

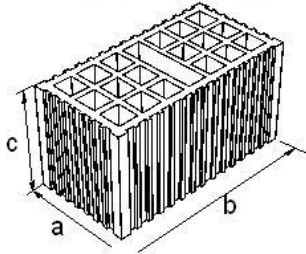
Apéndice **B**

Datos de los Materiales Utilizados

B. DATOS DE MATERIALES UTILIZADOS

B.1. ESPECÍMENES ANALIZADOS

Piezas de mampostería



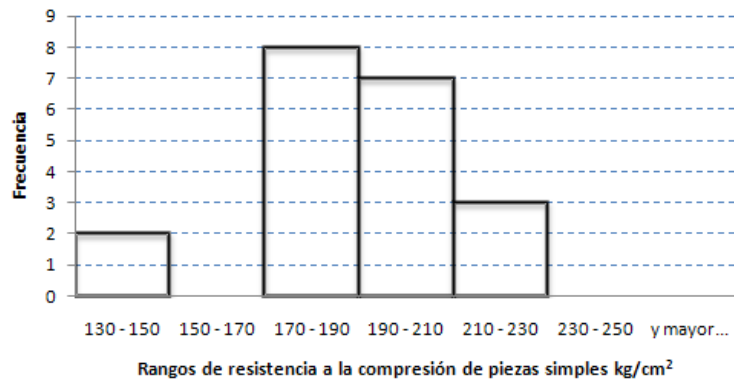
Proyecto: Muros SMIE para calibrar modelos de análisis
Fecha de ensayo: 22 y 23 de julio de 2008
Tipo de material: Arcilla extruida multiperforada
Vel. carga | escala | coefic: 17 t/min | 100 | 80

Esfuerzo f_p = 190.6 kg/cm²
 $f_p^* = f_p / (1 + 2.5c_p) = 127.08$ kg/cm² con control de calidad $c_p > 0.2$
 sin control de calidad $c_p > 0.3$
 artesanal $c_p > 0.35$

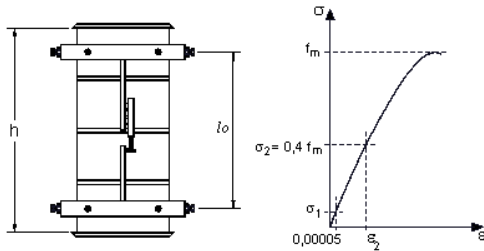
Pieza No.	Dimensiones, cm			Peso, kg	Carga, kg	Area cm ²	Peso Vol. bruto kg/m ³	Esfuerzo kg/cm ²
	a	b	c					
1	11.75	22.51	11.80	2.571	52000	264.5	824	196.6
2	12.03	22.82	12.10	2.587	50600	274.5	779	184.3
3	11.62	22.75	11.90	2.788	47500	264.4	886	179.7
4	11.92	22.75	11.92	2.548	37600	271.2	788	138.7
5	11.73	22.50	11.80	2.568	38200	263.9	825	144.7
6	11.81	22.64	11.92	2.557	50500	267.4	803	188.9
7	11.80	22.64	11.88	2.524	53500	267.2	795	200.3
8	11.65	22.38	11.86	2.566	55800	260.7	830	214.0
9	11.70	22.50	11.76	2.553	58800	263.3	825	223.4
10	11.73	22.70	11.90	2.533	48200	266.3	799	181.0
11	11.74	22.54	11.80	2.568	50800	264.7	822	191.9
12	11.75	22.66	11.78	2.599	52200	266.3	829	196.1
13	11.72	22.85	11.80	2.671	50000	267.7	846	186.8
14	11.92	22.63	11.84	2.551	50800	269.6	799	188.4
15	11.62	22.40	11.71	2.610	51800	260.2	856	199.1
16	11.77	22.65	11.84	2.558	54400	266.6	810	204.1
17	11.90	22.68	11.90	2.528	51200	269.9	787	189.7
18	11.86	22.69	11.92	2.559	49900	269.1	798	185.4
19	11.72	22.58	11.76	2.553	57500	264.6	821	217.3
20	11.83	22.64	11.92	2.554	54100	267.8	800	202.0
Promedio	11.8	22.6	11.9	2.58	50770	266.5	816	190.6
Coef var.	0.01	0.01	0.01	0.02	0.10	0.01	0.03	0.11

Histograma de piezas a compresión

Clase σ kg/cm ²	Frecuencia
130 - 150	2
150 - 170	0
170 - 190	8
190 - 210	7
210 - 230	3
230 - 250	0
y mayor...	0



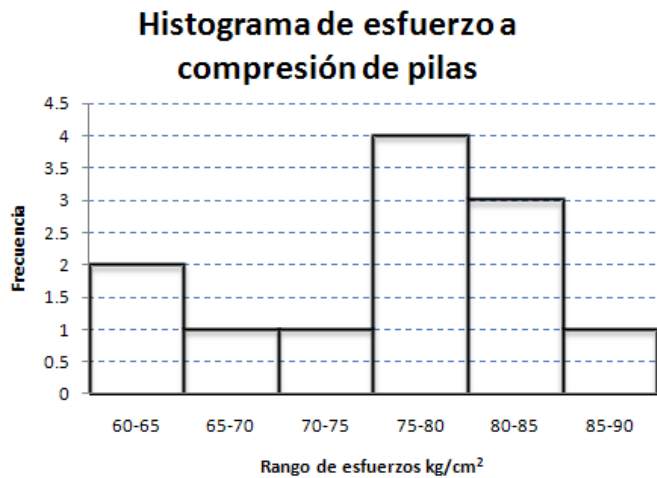
B.2. PILAS A COMPRESIÓN



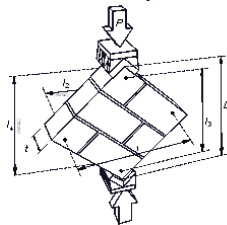
Proyecto: Muros SMIE para calibrar análisis
 Tipo de material: Tabique extruido de arcilla multiperforado
 $f_p^* = 127$ kg/cm²
 Resist. mortero 28 días: $f_b' = 108$ kg/cm² (promedio general)
 $f_m^* = f_m / (1 + 2.5c_m) = 55.41$ kg/cm² ($c_m \geq 0.15$)
 $E_m = 43921$ kg/cm² (promedio general)

Pila	Dimensiones cm			Area Bruta cm ²	Carga kg	fm kg/cm ²	Em kg/cm ²	ε fm	
	a	b	h						
ME1-P1	12	23	50	276	17728	64	41192	0.00284	
ME1-P2	12	23	50	276	23460	85	46528	0.00272	
ME1-P3	12	23	50	276	21815	79	42321	0.0031	
ME2-P1	12	23	50	276	21100	76	50791	0.00228	
ME2-P2	12	23	50	276	21101	76	43899	0.00227	
ME2-P3	12	23	50	276	17784	64	38981	0.00266	
ME3-P1	11.6	22.6	50	262.16	22550	86	46653	0.00249	
ME3-P2	12	23	50	276	21265	77	44465	0.00309	
ME3-P3	12	23	50	276	18328	66	40029	0.00287	
ME4-P1	12	23	50	276	20537	74	41882	0.00253	
ME4-P2	11.6	22.6	50	262.16	22075	84	42271	0.00313	
ME4-P3	11.6	22.9	49.6	265.64	21395	81	48044	0.00263	
Promedio						76	43921		
Coef. De variacion						0	0.07982		

Clase kg/cm ²	Frecuencia
60-65	2
65-70	1
70-75	1
75-80	4
80-85	3
85-90	1
y mayor...	0



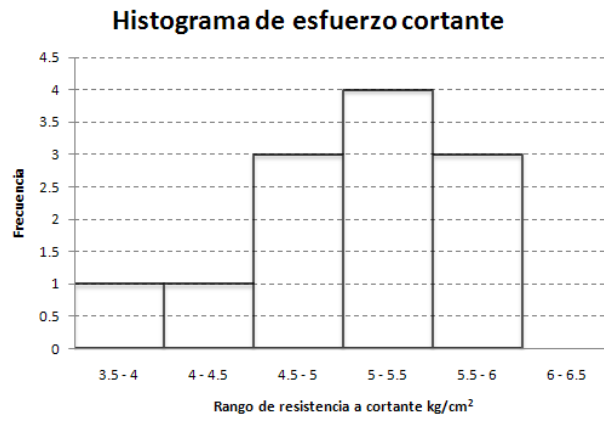
B.3. MURETES A COMPRESION DIAGONAL



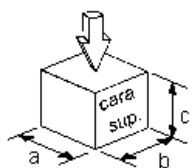
Proyecto: Muros SMIE para calibrar
 Tipo de material: Arcilla extruida multiperforada
 Mortero C:Cal:A: 1 : ¼ : 3
 Mortero 28 días: $f'_b = 82.9$ kg/cm² (promedio)
 $v_m^* = v_m / (1 + 2.5c_v) = 3.32$ kg/cm² ($c_v \geq 0.2$)
 $G_m = 5150$ kg/cm²
 De las pilas: $E_m = 43921$ kg/cm²

Murete	Dimensiones, cm				Área diag. A = t D, cm ²	Carga, kg	Esf. cortante v , kg/cm ²	Esf. de diseño, v_m^* kg/cm ²	Módulo de cortante, G_m kg/cm ²	Mor-tero, f_b' kg/cm ²	Módulo E_m kg/cm ²	Gm/ E_m
	L	h	D	t								
ME1-M1	38.0	37.4	52.3	11.9	619.8	2700	4.36					
ME1-M2	37.5	37.2	52.5	11.9	622.1	3170	5.10	3.11	4772	64.9	43347	0.11
ME1-M3	37.8	37.2	57.1	11.9	676.6	3070	4.54					
ME2-M1	37.4	38.0	53	11.9	628.1	3470	5.53					
ME2-M2	37.5	37.4	52.3	11.9	619.8	2460	3.97	3.34	4624	90.2	44557	0.10
ME2-M3	37.2	37.5	52.7	11.9	624.5	3460	5.54					
ME3-M1	38.3	37.4	53.0	11.9	628.1	3470	5.53					
ME3-M2	37.3	37.2	52.4	11.9	620.9	3150	5.07	3.52	6464	92.6	43716	0.15
ME3-M3	37.5	37.2	52.5	11.9	622.1	3270	5.26					
ME4-M1	37.8	37.0	52.8	11.9	625.7	3250	5.19					
ME4-M2	37.9	37.6	53.1	11.9	629.2	2950	4.69	3.30	4719	84.0	44066	0.11
ME4-M3	37.4	37.5	52.2	11.9	618.6	3080	4.98					
Promedio								3.32	5149.66	82.93	43921.33	0.12
Coefficiente de variación								0.05	0.17	0.15	0.01	0.18

Clase kg/cm ²	Frecuencia
3.5 - 4	1
4 - 4.5	1
4.5 - 5	3
5 - 5.5	4
5.5 - 6	3
6 - 6.5	0
y mayor...	0



B.4. MORTERO



Proyecto: Muros SMIE, arcilla extruida multiperforada

Espécimen: ME1, ME2, ME3 y ME4

Fecha de ensaye :

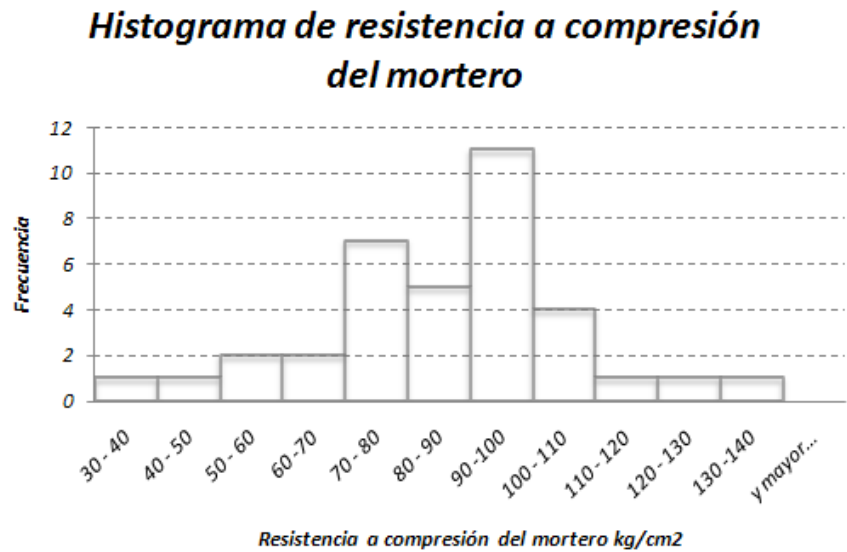
$f_b^* = 84.6 \text{ kg/cm}^2$

$f_j^* = f_b^* / (1 + 2.5c_j); f_j^* = 52.3 \text{ kg/cm}^2 (c_j \geq 0.2)$

Cem:cal:arena 1:¼:3

Muestra		fecha muestra	fecha ensaye	Edad, días	Dim., cm			Peso, g	Peso Vol. t/m³	Carga kg	Área cm²	Esfuerzo kg/cm²
Nº	Probeta				a	b	c					
M-1 (ME3)	1	05-Mar	02-Jul	119	5.10	5.07	5.07	221	1.69	2470	25.9	95.5
	2				5.16	5.07	5.07	224	1.69	3100	26.2	118.5
	3				5.10	5.07	5.07	223	1.70	2510	25.9	97.1
M-2 (ME3)	1	05-Mar	02-Jul	119	5.06	5.07	5.07	215	1.65	2330	25.7	90.8
	2				5.10	5.07	5.07	221	1.69	3210	25.9	124.1
	3				5.02	5.07	5.07	216	1.67	2420	25.5	95.1
M-3 (ME3)	1	05-Mar	02-Jul	119	4.99	5.07	5.07	205	1.60	1370	25.3	54.2
	2				4.98	5.07	5.07	206	1.61	1880	25.2	74.5
	3				4.97	5.07	5.07	203	1.59	1450	25.2	57.5
M-4 (ME3)	1	06-Mar	02-Jul	118	5.07	5.07	5.07	223	1.71	2500	25.7	97.3
	2				5.04	5.07	5.07	223	1.72	3440	25.6	134.6
	3				5.09	5.07	5.07	224	1.71	2710	25.8	105.0
M-5 (ME4)	1	06-Mar	02-Jul	118	5.02	5.07	5.07	215	1.67	2050	25.5	80.5
	2				5.07	5.07	5.07	216	1.66	2140	25.7	83.3
	3				5.05	5.07	5.07	215	1.66	1880	25.6	73.4
M-6 (ME4)	1	07-Mar	03-Jul	118	4.99	5.07	5.07	216	1.68	2230	25.3	88.1
	2				4.92	5.07	5.07	212	1.68	2280	24.9	91.4
	3				4.93	5.07	5.07	213	1.68	2320	25.0	92.8
M-7 (ME4)	1	10-Mar	04-Jul	116	4.97	5.07	5.07	210	1.64	2060	25.2	81.8
	2				5.03	5.07	5.07	214	1.66	2180	25.5	85.5
	3				4.98	5.07	5.07	213	1.66	1990	25.2	78.8
M-8i (ME2)	1	11-Mar	04-Jul	115	5.02	5.07	5.07	216	1.67	2750	25.5	108.0
	2				5.05	5.07	5.07	216	1.66	2760	25.6	107.8
	3				4.98	5.07	5.07	211	1.65	1870	25.2	74.1
M-8f (ME2, 1)	1	11-Mar	04-Jul	115	5.06	5.07	5.07	214	1.65	2450	25.7	95.5
	2				5.07	5.07	5.07	213	1.63	1730	25.7	67.3
	3				5.05	5.07	5.07	214	1.65	2330	25.6	91.0
M-9i (ME2)	1	11-Mar	04-Jul	115	5.09	5.07	5.07	218	1.67	1820	25.8	70.5
	2				5.07	5.07	5.07	218	1.67	2750	25.7	107.0
	3				5.09	5.07	5.07	217	1.66	2340	25.8	90.7
M-9f (ME1)	1	12-Mar	04-Jul	114	5.02	5.07	5.07	211	1.64	820	25.5	32.2
	2				5.08	5.07	5.07	213	1.63	2320	25.8	90.1
	3				5.09	5.07	5.07	214	1.64	2060	25.8	79.8
M-10 (ME1)	1	12-Mar	04-Jul	114	5.03	5.07	5.07	219	1.69	1590	25.5	62.3
	2				5.03	5.07	5.07	222	1.72	1950	25.5	76.5
	3				5.02	5.07	5.07	219	1.70	1240	25.5	48.7
Promedio								1.66			84.6	
. de variación								0.02			0.25	

Clase kg/cm ²	Frecuencia
30 - 40	1
40 - 50	1
50 - 60	2
60 - 70	2
70 - 80	7
80 - 90	5
90 - 100	11
100 - 110	4
110 - 120	1
120 - 130	1
130 - 140	1
y mayor...	0



B.5. CILINDROS DE CONCRETO

B.5.1. Castillos

Castillo	Cilindro	Dimensiones cm		Peso g	Area cm ²	Volumen cm ³	Peso Vol g/cm ³	Carga TDS kg	σ kg/cm ²	σ_{prom} kg/cm ²	$E_{c_{prom}}$ kg/cm ²
		ϕ	h								
ME1	C1	15.13	30.4	10560	179.791	5465.644	1.932	61400.000	341.508	334.634	117210.8
	C2	15.15	30.4	10576	180.267	5480.103	1.930	60500.000	335.614		
	C3	15.1	30.3	10508	179.079	5426.083	1.937	58500.000	326.672		
	C4	15.1	30.4	10576	179.079	5443.991	1.943	59945.000	334.741		
ME2	C1	15.226	30.25	10229	182.080	5507.911	1.857	36700.000	201.560	216.425	108251.6
	C2	15.125	30.45	10259	179.672	5471.015	1.875	40500.000	225.411		
	C3	15.224	30.375	10179	182.032	5529.218	1.841	39000.000	214.248		
	C4	15.175	30.35	10256	180.862	5489.161	1.868	40600.000	224.481		
ME3	C1	15.15	30.45	10240	180.267	5489.116	1.866	33300.000	184.726	184.679	101914.1
	C2	15.18	30.5	10266	180.981	5519.926	1.860	33200.000	183.444		
	C3	15.1	30.49	10289	179.079	5460.108	1.884	33600.000	187.627		
	C4	15.11	30.45	10278	179.316	5460.169	1.882	32800.000	182.917		
ME4	C1	15.171	30.375	10237	180.767	5490.787	1.864	45300.000	250.599	233.517	110928.9
	C2	15.085	30.4	10243	178.723	5433.180	1.885	42100.000	235.560		
	C3	15.188	30.4	10235	181.172	5507.629	1.858	40500.000	223.544		
	C4	15.179	30.375	10237	180.957	5496.579	1.862	40600.000	224.362		

B.5.2. Losa

Losa	Cilindro	Dimensiones cm		Peso g	Area cm ²	Volumen cm ³	Peso Vol g/cm ³	Carga TDS kg	f'c kg/cm ²	Ec kg/cm ²
		φ	h							
ME1	LZC1	15.0	29.9	10129	176	5266	1.9	49100	279	243587.9
	LZC2	15.4	30.9	10888	185	5709	1.9	50900	275	
	LZC3	15.2	29.9	10203	180	5381	1.9	52200	290	190357.3
ME2	LZC1	15.5	30.2	10817	189	5717	1.9	60100	317	278460.0
	LZC2	15.1	30.5	10704	180	5471	2.0	61400	342	
	LZC3	15.2	30.5	10652	180	5489	1.9	39000	216	244417.7
ME3	LZC1	15.3	30.3	10871	184	5569	2.0	60500	329	259968.6
	LZC2	15.1	30.4	10880	180	5450	2.0	57500	320	
	LZC3	15.8	31.6	12213	195	6176	2.0	65100	333	302185.1
ME4	LZC1	15.2	30.6	10724	181	5514	1.9	45300	251	285132.8
	LZC2	15.1	30.4	10741	180	5462	2.0	63000	351	
	LZC3	15.1	30.4	10720	180	5462	2.0	40500	225	263832.7
Promedio									294	258493
Coef. de variacion									0.15	0.13