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Buildings and Civil Engineering Works — Sealants — Determination of changes in adhesion, cohesion and appearance of elastic weatherproofing sealants after exposure of statically cured specimens to artificial weathering and mechanical cyclingClassification and requirements for pedestrian walkway sealants

Bâtiments et ouvrages de génie civil - Mastics - Determination

ICS: 91.100.50

Reference number
ISO/DIS 11528:2014(E)

Contents

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO xxxx was prepared by Technical Committee ISO/TC 59, *Building construction*, Subcommittee SC 8, *Jointing products*.

Users should note that all International Standards undergo revision from time to time and that any reference made herein to any other International Standard implies its latest edition, unless otherwise stated.

Buildings and civil engineering works — Sealants — Determination of crazing and cracking following exposure to artificial or natural weathering

1 Scope

This International Standard specifies methods for the assessment of surface defects (crazing and cracking) on sealants after exposure to artificial or natural weathering.

NOTE Sealants are weathered in the laboratory in order to simulate ageing processes occurring during natural weathering. Generally, valid correlations between ageing during artificial and natural weathering cannot be expected because of the large number of influencing factors. Certain relationships can only be expected if the effect of the important parameters (spectral distribution of the irradiance in their photochemically relevant range, temperature of the specimen, type of wetting, wetting cycle relative humidity) on the sealant is known. However, unlike natural weathering, testing in the laboratory is carried out taking into consideration a limited number of variables which can be controlled and therefore the results are more reproducible.

2 Normative references

The following standard contains provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the edition indicated was valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent edition of the standard indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

CIE Publication No.85: 1989, Recommendations for the Integrated Irradiance and the Spectral Distribution of Simulated Radiation for Testing Purposes; Solar Spectral Irradiance, ISBN 3 900 734 224

ISO 291:2008 Plastics — Standard atmospheres for conditioning and testing

ISO 3668:1998 Paints and varnishes — Visual comparison of the colour of paints

ISO 6927:2012 Building and civil engineering works — Sealants — Vocabulary

ISO 8339:2005 Building Construction — Sealants — Determination of tensile properties (Extension to break)

3 Terms and definitions

For the purposes of this standard, the definitions given in ISO 6927 apply.

4 Principle

ISO 11528 defines an evaluation scheme for designating the quantity and quality of specific surface defects (cohesive cracks and crazes) occurring in sealants as a result of exposure to outdoor or artificial weathering. The sealant test specimens are visually examined and rated for crack density, crack width and crack depth. The extent of damage in terms of crack width and crack density is determined by visual evaluation and comparison with pictorial references provided in this standard. The crack depth is visually assessed with reference to a rating scale. Visual assessment is carried out under specified illumination and viewing conditions in artificial daylight (D 65). Findings are documented by digital photography.

5 Apparatus

5.1 Standardized lighting apparatus, in accordance with ISO 3668, which is illuminating the test specimen surface with artificial daylight (D65) – 6500° Kelvin. The quality of simulation of daylight shall be assessed by the method described in CIE Publication No. 51. The spectral distribution of the illuminant shall be in category BC

(CIELAB) or better. The level of illumination at the specimen inspection position shall be between 2000 lx and 4000 lx.

5.2 Calliper gauge, with an accuracy of ± 0,05 mm, for the measurement of deviation of specimen surface flatness.

5.3 Microscope, with a magnification of x10, for the assessment of surface defects.

6 Observer

Observers shall have normal colour vision and shall be selected carefully because a significant proportion of people have defective colour vision. To avoid eye fatigue effects, pastel or complementary colours shall not be viewed immediately after strong colours. The quality of visual judgements falls off severely if the observer works continuously. Rest periods of several minutes during which no specimen inspection is attempted shall, therefore, be taken frequently.

7 Evaluation specimens

7.1 General

Evaluation specimens are cured sealant samples with or without adjacent substrates (supports) that have been exposed to either natural (outdoor) or artificial weathering. A minimum of 2 specimens shall be evaluated for each sealant product and weathering condition.

7.2 Specimen thickness

The thickness of the evaluation specimen (cured sealant layer) shall be a minimum of 3 mm.

7.3 Size of inspection surface

The size of the specimen surface that is inspected for surface defects shall be at a minimum 10 mm x 20 mm and at a maximum 40 mm x 50 mm in size.

NOTE Standard sized test specimens according to ISO 8339 are deemed as providing a suitable inspection surface.

7.4 Flatness of inspection surface

The inspection surface of the evaluation specimens shall be nearly flat, i.e., the deviation of the inspection surface from a perfect plane shall not exceed +/- 2 mm at any point across the inspection surface. Deviation from the plane is measured by placing a straight-edge steel ruler across the specimen and using a standard pointed depth gauge (calliper gauge, see section 5.2). The measured value shall be expressed as concave (+) when the surface layer is facing towards the ruler and as convex (-) when the surface layer is facing away from the ruler.

7.5 Conditioning of evaluation specimens

The evaluation specimens shall be conditioned at (23 ± 2) °C and (50 ± 10)% relative humidity (standard atmosphere 23/50 class 2 according to ISO 291) for a minimum of 16 hours prior to inspection.

8 Procedure

8.1 Viewing of evaluation specimens

View the evaluation specimens at a distance of 30-40 cm and an angle of 45-60° with illumination at an angle of 90° or vice versa in a controlled lighting apparatus (section 5.1) under standardized lighting conditions (conforming to CIE standard illuminant artificial daylight (D 65) – 6500° Kelvin).

8.2 Assessment of test specimens prior to exposure

If evaluation specimens are not obtained from the field and therefore are available prior to exposure, each specimen shall be inspected. Specimens with any significant application defects (bubbles, deviations from planarity, etc) shall be discarded.

8.3 Weathering

The evaluation specimens shall be exposed to natural (outdoor) or artificial weathering.

NOTE Weathering may be carried out with or without simultaneous or sequential cyclic movement. For a discussion of different weathering methods see, for instance ISO 11617 or the RILEM Technical Recommendations (bibliography).

8.4 Assessment of test specimens after exposure

After exposure to natural (outdoor) or artificial weathering, the evaluation specimens are inspected visually under controlled lighting conditions (8.1.). Inspection of the evaluation specimens may occur in their non-extended state or, preferably, in their extended state. The extension amplitude applied during inspection of the evaluation specimens shall be reported in the test report (extension amplitude of non-extended specimens: 0%).

The specimens shall be examined for evidence of loss of adhesion and cohesion or any surface changes (cracking, crazing, chalking, et cetera) of the sealant beads. Certain types of degradation may occur that are only visible at the back surface. Report any relevant observation, such as splitting of the sealant surface, depolymerisation (reversion) of the bulk sealant, et cetera.

Determine the rating for quantity, width and depth of cohesive cracks over the inspection area according to Tables 1, 2, and 3 respectively. Assess the quantity of cohesive cracks by reference to Table 1 and by using, as an example, Figures 1a and 1b, depending on the type of cracking.The degree of degradation (crack width, crack density and crack depth) can vary over the specimen surface. In such cases, the determination of the crack width, crack density and crack depth shall be made at several locations on the specimen surface and the minimum and maximum value shall be reported.

NOTE Figure 1a shows cracking without preferential direction and Figure 1b shows cracking in one preferential direction. Other forms of cracking occur, but the principles of assessing the quantity remain the same (see Annex A).

Use measuring devices capable of reading to 0.05 mm for crack depth and width.

NOTE Various tools for the determination of crack depth are commercially available, which are often used in the study of corrosion-induced pitting and cracking, for example, Measuring Microscope, Digital Optical Micrometer, and Digital Pit & Crack Depth Gauges.

NOTE For specimens exposed to natural (outdoor) weathering, dirt deposited on the surface from the atmosphere or surface mould growth may mask some of the cracking and crazing. In this case, efforts should be made to remove the dirt or mould by suitable means.

Table 1 —Rating for quantity of cohesive cracks

Rating	Quantity of Cracks (Q)
0	None, i.e. no detected cracks
1	Very few, i.e. some just detectable cracks
2	Few, i.e. small number of cracks
3	Moderate, i.e. medium number of cracks
4	Considerable, i.e. significant number of cracks
5	Dense, i.e. dense pattern of cracking

Table 2 —Rating for width of cohesive cracks

Rating	Width of Cracks
0	Not visible at 10x magnification
1	Only visible under magnification up to 10x
2	Just visible with normal (or corrected) vision (< 0.1 mm wide)
3	Clearly visible with normal (or corrected) vision (0.1 mm to < 0.5 mm wide)
4	Large cracks generally 0.5 mm to 1 mm wide
5	Very large cracks generally more than 1 mm wide

Table 3 —Rating for cohesive crack depth

Rating	Depth of Cracks
0	No cracks detectable at 10x magnification
1	Shallow surface crack depth (< 0.1 mm depth)
2	Medium surface crack depth (0.1 to 1 mm depth)
3	Significant surface crack depth (>1 mm to 3 mm depth)
4	Very significant surface crack depth (>3 mm to 10 mm depth)
5	Cohesive failure (>10 mm depth)

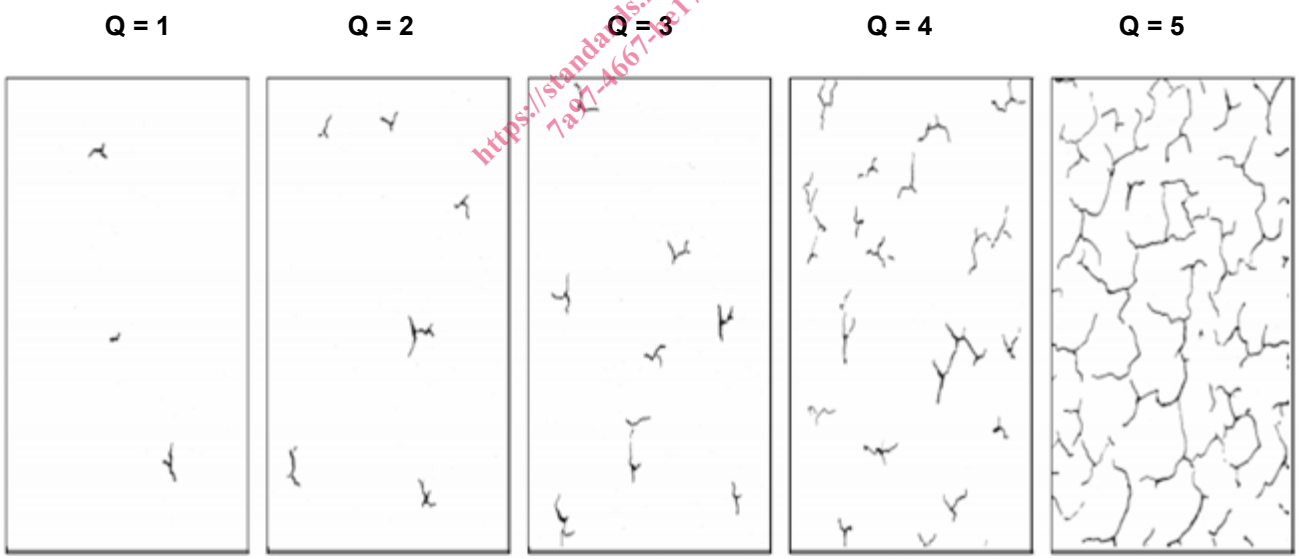

Figure 1a Cracking without preferential direction