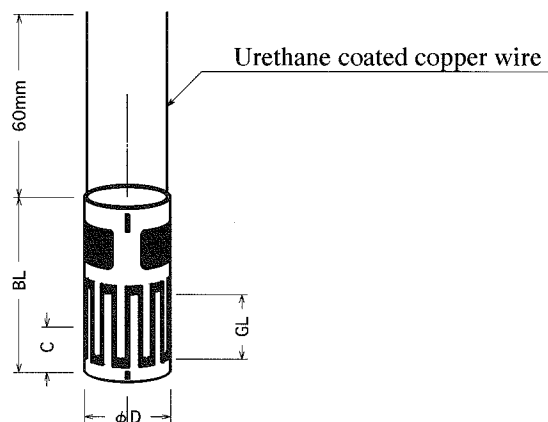


Showa Pipe Gages for Measurement of Axial Power of Bolts



General:

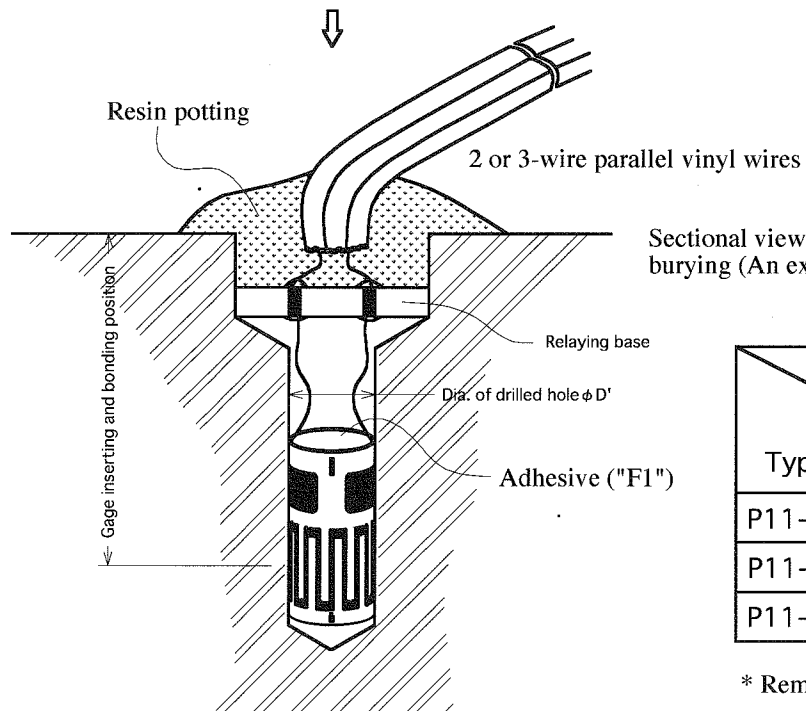
In 1981, we were successful in starting the marketing of PIPE GAGES as strain gage feature applied components although one of the most usual methods for the measurement of axial power of bolts had been to fix on the intended surfaces ordinary processed strain gages for measurement, which, as you may be aware, is not sufficiently precise. On the other hand, on measurement of axial power by means of the PIPE GAGES, the specially featured strain gages are buried into the hole preliminarily drilled through the center of bolts as shown in the left figures. Through this unique method, an excellent and precise detection of strain and stress has become possible because the measuring results have been always almost free from any effects from bending or torque moments. Recently, demands for high strength and high tension bolts have been increased in various industrial fields including automobiles, architecture, machinery, civil engineering, and so on, where our PIPE GAGES are widely used with high reputation for the evaluation of axial power of the bolts.

Applications:

- * As the low-cost load sensor to be used for measurement of axial force of bolts.
- * For measurement of contact pressure (Reference Literature: The Japan Machinery Academy Magazine, November, 1993).

Specifications:

- * Specifications to be in accordance with those of ordinary strain gages.
- * The maximum strain measuring range: $\epsilon \geq 5000$ microstrain (Depending on bonding condition of adhesive).



Sectional view of PIPE GAGE burying (An example)

Table of Sizes

Types	Sizes, etc.	Gage Length	Base Length	Center of the Gage	External Dia.	Dia. of Lead-Wire	Dia. of drilled Hole	Adhesive
		GL [mm]	BL [mm]	C [mm]	ϕD [mm]	ϕ [mm]	$\phi D'$ [mm]	(recommended)
P11-FA-05-120-11		0.5	3.5	1.2	1.0	0.08	1.1	F1
P11-FA-2-120-11		2.0	8.0	2.0	1.4	0.12	1.5	F1
P11-FA-3-120-11-S		3.0	11.0	2.5	1.9	0.12	2.0	F1

* Remarks: The item described on the catalogue of "P11-FA-3-120-11" (External dia.: 2.1 mm) is still being on production.