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Grading cut and polished tanzanite — Terminology, classification and test methods

EAST AFRICAN COMMUNITY

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Foreword

Development of the East African Standards has been necessitated by the need for harmonizing requirements governing quality of products and services in the East African Community. It is envisaged that through harmonized standardization, trade barriers that are encountered when goods and services are exchanged within the Community will be removed.

The Community has established an East African Standards Committee (EASC) mandated to develop and issue East African Standards (EAS). The Committee is composed of representatives of the National Standards Bodies in Partner States, together with the representatives from the public and private sector organizations in the community.

East African Standards are developed through Technical Committees that are representative of key stakeholders including government, academia, consumer groups, private sector and other interested parties. Draft East African Standards are circulated to stakeholders through the National Standards Bodies in the Partner States. The comments received are discussed and incorporated before finalization of standards, in accordance with the principles and procedures for development of East African Standards.

East African Standards are subject to review, to keep pace with technological advances. Users of the East African Standards are therefore expected to ensure that they always have the latest versions of the standards they are implementing.

The committee responsible for this document is Technical Committee EASC/TC 029, *Mining*, quarrying and mineral beneficiation.

Attention is drawn to the possibility that some of the elements of this document may be subject of patent rights. EAC shall not be held responsible for identifying any or all such patent rights.

Introduction

The aim of this Draft East African Standard for grading unmounted cut and polished tanzanite is to set rules for determining the weight, color, clarity and cut of individual cut and polished tanzanite with maximum precision and accuracy.

On one hand, based on these four criteria - also known as "the 4C's" - the tanzanite trade evaluates the value of tanzanite. On the other hand, some tanzanite grading reports may be issued based on different standards by different laboratories, potentially leading to different results for the same tanzanite. This situation damages the reputation of the whole tanzanite trade. Hence, the need for a unique harmonized standard for grading polished and cut tanzanite.

This document is of relevance, in particular, for the following stakeholder groups:

- jewelers of tanzanite articles,
- individuals and mining companies specially dealing with tanzanite,
- association of minerals dealers (buyers and sellers including authorized mineral brokers),
- regulators, market surveillance organizations, quality compliance organizations etc. Others that

can benefit from this document are:

- gemologists,
- policy makers,
- learning and research institutions,
- third party system and technology providers.
- Lapidaries

Grading cut and polished tanzanite — Terminology, classification and test methods

1 Scope

This Draft East African Standard specifies the terminology, classification and the methods that are used for the grading and description of single unmounted cut and polished tanzanite minimum 0.5 carat (ct).

This Draft East African Standard applies to natural, unmounted, cut and polished tanzanite. It is not to be used for synthetic, laboratory grown and imitated tanzanite.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

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

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

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

3.1 General terms

3.1.1
carat (ct)
unit of weight.

NOTE One carat being equivalent to 200 mg (0.20 g)

3.1.2
clarity
relative absence or presence of internal characteristics/inclusions and external characteristics/blemishes.

3.1.3
color
relative absence or presence of hue, saturation and tone in standardized observation conditions.

3.1.4
composite stone
stone constructed of two or more parts.

3.1.5
Fluorescence

degree of luminescence of tanzanite when viewed under a long-wave ultraviolet (UV) light source with a wavelength of 365 nm.

3.1.6
masterstone
standard/reference stone.

3.1.7
polished tanzanite
Tanzanite with defined cut.

3.1.8
tanzanite
rare gemstone from zoisite group that is only found from a single deposit in the world around Mirerani area, Manyara region in northern Tanzania. It has a refractive index of 1.690-1.700, specific gravity of 3.34 - 3.36 and hardness of 6-7 on the Mohs' scale.

3.2 Terms related to internal characteristics

3.2.1
bearding
tiny feathers extending in from the girdle.

3.2.2
bruise
surface percussion mark, often accompanied by tiny, root-like feathers.

3.2.3
cavity
large or deep opening.

3.2.4
chip
relatively shallow indentation, usually occurring along the girdle or culet (could also be external).

3.2.5
cleavage
large feather occurring in a plane, parallel to a crystal face.

3.2.6
cloud
hazy area made up of a number of very small inclusions.

3.2.7
colored graining
graining which appears as colored streaks.

3.2.8
crystal
mineral crystal included in a tanzanite.

3.2.9
feather
separation or break due to either cleavage or fracture, often feathery in appearance.

3.2.10
fracture
irregular breakage of the crystal.

3.2.11
internal graining
internal indications of irregular crystal growth.

3.2.12
laser drilling
burning a channel with a laser between the surface of a tanzanite and an inclusion, the channel being used as a conduit to allow a chemical treatment of the inclusion with the purpose of making the inclusion less. visible.

3.2.13 needle inclusion
long, thin included crystal which looks like a tiny rod.

3.2.14
reduced transparency
cloudy, or hazy appearance of the whole or part of a tanzanite due to internal features that may or may not be visible at 10 x magnification.

3.2.15
reflective graining
graining which appears as reflective plane.

3.3 Terms related to external characteristics

3.3.1
abrasion
tiny nicks 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
relatively shallow indentation, usually occurring along the girdle or culet (could also be internal).

3.3.5
cut
shape, proportions, polish and symmetry of a tanzanite.

3.3.6
extra facet
facet located without regard for symmetry and not required by the cutting style.

3.3.7
inscription
mark on the surface of or in a tanzanite.

3.3.8
lizardskin
transparent concave wave texture on the surface of a polished tanzanite, usually parallel to the direction of the cleavage surface.

3.3.9
naked eye
naked (unaided) eye, or visible to the eye through glasses adjusting an anomalous eyesight to normal.

3.3.10
polish line
tiny parallel lines left by polishing; fine parallel ridges confined to single facet, caused by crystal structure irregularities; or tiny, parallel, polished grooves produced by irregularities in the scarify surface.

3.3.11
scratch
linear indentation normally seen as a fine line, curved, or straight.

3.3.12 shape/form
outline of tanzanite when viewed perpendicular to the table facet.

3.3.13
treatment
any human intervention, other than the accepted practices of cutting, polishing, cleaning and setting that alters the appearance of a stone.

EXAMPLE Coating, fracture filling, heating, irradiation, laser drilling, High Pressure High Temperature (HPHT) treatment or any other physical or chemical process

4 Identification

It shall be the responsibility of the examiner to establish that the stone under examination is tanzanite before it is graded and be aware of the possibilities of the stone being a synthetic tanzanite, a treated tanzanite, imitated tanzanite, or composite stone.

5 Weight and measurement

5.1 Weight

The weight of tanzanite shall be expressed in carats (ct); one carat is equivalent to 200 mg (0.20 g). The weight of a tanzanite shall be stated in carats to two to three decimal places. There shall be no weight rounding upwards.

NOTE: Weight may be stated to three decimal places if the accuracy of the weighing equipment is accurate to this degree aces.

5.2 Measurement

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

6 Tanzanite classification

6.1 Color

Tanzanite exists predominantly in blue color but rarely in other fancy colors. Common fancy colors include: violet, pink, brown and greenish-yellow. Color classification of tanzanite shall be as per Table 1 below.

Table 1 — Color grades for tanzanite

S/N	Code	Clarification	Color saturation
i)	A	Exceptional color/Deep blue	
ii)	B	Vivid blue	
iii)	C	Moderate blue	
iv)	D	Light /Pale blue	

NOTE 1: All other colors apart from listed in Table 1 should be categorized as below D for example greenish blue, khaki, yellow, orange, rare green, pink etc.

NOTE 2: The colors shown in table 1 may look slightly different from the actual colors, for grading use master color stone.

6.2 Clarity

Clarity classification of tanzanite shall be as per Table 2 below.

Table 2 — Clarity grades for tanzanite

S/N	Code	Clarification
i)	IF	Internal Flawless Tanzanite • Very very slightly included • Can contain minute inclusion invisible to unaided eye and difficult to see under 10x magnification • Inclusions may be very fine needles, tiny hairline feathers, very faint clouds and percussion marks
ii)	EC	Eye clean • Very slightly included • Contain minor inclusions which are somewhat easy to see under 10x magnification but usually invisible to the unaided eye. • Inclusions may be small included crystals, liquid inclusions, fine needles, small feathers
iii)	SI	Slightly included • Contain noticeable inclusions which are apparent under 10x magnifications • Inclusions are included crystals, liquid inclusions, feathers, dense clouds
iv)	MI	Moderately included • Inclusion somewhat easy to see with naked eye and apparent under 10x magnification • Low grade stones •Characterized by inclusions that may have negative effect on either appearance or durability
v)	HI	Heavily Included • Inclusion easily seen by naked eye • Imperfect and lowest grade stones • Characterized by inclusions that have a negative effect on both appearance and durability

6.3 Cut

6.3.1 Cut characteristics

Cut shall be categorized by the following characteristics:

a) the outline of the tanzanite combined with the facet arrangement;

b) proportions: the relationships between the various parts of tanzanite and the girdle diameter; and

c) finish: the quality of the surface condition of tanzanite, the exactness of its shape and the arrangement of the facets.

6.3.2 Shape

Common tanzanite shapes and cut are illustrated in Annex A.1. Variety of other shapes exist and these shall be clearly described in detail.

6.3.3 Proportions

The proportions (see Figure A.2) described in Annex A.2 shall be included in the tanzanite grading report.

6.3.4 Finish

Finish includes the polish and symmetry categories. The external characteristics/blemishes shall be taken into consideration under polish or symmetry. They shall also be taken into consideration for clarity determination.

6.3.4.1 Polish

Polish refers to the quality of the facet surface condition and, shall be, graded according to the following categories **(refer Table 4)**:

a) excellent;

b) very good;

c) good;

d) fair; and

e) poor.

6.3.4.2 Symmetry

Symmetry refers to the exactness of the shape of tanzanite and the arrangement of the facets and shall be graded according to the following categories **(refer Table 3)**:

a) excellent;

b) very good;

c) good;

d) fair; and

e) poor.

7 Test methods

7.1 Testing weight

Maintain and calibrate all balances used to establish the carat weight of tanzanite to ensure accuracy. Prior to weighing, all tanzanite shall be clean.

7.2 Testing measurements

Use instruments accurate in millimetres to two decimal places to measure the dimensions of a tanzanite.

For round stones, determine minimum and maximum diameters by making at least four measurements at differing points on the diameter of the tanzanite. Clearly establish minimum and maximum diameter measurements.

For stones other than rounds determine minimum and maximum diameters by making two measurements (or more if applicable) across the apparent length and width of the tanzanite. Clearly establish the length and width plus any other descriptive measurements.

7.3 Testing and grading color

7.3.1 General

Prior to color grading the following must be taken into consideration;

7.3.1.1 Cleaning of master stone

Clean each master stone with solvent or gemstone cleaning cloth.

7.3.1.2. Masterstone for color

Use only round brilliant-cut tanzanite for this purpose. First generation master stones shall be not smaller than 100 ct and second-generation master stones shall be not smaller than 15 ct. All stones in a set shall be of similar weight and proportions, and the nature of the girdles shall be the same.

The second generation of masterstones shall be the last generation that shall be used laboratories for the issuing of tanzanite grading reports.

7.3.2 Procedures

7.3.2.1 Precautions

Persons grading tanzanite color shall be aware of the “tiring factor” and limit the time spent grading according to their individual capabilities.

7.3.2.2 Cleaning

Clean each submitted tanzanite with tanzanite cleaning clothes prior to grading.

7.3.2.3 Comparisons

The color of tanzanite to be graded shall be determined by visual comparison with masterstones and shall be observed from the pavilion side perpendicular with the pavilion facets. Place the stone between two of the masterstones and move the stone until the correct position is found.

7.3.2.4 Round stones

Round stones shall be examined in several directions. If different colors are observed, the predominant A to D grade shall be conclusive (Table 1.)

The color of other-shaped tanzanite shall be graded in the several directions, except the directions that points to the corners. If different colors are observed, the predominant A to D grade shall be conclusive (Table 1.)

7.3.2.5 Colors

Colors like purple and violet shall be graded as if they were within the same color series as the masterstones.

7.3.2.6 Lighting

Color grading shall be carried out under an artificial light source with a stable light output in a light intensity of approximately 600 luminance (lx).

NOTE: A convenient artificial light source is a commercial tubular fluorescent lamp with color temperature of 5500 K to 6500 K.

The masterstones and the stone to be graded shall be placed with the table down on a non-fluorescent and non-reflective white background under the central area of the tube. Reflections and distractions from the environment shall be excluded. Prevent direct view of the light sources.

7.3.2.7 Positioning

Tanzanite being graded and the masterstones shall be placed directly below the light source. For an observer with normal eyesight the distance between the light source and the tanzanite being graded shall be approximately 20 cm and the light intensity at that point shall be approximately 600 lx.

7.3.2.8 Grade

The color grade shall be given with one full color grade and its corresponding term in accordance with Table 1.

7.4 Testing and grading clarity

7.4.1 General

Clarity grading shall be determined in accordance with Table 2. The practical grading for clarity shall be made with the greatest caution and shall not be made under time pressure. Experience and regular practice shall be required to achieve accurate and consistent results. Before it is graded the stone shall be properly cleaned. A thorough examination through and on each of the tanzanite's numerous facets, and along the entire girdle, shall be carried out.

7.4.2 Tools/Apparatus

Clarity grading shall always be carried out under an artificial light source with a stable light output. The light intensity at a distance of 20 cm shall be approximately 600 lx.

NOTE: A convenient artificial light source is a commercial tubular fluorescent lamp with corrected color temperature of 5500 K to 6500 K.

7.4.3 Distance

Tanzanite being graded shall be held under the lamp at a distance of between 5 cm and 10 cm. Reflections and distractions from the environment shall be excluded. To determine the visibility of internal and external characteristics with the naked eye the tanzanite shall be held at a distance from the lamp of approximately 30 cm, in a position that allows light to enter through the crown, and only minimally through the pavilion.

7.4.4 Plotting

Optionally inclusions may be plotted as the needs arise.

7.5 Testing and grading of finish

7.5.1 Symmetry

When determining symmetry, the characteristics of the shape and the distribution of facets shall be taken into account, as well as extra facets and naturals. Tanzanite shall be graded in accordance with Tables 3 below. The observation techniques used to assign the categories listed in Table 3 are:

a) naked eye;

b) 10 x magnification; and

c) measurements.

Table 3 — Symmetry deviations

Visibility 10 x	**Grade**
No symmetry deviations	Excellent
Negligible visible symmetry deviations	Very good
Hardly visible or minor symmetry deviations	Good
Visible symmetry deviations	Medium
Major symmetry deviations	Fair

7.5.2 Polish

When determining the polish grade the characteristics listed in B.2 shall be taken into account and graded in accordance with Table 4. Combination of 10 x magnification and naked eye observations shall be used to assign the categories listed in Table 4.

Table 4 — Polish characteristics

Visibility 10 x	**Grade**
Not found or very hard to find	Excellent
Hard to find	Very good
Fairly hard to find	Good
Easy to find	Medium
Very easy to find easily visible to the naked eye	Fair

7.6 Testing and grading proportions

7.6.1 General

Appropriate instruments (clause 7.2) shall be used to establish the measurements required to describe the proportions of tanzanite.

7.6.2 Description

7.6.2.1 Table sizes

The table size shall be expressed as a percentage of the girdle diameter.

7.6.2.2 Crown height

The crown height shall be expressed as a percentage of the girdle diameter.

7.6.2.3 Pavilion depth

The pavilion depth shall be expressed as a percentage of the girdle diameter.

7.6.2.4 Girdle thickness

The girdle thickness shall be expressed as a percentage of the girdle diameter.

7.6.2.5 Culet size

The culet size shall be expressed as a percentage of the girdle diameter, in accordance with Annex A.2.6

7.6.3 Proportions comment

In order to maximize the beauty of the finished stone, tanzanite is cut to a particular set of proportions. Beauty is a personal impression and will vary from person to person and from time to time. Proportion parameters of round and other cut tanzanite shall be given in accordance with the refractive index which will give angles for pavilion.

8 Tanzanite grading report

Tanzanite grading report shall contain at least the following information:

a) the name and a valid address where a user can contact the institution/laboratory;

b) Tanzanite grading report (as a title);

c) unique tanzanite grading report reference;

d) the results of the following tests:

i. weight

ii. colour;

iii. clarity; and

iv. shape & cut.

e) proportions comment (only for round brilliant cuts);

f) measurements;

g) symmetry;

h) polish;

i) proportions (such as table size, total depth, crown height and/or crown angle, pavilion depth and/or pavilion angle, girdle thickness, culet size);

j) nature of the girdle (optional);

k) nature of the culet (optional);

l) comments (if applicable);

m) plot of internal characteristics/inclusions and external characteristics/blemishes (if applicable);

n) reference to this document;

o) the date and (highly recommended) the place of issue of the tanzanite grading report.

NOTE A combined presentation of color and clarity may be opted in tanzanite grading report.

Annex A
(normative)

Tanzanite cuts and proportions description

A.1 Common tanzanite shapes and cuts

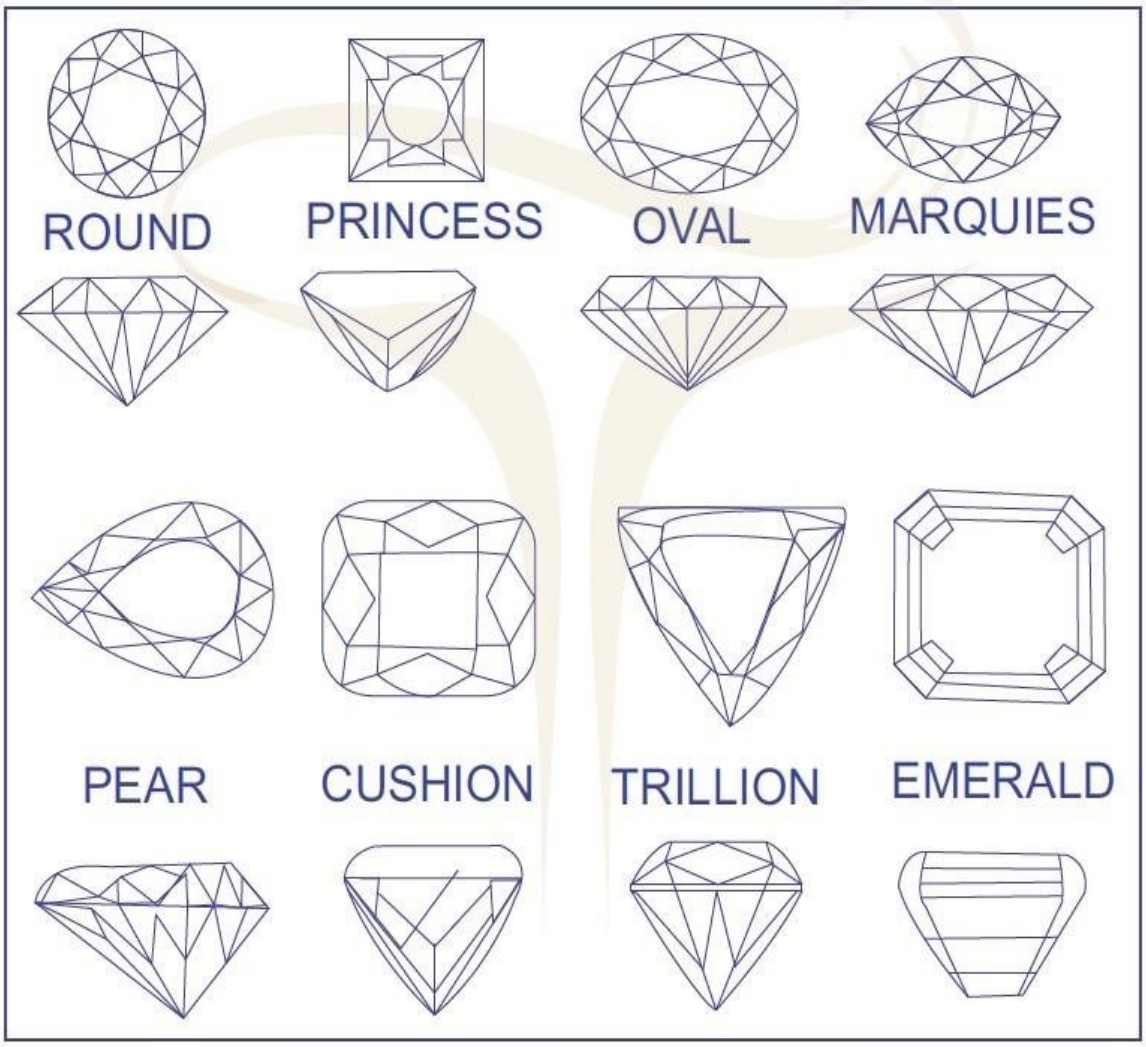


Figure A.1 — Common tanzanite shapes and cuts

A.2 Description of proportions involved in the description of tanzanite

A.2.1 Basis for descriptions of proportions

For round tanzanite cut, the basis for descriptions of proportions is the average of at least four measurements at different points of the diameter of the girdle. For other shapes, this basis is the width of the tanzanite.

A.2.2 Table size (percentage)

The table size shall be the average size of the table facet, expressed as a percentage of the average girdle diameter. For round stones measurements to describe the table size shall be made from opposite corner to corner and expressed as an average of the four possible measurements. For other shapes table size measurements shall be taken when viewing the profile of the tanzanite along its length

A.2.3 Crown height (percentage) and/or crown angle (degrees)

For round stones; the crown height shall be the average of main measurements reflecting the distance from the upper girdle level to the level of the table facet, measured where the bezel/upper main facets and upper girdle level meet, and expressed as a percentage of the girdle diameter. The crown angle shall be the average angle formed where the bezel/upper main facets and upper girdle plane meet, expressed in degrees.

For other shapes, the crown height and angle measurements shall be taken when viewing the profile of the tanzanite along its length

A.2.4 Pavilion depth (percentage) and/or pavilion angle (degrees)

For round stones; the pavilion depth shall be the average of the main measurements reflecting the distance from the lower girdle level to the level of the culet, measured where the pavilion / lower main facets meet the lower girdle level, and expressed as a percentage of the girdle diameter. The pavilion angle shall be the average angle formed where the pavilion / lower main facets and lower girdle plane meet, expressed in degrees.

For other shapes, the pavilion depth and angle measurements shall be taken when viewing the profile of the tanzanite along its length.

A.2.5 Girdle thickness (percentage) and description

The thickness of the girdle shall be the average of main measurements reflecting the distance between the levels where the related lower girdle facets and upper girdle facets meet the girdle and shall be expressed as a percentage of the girdle diameter, noting the minimum and maximum and/or the average percentage. Optionally a description as thin, medium or thick can be given instead.

For other shapes, girdle thickness measurements shall be taken when viewing the profile of the tanzanite along its length.

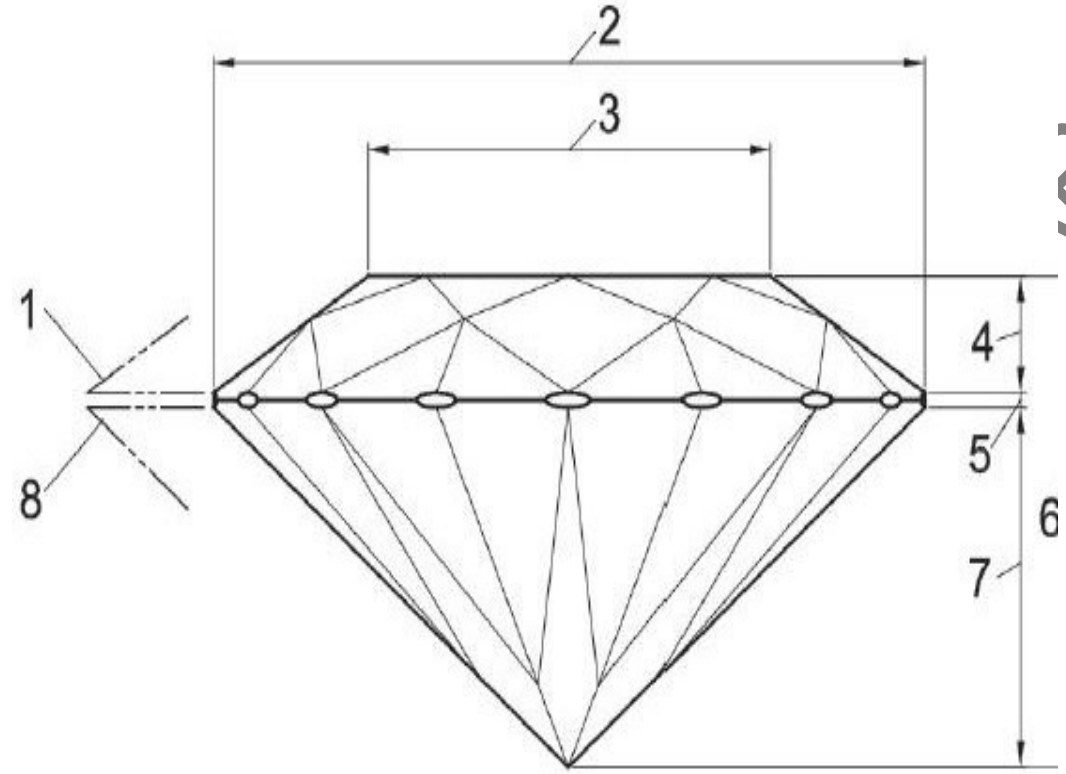
NOTE When applicable, the qualifier "partly" may be added to the girdle description.

A.2.6 Culet size (percentage) and description

The culet size shall be expressed as a percentage of the girdle diameter. Optionally a description as "pointed", small, and large can be given instead. The culet size shall be the diameter for round stones or the culet width for other shapes. A description of the nature of the culet shall be added as "pointed", polished", natural", or linear".

A.2.7 Total depth/height

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



Key

1	Crown angle	5	Girdle thickness
2	Girdle diameter	6	Total depth
3	Table size	7	Pavillion depth
4	Crown height	8	Pavillion angle

Figure A.2 — Proportions involved in the description of tanzanite

Annex B
(normative)

Clarity, polish and symmetry characteristics

B.1 Internal and external characteristics

Internal and external characteristics that shall be taken into consideration during clarity grading are detailed in subclause 3.2 and subclause 3.3 respectively.

B.2 Polish determination

The following characteristics that shall be taken into consideration for polish determination;

a) abrasion;

b) bruting line;

c) burn mark;

d) nick;

e) pit;

f) polish line;

g) pitted girdle;

h) scratch.

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