



**RWANDA
STANDARD**

**DRS
279**

Second edition

2020-mm-dd

Organic fertilizer — Specification

ICS 65.080

Reference number

DRS 279: 2020

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In order to match with technological development and to keep continuous progress in industries, standards are subject to periodic review. Users shall ascertain that they are in possession of the latest edition

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Requests for permission to reproduce this document should be addressed to:

Rwanda Standards Board

P.O Box 7099 Kigali-Rwanda

KK 15 Rd, 49

Tel. +250 788303492

Toll Free: 3250

E-mail: info@rsb.gov.rw

Website: www.rsb.gov.rw

ePortal: www.portal.rsb.gov.rw

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Foreword

Rwanda Standards are prepared by Technical Committees and approved by Rwanda Standards Board (RSB) Board of Directors in accordance with the procedures of RSB, in compliance with Annex 3 of the WTO/TBT agreement on the preparation, adoption and application of standards.

The main task of technical committees is to prepare national standards. Final Draft Rwanda Standards adopted by Technical committees are ratified by members of RSB Board of Directors for publication and gazettment as Rwanda Standards.

DRS 279 was prepared by Technical Committee RSB/TC 07, *Agrochemicals*.

In the preparation of this standard, reference was made to the following standard:

FDARS 1490: Organic fertilizer — Specification

The assistance derived from the above source is hereby acknowledged with thanks.

This second edition cancels and replaces the first edition (RS 279: 2019), of which has been technically revised.

Committee membership

The following organizations were represented on the Technical Committee on *Agrochemicals* (RSB/TC 07) in the preparation of this standard.

One Acre Fund - TUBURA

Ministry of Environment (MoE)

University of Rwanda/College of Agriculture and Veterinary Medicine (UR/CAVM)

University of Rwanda/College of Sciences and Technology (UR/CST)

Rwanda Inspectorate, Competition and Consumer Protection Authority (RICA)

Star Construction and Consultancy (SCC) Ltd

Rwanda Standards Board (RSB) – Secretariat

Introduction

Organic fertilizers are natural products used to provide plant nutrients. There are a number of organic fertilizers like farmyard manure, green manures, compost prepared from crop residues and other farm wastes, vermicompost, oil cakes, biological wastes—animal bones, slaughter house refuse and natural mineral deposits that include but not limited to phosphate rock, greensand, Epsom salt, calcium, limestone flour.

This standard has been prepared to promote safe use of organic fertilizers, promote fair trade practices and ensure safety of consumers.

PUBLIC REVIEW

Organic fertilizer — Specification

1 Scope

This Draft Rwanda Standard specifies the requirements, sampling and test methods of organic fertilizers.

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.

AOAC 2006.03, *Arsenic, cadmium, cobalt, chromium, lead, molybdenum, nickel, and selenium in fertilizers — Microwave digestion and inductively coupled plasma-optical emission spectrometry*

EN 13475, *Liming materials — Determination of calcium content — Oxalate method*

EN 16032, *Fertilizers — Extraction and determination of elemental sulfur*

EN 16197, *Fertilizers — Determination of magnesium by atomic absorption spectrometry*

EN 16198, *Fertilizers — Determination of magnesium by complexometry*

EN 16963, *Fertilizers — Determination of boron, cobalt, copper, iron, manganese, molybdenum and zinc using ICP-AES*

EN 16965, *Fertilizers — Determination of cobalt, copper, iron, manganese and zinc using flame atomic absorption spectrometry (FAAS)*

ISO 6579, *Microbiology of food and animal feeding stuffs — Horizontal method for the detection of Salmonella spp.*

ISO 6598, *Fertilizers — Determination of phosphorus content — Quinoline phosphomolybdate gravimetric method*

ISO 7251, *Microbiology of food and animal feeding stuffs — Horizontal method for the detection and enumeration of presumptive Escherichia coli — Most probable number technique*

ISO 7409, *Fertilizers — Marking — Presentation and declarations*

ISO 8157, *Fertilizers and soil conditioners — Vocabulary*

ISO 8397, *Solid fertilizers and soil conditioners — Test sieving*

ISO 10390, *Soil quality — Determination of pH*

ISO 10694, *Soil quality — Determination of organic and total carbon after dry combustion (elementary analysis)*

ISO 11047, *Soil quality — Determination of cadmium, chromium, cobalt, copper, lead, manganese, nickel and zinc — Flame and electrothermal atomic absorption spectrometric methods*

ISO 11261, *Soil quality — Determination of total nitrogen — Modified Kjeldahl method*

ISO 11265, *Soil quality — Determination of the specific electrical conductivity*

ISO 11465, *Soil quality — Determination of dry matter and water content on a mass basis — Gravimetric method*

ISO 14820-1, *Fertilizers and liming materials — Sampling and sample preparation — Part 1: Sampling*

ISO 14820-2, *Fertilizers and liming materials — Sampling and sample preparation — Part 2: Sample preparation*

ISO 15178, *Soil quality — Determination of total sulfur by dry combustion*

ISO 17318, *Fertilizers and soil conditioners — Determination of arsenic, cadmium, chromium, lead and mercury contents*

ISO 17184, *Soil quality — Determination of carbon and nitrogen by near-infrared spectrometry (NIRS)*

3 Terms and definitions

For the purposes of this standard, the terms and definitions given in ISO 8157 and the following apply.

3.1

blood meal

dried, powdered blood collected from livestock slaughter houses used as fertilizer.

3.2

bone meal

fertilizer made from degreased bone which may be degelatinized and has been ground or crushed

3.3

compost

well decomposed organic wastes like plant residues, animal slurry from livestock sheds

3.4

farmyard manure

a decomposed mixture of livestock dung and urine with straws and litter used as bedding material and residues from the fodder fed to livestock

3.5

fertilizer

substance containing one or more recognized plant nutrient(s), which is used for its plant nutrient content and which is designed for use or claimed to have value in promoting plant growth

3.6

fish emulsion fertilizer

a partially decomposed blend of finely pulverized fish

3.7

green manure

crop that is incorporated into the soil for the purpose of soil improvement and which may include spontaneous crops, plants or weeds

3.8

guano

well decomposed accumulated and mined excrements of birds, bats and seals valued as fertilizers

3.9

manure

mixture of litter and/or dung in process of biological change

3.10

natural mineral fertilizer

materials that are directly mined from mineral deposits and only subjected to physical processes such as crushing and drying. Examples of these materials may include: phosphate rock; gypsum; sulphate of potassium-magnesia and any other natural mineral deposits.

3.11

night soil

human urine and faeces collected separately from each other or mixed with flush water and amendments such as soil, ash other organic matter

3.12

organic based product

product that contains at least 70% organic material

3.13

organic fertilizer

any product in solid or liquid form, of plant (except by-products from petroleum industries) or animal origin that has undergone substantial decomposition that can supply available nutrients to plants. This may be enriched by microbial inoculants and naturally occurring minerals but no chemical or inorganic fertilizer material has been added to the finished product to affect the nutrient content.

3.14

organic matter

biomass of animals and plants. For this reason, only products that are solely derived from organic matter may be identified or described as "organic".

3.15

soil conditioner

material (could be inorganic or organic) added to soils to improve the physical and/ or chemical properties, and/ or the biological activity of soils without a declarable content of nutrients

3.16

sewage sludge

recycled product of sewage treatment plants

3.17

synthetic

substance that is formulated or manufactured by a chemical process or by a process that chemically changes a substance extracted from naturally occurring plant, animal, or mineral sources, except for those substances created by naturally occurring biological processes.

3.18**vermicompost**

product or process of composting using various worms such as earthworms to create a heterogenous mixture of decomposing vegetable or food waste, bedding materials.

4 Requirements**4.1 General requirements**

4.1.1 The organic fertilizer shall be in solid or liquid form.

4.1.2 The organic fertilizer shall be free from foul odour.

4.1.3 The organic fertilizer shall be homogenous in texture.

4.1.4 The organic fertilizer shall be free from contaminants which include but not limited to residual hormones, antibiotics, pesticides and disease organism.

4.1.5 Only allowed raw materials shall be used (Annex A). Those restricted shall be used after having recommended treatment or quality control (Annex A).

4.1.6 The inoculants if used shall comply with the relevant standards.

4.2 Specific requirements

4.2.1 Organic fertilizers shall conform to the composition requirements set out in Table 1.

Table 1 — Specific requirements for organic fertilizers

S/N	Parameter	requirements	Test Method
i)	pH	6 – 9	ISO 10390
ii)	Carbon: Nitrogen ratio,	≤ 20:1	ISO 17184
iii)	Moisture content,(solid) %, m/m	10-35	ISO 11465
iv)	Total Nitrogen, %, m/m, min.	>1	ISO 11261
v)	Dry matter content (solid), %, m/m, min.	≥70	ISO 11465
vi)	Organic carbon, %, m/m, min.	12	ISO 10694
vii)	Total primary nutrients — N-P ₂ O ₅ -K ₂ O (solid and liquid organic fertilizer),%, m/m, min	5	ISO 11261, ISO 6598

viii)	Stones >5 mm, %, m/m, max.	5	ISO 8397
ix)	Foreign matter > 2 mm, % m/m, max	0.5	ISO 8397
x)	Seed, number/kg, max	5	
xi)	Soluble salts (conductivity), μSm^{-1} max.	5	ISO 11265

* For pelletized fertilizer, moisture content should be $\leq 10\%$.

4.2.2 For organic plant food supplement products such as seaweed extract, fermented products, blood meal, and bone meal, any claim should be verifiable, while products with at least 3% total (soluble) N will be subjected to other confirmatory test.

4.2.3 Secondary plant nutrients must not be identified and guaranteed if they are not present in at least the following minimum concentrations as given in table 3:

Table 2 — Minimum nutrient percentage guarantee for organic fertilizers

S/N	Nutrients	Limit	Test Method
i)	Calcium, as Ca, %, m/m,	≥ 1.0000	EN 13475
ii)	Magnesium (%)	≥ 0.5000	EN 16197/ EN 16198
iii)	Sulphur (%)	≥ 1.0000	ISO 15178/ EN 16032
iv)	Boron mg/kg	20-140	EN 16963/ EN 16965
v)	Cobalt (mg/kg)	0.5-1.0	ISO 11047
vi)	Copper (mg/kg)	8-300	ISO 11047
vii)	Iron (mg/kg)	1000-2500	EN 16963/ EN 16965
viii)	Manganese (mg/kg)	200-800	ISO 11047
ix)	Molybdenum (mg/kg)	0.5-1.0	AOAC 2006.03
x)	Zinc (mg/kg)	40-1000	ISO 11047

4.2.4 Metal contaminants, if present, shall conform to the following limits as given in Table 3.

Table 3 — Minimum nutrient percentage guarantee for organic fertilizers

S/N	Heavy metals	Acceptable maximum limits (mg/kg, dry weight)	Test method
i	Arsenic (As)	10	ISO 17318
ii	Lead (Pb)	30	ISO 17318
iii	Chromium (Cr)	50	ISO 17318
iv	Nickel (Ni)	50	ISO 11047
v	Mercury (Hg)	0.5	ISO 17318
vi	Cadmium (Cd)	5	ISO 17318

4.2.5 The organic fertilizer shall be free from pathogenic organisms. Where applicable, the product shall also comply with microbiological limits in the following table 4:

Table 3 — Minimum nutrient percentage guarantee for organic fertilizers

Microorganisms	Acceptable limits	Test Methods
<i>E. coli</i>	1000 cfu/g	ISO 7251
Salmonella spp	Absent in 25 g fresh mass	ISO 6579
Faecal streptococci	<500 cfu/g	Annex B
Total coliforms	Nil	ISO 4831

5 Packaging and labelling

5.1 Packaging

The organic fertiliser shall be packaged in clean, non-defective and strong packages. The material for which the package is made shall be such as to protect the contents from moisture and also not lead to easy rupture during handling, transportation and storage.

5.2 Labelling

5.2.1 Each package of the fertiliser shall be legibly and indelibly marked in accordance with ISO 7409 and the following particulars:

- a) Name of product as Organic fertilizer
- b) nutrient content (N-K-P)
- c) carbon : nitrogen ratio;
- d) dry matter content;
- e) batch number/lot number;
- f) percentage foreign;
- g) name and physical address of the manufacturer/packer/importer;
- h) date of manufacture;
- i) best before date or expiry date;
- j) instructions for use, storage and handling; and

k) precautions /warnings

5.2.2 Where the organic fertilizer is distributed in bulk, the marking information shall accompany the delivery note to the purchaser.

5.3 Other labelling guidelines

5.3.1 *Testimonials/endorsements:* The public has no way of evaluating the status of the endorser in relation to a product. For this reason, testimonials and endorsements will be viewed as claims and evaluated accordingly.

5.3.2 *Other claims:* Any reference to the activity of a product containing plant nutrients that is not generally associated with its nutritional value must be substantiated with statistically significant efficacy data derived from field trials.

5.3.3 *Nutrient guarantees:* Any product represented as a source of plant nutrients must carry a guaranteed analysis.

5.3.4 *Directions for use:* All specialty fertilizers must carry instructions for use. These instructions must specify both the rate and frequency of application. Suggested rates of application must provide an adequate quantity of nutrients to the plants concerned.

5.3.5 Where the product does not contain all 3 major plant nutrients, the label should carry a statement indicating that some plants may require an additional source of the nutrient(s) that are lacking.

5.3.6 Any product containing composted materials or plant nutrients may represent a potential hazard when misused. In order to avoid giving the impression that reasonable precautions are unnecessary, blanket statements suggesting that the product is completely safe and non-toxic to humans, animals or the environment must not appear on the label.

5.3.7 *Miscellaneous terms:* Words, such as balanced and healthy, should be avoided as they are often misunderstood and consequently misleading. Also objectionable are comparatives such as best, superior, and greener, as they imply a comparison without indicating the basis of this comparison

5.3.8 *Environmentally beneficial:* Any product represented as "environmentally sound", etc. must identify the rationale for the claim and list all ingredients in order to allow the consumer to determine the validity of the statement.

5.2.9 *Slowly available plant nutrients:* Only products providing at least 70% of a plant nutrient in a slowly available form may indicate this on the label. Such a claim must be accompanied by the associated guarantee.

5.2.10 *Low leaching potential:* Only products containing at least 70% of a nutrient in a slowly available form may indicate that nutrient will be slowly available and thus unlikely to leach when used in accordance with label instructions.

5.3.11 *Improving soil structure:* In order to suggest that the use of an organic or organic based product will improve the structure of a soil, it must be recommended for use at rates that could be expected to significantly increase the organic matter level of the soil. Such as 1kg per square metre or 10 metric tonnes per hectare.

6 Sampling

Sampling and sample preparation for inspection and testing shall be carried out in accordance with ISO 14820 parts 1 and 2.

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Annex A (informative)

Substances that may be used as fertilizers or soil conditioners

Substance	Description; Compositional requirements; Conditions of use
Plant and animal origin	
Farmyard and poultry manure	<p>Products comprising a mixture of animal excrements and vegetable matter (animal bedding).</p> <p>Indication of animal species.</p> <p>Coming from extensive farming, but if sourced from intensive farming or not sourced from organic production systems, need recognition by the approved certifying organisation and shall be composted.</p>
Slurry or urine (not from human origin)	<p>If not from organic farming sources, need recognition by the approved certifying organisation.</p> <p>Use after controlled fermentation and/or appropriate dilution.</p> <p>Factory farming sources not permitted.</p> <p>Indication of animal species.</p>
Composted animal excrements, including poultry manure	<p>Need recognition by the approved certifying organisation.</p> <p>Indication of animal species.</p>
Dried farmyard manure and dehydrated poultry manure	<p>Need recognition by the approved certifying organisation.</p> <p>Indication of animal species.</p> <p>Coming from extensive farming, but if from intensive farming sources it must be composted.</p>
Guano	Need recognition by the approved certifying organisation.
Straw	Need recognition by the approved certifying organisation.
Composts from spent mushroom and dejecta of worms and insects (vermiculture substrates)	The initial composition limited to products on this list.
Composted or fermented organic household refuse	<p>Organic vegetable and animal waste separated from household waste, which has been subjected to composting or anaerobic fermentation for biogas production.</p> <p>Need recognition by the approved certifying organisation.</p> <p>Maximum concentrations in mg/kg of dry matter: Cadmium: 0.7; Copper: 70; Nickel: 25; Lead: 45; Zinc: 200; Mercury: 0.4; Chromium (total): 70; Chromium (VI): 0(*).</p> <p>(*) = limit of determination.</p>
Composted or fermented plant residues	<p>Need recognition by the approved certifying organisation.</p> <p>Mixtures of plant matter which has been subjected to composting or anaerobic fermentation for biogas production.</p>
Products and by-products of	Need recognition by the approved certifying organisation.

Substance	Description; Compositional requirements; Conditions of use
animal origin from slaughterhouses & fish industries: — blood meal — hoof meal — horn meal — bone meal or degelatinized bone meal — fish meal — meat meal — feather, hair and "chiquette" meal — wool — fur — hair — dairy products	— — — Heavy metal contamination monitoring necessary — — maximum concentration in mg/kg of dry matter of Chromium (VI):0 (*) (*) = limit of determination — —
By-products of food & textile industries	Not treated with synthetic additives. Need recognition by the approved certifying organisation.
Seaweeds and seaweeds products	Need recognition by the approved certifying organisation. Directly obtained by — physical processes; extraction with water or acid and/or alkaline solution; and fermentation.
Sawdust, bark and wood waste	From wood not chemically treated after felling.
Wood ash	From wood not chemically treated after felling.
Crop residues / by-products (from oil, palm, coconut and cocoa (including empty fruit bunch, coir, husks), palm oil mill effluent (pome), cocoa peat, empty cocoa pods, straw, peanut hulls, sugar cane trash, straw, mud press, etc.)	
Green manure / leguminous crops	
<i>Azolla</i> (mosquito fern, duckweed fern, fairy moss, water fern)	
Plant preparations and extracts	
Segregated biodegradable market waste	
Calcium lignosulfate	Recognized by the competent authority
Naturally occurring biological	

Substance	Description; Compositional requirements; Conditions of use
organisms e.g. worms	
Peat	Should not be extracted or treated using inorganic chemicals; permitted for seed, potting module composts.
By-products of industries processing ingredients from organic agriculture	Need recognition by the approved certifying organisation.
Night soil-faeces and material containing faecal matter	Subjected to either of the following treatments: composting, incineration/drying, anaerobic digestion and ammonia treatment
Sewage Sludge	Subjected to anaerobic digestion/fermentation, composting or long time treatments
Human urine	Proper storage (based on the action of ammonia in combination with temperature.
Stillage and stillage extract	Ammonium stillage excluded.
ii. Mineral origin	
Natural phosphate rock	Need recognition by the approved certifying organisation. Cadmium should not exceed 90mg/kg P ₂ O ₅ May contain elevated levels of trace elements. Detailed chemical analysis is necessary. Their widespread extraction can also deplete the natural deposits and may cause negative environmental impact. Rate of extraction is subject to regulations.
Basic slag	Need recognition by the approved certifying organisation.
Rock potash, mined potassium salts (e.g. kainite, sylvinite)	Need recognition by the approved certifying organisation.
Calcareous and magnesium amendments	Recognized by the competent authority
Limestone (dolomite, calcite), marl, chalk, lime	Recognized by the competent authority
Calcium chloride	
Chloride of lime	Only from natural sources/origin
Gypsum (calcium sulphate)	Only from natural sources/origin
Magnesium rock, kieserite and Epsom salt (magnesium sulfate)	Only from natural sources/origin
Rock potash, mined potassium salts (e.g. kainite, sylvinite)	Less than 60% chlorine
Sulphate of potash	Obtained by physical procedures but not enriched by

Substance	Description; Compositional requirements; Conditions of use
	chemical processes to increase its solution
Sulfur	Allowed if from natural source
Pulverized rock, stone meal	<p>May contain elevated levels of trace elements. Detailed chemical analysis is necessary.</p> <p>Their widespread extraction can also deplete the natural deposits and may cause negative environmental impact.</p> <p>Rate of extraction is subject to regulations.</p>
Clay (e.g. bentonite, perlite, vermiculite, zeolite)	
Sodium chloride	Only mined salt
Trace elements (e.g. boron, copper, iron, manganese, molybdenum, zinc)	
Stillage and stillage extract	Ammonium stillage excluded
Aluminum calcium phosphate	Cadmium should not exceed 90mg/kg P ₂ O ₅
iii. Microbiological	
Biodegradable processing by-products of microbial origin, e.g. by-products of brewery or distillery processing	
Microbial preparations (i.e. <i>Trichoderma</i> , <i>Rhizobia</i> , <i>Mychorriza</i> , others) of non-GMO origin	
iv. others	
Biodynamic and Agnihotra preparations	

Annex B (normative)

Test for Faecal *Streptococci*

B.1 Materials and culture media

Preferably use commercially available medium. Follow manufacturer's instructions for storing and discarding after preparation. If the medium must be prepared from basic ingredients, follow directions below.

B.1.1 Azide dextrose broth:

Beef extract	4.5 g
Tryptone or polypeptone	15.0 g
Glucose.....	7.5 g
Sodium chloride, NaCl	7.5 g
Sodium azide, NaN ₃	0.2 g
Reagent-grade water	1 L

CAUTION! Sodium azide is a dangerous chemical requiring special attention and care. It is toxic and mutagenic. Take precautions to avoid contact with this compound. Azide also can form explosive compounds if it contacts metal pipes.

Adjust pH so it is 7.2 ± 0.2 at 25°C after sterilization. If pH is out of range, adjust and retest pH; discard if pH remains out of range. The media described in this section are available commercially; follow manufacturer's instructions for storage and disposal after preparation.

B.1.2 Bile esculin azide agar

Yeast extract.....	5.0 g
Proteose peptone No. 3.....	3.0 g
Tryptone	17.0 g
Oxgall	10.0 g
Esculin.....	1.0 g

Ferric ammonium citrate	0.5 g
Sodium chloride	5.0 g
Sodium azide.....	0.15 g
Agar.....	15.0 g
Reagent-grade water	1 L

CAUTION! Sodium azide is a dangerous chemical requiring special attention and care. It is toxic and mutagenic. Take precautions to avoid contact with this compound. Azide also can form explosive compounds if it contacts metal pipes.

B.2 Presumptive test procedure

Inoculate a series of tubes of azide dextrose broth with appropriate graduated quantities of sample. Use sample volumes of 10 mL or less. Use double-strength broth for 10-mL inocula. The sample portions used will vary in size and number with the sample character. Use only decimal multiples of 1 mL. Incubate inoculated tubes at $35 \pm 0.5^\circ\text{C}$. Examine each tube for turbidity at the end of 24 ± 2 h. If no definite turbidity is present, reincubate, and read again at the end of 48 ± 4 h.

B.3 Confirmed test procedure

After 24 or 48 h incubation, subject all azide dextrose broth tubes showing turbidity to the confirmed test for streptococci. Streak a portion of growth from each positive azide dextrose broth tube on bile esculin azide agar (BEA). Invert and incubate the dish at $35 \pm 0.5^\circ\text{C}$ for 24 ± 2 h. Brownish-black colonies with brown halos confirm the presence of fecal streptococci. Then, transfer brownish-black colonies with brown halos to two tubes of brain–heart infusion (BHI) broth: one with 6.5% NaCl and one without NaCl. If growth is observed when tube is incubated at $35 \pm 0.5^\circ\text{C}$ after 48 ± 4 h (BHI broth with 6.5% NaCl) or 24 ± 2 h (BHI broth without NaCl), the colony is confirmed as a member of the *Enterococcus* genus. The aforementioned procedure is expected to offer an acceptably accurate confirmation of the presence of the faecal *Streptococci*. However, more accuracy ($\geq 90\%$) can be achieved by doing all of the following:

observing gram-positive cocci, a catalase-negative reaction, growth on BHI agar at $10 \pm 0.5^\circ\text{C}$, positive pyrrolidonylarylamidase (PYR) activity, and positive leucine aminopeptidase (LAP) reaction 3,4 using a commercially available test kit.

B.4 Computing and recording MPN

Calculate the total fecal streptococci density from the number of confirmed positive cultures on bile esculin azide agar and corresponding positive tubes of BHI broth with 6.5% NaCl at $35 \pm 0.5^\circ\text{C}$ after 48 ± 4 h. Compute the combination of positive and negative tubes and record as the most probable number (MPN).

Bibliography

- [1] ISO/IEC Directives, Part 2, *Rules for the structure and drafting of International Standards*, 2016

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