

WaterTenderApp.com - Shuttle Calculator

Severely Over Estimated

World's **FIRST-EVER** Water Tender Shuttle **Operations Calculator App**

Never again **OVER** or **UNDER** estimate your remote **HIGH** 'Fire-Flow' needs.

Finally, we can quickly and accurately estimate and verify **ACTUAL GPM/LPM** delivered and minimum **Portable Storage Tank capacities** to meet immediate and forecasted **Water Tender needs** critical to effectively support our incidents without **RISK** of **inadequate** or **excess** resources.

Only **seven (7)** entries verify **five (5)** Water Tenders will deliver approximately **653 GPM** to exceed the **600 GPM** minimum for **SAFETY**

- 1) SAE/Metric - Enter "S" or "M"
- 2) Estimated "Fire-Flow" (400 GPM) at 150% (600 GPM) to ensure FIREFIGHTER SAFETY!
- 3) Tank Size (TS) capacity (2,500 Gals.)
- 4) 'Fill' rate and 'Dump' rate (1,000 GPM)
- 5) Travel Distance to Water Source (4.0 mi.)
- 6) Avg. 'Make' and 'Break' and 'maneuver' time (1.5 min.) at each end of roundtrip (3.0)

The estimated GPM delivered in 22.25 min. 'CYCLE' at 90% of 2,500 (TS) yields 101 GPM requires six (6) identical tenders for SAFETY

7) Enter 'ACTUAL' roundtrip 'CYCLE' time [24 min at 90% of 2,500 (TS) yields 94 GPM].

Manually Enter 'Flow-Chart' Data

Enter EACH Water Tender by Identifier, Tank Size (TS), GPM or LPM, and minutes for each estimated or ACTUAL roundtrip 'CYCLE' to verify 653 GPM exceeds 600 GPM minimum.

Portable Storage Tank Capacity (at 8,000 gallons) is auto-calculated upon:

- 1) The Number of Water Tenders (5) assigned shuttling water... times (X)...
- 2) Average Water Tender Delivery rate in GPM or LPM (129 GPM)... times (X)...
- 3) Number of Deliveries per hour (12.4)...
- 4) Round UP to the nearest 500 Gallons or 2000 Liters for PERSONNEL SAFETY.

Water Tender Shuttle Calculator App

http://WaterTenderApp.com	Min. Req?	YES!
SAE or "M"	s	Port. Tank: 8,000
Identical Water Tenders Needed:	6	
Fire Flow:	400	+50% @ 600
Capacity:	2,500	delivers 101
Fill Rate:	1,000	Fill Time: 4.0
Dump Rate:	1,000	Dump Time: 4.0
Dist. Mi.:	4.0	Travel: 14.25
Make/Break:	1.5	Handling: 3.0
Estimated TRAVEL Time:	22.25	minutes

The calculation process estimates

2,500	delivers	101	GPM
ACTUAL:	Travel time	24	Delivers: 94

Complete the following chart to determine:

Req. Flow:	600	Min. Met?	
ACTUAL Flow:	653	Δ Flow 53.0 YES!	
Totals:	16,500	Deliveries per hour: 12.4	
Veh. Ident.	Capacity: GALLONS	GPM	Travel minutes
BU-57	2,500	101	23
TCU-44	5,000	188	24
MRFD-11	2,500	101	23
BU-39	4,000	162	29
BFD-69	2,500	94	24
Tender #6			
5	Tenders Avg.	129	GPM

Ensure ACTUAL delivery rates are neither OVER nor UNDER estimated per IFSTA 'Pumping Fire Apparatus Driver/Operator Handbook,' 3rd Edition, Copyright © 2015

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Be OSHA and NFPA compliant with these FIRST-EVER Firefighter Life and SAFETY Technologies and Equipment never before introduced in Fire Service history!

FREE Trial of 'TestFlight' (iOS) version (as available), 'Help File,' and functional Spreadsheet of the Water Tender Shuttle Calculator at: WaterTenderApp.com

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HFT Fire "TOTAL" Wildland Engine Pressure Slide-Rule

The world's first-ever to estimate accurately in mere seconds!

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Wildland Fire Hydraulics
Myth or Math

For the first time in Fire Service history, any fire apparatus driver/operator assigned to the pump-panel on any wildland fire hoselay can finally meet:

The **OSHA general duty clause**, Section 5(a) (1) of the Occupational Safety and Health Act, **requires** that each employer furnish to each of its employees a **workplace that is free from recognized hazards** that are causing or likely to cause death or serious physical harm.

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HFT Fire **'TOTAL'** Engine Pressure Slide-Rule Calculator



The Scenario

HEN-WAY		Length
GPM	FL	Lat.
75	19.7	2.5
43	6.3	2.5
43	6.3	2.5
53	9.6	2.5
53	9.6	2.5
53	9.6	2.5
53	9.6	2.5
63	13.7	2.5
63	13.7	2.5
73	18.4	0
73	18.4	0
Total:		135
(-288 PSI/-67%) FL:		148
Nozzle Pressure (NP):		100
TOTAL (before 'HEAD'):		248
Avail. Pressure to 400:		152
Max. HEAD in Feet:		351
Max. Length @ 32% Grd.:		1100

'HENWAY' at 248 PSI

Length	100
Attack	60C 75C
Overhaul	10/23C 10/23C
Max HEAD	
Max Grade	
Max GPM	60 75
Max GPH	3600 4500

Laterals	Operating
7	
6	
5	
4	
3	
2	
1	
0	113 120

1. Select (insert) mode: **'ATTACK'** vs. **'OVERHAUL'**

2. Pull insert "OUT" to current Hoselay Length in feet.

3. Rotate DIAL "A" to **TOTAL** of Nozzle Pressure (NP) + Friction Loss (FL) upon number of "Laterals" operating row by the **Nozzle FLOW (NFPA 1002)** @ (20/60C or 25/75C GPM 'ATTACK') column to LEFT.

4. Again rotate DIAL "A" until estimated (±) **HEAD** (in FEET) lines up with **TOTAL of #3 (NP + FL)**

5. Read estimated **ENGINE PRESSURE (EP)** upon **RED NEEDLE** of Dial "A" on "Fixed GAUGE "B".

Note: **TOTAL** Friction Loss (FL) is calculated upon 10 GPM Laterals w/ 10/23 or 10/30 Comb. Nozzles

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HFT-FIRE

Is not Friction Loss a direct mathematical function of Gallons Per Minute? Each individual (GPM) affected section of hose is subject to: (Friction Loss (FL) = (GPM/100)² * C * L/100) (SDTDC-2005: "C" for 1.5" hose is 35 and 1" is 250) On a 32% Grade, the **Standard** method **MUST STOP** at 600' before exceeding **MAX 400 PSI**; or @ 1,100', pump **DOWNHILL - 288'** The **HENWAY** pumps 75 GPM (56% > "Knock-Out" than 60 GPM) @ 500' / 83% **FARTHER** and 639' **MORE HEAD** for **SAFETY!**

Standard	Length	HEN-WAY	Length
75C	100'	75C	1,100'
75	19.7	75	19.7
85	25.5	85	25.5
95	31.6	95	31.6
105	38.6	105	38.6
115	46.3	115	46.3
125	54.7	125	54.7
135	63.8	135	63.8
145	73.6	145	73.6
155	84.1	155	84.1
165	95.3	165	95.3
175	107.2	175	107.2
185	119.8	185	119.8
195	133.1	195	133.1
205	147.1	205	147.1
215	161.8	215	161.8
225	177.2	225	177.2
235	193.3	235	193.3
245	210.1	245	210.1
255	227.6	255	227.6
265	245.8	265	245.8
275	264.7	275	264.7
285	284.4	285	284.4
295	304.8	295	304.8
305	325.9	305	325.9
315	347.7	315	347.7
325	370.2	325	370.2
335	393.4	335	393.4
345	417.3	345	417.3
355	441.9	355	441.9
365	467.2	365	467.2
375	493.2	375	493.2
385	519.8	385	519.8
395	547.1	395	547.1
405	575.0	405	575.0
415	603.6	415	603.6
425	632.8	425	632.8
435	662.7	435	662.7
445	693.3	445	693.3
455	724.6	455	724.6
465	756.6	465	756.6
475	789.3	475	789.3
485	822.7	485	822.7
495	856.8	495	856.8
505	891.6	505	891.6
515	927.1	515	927.1
525	963.3	525	963.3
535	1000.2	535	1000.2
545	1037.8	545	1037.8
555	1076.1	555	1076.1
565	1115.1	565	1115.1
575	1154.8	575	1154.8
585	1195.2	585	1195.2
595	1236.3	595	1236.3
605	1278.1	605	1278.1
615	1320.6	615	1320.6
625	1363.8	625	1363.8
635	1407.7	635	1407.7
645	1452.3	645	1452.3
655	1497.6	655	1497.6
665	1543.6	665	1543.6
675	1590.3	675	1590.3
685	1637.7	685	1637.7
695	1685.8	695	1685.8
705	1734.6	705	1734.6
715	1784.1	715	1784.1
725	1834.3	725	1834.3
735	1885.2	735	1885.2
745	1936.8	745	1936.8
755	1989.1	755	1989.1
765	2042.1	765	2042.1
775	2095.8	775	2095.8
785	2150.2	785	2150.2
795	2205.3	795	2205.3
805	2261.1	805	2261.1
815	2317.6	815	2317.6
825	2374.8	825	2374.8
835	2432.7	835	2432.7
845	2491.3	845	2491.3
855	2550.6	855	2550.6
865	2610.6	865	2610.6
875	2671.3	875	2671.3
885	2732.7	885	2732.7
895	2794.8	895	2794.8
905	2857.6	905	2857.6
915	2921.1	915	2921.1
925	2985.3	925	2985.3
935	3050.2	935	3050.2
945	3115.8	945	3115.8
955	3182.1	955	3182.1
965	3249.1	965	3249.1
975	3316.8	975	3316.8
985	3385.2	985	3385.2
995	3454.3	995	3454.3
1000	3524.1	1000	3524.1

1. Select (insert) mode: **'ATTACK'** vs. **'OVERHAUL'**

2. Pull insert "OUT" to current Hoselay Length in feet.

3. Rotate DIAL "A" to **TOTAL** of Nozzle Pressure (NP) + Friction Loss (FL) upon number of "Laterals" operating row by the **Nozzle FLOW (NFPA 1002)** @ (20/60C or 25/75C GPM 'ATTACK') column to LEFT.

4. Again rotate DIAL "A" until estimated (±) **HEAD** (in FEET) lines up with **TOTAL of #3 (NP + FL)**

5. Read estimated **ENGINE PRESSURE (EP)** upon **RED NEEDLE** of Dial "A" on "Fixed GAUGE "B".

Note: **TOTAL** Friction Loss (FL) is calculated upon 10 GPM Laterals w/ 10/23 or 10/30 Comb. Nozzles

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1. **Select** 'HENWAY' or 'Standard' method.
2. **Extend** insert to current hoselay Length (i.e. 1,100' at 75 GPM)
3. **Determine** NP + FL per number of laterals operating. (i.e. "5" Lat.)
4. **Rotate Dial "A"** (i.e. 248 PSI on flat ground)
5. **Count** the 40' contour lines on a USGS map to estimate elevation. (i.e. 8.75 X 40' ~ 350')
6. **Rotate Dial "A"** until **HEAD** in feet lines up with **FL + NP** of Step 4. (i.e. EP = MAX 400 PSI)

Length	900
Attack	60C 75C
Overhaul	10/23C 10/23C
Max HEAD	436 343
Max Grade	48% 38%
Max GPM	100 115
Max GPH	6000 6900

Laterals	Operating
7	
6	
5	
4	211 251
3	201 240
2	186 223
1	175 211
0	157 189

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