



comune  
**Carsoli**



regione  
**Abruzzo**

provincia  
**L'Aquila**



## PROGETTO ESECUTIVO

# PROGETTO PER L'ADEGUAMENTO STRUTTURALE DELL'EDIFICIO SEDE DEL MUNICIPIO DI CARSOLI (AQ)

localizzazione

**CARSOLI,**  
P.zza della Libertà, n°1  
Fg. 69 - Part.IIa 16

data

**Ottobre 2015**

tavola

R4A\_STR

scale

-

descrizione

elaborato

Allegato alla Relazione di Calcolo

committente

**COMUNE DI CARSOLI**  
P.zza della Libertà n°1  
67061 - CARSOLI (AQ)

Revisione elaborato:	data



Studio Tecnico Associato Progetto Integrato, Via Silvio Spaventa n°10, SULMONA (AQ)  
tel.0864-51619 - fax. 0864-950372 - email: studiotechnico@progettointegrato.it - www.progettointegrato.it

**Ing. Massimo Gerosolimo Porziella**

**COMUNE DI CARSOLI**  
PROVINCIA DI L'AQUILA

**ADEGUAMENTO STRUTTURALE DELL'EDIFICIO SEDE DEL  
MUNICIPIO DI CARSOLI (AQ)**

-Progetto Esecutivo-

<p><b>Allegato alla Relazione Di Calcolo Delle Strutture: Tabulati Di Verifica Dei Meccanismi Globali</b></p>
---

## INDICE

<b>1</b>	<b>TABULATI DELLE VERIFICHE SISMICHE GLOBALI ALLO STATO LIMITE DI SALVAGUARDIA DELLA VITA (SLV) PER <math>PGA = 0.209\text{ G}</math></b>	<b>3</b>
1.1	VERIFICHE SISMICHE GLOBALI – MASCHI IN MURATURA	3
1.1.1	<i>VERIFICA A TAGLIO NEL PIANO DEI MASCHI MURARI</i>	3
1.1.2	<i>VERIFICA A PRESSO FLESSIONE NEL PIANO DEI MASCHI MURARI</i>	6
1.1.3	<i>VERIFICA A PRESSO FLESSIONE FUORI PIANO DEI MASCHI MURARI</i>	8

1 TABULATI DELLE VERIFICHE SISMICHE GLOBALI ALLO STATO LIMITE DI SALVAGUARDIA DELLA VITA (SLV) PER PGA = 0.209 G

1.1 VERIFICHE SISMICHE GLOBALI – MASCHI IN MURATURA

1.1.1 VERIFICA A TAGLIO NEL PIANO DEI MASCHI MURARI

DATI MATERIALI E RESISTENZE CARATTERISTICHE- MURATURA RINFORZATA											
	1-Muratura a conci sbozzati, con			2- Muratura in pietra tenera -			3- Muratura a blocchi lapidei				
Livelli di Conoscenza	FC	1.35		FC	1.35		FC	1.35			
Resistenza Caratteristica a Compresi	f <sub>m</sub>	30.90	daN/cmq	f <sub>m</sub>	14.00	daN/cmq	f <sub>m</sub>	60.00	daN/cmq		
Resistenza a taglio puro	τ0	1.02	daN/cmq	τ0	0.28	daN/cmq	τ0	0.90	daN/cmq		
Coefficiente di Sicurezza	γ <sub>m</sub>	2.00		γ <sub>m</sub>	2.00		γ <sub>m</sub>	2.00			
Modulo Elastico Secante Normale	E	17400	daN/cmq	E	10800	daN/cmq	E	28000	daN/cmq		
Modulo Elastico Secante Tangenziale	G	5800	daN/cmq	G	3600	daN/cmq	G	8600	daN/cmq		
	Iniezioni	2.00		Iniezioni	1.70		Iniezioni	1.20			
	γ <sub>m</sub> *FC	2.70		γ <sub>m</sub> *FC	2.70		γ <sub>m</sub> *FC	2.70			
	f <sub>vd</sub> = τ0d	0.76	daN/cmq	f <sub>vd</sub> = τ0d	0.18	daN/cmq	f <sub>vd</sub> = τ0d	0.40	daN/cmq		
	f <sub>d_FRAGILE</sub>	22.89	daN/cmq	f <sub>d_FRAGILE</sub>	8.81	daN/cmq	f <sub>d_FRAGILE</sub>	26.67	daN/cmq		
	f <sub>d_DUTTILE</sub>	22.89	daN/cmq	f <sub>d_DUTTILE</sub>	8.81	daN/cmq	f <sub>d_DUTTILE</sub>	26.67	daN/cmq		

RINFORZO CON FIBRA		
Larghezza fascia	300	mm
Spessore fascia	0.254	mm
Asw	76.20	mm2
dist rinforzo dal bordo	200	mm
Es=	190000	MPa
f <sub>sdelam. 1 strato</sub>	6000	daN/cm <sup>q</sup>
f <sub>sdelam. 2 strati</sub>	3500	daN/cm <sup>q</sup>
Y <sub>Rd</sub> [taglio CNR]	1.200	

VERIFICHE SISMICHE D.M.2008								Geometria			Verifica a Taglio nel Piano						Verifica a Taglio nel Piano (sezione armata) - PASSI OTTIMIZZATI PER RINFORZO A TAGLIO																	
N° Elemento	Comb.	Materiale	Sforzo normale Fx=N	Taglio f.piano Fy=V3	Taglio nel piano Fz=V2	Mom. Torcente Mx=T	Mom. nel piano My=M3	Mom. fuori p. Mz=M2	Spes	Lungh	Altez	C.Snellez	T.Norm	T.Ultim	Taglio	RATIO	NV	MASCHIO	Sezione	Materiali	Vsd	R.biella Murat.			Contributo Muratura				Contr. Arm.			VERIF	RATIO	
			KN	KN	KN	KN-m	KN-m	KN-m	cm	cm	cm		daN/cm <sup>q</sup>	kN		-					kN	Vt,C	VERIF	P	Asw	s(passo)	sN	fvd	d	Vt,M	Vt,s	Vtot		-
																					(1strato/lat o)	cm	daN/cm <sup>q</sup>	daN/cm <sup>q</sup>	cm	kN	kN	kN						
1	min.	1	-1330.85	-52.47	-176.2	-7.32	-93.1	-14.59	60	320	310	1.00	6.93	395.77	OK	0.445	0	1	min.	1	176	1257	OK	-1330.9	1.52	80	7.27	3.66	305	671	174	845	OK	0.21
	max.	1	-90.27	47.01	234.74	8.67	221.4	33.11	60	320	310	1.00	0.47	147.17	WARNING	1.595	1		max.	1	235	1257	OK	-90.3	1.52	80	0.49	0.95	305	174	174	349	OK	0.67
2	min.	1	-1273.02	-57.89	-341.6	-2.99	-188.35	-35.35	60	315	310	1.00	6.74	384.46	OK	0.889	0	2	min.	1	342	1236	OK	-1273.0	1.52	60	7.07	3.58	300	645	229	874	OK	0.39
	max.	1	-295.34	42.52	348.21	3.38	161.78	51.68	60	315	310	1.00	1.56	207.61	WARNING	1.677	1		max.	1	348	1236	OK	-295.3	1.52	60	1.64	1.41	300	254	229	483	OK	0.72
3	min.	1	-970.5	-22.62	-399.28	-4.51	-138.22	-22.31	60	270	310	1.15	5.99	271.99	WARNING	1.468	1	3	min.	1	399	1051	OK	-970.5	1.52	40	6.34	3.29	255	504	291	795	OK	0.50
	max.	1	-211.95	40.33	377.61	4.35	146.77	40.44	60	270	310	1.15	1.31	145.44	WARNING	2.596	1		max.	1	378	1051	OK	-212.0	1.52	40	1.39	1.31	255	200	291	492	OK	0.77
4	min.	1	-1019.83	-53.67	-441.03	-8.63	-119.54	-10.13	60	243	310	1.28	6.99	236.57	WARNING	1.864	1	4	min.	1	441	939	OK	-1019.8	1.52	40	7.45	3.74	228	511	261	772	OK	0.57
	max.	1	-143.27	10.4	355.76	6.05	140.86	32.36	60	243	310	1.28	0.98	107.09	WARNING	3.322	1		max.	1	356	939	OK	-143.3	1.52	40	1.05	1.17	228	161	261	421	OK	0.84
5	min.	1	-1051.6	-45.01	-320.63	-13.16	-292.69	-15.47	60	243	310	1.28	7.21	239.96	WARNING	1.336	1	5	min.	1	321	939	OK	-1051.6	1.52	40	7.69	3.83	228	524	261	785	OK	0.41
	max.	1	-175.83	22.62	331.52	12.1	175.13	23.79	60	243	310	1.28	1.21	114.54	WARNING	2.894	1		max.	1	332	939	OK	-175.8	1.52	40	1.29	1.27	228	174	261	434	OK	0.76
6	min.	1	-1452.86	1.97	-342.85	-20.85	-97.49	-90.89	60	306	310	1.01	7.91	397.27	OK	0.863	0	6	min.	1	343	1199	OK	-1452.9	1.52	60	8.32	4.08	291	713	222	935	OK	0.37
	max.	1	-350.43	49.03	391.73	21.08	391.39	32.81	60	306	310	1.01	1.91	214.64	WARNING	1.825	1		max.	1	392	1199	OK	-350.4	1.52	60	2.01	1.56	291	272	222	494	OK	0.79
7	min.	1	-1475.91	-32.45	-351.04	-12.72	-285.76	-150.56	60	316	310	1.00	7.78	412.45	OK	0.851	0	7	min.	1	351	1240	OK	-1475.9	1.52	80	8.17	4.02	301	727	172	899	OK	0.39
	max.	1	-393.62	88.44	334.22	6.14	148.58	58.17	60	316	310	1.00	2.08	232.02	WARNING	1.440	1		max.	1	334	1240	OK	-393.6	1.52	80	2.18	1.63	301	294	172	466	OK	0.72
8	min.	1	-1554.86	-7.64	-44.21	-24.35	-49.17	-30.1	60	360	310	1.00	7.20	453.10	OK	0.098	0	8	min.	1	44	1421	OK	-1554.9	1.52	80	7.51	3.76	345	778	197	976	OK	0.05
	max.	1	-241.96	29.04	160.79	22.4	330.48	12.33	60	360	310	1.00	1.12	211.18	OK	0.761	0		max.	1	161	1421	OK	-242.0	1.52	80	1.17	1.22	345	253	197	450	OK	0.36
9	min.	1	-1930.46	-73.31	-663.01	-13.47	-1790.87	-98.25	60	920	310	1.00	3.50	837.67	OK	0.791	0	9	min.	1	663	3729	OK	-1930.5	1.52	60	3.56	2.18	905	1182	690	1872	OK	0.35
	max.	1	-587.82	106.43	940.41	12.86	527.08	73.06	60	920	310	1.00	1.06	530.77	WARNING	1.772	1		max.	1	940	3729	OK	-587.8	1.52	60	1.08	1.19	905	645	690	1335	OK	0.70
10	min.	1	-1156.29	-31.64	-390.21	-5.2	-707.46	-29.92	60	540	310	1.00	3.57	495.99	OK	0.787	0	10	min.	1	390	2163	OK	-1156.3	1.52	80	3.67	2.22	525	701	300	1001	OK	0.39
	max.	1	-394.48	27.84	434.78	3.55	603.51	33.3	60	540	310	1.00	1.22	325.78	WARNING	1.335	1		max.	1	435	2163	OK	-394.5	1.52	80	1.25	1.26	525	396	300	696	OK	0.62
11	min.	1	-1254.41	-29.39	-536.64	-5.18	-840.01	-40.67	60	540	310	1.00	3.87	513.83	WARNING	1.044	1	11	min.	1	537	2163	OK	-1254.4	1.52	80	3.98	2.35	525	740	300	1040	OK	0.52
	max.	1	-438.48	38.84	595.71	8.4	835.56	33.38	60	540	310	1.00	1.35	337.96	WARNING	1.763	1		max.	1	596	2163	OK	-438.5	1.52	80	1.39	1.31	525	413	300	713	OK	0.83
12	min.	1	-1268.92	-50.34	-616.95	-17.2	-1245.15	-31.99	60	810	310	1.00	2.61	652.15	OK	0.946	0	12	min.	1	617	3275	OK	-1268.9	1.52	80	2.66	1.82	795	868	454	1322	OK	0.47
	max.	1	-269.44	46.57	626.65	16.76	788.76	30.84	60	810	310	1.00	0.55	387.36	WARNING	1.618	1		max.	1	627	3275	OK	-269.4	1.52	80	0.56	0.98	795	468	454	923	OK	0.68
13	min.	1	-1492.66	-65.99	-797.07	-5.7	-646.75	-11	60	650	310	1.00	3.83	615.40	WARNING	1.295	1	13	min.	1	797	2616	OK	-1492.7	1.52	80	3.92	2.32	635	885	363	1248	OK	0.64
	max.	1	-307.79	13.69	791.54	6.87	659.39	49.09	60	650	310	1.00	0.79	341.85	WARNING	2.315	1		max.	1	792	2616	OK	-307.8	1.52	80	0.81	1.08	635	411	387	798	OK	0.99
14	min.	1	-1658.57	-8.31	-1135.26	-12.04	-797.69	-54.19	60	650	310	1.00	4.25	644.50	WARNING	1.761	1	14	min.	1	1135	2616	OK	-1658.6	1.52	40	4.35	2.50	635	951	726	1677	OK	0.68
	max.	1	-455.45	81.09	1175.05	11.43	769.93	49.01	60	650	310	1.00	1.17	386.65	WARNING	3.039	1		max.	1	1175	2616	OK	-455.5	1.52	40	1.20	1.23	635	470	726	1196	OK	0.98
15	min.	1	-1633.43	-74.8	-524.97	-9.33	-901.4	-90.93	60	670	310	1.00	4.06	651.14	OK	0.806	0	15	min.	1	525	2699	OK	-1633.4	1.52	80	4.16	2.42	655	950	374	1325	OK	0.40
	max.	1	-697.44	77.7	499.78	8.6	390.09	95.55	60	670	310	1.00	1.73	459.10	WARNING	1.089	1		max.	1	500	2699	OK	-697.4	1.52	80	1.77	1.47	655	576	374	950	OK	0.53
16	min.	1	-566.49	-40.68	-181.83</																													

21	min.	1	-895.33	-40.77	-398.54	-9.57	-365.32	-24.28	60	325	310	1.00	4.59	333.38	WARNING	1.195	1	21	min.	1	399	1277	OK	-895.3	1.52	40	4.81	2.68	310	499	354	853	OK	0.47
	max.	1	-384.43	27.4	679.72	8.44	515.68	31.29	60	325	310	1.00	1.97	233.86	WARNING	2.907	1		max.	1	680	1277	OK	-384.4	1.52	40	2.07	1.58	310	294	394	688	OK	0.99
22	min.	1	-636.76	-22.46	-415.33	-6.67	-285.45	-24.9	60	315	420	1.33	3.37	211.69	WARNING	1.962	1	22	min.	1	415	1236	OK	-636.8	1.52	80	3.54	2.17	300	391	171	562	OK	0.74
	max.	1	-108.63	31.01	176.05	8	260.76	18.58	60	315	420	1.33	0.57	114.00	WARNING	1.544	1		max.	1	176	1236	OK	-108.6	1.52	80	0.60	1.00	300	179	171	351	OK	0.50
23	min.	1	-654.91	-41.4	-453.63	-10.54	-321.85	-19.81	60	312	310	1.00	3.50	284.12	WARNING	1.597	1	23	min.	1	454	1224	OK	-654.9	1.52	80	3.68	2.23	297	397	170	566	OK	0.80
	max.	1	-110.01	21.62	206.24	8.14	291.52	31.3	60	312	310	1.00	0.59	151.40	WARNING	1.362	1		max.	1	206	1224	OK	-110.0	1.52	80	0.62	1.00	297	179	170	348	OK	0.59
24	min.	1	-540.32	-20.02	-129.19	-20.57	-131.8	-19.06	60	270	310	1.15	3.34	209.81	OK	0.616	0	24	min.	1	129	1051	OK	-540.3	1.52	80	3.53	2.17	255	332	146	477	OK	0.27
	max.	1	-94.4	18.29	201.77	21.06	157.14	17.14	60	270	310	1.15	0.58	113.87	WARNING	1.772	1		max.	1	202	1051	OK	-94.4	1.52	80	0.62	1.00	255	153	146	299	OK	0.67
25	min.	1	-1298.82	-27	-502.39	-14.17	-589.31	-30.05	60	370	310	1.00	5.85	423.34	WARNING	1.187	1	25	min.	1	502	1463	OK	-1298.8	1.52	80	6.10	3.19	355	680	203	883	OK	0.57
	max.	1	-112.98	40.12	233.59	12.73	216.41	24.22	60	370	310	1.00	0.51	173.32	WARNING	1.348	1		max.	1	234	1463	OK	-113.0	1.52	80	0.53	0.97	355	206	203	409	OK	0.57
26	min.	1	-1319.71	-38.28	-580.08	-12.9	-629.79	-19.12	60	316	310	1.00	6.96	391.58	WARNING	1.481	1	26	min.	1	580	1240	OK	-1319.7	1.52	80	7.31	3.68	301	664	172	836	OK	0.69
	max.	1	-140.53	17.8	318.94	14.16	272.23	24.3	60	316	310	1.00	0.74	163.22	WARNING	1.954	1		max.	1	319	1240	OK	-140.5	1.52	80	0.78	1.07	301	193	172	365	OK	0.87
27	min.	1	-1344.11	-11.97	-178.55	-10.76	-23.59	-18.6	60	360	310	1.00	6.22	423.68	OK	0.421	0	27	min.	1	179	1421	OK	-1344.1	1.52	80	6.49	3.35	345	694	197	891	OK	0.20
	max.	1	-131.55	11.78	106.37	9.1	292.2	17.48	60	360	310	1.00	0.61	176.31	OK	0.603	0		max.	1	106	1421	OK	-131.6	1.52	80	0.64	1.01	345	209	197	406	OK	0.26
28	min.	1	-1438.39	-42.01	-309.89	-26.3	-8.1	-38.3	60	360	310	1.00	6.66	437.08	OK	0.709	0	28	min.	1	310	1421	OK	-1438.4	1.52	80	6.95	3.54	345	732	197	929	OK	0.33
	max.	1	-223.82	57.03	274.11	24.31	335.36	14.82	60	360	310	1.00	1.04	205.86	WARNING	1.332	1		max.	1	274	1421	OK	-223.8	1.52	80	1.08	1.19	345	246	197	443	OK	0.62
29	min.	1	-508.21	-23.65	-34.79	-6.85	-134.92	-17.62	60	250	310	1.24	3.39	181.09	OK	0.192	0	29	min.	1	35	968	OK	-508.2	1.52	80	3.60	2.20	235	310	134	444	OK	0.08
	max.	1	-95.89	26.15	192.81	6.81	204.33	15.49	60	250	310	1.24	0.64	100.00	WARNING	1.928	1		max.	1	193	968	OK	-95.9	1.52	80	0.68	1.03	235	145	134	279	OK	0.69
30	min.	1	-541.18	-26.8	-56.23	-8.69	-162.4	-17.09	60	250	310	1.24	3.61	186.05	OK	0.302	0	30	min.	1	56	968	OK	-541.2	1.52	80	3.84	2.29	235	323	134	457	OK	0.12
	max.	1	-103.41	24.09	224.66	8.4	226.34	19.5	60	250	310	1.24	0.69	102.06	WARNING	2.201	1		max.	1	225	968	OK	-103.4	1.52	80	0.73	1.05	235	148	134	282	OK	0.80
31	min.	1	-1121.14	-50.71	-378.15	-7.38	-239.05	-56.98	60	356	310	1.00	5.25	387.75	OK	0.975	0	31	min.	1	378	1405	OK	-1121.1	1.52	80	5.48	2.95	341	603	195	798	OK	0.47
	max.	1	-250.46	40.46	365.13	9.12	219.69	41.75	60	356	310	1.00	1.17	212.05	WARNING	1.722	1		max.	1	365	1405	OK	-250.5	1.52	80	1.22	1.25	341	255	195	450	OK	0.81
32	min.	1	-538.21	-12.89	-179.84	-5.13	-58.56	-22.13	60	160	310	1.50	5.61	119.70	WARNING	1.502	1	32	min.	1	180	597	OK	-538.2	1.52	80	6.19	3.23	145	281	83	364	OK	0.49
	max.	1	-123.37	30.37	185.89	7.43	55.92	13.48	60	160	310	1.50	1.29	65.56	WARNING	2.835	1		max.	1	186	597	OK	-123.4	1.52	80	1.42	1.32	145	115	83	198	OK	0.94
33	min.	1	-605.6	-13.47	-175.8	-12.76	-49.19	-29.2	60	160	310	1.50	6.31	126.32	WARNING	1.392	1	33	min.	1	176	597	OK	-605.6	1.52	80	6.96	3.54	145	308	83	391	OK	0.45
	max.	1	-107.07	36.34	172.79	9.88	69.02	10.1	60	160	310	1.50	1.12	62.48	WARNING	2.765	1		max.	1	173	597	OK	-107.1	1.52	80	1.23	1.25	145	109	83	191	OK	0.90
34	min.	1	-1308.88	-40.28	-345.96	-7.45	-253.16	-48.68	60	355	310	1.00	6.14	415.39	OK	0.833	0	34	min.	1	346	1401	OK	-1308.9	1.52	80	6.42	3.32	340	678	194	872	OK	0.40
	max.	1	-334.7	48.84	364.93	6.09	207.03	56.69	60	355	310	1.00	1.57	234.45	WARNING	1.557	1		max.	1	365													



70	min.	1	-971.62	-12.23	-355.55	-8.18	-322.66	-39.67	55	356	420	1.18	4.96	293.76	WARNING	1.210	1	70	min.	1	356	1288	OK	-971.6	1.52	80	5.18	2.83	341	530	195	725	OK	0.49
	max.	1	-261.98	37.66	370.04	7.17	314.12	42.12	55	356	420	1.18	1.34	172.42	WARNING	2.146	1		max.	1	370	1288	OK	-262.0	1.52	80	1.40	1.31	341	246	195	441	OK	0.84
71	min.	1	-499.39	-15.68	-142.37	-4.27	-64.76	-14.69	55	108	420	1.50	8.41	89.30	WARNING	1.594	1	71	min.	1	142	351	OK	-499.4	1.52	40	9.76	4.66	93	238	142	380	OK	0.37
	max.	1	30.43	24.17	171.41	5.92	47.03	10.19	55	108	420	1.50	0.00	22.44	WARNING	7.639	1		max.	1	171	351	OK	30.4	1.52	40	0.00	0.76	93	39	133	172	OK	1.00
72	min.	1	-966.35	-12.12	-240.74	-5.96	-256.81	-17.24	55	210	420	1.50	8.37	173.25	WARNING	1.390	1	72	min.	1	241	736	OK	-966.4	1.52	80	9.01	4.36	195	468	111	579	OK	0.42
	max.	1	-195.07	17.7	267.58	6.9	274.74	33.49	55	210	420	1.50	1.69	87.05	WARNING	3.074	1		max.	1	268	736	OK	-195.1	1.52	80	1.82	1.48	195	159	111	271	OK	0.99
73	min.	1	-1086.46	-13.12	-323.43	-6.2	-322.82	-15.6	55	245	420	1.50	8.06	198.65	WARNING	1.628	1	73	min.	1	323	869	OK	-1086.5	1.52	80	8.59	4.19	230	530	131	662	OK	0.49
	max.	1	-246	18.22	287.02	7.27	327.07	33.96	55	245	420	1.50	1.83	104.59	WARNING	2.744	1		max.	1	287	869	OK	-246.0	1.52	80	1.94	1.53	230	194	131	325	OK	0.88
74	min.	1	-474.11	-10.98	-174.62	-5.07	-52.64	-6.68	55	108	420	1.50	7.98	87.16	WARNING	2.004	1	74	min.	1	175	351	OK	-474.1	1.52	40	9.27	4.46	93	228	106	335	OK	0.52
	max.	1	-15.46	16.62	137.11	5.19	65.1	4.1	55	108	420	1.50	0.26	27.11	WARNING	5.058	1		max.	1	137	351	OK	-15.5	1.52	40	0.30	0.88	93	45	106	151	OK	0.91
76	min.	1	-516.32	-25.08	-241.93	-13.09	-147.05	-15.36	50	320	558	1.50	3.23	156.39	WARNING	1.547	1	76	min.	1	242	1047	OK	-516.3	1.52	80	3.39	2.11	305	322	174	496	OK	0.49
	max.	1	-60.92	10.72	268.79	11.23	79.56	8.5	50	320	558	1.50	0.38	78.16	WARNING	3.439	1		max.	1	269	1047	OK	-60.9	1.52	80	0.40	0.92	305	140	174	314	OK	0.86
77	min.	1	-589.24	-124.5	-200.16	-4.12	-242.35	-55.2	50	315	558	1.50	3.74	164.05	WARNING	1.220	1	77	min.	1	200	1030	OK	-589.2	1.52	80	3.93	2.33	300	349	171	520	OK	0.38
	max.	1	-139.44	16.84	187.93	3.81	207.29	36.5	50	315	558	1.50	0.89	95.24	WARNING	1.973	1		max.	1	188	1030	OK	-139.4	1.52	80	0.93	1.13	300	169	171	341	OK	0.55
78	min.	1	-544.17	-121.32	-238.26	-6.78	-249.47	-59.58	50	270	558	1.50	4.03	145.27	WARNING	1.640	1	78	min.	1	238	876	OK	-544.2	1.52	80	4.27	2.46	255	314	146	460	OK	0.52
	max.	1	-116.3	8.31	227.26	8.35	235.91	33.73	50	270	558	1.50	0.86	80.96	WARNING	2.807	1		max.	1	227	876	OK	-116.3	1.52	80	0.91	1.12	255	143	146	289	OK	0.79
79	min.	1	-452.79	-111.97	-231.68	-3.55	-227.75	-60.95	50	245	558	1.50	3.70	126.93	WARNING	1.825	1	79	min.	1	232	790	OK	-452.8	1.52	80	3.94	2.33	230	268	131	399	OK	0.58
	max.	1	-145.98	17.85	232.52	5.84	240.59	19.35	50	245	558	1.50	1.19	81.52	WARNING	2.852	1		max.	1	233	790	OK	-146.0	1.52	80	1.27	1.26	230	145	131	277	OK	0.84
80	min.	1	-447.7	-114.92	-235.85	-4.03	-236.16	-61.98	50	245	558	1.50	3.65	126.31	WARNING	1.867	1	80	min.	1	236	790	OK	-447.7	1.52	80	3.89	2.31	230	266	131	397	OK	0.59
	max.	1	-144.52	18.38	223.66	3.9	210.64	20.26	50	245	558	1.50	1.18	81.24	WARNING	2.753	1		max.	1	224	790	OK	-144.5	1.52	80	1.26	1.26	230	145	131	276	OK	0.81
81	min.	1	-589.3	-123.88	-245.78	-7.77	-241.57	-69.09	50	305	558	1.50	3.86	161.10	WARNING	1.526	1	81	min.	1	246	996	OK	-589.3	1.52	80	4.06	2.38	290	345	166	511	OK	0.48
	max.	1	-116.6	13.29	264.52	8.54	274.75	33.1	50	305	558	1.50	0.76	88.30	WARNING	2.996	1		max.	1	265	996	OK	-116.6	1.52	80	0.80	1.08	290	156	166	322	OK	0.82
82	min.	1	-578.95	-129.32	-203.63	-2.89	-198.44	-60.11	50	316	558	1.50	3.66	163.10	WARNING	1.249	1	82	min.	1	204	1033	OK	-579.0	1.52	80	3.85	2.29	301	345	172	517	OK	0.39
	max.	1	-127.72	21.07	222.43	4.38	231.24	40.1	50	316	558	1.50	0.81	92.98	WARNING	2.392	1		max.	1	222	1033	OK	-127.7	1.52	80	0.85	1.10	301	165	172	337	OK	0.66
83	min.	1	-597.66	-24.42	-75.43	-11.48	-125.89	-16.56	50	360	558	1.50	3.32	178.10	OK	0.424	0	83	min.	1	75	1185	OK	-597.7	1.52	80	3.46	2.14	345	369	197	567	OK	0.13
	max.	1	-71.75	14.46	105.02	13.98	257.85	16.84	50	360	558	1.50	0.40	88.75	WARNING	1.183	1		max.	1	105	1185	OK	-71.8	1.52	80	0.42	0.92	345	159	197	356	OK	0.29
86	min.	1	-208.76	-8.93	-126.41	-1.82	-123.05	-4.49	50	108	558	1.50	3.87	57.06	WARNING	2.216	1	86	min.	1	126	319	OK	-208.8	1.52	40	4.49	2.55	93	119	106	225	OK	0.56
	max.	1	0.82	5.35	134.13	1.74	119.04	3.93	50	108	558	1.50	0.00	20.40	WARNING	6.575	1		max.	1	134	319	OK	0.8	1.52	40								

1.1.2 VERIFICA A PRESSO FLESSIONE NEL PIANO DEI MASCHI MURARI

DATI MATERIALI E RESISTENZE CARATTERISTICHE- MURATURA RINFORZATA											
Livelli di Conoscenza Resistenza Caratteristica a Compres Resistenza a taglio puro Coefficiente di Sicurezza Modulo Elastico Secante Normale Modulo Elastico Secante Tangenziale	1-Muratura a conci sbazzati, con			2- Muratura in pietra tenera -			3- Muratura a blocchi lapidei				
	FC	1.35		FC	1.35		FC	1.35			
	f <sub>m</sub>	30.90	daN/cm <sup>q</sup>	f <sub>m</sub>	14.00	daN/cm <sup>q</sup>	f <sub>m</sub>	60.00	daN/cm <sup>q</sup>		
	τ <sub>0</sub>	1.02	daN/cm <sup>q</sup>	τ <sub>0</sub>	0.28	daN/cm <sup>q</sup>	τ <sub>0</sub>	0.90	daN/cm <sup>q</sup>		
	γ <sub>m</sub>	2.00		γ <sub>m</sub>	2.00		γ <sub>m</sub>	2.00			
	E	17400	daN/cm <sup>q</sup>	E	10800	daN/cm <sup>q</sup>	E	28000	daN/cm <sup>q</sup>		
	G	5800	daN/cm <sup>q</sup>	G	3600	daN/cm <sup>q</sup>	G	8600	daN/cm <sup>q</sup>		
	Iniezioni	2.00		Iniezioni	1.70		Iniezioni	1.20			
	γ <sub>m</sub> •FC	2.70		γ <sub>m</sub> •FC	2.70		γ <sub>m</sub> •FC	2.70			
	f <sub>vd</sub> = τ <sub>0</sub> d	0.76	daN/cm <sup>q</sup>	f <sub>vd</sub> = τ <sub>0</sub> d	0.18	daN/cm <sup>q</sup>	f <sub>vd</sub> = τ <sub>0</sub> d	0.40	daN/cm <sup>q</sup>		
	f <sub>d</sub> _FRAGILE	22.89	daN/cm <sup>q</sup>	f <sub>d</sub> _FRAGILE	8.81	daN/cm <sup>q</sup>	f <sub>d</sub> _FRAGILE	26.67	daN/cm <sup>q</sup>		
	f <sub>d</sub> _DUTTILE	22.89	daN/cm <sup>q</sup>	f <sub>d</sub> _DUTTILE	8.81	daN/cm <sup>q</sup>	f <sub>d</sub> _DUTTILE	26.67	daN/cm <sup>q</sup>		

RINFORZO CON FIBRA		
Larghezza fascia	300	mm
Spessore fascia	0.254	mm
Asw	76.20	mm2
dist rinforzo dal bordo	100	mm
Es=	190000	MPa
f <sub>s</sub> delam. 1 strato	4930	daN/cm <sup>q</sup>
f <sub>s</sub> delam. 2 strati	3500	daN/cm <sup>q</sup>
e	0.015	
L setto rifer.	4.00	m

$$M_u = \frac{1}{2} I^2 t \sigma_0 \left( 1 - \frac{\sigma_0}{0.85 f_d} \right)$$

ELEM.	VERIFICHE SISMICHE D.M.2008								Geometria			Verifica Pressoflessione nel Piano							RINFORZO CON FIBRE DI ACCIAIO				CARATTERISTICHE MURATURA				
	Sez.	MAT	Sforzo normale	Taglio y	Taglio z	Mom. Torcente	Mom. nel piano	Mom. fuori p.	Spes	Lungh	Altez	C.Vertic	T.Norm		M.Ultim	P.Fless	RATIO	NV			Tpologia rinforzo	resistenza di calcolo a compressione (curva σ-ε) - confinata	coefficiente carichi di lunga durata di fcd per curva σ-ε cls	deformazione plasticizzazione a compressione	deformazione ultima a flessione cls	modulo elastico diagramma σ-ε	
			Fx=N	Fy=V3	Fz=V2	Mx=T	My	Mz	t	L	h	P	σ <sub>0</sub>	a	Mu	VERIF	VERIF										
			KN	KN	KN	KN-m	KN-m	KN-m	cm	cm	cm	kN	daN/cmq	cm	kNm		D/C		Passo fascia [cm]	n°fasce per lato		As per lato [cmq]		fccd[Mpa]	α <sub>cc</sub>	ε <sub>cc4</sub>	ε <sub>ccu</sub>
35	min.	1	-584.50	-20.23	-100.26	-3.42	-39.90	-18.58	60	110	310	584.50	8.86	79.34	89.59	OK	0.45	0.00	100	2.00	1.52	1	2.29	0.85	0.00	0.00	1740
	max.	1	-6.40	36.50	178.10	1.66	42.06	9.75	60	110	310	Tensoinflessio	#VALORE!	#VALORE!	0.00	WARNING	Tensoinflessio	1.00	100	2.00	1.52	1	2.29	0.85	0.00	0.00	1740
37	min.	1	-551.27	-16.43	-196.40	-3.83	-48.20	-28.43	60	110	310	551.27	8.35	74.83	96.93	OK	0.50	0.00	100	2.00	1.52	1	2.29	0.85	0.00	0.00	1740
	max.	1	-56.33	53.19	112.20	3.50	45.15	9.54	60	110	310	56.33	0.85	7.65	28.83	WARNING	1.57	1.00	100	2.00	1.52	1	2.29	0.85	0.00	0.00	1740
48	min.	1	-411.38	-4.89	-166.47	-1.77	-158.67	-3.20	55	108	420	411.38	6.93	60.92	96.84	WARNING	1.64	1.00	100	2.00	1.52	1	2.29	0.85	0.00	0.00	1740
49	min.	1	-439.45	-4.83	-177.21	-6.16	-183.84	-8.13	55	108	420	439.45	7.40	65.08	94.31	WARNING	1.95	1.00	100	2.00	1.52	1	2.29	0.85	0.00	0.00	1740
50	min.	1	-467.96	-11.38	-128.28	-7.54	-151.14	-2.38	55	108	420	467.96	7.88	69.30	90.55	WARNING	1.67	1.00	100	2.00	1.52	1	2.29	0.85	0.00	0.00	1740
51	min.	1	-542.20	-10.90	-131.27	-5.16	-162.55	-10.96	55	108	420	542.20	9.13	80.29	75.11	WARNING	2.16	1.00	100	2.00	1.52	1	2.29	0.85	0.00	0.00	1740
62	min.	1	-403.97	-4.53	-172.02	-3.15	-152.38	-2.15	55	108	420	403.97	6.80	59.82	97.31	WARNING	1.57	1.00	100	2.00	1.52	1	2.29	0.85	0.00	0.00	1740
63	min.	1	-445.40	-3.88	-183.46	-1.93	-163.64	-9.14	55	108	420	445.40	7.50	65.96	93.63	WARNING	1.75	1.00	100	2.00	1.52	1	2.29	0.85	0.00	0.00	1740
71	min.	1	-499.39	-15.68	-142.37	-4.27	-64.76	-14.69	55	108	420	499.39	8.41	73.95	85.01	OK	0.76	0.00	100	2.00	1.52	1	2.29	0.85	0.00	0.00	1740
	max.	1	30.43	24.17	171.41	5.92	47.03	10.19	55	108	420	Tensoinflessio	#VALORE!	#VALORE!	0.00	WARNING	Tensoinflessio	1.00	100	2.00	1.52	1	2.29	0.85	0.00	0.00	1740
74	min.	1	-474.11	-10.98	-174.62	-5.07	-52.64	-6.68	55	108	420	474.11	7.98	70.21	89.58	OK	0.59	0.00	100	2.00	1.52	1	2.29	0.85	0.00	0.00	1740
	max.	1	-15.46	16.62	137.11	5.19	65.10	4.10	55	108	420	15.46	0.26	2.29	8.17	WARNING	7.97	1.00	100	2.00	1.52	1	2.29	0.85	0.00	0.00	1740
86	min.	1	-208.76	-8.93	-126.41	-1.82	-123.05	-4.49	50	108	558	208.76	3.87	34.01	77.23	WARNING	1.59	1.00	100	2.00	1.52	1	2.29	0.85	0.00	0.00	1740
87	min.	1	-256.48	-5.19	-130.46	-4.78	-132.59	-9.39	50	108	558	256.48	4.75	41.78	84.92	WARNING	1.56	1.00	100	2.00	1.52	1	2.29	0.85	0.00	0.00	1740
88	min.	1	-185.86	-25.28	-158.52	-5.66	-126.11	-12.92	50	108	558	185.86	3.44	30.28	72.23	WARNING	1.75	1.00	100	2.00	1.52	1	2.29	0.85	0.00	0.00	1740
89	min.	1	-245.42	-4.79	-156.45	-5.85	-131.89	-3.16	50	108	558	245.42	4.54	39.98	83.47	WARNING	1.58	1.00	100	2.00	1.52	1	2.29	0.85	0.00	0.00	1740
93	min.	1	-424.22	-47.07	-149.79	-4.15	-201.22	-16.12	50	210	458	424.22	4.04	69.10	298.86	OK	0.67	0.00	100	3.00	2.29	1	2.29	0.85	0.00	0.00	1740
	max.	1	-44.35	7.27	163.08	4.56	183.56	30.93	50	210	458	44.35	0.42	7.22	44.97	WARNING	4.08	1.00	100	3.00	2.29	1	2.29	0.85	0.00	0.00	1740
94	min.	1	-486.25	-4.46	-170.81	-5.11	-234.13	-27.19	50	265	458	486.25	3.67	79.21	451.71	OK	0.52	0.00	100	3.00	2.29	1	2.29	0.85	0.00	0.00	1740
	max.	1	-56.35	42.59	155.15	4.65	206.50	29.37	50	265	458	56.35	0.43	9.18	72.08	WARNING	2.86	1.00	100	3.00	2.29	1	2.29	0.85	0.00	0.00	1740
99	min.	1	-204.47	-8.77	-130.04	-1.84	-115.22	-4.49	50	108	558	204.47	3.79	33.31	76.36	WARNING	1.51	1.00	100	2.00	1.52	1	2.29	0.85	0.00	0.00	1740
100	min.	1	-212.17	-5.25	-135.68	-1.86	-118.52	-3.97	50	108	558	212.17	3.93	34.56	77.91	WARNING	1.52	1.00	100	2.00	1.52	1	2.29	0.85	0.00	0.00	1740
109	min.	1	-279.31	-7.78	-107.29	-3.45	-50.77	-8.85	50	108	558	279.31	5.17	45.50	87.29	OK	0.58	0.00	100	2.00	1.52	1	2.29	0.85	0.00	0.00	1740
	max.	1	5.51	24.40	112.74	5.92	35.57	14.46	50	108	558	Tensoinflessio	#VALORE!	#VALORE!	0.00	WARNING	Tensoinflessio	1.00	100	2.00	1.52	1	2.29	0.85	0.00	0.00	1740
112	min.	1	-244.33	-7.48	-113.47	-5.55	-36.38	-7.97	50	108	558	244.33	4.52	39.80	83.32	OK	0.44	0.00	100	2.00	1.52	1	2.29	0.85	0.00	0.00	1740
	max.	1	10.47	24.69	101.85	3.57	48.75	14.67	50	108	558	Tensoinflessio	#VALORE!	#VALORE!	0.00	WARNING	Tensoinflessio	1.00	100	2.00	1.52	1	2.29	0.85	0.00	0.00	1740

CARATTERISTICHE RINFORZO IN ACCIAIO [FASCE]					GEOMETRIA SEZIONE MASCHIO MURARIO					ARMATURA DI RINFORZO						MOMENTO RESISTENTE FLESSIONE SEMPLICE A SLU			SFORZO NORMALE RESISTENTE A		SOLLECITAZIONI DI PROGETTO A PRESSO-		MOMENTO RESISTENTE A PRESSO-FLESSIONE SLU			VERIFICA A PRESSOFLESSIONE NEL PIANO DELLA MURATURA ARMATA			
modulo elastico	resistenza di calcolo	tensione caratteristica di rottura acciaio	tensione caratteristica a snervamento acciaio	deformazione snervamento a trazione	larghezza sezione	altezza sezione	copriferro	altezza netta	baricentro della sezione in CA	numero barre superiori	diametro barre superiori	armatura totale superiore	numero barre inferiori	diametro barre inferiori	armatura totale inferiore	asse neutro effettivo	deformazione armatura superiore	Momento resistente a SLU	Resistenza a compressione	Sforzo Normale resistente a compression	Sforzo Normale agente (+comp -traz.)	Momento flettente agente nel piano	Posizione asse neutro	Momento flettente resistente	Sforzo normale resistente				
Es	f <sub>yd</sub>	f <sub>tk</sub>	f <sub>yk</sub>	ε <sub>sa</sub>	B=S[mm]	H=L[mm]	c'[mm]	h [mm]	yc[mm]	n'φ	φ <sub>f</sub> '	A <sub>f</sub> ' [mmq]	nφ	φ <sub>f</sub>	A <sub>f</sub> [mmq]	xc	ε <sub>f</sub> '	M <sub>rd</sub>	f <sub>ccd</sub> [Mpa]	N <sub>rd,max</sub> [KN]	N <sub>sd</sub> [KN]	M <sub>sd</sub> [KNm]	X <sub>c</sub> [mm]	M <sub>rd</sub> [KNm]	N <sub>rd</sub>	Ceof.sic.	Verifica	RATIO	Elem.
190000	493	493	493	0.02	600	1100	250	850	550	0.00	0.00	152.40	0.00	0.00	152.40	140.40	arm_simm	-	2.29	1434.33	584.50	39.90	532.01	242.17	584.50	6.07	OK	0.16	35
190000	493	493	493	0.02	600	1100	250	850	550	0.00	0.00	152.40	0.00	0.00	152.40	140.40	arm_simm	-	2.29	1434.33	6.40	42.06	143.11	77.31	6.40	1.84	OK	0.54	
190000	493	493	493	0.02	600	1100	250	850	550	0.00	0.00	152.40	0.00	0.00	152.40	140.40	arm_simm	-	2.29	1434.33	551.27	48.20	501.76	237.64	551.27	4.93	OK	0.20	37
190000	493	493	493	0.02	600	1100	250	850	550	0.00	0.00	152.40	0.00	0.00	152.40	140.40	arm_simm	-	2.29	1434.33	56.33	45.15	51.27	74.91	56.33	1.66	OK	0.60	
190000	493	493	493	0.02	550	1080	250	830	540	0.00	0.00	152.40	0.00	0.00	152.40	146.13	arm_simm	-	2.29	1305.93	411.38	158.67	408.48	198.51	411.38	1.25	OK	0.80	48
190000	493	493	493	0.02	550	1080	250	830	540	0.00	0.00	152.40	0.00	0.00	152.40	146.13	arm_simm	-	2.29	1305.93	439.45	183.84	436.35	204.18	439.45	1.11	OK	0.90	49
190000	493	493	493	0.02	550	1080	250	830	540	0.00	0.00	152.40	0.00	0.00	152.40	146.13	arm_simm	-	2.29	1305.93	467.96	151.14	464.66	209.30	467.96	1.38	OK	0.72	50
190000	493	493	493	0.02	550	1080	250	830	540	0.00	0.00	152.40	0.00	0.00	152.40	146.13	arm_simm	-	2.29	1305.93	542.20	162.55	538.37	219.60	542.20	1.35	OK	0.74	51
190000	493	493	493	0.02	550	1080	250	830	540	0.00	0.00	152.40	0.00	0.00	152.40	146.13	arm_simm	-	2.29	1305.93	403.97	152.38	401.12	196.91	403.97	1.29	OK	0.77	62
190000	493	493	493	0.02	550	1080	250	830	540	0.00	0.00	152.40	0.00	0.00	152.40	146.13	arm_simm	-	2.29	1305.93	445.40	163.64	442.26	205.30	445.40	1.25	OK	0.80	63
190000	493	493	493	0.02	550	1080	250	830	540	0.00	0.00	152.40	0.00	0.00	152.40	146.13	arm_simm	-	2.29	1305.93	499.39	64.76	495.86	214.20	499.39	3.31	OK	0.30	71
190000	493	493	493	0.02	550	1080	250	830	540	0.00	0.00	152.40	0.00	0.00	152.40	146.13	arm_simm	-	2.29	1305.93	-30.43	47.03	132.96	61.11	-30.43	1.30	OK	0.77	
190000	493	493	493	0.02	550	1080	250	830	540	0.00	0.00	152.40	0.00	0.00	152.40	146.13	arm_simm	-	2.29	1305.93	474.11	52.64	470.76	210.32	474.11	4.00	OK	0.25	74
190000	493	493	493	0.02	550	1080	250	830	540	0.00	0.00	152.40	0.00	0.00	152.40	146.13	arm_simm	-	2.29	1305.93	15.46	65.10	153.36	77.20	15.46	1.19	OK	0.84	
190000	493	493	493	0.02	500	1080	250	830	540	0.00	0.00	152.40	0.00	0.00	152.40	152.65	arm_simm	-	2.29	1200.87	208.76	123.05	228.01	137.27	208.76	1.12	OK	0.90	86
190000	493	493	493	0.02	500	1080	250	830	540	0.00	0.00	152.40	0.00	0.00	152.40	152.65	arm_simm	-	2.29	1200.87	256.48	132.59	280.14	153.34	256.48	1.16	OK	0.86	87
190000	493	493	493	0.02	500	1080	250	830	540	0.00	0.00	152.40	0.00	0.00	152.40	152.65	arm_simm	-	2.29	1200.87	185.86	126.11	203.00	128.85	185.86	1.02	OK	0.98	88
190000	493	493	493	0.02	500	1080	250	830	540	0.00	0.00	152.40	0.00	0.00	152.40	152.65	arm_simm	-	2.29	1200.87	245.42	131.89	268.06	149.79	245.42	1.14	OK	0.88	89
190000	493	493	493	0.02	500	2100	250	1850	1050	0.00	0.00	152.40	0.00	0.00	152.40	152.65	arm_simm	-	2.29	2193.10	424.22	201.22	463.35	487.02	424.22	2.42	OK	0.41	93
190000	493	493	493	0.02	500	2100	250	1850	1050	0.00	0.00	152.40	0.00	0.00	152.40	152.65	arm_simm	-	2.29	2193.10	44.35	183.56	176.55	184.69	44.35	1.01	OK	0.99	
190000	493	493	493	0.02	500	2650	250	2400	1325	0.00	0.00	152.40	0.00	0.00	152.40	152.65	arm_simm	-	2.29	2728.13	486.25	234.13	531.10	702.52	486.25	3.00	OK	0.33	94
190000	493	493	493	0.02	500	2650	250	2400	1325	0.00	0.00	152.40	0.00	0.00	152.40	152.65	arm_simm	-	2.29	2728.13	56.35	206.50	183.62	251.79	56.35	1.22	OK	0.82	
190000	493	493	493	0.02	500	1080	250	830	540	0.00	0.00	152.40	0.00	0.00	152.40	152.65	arm_simm	-	2.29	1200.87	204.47	115.22	223.33	135.73	204.47	1.18	OK	0.85	99
190000	493	493	493	0.02	500	1080	250	830	540	0.00	0.00	152.40	0.00	0.00	152.40	152.65	arm_simm	-	2.29	1200.87	212.17	118.52	231.74	138.48	212.17	1.17	OK	0.86	100
190000	493	493	493	0.02	500	1080	250	830	540	0.00	0.00	152.40	0.00	0.00	152.40	152.65	arm_simm	-	2.29	1200.87	279.31	50.77	305.07	160.32	279.31	3.16	OK	0.32	109
190000	493	493	493	0.02	500	1080	250	830	540	0.00	0.00	152.40	0.00	0.00	152.40	152.65	arm_simm	-	2.29	1200.87	-5.51	35.57	149.93	68.06	-5.51	1.91	OK	0.52	
190000	493	493	493	0.02	500	1080	250	830	540	0.00	0.00	152.40	0.00	0.00	152.40	152.65	arm_simm	-	2.29	1200.87	244.33	36.38	266.87	149.43	244.33	4.11	OK	0.24	112
190000	493	493	493	0.02	500	1080	250	830	540	0.00	0.00	152.40	0.00	0.00	152.40	152.65	arm_simm	-	2.29	1200.87	-10.47	48.75	147.52	66.34	-10.47	1.36	OK	0.73	



1.1.3 VERIFICA A PRESSO FLESSIONE FUORI PIANO DEI MASCHI MURARI

DATI MATERIALI E RESISTENZE CARATTERISTICHE- MURATURA RINFORZATA											
Livelli di Conoscenza Resistenza Caratteristica a Compres Resistenza a taglio puro Coefficiente di Sicurezza Modulo Elastico Secante Normale Modulo Elastico Secante Tangenziale	1-Muratura a conci sbozzati, con			2- Muratura in pietra tenera -			3- Muratura a blocchi lapidei				
	FC	1.35		FC	1.35		FC	1.35			
	f <sub>m</sub>	30.90	daN/cm <sup>q</sup>	f <sub>m</sub>	14.00	daN/cm <sup>q</sup>	f <sub>m</sub>	60.00	daN/cm <sup>q</sup>		
	τ <sub>0</sub>	1.02	daN/cm <sup>q</sup>	τ <sub>0</sub>	0.28	daN/cm <sup>q</sup>	τ <sub>0</sub>	0.90	daN/cm <sup>q</sup>		
	γ <sub>m</sub>	2.00		γ <sub>m</sub>	2.00		γ <sub>m</sub>	2.00			
	E	17400	daN/cm <sup>q</sup>	E	10800	daN/cm <sup>q</sup>	E	28000	daN/cm <sup>q</sup>		
	G	5800	daN/cm <sup>q</sup>	G	3600	daN/cm <sup>q</sup>	G	8600	daN/cm <sup>q</sup>		
	Iniezioni	2.00		Iniezioni	1.70		Iniezioni	1.20			
	γ <sub>m</sub> *FC	2.70		γ <sub>m</sub> *FC	2.70		γ <sub>m</sub> *FC	2.70			
	f <sub>vd</sub> = τ <sub>0</sub> d	0.76	daN/cm <sup>q</sup>	f <sub>vd</sub> = τ <sub>0</sub> d	0.18	daN/cm <sup>q</sup>	f <sub>vd</sub> = τ <sub>0</sub> d	0.40	daN/cm <sup>q</sup>		
	f <sub>d</sub> _FRAGILE	22.89	daN/cm <sup>q</sup>	f <sub>d</sub> _FRAGILE	8.81	daN/cm <sup>q</sup>	f <sub>d</sub> _FRAGILE	26.67	daN/cm <sup>q</sup>		
	f <sub>d</sub> _DUTTILE	22.89	daN/cm <sup>q</sup>	f <sub>d</sub> _DUTTILE	8.81	daN/cm <sup>q</sup>	f <sub>d</sub> _DUTTILE	26.67	daN/cm <sup>q</sup>		

$$M_u = \frac{Nt}{2} \left( 1 - \frac{N}{0.85f_dlt} \right) = \frac{\sigma_0lt^2}{2} \cdot \left( 1 - \frac{\sigma_0}{0.85f_d} \right)$$

RINFORZO CON FIBRA		
Larghezza fascia	300	mm
Spessore fascia	0.254	mm
Asw	76.20	mm2
dist rinforzo dal bordo	100	mm
Es=	190000	MPa
fsdelam. 1 strato	4930	daN/cm <sup>q</sup>
fsdelam. 2 strati	3500	daN/cm <sup>q</sup>
e	0.015	
L setto rifer.	4.00	m

VERIFICHE SISMICHE D.M.2008									Geometria			Verifica Pressoflessione Fuori Piano							RINFORZO CON FIBRE DI ACCIAIO				CARATTERISTICHE MURATURA				
ELEM.	Sez.	MAT	Sforzo normale	Taglio y	Taglio z	Mom. Torcente	Mom. nel piano	Mom. fuori p.	Spes	Lungh	Altez	C.Vertic	Param	Param	M.Ultimo	P.Fless	RATIO	NV	Passo fascia [cm]	n*fascie per lato	As per lato [cmq]	Tpologia rinforzo	resistenza di calcolo a compressione (curva σ-ε)-confinata	coefficiente carichi di lunga durata di fcd per curva σ-ε cls	deformazione plasticizzazioe a compressione	deformazione ultima a flessione cls confinato	modulo elastico diagramma σ-ε
			Fx=N	Fy=V3	Fz=V2	Mx=T	My	Mz	t	L	h	P	n	m	Mu	VERIF	VERIF						fccd[Mpa]	αcc	εc4	εccu	Ec
			KN	KN	KN	KN-m	KN-m	KN-m	cm	cm	cm	kN	daN/cm <sup>q</sup>	cm	kNm		D/C										
49	min.	1	-439.45	-4.83	-177.21	-6.16	-183.84	-8.13	55	108	420	439.45	0.60	0.72	48.03	OK	0.17	49	100	2	1.52	1	2.29	0.85	0.0020	0.0035	1740.0
	max.	1	-0.52	6.61	199.26	2.02	166.68	3.25	55	108	420	0.52	0.00	0.00	0.14	WARNING	22.74		100	2	1.52	1	2.29	0.85	0.0020	0.0035	1740.0
63	min.	1	-445.4	-3.88	-183.46	-1.93	-163.64	-9.14	55	108	420	445.40	0.61	0.71	47.68	OK	0.19	63	100	2	1.52	1	2.29	0.85	0.0020	0.0035	1740.0
	max.	1	-1.35	6.75	174.3	6.89	167.68	3.36	55	108	420	1.35	0.00	0.01	0.37	WARNING	9.07		100	2	1.52	1	2.29	0.85	0.0020	0.0035	1740.0
66	min.	1	-621.97	-15.35	-200.62	-8.58	-107.95	-10.73	55	155	420	621.97	0.59	0.72	69.40	OK	0.15	66	100	2	1.52	1	2.29	0.85	0.0020	0.0035	1740.0
	max.	1	27.35	16.66	159.28	8.51	107.99	10.47	55	155	420	27.35	0.03	0.08	7.32	WARNING	1.43		100	2	1.52	1	2.29	0.85	0.0020	0.0035	1740.0
71	min.	1	-499.39	-15.68	-142.37	-4.27	-64.76	-14.69	55	108	420	499.39	0.68	0.65	43.29	OK	0.34	71	100	2	1.52	1	2.29	0.85	0.0020	0.0035	1740.0
	max.	1	30.43	24.17	171.41	5.92	47.03	10.19	55	108	420	30.43	0.04	0.12	8.02	WARNING	1.27		100	2	1.52	1	2.29	0.85	0.0020	0.0035	1740.0
86	min.	1	-208.76	-8.93	-126.41	-1.82	-123.05	-4.49	50	108	558	208.76	0.31	0.65	35.76	OK	0.13	86	100	2	1.52	1	2.29	0.85	0.0020	0.0035	1740.0
	max.	1	0.82	5.35	134.13	1.74	119.04	3.93	50	108	558	0.82	0.00	0.00	0.20	WARNING	19.19		100	2	1.52	1	2.29	0.85	0.0020	0.0035	1740.0
87	min.	1	-256.48	-5.19	-130.46	-4.78	-132.59	-9.39	50	108	558	256.48	0.39	0.71	39.32	OK	0.24	87	100	2	1.52	1	2.29	0.85	0.0020	0.0035	1740.0
	max.	1	5.83	18.99	150.52	1.66	126.91	5.27	50	108	558	5.83	0.01	0.03	1.44	WARNING	3.65		100	2	1.52	1	2.29	0.85	0.0020	0.0035	1740.0
89	min.	1	-245.42	-4.79	-156.45	-5.85	-131.89	-3.16	50	108	558	245.42	0.37	0.70	38.64	OK	0.08	89	100	2	1.52	1	2.29	0.85	0.0020	0.0035	1740.0
	max.	1	-22.34	26.24	161.3	5.69	128.28	12.93	50	108	558	22.34	0.03	0.10	5.40	WARNING	2.40		100	2	1.52	1	2.29	0.85	0.0020	0.0035	1740.0
93	min.	1	-424.22	-47.07	-149.79	-4.15	-201.22	-16.12	50	210	458	424.22	0.33	0.66	71.16	OK	0.23	93	100	3	2.29	1	2.29	0.85	0.0020	0.0035	1740.0
	max.	1	-44.35	7.27	163.08	4.56	183.56	30.93	50	210	458	44.35	0.03	0.10	10.71	WARNING	2.89		100	3	2.29	1	2.29	0.85	0.0020	0.0035	1740.0
97	min.	1	-510.74	-25.06	-344.96	-5.78	-245.11	-20.52	50	270	558	510.74	0.31	0.64	88.34	OK	0.23	97	100	3	2.29	1	2.29	0.85	0.0020	0.0035	1740.0
	max.	1	-23.36	12.48	327.99	5.03	185.75	13.07	50	270	558	23.36	0.01	0.04	5.76	WARNING	2.27		100	3	2.29	1	2.29	0.85	0.0020	0.0035	1740.0
99	min.	1	-204.47	-8.77	-130.04	-1.84	-115.22	-4.49	50	108	558	204.47	0.31	0.64	35.35	OK	0.13	99	100	2	1.52	1	2.29	0.85	0.0020	0.0035	1740.0
	max.	1	-2.38	5.16	128.2	1.74	118.12	4.02	50	108	558	2.38	0.00	0.01	0.59	WARNING	6.78		100	2	1.52	1	2.29	0.85	0.0020	0.0035	1740.0
100	min.	1	-212.17	-5.25	-135.68	-1.86	-118.52	-3.97	50	108	558	212.17	0.32	0.65	36.07	OK	0.11	100	100	2	1.52	1	2.29	0.85	0.0020	0.0035	1740.0
	max.	1	-5.56	8.43	127.4	2.39	123.19	4.58	50	108	558	5.56	0.01	0.02	1.38	WARNING	3.32		100	2	1.52	1	2.29	0.85	0.0020	0.0035	1740.0
109	min.	1	-279.31	-7.78	-107.29	-3.45	-50.77	-8.85	50	108	558	279.31	0.42	0.73	40.41	OK	0.22	109	100	2	1.52	1	2.29	0.85	0.0020	0.0035	1740.0
	max.	1	5.51	24.4	112.74	5.92	35.57	14.46	50	108	558	5.51	0.01	0.02	1.37	WARNING	10.59		100	2	1.52	1	2.29	0.85	0.0020	0.0035	1740.0
112	min.	1	-244.33	-7.48	-113.47	-5.55	-36.38	-7.97	50	108	558	244.33	0.37	0.70	38.57	OK	0.21	112	100	2	1.52	1	2.29	0.85	0.0020	0.0035	1740.0
	max.	1	10.47	24.69	101.85	3.57	48.75	14.67	50	108	558	10.47	0.02	0.05	2.58	WARNING	5.69		100	2	1.52	1	2.29	0.85	0.0020	0.0035	1740.0
114	min.	1	-829.81	-234.32	-446.77	-4.29	-294.02	-146.73	50	1055	240	829.81	0.13	0.34	180.87	OK	0.81	114	100	11	8.38	1	2.29	0.85	0.0020	0.0035	1740.0
	max.	1	-52.89	224.75	398.15	5.35	410.72	54.22	50	1055	240	52.89	0.01	0.02	13.11	WARNING	4.13		100	11	8.38	1	2.29	0.85	0.0020	0.0035	1740.0

CARATTERISTICHE RINFORZO IN ACCIAIO [FASCE]					GEOMETRIA SEZIONE MASCHIO MURARIO					ARMATURA DI RINFORZO						MOMENTO RESISTENTE FLESSIONE SEMPLICE A SLU			SFORZO NORMALE RESISTENTE A COMPRESSIONE		SOLLECITAZIONI DI PROGETTO A PRESSO-		MOMENTO RESISTENTE A PRESSO-FLESSIONE SLU			VERIFICA A PRESSOFLESSIONE FUORI PIANO DELLA MURATURA ARMATA			
modulo elastico	resistenza di calcolo	tensione caratteristica di rottura acciaio	tensione caratteristica a snervamento acciaio	deformazione snervamento a trazione	larghezza sezione	altezza sezione	copriferro	altezza netta	baricentro della sezione in CA	numero barre superiori	diametro barre superiori	armatura totale superiore	numero barre inferiori	diametro barre inferiori	armatura totale inferiore	asse neutro effettivo	deformazione armatura superiore	Momento resistente a SLU	Resistenza a compressione centrata CLS confinato	Sforzo Normale resistente a compressione semplice	Sforzo Normale agente (+comp - traz.)	Momento flettente agente fuori piano	Posizione asse neutro	Momento flettente resistente	Sforzo normale resistente				
Es	f <sub>yd</sub>	f <sub>tk</sub>	f <sub>yk</sub>	ε <sub>ea</sub>	B=L[mm]	H=Smm]	c'[mm]	h [mm]	yc[mm]	n'φ	φ'	Af' [mmq]	nφ	φf	Af[mmq]	xc	εf'	Mrd	f <sub>ccd</sub> [Mpa]	N <sub>rd,max</sub> [kN]	N <sub>sd</sub> [kN]	M <sub>sd</sub> [kNm]	X <sub>c</sub> [mm]	Mrd [kNm]	N <sub>rd</sub>	Ceof.sic.	Verifica	RATIO	Elem.
190000	493	493	493	1.50%	1080	550	0.1	550	275	0	0	152.40	0	0	152.40	0.38	arm_simm	-	2.29	1306	439	8.13	222	123.1	439.5	15.1	OK	0.07	49
190000	493	493	493	1.50%	1080	550	0.1	550	275	0	0	152.40	0	0	152.40	0.38	arm_simm	-	2.29	1306	1	3.25	0	41.5	0.5	12.8	OK	0.08	
190000	493	493	493	1.50%	1080	550	0.1	550	275	0	0	152.40	0	0	152.40	0.38	arm_simm	-	2.29	1306	445	9.14	225	123.7	445.4	13.5	OK	0.07	
190000	493	493	493	1.50%	1080	550	0.1	550	275	0	0	152.40	0	0	152.40	0.38	arm_simm	-	2.29	1306	1	3.36	0	41.7	1.4	12.4	OK	0.08	63
190000	493	493	493	1.50%	1550	550	0.1	550	275	0	0	152.40	0	0	152.40	0.37	arm_simm	-	2.29	1809	622	10.73	219	157.8	622.0	14.7	OK	0.07	
190000	493	493	493	1.50%	1550	550	0.1	550	275	0	0	152.40	0	0	152.40	0.37	arm_simm	-	2.29	1809	-27	10.47	0	33.8	-27.4	3.2	OK	0.31	
190000	493	493	493	1.50%	1080	550	0.1	550	275	0	0	152.40	0	0	152.40	0.38	arm_simm	-	2.29	1306	499	14.69	253	128.2	499.4	8.7	OK	0.11	71
190000	493	493	493	1.50%	1080	550	0.1	550	275	0	0	152.40	0	0	152.40	0.38	arm_simm	-	2.29	1306	-30	10.19	0	32.9	-30.4	3.2	OK	0.31	
190000	493	493	493	1.50%	1080	500	0.1	500	250	0	0	152.40	0	0	152.40	0.38	arm_simm	-	2.29	1201	209	4.49	92	83.0	208.8	18.5	OK	0.05	
190000	493	493	493	1.50%	1080	500	0.1	500	250	0	0	152.40	0	0	152.40	0.38	arm_simm	-	2.29	1201	-1	3.93	0	37.3	-0.8	9.5	OK	0.11	86
190000	493	493	493	1.50%	1080	500	0.1	500	250	0	0	152.40	0	0	152.40	0.38	arm_simm	-	2.29	1201	256	9.39	130	88.4	256.5	9.4	OK	0.11	
190000	493	493	493	1.50%	1080	500	0.1	500	250	0	0	152.40	0	0	152.40	0.38	arm_simm	-	2.29	1201	-6	5.27	0	36.1	-5.8	6.8	OK	0.15	
190000	493	493	493	1.50%	1080	500	0.1	500	250	0	0	152.40	0	0	152.40	0.38	arm_simm	-	2.29	1201	245	3.16	124	86.7	245.4	27.4	OK	0.04	89
190000	493	493	493	1.50%	1080	500	0.1	500	250	0	0	152.40	0	0	152.40	0.38	arm_simm	-	2.29	1201	22	12.93	1	43.1	22.3	3.3	OK	0.30	
190000	493	493	493	1.50%	2100	500	0.1	500	250	0	0	228.60	0	0	228.60	0.37	arm_simm	-	2.29	2268	424	16.12	110	143.7	424.2	8.9	OK	0.11	
190000	493	493	493	1.50%	2100	500	0.1	500	250	0	0	228.60	0	0	228.60	0.37	arm_simm	-	2.29	2268	44	30.93	3	67.4	44.4	2.2	OK	0.46	93
190000	493	493	493	1.50%	2700	500	0.1	500	250	0	0	228.60	0	0	228.60	0.37	arm_simm	-	2.29	2852	511	20.52	103	162.9	510.7	7.9	OK	0.13	
190000	493	493	493	1.50%	2700	500	0.1	500	250	0	0	228.60	0	0	228.60	0.37	arm_simm	-	2.29	2852	23	13.07	1	62.2	23.4	4.8	OK	0.21	
190000	493	493	493	1.50%	1080	500	0.1	500	250	0	0	152.40	0	0	152.40	0.38	arm_simm	-	2.29	1201	204	4.49	90	82.2	204.5	18.3	OK	0.05	97
190000	493	493	493	1.50%	1080	500	0.1	500	250	0	0	152.40	0	0	152.40	0.38	arm_simm	-	2.29	1201	2	4.02	0	38.1	2.4	9.5	OK	0.11	
190000	493	493	493	1.50%	1080	500	0.1	500	250	0	0	152.40	0	0	152.40	0.38	arm_simm	-	2.29	1201	212	3.97	94	83.6	212.2	21.1	OK	0.05	
190000	493	493	493	1.50%	1080	500	0.1	500	250	0	0	152.40	0	0	152.40	0.38	arm_simm	-	2.29	1201	6	4.58	0	38.9	5.6	8.5	OK	0.12	100
190000	493	493	493	1.50%	1080	500	0.1	500	250	0	0	152.40	0	0	152.40	0.38	arm_simm	-	2.29	1201	279	8.85	141	91.6	279.3	10.4	OK	0.10	
190000	493	493	493	1.50%	1080	500	0.1	500	250	0	0	152.40	0	0	152.40	0.38	arm_simm	-	2.29	1201	-6	14.46	0	36.2	-5.5	2.5	OK	0.40	
190000	493	493	493	1.50%	1080	500	0.1	500	250	0	0	152.40	0	0	152.40	0.38	arm_simm	-	2.29	1201	244	7.97	124	86.6	244.3	10.9	OK	0.09	112
190000	493	493	493	1.50%	1080	500	0.1	500	250	0	0	152.40	0	0	152.40	0.38	arm_simm	-	2.29	1201	-10	14.67	0	34.9	-10.5	2.4	OK	0.42	
190000	493	493	493	1.50%	10550	500	0.1	500	250	0	0	838.20	0	0	838.20	0.37	arm_simm	-	2.29	11089	830	146.73	36	404.2	829.8	2.8	OK	0.36	
190000	493	493	493	1.50%	10550	500	0.1	500	250	0	0	838.20	0	0	838.20	0.37	arm_simm	-	2.29	11089	53	54.22	1	219.7	52.9	4.1	OK	0.25	114