

leader Information									
Manufacturer:		G	E		Da	te Tested:		07-1	7-2020
Model Number:		40T-12				nple Rec.:			7-2020
Serial Number:		PRO				Station #:			eland - 3
Test Procedure:	Do	OE UEF 2	4h (Storag	ge)	Heating	Medium:		Nat	LP gas
Software Version		2.15.1	031.19			Operator:			y Cocit
Data File Name:		2,10,1	001.17	LIEESIM		GE3-1105	Report c		<i>y</i> 20 0 10
Report File Name:									
Report The Name.				UEFSIM	.gas51-5-0	GE3-1105	_ Ke port.xi	.SX	
-Hour Test Data Inputs									
Draw		1	2	3	4	5	6	7	
Draw duration [h	h·mm·ssl	_	0:01:58	0:00:58	0:05:12	0:04:54	0:02:52	0:00:58	
Volume Dra		26.93	1.98	0.00.38	8.96	14.93	4.97	0.98	
Minimum Flow Ra		2.97	0.94	0.93	1.66	2.95	1.66	0.94	
Maximum Flow Ra		3.04	1.02	1.03	1.73	3.05	1.74	1.03	
Inlet water temperature		57.66	57.89	57.97	57.77	57.63	57.72	57.83	
Inlet water temperature	max. [°F]	57.75	57.92	58.00	57.85	57.70	57.77	57.87	
Inlet water temperature	avg. [°F]	57.69	57.91	57.98	57.81	57.67	57.74	57.85	
Minimum outlet	temp.[°F]	97.94	110.20	121.93	106.10	112.25	111.29	117.81	
Maximum outlet t		125.17	137.88	129.01	131.21	131.24	139.84	140.55	
Average outlet t		123.88	132.91	128.33	129.54	130.55	138.64	138.35	
Average temp.		66.19	75.01	70.35	71.73	72.88	80.89	80.50	
nsity of Water at point wh measured, ρ		8.24	8.22	8.23	8.23	8.23	8.21	8.21	
Mass of Water Drawr	n. M: [lbs]	221.96	16.28	8.07	73.74	122.84	40.80	8.05	
Specific Heat of Water									
(Tdel,i + Tin,i/2) C _{pi} [I	Btu/lb-°F]	0.9986	0.9985	0.9986	0.9985	0.9985	0.9985	0.9985	
Cut out to cut out da	ta	1	2	3	4	5	6	7	
Duration [h		0:28:39	0:06:03	0:08:19	1:10:37	8:54:56	0:49:24	0:24:53	
Corrected Gas Consumpti		17.48	2.12	1.26	8.55	15.03	4.90	1.26	
Electrical Consumpti		0.00	0.00	0.00	0.00	0.00	0.00	0.00	
·	er CF Avg		0.9809	0.9818	0.9824	0.9840	0.9838	0.9841	
Dry Heating Value		1081.9	1081.5	1081.2	1081.0	1081.7	1081.8	1081.9	
Baromete			29.19	29.19	29.19	29.18	29.18	29.19	
Gas Meter Pressure									
		10.39	9.88	10.40	10.56	10.77	10.64	10.68	
	Γemp [°F]	68.12	68.70	68.90	68.78	67.94	67.98	68.01	
Uncorrected Gas Co		17.83	2.16	1.28	8.71	15.30	4.99	1.28	
leter Correction Factor (sat	urated to dry)	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	
HHV [Btu/ft ³ @ 60 °F, 30 in	. Hg, dry]	1082	1082	1081	1081	1082	1082	1082	
Q	Gas [Btu]	18912	2293	1362	9243	16257	5301	1363	
	ical [Btu]	0	0	0	0	0	0	0	
Q LICCII									

9243

16257

5301

1363

18912

Q Total [Btu]

2293

1362

Draw	8	9	10	11	12	13	14	Total	
Draw duration [hh:mm:ss]	0:00:57	0:00:58	0:01:57	0:01:58	0:01:08	0:01:08	0:04:34	0:38:26	
Water Consumed [gal.]	0.98	0.98	1.97	1.98	1.96	1.96	13.92		
Min. Flow Rate [GPM]	0.95	0.91	0.94	0.93	1.63	1.64	2.96		
Max. Flow Rate [GPM]	1.02	1.04	1.03	1.03	1.73	1.75	3.05		
Inlet water temperature min. [°F]	57.86	57.93	57.77	57.89	57.80	57.78	57.72		
Inlet water temperature max. [°F]	57.88	57.95	57.83	57.94	57.82	57.81	57.77		
Inlet water temperature avg. [°F]	57.87	57.95	57.80	57.92	57.81	57.79	57.74		
Min. outlet temp. [°F]	108.62	135.85	86.99	127.55	57.81	131.59	136.57		
Max. outlet temp. [°F]	139.74	140.89	137.76	139.89	141.80	143.29	144.70		
Avg. outlet temp. [°F]	136.50	140.41	135.08	139.24	141.14	142.48	143.06		
Avg. temp. delta [°F]	78.63	82.46	77.28	81.32	83.33	84.69	85.32		
Density of Water at point where Vol is	8.21	8.20	8.22	8.21	8.20	8.20	8.20		
measured, ρ _i [lbs/gal]	0.21	8.20	0.22	0.21	8.20	6.20	8.20		
Mass of Water Drawn, M _i [lbs]	8.05	8.04	16.19	16.25	16.08	16.07	114.11		
Specific Heat of Water Drawn, C _{pi}	0.9985	0.9985	0.9985	0.9985	0.9985	0.9985	0.9985		
[Btu/lb-°F]									
Cut out to cut out data	8	9	10	11	12	13	14	15	16
Duration [hh:mm:ss]	0:44:51	0:05:05	3:11:09	0:15:17	0:14:26	0:14:59	0:29:02	6:42:11	10
Corrected Gas Consumption [ft ³]	1.39	1.10	3.11.03	2.11	1.97	1.99	10.78	2.94	0.00
Electrical Consumption [Whr]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gas Meter CF Avg	0.9850	0.9843	0.9861	0.9870	0.9869	0.9870	0.9856	0.9877	
Dry Heating Value [Btu/ft3]	1082.0	1081.8	1082.5	1083.0	1083.2	1083.3	1083.3	1083.5	
Barometer [in h.g]	29.21	29.21	29.24	29.27	29.27	29.27	29.27	29.29	
Gas Meter Pressure [in w.c.]	10.75	10.17	10.80	10.53	10.50	10.59	10.09	10.82	
Gas Temp [°F]		67.62	67.87	67.61	67.61	67.66	67.84	67.99	
Uncorrected Gas Cons. [ft3]	1.41	1.12	3.22	2.14	2.00	2.02	10.94	2.98	
Meter Correction Factor (saturated to dry)	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
HHV [Btu/ft ³ @ 60 °F, 30 in. Hg, dry]	1082	1082	1082	1083	1083	1083	1083	1083	0
Q Gas [Btu]		1192	3437	2287	2138	2160	11680	3189	0
Q Electrical [Btu]		0	0	0	0	0	0	0	0
Q Total [Btu]		1192	3437	2287	2138	2160	11680	3189	0
24hr Test Conditions									
	M	[easureme	ent	Min.	Max.	Check	Unit		
	Min.	Max.	Avg.						
Inlet temperature	57.63	58.00	n/a	56.00	60.00	TRUE	°F		
Total water withdrawn			83.48	83.00	85.00	TRUE	gall.		
Relative Humidity(Heat Pump Only)	0.00	0.00	0.00	48.00	52.00	N/A	%		
Ambient Room	67.17	69.03	67.67	65.00	70.00	TRUE	° F		

Measured Storage Volume, V _{st} 38.35 gall. 3.2 Recovery Efficiency Draw # that the first recovery period ended, ftp Mean tank temperature at the start of the 42th rest, T _{st} 32.38 °F Max Mean Tank Temp after Cut-out following 1st recovery period, T _{start} Density of stored hot where, ro. 2 Specific heat of stored water, Q _{st} Specific heat of stored water, Q _{st} Specific heat of stored water, Q _{st} Specific heat of withdrawn water during the first recovery period, QF1_avg average water outlet temperature from the start of the 24th rest to the end of the first recovery period, QF1_avg average water outlet temperature from the start of the 24th rest to the end of the first recovery period, Tel_1avg average water inlet temperature from the start of the 24th rest to the end of the first recovery period, Tel_1avg average water inlet temperature from the start of the 24th rest to the end of the first recovery period, Tel_1avg average water inlet temperature from the start of the 24th rest to the end of the first recovery period, Tel_1avg average water inlet temperature from the start of the 24th rest to the end of the first draw cluster, Q_sub MCG ₁ (T ₁ , T ₁ , T ₂ , T ₂), (V ₂ , V ₂ , C ₁ , T ₁ , T ₂ , T ₃) Recovery Efficiency, n ₁ 7, — (M, C ₂ , (T ₁ , T ₂ , T ₃ , T ₃)), (V ₂ , V ₂ , C ₁ , T ₁ , T ₂ , T ₃ , T ₃) Recovery Efficiency, n ₁ 7, — (M, C ₂ , (T ₁ , T ₂ , T ₃ , T ₃)), (V ₂ , V ₂ , C ₁ , T ₂ , T ₃ , T ₃) Recovery Efficiency, n ₁ 7, — (M, C ₂ , (T ₁ , T ₂ , T ₃ , T ₃ , T ₃) Recovery Efficiency, n ₁ 7, — (M, C ₂ , (T ₁ , T ₂ , T ₃ , T	SIMUSAGE UEF STORAGE WATER HEATER Draw Pattern: High-Usage Heat 123.592 P gas	1	
Measured Storage Volume, V _{st} 38.35 gall. 38.36 gall. 38.36 gall. 38.36 gall. Mean tank temperature at the start of the 24hr test. T _{st} Max Mean Tank Temp after Cut-out following 1st recovery period ended, frp. Max Mean Tank Temp after Cut-out following 1st recovery period, Prost. Density of stored hot whee, rp. o. 2 Specific heat of stored wate? C _{st} Specific heat of stored wate? C _{st} Specific heat of stored wate? C _{st} Mass removed during the first recovery period, Prost. Mass removed during the first recovery period, Prost. Mass removed during the first recovery period, Prost. Specific heat of withdrawn water during the first recovery period, Prost. Specific heat of withdrawn water during the first recovery period, Prost. Specific heat of withdrawn water during the first recovery period, Prost. Specific heat of withdrawn water during the first recovery period, Prost. Specific heat of withdrawn water during the first recovery period, Prost. Specific heat of withdrawn water during the first recovery period, Prost. Specific heat of withdrawn water during the first recovery period, Prost. Specific heat of withdrawn water during the first recovery period, Prost. Specific heat of withdrawn water during the first recovery period, Prost. Specific heat of the first fraw duster, Q _s with the special prost. Specific heat of the first fraw duster, Q _s with the special prost. Specific heat of the first fraw duster, Q _s with the special prost. Specific heat of the standby test, Q _s with the special prost. Specific heat of stored his water, p _s special prost. Specific heat of stored his water, p _s special his prost. Specific heat of stored his water, p _s special his prost. Specific heat of stored his water, p _s special his prost. Specific heat of stored his water, p _s special his prost. Special prost. Specific heat of stored his water, p _s special his prost. Special prost. Specific heat of stored his water, p _s special his prost. Special prost. Special prost. Special pr		-	
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Draw if that the first recovery period ended, froid Mean Tank Temperature at the standy the 24hr test, $T_{col.} = T_{col.} = T_{co$		38.35	gall.
Mean tank temperature at the start of the 24hr test, T_a 123.88 F Max Mean Tank Temp after CU-out following is the recovery period, T_max. 123.51			1
Max Mean Tank Temp after Cut-out following 1st recovery period, T_{anacl} 13.3.51 F. Density of stored hot water, t_{total} 28.24 Ibs/gall. Specific heat of stored water- t_{total} 39.89 Bttl/lb** Total Energy Used from the start of the 24hr test and following first recovery period, t_{total} 29.99 Bttl/lb** Mass removed during the first recovery period, t_{total} 21.996 Ibs Specific Heat of withdrawn water during the first recovery period, t_{total} 21.996 Ibs Specific Heat of withdrawn water during the first recovery period, t_{total} 39.80 F. average water outlet temperature from the start of the 24hr test to the end of the first recovery period, t_{total} 39.80 F. average water inlet temperature from the start of the 24hr test to the end of the first recovery period, t_{total} 39.80 F. t_{total} 39.80 F. t_{total} 40.80 F. Becovery Efficiency, t_{total} 40.70 F. Recovery Efficiency, t_{total} 40.70 F. Recovery Efficiency, t_{total} 57.69 F. 31.80 F. 31.81 F. But 33.51 F. Density of stored hot water, t_{total} 57.69 F. Recovery Efficiency 40.90 F. Recovery Efficiency, t_{total} 57.69 F. 32.18 F. 32.18 Bttl 40.18 F. 32.18 Bttl 40.18 F. 32.29 F. 32.21 Bttl 40.18 F. 32.22 Bttl 40.18 F. 32.23 Bttl 40.18 F. 32.24 Bttl 40.18 F. 32.24 Bttl 40.18 F. 32.25 Bttl 40.18 F. 32.26 Bttl 40.18 F. 32.27 F. 32.28 Bttl 40.28 F. 32.28 Bttl 40.28 F. 32.29 Bttl 40.28 F.			
Density of stored hot waker, rho 2 Specific heat of stored water, rho 2 Specific heat of withdrawn water dollowing first recovery period, M3, and Specific heat of withdrawn water during the first recovery period, M3, and severage water outlet temperature from the start of the 24hr test to the end of the first recovery period, TGL_lavg average water inlet temperature from the start of the 24hr test to the end of the first recovery period, Tin_lavg The Specific heat of stored water, rho 2 Specific heat of stored water, rho 3 Specific heat of stored water, rho		' 	
Specific heat of stored water, Cq. 10,9899 Btu/lb-*f Total Energy Used from the start of the 24hr test and following first recovery period, Qr. 10,100 Btu Mass removed during the first recovery period, Qr. 10,100 Specific Heat of withdrawn water during the first recovery period, Qr. 10,100 Specific Heat of withdrawn water during the first recovery period, Qr. 10,100 Specific Heat of withdrawn water during the first recovery period, Qr. 10,100 Specific Heat of withdrawn water during the first recovery period, Qr. 10,100 Specific Heat of the 24hr test to the end of the first recovery period, Tin_lavg water average water inlet temperature from the start of the 24hr test to the end of the first recovery period, Tin_lavg water average water inlet temperature from the start of the 24hr test to the end of the first recovery period, Tin_lavg water average water inlet temperature from the start of the 24hr test to the end of the first draw cluster, Q. 10,77 standby Loss Recovery Efficiency, np 0,77			
Total Energy Used from the start of the 24hr test and following first recovery period, $Q_{1, total}$ 18910 Btu Mass removed during the first recovery period, $Q_{1, total}$ 221.96 lbs Specific Heat of withdrawn water during the first recovery period, $Q_{1, total}$ 221.97 Btu/lb-7g average water outlet temperature from the start of the 24hr test to the end of the first recovery period, $Q_{1, total}$ 23.88 °F average water inlet temperature from the start of the 24hr test to the end of the first recovery period, $Q_{1, total}$ 25.88 °F average water inlet temperature from the start of the 24hr test to the end of the first recovery period, $Q_{1, total}$ 27.69 °F secondary Standby Loss (M.C., $Q_{1, total}$) + $Q_{1, total}$ 27.69 °F secondary Standby Loss (M.C., $Q_{1, total}$) + $Q_{1, total}$ 28.31 Hourly Standby Loss (M.C., $Q_{1, total}$) + $Q_{1, total}$ 29.32 May 19.32 May 19.			
Specific Heat of withdrawn water during the first recovery period, M _{1, and} 221.96 bts 3 pacific Heat of withdrawn water during the first recovery period, CP1_avg 0.9986 btw/lb-19 average water outlet temperature from the start of the 24hr test to the end of the first recovery period, Tde_1avg 123.88 F average water inlet temperature from the start of the 24hr test to the end of the first recovery period, Tin_1avg 57.69 F **F **F **In_ = \begin{picture} M_{\text{Cp_1}\text{\text{Cp_1}\text{\text{Cp_1}\text{\text{\text{Cp_2}\text{\t		<u> </u>	
Specific Heat of withdrawn water during the first recovery period, CP1_avg 0,9986 Btu/lb-*f average water outlet temperature from the start of the 24hr test to the end of the first recovery period, Tdel_1avg 123.88 *F average water inlet temperature from the start of the 24hr test to the end of the first recovery period, Tdel_1avg 57.69 *F \[\begin{align*} \begin			
average water outlet temperature from the start of the 24hr test to the end of the first recovery period, Tdel_lawg average water inlet temperature from the start of the 24hr test to the end of the first recovery period, Tin_lavg 57.69 The \(\begin{array}{c} \left(\text{M_C}_{g_1}(\text{True}_t, \text{ - Tm.}, \text{ 1}) \\ \text{ \sqrt{M_PD_PC}_{g_2}(\text{True}_t, \text{ - Tm.}, \text{ 1})} \\ \end{array} \) \(\begin{array}{c} \left(\text{ \sqrt{M_PD_PC}_{g_2}(\text{True}_t, \text{ - Tm.}, \text{ 1})} \) \(\begin{array}{c} \left(\text{ \sqrt{M_PD_PC}_{g_2}(\text{True}_t, \text{ - Tm.}, \text{ 1})} \) \(\begin{array}{c} \left(\text{ \sqrt{M_PD_PC}_{g_2}(\text{True}_t, \text{ - Tm.}, \text{ 1})} \) \(\text{ \sqrt{M_PD_PC}_{g_2}(\text{True}_t, \text{ - Tm.}, \text{ 1})} \) \(\text{ \sqrt{M_PD_PC}_{g_2}(\text{True}_t, \text{ - Tm.}, \text{ 1})} \) \(\text{ \sqrt{M_PD_PC}_{g_2}(\text{True}_t, \text{ - Tm.}, \text{ 1})} \) \(\text{ \sqrt{M_PD_PC}_{g_2}(\text{True}_t, \text{ - Tm.}, \text{ 1})} \) \(\text{ \sqrt{M_PD_PC}_{g_2}(\text{True}_t, \text{ - Tm.}, \text{ 1})} \) \(\text{ \sqrt{M_PD_PC}_{g_2}(\text{True}, \text{ - Tm.}, \text{ 1})} \) \(\text{ \sqrt{M_PD_PC}_{g_2}(\text{True}, \text{ - Tm.}, \text{ 1})} \) \(\text{ \sqrt{M_PD_PC}_{g_2}(\text{ \text{ \sqrt{M_PD_PC}_{g_2}(\text{ \text{ \text{ \sqrt{M_PD_PC}_{g_2}(\text{ \text	-		
average water inlet temperature from the start of the 24hr test to the end of the first recovery period, Tin_lavg 57.69 °F $ \eta_{r} = \left(\frac{M_{r}C_{p,1}(T_{colu.1} - T_{in.1})}{Q_{r}} \right) + \left(\frac{V_{s}p_{s}C_{p_{s}}(T_{conu.1} - T_{o})}{Q_{r}} \right) \\ Recovery Efficiency, \eta_{r} 0.77 \\ 3.3 Hourly Standby Loss mulative energy consumption from the start of the 24-hour test to the time the maximum mean tank temperature is achieved 5 minutes after recovery of the first draw cluster, Q_sub of the first fraw cluster, Q_sub of the firs$			
Recovery Efficiency, \mathbf{q}_i 0.77 3.3 Hourly Standby Loss Insulative energy consumption from the start of the 24-hour test to the time the maximum mean tank temperature is achieved 5 minutes after recovery of the first draw cluster, \mathbf{Q}_i upon the start of the 24-hour test to the minute prior to the start of the draw following the end of the first draw cluster, \mathbf{Q}_i upon the start of the start of the draw following the first draw cluster, \mathbf{Q}_i upon the start of the draw following the first draw cluster, \mathbf{Q}_i upon the start of the start of the draw following the first draw cluster, \mathbf{Q}_i upon the start of the draw following the first draw cluster of the start of the draw following the first draw cluster of the start of the draw following the first draw cluster of the start of the draw following the first draw cluster, \mathbf{Q}_i upon the start of the draw following the first draw cluster, \mathbf{Q}_i upon the start of the draw following the first draw cluster, \mathbf{Q}_i upon the start of the draw following the first draw cluster, \mathbf{Q}_i upon the start of the draw following the first draw cluster, \mathbf{Q}_i upon the start of the draw following the first draw cluster, \mathbf{Q}_i upon the start of the draw following the first draw cluster, \mathbf{Q}_i upon the start of the draw following the first draw cluster, \mathbf{Q}_i upon the start of the maximum mean tank temperature between the time at which the maximum mean tank temperature is observed starting 5 minutes after the recovery from the first draw cluster and the minute prior to commencement of the next draw following the first draw cluster, \mathbf{Q}_i and $\mathbf{Q}_{int} = \frac{Q_{inty} - \frac{V_{int} C_{int} C_{inty} - T_{into}}{v_i}$ hrs Hourly Standby Losses, \mathbf{Q}_i the starting five minutes after cut-out following the first draw cluster and the minute prior to commencement of the next draw following the first draw cluster, \mathbf{T}_{into} and \mathbf{T}_{in			-
Recovery Efficiency, η_r 0.77 3.3 Hourly Standby Loss Intulative energy consumption from the start of the 24-hour test to the time the maximum mean tank temperature is achieved 5 minutes after recovery of the first draw cluster, Q_{sub} 32018 Btu Cumulative energy consumption from the start of the 24-hour test to the minute prior to the start of the draw following the end of the first draw cluster, Q_{sub} 35871 Btu Energy Consumed as part of the standby test, Q_{sub} 38874 Mean 30.008 at the minute prior to the start of the draw following the first draw cluster, Q_{sub} 130.01 °F laximum mean tank temperature observed 132.974 rst recovery following the first draw cluster, Q_{sub} 132.97 °F Elapsed time between the time at which the maximum mean tank temperature is observed starting 5 minutes after the recovery from the first draw cluster and the minute prior to the start of the first draw following the first draw cluster, Q_{sub} 132.97 °F Average ambient temperature between the time when the maximum mean tank temperature is observed starting five minutes after cut-out following the first draw cluster and the minute prior to commencement of the next draw following the first draw cluster, Q_{sub} 131.45 °F Average storage tank temperature between the time when the maximum mean tank temperature is observed starting five minutes after cut-out following the first draw cluster and the minute prior to commencement of the next draw following the first draw cluster, Q_{sub} 131.45 °F $Q_{loc} = \frac{Q_{sub}}{Q_{loc}} - \frac{V_{stb}Q_{sc}(P_{loc} - P_{sub})}{P_{stb}Q_{sc}}$ 131.45 °F $Q_{loc} = \frac{Q_{loc}}{Q_{loc}} - \frac{Q_{loc}}{Q$		57.69	°F
But the minute prior to a recovery occurring at the start of the draw following the first draw cluster, T_{sub} and $T_{suby,1}$ because of the minute prior to a recovery occurring at the start of the first draw cluster, $T_{suby,1}$ and $T_{suby,1}$ because of the first draw cluster, $T_{suby,1}$ and $T_{suby,1}$ because of the minute prior to the start of the draw following the first draw cluster, $T_{suby,1}$ and $T_{suby,1}$ because of the minute prior to the start of the draw following the first draw cluster or the first draw cluster, $T_{suby,1}$ and $T_{suby,1}$ because of the standby test, $T_{suby,1}$ because of the standby test, $T_{suby,1}$ and $T_{suby,1}$ because of the standby test, $T_{suby,1}$ be	$\eta_{r} = \!$		
Btu 130.008		0.77	
Sachieved 5 minutes after recovery of the first draw cluster, Q_subset of the start of the draw hute prior to a recovery occurring at the start of the draw following the end of the first draw cluster, Q_subset of the minute prior to a recovery occurring at the start of the draw following the end of the first draw cluster, Q_subset of the minute prior to the start of the draw following the first draw cluster, Q_subset of the minute prior to the start of the draw following the first draw cluster, Q_subset of the draw following the first draw cluster, T_subset of the draw following the end of the first draw cluster, T_subset of the draw following the first draw cluster, T_subset of the draw following the first draw cluster, T_subset of the draw following the first draw cluster, T_subset of the draw following the first draw cluster, T_subset of the draw following the first draw cluster, T_subset of the draw following the first draw cluster, T_subset of the draw following the first draw cluster, T_subset of the draw following the first draw cluster, T_subset of the draw following the first draw following the first draw cluster, T_subset of the draw following the first draw cluster, T_subset of the draw following the first draw following the first draw cluster, T_subset of the draw following the first draw cluster and the minute prior to the draw following the first draw cluster and the minute prior to to commencement of the next draw following the first draw cluster, T_subset of the draw following the first draw cluster, T_subset of the draw following the first draw cluster, T_subset of the draw following the first draw cluster, T_subset of the draw following the first draw cluster, T_subset of the draw following the first draw cluster, T_subset of the draw following the first draw cluster, T_subset of the draw following the first draw cluster, T_subset of the draw following the first draw cluster, T_subset of the d		ı	ı
Energy Consumed as part of the draw following the end of the first draw cluster, Q_suff and the minute prior to the start of the draw following the first draw cluster or the first draw cluster, T_suff and the minute prior to the start of the draw following the first draw cluster or the first draw cluster, T_suff and the minute prior to the start of the draw following the first draw cluster, T_suff and the minute prior to the start of the draw following the first draw cluster, T_suff and the minute prior to the start of the first draw following the first draw cluster, T_suff and the minute prior to the start of the first draw following the first draw cluster, T_suff and the first draw cluster, T_suff and the minute prior to the start of the first draw following the first draw cluster, T_suff and the first draw	0.4.0.07, 0.0.4	7 220110	Btu
Mean 130.008 at the minute prior to the start of the draw following the first draw cluster or the simulate prior to a recovery occurring at the start of the draw following the end of the first draw cluster, T_{-stoff} and the start of the draw following the first draw cluster, T_{-stoff} and the start of the draw following the first draw cluster, T_{-stoff} and the start of the draw following the first draw cluster, T_{-stoff} and the start of the first draw cluster, T_{-stoff} and the start of the first draw cluster, T_{-stoff} and the maximum mean tank temperature is observed starting 5 minutes after the recovery from the first draw cluster and the minute prior to the start of the first draw following the first draw cluster, T_{-stoff} and $T_{$	following th 35858.565 nute prior to a recovery occurring at the start of the draw following the end	35871	Btu
Maximum mean tank temperature observed 132.974	Energy Consumed as part of the standby test, Q_stb	3854	
Density of stored hot water, ρ 8.23 lbs/gall. Specific heat of stored hot water, ρ 0.9992 Btu/lb-°f Elapsed time between the time at which the maximum mean tank temperature is observed starting 5 minutes after the recovery from the first draw cluster and the minute prior to the start of the first draw following the first draw cluster, $\tau_{\text{stby,1}}$ 8.09 hrs $Q_{hr} = \frac{Q_{\text{stby}} - \frac{V_{\text{st}} \rho C_p(\bar{T}_{\text{su,f}} - \bar{T}_{\text{su,0}})}{\eta_r}}{\tau_{\text{stby,1}}}$ Hourly Standby Losses, Q_{hr} 626 Btu/hr Average ambient temperature between the time when the maximum mean tank temperature is observed starting five minutes after cut-out following the first draw cluster and the minute prior to commencement of the next draw following the first draw cluster, $T_{a,\text{stby,1}}$ 67.44 °F Average storage tank temperature between the time when the maximum mean tank temperature is observed starting five minutes after cut-out following the first draw cluster and the minute prior to commencement of the next draw following the first draw cluster, $T_{a,\text{stby,1}}$ 131.45 °F $UA = \frac{Q_{hr}}{\left(\overline{T}_{t,\text{stby}} - \overline{T}_{a,\text{stby}}\right)}$	1130.000	/ 12∩ ∩1	°F
Specific heat of stored hot water, Cp 0.9992 Btu/lb·°f Elapsed time between the time at which the maximum mean tank temperature is observed starting 5 minutes after the recovery from the first draw cluster and the minute prior to the start of the first draw following the first draw cluster, $T_{stby,1}$ 8.09 hrs $Q_{hr} = \frac{Q_{stby} - \frac{V_{st} \rho C_p(\overline{T}_{su.f} - \overline{T}_{su.0})}{\eta_r}}{T_{stby,1}}$ Average ambient temperature between the time when the maximum mean tank temperature is observed starting five minutes after cut-out following the first draw cluster and the minute prior to commencement of the next draw following the first draw cluster, $T_{a,stby,1}$ 67.44 °F Average storage tank temperature between the time when the maximum mean tank temperature is observed starting five minutes after cut-out following the first draw cluster and the minute prior to commencement of the next draw following the first draw cluster, $T_{a,stby,1}$ °F $UA = \frac{Q_{hr}}{\left(\overline{T}_{t, stby} - \overline{T}_{a, stby}\right)}$	11.77.37.4	4 100 (1)	°F
Specific heat of stored hot water, Cp 0.9992 Btu/lb·°f Elapsed time between the time at which the maximum mean tank temperature is observed starting 5 minutes after the recovery from the first draw cluster and the minute prior to the start of the first draw following the first draw cluster, $T_{stby,1}$ 8.09 hrs $Q_{hr} = \frac{Q_{stby} - \frac{V_{st} \rho C_p(\overline{T}_{su.f} - \overline{T}_{su.0})}{\eta_r}}{T_{stby,1}}$ Average ambient temperature between the time when the maximum mean tank temperature is observed starting five minutes after cut-out following the first draw cluster and the minute prior to commencement of the next draw following the first draw cluster, $T_{a,stby,1}$ 67.44 °F Average storage tank temperature between the time when the maximum mean tank temperature is observed starting five minutes after cut-out following the first draw cluster and the minute prior to commencement of the next draw following the first draw cluster, $T_{a,stby,1}$ °F $UA = \frac{Q_{hr}}{\left(\overline{T}_{t, stby} - \overline{T}_{a, stby}\right)}$	Density of stored hot water, g	8.23	lbs/gall.
the recovery from the first draw cluster and the minute prior to the start of the first draw following the first draw cluster, $\tau_{\text{stby,1}}$ $Q_{hr} = \frac{Q_{stby} - \frac{V_{stP}C_p(\overline{T}_{su,f} - \overline{T}_{su,0})}{\eta_r}}{\tau_{stby,1}}$ Hourly Standby Losses, \mathbf{Q}_{hr} Average ambient temperature between the time when the maximum mean tank temperature is observed starting five minutes after cut-out following the first draw cluster and the minute prior to commencement of the next draw following the first draw cluster, $\mathbf{T}_{a,\text{stby,1}}$ Average storage tank temperature between the time when the maximum mean tank temperature is observed starting five minutes after cut-out following the first draw cluster and the minute prior to commencement of the next draw following the first draw cluster, $\mathbf{T}_{t,\text{stby,1}}$ $\mathbf{VA} = \frac{\mathbf{Q}_{hr}}{\left(\overline{\mathbf{T}}_{t,\text{ stby}} - \overline{\mathbf{T}}_{a,\text{ stby}}\right)}$	Specific heat of stored hot water, C r	0.9992	Btu/lb·°F
Average ambient temperature between the time when the maximum mean tank temperature is observed starting five minutes after cut-out following the first draw cluster and the minute prior to commencement of the next draw following the first draw cluster, $T_{a,stby,1}$ Average storage tank temperature between the time when the maximum mean tank temperature is observed starting five minutes after cut-out following the first draw cluster and the minute prior to commencement of the next draw following the first draw cluster, $T_{t,stby,1}$ $UA = \frac{Q_{hr}}{\left(\overline{T}_{t, stby} - \overline{T}_{a, stby}\right)}$	the recovery from the first draw cluster and the minute prior to the start of the first draw following the first draw	8.09	hrs
Average ambient temperature between the time when the maximum mean tank temperature is observed starting five minutes after cut-out following the first draw cluster and the minute prior to commencement of the next draw following the first draw cluster, $T_{a,stby,1}$ Average storage tank temperature between the time when the maximum mean tank temperature is observed starting five minutes after cut-out following the first draw cluster and the minute prior to commencement of the next draw following the first draw cluster, $T_{t,stby,1}$ $UA = \frac{Q_{hr}}{\left(\overline{T}_{t, stby} - \overline{T}_{a, stby}\right)}$	$Q_{hr} = rac{Q_{stby} - rac{V_{st} ho C_p(\overline{T}_{su,f} - \overline{T}_{su,0})}{\eta_r}}{}$		•
Average ambient temperature between the time when the maximum mean tank temperature is observed starting five minutes after cut-out following the first draw cluster and the minute prior to commencement of the next draw following the first draw cluster, $T_{a,stby,1}$ Average storage tank temperature between the time when the maximum mean tank temperature is observed starting five minutes after cut-out following the first draw cluster and the minute prior to commencement of the next draw following the first draw cluster, $T_{t,stby,1}$ $UA = \frac{Q_{hr}}{\left(\overline{T}_{t, stby} - \overline{T}_{a, stby}\right)}$		626	Btu/hr
observed starting five minutes after cut-out following the first draw cluster and the minute prior to commencement of the next draw following the first draw cluster, $T_{a,stby,1}$ Average storage tank temperature between the time when the maximum mean tank temperature is observed starting five minutes after cut-out following the first draw cluster and the minute prior to commencement of the next draw following the first draw cluster, $T_{t,stby,1}$ $UA = \frac{Q_{hr}}{\left(\overline{T}_{t, stby} - \overline{T}_{a, stby}\right)}$			2.07.111
Average storage tank temperature between the time when the maximum mean tank temperature is observed starting five minutes after cut-out following the first draw cluster and the minute prior to commencement of the next draw following the first draw cluster, $T_{t,stby,1}$ $UA = \frac{Q_{hr}}{\left(\overline{T}_{t, stby} - \overline{T}_{a, stby}\right)}$	observed starting five minutes after cut-out following the first draw cluster and the minute prior to	67.44	°F
observed starting five minutes after cut-out following the first draw cluster and the minute prior to commencement of the next draw following the first draw cluster, $T_{t,stby,1}$ of $UA = \frac{Q_{hr}}{\left(\overline{T}_{t, stby} - \overline{T}_{a, stby}\right)}$			
commencement of the next draw following the first draw cluster, $T_{t,stby,1}$ $UA = \frac{Q_{hr}}{\left(\overline{T}_{t, \; stby} - \overline{T}_{a, \; stby}\right)}$			
$UA = \frac{Q_{hr}}{\left(\overline{T}_{t,stby} - \overline{T}_{a,stby}\right)}$			
	· ·		
Standby Heat Loss Coefficient 11A 9.78 Rtu/br.º	$UA = \frac{\mathbf{T}_{t, stby}}{\left(\overline{T}_{t, stby} - \overline{T}_{a, stby}\right)}$		
	Standby Heat Loss Coefficient, UA	9.78	Btu/hr·°F

Total fossil fuel energy used by the water heater during the 24-hour simulated			_
Total electrical energy used during the 24 hour simulated	use test, Qf	82257	Btu
Total electrical energy used during the 24-hour simulated-	use test, Qe	0	Btu
Total energy used by the water heater during the 24-hour simulated-use test, including auxi	liary energy	82257	D+
such as pilot lights, pumps,	fans, etc, Q	82237	Btu
Mean tank temperature at the end of the 24-hour simulated-u	ise test, T24	133.23	°F
Density of stored		8.23	lbs/gall.
Specific heat of the store	ed water, C _p	1.00	Btu/lb∙°F
$Q_d = Q - \frac{V_{st}\rho C_p (T_{24} - T_0)}{\eta_r}$			
	mntion Od	78428	Btu
The daily water heating energy consustant Adjusted Daily Water Heater Consumption	imption, Qa	70420	Dlu
number of hours during the 24-hour simulated-use test when water is not being withdraw	vn from the		П
	er, t_stdby2	23.36	hrs.
average ambient temperature during the total standby portion of the 24-hour simulat			
average ambient temperature daring the total standay portion of the 2 mour simulation	Ta_stdby2	67.67	°F
$Q_{da} = Q_d - (67.5^{\circ}F - \overline{T}_{a,stby,2})UA \tau_{stby,2}$			
adjusted daily water heating energy consur	nption, Qda	78467	Btu
	, , , , , , , , ,		-
$\mathbf{Q}_{HW} = \sum_{i = 1}^{6} \left(\frac{M_{i} C_{p,i} \left(\overline{T}_{del,i} - \overline{T}_{in,i} \right)}{\eta_{r}} \right)$			
,	water Ohw	66148	Btu/day
Energy used to heat the $\frac{N}{N}M_{*}C_{**}(125^{\circ}F - 58^{\circ}F)$	water, Qnw	00146	Dtu/uay
$Q_{HW,67^{\circ} ext{F}} = \sum_{r=1}^{N} rac{M_i C_{pi} (125^{\circ} ext{F} - 58^{\circ} ext{F})}{\eta_T}$			
	Dies O	50600	D: / I
Energy for Same Quantity with 67 °F	Rise, Q _{HW,67}	59688	Btu/day
$Q_{HWD} = Q_{HW,67 \circ F} - Q_{HW}$			
Q _H	wD -64	460	Btu
$Q_{dm} = Q_{da} + Q_{HWD}$			
	70/		
Q_d	m /20	007	Btu
3.6 Uniform Energy Factor			
3.6 Uniform Energy Factor	ned at 91.5F	0.9983	
3.6 Uniform Energy Factor			
3.6 Uniform Energy Factor $UEF = \sum_{i=1}^{N} \frac{M_i C_{pi} (125^{\circ}F - 58^{\circ}F)}{Q_{dm}}$ Cp determine the determinant of the	ned at 91.5F	0.9983	
3.6 Uniform Energy Factor Cp determine $UEF = \sum_{i=1}^{N} \frac{M_i C_{pi} (125^{\circ} F - 58^{\circ} F)}{Q_{dm}}$ Uniform Energy	ned at 91.5F	0.9983	
3.6 Uniform Energy Factor $UEF = \sum_{i=1}^{N} \frac{M_i C_{pi} (125^{\circ}F - 58^{\circ}F)}{Q_{dm}}$ Uniform Energy 3.7 Annual Energy Consumption	ned at 91.5F	0.9983	Btu/lb·°F
3.6 Uniform Energy Factor $UEF = \sum_{i=1}^{N} \frac{M_i C_{pi} (125^{\circ}F - 58^{\circ}F)}{Q_{dm}}$ Uniform Energy 3.7 Annual Energy Consumption Volume of water drawn during the applicable drawn	ned at 91.5F	0.9983	
3.6 Uniform Energy Factor $UEF = \sum_{i=1}^{N} \frac{M_i C_{pi} (125^{\circ}F - 58^{\circ}F)}{Q_{dm}}$ Uniform Energy 3.7 Annual Energy Consumption Volume of water drawn during the applicable drawn during the ap	Factor, UEF v pattern, V v constant, p	0.9983 0.638	Btu/lb·°F gall. lbs/gall.
3.6 Uniform Energy Factor $UEF = \sum_{i=1}^{N} \frac{M_i C_{pi} (125^\circ F - 58^\circ F)}{Q_{dm}}$ Uniform Energy Onsumption Volume of water drawn during the applicable drawn during the applicable drawn Specific heat of	Factor, UEF v pattern, V v constant, p	0.9983 0.638 84.00 8.24	Btu/lb·°F gall. lbs/gall.
3.6 Uniform Energy Factor $UEF = \sum_{i=1}^{N} \frac{M_i C_{pi} (125^{\circ}F - 58^{\circ}F)}{Q_{dm}}$ Uniform Energy Onsumption Volume of water drawn during the applicable drawn Density	Factor, UEF v pattern, V v constant, p	0.9983 0.638 84.00 8.24	Btu/lb·°F gall. lbs/gall.
3.6 Uniform Energy Factor $UEF = \sum_{i=1}^{N} \frac{M_i C_{pi} (125^\circ F - 58^\circ F)}{Q_{dm}}$ Uniform Energy Onsumption Volume of water drawn during the applicable drawn during the applicable drawn Specific heat of	Factor, UEF w pattern, V y constant, Cp	0.9983 0.638 84.00 8.24 1.0000	Btu/lb·°F gall. lbs/gall.
3.6 Uniform Energy Factor $UEF = \sum_{i=1}^{N} \frac{M_i C_{pi} (125^\circ F - 58^\circ F)}{Q_{dm}}$ Uniform Energy 3.7 Annual Energy Consumption $Volume \ of \ water \ drawn \ during \ the \ applicable \ drawn \ Density Specific heat of Specific heat of UEF$	Factor, UEF w pattern, V y constant, C constant, C ual	0.9983 0.638 84.00 8.24 1.0000	gall. lbs/gall. Btu/lb·°F
$UEF = \sum_{i=1}^{N} \frac{M_i C_{pi} (125^\circ F - 58^\circ F)}{Q_{dm}}$ $Uniform \ Energy$ $3.7 \ Annual \ Energy \ Consumption$ $Volume \ of \ water \ drawn \ during \ the \ applicable \ drawn \ Density \ Specific \ heat \ Grammal = 365 \ x \ \frac{(V)(\rho)(C_P)(67)}{UEF}$ $Annual \ Energy \ Consumption, \ E_{annual, there}$ $Annual \ Fossil \ fuel \ Energy \ Consumption, \ E_{annual, there}$	Factor, UEF w pattern, V y constant, C constant, C ual	0.9983 0.638 84.00 8.24 1.0000	gall. lbs/gall. Btu/lb·°F
$UEF = \sum_{i=1}^{N} \frac{M_i C_{pi} (125^\circ F - 58^\circ F)}{Q_{dm}}$ $Uniform \ Energy$ $3.7 \ Annual \ Energy \ Consumption$ $Volume \ of \ water \ drawn \ during \ the \ applicable \ drawn \ Density \ Specific \ heat \ Grammal = 365 \ \chi \ \frac{(V)(\rho)(C_P)(67)}{UEF}$ $Annual \ Energy \ Consumption, \ E_{annual, there}$ $Annual \ Fossil \ fuel \ Energy \ Consumption, \ E_{annual, there}$	Factor, UEF w pattern, V y constant, C constant, C ual	0.9983 0.638 84.00 8.24 1.0000	gall. lbs/gall. Btu/lb·°F
3.6 Uniform Energy Factor $UEF = \sum_{i=1}^{N} \frac{M_i C_{pi} (125^\circ F - 58^\circ F)}{Q_{dm}}$ Uniform Energy 3.7 Annual Energy Consumption Volume of water drawn during the applicable drawn Specific heat of Specif	Factor, UEF w pattern, V y constant, C constant, C ual 2654	0.9983 0.638 84.00 8.24 1.0000	gall. lbs/gall. Btu/lb·°F
3.6 Uniform Energy Factor $UEF = \sum_{i=1}^{N} \frac{M_i C_{pi} (125^\circ F - 58^\circ F)}{Q_{dm}}$ Uniform Energy 3.7 Annual Energy Consumption $Volume \ of \ water \ drawn \ during \ the \ applicable \ drawn \ Specific \ heat \ Grammal = 365 \ x \ \frac{(V)(\rho)(C_P)(67)}{UEF}$ Annual Energy Consumption, Eannual Fossil fuel Energy Consumption, Eannual the Annual Electrical Energy Consumption $E_{annual,e} = E_{annual} (Q_e/Q)/3412$	Factor, UEF w pattern, V y constant, C constant, C ual 2654	0.9983 0.638 84.00 8.24 1.0000	gall. lbs/gall. Btu/lb·°F
3.6 Uniform Energy Factor $UEF = \sum_{i=1}^{N} \frac{M_i C_{pi} (125^\circ F - 58^\circ F)}{Q_{dm}}$ Uniform Energy 3.7 Annual Energy Consumption Volume of water drawn during the applicable drawn Density Specific heat of Specific heat o	Factor, UEF w pattern, V y constant, C constant, C ual 2654	0.9983 0.638 84.00 8.24 1.0000	gall. lbs/gall. Btu/lb·°F
$UEF = \sum_{i=1}^{N} \frac{M_i C_{pi} (125^\circ F - 58^\circ F)}{Q_{dm}}$ $Uniform \ Energy$ 3.7 Annual Energy Consumption Volume of water drawn during the applicable drawn Specific heat of Specific heat	Factor, UEF w pattern, V y constant, Cp constant, Cp ual 2654 ms 262	0.9983 0.638 84.00 8.24 1.0000	gall. lbs/gall. Btu/lb·°F Btu Therms
$UEF = \sum_{i=1}^{N} \frac{M_i C_{pi} (125^\circ F - 58^\circ F)}{Q_{dm}}$ Uniform Energy 3.7 Annual Energy Consumption Volume of water drawn during the applicable draw Specific heat of S	Factor, UEF W pattern, V Y constant, Cp Constant, Cp Lual 2654 Male 2654	0.9983 0.638 84.00 8.24 1.0000	gall. lbs/gall. Btu/lb·°F
Cp determine $UEF = \sum_{i=1}^{N} \frac{M_i C_{pi} (125^\circ F - 58^\circ F)}{Q_{dm}}$ Uniform Energy $R_i = \sum_{i=1}^{N} \frac{M_i C_{pi} (125^\circ F - 58^\circ F)}{Q_{dm}}$ Uniform Energy $R_i = \sum_{i=1}^{N} \frac{M_i C_{pi} (125^\circ F - 58^\circ F)}{Q_{dm}}$ Volume of water drawn during the applicable drawn of the applica	Factor, UEF W pattern, V Y constant, Cp Constant, Cp Lual 2654 Male 2654	0.9983 0.638 84.00 8.24 1.0000	gall. lbs/gall. Btu/lb·°F Btu Therms
Cp determine $UEF = \sum_{i=1}^{N} \frac{M_i C_{pi} (125^\circ F - 58^\circ F)}{Q_{dm}}$ Uniform Energy Tannual Energy Consumption Volume of water drawn during the applicable drawn Specific heat of Specifi	Factor, UEF V pattern, V V constant, p constant, Cp ual 2654 ms 262 al.f 2654 sting)	0.9983 0.638 84.00 8.24 1.0000	gall. lbs/gal Btu/lb-

Thermocouple 1	Z00007616	TJ180-CPSS-18U-	+/-0.5°F	7/8/2020	1/8/2021
Thermocouple 2	Z00005566	TJ180-CPSS-18U-	+/-0.5°F	7/8/2020	1/8/2021
Thermocouple 3	Z00007590	TJ180-CPSS-18U-	+/-0.5°F	7/8/2020	1/8/2021
Thermocouple 4	Z00005567	TJ180-CPSS-18U-	+/-0.5°F	7/8/2020	1/8/2021
Thermocouple 5	Z00005563	TJ-180CPSS-18U-	+/-0.5°F	7/8/2020	1/8/2021
Thermocouple 6	Z00004877	TJ180-CPSS-18U-	+/-0.5°F	7/8/2020	1/8/2021
RTD Inlet	Z00009715	3SSDXK6BZZZZ	+/-0.2°F	4/17/2020	7/17/2020
RTD Outlet	Z00007877	3SSDXK6BZZZZ	+/-0.2°F	4/17/2020	7/17/2020
Ambient RTD	Z00017274	3SSBRK6BZZZZ	+/-0.2°F	4/27/2020	7/27/2020
Power Meter	Z00001528	WT310HC	+/- 0.1% of	5/6/2020	5/6/2021
Water Flow	9389	ACM-3000	+/- 0.5% of	5/8/2020	8/8/2020
Water Pressure	Z00009189	ZM1500-DI0300	±0.125%FS	5/6/2020	5/6/2021
Gas Meter	Z00005027	ZM1500-DN0028	±0.125%FS	5/6/2020	5/6/2021
Gas Meter	Z00001497	AC-250	+/-1% of reading	5/6/2020	5/6/2021
as Meter Temperatu	Z00015424	3SSBRK6BZZZZ	+/-0.2°F	5/6/2020	5/6/2021
Manifold Pressure	Z00013657	ZM1500-DM0028	±0.125%FS	5/6/2020	5/6/2021

Notes/Comments (Please clarify any pertinent details, unusual events, etc.)

Test Report Sign-Off Block

By signing in the space below, we certify that the information and data in this report: (1) were obtained from the specific test unit under test; (2) were obtained during the specific test being reported; (3) were not copied from any other source, except where instructed to do so; and (4) were not altered or modified in any way.

Role	Date	Entity
Test Completion	07-17-2020	Ashley Cocita
Template Completion	07-17-2020	Ashley Cocita
Report Review by Test Lab	07-20-2020	Jim Neyman