DUS 2257

DRAFT UGANDA STANDARD

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Refined Gold — Specification

Reference number
DUS 2257: 2020

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A Uganda Standard does not purport to include all necessary provisions of a contract. Users are responsible for its correct application

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Foreword

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The work of preparing Uganda Standards is carried out through Technical Committees. A Technical Committee is established to deliberate on standards in a given field or area and consists of key stakeholders including government, academia, consumer groups, private sector and other interested parties.

Draft Uganda Standards adopted by the Technical Committee are widely circulated to stakeholders and the general public for comments. The committee reviews the comments before recommending the draft standards for approval and declaration as Uganda Standards by the National Standards Council.

The committee responsible for this document is Technical Committee UNBS/TC 16, *Petroleum*, Subcommittee SC 2, *Petroleum and Petroleum Products*.

Refined Gold — Specification

1 Scope

This Draft Uganda Standard specifies the requirements and methods of sampling and test for refined gold in cast bar form.

2 Normative references

The following referenced documents 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.

DUS 2258:2020 Test Method for Chemical Analysis of Refined Gold by Direct Current Plasma Atomic Emission Spectrometry

3 Terms and definitions

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

3.1
Fineness
gold content measured in parts per thousand; example; (a fineness of 999.9 equals 99.99 per cent gold.

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

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

4 General Requirements

4.1 Grading and Fineness

Refined gold shall be characterised in terms of grade or fineness as described below;

a) Grade 99.5—Gold having a minimum fineness of 995.

b) Grade 99.95—Gold having a minimum fineness of 999.5.

c) Grade 99.99—Gold having a minimum fineness of 999.9.

d) Grade 99.995—Gold having a minimum fineness of 999.95.

Note: The minimum acceptable fineness is 995.0 parts per thousand fine gold

4.2 Appearance

The surface of the bar shall be smooth, free of any irregularities such as layering, surface cavities, bubbles, spots, blowholes or shrinkage

4.3 Dimensions

All shapes and sizes of the fine kilobar may have minor variations, the following measurements should be considered as the benchmarks

a) Maximum Length: 119mm

b) Maximum Width: 55mm

c) Maximum Thickness: 9mm

4.4 Weight

For 1 Kilogram of tradable gold bar meeting the requirements of this standards shall have a minimum of 995 purity and / or minimum of 999.9 purity per thousand parts of gold

For small tradable gold bar an exact weight of 1.00g, 2.5g, 5.00g, 10.00g, 50.00g, 100.00g, 10 tola with a weight of 11.6638g shall have minimum 999.0 purity and / or higher purity of 999.9 per thousand parts of fine gold

4.5 Materials and Manufacture

The metal may be produced by any process that yields a product capable of meeting the requirements of this specification.

The purchaser or regulatory authority, upon request, shall be informed of the refining process used

4.6 Specific requirements

Refined gold shall comply with the limits specified in Table 1, when tested in accordance with DUS 2258

Table 1 — Specific requirements for Refined Gold

Element[A]	Composition,%			
	Grade 99.5[B]	Grade 99.95	Grade 99.99	Grade 99.995
Gold, (min)	99.5	-	-	-
Gold, (min) (by difference)	-	99.95	99.99	99.995
Silver + copper, (max)	-	-	0.04	-
Silver, (max)	-	0.035	0.009	0.001
Copper, (max)	-	0.02	0.005	0.001
Palladium, (max)	-	0.02	0.005	0.001
Iron, (max)	-	0.005	0.002	0.001
Lead,(max)	-	0.005	0.002	0.001
Silicon, (max)	-	-	0.005	0.001
Magnesium, (max)	-	-	0.003	0.001
Arsenic, (max)	-	-	0.003	-

Bismuth, (max)	-	-	0.002	0.001
Tin,(max)	-	-	0.001	0.001
Chromium, (max)	-	-	0.0003	0.0003
Nickel, (max)	-	-	0.0003	-
Manganese, (max)	-	-	-	0.0003

A By agreement between manufacturer and purchaser analyses may be required and limits established for elements not specified in this table.

B Chemical composition of materials required for Grade 99.5 refined gold shall be determined by a test method similar to the fire assay test method listed in the Annex A

5 Product Marking

Gold bars shall bare the following information in legible and indelible marking;

a) Serial Numbers

b) Hallmark/brand stamp of the refiner

c) Fineness (to four significant figures)

d) Weight (expressed in grams, kilograms or troy ounces)

e) Year of manufacture, or if not, the year must be stated on the accompanying certificate of the manufacturer

6 Sampling

A sample may be taken from the melt before pouring (A single melt or bar(s) cast from a single melt shall constitute a lot for sampling.)

The amount of sample taken shall be in accordance to that specified in DUS 2258

Annex A
(normative)

Test method for chemical analysis of refined gold by Cupellation Fire Assay

A.1 Scope

This test method covers the cupellation analysis of Grade 99.5 refined gold for gold content

A.2 Summary of Test Method

The weighed sample along with required silver, copper, and lead is cupelled until all base metal is absorbed and only the precious metals remain. The silver is then removed by dissolution with nitric acid. The remaining gold is dried, annealed, and weighed. Synthetic proof samples of known amounts of gold are also assayed and the sample is corrected for gains or losses in the proof sample.

A.3 Interferences

The presence of the following elemental concentrations will lead to erroneous results.

Element	**Max %**
Nickel, Iron, Tin	2.0
Tungsten	0.5
Palladium, Platinum	00.1
Iridium, Rhodium, Ruthenium, Osmium	0.01

A.4 Apparatus

- Muffle furnace, capable of maintaining 1250°C and having adjustable air flow control.
- Analytical balance, capable of weighing 60.002 mg.
- Rolling mill.
- Platinum basket.

A.5 Reagents and Materials

- Nitric acid, 22° Baume´, 1.169 6 0.01 specific gravity by hydrometer.
- Nitric acid, 32° Baume´, 1.285 6 0.01 specific gravity by hydrometer.
- Lead foil.
- Silver wire, 99.99 % (<0.001 ppt Au).

- Copper disks, 25 mg.
- Proof gold wire, 99.999 %.

A.6 Procedure

Sample Preparation—Wire brush chill pin samples to remove glass particles from surface, then cut and roll. After rolling, inspect the sample for inclusions or other signs of segregation. Drillings and grain samples are as is.

Weigh samples in triplicate at 0.50g and place in 2.5g lead cornucopias, along with 1.25 g of fine silver and 1/2 disk of copper.

Prepare two proofs per sample. Weigh fine gold at 0.4975 +/- 0.00050 g. Add silver at 1.25 g, along with 1/2 disk of copper.

Close lead cornucopias and compress with pliers into spheres to fit cupels. Place in numbered tray compartments.

Load a set of 15 (three rows of five) 1 in. magnesite cupels into the muffle furnace (no air flow) at approximately 1225°C and allow to dry for 30 min. calibrate the temperature of the furnace by noting the temperature necessary to melt pure gold.

Carefully place each lead wrapped sample in a cupel, starting with the next to the front row, as follows:

B	B	B	B	B
3A	P	3B	P	3C
2A	P	2B	P	2C
1A	P	1B	P	1C
B	B	B	B	B

where:

B = blank cupel, and

P = proof.

Close the door and wait 2 to 3 min until all samples become molten. Open the draft and adjust after 1 min for sufficient draft (fumes visibly rising off cupels and flowing back to vent in rear of furnace).

Close the door and wait 2 to 3 min until all samples become molten. Open the draft and adjust after 1 min for sufficient draft (fumes visibly rising off cupels and flowing back to vent in rear of furnace).

After 8 to 10 min the samples will appear silvery but not solidified. At this point remove the cupels from the furnace one at a time and place in front of the furnace door, where the samples will immediately solidify and blink.

Once cooled, remove beads from cupels with flat pliers and place in dimpled porcelain trays.

Clean beads by squeezing bead with flat plier and brushing away adhering bone ash.

Flatten beads with one middle blow and several end blows. Roll beads to about 0.040 in. by passing twice through hand roller, and anneal at 1550°F (843.3°C) for 7 min.

Roll beads to a thickness of 0.015 in. by passing twice through hand roller, and anneal again at 1550°F (843.3°C) for 7 min. Finally roll beads to 0.012 in., and anneal one final time at 1550°F (843.3°C) for 7 min. The edges of the rolled bead must be smooth and have no roughness. It is important that all fillets of each row are the same size and thickness.

Coil fillets into “coronets” or spirals using thin-nose pliers or rolling tool.

Place coronets in a platinum basket in a definite pattern so as not to mix each coronet.

Place the basket in 22° Baume´ nitric acid at 105°C (boil gently) for 45 min, for full basket.

Remove the basket, rinse with hot deionized water and place in 32° Baume´ nitric acid at 110°C (boil gently) for 45 min, for full basket.

Rinse the basket first in hot deionized water, then a hot 5 % ammonium hydroxide solution rinse, and three more hot deionized water rinses.

Place the basket (still containing coronets) on the hot plate and dry.

Place the basket in an annealing furnace at 1550°F (843.3°C) for 7 min.

Cool gold coronets and weigh

A.7 Calculation

Gold Concentration:

Gold concentration in parts per thousand5 = (A x B x 1000)/C

where:

A = Final gold weight, g,

B = Average of two proof factors, and

Proof factor5 = Initial proof gold weight, g / Final proof gold weight, g

C = Initial sample weight, g.

Bibliography

[1] ASTM B562 Standard Specification for Refined Gold

[2] GDL Gold Bar Specifications

[3] LBMA Gold Bar Specifications

Certification marking

Products that conform to Uganda standards may be marked with Uganda National Bureau of Standards (UNBS) Certification Mark shown in the figure below.

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