



Dow Performance Silicones

Using the Dow Joint Movement Indicator

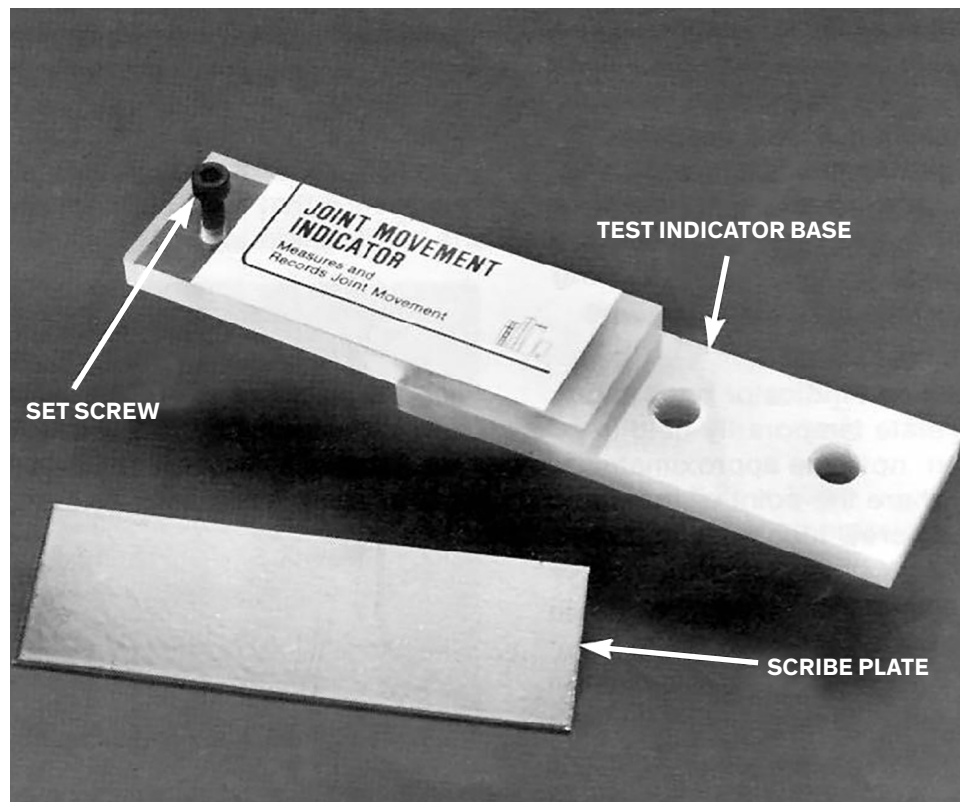


Record Joint Movement Whenever It Occurs

Dow has developed an easy-to-use device that lets you test virtually any sealed joint for expansion and compression, and to record such movement over any period of time. The Joint Movement Indicator measures even the most minute movement of the joint – whether for a day, a month, or an entire year or more. And, since joint movement is recorded with a scratch, it records movement that takes place on a warm, sunny day or in the middle of the worst winter night.

The Joint Movement Indicator unit consists of a metal scribe plate and a test indicator base. A set-screw, tapered to a fine point to form a scriber, is threaded into the test indicator to record joint movement.

With the Indicator, you can determine the exact amount of joint movement. This will let you accurately anticipate the size of the joint required to stay within the movement capabilities of a sealant, as sealants are rated as a percentage of joint size.



Prepare the Surface for the Joint Movement Indicator

First, select the joint you want to test. Position the test indicator as shown in Fig. 1 and trace around it with a pencil or chalk. Follow the same procedure to mark positioning of the scribe plate, which will be directly opposite across the joint.

Figure 1



With the test indicator base and scribe plate temporarily held in position (Fig. 2), note the approximate place where the point of the tapered screw touches the scribe plate. Mark this point on the scribe plate with an arrowhead.

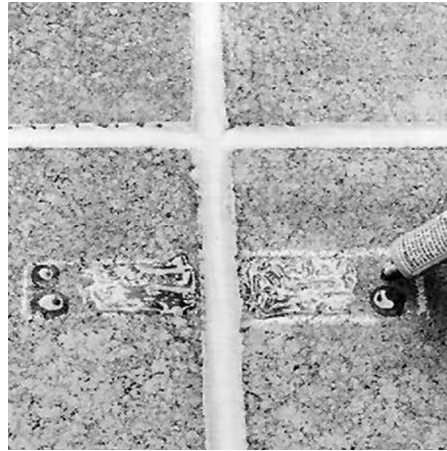
Figure 2



Measure the width of the joint ($\frac{1}{2}$ inch for this example), and record that measurement on the scribe plate, too.

Next, remove the test indicator base and scribe plate, and place two dabs of high-strength epoxy cement¹ in the outlined areas close to the edge of the joint where each part will sit (Fig. 3). Each dab should be about the size of a 5-cent coin.

Figure 3



Mix the epoxy with a stick or spatula and spread the mixture over about two-thirds of the area to be covered. Then, place two smaller dabs of quick-set epoxy adhesive near the outside ends (those farthest from the joint) of the outlined areas and mix as before. Each dab should be about the size of a 10-cent coin.

NOTE: Instead of adhesive, you may use flat-head screws to attach the test indicator to the substrate. If you use this method, ensure that the screw heads are not in line with the point of the set-screw.

Install the Joint Movement Indicator

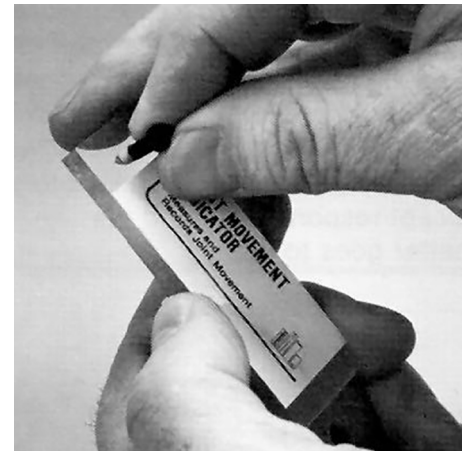
Place the scribe plate on the prepared surface (Fig. 4) and press firmly against the plate to squeeze out any excess epoxy mixture.

Figure 4



Loosen the set-screw in the test indicator (Fig. 5) so that it won't touch the scribe plate when it is placed over it during installation.

Figure 5



¹When using any epoxy, always follow the manufacturer's instructions on the container label regarding precautions, clean-up and disposal.

Place the test indicator base on the opposite side of the joint, directly across from the scribe plate (Fig. 6).

Press the base firmly into the epoxy mixture. As you do this, position the indicator so the point of the screw falls directly in line with the arrowhead you marked on the scribe plate. Hold or tape this assembly in place until the epoxy adhesive sets sufficiently to hold it.

Tighten the set-screw so the point is in firm contact with the scribe plate (Fig. 7). Ensure that the point of the screw is still in direct line with the arrowhead.



Figure 6



Figure 7

Read the Joint Movement Indicator

If the joint has moved due to compression or expansion since the Joint Movement Indicator was installed, the amount of that movement will be recorded on the indicator plate (Fig. 8).

Expansion Formula:

$Inner\ length \div Original\ joint\ width \times 100 = \% \text{ expansion}$

Example: The scribed line is 3/8 inch in(toward the joint) from the arrowhead.

$$Inner\ length = 3/8 \text{ inch (0.375)}$$

$$Original\ joint\ width = 1/2 \text{ inch (0.5)}$$

Therefore:

$$\frac{0.375}{0.5} = 0.75 \times 100 = 75\% \text{ expansion}$$

Compression Formula:

$Outer\ length \div Original\ joint\ width \times 100 = \% \text{ compression}$

Example: The scribed line is 1/8 inch out(away from the joint) from the arrowhead.

$$Outer\ length = 1/8 \text{ inch (0.125)}$$

$$Original\ joint\ width = 1/2 \text{ inch (0.5)}$$

Therefore:

$$\frac{0.125}{0.5} = 0.25 \times 100 = 25\% \text{ compression}$$

You may measure the scribe mark made by the set-screw through the test indicator plate, or you may remove the test indicator and read it directly.

NOTE: If you decide to continue the test, it is better to read the results through the clear plastic. If you remove the test indicator, then decide to continue the test, you must replace the test indicator in the exact position it was in when you removed it.

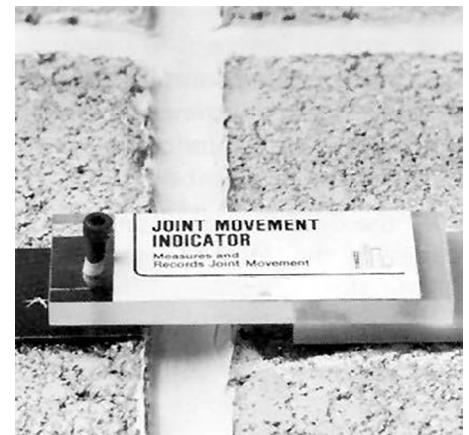


Figure 8

Use the Data

In the preceding example, the joint experienced 75 percent expansion (3/8 inch) and 25 percent compression (1/8 inch) for a total movement of 100 percent (1/2 inch).

Assume the Joint Movement Indicator was in place for one cycle that included the middle of winter and the middle of summer. This is the total movement you can expect. There are four options to seal the joint:

OPTION 1: Grind out the joint to 2 inches. Then you may use any good sealant with a ± 25 percent or greater movement capability. You can install it during any season – even on the hottest afternoon of the year – because $0.5 \text{ inch (total movement)} \div 2 \text{ inches joint width} = 0.25$ or 25 percent.

DOWSIL™ 795 Silicone Building Sealant and DOWSIL™ 790 Silicone Building Sealant are good choices to seal this type of joint.

OPTION 2: Grind out the joint to 1 inch and use any good sealant with ± 25 percent movement capability. *Be absolutely sure the joint is cut and the sealant is installed when the substrate temperature is exactly mid-point between the year's high and low expected temperatures.*

This sealant will tolerate movement of only $\pm 1/4$ inch, to give the $1/2$ inch total movement expected. Extreme care must be taken to meet these conditions exactly, since it's difficult to ensure compliance in actual application.

OPTION 3: Grind out the joint to 1 inch and use a good sealant with ± 50 percent movement capability, like DOWSIL™ 790 Silicone Building Sealant. The sealant may be installed at any convenient time, during any season of the year.

(The sealant's $1/2$ inch total movement $\div 1$ inch joint width = maximum of 50 percent movement in any direction.)

OPTION 4: Leave the joint at $1/2$ inch and use a sealant with ± 50 percent movement capability, like DOWSIL™ 790 Silicone Building Sealant. This product has movement capability *in expansion* of up to 100 percent of the joint width. Install the sealant when the substrate temperature is *at or above* the mid-point for the year.

In all cases, remember that these are minimums. If you know movement is a problem, the safest solution is to use a sealant with higher movement capability than the predicted need determined from the expansion calculation.

DOWSIL™ brand silicone construction sealants include a range of products. DOWSIL™ 795 Silicone Building Sealant has demonstrated ± 50 percent joint movement characteristics. DOWSIL™ 790 Silicone Building Sealant is officially rated at ± 50 percent, but has proven experience of movement capability up to greater than 100 percent of the joint width.

Predicting Yearly Changes from Short-term Data

If the scratch on the indicator plate is recorded during an interval that did not include the hottest and coldest days of the year, short-term data may be used to approximate the joint data for the year. It's easiest if a north exposure is used, since the substrate temperature will approximate the air temperature.

Consider, as an example, a scratch with an inner length of $3/8$ inch and an outer length of $1/8$ inch. It was installed two days earlier. At night, the temperature went to 40°F (5°C), and during the day it reached 80°F (27°C). This region expects

annual low temperatures of 0°F (-18°C), and a high of 105°F (41°C). A south exposure substrate peak temperature is expected to be 140°F (60°C). The total observed movement is $1/8 + 3/8$ (0.5 inches) with 40°F (5°C) total temperature change observed.

The substrate on the south side will see 140°F (60°C) temperature change, so the south side's expected total movement is 140 (yearly temperature change) $\times 0.5$ (total observed movement change) $\div 40$ (observed temperature change).

Example:

$$\frac{140 \times 0.5}{40} = 1.75 \text{ inches total movement expected}$$

NOTE: Movement is probably just from expansion and contraction; settling and other movement factors will add to this.

Dow will help you use the data recorded by the Joint Movement Indicator to resolve problems related to joint movement, to advise you if the intended sealant is inadequate, or to recommend a sealant suited for the job.

However, in order to make recommendations, our Technical Service and Development Department will need the following information:

- All data you get from reading the Joint Movement Indicator
- Approximate temperature of the substrate, which could be different from the air temperature
- Temperature extremes expected over the course of a year at the building site
- Width of the joint when you installed the Joint Movement Indicator
- Building orientation (south wall, west wall, height, etc.)
- Any other data you feel is pertinent

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