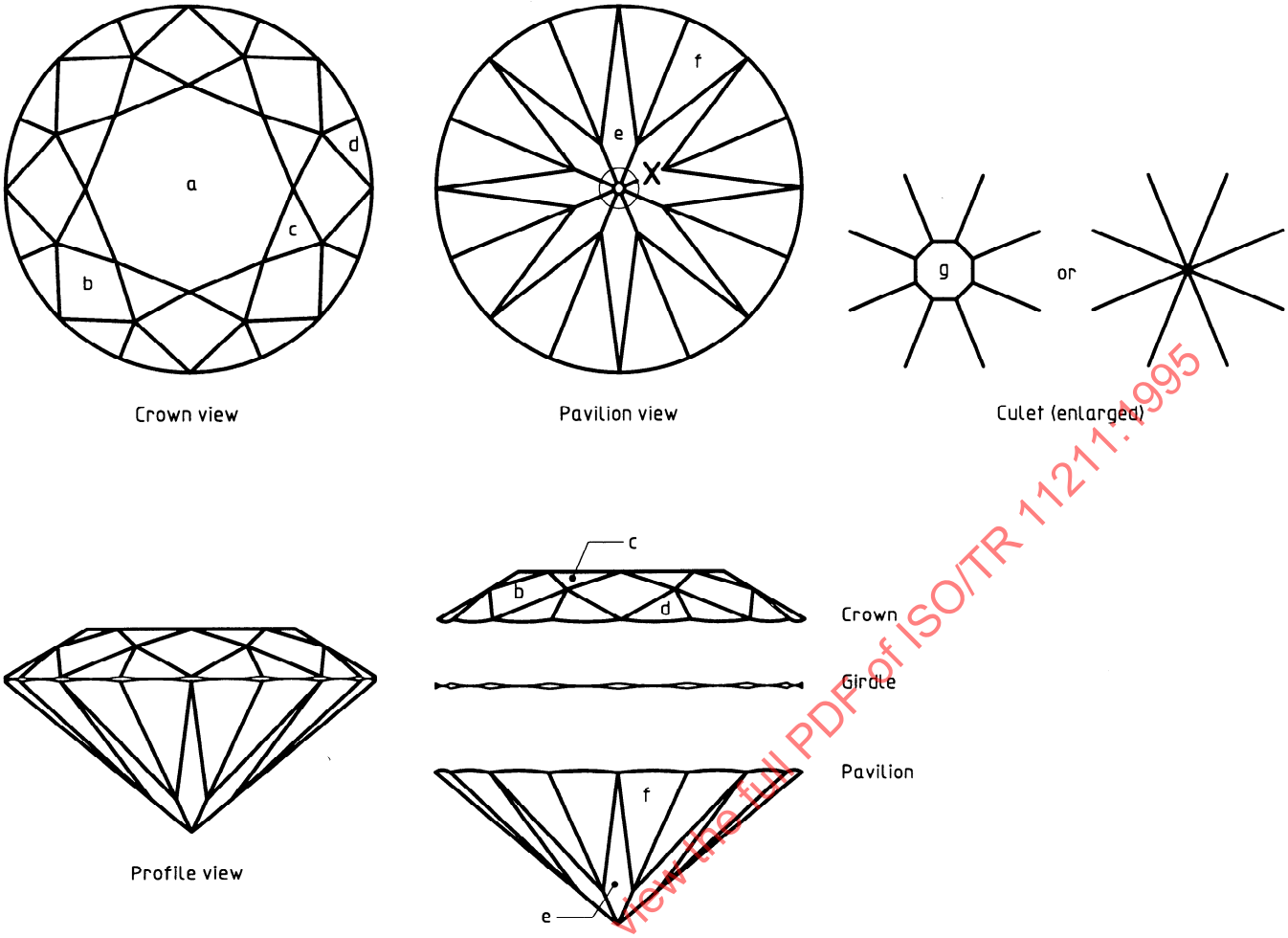


Figure 2 — Common diamond shapes



Facet name	Numbers
a Table	1
b Bezel/Upper main	8
c Star	8
d Upper girdle/Upper halves	16
e Pavilion main/Lower main	8
f Lower girdle/Lower halves	16
g Culet	0 or 1
Total number of facets	57 or 58

Figure 3 — Parts and facet arrangement of a round brilliant

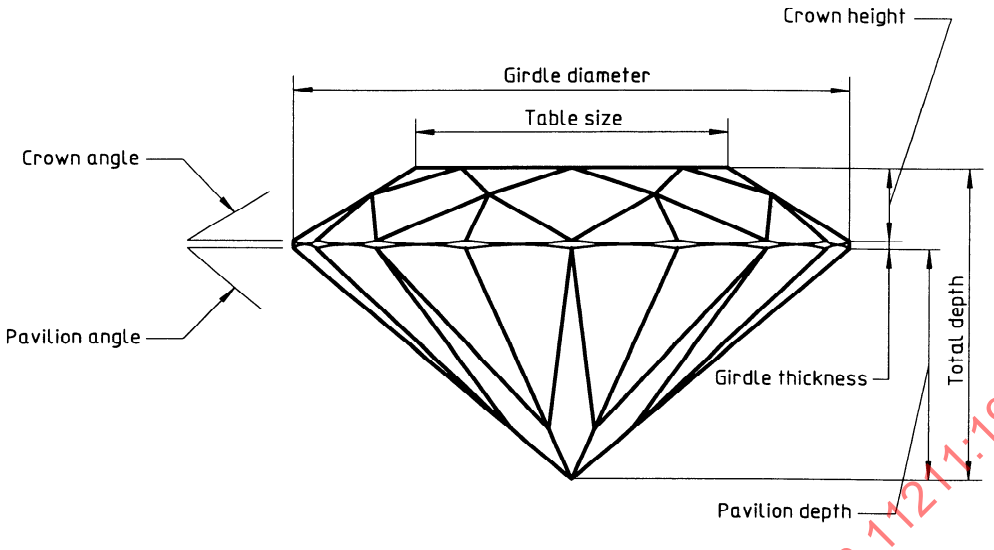


Figure 4 — Proportions involved in the description of a diamond

7.3.6 Culet size (percentage or description)

The culet size is

a) expressed as an average percentage of the average girdle diameter; or

b) described as follows:

none/pointed/linear,

very small,

small,

medium,

large,

very large.

In addition, a description of the nature of the culet may be noted.

7.3.7 Total depth/height (percentage)

The total depth is the distance between the table facet and the culet facet, expressed as a percentage of the average girdle diameter.

NOTE 7 At present investigations are taking place between the organizations that prepared this document (see the introduction) into the terminology for a proportion comment (not a grade). It is intended to cover the full range of diamond mass, shapes and colours. Agreement will be reached in this area following these investigations.

7.4 Finish

Finish includes the polish and symmetry categories.

The external characteristics/blemishes which are taken into consideration under polish or symmetry are also listed in A.2.1 and A.2.2. They can also be taken into consideration for clarity determination but only to distinguish between "flawless" and "internally flawless".

7.4.1 Polish

Polish refers to the quality of the facet surface condition and is graded according to the following categories:

very good,

good,

fair/medium,

poor.

N.B. An optional grade of excellent may be used.

7.4.2 Symmetry

Symmetry refers to the exactness of the shape of a diamond and the arrangement of the facets and is graded according to the following categories:

very good,

good,

fair/medium,

poor.

N.B. An optional grade of excellent may be used.

When grading symmetry, examples of major deviations taken into consideration are as follows:

imperfect roundness/uneven outline,

variation of crown height,

deviation of the central table position,

deviation of the central culet position,

wavy girdle.

Annex A
(normative)

Clarity, polish and symmetry characteristics

A.1 Internal characteristics/inclusions

Bearding: tiny feathers extending in from the girdle.

Bruise: surface percussion mark, often accompanied by tiny, root-like feathers.

Cavity: a large or deep opening.

Chip: a relative shallow rounded opening, usually occurring along the girdle or culet.

Cleavage: a large feather occurring in a plane, usually parallel to a crystal face.

Cloud: a hazy or milky area made up of a number of very small inclusions.

Crystal: a mineral crystal included in a diamond.

Feather: a separation or break due to either cleavage or fracture, often white and feathery in appearance.

Grain centre: a small area of concentrated crystal structure distortion.

Graining: internal indications of irregular crystal growth.

a) Coloured: appears as coloured streaks.

b) Reflective: appears as reflective plane.

c) Whitish: may appear as whitish streaks or may give the stone a hazy (cloudy) appearance which decreases transparency.

Indented natural: a natural that penetrates the stone.

Knot: an included diamond crystal which reaches the surface.

Laser drill hole: a tiny tube made by a laser; the surface opening may resemble a pit, while the tube usually looks needle-like.

Needle: a long, thin included crystal which looks like a tiny rod.

Pinpoint: a very small inclusion; under × 10 normally seen as a tiny dot, either singly or in groups or strings.

Twinning wisp: inclusions located in a plane, which occur as a result of the change in orientation of the diamond crystal structure.

A.2 External characteristics/blemishes

Abrasion: tiny nicks along facet junctions or culet, producing white fuzzy lines instead of sharp facet edges.

Bruting line: tiny lines on a girdle not displaying a feather-like appearance.

Burn mark: surface clouding caused by excessive heat, or uneven polished surface resulting from structural irregularities.