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DRAFT EAST AFRICAN STANDARD

Compounded pig feed — Specification

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. XXXXXX.

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 001, *Animal feeding, feeds and feeding stuffs*.

This second edition cancels and replaces the first edition EAS 55:2000, which has been technically revised.

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

To achieve efficient animal production, all nutrients should be provided in amounts necessary to meet the animal's nutritional requirements. The formulation of balanced diets that provide the correct amounts and proportions of these nutrients is essential to support the requirements for maintenance and production. Nutrient requirements become defined accurately through research trials so as to formulate diets more precisely. The standards presented in this document give the restrictions required for the prevention of poor animal performance.

Feeds may be produced by mixing various feeding stuffs or ingredients which may themselves vary in composition. The choice of raw materials mixtures will depend on locality, season and availability, economics, prices, quality and safety of the product. The chemical composition of feedstuffs plays an important role in formulation of balanced and economical rations for various classes of animals. This is only possible when knowledge of the chemical composition of feedstuffs is available. Studies on the nutritive value of feed stuffs available in the East African region show differences between analytical values.

Compounded pig feed — Specification

1 Scope

This Draft East African Standard specifies requirements, methods of sampling and test for compounded feed used as a sole source of nutrients for:

- a) pig starter feed;
- b) pig growers feed;
- c) pig finishing feed; and
- d) lactating sow feed.

2 Normative references

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

ISO 5510, *Animal feeding stuffs — Determination of available lysine*

ISO 5983-1, *Animal feeding stuffs — Determination of nitrogen content and calculation of crude protein content — Part 1: Kjeldahl method*

ISO 5984, *Animal feeding stuffs — Determination of crude ash*

ISO 5985, *Animal feeding stuffs — Determination of ash insoluble in hydrochloric acid*

ISO 6490-1, *Animal feeding stuffs — Determination of calcium content — Part 1: Titrimetric method*

ISO 6491, *Animal feeding stuffs — Determination of phosphorus content — Spectrometric method*

ISO 6492, *Animal feeding stuffs — Determination of fat content*

ISO 6495, *Animal feeding stuffs — Determination of water-soluble chlorides content*

ISO 6496, *Animal feeding stuffs — Determination of moisture and other volatile matter content*

ISO 6497, *Animal feeding stuffs — Sampling*

ISO 6865, *Animal feeding stuffs — Determination of crude fibre content — Method with intermediate filtration*

ISO 9831, *Animal feeding stuffs, animal products, and faeces or urine — Determination of gross calorific value — Bomb calorimeter method*

ISO 13903, *Animal feeding stuffs — Determination of amino acids content*

ISO 14718, *Animal feeding stuffs — Determination of aflatoxin B₁ content of mixed feeding stuffs — Method using high-performance liquid chromatography*

ISO 17375, *Animal feeding stuffs — Determination of aflatoxin B₁*

ISO 16050, *Foodstuffs — Determination of aflatoxin B₁, and the total content of aflatoxins B₁, B₂, G₁ and G₂ in cereals, nuts and derived products — High-performance liquid chromatographic method*

ISO 27085, *Animal feeding stuff — Determination of calcium, sodium, phosphorous, magnesium, potassium, iron, zinc, copper, manganese, cobalt, molybdenum, arsenic, lead and cadmium by ICP-AES*

3 Terms and definitions

3.1

pig starter feed/creep feed

pig feed suitable for growing pigs up to 20 kg live weight from 1 to 10 weeks

3.2

pig grower feed

pig feed suitable for growing pigs up to 55 kg live weight from age of 11 to 15 weeks

3.3

pig finishing feed

pig feed suitable for fattening pigs weighing over 55 kg live weight

3.4

lactating sow feed

pig feed suitable for lactating sows

3.5

feed (or feed stuff)

any substance or product, including additives, whether processed, partially processed or unprocessed, intended to be used for oral feeding to animals

4 Requirements

4.1 General quality requirements

4.1.1 All ingredients and raw materials shall not be decomposed or deteriorated and shall comply with the relevant East African standards. The common feed stuffs described in Annex A and their nutrient composition provided in Annex B may be used for purposes of formulating compounded pig feeds.

4.1.2 Ingredients of animal origin shall be sterilised before use.

4.1.3 Where soy bean meal is used, it shall have been subjected to adequate heat treatment to reduce the activity of trypsin inhibitor.

4.1.4 Vitamin preparations added to feed shall be in stabilised form.

4.1.5 Pig feeds shall:

- a) either be dry or wet, raw or pre-cooked meal, crumbs or pellets.
- b) be free from harmful levels of substances such as metallic objects, and adulterants
- c) be free from fungi pathogenic microorganisms or insect infestation.
- d) not be, musty, rancid and shall not have any objectionable odours.

4.2 Specific requirements for pig feeds

4.2.1 The level of free fatty acids in pig feeds should not exceed 15 % of the crude fat content at the time of manufacture.

4.2.2 Compounded pig feed shall meet the requirements of the nutrients and metabolizable energy in Table 1. Compounded pig feed may contain additional micronutrients and when added shall comply with the limits provided in Annex C.

Table 1 — Specific nutritional requirements for pig feed

Parameter	Pig starter feed		Pig grower feed		Pig finishing feed		Lactating sow feed		Test method
	Min	Max	Min	Max	Min	Max	Min	Max	
Metabolizable energy, Kcal/kg ^a	3 200	-	2 700		2400	-	3 000	-	ISO 9831
Crude protein, %	18	-	17	-	15	-	16	-	ISO 5983-1
Crude fat, %	2	-		8	-	8	-	8	ISO 6492
Crude fibre, %	-	6	-	8	-	8	-	8	ISO 6865
Acid insoluble ash, %	-	4	-	4	-	4	-	4	ISO 5985
Sodium chloride, %	0.3	0.5	-	0.5	0.8	1.5	-	0.5	ISO 6495
Calcium, %	0.7		0.8		0.75		0.75		ISO 6490-1
Total Phosphorus ^b , %	0.5		0.8		0.75		0.7		ISO 6491
Lysine ^c , %	1.3	-	0.8	-	0.6	-	0.6	-	ISO 5510
Cystine ^c + Methionine, %	0.8	-	0.6	-	0.4	-	0.4	-	ISO 13903
Methionine, %	0.5	-	0.3	-	0.25	-	0.25	-	ISO 13903
Moisture, %		13		13		13		13	ISO 6496

^a DE=GE*0.85, ME=DE*factor (f).
For feed with < 3% fat ME = DE*1.01 – 0.45,
For feed with ≥ 3% fat ME = (DE*1.01 – 0.45) + (0.0046*EE% -3)
EE is ether extracts (fat)

^b Not more than 70 % of the total phosphorus content may be derived from plant origin.
^c Not more than 50 % of the cystine and methionine requirement may be in the form of cystine.

5 Feed additives and provisions related to their use

5.1 Additives in the following categories may be used in pig feeds and if used, they shall comply with the requirements given in Annex D.

- a) antioxidants;
- b) colourants;
- c) emulsifiers;
- d) stabilisers;
- e) thickeners and gelling agents;
- f) binders;

- g) anti-caking agents and coagulants;
- h) aromatic and appetising substances;
- i) enzymes; and
- j) preservatives.

NOTE Materials intended for mixing with animal feed as additives for use as feeding stuffs should specify the kind of and, if appropriate the age group of the animal for which the feed is intended. In addition, the quantity in grams per kilogram (or percentage by weight) of the complete feed which conform to the provisions of this standard should be stated in the label (see also Clause 9).

5.2 No antibiotic, hormone substance, drug, mineral or urea shall be added to or included in pig feed other than such ingredients required to satisfy this standard and approved by World organization for animal health (OIE).

6.6 Anti-nutritive factors

Pig feeds shall not contain anti-nutritive factors beyond the limits as prescribed by the World Organization for Animal Health (OIE).

7 Contaminants

7.1 Aflatoxins

Pig feed shall comply with the maximum aflatoxin limits given in Table 2 when tested in accordance with the methods specified therein.

Table 2 — Maximum limits for aflatoxin in compounded pig feed

S/N	Aflatoxin	Type of pig feeds	Maximum limit, µg/kg	Test method
i.	Total aflatoxin	Pig starter feed	50	ISO 16050
		Grower feed, finishing feed and lactating sow feed	200	
ii.	Aflatoxin B1	Grower feed, finishing feed and lactating sow feed	20	ISO 14718
		Pig starter feed	10	ISO 17375

7.2 Pesticide residues

Pig feeds shall comply with those maximum pesticide residue limits established by the Codex Alimentarius Commission for the ingredient used in pig feed.

7.3 Heavy metals

Pig feeds shall comply with the limits of heavy metals as specified in the Table 3 when tested in accordance with the methods specified therein.

Table 3 — Limits for heavy metals in compounded pig feed

S/N	Heavy metal	Maximum limit, mg/kg	Test method
i.	Arsenic	2.0	ISO 27085
ii.	Lead	5.0	
iii.	Cadmium	1.0	
iv.	Mercury	0.1	

8 Packaging

Pig feeds for sale shall be packaged in suitable containers that are of sufficient strength, and sufficiently sealed so as to withstand reasonable handling without tearing, bursting or falling open. The containers shall be clean and not previously used.

9 Labelling

Each package of pig feed shall be legibly and indelibly labelled with the following:

- a) name of the feed;
- b) name and physical address of the manufacturer;
- c) net weight in metric units;
- d) manufacturing date;
- e) Storage instruction and
- f) expiry date.

The following information shall be included on the bag and may also be included on a tag:

- a) proportions of crude protein, crude fibre, crude fat, metabolizable energy, phosphorus, calcium, lysine and methionine
- b) additives if included shall be declared;
- c) batch number/ lot identification
- d) directions and precautions for use

10 Sampling

Representative samples shall be drawn in accordance with ISO 6497.

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Annex A (informative)

Description of common feedstuffs

Product	Description	Main nutritional constituent
1. Alfalfa meal	Alfalfa as grown, dried and processed, and to which no other matter has been added	Crude protein, crude fibre
2. Barley meal	The meal obtained by grinding barley, as grown, which shall be the whole grain together only with such other substances as may reasonably be expected to have become associated with the grain in the field.	Crude protein, crude fibre
3. Bean meal	The meal obtained by grinding commercially pure leguminous beans (other than soya bean).	Crude protein, crude fibre
6. Brewery and distillery grains	The product obtained by drying the residue from distillery mash-tube, and to which no other matter has been added	Crude fibre, crude protein
7. Cassava, dried	The dried root of the species <i>Manihot esculenta</i>	starch
8. Clover meal	Clover as grown, dried and processed and to which no other matter has been added	Crude protein, crude fibre
9. Coconut cake	The residue resulting after part removal of oil and of cortex from commercially pure coconut kernels	Crude protein crude fibre
10. Cotton seed cake	The residue resulting after part removal of oil and of cortex from commercially pure cotton seed	Crude protein, crude fibre
11. Sorghum meal	The meal obtained by grinding sorghum as grown which shall be the whole grain together only with such substances as may reasonably be expected to have become associated with the grain in the field.	Crude protein, crude fibre, starch
12. Fish meal	A product, which may contain an added antioxidant but to which no other matter has been added, obtained by drying and grinding or otherwise treating fish or fish waste.	Crude protein, oil, total ash
13. Grass, meal	Any product which, (i) is obtained by artificially drying any of the following: grass, clover, lucerne, green cereal, or any mixture consisting of any of them, and (ii) is otherwise as grown (that is to say including any growths harvested there with but with no other substance added thereto), and contains not less than 13 % crude protein calculated on the assumption that it contain 10 % moisture.	Crude protein, crude fibre

14. Groundnut cake	The residue resulting after part removal of oil and part of non-removal of cortex from commercially pure groundnuts	Crude protein, Oil, crude fibre
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Product	Description	Main nutritional constituent
15. Maize	Maize kernel or crushed maize kernel as grown for commercial purposes	Crude protein, starch
16. Maize germ meal	Consisting mainly of embryo of kernel not less than 10 % oil, and not more than 5 % ash	Crude protein, starch
17. Maize and cob meal	Ground maize on the cob	Crude protein, oil, crude fibre
18. Maize meal	Milled whole maize	Crude protein, oil, starch
19. Maize gluten meal	A by-product resulting from removal of a bran starch and germ from maize	Crude protein, oil,
21. Milk powder/milk replacer	Dried milk from which a substantial amount of fat has been removed and to which no other substance is added	Crude protein
22. Millet	Finger millet of the species <i>Eleusine coracana</i>	Crude protein, crude fibre, starch
23. Mineral mixture	Mixture of substances used whether in the form powder or licks and purporting to be essential for livestock	Percent of the mineral and trace elements
24. Molasses	A concentrated syrup product obtained in the manufacture of sugar from sugar cane to which no other matter has been added	Sugar as sucrose
25. Oats, ground	The product obtained by grinding commercially pure oats	Crude protein, crude fibre
26. Pea meal	The meal obtained by grinding or crushing commercially pure peas including pods	Crude protein, crude fibre
27. Rice bran	The outside husk or rice kernel to which no other matter has been added	Crude protein, crude fibre, oil, starch
28. Rice meal	The product obtained by grinding commercially pure rice after the removal of hulls and to which no other substance is added	Crude fibre, crude protein, oil, starch
29. Rice polishings	The product obtained when polishing kernels after the removal of hulls and bran	Crude protein, oil, crude fibre, starch
30. Sesame cake	The residue resulting after the part removal of oil from commercially pure simsim kernels	Crude protein, oil, crude fibre

31. Soya bean meal	The residue resulting after the part removal of oil from commercially pure soya bean seeds	Crude protein, oil, crude fibre
32. Sweet potatoes	The dried tubers of the species <i>Ipomea batatas</i>	Crude protein, crude fibre, starch
33. Wheat meal	The meal obtained by grinding commercially pure wheat as grown and to which no other substance has been added	Crude protein, crude fibre, starch
34. wheat bran	Outside husk of what kernel to which no other matter was added	Crude protein, crude fibre, starch
35. Wheat pollard	A by-product of wheat separated during production of flour not mentioned otherwise in this schedule containing not more than 4 % of other than wheat vegetable substances	Crude protein, crude fibre, starch
36. Yeast dried	The product obtained by drying of yeast or yeast residues, and to which no other matter has been added.	Crude protein

Annex B
(informative)

Nutrient composition of common feed ingredients

Ingredients	DM%	CP%	CF%	Ca%	P%	ME Kcal/kg	Lysine %	Methionine %
Maize	88	8	12	0.17	0.55	3000	0.53	0.29
Maize bran	88	9.4	13	0.04	1.03	2200	0.18	0.21
Maize/cob meal	88	7	8	-	0.30	-	-	-
Rice bran	88	13.5	6.5	0.06	1.43	3000	0.5	0.22
Cassava meal	88	2.8	4.0	0.3	0.05	3000	-	-
Molasses	75	3.0	-	0.75	0.08	2330	-	-
Millet	88	10.5	2.0	0.05	0.40	1392	0.2	0.27
Sorghum	88	9.0	2.1	0.03	0.28	3250	0.2	0.12
Fish meal	88	60.0	1.0	4.37	2.53	2310	4.08	1.70
Cotton seed cake	88	40.0	14	0.20	1.20	968	1.6	0.52
Soya bean meal	88	43.0	6	0.53	0.64	2800	2.84	0.65
Limestone	98	-	-	38.0	-	-	-	-
Oyster shells	98	-	-	35.0	-	-	-	-
Wheat pollard	98	15.0	-	-	-	-	0.60	0.35
Wheat bran	91.4	15.0	12.5	-	1.20	-	0.60	0.35
Sunflower cake	92	35.0	26.7	-	-	-	1.80	1.20
Groundnut cake	93	40.0	7.3	-	-	-	2.00	1.80
Rice polishings	92.5	12.0	4.2	-	-	-	4.0	0.40
Dicalcium phosphate	-	-	-	24	18	-	-	-
Tricalcium phosphate	-	-	-	38	19	-	-	-
Alfalfa hay	87.5	18.9	33.1	-	-	-	-	-
Sugarcane bagasse	90.5	1.7	50.3	-	-	-	-	-

Sesame cake	93	36.1	6.7	-	-	-	-	-
Sugarcane tops	33.5	6.2	29.5	-	-	-	-	-
Whey	90	13.0	1.3	0.97	0.76	3100	-	0.2

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Annex C
(normative)

Micronutrients requirements for pig feeds

Parameter	Pig starter feed		Grower feed		Finishing feed		Lactating sow feed	
	Min	Max	Min	Max	Min	Max	Min	Max
Selenium, mg/kg	0.20	5	0.20	5	0.20	5	0.20	5
Manganese, mg/kg	20	-	20	-	20	-	20	-
Iodine, mg/kg	1.00	-	1.00	-	0.50	-	1.00	-
Zinc, mg/kg	50	-	100	-	100	-	100	-
Iron, mg/kg	100	120	80	-	125	-	80	-
Copper, mg/kg	200	400	20	-	20	180	20	-
Cobalt, mg/kg	5	-	0.3	0.6	0.3	0.6	0.3	0.6
Riboflavin, mg/kg	15	-	5	-	5	-	5	-
Pantothenic acid, mg/kg	10	-	10	-	10	-	10	-
Niacin, mg/kg	15	-	15	-	15	-	15	-
Biotin, mg/kg	0.50	-	0.05	-	0.50	-	0.05	-
Folic acid, mg/kg	0.15	-	0.15	-	0.15	-	0.15	-
Vitamin B ₁₂ , mg/kg	0.01	-	0.015	-	0.01	-	0.015	-
Vitamin A, IU/kg	10000	-	12000	-	8000	-	12000	-
Vitamin D ₃ , IU/kg	2000	-	2400	-	1600	-	2400	-
Vitamin E, IU/kg	5	-	5	-	5	-	5	-
Vitamin K, mg/kg	2	-	3	-	1	-	3	-
Tryptophan, %	1.20	-	1.25	-	1.25	-	1.25	-

Annex D (normative)

Recommended additives used in pig feeds

D.1 Requirements for antioxidants in pig feeds

Pig feeds shall contain no added antioxidant other than an antioxidant of a name or description specified in the first column of Table D.1 or any other antioxidant as shall be approved by OIE. Where an antioxidant is added should not exceed the maximum content, if any, specified in the second column of the Table D.1.

Table D.1 — Requirements for antioxidants in pig feeds

Name or description	Maximum content in complete feed stuff, mg/kg
L-Ascorbic acid Sodium L-ascorbate Calcium di (L-ascorbate) 5,6-Diacetyl-L-ascorbic acid 6-Palmitoyl-L-ascorbic acid Tocopherol-rich extracts of a natural origin Synthetic alpha-tocopherol Synthetic gamma-tocopherol Synthetic delta-tocopherol	GMP
Propyl gallate Octyl gallate Dodecyl gallate	100, singly or in combination
Butylated hydroxyanisole (BHA)	150

D.2 Requirements for emulsifiers, stabilisers, thickeners and gelling agents

D.2.1 General

Pig feeds shall contain no added emulsifier, stabiliser, thickener or gelling agent other than an emulsifier, stabiliser, thickener or gelling agent of a name or description, specified in D.2.2 and D.2.3 any other emulsifier, stabiliser, thickener or gelling agent as shall be approved by OIE.

D.2.2 Name or description

Lecithins; Alginic acid; Sodium alginate; Potassium alginate; Ammonium alginate Calcium alginate; Propylene glycol alginate (propane- 1,1-diol alginate) Agar; Carrageenan; Furcellaran; Locust bean gum (carob gum); Tamarind seed flour Guar gum (gua flour); Tragacanth; Acacia (gum Arabic); Zanthan gum; Dglucitol (sorbitol); mannitol; Glycerol; Pectins; microcrystalline cellulose; Methylcellulose; Ethylcellulose; Hydroxypropyl cellulose;Hydroxypropylmethylcellulose; Ethylmethylcellulose; Carboxymethylcellulose;sodium salt; Sodium, potassium and calcium salts or edible fatty acids alone or in mixtures, derived from edible fat or distilled fatty acids Monoacyl and

diacylglycerols esterified with the following acids: (a) acetic (b) lactic (c) citric (d) tartaric (e) monoacetyltartaric and (f) diacetyltartaric.

D.2.3 Sucrose esters or fatty acids

D.2.3.1 The following sucrose esters fatty acids may be added to pig feeds:

- a) mixture of sucrose esters of monocyl and diacylglycerols (sucroglycerides, polyglycerides);
- b) polyglycerol esters of non-polymerised edible fatty acids;
- c) propylene glycol esters of fatty acids (propane-1,2-diol esters of fatty acids);
- d) stearyl-2-lactylic acid; sodium stearyl-1,2-lactylate; calcium stearyl-1,2-lactylate;
- e) stearyl-1-tartrate; glycerol poly (ethylene glycol) ricinolate; dextrans; sorbitan monostearate;
- f) sorbitan tristearate; sorbitan monolaurate; sorbitan mono-oleate; sorbitan monopalmitate;
- g) partial polyglycerol esters of polycondensed fatty acids of castor oil (polyglycerol polyricinoleate) polyoxyethylene (20) sorbitan monolaurate;
- h) polyoxyethylene (20) sorbitan monopalmitate, polyoxyethylene (20) sorbitan monostearate;
- i) polyoxyethylene (20) sorbitan tristearate, polyoxyethylene (20) sorbitan monocleate;
- j) polyoxyethylene (20) sorbitan tricleate, polyoxyethylene (8) sorbitan stearate; and
- k) polyoxyethylene (40) stearate.

D.2.3.2 The emulsifiers, stabilisers, thickeners and gelling agents listed in Table D.2 shall conform to the requirement therein.

Table D.2 — Requirements for emulsifiers, stabilisers, thickeners and gelling agents in pig feeds

Name or description	Maximum content in complete feed, mg/kg
Poly (ethylene glycol) 6 000	300
Polyoxypropylene-polyoxyethelene polymer (M.W 6 800 - 9 000)	50
Propane -1-2-diol	12 000
	36 000

D.3 Requirements for binders, anti-caking agents and coagulants

D.3.1 General

Pig feeds shall contain no added binder, anti-caking agent or coagulant other than a binder, anti-caking agent or coagulant of a name or description specified in D.3.2.

D.3.2 Name or description

Lignosulphonates; Colloidal silica; Silicic acid, precipitate and dried; Sodium aluminosilicate, Sodium, potassium and calcium stearate; Kaolin and Kaslinitic clays free of asbestos- natural accruing mixtures of minerals containing at least 65 % complex hydrated aluminium silicates whose main constituent in Kasolinite; Bentonite and other montmerillonitee clays; Vermiculite-hydrated silicate of magnesium, aluminium and iron; Citric acid; Kieselguhr (diatomaceous earth, purified); Calcium silicate (synthetic); Natural mixtures of steatite and chlorite free of asbestos.

D.4 Requirements for aromatic and appetising substances

Pig feeds shall contain no added aromatic or appetising substance other than an aromatic or appetising substance of a name or description specified in Table D.3 and taking account of any such substance which is naturally present, without exceeding the maximum content specified.

Table D.3 — Requirements for aromatic and appetising substances

Name or description	Maximum content in complete feed, mg/kg
Saccharin All natural products and corresponding synthetic products	GMP

Bibliography

- [1] ISO #####-#, *General title — Part #: Title of part*
- [2] ISO #####-##:20##, *General title — Part ##: Title of part*

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