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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 1454-2021

Replacing GB/T 1454-2005

**Test method for edgewise compressive properties of sandwich
constructions**

夹层结构侧压性能试验方法

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1 Scope

GB/T 1454-2021 is the Chinese national standard on test method for edgewise compressive properties of sandwich constructions, in the field of rubber and plastic industries. The /T suffix marks it as a recommended standard: it is not compulsory by itself, but it becomes binding as soon as a contract, a tender or a customer specification calls it up - which in practice is how most foreign buyers meet it. It was issued on 9 March 2021 by the State Administration for Market Regulation; Standardization Administration of China, and has been in force since 1 October 2021. Classification: ICS 83.120, CCS Q23. This page is published from the official record of the standard held by the Chinese standards administration: the identification, the dates, the classification and the issuing body are taken from there. The clause text, the tables and the numeric limits are in the document itself, which is delivered complete in English translation.

This standard specifies the test principles, test equipment, specimens, test state adjustment and test environmental conditions of the lateral pressure test method for sandwich structures. Test procedures, test results and treatment and test reports. This standard is applicable to the determination of the lateral compressive strength, modulus, Poisson's ratio of sandwich structure and the lateral compressive strength and modulus of sandwich structure panels.

2 Ef1·tf1·b Ef2·tf2·b (A.4) Where. σ_{mf1}

--- Lateral compressive strength or lateral compressive stress of panel 1 (one of the

panels), in megapascals (MPa); σ_{f2}

--- the lateral compressive strength or lateral compressive stress of panel 2 (corresponding to the other side panel of panel 1), in megapascals (MPa); E_{f1} , E_{f2}

---the modulus of elasticity of panel 1, panel 2, in megapascals (MPa); t_{f1} , t_{f2}

--- the thickness of panel 1, panel 2, in millimeters (mm). Note

1. When the ratio of the elastic modulus of the two panels is known, or the elastic modulus of one panel is known, the panel side of the sandwich structure of two different panels can be measured. Compressive strength. Note

2. The side compressive stress of the panel on one side of the failure is the panel side compressive strength, and the other side panel is called the panel side compressive stress. If panel 2 is damaged, then σ_{f2} is the lateral compressive strength of the panel, σ_{f1} is the lateral compressive stress of the panel. A.2.2 The side compression modulus of the panel is calculated according to formula (A.5) and formula (A.6). When E_{f1} is known, E_{f2} is calculated according to formula (A.5).

3 Terms and definitions

The following terms and definitions defined in GB/T 3961 apply to this document.

3.1 Edgewise compression The direction of force is parallel to the compressed state of the sandwich panel.

Note. Anisotropic materials include two states, longitudinal and transverse, see 6.6.

3.2 Edgewise compressive strength In the case of lateral pressure failure, the compressive stress obtained by dividing the corresponding load by the cross-sectional area of the sandwich structure.

3.3 Side compression modulus edgewise compressive modulus In the process of lateral pressure, the ratio of the compressive stress and strain obtained by dividing the corresponding load in the elastic range by the cross-sectional area of the sandwich structure.

3.4 The side pressure strength of the panel edgewise compression strength of facing In the case of lateral pressure failure, the compressive stress obtained by dividing the corresponding load by the cross-sectional area of the sandwich structure panel.

3.5 The side compression modulus of the panel edgewise compressive modulus of facing In the process of lateral pressure, the ratio of compressive stress to strain obtained by dividing the corresponding load in the elastic range by the cross-sectional area of the sandwich panel.

3.6 Nominal thickness of facing Calculate or measure the thickness of the blank panel or

the panel directly provided by the manufacturer according to theory.

4 Test principle

A compressive load is applied to the sample along the direction of the panel through the support fixtures at both ends of the sample (usually one end is round support, one end is flat support) Support), with the help of the circular support to make the panel evenly stressed, so that the sandwich structure or sandwich structure panel will be destroyed.

5 Test equipment

5.1 The testing machine should meet the requirements of GB/T 1446 for testing machines.

5.2 The side pressure fixture is shown in Figure 1, which is divided into flat support [see Figure 1a)] and round support [see Figure 1b)], which can be adjusted by screws. Like installation thickness.

5.3 Deformation measurement system, can obtain the deformation of the sample, the accuracy of the strain gauge is 0.5μ , and the accuracy of the extensometer is 1%.

5.4 Vernier calipers or other length measuring instruments, with an accuracy of 0.02mm. Figure

6 Sample

6.1 The sample shape and size are shown in Figure

2.The thickness can be the same as the thickness of the sandwich structure product. The recommended core thickness is 15mm and the panel thickness is 0.5mm~1.0mm.

6.2 The recommended sample width is 60mm, and the width of lattice core materials such as honeycomb and corrugated shall include at least 4 complete lattices.

6.3 The unsupported height of the sample should not be greater than 8 times the thickness. Generally, the ratio of formula (1) is adopted. $t.b.H=1.4.6 (1)$ Where. t

---the thickness of the sample, in millimeters (mm); b

---The width of the sample, in millimeters (mm); H

---The height of the specimen without support, in millimeters (mm).

6.4 The total height of the sample $H'=H+2h$, and the supporting height h is 10mm~20mm.

6.5 The loaded end surface of the sample should be smooth and free of burrs, parallel to each other, and its parallelism tolerance should be 0.10mm, and should be perpendicular to the panel, and the perpendicularity should be normal. The difference is 0.2mm.

6.6 For the orthotropic sandwich structure, the samples are divided into two types.

longitudinal and transverse.

6.7 For the honeycomb sandwich structure, if effective damage cannot be obtained, epoxy adhesive can be used to reinforce or potting within 20mm of both ends of the sample.

6.8 The number of samples is in accordance with GB/T 1446, and at least 5 are valid.

7 Test status adjustment and test environmental conditions

According to the provisions of GB/T 1446.

8 Test procedure

8.1 Screen the samples according to GB/T 1446, number the qualified samples, measure the width of any three places of the sample, and take the arithmetic average. Panel thickness Take the nominal thickness or the average thickness of 10 panels in the same batch of samples. The measurement accuracy is in accordance with GB/T 1446.

Note. 1 value per panel is enough.

8.2 Install the sample in the supporting fixture according to Figure

3. Tighten the screw until the sample does not fall. Pay attention to the centering and adjust the zero point of the testing machine.

8.3 When determining the lateral compressive strength, adjust the circular support, and the two panels of the sample are evenly compressed. Then use 0.5mm/min~2mm/min Load the sample at a constant speed until the specimen fails, record the load-displacement curve, and record the failure mode, see Table 1 and Figure 4.

Note. When the testing machine has a spherical support structure, this structure can be used instead of a round support at one end, while flat support supports are used at both ends of the sample.

8.4 When determining the elastic modulus and Poisson's ratio, adjust the circular support, apply the initial load (approximately 5% of the maximum load), install and adjust the deformation measurement The instrument is loaded to about 15% of the maximum load, and the deformation measurement instrument reading is observed. If the difference between the readings on both sides exceeds 10% of the average value, adjust the support Seat and reload, load at a constant speed of 0.5mm/min~2mm/min to 40%~50% of the failure load, and record the load-deformation data.

8.5 Samples with obvious defects or broken ends should be invalidated. If there are less than 5 valid samples in the same batch, the test should be repeated.

9 Test results and treatment