

# Bursting Analysis of GFRP Composite Pipeline Used in Oil & Gas Applications

S. Thirumavalavan, Hariharan.R, R. Shravanan

**Abstract:** The goal of this trial study was to research the impacts of low speed effect stacking on the weight bearing limit of the E-Glass and Epoxy Composite Pipe. In this investigation we are looking at the Burst Test Results of both PVC Pipe and FRP Pipe. The examples were loaded up with water and exposed to blast test until particular spillage disappointment is watched.

**Keywords :** Bearing Limit, E – Glass

## I. INTRODUCTION

Elite composite segments are normally made of layers every one of them having directional properties. Composite funnels are progressively utilized in the oil and gas industry, rather than ordinary carbon steel channels. The fundamental explanation is the better erosion opposition of composite channels contrasted with steel funnels. The main composite choices to steel pipelines comprised of composite funnels dependent on thermoset frameworks[19],[21],[22]. The properties of thermoset composites are outstanding and reported. Be that as it may, the expanding requests of the oil and gas industry, including high temperature opposition and the requirement for harm resistance and adaptability, frequently surpass the abilities of thermosets. As thermoplastics can fulfill these requests, a few sorts of consistent fiber strengthened thermoplastic pipe (RTP) frameworks are at present being worked on[1],[3],[5].

Quite a bit of our current pipeline framework is built from steel. Steel is solid, precisely vigorous and generally economical. In any case, huge aggregates of cash are spent in attempting to diminish the introduction of steel pipelines to destructive situations. One approach to conquer this issue is to utilize a material with great consumption obstruction, for example, glass fiber strengthened polymers (GFRPs), rather than steel. GFRPs speak to an appealing option for pipelines exposed to serious inward or outside conditions in coastal or seaward applications[2],[4],[6].

## II. MATERIALS

The glass fiber fabric is taken and cut into explicit measurements and with appropriate direction. The required number of layers for getting the all out thickness can be

controlled by considering the tangle thickness and the glass-to-pitch proportion by weight.

The glass filaments are gauged and the tar is taken as 1:1 proportion by the heaviness of the fiber. At that point hardener is included by 10% of the heaviness of the tar or fiber. The gum and hardener are totally blended which structures the framework[7],[9],[11].

## III. FABRICATION OF THE GFRP COMPOSITE

Gel coat is first applied to the shape utilizing a splash firearm for an excellent surface, which goes about as a discharging specialist among item and form.

- o When the gel coat has restored adequately, move stock fiberglass support is physically put on the form.
- o The covering pitch is applied by pouring, brushing, showering, or utilizing a paint roller[8],[10],[12].
- o FRP rollers, paint rollers, or squeegees are utilized to merge the cover, completely wetting the support and evacuating captured air.
- o Subsequent layers of fiberglass fortification are added to fabricate cover thickness.
- o Setup is kept 24hrs for relieving, after which it is evacuated cautiously.



Figure – 1 E – Glass fiber

**Revised Manuscript Received on August 22, 2019.**

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Figure 2 - Glass-Epoxy Composite (GFRP) Pipe Fabrication



Figure – 3 PVC and GFRP Pipes

readiness, their level of beating and refining, upon sheet development, and the utilization of added substances[13],[15],[17] .

The weight perusing at the moment of break is recorded as the blasting quality. The units of articulation are pounds per square inch or "points". The estimation is differently named the "Mullen", "pop test", or essentially the "burst". The burst test for paperboard contrasts from that of lighter papers in that a heavier Mullen analyzer is utilized with a bigger stomach opening



Fig.6 Fixture of GFRP Pipe Before Testing

#### IV. TEST METHODS

##### A. Impact Test

Impacttesting is ASTM standard strategy for deciding the effect obstruction of materials. An arm held at a particular tallness (steady potential vitality) is discharged. The arm hits the example.



Figure - 4 Impact Test on GFRP Pipe Specimen

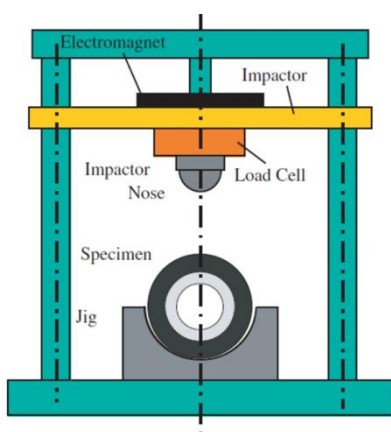


Figure 5 - Impact Tests Apparatus

##### B. Burning Test

The blasting quality of paper or paperboard is a composite quality property that is influenced by different properties of the sheet, chiefly elasticity and stretch[14],[16],[18]. For the most part, blasting quality relies on the sort, extent, and measure of strands present in the sheet, their strategy for



Figure 7 - GFRP Pipe Connected with Pressure Lines for Testing



Figure - 8 Bursting Test of GFRP Pipe



Figure 9 - Bursting Test of PVC Pipe



Figure 10- After Bursting Test of PVC Pipe

## V. RESULTS

Circumference of the pipes = 63mm  
Wall Thickness of the pipes = 2mm

Sample	Burst Pressure (Kg/Cm <sup>2</sup> )	Impact Test
UPVC Pipe	20.0	No Crack and Split Observed
GFRP Pipe	34.0	No Crack and Split Observed

## VI. CONCLUSION

1. It is explained that the essential driver of the debasement of leftover burst quality is fiber breakage brought about by small scale clasping.
2. Delamination of glass layer likewise debases the remaining quality.
3. The burst weight limit of the pipe will diminish with increment in harm zone brought about by the effect vitality.
4. GFRP pipe of same divider thickness as PVC pipe has 70% more blasted weight limit than PVC pipe.

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