PHOENIX FLY ASH

CLASS F POZZOLAN

Salt River Materials Group

100% American™

Salt River Materials Group (SRMG) Class F Fly Ash meets all chemical and physical requirements of the current ASTM Specification C 618 Coal Fly Ash for use in Concrete. Collected and processed at several power plants in Northern Arizona and New Mexico, Phoenix Class F fly ash is a pre-approved pozzolan source for Arizona Department of Transportation (ADOT), Caltrans, New Mexico Department of Transportation (NMDOT), Colorado Department of Transportation (CDOT), Texas Department of Transportation (TxDOT), Utah Department of Transportation (UDOT), Idaho Transportation Department (IDT), Nevada Department of Transportation (NDOT), the Bureau of Reclamation and the Army Corps of Engineers.

Proportioning

Under normal conditions, Phoenix Class F fly ash is used to replace 15-35% of portland cement by weight. Replacement rates outside of this normal range have been used successfully for more specialized applications. Phoenix Class F fly ash can also be added without cement reduction to achieve desired mix characteristics. Throughout the range of fly ash percentages, proper testing can provide proportions and material combinations yielding competitive strengths at various age requirements.

Strength, Set Time and Pumping Ability

Strengths of concrete properly proportioned with Phoenix Class F fly ash can be designed to closely match those of equivalent cement-only mixes. In fact, due to the secondary pozzolanic reaction, fly ash mixes with similar 28-day compressive strengths generally achieve 10-20% higher strengths at ages beyond 28 days.

Concrete set times utilizing 15-35% Phoenix Class F fly ash can be extended if adjustments are not made to the mix. Proper testing can provide the materials combinations and proportions to yield comparable set times. Due to the spherical particle shape of fly ash, the ball bearing effect, whereby the use of fly ash in concrete lubricates the mix, results in superior pumping ability in mixes using very angular materials or high in coarse aggregate content.

Durability

Tests made in accordance with ASTM C 441 and ASTM C 1012 have shown that the use of Phoenix Class F fly ash significantly reduces the potential for damage due to alkali-aggregate reactivity and sulfate attack. ACI 232.2, Use of Fly Ash in Concrete recommends Type II cement and Class F fly ash as superior to Type V cement alone for high resistance to sulfate attack.

Water Demand

Depending on the quantity of ash used, the use of Phoenix Class F fly ash consistently provides a 10% or greater reduction in the amount of water required for a given workability. This translates directly into increased strength and durability, reduced potential for shrinkage, reduced segregation, and most importantly, lower permeability.

Uniformity

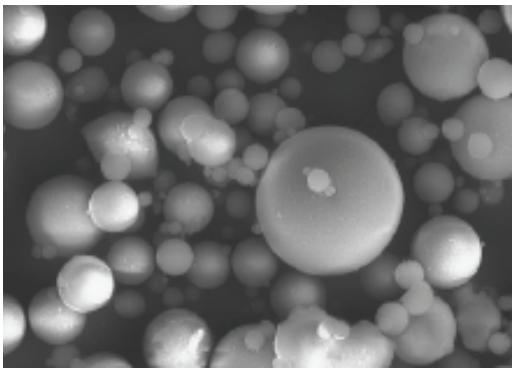
Phoenix Class F fly ash is selected by particle size to ensure the best and most consistent performance possible. In-line sampling can detect inferior fly ash and allow operators to reject it before the fly ash reaches the customer. This is why the carbon content in Phoenix Class F fly ash is consistently some of the lowest found in the region.

The understanding of end product performance enhances our ability to provide predictable and consistent product meeting customer requirements.

SRMG has processed and supplied fly ash to the Southwest since 1986. This experience enables SRMG to continue to provide some of the highest quality fly ash available.

Sources of Salt River Materials Group Fly Ash:

• Cholla • Four Corners • San Juan • Escalante



Micrograph of Cholla Fly Ash particles

Four Corners Fly Ash Facility

	ASTM C618 Average Results				Class F
Chemical Analysis	Cholla	Four Corners	San Juan	Escalante	Specification
Calcium Oxide, CaO_2	3.86%	2.10%	4.66%	3.91%	NA
Silicon Dioxide, SiO_2	59.33%	61.70%	56.31%	62.31%	NA
Aluminum Oxide, Al_2O_3	23.78%	24.60%	27.24%	23.01%	NA
Ferric Oxide, Fe_2O_3	6.22%	4.38%	3.61%	4.82%	NA
$SiO_2+Al_2O_3+Fe_2O_3$	89.33%	90.68%	87.16%	90.13%	70.0% Min
Magnesium Oxide, MgO	1.39%	1.22%	1.15%	1.24%	NA
Sulfur Trioxide, SO_3	0.33%	0.18%	0.38%	0.23%	5.0% Max
Moisture content	0.06%	0.06%	0.06%	0.05%	3.0% Max
Loss on Ignition	0.36%	0.29%	0.45%	0.20%	6.0% Max
Available alkalies as Na_2O	0.35%	0.35%	0.42%	0.28%	1.5% Max*
Total alkalies as Na_2O	1.35%	2.01%	2.04%	1.21%	5.0% Max*
Physical Analysis					
Fineness, +325 Sieve	20.0%	22.0%	16.0%	25.0%	34.0% Max
Variation from average	0.30%	0.31%	0.58%	0.14%	5.0% Max
Density, g/cm³	2.25	1.95	2.05	2.10	NA
Variation from average	0.00%	0.00%	0.00%	0.02%	5.0% Max
Strength Activity Index w/ Cement					
7 Day, % of control	80%	79%	78%	78%	NA
28 Day, % of control	87%	85%	82%	85%	75% Min
Water Requirement, % of control	95%	96%	97%	96%	105% Max
Soundness	-0.03%	-0.03%	0.00%	-0.02%	0.8% Max

* not an ASTM specification requirement

Mission Statement

Creating Opportunities and Solutions with Quality Products and Exceptional People

Values

Profitability The Right Way...
Integrity, Accountability, Excellence

SRMG Salt River Materials Group

PHOENIX CEMENT 100% AMERICAN

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