GOVERNMENT OF ZAMBIA

STATUTORY INSTRUMENT NO. 68 OF 2017

The Standards Act
(Laws, Volume 23, Cap 416)

The Standards (Compulsory Standards) (Declaration) Order, 2017

IN EXERCISE of the powers contained in section 7 of the Standards Act, the following Order is made:

Title

1. This Order may be cited as the Standards (Compulsory Standards) (Declaration) Order, 2017.

Declaration of compulsory standards

2. The Standards set out in the First Schedule are declared as compulsory standards.

Application of standards

3. The Standards set out in the First Schedule apply to the commodities listed in the Second Schedule.

FIRST SCHEDULE

(Paragraph 3)

Zambian Standard ZS 063

PETROLEUM JELLY-SPECIFICATION

1. SCOPE

This Zambian Standard specifies requirements and methods of sampling and testing for snow-white, white and yellow petroleum jellies for the cosmetic industry.

2. TERMINOLOGY

For the purpose of this Standard, the following definitions apply:

" snow-white petroleum jelly " means a completely decolourised petroleum jelly;

" white petroleum jelly " means a partially decolourised jelly; and

" yellow petroleum jelly " means a purified, semi-solid mixture of hydrocarbons obtained from petroleum.

3. REQUIREMENTS

3.1. *Appearance*

Petroleum jelly shall be an unctuous mass transparent in thin layers and possessing a slight fluorescence only, even after being melted.

3.2. *Taste*

Petroleum jelly shall be tasteless.

3.3. *Odour*

Petroleum jelly shall be odourless at room temperature and there shall be no objectionable odour when it is heated in boiling water for 30 minutes.

3.4. *Solubility*

Petroleum jelly shall be insoluble in water and in ethyl alcohol (90 percent), but shall be soluble in petroleum ether and in chloroform.

3.5. Added colouring matter

When 5g of yellow or white petroleum jelly is boiled with 10ml of alcohol (90 percent), the alcohol shall not be coloured.

3.6. *Requirements*

Petroleum jelly covered by this specification shall comply with the requirements given in Table 1 for colour and Table 2 for other requirements.

TABLE 1—COLOUR REQUIREMENTS FOR PETROLEUM JELLY

Type	Lovibond Colour Composition		National Petroleum Association Colour number
	2-in cell	½-in cell	
Snow-white	Not darker than - 2 yellow	— —	
White	Not darker than35 yellow 2 red	Not darker than 35 yellow 4 red	1½ max
Yellow			3½

1. PACKAGING AND LABELLING

1.1. Packaging

(a) Petroleum jelly shall be packed in clean, dry containers of adequate strength and closure to prevent damage, breakage or contamination during transportation and to allow for re-closing.

(b) The container shall be filled to not more than 1 percent above the declared net mass of the contents.

1.2. Labelling

The following information shall appear clearly on each container of petroleum jelly or on a label fixed to the container:

(i) the name 'Petroleum jelly';

(ii) the grade 'cosmetic';

(iii) the colour;

(iv) the manufacturer's name and registered trade mark brand; and

(v) the net mass of the contents.

TABLE 2—REQUIREMENTS FOR PETROLEUM JELLY

SL. No.	*Property*	*Requirement*	*Method of test (Ref. ZS 143*
1.	Kinematic viscosity at 93^{0}C, cst[1]	7.4 to 17.02	2
2.	Melting point, °C	38 to 56	3
3.	Specific Gravity at 60^{0}C	0.815 to 0.880	4
4.	Saponifiable matter	Nil	5
5.	Sulphated ash, percent by mass, max	0.10	6
6.	Free acids and alkalis	To pass the test	7
7.	Organic acids	To Pass the test	8
8.	Sulphur and Sulphides	To pass the test	9
9.	Arsenic (as As_2O_3) parts per million, max	2	10
10.	Absorbance, max at wavelength:		13
	280-289nm	0.25	
	290-299nm	0.20	
	300-359nm	0.14	
	360-400nm	0.04	

11	Heavy metals (as Pb), parts per million, max	20	11
12	Iodine value (Wigs), max	1.5	12
		Melt the material completely and examine visually in sunlight. There shall be no fluorescence	—
13	Fluorescence[1]	100 to 275, as agreed between the purchaser and the supplier	—
14	Consistence		

[1] The range of viscosity corresponds to value of 45 to 75 Seconds Viscosity, Redwood No. I at 93 °C.

[1] Done only when demanded.

1. SAMPLING AND COMPLIANCE WITH THE SPECIFICATION

1.1. Sampling

Sampling of the product shall be carried out in accordance with Annex A.

1.2. Number of tests

Tests for all the requirements given in clause 3 shall be conducted on the composite sample.

1.3. Criteria for conformity

A lot shall be declared as conforming to this specification if the composite sample satisfies all the requirements (see clause 3).

ANNEX A

SAMPLING PROCEDURE

A. 1. General Requirements

A.1.1. In drawing, preparing, storing and handling test samples the following precautions and directions shall be observed.

A.1.2. Samples shall not be taken in an exposed place.

A.1.3. The sampling instrument shall be clean and dry.

A.1.4. Precaution shall be taken to protect the samples, the material being sampled, the sampling instrument and the containers for samples from contamination.

A.1.5. To draw a representative sample, the contents of each container selected for sampling shall be mixed as thoroughly as possible by suitable means.

A.1.6. The sample containers shall be of a size that they are almost completely filled by the sample.

A.1.7. Each sample container shall be sealed air-tight with a suitable stopper after filling, and marked with full details of sampling, the date of sampling and the year of manufacture of the material.

A. 2. Scale of Sampling

A.2.1. Lot

All the cartons in a single consignment of the material drawn from a single batch of manufacture shall constitute a lot. If a consignment is declared to consist of different batches of manufacture, the batches shall be marked separately and the groups of cartons in each batch shall constitute separate lots.

Samples shall be tested from each lot for ascertaining conformity of the material to the requirements of the specification.

A.2.2. The number of cartons (n) to be chosen from the lot shall depend on the size of the lot (N) and shall be in accordance with column 1 and 2 of Table A. 1.

A.2.3. The cartons and containers to be selected for sampling shall be chosen at random from the lot and for this purpose random number tables shall be used. In case the tables are not available, the following procedure shall be adopted:

Starting from any container, count them as 1, 2, 3 ……. etc. up to *r* and so on, in a systematic manner, where *r* is the integral part of *N/n*. Every *r*th container thus counted shall be withdrawn from the lot.

TABLE A. 1—SCALE OF SAMPLING

1	2	3
Lot Size	Number of Cartons to be Selected	Percentage of Containers to be Selected from each Carton
N	*N*	
3 to 50	3	10
51 to 200	4	10
201 to 400	5	10
401 to 650	6	10
651 to 1000	7	10

A. 3. Test Samples and Reference Sample

A.3.1. Preparation of Test Samples

Draw with an appropriate sampling instrument, the material from different parts of each carton selected (See Table A. 1.). The total quantity of the material drawn from each carton shall be sufficient to conduct the test for all the characteristics given under 3 and shall not be less than 200g.

Thoroughly mix all portions of the material drawn from the same carton. Out of these portions, equal quantity shall be taken from each of the selected cartons and shall be well mixed together so as to form a composite sample weighing at least 0.5 Kg. This composite sample shall be divided into three equal parts, one for the purchaser, and another for the supplier and the third for reference.

A.3.2. Reference Sample

The reference sample shall consist of the composite sample marked for this purpose and shall bear the seals of the purchaser and the supplier. It shall be kept at a place agreed to between the purchaser and the supplier and shall be used in case of dispute between the two.

Zambian Standard ZS 065

PURE GLYCERINE-SPECIFICATION

1. SCOPE

This Zambian Standard specifies the requirements for pure glycerine.

2. REQUIREMENTS

2.1. *General*

Pure glycerine covered by this specification shall, in addition to requirements given in sub-clauses 2.2. to 2.6., comply with the requirements given in Table 1, when tested in accordance with the corresponding methods referred to in column 4 of Table 1.

2.2. *Description*

Zambian Standard pure glycerine shall be a clear odourless viscous liquid consisting essentially of glycerol.

2.3. *Appearance*

The material shall be free from visible foreign matter.

2.4. *Odour*

The material shall be free from odour when tested by the method described in ZS 144: Part 13.

2.5. *Taste*

The material shall taste sweet followed by a sensation of warmth.

TABLE 1—REQUIREMENTS FOR PURE GLYCERINE

Sl.No.	*Property*	*Requirements*	*Methods of Test (Ref.to ZS 144 part)*
1.	Alkalinity or acidity, maximum miliequivalent per 100g	0.064	4
2.	Arsenic contents, as As mg/kg,Maximum	2.0	6
3.	Chloride limit	No Turbidity	7
4.	Glycerol content per cent by mass, minimum	99.0	3
5.	Lead content as Pb,mg/kg, Maximum	1.0	10
6.	Total heavy metals content, as Pb,mg/kg , Maximum	5.0	9
7.	Organic Chloride limit	Turbidity produced shall not be greater than that produced by the control	8
8.	Relative density(20°C/20°C), range	1.258- 1.263	14
9.	Saponification equivalent, maximum miliequivalent per 100g	0.64	12
10.	Sugars	Nil	15
11.	Sulphated ash, percent by mass, maximum	0.010	5
12.	Test for reducing substances	The colour produced shall not be darker than that produced by the standard dextrose solution.	11

3. SAMPLING AND SAMPLE SIZES

3.1. *General*

Sampling and samples sizes shall be as given in ZS 144: Parts 1 and 2.

3.2. *Reference Sample*

The reference sample shall consist of the composite sample marked for this purpose and shall bear the seals of the purchaser and the supplier. It shall be kept at a place agreed to between the purchaser and the supplier and be used in case of a dispute between the two.

4. TESTS AND CRITERIA FOR CONFORMITY

4.1. *Tests*

Tests for all the requirements given in clause 2 shall be conducted on the composite sample.

4.2. *Criteria for conformity*

A lot shall be declared as conforming to this specification if the composite sample satisfies all the requirements in clause 2.

5. PACKAGING

The product shall be packaged in suitable containers that will prevent contamination of the product.

6. LABELLING

The label on the container shall bear the following information:

(i) the name of the product, that is, “Pure Glycerine”;

(ii) the name and address of the manufacturer;

(iii) the brand name if any;

(iv) the lot or batch number; and

(v) the net volume.

Zambian Standard ZS 190

DRINKING WATER-SPECIFICATION

1. SCOPE

This Zambian Standard prescribes requirements for potable drinking water suitable for human consumption.

2. DEFINITIONS

For the purpose of this Zambian Standard, the definitions given in ZS 191 shall apply.

3. NON-INJURIOUS CONSTITUENTS OF DRINKING WATER

3.1. *General*

Parameters that do not pose a risk to human health are addressed under clause 4.

3.2. *Requirements*

(a) General physical and chemical characteristics

Drinking water shall comply with the general physical and chemical requirements as given in Table 1.

TABLE 1—GENERAL PHYSICAL CHARACTERISTICS OF DRINKING WATER

Parameters	*Requirement*	*Method of test*
Odour	Unobjectionable to most consumers	ZS 312 Part 1
Colour (True colour units or TCU)	15 (max)	ZS ISO 7887
Taste	Unobjectionable to most consumers	ZS ASTM 2106B
Ph	6.5 - 8.0	ZS ISO 10523
Hardness (total) as Calcium carbonate $CaCO_3$ (mg/litre)	500 (max)	ZS ASTM D1126
Dissolved solids (total)mg/l	1 000 (max)	ZS 312 Part 19
Turbidity (NTU)	5 (max)	ZS ISO 7027
Conductivity (µs/cm)	1,500 (max)	ZS ISO 7888

(a) Non-toxic chemical substances

Drinking water shall comply with the following specifications for non-toxic chemical substances as given in Table 2.

TABLE 2-NON-TOXIC CHEMICAL SUBSTANCES IN DRINKING WATER

Substance	*Requirements (mg/litre*	*Method of test*
Calcium (Ca)	200 max	ZS ISO 6058
Chloride (Cl)	250 (max)	ZS ISO 9297
Chlorine residue	0.2-0.5	ZS ISO 7393 Part 1
Copper (Cu)	1.0 (max)	ZS ISO 8288
Iron (Fe)	0.3 (max)	ZS ISO 11885
Magnesium (Mg)	150 (max)	ZS ISO 7980
Sulphate (SO^2_4)	400 (max)	ZS ISO 312 Part 3
Zinc (Zn)	3 (max)	ZS ISO 8288
Phenolic compounds (as phenol)	0.002 (max)	ZS ISO 6439
Detergents (alkyl benzene sulphate)	1.0 (max)	ZS ISO 312 Part 20
Sodium	200 (max)	ZS ISO 9964 Part 1

(c) Total residual chlorine

(i) The total residual chlorine in treated drinking water shall be sufficient for complete elimination of all microorganisms. Drinking water shall have residual chlorine concentration as outlined in Table 2 on receipt by the consumer.

(ii) The amount of chlorine residue shall be increased during epidemic cases or special cases according to instructions from the Ministry responsible for health.

Note: In cases of water treatment with ozone, saturated iodine solution, ultraviolet rays or by any other treatment other than chlorine, the treatment shall be sufficient to eliminate all the microorganisms. Treated water shall comply with the microbiological requirements in Table 5.

4. INJURIOUS CONSTITUENTS OF DRINKING WATER

1.1. *General*

Parameters that pose a risk to human health are addressed under clause 5.

1.2. *Requirements*

(a) Specific toxic chemical substances

Drinking water shall comply with the specifications for toxic chemicals as given in Table 3.

TABLE 3-TOXIC CHEMICAL SUBSTANCES IN DRINKING WATER

Substance	*Maximum permissible limit (mg/litre*	*Method of test*
Aluminium (Al)	0.2	ZS ISO 10566
Arsenic (As)	0.01	ZS ISO 11969
Cadmium	0.003	ZS ISO 5961
Barium	0.7	ZS ISO 11885
Chromium (Cr)	0.05	ZS ISO 9174
Cobalt (Co)/litre)	0.5	ZS ISO 8288
Cyanide (CN)	0.01	ZS ISO 6703-1
Flouride (F)	1.5	ZS ISO 10359 Part 1
Lead (Pb)	0.01	ZS ISO 8288
Mercury (Hg)	0.001	ZS ISO 5666
Manganese (Mn)	0.1	ZS ISO 6333
Nitrates (NO_3 N)	10	ZS ISO 7890 Part 3
Nitrate (NO2 N)	1.0	ZS ISO 312: Part 13
Selenium (Se)	0.01	ZS ISO 9965
Silver (Ag)	0.05	ZS ISO 11885

(b) Pesticides

The maximum permissible limits of pesticides if present in drinking water shall be as outlined in Table 4.

TABLE 4-PESTICIDE LIMITS IN DRINKING WATER

Pesticide	*Maximum permissible limit (µg/litre*	*Method of Test*
Aldrin/dieldrin	0.01	ZS 312: Part 15
Chlordane	0.3	
2,4-D	30	
DDT	1.0	
Endonsulfan	2	
Endrin	0.2	
Heptachlor and heptachlor epoxide	0.1	
Hexachlorobenzene	0.01	
Lindane (Gamma BHC)	3.0	
Methoxychlor	30	
Toxaphene	5	

Note: Corresponding chemical names of the pesticides in Table 4 are given in Annex A.

(c) Trihalomethanes

The concentration of trihalomethanes (chloroform, bromodichloromethane, dibromochloromethane and tribomomethane) shall not exceed 30 µg/litre when tested in accordance with ZS 312: Part 18.

(d) Chemical substances which indicate pollution

Considerable variations in the amount of the following chemical substances in drinking water from the prevailing quantities in the water source area shall indicate presence of pollution:

(i) organic matter;

(ii) albuminoid nitrogen;

(iii) nitrates;

(iv) hydrogen sulphide;

(v) dissolved oxygen;

(vi) free carbon dioxide;

(vii) phosphate;

(viii) ammonia; and

(ix) nitrite.

(e) Microbiological Requirements

Coliforms in piped supply and un-piped supplies of drinking water shall not exceed the limits given in Table 5.

TABLE 5- MICROBIOLOGICAL REQUIREMENTS OF PIPED AND UN-PIPED DRINKING WATER

Type of Drinking Water	*Maximum permissible limit in 100 ml*		*Remark*
1. Piped Water Supplies	Faecal Coliforms	Coliform organisms	
Treated water entering the distribution system	0	0	In any one sample
Untreated water entering the distribution system	0	3	In any one sample
	0 0	0 0	In any two consecutive samples
	0	20	0 in 95 percent of yearly samples
	0	20	In an occasional sample but not in consecutive samples

Water in the distribution system	0	10	In any two consecutive samples
	0	20	In an occasional sample but not in consecutive samples
2. Un-Piped Water Supplies			
	0	20	In any two consecutive samples
	0	50	In an occasional sample but not in consecutive samples
Emergency supplies of water	0	0	

(f) Biological Characteristics

Drinking water shall be completely free from insects and their ova or cyst, their vesicles or parts, and free from amoeba, algae, mould and parasites.

(g) Radioactive Requirements

The levels of radioactive constituents of drinking water shall not be more than the limits given in Table 6.

TABLE 6—RADIOACTIVE REQUIREMENTS FOR DRINKING WATER

Substance	*Maximum permissible limit (Bq/litre)*	*Method of test*
Gross alpha activity	0.1	ZSISO 9696
Gross beta activity	1	ZSISO 9697

5. SAMPLING

Representative samples shall be drawn according to sampling schemes designed in accordance with ZS 276.

6. TESTING AND CONFORMITY TO THE STANDARD

The drinking water shall conform to this standard if it meets all the requirements prescribed in this standard.

Zambian Standard ZS 233

CRUDE EDIBLE VEGETABLE OILS-SPECIFICATION

1. SCOPE

This Zambian Standard specifies the requirements for crude edible vegetable oils obtained from groundnuts (*Arachia, hypogen*), cotton seeds (*Gossypium, spp.*), sunflower seeds (*Helianthus, annuus*), soya beans (*Glycine max*), olives and palms (*Elaeis guineensis*).

2. NORMATIVE REFERENCES

(a) ZS 002: Methods of sampling fats and fatty oils.

(b) ZS 226: Methods of test for oils and fats.

Part 1: Physical tests

Part 2: Chemical tests

3. DEFINITIONS

In this standard, the definitions given in clause 2 of ZS 226: Part 2 and the following shall apply:

" crude edible vegetable oil " means the oil obtained by the process of expression or solvent extraction from vegetable sources without further processing;

" virgin oil " means the product that has been subjected to mechanical procedures such as expelling or pressing and application of heat without altering the nature of the oil; and

" cold pressed oil " means the product that has been subjected to mechanical procedures such as expelling or pressing and without the application of heat, without altering the nature of the oil.

Note: Purification may be done by washing with water, settling, filtering and centrifuging only.

4. QUALITY REQUIREMENTS

4.1. *Description*

(a) Crude groundnut oil: golden yellow oil obtained from well-selected groundnut kernels free from fungal infection, which may deposit a small quantity of steariness after standing at a low temperature. It has a pleasant nutty taste and odour.

(b) Crude soya bean oil: medium to dark yellow brown liquid oil, which on standing, deposits an appreciable quantity of steariness. It has a slight characteristic odour.

(c) Crude sunflower oil: pale yellow oil, which may deposit small quantities of steariness. It has a slight characteristic odour.

(d) Crude cottonseed oil: medium to dark yellow brown oil, which on standing deposits an appreciable quantity of stearine. It has a slight characteristic odour.

(e) Crude or virgin olive oil: clear, yellow or green oil, with specific odour and taste, free from odour or taste indicating alteration or pollution.

4.2. *Physical Requirements*

When tested in accordance with ZS 226: Part 1, the physical requirements of crude edible vegetable oils shall conform to those specified in Table 1.

TABLE 1—PHYSICAL REQUIREMENTS FOR CRUDE EDIBLE VEGETABLE OILS

CHARACTERISTIC	REQUIREMENTS					
	Groundnut	Cottonseed	Sunflower	Soya Beans	Palm	Virgin/ Cold pressed
Specific gravity (20°C/20°C)	0.912-0.920	0.918-0.926	0.918-0.923	0.919-0.921	0.891-0.899	0.910
Refractive index (D_{Na} at 40°C)	1.4568-1.4608	1.4650-1.4660	1.4536-1.4641	1.4650-1.4710	1.454-1.456	1.4677-1.4707
Colour in 5.25" Lovibond cell:						
Red (max)	2	12	2	12	—	—
Yellow (max)	25	25	30	25	—	—
Moisture and volatile matter, at 105°C, % max	1	1	1	1	1	0.2
Titre, °C	27-32	30-37	16-20	20-21	19-23.5	—

4.3. *Chemical Requirements*

When tested in accordance with ZS 226: Part 2, the chemical requirements of crude edible vegetable oils shall conform to those specified in Table 2.

TABLE 2—CHEMICAL REQUIREMENTS FOR CRUDE EDIBLE VEGETABLE OILS

CHARACTERISTIC	REQUIREMENTS					
	Groundnut	Cottonseed	Sunflower	Soya Beans	Palm	Virgin/ Cold pressed
Saponification value, mgKOH/g	187-196	190-195	190-195	189-198	190-209	184-196
Unsaponifiable matter, % max.	10	15	15	10	12	15
Peroxide value, mEq/Kg, max.	10	10	10	10	10	15
Free fatty acids, % max.	3	3	3	2	3	3
Iodine value (Wijs)	86-107	124-139	124-139	100-123	50-55	75-94

5. PACKAGING, STORAGE AND TRANSPORTATION

Crude oil shall be packed in clean food grade drums or tankers.

6. USE

Crude oil shall be used as a raw material in the manufacture of edible fats, oils and shortenings.

7. SAMPLING

Representative samples of the material shall be drawn as described in ZS 002.

8. TESTING

Tests shall be carried out as prescribed in ZS 226: Parts 1 and 2.

9. COMPLIANCE WITH THE STANDARD

The lot shall be considered to conform to the requirements of this standard, if the test samples satisfy the requirements.

Zambian Standard ZS 327

BLENDED (PHYSICAL MIXTURE) FERTILISERS-SPECIFICATION

1. SCOPE

This Zambian Standard specifies the requirements for blended fertilisers (or physical mixtures of fertilisers) intended for use as fertilisers.

2. NORMATIVE REFERENCES

2.1. The following standards are referred to in this standard:

(a) ZS 324: Part 2-Determination of total phosphorous-Quinolinium Phosphomolybdate method;

(b) ZS 324: Part 3-Determination of total nitrogen-Kjedahl method;

(c) ZS 324: Part 12-Extraction of water soluble phosphates;

(d) ZS 324: Part 13-Determination of total nitrogen-Titrimetric method;

(e) ZS 324: Part 17-Determination of water soluble potassium content;

(f) ZS 325-Fertlizers and soil conditioners-Vocabulary;

(g) ZS 605, ZS 606, ZS 607, ZS 608, ZS 609, ZS 610, ZS 612, ZS 613, ZS 614, ZS 615 (Straight Fertilisers); and

(h) ZS 431: 2004-Compound Fertilisers-Specification.

2.2. All standards are subject to revision and since any reference to a standard is considered to be a reference to the latest edition of that standard, parties to agreements based on this standard are encouraged to ensure the use of the most recent editions of the standards indicated above.

3. DEFINITIONS

In this standard, the definitions given in ZS 325 and the following shall apply:

" blended fertiliser " means a product obtained by physical mixing of different fertiliser ingredients or stock materials and containing more than one of the major plant nutrients, namely, nitrogen, phosphorous and potassium and/or are simple mixtures of more than one fertiliser in which chemical interaction does not take place and they may be mixed in different proportions;

" compatibility " means a non-chemical reaction of two or more fertiliser ingredients (materials) when mixed;

" crop " means a plant for which a particular blended fertiliser shall be used to provide nutrients in a field for a particular crop season;

" filler " means a substance added to fertiliser materials to provide bulk, prevent caking, or serve some purpose except providing essential plant nutrients;

" ingredients (source) " means materials, usually straight fertilisers, used as sources of particular nutrients in a blended fertiliser (See Annex A);

" segregation " means a non-uniformity of composition throughout a blended fertiliser lot; and

"soil testing" means a process of taking a representative sample from a field and testing it for available nutrients and other properties, for example, pH.

4. REQUIREMENTS

4.1. *General*

(a) Blended fertilisers shall be in the form of powder, crystals or granules and shall be non-caking, free flowing and free from visible impurities.

(b) The blended fertiliser shall be properly mixed so that the ingredients are uniformly distributed and there is no segregation of the ingredients.

(c) There shall be very negligible dust or fine particles settling at the bottom of the blended fertiliser (bags or bulk).

4.2. *Particle Size*

(a) The size range as well as the particle size distribution of the different ingredients of the blended fertilisers shall be compatible.

(b) The particle size (sieve analysis) of blended fertilisers shall be such that a minimum of 90% shall pass through 1.5 mm- 5.0 mm sieve and retained on 1.00 mm sieve for standard products.

4.3. *Chemical Requirements*

(a) General

Blended fertilisers shall be essentially a mixture of chemically compatible (See Annex B) and physically homogenous constituents.

(b) Nutrient Composition

(i) If a particular blended fertiliser has the same specification as any of the compound fertilisers in ZS 431 (Compound Fertilisers-Specification), it shall be required to meet the analysis of that particular compound fertiliser. Other blended fertilisers not contained in ZS 431 shall conform to the labelled nutrient composition upon laboratory testing.

(ii) Every ingredient (source) of the declared nutrients in the blended fertilisers shall be readily available to the particular crop for the particular crop season and not just past the period when the crop needs the nutrients. This may require that both the farmer and the supplier are aware of the soil characteristics through soil testing (any other factor in the soil or weather conditions which may affect the fertiliser performance) for which the particular blended fertiliser is being mixed so that good results are realised. This also means that the crop shall not show adverse deficiency of any nutrient of an efficiently and effectively applied blended fertiliser.

(iii) Elemental nutrient sources or ingredients if used shall also be readily available to the crop as stated in (ii). Non-soluble elemental sources shall not be used in blended fertilisers.

(iv) If a micronutrient source in powder form is added as a coat on to the surface of the blend granules or crystals, an effective binder or coating agent (to enhance adherence) shall be used so that there is no segregation of the micronutrient onto the bottom of the blended fertiliser.

NOTE: Only micronutrient sources shall be in powder (fine) form.

(v) The filler used in the blended fertiliser shall by no means substitute any of the declared nutrients.

(vi) The composition nutrients of blended fertiliser shall be declared in terms of total nitrogen, total phosphorous or water-soluble phosphorous and water-soluble potassium in accordance with ZS 324: Parts 3 or 13, ZS 324: Parts 2 or 12 and ZS 324: Part 17 respectively. The permissible limit of variation for these nutrients shall be as follows:

The actual percentage nutrient content of each declared nutrient shall be within ± 2% of the fertiliser when determined in accordance with the declared content; and

The sum of actual percentage nutrient content of all declared nutrients shall be within ± 2.5% unit of the sum of the declared contents.

5. SAMPLING

Sampling shall be carried out in accordance with ZS 356: Part 1.

6. PACKAGING

6.1. *Individual Container*

(a) Blended fertilisers shall be packaged in suitable, clean, sound and moisture proof containers or packages.

(b) Suitable packaging materials include polypropylene, and high density polyethylene bags with an inner loose tubular liner polyethylene film.

6.2. *Bulk Container*

The fertiliser may also be supplied in bulk. Where it is supplied in bulk, the bulk container shall be sound, clean, dry and capable of protecting the product from adventitious contamination and moisture absorption.

7. LABELLING AND MARKING

7.1. *Individual Container*

(a) Each container of blended fertilisers shall be labelled indelibly with the following particulars:

(i) name of the fertiliser;

(ii) the word "BLENDED", conveniently in brackets;

(iii) the nominal percentage composition of the mixture as N: P2O5: K2O and trace elements in elemental form;

(iv) the values of P (as P2O5);

(v) traceability notation;

(a) name and address of the manufacturer or supplier; and

(b) any other marking requirements laid down by the purchaser.

(c) Each container should carry relevant safety and environmental effect markings.

7.2. *Bulk Container*

Where the fertiliser is supplied in bulk, the labelling information shall accompany the delivery note.

8. TEST REPORT

8.1. The test report for the particular batch or lot of the blended fertiliser shall declare the source or ingredients and the proportions in which they were mixed for the particular nutrient composition stated.

8.2. If a binder or coating agent is used for the adherence of the micronutrients onto the fertiliser granules or crystals, it shall also be declared (name and quantity) in the test report.

8.3. Any filler and its proportion, used in the blended fertiliser, shall be declared in the test report.

9. COMPLIANCE WITH THE STANDARD

A lot of a blended fertiliser shall be considered to comply with this standard if on inspection and testing, the provisions of clauses 4, 6, 7 and 8 are satisfied.

ANNEX A

(Informative)

FERTILISER MATERIALS AND THEIR ANALYSIS COMMONLY USED IN BLENDED FERTILISER FORMULAE ANALYSIS (%)

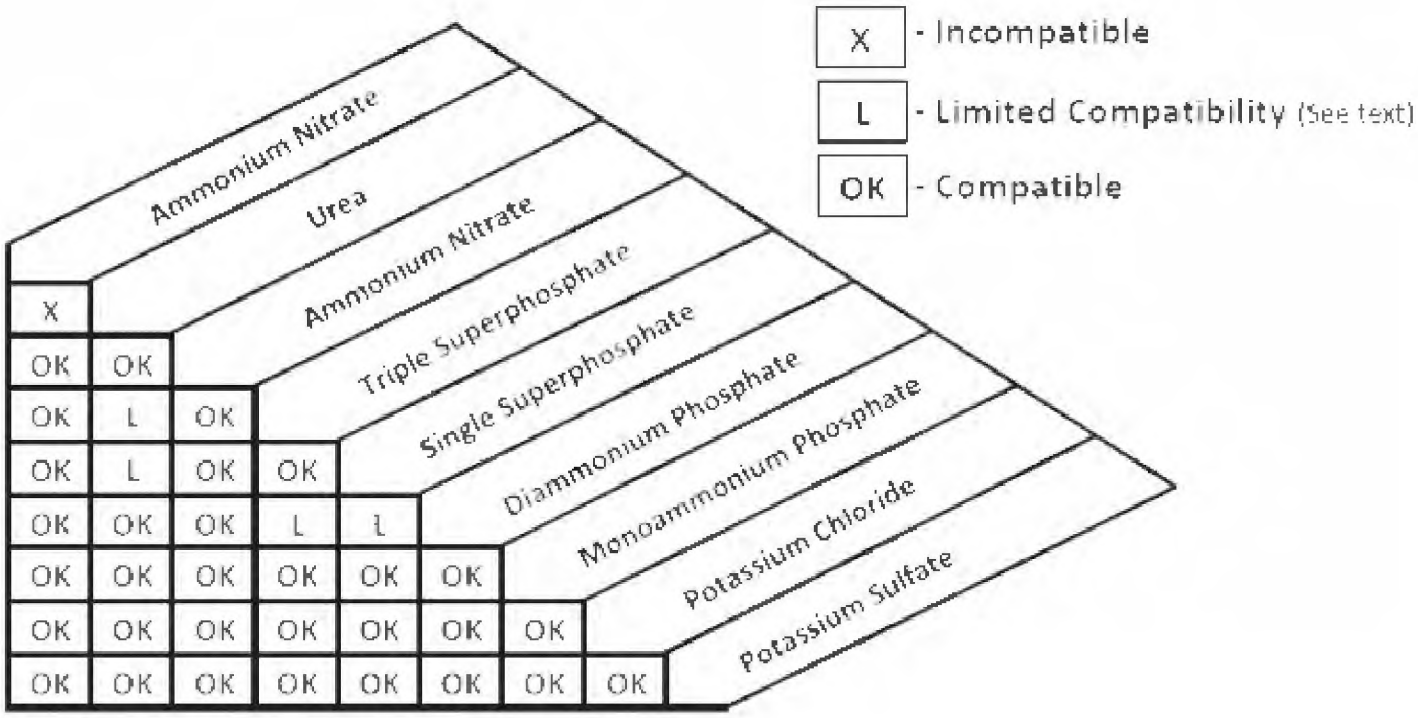
MATERIAL:	N	P_2O_5	K_20	S
DIAMMONIUM PHOSPHATE	18	46	0	0
MONOAMMONIUM PHOSPHATE	11	52	0	0
AMMONIUM SULPHATE	21	0	0	24
AMMONIUM NITRATE	34	0	0	0
UREA	46	0	0	0
TRIPLE SUPERPHOSPHATE	0	45	0	0
MURIATE OF POTASH	0	0	60	0
SULPHATE OF POTASHFILLER	0	0	48	18
FILLER		(not specified)		

Note: Fertiliser materials (straight fertilisers) used in blended fertilisers, as sources of specific nutrients are not limited to the ones mentioned here. For more details, reference can be made to ZS 431 and straight fertiliser standards ZS 605, ZS 606, ZS 607, ZS 608, ZS 609, ZS 610, ZS 612, ZS 613, ZS 614 and ZS 615.

ANNEX B

(Informative)

CHEMICAL COMPATIBILITY OF BLENDED MATERIALS



Zambian Standard ZS 357

PRESSED STEEL DOOR FRAMES-SPECIFICATION

1. SCOPE

This specification sets out the sizes, fittings and finish for pressed steel door frames.

2. MATERIAL

Pressed steel door frames shall be manufactured from good commercial quality mild steel of not less than 18 BG+ (1.2 mm).

NOTE: +BG - Birmingham gauge

3. SIZES

The door frames shall be suitable for doors 45 mm nominal thickness and the door frames shall conform to the following door dimensions in Figures 1 to 3 and Table 1:

TABLE 1-MODULAR AND OVERALL WIDTHS FOR DOOR FRAMES

Door width	*Single door size*			*Double door size*	
	625	725	825	1125	1425
Overall	695	795	895	1195	1495
Modular	700	800	900	1200	1500

Note:

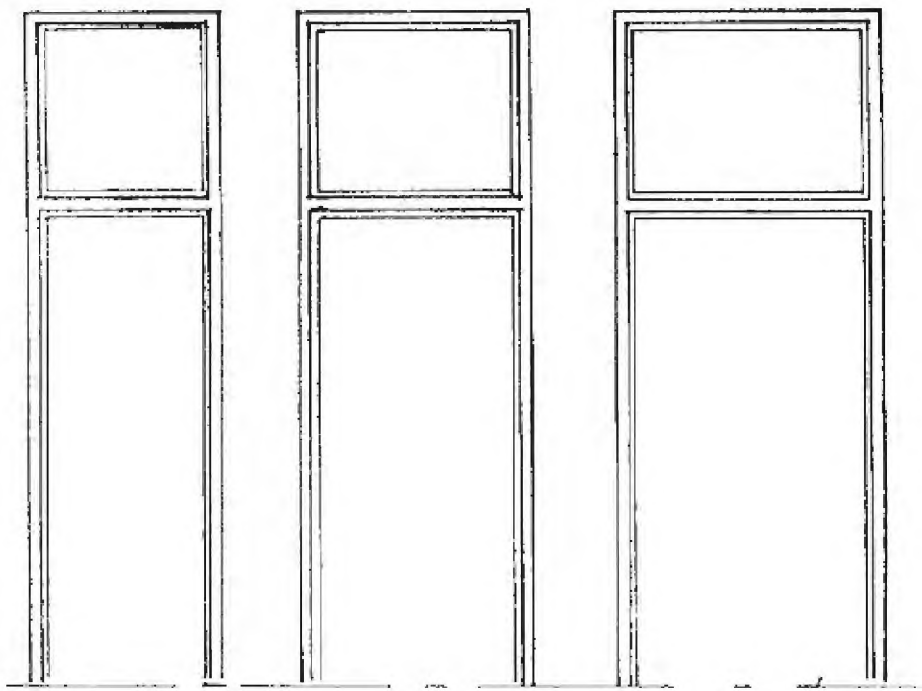
1. All dimensions are in 'mm'.

The sizes include those for cupboard frames

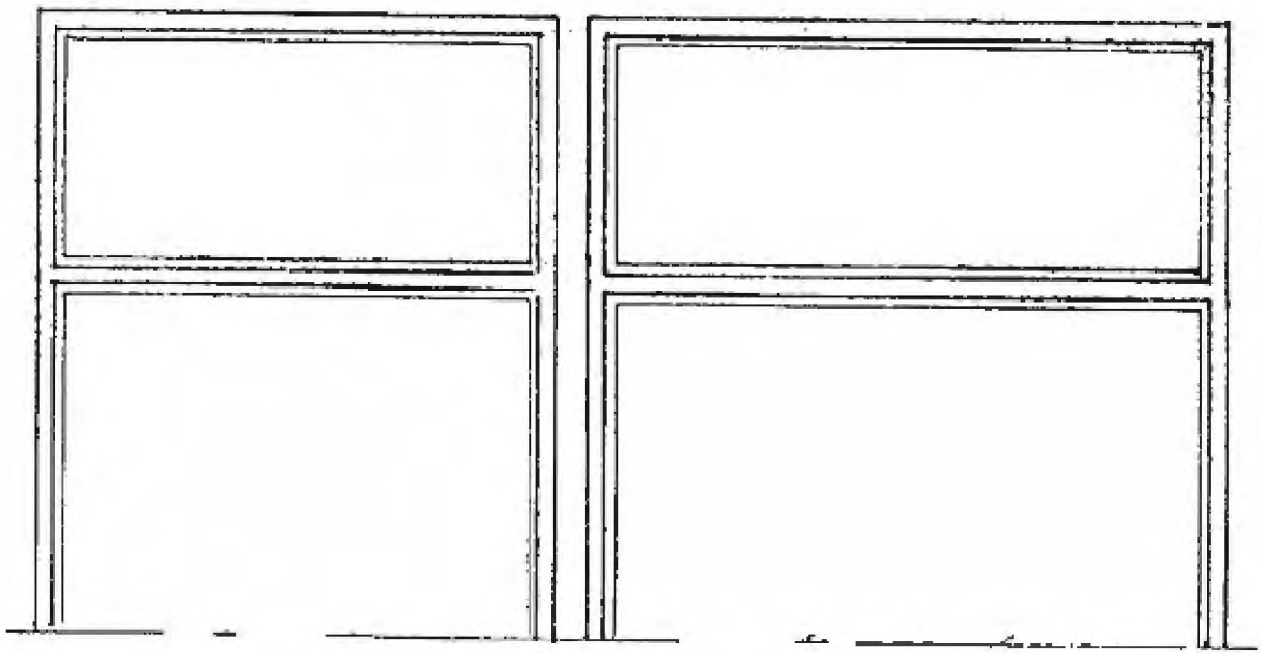
4. PROFILES

4.1. Double rebated frames

Steel door frames shall normally be double rebated and made in accordance with one of the three profiles 1 M, 1½ M or 2 M as shown in Figure 4.



1. Single door frames

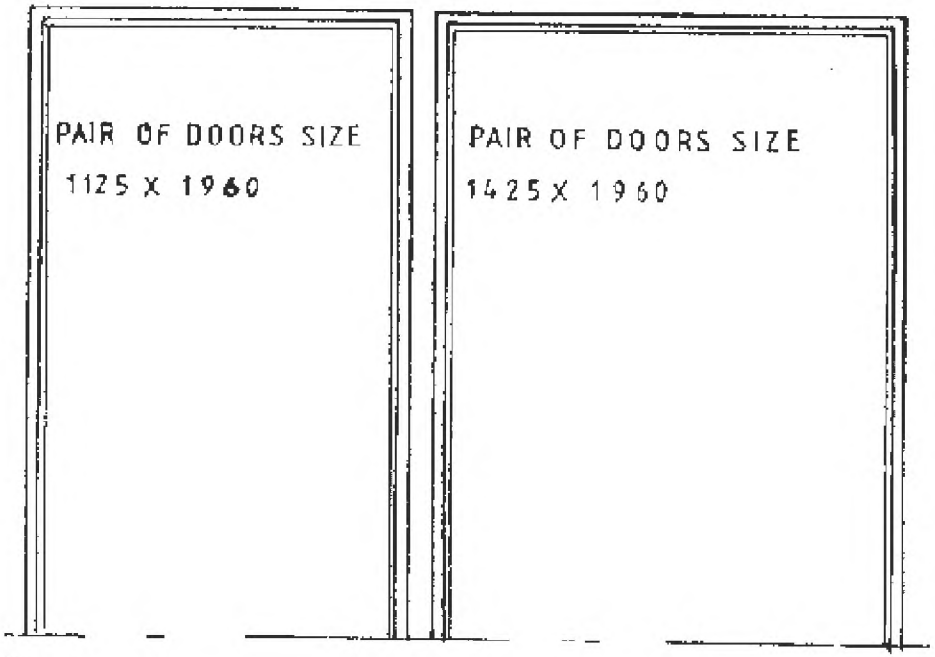


2. Double door frames

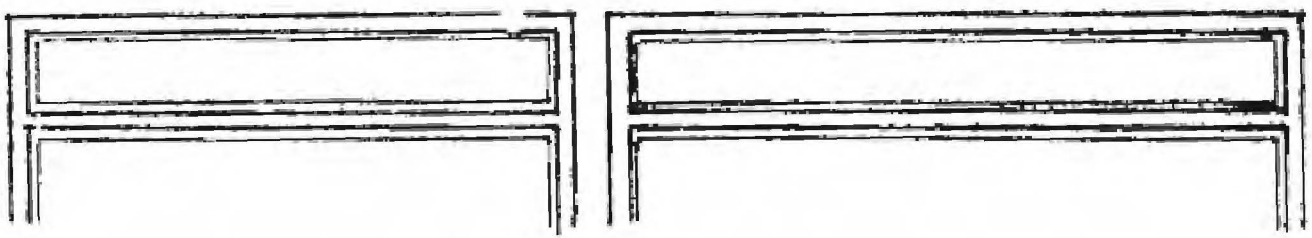
Note:

1. Module and overall widths (See Table 1).
2. All cupboard frames are for a 1 M wall and it is therefore not necessary to specify wall thickness when ordering.
3. Modular height: 2600 mm
   Overall height: 2595 mm

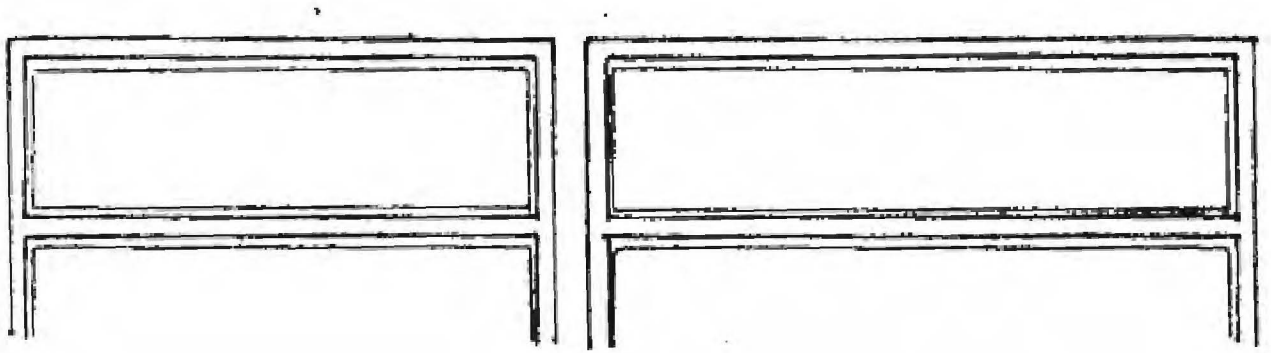
Figure 1-Single door frames



1. Plain door frames



2. Door frames with fanlights beaded for fixed glazing (22F type)

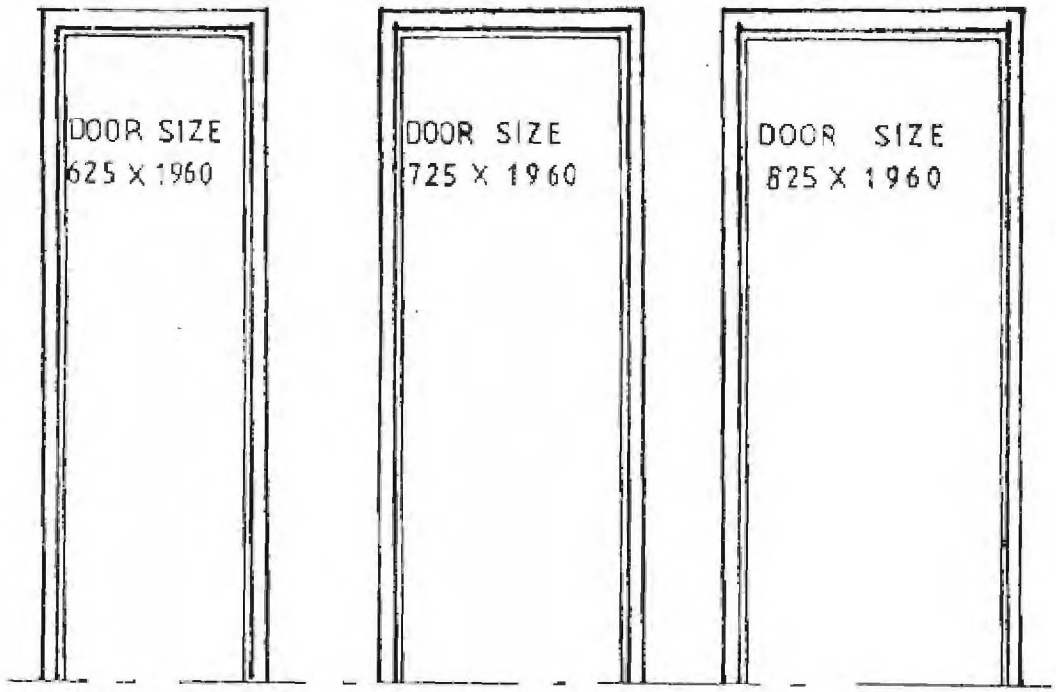


3. Door frames with fanlights beaded for timber sashes (24F type)

Note:

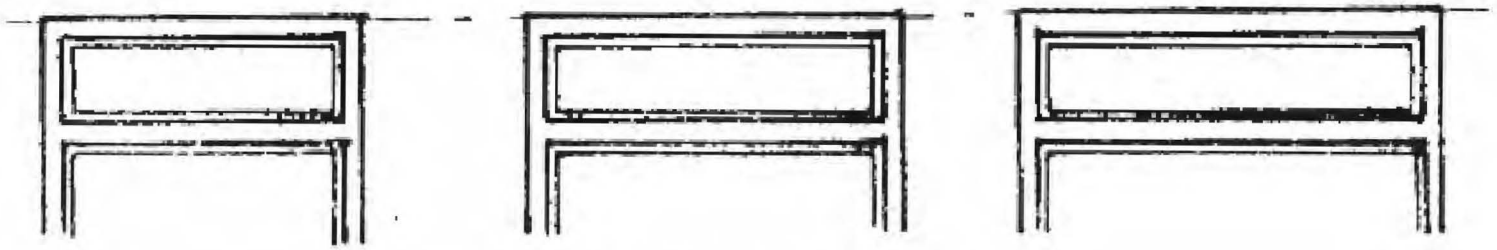
See Figure 1 for modular and overall heights

Figure 2-Double door frames



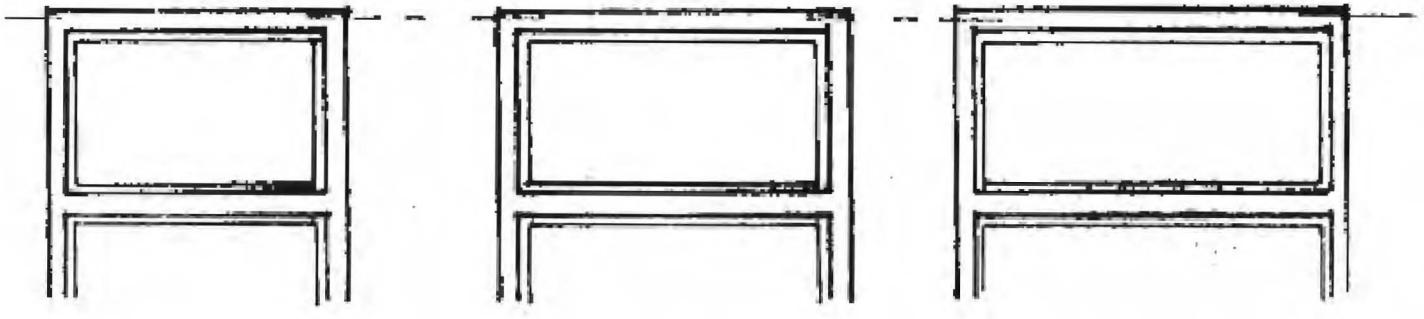
Modular height: 2000 mm
Overall height: 1995 mm

1. ~~Plain door frames~~



Modular height: 2200 mm
Overall height: 2195 mm

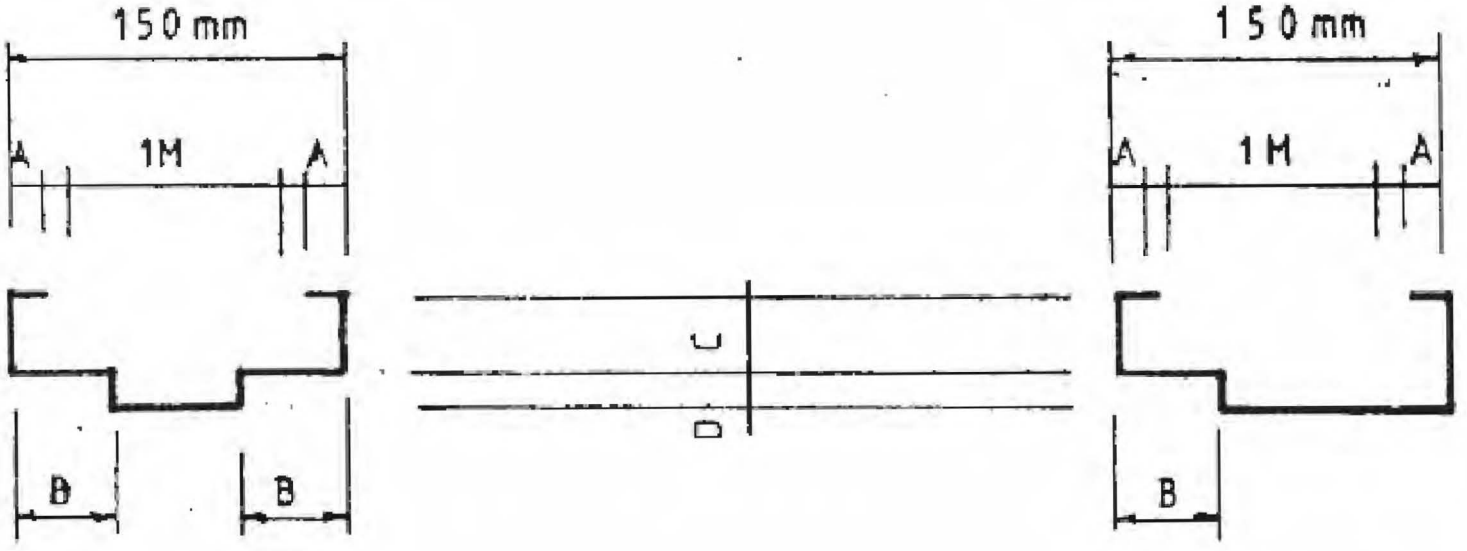
2 Door frames with fanlights beaded for fixed glazing (22F type)



Modular height: 2400 mm
Overall height: 2395 mm

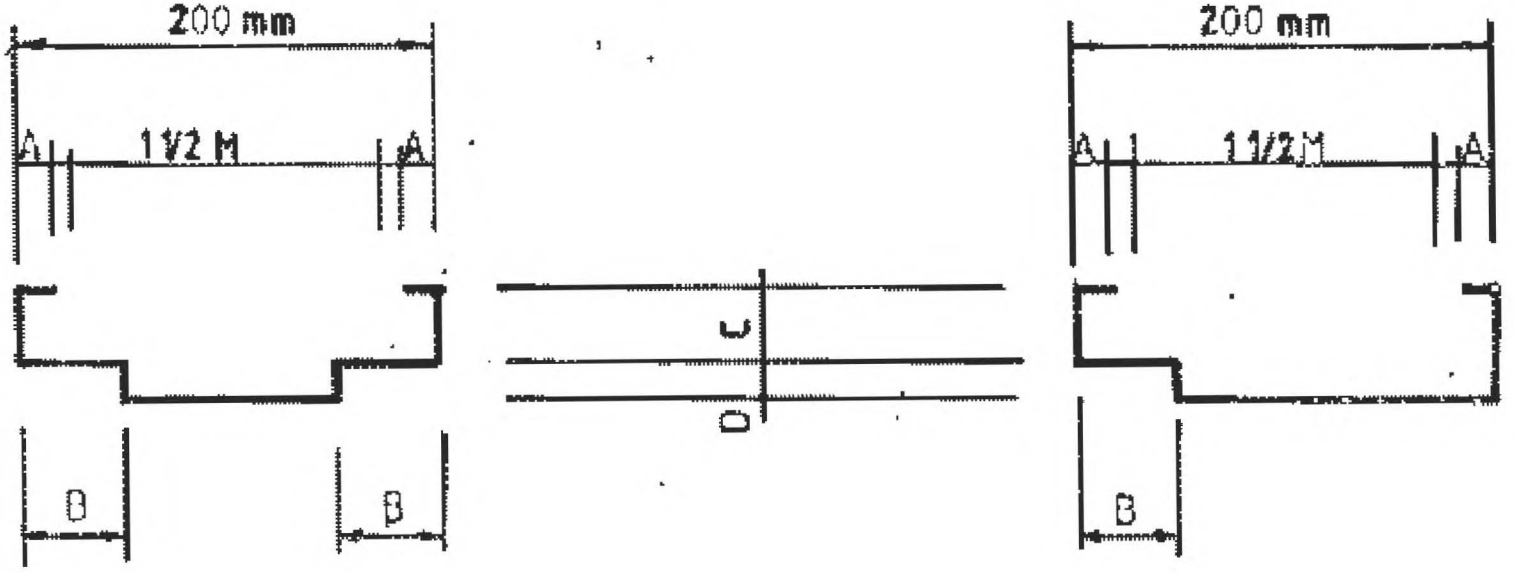
3. Door frames with fanlights hinged for timber sashes (24F type)

Figure 3-Cupboard frames



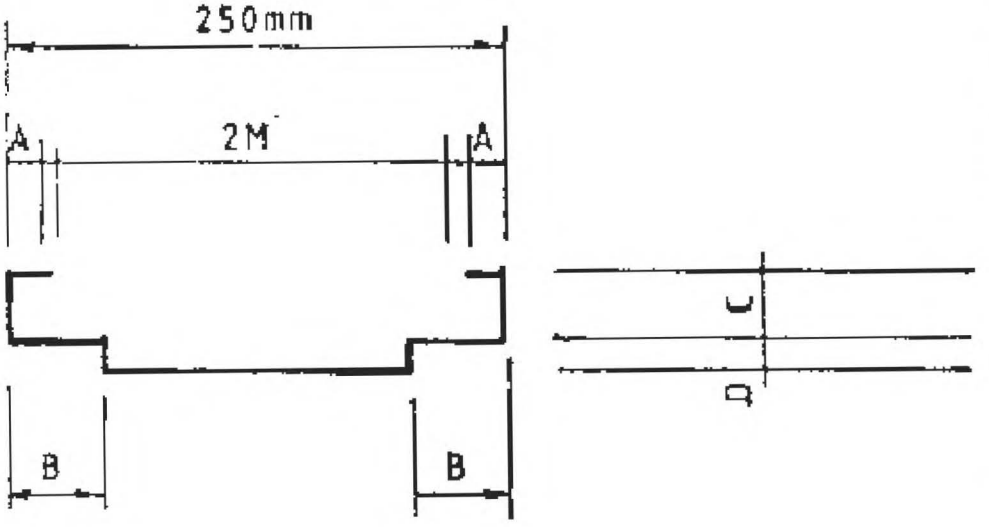
1M Profile double rebate

1M Profile single rebate

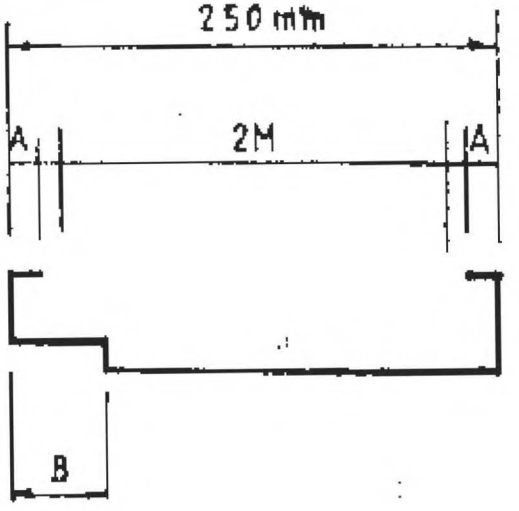


½M Profile double rebate

1½M Profile single rebate



2M Profile double rebate



2M Profile single rebate.

Note:

Dimensions A: 12 mm, B: 48 mm, C: 32 mm, D: 12 mm

Figure 4-Frame profiles

Each of the three profiles shall be supplied to suit doors of either hand. The profile sizes shall be as given in Table 2.

TABLE 2-DIMENSIONS FOR PROFILE SIZES

Profile	*Overall size*	*Thickness of wall (to be plastered both sides)*
1M	150	100
1½M	200	150
2M	250	200

All dimensions in millimetres.

4.2. *Single rebated frames*

Single rebated door frames and other profile sizes shall be matters for agreement between manufacturer and purchaser.

5. CONSTRUCTION

5.1. A door frame shall consist of a hinge jamb, lock jamb and head, the whole of which shall be welded together.

5.2. Two base ties shall be applied to the frame.

5.3. The corners shall be adequately reinforced with mild steel of thickness not less than 14 BG (2 mm), 76 mm, from the corner in either directions.

Note:

(a) The corner plate shall be optional when corners are joined by continuous welding.

(b) The welded frames shall be square and without twist. All welds on surfaces which will remain exposed after building-in shall be cleaned off flush.

6. BASE TIES

3.1. Base ties shall be of mild steel of a thickness not less than 18 BG (1.2 mm) and shall have an L-shaped section with a girth of not less than 25 mm.

3.2. The base ties shall be positioned to allow for a 25 mm floor screed and finish as shown in Figures 5 and 6.

7. FITTINGS

Each door frame shall be provided with the following fittings:

(a) Fixed lugs

(i) There shall be three adjustable fixing lugs to each jamb.

(ii) The lugs shall be at least 18 BG (1.2 mm) thick with a minimum outstand of 152 mm.

(b) Hinges

(i) One pair of 100 mm hinges shall be provided for each door jamb. The hinges shall have 5 knuckles and a removable pin, all made of mild steel. The minimum thickness of the hinge leaves shall be 14 BG (2 mm). The top of the upper hinge shall be positioned 127 mm from the inside of the head of the door and the bottom of the lower hinge shall be 1730 mm from the inside of the head of the door.

(ii) When T-hinges are required for batten doors, the T-hinges shall have a minimum thickness of 14 BG (2 mm) and a minimum length of 305 mm.

(c) Lock strike plate

There shall be an adjustable lock strike plate of rust-proofed steel with a mortar guard, to accommodate locks or latches complying with ZS EN 12209 This lock strike plate shall be so placed that the distance from the inside of the rebate at the head to the centre line of the plate shall be 745 mm.

(d) Shock absorbers

(i) For side hung doors, there shall be at least two rubber buffers inserted in holes in the rebate and located at least 475 mm above and 940 mm below the centre line of the lock strike plate.

(ii) For double doors, there shall be at least two rubber buffers inserted in holes in the rebate and located 152 mm on either side of the centre line of the frame at the top.

8. FINISH

5.1. *Protective coating*

The door frames shall be cleaned of rust, scale and dirt and given a protective shop coat of paint complying with an appropriate standard on dipping primers.

5.2. *Alternative protective coatings*

The provision of other protective coatings shall as agreed between manufacturer and purchaser. If paint primers are specified they shall comply with ZS 201: 1994.

9. MARKING

Each door shall be marked with the manufacturer's name or trade mark.

APPENDIX A

INFORMATION TO BE SUPPLIED BY THE PURCHASER WHEN ORDERING

When ordering metal door frames, the purchaser should clearly indicate the following:

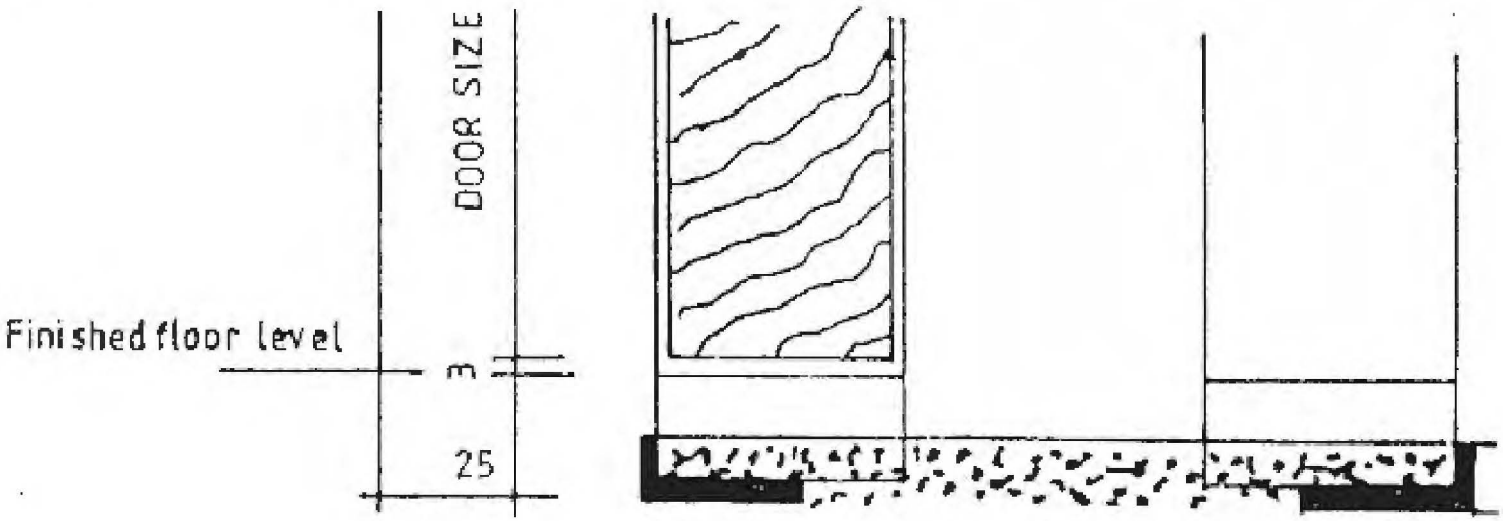
(a) The handling of the door. This is determined by the side at which the door is hinged when standing on the pull side as shown in Figure 7.

(b) Any special requirements such as single rebated frames or differing profiles (See clause 4.2.).

(c) Type of lock or latch (See clause 7 (c)).

(d) For type 24F door frames, the requirement of the fanlight-hinged or fixed.

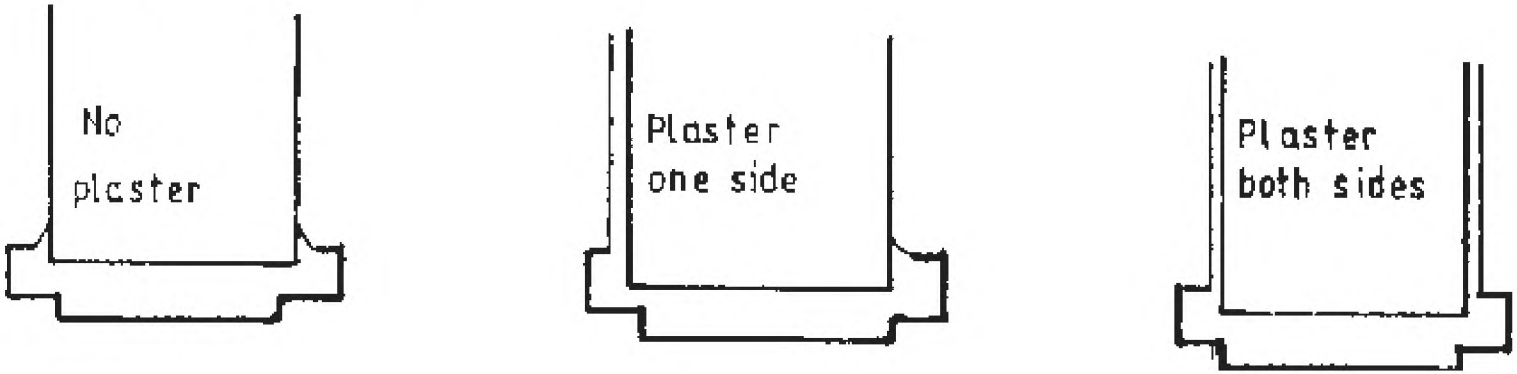
Figure 5-Threshold details



Note:

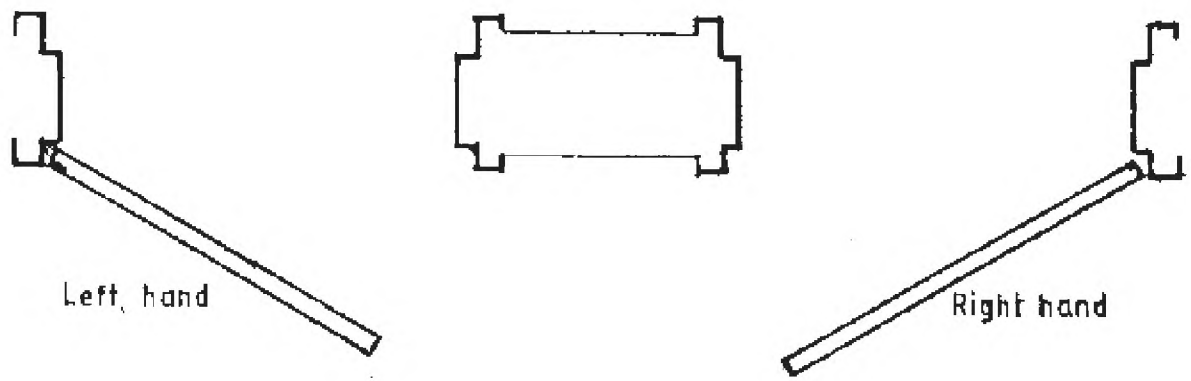
Tie bars welded to underside of jambs for use with 25 mm finished floor.

Figure 6—Application of doorframes to wall



Note:
Where wall thickness exceeds 2M (nominal 200 mm) doorframes may be sited as desired on wl1ll centre or abutting either inside or- outside face.

Figure 7-Handling of doorframes



ANNEX A

(Informative)

CHEMICAL NAMES FOR PESTICIDES MENTIONED IN THIS STANDARD

Common name	Chemical name
Aldrin	1,2,3,4,10,10-hexachloro-1,4,4a-5,8,8a-hexahydro-endo-1,4-exo-5,8-dimethanonaphthalene
Chlordane	1,2,4,5,6,7,8,8-Octachloro-2,3,3a,4,7,7a-hexahydro-4,7-methanoindene
2,4-D	(2,4-dichlorophenoxy) acetic acid
o,p'-DDT	1,1,1-trichloro-2-(o-chlorophenyl) -2-(p-chlorophenyl)-ethane
p,p'-DDT	1,1,1-trichloro-2,2-bis(p-chlorophenyl) ethane
Dieldrin	1,2,3,4,10-10-hexachloro-exo-6,7-epoxy-,4a,5,6,-7,8,8a-octahydro-1,4-endo,exo-5,8-dimethano- naphthalene
Endosulfan (Alpha and beta)	6,7,8,9,10,10-hexachloro-exo-6, 7-epoxy-4a,5,6,-7,8,8a-Octahydro-1,4-endo, exo-5,8-dimethano naphthalene
Endrin	1,2,3,4,10,10-hexachloro-6,7-epoxy -1,4,4a,5,6,7,8,8a-octahydro-endo-5,8-dimethanonaphthalene
Heptachlor	1,4,5,6,7,8,8-heptachloro-3a,4,7, 7a-tetrahydro-4,7-methanoindene
Hexachlorobenzene	Same name
Lindane (gamma BHC)	1,2,3,4,5,6-a,a,e,e,e-hexachloro-cyclohexane
Methoxychlor	2,2,-bis(p-methoxyphenyl)-1,1,1-trichloroethane
Toxaphene (camphechlor)	Approximately $C_{10}H_{10}Cl_8$

Note:

1. "p,p'-DDT" is the pure technical form of DDT which is transformed into a family of closely related partial degradation and re-arrangement compounds (o,p'-DDT, DDD, DDE and others) in the environment.
2. Toxaphene (camphechlor)is a mixture of chlorinated camphenes.

Zambian Standard ZS 389

WHITE SUGAR-SPECIFICATION

1. SCOPE

This standard prescribes the requirements for white sugar derived from sugar- cane or sugar beet intended for human consumption.

2. NORMATIVE REFERENCES

In this standard reference has been made to the following publications:

Food and Drugs Regulations of Zambia; and

ZS 033: Parts 1 to 5 - Labeling of prepackaged foods

3. TYPES OF SUGAR

White sugar shall be one of the following types classified according to its form:

(a) granulated sugar;

(b) mill white sugar (plantation white sugar);

(c) brown Sugar;

(d) VHP (Very high pol) sugar;

(e) Mill white sugar (plantation white sugar);

(f) refined sugar;

(g) powdered sugars;

(h) castor sugar;

(i) icing sugar; or

(j) sugar cubes.

4. DEFINITIONS

In this standard, unless the context otherwise requires-

"white sugar" means purified crystallized sucrose (saccharose);

"powdered sugar" means finely pulverized white sugar with or without the addition of an anti-caking agent; and

"sugar cubes" means granulated sugar in the form of regular hexahedrons or tablets.

5. COMPOSITIONAL REQUIREMENTS

The composition of the various types of sugar shall be in accordance with the requirements given in Table 1. In addition to compositional specifications given in Table 1, sugar shall be fortified with vitamin A premix (see Appendix A).

TABLE 1—COMPOSITIONAL REQUIREMENTS OF WHITE SUGAR

CHARACTERISTICS	REQUIREMENTS OF SUGAR						
	Granulated				Castor Sugar	Powder (icing sugar)	Sugar Cubes
	Brown Sugar	VHP Sugar	Mill White Sugar	Refined Sugar			
Polarization °S, min.	98	99.3	99.5	99.8	99.78	99.78	99.7
Moisture %, max. (at 105° for 3 hours)	0.05	0.05	0.05	0.05	0.04	0.04	0.20
Ash Conductivity % m/m, max.	0.10	0.10	0.10	0.04	0.04	0.04	0.04
Invert Sugar % (m/m), max.	0.10	0.10	0.10	0.04	0.04	0.04	0.04
Sulphur dioxide mg/kg, max.	70	70	70	20	20	20	20
Colour (ICUMSA UNITS), max.	2000	1500	650	100	100	100	100
Water-insoluble matters, mg/kg, max.	60	60	60	60	—	—	—
Arsenic, ppm, max.	1	1	1	1	1	1	1
Lead, ppm, max.	2	2	2	1	2	2	2
Copper, ppm, max.	2	2	2	2	2	2	2
Vitamin A (as retinol), mg/kg, min.	10	—	10	10	—	—	—

6. GENERAL REQUIREMENTS

Sugar flavour shall be that which is characteristic of white sugar and shall be free from any foreign flavour and odour. The sugar shall be free of traces of pests, rodent and any other contaminants. No colouring matter or ultramarine shall be added to sugar.

6.1. *Permissible additives*

Anti-caking Agents:

(a) The following anti-caking agents may be added to powdered sugar singly or in combination:

(i) Magnesium stearate or magnesium carbonate or magnesium trisilicate;

(ii) Calcium triphosphate;

(iii) Sodium - calcium - alumine – silicate; or

(iv) Calcium silicate.

However, starch shall not be-

(i) present; and

(ii) more than 1.5 per cent m/m.

(b) When no other anti-caking agent is used in powdered sugar, starch can be used up to a maximum of 5 per cent m/m.

6.2. *Sieving requirements*

Not more than 4 per cent shall remain on a 1 mm aperture screen and not more than 8 per cent shall pass through a 0.180 mm (180µ) aperture screen.

6.3. *Hardness of cube sugar*

The pressure required to break each cube shall not be less than 10.5 kg/cm.^{2}

6.4. *Microbiological Requirements*

(a) Total Count of Organisms

When tested in accordance with approved methods the total count of organisms shall not exceed 500 colonies per 1g.

(b) Yeast and Moulds

When tested in accordance with approved methods the total colony counts of yeasts and moulds shall not exceed 50 per 1g.

(c) Escherichia

When tested in accordance with approved methods the product shall be free from Escherichia coli.

7 PACKAGINGAND MARKING

7.1. *Packing*

Sugar shall be packaged in a plastic film or paper bag made of non-toxic material whichever is applicable or any other suitable package. The material used to package sugar shall be clean and shall protect it from contamination and heat or light.

7.2. *Marking*

The label on the package shall, in addition to complying with the requirements of ZS 033: Parts 1 to 5, bear the following information in legible and indelible marking:

(a) name and address of manufacturer, or the manufacturer's registered trade mark;

(b) type of sugar in accordance with Clause 3;

(c) for powdered sugar name of "anti-caking agent" shall be mentioned;

(d) batch number;

(e) net weight;

(f) number of sugar cubes per pack;

(g) retinol content;

(h) the words "fortified with vitamin A" in bold letters; and

(i) store in a cool dry place away from strong light.

8. SAMPLING

8.1. *General requirements of sampling for inspection*

(a) In drawing, preparing, storing and handling samples, the following precautions and directions shall be observed.

(b) Samples shall be taken in a protected place not exposed to damp air, dust or soot and sunlight or heat.

(c) The sampling instruments shall be clean and dry when used.

(d) Sampling for bacteriological purposes

The sampling instruments and containers for samples shall be sterilised preferably by dry heat at 170°C for one hour before use.

(e) Adequate precautions shall be taken to protect the samples, the material being sampled, the sampling instruments and the containers for samples from adventitious contamination.

(f) The samples shall be placed in clean and dry moisture proof containers, which may be of glass plastic or polyethylene materials.

(g) Each sample container shall be sealed airtight after filling and marked with the name of the material date of sampling, batch number, and name of the manufacturer and other important particulars of the batch.

(h) The sample shall be protected from light as far as practicable and shall be stored in a cool place.

8.2. *Scale of sampling*

(a) Lot

All the containers of sugar in a single day's production shall constitute a lot.

(b) Gross Sample

A number of containers not less than the sample size indicated in Table 2 shall be selected at random from a lot for the purpose of drawing samples for test. This number of containers shall constitute the gross sample.

(c) To ensure the randomness of selection, a random number table as agreed to between the purchaser and the supplier shall be used. In case such a table is not available the following procedure shall be used:

Starting from any container count all the containers as 1,2,3, ... up to r and so on in one order, where 'r' is equal to the integral part of N/n, 'N' being the total number of containers in the lot and 'n' the number of containers to be selected, (see Table 2). Every 'rth' bag thus counted shall be withdrawn for sampling.

(d) Containers stacked in pyramidical shape

In case of bags stacked in a pyramidical shape, approximate equal number of bags shall be selected from all exposed sides of the lot so as to give the required number of sample bags.

TABLE 2—SAMPLING SCALE

LOT SIZE	SAMPLE SIZE
(N)	(n)
2-15	2
16-50	3
51-150	5
151-500	8
501-3200	13
3201 and above	20

8.3. *Test samples and reference samples*

(a) Test Samples

Draw from the top bottom and middle of each container in the gross sample about 1.5 Kg of the material with an appropriate sampling instrument. Mix thoroughly the material drawn from all the containers in the gross sample of that particular lot. Divide the composite sample with a suitable raffler into three approximately equal reduced samples.

(b) These reduced samples shall constitute the test samples, each test sample being not less than 0.5kg.

(c) The test samples shall be transferred immediately to thoroughly clean dry and sterile glass containers that shall be sealed air tight and labeled with the particulars given in 8.1. (g). The inspecting authority shall take one test sample and the other shall be handed over or sent to the manufacturer or his representative.

(d) Reference Sample

The third test sample, bearing the seals of the manufacturer and the inspecting authority shall constitute the reference sample to be used in case of dispute. It shall be kept at a place agreed to between the inspecting authority and the manufacturer, or in the absence of the manufacturer, the manufacturer's representative.

(e) Criterion for Compliance

If on testing the sample is found to conform to the requirements specified in the standard, the batch shall be accepted as complying to this standard.

9. TEST METHODS

White sugar shall be tested in accordance with approved Methods of test for sugar including Honey.

APPENDIXA

REQUIREMENTS FOR VITAMIN A FORTIFICANT PREMIX

A. 1. The retinol content shall not be less than 15 g/kg.

A. 2. The vegetable oil

A. 3. The antioxidant used shall be at levels adequate to prevent peroxidation and rancidity.

A. 4. The vitamin A fortificant premix shall readily dissolve in water.

A. 5. The packaging for vitamin A fortificant premix shall be of such quality and design as to protect the fortificant premix from contamination.

A. 6. The following information shall appear on the label:

(i) the date of manufacture;

(ii) the retinol content; and

(i) the words "VITAMIN A PREMIX NOT FOR DIRECT HUMAN CONSUMPTION" in letters half the size of the trade name.

Zambian Standard ZS 394

AVIATION TURBINE FUEL-SPECIFICATION FOR JET A-1

1. SCOPE

This Zambian Standard specifies requirements for Aviation Turbine Fuel, Jet A-1 in particular.

2. NORMATIVE REFERENCES

In this standard, reference has been made to the following methods:

ZS 396 Sampling Petroleum Products Part 1: Manual Sampling of Liquid Hydrocarbons

3. DEFINITIONS

In this Standard, unless the context otherwise requires-

"Additive" means a compound added to aviation turbine fuel to improve performance or storage stability.

4. REQUIREMENTS

4.1. *General*

(i) The aviation turbine fuel shall be hydrocarbon oil derived from petroleum or fossil fuels. This does not preclude the incorporation of small amounts of additives intended to improve some aspects of performance. The product shall be free from inorganic acid and from quantities of grit, fibrous material and other foreign matter likely to interfere with the operation of normal equipment.

(ii) When tested in accordance with the methods of test given in Table 1, aviation turbine fuel shall be in accordance with the limiting requirements given in the Table.

(iii) On visual inspection at ambient temperature, the aviation turbine fuel shall be clear, bright and free from solid matter.

4.2. *Storage Stability*

After conventional storage under normal conditions for a period of 6 months after the date of receipt, the aviation turbine fuel shall still comply with all the requirements of this standard (other than the requirements for potential gum content).

5. PACKAGING AND MARKING

5.1. *Packaging*

The condition of the containers, rail tankers and road tank vehicles into which the aviation turbine fuel is filled shall be such as not to be detrimental to the quality of the fuel during normal transportation and storage. The containers shall be acceptably sealed and in addition shall conform to the Petroleum Act, Chapter 435 of the Laws of Zambia, and ZS 371.

5.2. *Marking*

The following information shall appear in legible and indelible marking on each container or in the case of aviation turbine fuel filled into bulk storage tanks, with the storage and consignment documents of each road tanker or rail wagon as stipulated in ZS 372:

(i) the manufacturer's name and address;

(ii) the type of fuel as stipulated under UN Code;

(iii) the hazards involved in handling and transportation;

(iv) the Transport Emergency Card (Tremcard);

(v) the volume in litres; and

(vi) the batch/lot number.

6. TEST METHODS

For all characteristics, the test methods listed in column 4 of Table 1 shall apply.

7. SAMPLING

7.1. *Sampling from storage tanks*

For the purpose of this Standard all sampling shall be carried out in accordance with the relevant procedures of ZS 396: Part 1 and, additionally, as detailed in 7.2.

7.2. *Sampling from fuel lines*

(a) Sampling cans of 5 litres and 1 litre capacity

The construction of the cans shall comply with the appropriate safety requirements for cans that are to hold highly flammable material. They shall be provided with screw caps incorporating a petroleum resistant washer in good condition. A stock of cans shall be kept solely for the purpose of taking Aviation Turbine Fuel samples.

(b) Preparation of cans

New cans shall be rinsed with Aviation Turbine Fuel before being used to remove any residual traces of oil left during manufacturing operations, and then allowed to dry. Before use, all cans shall be checked to ensure that they are sound and free from leaks.

(c) Sampling procedure

From the pump nozzle, 5 litres of Aviation Turbine Fuel shall be drawn carefully into a cool 5 litres can using a clean dry funnel. Immediately afterwards, this sample shall be decanted carefully into the requisite number of 1 litre cans using a funnel, filling the cans within 15 mm of the brim.

If more than 5 litres are needed, the operation shall be repeated immediately and before the pump has been used for any other purpose. The screw caps shall be tightened fully and the cans checked to ensure that there are no leaks.

The sampling procedure shall not be carried out in direct sunlight. If carried out in direct sunlight, changes in fuel quality may occur.

(d) Storage, labeling and transport

(i) Samples shall be kept in a cool place although it is not necessary to keep them refrigerated.

(ii) Full and legible information relating to the source of the sample shall be attached to the can in such a manner that it will not easily become detached subsequently.

(iii) If required, the sample may be sealed and labeled to maintain its integrity,

(iv) If the sample has to be sent to a laboratory by public transport, it will be necessary to comply with the general regulations covering transportation of flammable materials and with the requirements of the transport authority concerned. Information on the appropriate procedures and the type of packaging required should be obtained from the transport authority involved.

TABLE 1- REQUIREMENTS FOR AVIATION TURBINE FUEL (JET A-1)

CHARACTERISTICS	LIMIT	REQUIREMENT	TEST METHOD
COMPOSITION			
Acidity (mgKOH/g)	Max	0.015	ASTM D3242, IP 354
Aromatics (% vol)	Max	22	ASTM D 1319, IP 156
Doctor Test[1)]		Negative	ASTM D 4952
Sulphur, Mercaptan (% m/m)	Max	0.003	ASTM D 3227
Sulphur, Total (% m/m)	Max	0.30	ASTM D 1266, D 1552, D 2622, D 4294 or 5453
Colour		Report	ASTM D 156
VOLATILITY			
Distillation Temperatures			ASTM D 86
10% Recovered, temperature, °C	Max	205	ASTM D 86
End Boiling Point, temperature, °C	Max	300	ASTM D 86
Distillation Residue, (% vol)	Max	1.5	ASTM D 86
Distillation Loss, (% vol)	Max	1.5	ASTM D 86
Flash Point, (°C)	Min	38	ASTM D 56, D 3828 or IP 170
Density at 15°C, (kg/m^3)		775 to 840	ASTM D 1298, D 4052
FLUIDITY			
Freezing Point, (°C)	Max	-47	ASTM D 2385, D 2386, D 5901, D 5972
Viscosity @ -20°C, (mm^2/s)	Max	8	ASTM D 445
COMBUSTION			
Net Heat of Combustion , (MJ/kg)	Min	42.8	ASTM D 4529, D 3338 or D 4809

One of the following requirements shall be met:			
Luminometer Number	Min	45	ASTM D 1740
Smoke Point, (mm)	Min	25	ASTM D 1322
Smoke Point, (mm) and	Min	19	ASTM D 1322
Naphthalenes (% vol)	Max	3	ASTM D 1322
CORROSION			
Copper Strip, 2 hours at 100°C	Max	1	ASTM D 130
Ag Corrosion, 4 hours at 50°C	Max	2	IP 227
STABILITY			
Thermal:	Max	25	ASTM D 3241
Filter Pressure Drop, (mm Hg)	Max	3	ASTM D 3241
Tube Deposit less than			
CONTAMINANTS			
Existent Gum, (mg/ 100 ml)	Max	7	ASTM D 381
Water Reaction:			
Interface Rating	Max	1b	ASTM D 1094
Water Separator Index	Min	70	ASTM D 2550
CONDUCTIVITY			
Electrical Conductivity, (pS/m)		50-450	ASTM D 2624
ADDITIVES			
Anti-oxidant, (mg/l)			
Hydrotreated Fuels (Mandatory)	Min	17	ASTM D 2550
	Max	24	ASTM D 2550
Non Hydrotreated Fuels (Optional)	Max	24	ASTM D 2550
Metal Deactivator, (mg/l)	Max	5.7	ASTM D 2550
Static Dissipator (Mandatory)			
First Doping, (mg/l)	Max	3.0	ASTM D 2550
Cumulative Doping, (mg/l)	Max	5.0	ASTM D 2550

(1) A positive Doctor Test result will not stop a sample from qualifying providing that the Mercaptan Sulphur Result is within specification.

Zambian Standard ZS 422-1

PENETRATION GRADE BITUMENS-SPECIFICATION

1. SCOPE

This part of the ZS 422 specifies the requirements for penetration grade bitumens which are suitable for use in road construction in Zambia. The penetration grade bitumens are classified into a number of grades for each of which an appropriate designation and properties are specified.

This part of the standard does not cover bitumen emulsions, cut back bitumens or bitumen mixtures containing lake asphalt, coal tar or pitch; such materials are specified in a separate standard. Advice on handling and packaging, and on sampling and testing is given in the Appendices A and B.

2. REFERENCES

In this standard, reference has been made to the following methods:

ZS 396 Sampling Petroleum Products – Part 1: Manual sampling of liquid hydrocarbons

3. DEFINITIONS

For the purpose of this standard, the following definition applies:

3.1. *Bitumen*

A viscous liquid, or solid, consisting essentially of hydrocarbons and their derivatives, which is soluble in trichloroethylene and is substantially non-volatile and softens gradually when heated. It is black or brown in colour and possesses waterproofing and adhesive properties. It is obtained by a refinery process from petroleum, and is found as a natural deposit or as a component of naturally occurring asphalt, in which it is associated with mineral matter.

4. REQUIREMENTS

4.1. *General*

When tested in accordance with the methods of test given in Table 1, the penetration grade bitumen shall be within the limiting requirements given in the Table.

Numbers representing the penetration range designate penetration grade of bitumen specified in this part of the standard. Penetration grades are also referred to using the suffix ‘pen’.

4.2. Storage stability

(a) General

Penetration grade bitumens require storage and handling plant equipped with heating facilities. However, this does depend on the cutback grade of the bitumen being handled.

After conventional storage under normal conditions for a period of up to 6 months after the date of manufacture, the penetration grade bitumen shall comply with all the requirements of this standard.

In the case of penetration grade bitumen that is stored for more than 6 months, the product shall comply with the requirements of Table 1. It shall comply with such other requirements as are agreed upon between the supplier and purchaser.

(b) Marking

The following information shall appear in legible and indelible marking on each container or in the case of products being transported in a road tank vehicle, in the storage and consignment documents:

(i) the supplier's name and address;

(ii) the date of manufacture;

(iii) the name of the product, e.g. 150/200 pen bitumen;

(iv) the quantity in kg;

(v) the batch/lot number;

(vi) a statement on safety, health and environment.

5. TEST METHODS

For all characteristics, use the applicable methods listed in column 7 of Table 1.

TABLE 1—REQUIREMENTS FOR PENETRATION GRADED BITUMENS

1	*2*	*3*	*4*	*5*	*6*	*7*
		GRADE				
CHARACTERISTIC	LIMIT	40/50 pen	60/70 pen	80/100 pen	150/200 pen	TEST METHOD
Penetration @ 25°C, 0.1 mm (100g/5s)	Range	40-50	60-70	80-100	150-200	ASTM D 5
Softening Point, °C	Min Max	49 59	46 56	41 51	36 43	IP 58 ASTM D 36
Ductility @ 25°C, mm	Min	1000	1000	1000	1000	ASTM D 113
Rolling Thin Film Oven Test Loss on Heating, % m/m	Max	0.8	1.0	1.0	1.4	ASTM D 2872
Retained Penetration of Residue, % of original		60 min	55 min	50 min	45 min	ASTM D 5 IP 49
Ductility of Residue @ 25°C, mm	Min	400	600	1000	1000	ASTM D 113
Solubility, Trichloroethylene, % m/m	Min	99.0	99.0	99.0	99.0	ASTM D 2042 IP 47
Viscosity @ 135°C, Pa.s	Min	0.27	0.22	0.15	0.12	ASTM D 4402 IP 319

APPENDIX A

(Normative)

HANDLING AND PACKAGING

A. 1. Handling and Packaging

Penetration grade bitumens are normally supplied hot in bulk by road tanker, and handling procedures should be in accordance with the latest revision of the Institute of Petroleum Model Code of Safe Practice, Part 11, Bitumen Safety Code or the Bitumen Safety Handbook published by SABITA. Penetration grade bitumen may also be supplied in sealed drums and suppliers' recommendations should be sought with regard to appropriate handling procedures. The condition of the containers and road tank vehicles into which the penetration grade bitumen is filled shall be such as not to be detrimental to the quality of the product during normal transportation and storage. The drums shall be sealed and shall conform to the Petroleum Act, Chapter 435 of the Laws of Zambia.

APPENDIX B

(Normative)

SAMPLING AND TESTING

B. 1. S*ampling Locations*

B. 1.1. For the purposes of this Zambian Standard all sampling shall be carried out in accordance with the relevant procedures of ZS 396. In addition, if it is desired to take a sample of penetration grade bitumen it may be taken from any of the following locations:

(a) from the tanker, in the case of bulk delivery by road, immediately before discharge;

(b) from the storage tank (or the feed pipe to the mixer) of a manufacturer of mixtures of bitumen and mineral matter, immediately before mixing; or

(c) from the tank of a binder distributor used for surface dressing immediately before spraying.

B. 2. *Sampling Procedures*

When sampling penetration grade bitumen it is essential that the purchaser obtain a sample of not less than 5 Kg, which represents the material supplied. The sample shall be immediately divided into three approximately equal sub-samples that shall be placed in clean and dry metal containers capable of being securely closed. Each sub sample shall be clearly labelled with the names of the supplier and purchaser, details of the grades of penetration grade bitumen, time and date of sampling and identification of the sampling location. Samples should be retained for at least three months.

It is essential that the purchaser use only one of the sub-samples for the purchasers own tests, the remaining two sub-samples being retained by the purchaser in case of dispute.

NOTE:

1. It is recommended that routine checking of penetration grade bitumen should be based on the penetration test and softening point in the case of grades covered in Table 1. Experience shows that checking other specified properties is only necessary when there are reasons to suspect the quality of the material.
2. To ensure valid comparison between the test results of the purchaser and supplier, it is essential that both test the material within 7 days of taking the sample.

Zambian Standard ZS 422-2

CUTBACK BITUMENS-SPECIFICATION

1. SCOPE

This part of ZS 422 specifies the requirements for cutback bitumens which are suitable for use in road construction in Zambia. The cutback bitumens are classified into a number of grades for each of which an appropriate designation and properties are specified.

This part of the standard does not cover penetration grade bitumens, bitumen emulsions or bitumen mixtures containing lake asphalt, coal tar or pitch. Advice on handling and packaging, and on sampling and testing is given in the Appendices A and B.

2. NORMATIVE REFERENCES

In this standard, reference has been made to the following methods:

ZS 396 Sampling Petroleum Products – Part 1: Manual sampling of liquid hydrocarbons

3. DEFINITIONS

For the purpose of this standard, the following definitions as well as those defined in Part 1 apply:

"bitumen" means a viscous liquid, or solid, consisting essentially of hydrocarbons and their derivatives, which is soluble in trichloroethylene and is substantially non-volatile and softens gradually when heated and-

(i) it is black or brown in colour and possesses waterproofing and adhesive properties; and

(ii) it is obtained by a refinery process from petroleum, and is found as a natural deposit or as a component of naturally occurring asphalt, in which it is associated with mineral matter; and

" cutback bitumen " means bitumen whose viscosity has been reduced by blending with a suitable volatile diluent. It is viscous at ambient temperatures and some grades will require heating before mixing and spraying. Cutback bitumen shall be homogenous, free from visible water and will not foam when heated to application temperature.

4. REQUIREMENTS

4.1. *General*

When tested in accordance with the methods of test given in Table 1, the cutback bitumen shall be within the limiting requirements given in the Table.

4.2. *Storage stability*

(a) General

Cutback bitumens require storage and handling plant equipped with heating facilities. However, this does depend on the cutback grade of the bitumen being handled.

After conventional storage under normal conditions for a period of up to 6 months after the date of manufacture, the cutback bitumen shall comply with all the requirements of this standard.

In the case of cutback bitumen that is stored for more than 6 months, the product shall comply with the requirements of Table 1. It shall comply with such other requirements as are agreed upon between the supplier and purchaser.

(b) Marking

The following information shall appear in legible and indelible marking on each container or in the case of cutback bitumen being transported in a road tank vehicle, in the storage and consignment documents:

(i) the supplier's name and address;

(ii) the date of manufacture;

(iii) the name of the product, e.g. MC 30 cutback bitumen;

(iv) the quantity in kg;

(v) the batch/lot number; and

(vi) a statement on safety, health and environment.

5. TEST METHODS

For all characteristics, use the applicable methods listed in column 10 of Table 1

TABLE 1—REQUIREMENTS FOR CUTBACK BITUMENS[1]

1	*2*	*3*		*4*	*5*	*6*	*7*	*8*	*9*	*10*
		GRADE								
CHARACTERISTIC[4]		MC 30		MC 70		MC 800		MC 3000		TEST METHOD
		Min	Max	Min	Max	Min	Max	Min	Max	
Kinematic Viscosity @ 60°C, cSt		30	60	70	140	800	1600	3000	6000	ASTM D2170
Flash Point, °C		38		38		66		66		IP 113 or ASTM D 1310[1]
Distillation, % by vol of total distillate to 360°C to 190°C to 225 °C to 260 °C to 316 °C		0 15 50 80	15 60 85 100	— 10 40 80	— 50 80 95	— 0 10 50	— 35 60 90	— 0 0 35	— 25 40 85	IP 27 ASTM D 402
Residue from Distillation to 360 °C, % vol of original sample		50	—	55	—	75	—	80	—	IP 27 ASTM D 402
Penetration at 25 °C on residue from distillation, 0.1 mm		90	180	90	180	90	180	90	180	IP 49A STM D 5
Ductility on residue from distillation @ 25 °C, mm		1000		1000		1000		1000		ASTM D 113
Solubility Trichloroethylene, % m/m		99.0		99.0		99.0		99.0		ASTM D 2042
Water, % volume			0.2		0.2		0.2		0.2	ASTM D 95

[1] All cutbacks shall be blended from pen 80 – 100 grade bitumen.
[2] Cutback bitumen shall be homogenous, free from visible water and will not foam when heated to application temperature.
[3] IP 113 and ASTM D 1310 are acceptable methods to be used to determine the flash point although cognisance should be taken of the diluent used to make the cutback bitumen as this will affect the accuracy of results obtained

APPENDIX A
(Normative)

HANDLING AND PACKAGING

A. 1. *Handling and Packaging*

Cutback bitumens are normally supplied hot in bulk by road tanker. Handling procedures should be in accordance with the latest revision of the Institute of Petroleum Model Code of Safe Practice, Part 11, Bitumen Safety Code or the Bitumen Safety Handbook published by SABITA. Uncontrolled heating of cutback bitumens can lead to loss of volatile diluent and consequent non-compliance with the specification.

Cutback bitumen may also be supplied in sealed drums and suppliers' recommendations should be sought with regard to appropriate handling procedures. The condition of the containers and road tank vehicles into which the cutback bitumen is filled shall be such as not to be detrimental to the quality and quantity of the product during normal transportation and storage. The drums shall be sealed and shall conform to the Petroleum Act, Chapter 435 of the Laws of Zambia.

APPENDIX B
(Normative)

SAMPLING AND TESTING

B. 1. *Sampling Locations*

B. 1. 1. For the purposes of this Zambian Standard all sampling shall be carried out in accordance with the relevant procedures of ZS 396. In addition, if it is desired to take a sample of cutback bitumen it may be taken from any of the following locations:

(a) from the tanker, in the case of bulk delivery by road, immediately before discharge;

(b) from the storage tank (or the feed pipe to the mixer) of a manufacturer of mixtures of bitumen and mineral matter, immediately before mixing; or

(c) from the tank of a binder distributor used for surface dressing immediately before spraying.

B. 1. 2. The procedures involved in handling the binder for surface dressing may lead to some loss of volatile constituents from the cutback bitumen without necessarily impairing the performance of the surface dressing. Where a sample of cutback bitumen has been taken from one of the locations listed in B.1.1 it shall be assumed that the viscosity requirements of the standard have been complied with provided the viscosity is within the following limits.

Saybolt – Furol Viscosity Limits

MC-30 - Furol Viscosity at 25°C – 75 to 150 sec

MC-70 – Furol Viscosity at 50°C – 60 to 120 sec

MC-800 – Furol Viscosity at 82.2°C – 100 to 200 sec

MC-3000 – Furol Viscosity at 82.2°C – 300 to 600 sec

B. 2. *Sampling Procedures*

When sampling cutback bitumen it is essential that the purchaser obtain a sample of not less than 5 kg, which represents the material supplied. The sample shall be immediately divided into three approximately equal sub-samples that shall be placed in clean and dry metal containers capable of being securely closed. Each sub sample shall be clearly labelled with the names of the supplier and purchaser, details of the grades of cutback bitumen, time and date of sampling and identification of the sampling location. Samples should be retained for at least three months.

It is essential that the purchaser use only one of the sub-samples for the purchaser's own tests, with the remaining two sub-samples being retained by the purchaser in case of dispute.

Note:

1. It is recommended that routine checking of cutback bitumen should be based on the viscosity test in the case of grades covered in Table 1. Experience shows that checking other specified properties is only necessary when there are reasons to suspect the quality of the material.
2. To ensure valid comparison between the test results of the purchaser and supplier, it is essential that both test samples are of the same age.

SECOND SCHEDULE

(Paragraph 3)

1.	ZS 063	Petroleum Jelly
2.	ZS 065	Pure Glycerine
3.	ZS 190	Drinking Water
4.	ZS 233	Crude Edible Vegetable Oils
5.	ZS 327	Blended (Physical Mixture) Fertilisers
6.	ZS 357	Pressed Steel Door Frames
7.	ZS 373 Part 1	Portable Fire Extinguishers
8.	ZS 373 Part 2	Portable Fire Extinguishers
9.	ZS 389	White Sugar
10.	ZS 394	Aviation Turbine Fuel
11.	ZS 422 Part 1	Penetration Grade Bitumens
12.	ZS 422 Part 2	Cutback Bitumens

M. D. MWANAKATWE,
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LUSAKA

14th September, 2017