

Volume, Mass, and Specific Heat Calculations with Equivalent Heating Capabilities

Specific heat of Cement:	1.55	kJ/kg K						
Specific heat of Steel:	0.49	kJ/kg K						
Specific heat of Water:	4.187	kJ/kg K						
Boiling Temperature of Water:	100	°C						
Density of Water:	1	kg/l						
Density of Cement:	1.51	g/cm3						
Density of Rebar/Steel:	7.85	g/cm3						
Volume of Cement in TSU:	15749	cm3					Steel Structures:	
Volume of Steel in TSU:	1921	cm3						
Total Volume in TSU:	17670	cm3					Rebar Diameter:	1.27 cm
Volume of Cavity:	1257	cm3					Rebar Volume:	163 cm3
Total Volume of Mold:	18927	cm3					Plate Volume:	1039 cm3
							Pipe Volume:	180 cm3
Weight of Cement in TSU:	23.8	kg					End Cap Volume:	539 cm3
Weight of Steel in TSU:	15.1	kg					Total Volume:	1921 cm3
Total Weight:	38.9	kg						
Energy Requirements								
Cement:	36.9	kJ/K						
Steel:	7.4	kJ/K						
Total for TSU:	36.9	kJ/K						
Specific Heat of TSU:	0.95	kJ/kg K						
E to Increase TSU 20°C to 100°C	2949	kJ						
E to Increase TSU 100°C to 200°C	3686	kJ						
Mass of Water Which Could be Boiled Through Reducing TSU Temperature from 200°C to 100°C (100% Efficiency)	8.8	kg						
Equivalent Volume:	8.8	liters						
Mass of Water Which Could be Boiled Through Reducing TSU Temperature from 200°C to 100°C (50% Efficiency)	4.4	kg						
Equivalent Volume:	4.4	liters						
Best Fit Eq. from Exp. Data	Inverse Equation							
$y = 1685.4x - 1.729$	$x = (y/1685.4) - (1/1.729)$							
Time to Drop from 200°C to 100°C	1.69	hours						