CDF Controlled Density Fill – C4 to C12

Rapid Curing, Flowable Fill, Controlled Density Fill [CDF]

INTRODUCTION

Axtell Rapid Foam uses a liquid air entrained admixture to produce a low strength fill material which is often referred to in the construction industry as flowable fill, controlled density fill, flowable mortar and sand-cement slurry.

Rapid Foam is fast setting to minimise disruption associated with safety issues when guarding a liquid construction and/or speed of production to reinstate the road/specific application without costly delays.

Rapid Foam is self-levelling low strength material with a flowable consistency that is used as an economical fill or backfill material and a viable alternative to compacting granular fill. Note: CDF or Flowable fill is not concrete nor is it used to replace conventional concrete.

Rapid Foam contains specially selected and graded aggregates, cement components and chemical admixtures which comply with BS EN 934.

Concrete Technology Guidance

ADVANTAGES

- Readily available, using locally sourced materials.
- Rapid setting for improved safety and speed of production.
- Flowable fill does not form voids during placement, and won't settle, this advantage is especially significant if the backfill in a utility trench is to be covered by a pavement patch.
- Flowable fill mix designs can be adjusted to meet specific requirements and a variety of performance characteristics.
- Depending on the type and location of void to be filled, flowable fill can be placed by chute, conveyor, pump, or bucket. Because flowable fill is self-levelling, it needs little or no spreading or compacting.
- Load-carrying capacities of flowable fill typically are higher than those of compacted soil or granular fill.

Either a low compressive strength excavatable with conventional equipment for most backfilling needs or higher strengths for more specific load-bearing applications are available.

APPLICATIONS

Rapid Foam broadens the potential applications and uses for CDF applications, utilising stable air contents and reductions in both water contents and cement factors; this establishes a product which does not segregate, settle or bleed, resulting in a homogeneous, cohesive CDF which can be placed in one pass.

Rapid Foam is placed as a flowable liquid yet hardens and rapidly develops load-bearing properties with no compaction. The properties of flowable fill make it an economical alternative to a compacted granular material due to savings of labour and time during placement. Flowable fill also has the advantage of displacing any standing water left in a trench. The flowable characteristics of this material can readily be placed into a trench with tight or restricted access.

PERFORMANCE PARAMETERS

Rapid Foam achieves Initial Set within 4-hours and Final Set after 5-hours; this is justified to an approximate 1.0N/mm^2 strength which is both a stabilised structure but also allows quicker reinstatement operations.

The general strength characteristics is defined as 4.0 N/mm^2, although most applications would use strengths less than 2.0 N/mm^2; the Rapid Foam CDF range will accommodate strengths from C4 to C12. CDF has a standard design parameter to achieve stable air contents ranging from 15-35%, which not only improves material yields but more importantly, allows for ultimate strength cap specifications for future excavations.

Rapid Foam achieves excellent flowing characteristics via the "ball-bearing" effect caused by the presence of millions of air voids, in lieu of utilising conventional methods to obtain flowability (i.e. high-water contents). In terms of its flowability, consistence as measured for concrete, is generally greater than 200mm. It is a free flowing / self-levelling material and can be placed with minimal effect and does not require tamping or vibration. It hardens into a stable material with minimum subsidence.

CDF materials should not be expected to resist cycles of freezing and thawing, abrasive or erosive actions, or aggressive chemicals; if CDF deteriorates in place it will continue to function like a granular fill. CDF does not need to be cured like concrete but should be protected from freezing until it has hardened.

INSULATED CURING

To attain the full-strength potential, it is the essential to install insulation curing blankets which will maintain the temperature and strength gain but can be removed quickly and easily.

CDF-FLOWABLE FILL APPLICATIONS

Flowable fill is an economical alternative to compacted granular fill considering the savings in labour costs, equipment and time. Since it does not need manual compaction, trench width or the size of excavation is significantly reduced. Placing flowable fill does not require personnel to enter an excavation, a significant safety concern.

USES OF CDF-FLOWABLE FILL

Backfill – sewer trenches, utility trenches, bridge abutments, retaining walls conduit encasements, pile excavations, and road cuts.

Note: Flowable fill is beneficial as a bedding material for pipe, electrical, telephone, and other types of conduits because the mixture easily fills voids beneath the conduit and provides uniform support.

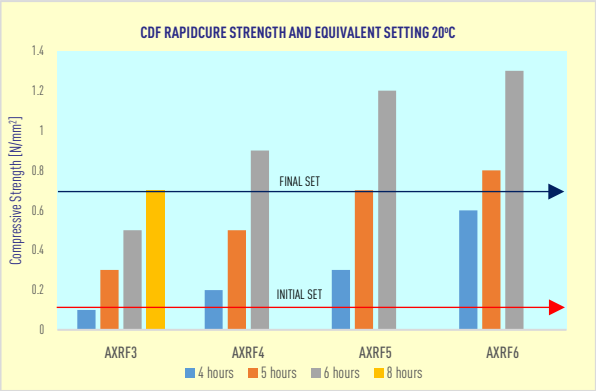
Structural Fill – foundation sub-base, sub-footing, floor slab base, pavement bases and conduit bedding.

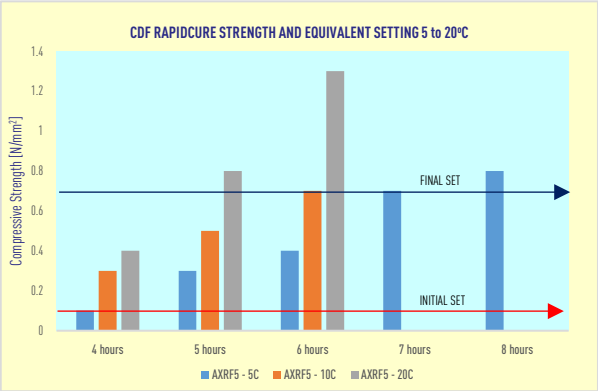
Other Uses – abandoned mines, underground storage tanks, wells, abandoned tunnel shafts and sewers, basements and underground structures, voids under pavement, erosion control and thermal insulation with high air content flowable fill

CDF is also an excellent solution for filling inaccessible areas, such as underground tanks, where compacted fill cannot be placed.

CDF Controlled Density Fill – C4 to C12

Rapid Curing, Flowable Fill, Controlled Density Fill [CDF]





CAUTIONS WITH TRADITIONAL FLOWABLE FILL

1. Flowable fill will exert fluid pressure against forms, embankment, or walls used to contain the fill, until setting has occurred.
   - Rapid Foam will significantly reduce the period of fluid pressure
2. In-place fluid flowable fill should be covered or cordoned off for both site and general public safety objectives.
   - Rapid Foam only requires safety measures for up to 5-hours
3. Placement of flowable fill around and under tanks, pipes or large containers can cause these items to float or shift
   - Should be addressed by placing appropriate anchorage points

POTENTIAL STRENGTH RANGE [N/mm²]

	AXRF3 RAPID FOAM	AXRF4 RAPID FOAM	AXRF5 RAPID FOAM	AXRF6 RAPID FOAM
4 hours	0.1	0.2	0.3	0.6
5 hours	0.3	0.5	0.7	0.8
6 hours	0.5	0.9	1.2	1.3
7-28 days	4.5 – 6.0	7.0 – 8.5	8.5 – 10.0	13.5 – 17.0

Concrete Technology Guidance

RAPIDFOAM CDF:	CONTRACTORS:	THE CLIENT:
• C4 to C12 Strength Range	• Easier Pumping and Placement	• Reduced Penalty Clauses
• Final Set after 5-hours	• No Tamping or Vibration Required	• Improved Site Safety
• Cohesive Flow Consistence	• Speed of Production / Reinstatement	• Offers Numerous Cost Advantages
	• Hardens into a Stable Material with Minimum Subsidence	• Can be Easily Excavated

TECHNICAL SERVICE

Our Technical Service department of Axtell Limited is available to assist and provide a technical and advisable service, which can be consulted early in the design process. This service can assist to create bespoke mixes, or if requested provide suggestions to ensure specification needs of the project.

Contact:

Nick Page **Technical Manager**
Mobile: **07823 344732**
Tele: **01483 203447**
E-mail: **nick.page@axtell.co.uk**

HEALTH AND SAFETY

Wet concrete can cause serious alkali burns, a form of skin ulceration, from contact with freshly mixed concrete. Allergic contact dermatitis may be caused by individual sensitivity to Chromium (VI) compounds in cement.

Suitable protective clothing must be worn when working with concrete (long-sleeved clothing, gloves, full length trousers, safety glasses and impervious safety boots). Keep out of reach of children.

Back injuries are a hazard when lifting, stand clear of the truck when it's manoeuvring and discharging the load.