



European Technical Assessment

ETA 20/0377
of 22.06.2020



General part

Technical Assessment Body issuing the ETA: ITeC

ITeC has been designated according to Article 29 of Regulation (EU) No 305/2011 and is member of EOTA (European Organisation for Technical Assessment).

Trade name of the construction product

RARX®

Product family to which the construction product belongs

Compound for bitumen and bituminous mixtures based on crumb rubber powder.

Manufacturer

CÍRCULO TECNOLÓGICO 2020 S.L.
C/Juan Esplandiu 11, 13 floor
28007 Madrid
Spain

Manufacturing plant(s)

CÍRCULO TECNOLÓGICO 2020 S.L.
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Spain

This European Technical Assessment contains

7 pages including 1 annex which forms an integral part of this assessment.

This European Technical Assessment is issued in accordance with Regulation (EU) 305/2011, on the basis of

European Assessment Document EAD 230145-00-0105.

General comments

Translations of this European Technical Assessment in other languages shall fully correspond to the original issued document.

Communication of this European Technical Assessment, including transmission by electronic means, shall be in full (excepted the confidential Annex(es)).

Specific parts of the European Technical Assessment

1 Technical description of the product

The RARX[®] is a compound which consists of crumb rubber powder (60 % ± 3 %) (in weight), bitumen (16 % ± 3 %), lime (24 % ± 3 %) and other additives. The compound is a powder with maximum grain size of 1,0 mm.

The compound is based on crumb rubber powder obtained from ELT (end life tyres), which is heated and then coated with bitumen to complete the digestion process of the crumb rubber powder. After this, lime and other additives are added.

The RARX[®] mixed with bitumen contributes to the bituminous mixtures as binder, alike bitumen does in “non-modified” bituminous mixtures. Performance of 35 % RARX[®] mixed with 65 % bitumen 50/70 are stated in clause 3.

2 Specification of the intended use(s) in accordance with the applicable EAD

The RARX[®] is intended to be used to modify bitumen and bituminous mixtures used for the construction and maintenance of roads, airport runways and other paved areas.

The RARX[®] is added in the mixer with the aggregates, before adding the bitumen (see Figure 1). To countervail that the product is added at ambient temperature, aggregates and bitumen are heated above the normal temperature of these types of bitumen mixtures. The resulting bituminous mixture has modified rheological and mechanical properties.

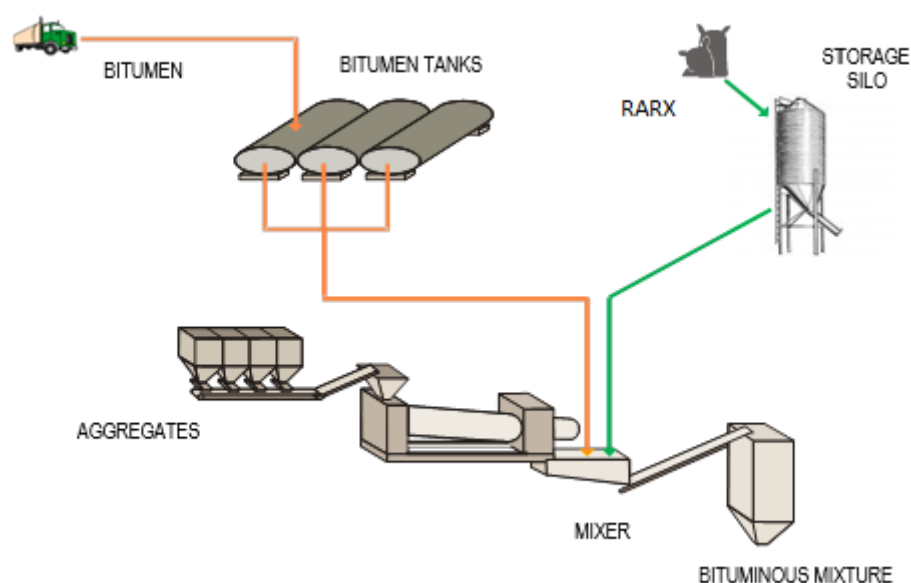


Figure 1: Bituminous mixture production scheme using RARX[®].

The provisions made in this ETA are based on a working life of RARX[®] of at least 15 years, provided that the conditions laid down in the manufacturer’s instructions for the installation, use and maintenance are met. These provisions are based upon the current state of the art and the available knowledge and experience.

The indications given as to the working life of the product cannot be interpreted as a guarantee but are regarded only as a means for choosing the appropriate products in relation to the expected economically reasonable working life of the works.

3 Performance of the product and reference to the methods used for its assessment

3.1 Performance of the product

The assessment of RARX® has been performed in accordance with EAD 230145-00-0105 for *Compound for bitumen and bituminous mixtures based on crumb rubber powder (February 2020)*.

Tests have been performed with mixtures prepared as follows:

- Composition:
 - o RARX® as defined in clause 1.
 - o Paving grade bitumen 50/70 according to EN 12591 with penetration at 25 °C of 58 mm/10 and a softening point of 50,0 °C.
- Mixing procedure:
 - o The specimens' mixing is performed with an overhead stirrer at the temperature 180 °C, for 5 minutes under rotational velocity of mixing 500 rpm. Percentage in weight of RARX® is 35 % and bitumen is 65 %.

Table 1: Performance of RARX® mixed with bitumen 50/70 in a proportion of 35 % / 65 %.

Basic requirement	Essential characteristic	Performance
BWR 1 Mechanical resistance and stability	Granulometry*	1,0 mm – 99,5 %
		0,8 mm – 99,4 %
		0,5 mm – 71,3 %
		0,25 mm – 25,6 %
		0,125 mm – 9,3 %
		0,063 mm – 5,1 %
	Penetration at 25 °C	26 mm/10
	Softening point	75,6 °C
	Cohesion: Force-ductility	3,63 J/cm ²
	Flash point	332 °C
	Elastic recovery at 25 °C	81 %
	Elastic recovery at 10 °C	79 %
	Resistance to hardening: change of mass	NPA
	Resistance to hardening: retained penetration	NPA
	Resistance to hardening: increase of softening point	NPA
Resistance to hardening: drop of softening point	NPA	
Resistance to hardening: elastic recovery at 25 °C	NPA	
Resistance to hardening: elastic recovery at 10 °C	NPA	
Behaviour at low temperatures with the bending beam rheometer	NPA	

(*) Performance of RARX® without mixing it with bitumen. Percentage of passing sieves.

3.2 Methods used for the assessment

3.2.1 Granulometry

Tests have been performed according to EN 14243-2, clause 5.5.

3.2.2 Penetration at 25 °C

Tests have been performed according to EN 1426.

3.2.3 Softening point

Tests have been performed according to EN 1427.

3.2.4 Cohesion: Force-ductility

Tests have been performed according to EN 13589.

3.2.5 Flash point

Tests have been performed according to EN ISO 2592.

3.2.6 Elastic recovery at 25 °C

Tests have been performed according to EN 13398 at 25 °C.

3.2.7 Elastic recovery at 10 °C

Tests have been performed according to EN 13398 at 10 °C.

4 Assessment and verification of constancy of performance (AVCP) system applied, with reference to its legal base

According to the Decision 98/601/EC of the European Commission, as amended by Decision 2001/596/EC, the system of AVCP (see EC delegated Regulation (EU) No 568/2014 amending Annex V to Regulation (EU) 305/2011) given in the following table applies.

Table 2: AVCP system.

Product(s)	Intended use(s)	System
Bitumen	For road construction and surface treatment of roads	2+

5 Technical details necessary for the implementation of the AVCP system, as foreseen in the applicable EAD

All the necessary technical details for the implementation of the AVCP system are laid down in the *Control Plan* deposited with the ITeC and agreed in accordance with EAD 230145-00-0105, section 3.

The *Control Plan* is a confidential part of the ETA and only handed over to the notified product certification body involved in the assessment and verification of constancy of performance.

The factory production control operated by the manufacturer shall be in accordance with the above-mentioned *Control Plan*.

Issued in Barcelona on 22 June 2020

by the Catalonia Institute of Construction Technology.



Technical Director, ITeC

Annex A: Procedure to obtain a modified bituminous mixture with RARX®

In the production of bituminous mixtures with RARX® a normal filler silo with a proper feeder may be used to add the RARX® in the mixer used in asphalt plants. However, it should be considered that RARX® has a 0,6 g/cm³ density, thus requiring a high-volume throughput system. In order to ensure a homogeneous mixture, RARX® is added to the mixer together with the aggregates and before bitumen. RARX® should be mixed for 10 sec with the aggregate, before the addition of bitumen and 20 sec to 30 sec afterwards.

It is recommended the aggregates to be overheated by 5 °C to 15 °C, compared to the normal temperature used in a similar type of mixing (but without exceeding 195 °C) in order to compensate the fact that RARX® is added at regular ambient temperature. Also, it is recommended that the heating of the bitumen is 5 °C above the normal temperature used for this kind of mixtures (but without exceeding 195 °C or the temperature recommended by bitumen producer).

It is recommended a mixing temperature between 175° C and 180° C. It is recommended a compaction temperature between 160° C and 170° C with steel rollers cylinder, wet with water with 2 % hydrated lime approximately. The compaction must be done with at least three roller compactors, one of them should always be close to the paver at maximum distance of 10 m.

The percentage of RARX® to be added to the final rubberized asphalt mixture must be defined in the formulation study, being this value variable between 0,5 % and 4,5 % over total asphalt mix weight, depending on the type of bituminous mixture to be manufactured. RARX® can be applied to the most diverse types of hot bituminous mixtures such as, open, dense, for thin layers, conventional, Stone Mastic Asphalt, gap graded and thin gap graded, etc.

The exact percentage of RARX®, the mixing temperature, as well as the minimum mixing time, shall be determined by the mixture formulation study prepared by an Independent Testing Laboratory, experienced in the formulation of such bituminous mixtures, and approved by the Supervision. Once the exact percentage of RARX® to be used is set, allowed deviations from that value will be fixed.