

# HOLCIM DUQUESNE SLAG

## AIR COOLED BLAST FURNACE SLAG

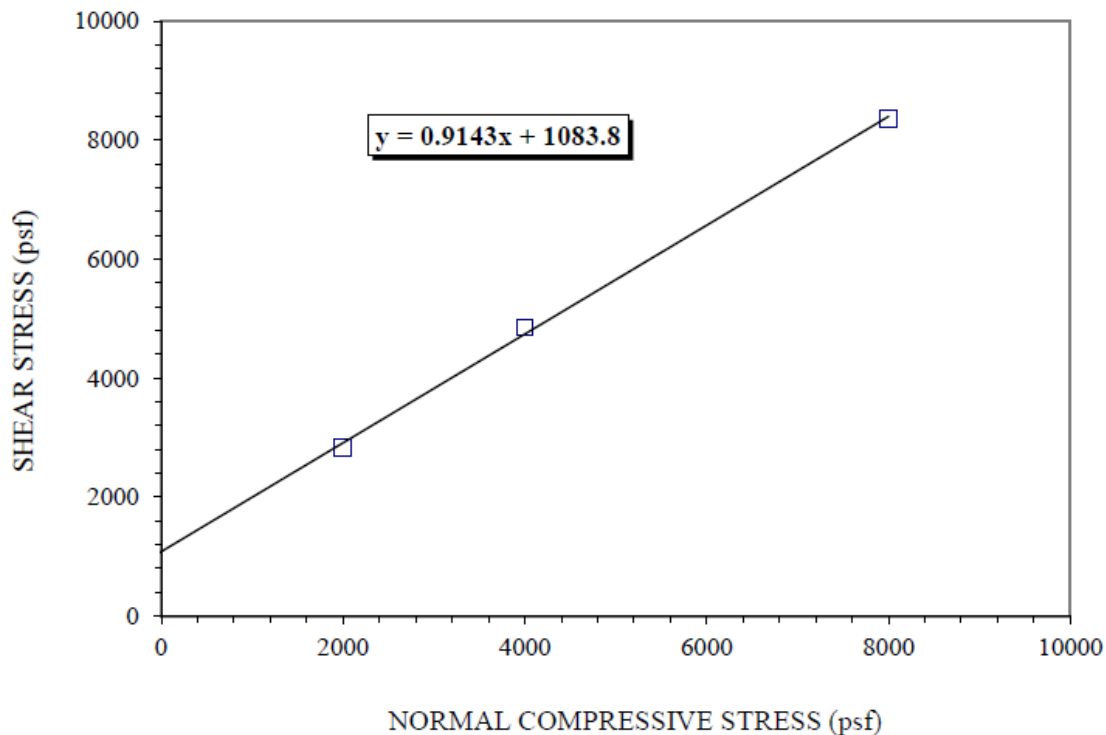
#57 Shear  
Test Results

INTERFACE : 12" Direct Shear of #57 Aggregate  
@ 86.1 pcf & 5.7 % M.C.

### PEAK SHEAR

FRICITION ANGLE (deg) :  $\Phi = 42.4$   
COEFFICIENT OF FRICTION : = 0.914  
COHESION [Calculated] (psf): a = 1084

- NOTES:
- 1.) Specimen was lightly compacted at the as-received moisture content.
  - 2.) The specimen was loaded & seated for 1 hour prior to shearing.
  - 3.) The peak friction angle was calculated using linear regression on the three data points.



In the United States, Holcim is the leader in innovative and sustainable building solutions. Our customers rely on us to help them design and build better communities that deliver structural integrity and eco-efficiency.

**Duquesne Slag Operations**  
890 Noble Drive  
West Mifflin, PA 15122  
Tel.: 412-461-1163  
[www.holcim.us](http://www.holcim.us)

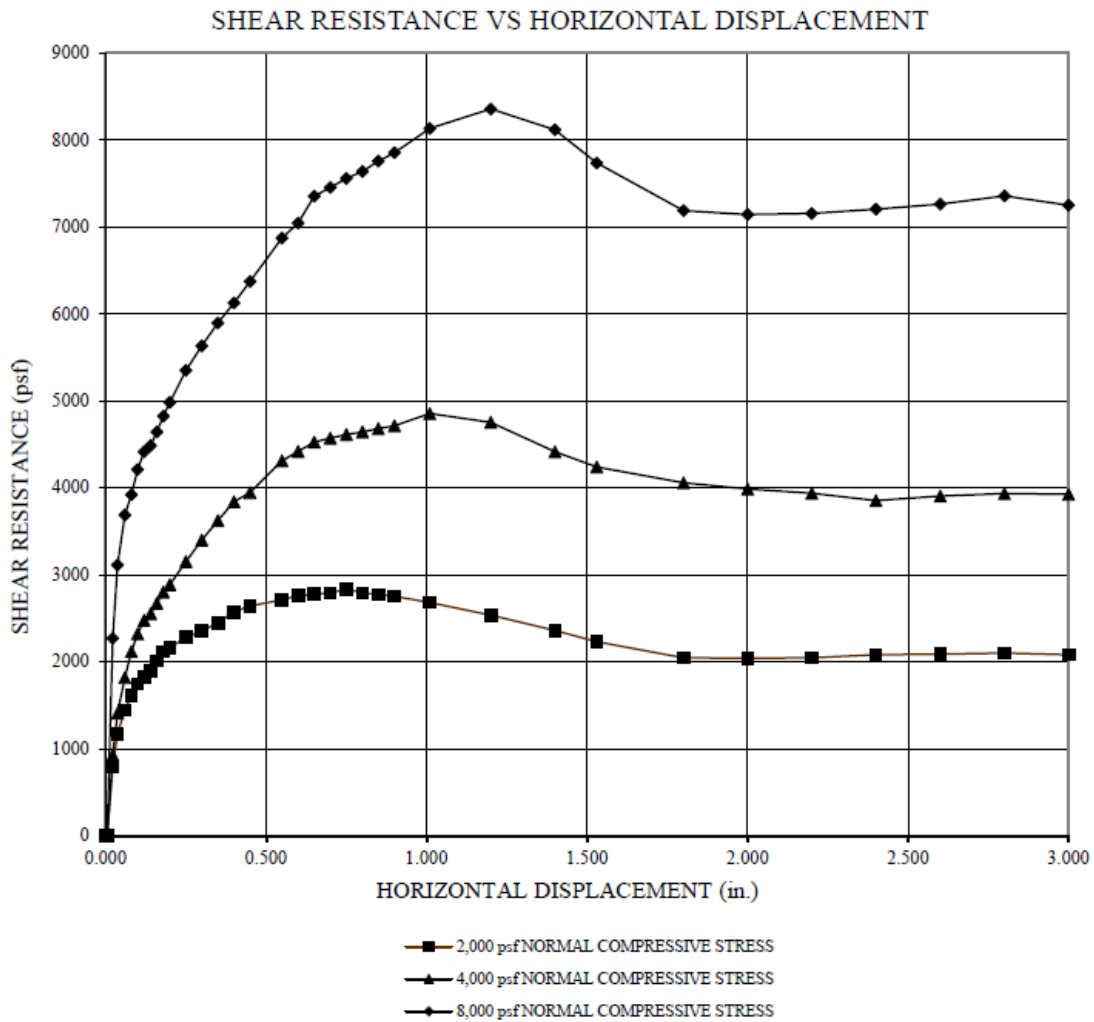


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# HOLCIM DUQUESNE SLAG

#57 Sheer  
Test Results

## AIR COOLED BLAST FURNACE SLAG

INTERFACE: 12" Direct Shear of #57 Aggregate  
@ 86.1 pcf & 5.7 % M.C.

STRAIN RATE (in / min) : 0.04

DIRECT SHEAR UNIT: Geo Test 1

PLACEMENT CONDITION: Dry

NORMAL LOAD: Hydraulic Cylinder

NORMAL LOAD (psf) 2000			NORMAL LOAD (psf) 4000			NORMAL LOAD (psf) 8000		
PEAK SHEAR STRESS (psf) 2836			PEAK SHEAR STRESS (psf) 4856			PEAK SHEAR STRESS (psf) 8360		
PEAK SECANT ANGLE (deg) 54.8			PEAK SECANT ANGLE (deg) 50.5			PEAK SECANT ANGLE (deg) 46.3		
RESIDUAL SHEAR (psf) 2081			RESIDUAL SHEAR (psf) 3926			RESIDUAL SHEAR (psf) 7252		
RESID. SECANT ANGLE (deg) 46.1			RESID. SECANT ANGLE (deg) 44.5			RESID. SECANT ANGLE (deg) 42.2		
HORIZONTAL			HORIZONTAL			HORIZONTAL		
DISPLACE.	SHEAR FORCE	STRESS	DISPLACE.	SHEAR FORCE	STRESS	DISPLACE.	SHEAR FORCE	STRESS
(in.)	(lbs)	(psf)	(in.)	(lbs)	(psf)	(in.)	(lbs)	(psf)
0.000	0	0	0.000	0	0	0.000	0	0
0.005	4	4	0.005	2	2	0.005	2	2
0.023	797	797	0.023	927	927	0.023	2268	2268
0.038	1174	1174	0.038	1410	1410	0.038	3115	3115
0.060	1443	1443	0.060	1819	1819	0.060	3690	3690
0.080	1613	1613	0.080	2116	2116	0.080	3922	3922
0.100	1744	1744	0.100	2321	2321	0.100	4212	4212
0.120	1825	1825	0.120	2476	2476	0.120	4417	4417
0.140	1890	1890	0.140	2551	2551	0.140	4487	4487
0.160	2011	2011	0.160	2671	2671	0.160	4644	4644
0.180	2117	2117	0.180	2801	2801	0.180	4824	4824
0.200	2161	2161	0.200	2887	2887	0.200	4983	4983
0.250	2281	2281	0.250	3153	3153	0.250	5351	5351
0.300	2355	2355	0.300	3401	3401	0.300	5634	5634
0.350	2448	2448	0.350	3625	3625	0.350	5898	5898
0.400	2575	2575	0.400	3841	3841	0.400	6129	6129
0.450	2643	2643	0.450	3945	3945	0.450	6375	6375
0.550	2711	2711	0.550	4312	4312	0.550	6875	6875
0.600	2763	2763	0.600	4418	4418	0.600	7047	7047
0.650	2777	2777	0.650	4527	4527	0.650	7356	7356
0.700	2793	2793	0.700	4573	4573	0.700	7456	7456
0.750	2836	2836	0.750	4613	4613	0.750	7561	7561
0.800	2791	2791	0.800	4642	4642	0.800	7640	7640
0.850	2774	2774	0.850	4682	4682	0.850	7757	7757
0.900	2755	2755	0.900	4714	4714	0.900	7855	7855
1.010	2681	2681	1.010	4856	4856	1.010	8134	8134
1.200	2536	2536	1.200	4755	4755	1.200	8360	8360
1.400	2361	2361	1.400	4415	4415	1.400	8118	8118
1.530	2230	2230	1.530	4239	4239	1.530	7738	7738
1.800	2045	2045	1.800	4058	4058	1.800	7190	7190
2.000	2041	2041	2.000	3987	3987	2.000	7144	7144
2.200	2046	2046	2.200	3940	3940	2.200	7156	7156
2.400	2081	2081	2.400	3853	3853	2.400	7205	7205
2.600	2086	2086	2.600	3906	3906	2.600	7264	7264
2.800	2102	2102	2.800	3936	3936	2.800	7359	7359
3.000	2081	2081	3.000	3926	3926	3.000	7252	7252

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