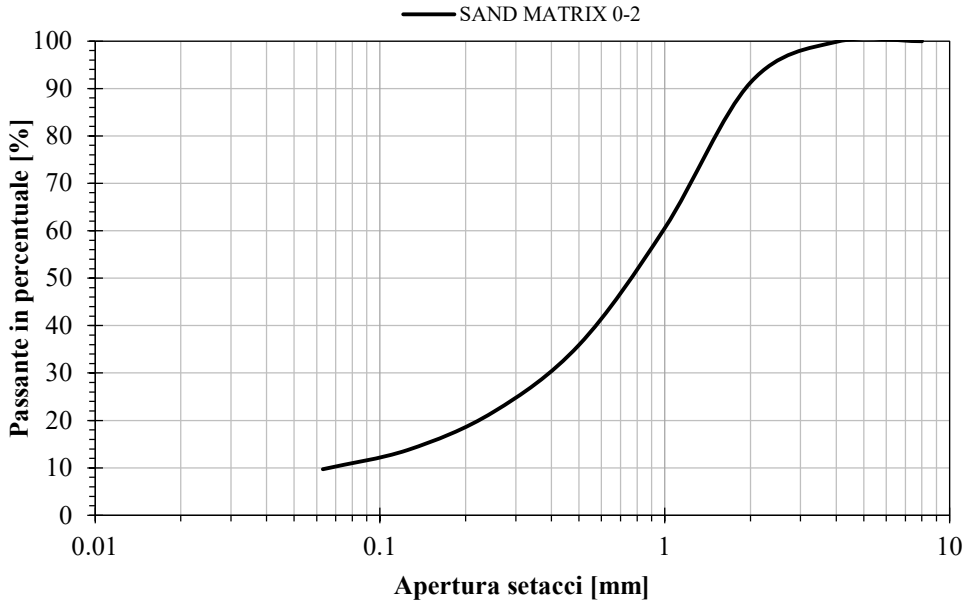
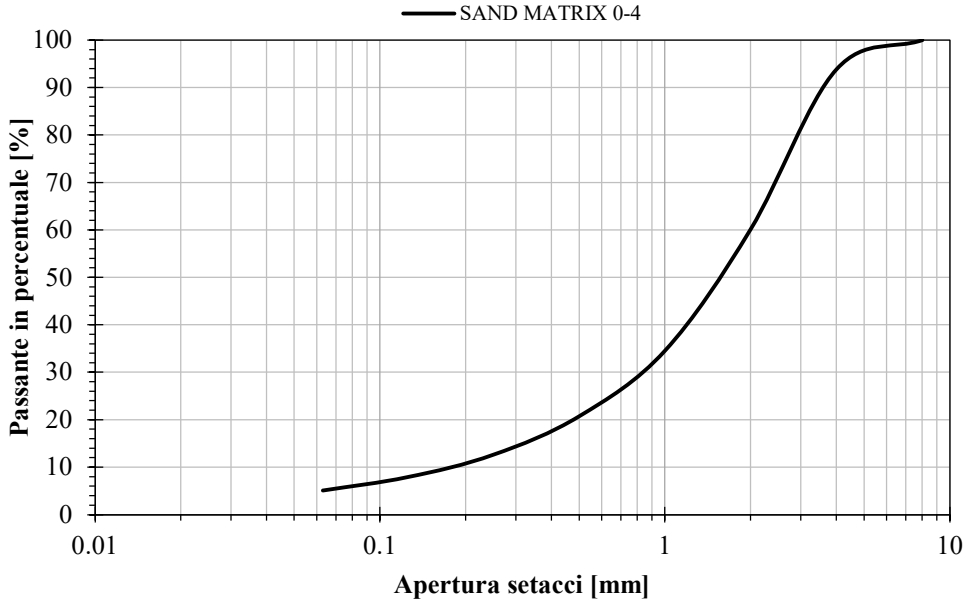
ALLEGATI

- CURVE GRANULOMETRICA MATRIX
- CURVE (σ_F, ε_F) DI FLESSIONE DEI TRAVETTI A 7 GIORNI
- CURVE (σ_F, ε_F) DI FLESSIONE DEI TRAVETTI A 28 GIORNI
- CURVE (σ_C, ε_C) DI COMPRESSIONE DEI TRAVETTI A 7 GIORNI
- CURVE (σ_C, ε_C) DI COMPRESSIONE DEI TRAVETTI A 28 GIORNI
- PROVA PROCTOR MODIFICATA_ AGGREGATO NATURALE
- PROVA PROCTOR MODIFICATA_ AGGREGATO DA C&D
- TABELLA FASE DI COSTIPAMENTO
- CURVE (Log [N], C_N [%]) DI LAVORABILITÀ DELLE MISCELE
- MR -ANALISI DI LIVELLO 2
- DIAGRAMMI I_1-MR - ANALISI LIVELLO 2
- MODELLAZIONE M-EPDG
- TABELLE PROVE A ROTTURA (UCS E ITS)
- UCS - FASE B1: MISCELE DI RIFERIMENTO
- UCS - FASE B2: MISCELE SPERIMENTALI
- ITS - FASE B1: MISCELE DI RIFERIMENTO
- ITS - FASE B2: MISCELE SPERIMENTALI

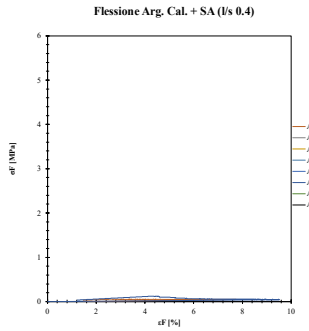
CURVE GRANULOMETRICA MATRIX



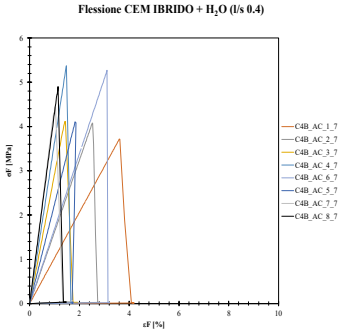


CURVE (σ_F, ε_F) DI FLESSIONE DEI TRAVETTI A 7 GIORNI

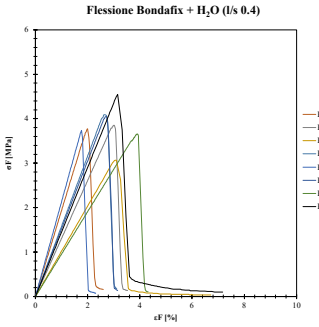
ARGILLA CALCINATA

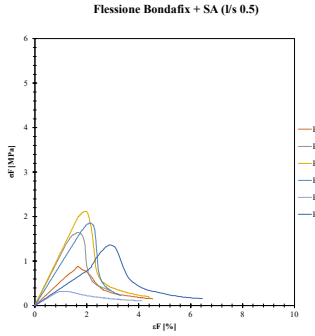


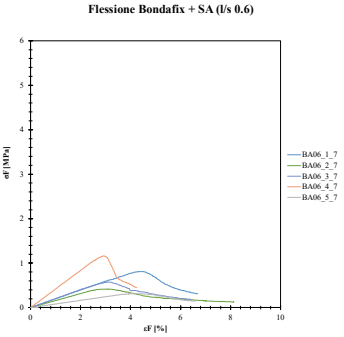
CEM IBRIDO



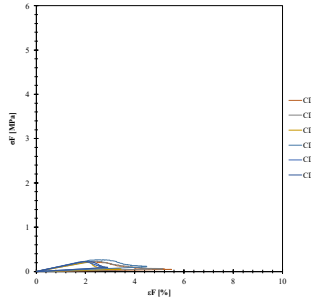
BONDAFIX

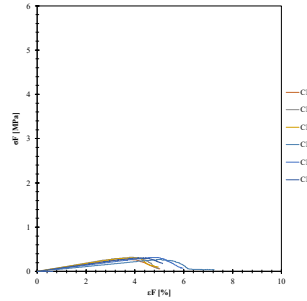




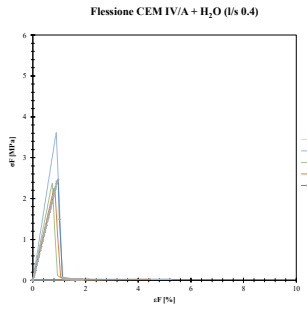


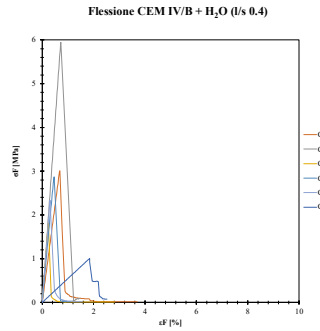
POLVERI DI C&D

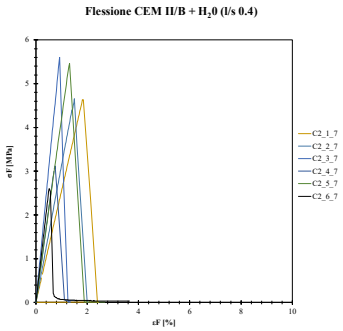




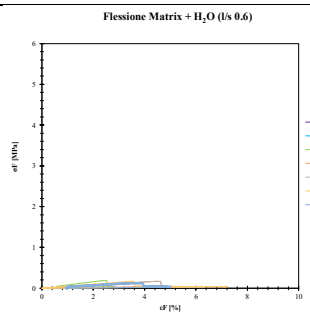
CEMENTI

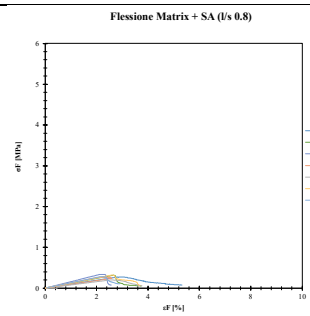






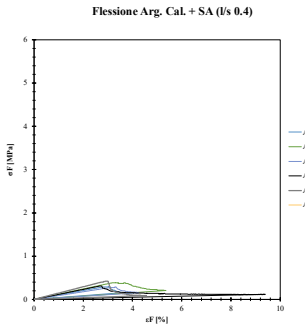
MATRIX



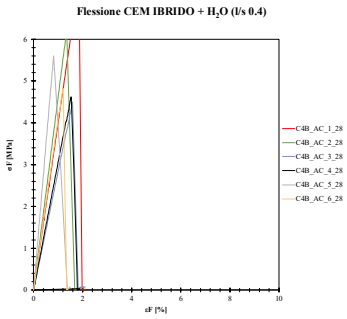


CURVE (σ_F, ε_F) DI FLESSIONE DEI TRAVETTI A 28 GIORNI

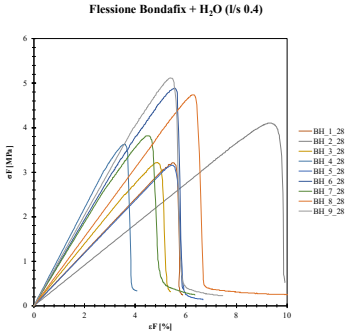
ARGILLA CALCINATA

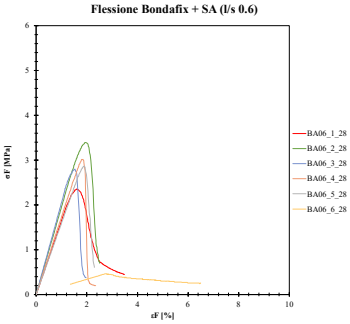


CEM IBRIDO

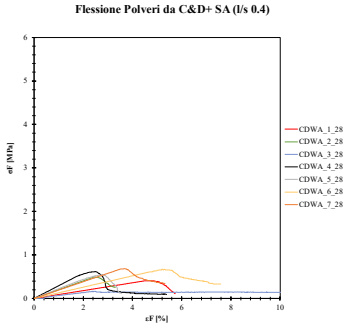


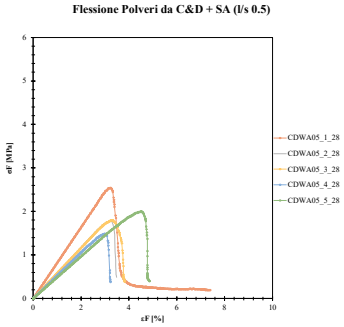
BONDAFIX



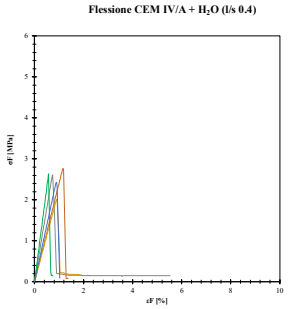


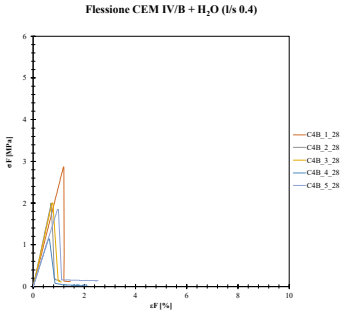
POLVERI DI C&D

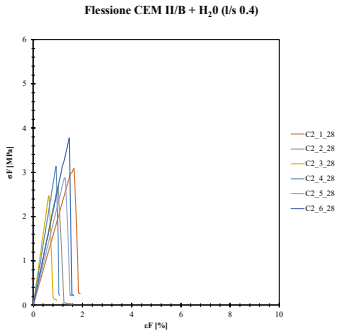




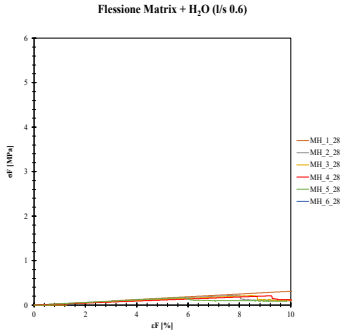
CEMENTI

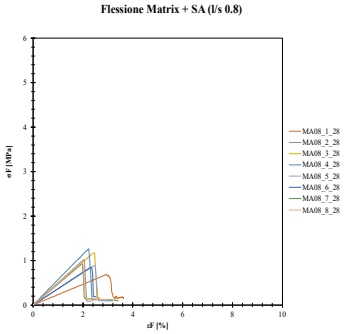






MATRIX

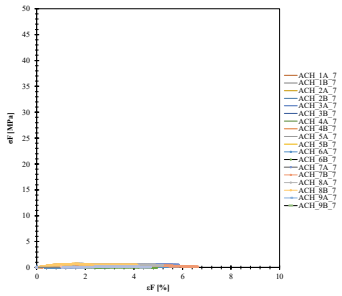




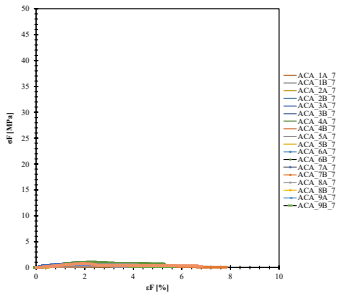
CURVE (σ_C, ε_C) DI COMPRESSIONE DEI TRAVETTI A 7 GIORNI

ARGILLA CALCINATA

Compressione Arg. Cal. + H_2O (l/s 0.4)

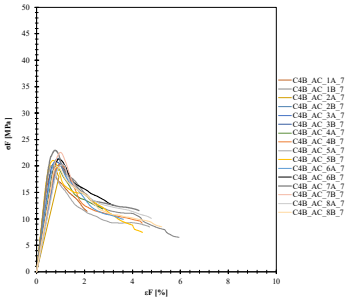


Compressione Arg. Cal. + SA (l/s 0.4)



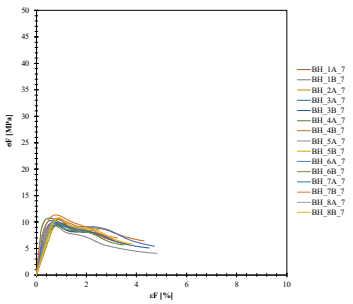
CEM IBRIDO

Compressione CEM IBRIDO + H_2O (l/s 0.4)

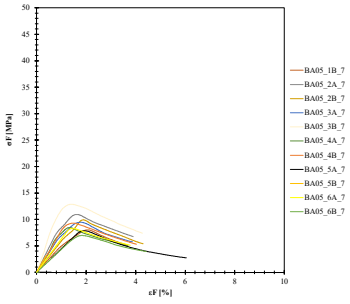


BONDAFIX

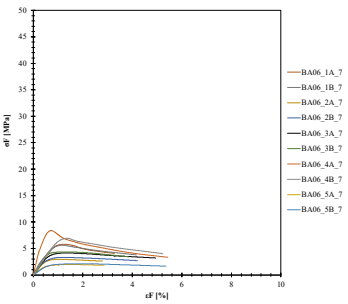
Compressione Bondafix+ H_2O (l/s 0.4)



Compressione Bondafix + SA (l/s 0.5)

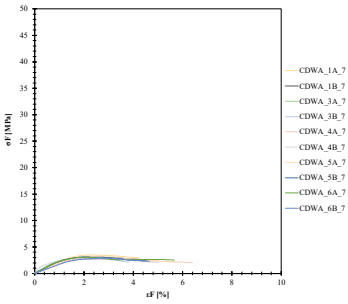


Compressione Bondafix + SA (l/s 0.6)

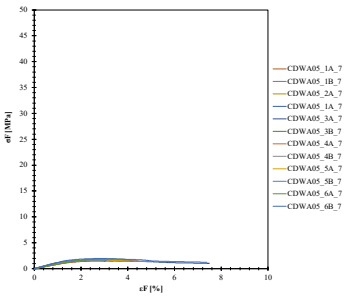


POLVERI DI C&D

Compressione Polveri da C&D + SA (l/s 0.4)

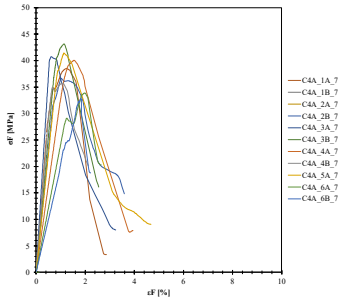


Compressione Polveri da C&D +SA (l/s 0.5)

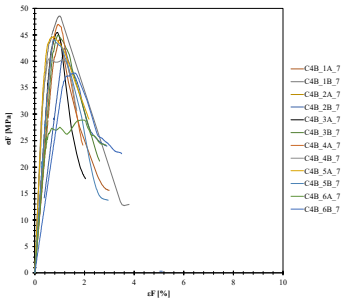


CEMENTI

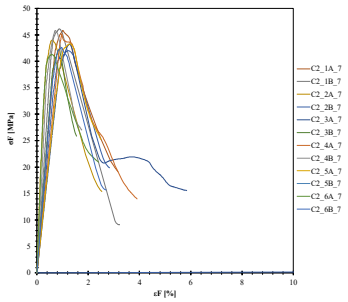
Compressione CEM IV/A + H_2O (l/s 0.4)



Compressione CEM IV/B + H_20 (l/s 0.4)

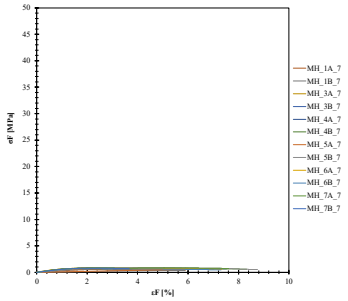


Compressione CEM II/B + H_20 (l/s 0.4)

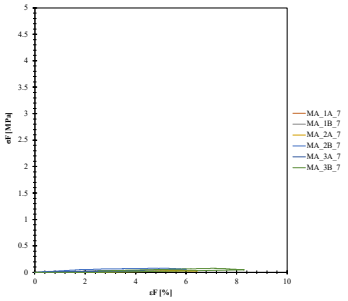


MATRIX

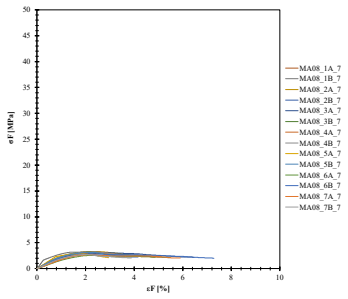
Compressione Matrix + H_2O (l/s 0.6)



Compressione Matrix + SA (l/s 0.6)



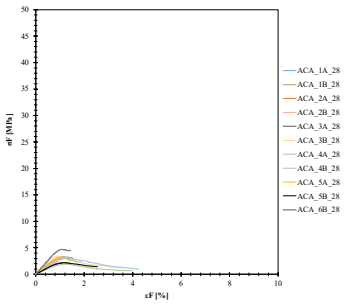
Compressione Matrix + SA (l/s 0.8)



CURVE (σ_C, ε_C) DI COMPRESSIONE DEI TRAVETTI A 28 GIORNI

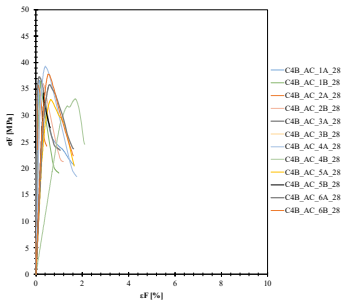
ARGILLA CALCINATA

Compressione Arg. Cal. + SA (l/s 0.4)



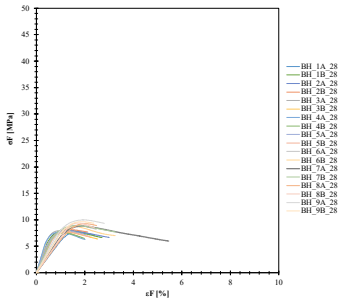
CEM IBRIDO

Compressione CEM IBRIDO + H_2O (l/s 0.4)

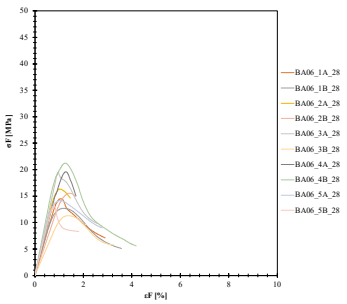


BONDAFIX

Compressione Bondafix+ H_2O (l/s 0.4)

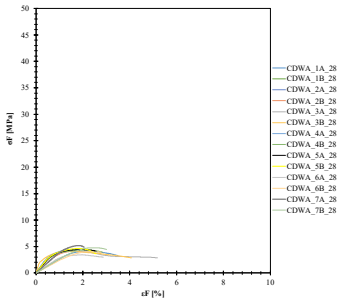


Compressione Bondafix + SA (l/s 0.6)

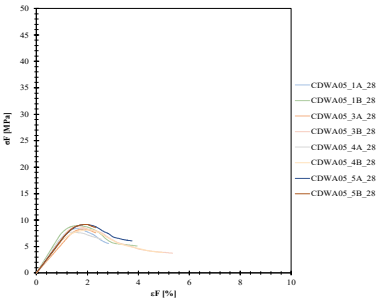


POLVERI DI C&D

Compressione Polveri da C&D + SA (l/s 0.4)

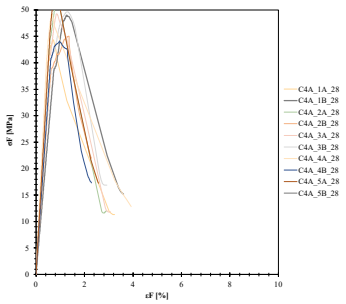


Compressione Polveri da C&D +SA (l/s 0.5)

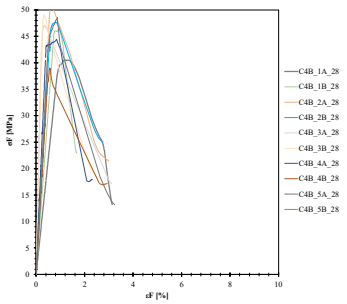


CEMENTI

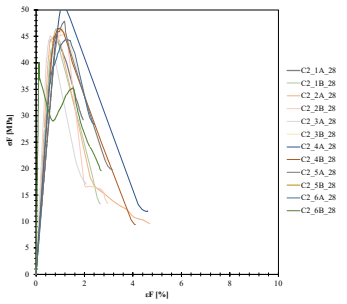
Compressione CEM IV/A + H_20 (l/s 0.4)



Compressione CEM IV/B + H_20 (l/s 0.4)

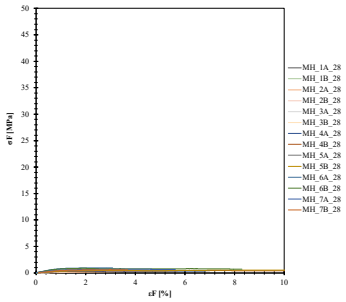


Compressione CEM II/B + H20 (l/s 0.4)

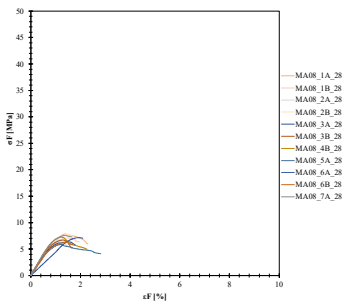


MATRIX

Compressione Matrix + H_2O (l/s 0.6)



Compressione Matrix + SA (l/s 0.8)



PROVA PROCTOR MODIFICATA_ AGGREGATO NATURALE

PROVA PROCTOR MODIFICATA P-B S-B

MISCELA	n°	MASSA CAMPIONE [g]	LEGANTE [%]	TOT. PARTE SOLIDA [g]	$W_{i,teorico}$ [%]	$W_{i,teorico}$ [g]	TARA FUST. [g]	TARA FUST. + MAT. [g]	TARA + MAT. UMIDO [g]	TARA + MAT. SECCO [g]	$W_{i,effettivo}$ [%]	γ_w [Mg/m^3]	γ_d [Mg/m^3]
NAT Tal quale	1	5800	-	5800	2	120.6	10347.1	15029.2	2417.6	2378.6	2.0	2.208	2.165
	2	5800	-	5800	4	236.2	10356.4	15127.3	3033.5	2939.5	3.9	2.250	2.165
	3	5800	-	5800	6	351.2	10347.1	15364.7	2451.3	2342.9	5.6	2.366	2.241
	4	5800	-	5800	6.6	382.8	10354.5	15411	3648.6	3471.8	5.8	2.384	2.255
	5	5800	-	5800	8	467	10357.3	15445.6	2733.3	2581.3	7.0	2.399	2.243
	6	5800	-	5800	10	582.3	10356.8	15414.7	2733.7	2564.3	7.9	2.385	2.211
NAT + 2% CEM II/B	1	5700	2	5814	2	119.1	10346.4	15035.9	2600	2558.2	1.9	2.211	2.167
	2	5700	2	5814	4	236.6	10356	15165	3360.8	3264.7	3.8	2.268	2.179
	3	5700	2	5814	6	352	10346.4	15360.2	3014.5	2891.4	5.2	2.364	2.229
	4	5700	2	5814	6.5	377.1	10355.1	15435.4	2638.3	2519.5	5.6	2.396	2.250
	5	5700	2	5814	8	470.1	10356	15415	3295.6	3119.3	7.0	2.386	2.207
	6	5700	2	5814	10	586.4	10346.4	15433.9	2976.6	2815.1	7.0	2.399	2.179
NAT + 3% CEM II/B	1	5600	3	5768	2	117.3	10356.1	14978.1	2854	2812.5	1.8	2.180	2.136
	2	5600	3	5768	4	234.9	10347.1	15115.5	2844.9	2759.1	3.8	2.249	2.161
	3	5600	3	5768	6	351.8	10356	15423.1	3418.2	3276.8	5.0	2.389	2.252
	4	5600	3	5768	7	403.8	10345.9	15462.2	2732.3	2601	6.0	2.413	2.255
	5	5600	3	5768	8	464.5	10347	15280	3349.9	3194.5	7.2	2.326	2.153
	6	5600	3	5768	10	580	10356	15357.7	3478.3	3256.7	8.2	2.359	2.143
NAT + 4% CEM II/B	1	5500	4	5720	2	116	10356.5	14955.1	3288.3	3244.3	2.0	2.169	2.125
	2	5500	4	5720	4	230.7	10347.3	15140.1	2641.2	2559.7	3.9	2.260	2.173
	3	5500	4	5720	6	346.3	10347.1	15408.6	2971.7	2848.5	5.0	2.387	2.251
	4	5500	4	5720	7	400.4	10355.4	15446.3	3011.3	2862.6	6.0	2.401	2.244
	5	5500	4	5720	8	460.2	10356.1	15368.1	2698.7	2546.8	7.0	2.364	2.188
	6	5500	4	5720	10	574.5	10347.1	15359.9	2845.2	2677.8	7.4	2.364	2.148

PROVA PROCTOR MODIFICATA_ AGGREGATO DA C&D

PROVA PROCTOR MODIFICATA P-B S-B

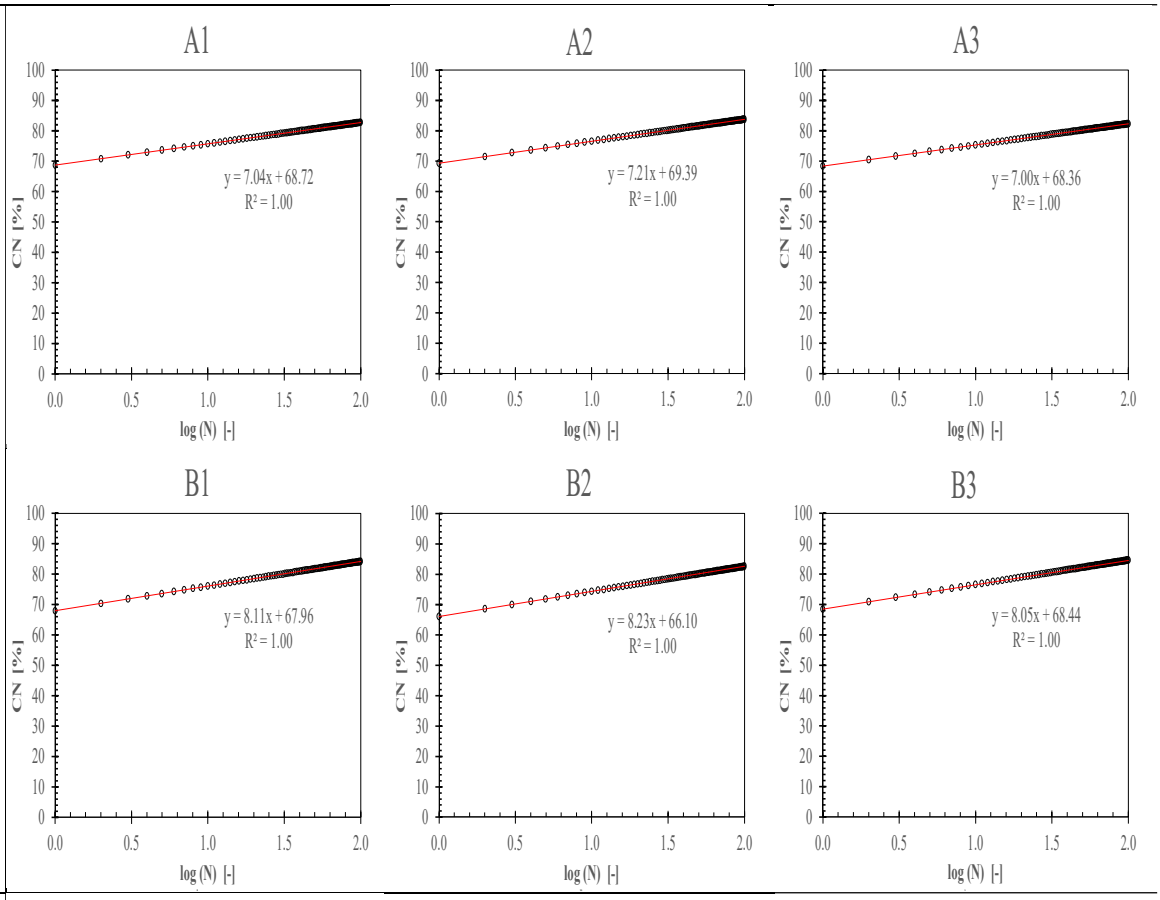
MISCELA	n°	MASSA CAMPIONE [g]	LEGANTE [%]	TOT. PARTE SOLIDA [g]	$W_{i,teorico}$ [%]	$W_{i,teorico}$ [g]	TARA FUST. [g]	TARA FUST. + MAT. [g]	TARA + MAT. UMIDO [g]	TARA + MAT. SECCO [g]	$W_{i,effettivo}$ [%]	γ_w [Mg/m^3]	γ_d [Mg/m^3]
C&D Tal quale	1	1	6342	-	4	264.4	10359.3	14928.4	2895.2	2781	4.8	2.155	2.056
	2	2	6139.2	-	6	379	10359.3	15026.6	2718.7	2578.1	6.5	2.201	2.067
	3	3	6083.6	-	8	498.3	10358.3	15241.3	3160	2950.1	8.3	2.303	2.127
	4	4	6225.7	-	10	631.1	10359.3	15204	3611.6	3309.9	10.7	2.285	2.063
	5	5	6297.3	-	12	767.8	10361.2	15173.6	2852	2607.7	11.1	2.269	2.043
C&D + 2% CEM II/B	1	1	5682.8	2	5	292.3	10356.9	14899	2486	2379	5.4	2.142	2.039
	2	2	5630.2	2	7	403.8	10347.4	14981.9	2482.6	2348	7.2	2.185	2.042
	3	3	5620.9	2	9	519.2	10356.7	15200.5	3319.1	3097.3	8.7	2.284	2.095
	4	4	5700	2	9.5	552.3	10345.8	15193.8	3257.1	3008.1	9.6	2.286	2.088
	5	5	5682.6	2	11	640.1	10347.5	15219.9	2989.6	2773	9.6	2.298	2.069
	6	6	5669.4	2	13	754	10346.2	15261	2821.2	2597.1	10.3	2.318	2.050
C&D + 3% CEM II/B	1	1	5462.7	3	5	283.2	10357.8	14813.2	2354.9	2260.6	5.1	2.101	2.000
	2	2	5503.8	3	7	398.3	10357.1	15068.5	2809.2	2653.1	6.9	2.222	2.076
	3	3	5600	3	8.5	490.3	10355.1	15230.2	3273.7	3051.9	8.4	2.299	2.119
	4	4	5495.9	3	9	511.5	10357.2	15173.4	2746.2	2558.2	8.7	2.271	2.083
	5	5	5548.1	3	11	630.1	10357	15100.5	2860.1	2625.2	10.6	2.237	2.015
	6	6	5538.2	3	13	743.1	10347.9	15155.6	2696	2482.4	10.3	2.267	2.006
C&D + 4% CEM II/B	1	1	5838.4	4	5	305.2	10357.7	14904.2	2371.9	2272.5	5.3	2.144	2.041
	2	2	5500	4	8	457.6	10345.8	15089.2	3194.4	2993.9	7.8	2.237	2.071
	3	3	5833.2	4	9	546	10357.7	15235.1	3056.7	2846.7	8.8	2.300	2.110
	4	4	5380.8	4	11	617	10357.7	15177.7	2931.8	2699.7	10.1	2.273	2.047
	5	5	5813	4	14.5	875.1	10358.4	15168.9	3474.7	3207.1	9.8	2.268	1.982
C&D + SA	1	1	5800.6	-	6	351.3	10358.5	15112.8	2414.4	2316.6	5.1	2.242	2.114
	2	2	5822.2	-	8	468.9	10358.5	15316.8	2498.5	2380.1	6.0	2.338	2.164
	3	3	5879.6	-	10	589.5	10359.1	15217.4	2665.3	2519.6	6.9	2.291	2.082
	4	4	5823.3	-	12	700.5	10357.9	15313.3	2757.1	2611.9	6.6	2.337	2.086
	5	5	5804	-	14	815	10358.4	15210.2	3189.6	2997.4	7.7	2.288	2.006

TABELLA FASE DI COSTIPAMENTO

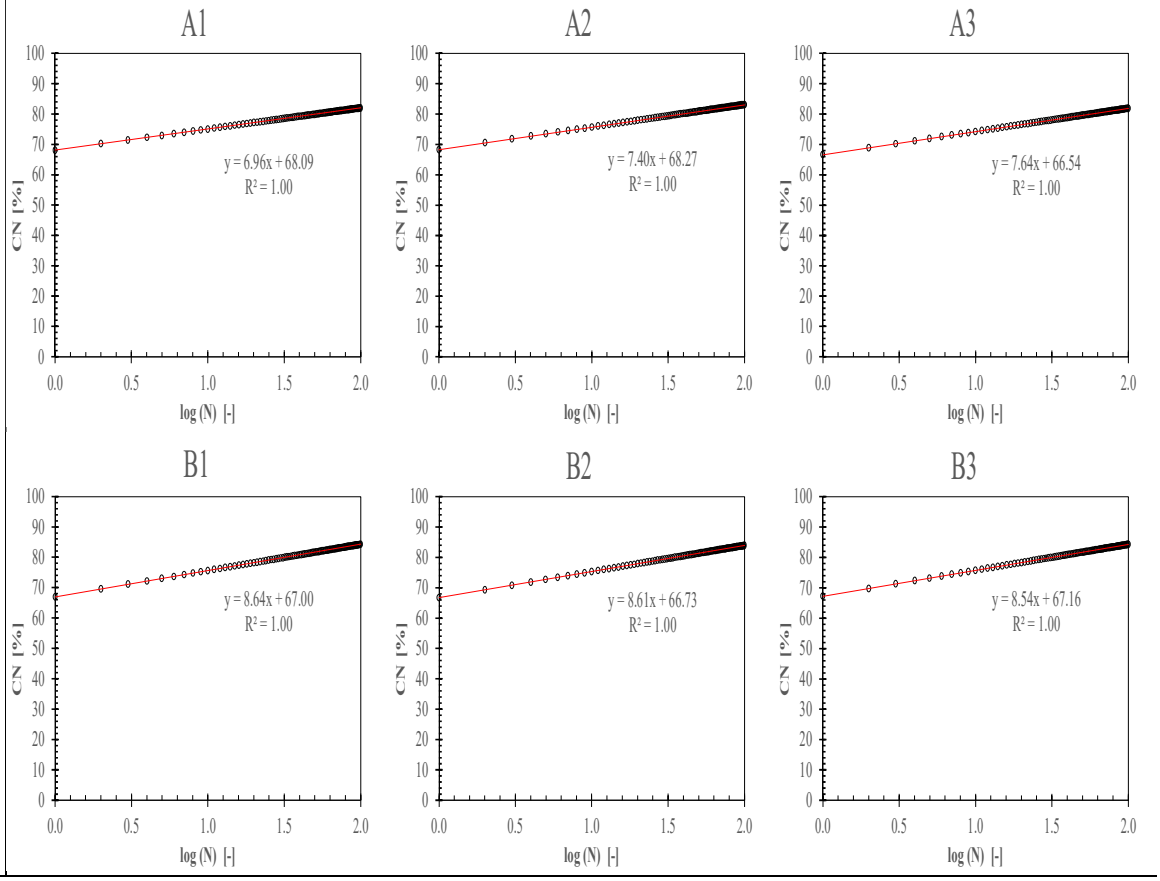
CAMPIONE	DIMENSIONE[mm]	SA [g]	H_2O[g]	[g]	MASSA NETTA[g]	w_{PERSO} [g]	w_{PERSO} [%]
C&D_SA_A1	186 x 100	266.4	-	3400.5	3383.9	16.6	0.53%
C&D_SA_A2	186 x 100	266.4	-	3400.5	3376.1	24.4	0.78%
C&D_SA_A3	186 x 100	266.4	-	3400.5	3385.9	14.6	0.47%
C&D_SA_B1	100 x 100	143.2	-	1828.2	1814.6	13.6	0.81%
C&D_SA_B2	100 x 100	143.2	-	1828.2	1818.6	9.6	0.57%
C&D_SA_B3	100 x 100	143.2	-	1828.2	1819.4	8.8	0.53%
C&D_SA_28_A1	186 x 100	266.4	-	3400.5	3390.0	10.5	0.34%
C&D_SA_28_A2	186 x 100	266.4	-	3400.5	3388.9	11.6	0.37%
C&D_SA_28_A3	186 x 100	266.4	-	3400.5	3374.3	26.2	0.84%
C&D_4H20_8.5SA_A1	186 x 100	266.4	125.4	3525.9	3430.5	95.4	3.04%
C&D_4H20_8.5SA_A2	186 x 100	266.4	125.4	3525.9	3427.4	98.5	3.14%
C&D_4H20_8.5SA_A3	186 x 100	266.4	125.4	3525.9	3439.4	86.5	2.76%
C&D_4H20_8.5SA_B1	100 x 100	143.2	67.4	1895.6	1841.0	54.6	3.24%
C&D_4H20_8.5SA_B2	100 x 100	143.2	67.4	1895.6	1830.3	65.3	3.88%
C&D_4H20_8.5SA_B3	100 x 100	143.2	67.4	1895.6	1843.9	51.7	3.07%
C&D_4H20_5.5SA_A1	186 x 100	172.4	125.4	3431.9	3380.6	51.3	1.64%
C&D_4H20_5.5SA_A2	186 x 100	172.4	125.4	3431.9	3401.4	30.5	0.97%
C&D_4H20_5.5SA_A3	186 x 100	172.4	125.4	3431.9	3405.9	26.0	0.83%
C&D_4H20_5.5SA_B1	100 x 100	92.7	67.4	1845.1	1828.0	17.1	1.01%
C&D_4H20_5.5SA_B2	100 x 100	92.7	67.4	1845.1	1814.1	31.0	1.84%
C&D_4H20_5.5SA_B3	100 x 100	92.7	67.4	1845.1	1824.9	20.2	1.20%
C&D_4H20_4SA_A1	186 x 100	125.4	125.4	3384.9	3371.8	13.1	0.42%
C&D_4H20_4SA_A2	186 x 100	125.4	125.4	3384.9	3369.3	15.6	0.50%
C&D_4H20_4SA_A3	186 x 100	125.4	125.4	3384.9	3378.5	6.4	0.20%
C&D_4H20_4SA_B1	100 x 100	67.4	67.4	1819.8	1808.1	11.7	0.70%
C&D_4H20_4SA_B2	100 x 100	67.4	67.4	1819.8	1800.3	19.5	1.16%
C&D_4H20_4SA_B3	100 x 100	67.4	67.4	1819.8	1808.9	10.9	0.65%
C&D_4H20_7SA_A1	186 x 100	219.4	125.4	3478.9	3409.6	69.3	2.21%
C&D_4H20_7SA_A2	186 x 100	219.4	125.4	3478.9	3412.2	66.7	2.13%
C&D_4H20_7SA_A3	186 x 100	219.4	125.4	3478.9	3426.6	52.3	1.67%
C&D_4H20_7SA_B1	100 x 100	118.0	67.4	1870.4	1833.3	37.1	2.20%
C&D_4H20_7SA_B2	100 x 100	118.0	67.4	1870.4	1823.2	47.2	2.80%
C&D_4H20_7SA_B3	100 x 100	118.0	67.4	1870.4	1811.4	59.0	3.50%
C&D_3CEMIVB_A1	186 x 100	-	263.1	3358.4	3325.8	32.6	1.05%
C&D_3CEMIVB_A2	186 x 100	-	263.1	3358.4	3324.6	33.8	1.09%
C&D_3CEMIVB_A3	186 x 100	-	263.1	3358.4	3321.7	36.7	1.18%
C&D_3CEMIVB_B1	100 x 100	-	141.5	1805.6	1828.6	-23.0	-1.38%
C&D_3CEMIVB_B2	100 x 100	-	141.5	1805.6	1774.5	31.1	1.87%
C&D_3CEMIVB_B3	100 x 100	-	141.5	1805.6	1775.3	30.3	1.82%
C&D_3CEMIVB_A1_28	186 x 100	-	263.1	3358.4	3317.6	40.8	1.32%
C&D_3CEMIVB_A2_28	186 x 100	-	263.1	3358.4	3302.5	55.9	1.81%
C&D_3CEMIVB_A3_28	186 x 100	-	263.1	3358.4	3336.7	21.7	0.70%
C&D_2H20_7SA_A1	186 x 100	219.4	62.7	3416.2	3396.7	19.5	0.62%
C&D_2H20_7SA_A2	186 x 100	219.4	62.7	3416.2	3390.5	25.7	0.82%
C&D_2H20_7SA_A3	186 x 100	219.4	62.7	3416.2	3386.7	29.5	0.94%
C&D_2H20_7SA_B1	100 x 100	118.0	33.7	1836.7	1823.7	13.0	0.77%
C&D_2H20_7SA_B2	100 x 100	118.0	33.7	1836.7	1825.4	11.3	0.67%
C&D_2H20_7SA_B3	100 x 100	118.0	33.7	1836.7	1825.4	11.3	0.67%

CURVE (LOG [N], C_N [%]) DI LAVORABILITÀ DELLE MISCELE

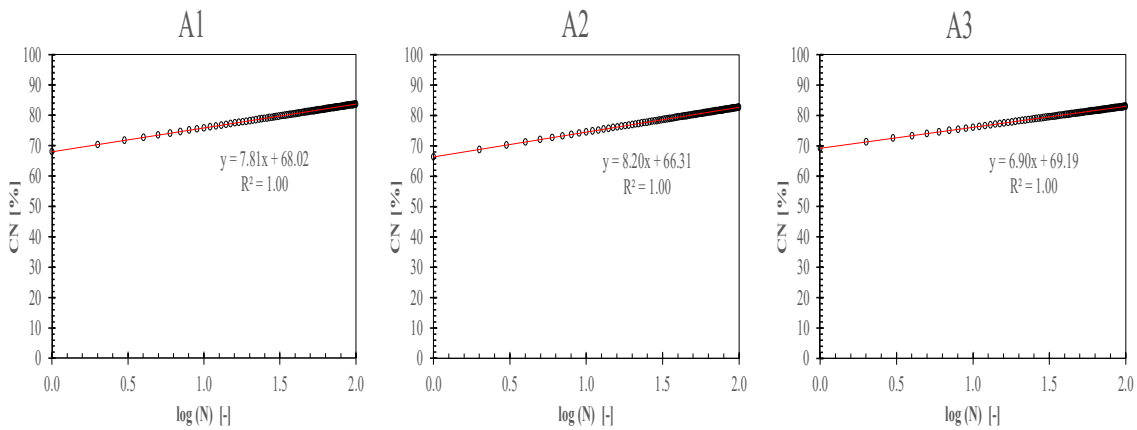
NAT Tal quale

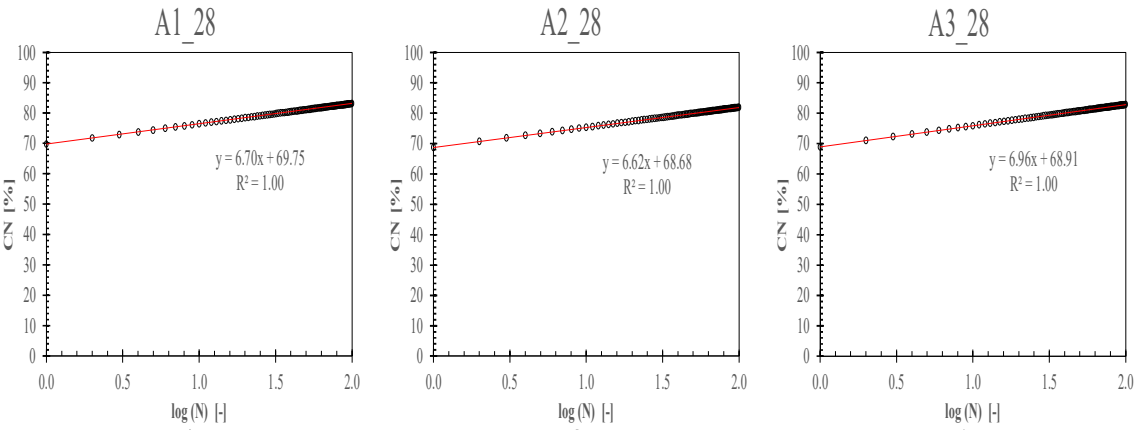


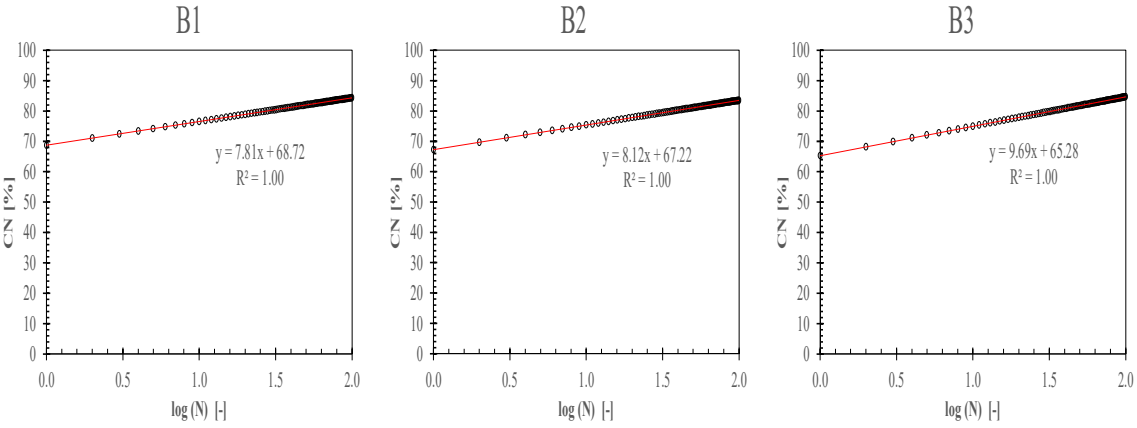
NAT + 2% CEM II/B



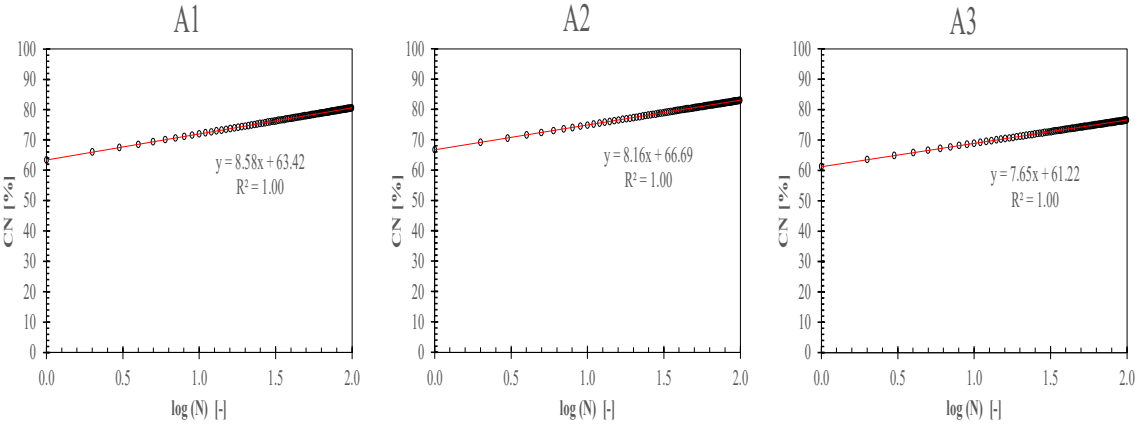
NAT + 3% CEM II/B



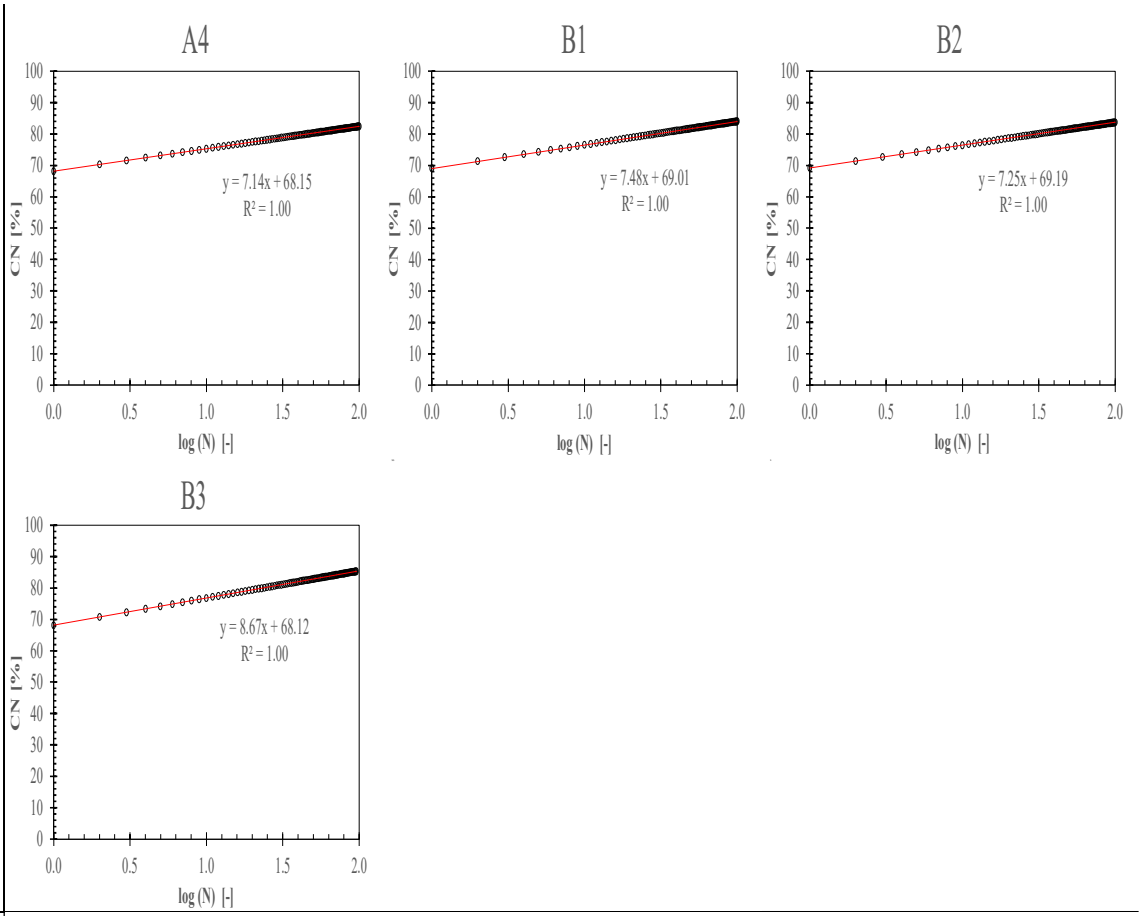




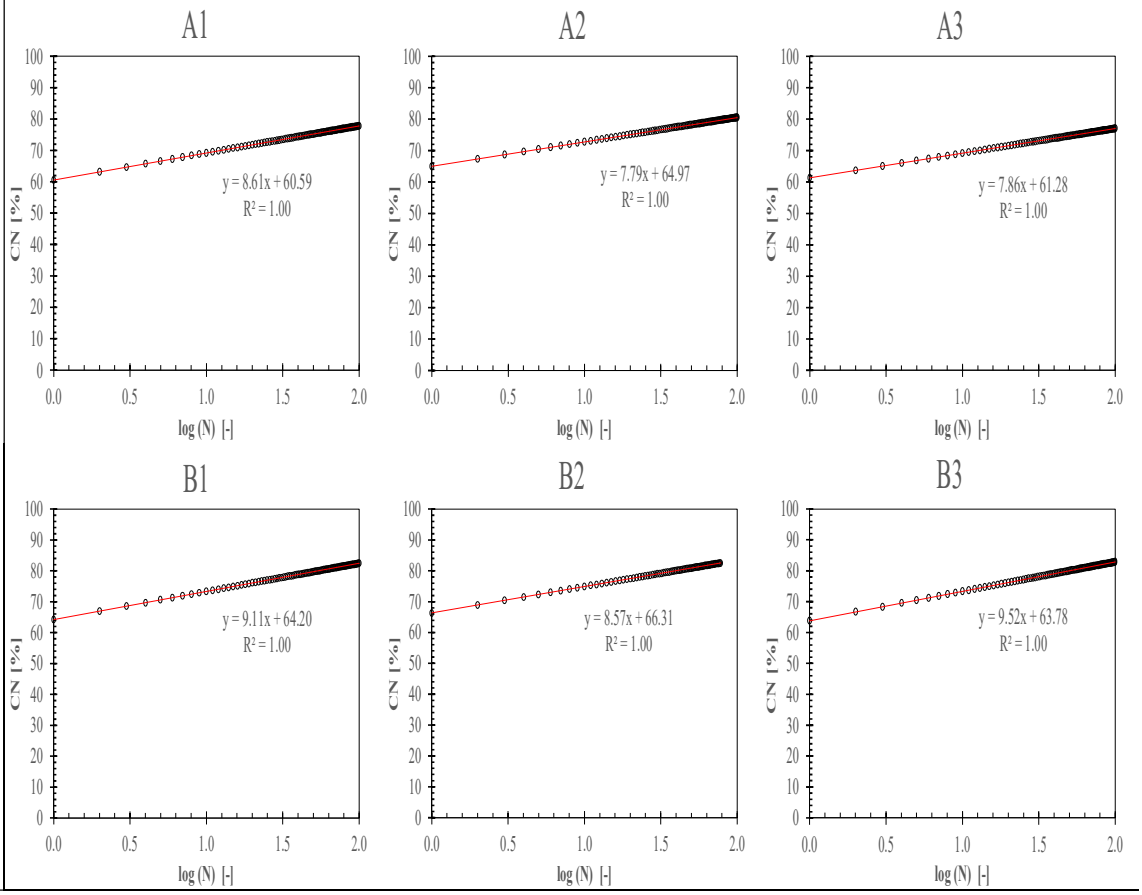
NAT + 4% CEM II/B



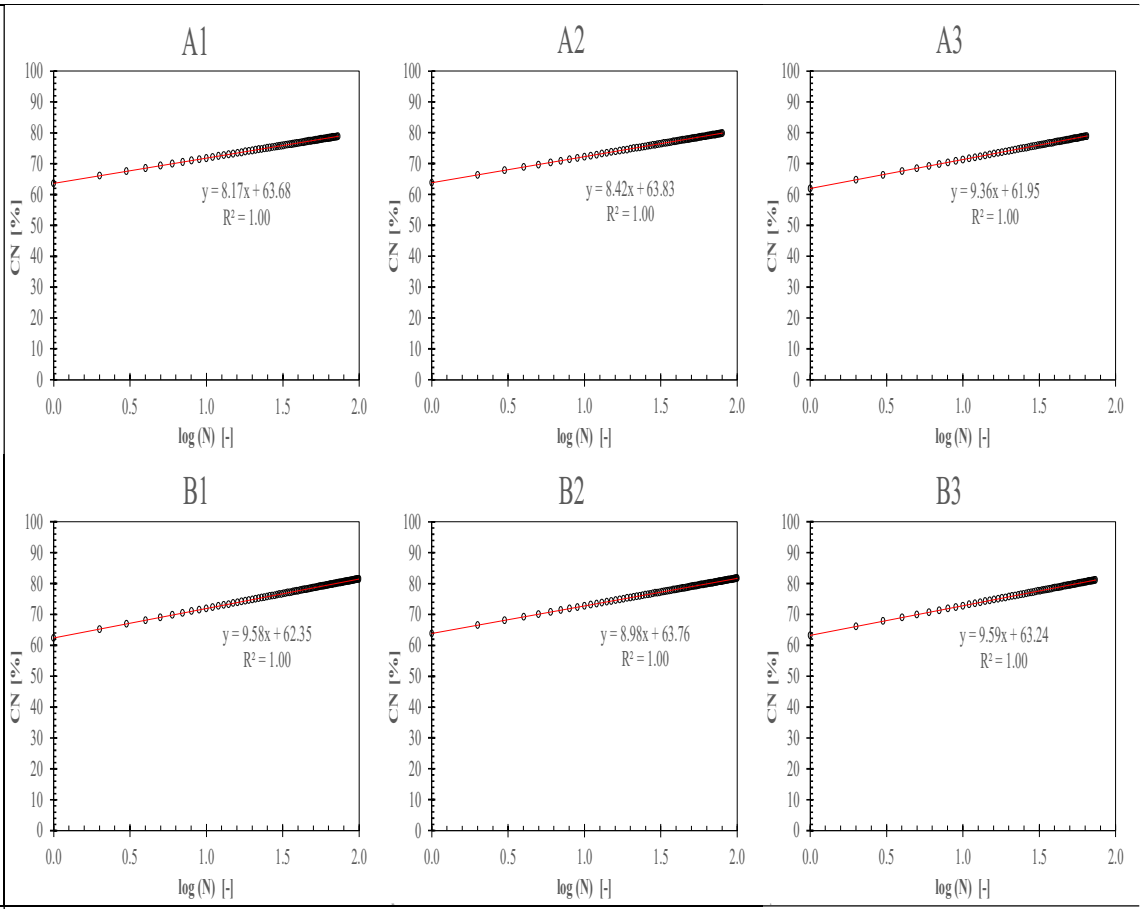
NAT + 4% CEM II/B



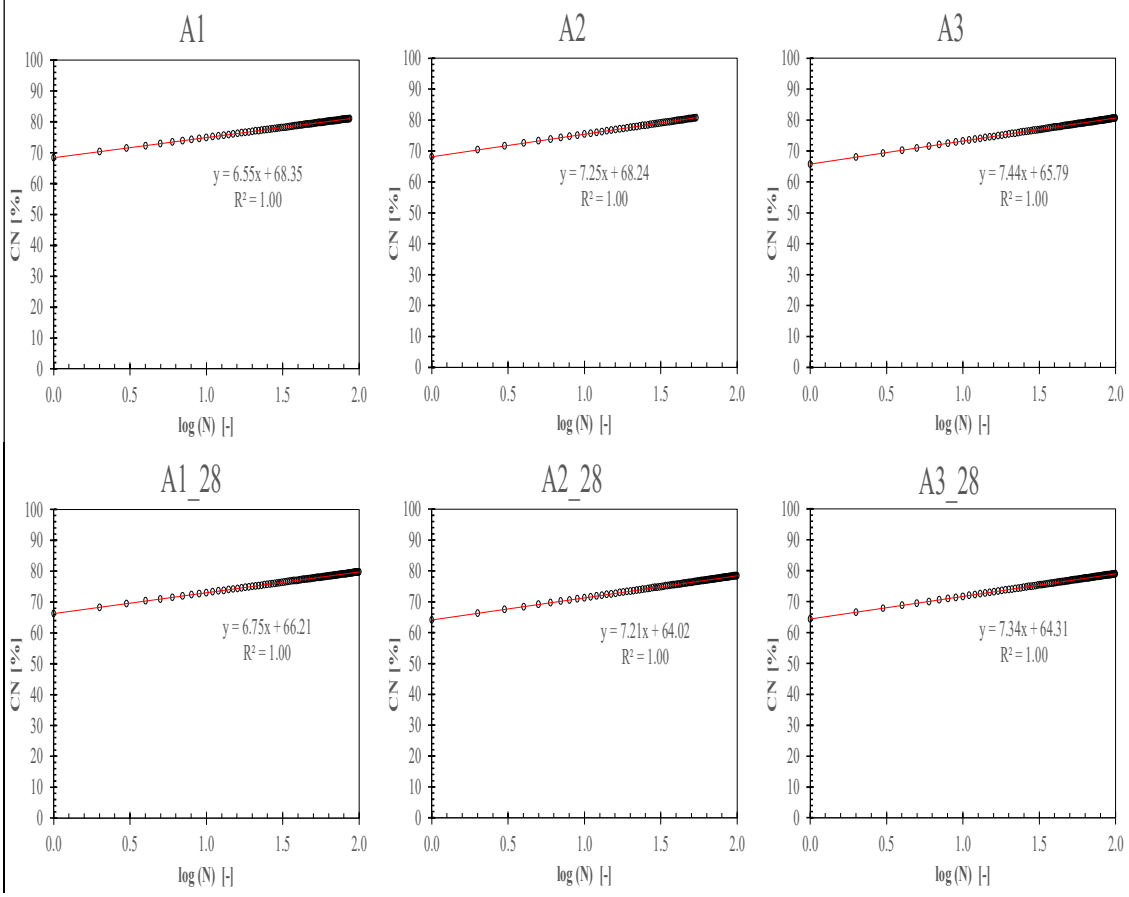
C&D Tal quale

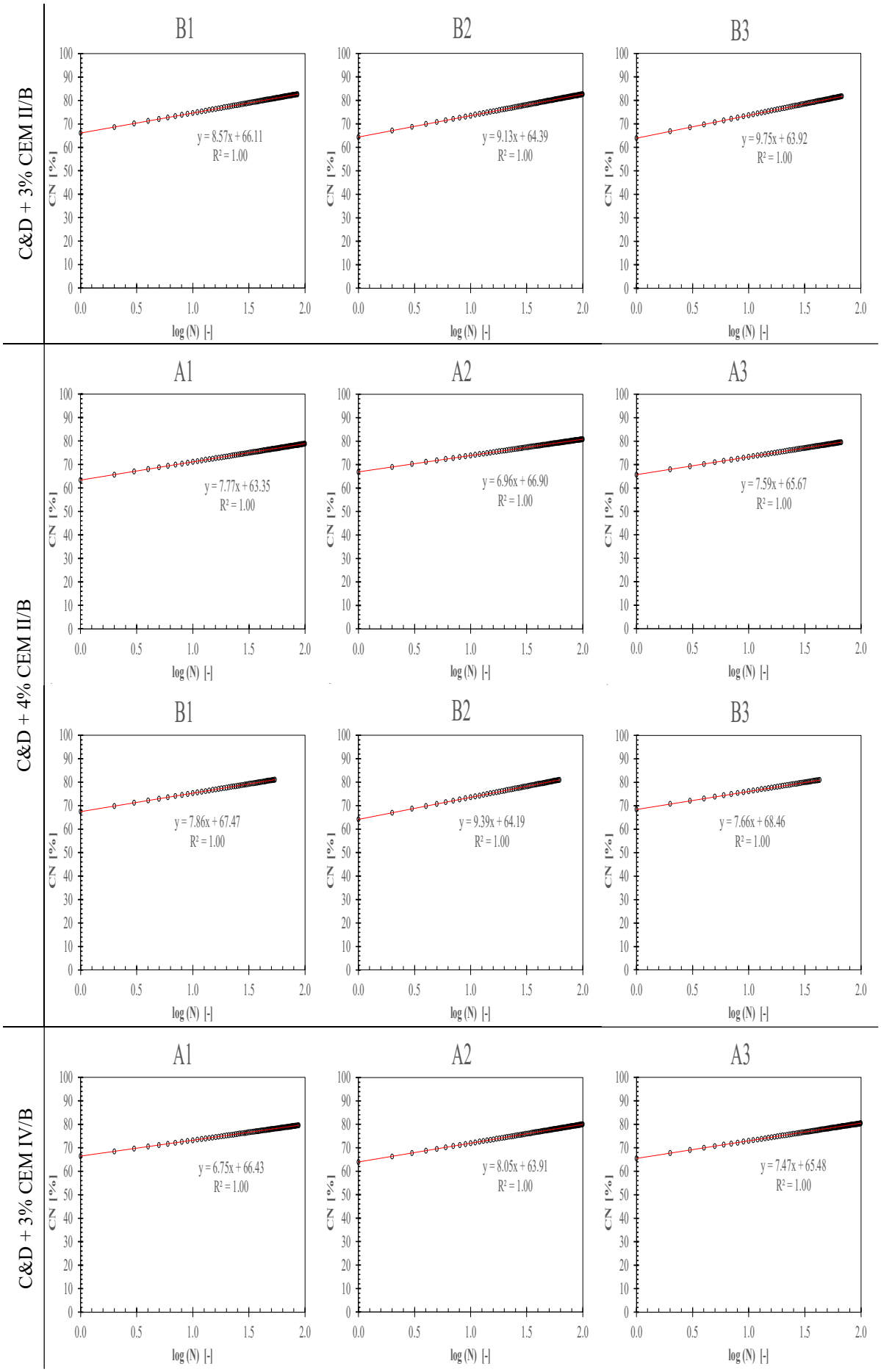


C&D + 2% CEM II/B

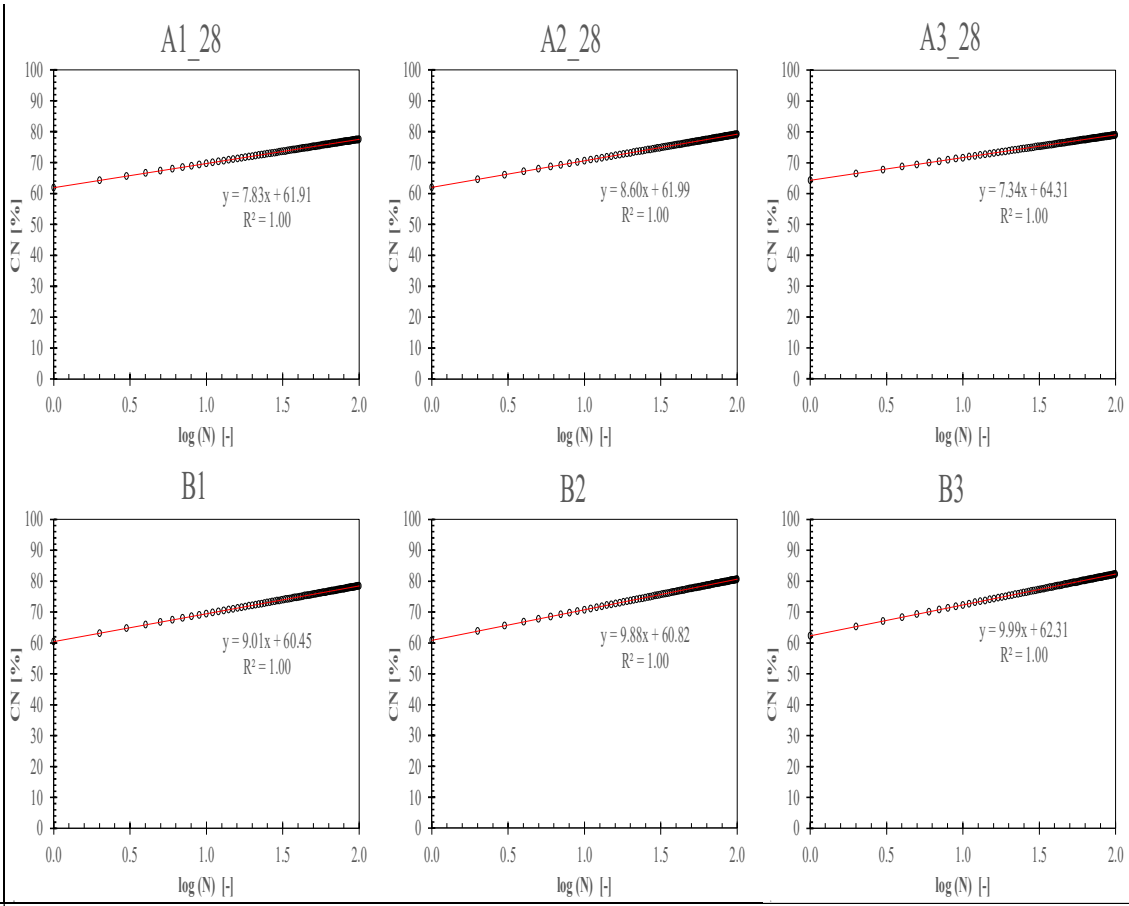


C&D + 3% CEM II/B

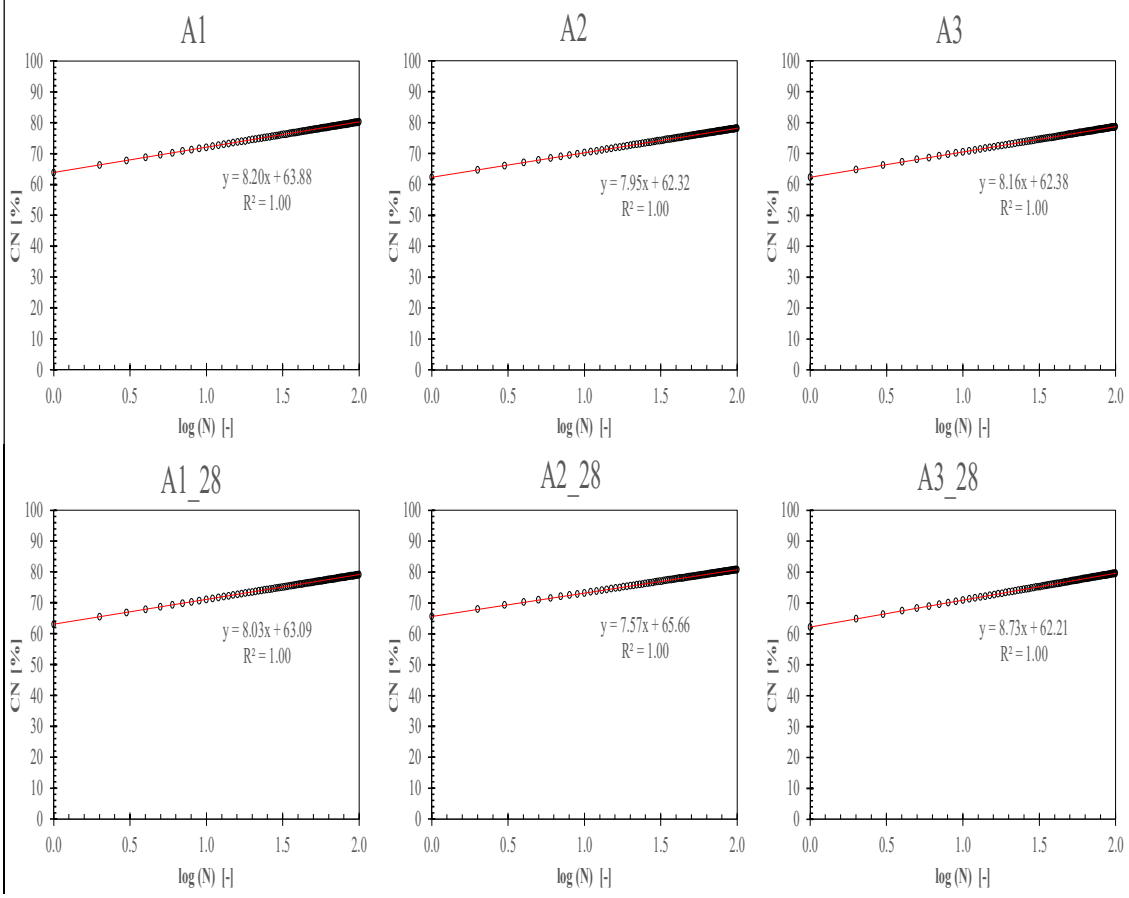


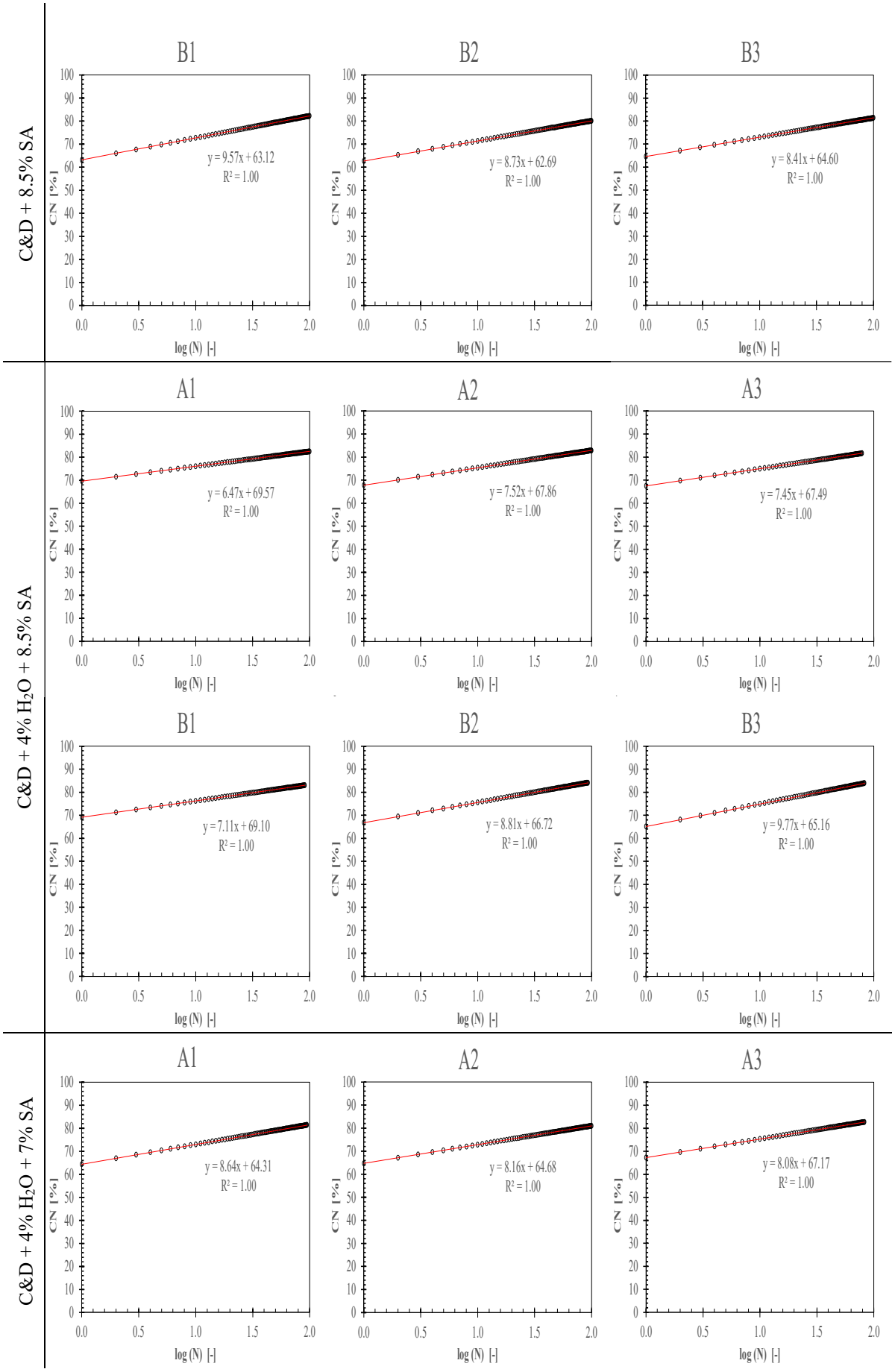

C&D + 3% CEM II/B
B1
y = 8.57x + 66.11
R² = 1.00
B2
y = 9.13x + 64.39
R² = 1.00
B3
y = 9.75x + 63.92
R² = 1.00
C&D + 4% CEM II/B
A1
y = 7.77x + 63.35
R² = 1.00
A2
y = 6.96x + 66.90
R² = 1.00
A3
y = 7.59x + 65.67
R² = 1.00
B1
y = 7.86x + 67.47
R² = 1.00
B2
y = 9.39x + 64.19
R² = 1.00
B3
y = 7.66x + 68.46
R² = 1.00
C&D + 3% CEM IV/B
A1
y = 6.75x + 66.43
R² = 1.00
A2
y = 8.05x + 63.91
R² = 1.00
A3
y = 7.47x + 65.48
R² = 1.00
CN [%]
log (N) [-]

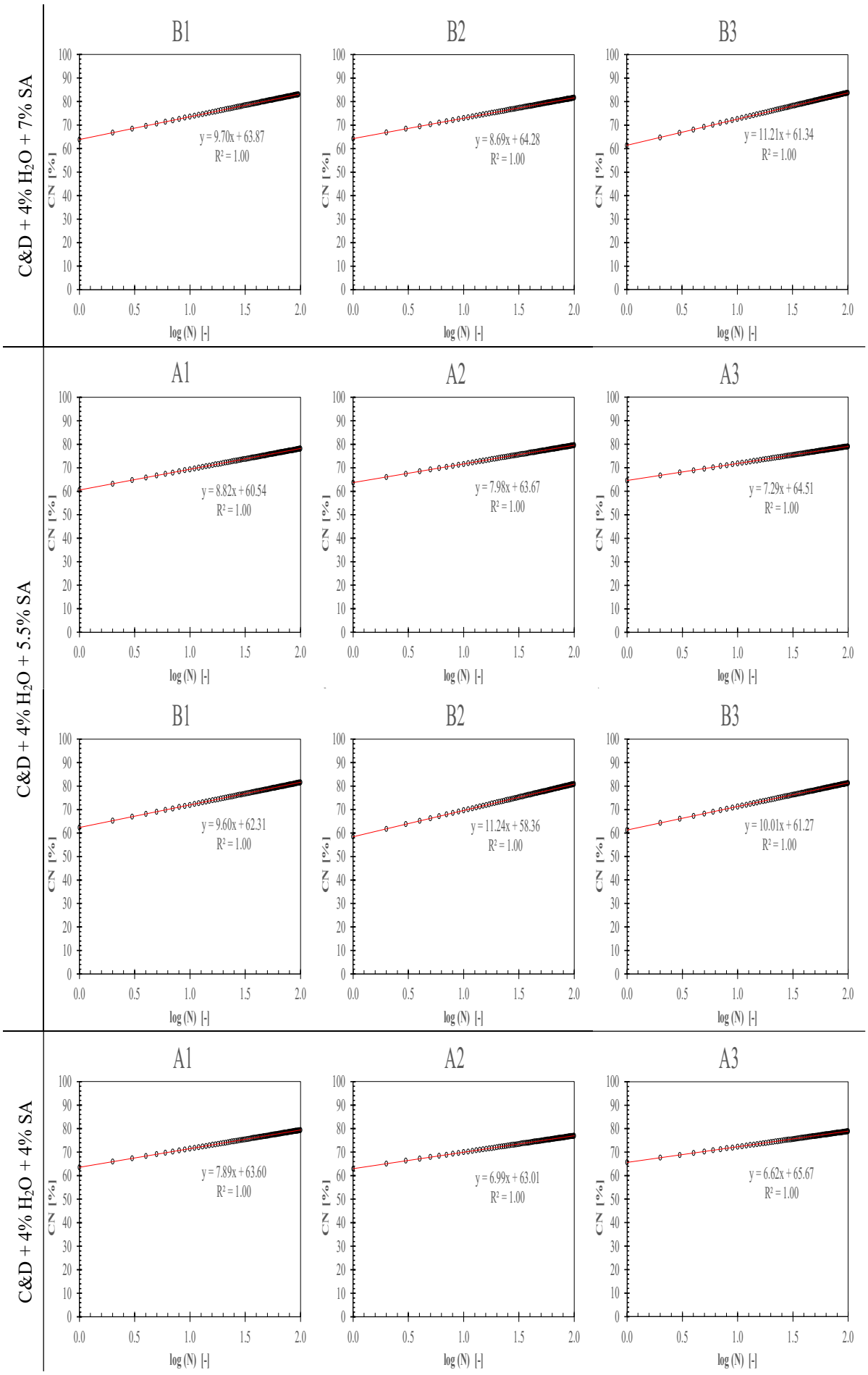
C&D + 3% CEM IV/B

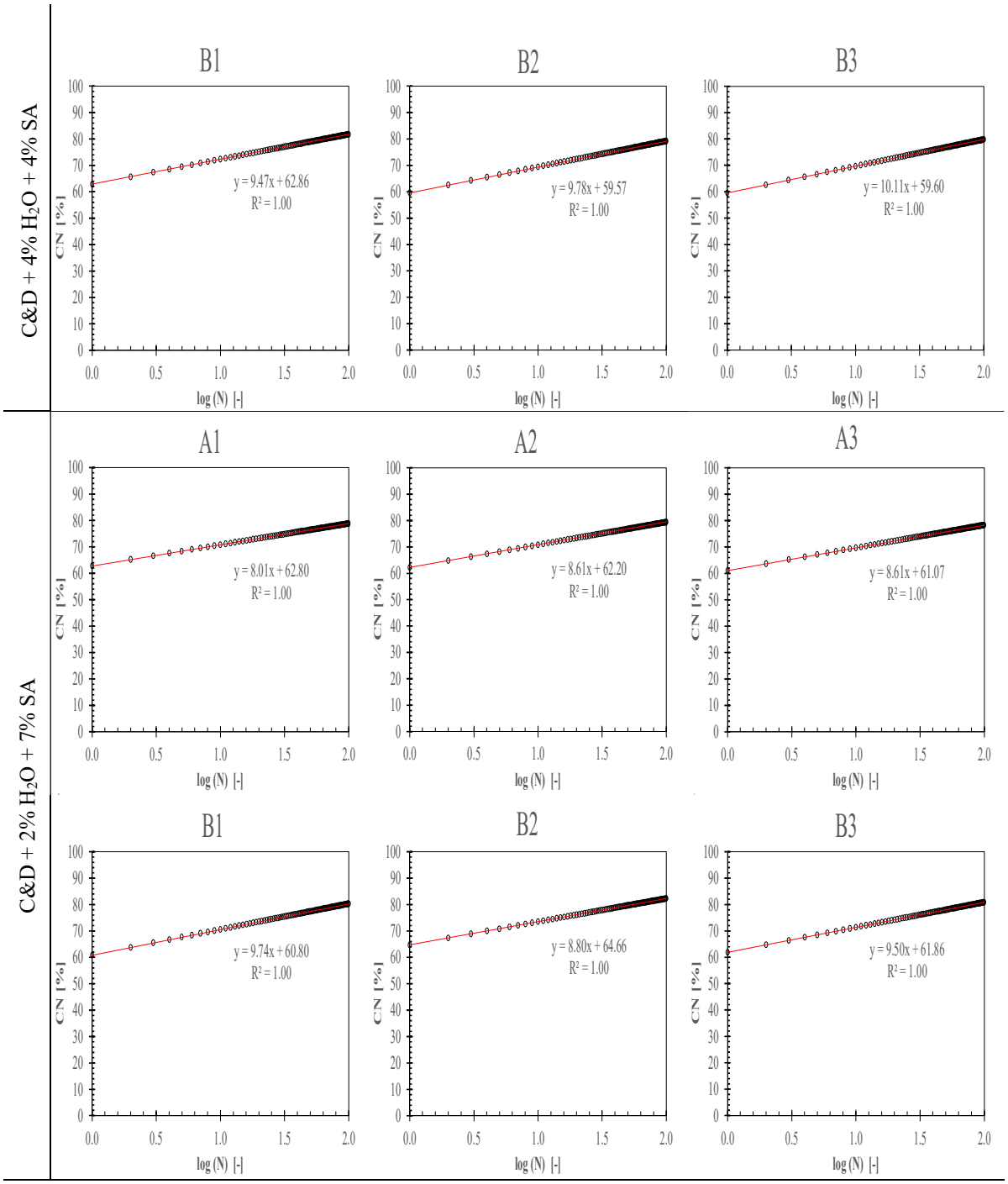


C&D + 8.5% SA




C&D + 8.5% SA
B1
y = 9.57x + 63.12
R² = 1.00
B2
y = 8.73x + 62.69
R² = 1.00
B3
y = 8.41x + 64.60
R² = 1.00
C&D + 4% H2O + 8.5% SA
A1
y = 6.47x + 69.57
R² = 1.00
A2
y = 7.52x + 67.86
R² = 1.00
A3
y = 7.45x + 67.49
R² = 1.00
B1
y = 7.11x + 69.10
R² = 1.00
B2
y = 8.81x + 66.72
R² = 1.00
B3
y = 9.77x + 65.16
R² = 1.00
C&D + 4% H2O + 7% SA
A1
y = 8.64x + 64.31
R² = 1.00
A2
y = 8.16x + 64.68
R² = 1.00
A3
y = 8.08x + 67.17
R² = 1.00
CN [%]
log (N) [-]


C&D + 4% H2O + 7% SA
B1
y = 9.70x + 63.87
R² = 1.00
B2
y = 8.69x + 64.28
R² = 1.00
B3
y = 11.21x + 61.34
R² = 1.00
C&D + 4% H2O + 5.5% SA
A1
y = 8.82x + 60.54
R² = 1.00
A2
y = 7.98x + 63.67
R² = 1.00
A3
y = 7.29x + 64.51
R² = 1.00
B1
y = 9.60x + 62.31
R² = 1.00
B2
y = 11.24x + 58.36
R² = 1.00
B3
y = 10.01x + 61.27
R² = 1.00
C&D + 4% H2O + 4% SA
A1
y = 7.89x + 63.60
R² = 1.00
A2
y = 6.99x + 63.01
R² = 1.00
A3
y = 6.62x + 65.67
R² = 1.00
CN [%]
log (N) [-]


C&D + 4% H2O + 4% SA
B1
y = 9.47x + 62.86
R² = 1.00
B2
y = 9.78x + 59.57
R² = 1.00
B3
y = 10.11x + 59.60
R² = 1.00
C&D + 2% H2O + 7% SA
A1
y = 8.01x + 62.80
R² = 1.00
A2
y = 8.61x + 62.20
R² = 1.00
A3
y = 8.61x + 61.07
R² = 1.00
B1
y = 9.74x + 60.80
R² = 1.00
B2
y = 8.80x + 64.66
R² = 1.00
B3
y = 9.50x + 61.86
R² = 1.00
CN [%]
log (N) [-]

MR -ANALISI DI LIVELLO 2

NAT Tal quale

Specimen	Sequence	Code	Confining Pressure (kPa)	Cyclic Axial Stress (kPa)	Maximum Axial Stress (kPa)	Contact Axial Stress (kPa)	Recoverable Axial Strain (%)	Permanent Axial Strain (%)	Cyclic Axial Load (kN)	Maximum Axial Load (kN)	Contact Axial Load (kN)	Recoverable Axial Deformation (mm)	Permanent Axial Deformation (mm)	Stress σ_1 (kPa)	Stress σ_2 (kPa)	Stress σ_3 (kPa)	Deviatoric stress σ_d (kPa)	Octahedral normal stress σ_{oct} (kPa)	Octahedral shear stress τ_{oct} (kPa)	First stress invariant I_1 (kPa)	Second stress invariant I_2 (kPa)	Third stress invariant I_3 (kPa)	RM (avg.) (MPa)
s1	0	s1_0	107.4	93.0	103.4	10.3	0.050	0.077	0.731	0.812	0.081	0.0959	0.1454	210.8	107.4	107.4	103.4	141.9	48.7	425.6	56810	2431297	184.5
s1	1	s1_1	24.7	18.8	20.7	1.9	0.029	0.000	0.147	0.162	0.015	0.0548	-0.0005	45.4	24.7	24.7	20.7	31.6	9.7	94.8	2852	27686	65.1
s1	2	s1_2	24.7	36.8	41.3	4.5	0.051	0.013	0.289	0.324	0.036	0.0964	0.0254	66.0	24.7	24.7	41.3	38.5	19.5	115.4	3871	40278	72.6
s1	3	s1_3	24.7	55.5	62.0	6.4	0.067	0.032	0.436	0.487	0.050	0.1270	0.0617	86.7	24.7	24.7	62.0	45.4	29.2	136.1	4892	52883	83.1
s1	4	s1_4	38.5	31.2	34.7	3.4	0.035	0.034	0.245	0.272	0.027	0.0673	0.0650	73.2	38.5	38.5	34.7	50.1	16.3	150.2	7116	108441	88.2
s1	5	s1_5	38.5	61.9	68.7	6.9	0.060	0.046	0.486	0.540	0.054	0.1145	0.0869	107.2	38.5	38.5	68.7	61.4	32.4	184.2	9738	158927	102.7
s1	6	s1_6	38.5	92.9	103.3	10.3	0.081	0.075	0.730	0.811	0.081	0.1545	0.1421	141.8	38.5	38.5	103.3	72.9	48.7	218.8	12398	210124	114.3
s1	7	s1_7	72.9	61.9	68.9	6.9	0.044	0.086	0.487	0.541	0.054	0.0831	0.1627	141.8	72.9	72.9	68.9	95.9	32.5	287.6	25986	753477	141.8
s1	8	s1_8	72.9	124.0	137.9	13.8	0.076	0.114	0.974	1.083	0.109	0.1448	0.2171	210.8	72.9	72.9	137.9	118.9	65.0	356.6	36046	1120171	162.9
s1	9	s1_9	72.9	185.9	206.7	20.7	0.106	0.189	1.460	1.623	0.163	0.2020	0.3583	279.6	72.9	72.9	206.7	141.8	97.4	425.4	46077	1485803	175.0
s1	10	s1_10	107.4	62.0	68.9	6.9	0.036	0.181	0.487	0.541	0.054	0.0681	0.3436	176.3	107.4	107.4	68.9	130.4	32.5	391.1	49395	2033117	172.8
s1	11	s1_11	107.4	93.1	103.3	10.3	0.051	0.185	0.731	0.812	0.081	0.0972	0.3519	210.7	107.4	107.4	103.3	141.8	48.7	425.5	56802	2430835	181.9
s1	12	s1_12	107.4	186.1	206.8	20.7	0.088	0.214	1.461	1.624	0.162	0.1667	0.4075	314.2	107.4	107.4	206.8	176.3	97.5	529.0	79021	3623991	212.2
s1	13	s1_13	141.9	93.0	103.3	10.3	0.042	0.217	0.730	0.811	0.081	0.0801	0.4114	245.2	141.9	141.9	103.3	176.3	48.7	529.0	89735	4938057	220.6
s1	14	s1_14	141.9	124.0	137.8	13.8	0.053	0.221	0.974	1.082	0.108	0.1016	0.4190	279.7	141.9	141.9	137.8	187.8	65.0	563.5	99514	5631930	231.9
s1	15	s1_15	141.9	247.9	275.6	27.6	0.093	0.260	1.947	2.165	0.217	0.1774	0.4939	417.5	141.9	141.9	275.6	233.8	129.9	701.3	138616	8406214	265.5
s2	0	s2_0	107.4	93.1	103.3	10.3	0.047	0.081	0.731	0.812	0.081	0.0881	0.1516	210.7	107.4	107.4	103.3	141.8	48.7	425.5	56802	2430835	197.8
s2	1	s2_1	24.7	18.7	20.7	2.0	0.026	0.008	0.147	0.163	0.015	0.0492	0.0150	45.4	24.7	24.7	20.7	31.6	9.8	94.8	2853	27698	71.3
s2	2	s2_2	24.7	37.5	41.4	3.9	0.048	0.021	0.295	0.325	0.030	0.0890	0.0388	66.1	24.7	24.7	41.4	38.5	19.5	115.5	3875	40327	79.0
s2	3	s2_3	24.7	56.0	62.0	6.0	0.063	0.041	0.440	0.487	0.048	0.1178	0.0766	86.7	24.7	24.7	62.0	45.4	29.2	136.1	4895	52919	89.0
s2	4	s2_4	38.5	30.6	34.5	3.9	0.032	0.044	0.240	0.271	0.030	0.0597	0.0817	73.0	38.5	38.5	34.5	50.0	16.2	150.0	7100	108145	95.8
s2	5	s2_5	38.5	61.7	68.9	7.2	0.056	0.054	0.484	0.541	0.057	0.1055	0.1014	107.4	38.5	38.5	68.9	61.5	32.5	184.4	9752	159194	109.5
s2	6	s2_6	38.5	93.1	103.5	10.4	0.077	0.082	0.731	0.813	0.082	0.1441	0.1531	142.0	38.5	38.5	103.5	73.0	48.8	219.0	12415	210450	121.0
s2	7	s2_7	72.9	62.0	68.9	6.9	0.040	0.093	0.487	0.541	0.054	0.0753	0.1750	141.8	72.9	72.9	68.9	95.9	32.5	287.6	25986	753477	154.2
s2	8	s2_8	72.9	124.0	137.8	13.8	0.071	0.119	0.974	1.082	0.109	0.1337	0.2227	210.7	72.9	72.9	137.8	118.8	65.0	356.5	36040	1119959	173.7
s2	9	s2_9	72.9	186.2	206.8	20.7	0.101	0.181	1.462	1.625	0.163	0.1884	0.3389	279.7	72.9	72.9	206.8	141.8	97.5	425.5	46101	1486653	185.1
s2	10	s2_10	107.4	62.0	68.9	6.9	0.033	0.176	0.487	0.541	0.054	0.0619	0.3297	176.3	107.4	107.4	68.9	130.4	32.5	391.1	49400	2033347	187.5
s2	11	s2_11	107.4	93.1	103.4	10.3	0.047	0.180	0.731	0.812	0.081	0.0889	0.3370	210.8	107.4	107.4	103.4	141.9	48.7	425.6	56806	2431066	196.1
s2	12	s2_12	107.4	186.0	206.7	20.7	0.083	0.204	1.461	1.624	0.163	0.1558	0.3825	314.1	107.4	107.4	206.7	176.3	97.5	528.9	79012	3623530	223.7
s2	13	s2_13	141.9	93.1	103.4	10.3	0.040	0.207	0.731	0.812	0.081	0.0748	0.3879	245.3	141.9	141.9	103.4	176.4	48.7	529.1	89752	4939265	233.1
s2	14	s2_14	141.9	124.0	137.9	13.8	0.051	0.211	0.974	1.083	0.109	0.0952	0.3944	279.8	141.9	141.9	137.9	187.9	65.0	563.6	99531	5633138	244.0
s2	15	s2_15	141.9	248.1	275.7	27.7	0.090	0.246	1.948	2.165	0.217	0.1693	0.4617	417.6	141.9	141.9	275.7	233.8	130.0	701.4	138656	8409033	274.3
s3	0	s3_0	107.4	93.1	103.4	10.3	0.046	0.101	0.731	0.812	0.081	0.0872	0.1937	210.8	107.4	107.4	103.4	141.9	48.7	425.6	56810	2431297	203.9
s3	1	s3_1	24.7	18.8	20.7	2.0	0.027	0.032	0.147	0.163	0.015	0.0507	0.0614	45.4	24.7	24.7	20.7	31.6	9.8	94.8	2853	27698	70.6
s3	2	s3_2	24.7	37.3	41.3	4.0	0.047	0.044	0.293	0.325	0.032	0.0895	0.0847	66.0	24.7	24.7	41.3	38.5	19.5	115.4	3872	40290	79.6
s3	3	s3_3	24.7	55.9	62.1	6.2	0.062	0.064	0.439	0.488	0.048	0.1192	0.1226	86.8	24.7	24.7	62.1	45.4	29.3	136.2	4896	52931	89.6
s3	4	s3_4	38.5	31.2	34.5	3.3	0.032	0.066	0.245	0.271	0.026	0.0619	0.1261	73.0	38.5	38.5	34.5	50.0	16.2	150.0	7100	108145	96.1
s3	5	s3_5	38.5	61.9	68.8	6.9	0.056	0.077	0.486	0.541	0.054	0.1078	0.1473	107.3	38.5	38.5	68.8	61.4	32.4	184.3	9746	159075	109.7
s3	6	s3_6	38.5	92.9	103.3	10.4	0.078	0.112	0.730	0.812	0.082	0.1482	0.2139	141.8	38.5	38.5	103.3	72.9	48.7	218.8	12402	210213	119.8
s3	7	s3_7	72.9	62.0	68.8	6.9	0.041	0.122	0.487	0.541	0.054	0.0774	0.2334	141.7	72.9	72.9	68.8	95.8	32.5	287.5	25980	753264	153.0
s3	8	s3_8	72.9	124.2	137.8	13.6	0.072	0.154	0.976	1.082	0.106	0.1377	0.2940	210.7	72.9	72.9	137.8	118.8	65.0	356.5	36032	1119640	172.2
s3	9	s3_9	72.9	185.9	206.5	20.7	0.103	0.242	1.460	1.622	0.163	0.1959	0.4628	279.4	72.9	72.9	206.5	141.7	97.4	425.2	46054	1484952	181.2
s3	10	s3_10	107.4	62.0	68.9	6.9	0.034	0.236	0.487	0.541	0.054	0.0651	0.4499	176.3	107.4	107.4	68.9	130.4	32.5	391.1	49404	2033578	182.1
s3	11	s3_11	107.4	93.0	103.4	10.4	0.049	0.240	0.730	0.812	0.082	0.0935	0.4581	210.8	107.4	107.4	103.4	141.9	48.7	425.6	56810	2431297	189.9
s3	12	s3_12	107.4	186.0	206.8	20.8	0.085	0.272	1.461	1.624	0.164	0.1631	0.5192	314.2	107.4	107.4	206.8	176.3	97.5	529.0	79025	3624222	217.8
s3	13	s3_13	141.9	93.0	103.4	10.4	0.041	0.274	0.730	0.812	0.081	0.0786	0.5229	245.3	141.9	141.9	103.4	176.4	48.7	529.1	89746	4938862	225.9
s3	14	s3_14	141.9	124.0	137.9	13.9	0.052	0.277	0.974	1.083	0.109	0.1001	0.5298	279.8	141.9	141.9	137.9	187.9	65.0	563.6	99531	5633138	236.4
s3	15	s3_15	141.9	247.9	275.6	27.6	0.093	0.324	1.947	2.164	0.217	0.1771	0.6191	417.5	141.9	141.9	275.6	233.8	129.9	701.3	138611	8405812	267.3

NAT + 2% CEM II/B

Specimen	Sequence	Code	Confining Pressure (kPa)	Cyclic Axial Stress (kPa)	Maximum Axial Stress (kPa)	Contact Axial Stress (kPa)	Recoverable Axial Strain (%)	Permanent Axial Strain (%)	Cyclic Axial Load (kN)	Maximum Axial Load (kN)	Contact Axial Load (kN)	Recoverable Axial Deformation (mm)	Permanent Axial Deformation (mm)	Stress σ_1 (kPa)	Stress σ_2 (kPa)	Stress σ_3 (kPa)	Deviatoric stress σ_d (kPa)	Octahedral normal stress σ_{oct} (kPa)	Octahedral shear stress τ_{oct} (kPa)	First stress invariant I_1 (kPa)	Second stress invariant I_2 (kPa)	Third stress invariant I_3 (kPa)	RM (avg.) (MPa)
s1	0	s1_0	107.4	93.0	103.4	10.3	0.020	0.056	0.731	0.812	0.081	0.0382	0.1073										
s1	1	s1_1	24.7	18.6	20.7	2.1	0.009	0.022	0.146	0.162	0.016	0.0179	0.0428										
s1	2	s1_2	24.7	37.3	41.4	4.1	0.016	0.025	0.293	0.325	0.032	0.0307	0.0473										
s1	3	s1_3	24.7	55.9	62.1	6.2	0.021	0.028	0.439	0.488	0.049	0.0408	0.0527										
s1	4	s1_4	38.5	31.0	34.5	3.5	0.012	0.045	0.243	0.271	0.027	0.0221	0.0853										
s1	5	s1_5	38.5	62.0	68.9	6.9	0.021	0.047	0.487	0.541	0.054	0.0400	0.0908										
s1	6	s1_6	38.5	93.1	103.4	10.3	0.028	0.051	0.731	0.812	0.081	0.0545	0.0986										
s1	7	s1_7	72.9	62.0	68.9	6.9	0.017	0.080	0.487	0.541	0.054	0.0318	0.1541										
s1	8	s1_8	72.9	124.0	137.9	13.8	0.030	0.086	0.974	1.083	0.108	0.0569	0.1653										
s1	9	s1_9	72.9	186.0	206.7	20.7	0.039	0.096	1.461	1.623	0.163	0.0754	0.1832										
s1	10	s1_10	107.4	62.0	68.9	6.9	0.015	0.119	0.487	0.541	0.054	0.0295	0.2286										
s1	11	s1_11	107.4	93.1	103.4	10.3	0.022	0.121	0.731	0.812	0.081	0.0414	0.2323										
s1	12	s1_12	107.4	185.8	206.6	20.7	0.038	0.129	1.460	1.622	0.163	0.0727	0.2480										
s1	13	s1_13	141.9	93.1	103.4	10.3	0.020	0.131	0.731	0.812	0.081	0.0387	0.2516										
s1	14	s1_14	141.9	124.0	137.9	13.8	0.026	0.133	0.974	1.083	0.108	0.0494	0.2550										
s1	15	s1_15	141.9	248.2	275.8	27.6	0.044	0.144	1.949	2.166	0.217	0.0843	0.2760										
s2	0	s2_0	107.4	93.1	103.3	10.3	0.014	0.028	0.731	0.812	0.081	0.0270	0.0528	210.7	107.4	107.4	103.3	141.8	48.7	425.5	56802	2430835	655.2
s2	1	s2_1	24.7	18.6	20.7	2.1	0.008	-0.006	0.146	0.163	0.016	0.0148	-0.0106	45.4	24.7	24.7	20.7	31.6	9.8	94.8	2853	27698	241.0
s2	2	s2_2	24.7	37.3	41.4	4.1	0.014	-0.003	0.293	0.325	0.032	0.0260	-0.0059	66.1	24.7	24.7	41.4	38.5	19.5	115.5	3873	40303	272.4
s2	3	s2_3	24.7	55.9	62.0	6.2	0.019	-0.001	0.439	0.487	0.049	0.0354	-0.0015	86.7	24.7	24.7	62.0	45.4	29.2	136.1	4895	52919	300.5
s2	4	s2_4	38.5	30.9	34.4	3.5	0.010	0.004	0.243	0.270	0.028	0.0184	0.0075	72.9	38.5	38.5	34.4	50.0	16.2	149.9	7099	108115	321.0
s2	5	s2_5	38.5	62.0	68.9	6.9	0.017	0.007	0.487	0.541	0.054	0.0318	0.0125	107.4	38.5	38.5	68.9	61.5	32.5	184.4	9752	159194	372.2
s2	6	s2_6	38.5	93.1	103.4	10.3	0.022	0.010	0.731	0.812	0.081	0.0423	0.0188	141.9	38.5	38.5	103.4	73.0	48.7	218.9	12407	210302	418.9
s2	7	s2_7	72.9	62.0	68.9	6.9	0.012	0.020	0.487	0.541	0.054	0.0225	0.0387	141.8	72.9	72.9	68.9	95.9	32.5	287.6	25983	753371	526.0
s2	8	s2_8	72.9	124.0	137.8	13.8	0.021	0.027	0.974	1.083	0.108	0.0403	0.0512	210.7	72.9	72.9	137.8	118.8	65.0	356.5	36040	1119959	586.2
s2	9	s2_9	72.9	186.0	206.7	20.7	0.032	0.048	1.461	1.624	0.163	0.0604	0.0909	279.6	72.9	72.9	206.7	141.8	97.5	425.4	46086	1486122	587.2
s2	10	s2_10	107.4	61.9	68.9	6.9	0.011	0.052	0.486	0.541	0.054	0.0215	0.0987	176.3	107.4	107.4	68.9	130.4	32.5	391.1	49395	2033117	550.3
s2	11	s2_11	107.4	93.0	103.3	10.3	0.016	0.054	0.731	0.812	0.081	0.0304	0.1022	210.7	107.4	107.4	103.3	141.8	48.7	425.5	56802	2430835	585.2
s2	12	s2_12	107.4	186.1	206.8	20.7	0.028	0.066	1.461	1.624	0.163	0.0533	0.1251	314.2	107.4	107.4	206.8	176.3	97.5	529.0	79021	3623991	665.5
s2	13	s2_13	141.9	93.1	103.4	10.3	0.014	0.071	0.731	0.812	0.081	0.0269	0.1349	245.3	141.9	141.9	103.4	176.4	48.7	529.1	89752	4939265	662.3
s2	14	s2_14	141.9	124.0	137.8	13.8	0.018	0.072	0.974	1.082	0.108	0.0342	0.1378	279.7	141.9	141.9	137.8	187.8	65.0	563.5	99520	5632333	691.3
s2	15	s2_15	141.9	248.1	275.7	27.6	0.035	0.108	1.949	2.165	0.217	0.0665	0.2064	417.6	141.9	141.9	275.7	233.8	129.9	701.4	138639	8407825	711.6
s3	0	s3_0	107.4	93.0	103.4	10.3	0.014	0.034	0.731	0.812	0.081	0.0279	0.0657	210.8	107.4	107.4	103.4	141.9	48.7	425.6	56806	2431066	645.4
s3	1	s3_1	24.7	18.6	20.6	2.1	0.008	0.000	0.146	0.162	0.016	0.0151	-0.0001	45.3	24.7	24.7	20.6	31.6	9.7	94.7	2849	27649	236.2
s3	2	s3_2	24.7	37.3	41.4	4.1	0.014	0.002	0.293	0.325	0.032	0.0279	0.0031	66.1	24.7	24.7	41.4	38.5	19.5	115.5	3874	40315	257.5
s3	3	s3_3	24.7	55.9	62.1	6.2	0.019	0.004	0.439	0.488	0.049	0.0374	0.0074	86.8	24.7	24.7	62.1	45.4	29.3	136.2	4898	52956	288.7
s3	4	s3_4	38.5	31.0	34.4	3.5	0.010	0.009	0.243	0.270	0.027	0.0193	0.0173	72.9	38.5	38.5	34.4	50.0	16.2	149.9	7099	108115	309.4
s3	5	s3_5	38.5	62.0	68.9	6.9	0.017	0.012	0.487	0.541	0.054	0.0329	0.0226	107.4	38.5	38.5	68.9	61.5	32.5	184.4	9752	159194	363.0
s3	6	s3_6	38.5	93.1	103.4	10.3	0.022	0.016	0.731	0.812	0.081	0.0433	0.0301	141.9	38.5	38.5	103.4	73.0	48.7	218.9	12405	210272	414.3
s3	7	s3_7	72.9	62.0	68.9	6.9	0.012	0.026	0.487	0.541	0.054	0.0233	0.0499	141.8	72.9	72.9	68.9	95.9	32.5	287.6	25992	753690	512.6
s3	8	s3_8	72.9	124.1	137.9	13.8	0.021	0.034	0.974	1.083	0.108	0.0408	0.0664	210.8	72.9	72.9	137.9	118.9	65.0	356.6	36043	1120065	586.3
s3	9	s3_9	72.9	186.1	206.8	20.7	0.031	0.069	1.462	1.624	0.163	0.0592	0.1329	279.7	72.9	72.9	206.8	141.8	97.5	425.5	46098	1486547	605.8
s3	10	s3_10	107.4	61.9	68.9	6.9	0.011	0.073	0.487	0.541	0.054	0.0208	0.1409	176.3	107.4	107.4	68.9	130.4	32.5	391.1	49395	2033117	574.8
s3	11	s3_11	107.4	93.0	103.3	10.3	0.015	0.075	0.731	0.811	0.081	0.0294	0.1437	210.7	107.4	107.4	103.3	141.8	48.7	425.5	56802	2430835	611.3
s3	12	s3_12	107.4	186.0	206.7	20.7	0.027	0.088	1.461	1.623	0.163	0.0529	0.1695	314.1	107.4	107.4	206.7	176.3	97.4	528.9	79008	3623299	677.4
s3	13	s3_13	141.9	93.0	103.3	10.3	0.014	0.093	0.731	0.812	0.081	0.0264	0.1788	245.2	141.9	141.9	103.3	176.3	48.7	529.0	89735	4938057	678.1
s3	14	s3_14	141.9	124.0	137.8	13.8	0.018	0.094	0.974	1.083	0.109	0.0339	0.1814	279.7	141.9	141.9	137.8	187.8	65.0	563.5	99526	5632736	704.8
s3	15	s3_15	141.9	248.0	275.6	27.6	0.034	0.136	1.948	2.165	0.217	0.0664	0.2625	417.5	141.9	141.9	275.6	233.8	129.9	701.3	138633	8407423	720.6

NAT + 3% CEM II/B

Specimen	Sequence	Code	Confining Pressure (kPa)	Cyclic Axial Stress (kPa)	Maximum Axial Stress (kPa)	Contact Axial Stress (kPa)	Recoverable Axial Strain (%)	Permanent Axial Strain (%)	Cyclic Axial Load (kN)	Maximum Axial Load (kN)	Contact Axial Load (kN)	Recoverable Axial Deformation (mm)	Permanent Axial Deformation (mm)	Stress σ_1 (kPa)	Stress σ_2 (kPa)	Stress σ_3 (kPa)	Deviatoric stress σ_d (kPa)	Octahedral normal stress σ_{oct} (kPa)	Octahedral shear stress τ_{oct} (kPa)	First stress invariant I_1 (kPa)	Second stress invariant I_2 (kPa)	Third stress invariant I_3 (kPa)	RM (avg.) (MPa)
s1	0	s1_0	107.4	93.0	103.3	10.3	0.011	0.018	0.731	0.812	0.081	0.0215	0.0337	210.7	107.4	107.4	103.3	141.8	48.7	425.5	56802	2430835	816.1
s1	1	s1_1	24.7	18.5	20.6	2.1	0.006	-0.011	0.145	0.162	0.016	0.0120	-0.0199	45.3	24.7	24.7	20.6	31.6	9.7	94.7	2849	27649	291.2
s1	2	s1_2	24.7	37.3	41.4	4.1	0.011	-0.009	0.293	0.325	0.032	0.0205	-0.0171	66.1	24.7	24.7	41.4	38.5	19.5	115.5	3874	40315	342.7
s1	3	s1_3	24.7	55.9	62.1	6.2	0.014	-0.007	0.439	0.488	0.049	0.0270	-0.0137	86.8	24.7	24.7	62.1	45.4	29.3	136.2	4897	52944	392.4
s1	4	s1_4	38.5	31.0	34.5	3.5	0.007	-0.003	0.243	0.271	0.028	0.0138	-0.0058	73.0	38.5	38.5	34.5	50.0	16.3	150.0	7102	108175	424.4
s1	5	s1_5	38.5	62.0	68.9	6.9	0.013	-0.001	0.487	0.541	0.054	0.0238	-0.0022	107.4	38.5	38.5	68.9	61.5	32.5	184.4	9751	159164	491.9
s1	6	s1_6	38.5	93.1	103.4	10.3	0.017	0.001	0.731	0.812	0.081	0.0317	0.0025	141.9	38.5	38.5	103.4	73.0	48.7	218.9	12409	210331	555.5
s1	7	s1_7	72.9	62.0	68.9	6.9	0.010	0.010	0.487	0.541	0.054	0.0179	0.0181	141.8	72.9	72.9	68.9	95.9	32.5	287.6	25983	753371	652.2
s1	8	s1_8	72.9	124.0	137.8	13.8	0.016	0.014	0.974	1.083	0.108	0.0310	0.0265	210.7	72.9	72.9	137.8	118.8	65.0	356.5	36040	1119959	756.3
s1	9	s1_9	72.9	186.0	206.7	20.7	0.023	0.026	1.461	1.624	0.163	0.0443	0.0485	279.6	72.9	72.9	206.7	141.8	97.4	425.4	46083	1486015	793.6
s1	10	s1_10	107.4	62.0	68.9	6.9	0.008	0.031	0.487	0.541	0.054	0.0159	0.0581	176.3	107.4	107.4	68.9	130.4	32.5	391.1	49400	2033347	734.4
s1	11	s1_11	107.4	93.1	103.4	10.3	0.012	0.032	0.731	0.812	0.081	0.0225	0.0600	210.8	107.4	107.4	103.4	141.9	48.7	425.6	56806	2431066	782.0
s1	12	s1_12	107.4	185.9	206.6	20.7	0.021	0.039	1.460	1.623	0.163	0.0401	0.0730	314.0	107.4	107.4	206.6	176.3	97.4	528.8	78991	3622376	875.4
s1	13	s1_13	141.9	93.0	103.4	10.3	0.011	0.045	0.731	0.812	0.081	0.0202	0.0858	245.3	141.9	141.9	103.4	176.4	48.7	529.1	89740	4938460	869.7
s1	14	s1_14	141.9	124.0	137.9	13.8	0.014	0.046	0.974	1.083	0.109	0.0258	0.0878	279.8	141.9	141.9	137.9	187.9	65.0	563.6	99531	5633138	906.9
s1	15	s1_15	141.9	248.2	275.8	27.6	0.026	0.063	1.949	2.166	0.217	0.0495	0.1190	417.7	141.9	141.9	275.8	233.8	130.0	701.5	138673	8410242	948.7
s2	0	s2_0	107.4	93.1	103.4	10.3	0.018	0.119	0.731	0.812	0.081	0.0335	0.2256										
s2	1	s2_1	24.7	66.6	68.6	2.1	0.054	0.044	0.523	0.539	0.016	0.1023	0.0840										
s2	2	s2_2	24.7	37.3	41.4	4.1	0.020	0.093	0.293	0.325	0.032	0.0372	0.1763										
s2	3	s2_3	24.7	55.8	62.0	6.2	0.025	0.095	0.438	0.487	0.049	0.0482	0.1817										
s2	4	s2_4	38.5	0.0	3.9	3.9	0.000	0.147	0.000	0.031	0.031	0.0001	0.2797										
s2	5	s2_5	38.5	61.9	68.9	6.9	0.022	0.150	0.487	0.541	0.054	0.0428	0.2858										
s2	6	s2_6	38.5	93.1	103.4	10.3	0.030	0.154	0.731	0.812	0.081	0.0563	0.2936										
s2	7	s2_7	72.9	62.0	68.9	6.9	0.016	0.179	0.486	0.541	0.054	0.0309	0.3410										
s2	8	s2_8	72.9	124.1	137.9	13.8	0.028	0.186	0.975	1.083	0.108	0.0525	0.3546										
s2	9	s2_9	72.9	186.0	206.7	20.7	0.036	0.195	1.461	1.623	0.162	0.0690	0.3704										
s2	10	s2_10	107.4	62.0	68.9	6.9	0.027	0.164	0.487	0.541	0.054	0.0513	0.3123										
s2	11	s2_11	107.4	93.1	103.4	10.3	0.020	0.191	0.731	0.812	0.081	0.0375	0.3630										
s2	12	s2_12	107.4	186.0	206.7	20.7	0.031	0.207	1.461	1.624	0.163	0.0591	0.3943										
s2	13	s2_13	141.9	93.0	103.3	10.3	0.019	0.228	0.731	0.812	0.081	0.0355	0.4347										
s2	14	s2_14	141.9	124.0	137.8	13.8	0.023	0.231	0.974	1.083	0.108	0.0436	0.4398										
s2	15	s2_15	141.9	248.0	275.6	27.6	0.037	0.252	1.948	2.164	0.217	0.0712	0.4793										
s3	0	s3_0	107.4	93.0	103.4	10.3	0.013	0.025	0.731	0.812	0.081	0.0240	0.0477	210.8	107.4	107.4	103.4	141.9	48.7	425.6	56806	2431066	741.0
s3	1	s3_1	24.7	18.6	20.7	2.1	0.008	-0.007	0.146	0.162	0.016	0.0158	-0.0139	45.4	24.7	24.7	20.7	31.6	9.7	94.8	2852	27686	223.9
s3	2	s3_2	24.7	37.2	41.3	4.1	0.014	-0.005	0.293	0.325	0.032	0.0266	-0.0100	66.0	24.7	24.7	41.3	38.5	19.5	115.4	3872	40290	266.8
s3	3	s3_3	24.7	55.8	62.0	6.2	0.018	-0.003	0.439	0.487	0.049	0.0339	-0.0054	86.7	24.7	24.7	62.0	45.4	29.2	136.1	4895	52919	314.8
s3	4	s3_4	38.5	31.0	34.5	3.5	0.009	0.003	0.243	0.271	0.028	0.0172	0.0049	73.0	38.5	38.5	34.5	50.0	16.3	150.0	7103	108204	343.7
s3	5	s3_5	38.5	61.9	68.8	6.9	0.015	0.005	0.486	0.540	0.054	0.0282	0.0101	107.3	38.5	38.5	68.8	61.4	32.4	184.3	9746	159075	419.5
s3	6	s3_6	38.5	93.1	103.4	10.3	0.019	0.009	0.731	0.812	0.081	0.0368	0.0162	141.9	38.5	38.5	103.4	73.0	48.7	218.9	12405	210272	482.2
s3	7	s3_7	72.9	62.0	68.8	6.9	0.010	0.018	0.487	0.541	0.054	0.0200	0.0339	141.7	72.9	72.9	68.8	95.8	32.5	287.5	25980	753264	591.0
s3	8	s3_8	72.9	124.1	137.9	13.8	0.018	0.024	0.974	1.083	0.108	0.0343	0.0448	210.8	72.9	72.9	137.9	118.9	65.0	356.6	36043	1120065	689.2
s3	9	s3_9	72.9	186.0	206.7	20.7	0.026	0.040	1.461	1.623	0.163	0.0487	0.0768	279.6	72.9	72.9	206.7	141.8	97.4	425.4	46080	1485909	728.3
s3	10	s3_10	107.4	62.0	68.9	6.9	0.009	0.044	0.487	0.541	0.054	0.0175	0.0846	176.3	107.4	107.4	68.9	130.4	32.5	391.1	49400	2033347	675.2
s3	11	s3_11	107.4	93.1	103.4	10.3	0.013	0.046	0.731	0.812	0.081	0.0244	0.0870	210.8	107.4	107.4	103.4	141.9	48.7	425.6	56810	2431297	727.2
s3	12	s3_12	107.4	186.1	206.8	20.7	0.023	0.054	1.461	1.624	0.163	0.0431	0.1037	314.2	107.4	107.4	206.8	176.3	97.5	529.0	79016	3623760	824.0
s3	13	s3_13	141.9	93.1	103.4	10.3	0.011	0.059	0.731	0.812	0.081	0.0216	0.1121	245.3	141.9	141.9	103.4	176.4	48.7	529.1	89740	4938460	823.5
s3	14	s3_14	141.9	124.0	137.8	13.8	0.015	0.060	0.974	1.082	0.108	0.0276	0.1140	279.7	141.9	141.9	137.8	187.8	65.0	563.5	99520	5632333	855.3
s3	15	s3_15	141.9	248.2	275.8	27.6	0.028	0.081	1.949	2.166	0.217	0.0531	0.1555	417.7	141.9	141.9	275.8	233.8	130.0	701.5	138673	8410242	892.1

NAT + 4% CEM II/B

Specimen	Sequence	Code	Confining Pressure (kPa)	Cyclic Axial Stress (kPa)	Maximum Axial Stress (kPa)	Contact Axial Stress (kPa)	Recoverable Axial Strain (%)	Permanent Axial Strain (%)	Cyclic Axial Load (kN)	Maximum Axial Load (kN)	Contact Axial Load (kN)	Recoverable Axial Deformation (mm)	Permanent Axial Deformation (mm)	Stress σ_1 (kPa)	Stress σ_2 (kPa)	Stress σ_3 (kPa)	Deviatoric stress σ_d (kPa)	Octahedral normal stress σ_{oct} (kPa)	Octahedral shear stress τ_{oct} (kPa)	First stress invariant I_1 (kPa)	Second stress invariant I_2 (kPa)	Third stress invariant I_3 (kPa)	RM (avg.) (MPa)
s1	0	s1_0	107.4	93.0	103.4	10.3	0.012	0.026	0.731	0.812	0.081	0.0240	0.0508	210.8	107.4	107.4	103.4	141.9	48.7	425.6	56806	2431066	756.6
s1	1	s1_1	24.7	18.6	20.7	2.1	0.007	-0.004	0.146	0.163	0.016	0.0137	-0.0076	45.4	24.7	24.7	20.7	31.6	9.7	94.8	2851	27674	263.6
s1	2	s1_2	24.7	37.2	41.3	4.1	0.013	-0.003	0.293	0.325	0.032	0.0253	-0.0049	66.0	24.7	24.7	41.3	38.5	19.5	115.4	3872	40290	286.9
s1	3	s1_3	24.7	55.9	62.1	6.2	0.017	-0.001	0.439	0.487	0.049	0.0338	-0.0010	86.8	24.7	24.7	62.1	45.4	29.3	136.2	4896	52931	322.5
s1	4	s1_4	38.5	31.0	34.5	3.5	0.009	0.004	0.243	0.271	0.027	0.0175	0.0084	73.0	38.5	38.5	34.5	50.0	16.3	150.0	7102	108175	345.0
s1	5	s1_5	38.5	62.0	68.9	6.9	0.015	0.007	0.487	0.541	0.054	0.0293	0.0130	107.4	38.5	38.5	68.9	61.5	32.5	184.4	9751	159164	413.2
s1	6	s1_6	38.5	93.1	103.4	10.3	0.019	0.010	0.731	0.812	0.081	0.0372	0.0188	141.9	38.5	38.5	103.4	73.0	48.7	218.9	12405	210272	487.2
s1	7	s1_7	72.9	62.0	68.9	6.9	0.010	0.019	0.487	0.541	0.054	0.0194	0.0376	141.8	72.9	72.9	68.9	95.9	32.5	287.6	25989	753583	622.5
s1	8	s1_8	72.9	124.1	137.9	13.8	0.017	0.026	0.974	1.083	0.108	0.0337	0.0499	210.8	72.9	72.9	137.9	118.9	65.0	356.6	36043	1120065	717.9
s1	9	s1_9	72.9	186.0	206.7	20.7	0.024	0.046	1.461	1.624	0.163	0.0463	0.0891	279.6	72.9	72.9	206.7	141.8	97.5	425.4	46086	1486122	783.7
s1	10	s1_10	107.4	62.0	68.9	6.9	0.009	0.049	0.486	0.541	0.054	0.0168	0.0962	176.3	107.4	107.4	68.9	130.4	32.5	391.1	49395	2033117	717.2
s1	11	s1_11	107.4	93.1	103.4	10.3	0.012	0.050	0.731	0.812	0.081	0.0237	0.0982	210.8	107.4	107.4	103.4	141.9	48.7	425.6	56810	2431297	765.5
s1	12	s1_12	107.4	186.0	206.7	20.7	0.021	0.058	1.461	1.623	0.163	0.0417	0.1126	314.1	107.4	107.4	206.7	176.3	97.4	528.9	79003	3623068	869.1
s1	13	s1_13	141.9	93.1	103.4	10.3	0.011	0.063	0.731	0.812	0.081	0.0214	0.1227	245.3	141.9	141.9	103.4	176.4	48.7	529.1	89740	4938460	849.1
s1	14	s1_14	141.9	124.0	137.9	13.8	0.014	0.064	0.974	1.083	0.109	0.0272	0.1248	279.8	141.9	141.9	137.9	187.9	65.0	563.6	99531	5633138	888.7
s1	15	s1_15	141.9	248.0	275.7	27.7	0.026	0.082	1.948	2.165	0.217	0.0498	0.1598	417.6	141.9	141.9	275.7	233.8	129.9	701.4	138639	8407825	971.0
s2	0	s2_0	107.4	93.0	103.3	10.3	0.013	0.017	0.731	0.812	0.081	0.0247	0.0321	210.7	107.4	107.4	103.3	141.8	48.7	425.5	56802	2430835	714.6
s2	1	s2_1	24.7	18.5	20.6	2.1	0.006	-0.011	0.146	0.162	0.017	0.0113	-0.0203	45.3	24.7	24.7	20.6	31.6	9.7	94.7	2850	27661	312.1
s2	2	s2_2	24.7	37.2	41.3	4.1	0.011	-0.010	0.293	0.325	0.032	0.0207	-0.0189	66.0	24.7	24.7	41.3	38.5	19.5	115.4	3872	40290	342.3
s2	3	s2_3	24.7	55.9	62.1	6.2	0.015	-0.009	0.439	0.488	0.049	0.0286	-0.0167	86.8	24.7	24.7	62.1	45.4	29.3	136.2	4898	52956	371.7
s2	4	s2_4	38.5	31.0	34.5	3.5	0.008	-0.005	0.244	0.271	0.027	0.0149	-0.0092	73.0	38.5	38.5	34.5	50.0	16.2	150.0	7100	108145	395.9
s2	5	s2_5	38.5	62.0	68.9	6.9	0.014	-0.003	0.487	0.541	0.054	0.0265	-0.0058	107.4	38.5	38.5	68.9	61.5	32.5	184.4	9755	159253	445.7
s2	6	s2_6	38.5	93.1	103.4	10.3	0.019	-0.001	0.731	0.812	0.081	0.0361	-0.0011	141.9	38.5	38.5	103.4	73.0	48.7	218.9	12407	210302	490.4
s2	7	s2_7	72.9	62.0	68.8	6.9	0.011	0.008	0.487	0.541	0.054	0.0203	0.0153	141.7	72.9	72.9	68.8	95.8	32.5	287.5	25980	753264	578.9
s2	8	s2_8	72.9	124.0	137.8	13.8	0.019	0.013	0.974	1.082	0.108	0.0356	0.0255	210.7	72.9	72.9	137.8	118.8	65.0	356.5	36034	1119746	661.0
s2	9	s2_9	72.9	186.0	206.7	20.7	0.027	0.029	1.461	1.623	0.162	0.0505	0.0547	279.6	72.9	72.9	206.7	141.8	97.4	425.4	46074	1485696	700.2
s2	10	s2_10	107.4	62.0	68.9	6.9	0.009	0.033	0.487	0.541	0.054	0.0178	0.0629	176.3	107.4	107.4	68.9	130.4	32.5	391.1	49404	2033578	661.0
s2	11	s2_11	107.4	93.1	103.4	10.3	0.013	0.034	0.731	0.812	0.081	0.0252	0.0651	210.8	107.4	107.4	103.4	141.9	48.7	425.6	56815	2431527	703.2
s2	12	s2_12	107.4	186.0	206.7	20.7	0.024	0.044	1.461	1.624	0.163	0.0452	0.0826	314.1	107.4	107.4	206.7	176.3	97.5	528.9	79012	3623530	782.3
s2	13	s2_13	141.9	93.1	103.4	10.3	0.012	0.049	0.731	0.812	0.081	0.0226	0.0924	245.3	141.9	141.9	103.4	176.4	48.8	529.1	89757	4939668	782.5
s2	14	s2_14	141.9	124.0	137.8	13.8	0.015	0.050	0.974	1.083	0.108	0.0288	0.0947	279.7	141.9	141.9	137.8	187.8	65.0	563.5	99520	5632333	820.2
s2	15	s2_15	141.9	248.0	275.7	27.7	0.029	0.073	1.948	2.165	0.218	0.0547	0.1391	417.6	141.9	141.9	275.7	233.8	130.0	701.4	138662	8409436	862.4
s3	0	s3_0	107.4	93.1	103.4	10.3	0.012	0.034	0.731	0.812	0.081	0.0233	0.0639	210.8	107.4	107.4	103.4	141.9	48.7	425.6	56810	2431297	759.2
s3	1	s3_1	24.7	18.5	20.6	2.1	0.008	0.001	0.146	0.162	0.016	0.0149	0.0027	45.3	24.7	24.7	20.6	31.6	9.7	94.7	2850	27661	236.0
s3	2	s3_2	24.7	37.3	41.4	4.1	0.013	0.004	0.293	0.325	0.032	0.0248	0.0069	66.1	24.7	24.7	41.4	38.5	19.5	115.5	3874	40315	285.5
s3	3	s3_3	24.7	55.9	62.1	6.2	0.017	0.006	0.439	0.487	0.049	0.0322	0.0112	86.8	24.7	24.7	62.1	45.4	29.3	136.2	4896	52931	329.4
s3	4	s3_4	38.5	31.0	34.5	3.5	0.009	0.011	0.244	0.271	0.027	0.0172	0.0201	73.0	38.5	38.5	34.5	50.0	16.3	150.0	7103	108204	342.9
s3	5	s3_5	38.5	62.0	68.9	6.9	0.015	0.013	0.487	0.541	0.054	0.0279	0.0252	107.4	38.5	38.5	68.9	61.5	32.5	184.4	9751	159164	422.8
s3	6	s3_6	38.5	93.1	103.4	10.3	0.019	0.016	0.731	0.812	0.081	0.0353	0.0313	141.9	38.5	38.5	103.4	73.0	48.7	218.9	12407	210302	500.4
s3	7	s3_7	72.9	62.0	68.9	6.9	0.010	0.026	0.487	0.541	0.054	0.0188	0.0493	141.8	72.9	72.9	68.9	95.9	32.5	287.6	25983	753371	625.9
s3	8	s3_8	72.9	124.1	137.9	13.8	0.017	0.031	0.975	1.083	0.108	0.0324	0.0598	210.8	72.9	72.9	137.9	118.9	65.0	356.6	36049	1120278	725.7
s3	9	s3_9	72.9	186.0	206.7	20.7	0.024	0.046	1.461	1.624	0.163	0.0461	0.0879	279.6	72.9	72.9	206.7	141.8	97.5	425.4	46086	1486122	768.1
s3	10	s3_10	107.4	62.0	68.9	6.9	0.009	0.050	0.487	0.541	0.054	0.0172	0.0945	176.3	107.4	107.4	68.9	130.4	32.5	391.1	49395	2033117	685.4
s3	11	s3_11	107.4	93.1	103.4	10.3	0.012	0.051	0.731	0.812	0.081	0.0234	0.0979	210.8	107.4	107.4	103.4	141.9	48.8	425.6	56819	2431758	757.1
s3	12	s3_12	107.4	186.1	206.8	20.7	0.022	0.062	1.461	1.624	0.163	0.0409	0.1169	314.2	107.4	107.4	206.8	176.3	97.5	529.0	79025	3624222	864.8
s3	13	s3_13	141.9	93.1	103.4	10.3	0.011	0.102	0.731	0.812	0.081	0.0217	0.1944	245.3	141.9	141.9	103.4	176.4	48.7	529.1	89752	4939265	818.1
s3	14	s3_14	141.9	124.0	137.8	13.8	0.014	0.105	0.974	1.083	0.108	0.0271	0.1991	279.7	141.9	141.9	137.8	187.8	65.0	563.5	99520	5632333	869.7
s3	15	s3_15	141.9	248.0	275.7	27.6	0.026	0.127	1.948	2.165	0.217	0.0491	0.2414	417.6	141.9	141.9	275.7	233.8	130.0	701.4	138645	8408228	960.1

NAT + 3% CEM II/B (28 gg)

Specimen	Sequence	Code	Confining Pressure (kPa)	Cyclic Axial Stress (kPa)	Maximum Axial Stress (kPa)	Contact Axial Stress (kPa)	Recoverable Axial Strain (%)	Permanent Axial Strain (%)	Cyclic Axial Load (kN)	Maximum Axial Load (kN)	Contact Axial Load (kN)	Recoverable Axial Deformation (mm)	Permanent Axial Deformation (mm)	Stress σ_1 (kPa)	Stress σ_2 (kPa)	Stress σ_3 (kPa)	Deviatoric stress σ_d (kPa)	Octahedral normal stress σ_{oct} (kPa)	Octahedral shear stress τ_{oct} (kPa)	First stress invariant I_1 (kPa)	Second stress invariant I_2 (kPa)	Third stress invariant I_3 (kPa)	RM (avg.) (MPa)
s1	0	s1_0	103.4	93.0	103.3	10.3	0.013	0.083	0.730	0.811	0.081	0.0246	0.1580	206.7	103.4	103.4	103.3	137.8	48.7	413.5	53437	2209945	719.8
s1	1	s1_1	20.7	18.5	20.6	2.1	0.006	0.054	0.146	0.162	0.016	0.0120	0.1031	41.3	20.7	20.7	20.6	27.6	9.7	82.7	2139	17705	294.9
s1	2	s1_2	20.7	37.3	41.4	4.1	0.011	0.055	0.293	0.325	0.032	0.0210	0.1053	62.1	20.7	20.7	41.4	34.5	19.5	103.5	2999	26601	338.3
s1	3	s1_3	20.7	55.9	62.1	6.2	0.015	0.057	0.439	0.488	0.049	0.0280	0.1086	82.8	20.7	20.7	62.1	41.4	29.3	124.2	3856	35470	380.1
s1	4	s1_4	34.5	31.0	34.4	3.5	0.008	0.061	0.243	0.271	0.027	0.0144	0.1163	68.9	34.5	34.5	34.4	46.0	16.2	137.9	5947	82056	409.3
s1	5	s1_5	34.5	62.0	68.9	6.9	0.013	0.063	0.487	0.541	0.054	0.0250	0.1207	103.4	34.5	34.5	68.9	57.5	32.5	172.4	8323	123048	471.7
s1	6	s1_6	34.5	93.1	103.4	10.3	0.018	0.067	0.731	0.812	0.081	0.0335	0.1276	137.9	34.5	34.5	103.4	69.0	48.7	206.9	10703	164088	528.8
s1	7	s1_7	68.9	62.0	68.8	6.9	0.010	0.075	0.486	0.541	0.054	0.0193	0.1433	137.7	68.9	68.9	68.8	91.8	32.5	275.5	23728	653881	612.1
s1	8	s1_8	68.9	124.0	137.8	13.8	0.018	0.087	0.974	1.082	0.108	0.0350	0.1648	206.7	68.9	68.9	137.8	114.8	65.0	344.5	33233	981343	674.0
s1	9	s1_9	68.9	185.9	206.7	20.7	0.026	0.187	1.460	1.623	0.163	0.0488	0.3563	275.6	68.9	68.9	206.7	137.8	97.4	413.4	42719	1308141	725.8
s1	10	s1_10	103.4	61.9	68.9	6.9	0.009	0.192	0.487	0.541	0.054	0.0174	0.3651	172.3	103.4	103.4	68.9	126.4	32.5	379.1	46315	1841728	677.9
s1	11	s1_11	103.4	93.1	103.4	10.3	0.013	0.193	0.731	0.812	0.081	0.0248	0.3676	206.8	103.4	103.4	103.4	137.9	48.7	413.6	53450	2210587	713.7
s1	12	s1_12	103.4	186.0	206.8	20.7	0.023	0.217	1.461	1.624	0.163	0.0446	0.4122	310.2	103.4	103.4	206.8	172.3	97.5	517.0	74833	3316094	793.1
s1	13	s1_13	137.9	93.1	103.4	10.3	0.012	0.321	0.731	0.812	0.081	0.0227	0.6102	241.3	137.9	137.9	103.4	172.4	48.7	517.1	85561	4588279	782.2
s1	14	s1_14	137.9	124.0	137.8	13.8	0.015	0.322	0.974	1.083	0.108	0.0291	0.6136	275.7	137.9	137.9	137.8	183.8	65.0	551.5	95066	5243585	810.7
s1	15	s1_15	137.9	247.9	275.5	27.6	0.028	0.366	1.947	2.164	0.217	0.0535	0.6974	413.4	137.9	137.9	275.5	229.7	129.9	689.2	133038	7861764	882.9
s2	0	s2_0	103.4	93.0	103.4	10.3	0.010	0.006	0.731	0.812	0.081	0.0190	0.0109	206.8	103.4	103.4	103.4	137.9	48.7	413.6	53450	2210587	940.0
s2	1	s2_1	20.7	18.5	20.6	2.1	0.006	-0.014	0.146	0.162	0.016	0.0109	-0.0270	41.3	20.7	20.7	20.6	27.6	9.7	82.7	2139	17705	326.1
s2	2	s2_2	20.7	37.3	41.4	4.1	0.009	-0.013	0.293	0.325	0.032	0.0178	-0.0249	62.1	20.7	20.7	41.4	34.5	19.5	103.5	2999	26601	402.6
s2	3	s2_3	20.7	55.9	62.1	6.2	0.012	-0.012	0.439	0.488	0.049	0.0228	-0.0223	82.8	20.7	20.7	62.1	41.4	29.3	124.2	3856	35470	471.2
s2	4	s2_4	34.5	31.0	34.5	3.5	0.006	-0.009	0.243	0.271	0.027	0.0121	-0.0165	69.0	34.5	34.5	34.5	46.0	16.3	138.0	5950	82103	491.7
s2	5	s2_5	34.5	62.1	69.0	6.9	0.010	-0.007	0.487	0.542	0.054	0.0199	-0.0136	103.5	34.5	34.5	69.0	57.5	32.5	172.5	8329	123143	597.9
s2	6	s2_6	34.5	93.1	103.3	10.3	0.014	-0.005	0.731	0.812	0.081	0.0259	-0.0103	137.8	34.5	34.5	103.3	68.9	48.7	206.8	10701	164064	688.2
s2	7	s2_7	68.9	61.9	68.9	6.9	0.008	0.000	0.487	0.541	0.054	0.0152	0.0003	137.8	68.9	68.9	68.9	91.9	32.5	275.6	23731	653976	784.3
s2	8	s2_8	68.9	124.0	137.8	13.8	0.014	0.003	0.974	1.083	0.109	0.0261	0.0062	206.7	68.9	68.9	137.8	114.8	65.0	344.5	33236	981438	912.1
s2	9	s2_9	68.9	186.0	206.8	20.7	0.019	0.011	1.461	1.624	0.163	0.0372	0.0216	275.7	68.9	68.9	206.8	137.8	97.5	413.5	42733	1308616	960.1
s2	10	s2_10	103.4	61.9	68.9	6.9	0.007	0.013	0.486	0.541	0.054	0.0140	0.0256	172.3	103.4	103.4	68.9	126.4	32.5	379.1	46315	1841728	848.8
s2	11	s2_11	103.4	93.1	103.4	10.3	0.010	0.014	0.731	0.812	0.081	0.0195	0.0273	206.8	103.4	103.4	103.4	137.9	48.7	413.6	53450	2210587	912.4
s2	12	s2_12	103.4	186.0	206.7	20.7	0.018	0.020	1.461	1.623	0.163	0.0345	0.0376	310.1	103.4	103.4	206.7	172.3	97.4	516.9	74820	3315453	1034.4
s2	13	s2_13	137.9	93.1	103.4	10.3	0.010	0.022	0.731	0.812	0.081	0.0183	0.0430	241.3	137.9	137.9	103.4	172.4	48.7	517.1	85556	4587899	977.5
s2	14	s2_14	137.9	124.1	137.8	13.8	0.012	0.023	0.975	1.083	0.108	0.0231	0.0447	275.7	137.9	137.9	137.8	183.8	65.0	551.5	95066	5243585	1030.6
s2	15	s2_15	137.9	248.0	275.7	27.7	0.022	0.036	1.948	2.165	0.217	0.0427	0.0687	413.6	137.9	137.9	275.7	229.8	129.9	689.4	133076	7864427	1116.0
s3	0	s3_0	103.4	93.1	103.4	10.3	0.011	0.028	0.731	0.812	0.081	0.0209	0.0529	206.8	103.4	103.4	103.4	137.9	48.7	413.6	53450	2210587	849.1
s3	1	s3_1	20.7	18.6	20.7	2.1	0.008	-0.007	0.146	0.163	0.016	0.0145	-0.0136	41.4	20.7	20.7	20.7	27.6	9.8	82.8	2142	17739	244.8
s3	2	s3_2	20.7	37.3	41.3	4.1	0.013	-0.005	0.293	0.325	0.032	0.0247	-0.0102	62.0	20.7	20.7	41.3	34.5	19.5	103.4	2997	26584	287.4
s3	3	s3_3	20.7	55.9	62.1	6.2	0.017	-0.003	0.439	0.488	0.049	0.0324	-0.0066	82.8	20.7	20.7	62.1	41.4	29.3	124.2	3857	35488	328.6
s3	4	s3_4	34.5	31.0	34.5	3.5	0.009	0.002	0.243	0.271	0.028	0.0170	0.0037	69.0	34.5	34.5	34.5	46.0	16.3	138.0	5950	82103	348.2
s3	5	s3_5	34.5	61.9	68.8	6.9	0.015	0.004	0.486	0.541	0.054	0.0278	0.0078	103.3	34.5	34.5	68.8	57.4	32.5	172.3	8321	123000	423.7
s3	6	s3_6	34.5	93.0	103.3	10.3	0.019	0.007	0.731	0.812	0.081	0.0362	0.0125	137.8	34.5	34.5	103.3	68.9	48.7	206.8	10701	164064	490.2
s3	7	s3_7	68.9	62.0	68.9	6.9	0.010	0.018	0.487	0.541	0.054	0.0188	0.0339	137.8	68.9	68.9	68.9	91.9	32.5	275.6	23731	653976	631.0
s3	8	s3_8	68.9	124.0	137.8	13.8	0.017	0.023	0.974	1.083	0.108	0.0328	0.0433	206.7	68.9	68.9	137.8	114.8	65.0	344.5	33236	981438	719.5
s3	9	s3_9	68.9	186.1	206.8	20.7	0.025	0.034	1.462	1.624	0.163	0.0479	0.0651	275.7	68.9	68.9	206.8	137.8	97.5	413.5	42736	1308711	740.2
s3	10	s3_10	103.4	62.0	68.9	6.9	0.009	0.043	0.487	0.541	0.054	0.0167	0.0815	172.3	103.4	103.4	68.9	126.4	32.5	379.1	46319	1841942	707.9
s3	11	s3_11	103.4	93.1	103.4	10.3	0.012	0.044	0.731	0.812	0.081	0.0229	0.0840	206.8	103.4	103.4	103.4	137.9	48.7	413.6	53454	2210801	775.8
s3	12	s3_12	103.4	186.1	206.8	20.7	0.021	0.051	1.461	1.624	0.163	0.0404	0.0979	310.2	103.4	103.4	206.8	172.3	97.5	517.0	74837	3316308	878.6
s3	13	s3_13	137.9	93.1	103.4	10.3	0.010	0.061	0.731	0.812	0.081	0.0196	0.1170	241.3	137.9	137.9	103.4	172.4	48.7	517.1	85556	4587899	903.9
s3	14	s3_14	137.9	124.1	137.9	13.8	0.013	0.063	0.974	1.083	0.108	0.0250	0.1195	275.8	137.9	137.9	137.9	183.9	65.0	551.6	95082	5244726	944.5
s3	15	s3_15	137.9	248.1	275.7	27.6	0.024	0.077	1.948	2.165	0.217	0.0464	0.1472	413.6	137.9	137.9	275.7	229.8	129.9	689.4	133076	7864427	1019.3

Specimen	Sequence	Code	Confining Pressure (kPa)	Cyclic Axial Stress (kPa)	Maximum Axial Stress (kPa)	Contact Axial Stress (kPa)	Recoverable Axial Strain (%)	Permanent Axial Strain (%)	Cyclic Axial Load (kN)	Maximum Axial Load (kN)	Contact Axial Load (kN)	Recoverable Axial Deformation (mm)	Permanent Axial Deformation (mm)	Stress σ_1 (kPa)	Stress σ_2 (kPa)	Stress σ_3 (kPa)	Deviatoric stress σ_d (kPa)	Octahedral normal stress σ_{oct} (kPa)	Octahedral shear stress τ_{oct} (kPa)	First stress invariant I_1 (kPa)	Second stress invariant I_2 (kPa)	Third stress invariant I_3 (kPa)	RM (avg.) (MPa)
s1	0	s1_0	107.4	93.1	103.4	10.3	0.033	0.111	0.731	0.812	0.081	0.0649	0.2173	210.8	107.4	107.4	103.4	141.9	48.7	425.6	56810	2431297	280.4
s1	1	s1_1	24.7	18.6	20.7	2.1	0.025	0.028	0.146	0.163	0.017	0.0486	0.0547	45.4	24.7	24.7	20.7	31.6	9.7	94.8	2852	27686	74.5
s1	2	s1_2	24.7	37.4	41.3	4.0	0.044	0.038	0.293	0.325	0.031	0.0868	0.0741	66.0	24.7	24.7	41.3	38.5	19.5	115.4	3872	40290	84.0
s1	3	s1_3	24.7	56.1	62.1	6.1	0.058	0.055	0.440	0.488	0.048	0.1136	0.1075	86.8	24.7	24.7	62.1	45.4	29.3	136.2	4898	52956	96.4
s1	4	s1_4	38.5	30.9	34.5	3.6	0.028	0.064	0.243	0.271	0.028	0.0539	0.1259	73.0	38.5	38.5	34.5	50.0	16.3	150.0	7102	108175	112.0
s1	5	s1_5	38.5	61.8	68.8	7.1	0.047	0.075	0.485	0.540	0.056	0.0927	0.1469	107.3	38.5	38.5	68.8	61.4	32.5	184.3	9747	159105	130.1
s1	6	s1_6	38.5	93.1	103.4	10.2	0.065	0.103	0.731	0.812	0.080	0.1269	0.2017	141.9	38.5	38.5	103.4	73.0	48.7	218.9	12409	210331	143.5
s1	7	s1_7	72.9	62.0	68.9	6.9	0.031	0.121	0.487	0.541	0.054	0.0603	0.2372	141.8	72.9	72.9	68.9	95.9	32.5	287.6	25983	753371	200.5
s1	8	s1_8	72.9	124.2	137.9	13.7	0.056	0.151	0.975	1.083	0.108	0.1092	0.2941	210.8	72.9	72.9	137.9	118.9	65.0	356.6	36052	1120384	222.0
s1	9	s1_9	72.9	185.9	206.6	20.7	0.080	0.236	1.460	1.623	0.163	0.1565	0.4617	279.5	72.9	72.9	206.6	141.8	97.4	425.3	46071	1485590	232.1
s1	10	s1_10	107.4	62.0	68.8	6.9	0.025	0.235	0.487	0.541	0.054	0.0488	0.4599	176.2	107.4	107.4	68.8	130.3	32.5	391.0	49391	2032886	248.0
s1	11	s1_11	107.4	93.1	103.4	10.3	0.036	0.240	0.731	0.812	0.081	0.0705	0.4685	210.8	107.4	107.4	103.4	141.9	48.7	425.6	56810	2431297	258.0
s1	12	s1_12	107.4	186.0	206.7	20.6	0.064	0.271	1.461	1.623	0.162	0.1250	0.5285	314.1	107.4	107.4	206.7	176.3	97.4	528.9	78999	3622837	290.9
s1	13	s1_13	141.9	93.0	103.3	10.3	0.029	0.275	0.731	0.812	0.081	0.0568	0.5373	245.2	141.9	141.9	103.3	176.3	48.7	529.0	89735	4938057	319.9
s1	14	s1_14	141.9	124.1	137.9	13.8	0.037	0.279	0.975	1.083	0.108	0.0732	0.5459	279.8	141.9	141.9	137.9	187.9	65.0	563.6	99537	5633541	331.1
s1	15	s1_15	141.9	248.2	275.8	27.6	0.070	0.329	1.949	2.166	0.217	0.1361	0.6429	417.7	141.9	141.9	275.8	233.8	130.0	701.5	138668	8409839	356.1
s2	0	s2_0	107.4	93.0	103.4	10.3	0.043	0.081	0.731	0.812	0.081	0.0812	0.1515	210.8	107.4	107.4	103.4	141.9	48.7	425.6	56810	2431297	215.4
s2	1	s2_1	24.7	18.5	20.7	2.1	0.027	-0.005	0.146	0.162	0.017	0.0499	-0.0086	45.4	24.7	24.7	20.7	31.6	9.7	94.8	2851	27674	69.9
s2	2	s2_2	24.7	37.3	41.3	4.1	0.047	0.008	0.293	0.325	0.032	0.0889	0.0146	66.0	24.7	24.7	41.3	38.5	19.5	115.4	3871	40278	78.7
s2	3	s2_3	24.7	55.9	62.1	6.2	0.060	0.025	0.439	0.487	0.048	0.1134	0.0469	86.8	24.7	24.7	62.1	45.4	29.3	136.2	4896	52931	92.7
s2	4	s2_4	38.5	31.0	34.5	3.5	0.033	0.028	0.243	0.271	0.027	0.0612	0.0535	73.0	38.5	38.5	34.5	50.0	16.3	150.0	7103	108204	95.4
s2	5	s2_5	38.5	62.0	68.9	6.9	0.054	0.041	0.487	0.541	0.054	0.1015	0.0761	107.4	38.5	38.5	68.9	61.5	32.5	184.4	9751	159164	114.7
s2	6	s2_6	38.5	93.0	103.3	10.3	0.070	0.070	0.730	0.811	0.081	0.1320	0.1324	141.8	38.5	38.5	103.3	72.9	48.7	218.8	12402	210213	132.3
s2	7	s2_7	72.9	62.0	68.9	6.9	0.036	0.086	0.487	0.541	0.054	0.0671	0.1626	141.8	72.9	72.9	68.9	95.9	32.5	287.6	25986	753477	173.7
s2	8	s2_8	72.9	124.0	137.8	13.8	0.063	0.113	0.974	1.082	0.109	0.1177	0.2128	210.7	72.9	72.9	137.8	118.8	65.0	356.5	36040	1119959	198.2
s2	9	s2_9	72.9	186.0	206.7	20.7	0.089	0.181	1.461	1.623	0.163	0.1664	0.3405	279.6	72.9	72.9	206.7	141.8	97.4	425.4	46080	1485909	210.2
s2	10	s2_10	107.4	62.0	68.9	6.9	0.028	0.178	0.487	0.541	0.054	0.0533	0.3346	176.3	107.4	107.4	68.9	130.4	32.5	391.1	49408	2033809	218.5
s2	11	s2_11	107.4	93.1	103.4	10.3	0.041	0.183	0.731	0.812	0.081	0.0777	0.3437	210.8	107.4	107.4	103.4	141.9	48.8	425.6	56819	2431758	225.4
s2	12	s2_12	107.4	186.0	206.7	20.7	0.073	0.210	1.461	1.623	0.163	0.1368	0.3948	314.1	107.4	107.4	206.7	176.3	97.4	528.9	78999	3622837	255.6
s2	13	s2_13	141.9	93.1	103.4	10.3	0.034	0.242	0.731	0.812	0.081	0.0636	0.4551	245.3	141.9	141.9	103.4	176.4	48.7	529.1	89740	4938460	274.8
s2	14	s2_14	141.9	124.0	137.9	13.8	0.043	0.247	0.974	1.083	0.109	0.0816	0.4635	279.8	141.9	141.9	137.9	187.9	65.0	563.6	99531	5633138	286.1
s2	15	s2_15	141.9	248.1	275.6	27.6	0.078	0.286	1.948	2.165	0.217	0.1467	0.5385	417.5	141.9	141.9	275.6	233.8	129.9	701.3	138633	8407423	317.9
s3	0	s3_0	107.4	93.1	103.4	10.3	0.036	0.137	0.731	0.812	0.081	0.0707	0.2735	210.8	107.4	107.4	103.4	141.9	48.7	425.6	56806	2431066	261.9
s3	1	s3_1	24.7	18.4	20.5	2.1	0.021	0.070	0.145	0.162	0.017	0.0426	0.1383	45.2	24.7	24.7	20.5	31.5	9.7	94.6	2845	27600	86.1
s3	2	s3_2	24.7	37.3	41.3	4.1	0.040	0.081	0.292	0.324	0.032	0.0791	0.1618	66.0	24.7	24.7	41.3	38.5	19.5	115.4	3872	40290	93.8
s3	3	s3_3	24.7	55.9	62.1	6.2	0.054	0.106	0.439	0.487	0.049	0.1079	0.2108	86.8	24.7	24.7	62.1	45.4	29.3	136.2	4898	52956	103.1
s3	4	s3_4	38.5	31.0	34.5	3.5	0.027	0.108	0.243	0.271	0.028	0.0542	0.2152	73.0	38.5	38.5	34.5	50.0	16.2	150.0	7100	108145	113.7
s3	5	s3_5	38.5	62.0	68.8	6.9	0.046	0.122	0.487	0.541	0.054	0.0919	0.2430	107.3	38.5	38.5	68.8	61.4	32.5	184.3	9747	159105	134.1
s3	6	s3_6	38.5	93.1	103.4	10.3	0.064	0.162	0.731	0.812	0.081	0.1279	0.3223	141.9	38.5	38.5	103.4	73.0	48.7	218.9	12405	210272	144.8
s3	7	s3_7	72.9	62.0	68.9	6.9	0.032	0.173	0.487	0.541	0.054	0.0640	0.3443	141.8	72.9	72.9	68.9	95.9	32.5	287.6	25986	753477	192.6
s3	8	s3_8	72.9	124.1	137.9	13.7	0.059	0.211	0.975	1.083	0.108	0.1166	0.4188	210.8	72.9	72.9	137.9	118.9	65.0	356.6	36043	1120065	211.9
s3	9	s3_9	72.9	186.1	206.8	20.7	0.084	0.332	1.461	1.624	0.163	0.1669	0.6612	279.7	72.9	72.9	206.8	141.8	97.5	425.5	46092	1486334	221.9
s3	10	s3_10	107.4	62.0	68.8	6.9	0.026	0.326	0.487	0.541	0.054	0.0514	0.6490	176.2	107.4	107.4	68.8	130.3	32.5	391.0	49391	2032886	239.7
s3	11	s3_11	107.4	93.0	103.4	10.3	0.038	0.331	0.731	0.812	0.081	0.0756	0.6592	210.8	107.4	107.4	103.4	141.9	48.7	425.6	56806	2431066	244.6
s3	12	s3_12	107.4	186.0	206.7	20.7	0.068	0.369	1.461	1.624	0.162	0.1346	0.7349	314.1	107.4	107.4	206.7	176.3	97.4	528.9	79008	3623299	275.0
s3	13	s3_13	141.9	93.1	103.3	10.3	0.031	0.371	0.731	0.812	0.081	0.0624	0.7376	245.2	141.9	141.9	103.3	176.3	48.7	529.0	89735	4938057	296.6
s3	14	s3_14	141.9	124.1	137.9	13.8	0.041	0.375	0.974	1.083	0.108	0.0806	0.7471	279.8	141.9	141.9	137.9	187.9	65.0	563.6	99537	5633541	306.4
s3	15	s3_15	141.9	248.0	275.6	27.6	0.074	0.433	1.948	2.164	0.217	0.1476	0.8624	417.5	141.9	141.9	275.6	233.8	129.9	701.3	138616	8406214	334.5

C&D + 2% CEM II/B

Specimen	Sequence	Code	Confining Pressure (kPa)	Cyclic Axial Stress (kPa)	Maximum Axial Stress (kPa)	Contact Axial Stress (kPa)	Recoverable Axial Strain (%)	Permanent Axial Strain (%)	Cyclic Axial Load (kN)	Maximum Axial Load (kN)	Contact Axial Load (kN)	Recoverable Axial Deformation (mm)	Permanent Axial Deformation (mm)	Stress σ_1 (kPa)	Stress σ_2 (kPa)	Stress σ_3 (kPa)	Deviatoric stress σ_d (kPa)	Octahedral normal stress σ_{oct} (kPa)	Octahedral shear stress τ_{oct} (kPa)	First stress invariant I_1 (kPa)	Second stress invariant I_2 (kPa)	Third stress invariant I_3 (kPa)	RM (avg.) (MPa)
s1	0	s1_0	107.4	93.0	103.4	10.3	0.012	0.034	0.731	0.812	0.081	0.0233	0.0642	210.8	107.4	107.4	103.4	141.9	48.7	425.6	56806	2431066	755.4
s1	1	s1_1	24.7	18.6	20.7	2.1	0.007	0.005	0.146	0.162	0.016	0.0126	0.0085	45.4	24.7	24.7	20.7	31.6	9.8	94.8	2853	27698	281.0
s1	2	s1_2	24.7	37.3	41.4	4.1	0.012	0.006	0.293	0.325	0.032	0.0218	0.0106	66.1	24.7	24.7	41.4	38.5	19.5	115.5	3873	40303	322.9
s1	3	s1_3	24.7	55.9	62.1	6.2	0.015	0.007	0.439	0.487	0.049	0.0290	0.0134	86.8	24.7	24.7	62.1	45.4	29.3	136.2	4897	52944	365.4
s1	4	s1_4	38.5	30.9	34.4	3.5	0.008	0.011	0.243	0.270	0.027	0.0150	0.0217	72.9	38.5	38.5	34.4	50.0	16.2	149.9	7099	108115	391.6
s1	5	s1_5	38.5	62.0	68.9	6.9	0.013	0.014	0.487	0.541	0.054	0.0252	0.0256	107.4	38.5	38.5	68.9	61.5	32.5	184.4	9754	159223	466.3
s1	6	s1_6	38.5	93.1	103.4	10.3	0.018	0.016	0.731	0.812	0.081	0.0336	0.0303	141.9	38.5	38.5	103.4	73.0	48.7	218.9	12409	210331	524.8
s1	7	s1_7	72.9	62.0	68.9	6.9	0.010	0.025	0.487	0.541	0.054	0.0185	0.0468	141.8	72.9	72.9	68.9	95.9	32.5	287.6	25986	753477	633.7
s1	8	s1_8	72.9	124.1	137.9	13.8	0.018	0.031	0.975	1.083	0.108	0.0332	0.0586	210.8	72.9	72.9	137.9	118.9	65.0	356.6	36043	1120065	708.1
s1	9	s1_9	72.9	186.1	206.8	20.7	0.026	0.060	1.461	1.624	0.163	0.0491	0.1129	279.7	72.9	72.9	206.8	141.8	97.5	425.5	46089	1486228	716.7
s1	10	s1_10	107.4	62.0	68.9	6.9	0.009	0.064	0.487	0.541	0.054	0.0172	0.1217	176.3	107.4	107.4	68.9	130.4	32.5	391.1	49395	2033117	682.4
s1	11	s1_11	107.4	93.0	103.3	10.3	0.013	0.066	0.731	0.812	0.081	0.0241	0.1244	210.7	107.4	107.4	103.3	141.8	48.7	425.5	56802	2430835	731.5
s1	12	s1_12	107.4	186.0	206.7	20.7	0.024	0.082	1.461	1.624	0.163	0.0446	0.1555	314.1	107.4	107.4	206.7	176.3	97.4	528.9	79008	3623299	790.8
s1	13	s1_13	141.9	93.0	103.3	10.3	0.012	0.089	0.731	0.812	0.081	0.0219	0.1679	245.2	141.9	141.9	103.3	176.3	48.7	529.0	89729	4937654	803.3
s1	14	s1_14	141.9	124.1	137.9	13.8	0.015	0.090	0.974	1.083	0.108	0.0280	0.1710	279.8	141.9	141.9	137.9	187.9	65.0	563.6	99531	5633138	838.2
s1	15	s1_15	141.9	248.2	275.8	27.6	0.029	0.139	1.950	2.166	0.216	0.0553	0.2633	417.7	141.9	141.9	275.8	233.8	130.0	701.5	138673	8410242	850.1
s2	0	s2_0	107.4	93.1	103.4	10.3	0.012	0.029	0.731	0.812	0.081	0.0229	0.0534	210.8	107.4	107.4	103.4	141.9	48.7	425.6	56810	2431297	763.0
s2	1	s2_1	24.7	0.0	3.5	3.5	0.000	0.021	0.000	0.028	0.027	0.0001	0.0398										
s2	2	s2_2	24.7	37.3	41.4	4.1	0.016	0.022	0.293	0.325	0.032	0.0297	0.0411	66.1	24.7	24.7	41.4	38.5	19.5	115.5	3875	40327	236.4
s2	3	s2_3	24.7	55.8	62.0	6.2	0.020	0.025	0.439	0.487	0.049	0.0374	0.0460	86.7	24.7	24.7	62.0	45.4	29.2	136.1	4894	52907	279.9
s2	4	s2_4	38.5	0.0	4.7	4.7	0.000	0.059	0.000	0.037	0.037	0.0001	0.1102										
s2	5	s2_5	38.5	61.9	68.8	6.9	0.017	0.061	0.486	0.541	0.054	0.0314	0.1136	107.3	38.5	38.5	68.8	61.4	32.5	184.3	9747	159105	369.6
s2	6	s2_6	38.5	93.1	103.4	10.3	0.023	0.063	0.731	0.812	0.081	0.0436	0.1186	141.9	38.5	38.5	103.4	73.0	48.7	218.9	12407	210302	400.2
s2	7	s2_7	72.9	62.0	68.8	6.9	0.012	0.093	0.487	0.541	0.054	0.0230	0.1752	141.7	72.9	72.9	68.8	95.8	32.5	287.5	25980	753264	504.4
s2	8	s2_8	72.9	124.1	137.9	13.8	0.023	0.098	0.975	1.083	0.109	0.0423	0.1831	210.8	72.9	72.9	137.9	118.9	65.0	356.6	36052	1120384	549.2
s2	9	s2_9	72.9	186.0	206.8	20.7	0.031	0.103	1.461	1.624	0.163	0.0589	0.1930	279.7	72.9	72.9	206.8	141.8	97.5	425.5	46089	1486228	592.5
s2	10	s2_10	107.4	62.0	68.9	6.9	0.011	0.116	0.486	0.541	0.054	0.0202	0.2172	176.3	107.4	107.4	68.9	130.4	32.5	391.1	49395	2033117	578.0
s2	11	s2_11	107.4	93.0	103.4	10.3	0.014	0.119	0.731	0.812	0.081	0.0268	0.2223	210.8	107.4	107.4	103.4	141.9	48.7	425.6	56806	2431066	650.8
s2	12	s2_12	107.4	186.0	206.7	20.7	0.027	0.124	1.461	1.623	0.163	0.0508	0.2322	314.1	107.4	107.4	206.7	176.3	97.4	528.9	78995	3622607	686.7
s2	13	s2_13	141.9	93.1	103.4	10.3	0.012	0.135	0.731	0.812	0.081	0.0229	0.2538	245.3	141.9	141.9	103.4	176.4	48.7	529.1	89746	4938862	763.0
s2	14	s2_14	141.9	124.0	137.8	13.8	0.016	0.141	0.974	1.082	0.109	0.0296	0.2637	279.7	141.9	141.9	137.8	187.8	65.0	563.5	99520	5632333	786.9
s2	15	s2_15	141.9	247.8	275.4	27.6	0.030	0.154	1.947	2.163	0.217	0.0557	0.2892	417.3	141.9	141.9	275.4	233.7	129.8	701.1	138571	8402993	833.9
s3	0	s3_0	107.4	93.0	103.3	10.3	0.017	0.175	0.730	0.811	0.081	0.0337	0.3380	210.7	107.4	107.4	103.3	141.8	48.7	425.5	56797	2430605	534.6
s3	1	s3_1	24.7	18.5	20.7	2.1	0.007	0.133	0.146	0.162	0.016	0.0126	0.2569	45.4	24.7	24.7	20.7	31.6	9.7	94.8	2851	27674	283.8
s3	2	s3_2	24.7	37.2	41.3	4.1	0.013	0.133	0.292	0.324	0.032	0.0248	0.2581	66.0	24.7	24.7	41.3	38.5	19.5	115.4	3872	40290	290.5
s3	3	s3_3	24.7	55.9	62.1	6.2	0.019	0.135	0.439	0.488	0.049	0.0358	0.2622	86.8	24.7	24.7	62.1	45.4	29.3	136.2	4899	52968	302.3
s3	4	s3_4	38.5	31.0	34.5	3.5	0.009	0.151	0.243	0.271	0.027	0.0180	0.2926	73.0	38.5	38.5	34.5	50.0	16.2	150.0	7100	108145	333.6
s3	5	s3_5	38.5	62.0	68.9	6.9	0.018	0.154	0.487	0.541	0.054	0.0352	0.2973	107.4	38.5	38.5	68.9	61.5	32.5	184.4	9749	159134	340.8
s3	6	s3_6	38.5	93.0	103.3	10.3	0.026	0.158	0.731	0.812	0.081	0.0506	0.3050	141.8	38.5	38.5	103.3	72.9	48.7	218.8	12404	210242	356.5
s3	7	s3_7	72.9	61.9	68.8	6.9	0.014	0.181	0.486	0.541	0.054	0.0262	0.3509	141.7	72.9	72.9	68.8	95.8	32.4	287.5	25971	752946	457.7
s3	8	s3_8	72.9	124.1	137.9	13.8	0.026	0.187	0.974	1.083	0.108	0.0507	0.3623	210.8	72.9	72.9	137.9	118.9	65.0	356.6	36046	1120171	473.6
s3	9	s3_9	72.9	186.0	206.7	20.7	0.037	0.195	1.461	1.624	0.162	0.0719	0.3776	279.6	72.9	72.9	206.7	141.8	97.4	425.4	46077	1485803	501.3
s3	10	s3_10	107.4	62.0	68.9	6.9	0.011	0.219	0.487	0.541	0.054	0.0220	0.4239	176.3	107.4	107.4	68.9	130.4	32.5	391.1	49395	2033117	546.4
s3	11	s3_11	107.4	93.1	103.3	10.3	0.017	0.221	0.731	0.812	0.081	0.0332	0.4279	210.7	107.4	107.4	103.3	141.8	48.7	425.5	56802	2430835	544.1
s3	12	s3_12	107.4	186.0	206.7	20.7	0.033	0.232	1.461	1.623	0.163	0.0633	0.4498	314.1	107.4	107.4	206.7	176.3	97.4	528.9	78999	3622837	568.5
s3	13	s3_13	141.9	93.1	103.4	10.3	0.015	0.237	0.731	0.812	0.081	0.0292	0.4591	245.3	141.9	141.9	103.4	176.4	48.7	529.1	89740	4938460	617.1
s3	14	s3_14	141.9	124.0	137.8	13.8	0.020	0.239	0.974	1.083	0.108	0.0383	0.4627	279.7	141.9	141.9	137.8	187.8	65.0	563.5	99526	5632736	625.8
s3	15	s3_15	141.9	248.1	275.8	27.6	0.038	0.252	1.949	2.166	0.217	0.0731	0.4887	417.7	141.9	141.9	275.8	233.8	130.0	701.5	138673	8410242	657.6

C&D + 3% CEM II/B

Specimen	Sequence	Code	Confining Pressure (kPa)	Cyclic Axial Stress (kPa)	Maximum Axial Stress (kPa)	Contact Axial Stress (kPa)	Recoverable Axial Strain (%)	Permanent Axial Strain (%)	Cyclic Axial Load (kN)	Maximum Axial Load (kN)	Contact Axial Load (kN)	Recoverable Axial Deformation (mm)	Permanent Axial Deformation (mm)	Stress σ_1 (kPa)	Stress σ_2 (kPa)	Stress σ_3 (kPa)	Deviatoric stress σ_d (kPa)	Octahedral normal stress σ_{oct} (kPa)	Octahedral shear stress τ_{oct} (kPa)	First stress invariant I_1 (kPa)	Second stress invariant I_2 (kPa)	Third stress invariant I_3 (kPa)	RM (avg.) (MPa)
s1	0	s1_0	107.4	93.0	103.3	10.3	0.013	0.007	0.731	0.812	0.081	0.0240	0.0140	210.7	107.4	107.4	103.3	141.8	48.7	425.5	56802	2430835	731.5
s1	1	s1_1	24.7	18.6	20.7	2.1	0.009	-0.020	0.146	0.162	0.016	0.0176	-0.0370	45.4	24.7	24.7	20.7	31.6	9.7	94.8	2851	27674	199.6
s1	2	s1_2	24.7	37.2	41.3	4.1	0.015	-0.017	0.292	0.325	0.032	0.0279	-0.0315	66.0	24.7	24.7	41.3	38.5	19.5	115.4	3871	40278	251.8
s1	3	s1_3	24.7	55.9	62.1	6.2	0.017	-0.014	0.439	0.488	0.049	0.0330	-0.0264	86.8	24.7	24.7	62.1	45.4	29.3	136.2	4897	52944	319.7
s1	4	s1_4	38.5	31.0	34.5	3.5	0.010	-0.010	0.243	0.271	0.027	0.0194	-0.0191	73.0	38.5	38.5	34.5	50.0	16.3	150.0	7102	108175	300.8
s1	5	s1_5	38.5	62.0	68.9	6.9	0.015	-0.008	0.487	0.541	0.054	0.0276	-0.0144	107.4	38.5	38.5	68.9	61.5	32.5	184.4	9749	159134	424.4
s1	6	s1_6	38.5	93.1	103.4	10.3	0.018	-0.005	0.731	0.812	0.081	0.0332	-0.0094	141.9	38.5	38.5	103.4	73.0	48.7	218.9	12405	210272	529.4
s1	7	s1_7	72.9	61.9	68.8	6.9	0.010	0.002	0.487	0.541	0.054	0.0191	0.0043	141.7	72.9	72.9	68.8	95.8	32.5	287.5	25980	753264	612.1
s1	8	s1_8	72.9	124.1	137.9	13.8	0.017	0.006	0.974	1.083	0.108	0.0312	0.0116	210.8	72.9	72.9	137.9	118.9	65.0	356.6	36043	1120065	750.1
s1	9	s1_9	72.9	186.0	206.7	20.7	0.024	0.014	1.461	1.623	0.163	0.0448	0.0266	279.6	72.9	72.9	206.7	141.8	97.4	425.4	46080	1485909	784.8
s1	10	s1_10	107.4	62.0	68.9	6.9	0.010	0.016	0.487	0.541	0.054	0.0184	0.0311	176.3	107.4	107.4	68.9	130.4	32.5	391.1	49395	2033117	636.2
s1	11	s1_11	107.4	93.1	103.4	10.3	0.013	0.018	0.731	0.812	0.081	0.0248	0.0331	210.8	107.4	107.4	103.4	141.9	48.7	425.6	56815	2431527	708.5
s1	12	s1_12	107.4	186.0	206.7	20.7	0.022	0.023	1.461	1.623	0.163	0.0415	0.0430	314.1	107.4	107.4	206.7	176.3	97.4	528.9	78995	3622607	846.8
s1	13	s1_13	141.9	93.1	103.4	10.3	0.012	0.026	0.731	0.812	0.081	0.0226	0.0497	245.3	141.9	141.9	103.4	176.4	48.7	529.1	89746	4938862	778.3
s1	14	s1_14	141.9	124.0	137.8	13.8	0.015	0.027	0.974	1.083	0.108	0.0282	0.0513	279.7	141.9	141.9	137.8	187.8	65.0	563.5	99520	5632333	831.2
s1	15	s1_15	141.9	248.1	275.7	27.6	0.027	0.038	1.948	2.165	0.217	0.0507	0.0716	417.6	141.9	141.9	275.7	233.8	130.0	701.4	138645	8408228	923.6
s2	0	s2_0	107.4	93.0	103.3	10.3	0.015	0.012	0.731	0.812	0.081	0.0275	0.0215	210.7	107.4	107.4	103.3	141.8	48.7	425.5	56802	2430835	635.5
s2	1	s2_1	24.7	18.6	20.7	2.1	0.008	-0.014	0.146	0.162	0.017	0.0148	-0.0265	45.4	24.7	24.7	20.7	31.6	9.7	94.8	2851	27674	236.1
s2	2	s2_2	24.7	37.2	41.3	4.1	0.013	-0.012	0.292	0.325	0.032	0.0252	-0.0226	66.0	24.7	24.7	41.3	38.5	19.5	115.4	3872	40290	277.5
s2	3	s2_3	24.7	55.9	62.1	6.2	0.017	-0.010	0.439	0.488	0.049	0.0325	-0.0188	86.8	24.7	24.7	62.1	45.4	29.3	136.2	4896	52931	322.9
s2	4	s2_4	38.5	31.0	34.5	3.5	0.010	-0.006	0.244	0.271	0.027	0.0179	-0.0117	73.0	38.5	38.5	34.5	50.0	16.3	150.0	7103	108204	325.6
s2	5	s2_5	38.5	62.0	68.9	6.9	0.015	-0.004	0.487	0.541	0.054	0.0289	-0.0076	107.4	38.5	38.5	68.9	61.5	32.5	184.4	9752	159194	402.1
s2	6	s2_6	38.5	93.1	103.4	10.3	0.020	-0.001	0.731	0.812	0.081	0.0367	-0.0028	141.9	38.5	38.5	103.4	73.0	48.7	218.9	12405	210272	476.3
s2	7	s2_7	72.9	62.0	68.9	6.9	0.012	0.005	0.487	0.541	0.054	0.0226	0.0101	141.8	72.9	72.9	68.9	95.9	32.5	287.6	25986	753477	514.8
s2	8	s2_8	72.9	124.0	137.8	13.8	0.019	0.010	0.974	1.083	0.108	0.0364	0.0187	210.7	72.9	72.9	137.8	118.8	65.0	356.5	36040	1119959	640.0
s2	9	s2_9	72.9	186.1	206.8	20.7	0.027	0.021	1.461	1.624	0.163	0.0503	0.0390	279.7	72.9	72.9	206.8	141.8	97.5	425.5	46089	1486228	694.8
s2	10	s2_10	107.4	61.9	68.9	6.9	0.012	0.022	0.486	0.541	0.054	0.0221	0.0408	176.3	107.4	107.4	68.9	130.4	32.5	391.1	49395	2033117	526.9
s2	11	s2_11	107.4	93.0	103.3	10.3	0.016	0.023	0.731	0.812	0.081	0.0292	0.0438	210.7	107.4	107.4	103.3	141.8	48.7	425.5	56802	2430835	597.2
s2	12	s2_12	107.4	186.0	206.7	20.7	0.025	0.030	1.462	1.624	0.163	0.0467	0.0560	314.1	107.4	107.4	206.7	176.3	97.5	528.9	79012	3623530	748.4
s2	13	s2_13	141.9	93.1	103.4	10.3	0.015	0.032	0.731	0.812	0.081	0.0280	0.0595	245.3	141.9	141.9	103.4	176.4	48.7	529.1	89752	4939265	624.0
s2	14	s2_14	141.9	124.0	137.8	13.8	0.018	0.033	0.974	1.082	0.108	0.0336	0.0625	279.7	141.9	141.9	137.8	187.8	65.0	563.5	99526	5632736	693.0
s2	15	s2_15	141.9	248.1	275.7	27.6	0.030	0.047	1.948	2.165	0.217	0.0564	0.0885	417.6	141.9	141.9	275.7	233.8	129.9	701.4	138639	8407825	824.7
s3	0	s3_0	107.4	93.1	103.4	10.3	0.016	0.038	0.731	0.812	0.081	0.0298	0.0720	210.8	107.4	107.4	103.4	141.9	48.7	425.6	56810	2431297	591.4
s3	1	s3_1	24.7	18.6	20.7	2.1	0.009	0.012	0.146	0.162	0.016	0.0169	0.0228	45.4	24.7	24.7	20.7	31.6	9.7	94.8	2852	27686	208.8
s3	2	s3_2	24.7	37.3	41.4	4.1	0.015	0.015	0.293	0.325	0.032	0.0286	0.0279	66.1	24.7	24.7	41.4	38.5	19.5	115.5	3873	40303	246.8
s3	3	s3_3	24.7	55.9	62.1	6.2	0.019	0.017	0.439	0.487	0.049	0.0366	0.0330	86.8	24.7	24.7	62.1	45.4	29.3	136.2	4897	52944	289.2
s3	4	s3_4	38.5	30.9	34.5	3.5	0.010	0.022	0.243	0.271	0.028	0.0197	0.0422	73.0	38.5	38.5	34.5	50.0	16.2	150.0	7100	108145	297.7
s3	5	s3_5	38.5	62.0	68.8	6.9	0.017	0.025	0.487	0.541	0.054	0.0315	0.0477	107.3	38.5	38.5	68.8	61.4	32.5	184.3	9747	159105	373.1
s3	6	s3_6	38.5	93.1	103.4	10.3	0.022	0.029	0.731	0.812	0.081	0.0410	0.0555	141.9	38.5	38.5	103.4	73.0	48.7	218.9	12409	210331	429.0
s3	7	s3_7	72.9	62.0	68.9	6.9	0.012	0.038	0.487	0.541	0.054	0.0231	0.0723	141.8	72.9	72.9	68.9	95.9	32.5	287.6	25983	753371	507.0
s3	8	s3_8	72.9	124.0	137.8	13.8	0.022	0.046	0.974	1.082	0.109	0.0409	0.0878	210.7	72.9	72.9	137.8	118.8	65.0	356.5	36037	1119852	574.2
s3	9	s3_9	72.9	186.0	206.8	20.8	0.032	0.065	1.461	1.624	0.163	0.0597	0.1232	279.7	72.9	72.9	206.8	141.8	97.5	425.5	46092	1486334	590.5
s3	10	s3_10	107.4	62.0	68.9	6.9	0.020	0.082	0.487	0.541	0.054	0.0379	0.1561	176.3	107.4	107.4	68.9	130.4	32.5	391.1	49404	2033578	309.7
s3	11	s3_11	107.4	93.0	103.4	10.3	0.020	0.098	0.731	0.812	0.081	0.0387	0.1849	210.8	107.4	107.4	103.4	141.9	48.7	425.6	56810	2431297	454.9
s3	12	s3_12	107.4	186.0	206.7	20.8	0.034	0.113	1.461	1.624	0.163	0.0636	0.2146	314.1	107.4	107.4	206.7	176.3	97.5	528.9	79012	3623530	553.5
s3	13	s3_13	141.9	93.0	103.4	10.3	0.029	0.111	0.731	0.812	0.081	0.0548	0.2097	245.3	141.9	141.9	103.4	176.4	48.7	529.1	89746	4938862	321.6
s3	14	s3_14	141.9	124.0	137.8	13.8	0.025	0.127	0.974	1.083	0.109	0.0476	0.2408	279.7	141.9	141.9	137.8	187.8	65.0	563.5	99520	5632333	493.6
s3	15	s3_15	141.9	248.0	275.6	27.6	0.041	0.149	1.948	2.165	0.217	0.0779	0.2819	417.5	141.9	141.9	275.6	233.8	129.9	701.3	138628	8407020	603.2

C&D + 4% CEM II/B

Specimen	Sequence	Code	Confining Pressure (kPa)	Cyclic Axial Stress (kPa)	Maximum Axial Stress (kPa)	Contact Axial Stress (kPa)	Recoverable Axial Strain (%)	Permanent Axial Strain (%)	Cyclic Axial Load (kN)	Maximum Axial Load (kN)	Contact Axial Load (kN)	Recoverable Axial Deformation (mm)	Permanent Axial Deformation (mm)	Stress σ_1 (kPa)	Stress σ_2 (kPa)	Stress σ_3 (kPa)	Deviatoric stress σ_d (kPa)	Octahedral normal stress σ_{oct} (kPa)	Octahedral shear stress τ_{oct} (kPa)	First stress invariant I_1 (kPa)	Second stress invariant I_2 (kPa)	Third stress invariant I_3 (kPa)	RM (avg.) (MPa)
s1	0	s1_0	107.4	93.1	103.4	10.3	0.018	0.014	0.731	0.812	0.081	0.0335	0.0261	210.8	107.4	107.4	103.4	141.9	48.7	425.6	56806	2431066	525.8
s1	1	s1_1	24.7	24.7	29.3	4.6	0.006	-0.020	0.194	0.230	0.036	0.0120	-0.0377										
s1	2	s1_2	24.7	37.3	41.4	4.1	0.020	-0.018	0.293	0.325	0.032	0.0381	-0.0350	66.1	24.7	24.7	41.4	38.5	19.5	115.5	3874	40315	185.5
s1	3	s1_3	24.7	55.9	62.1	6.2	0.024	-0.015	0.439	0.488	0.049	0.0449	-0.0292	86.8	24.7	24.7	62.1	45.4	29.3	136.2	4897	52944	235.8
s1	4	s1_4	38.5	31.0	34.5	3.5	0.013	-0.009	0.243	0.271	0.027	0.0245	-0.0174	73.0	38.5	38.5	34.5	50.0	16.3	150.0	7103	108204	239.9
s1	5	s1_5	38.5	61.9	68.8	6.9	0.019	-0.006	0.486	0.540	0.054	0.0366	-0.0108	107.3	38.5	38.5	68.8	61.4	32.5	184.3	9747	159105	320.9
s1	6	s1_6	38.5	93.1	103.4	10.3	0.024	-0.002	0.731	0.812	0.081	0.0449	-0.0042	141.9	38.5	38.5	103.4	73.0	48.7	218.9	12405	210272	393.0
s1	7	s1_7	72.9	62.0	68.9	6.9	0.014	0.008	0.487	0.541	0.054	0.0269	0.0148	141.8	72.9	72.9	68.9	95.9	32.5	287.6	25986	753477	437.1
s1	8	s1_8	72.9	124.0	137.8	13.8	0.024	0.014	0.974	1.083	0.108	0.0448	0.0260	210.7	72.9	72.9	137.8	118.8	65.0	356.5	36032	1119640	524.5
s1	9	s1_9	72.9	186.0	206.7	20.7	0.033	0.029	1.461	1.623	0.163	0.0629	0.0554	279.6	72.9	72.9	206.7	141.8	97.4	425.4	46080	1485909	560.9
s1	10	s1_10	107.4	61.9	68.8	6.9	0.014	0.065	0.486	0.541	0.054	0.0271	0.1230	176.2	107.4	107.4	68.8	130.3	32.4	391.0	49383	2032425	432.3
s1	11	s1_11	107.4	93.0	103.3	10.3	0.019	0.067	0.731	0.812	0.081	0.0369	0.1265	210.7	107.4	107.4	103.3	141.8	48.7	425.5	56802	2430835	478.6
s1	12	s1_12	107.4	186.0	206.7	20.7	0.032	0.077	1.461	1.623	0.163	0.0616	0.1451	314.1	107.4	107.4	206.7	176.3	97.4	528.9	78999	3622837	573.0
s1	13	s1_13	141.9	93.1	103.4	10.3	0.017	0.083	0.731	0.812	0.081	0.0315	0.1577	245.3	141.9	141.9	103.4	176.4	48.7	529.1	89746	4938862	561.4
s1	14	s1_14	141.9	124.0	137.8	13.8	0.021	0.084	0.974	1.082	0.108	0.0406	0.1595	279.7	141.9	141.9	137.8	187.8	65.0	563.5	99520	5632333	580.1
s1	15	s1_15	141.9	248.1	275.7	27.6	0.037	0.096	1.948	2.165	0.217	0.0695	0.1819	417.6	141.9	141.9	275.7	233.8	130.0	701.4	138645	8408228	677.1
s2	0	s2_0	107.4	92.9	103.3	10.4	0.023	0.002	0.730	0.812	0.081	0.0429	0.0038	210.7	107.4	107.4	103.3	141.8	48.7	425.5	56797	2430605	406.8
s2	1	s2_1	24.7	18.7	20.7	2.0	0.016	-0.026	0.147	0.162	0.015	0.0306	-0.0486	45.4	24.7	24.7	20.7	31.6	9.7	94.8	2851	27674	115.0
s2	2	s2_2	24.7	37.3	41.3	4.0	0.022	-0.022	0.293	0.325	0.032	0.0422	-0.0420	66.0	24.7	24.7	41.3	38.5	19.5	115.4	3872	40290	166.3
s2	3	s2_3	24.7	55.9	62.1	6.2	0.025	-0.019	0.439	0.488	0.049	0.0468	-0.0360	86.8	24.7	24.7	62.1	45.4	29.3	136.2	4897	52944	224.7
s2	4	s2_4	38.5	30.7	34.4	3.8	0.018	-0.017	0.241	0.270	0.029	0.0344	-0.0326	72.9	38.5	38.5	34.4	50.0	16.2	149.9	7097	108086	167.7
s2	5	s2_5	38.5	62.0	68.9	6.9	0.023	-0.013	0.487	0.541	0.054	0.0424	-0.0248	107.4	38.5	38.5	68.9	61.5	32.5	184.4	9751	159164	274.6
s2	6	s2_6	38.5	93.1	103.3	10.2	0.025	-0.009	0.731	0.811	0.080	0.0476	-0.0167	141.8	38.5	38.5	103.3	72.9	48.7	218.8	12401	210183	367.8
s2	7	s2_7	72.9	62.0	68.9	6.9	0.020	-0.005	0.487	0.541	0.054	0.0370	-0.0091	141.8	72.9	72.9	68.9	95.9	32.5	287.6	25983	753371	315.2
s2	8	s2_8	72.9	124.0	137.8	13.8	0.025	0.003	0.974	1.082	0.108	0.0474	0.0053	210.7	72.9	72.9	137.8	118.8	65.0	356.5	36037	1119852	491.8
s2	9	s2_9	72.9	186.0	206.7	20.7	0.032	0.014	1.461	1.623	0.162	0.0597	0.0271	279.6	72.9	72.9	206.7	141.8	97.4	425.4	46077	1485803	585.6
s2	10	s2_10	107.4	62.0	68.9	6.9	0.020	0.010	0.487	0.541	0.054	0.0382	0.0186	176.3	107.4	107.4	68.9	130.4	32.5	391.1	49404	2033578	305.7
s2	11	s2_11	107.4	93.0	103.3	10.3	0.023	0.013	0.731	0.812	0.081	0.0441	0.0246	210.7	107.4	107.4	103.3	141.8	48.7	425.5	56802	2430835	396.8
s2	12	s2_12	107.4	185.9	206.6	20.7	0.031	0.023	1.461	1.623	0.163	0.0576	0.0437	314.0	107.4	107.4	206.6	176.3	97.4	528.8	78986	3622145	606.8
s2	13	s2_13	141.9	93.0	103.4	10.3	0.023	0.022	0.731	0.812	0.081	0.0431	0.0412	245.3	141.9	141.9	103.4	176.4	48.7	529.1	89740	4938460	406.0
s2	14	s2_14	141.9	124.0	137.8	13.8	0.025	0.025	0.974	1.082	0.109	0.0473	0.0469	279.7	141.9	141.9	137.8	187.8	65.0	563.5	99520	5632333	492.1
s2	15	s2_15	141.9	248.1	275.7	27.6	0.036	0.041	1.948	2.165	0.217	0.0668	0.0763	417.6	141.9	141.9	275.7	233.8	129.9	701.4	138639	8407825	698.0
s3	0	s3_0	107.4	93.1	103.4	10.3	0.023	0.010	0.731	0.812	0.081	0.0431	0.0192	210.8	107.4	107.4	103.4	141.9	48.7	425.6	56806	2431066	403.6
s3	1	s3_1	24.7	18.6	20.7	2.1	0.012	-0.019	0.146	0.163	0.016	0.0216	-0.0346	45.4	24.7	24.7	20.7	31.6	9.8	94.8	2853	27698	160.9
s3	2	s3_2	24.7	37.3	41.4	4.1	0.020	-0.014	0.293	0.325	0.032	0.0366	-0.0265	66.1	24.7	24.7	41.4	38.5	19.5	115.5	3874	40315	190.4
s3	3	s3_3	24.7	55.8	62.1	6.2	0.024	-0.011	0.439	0.487	0.049	0.0448	-0.0210	86.8	24.7	24.7	62.1	45.4	29.3	136.2	4897	52944	233.2
s3	4	s3_4	38.5	31.0	34.5	3.5	0.015	-0.008	0.243	0.271	0.027	0.0279	-0.0146	73.0	38.5	38.5	34.5	50.0	16.3	150.0	7102	108175	207.9
s3	5	s3_5	38.5	62.0	68.9	6.9	0.022	-0.004	0.487	0.541	0.054	0.0407	-0.0080	107.4	38.5	38.5	68.9	61.5	32.5	184.4	9752	159194	285.5
s3	6	s3_6	38.5	93.1	103.4	10.3	0.026	0.000	0.731	0.812	0.081	0.0485	-0.0007	141.9	38.5	38.5	103.4	73.0	48.7	218.9	12405	210272	359.0
s3	7	s3_7	72.9	62.0	68.9	6.9	0.019	0.005	0.487	0.541	0.054	0.0347	0.0098	141.8	72.9	72.9	68.9	95.9	32.5	287.6	25989	753583	334.1
s3	8	s3_8	72.9	124.1	137.8	13.8	0.026	0.012	0.974	1.083	0.108	0.0487	0.0223	210.7	72.9	72.9	137.8	118.8	65.0	356.5	36040	1119959	475.6
s3	9	s3_9	72.9	186.1	206.7	20.7	0.033	0.023	1.461	1.624	0.162	0.0616	0.0427	279.6	72.9	72.9	206.7	141.8	97.5	425.4	46086	1486122	565.5
s3	10	s3_10	107.4	62.0	68.9	6.9	0.019	0.020	0.487	0.541	0.054	0.0346	0.0374	176.3	107.4	107.4	68.9	130.4	32.5	391.1	49395	2033117	334.9
s3	11	s3_11	107.4	93.1	103.4	10.3	0.023	0.023	0.731	0.812	0.081	0.0428	0.0421	210.8	107.4	107.4	103.4	141.9	48.7	425.6	56806	2431066	406.4
s3	12	s3_12	107.4	186.0	206.7	20.7	0.031	0.031	1.461	1.624	0.162	0.0582	0.0589	314.1	107.4	107.4	206.7	176.3	97.4	528.9	79008	3623299	598.2
s3	13	s3_13	141.9	93.1	103.4	10.3	0.022	0.030	0.731	0.812	0.081	0.0416	0.0569	245.3	141.9	141.9	103.4	176.4	48.7	529.1	89740	4938460	418.4
s3	14	s3_14	141.9	124.1	137.8	13.8	0.025	0.033	0.974	1.082	0.108	0.0469	0.0614	279.7	141.9	141.9	137.8	187.8	65.0	563.5	99520	5632333	494.1
s3	15	s3_15	141.9	248.2	275.8	27.6	0.036	0.048	1.949	2.166	0.217	0.0667	0.0893	417.7	141.9	141.9	275.8	233.8	130.0	701.5	138679	8410644	696.0

C&D + 3% CEM II/B (28gg)

Specimen	Sequence	Code	Confining Pressure (kPa)	Cyclic Axial Stress (kPa)	Maximum Axial Stress (kPa)	Contact Axial Stress (kPa)	Recoverable Axial Strain (%)	Permanent Axial Strain (%)	Cyclic Axial Load (kN)	Maximum Axial Load (kN)	Contact Axial Load (kN)	Recoverable Axial Deformation (mm)	Permanent Axial Deformation (mm)	Stress σ_1 (kPa)	Stress σ_2 (kPa)	Stress σ_3 (kPa)	Deviatoric stress σ_d (kPa)	Octahedral normal stress σ_{oct} (kPa)	Octahedral shear stress τ_{oct} (kPa)	First stress invariant I_1 (kPa)	Second stress invariant I_2 (kPa)	Third stress invariant I_3 (kPa)	RM (avg.) (MPa)
s1	0	s1_0	103.4	93.0	103.3	10.3	0.011	0.012	0.731	0.812	0.081	0.0213	0.0234	206.7	103.4	103.4	103.3	137.8	48.7	413.5	53441	2210159	835.1
s1	1	s1_1	20.7	18.6	20.7	2.1	0.011	-0.023	0.146	0.162	0.017	0.0219	-0.0446	41.4	20.7	20.7	20.7	27.6	9.7	82.8	2142	17731	162.4
s1	2	s1_2	20.7	37.3	41.4	4.1	0.017	-0.021	0.293	0.325	0.032	0.0331	-0.0400	62.1	20.7	20.7	41.4	34.5	19.5	103.5	2998	26592	215.9
s1	3	s1_3	20.7	55.8	62.0	6.2	0.021	-0.018	0.438	0.487	0.049	0.0394	-0.0352	82.7	20.7	20.7	62.0	41.4	29.2	124.1	3853	35445	271.8
s1	4	s1_4	34.5	30.9	34.4	3.5	0.010	-0.011	0.243	0.271	0.027	0.0198	-0.0217	68.9	34.5	34.5	34.4	46.0	16.2	137.9	5947	82056	299.9
s1	5	s1_5	34.5	62.0	68.9	6.9	0.015	-0.009	0.487	0.541	0.054	0.0289	-0.0167	103.4	34.5	34.5	68.9	57.5	32.5	172.4	8322	123024	410.4
s1	6	s1_6	34.5	93.0	103.3	10.3	0.018	-0.006	0.731	0.812	0.081	0.0351	-0.0115	137.8	34.5	34.5	103.3	68.9	48.7	206.8	10701	164064	507.3
s1	7	s1_7	68.9	62.0	68.9	6.9	0.009	0.004	0.487	0.541	0.054	0.0174	0.0078	137.8	68.9	68.9	68.9	91.9	32.5	275.6	23733	654071	682.7
s1	8	s1_8	68.9	124.0	137.8	13.8	0.016	0.008	0.974	1.082	0.108	0.0309	0.0150	206.7	68.9	68.9	137.8	114.8	65.0	344.5	33230	981248	769.5
s1	9	s1_9	68.9	186.1	206.8	20.7	0.023	0.018	1.461	1.624	0.163	0.0440	0.0346	275.7	68.9	68.9	206.8	137.8	97.5	413.5	42733	1308616	809.0
s1	10	s1_10	103.4	61.9	68.8	6.9	0.008	0.022	0.487	0.541	0.054	0.0154	0.0431	172.2	103.4	103.4	68.8	126.3	32.5	379.0	46311	1841514	769.3
s1	11	s1_11	103.4	93.0	103.3	10.3	0.012	0.023	0.731	0.811	0.081	0.0220	0.0447	206.7	103.4	103.4	103.3	137.8	48.7	413.5	53445	2210373	808.2
s1	12	s1_12	103.4	185.9	206.5	20.7	0.020	0.030	1.460	1.622	0.163	0.0389	0.0581	309.9	103.4	103.4	206.5	172.2	97.4	516.7	74787	3313742	916.6
s1	13	s1_13	137.9	93.0	103.3	10.3	0.011	0.035	0.730	0.811	0.081	0.0202	0.0674	241.2	137.9	137.9	103.3	172.3	48.7	517.0	85539	4586758	879.3
s1	14	s1_14	137.9	124.0	137.8	13.8	0.013	0.036	0.974	1.082	0.108	0.0250	0.0698	275.7	137.9	137.9	137.8	183.8	65.0	551.5	95054	5242824	949.7
s1	15	s1_15	137.9	247.7	275.3	27.6	0.024	0.053	1.946	2.162	0.217	0.0466	0.1023	413.2	137.9	137.9	275.3	229.7	129.8	689.0	132977	7857581	1018.5
s2	0	s2_0	103.4	93.1	103.4	10.3	0.012	0.037	0.731	0.812	0.081	0.0230	0.0714	206.8	103.4	103.4	103.4	137.9	48.7	413.6	53458	2211015	785.1
s2	1	s2_1	20.7	18.6	20.7	2.1	0.006	0.010	0.146	0.162	0.017	0.0110	0.0196	41.4	20.7	20.7	20.7	27.6	9.7	82.8	2142	17731	327.2
s2	2	s2_2	20.7	37.3	41.4	4.1	0.010	0.011	0.293	0.325	0.032	0.0190	0.0216	62.1	20.7	20.7	41.4	34.5	19.5	103.5	3000	26618	381.6
s2	3	s2_3	20.7	55.9	62.0	6.2	0.013	0.012	0.439	0.487	0.048	0.0253	0.0241	82.7	20.7	20.7	62.0	41.4	29.2	124.1	3854	35453	428.2
s2	4	s2_4	34.5	31.0	34.5	3.5	0.007	0.016	0.243	0.271	0.028	0.0135	0.0310	69.0	34.5	34.5	34.5	46.0	16.3	138.0	5950	82103	446.2
s2	5	s2_5	34.5	61.9	68.9	6.9	0.012	0.018	0.486	0.540	0.054	0.0227	0.0344	103.4	34.5	34.5	68.9	57.5	32.5	172.4	8322	123024	530.4
s2	6	s2_6	34.5	93.1	103.3	10.2	0.016	0.020	0.732	0.812	0.080	0.0308	0.0387	137.8	34.5	34.5	103.3	68.9	48.7	206.8	10701	164064	586.4
s2	7	s2_7	68.9	62.0	68.9	6.9	0.009	0.028	0.487	0.541	0.054	0.0184	0.0534	137.8	68.9	68.9	68.9	91.9	32.5	275.6	23733	654071	653.9
s2	8	s2_8	68.9	124.1	137.9	13.7	0.017	0.033	0.975	1.083	0.108	0.0322	0.0630	206.8	68.9	68.9	137.9	114.9	65.0	344.6	33241	981628	747.9
s2	9	s2_9	68.9	186.0	206.7	20.7	0.024	0.051	1.461	1.623	0.162	0.0465	0.0986	275.6	68.9	68.9	206.7	137.8	97.4	413.4	42725	1308331	775.8
s2	10	s2_10	103.4	61.9	68.8	6.9	0.009	0.056	0.486	0.541	0.054	0.0168	0.1090	172.2	103.4	103.4	68.8	126.3	32.5	379.0	46311	1841514	715.3
s2	11	s2_11	103.4	93.0	103.3	10.3	0.012	0.057	0.731	0.811	0.081	0.0233	0.1114	206.7	103.4	103.4	103.3	137.8	48.7	413.5	53445	2210373	774.1
s2	12	s2_12	103.4	186.0	206.7	20.7	0.022	0.069	1.461	1.624	0.163	0.0419	0.1335	310.1	103.4	103.4	206.7	172.3	97.4	516.9	74824	3315667	862.8
s2	13	s2_13	137.9	93.0	103.4	10.3	0.011	0.168	0.731	0.812	0.081	0.0216	0.3251	241.3	137.9	137.9	103.4	172.4	48.7	517.1	85556	4587899	836.9
s2	14	s2_14	137.9	124.0	137.9	13.8	0.014	0.169	0.974	1.083	0.108	0.0274	0.3270	275.8	137.9	137.9	137.9	183.9	65.0	551.6	95071	5243965	877.4
s2	15	s2_15	137.9	248.2	275.8	27.6	0.026	0.197	1.949	2.166	0.217	0.0510	0.3829	413.7	137.9	137.9	275.8	229.8	130.0	689.5	133120	7867469	945.2
s3	0	s3_0	103.4	93.1	103.4	10.3	0.014	0.033	0.731	0.812	0.081	0.0269	0.0640	206.8	103.4	103.4	103.4	137.9	48.7	413.6	53454	2210801	662.0
s3	1	s3_1	20.7	18.6	20.7	2.1	0.006	0.008	0.146	0.162	0.017	0.0111	0.0150	41.4	20.7	20.7	20.7	27.6	9.8	82.8	2142	17739	320.7
s3	2	s3_2	20.7	37.3	41.4	4.1	0.010	0.009	0.293	0.325	0.032	0.0199	0.0175	62.1	20.7	20.7	41.4	34.5	19.5	103.5	2998	26592	358.3
s3	3	s3_3	20.7	55.9	62.1	6.2	0.014	0.012	0.439	0.487	0.049	0.0273	0.0227	82.8	20.7	20.7	62.1	41.4	29.3	124.2	3856	35470	391.3
s3	4	s3_4	34.5	30.9	34.4	3.5	0.008	0.015	0.243	0.271	0.027	0.0147	0.0290	68.9	34.5	34.5	34.4	46.0	16.2	137.9	5947	82056	402.9
s3	5	s3_5	34.5	62.0	68.9	6.9	0.014	0.018	0.487	0.541	0.054	0.0259	0.0339	103.4	34.5	34.5	68.9	57.5	32.5	172.4	8323	123048	459.1
s3	6	s3_6	34.5	93.1	103.4	10.3	0.018	0.022	0.731	0.812	0.081	0.0352	0.0419	137.9	34.5	34.5	103.4	69.0	48.7	206.9	10705	164135	507.1
s3	7	s3_7	68.9	62.0	68.9	6.9	0.011	0.030	0.487	0.541	0.054	0.0208	0.0566	137.8	68.9	68.9	68.9	91.9	32.5	275.6	23736	654166	569.7
s3	8	s3_8	68.9	124.0	137.8	13.8	0.019	0.034	0.974	1.083	0.108	0.0359	0.0656	206.7	68.9	68.9	137.8	114.8	65.0	344.5	33233	981343	661.8
s3	9	s3_9	68.9	186.0	206.7	20.7	0.025	0.038	1.461	1.624	0.163	0.0485	0.0735	275.6	68.9	68.9	206.7	137.8	97.4	413.4	42728	1308426	735.3
s3	10	s3_10	103.4	62.0	68.9	6.9	0.010	0.039	0.487	0.541	0.054	0.0188	0.0752	172.3	103.4	103.4	68.9	126.4	32.5	379.1	46319	1841942	631.2
s3	11	s3_11	103.4	93.0	103.4	10.3	0.013	0.041	0.731	0.812	0.081	0.0255	0.0789	206.8	103.4	103.4	103.4	137.9	48.7	413.6	53450	2210587	699.7
s3	12	s3_12	103.4	186.0	206.7	20.7	0.023	0.049	1.461	1.624	0.163	0.0441	0.0940	310.1	103.4	103.4	206.7	172.3	97.5	516.9	74829	3315880	807.5
s3	13	s3_13	137.9	93.1	103.4	10.3	0.012	0.052	0.731	0.812	0.081	0.0231	0.1001	241.3	137.9	137.9	103.4	172.4	48.7	517.1	85561	4588279	773.1
s3	14	s3_14	137.9	124.1	137.9	13.8	0.015	0.054	0.975	1.083	0.108	0.0289	0.1028	275.8	137.9	137.9	137.9	183.9	65.0	551.6	95071	5243965	822.7
s3	15	s3_15	137.9	248.0	275.6	27.6	0.027	0.060	1.948	2.165	0.217	0.0508	0.1151	413.5	137.9	137.9	275.6	229.8	129.9	689.3	133071	7864046	934.6

C&D + 8.5% SA

Specimen	Sequence	Code	Confining Pressure (kPa)	Cyclic Axial Stress (kPa)	Maximum Axial Stress (kPa)	Contact Axial Stress (kPa)	Recoverable Axial Strain (%)	Permanent Axial Strain (%)	Cyclic Axial Load (kN)	Maximum Axial Load (kN)	Contact Axial Load (kN)	Recoverable Axial Deformation (mm)	Permanent Axial Deformation (mm)	Stress σ_1 (kPa)	Stress σ_2 (kPa)	Stress σ_3 (kPa)	Deviatoric stress σ_d (kPa)	Octahedral normal stress σ_{oct} (kPa)	Octahedral shear stress τ_{oct} (kPa)	First stress invariant I_1 (kPa)	Second stress invariant I_2 (kPa)	Third stress invariant I_3 (kPa)	RM (avg.) (MPa)
s1	0	s1_0	103.4	93.1	103.4	10.3	0.028	0.100	0.731	0.812	0.081	0.0546	0.1929										
s1	1	s1_1	24.8	18.6	20.7	2.1	0.009	0.057	0.146	0.162	0.016	0.0166	0.1098										
s1	2	s1_2	24.8	37.3	41.4	4.1	0.017	0.057	0.293	0.325	0.032	0.0323	0.1095										
s1	3	s1_3	24.8	55.9	62.1	6.2	0.025	0.059	0.439	0.487	0.049	0.0472	0.1127										
s1	4	s1_4	41.4	31.0	34.5	3.5	0.013	0.064	0.243	0.271	0.028	0.0247	0.1231										
s1	5	s1_5	41.4	62.0	68.9	6.9	0.025	0.069	0.487	0.541	0.054	0.0476	0.1316										
s1	6	s1_6	41.4	93.0	103.3	10.3	0.036	0.075	0.730	0.811	0.081	0.0685	0.1435										
s1	7	s1_7	75.8	62.0	68.9	6.9	0.022	0.088	0.487	0.541	0.054	0.0413	0.1695										
s1	8	s1_8	75.8	124.0	137.8	13.8	0.041	0.104	0.974	1.082	0.108	0.0789	0.2000										
s1	9	s1_9	75.8	186.0	206.7	20.7	0.064	0.147	1.461	1.623	0.163	0.1237	0.2832										
s1	10	s1_10	113.7	62.0	68.9	6.9	0.021	0.156	0.487	0.541	0.054	0.0393	0.2993										
s1	11	s1_11	113.7	93.1	103.4	10.3	0.029	0.162	0.731	0.812	0.081	0.0566	0.3120										
s1	12	s1_12	113.7	186.1	206.8	20.7	0.056	0.195	1.462	1.625	0.163	0.1080	0.3746										
s1	13	s1_13	137.9	93.1	103.3	10.3	0.028	0.201	0.731	0.812	0.081	0.0532	0.3866										
s1	14	s1_14	137.9	124.0	137.8	13.8	0.035	0.209	0.974	1.082	0.108	0.0671	0.4005										
s1	15	s1_15	137.9	247.9	275.5	27.6	0.071	0.274	1.947	2.164	0.217	0.1366	0.5257										
s2	0	s2_0	103.4	93.1	103.3	10.3	0.014	0.041	0.731	0.812	0.081	0.0267	0.0800	206.7	103.4	103.4	103.3	137.8	48.7	413.5	53445	2210373	684.1
s2	1	s2_1	20.7	18.6	20.7	2.1	0.006	0.011	0.146	0.162	0.016	0.0115	0.0209	41.4	20.7	20.7	20.7	27.6	9.7	82.8	2142	17731	317.1
s2	2	s2_2	20.7	37.3	41.4	4.1	0.010	0.011	0.293	0.325	0.032	0.0203	0.0212	62.1	20.7	20.7	41.4	34.5	19.5	103.5	2999	26601	358.5
s2	3	s2_3	20.7	55.9	62.1	6.2	0.014	0.012	0.439	0.487	0.049	0.0281	0.0232	82.8	20.7	20.7	62.1	41.4	29.3	124.2	3856	35479	391.5
s2	4	s2_4	34.5	31.0	34.5	3.5	0.007	0.016	0.243	0.271	0.027	0.0145	0.0308	69.0	34.5	34.5	34.5	46.0	16.2	138.0	5948	82080	419.5
s2	5	s2_5	34.5	61.9	68.8	6.9	0.013	0.018	0.486	0.541	0.054	0.0262	0.0353	103.3	34.5	34.5	68.8	57.4	32.5	172.3	8321	123000	465.0
s2	6	s2_6	34.5	93.0	103.3	10.3	0.019	0.021	0.731	0.811	0.081	0.0364	0.0406	137.8	34.5	34.5	103.3	68.9	48.7	206.8	10701	164064	501.8
s2	7	s2_7	68.9	62.0	68.9	6.9	0.011	0.030	0.487	0.541	0.054	0.0212	0.0590	137.8	68.9	68.9	68.9	91.9	32.5	275.6	23733	654071	575.0
s2	8	s2_8	68.9	124.1	137.8	13.8	0.020	0.036	0.974	1.083	0.108	0.0385	0.0706	206.7	68.9	68.9	137.8	114.8	65.0	344.5	33236	981438	632.9
s2	9	s2_9	68.9	186.0	206.7	20.7	0.029	0.047	1.461	1.623	0.163	0.0563	0.0918	275.6	68.9	68.9	206.7	137.8	97.4	413.4	42719	1308141	648.9
s2	10	s2_10	103.4	62.0	68.9	6.9	0.010	0.051	0.487	0.541	0.054	0.0187	0.1008	172.3	103.4	103.4	68.9	126.4	32.5	379.1	46315	1841728	649.5
s2	11	s2_11	103.4	93.0	103.3	10.3	0.014	0.054	0.730	0.811	0.081	0.0269	0.1058	206.7	103.4	103.4	103.3	137.8	48.7	413.5	53437	2209945	678.8
s2	12	s2_12	103.4	185.9	206.6	20.7	0.026	0.064	1.461	1.623	0.163	0.0516	0.1254	310.0	103.4	103.4	206.6	172.3	97.4	516.8	74808	3314811	707.5
s2	13	s2_13	137.9	93.1	103.4	10.3	0.013	0.070	0.731	0.812	0.081	0.0253	0.1366	241.3	137.9	137.9	103.4	172.4	48.7	517.1	85561	4588279	723.8
s2	14	s2_14	137.9	124.0	137.8	13.8	0.017	0.073	0.974	1.082	0.108	0.0326	0.1430	275.7	137.9	137.9	137.8	183.8	65.0	551.5	95060	5243205	747.1
s2	15	s2_15	137.9	247.9	275.5	27.6	0.033	0.091	1.946	2.163	0.217	0.0647	0.1795	413.4	137.9	137.9	275.5	229.7	129.9	689.2	133021	7860623	752.5
s3	0	s3_0	103.4	93.0	103.3	10.3	0.017	0.006	0.731	0.811	0.081	0.0337	0.0126	206.7	103.4	103.4	103.3	137.8	48.7	413.5	53445	2210373	541.6
s3	1	s3_1	20.7	18.6	20.7	2.1	0.007	-0.021	0.146	0.162	0.016	0.0134	-0.0420	41.4	20.7	20.7	20.7	27.6	9.7	82.8	2141	17722	272.1
s3	2	s3_2	20.7	37.3	41.4	4.1	0.011	-0.019	0.293	0.325	0.032	0.0222	-0.0378	62.1	20.7	20.7	41.4	34.5	19.5	103.5	2998	26592	329.2
s3	3	s3_3	20.7	55.9	62.0	6.2	0.015	-0.016	0.439	0.487	0.049	0.0300	-0.0317	82.7	20.7	20.7	62.0	41.4	29.2	124.1	3854	35453	365.0
s3	4	s3_4	34.5	31.0	34.4	3.5	0.008	-0.012	0.243	0.271	0.028	0.0165	-0.0239	68.9	34.5	34.5	34.4	46.0	16.2	137.9	5947	82056	368.3
s3	5	s3_5	34.5	61.9	68.8	6.9	0.015	-0.008	0.486	0.541	0.054	0.0283	-0.0148	103.3	34.5	34.5	68.8	57.4	32.5	172.3	8321	123000	427.2
s3	6	s3_6	34.5	93.0	103.4	10.3	0.020	0.001	0.731	0.812	0.081	0.0399	0.0027	137.9	34.5	34.5	103.4	69.0	48.7	206.9	10703	164088	455.7
s3	7	s3_7	68.9	62.0	68.9	6.9	0.013	0.011	0.487	0.541	0.054	0.0244	0.0214	137.8	68.9	68.9	68.9	91.9	32.5	275.6	23736	654166	496.0
s3	8	s3_8	68.9	124.0	137.8	13.8	0.023	0.023	0.974	1.083	0.108	0.0444	0.0457	206.7	68.9	68.9	137.8	114.8	65.0	344.5	33236	981438	547.4
s3	9	s3_9	68.9	186.0	206.7	20.7	0.032	0.041	1.461	1.623	0.163	0.0625	0.0795	275.6	68.9	68.9	206.7	137.8	97.4	413.4	42719	1308141	581.9
s3	10	s3_10	103.4	61.9	68.8	6.9	0.012	0.044	0.486	0.541	0.054	0.0227	0.0860	172.2	103.4	103.4	68.8	126.3	32.4	379.0	46307	1841300	535.6
s3	11	s3_11	103.4	93.0	103.3	10.3	0.016	0.047	0.731	0.812	0.081	0.0314	0.0918	206.7	103.4	103.4	103.3	137.8	48.7	413.5	53445	2210373	580.8
s3	12	s3_12	103.4	186.0	206.7	20.7	0.029	0.059	1.461	1.623	0.163	0.0574	0.1153	310.1	103.4	103.4	206.7	172.3	97.4	516.9	74816	3315239	633.4
s3	13	s3_13	137.9	93.0	103.3	10.3	0.015	0.064	0.731	0.812	0.081	0.0295	0.1246	241.2	137.9	137.9	103.3	172.3	48.7	517.0	85550	4587519	616.2
s3	14	s3_14	137.9	124.1	137.9	13.8	0.019	0.067	0.974	1.083	0.108	0.0374	0.1311	275.8	137.9	137.9	137.9	183.9	65.0	551.6	95071	5243965	649.5
s3	15	s3_15	137.9	248.0	275.6	27.6	0.035	0.086	1.948	2.164	0.217	0.0694	0.1687	413.5	137.9	137.9	275.6	229.8	129.9	689.3	133054	7862905	699.3

C&D + 3% CEM IV/B

Specimen	Sequence	Code	Confining Pressure (kPa)	Cyclic Axial Stress (kPa)	Maximum Axial Stress (kPa)	Contact Axial Stress (kPa)	Recoverable Axial Strain (%)	Permanent Axial Strain (%)	Cyclic Axial Load (kN)	Maximum Axial Load (kN)	Contact Axial Load (kN)	Recoverable Axial Deformation (mm)	Permanent Axial Deformation (mm)	Stress σ_1 (kPa)	Stress σ_2 (kPa)	Stress σ_3 (kPa)	Deviatoric stress σ_d (kPa)	Octahedral normal stress σ_{oct} (kPa)	Octahedral shear stress τ_{oct} (kPa)	First stress invariant I_1 (kPa)	Second stress invariant I_2 (kPa)	Third stress invariant I_3 (kPa)	RM (avg.) (MPa)
s1	0	s1_0	103.4	93.1	103.4	10.3	0.010	0.016	0.731	0.812	0.081	0.0200	0.0304	206.8	103.4	103.4	103.4	137.9	48.7	413.6	53458	2211015	890.2
s1	1	s1_1	24.8	18.6	20.7	2.1	0.005	-0.011	0.146	0.163	0.016	0.0087	-0.0212	45.5	24.8	24.8	20.7	31.7	9.8	95.1	2873	27997	410.5
s1	2	s1_2	24.8	37.3	41.4	4.1	0.008	-0.011	0.293	0.325	0.032	0.0154	-0.0202	66.2	24.8	24.8	41.4	38.6	19.5	115.8	3899	40716	461.6
s1	3	s1_3	24.8	55.9	62.1	6.2	0.011	-0.010	0.439	0.488	0.049	0.0211	-0.0188	86.9	24.8	24.8	62.1	45.5	29.3	136.5	4925	53447	504.5
s1	4	s1_4	41.4	31.0	34.5	3.5	0.006	-0.005	0.243	0.271	0.028	0.0109	-0.0102	75.9	41.4	41.4	34.5	52.9	16.3	158.7	7997	130055	543.5
s1	5	s1_5	41.4	62.0	68.8	6.9	0.010	-0.004	0.487	0.541	0.054	0.0193	-0.0075	110.2	41.4	41.4	68.8	64.3	32.5	193.0	10842	188947	612.1
s1	6	s1_6	41.4	93.0	103.3	10.3	0.014	-0.002	0.731	0.812	0.081	0.0264	-0.0044	144.7	41.4	41.4	103.3	75.8	48.7	227.5	13697	248044	673.1
s1	7	s1_7	75.8	62.0	68.9	6.9	0.008	0.007	0.487	0.541	0.054	0.0152	0.0128	144.7	75.8	75.8	68.9	98.8	32.5	296.3	27679	831279	778.7
s1	8	s1_8	75.8	124.0	137.9	13.8	0.014	0.011	0.974	1.083	0.109	0.0275	0.0204	213.7	75.8	75.8	137.9	121.8	65.0	365.3	38140	1227728	860.2
s1	9	s1_9	75.8	186.0	206.7	20.7	0.021	0.026	1.461	1.624	0.162	0.0396	0.0496	282.5	75.8	75.8	206.7	144.7	97.4	434.1	48576	1623258	894.3
s1	10	s1_10	113.7	62.0	68.9	6.9	0.007	0.034	0.487	0.541	0.054	0.0134	0.0654	182.6	113.7	113.7	68.9	136.7	32.5	410.0	54446	2360338	885.1
s1	11	s1_11	113.7	93.1	103.4	10.3	0.010	0.035	0.731	0.812	0.081	0.0193	0.0675	217.1	113.7	113.7	103.4	148.2	48.7	444.5	62287	2806084	917.8
s1	12	s1_12	113.7	186.0	206.7	20.7	0.019	0.043	1.461	1.623	0.163	0.0364	0.0825	320.4	113.7	113.7	206.7	182.6	97.4	547.8	85778	4141515	973.7
s1	13	s1_13	137.9	93.0	103.3	10.3	0.010	0.050	0.731	0.812	0.081	0.0183	0.0947	241.2	137.9	137.9	103.3	172.3	48.7	517.0	85550	4587519	969.2
s1	14	s1_14	137.9	124.0	137.8	13.8	0.012	0.051	0.974	1.082	0.108	0.0237	0.0969	275.7	137.9	137.9	137.8	183.8	65.0	551.5	95066	5243585	1000.3
s1	15	s1_15	137.9	248.1	275.8	27.6	0.024	0.069	1.949	2.166	0.217	0.0462	0.1315	413.7	137.9	137.9	275.8	229.8	130.0	689.5	133104	7866328	1025.5
s2	0	s2_0	103.4	93.0	103.3	10.3	0.012	0.032	0.731	0.812	0.081	0.0231	0.0609	206.7	103.4	103.4	103.3	137.8	48.7	413.5	53441	2210159	762.5
s2	1	s2_1	24.8	18.6	20.7	2.1	0.005	0.008	0.146	0.163	0.017	0.0102	0.0159	45.5	24.8	24.8	20.7	31.7	9.8	95.1	2872	27984	345.7
s2	2	s2_2	24.8	37.3	41.4	4.1	0.009	0.009	0.293	0.325	0.032	0.0178	0.0173	66.2	24.8	24.8	41.4	38.6	19.5	115.8	3898	40703	396.6
s2	3	s2_3	24.8	55.9	62.0	6.2	0.013	0.010	0.439	0.487	0.049	0.0242	0.0193	86.8	24.8	24.8	62.0	45.5	29.2	136.4	4922	53410	436.9
s2	4	s2_4	41.4	31.0	34.5	3.5	0.007	0.014	0.243	0.271	0.027	0.0130	0.0265	75.9	41.4	41.4	34.5	52.9	16.3	158.7	7998	130090	455.9
s2	5	s2_5	41.4	62.0	68.8	6.9	0.012	0.016	0.487	0.541	0.054	0.0224	0.0298	110.2	41.4	41.4	68.8	64.3	32.5	193.0	10842	188947	524.9
s2	6	s2_6	41.4	93.1	103.4	10.3	0.016	0.018	0.731	0.812	0.081	0.0301	0.0337	144.8	41.4	41.4	103.4	75.9	48.7	227.6	13700	248113	585.3
s2	7	s2_7	75.8	62.0	68.9	6.9	0.009	0.025	0.487	0.541	0.054	0.0178	0.0480	144.7	75.8	75.8	68.9	98.8	32.5	296.3	27679	831279	659.4
s2	8	s2_8	75.8	124.1	137.8	13.8	0.017	0.030	0.974	1.083	0.108	0.0316	0.0572	213.6	75.8	75.8	137.8	121.7	65.0	365.2	38133	1227499	745.4
s2	9	s2_9	75.8	186.0	206.7	20.7	0.024	0.050	1.461	1.624	0.163	0.0462	0.0946	282.5	75.8	75.8	206.7	144.7	97.4	434.1	48576	1623258	763.6
s2	10	s2_10	113.7	62.0	68.9	6.9	0.009	0.055	0.487	0.541	0.054	0.0162	0.1039	182.6	113.7	113.7	68.9	136.7	32.5	410.0	54446	2360338	729.2
s2	11	s2_11	113.7	93.0	103.3	10.3	0.012	0.056	0.731	0.811	0.081	0.0227	0.1066	217.0	113.7	113.7	103.3	148.1	48.7	444.4	62278	2805567	776.5
s2	12	s2_12	113.7	186.0	206.7	20.7	0.022	0.067	1.461	1.623	0.163	0.0419	0.1279	320.4	113.7	113.7	206.7	182.6	97.4	547.8	85787	4142032	840.9
s2	13	s2_13	137.9	93.1	103.4	10.3	0.011	0.071	0.731	0.812	0.081	0.0216	0.1339	241.3	137.9	137.9	103.4	172.4	48.7	517.1	85556	4587899	819.2
s2	14	s2_14	137.9	124.1	137.9	13.8	0.015	0.072	0.974	1.083	0.108	0.0275	0.1364	275.8	137.9	137.9	137.9	183.9	65.0	551.6	95077	5244346	855.7
s2	15	s2_15	137.9	248.1	275.7	27.6	0.028	0.100	1.948	2.165	0.217	0.0533	0.1903	413.6	137.9	137.9	275.7	229.8	129.9	689.4	133076	7864427	881.5
s3	0	s3_0	103.4	93.0	103.3	10.3	0.015	0.015	0.731	0.812	0.081	0.0285	0.0291	206.7	103.4	103.4	103.3	137.8	48.7	413.5	53437	2209945	618.4
s3	1	s3_1	24.8	18.5	22.6	4.1	0.006	-0.006	0.146	0.178	0.032	0.0114	-0.0122	47.4	24.8	24.8	22.6	32.3	10.7	97.0	2967	29165	308.7
s3	2	s3_2	24.8	37.3	41.4	4.1	0.011	-0.006	0.293	0.325	0.032	0.0216	-0.0117	66.2	24.8	24.8	41.4	38.6	19.5	115.8	3898	40703	327.6
s3	3	s3_3	24.8	55.9	62.1	6.2	0.016	-0.001	0.439	0.487	0.049	0.0293	-0.0027	86.9	24.8	24.8	62.1	45.5	29.3	136.5	4924	53435	360.5
s3	4	s3_4	41.4	31.4	34.9	3.5	0.008	0.003	0.247	0.274	0.027	0.0144	0.0062	76.3	41.4	41.4	34.9	53.0	16.5	159.1	8033	130809	410.8
s3	5	s3_5	41.4	62.0	68.9	6.9	0.014	0.008	0.487	0.541	0.054	0.0259	0.0144	110.3	41.4	41.4	68.9	64.4	32.5	193.1	10847	189050	453.9
s3	6	s3_6	41.4	93.0	103.3	10.3	0.019	0.016	0.731	0.812	0.081	0.0358	0.0311	144.7	41.4	41.4	103.3	75.8	48.7	227.5	13695	248010	492.1
s3	7	s3_7	75.8	62.0	68.9	6.9	0.011	0.024	0.487	0.541	0.054	0.0205	0.0446	144.7	75.8	75.8	68.9	98.8	32.5	296.3	27679	831279	573.9
s3	8	s3_8	75.8	124.1	137.9	13.8	0.020	0.033	0.974	1.083	0.108	0.0376	0.0623	213.7	75.8	75.8	137.9	121.8	65.0	365.3	38143	1227843	626.8
s3	9	s3_9	75.8	186.0	206.7	20.7	0.028	0.047	1.461	1.624	0.163	0.0526	0.0886	282.5	75.8	75.8	206.7	144.7	97.4	434.1	48576	1623258	671.6
s3	10	s3_10	113.7	61.9	68.8	6.9	0.009	0.010	0.486	0.540	0.054	0.0165	0.0195	182.5	113.7	113.7	68.8	136.6	32.4	409.9	54428	2359303	713.1
s3	11	s3_11	113.7	93.1	103.4	10.3	0.012	0.014	0.731	0.812	0.081	0.0229	0.0273	217.1	113.7	113.7	103.4	148.2	48.7	444.5	62287	2806084	771.7
s3	12	s3_12	113.7	186.0	206.7	20.7	0.022	0.023	1.461	1.623	0.162	0.0424	0.0427	320.4	113.7	113.7	206.7	182.6	97.4	547.8	85787	4142032	831.8
s3	13	s3_13	137.9	93.1	103.4	10.3	0.011	0.024	0.731	0.812	0.081	0.0215	0.0459	241.3	137.9	137.9	103.4	172.4	48.7	517.1	85561	4588279	821.0
s3	14	s3_14	137.9	124.0	137.9	13.9	0.015	0.025	0.974	1.083	0.109	0.0277	0.0480	275.8	137.9	137.9	137.9	183.9	65.0	551.6	95071	5243965	849.3
s3	15	s3_15	137.9	248.2	275.7	27.5	0.027	0.032	1.949	2.165	0.217	0.0521	0.0611	413.6	137.9	137.9	275.7	229.8	130.0	689.4	133087	7865187	904.5

C&D + 8.5% SA (28gg)

Specimen	Sequence	Code	Confining Pressure (kPa)	Cyclic Axial Stress (kPa)	Maximum Axial Stress (kPa)	Contact Axial Stress (kPa)	Recoverable Axial Strain (%)	Permanent Axial Strain (%)	Cyclic Axial Load (kN)	Maximum Axial Load (kN)	Contact Axial Load (kN)	Recoverable Axial Deformation (mm)	Permanent Axial Deformation (mm)	Stress σ_1 (kPa)	Stress σ_2 (kPa)	Stress σ_3 (kPa)	Deviatoric stress σ_d (kPa)	Octahedral normal stress σ_{oct} (kPa)	Octahedral shear stress τ_{oct} (kPa)	First stress invariant I_1 (kPa)	Second stress invariant I_2 (kPa)	Third stress invariant I_3 (kPa)	RM (avg.) (MPa)
s1	0	s1_0	103.4	93.1	103.4	10.3	0.016	0.026	0.731	0.812	0.081	0.0320	0.0513	206.8	103.4	103.4	103.4	137.9	48.7	413.6	53450	2210587	567.4
s1	1	s1_1	24.8	18.6	22.6	4.1	0.008	-0.001	0.146	0.178	0.032	0.0156	-0.0027	47.4	24.8	24.8	22.6	32.3	10.7	97.0	2968	29177	231.7
s1	2	s1_2	24.8	37.3	41.4	4.1	0.014	-0.002	0.293	0.325	0.032	0.0278	-0.0037	66.2	24.8	24.8	41.4	38.6	19.5	115.8	3897	40691	261.3
s1	3	s1_3	24.8	55.9	62.1	6.2	0.019	0.000	0.439	0.488	0.049	0.0361	-0.0005	86.9	24.8	24.8	62.1	45.5	29.3	136.5	4925	53447	302.2
s1	4	s1_4	41.4	31.0	36.9	6.0	0.010	0.006	0.243	0.290	0.047	0.0190	0.0109	78.3	41.4	41.4	36.9	53.7	17.4	161.1	8201	134272	315.7
s1	5	s1_5	41.4	62.0	68.9	6.9	0.017	0.007	0.487	0.541	0.054	0.0331	0.0135	110.3	41.4	41.4	68.9	64.4	32.5	193.1	10843	188981	364.5
s1	6	s1_6	41.4	93.1	103.4	10.3	0.022	0.010	0.731	0.812	0.081	0.0432	0.0197	144.8	41.4	41.4	103.4	75.9	48.7	227.6	13702	248147	419.7
s1	7	s1_7	75.8	61.9	73.4	11.5	0.012	0.021	0.487	0.577	0.090	0.0242	0.0418	149.2	75.8	75.8	73.4	100.3	34.6	300.8	28367	857364	499.4
s1	8	s1_8	75.8	124.0	137.8	13.8	0.022	0.026	0.974	1.083	0.108	0.0432	0.0501	213.6	75.8	75.8	137.8	121.7	65.0	365.2	38133	1227499	558.7
s1	9	s1_9	75.8	186.1	206.8	20.7	0.031	0.036	1.461	1.624	0.163	0.0604	0.0704	282.6	75.8	75.8	206.8	144.7	97.5	434.2	48582	1623488	599.9
s1	10	s1_10	113.7	62.0	71.5	9.5	0.011	0.041	0.487	0.561	0.075	0.0221	0.0800	185.2	113.7	113.7	71.5	137.5	33.7	412.6	55038	2393950	546.6
s1	11	s1_11	113.7	93.1	103.4	10.3	0.016	0.043	0.731	0.812	0.081	0.0310	0.0829	217.1	113.7	113.7	103.4	148.2	48.7	444.5	62287	2806084	584.6
s1	12	s1_12	113.7	186.0	206.7	20.7	0.028	0.050	1.461	1.623	0.162	0.0548	0.0979	320.4	113.7	113.7	206.7	182.6	97.4	547.8	85782	4141773	660.9
s1	13	s1_13	137.9	93.0	103.3	10.3	0.015	0.053	0.731	0.812	0.081	0.0295	0.1026	241.2	137.9	137.9	103.3	172.3	48.7	517.0	85550	4587519	612.9
s1	14	s1_14	137.9	124.0	137.8	13.8	0.019	0.055	0.974	1.083	0.108	0.0367	0.1072	275.7	137.9	137.9	137.8	183.8	65.0	551.5	95060	5243205	657.6
s1	15	s1_15	137.9	248.1	275.7	27.6	0.034	0.068	1.949	2.166	0.217	0.0669	0.1325	413.6	137.9	137.9	275.7	229.8	130.0	689.4	133098	7865948	722.2
s2	0	s2_0	103.4	93.1	103.3	10.3	0.017	0.026	0.731	0.812	0.081	0.0322	0.0495	206.7	103.4	103.4	103.3	137.8	48.7	413.5	53445	2210373	550.5
s2	1	s2_1	24.8	18.7	22.6	4.0	0.008	0.011	0.147	0.178	0.032	0.0162	0.0214	47.4	24.8	24.8	22.6	32.3	10.7	97.0	2968	29177	220.1
s2	2	s2_2	24.8	37.0	41.4	4.4	0.013	0.011	0.291	0.325	0.035	0.0255	0.0218	66.2	24.8	24.8	41.4	38.6	19.5	115.8	3897	40691	276.8
s2	3	s2_3	24.8	55.9	62.0	6.1	0.016	0.014	0.439	0.487	0.048	0.0300	0.0267	86.8	24.8	24.8	62.0	45.5	29.2	136.4	4922	53410	355.4
s2	4	s2_4	41.4	31.1	37.0	5.9	0.010	0.017	0.244	0.290	0.046	0.0187	0.0317	78.4	41.4	41.4	37.0	53.7	17.4	161.2	8202	134306	317.0
s2	5	s2_5	41.4	62.0	68.8	6.9	0.015	0.018	0.487	0.541	0.054	0.0289	0.0339	110.2	41.4	41.4	68.8	64.3	32.5	193.0	10842	188947	409.9
s2	6	s2_6	41.4	93.1	103.3	10.3	0.018	0.021	0.731	0.811	0.081	0.0349	0.0396	144.7	41.4	41.4	103.3	75.8	48.7	227.5	13698	248079	509.2
s2	7	s2_7	75.8	61.9	73.4	11.5	0.012	0.026	0.487	0.577	0.090	0.0237	0.0486	149.2	75.8	75.8	73.4	100.3	34.6	300.8	28370	857479	497.9
s2	8	s2_8	75.8	124.1	137.8	13.8	0.020	0.030	0.975	1.083	0.108	0.0385	0.0566	213.6	75.8	75.8	137.8	121.7	65.0	365.2	38133	1227499	613.6
s2	9	s2_9	75.8	185.8	206.5	20.6	0.027	0.041	1.459	1.622	0.162	0.0513	0.0783	282.3	75.8	75.8	206.5	144.6	97.3	433.9	48539	1621879	690.4
s2	10	s2_10	113.7	62.1	71.5	9.4	0.013	0.040	0.487	0.562	0.074	0.0246	0.0765	185.2	113.7	113.7	71.5	137.5	33.7	412.6	55042	2394208	480.7
s2	11	s2_11	113.7	93.1	103.4	10.3	0.017	0.041	0.731	0.812	0.081	0.0325	0.0786	217.1	113.7	113.7	103.4	148.2	48.7	444.5	62292	2806343	545.6
s2	12	s2_12	113.7	186.1	206.7	20.7	0.026	0.049	1.461	1.624	0.162	0.0498	0.0933	320.4	113.7	113.7	206.7	182.6	97.4	547.8	85791	4142290	712.3
s2	13	s2_13	137.9	93.1	103.4	10.3	0.017	0.047	0.731	0.812	0.081	0.0323	0.0901	241.3	137.9	137.9	103.4	172.4	48.8	517.1	85572	4589040	548.4
s2	14	s2_14	137.9	124.1	137.8	13.8	0.020	0.049	0.974	1.083	0.108	0.0379	0.0942	275.7	137.9	137.9	137.8	183.8	65.0	551.5	95066	5243585	623.9
s2	15	s2_15	137.9	248.2	275.8	27.6	0.032	0.063	1.950	2.166	0.217	0.0608	0.1208	413.7	137.9	137.9	275.8	229.8	130.0	689.5	133104	7866328	777.5
s3	0	s3_0	103.4	93.1	103.4	10.3	0.021	0.101	0.731	0.812	0.081	0.0403	0.1950	206.8	103.4	103.4	103.4	137.9	48.7	413.6	53450	2210587	446.6
s3	1	s3_1	24.8	18.5	22.7	4.2	0.011	0.078	0.145	0.178	0.033	0.0213	0.1515	47.5	24.8	24.8	22.7	32.4	10.7	97.1	2969	29190	167.7
s3	2	s3_2	24.8	37.2	41.3	4.1	0.018	0.079	0.292	0.325	0.032	0.0340	0.1526	66.1	24.8	24.8	41.3	38.6	19.5	115.7	3895	40666	212.0
s3	3	s3_3	24.8	55.8	62.1	6.2	0.021	0.083	0.438	0.487	0.049	0.0401	0.1603	86.9	24.8	24.8	62.1	45.5	29.3	136.5	4923	53422	269.9
s3	4	s3_4	41.4	30.8	36.9	6.1	0.012	0.088	0.242	0.290	0.048	0.0229	0.1697	78.3	41.4	41.4	36.9	53.7	17.4	161.1	8201	134272	260.6
s3	5	s3_5	41.4	62.0	68.9	6.9	0.019	0.090	0.487	0.541	0.054	0.0368	0.1735	110.3	41.4	41.4	68.9	64.4	32.5	193.1	10848	189084	326.4
s3	6	s3_6	41.4	93.0	103.3	10.3	0.023	0.095	0.731	0.812	0.081	0.0450	0.1840	144.7	41.4	41.4	103.3	75.8	48.7	227.5	13698	248079	400.3
s3	7	s3_7	75.8	62.0	73.5	11.5	0.015	0.102	0.487	0.577	0.090	0.0287	0.1982	149.3	75.8	75.8	73.5	100.3	34.6	300.9	28380	857824	418.4
s3	8	s3_8	75.8	124.0	137.8	13.8	0.026	0.112	0.974	1.082	0.108	0.0498	0.2166	213.6	75.8	75.8	137.8	121.7	65.0	365.2	38124	1227154	481.7
s3	9	s3_9	75.8	185.9	206.6	20.7	0.035	0.138	1.460	1.623	0.162	0.0673	0.2663	282.4	75.8	75.8	206.6	144.7	97.4	434.0	48557	1622569	534.9
s3	10	s3_10	113.7	62.0	71.4	9.5	0.015	0.139	0.487	0.561	0.075	0.0298	0.2689	185.1	113.7	113.7	71.4	137.5	33.7	412.5	55029	2393433	401.2
s3	11	s3_11	113.7	93.0	103.3	10.3	0.021	0.141	0.731	0.812	0.081	0.0404	0.2736	217.0	113.7	113.7	103.3	148.1	48.7	444.4	62278	2805567	445.9
s3	12	s3_12	113.7	186.0	206.7	20.7	0.033	0.159	1.461	1.624	0.162	0.0635	0.3078	320.4	113.7	113.7	206.7	182.6	97.4	547.8	85791	4142290	567.5
s3	13	s3_13	137.9	93.0	103.4	10.3	0.020	0.159	0.731	0.812	0.081	0.0397	0.3076	241.3	137.9	137.9	103.4	172.4	48.7	517.1	85556	4587899	454.4
s3	14	s3_14	137.9	124.0	137.8	13.8	0.024	0.163	0.974	1.083	0.108	0.0470	0.3157	275.7	137.9	137.9	137.8	183.8	65.0	551.5	95066	5243585	510.9
s3	15	s3_15	137.9	248.2	275.8	27.6	0.040	0.193	1.949	2.166	0.217	0.0766	0.3733	413.7	137.9	137.9	275.8	229.8	130.0	689.5	133104	7866328	627.3

C&D + 3% CEM IV/B (28gg)

Specimen	Sequence	Code	Confining Pressure (kPa)	Cyclic Axial Stress (kPa)	Maximum Axial Stress (kPa)	Contact Axial Stress (kPa)	Recoverable Axial Strain (%)	Permanent Axial Strain (%)	Cyclic Axial Load (kN)	Maximum Axial Load (kN)	Contact Axial Load (kN)	Recoverable Axial Deformation (mm)	Permanent Axial Deformation (mm)	Stress σ_1 (kPa)	Stress σ_2 (kPa)	Stress σ_3 (kPa)	Deviatoric stress σ_d (kPa)	Octahedral normal stress σ_{oct} (kPa)	Octahedral shear stress τ_{oct} (kPa)	First stress invariant I_1 (kPa)	Second stress invariant I_2 (kPa)	Third stress invariant I_3 (kPa)	RM (avg.) (MPa)
s1	0	s1_0	103.4	93.1	103.4	10.3	0.019	0.026	0.731	0.812	0.081	0.0377	0.0498	206.8	103.4	103.4	103.4	137.9	48.7	413.6	53450	2210587	481.8
s1	1	s1_1	24.8	18.6	22.7	4.1	0.013	-0.008	0.146	0.178	0.032	0.0255	-0.0155	47.5	24.8	24.8	22.7	32.4	10.7	97.1	2969	29190	142.1
s1	2	s1_2	24.8	37.0	41.4	4.4	0.022	-0.008	0.291	0.325	0.035	0.0433	-0.0148	66.2	24.8	24.8	41.4	38.6	19.5	115.8	3899	40716	166.5
s1	3	s1_3	24.8	55.8	62.1	6.3	0.027	-0.005	0.438	0.488	0.050	0.0533	-0.0088	86.9	24.8	24.8	62.1	45.5	29.3	136.5	4925	53447	204.2
s1	4	s1_4	41.4	30.9	37.0	6.0	0.013	0.005	0.243	0.290	0.047	0.0262	0.0106	78.4	41.4	41.4	37.0	53.7	17.4	161.2	8204	134340	230.9
s1	5	s1_5	41.4	62.0	68.9	6.9	0.022	0.007	0.487	0.541	0.054	0.0425	0.0139	110.3	41.4	41.4	68.9	64.4	32.5	193.1	10845	189016	284.3
s1	6	s1_6	41.4	93.0	103.4	10.3	0.026	0.011	0.730	0.812	0.081	0.0505	0.0211	144.8	41.4	41.4	103.4	75.9	48.7	227.6	13700	248113	359.0
s1	7	s1_7	75.8	61.9	73.5	11.5	0.015	0.021	0.487	0.577	0.090	0.0291	0.0416	149.3	75.8	75.8	73.5	100.3	34.6	300.9	28376	857709	414.7
s1	8	s1_8	75.8	124.0	137.8	13.8	0.025	0.027	0.974	1.082	0.108	0.0482	0.0517	213.6	75.8	75.8	137.8	121.7	65.0	365.2	38124	1227154	501.4
s1	9	s1_9	75.8	186.2	207.0	20.9	0.032	0.047	1.462	1.626	0.164	0.0629	0.0921	282.8	75.8	75.8	207.0	144.8	97.6	434.4	48624	1625097	577.1
s1	10	s1_10	113.7	62.0	71.5	9.5	0.015	0.049	0.487	0.562	0.075	0.0299	0.0947	185.2	113.7	113.7	71.5	137.5	33.7	412.6	55051	2394725	404.7
s1	11	s1_11	113.7	93.1	103.3	10.3	0.020	0.049	0.731	0.811	0.081	0.0392	0.0963	217.0	113.7	113.7	103.3	148.1	48.7	444.4	62278	2805567	462.9
s1	12	s1_12	113.7	186.3	206.8	20.6	0.030	0.060	1.463	1.625	0.162	0.0576	0.1165	320.5	113.7	113.7	206.8	182.6	97.5	547.9	85818	4143842	629.3
s1	13	s1_13	137.9	92.9	103.3	10.4	0.020	0.059	0.730	0.811	0.081	0.0382	0.1143	241.2	137.9	137.9	103.3	172.3	48.7	517.0	85539	4586758	474.1
s1	14	s1_14	137.9	124.1	137.8	13.7	0.023	0.061	0.975	1.082	0.107	0.0443	0.1183	275.7	137.9	137.9	137.8	183.8	64.9	551.5	95043	5242064	545.7
s1	15	s1_15	137.9	248.2	275.8	27.6	0.035	0.083	1.950	2.166	0.217	0.0683	0.1627	413.7	137.9	137.9	275.8	229.8	130.0	689.5	133120	7867469	708.4
s2	0	s2_0	103.4	93.1	103.4	10.3	0.013	0.040	0.731	0.812	0.081	0.0254	0.0764	206.8	103.4	103.4	103.4	137.9	48.7	413.6	53450	2210587	701.8
s2	1	s2_1	24.8	18.6	22.7	4.1	0.007	0.016	0.146	0.178	0.032	0.0124	0.0302	47.5	24.8	24.8	22.7	32.4	10.7	97.1	2970	29202	285.8
s2	2	s2_2	24.8	37.3	41.4	4.1	0.012	0.016	0.293	0.325	0.032	0.0228	0.0305	66.2	24.8	24.8	41.4	38.6	19.5	115.8	3900	40728	313.1
s2	3	s2_3	24.8	55.9	62.1	6.2	0.016	0.018	0.439	0.488	0.049	0.0304	0.0338	86.9	24.8	24.8	62.1	45.5	29.3	136.5	4924	53435	351.6
s2	4	s2_4	41.4	31.0	37.0	6.0	0.008	0.024	0.243	0.290	0.047	0.0152	0.0453	78.4	41.4	41.4	37.0	53.7	17.4	161.2	8202	134306	391.9
s2	5	s2_5	41.4	62.0	68.9	6.9	0.014	0.025	0.487	0.541	0.054	0.0270	0.0474	110.3	41.4	41.4	68.9	64.4	32.5	193.1	10845	189016	439.0
s2	6	s2_6	41.4	93.0	103.3	10.3	0.018	0.027	0.731	0.811	0.081	0.0344	0.0523	144.7	41.4	41.4	103.3	75.8	48.7	227.5	13697	248044	516.8
s2	7	s2_7	75.8	62.0	73.5	11.5	0.010	0.037	0.487	0.577	0.090	0.0184	0.0699	149.3	75.8	75.8	73.5	100.3	34.6	300.9	28373	857594	645.4
s2	8	s2_8	75.8	124.0	137.8	13.8	0.017	0.040	0.974	1.083	0.108	0.0334	0.0767	213.6	75.8	75.8	137.8	121.7	65.0	365.2	38133	1227499	710.4
s2	9	s2_9	75.8	186.0	206.7	20.7	0.024	0.055	1.461	1.623	0.163	0.0465	0.1045	282.5	75.8	75.8	206.7	144.7	97.4	434.1	48570	1623028	765.3
s2	10	s2_10	113.7	61.9	71.4	9.5	0.009	0.059	0.486	0.561	0.075	0.0172	0.1121	185.1	113.7	113.7	71.4	137.5	33.7	412.5	55029	2393433	688.2
s2	11	s2_11	113.7	93.0	103.3	10.3	0.013	0.059	0.731	0.812	0.081	0.0242	0.1132	217.0	113.7	113.7	103.3	148.1	48.7	444.4	62283	2805826	736.1
s2	12	s2_12	113.7	186.0	206.7	20.7	0.022	0.067	1.461	1.624	0.163	0.0424	0.1277	320.4	113.7	113.7	206.7	182.6	97.4	547.8	85787	4142032	840.9
s2	13	s2_13	137.9	93.1	103.3	10.3	0.012	0.068	0.731	0.811	0.081	0.0233	0.1306	241.2	137.9	137.9	103.3	172.3	48.7	517.0	85545	4587138	762.5
s2	14	s2_14	137.9	124.1	137.9	13.8	0.015	0.070	0.974	1.083	0.108	0.0290	0.1330	275.8	137.9	137.9	137.9	183.9	65.0	551.6	95071	5243965	818.3
s2	15	s2_15	137.9	248.3	275.9	27.6	0.027	0.087	1.950	2.167	0.217	0.0525	0.1660	413.8	137.9	137.9	275.9	229.9	130.1	689.6	133137	7868610	906.2
s3	0	s3_0	103.4	93.0	103.3	10.3	0.012	0.006	0.730	0.811	0.081	0.0221	0.0121	206.7	103.4	103.4	103.3	137.8	48.7	413.5	53433	2209732	804.3
s3	1	s3_1	24.8	18.6	22.7	4.1	0.004	-0.012	0.146	0.178	0.032	0.0085	-0.0230	47.5	24.8	24.8	22.7	32.4	10.7	97.1	2970	29202	422.3
s3	2	s3_2	24.8	37.3	41.4	4.1	0.008	-0.012	0.293	0.325	0.032	0.0158	-0.0237	66.2	24.8	24.8	41.4	38.6	19.5	115.8	3900	40728	452.9
s3	3	s3_3	24.8	55.9	62.0	6.2	0.011	-0.011	0.439	0.487	0.049	0.0211	-0.0218	86.8	24.8	24.8	62.0	45.5	29.2	136.4	4922	53410	508.6
s3	4	s3_4	41.4	31.0	37.0	6.0	0.005	-0.007	0.243	0.290	0.047	0.0104	-0.0142	78.4	41.4	41.4	37.0	53.7	17.4	161.2	8202	134306	573.3
s3	5	s3_5	41.4	62.0	68.9	6.9	0.010	-0.007	0.487	0.541	0.054	0.0192	-0.0129	110.3	41.4	41.4	68.9	64.4	32.5	193.1	10843	188981	619.6
s3	6	s3_6	41.4	93.0	103.4	10.3	0.014	-0.005	0.731	0.812	0.081	0.0264	-0.0094	144.8	41.4	41.4	103.4	75.9	48.7	227.6	13700	248113	679.3
s3	7	s3_7	75.8	62.0	73.5	11.5	0.008	0.002	0.487	0.577	0.090	0.0148	0.0038	149.3	75.8	75.8	73.5	100.3	34.6	300.9	28380	857824	801.1
s3	8	s3_8	75.8	124.0	137.9	13.8	0.015	0.005	0.974	1.083	0.109	0.0286	0.0090	213.7	75.8	75.8	137.9	121.8	65.0	365.3	38136	1227613	832.5
s3	9	s3_9	75.8	186.0	206.8	20.8	0.021	0.012	1.460	1.624	0.163	0.0398	0.0223	282.6	75.8	75.8	206.8	144.7	97.5	434.2	48582	1623488	896.6
s3	10	s3_10	113.7	62.0	71.5	9.5	0.007	0.015	0.487	0.562	0.075	0.0142	0.0297	185.2	113.7	113.7	71.5	137.5	33.7	412.6	55033	2393691	837.3
s3	11	s3_11	113.7	93.0	103.3	10.3	0.011	0.016	0.730	0.811	0.081	0.0206	0.0304	217.0	113.7	113.7	103.3	148.1	48.7	444.4	62278	2805567	862.9
s3	12	s3_12	113.7	186.0	206.8	20.8	0.019	0.021	1.460	1.624	0.163	0.0366	0.0396	320.5	113.7	113.7	206.8	182.6	97.5	547.9	85805	4143066	972.7
s3	13	s3_13	137.9	93.0	103.3	10.3	0.010	0.022	0.730	0.811	0.081	0.0197	0.0430	241.2	137.9	137.9	103.3	172.3	48.7	517.0	85545	4587138	904.9
s3	14	s3_14	137.9	124.0	137.8	13.8	0.013	0.023	0.974	1.083	0.109	0.0250	0.0448	275.7	137.9	137.9	137.8	183.8	65.0	551.5	95060	5243205	953.8
s3	15	s3_15	137.9	248.1	275.8	27.7	0.024	0.033	1.949	2.167	0.218	0.0455	0.0639	413.7	137.9	137.9	275.8	229.8	130.0	689.5	133126	7867849	1046.1

C&D + 4%H_2O + 8.5% SA

Specimen	Sequence	Code	Confining Pressure (kPa)	Cyclic Axial Stress (kPa)	Maximum Axial Stress (kPa)	Contact Axial Stress (kPa)	Recoverable Axial Strain (%)	Permanent Axial Strain (%)	Cyclic Axial Load (kN)	Maximum Axial Load (kN)	Contact Axial Load (kN)	Recoverable Axial Deformation (mm)	Permanent Axial Deformation (mm)	Stress σ_1 (kPa)	Stress σ_2 (kPa)	Stress σ_3 (kPa)	Deviatoric stress σ_d (kPa)	Octahedral normal stress σ_{oct} (kPa)	Octahedral shear stress τ_{oct} (kPa)	First stress invariant I_1 (kPa)	Second stress invariant I_2 (kPa)	Third stress invariant I_3 (kPa)	RM (avg.) (MPa)
s1	0	s1_0																					
s1	1	s1_1																					
s1	2	s1_2																					
s1	3	s1_3																					
s1	4	s1_4																					
s1	5	s1_5																					
s1	6	s1_6																					
s1	7	s1_7																					
s1	8	s1_8																					
s1	9	s1_9																					
s1	10	s1_10																					
s1	11	s1_11																					
s1	12	s1_12																					
s1	13	s1_13																					
s1	14	s1_14																					
s1	15	s1_15																					
s2	0	s2_0	103.4	93.0	103.3	10.3	0.027	0.095	0.731	0.812	0.081	0.0519	0.1800	206.7	103.4	103.4	103.3	137.8	48.7	413.5	53445	2210373	340.6
s2	1	s2_1	24.8	18.6	20.7	2.1	0.009	0.051	0.146	0.162	0.017	0.0172	0.0961	45.5	24.8	24.8	20.7	31.7	9.8	95.1	2873	27997	204.6
s2	2	s2_2	24.8	37.3	41.4	4.1	0.018	0.051	0.293	0.325	0.032	0.0335	0.0961	66.2	24.8	24.8	41.4	38.6	19.5	115.8	3899	40716	211.7
s2	3	s2_3	24.8	55.9	62.1	6.2	0.025	0.052	0.439	0.488	0.049	0.0483	0.0994	86.9	24.8	24.8	62.1	45.5	29.3	136.5	4923	53422	219.5
s2	4	s2_4	41.4	31.0	34.5	3.5	0.013	0.058	0.243	0.271	0.027	0.0255	0.1097	75.9	41.4	41.4	34.5	52.9	16.3	158.7	7997	130055	230.5
s2	5	s2_5	41.4	62.0	68.9	6.9	0.025	0.062	0.487	0.541	0.054	0.0481	0.1180	110.3	41.4	41.4	68.9	64.4	32.5	193.1	10843	188981	244.7
s2	6	s2_6	41.4	93.0	103.3	10.3	0.036	0.069	0.731	0.812	0.081	0.0681	0.1305	144.7	41.4	41.4	103.3	75.8	48.7	227.5	13698	248079	259.3
s2	7	s2_7	75.8	62.0	68.9	6.9	0.021	0.083	0.487	0.541	0.054	0.0399	0.1574	144.7	75.8	75.8	68.9	98.8	32.5	296.3	27676	831164	294.8
s2	8	s2_8	75.8	124.1	137.8	13.8	0.040	0.098	0.974	1.082	0.108	0.0764	0.1865	213.6	75.8	75.8	137.8	121.7	65.0	365.2	38133	1227499	308.3
s2	9	s2_9	75.8	185.8	206.6	20.7	0.063	0.142	1.460	1.622	0.163	0.1194	0.2689	282.4	75.8	75.8	206.6	144.7	97.4	434.0	48551	1622339	295.4
s2	10	s2_10	113.7	62.0	68.8	6.9	0.020	0.150	0.487	0.541	0.054	0.0372	0.2841	182.5	113.7	113.7	68.8	136.6	32.5	409.9	54437	2359821	316.0
s2	11	s2_11	113.7	93.0	103.3	10.3	0.029	0.155	0.730	0.811	0.081	0.0543	0.2948	217.0	113.7	113.7	103.3	148.1	48.7	444.4	62269	2805050	325.1
s2	12	s2_12	113.7	185.9	206.7	20.7	0.055	0.186	1.460	1.623	0.163	0.1042	0.3535	320.4	113.7	113.7	206.7	182.6	97.4	547.8	85778	4141515	338.7
s2	13	s2_13	137.9	93.1	103.4	10.3	0.027	0.192	0.731	0.812	0.081	0.0509	0.3637	241.3	137.9	137.9	103.4	172.4	48.7	517.1	85556	4587899	347.2
s2	14	s2_14	137.9	124.0	137.8	13.8	0.034	0.198	0.974	1.082	0.108	0.0652	0.3754	275.7	137.9	137.9	137.8	183.8	65.0	551.5	95054	5242824	361.1
s2	15	s2_15	137.9	248.0	275.6	27.6	0.069	0.258	1.948	2.165	0.217	0.1316	0.4904	413.5	137.9	137.9	275.6	229.8	129.9	689.3	133065	7863666	357.8
s3	0	s3_0	103.4	93.1	103.4	10.3	0.028	0.100	0.731	0.812	0.081	0.0546	0.1929	206.8	103.4	103.4	103.4	137.9	48.7	413.6	53458	2211015	327.4
s3	1	s3_1	24.8	18.6	20.7	2.1	0.009	0.057	0.146	0.162	0.016	0.0166	0.1098	45.5	24.8	24.8	20.7	31.7	9.7	95.1	2870	27960	214.3
s3	2	s3_2	24.8	37.3	41.4	4.1	0.017	0.057	0.293	0.325	0.032	0.0323	0.1095	66.2	24.8	24.8	41.4	38.6	19.5	115.8	3897	40691	221.3
s3	3	s3_3	24.8	55.9	62.1	6.2	0.025	0.059	0.439	0.487	0.049	0.0472	0.1127	86.9	24.8	24.8	62.1	45.5	29.3	136.5	4924	53435	227.0
s3	4	s3_4	41.4	31.0	34.5	3.5	0.013	0.064	0.243	0.271	0.028	0.0247	0.1231	75.9	41.4	41.4	34.5	52.9	16.2	158.7	7995	130021	240.0
s3	5	s3_5	41.4	62.0	68.9	6.9	0.025	0.069	0.487	0.541	0.054	0.0476	0.1316	110.3	41.4	41.4	68.9	64.4	32.5	193.1	10843	188981	250.0
s3	6	s3_6	41.4	93.0	103.3	10.3	0.036	0.075	0.730	0.811	0.081	0.0685	0.1435	144.7	41.4	41.4	103.3	75.8	48.7	227.5	13695	248010	260.8
s3	7	s3_7	75.8	62.0	68.9	6.9	0.022	0.088	0.487	0.541	0.054	0.0413	0.1695	144.7	75.8	75.8	68.9	98.8	32.5	296.3	27676	831164	287.7
s3	8	s3_8	75.8	124.0	137.8	13.8	0.041	0.104	0.974	1.082	0.108	0.0789	0.2000	213.6	75.8	75.8	137.8	121.7	65.0	365.2	38130	1227384	301.9
s3	9	s3_9	75.8	186.0	206.7	20.7	0.064	0.147	1.461	1.623	0.163	0.1237	0.2832	282.5	75.8	75.8	206.7	144.7	97.4	434.1	48570	1623028	288.8
s3	10	s3_10	113.7	62.0	68.9	6.9	0.021	0.156	0.487	0.541	0.054	0.0393	0.2993	182.6	113.7	113.7	68.9	136.7	32.5	410.0	54451	2360596	302.4
s3	11	s3_11	113.7	93.1	103.4	10.3	0.029	0.162	0.731	0.812	0.081	0.0566	0.3120	217.1	113.7	113.7	103.4	148.2	48.7	444.5	62296	2806601	316.0
s3	12	s3_12	113.7	186.1	206.8	20.7	0.056	0.195	1.462	1.625	0.163	0.1080	0.3746	320.5	113.7	113.7	206.8	182.6	97.5	547.9	85814	4143583	330.8
s3	13	s3_13	137.9	93.1	103.3	10.3	0.028	0.201	0.731	0.812	0.081	0.0532	0.3866	241.2	137.9	137.9	103.3	172.3	48.7	517.0	85550	4587519	336.1
s3	14	s3_14	137.9	124.0	137.8	13.8	0.035	0.209	0.974	1.082	0.108	0.0671	0.4005	275.7	137.9	137.9	137.8	183.8	65.0	551.5	95060	5243205	354.7
s3	15	s3_15	137.9	247.9	275.5	27.6	0.071	0.274	1.947	2.164	0.217	0.1366	0.5257	413.4	137.9	137.9	275.5	229.7	129.9	689.2	133043	7862145	348.6

C&D + 4%H_2O + 7% SA

Specimen	Sequence	Code	Confining Pressure (kPa)	Cyclic Axial Stress (kPa)	Maximum Axial Stress (kPa)	Contact Axial Stress (kPa)	Recoverable Axial Strain (%)	Permanent Axial Strain (%)	Cyclic Axial Load (kN)	Maximum Axial Load (kN)	Contact Axial Load (kN)	Recoverable Axial Deformation (mm)	Permanent Axial Deformation (mm)	Stress σ_1 (kPa)	Stress σ_2 (kPa)	Stress σ_3 (kPa)	Deviatoric stress σ_d (kPa)	Octahedral normal stress σ_{oct} (kPa)	Octahedral shear stress τ_{oct} (kPa)	First stress invariant I_1 (kPa)	Second stress invariant I_2 (kPa)	Third stress invariant I_3 (kPa)	RM (avg.) (MPa)
s1	0	s1_0	103.4	93.1	103.4	10.3	0.021	0.094	0.731	0.812	0.081	0.0393	0.1794	206.8	103.4	103.4	103.4	137.9	48.7	413.6	53450	2210587	450.0
s1	1	s1_1	24.8	18.5	20.6	2.1	0.007	0.051	0.146	0.162	0.017	0.0135	0.0978	45.4	24.8	24.8	20.6	31.7	9.7	95.0	2868	27935	260.1
s1	2	s1_2	24.8	37.3	41.4	4.1	0.014	0.052	0.293	0.325	0.032	0.0265	0.0980	66.2	24.8	24.8	41.4	38.6	19.5	115.8	3898	40703	267.4
s1	3	s1_3	24.8	55.9	62.1	6.2	0.020	0.053	0.439	0.488	0.049	0.0388	0.1008	86.9	24.8	24.8	62.1	45.5	29.3	136.5	4923	53422	274.1
s1	4	s1_4	41.4	31.0	34.5	3.5	0.010	0.059	0.243	0.271	0.027	0.0192	0.1126	75.9	41.4	41.4	34.5	52.9	16.3	158.7	7997	130055	306.1
s1	5	s1_5	41.4	62.0	68.9	6.9	0.020	0.063	0.487	0.541	0.054	0.0372	0.1196	110.3	41.4	41.4	68.9	64.4	32.5	193.1	10847	189050	316.7
s1	6	s1_6	41.4	93.0	103.3	10.3	0.028	0.068	0.730	0.811	0.081	0.0540	0.1296	144.7	41.4	41.4	103.3	75.8	48.7	227.5	13697	248044	327.3
s1	7	s1_7	75.8	62.0	68.9	6.9	0.016	0.083	0.487	0.541	0.054	0.0301	0.1572	144.7	75.8	75.8	68.9	98.8	32.5	296.3	27679	831279	392.3
s1	8	s1_8	75.8	124.0	137.8	13.8	0.031	0.096	0.974	1.083	0.108	0.0589	0.1824	213.6	75.8	75.8	137.8	121.7	65.0	365.2	38133	1227499	400.4
s1	9	s1_9	75.8	185.9	206.6	20.8	0.049	0.133	1.460	1.623	0.163	0.0939	0.2535	282.4	75.8	75.8	206.6	144.7	97.4	434.0	48564	1622799	376.2
s1	10	s1_10	113.7	61.9	68.9	6.9	0.015	0.143	0.487	0.541	0.054	0.0277	0.2713	182.6	113.7	113.7	68.9	136.7	32.5	410.0	54446	2360338	426.3
s1	11	s1_11	113.7	93.0	103.4	10.3	0.021	0.148	0.731	0.812	0.081	0.0401	0.2811	217.1	113.7	113.7	103.4	148.2	48.7	444.5	62287	2806084	440.6
s1	12	s1_12	113.7	186.0	206.7	20.7	0.042	0.174	1.460	1.623	0.162	0.0806	0.3309	320.4	113.7	113.7	206.7	182.6	97.4	547.8	85778	4141515	438.3
s1	13	s1_13	137.9	93.0	103.3	10.3	0.020	0.180	0.731	0.811	0.081	0.0376	0.3427	241.2	137.9	137.9	103.3	172.3	48.7	517.0	85545	4587138	469.8
s1	14	s1_14	137.9	124.1	137.8	13.8	0.026	0.186	0.974	1.082	0.108	0.0485	0.3528	275.7	137.9	137.9	137.8	183.8	65.0	551.5	95060	5243205	485.6
s1	15	s1_15	137.9	248.0	275.6	27.6	0.053	0.234	1.948	2.165	0.217	0.1011	0.4452	413.5	137.9	137.9	275.6	229.8	129.9	689.3	133065	7863666	466.2
s2	0	s2_0	103.4	93.0	103.4	10.3	0.020	0.090	0.731	0.812	0.081	0.0387	0.1714	206.7	103.4	103.4	103.4	137.8	48.7	413.4	53416	2208451	460.7
s2	1	s2_1	24.8	18.6	20.7	2.1	0.007	0.051	0.146	0.162	0.016	0.0130	0.0967	45.5	24.8	24.8	20.7	31.7	9.7	95.1	2870	27960	273.8
s2	2	s2_2	24.8	37.2	41.3	4.1	0.013	0.051	0.292	0.325	0.032	0.0254	0.0967	66.1	24.8	24.8	41.3	38.6	19.5	115.7	3896	40679	280.0
s2	3	s2_3	24.8	55.9	62.1	6.2	0.020	0.052	0.439	0.487	0.049	0.0376	0.0992	86.9	24.8	24.8	62.1	45.5	29.3	136.5	4924	53435	284.3
s2	4	s2_4	41.4	31.0	34.5	3.5	0.010	0.058	0.243	0.271	0.027	0.0187	0.1108	75.9	41.4	41.4	34.5	52.9	16.3	158.7	7998	130090	316.8
s2	5	s2_5	41.4	62.0	68.9	6.9	0.019	0.061	0.487	0.541	0.054	0.0363	0.1173	110.3	41.4	41.4	68.9	64.4	32.5	193.1	10843	188981	326.1
s2	6	s2_6	41.4	93.0	103.4	10.4	0.027	0.066	0.730	0.812	0.081	0.0523	0.1265	144.8	41.4	41.4	103.4	75.9	48.7	227.6	13700	248113	340.2
s2	7	s2_7	75.8	62.0	68.9	6.9	0.015	0.079	0.487	0.541	0.054	0.0293	0.1520	144.7	75.8	75.8	68.9	98.8	32.5	296.3	27682	831394	405.2
s2	8	s2_8	75.8	124.1	137.9	13.8	0.030	0.092	0.974	1.083	0.109	0.0573	0.1767	213.7	75.8	75.8	137.9	121.8	65.0	365.3	38146	1227958	414.4
s2	9	s2_9	75.8	186.0	206.7	20.7	0.047	0.130	1.461	1.624	0.162	0.0906	0.2495	282.5	75.8	75.8	206.7	144.7	97.4	434.1	48573	1623143	392.9
s2	10	s2_10	113.7	62.0	68.8	6.9	0.014	0.139	0.487	0.540	0.054	0.0266	0.2656	182.5	113.7	113.7	68.8	136.6	32.4	409.9	54428	2359303	445.3
s2	11	s2_11	113.7	93.1	103.3	10.2	0.021	0.143	0.731	0.811	0.080	0.0395	0.2739	217.0	113.7	113.7	103.3	148.1	48.7	444.4	62269	2805050	451.4
s2	12	s2_12	113.7	186.1	206.9	20.8	0.041	0.168	1.462	1.625	0.163	0.0788	0.3209	320.6	113.7	113.7	206.9	182.7	97.5	548.0	85832	4144617	451.7
s2	13	s2_13	137.9	93.0	103.3	10.4	0.019	0.173	0.730	0.811	0.081	0.0370	0.3316	241.2	137.9	137.9	103.3	172.3	48.7	517.0	85545	4587138	480.6
s2	14	s2_14	137.9	123.9	137.8	13.9	0.025	0.178	0.973	1.082	0.109	0.0483	0.3406	275.7	137.9	137.9	137.8	183.8	65.0	551.5	95054	5242824	490.9
s2	15	s2_15	137.9	248.5	275.7	27.2	0.052	0.226	1.952	2.166	0.214	0.0992	0.4318	413.6	137.9	137.9	275.7	229.8	130.0	689.4	133098	7865948	479.4
s3	0	s3_0																					
s3	1	s3_1																					
s3	2	s3_2																					
s3	3	s3_3																					
s3	4	s3_4																					
s3	5	s3_5																					
s3	6	s3_6																					
s3	7	s3_7																					
s3	8	s3_8																					
s3	9	s3_9																					
s3	10	s3_10																					
s3	11	s3_11																					
s3	12	s3_12																					
s3	13	s3_13																					
s3	14	s3_14																					
s3	15	s3_15																					

C&D + 4%H_2O + 5.5% SA

Specimen	Sequence	Code	Confining Pressure (kPa)	Cyclic Axial Stress (kPa)	Maximum Axial Stress (kPa)	Contact Axial Stress (kPa)	Recoverable Axial Strain (%)	Permanent Axial Strain (%)	Cyclic Axial Load (kN)	Maximum Axial Load (kN)	Contact Axial Load (kN)	Recoverable Axial Deformation (mm)	Permanent Axial Deformation (mm)	Stress σ_1 (kPa)	Stress σ_2 (kPa)	Stress σ_3 (kPa)	Deviatoric stress σ_d (kPa)	Octahedral normal stress σ_{oct} (kPa)	Octahedral shear stress τ_{oct} (kPa)	First stress invariant I_1 (kPa)	Second stress invariant I_2 (kPa)	Third stress invariant I_3 (kPa)	RM (avg.) (MPa)
s1	0	s1_0	103.4	93.0	103.3	10.3	0.032	0.019	0.731	0.812	0.081	0.0631	0.0371	206.7	103.4	103.4	103.3	137.8	48.7	413.5	53445	2210373	291.3
s1	1	s1_1	24.8	18.7	20.7	2.1	0.010	-0.019	0.146	0.163	0.016	0.0204	-0.0381	45.5	24.8	24.8	20.7	31.7	9.8	95.1	2873	27997	180.1
s1	2	s1_2	24.8	37.2	41.3	4.1	0.021	-0.016	0.293	0.325	0.032	0.0412	-0.0321	66.1	24.8	24.8	41.3	38.6	19.5	115.7	3896	40679	178.5
s1	3	s1_3	24.8	55.8	62.0	6.2	0.032	-0.011	0.439	0.487	0.049	0.0630	-0.0216	86.8	24.8	24.8	62.0	45.5	29.2	136.4	4922	53410	175.2
s1	4	s1_4	41.4	30.9	34.4	3.5	0.014	-0.007	0.243	0.270	0.027	0.0281	-0.0144	75.8	41.4	41.4	34.4	52.9	16.2	158.6	7994	129987	217.0
s1	5	s1_5	41.4	61.9	68.8	6.9	0.028	-0.001	0.486	0.541	0.054	0.0562	-0.0018	110.2	41.4	41.4	68.8	64.3	32.4	193.0	10839	188878	217.8
s1	6	s1_6	41.4	93.0	103.3	10.3	0.043	0.011	0.731	0.812	0.081	0.0846	0.0212	144.7	41.4	41.4	103.3	75.8	48.7	227.5	13698	248079	217.4
s1	7	s1_7	75.8	62.0	68.9	6.9	0.022	0.019	0.487	0.541	0.054	0.0434	0.0380	144.7	75.8	75.8	68.9	98.8	32.5	296.3	27679	831279	282.8
s1	8	s1_8	75.8	124.1	137.9	13.8	0.043	0.036	0.974	1.083	0.108	0.0856	0.0712	213.7	75.8	75.8	137.9	121.8	65.0	365.3	38136	1227613	286.3
s1	9	s1_9	75.8	186.0	206.7	20.7	0.064	0.068	1.461	1.623	0.163	0.1255	0.1336	282.5	75.8	75.8	206.7	144.7	97.4	434.1	48570	1623028	292.9
s1	10	s1_10	113.7	61.9	68.8	6.9	0.019	0.067	0.486	0.541	0.054	0.0367	0.1316	182.5	113.7	113.7	68.8	136.6	32.5	409.9	54437	2359821	334.1
s1	11	s1_11	113.7	93.0	103.3	10.3	0.028	0.070	0.730	0.811	0.081	0.0545	0.1380	217.0	113.7	113.7	103.3	148.1	48.7	444.4	62278	2805567	337.3
s1	12	s1_12	113.7	186.0	206.7	20.7	0.053	0.089	1.461	1.623	0.163	0.1043	0.1753	320.4	113.7	113.7	206.7	182.6	97.4	547.8	85778	4141515	352.6
s1	13	s1_13	137.9	93.1	103.4	10.3	0.025	0.089	0.731	0.812	0.081	0.0500	0.1765	241.3	137.9	137.9	103.4	172.4	48.7	517.1	85556	4587899	367.5
s1	14	s1_14	137.9	124.1	137.9	13.8	0.033	0.093	0.975	1.083	0.108	0.0654	0.1829	275.8	137.9	137.9	137.9	183.9	65.0	551.6	95071	5243965	375.0
s1	15	s1_15	137.9	248.2	275.8	27.6	0.063	0.121	1.949	2.166	0.217	0.1246	0.2396	413.7	137.9	137.9	275.8	229.8	130.0	689.5	133104	7866328	393.9
s2	0	s2_0	103.4	93.1	103.4	10.3	0.023	0.087	0.731	0.812	0.081	0.0442	0.1676	206.8	103.4	103.4	103.4	137.9	48.7	413.6	53450	2210587	407.8
s2	1	s2_1	24.8	18.6	20.7	2.1	0.009	0.042	0.146	0.163	0.017	0.0179	0.0822	45.5	24.8	24.8	20.7	31.7	9.8	95.1	2872	27984	200.6
s2	2	s2_2	24.8	37.3	41.3	4.0	0.018	0.043	0.293	0.325	0.032	0.0347	0.0839	66.1	24.8	24.8	41.3	38.6	19.5	115.7	3894	40654	208.4
s2	3	s2_3	24.8	55.8	62.1	6.2	0.026	0.046	0.438	0.487	0.049	0.0495	0.0886	86.9	24.8	24.8	62.1	45.5	29.3	136.5	4923	53422	218.5
s2	4	s2_4	41.4	31.0	34.5	3.5	0.012	0.054	0.243	0.271	0.027	0.0240	0.1037	75.9	41.4	41.4	34.5	52.9	16.3	158.7	7997	130055	250.5
s2	5	s2_5	41.4	62.0	68.9	6.9	0.023	0.058	0.487	0.541	0.054	0.0447	0.1124	110.3	41.4	41.4	68.9	64.4	32.5	193.1	10845	189016	268.3
s2	6	s2_6	41.4	93.0	103.3	10.3	0.032	0.064	0.730	0.811	0.081	0.0626	0.1248	144.7	41.4	41.4	103.3	75.8	48.7	227.5	13693	247976	287.4
s2	7	s2_7	75.8	62.0	68.9	6.9	0.018	0.078	0.487	0.541	0.054	0.0346	0.1511	144.7	75.8	75.8	68.9	98.8	32.5	296.3	27676	831164	346.1
s2	8	s2_8	75.8	124.1	137.8	13.8	0.034	0.092	0.974	1.082	0.108	0.0653	0.1782	213.6	75.8	75.8	137.8	121.7	65.0	365.2	38127	1227269	367.8
s2	9	s2_9	75.8	185.9	206.6	20.7	0.052	0.128	1.460	1.622	0.162	0.1010	0.2488	282.4	75.8	75.8	206.6	144.7	97.4	434.0	48554	1622454	356.2
s2	10	s2_10	113.7	62.0	68.9	6.9	0.016	0.134	0.487	0.541	0.054	0.0313	0.2594	182.6	113.7	113.7	68.9	136.7	32.5	410.0	54442	2360079	383.9
s2	11	s2_11	113.7	93.1	103.4	10.3	0.024	0.138	0.731	0.812	0.081	0.0456	0.2678	217.1	113.7	113.7	103.4	148.2	48.7	444.5	62292	2806343	395.1
s2	12	s2_12	113.7	186.0	206.7	20.7	0.045	0.160	1.461	1.624	0.163	0.0873	0.3094	320.4	113.7	113.7	206.7	182.6	97.5	547.8	85796	4142549	412.4
s2	13	s2_13	137.9	93.0	103.3	10.3	0.022	0.163	0.730	0.811	0.081	0.0427	0.3165	241.2	137.9	137.9	103.3	172.3	48.7	517.0	85550	4587519	422.5
s2	14	s2_14	137.9	124.0	137.9	13.8	0.028	0.168	0.974	1.083	0.108	0.0549	0.3246	275.8	137.9	137.9	137.9	183.9	65.0	551.6	95071	5243965	438.4
s2	15	s2_15	137.9	248.2	275.7	27.6	0.055	0.207	1.949	2.165	0.216	0.1074	0.4002	413.6	137.9	137.9	275.7	229.8	130.0	689.4	133087	7865187	447.4
s3	0	s3_0	103.4	93.1	103.4	10.3	0.023	0.085	0.731	0.812	0.081	0.0448	0.1661	206.8	103.4	103.4	103.4	137.9	48.7	413.6	53454	2210801	407.9
s3	1	s3_1	24.8	18.6	20.7	2.1	0.008	0.045	0.146	0.162	0.016	0.0162	0.0879	45.5	24.8	24.8	20.7	31.7	9.7	95.1	2870	27960	224.7
s3	2	s3_2	24.8	37.3	41.4	4.1	0.016	0.045	0.293	0.325	0.032	0.0316	0.0890	66.2	24.8	24.8	41.4	38.6	19.5	115.8	3899	40716	231.7
s3	3	s3_3	24.8	55.8	62.0	6.2	0.023	0.047	0.438	0.487	0.049	0.0457	0.0928	86.8	24.8	24.8	62.0	45.5	29.2	136.4	4921	53398	239.4
s3	4	s3_4	41.4	31.0	34.5	3.5	0.012	0.054	0.243	0.271	0.027	0.0227	0.1054	75.9	41.4	41.4	34.5	52.9	16.3	158.7	7997	130055	268.0
s3	5	s3_5	41.4	61.9	68.9	6.9	0.022	0.058	0.487	0.541	0.054	0.0434	0.1131	110.3	41.4	41.4	68.9	64.4	32.5	193.1	10843	188981	279.6
s3	6	s3_6	41.4	93.1	103.4	10.3	0.032	0.064	0.731	0.812	0.081	0.0619	0.1251	144.8	41.4	41.4	103.4	75.9	48.7	227.6	13702	248147	294.7
s3	7	s3_7	75.8	62.0	68.9	6.9	0.018	0.076	0.487	0.541	0.054	0.0350	0.1494	144.7	75.8	75.8	68.9	98.8	32.5	296.3	27679	831279	347.0
s3	8	s3_8	75.8	124.1	137.8	13.8	0.034	0.091	0.974	1.083	0.108	0.0662	0.1777	213.6	75.8	75.8	137.8	121.7	65.0	365.2	38133	1227499	367.2
s3	9	s3_9	75.8	186.1	206.8	20.7	0.052	0.132	1.462	1.624	0.163	0.1018	0.2579	282.6	75.8	75.8	206.8	144.7	97.5	434.2	48594	1623948	358.6
s3	10	s3_10	113.7	61.9	68.8	6.9	0.016	0.137	0.486	0.541	0.054	0.0314	0.2685	182.5	113.7	113.7	68.8	136.6	32.5	409.9	54437	2359821	387.1
s3	11	s3_11	113.7	93.0	103.3	10.3	0.023	0.141	0.730	0.812	0.081	0.0457	0.2769	217.0	113.7	113.7	103.3	148.1	48.7	444.4	62278	2805567	399.2
s3	12	s3_12	113.7	185.8	206.6	20.7	0.045	0.164	1.460	1.622	0.163	0.0874	0.3219	320.3	113.7	113.7	206.6	182.6	97.4	547.7	85755	4140222	416.9
s3	13	s3_13	137.9	93.1	103.4	10.3	0.022	0.168	0.731	0.812	0.081	0.0429	0.3284	241.3	137.9	137.9	103.4	172.4	48.8	517.1	85572	4589040	426.0
s3	14	s3_14	137.9	124.1	137.8	13.8	0.028	0.172	0.974	1.083	0.108	0.0549	0.3369	275.7	137.9	137.9	137.8	183.8	65.0	551.5	95066	5243585	443.0
s3	15	s3_15	137.9	248.1	275.6	27.5	0.055	0.215	1.949	2.165	0.216	0.1073	0.4204	413.5	137.9	137.9	275.6	229.8	129.9	689.3	133071	7864046	453.4

C&D + 4%H_2O + 4% SA

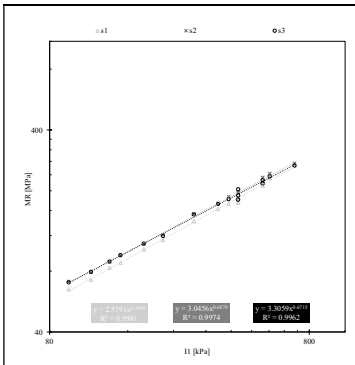
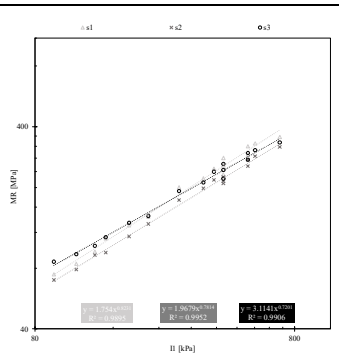
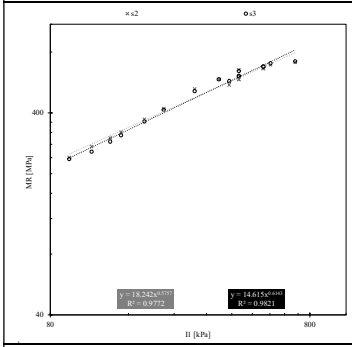
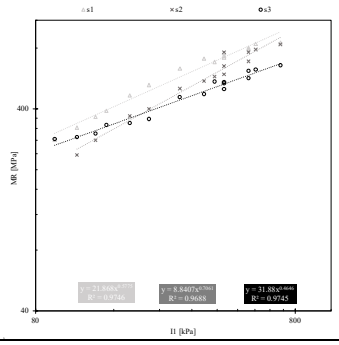
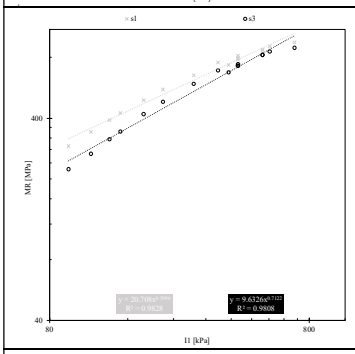
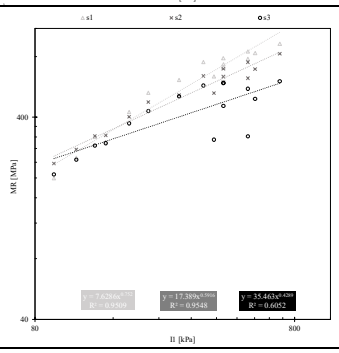
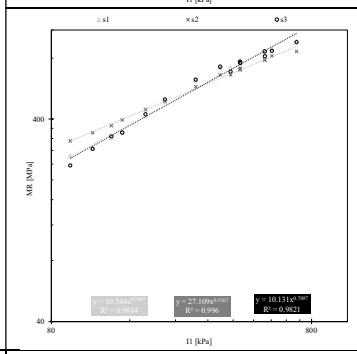
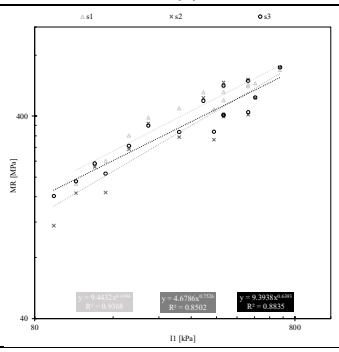
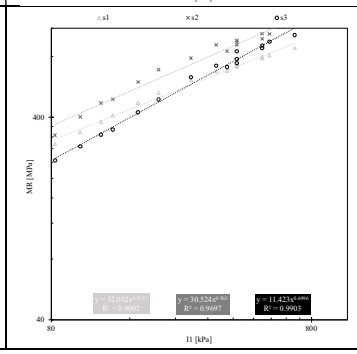
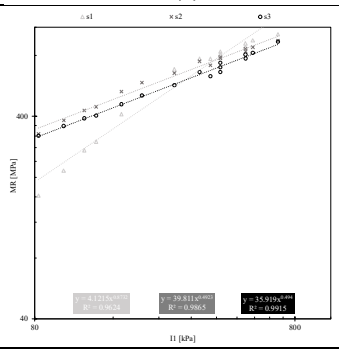
Specimen	Sequence	Code	Confining Pressure (kPa)	Cyclic Axial Stress (kPa)	Maximum Axial Stress (kPa)	Contact Axial Stress (kPa)	Recoverable Axial Strain (%)	Permanent Axial Strain (%)	Cyclic Axial Load (kN)	Maximum Axial Load (kN)	Contact Axial Load (kN)	Recoverable Axial Deformation (mm)	Permanent Axial Deformation (mm)	Stress σ_1 (kPa)	Stress σ_2 (kPa)	Stress σ_3 (kPa)	Deviatoric stress σ_d (kPa)	Octahedral normal stress σ_{oct} (kPa)	Octahedral shear stress τ_{oct} (kPa)	First stress invariant I_1 (kPa)	Second stress invariant I_2 (kPa)	Third stress invariant I_3 (kPa)	RM (avg.) (MPa)
s1	0	s1_0	103.4	93.0	103.3	10.3	0.022	0.079	0.731	0.812	0.081	0.0428	0.1537	206.7	103.4	103.4	103.3	137.8	48.7	413.5	53441	2210159	421.7
s1	1	s1_1	24.8	18.6	20.6	2.1	0.009	0.034	0.146	0.162	0.016	0.0167	0.0651	45.4	24.8	24.8	20.6	31.7	9.7	95.0	2869	27947	216.6
s1	2	s1_2	24.8	37.3	41.4	4.1	0.017	0.034	0.293	0.325	0.032	0.0332	0.0668	66.2	24.8	24.8	41.4	38.6	19.5	115.8	3897	40691	217.9
s1	3	s1_3	24.8	55.8	62.0	6.2	0.025	0.037	0.438	0.487	0.049	0.0483	0.0720	86.8	24.8	24.8	62.0	45.5	29.2	136.4	4920	53385	223.9
s1	4	s1_4	41.4	31.0	34.5	3.5	0.012	0.043	0.244	0.271	0.028	0.0239	0.0843	75.9	41.4	41.4	34.5	52.9	16.3	158.7	8000	130124	252.6
s1	5	s1_5	41.4	61.9	68.8	6.9	0.023	0.048	0.486	0.540	0.054	0.0452	0.0929	110.2	41.4	41.4	68.8	64.3	32.4	193.0	10839	188878	266.1
s1	6	s1_6	41.4	93.0	103.3	10.3	0.033	0.055	0.731	0.812	0.081	0.0641	0.1067	144.7	41.4	41.4	103.3	75.8	48.7	227.5	13697	248044	281.5
s1	7	s1_7	75.8	61.9	68.8	6.9	0.018	0.069	0.486	0.540	0.054	0.0347	0.1339	144.6	75.8	75.8	68.8	98.7	32.4	296.2	27670	830934	346.7
s1	8	s1_8	75.8	124.0	137.8	13.8	0.034	0.082	0.974	1.083	0.108	0.0652	0.1595	213.6	75.8	75.8	137.8	121.7	65.0	365.2	38130	1227384	369.1
s1	9	s1_9	75.8	186.0	206.7	20.7	0.051	0.116	1.461	1.624	0.163	0.0999	0.2242	282.5	75.8	75.8	206.7	144.7	97.5	434.1	48579	1623373	361.5
s1	10	s1_10	113.7	62.0	68.9	6.9	0.015	0.123	0.487	0.541	0.054	0.0296	0.2382	182.6	113.7	113.7	68.9	136.7	32.5	410.0	54446	2360338	406.7
s1	11	s1_11	113.7	93.1	103.4	10.3	0.022	0.127	0.731	0.812	0.081	0.0436	0.2454	217.1	113.7	113.7	103.4	148.2	48.7	444.5	62292	2806343	414.4
s1	12	s1_12	113.7	185.8	206.5	20.7	0.043	0.145	1.459	1.622	0.163	0.0834	0.2822	320.2	113.7	113.7	206.5	182.5	97.4	547.6	85750	4139963	432.6
s1	13	s1_13	137.9	93.0	103.4	10.3	0.021	0.151	0.731	0.812	0.081	0.0398	0.2931	241.3	137.9	137.9	103.4	172.4	48.7	517.1	85556	4587899	454.0
s1	14	s1_14	137.9	124.0	137.8	13.8	0.027	0.155	0.974	1.082	0.108	0.0517	0.3000	275.7	137.9	137.9	137.8	183.8	65.0	551.5	95060	5243205	465.9
s1	15	s1_15	137.9	248.1	275.7	27.6	0.052	0.187	1.949	2.166	0.217	0.1013	0.3619	413.6	137.9	137.9	275.7	229.8	130.0	689.4	133093	7865568	474.8
s2	0	s2_0	103.4	92.8	103.2	10.3	0.039	0.125	0.729	0.810	0.081	0.0785	0.2523	206.6	103.4	103.4	103.2	137.8	48.6	413.4	53408	2208449	237.9
s2	1	s2_1	24.8	18.7	20.7	2.1	0.013	0.084	0.146	0.163	0.016	0.0268	0.1685	45.5	24.8	24.8	20.7	31.7	9.8	95.1	2872	27984	139.8
s2	2	s2_2	24.8	37.2	41.4	4.1	0.027	0.087	0.292	0.325	0.032	0.0546	0.1744	66.2	24.8	24.8	41.4	38.6	19.5	115.8	3900	40728	137.5
s2	3	s2_3	24.8	55.9	62.1	6.2	0.039	0.094	0.439	0.488	0.049	0.0778	0.1886	86.9	24.8	24.8	62.1	45.5	29.3	136.5	4926	53459	144.8
s2	4	s2_4	41.4	30.9	34.4	3.5	0.020	0.096	0.243	0.271	0.028	0.0408	0.1933	75.8	41.4	41.4	34.4	52.9	16.2	158.6	7994	129987	152.3
s2	5	s2_5	41.4	61.8	68.8	7.0	0.038	0.103	0.486	0.540	0.055	0.0759	0.2072	110.2	41.4	41.4	68.8	64.3	32.4	193.0	10839	188878	164.1
s2	6	s2_6	41.4	93.1	103.4	10.3	0.053	0.120	0.731	0.812	0.081	0.1059	0.2415	144.8	41.4	41.4	103.4	75.9	48.7	227.6	13700	248113	177.0
s2	7	s2_7	75.8	62.0	68.9	6.9	0.031	0.127	0.487	0.541	0.054	0.0632	0.2567	144.7	75.8	75.8	68.9	98.8	32.5	296.3	27682	831394	197.5
s2	8	s2_8	75.8	124.1	137.9	13.8	0.057	0.152	0.975	1.083	0.108	0.1152	0.3051	213.7	75.8	75.8	137.9	121.8	65.0	365.3	38143	1227843	217.0
s2	9	s2_9	75.8	186.1	206.8	20.7	0.085	0.230	1.462	1.624	0.163	0.1720	0.4639	282.6	75.8	75.8	206.8	144.7	97.5	434.2	48594	1623948	217.8
s2	10	s2_10	113.7	62.0	68.8	6.9	0.028	0.225	0.487	0.541	0.054	0.0564	0.4532	182.5	113.7	113.7	68.8	136.6	32.5	409.9	54437	2359821	221.3
s2	11	s2_11	113.7	93.1	103.3	10.3	0.041	0.230	0.731	0.811	0.081	0.0830	0.4635	217.0	113.7	113.7	103.3	148.1	48.7	444.4	62269	2805050	225.6
s2	12	s2_12	113.7	186.1	206.9	20.7	0.075	0.261	1.462	1.625	0.163	0.1514	0.5246	320.6	113.7	113.7	206.9	182.7	97.5	548.0	85828	4144359	247.6
s2	13	s2_13	137.9	93.0	103.4	10.3	0.038	0.258	0.731	0.812	0.081	0.0768	0.5192	241.3	137.9	137.9	103.4	172.4	48.7	517.1	85561	4588279	243.8
s2	14	s2_14	137.9	124.1	137.9	13.8	0.049	0.263	0.975	1.083	0.109	0.0988	0.5288	275.8	137.9	137.9	137.9	183.9	65.0	551.6	95071	5243965	252.8
s2	15	s2_15	137.9	248.0	275.6	27.6	0.090	0.314	1.948	2.164	0.216	0.1804	0.6321	413.5	137.9	137.9	275.6	229.8	129.9	689.3	133049	7862525	276.8
s3	0	s3_0	103.4	93.0	103.4	10.3	0.026	0.135	0.731	0.812	0.081	0.0507	0.2641	206.8	103.4	103.4	103.4	137.9	48.7	413.6	53454	2210801	357.8
s3	1	s3_1	24.8	18.6	20.7	2.1	0.010	0.085	0.146	0.163	0.016	0.0187	0.1655	45.5	24.8	24.8	20.7	31.7	9.8	95.1	2872	27984	193.7
s3	2	s3_2	24.8	37.2	41.4	4.1	0.020	0.086	0.293	0.325	0.033	0.0382	0.1676	66.2	24.8	24.8	41.4	38.6	19.5	115.8	3897	40691	190.0
s3	3	s3_3	24.8	55.9	62.1	6.2	0.029	0.090	0.439	0.487	0.049	0.0564	0.1756	86.9	24.8	24.8	62.1	45.5	29.3	136.5	4923	53422	193.3
s3	4	s3_4	41.4	31.0	34.4	3.5	0.014	0.097	0.243	0.271	0.027	0.0273	0.1899	75.8	41.4	41.4	34.4	52.9	16.2	158.6	7994	129987	221.0
s3	5	s3_5	41.4	62.0	68.9	6.9	0.027	0.103	0.487	0.541	0.054	0.0526	0.2017	110.3	41.4	41.4	68.9	64.4	32.5	193.1	10847	189050	230.1
s3	6	s3_6	41.4	93.1	103.4	10.3	0.038	0.114	0.731	0.812	0.081	0.0748	0.2216	144.8	41.4	41.4	103.4	75.9	48.7	227.6	13703	248181	242.6
s3	7	s3_7	75.8	62.0	68.9	6.9	0.021	0.129	0.487	0.541	0.054	0.0405	0.2515	144.7	75.8	75.8	68.9	98.8	32.5	296.3	27679	831279	298.8
s3	8	s3_8	75.8	124.1	137.9	13.8	0.039	0.146	0.974	1.083	0.108	0.0756	0.2847	213.7	75.8	75.8	137.9	121.8	65.0	365.3	38140	1227728	320.1
s3	9	s3_9	75.8	185.9	206.7	20.7	0.057	0.184	1.461	1.623	0.163	0.1121	0.3594	282.5	75.8	75.8	206.7	144.7	97.4	434.1	48567	1622913	323.6
s3	10	s3_10	113.7	61.9	68.8	6.9	0.017	0.191	0.487	0.541	0.054	0.0337	0.3718	182.5	113.7	113.7	68.8	136.6	32.4	409.9	54433	2359562	357.9
s3	11	s3_11	113.7	93.1	103.4	10.3	0.026	0.195	0.731	0.812	0.081	0.0497	0.3799	217.1	113.7	113.7	103.4	148.2	48.7	444.5	62287	2806084	364.9
s3	12	s3_12	113.7	185.9	206.6	20.7	0.048	0.216	1.460	1.623	0.163	0.0927	0.4218	320.3	113.7	113.7	206.6	182.6	97.4	547.7	85773	4141256	391.0
s3	13	s3_13	137.9	93.1	103.4	10.3	0.023	0.220	0.731	0.812	0.081	0.0452	0.4292	241.3	137.9	137.9	103.4	172.4	48.7	517.1	85561	4588279	401.9
s3	14	s3_14	137.9	124.1	137.9	13.8	0.030	0.224	0.974	1.083	0.108	0.0580	0.4370	275.8	137.9	137.9	137.9	183.9	65.0	551.6	95077	5244346	417.8
s3	15	s3_15	137.9	248.1	275.7	27.6	0.057	0.260	1.949	2.165	0.217	0.1105	0.5072	413.6	137.9	137.9	275.7	229.8	130.0	689.4	133087	7865187	437.9

C&D + 2%H_2O + 7% SA

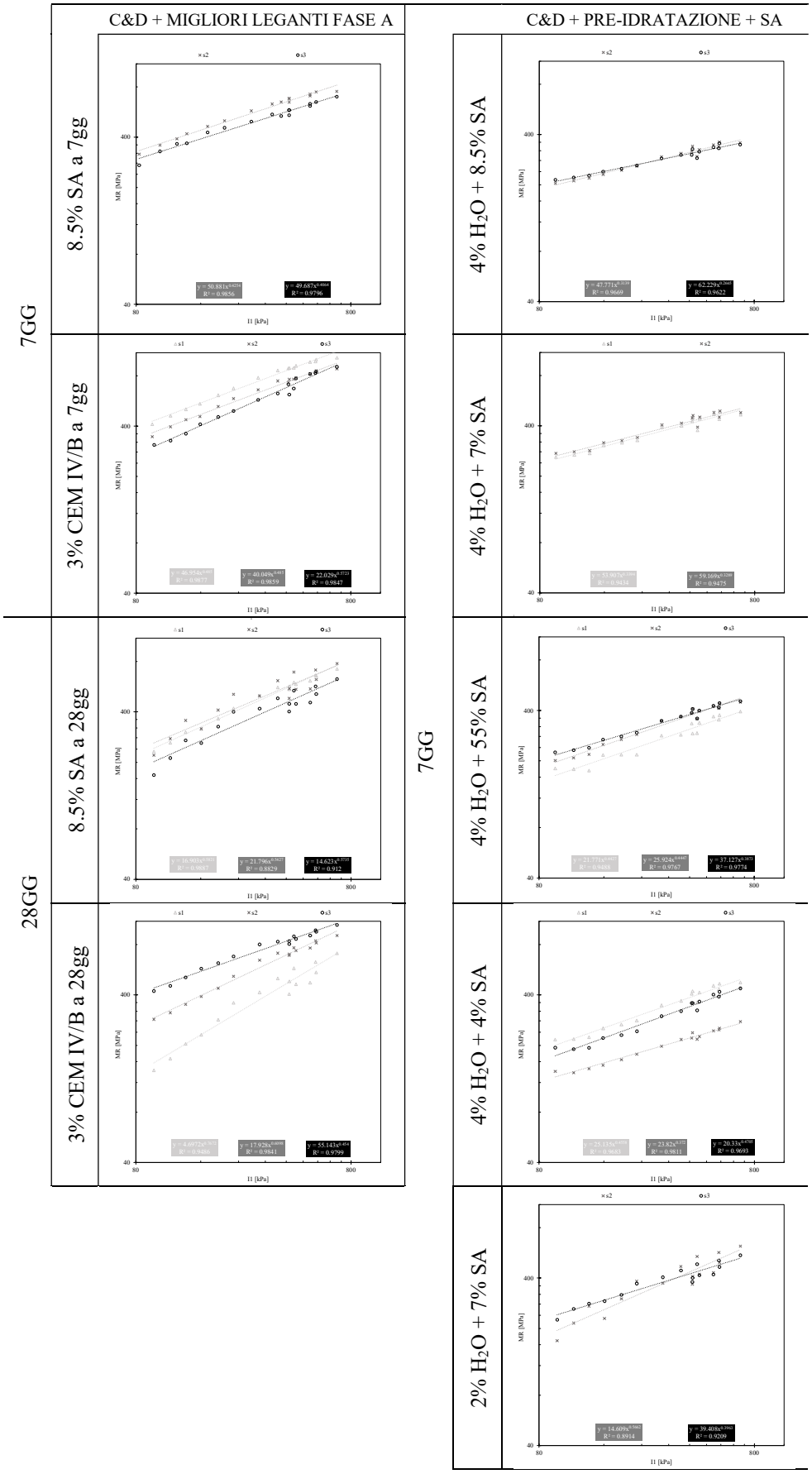
Specimen	Sequence	Code	Confining Pressure (kPa)	Cyclic Axial Stress (kPa)	Maximum Axial Stress (kPa)	Contact Axial Stress (kPa)	Recoverable Axial Strain (%)	Permanent Axial Strain (%)	Cyclic Axial Load (kN)	Maximum Axial Load (kN)	Contact Axial Load (kN)	Recoverable Axial Deformation (mm)	Permanent Axial Deformation (mm)	Stress σ_1 (kPa)	Stress σ_2 (kPa)	Stress σ_3 (kPa)	Deviatoric stress σ_d (kPa)	Octahedral normal stress σ_{oct} (kPa)	Octahedral shear stress τ_{oct} (kPa)	First stress invariant I_1 (kPa)	Second stress invariant I_2 (kPa)	Third stress invariant I_3 (kPa)	RM (avg.) (MPa)
s1	0	s1_0																					
s1	1	s1_1																					
s1	2	s1_2																					
s1	3	s1_3																					
s1	4	s1_4																					
s1	5	s1_5																					
s1	6	s1_6																					
s1	7	s1_7																					
s1	8	s1_8																					
s1	9	s1_9																					
s1	10	s1_10																					
s1	11	s1_11																					
s1	12	s1_12																					
s1	13	s1_13																					
s1	14	s1_14																					
s1	15	s1_15																					
s2	0	s2_0	103.4	92.8	103.3	10.5	0.023	0.017	0.729	0.811	0.082	0.0440	0.0329	206.7	103.4	103.4	103.3	137.8	48.7	413.5	53429	2209518	409.4
s2	1	s2_1	24.8	18.6	22.7	4.0	0.011	-0.003	0.146	0.178	0.032	0.0213	-0.0066	47.5	24.8	24.8	22.7	32.4	10.7	97.1	2969	29190	169.0
s2	2	s2_2	24.8	37.4	41.4	4.0	0.017	-0.004	0.293	0.325	0.032	0.0337	-0.0079	66.2	24.8	24.8	41.4	38.6	19.5	115.8	3899	40716	215.3
s2	3	s2_3	24.8	55.3	62.0	6.6	0.020	-0.002	0.435	0.487	0.052	0.0395	-0.0030	86.8	24.8	24.8	62.0	45.5	29.2	136.4	4921	53398	272.0
s2	4	s2_4	41.4	31.2	36.9	5.8	0.014	0.001	0.245	0.290	0.045	0.0263	0.0018	78.3	41.4	41.4	36.9	53.7	17.4	161.1	8199	134237	230.0
s2	5	s2_5	41.4	62.2	68.8	6.6	0.021	0.002	0.488	0.540	0.052	0.0401	0.0047	110.2	41.4	41.4	68.8	64.3	32.4	193.0	10839	188878	301.0
s2	6	s2_6	41.4	92.7	103.2	10.5	0.024	0.007	0.728	0.811	0.083	0.0470	0.0131	144.6	41.4	41.4	103.2	75.8	48.6	227.4	13687	247839	382.9
s2	7	s2_7	75.8	61.4	73.3	11.9	0.016	0.014	0.482	0.576	0.094	0.0319	0.0264	149.1	75.8	75.8	73.3	100.2	34.6	300.7	28349	856675	372.9
s2	8	s2_8	75.8	123.6	137.5	13.9	0.026	0.017	0.971	1.080	0.109	0.0513	0.0338	213.3	75.8	75.8	137.5	121.6	64.8	364.9	38085	1225660	468.2
s2	9	s2_9	75.8	185.7	206.8	21.1	0.034	0.026	1.459	1.624	0.166	0.0670	0.0503	282.6	75.8	75.8	206.8	144.7	97.5	434.2	48585	1623603	538.5
s2	10	s2_10	113.7	62.0	71.4	9.5	0.017	0.024	0.487	0.561	0.074	0.0327	0.0475	185.1	113.7	113.7	71.4	137.5	33.7	412.5	55029	2393433	368.0
s2	11	s2_11	113.7	93.1	103.0	10.0	0.022	0.026	0.731	0.809	0.078	0.0429	0.0506	216.7	113.7	113.7	103.0	148.0	48.6	444.1	62214	2801948	421.5
s2	12	s2_12	113.7	186.1	206.7	20.6	0.033	0.036	1.462	1.623	0.161	0.0636	0.0693	320.4	113.7	113.7	206.7	182.6	97.4	547.8	85782	4141773	567.8
s2	13	s2_13	137.9	93.5	103.3	9.8	0.022	0.033	0.735	0.812	0.077	0.0422	0.0644	241.2	137.9	137.9	103.3	172.3	48.7	517.0	85550	4587519	430.7
s2	14	s2_14	137.9	123.6	137.9	14.3	0.025	0.037	0.971	1.083	0.112	0.0484	0.0711	275.8	137.9	137.9	137.9	183.9	65.0	551.6	95088	5245106	496.0
s2	15	s2_15	137.9	247.5	275.6	28.2	0.040	0.049	1.944	2.165	0.221	0.0774	0.0955	413.5	137.9	137.9	275.6	229.8	129.9	689.3	133071	7864046	620.6
s3	0	s3_0	103.4	93.3	103.4	10.1	0.023	0.084	0.733	0.812	0.079	0.0454	0.1645	206.8	103.4	103.4	103.4	137.9	48.7	413.6	53454	2210801	401.4
s3	1	s3_1	24.8	18.9	22.7	3.8	0.008	0.067	0.149	0.178	0.030	0.0165	0.1302	47.5	24.8	24.8	22.7	32.4	10.7	97.1	2972	29227	225.5
s3	2	s3_2	24.8	37.5	41.4	3.9	0.014	0.067	0.294	0.325	0.031	0.0280	0.1304	66.2	24.8	24.8	41.4	38.6	19.5	115.8	3900	40728	261.9
s3	3	s3_3	24.8	55.6	62.1	6.4	0.020	0.067	0.437	0.487	0.050	0.0387	0.1308	86.9	24.8	24.8	62.1	45.5	29.3	136.5	4923	53422	281.1
s3	4	s3_4	41.4	30.7	37.0	6.3	0.011	0.072	0.241	0.290	0.049	0.0205	0.1415	78.4	41.4	41.4	37.0	53.7	17.4	161.2	8202	134306	291.5
s3	5	s3_5	41.4	61.7	68.8	7.1	0.019	0.072	0.485	0.541	0.056	0.0380	0.1411	110.2	41.4	41.4	68.8	64.3	32.5	193.0	10842	188947	317.4
s3	6	s3_6	41.4	92.8	103.3	10.5	0.025	0.075	0.729	0.812	0.083	0.0489	0.1473	144.7	41.4	41.4	103.3	75.8	48.7	227.5	13698	248079	370.5
s3	7	s3_7	75.8	61.8	73.5	11.7	0.015	0.084	0.485	0.577	0.092	0.0298	0.1633	149.3	75.8	75.8	73.5	100.3	34.6	300.9	28373	857594	404.3
s3	8	s3_8	75.8	124.0	137.7	13.7	0.028	0.088	0.974	1.082	0.108	0.0545	0.1709	213.5	75.8	75.8	137.7	121.7	64.9	365.1	38109	1226579	444.3
s3	9	s3_9	75.8	185.6	206.6	21.0	0.038	0.101	1.457	1.622	0.165	0.0749	0.1973	282.4	75.8	75.8	206.6	144.7	97.4	434.0	48551	1622339	484.5
s3	10	s3_10	113.7	61.4	71.4	9.9	0.016	0.101	0.483	0.560	0.078	0.0317	0.1979	185.1	113.7	113.7	71.4	137.5	33.6	412.5	55010	2392398	379.4
s3	11	s3_11	113.7	92.9	103.3	10.4	0.022	0.102	0.730	0.811	0.081	0.0437	0.2001	217.0	113.7	113.7	103.3	148.1	48.7	444.4	62269	2805050	415.6
s3	12	s3_12	113.7	185.8	206.6	20.7	0.036	0.113	1.459	1.622	0.163	0.0712	0.2209	320.3	113.7	113.7	206.6	182.6	97.4	547.7	85755	4140222	509.9
s3	13	s3_13	137.9	92.7	103.2	10.4	0.022	0.112	0.728	0.810	0.082	0.0432	0.2184	241.1	137.9	137.9	103.2	172.3	48.6	516.9	85501	4584096	419.9
s3	14	s3_14	137.9	123.9	137.8	13.8	0.027	0.115	0.973	1.082	0.109	0.0519	0.2239	275.7	137.9	137.9	137.8	183.8	65.0	551.5	95049	5242444	465.9
s3	15	s3_15	137.9	248.0	275.5	27.5	0.045	0.132	1.948	2.164	0.216	0.0885	0.2585	413.4	137.9	137.9	275.5	229.7	129.9	689.2	133027	7861004	546.9

DIAGRAMMI I_1-MR - ANALISI LIVELLO 2

MR - FASE B1: MISCELE DI RIFERIMENTO

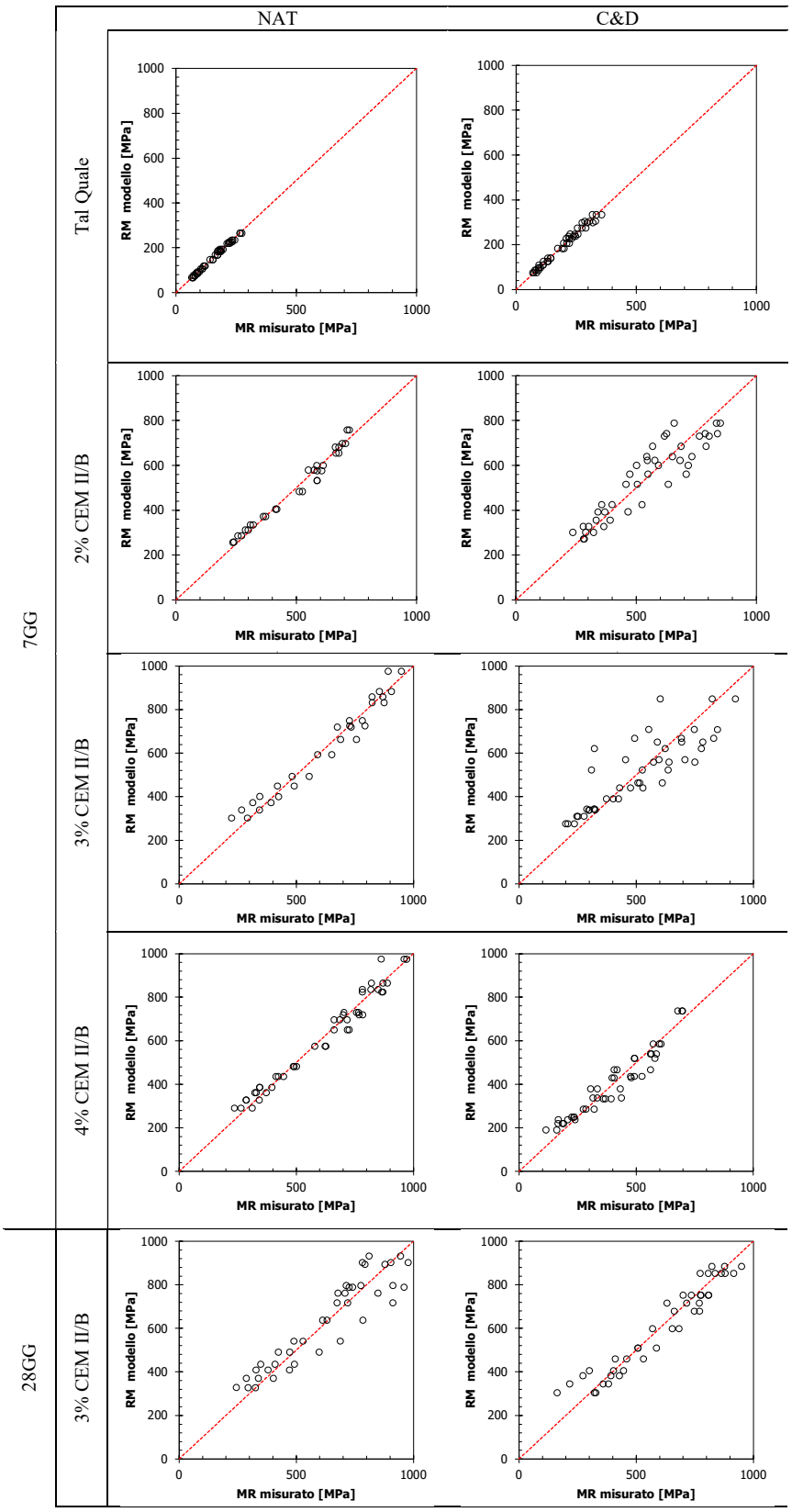
		NAT	C&D
7GG	Tal Quale		
7GG	2% CEM II/B		
7GG	3% CEM II/B		
7GG	4% CEM II/B		
28GG	3% CEM II/B		

MR - FASE B2: MISCELE SPERIMENTALI



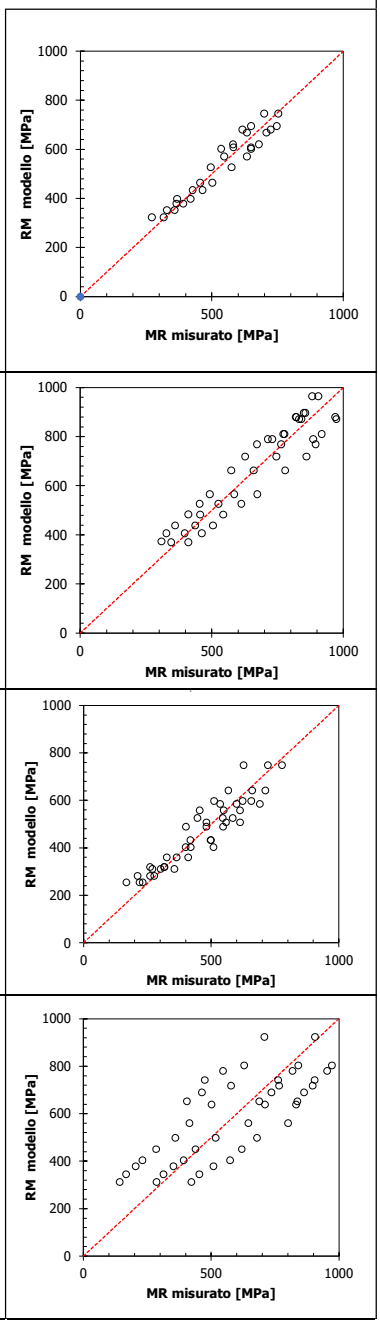
MODELLAZIONE M-EPDG

MR - FASE B1: MISCELE DI RIFERIMENTO



MR - FASE B2: MISCELE SPERIMENTALI

C&D + MIGLIORI LEGANTI FASE A



C&D + PRE-IDRATAZIONE + SA

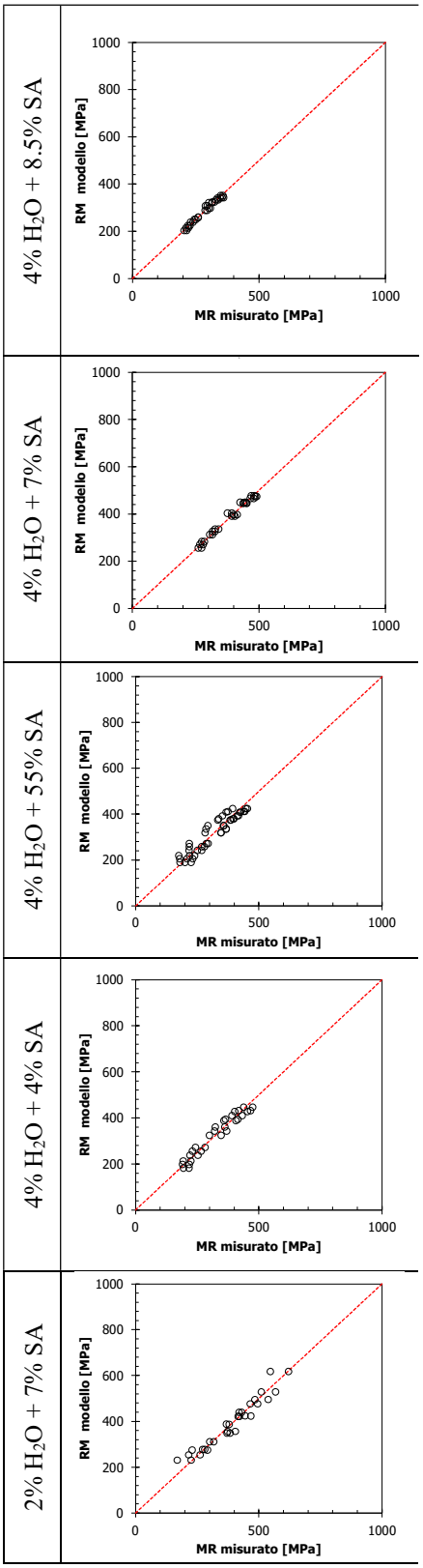


TABELLE PROVE A ROTTURA (UCS E ITS)

UCS_NATURALE

Campione	Massa netta campione [g]	h_{med} [mm]	Umidità misurata [%]	$w_{teorico}$ [%]	γ_w [Mg/m^3]	γ_d [Mg/m^3]	γ_{PIC} [Mg/m^3]	γ_{H20} [Mg/m^3]	Gs [-]	e [-]	S [%]
NAT_TQ_A1	3422.9	189.2	5.4	6.5	2.304	2.163	2.655	1	2.7	0.2	75.9
NAT_TQ_A2	3418.2	188.3	5.2	6.5	2.311	2.170	2.655	1	2.7	0.2	77.2
NAT_TQ_A3	3435.5	189.3	5.3	6.5	2.310	2.169	2.655	1	2.7	0.2	77.1
NAT_2CEMII_A1	3477.3	191.7	5.6	6.5	2.310	2.169	2.660	1	2.7	0.2	76.4
NAT_2CEMII_A2	3454.4	190.7	5.5	6.5	2.307	2.166	2.660	1	2.7	0.2	75.8
NAT_2CEMII_A3	3456.6	192.8	5.6	6.5	2.282	2.143	2.660	1	2.7	0.2	71.7
NAT_3CEMII_A1	3420.7	188.3	5.6	6.5	2.313	2.171	2.662	1	2.7	0.2	76.6
NAT_3CEMII_A2	3448.6	191.3	5.3	6.5	2.295	2.155	2.662	1	2.7	0.2	73.5
NAT_3CEMII_A3	3466.1	189.3	5.4	6.5	2.331	2.189	2.662	1	2.7	0.2	80.0
NAT_4CEMII_A1	3442.7	195.0	5.2	6.5	2.248	2.111	2.665	1	2.7	0.3	66.0
NAT_4CEMII_A2	3439.0	189.3	5.3	6.5	2.313	2.172	2.665	1	2.7	0.2	76.3
NAT_4CEMII_A4	3457.0	189.7	3.8	6.5	2.321	2.179	2.665	1	2.7	0.2	77.7
NAT_3CEMII_A1_28	3467.8	189.5	5.2	6.5	2.330	2.188	2.662	1	2.7	0.2	79.8
NAT_3CEMII_A2_28	3480.3	192.0	5.4	6.5	2.308	2.167	2.662	1	2.7	0.2	75.7
NAT_3CEMII_A3_28	3470.3	190.7	5.2	6.5	2.317	2.176	2.662	1	2.7	0.2	77.4

ITS_NATURALE

Campione	Massa netta campione [g]	h_{med} [mm]	Umidità misurata [%]	$w_{teorico}$ [%]	γ_w [Mg/m^3]	γ_d [Mg/m^3]	γ_{PIC} [Mg/m^3]	γ_{H20} [Mg/m^3]	Gs [-]	e [-]	S [%]
NAT_TQ_B1	1830.2	100.3	3.3	6.5	2.323	2.181	2.655	1	2.7	0.2	79.4
NAT_TQ_B2	1843.5	102.0	5.7	6.5	2.301	2.161	2.655	1	2.7	0.2	75.4
NAT_TQ_B3	1855.7	100.7	5.7	6.5	2.347	2.204	2.655	1	2.7	0.2	84.3
NAT_2CEMII_B1	1850.7	101.3	5.3	6.5	2.325	2.183	2.660	1	2.7	0.2	79.2
NAT_2CEMII_B2	1840.8	101.0	5.7	6.5	2.321	2.179	2.660	1	2.7	0.2	78.3
NAT_2CEMII_B3	1865.4	101.0	5.5	6.5	2.352	2.208	2.660	1	2.7	0.2	84.5
NAT_3CEMII_B1	1858.0	101.3	5.2	6.5	2.335	2.192	2.662	1	2.7	0.2	80.7
NAT_3CEMII_B2	1860.4	102.3	5.4	6.5	2.315	2.173	2.662	1	2.7	0.2	76.9
NAT_3CEMII_B3	1848.8	101.3	5.2	6.5	2.323	2.181	2.662	1	2.7	0.2	78.5
NAT_4CEMII_B1	1857.1	101.3	5.3	6.5	2.333	2.191	2.665	1	2.7	0.2	80.1
NAT_4CEMII_B2	1859.0	101.3	5.3	6.5	2.336	2.193	2.665	1	2.7	0.2	80.6
NAT_4CEMII_B3	1849.2	101.0	5.2	6.5	2.331	2.189	2.665	1	2.7	0.2	79.7

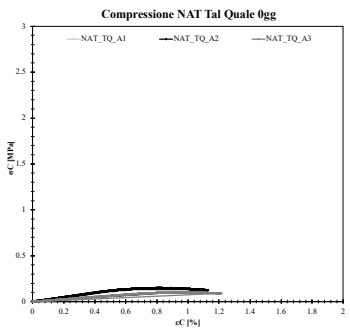
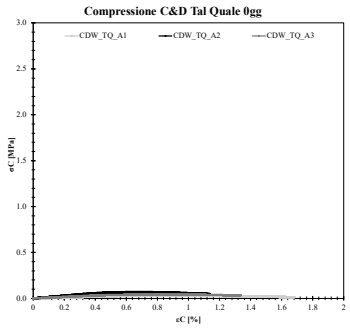
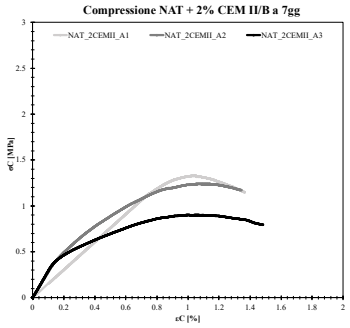
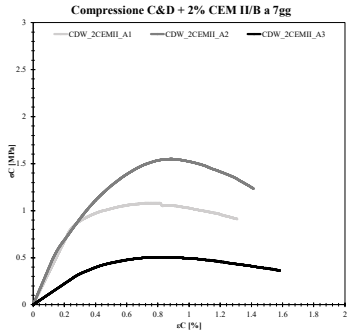
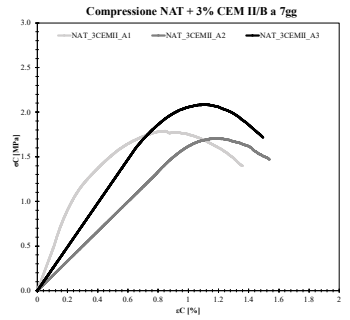
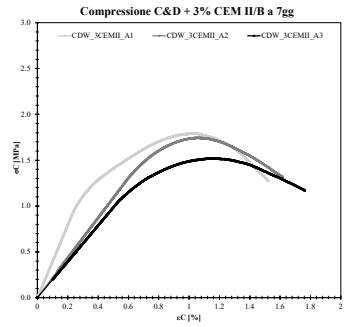
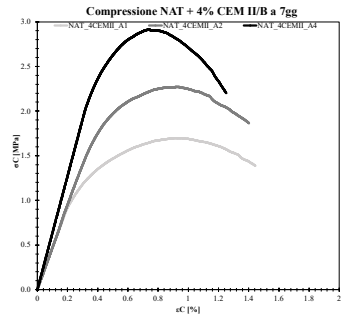
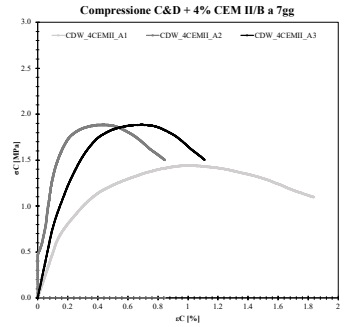
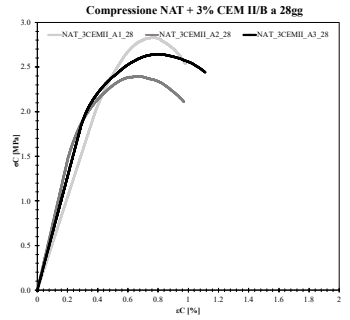
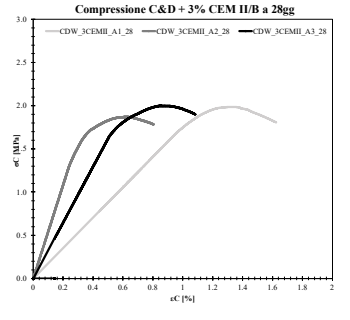
UCS_AGGREGATO DA C&D

Campione	Massa netta campione [g]	h_{med} [mm]	Umidità misurata [%]	$w_{teorico}$ [%]	γ_w [Mg/m^3]	γ_d [Mg/m^3]	γ_{PIC} [Mg/m^3]	γ_{SA} [Mg/m^3]	γ_{SA+H2O} [Mg/m^3]	Gs [-]	e [-]	S [%]
C&D_TQ_A1	3277.3	196.3	7.4	8.5	2.125	1.959	2.597	-	-	2.6	0.3	67.8
C&D_TQ_A2	3273.5	199.0	7.8	8.5	2.094	1.930	2.597	-	-	2.6	0.3	63.9
C&D_TQ_A3	3278.0	198.3	7.8	8.5	2.104	1.940	2.597	-	-	2.6	0.3	65.1
C&D_2CEMII_A1	3257.2	188.0	8.0	8.5	2.206	2.033	2.603	-	-	2.6	0.3	79.0
C&D_2CEMII_A2	3255.6	187.3	8.1	8.5	2.213	2.039	2.603	-	-	2.6	0.3	80.1
C&D_2CEMII_A3	3228.0	191.7	8.0	8.5	2.144	1.976	2.603	-	-	2.6	0.3	69.8
C&D_3CEMII_A1	3316.7	188.7	7.8	8.5	2.238	2.063	2.606	-	-	2.6	0.3	84.2
C&D_3CEMII_A2	3326.5	187.7	8.0	8.5	2.257	2.080	2.606	-	-	2.6	0.3	87.7
C&D_3CEMII_A3	3318.8	188.7	7.8	8.5	2.240	2.064	2.606	-	-	2.6	0.3	84.5
C&D_4CEMII_A1	3264.3	188.7	7.4	8.5	2.203	2.030	2.608	-	-	2.6	0.3	77.9
C&D_4CEMII_A2	3276.2	187.8	7.0	8.5	2.221	2.047	2.608	-	-	2.6	0.3	80.8
C&D_4CEMII_A3	3266.1	186.0	7.0	8.5	2.236	2.061	2.608	-	-	2.6	0.3	83.4
C&D_3CEMII_A1_28	3334.9	190.5	7.8	8.5	2.229	2.054	2.606	-	-	2.6	0.3	82.5
C&D_3CEMII_A2_28	3321.2	193.0	7.3	8.5	2.191	2.019	2.606	-	-	2.6	0.3	76.3
C&D_3CEMII_A3_28	3318.5	192.2	7.3	8.5	2.199	2.026	2.606	-	-	2.6	0.3	77.5
C&D_SA_A1	3377.8	191.0	4.9	8.5	2.252	2.075	2.597	1.45	-	1.8	0.3	60.6
C&D_SA_A2	3374.8	195.3	5.0	8.5	2.200	2.027	2.597	1.45	-	1.8	0.3	54.2
C&D_SA_A3	3383.2	195.0	4.8	8.5	2.209	2.036	2.597	1.45	-	1.8	0.3	55.2
C&D_4H20_8.5SA_A1	3428.2	189.7	-	12.5	2.301	2.046	2.597	1.45	1.306	2.0	0.3	92.2
C&D_4H20_8.5SA_A2	3423.1	189.7	7.9	12.5	2.298	2.043	2.597	1.45	1.306	2.0	0.3	91.6
C&D_4H20_8.5SA_A3	3435.5	191.7	8.1	12.5	2.282	2.029	2.597	1.45	1.306	2.0	0.3	88.7
C&D_4H20_5.5SA_A1	3377.9	194.3	6.4	9.5	2.213	2.021	2.597	1.45	1.261	2.1	0.3	68.7
C&D_4H20_5.5SA_A2	3398.2	193.3	6.5	9.5	2.238	2.044	2.597	1.45	1.261	2.1	0.3	72.3
C&D_4H20_5.5SA_A3	3402.8	195.0	6.5	9.5	2.222	2.029	2.597	1.45	1.261	2.1	0.3	69.9
C&D_4H20_4SA_A1	3364.7	194.7	6.0	8	2.201	2.038	2.597	1.45	1.225	2.1	0.3	61.8
C&D_4H20_4SA_A2	3359.7	200.3	-	8	2.135	1.977	2.597	1.45	1.225	2.1	0.3	54.1
C&D_4H20_4SA_A3	3364.0	195.0	6.1	8	2.197	2.034	2.597	1.45	1.225	2.1	0.3	61.2
C&D_SA_28_A1	3380.7	194.0	4.7	8.5	2.219	2.045	2.597	1.45	-	1.8	0.3	56.4
C&D_SA_28_A2	3382.2	191.0	4.9	8.5	2.255	2.078	2.597	1.45	-	1.8	0.2	61.0
C&D_SA_28_A3	3365.9	193.0	4.8	8.5	2.221	2.047	2.597	1.45	-	1.8	0.3	56.6
C&D_4H20_7SA_A1	3406.2	188.7	7.5	11	2.299	2.071	2.597	1.45	1.286	1.6	0.3	69.7
C&D_4H20_7SA_A2	3408.7	190.7	7.4	11	2.276	2.051	2.597	1.45	1.286	1.6	0.3	65.8
C&D_4H20_7SA_A3	3422.8	188.3	7.6	11	2.314	2.085	2.597	1.45	1.286	1.6	0.2	72.5
C&D_3CEMIVB_A1	3322.2	190.0	7.5	8.5	2.226	2.052	2.606	-	-	2.6	0.3	82.1
C&D_3CEMIVB_A2	3310.3	189.3	7.6	8.5	2.226	2.052	2.606	-	-	2.6	0.3	82.0
C&D_3CEMIVB_A3	3318.0	190.0	7.6	8.5	2.223	2.049	2.606	-	-	2.6	0.3	81.6
C&D_3CEMIVB_A1_28	3310.0	195.0	7.5	8.5	2.161	1.992	2.606	-	-	2.6	0.3	71.9
C&D_3CEMIVB_A2_28	3298.1	191.5	7.4	8.5	2.193	2.021	2.606	-	-	2.6	0.3	76.6
C&D_3CEMIVB_A3_28	3323.6	191.3	7.3	8.5	2.212	2.038	2.606	-	-	2.6	0.3	79.6
C&D_2H2O_7SA_A1	3396.3	194.8	-	9	2.219	2.036	2.597	1.45	1.350	2.0	0.3	66.5
C&D_2H2O_7SA_A2	3378.4	193.3	5.7	9	2.225	2.041	2.597	1.45	1.350	2.0	0.3	67.5
C&D_2H2O_7SA_A3	3377.8	195.2	5.8	9	2.204	2.022	2.597	1.45	1.350	2.0	0.3	63.9

ITS_AGGREGATO DA C&D

Campione	Massa netta campione [g]	h_{med} [mm]	Umidità misurata [%]	$w_{teorico}$ [%]	γ_w [Mg/m^3]	γ_d [Mg/m^3]	γ_{PIC} [Mg/m^3]	γ_{SA} [Mg/m^3]	γ_{SA+H2O} [Mg/m^3]	Gs [-]	e [-]	S [%]
C&D_TQ_B1	1776.4	100.3	7.6	8.5	2.254	2.078	2.597	-	-	2.6	0.2	88.3
C&D_TQ_B2	1782.9	100.0	8.1	8.5	2.270	2.092	2.597	-	-	2.6	0.2	91.5
C&D_TQ_B3	1775.6	101.7	8.0	8.5	2.224	2.049	2.597	-	-	2.6	0.3	82.6
C&D_2CEMII_B1	1750.3	100.7	8.0	8.5	2.214	2.040	2.603	-	-	2.6	0.3	80.3
C&D_2CEMII_B2	1752.8	100.0	7.9	8.5	2.232	2.057	2.603	-	-	2.6	0.3	83.4
C&D_2CEMII_B3	1747.1	101.0	8.1	8.5	2.202	2.030	2.603	-	-	2.6	0.3	78.4
C&D_3CEMII_B1	1788.2	100.3	7.9	8.5	2.269	2.091	2.606	-	-	2.6	0.2	90.1
C&D_3CEMII_B2	1782.9	102.0	7.6	8.5	2.226	2.051	2.606	-	-	2.6	0.3	81.9
C&D_3CEMII_B3	1775.0	100.0	7.9	8.5	2.260	2.083	2.606	-	-	2.6	0.3	88.3
C&D_4CEMII_B1	1762.7	101.7	7.8	8.5	2.208	2.035	2.608	-	-	2.6	0.3	78.6
C&D_4CEMII_B2	1760.3	100.0	7.6	8.5	2.241	2.066	2.608	-	-	2.6	0.3	84.4
C&D_4CEMII_B3	1771.2	101.0	8.5	8.5	2.233	2.058	2.608	-	-	2.6	0.3	82.9
C&D_SA_B1	1814.6	101.3	4.0	8.5	2.280	2.101	2.597	1.45	-	1.8	0.2	64.6
C&D_SA_B2	1818.7	102.7	4.9	8.5	2.255	2.079	2.597	1.45	-	1.8	0.2	61.1
C&D_SA_B3	1819.3	101.7	5.1	8.5	2.278	2.100	2.597	1.45	-	1.8	0.2	64.3
C&D_4H20_8.5SA_B1	1839.3	101.5	8.0	12.5	2.307	2.051	2.597	1.45	1.306	2.0	0.3	93.3
C&D_4H20_8.5SA_B2	1827.3	101.7	7.8	12.5	2.288	2.034	2.597	1.45	1.306	2.0	0.3	89.8
C&D_4H20_8.5SA_B3	1841.7	101.7	8.1	12.5	2.306	2.050	2.597	1.45	1.306	2.0	0.3	93.2
C&D_4H20_5.5SA_B1	1827.6	102.7	6.3	9.5	2.267	2.070	2.597	1.45	1.261	2.1	0.3	76.9
C&D_4H20_5.5SA_B2	1813.6	103.2	6.5	9.5	2.238	2.044	2.597	1.45	1.261	2.1	0.3	72.4
C&D_4H20_5.5SA_B3	1823.6	102.7	6.4	9.5	2.262	2.065	2.597	1.45	1.261	2.1	0.3	76.0
C&D_4H20_4SA_B1	1806.7	101.7	5.9	8	2.263	2.095	2.597	1.45	1.225	2.1	0.2	70.8
C&D_4H20_4SA_B2	1799.6	105.5	5.9	8	2.172	2.011	2.597	1.45	1.225	2.1	0.3	58.2
C&D_4H20_4SA_B3	1807.3	104.3	6.1	8	2.206	2.042	2.597	1.45	1.225	2.1	0.3	62.4
C&D_4H20_7SA_B1	1832.4	100.3	7.5	11	2.325	2.095	2.597	1.45	1.286	2.0	0.2	92.7
C&D_4H20_7SA_B2	1820.9	101.7	7.4	11	2.280	2.054	2.597	1.45	1.286	2.0	0.3	84.1
C&D_4H20_7SA_B3	1809.4	101.3	7.4	11	2.273	2.048	2.597	1.45	1.286	2.0	0.3	82.9
C&D_3CEMIVB_B1	1827.2	103.3	7.5	8.5	2.251	2.075	2.606	-	-	2.6	0.3	86.6
C&D_3CEMIVB_B2	1772.7	100.3	7.7	8.5	2.250	2.073	2.606	-	-	2.6	0.3	86.3
C&D_3CEMIVB_B3	1774.1	100.0	7.5	8.5	2.259	2.082	2.606	-	-	2.6	0.3	88.0
C&D_2H20_7SA_B1	1823.0	104.0	6.1	9	2.232	2.048	2.597	1.45	1.350	1.9	0.3	64.5
C&D_2H20_7SA_B2	1825.7	102.0	6.2	9	2.279	2.091	2.597	1.45	1.350	1.9	0.2	71.5
C&D_2H20_7SA_B3	1825.5	102.7	6.1	9	2.264	2.077	2.597	1.45	1.350	1.9	0.3	69.2

UCS - FASE B1: MISCELE DI RIFERIMENTO

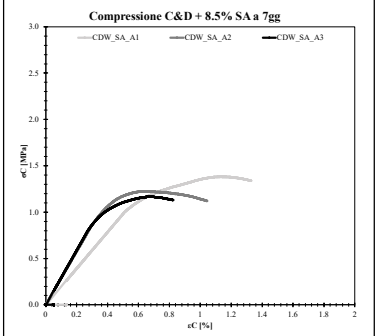
		NAT	C&D
7GG	Tal Quale		
	2% CEM II/B		
	3% CEM II/B		
	4% CEM II/B		
28GG	3% CEM II/B		

UCS - FASE B2: MISCELE SPERIMENTALI

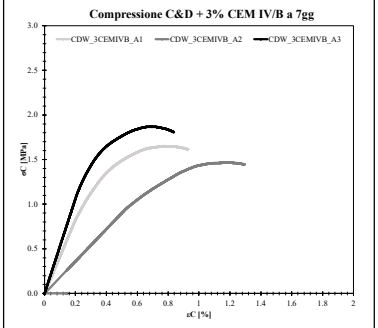
C&D + MIGLIORI LEGANTI FASE A

7GG

8.5% SA a 7gg

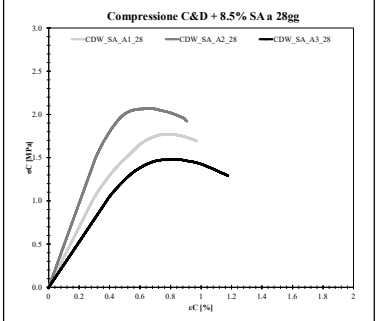


3% CEM IV/B a 7gg

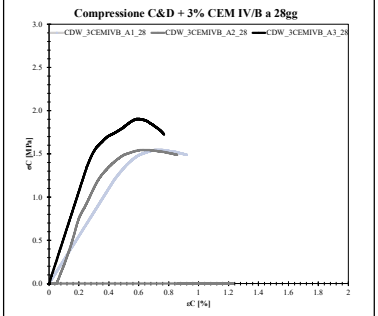


28GG

8.5% SA a 28gg



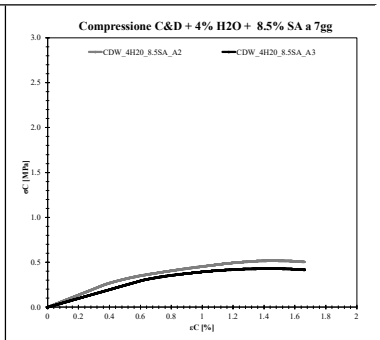
3% CEM IV/B a 28gg



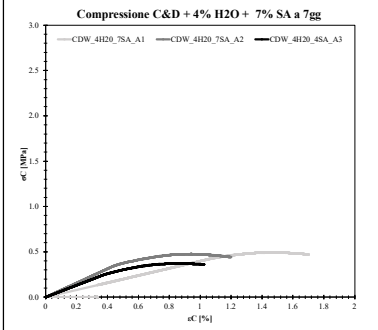
C&D + PRE-IDRATAZIONE + SA

7GG

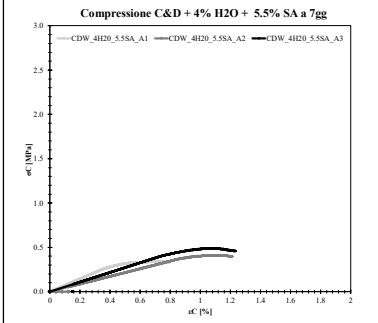
4% H_2O + 8.5% SA



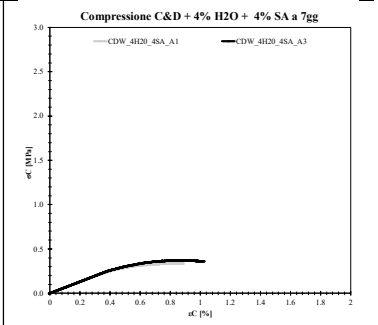
4% H_2O + 7% SA



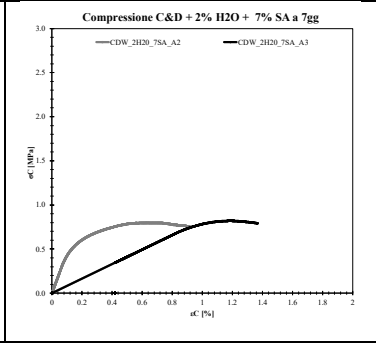
4% H_2O + 55% SA



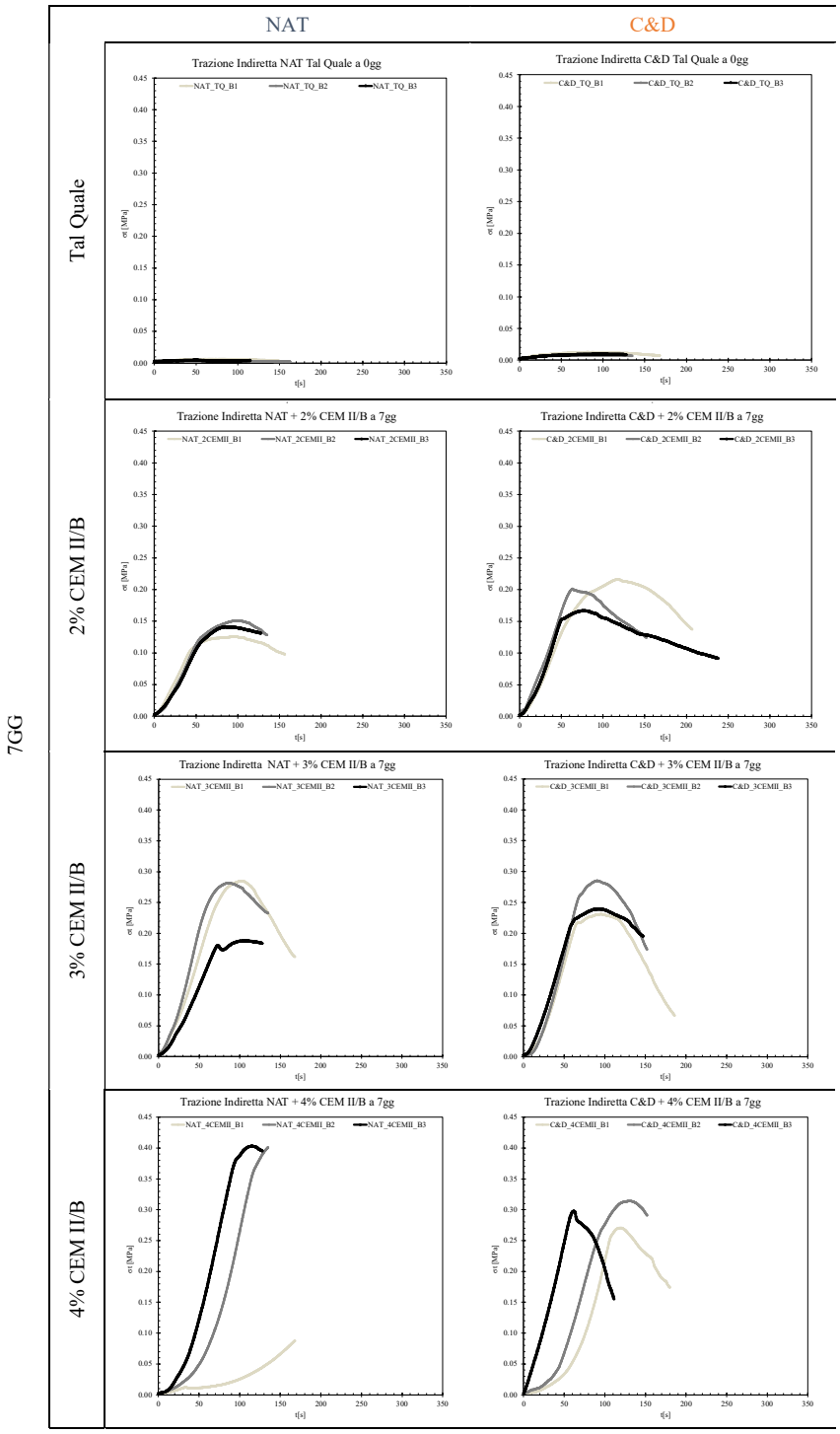
4% H_2O + 4% SA



2% H_2O + 7% SA



ITS - FASE B1: MISCELE DI RIFERIMENTO

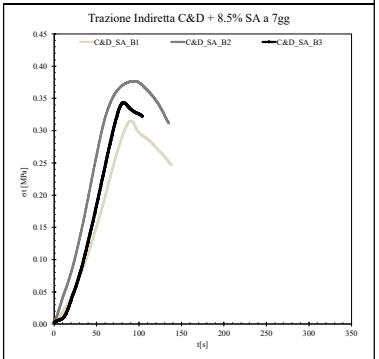


ITS - FASE B2: MISCELE SPERIMENTALI

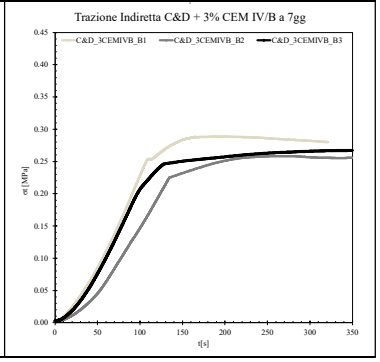
C&D + MIGLIORI LEGANTI FASE A

7GG

8.5% SA



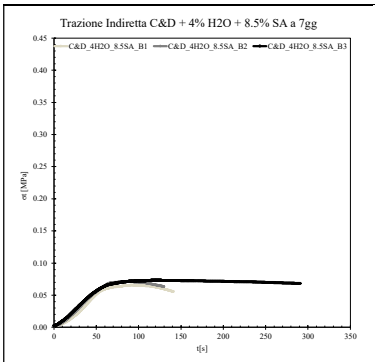
3% CEM IV/B



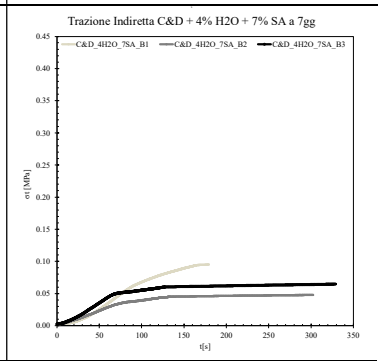
C&D + PRE-IDRATAZIONE + SA

7GG

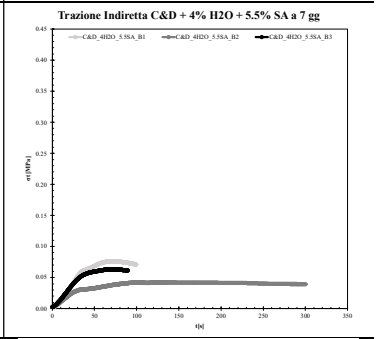
4% H_2O + 8.5% SA



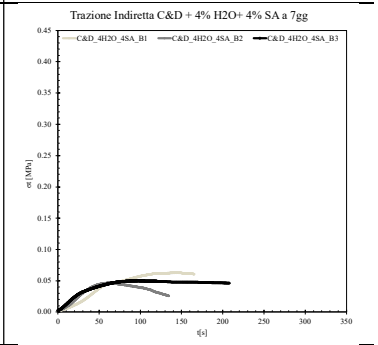
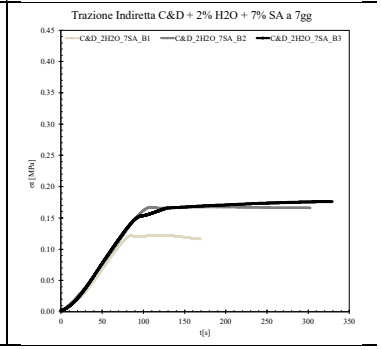
4% H_2O + 7% SA



4% H_2O + 5.5% SA



4% H_2O + 4% SA



2% H_2O + 7% SA