



**RWANDA
STANDARD**

**DRS
395-1**

Second edition

2023-mm-dd

**Bitumen and bituminous binders —
Part 1: Terminology**

ICS 91.100.50; 93.080.20

Reference number

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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 395-1 was prepared by Technical Committee RSB/TC 55, *Roads and highway engineering*.

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

- 1) BS 12591: 2009, *Bitumen and Bituminous Binders*
- 2) ASTM D673 - 16, *Standard Specification for Performance Graded Asphalt Binder*

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

This second edition cancels and replaces the first edition (RS 395-1: 2018), [clauses 3] which has been technically revised.

DRS 395 consists of the following parts, under the general title *Bitumen and bituminous binders* —:

- *Part 1: Terminology*
- *Part 2: Specification for paving grade bitumen*
- *Part 3: Specification for bituminous emulsion (under development)*

Committee membership

The following organizations were represented on the Technical Committee on *Roads and highway engineering* (RSB/TC 55) in the preparation of this standard.

ASTRIK International Ltd

EDITRACE LTD and General Reliance

JV CSC&EC(Property) and Fair Construction Ltd

MININFRA

NPD Ltd

Rwanda Inspectorate Competition and Consumer Protection Authority (RICA)

Rwanda Transport development agency (RTDA)

TCMF Ltd

University of Rwanda - College of Science Technology (UR-CST)

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Bitumen and bituminous binders — Part 1: Terminology

1 Scope

This Draft Rwanda Standard defines terms for paving or industrial bitumen of various types and binders derived from bitumen.

It does not extend to non-petroleum “hydrocarbon” binders such as coal tar and its derivatives or to natural asphalts. However, some definitions are given for some excluded materials and related terms. The corresponding terms were introduced only when they appeared in a definition of a product or process and when their definition was found necessary for understanding or for avoiding any ambiguity.

NOTE The types covered by this Standard are shown in Annex A. The figure also shows a clear distinction between materials inside and outside the scope of this standard. paragraph.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

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

3.1

binder

material serving to adhere to aggregate and ensure cohesion of the mixture

3.2

hydrocarbon binder

generic term for an adhesive material containing bitumen, or tar, or both bitumen and tar

Note 1 to entry 1: This term is not scientifically precise, in that all of the materials covered by the term contain non-hydrocarbon components. However, the term has been included to allow the term “bituminous binder” (3.3.2) to apply exclusively to non-pyrolysis material, i.e. bitumen.

3.3

bitumen

virtually not volatile, adhesive and waterproofing material derived from crude petroleum, or present in natural asphalt, which is completely or nearly completely soluble in toluene, and very viscous or nearly solid at ambient temperatures

Note 1 to entry: Some grades of bitumen are used in both paving and industrial applications, Example certain penetration-graded bitumen are used for industrial purposes such as in the manufacture of roofing felts and other waterproofing membranes.

3.3.1

bituminous

adjective applicable to binders, to mixtures of binders and aggregates and more generally to any material containing bitumen

3.3.2

bituminous binder

adhesive material containing bitumen

Note 1 to entry: A bituminous binder may be in any of the following forms: unmodified, modified, oxidized, cutback, fluxed, emulsified.

Note 2 to entry: To avoid uncertainty, whenever possible the term describing the actual binder in question is used.

3.4

paving bitumen

bitumen used to coat aggregate and/or reclaimed asphalt, mainly used in the construction and maintenance of paved surfaces and hydraulic works

Note 1 to entry: In Rwanda, the most-used grades of paving bitumen are defined by their needle penetration at 25 °C, up to a maximum value of 900 × 0.1 mm. Grades softer than this are designated as given in 3.4.1.

3.4.1

soft grade bitumen

paving bitumen used in the manufacture of low stiffness asphalt

Note 1 to entry: Bitumen grades are specified primarily in terms of their needle penetration (referred to as 'pen'), soft bitumen has high pen number. Also, the grades of soft grade bitumen can be defined by their viscosity at 60 °C.3.4.2

3.4.2

hard grade bitumen

bitumen possessing hard and brittle characteristics at ambient temperature

Note 1 to entry: Bitumen grades are specified primarily in terms of their needle penetration (referred to as 'pen'), hard bitumen have low pen numbers.

3.4.3

air-rectified bitumen

bitumen that has been subjected to mild oxidation with the goal of producing a bitumen meeting paving grade bitumen specifications

Note 1 to entry: Air-rectified bitumen has a penetration index $PI \leq +2.0$.

3.5

modified bitumen

bituminous binder whose rheological properties have been modified during manufacture by the use of one or more chemical agents

Note 1 to entry: In this context, "chemical agent" includes natural rubber, synthetic polymers, waxes, sulfur and certain organo-metallic compounds, but not oxygen or oxidation "catalysts" such as ferric chloride, phosphoric acid and phosphorus pentoxide. Fibres and inorganic powders ("fillers") are not considered to be bitumen modifiers. Modified bitumen may be employed "directly" or in the form of cut-backs or emulsions, or blended with (for example) natural asphalt.

3.5.1

polymer modified bitumen

is bitumen modified by combining with one or more organic polymer materials or rubber (typically styrene-butadiene-styrene (SBS) copolymer). This modification is done with the aim of enhancing the mechanical properties of the bitumen material. Polymer modified bitumen is typically used on road pavements, particularly those that are intended to withstand heavy-duty traffic and extreme weather conditions.

3.6

special bitumen

bitumen for which the process selected has conferred special properties which meet requirements for paving or industrial applications

3.6.1

multigrade bitumen

special bitumen for road applications which is less temperature susceptible than paving grade bitumen and having a penetration index PI positive

Note 1 to entry: Multigrade bitumen is manufactured from the same sources as conventional bitumen but requires processing to reduce temperature susceptibility. This provides some of the advantages of increased binder stiffness at higher temperatures while retaining satisfactory low-temperature characteristics.

Note 2 to entry: Multigrade may be used for high-stress seals and in place of conventional bitumen in high-temperature areas.

3.7

industrial bitumen

bitumen used for purposes other than the construction or maintenance of paved surfaces

3.7.1

oxidized bitumen

bitumen whose rheological properties have been substantially modified by reaction with air at elevated temperatures

Note 1 to entry: Oxidized bitumen have a penetration index $PI > +2.0$

3.7.2

hard industrial bitumen

bitumen for industrial applications possessing hard and brittle characteristics at ambient temperature

Note 1 to entry: Hard industrial bitumen products are graded by the limits of the ring and ball softening point values, expressed as multiples of 5, and are characterized by an H in front of the values

3.8

flux/cut-back solvent

fluid added to another to reduce its viscosity

Note 1 to entry: These fluids are derived from various sources including mineral or vegetal origin products

3.8.1

flux or flux oil

relatively involatile fluid (oil) used in the manufacture of fluxed bitumen

3.8.2

solvent for cut-back

relatively volatile fluid used in the manufacture of cutback bitumen

Note 1 to entry: Solvent is any substance, usually liquid, which is capable of dissolving one or several substances, thus creating a solution.

3.9

cut-back bitumen whose viscosity has been reduced by the addition of a cut-back solvent (3.8.2)

Note 1 to entry: Typically, white spirit and kerosine are the petroleum fluxes employed.

3.9.1

petroleum cut-back bitumen

bitumen whose viscosity has been reduced by the addition of a cut-back solvent derived from petroleum

Note 1 to entry: Typically, white spirit and kerosine are the petroleum derived fluxes employed.

3.10

fluxed bitumen

bitumen whose viscosity has been reduced by the addition of low flux oil(s) (3.8.1)

Note 1 to entry: A petroleum-fluxed bitumen is so called when the flux oil is of petroleum origin.

3.10.1

bio-fluxed bitumen

bitumen whose viscosity has been reduced by the addition of a flux oil derived from vegetal or animal oils

3.10.2

carbochemical fluxed bitumen

bitumen whose viscosity has been reduced by the addition of a flux derived from coal tar based products

Note 1 to entry: Carbochemical products are obtained from coal pyrolysis.

3.10.3

petroleum fluxed bitumen

bitumen whose viscosity has been reduced by the addition of a flux oil derived from petroleum

Note 1 to entry: Typically, gas oils of various distillation ranges are used as flux.

3.11

emulsion

fluid system in which bitumen droplets and/or liquid crystals are dispersed in a water

Note 1 to entry: Dispersion is thermodynamically metastable. Type of emulsifier, Natural (vegetable- agar, tragacanth, animal souce wool fat, gelatin

3.11.1

dispersed phase

liquid which has been dispersed in the continuous phase

Note 1 to entry: The “dispersed phase” is also referred to as the “discontinuous phase”.

3.11.2

continuous phase

liquid in which the dispersed/discontinuous phase has been dispersed

Note 1 to entry: This is normally an aqueous solution.

3.11.3

emulsifier

surfactant which when present in small amounts facilitates the formation of an emulsion, or enhances its colloidal stability

3.11.4

bituminous emulsion

dispersion of bitumen in an aqueous phase containing a surfactant

Note 1 to entry: Unless otherwise stated, continuous phase is assumed to be aqueous solution.

3.11.4.1

anionic bituminous emulsion

emulsion in which the emulsifier imparts negative charges to the dispersed bitumen droplets

3.11.4.2

cationic bituminous emulsion

emulsion in which the emulsifier imparts positive charges to the dispersed bitumen droplets

3.11.4.3

polymer-modified bituminous emulsion

emulsion in which the dispersed phase is a polymermodified bitumen or a bitumen emulsion modified with polymer latex

3.12

asphalt

mixture of aggregates and bituminous binder

3.13

natural asphalt

relatively hard bitumen found in natural deposits, often mixed with fine or very fine mineral matter, which is virtually solid at 25 °C but which is a viscous fluid at 175 °C

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Annex A
(normative)

Types of hydrocarbon binders

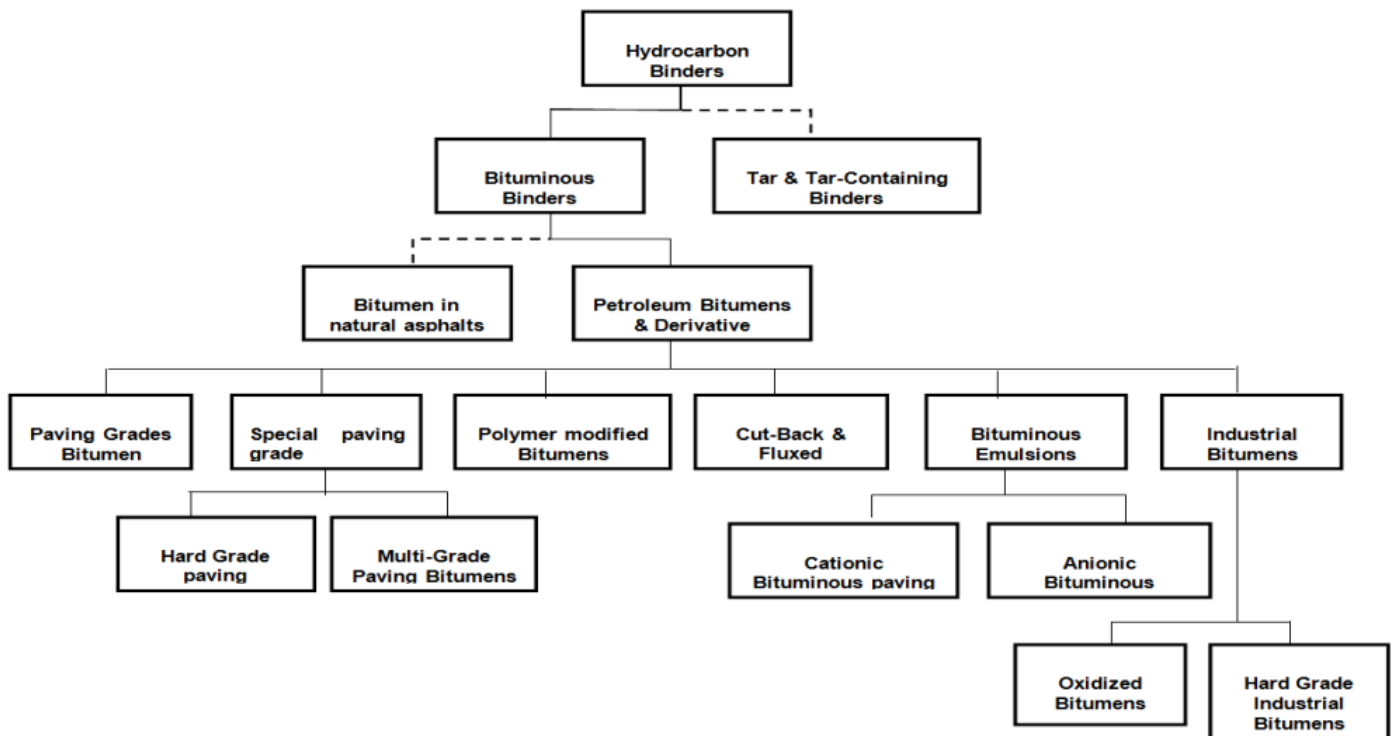


Figure 1-Types of Hydrocarbon binders

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