3.0 RESULTS AND DISCUSSION

3.1 Flowability

The results of the flowing ability test of polyester grouts with various level of fly ash are illustrated in Figure 4. The effect of the fly ash content on the flowing ability (flow spread) of the polymer resin grouts is evident from this Figure. In general, the flow spread of grouts decrease with the increase in the fly ash content. This is attributed to the increase in surface area of the filler in the presence of fly ash. These results were useful for selecting the proper fly ash contents to be used in polyester grout mixtures as infill material. The fly ash content greater than 16% was not effective for a good flowing ability of polymer resin grout. In addition, handling and mixing difficulties encountered in the polyester grout with fly ash content of 32%. Therefore, PG-32-30 mix is impossible to be use as infill material for lack of its flowability. It was understood based on the mortar flowability results that a fly ash contents greater than 16% should not be used for polyester grout as infill material for grouted connection. Because the flowability of this polyester grout will use as bonding material is limited by the practicalities of pouring the polyester grout mix in the grouted connection.

![Figure 4](image-url) Flow spread of polyester grouts with various fly ash contents.

3.2 Compressive Strength

Figure 5 presents the results of the effect of fly ash content on the compressive strength at the age of 1 day of polyester grouts with binder to filler ratio of 0.43 and total filler content of 70%. The change in compressive strength of PG mixes with fly ash content is nearly the same up to 22%. However, beyond 22%, it increases with filler content. The highest value of the compression strength of 65.48 MPa was obtained for mix PG-32-30 with 32% of fly ash of the total mix volume.

![Figure 5](image-url) Compressive strength of polymer resin grout versus proportion of fly ash

3.3 Tensile Performance of Polyester Grouted Connections

The load- displacement curve, stresses-strain curve and the mode of failure for tested polyester grouted connections are shown in Figures 6, 7 and 8. The ultimate load, stress and strain for all connections are presented in Table 3. From Figures 6 and 8, it can be noticed that, two types of behaviour were observed. Firstly, specimens D33-Le100 and D33-Le75 provide inadequate bond and failed in brittle manner due to bar slippage out of the sleeve before the spliced bars yielded. Secondly, specimen D33-Le125 with bar embedded length of 125 mm provide adequate bond and failed in spliced bar fractured outside in ductile manner. The spliced bars in the sleeve was yielded and elongated before fracture outside of the sleeve. Referring to Figure 7 and Table 3, the specimens that failed by bar pull out D33-Le100 and D33-Le75 with the bar embedded length are 100 mm and 75 mm respectively had the ultimate tensile stresses in the spliced bar below the specified yield stress of 500 N/mm². The spliced bar didn’t yield at the strain less than 2300x10^-6 mm/mm, indicating that the spliced bars remained elastic throughout the test. On the other hand, the maximum stress reached in the bar of specimen D33-Le125 was 612.06 N/mm² this value is beyond the specified yield stresses of the deformed bar of 500 N/mm². Also in view of the maximum strain of 3550x10^-6 mm/mm reached in the bar is substantially greater than the yield strain of 2300x10^-6 mm/mm. In the case of D33-Le125 (see Figure 7), the spliced bars behaved elastically before yielding, and then, behaved in-elastically after yielding and experienced a sudden...