

European Technical Approval

ETA-01/0005

Trade name:

DC 993 and DC 895

Holder of the approval:

DOW CORNING
Parc Industriel Zone C,
B 7180 SENEFFE
Belgium

Website:<http://www.dowcorning.com>**Generic type and use
of construction
product(s):**

Sealant used in structural sealant glazing systems to
bond glass onto metal

Validity from:

2012-04-06

to:

2017-04-05

Manufacturing plants:

DOW CORNING
Parc Industriel Zone C, B 7180 SENEFFE
DOW CORNING GmbH, D WIESBADEN

This version replaces

ETA 01/0005 valid from 2011-06-27 until 2016-06-26

**This European
Technical Approval
contains:**

8 pages, without annexes.



European Organisation for Technical Approvals
Organisation Européenne pour l'Agrément Technique
Europäische Organisation für Technische Zulassungen

I LEGAL BASES AND GENERAL CONDITIONS

1. This European Technical Approval is issued by UBAtc in accordance with:
 - Council Directive 89/106/EEC of 21 December 1988 on the approximation of laws, regulations and administrative provisions of Member States relating to construction products¹, modified by Council Directive 93/68/EEC² and Regulation (EC) N° 1882/2003 of the European Parliament and of the Council³;
 - Belgian law of 25 March 1996 concerning the adaptation of legislative and administrative provisions of Member States to the Construction Products Directive (89/106/EEC) for construction products⁴ and Belgian Royal Decree of 18 August 1998 concerning construction products⁵
 - ETA-Guideline 002 "Structural Sealant Glazing System", edition November 1999 amended 2001, Part 1
 - Common Procedural Rules for Requesting, Preparing and the Granting of European Technical Approvals set out in the Annex to Commission Decision 94/23/EC⁶;
 - SCC decision CONSTRUCT 00/427 concerning structural sealants as component of kit covered by existing ETAG
2. The UBAtc is authorized to check whether the provisions of this European Technical Approval are met. Checking may take place in the manufacturing plant(s). Nevertheless, the responsibility for the conformity of the products to the European Technical Approval and for their fitness for the intended use remains with the holder of the European Technical Approval.
3. This European Technical Approval is not to be transferred to manufacturers or agents of manufacturers other than those indicated on page 1, or manufacturing plants other than those laid down in the context of this European Technical Approval.
4. This European Technical Approval may be withdrawn by UBAtc, in particular pursuant to information by the Commission according to Article 5(1) of Council Directive 89/106/EEC.
5. Reproduction of this European Technical Approval including transmission by electronic means shall be in full. However, partial reproduction can be made with the written consent of UBAtc. In this case partial reproduction has to be designated as such. Texts and drawings of advertising brochures shall not contradict or misuse the European Technical Approval.
6. Subject to the application introduced, the European Technical Approval is issued by the approval body in its official languages. These versions correspond fully to the English version circulated in EOTA. Translations into other languages have to be designated as such.
7. Compared with the previous version, new colours have been introduced.

¹ Official Journal of the European Communities N° L 40, 11.2.1989, p. 12

² Official Journal of the European Communities N° L 220, 30.8.1993, p. 1

³ Official Journal of the European Union N° L 284, 31.10.2003, p. 1

⁴ Belgian Law Gazette, 21.05.1996

⁵ Belgian Law Gazette, 11.09.1998

⁶ Official Journal of the European Communities N° L 17, 20.1.1994, p. 34

II SPECIFIC CONDITIONS OF THE EUROPEAN TECHNICAL APPROVAL

1. Definition and scope of the product and intended use

1.1. Scope

The structural sealants DC 895 and DC993 are silicone based sealants to be used in structural sealant glazing system (SSGS) as defined in ETAG 002.

1.2. Intended use

The structural sealants DC 895 and DC993 are to be used in structural sealant glazing system (SSGS) to bond glazing products on metallic structural seal support frames. The suitable substrates are defined for each sealant in the present ETA § 4.2.2.3.

The sealant DC 895 is a single component sealant which can be used in structural glazing systems types I or II as per ETAG 002 SSGS table 1, while DC 993 is a bi-component sealant which can be used in structural glazing systems types I, II, III, IV as per ETAG 002 SSGS table 1.

The essential requirements ER2 Safety in case of fire, ER3 Hygiene, health and environment, ER4 Safety in use, ER6 Energy economy and heat retention shall be fulfilled. Failure of the structural bond might cause risk to human life and/or have considerable economic consequences.

The provisions made in this European Technical Approval are based on the assumed working life of the SSGS of 25 years⁷.

⁷ The indications given as to the working life of the products cannot be interpreted as a guarantee given by the ETA-holder or the approval body. It should only be regarded as a means for specifiers to choose the appropriate criteria for this product in relation to the expected, economically reasonable working life of the works.

2. Characteristics of the product and method of verification

2.1. Characteristics of the products

2.1.1. General

This ETA is being issued for the product on the basis of agreed data/information, deposited with the UBAtc, which identifies the product that has been assessed and judged. Changes to the product/production process, which could result in the deposited data/information being incorrect, should be notified to the UBAtc before the changes are introduced. The UBAtc will decide whether or not such changes affect the ETA and consequently the validity of the CE marking on the basis of the ETA and if so whether further assessment/alterations to the ETA, shall be necessary.

2.1.2. Structural sealant DC 895

- Design stress in tension: $\sigma_{des} = 0,14$ MPa
- Design stress in dynamic shear: $\tau_{des} = 0,14$ MPa
- Elastic modulus in tension or compression tangential to the origin: $E_0 = 0,9$ MPa
- Elastic modulus in shear tangential to the origin $G_0 = 0,3$ MPa
- Working time (at 25°C, 50% R.H.): 15 minutes
- Skin over time (at 25°C, 50% R.H.): 15 minutes
- Tack-free time (at 25°C, 50% R.H.): 30 to 50 minutes
- Time before transport of the bonded frame: The minimum time before transport is normally 21 days.

Nevertheless, earlier transportation on work site is allowed if the following two conditions are respected (see ETAG Table 10 Checks during the production): The tested H-samples give the result: Rupture 100% cohesive and breaking stress $\geq 0,7$ MPa.

Table 1 – DC 895: Structural Sealant - identification characteristics

Test	ETAG ref.	DC 895
Specific mass	5.2.1.1	$V_{mean} = 1,45$ (1,4 to 1,55)
Hardness A	5.2.1.2	Mean of 33 (minimum of 32)
Thermogravimetric analysis	5.2.1.3	Curve kept in the ETA technical file
Colour	5.2.1.4	Black

2.1.3. Structural sealant DC 993

- Design stress in tension : $\sigma_{des} = 0,14$ MPa
- Design stress in dynamic shear : $\tau_{des} = 0,11$ MPa
- Design stress in static shear : $\tau_{\infty} = 0,011$ MPa
- Elastic modulus in tension or compression tangential to the origin: $E_0 = 1,4$ MPa
- Elastic modulus in shear tangential to the origin $G_0 = 0,47$ MPa
- Working time (at 25°C, 50% R.H.) : 10 to 30 minutes

- Skin over time (at 25°C, 50% R.H.) : bi-component
- not applicable
- Tack-free time (at 25°C, 50% R.H.) : 80 to 100 minutes
- Time before transport of the bonded frame: The minimum time before transport is normally 10 days.

Nevertheless, earlier transportation on work site is allowed if the following two conditions are respected (see ETAG Table 10 Checks during the production):
The tested H-samples give the following result: Rupture 100% cohesive and breaking stress $\geq 0,7$ MPa.

Table 2 – DC 993: Structural Sealant - identification characteristics

Test	ETAG ref.	Result
Specific mass (mixed at 10/1 ratio)	5.2.1.1	$V_{\text{mean}} = 1,33 (\pm 0.023)$
Hardness A	5.2.1.2	Mean of 36 (minimum of 34)
Thermogravimetric analysis	5.2.1.3	Curve kept in ETA technical file
Colour	5.2.1.4	From black to white colour and all the grey scales in-between

2.1.4. Ancillary products for structural seal adhesion surface preparation

2.1.4.1. DC 895

Cleaning product:

- R40 manufacturer DOW CORNING
- Organic cleaner (isopropanol / acetone)

Primer:

- DC 1200 manufacturer DOW CORNING
- Silane solution in an organic solvent

2.1.4.2. DC 993

Cleaning product:

- R40 manufacturer DOW CORNING
- Organic cleaner (isopropanol / acetone)

Primer:

- DC 1200 manufacturer DOW CORNING
- Silane solution in an organic solvent

2.2. Method of verification

The assessment of the fitness for use of the structural sealant for the intended use in relation to the requirements for safety in case of fire; safety in use; hygiene health and environment; energy economy and heat retention; in the sense of the Essential Requirements 2, 3, 4 and 6, has been made in accordance with the "Guideline for European Technical Approval for Structural Sealant Glazing Systems (ETAG 002).

Where the guideline allows for classifications and/or choice, the following selection has been made:

ER2 Safety in case of fire

The behaviour in case of fire has to be assessed in the framework of the ETA for the kit

ER3 Hygiene, health and environment

In matter of "Dangerous substances", the sealant manufacturer made a declaration of conformity to the Council Directive 76/769/EEC published in "Official Journal of the European Communities" of 27/07/1976 and its amendments.

ER4 Safety in use

The product has been successfully subjected to the following tests, which are relevant for sealant: 5.1.4.1.1, 5.1.4.1.2, 5.1.4.2.1, 5.1.4.2.2, 5.1.4.2.3, 5.1.4.2.4, 5.1.4.2.5, 5.1.4.6.1, 5.1.4.6.2, 5.1.4.6.3, 5.1.4.6.4, 5.1.4.6.5, 5.1.4.6.7, 5.2.1.1, 5.2.1.2, 5.2.1.3, 5.2.1.4, with reference to ETAG 002

ER6 Energy economy and heat retention:

- *Determination of thermal insulation and susceptibility to condensation - Calculation method*

As a function of the design and the glazing chosen for the SSGS kits, thermal modelling may be undertaken with various computer software packages. To use the results of these programmes, it is necessary to ensure that they are at least two-dimensional and cover all the required parameters.

The generally accepted value of the thermal conductivity (λ -value) of the structural sealant to be used in thermal modelling for assessment of the thermal performance is 0,35 W/m K (EN 12524 – 04.2000).

- *Durability*

The durability of the fitness for use of the structural sealants in structural bond has been demonstrated as follows:

All the specific aspects of durability have been covered under the headings above, more particularly ER4 Safety in use.

3. Evaluation of conformity and CE marking

3.1. Attestation of conformity system

The systems of attestation of conformity specified by the European Commission detailed in EC Decision 96/582/EC⁸ are as follows:

- System 1 (without audit testing of samples) for SSG kits Type II;
- System 2+ (first possibility, including certification of the factory production control (FPC) by an approved body on the basis of its continuous surveillance, assessment and approval) for SSG kits Type I

[The systems being as described in Council Directive 89/106 EEC Annex 11.2.(i) and (ii) respectively].

The structural sealant being a component put on the market as such, it is impossible to determine in advance the Type of the kits in which the sealant is to be used. As a consequence, only the system 1 applies.

System 1

- tasks for the manufacturer
 - factory production control;
 - testing of samples taken at the factory by the manufacturer in accordance with a prescribed test plan.
- tasks for the approved body
 - initial type testing of the product;
 - initial inspection of the factory and of factory production control;
 - continuous surveillance, assessment and approval of the factory production control.

3.2. Responsibilities

3.2.1. Tasks for the manufacturer - Factory production control

3.2.1.1. General

The manufacturer shall establish, document and maintain a FPC system to ensure that the products placed on the market conform to the stated performance characteristics. The FPC system shall consist of procedures, regular inspections and tests and/or assessments and the use of the results to control raw and other incoming materials or components, equipment, the production process and the product.

A FPC system conforming with the requirements of EN ISO 9001, and made specific to the requirements of this ETA, is considered to satisfy the above requirements.

The results of inspections, tests or assessments requiring action shall be recorded, as shall any action taken. The action to be taken when control values or criteria are not met shall be recorded.

3.2.1.2. Equipment

All weighing, measuring and testing equipment shall be calibrated and regularly inspected according to documented procedures, frequencies and criteria.

3.2.1.3. Raw materials and components

The specifications of all incoming raw materials and components shall be documented, as shall the inspection scheme for ensuring their conformity.

3.2.1.4. Non-conforming products

In the event of any non-conformity of any product, that product shall be placed into quarantine and action taken to rectify the cause of the non-conformity. Products may not subsequently be dispatched until the problem has been resolved.

3.2.1.5. Tests and frequencies

All the elements, requirements and provisions adopted by the manufacturer are documented in a systematic manner in the form of written policies and procedures. This production control system ensures that the product is in conformity with the European Technical Approval (ETA).

The FPC involves the following tests: Appearance, flow, specific gravity, application rate, curing, hardness, elongation at break, tensile at break, modulus at 50% and 100% elongation, peel adhesion and cohesive failure.

In the context of structural sealants, it is necessary for the manufacturer to undertake adhesion/cohesion tests to rupture after thermal conditioning as described in ETAG 002 §8.3.2.4, checks on incoming material (i) and on each batch of sealant. The testing of "H" pieces, peel tests, as part of FPC provides the necessary evidence.

3.2.2. Tasks for the approval body:

3.2.2.1. Initial Type Testing

Approval tests on the sealant have been conducted under the responsibility by the approval body (UBAtc) in accordance with Chapter 5 of the ETAG 002. The approval body (UBAtc) has assessed the results of these tests in accordance with Chapter 6 of this ETAG, as part of the ETA issuing procedure. These tests should be used for the purposes of Initial Type Testing.

As required by the System 1, this work is to be validated by the approval body for Certification of Conformity purposes.

3.2.2.2. Assessment of the factory production control - Initial inspection and continuous surveillance

Assessment of the FPC is the responsibility of a Notified Body

An assessment shall be carried out on the required manufacturing steps of each manufacturing plant to demonstrate that the factory production control is in conformity with the ETA and any subsidiary information. This assessment is based on an initial inspection of the factory.

⁸ Commission decision of 24/06/96, published in the EC Official Journal L254 of 08/10/96

Subsequently continuous surveillance of factory production control is necessary to ensure continuing conformity with the ETA. This continuous surveillance is performed as per ETA § 3.2.1

It is recommended that surveillance inspections should be conducted at least twice a year.

3.2.2.3. Certification

The approved body has issued Certification of Conformity of the product (for System 1).

3.2.2.4. CE marking

The CE marking shall be affixed on each cartridge or packaging. The symbol "CE" shall be accompanied by the following information:

- Identification number of the certification body;
- Name of identifying mark of the producer and manufacturing plan;
- The last two digits of the year in which the CE marking was affixed;
- Reference to the ETA-Guideline
- Number of European Technical Approval;
- Number of EC Certificate of conformity.

For the structural sealant DC 993

	"CE"-symbol
xxxx	Number of Notified Body
DOW CORNING SENEFFE, Parc Industriel - Zone C, B 7180 SENEFFE Dow Corning GmbH Rheingautstrasse D – 65201 Wiesbaden	Name and address of the manufacturer or his representative established in the EEA and of the plant where the product was manufactured
xx	Two last digits of year of affixing CE Marking
xxxx-CPD-xxxx	Number of EC certificate of conformity (where relevant)
ETA N° 01/0005	ETA Number
ETAG 002 Structural Sealant	ETA-Guideline
DC 993 : Types I, II, III & IV	Relevant performance characteristics and/or designation code

Figure 1: Example of CE marking and accompanying information

For the structural sealant DC 895

	"CE"-symbol
xxxx	Number of Notified Body
DOW CORNING SENEFFE, Parc Industriel - Zone C, B 7180 SENEFFE	Name and address of the manufacturer or his representative established in the EEA and of the plant where the product was manufactured
xx	Two last digits of year of affixing CE Marking
xxxx-CPD-xxxx	Number of EC certificate of conformity (where relevant)
ETA N° 01/0005	ETA Number
ETAG 002 Structural Sealant	ETA-Guideline
DC 895 : Types I & II	Relevant performance characteristics and/or designation code

Figure 2: Example of CE marking and accompanying information

4. Assumption under which the fitness of the product for the intended use was favourably assessed

4.1. Manufacturing directives

4.1.1. DC 895

The structural sealant DC 895 is fabricated and packaged by the firm Dow Corning Seneffe Belgium. The maximum storage duration of the sealant is 12 months after the fabrication date in its original unopened packaging, when stored below 30°C.

4.1.2. DC 993

The base of the structural sealant DC 993 is fabricated and packaged by the firm Dow Corning Seneffe Belgium, while the catalyst is fabricated and packaged by the firm Dow Corning Wiesbaden Germany.

The maximum storage duration of the sealant is 12 months for the base and 12 months for the catalyst after the fabrication date in their original unopened packaging, when stored below 30°C.

4.2. Design rules and application of the sealant

4.2.1. Design rules

4.2.1.1. Structural seal design

See method of calculation in ETAG 002

4.2.1.2. Suitable substrates for structural adhesion surface

The generic types of suitable adhesion substrates are given here after as a function of the structural sealant only as indication.

Except for the float glass, the combination of a particular substrate of the generic types of substrates given in the table 1 and a structural sealant shall be assessed in the framework SSGS ETA by passing the following set of tests by reference to the ETAG 002, § 5.1.4.1.1, 5.1.4.2.1, 5.1.4.2.2, 5.1.4.2.3, 5.1.4.2.4, 5.1.4.2.5.

In addition this particular substrate for structural seal adhesion surface has to be identified and assessed as per the relevant § of the chapter 5 and 6 of the ETAG 002.

Table 3 – Structural Sealants – Generic type of substrates

Generic types of substrates	DC 895	DC 993
Glass	Suitable	Suitable
Coated glass	Suitable	Suitable
Stainless steel	Suitable	Suitable
Anodised aluminium	Suitable	Suitable

Besides, those specific substrates for structural seal, adhesion surfaces has been identified and assessed as per the relevant § of the chapter 5 and 6 of the ETAG 002.

Table 4 – Structural Sealants – Specific type of substrates

Specific type of substrates	DC 895	DC 993	Primer
Coated glass SOLARBEL SS 20 (AGC)	Not covered	Suitable	No primer
Coated glass SOLARBEL PB 20 (AGC)	Not covered	Suitable	No primer
Coated glass SGG COOL-LITE SS 108 (SGG)	Not covered	Suitable	No primer
Coated glass SGG COOL-LITE PB 114 N (SGG)	Not covered	Suitable	No primer
Coated glass SGG ANTELIO Clair (SGG)	Not covered	Suitable	No primer
Coated glass SGG ANTELIO Argent (SGG)	Not covered	Suitable	No primer
Coated glass COOL LITE ST 150 (SGG)	Not covered	Suitable	No primer

4.2.1.3. Drainage and ventilation

Water stagnation is not allowed in the vicinity of structural seal. The SSGS shall then be designed with an efficient water tightness assisted by drainage and ventilation or by the absence of any void or cavity close to the IG seal.

4.2.1.4. Transfer of the infill loading on the building structure via the structural sealant

The DC 895 is suitable to be used in SSGS type I or II as defined in ETAG 002. This means that the SSGS must be equipped with mechanical self-weight devices in order to transfer the dead load of the glass to the façade structure.

The DC 993 is suitable to be used in SSGS type I to IV as defined in ETAG 002. This means that the SSGS may or may not be equipped with mechanical self-weight devices.

4.2.1.5. Resistance to tearing

The DC 993 and DC 895 sealants are category 1 sealant according ETAG 002 § 6.1.4.6.4 and inserts in the sealant joint are allowed.

4.2.2. Application of the sealant

4.2.2.1. Description of the structural sealant application

The ETA's for structural sealant glazing kits describe the sealant application, in particular, the ETA's give the cleaning product to be used as well as the primer, if needed, and method of application.

4.2.2.2. General technical conditions

The Dow Corning DC 895 sealant has to be applied between 5 and 35°C in a dust free location. The seal needs to be tooled before the skin-over time has been reached, preferably within 10 minutes after the extrusion. It is important to realise that the skin-over time can vary with temperature and relative humidity. After the skin-over time has been reached, there should be no further relative movement induced between the glass and the metal frame.

The Dow Corning DC 993 needs to be mixed at a ratio base/catalyst by weight of 10/1 (min. 9/1 and max. 11/1). The Dow Corning DC 993 sealant has to be applied between 5 and 35°C in a dust free location. The joint needs to be tooled before the snap time has been reached, preferably within 10 minutes after the extrusion. It is important to realise that the snap time can vary with temperature and relative humidity. After the snap time has been reached, there should be no relative movement induced anymore between the glass and the metal frame.

In all cases, it should be checked that there is no condensation on the substrates prior to the sealant application.

4.2.3. Recommendation for façade cleaning

It is recommended to use the following product for façade cleaning:

- cleaning agent EXTRAN 02 Neutral -MERK dilution 2% for DC 895 and DC 993
- cleaning agent PRIL dilution 1% for DC 993

Nevertheless, the assessment of the façade cleaning product must be done in the framework of the ETA for the kit in order to check that those cleaning agents do not affect other kit products (gaskets, weather sealant, ...

4.2.4. Chemical compatibility

The chemical compatibility has to be assessed in the framework of the ETA for system as required by the ETAG 002 SSGS, § 5.1.4.2.5.

In the assessment procedure of the present ETA, the following products combination has been evaluated as required.

- The structural sealant DC 895 is compatible with the NORTON spacer V2100.
- The structural sealant DC 993 is compatible with the NORTON spacers V2100 and V3100.

4.2.5. Responsibility of the manufacturer

It is the responsibility of the ETA holder to ensure that the information on the sealant characteristics and on the sealant extrusion is given to the person concerned. This information may be made by reproduction of the relevant parts of the European Technical Approval.