



GoldenAir™

TECHNICAL BULLETIN GA 946

GoldenAir™

For Controlled Low Strength Material (CLSM) - Flowable Fill

A superior replacement for conventionally compacted backfill material.

Important advantages for:

- Contractors - Faster set times in all weather conditions.
- Engineers and Specifiers - Will not subside after placement.
- Pump Operators - More cohesive, low - bleed mixes will not segregate and jam lines.
- Maintenance departments - Will remain excavatable for the life of the project.

GoldenAir™ Flowable Fill is the solution to these construction demands.

Typical Mixes

Mix Designation	Features	Set Times (Hrs)		Easy to Remove
		65 ⁰ +	44 ⁰ -64 ⁰	28 day Strength
GA1	Flowable Cohesive Non-bleeding Fast Setting Mix	3-5	4-6	Machine Removable Less than 200 psi or 1.38 Mpa
GA2	Flowable Cohesive Non-Bleeding Low Strength Medium Fast Set Times	4-7	5-9	Hand or Machine Removable Less than 150 psi or 1.03 Mpa
GA3	Designed for easy placement and pumping Normal Set Times	6+	12+	Machine Removable Less than 200 psi or 1.38 Mpa
GA4	Ultra flowable and consistent. Designed for excellent pumpability through 2" lines Normal Set Times	6+	12+	Machine Removable Less than 200 psi or 1.38 Mpa



- **GA1** For fast set applications. Ideal for utility trench work in situations where rapid paving is required to open roads quickly. This mix sets in under 5 hours in cold saturated soil conditions. Ultimate strengths are capped at less than 200 psi or 1.38 Mpa for long term excavatability.
- **GA2** Meets a wide range of trench and surface-work fill needs in non-vehicular applications. Strengths are capped at less than 150 psi or 1.03 Mpa.
- **GA3** Excellent stability. Excellent pumpability. Strengths are capped at less than 200 psi or 1.38 Mpa.
- **GA4** Meets the tough pumping demands of small diameter pump lines. Strengths are capped at less than 200 psi or 1.38 Mpa.

Typical Mix Designs

GoldenAir™ is added at the jobsite and mixed for 5 minutes at mixing speed

These designs are for **ONE CUBIC YARD** after foaming with GoldenAir™

Mix Designation	Cement (lb)	Flyash (lb)	CLSM Wt. (lb)	Sand C-33 (lb)	Water (gal)	GoldenAir (per cu yd)	Slump before GoldenAir (inches)	Slump After GoldenAir (inches)
GA1	125 -150	0	113.5	2600	30	3 oz.	±1.5	7 - 9
GA2	75 - 100	0	115	2500	32	3 oz.	±1.5	7 - 9
GA3	50	250	112	2500	34	3 oz.	±1.5	7 - 9
GA4	50	350	110	2300	35	3 oz.	±1.5	7 - 9

These designs are for **ONE CUBIC METER** after foaming with GoldenAir™

Mix Designation	Cement (kg)	Flyash (kg)	CLSM Wt. (kg)	Sand C-33 (kg)	Water (liters)	GoldenAir (per cu meter)	Slump before GoldenAir (mm)	Slump After GoldenAir (mm)
GA1	75 -90	0	67.0	1545	115	116 ml.	±38	178 - 228
GA2	45 - 60	0	68.2	1485	120	116 ml.	±38	178 - 228
GA3	30	115	66.4	1485	129	116 ml.	±38	178 - 228
GA4	30	160	65.3	1365	132	116 ml.	±38	178 - 228

Controlled Low Strength Material (CLSM) is referred to by American Concrete Institute (ACI) Committee 229-R-94 report as material typically having compressive strength less than 300 psi or 2.07 Mpa. A CLSM compressive strength of 50 - 100 psi or 0.34 - 0.69 Mpa equates to an allowable bearing capacity of a well-compacted soil.

- **NOTE:** Our appreciation is extended to our many customers who have provided us with these successful GoldenAir™ flowable fill typical mix designs. Mix performance and design requirements vary due to local material conditions, availability and economics. Please refer to your local geological engineer for design criteria. These designs are typical designs only.