RWANDA STANDARD

DRS 234-2

Third edition

2025-mm-dd

Non-food compounds used in food processing establishments — Requirements —

Part 2 : Detergents for cleaning purposes

ICS 67.020

Reference number

DRS 234-2: 2025

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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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.

RS 234-2 was prepared by Technical Committee RSB/TC 024, *Organic and inorganic Chemicals.*

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

1) KS 2117: Acidic detergents for 'Cleaning-in-place' in food and beverage industry — Specification

2) KS 2119: Heavy duty alkaline detergents for 'Cleaning-in-place' in food and beverage industry — Specification

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

This Third edition cancels and replaces the second (RS 234-2:2021) of which has been technically revised.

RS 234 consists of the following parts, under the general title *Non-food compounds used in food processing establishments — Requirements*:

— *Part 1: Food-grade lubricants*

— *Part 2: Detergents for cleaning purposes*

Committee membership

The following organizations were represented on the Technical Committee on Organic and inorganic Chemicals (RSB/TC 024) in the preparation of this standard.

BARANYUZWE Cosmetics Ltd

AGROPY Ltd

National Industrial Research and Development Agency (NIRDA)

Rwanda Environmental Management Authority (REMA)

Rwanda Food and Drugs Authority (Rwanda FDA)

Rwanda Forensic Institute (RFI)

Star Construction and Consultancy (SCC) Ltd

University of Kibungo (UNIK)

Rwanda Inspectorate, Competition and Consumer Protection Authority (RICA)

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

Rwanda Standards Board (RSB) – Secretariat

Introduction

Cleaning and hygiene are essential for food safety in food-processing establishments. Detergents remove soils by loosening and suspending contaminants so they can be rinsed away. They may be alkaline for general cleaning or acidic for periodic removal of mineral deposits such as limescale. Some formulations include chlorine to improve cleaning efficiency, while heat may serve as an alternative for microbial control. To prevent contamination, detergents used in food-handling areas must meet defined quality, safety, and performance requirements. This standard specifies these requirements and the test methods for evaluating acidic, alkaline, chlorine-containing or other approved chlorine-releasing agents, and chlorine-free detergents to ensure they are effective, safe, and suitable for use in food-processing establishments.

Non-food compounds used in food processing establishments — Requirements — Part 2 : Detergents for cleaning purposes

1 Scope

This Draft Rwanda Standard specifies requirements for both acidic and alkaline detergents used for cleaning food processing equipment, machinery, piping, and other surfaces in food-processing establishments. It applies to detergents that may come into incidental contact with food and are intended for use on stainless steel and other compatible materials.

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.

RS ISO 4316, *Surface active agents — Determination of pH of aqueous solution — Potentiometric method*

RS ISO 684, *Analysis of soaps — Determination of total free alkali*

ISO 4314, *Surface active agents — Determination of free alkalinity or free acidity — Titrimetric method*

RS EAS 814, *Determination of the biodegradability of surfactants*

AOAC 999.11, *Lead, Cadmium, Copper, Iron and zinc in foods. Atomic absorption spectrophotometry after dry ashing*

EAS 847-16, *Cosmetics — Analytical methods — Part 16: Determination of lead, mercury and arsenic content*

RS CAC/RCP 1, *Code of practice — General Principles of Food Hygiene*

RS ISO 4833-1, *Microbiology of the food chain — Horizontal method for the enumeration of microorganisms — Part 1: Colony count at 30 degrees C by the pour plate technique*

3 Terms and definitions

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

3.1

soil

any residue, scale and other deposits to be removed from the food and beverage contact surface during the cleaning process

3.2

use dilution

minimum concentration of the detergent, in water, that the manufacturer has recommended for acid cleaning

3.3

cleaning-In-Place (CIP)

method for cleaning equipment, using no direct mechanical aid to remove the soil but depending on solution flows, temperature and the properties of the detergent solution3.4

3.4

use temperature

temperature that the supplier/manufacturer recommends for a specific application. Cold is between 1 ºC and 35 ºC, warm between 36 ºC and 59 ºC, and hot is 60 ºC and above

3.5

detergent

cleaning formulation containing one or more surfactants, supporting ingredients, and other functional additives that reduce surface tension and enable the removal of soils from equipment, piping, utensils, and food-contact surfaces in food-processing establishments

3.6

surfactant:

surface-active substance that reduces surface or interfacial tension and aids wetting, emulsification, and soil removal during cleaning

3.7

non-food compound

chemical product intended for use in food-processing establishments but not for direct consumption, such as detergents, lubricants, and disinfectant

4 Classification

4.1 Acidic detergents — formulated to dissolve and remove mineral deposits such as limescale, rust, beer stone, and milk stone from food-processing establishments and equipment They include organic (phosphoric, nitric, sulfamic, sodium acid sulfate, hydrochloric) and inorganic acids (hydroxy acetic, citric, gluconic) ...They are often used in a two-step sequential cleaning regime with alkaline detergents. Acidic detergents are also used for the prevention or removal of stone films (mineral stone, beer stone, or milk stone).

4.2 Alkaline detergents — formulated with alkaline substances—such as sodium hydroxide, potassium hydroxide, phosphates, silicates, or carbonates—used to remove organic soils including fats, oils, proteins, and starches from equipment, floors, and other food-processing surfaces and are classified into two types:

a) Highly alkaline detergents (heavy-duty) use strong alkalis such as caustic soda or caustic potash. They are effective at saponifying fats and are widely used in Clean-in-Place (CIP) systems and bottle-washing operations.

b) Moderately alkaline detergents contain salts of phosphates, silicates, or carbonates. Tri-sodium phosphate (TSP) is one of the most effective and well-known examples. Silicates often function as corrosion inhibitors, while carbonate-based detergents have limited application in food-processing environments due to interactions with calcium and magnesium ions, which may lead to undesirable film formation.

4.3 Chlorine-containing detergents formulated with chlorine-releasing compounds—such as sodium hypochlorite, calcium hypochlorite, or sodium dichloroisocyanurate (NaDCC)—that serve both to enhance stain removal and to provide effective microbial control. By releasing active chlorine during use, these detergents act as powerful oxidizing agents, capable of whitening fabrics, eliminating tough organic residues, and disinfecting surfaces against a wide range of pathogens.

4.4 Chlorine-Free Detergents formulations that contain no available chlorine and rely instead on surfactants, alkalinity builders, chelating agents, enzymes, or oxygen-based oxidizing compounds (such as sodium percarbonate or sodium perborate) to remove soils. These detergents are used in food-processing environments where chlorine odour, corrosivity, or residue is undesirable, and where greater material compatibility or reduced chemical reactivity is required

5 Requirements

5.1 General requirements

5.1.1 Raw materials used in manufacturing and formulating the detergent for cleaning purposes shall not contain ingredients which are known to be toxic to humans or capable of leaving harmful residues on food-contact surfaces. Approved active ingredients, such as chlorine, may be used only within established safety limits and must not result in hazardous or unacceptable residues during or after use.

5.1.2 The detergent shall not contain perfume, fragrance or deodorizer. It shall neither impart any colour, odour or flavour to food products; nor leave an objectionable odour to the equipment being cleaned if used in accordance with the manufacturer's instructions.

5.1.3 The detergent shall be biodegradable when tested in accordance with RS EAS 814.

5.1.4 The detergent may be in liquid or in powder form.

5.1.5 The detergent in powder form shall be homogenous, off-white colour, free flowing and free form foreign matters.

5.1.6 The detergent in liquid form shall be colourless, clear to light brown liquid.

5.2 Specific requirements

5.2.1 The product shall comply with the specific requirements given in table 1 when tested in accordance with the methods indicated therein.

Table 1 — Specific requirements for food grade detergents used for cleaning purposes

S/N	Parameters		Requirements					Test methods
			Acidic	Alkaline				
				Powder		Liquid		
				With chlorine	Chlorine free	With chlorine	Chlorine free	
1	Acidity, % by mass, max.		7.0	—	—	—	—	ISO 4314
2	Alkalinity, % by mass, max.	As NaOH	—	12	83	40	12	RS ISO 684
		As Na_2O	—	10	65	—	—	
3	pH, 1% solution, min.		≤ 3.5	8 – 13	12	11	12	RS ISO 4316
4	Available chlorine, % by mass, max.		—	2	—	2	—	Annex A

5.2.2 Corrosion

The detergent shall pass the test when tested in accordance with Annex B at the use-dilution and maximum use temperature recommended by the manufacturer.

5.2.3 Freedom from grit

A solution of the detergent in powder from prepared at twice the concentration of the use-dilution at the recommended temperature, using more than 5 g of the product, shall completely dissolve and the solution shall be free from grit and residue shall be easily rinseable.

5.2.4 Alkaline

The alkaline detergent shall show acceptable cleaning efficacy when used with water of up to 200 mg/L (expressed as calcium carbonate, $CaCO_3$) hardness.

5.3 Heavy metals

Food grade detergents used for cleaning purposes shall comply with the maximum heavy metal limits specified in Table 2 when tested in accordance with the applicable test methods.

Table 2 — Maximum heavy metal limits for food grade detergents used for cleaning purposes

S/N	Characteristics	Maximum limit mg/kg	Test method
i.	Cadmium (Cd)	1	AOAC 999.11
ii.	Lead (Pb)	0.2	EAS 847-16
iii.	Arsenic (As)	1	
iv.	Mercury (Hg)	1	

5.4 Hygiene

Food grade detergents used for cleaning purposes shall be manufactured and handled in a hygienic manner in accordance with RS CAC/RCP 1 and shall comply with the microbiological limits stipulated in Table 3 when tested in accordance with the test methods specified therein.

Table 3 — Microbiological limits for food grade detergents used for cleaning purposes

Microorganism	Maximum limit	Test method
Total viable count, cfu/g, max	10^3	RS ISO 4833-1

6 Packaging, labelling and storage

6.1 Packaging

The product shall be packaged in containers that are strong enough and appropriate to permit normal usage and transportation of the detergent, to prevent contamination, loss and gain of moisture.

6.2 Labelling

Each package shall be legibly, clearly and indelibly labelled with the following information:

a) name and nature of the detergent, similar or closely similar to: acidic/alkaline detergent for use in cleaning food processing equipment;

b) manufacturer's name and physical address including the country of origin;

c) net content in SI units;

d) batch number;

e) date of manufacture and the best before date;

f) list of ingredients in descending order;

g) degree of foaming;

h) detailed instructions of use including necessary precautions;

i) storage and disposal instructions; and

j) available chlorine (or other disinfectants) if claimed.

6.3 Storage

The detergent shall be stored in a designated, dry and well-ventilated area which shall be separated from all food production, storage and handling areas such that no possibility of cross-contamination of food exists.

Annex A
(normative)

Determination of available chlorine

A.1 Reagents

A.1.1 Crystalline potassium iodide (iodate free)

A.1.2 Glacial acetic acid

A.1.3 Potassium dichromate solution, 0.1 N — Carefully pulverize a quantity of potassium dichromate ($K_2Cr_2O_7$) and dry at 110 ºC ± 5 ºC to constant weight. Dissolve 4.7904 g of the dried reagent in water to make exactly 1 L and mix thoroughly.

A.1.4 Standard sodium thiosulphate solution 0.1 N

A.1.4.1 In a 250 mL glass-stoppered flask, take 2 g of potassium iodide and about 25 mL water to dissolve it. Add approximately 2 g of sodium bicarbonate and 5 mL of hydrochloric acid.

A.1.4.2 Just before the effervescence dies down, add 25 mL of 0.1 N potassium dichromate solution. When the effervescence ceases, stopper the flask and allow to stand for 10 minutes in a cool dry place.

A.1.4.3 Dilute with 50 mL of water and titrate against standard sodium thiosulphate solution till the liquid in the flask has assumed a yellowish green colour. Add starch solution and continue with the addition of sodium thiosulphate solution until the blue colour in just discharged.

A.1.5 Starch indicator — Titrate 1 g of starch with 10 mL of cold water and pour, with constant storring, into 200 mL of boiling water. Allow to settle and use the clear supernatant liquid.

A.2 Procedure

A.2.1 Weigh accurately about 2.5 g of the sample and grind in a mortar with water till a smooth paste is formed. Add 15 mL – 25 mL of water and decant off the fine part into a 250 mL flask. Again, grind the material left behind and repeat the process of decanting off till no gritty material is left. Wash the pestle and monitor in the same flask. Make the solution to 250 mL.

A.2.2 Take 25 mL of the solution, add 2 g of potassium iodide crystals and 100 mL of water and then add 2 mL of glacial acetic acid and titrate it against the standardized sodium thiosulphate solution till the pale-yellow colour is left. At this stage add starch indicator and continue the addition of standard sodium thiosulphate solution till the blue colour changes.

A.3 Calculation

$$Available\ chlorine, wt\ \% = \frac{3.5453\ x\ V\ x\ N}{W}$$

Where,

V volume in mL of the standard sodium thiosulphate solution used;

N normality of the standard sodium thiosulphate solution used; and

W weight in g of sample taken for the test, I grams.

Annex B
(normative)

Determination of the detergent corrosion potential

B.1 Apparatus and materials

The following special apparatus and materials are required:

a) squat and tall 1 L beakers of Pyrex glass and watch glasses to cover beakers;

b) A water bath with a close-fitting lid capable of maintain the test temperature (see B.3 (b)) within ± 1 ºC;

c) an oven capable of maintaining a temperature of 105 ºC ± 2 ºC;

d) test panels made of stainless steel (316) of approximate dimensions 125 x 63 x 1.5 mm. the panel shall have a '2B' finish on both faces. They shall be undamaged and unmarked, flat and their edges free from burrs;

e) stainless steel tongs for handling the panels;

f) panel holders made of inert material such as polypropylene for use during pre-cleaning and drying operations;

g) rubber bands of rectangular cross-section, measuring, when lying flat and unstretched, approximately 6 x 80 mm;

h) magnesium carbonate, LR grade, for use as an abrasive for cleaning the panels; and

i) distilled water.

B.2 Pre-cleaning of test panels and rubber bands

B.2.1 Panels

The pre-cleaning procedure for panels shall be as follows:

a) swab the test panels, two for each test, with cotton wool using a warm 1 % m/V solution of a general-purpose dairy detergent;

b) scour the panels with cotton wool using water as lubricant and the magnesium carbonate as an abrasive;

Note The scouring is to remove any film that is produced by reaction between the detergent and the abrasive, e.g. magnesium silicate.

c) without delay, thoroughly rinse the panels under hot tap water;

d) rinse the panels I boiling water immersing each panel in turn in water contained in three 1 L beakers; and

e) dry in oven at 105 ºC ± 2 ºC and allow to cool in a dry, dust-free position.

B.2.2 Rubber bands

The pre-cleaning procedure for rubber bands shall be as follows:

a) place the rubber bands in a hard-boiling 1% m/V solution of general-purpose dairy detergent; and

b) rinse under hot tap water and then rinse in distilled water and allow to dry.

B.3 Procedure

The procedure shall be carried out in duplicate as follows:

a) in a tall 1 L beaker, make up 950 mL of the use dilution of the detergent under test, mark the level of the solution on the side of the beaker;

b) heat the solution to the maximum use temperature recommended by the manufacturer;

c) place the beaker of solution in a water bath controlled at the maximum use temperature ± 1 ºC;

d) place a rubber band around the test panel in the direction of the panel's long axis, ensuring that the band is fat against both sides of the panel and that the panel is not touched by fingers;

e) 5 minutes after placement of the band, immerse the panel on its end in the test solution so that there is at least 10 mm of solution above the panel. Note the time;

f) leave the panel in the test solution for 72 hours. Each morning and evening, top up the solution to the mark with distilled water;

g) at the end of the 72 hours, remove the panel from the test solution and remove the rubber bands and rinse under hot, running tap water;

h) rinse three times as prescribed in paragraph B.2.1 (c) above;

i) Final, dry the panel in the oven at 105 ºC. allow to cool; and

j) examine the panel for evidence of corrosion (see note below); or discoloration.

Note Pitting is most likely to occur where the rubber band contacts the edges of the panel.

B.4 Interpretation of results

If the duplicate panels from the test detergent show the same characteristics, record the result. If the duplicates differ, repeat the test using fresh panels.

B.5 Report

The report shall contain the information, whether corrosion or discoloration of the panels has occurred.

Price based on 9 pages