KV-C CRACK GAGE
OPERATION MANUAL

Model	Resis-tance(Ω)	Base size	Grid size (mm)				No. of grid lines	Base material
			L₁	L₂	W	a(pitch)		
KV-5C	App.1.0	30×5	5.4	25.2	4.6	0.1	46	Phester

1. To cement the KV-C crack gage, use the CC-33A instantaneous adhesive.
2. As showin in Fig.1, cement the KV-C crack gage so that the L1 side (shorter grid side) of the gage points to the direction of a crack in progress.
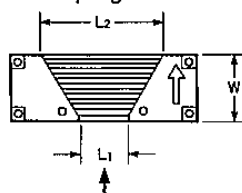
Direction of a crack in progress
Fig.1

3. As shown in Fig.2, a gage terminal can be conveniently used to connect with the gage.
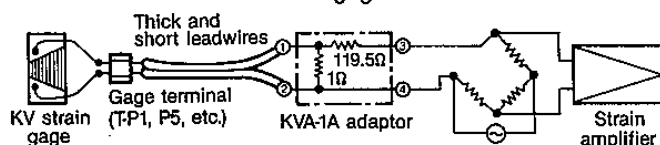

Fig.2

For connection with the adaptor, use leadwires providing as much low (below 0.1Ω) resistance as possible.

Leadwire resistance per one
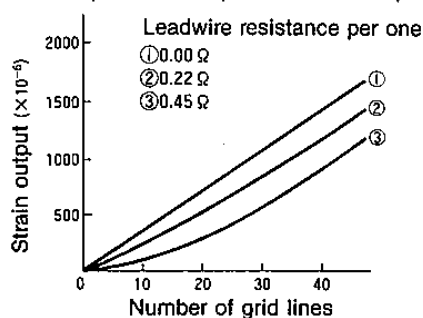① 0.00 Ω
② 0.22 Ω
③ 0.45 Ω

Number of grid lines
Fig.3

4. Solder the gage leadwires at the ① and ② terminals, and connect the ③ and ④ terminals with the active terminals of a bridge box or switch box.
   (If an adaptor is inavailable, use two fixed resistors, 119.5Ω and 1Ω, as illustrated in Fig.2 above. These resistors should provide high stability.)
5. When disconnection occurs to gage grid line/s due to a crack in progress, resistance between the gage terminals also changes. It is then possible to translate changing gage bridge outputs into strains through static calibration of the circuit introduced in Fig.4.
   Making reference to the calibration curve, measure changing strains using a strain amplifier and find the length of a crack in progress
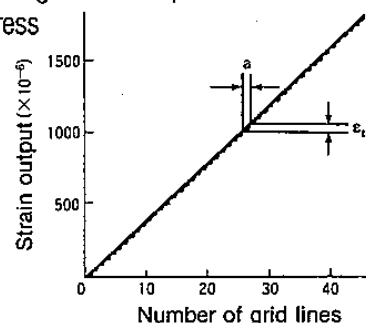

Number of grid lines
Fig.4

6. Draw the calibration curve as follows.
   Suppose that ε_0 is a strain value which is obtained when the gage is connected as in Fig.2, and ε_{MAX} is a strain value which is obtained when one leadwire is disconnected from the gage terminal. Then, strain quanity ε_1 per grid line can be calculated by the equation below, thus allowing to draw the calibration curve.

$$\varepsilon_1 = \frac{\varepsilon_{MAX} - \varepsilon_0}{46}$$

7. In order to measure the propagation speed of a crack, record the condition in which a strain amplifier produces changing outputs in stages on the time axis.
   In the above record, the propagation speed is expressed by the gradient which is presented by a straight line connecting two peaks in the square waveform.
   For example, speed v at point P in Fig.5 is expressed by:

$$v = \frac{a}{t}$$

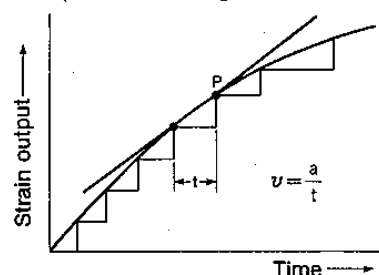where a is the pitch between grid lines in the gage pattern.

Time
Fig.5

High-speed propagation of a crack should be photographed with an oscilloscope.

8. At the front and rear of the gage, a start trigger and an end trigger are provided, respectively. The start trigger transmits a signal at the occurrence of a crack, and end trigger transmits a signal at the completion of crack measurement.
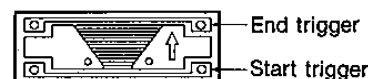

End trigger
Start trigger
Fig.6