



## ***Anchoring GFRP reinforcing bars and rods in metal pipe tabs for tensile testing (15 words or less)***

**Problem/Question** – The first paragraph in this section should clearly identify the issue in the state-of-the-practice that needs to be solved (Problem) and provide a brief summary or outline of the subject matter (Question).

**Response** – The second paragraph should concisely describe the solution and alternatives to the subject matter raised in the question (Response).

*Keywords:* these should include at least 3 applicable keywords (but no more than 6) to succinctly describe the matter in the document and facilitate an online search

### **Applicability**

This should clearly describe the applicability and/or limitation of the proposed solution and alternatives of the subject matter.

### **Discussion**

This should effectively communicate the type of information presented, the importance of the subject matter, the proposed method/approach, and demonstrate the required procedure if applicable (below is part of an example).

*PracNotes* are written in nonmandatory language and should have no more than 3500 words or word-equivalents (fewer than four pages in single-spaced and double-column format). Section word headings should not be numbered. The manuscript should be prepared in a single-column and double-spaced format with continuous line numbering and Times New Roman font in 11-point type. The document can include photographic images (with a minimum resolution of 300 dpi), drawings, plots and numeric examples besides body text.

The International System of units (SI) should be used as the primary units of measure. Since *PracNotes* are practice-oriented, imperial units of measurement (secondary units) should be given in parentheses after the SI unit for a dual-unit format.

### **Equipment**

- Assembly rack with clips to hold the specimens centered and in a vertical position
- Containers for mixing and measuring the potting material
- Scale for weighing mortar components as needed

### **Material**

- Potting compound such as expansive mortar or grout. Selection of potting compound is described further below.
- Schedule 40 steel pipes per Table 1 – two lengths are required per bar/rod specimen.

### **Specimens**

- Each bar/rod specimen is cut to the correct length using a saw and mounted in the appropriate anchorage. The bar/rod length should be the required gauge length plus the required embedment length (Table 1) at each end.

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**Table 1** Recommended pipe tab dimensions

Nominal bar/rod size	Schedule 40 steel pipe diameter	Length
#2 (6.4 mm)	19 mm (3/4")	250 mm (10")
#3 (9.5 mm)	19 mm (3/4")	250 mm (10")
#4 (12.5 mm)	25 mm (1")	250 mm (10")

**Procedure**

1. Seal one end of the pipe to be used as the tab so the potting compound will be contained prior to setting. Methods for sealing this end are further described in this document.
2. Mix potting compound or grout as instructed by the manufacturer.
3. Store the specimen in an upright position to prevent the grout from running out or the bar/rod to become off center as seen in Fig. 1.



**Figure 1** Grouted tabs.

**Tips and enhancements to ensure successful tabbing for accurate and consistent test results**

1. A good quality expansive mortar or grout compound is critical and can significantly impact the success and repeatability of testing by ensuring a strong, uniform and consistent bond between the tab and the test specimen. Several brands and types of grout have been shown to work well with the bar/rod and pipe tab combinations shown in Table 1; these include, but are not limited to, those produced by Hydro-Stone, Pilgrim’s MagmaFlo, compounds from RockFrac, and expansive mortars from Dexpan. One should experiment with different types to find which gives the most success for specific laboratory conditions and potting techniques. Lower viscosity mortars or grouts are often easier to pour between the tube and the specimen but also usually have lower expansion, resulting in poorer bonding to the tab. It is important to find a balance between potting compounds that may be reliably poured and those that give good adhesion.
2. The tubing used for tabbing can have a dramatic impact. The test methods call for schedule 40 steel pipe, but thicker schedule 80 pipe and cold-rolled seamless tubing have been used with higher rates of success due to their resistance to bulging when more expansive grouts are used. Using thicker tubing results in more internal pressure between the tube and the bar/rod and provides better grip on the test specimen.

**Summary**

This should briefly state the principle conclusions, procedures, and or implications in practice.

**References**

All references should be cited within the body of the document using a typical author-date format (e.g., Johnson and Davis et al. 2018). They should be listed alphabetically in a section by last name of the first author.

**Authors:** It should include the full name of each contributing author and his or her affiliation and professional designation (e.g., Ph.D., P.E., S.E.), if applicable. The corresponding author should be noted with an asterisk symbol.

A *PracNote* (i.e., Practice Note) is a practice-oriented guide focusing on a single topic related to the application of fibre-reinforced polymer (FRP) composites in civil infrastructures and in the service of the engineering profession and society.