Unreinforced Masonry

ACI 530-05, section 2.2.3

8" thick CMU wall grouted at 16" o.c. (no reinforcing)

	A(avg)	65.8	in^2
	I(avg)	387.1	in^4
	r(avg)	2.43	in
	A(net)	62	in^2
	I(net)	378.6	in^4
	S(net)	99.3	in^3

8" thick CMU wall grouted at 8" o.c. (no reinforcing)

	A(avg)	91.5	in^2
	I(avg)	443.3	in^4
	r(avg)	2.2	in
	A(net)	91.5	in^2
	I(net)	443.3	in^4
	S(net)	116.3	in^3
f'm	assumed	1500	psi
Em	900f'm =	1350000	psi (based on f'm = 1500 psi)
e		2	in

For members having an h/r ratio NOT greater than 99

h	12	ft	
h/r	59		
h/r	65		
Fa	308	psi	grouted at 16" o.c.
Fa	293	psi	grouted at 8" o.c.
Fb	500	psi	f'm / 3

With Axial Load only - (i.e. e = 0 and fb = 0)

Pa	**19084**	lbs	grouted at 16" o.c. - based on A(net)
Pa	**26812**	lbs	grouted at 8" o.c. - based on A(net)

With Axial plus bending due to e > 0

Use fa/Fa + fb/Fb <=1.0 with fa = Pa/An and fb = 2Pa/Sn

Pa	**10789**	lbs	grouted at 16" o.c.
Unity	0.9999		
Pa	**13948**	lbs	grouted at 8" o.c.
Unity	0.9999		

Therefore - walls with full grout (8" o.c.) take more load than walls with grout at 16" o.c.

For members having an h/r ratio greater than 99

h	20	ft	use to get h/r > 99
h/r	99		grouted at 16" o.c.
h/r	109		grouted at 8" o.c.
Fa	188	psi	grouted at 16" o.c.
Fa	154	psi	grouted at 8" o.c.
Fb	500	psi	f'm / 3

With Axial Load only - (i.e. e = 0 and fb = 0)

Pa	11679	lbs	grouted at 16" o.c. - based on A(net)	
Pa	14128	lbs	grouted at 8" o.c. - based on A(net)	
Pe	87577	lbs	grouted at 16" o.c.	with e = 0
Pe	102544	lbs	grouted at 8" o.c.	with e = 0

With Axial plus bending due to e > 0

Use fa/Fa + fb/Fb <=1.0 with fa = Pa/An and fb = 2Pa/Sn

Pa	**7942**	lbs	grouted at 16" o.c.
Unity	0.9999		
Pa	**9507**	lbs	grouted at 8" o.c.
Unity	0.9999		
Pe	**12680**	lbs	grouted at 16" o.c.
Pe	**102544**	lbs	grouted at 8" o.c.

Controlling Axial Load equals the lesser of Pa or Pe

Max Pa	**7942**	lbs	grouted at 16" o.c.
Max Pa	**9507**	lbs	grouted at 8" o.c.

Therefore - walls with full grout (8" o.c.) take more load than walls with grout at 16" o.c.