

**VINYL COMPOUNDS AND THEIR MANUFACTURE  
FOR PVC WINDOW PROFILES**

**Technical document 34-01**

Modifying  
characteristics/components

Technical document 34.01 rev. 01  
18/05/2020

CSTB (Centre Scientifique et Technique du Bâtiment), a public establishment supporting innovation in construction, has four key activities: research, expertise, assessment and dissemination of knowledge, organised to meet the challenges of ecological and energy transition in the construction sector. Its field of competence covers construction materials, buildings and their integration into districts and towns.

With over 900 employees, its subsidiaries and networks of national, European and international partners, the CSTB group works for all the stakeholders in the construction sector to advance building quality and safety.

All reproduction or representation, complete or partial, by whatever means, of the pages published in this technical document and executed without the authorisation of CSTB is illegal and constitutes an act of forgery. The only authorised exceptions are 1) reproductions strictly reserved for the use of the typist and not intended for any collective use, or 2) analyses and short quotations required due to the scientific or informational nature of the work in which they appear (article L.122-5 of the French Intellectual Property Code). This document has been drawn up under the initiative and direction of CSTB, which has brought together the opinions of all interested parties.

© CSTB

# MODIFICATION HISTORY

Parts modified	Revision no.	Effective date	Modifications made
-	00	13/11/2018	Creation of the document.
	01	18/05/2020	Clarification of tests § 1 CPE impact modifier § 2.3 Addition of § 2.4 Pigments § 2.8

## Table of contents

1. Changing shades
2. Changing one of the components in the certified vinyl compound
  - 2.1 Thermal stabiliser one pack
  - 2.2 Acrylic impact modifier
  - 2.3 CPE impact modifier
  - 2.4 Impact modifier not in the acrylic or CPE category
  - 2.5 TiO<sub>2</sub>
  - 2.6 Calcium carbonate
  - 2.7 Additives
  - 2.8 Pigments
- 2.9 PVC resin

*'This document has been drawn up under the initiative and direction of CSTB, which has gathered the opinions of all interested parties.*

*Any reproduction or representation of this document in whole or in part, and any use of all or part of this document for the purpose of assessments, certification or tests performed without CSTB's prior written consent, are prohibited'.*

# 1. Changing shades

## **CHANGING THE SHADE OF THE CERTIFIED VINYL COMPOUND**

Using an initial certified vinyl compound for which a change in shade is planned (colour shading by adjusting the ratio and/or nature of the tinting pigments), particularly beige or light grey, the following tests are conducted, as the case may be.

➤ **Case 1**

if  $\Delta L^* \leq 2$   
and  $\Delta a^* \leq 1$   
and  $\Delta b^* \leq 1.6$  } no ageing tests need to be carried out.

➤ **Case 2**

if  $2 < \Delta L^* \leq 5$   
and/or  $\Delta a^* \geq 1$   
and/or  $\Delta b^* \geq 1.6$  } 4000 hours of artificial ageing are to be completed.

In this case, welding factor tests will not need to be carried out. The values determined for the initially certified vinyl compound will be taken into account.

➤ **Case 3**

If  $\Delta L^* \geq 5$ , 4000 hours of artificial ageing and 2 years of natural ageing are to be completed (in accordance with *technical document 34.03 no. 2*).

*In all three cases, determination of identification characteristics takes place in the Mark laboratory (Vicat needle test point temperature, density, DHC, ash content, colorimetry, tensile-impact, modulus of elasticity under bending stress)*

*The welding factor is not to be determined.*

*For cases 2 and 3, refer to the additional testing defined in technical document 34.03.*

## 2. Changing one of the components in the certified vinyl compound

Firstly, the identification characteristics (identical to those supplied at the time of initial certification) must be retained.

The code that was assigned to the initially certified composition will remain the same.

### **2.1 Thermal stabiliser one pack**

If the one pack product reference changes (whether defined by a supplier or belonging to the owner of the formula and prepared to order), artificial ageing and two years of natural ageing will be completed according to technical documents no. 1 and no. 2.

For light shades, as provided for in the field of application covered by standard EN 12608.1, modification of the one pack stabiliser's reference may be extended to all certified formulations with different colorimetry characteristics having the same declared DHC value, ash content, density and Vicat needle test point temperature. *(this includes the specific case of pigmentation on the production line meeting the requirement of identical identification characteristics)*

### **2.2 Acrylic impact modifier**

***A) Substitution of one impact modifier for another in the table provided at <http://evaluation.cstb.fr/> and with identical identification characteristics***

No ageing tests need to be carried out.

Three scenarios are possible:

1) the impact modifier content stays the same: no testing is required, only a CSTB declaration;

2) the impact modifier content is reduced by a maximum of 10%:

a double-notch Charpy impact test on a new extruded profile with the declared reduced impact modifier content will be performed by the CSTB laboratory;

the results of the test must comply with the specifications of reference system QB 34.

3) the impact modifier content is increased by a maximum of 10%: no testing is required, only a CSTB declaration.

***B) Modification of the content of the same impact modifier with identical identification characteristics in the composition of a qualified vinyl compound.***

The content can be reduced or increased by up to 10% without the need for ageing tests. Two scenarios are possible:

1) the impact modifier content is reduced by a maximum of 10%:

a double-notch Charpy impact test on a new extruded profile formulated with the reduced content will be performed by the CSTB laboratory;

the results of the test must comply with the specifications of reference system QB 34.

The reduced content is validated for the applicant's other formulations with identical identification characteristics but different colours.

If the content is reduced by more than 10%, the qualification procedure for a new vinyl compound will apply.

2) the impact modifier content is increased by a maximum of 10%: no testing is required, only a CSTB declaration.  
These provisions concern impact modifiers with identical chemical compositions.

### ***C) Admission procedure for a new acrylic impact modifier reference in the equivalence table***

An impact modifier supplier wishes to introduce a new product reference on the market or a certified vinyl compound holder wishes to adopt a new impact modifier product reference.

An artificial ageing test with the new impact modifier product reference from a previously-qualified formulation with a listed impact modifier will be performed at the CSTB laboratory.

If the results comply with the provisions of reference system QB 34, the new product reference will be added to the list.

The acrylic impact modifier reference, the name of the manufacturer and the production site are inseparable: if one of the three changes, the assessment procedure defined in technical document 34.01

§ 2.3.1 must be applied.

### ***2.3 CPE impact modifier***

#### ***1) Admission procedure for a new CPE impact modifier reference in a certified material***

With identical identification characteristics to the certified material:

For acceptance of a new CPE impact modifier product reference in a previously qualified vinyl compound. The below process is followed:

- The name of the manufacturer and the production site of the CPE modifier will be provided at the time of the application by the holder of the certified vinyl compound.

If they do not have this information, no examination can take place

- The tests to conduct are: determination and verification of equivalence of identification characteristics, welding factor and artificial ageing in accordance with the reference system.

- The holder of the vinyl compound certification shall complete the application and conduct testing.

- These tests will be run on one of their previously certified compounds with either a 100% CPE modifier content or a blend of CPE and Acrylic modifiers. In this latter case, the total modifier content will remain unchanged, the ratio will remain the same (e.g. if there are 6 phr in total in a formulation, i.e. 2 phr of acrylic modifier + 4 phr of CPE modifier, then substitute 4 phr of the new CPE in the initially certified compound).

The CPE reference, the name of the manufacturer and the production site are inseparable: if one of the three changes, the assessment procedure defined in technical document 34.01 § 2.3.1 must be applied.

## 2) Field of application of a new CPE reference

- It was validated in a holder's 'clean' formulation.

Use of this new product reference can be extended to all of this holder's certified formulations (formulations with identical CPE contents) with different colorimetry characteristics (under EN 12608.1) but the same declared DHC value, ash content, density and Vicat needle test point temperature.

- A CPE modifier was validated for a defined certified formulation (clean or Cf. § 2)

If this CPE modifier is used in another certified formulation (other holder), the validation procedure will be the one set out in § 2.3.1.

It is considered that, after three (3) satisfactory test results with this new CPE modifier in the formulations of three (3) different holders, it can be included in the equivalence table.

### **2.4 Impact modifier not in the acrylic or CPE category**

The application is considered a new formulation (new application process) even if it has identical identification characteristics to the previously certified formulation.

### **2.5 TiO<sub>2</sub>**

1) If the TiO<sub>2</sub> product reference is substituted with an identical content compared to that submitted when the vinyl compound was qualified, a 2-year natural ageing test as well as an artificial ageing test will be performed in accordance with *technical document 34.03 (no. 1 and no. 2)*.

Modification of the TiO<sub>2</sub> product reference can be extended to all the qualified formulations with different colorimetry characteristics (under EN 12608.1) but the same declared DHC value, ash content, density and Vicat needle test point temperature.

2) If the quantity of TiO<sub>2</sub> is decreased compared to the quantity submitted during the vinyl compound qualification, a new qualification application must be submitted.

3) A qualification is indicated for a formulation with a reference A TiO<sub>2</sub> content;

This same formulation is also qualified with a reference B TiO<sub>2</sub> content (same level).

If the qualification application for this formula is for overseas departments and territories, this formula must be qualified for each TiO<sub>2</sub> product reference.

4) In a formulation qualified using a 100% reference A TiO<sub>2</sub> content and this same formula is qualified with a 100% reference B TiO<sub>2</sub> content, the holder may adjust the portion of reference A TiO<sub>2</sub> and that of reference B TiO<sub>2</sub> in the formula without further experimental verification.

5) In a non-UV-resistant formulation, a change in supplier and TiO<sub>2</sub> reference is acceptable without testing.

## **2.6 Calcium carbonate**

- 1) If a ground product is replaced with a precipitated product (or vice versa) with identical identification characteristics and identical content compared to that submitted when the vinyl compound was qualified, a 2-year natural ageing test as well as an artificial ageing test will be performed in accordance with technical documents.
- 2) If the product reference is changed but the identification characteristics, content and chemical nature are identical to the values submitted during vinyl compound qualification: no testing is required, only a CSTB declaration.

## **2.7 Additives**

### ***Lubricants, processing aids***

The qualified vinyl compound lubrication and processing aid content with identical identification characteristics can be increased or reduced without requiring tests.

## **2.8 Pigments**

**For white shades where  $L^* \geq 90$  and  $b^* \leq 5$ ; For shades where  $L^* < 82$  designed to be film-coated; for shades where  $82 \leq L^* < 90$  and  $b > 5$**

with identical identification characteristics, testing is not required when changing the pigment references if the supplier of the pigments provides proof that the CAS NUMBER is the same.



## **2.9 PVC resin**

1) If identification characteristics are identical, changing the PVC product reference to one with an identical Kwert value (min. Kwert: 63) is possible without carrying out ageing tests. A simple CSTB declaration will suffice.

### **2) Grafted PVC/Rigid PVC + impact modifier**

A qualified vinyl compound based on 50% grafted PVC + 50% PVC resin can be substituted with a 70% grafted PVC + 30% PVC resin or 30% grafted PVC + 70% PVC resin without testing, on the condition that impact modifier content remains the same throughout the formulation.

A qualified vinyl compound with grafted PVC (100%) can be substituted with a 100% PVC resin formula and impact modifier after an artificial ageing test (4000 hours), on the condition that the qualified vinyl compound's identification characteristics remain unchanged.

A qualified vinyl compound with 50% grafted PVC + 50% PVC resin with impact modifier can be substituted with a 100% PVC resin formula with impact modifier after an artificial ageing test (4000 hours), on the condition that the qualified vinyl compound's identification characteristics remain unchanged.