



Water Supplies

Water Supplies

- Adequacy
- Reliability

Reliability 

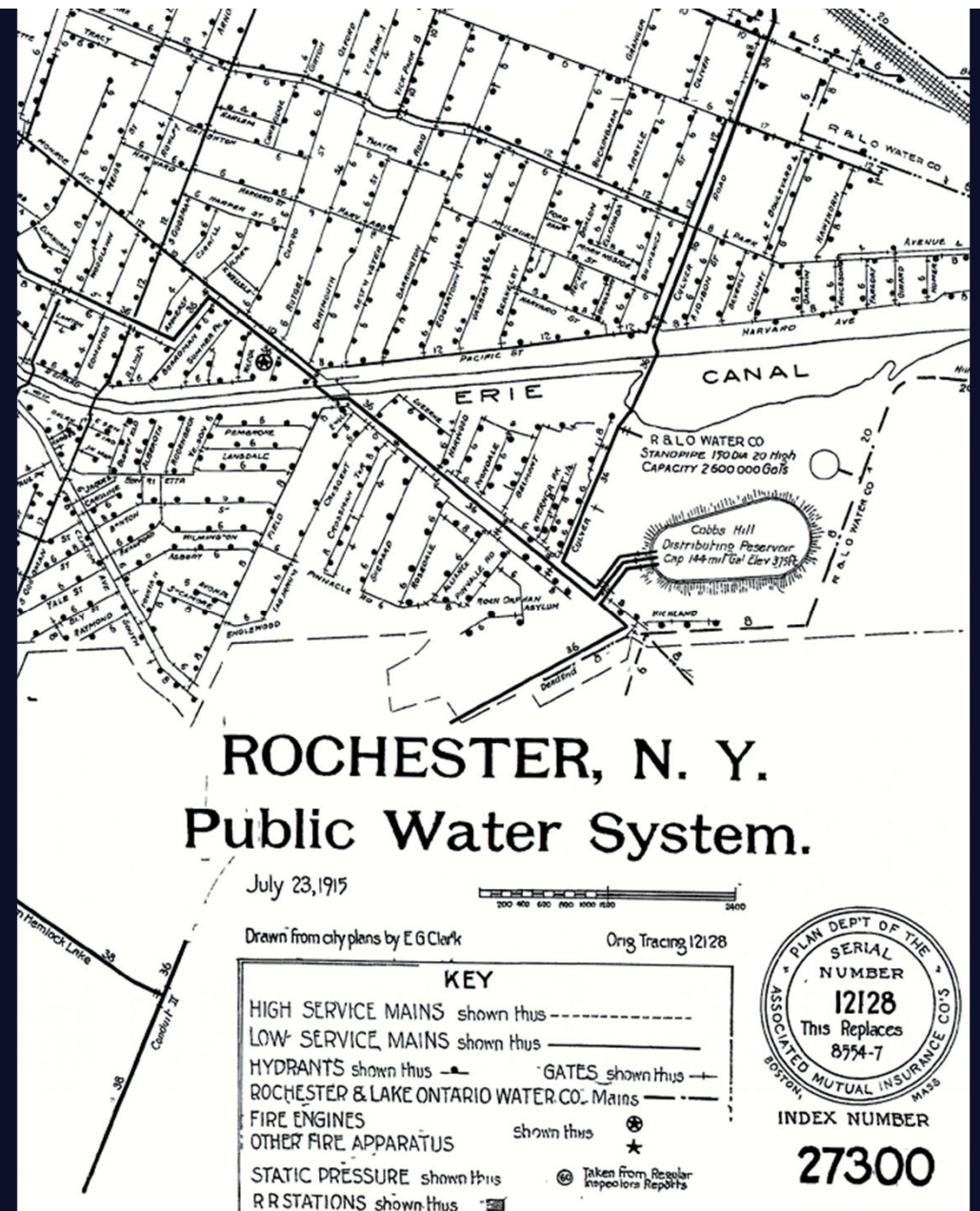
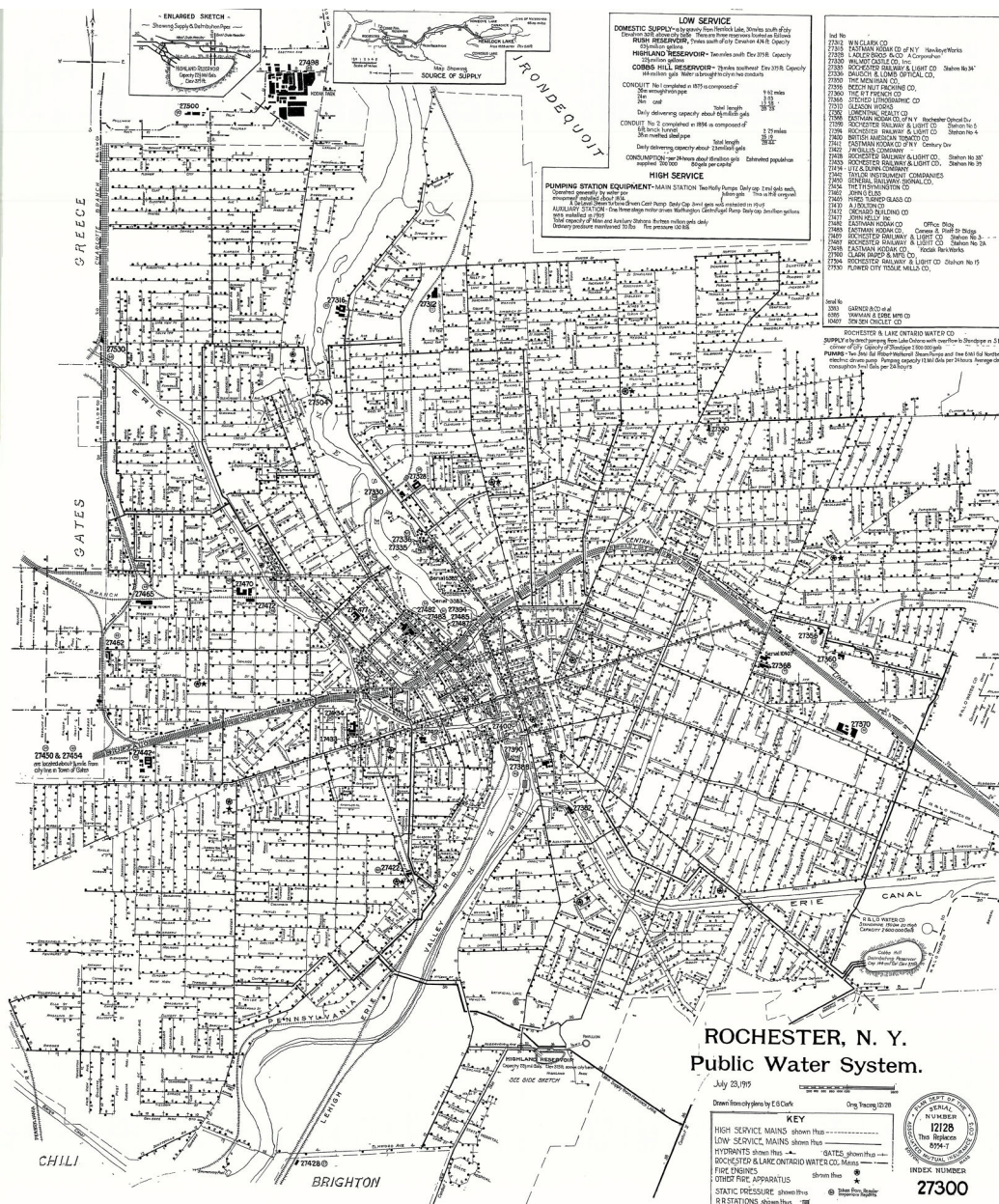
Water Supply Reliability

- FM Data Sheet 3-29
- Types of reliable water supplies:
 1. Direct connection to public or industrial fire fighting water supply
 2. On-site gravity tank
 3. Fire pump and suction tank
 4. Booster fire pump from from 1.
 5. Fire pump pond, lake, or river
 6. Fire pump and break tank

RELIABILITY OF FIRE PROTECTION WATER SUPPLIES

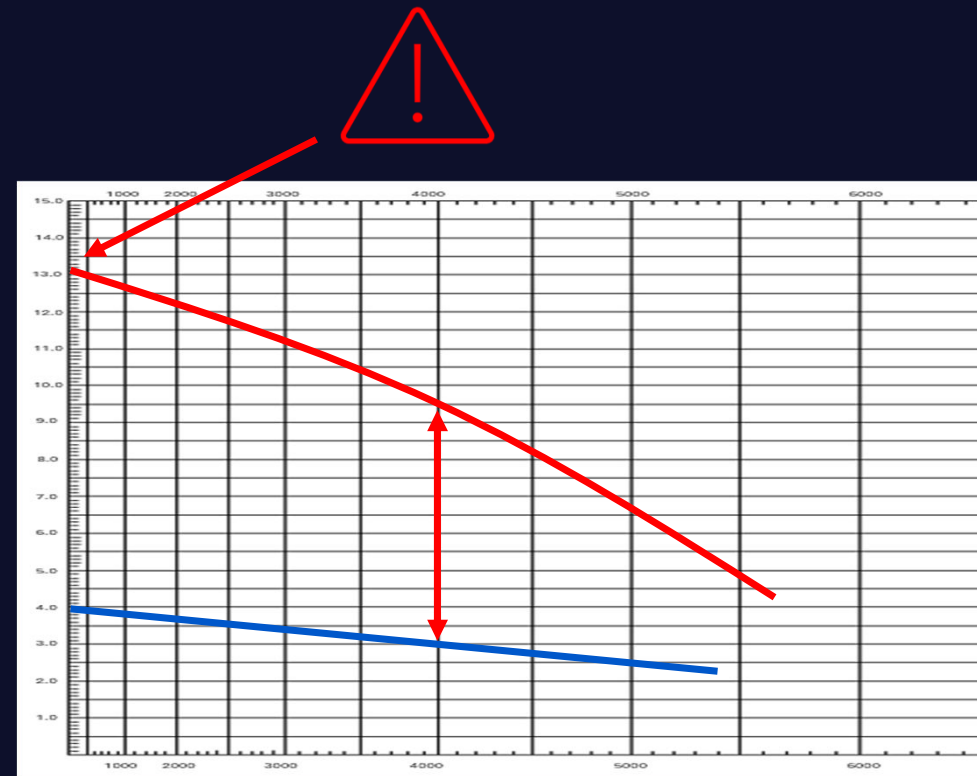
Table of Contents

	Page
1.0 SCOPE	2
1.1 Changes	2
2.0 LOSS PREVENTION RECOMMENDATIONS	2
2.1 Protection	2
2.1.1 Fire Protection Water Supplies	2
2.1.2 Enhanced Water Supply Reliability	2
3.0 SUPPORT FOR RECOMMENDATIONS	3
3.1 Loss History	3
4.0 REFERENCES	3
4.1 FM	3
4.2 Other	3
APPENDIX A GLOSSARY OF TERMS	3
APPENDIX B DOCUMENT REVISION HISTORY	4
APPENDIX C ENHANCED WATER SUPPLY RISK FACTORS	4
C.1 Risk Factors	4
C.1.1 Size, Value	4
C.1.2 Business Continuity	4
C.1.3 Occupancy	4
C.1.4 Arrangement and Condition of Water Supply	4
C.1.5 Geographic Location	5



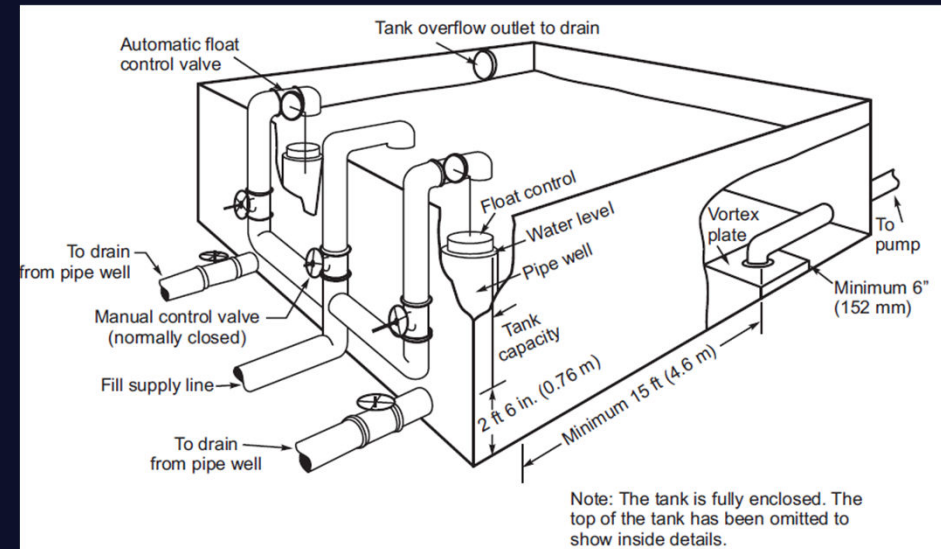
Public Water Supply and Booster Pumps

- Direct connection to public supply maybe adequate for offices and other low-hazard occupancies
- Booster fire pump needed for manufacturing and storage occupancies
- Limited capacity (flow)
- Incorrect pump selection and excessive churn pressures
- Increasing issues with connecting to public water system or doing full-flow testing (water companies)
- Water wastage during testing



Break Tanks

- FM Data Sheet 3-2, *Water Tanks for Fire Protection*
- Infill capacity from the public water supply should exceed 150% of the fire pump rated flow i.e., break tank should not be depleted/drained during the fire
- Two redundant automatic in-fill lines, and one manual fill line, each able to supply 150% capacity
- Automatic fill valves, mechanical float type



Usual problems:

- Insufficient or unknown capacity of public system
- No test line on public system
- Tank overflow same size as in-fill (inadequate)
- Electric valves on the in-fill lines:
 - Fail-safe?
 - Fed from one control panel (no redundancy)
 - Electric supply?

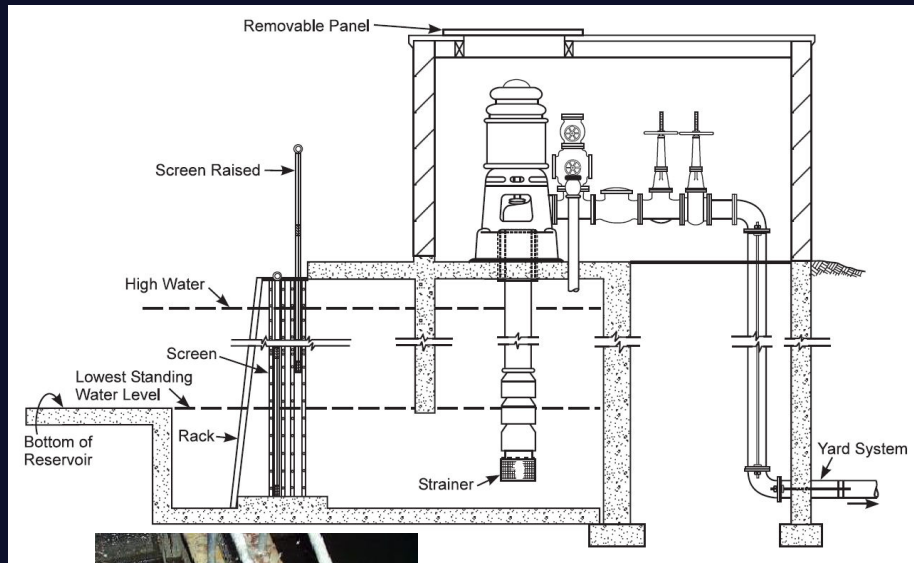
Gravity Tanks

- Not typical in Europe



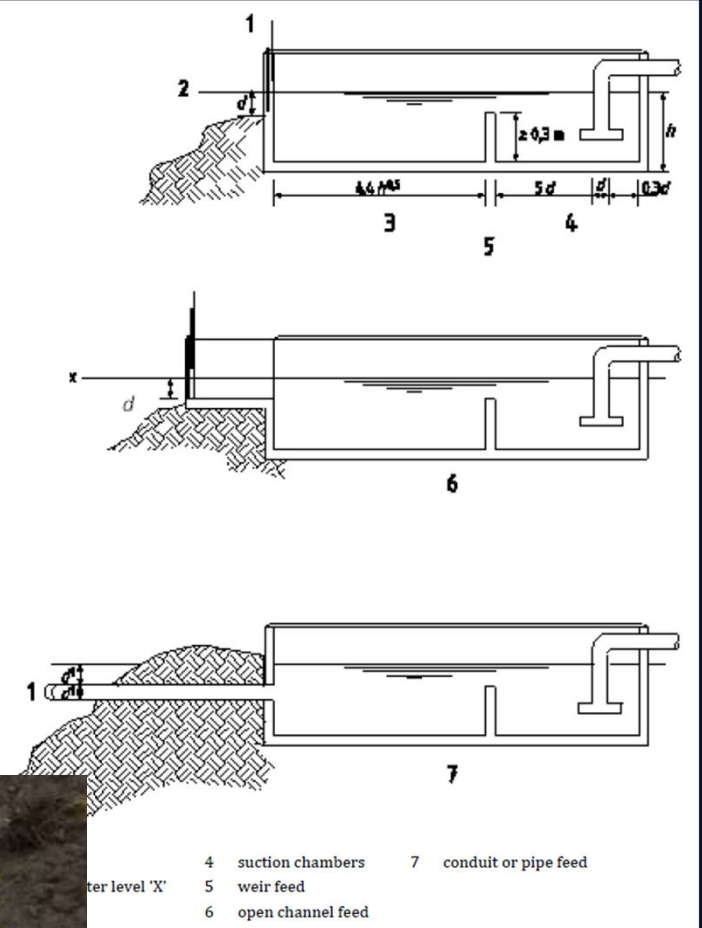
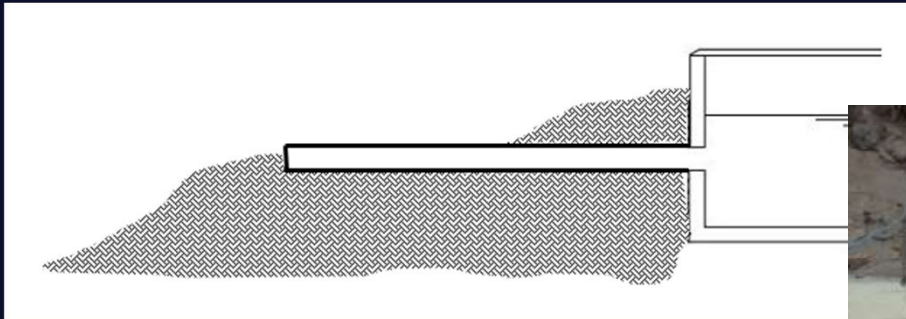
Water Supply from Open Body

- FM Data Sheet 3-7:
 - Vertical turbine pump
 - Dual suction screens
 - Strainer on suction intake



Water Supply from Open Body

- EN12845:
 - Arrangement 7, how and when to inspect the end of the pipe?
 - Horizontal fire pump and priming tanks



Fire Pumps

Enhanced Water Supply DS 3-29

Option	1	2	3	4	5
No. pumps & pump duty	100%	2 x 75%	3 x 50%	2 x 100%	1 x 100% + Backup Gen
Maximum pump rated flow to meet Q _{max}	140%	110%	110%	110%	110%
Driver (diesel, electric)	Diesel OR Electric	Diesel AND OR Electric	Diesel OR Electric	Diesel OR Electric	Electric
Nonstorage occupancy	Yes	Yes	Yes	Yes	Yes
Storage occupancy	Yes	No	Yes	Yes	Yes
Identical pump sizing	Does not apply	Yes	Yes	Yes	Does not apply

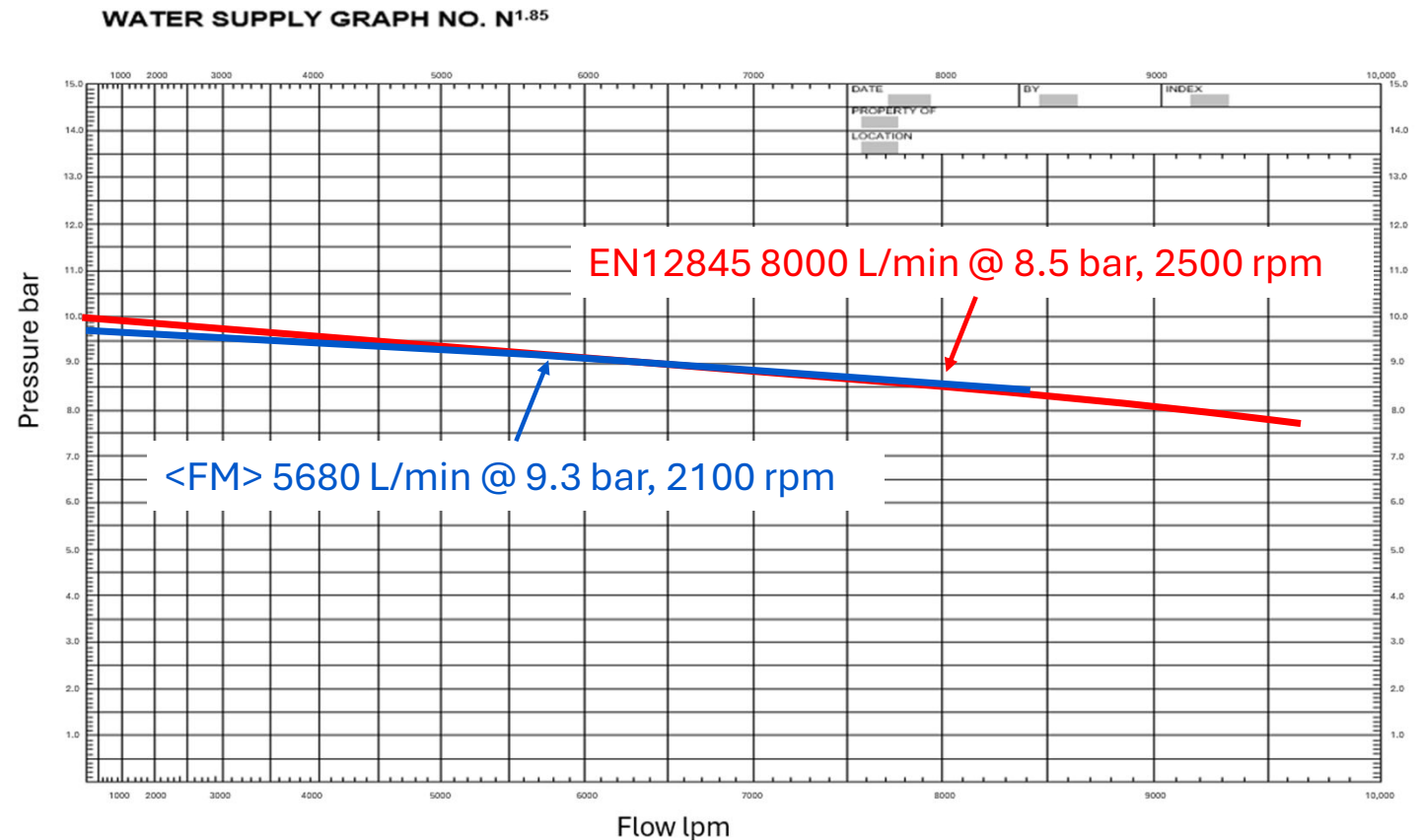
Fire Pumps

- FM Approved package (pump, driver, controller)
- Diesel or electric driver is acceptable
- Suction under lift not acceptable. Use vertical turbine pump, not priming tanks.
- Pump houses should be non-combustible and sprinklered (if diesel fuel is present)



Fire Pumps

- FM pumps are not inherently larger capacity
- Usually have a flatter curve and slower speed
- When sizing, include sprinkler demand + hose streams + monitors if fed from the pump



Fire Pumps

- No plastic or rubber components
- All-elastomeric couplings should be replaced
- Rubber bellows should not be needed. If present replace with FM Approved all-metal flexible coupling.

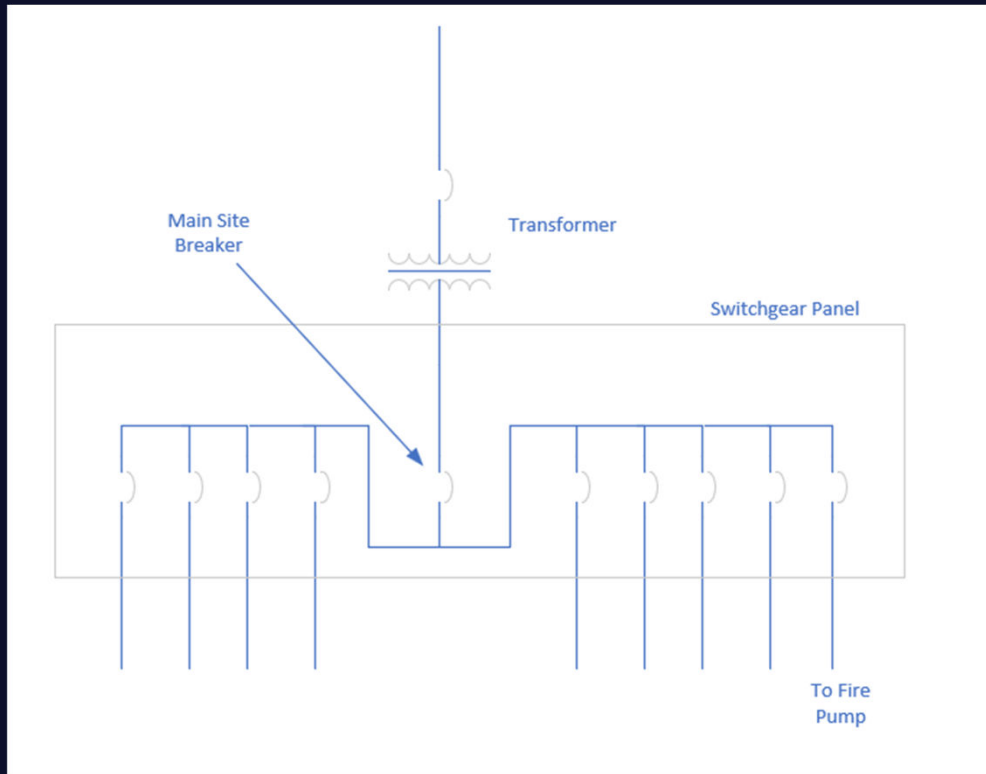


Electric Fire Pumps

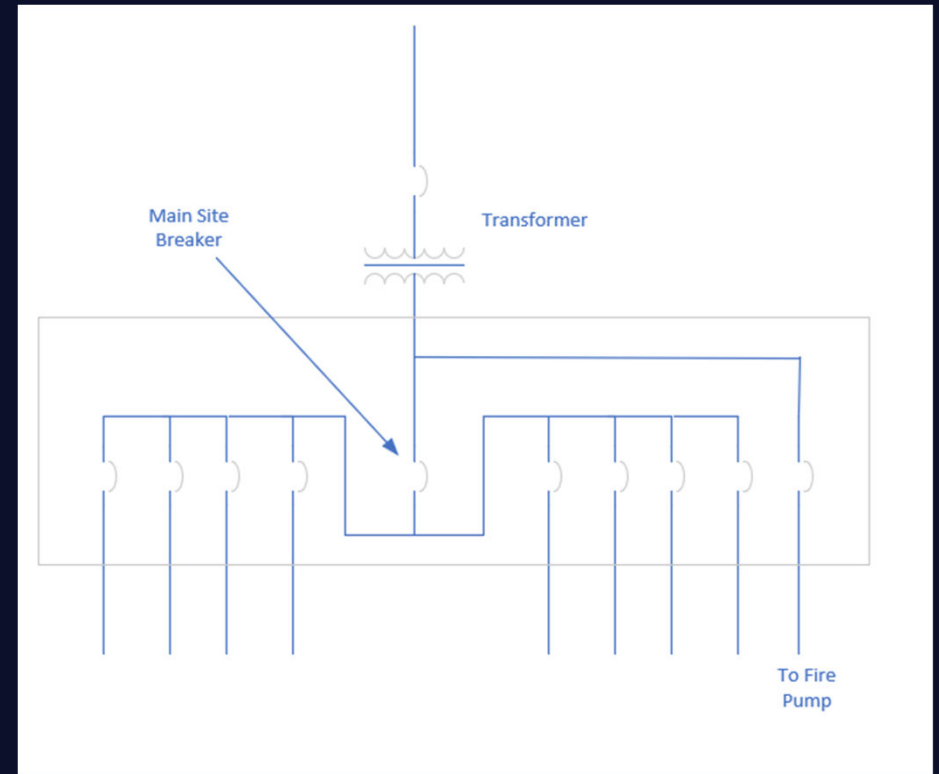
- Do not run the power cable through the protected area
- Arrange so power supply to pump is not isolated when isolating power to the plant or fire area
 - Same concept as in EN12845
 - Same concept in IEC 62091, Controllers for drivers of stationary fire pumps
 - Often not done (electrical contractors see the motor like any other electrical load)



Electrical Feed



Poorly arranged



Properly arranged

Electrical Feed

- Dutch guidance (good):
- Recommendations:
 - Rearrange electrical feed, or
 - Provide an automatic transfer switch and feed from a backup generator

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veiligheid

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3508 SC Utrecht

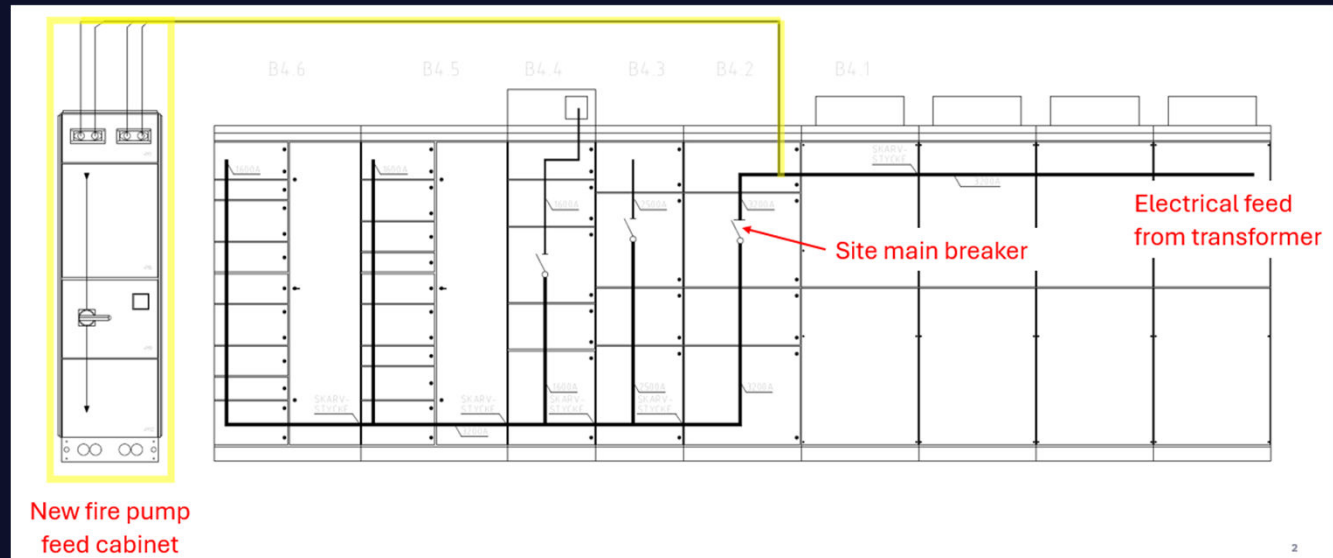
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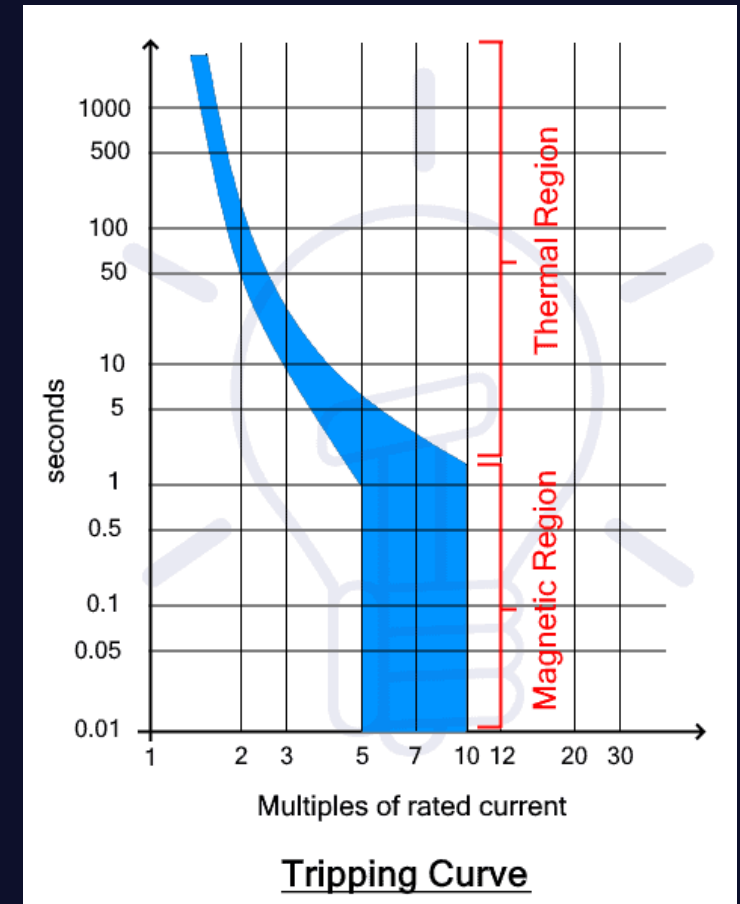
Technisch Bulletin 77B

POMPSETS VOOR VBB SYSTEMEN



Electrical Feed

- Size cable for 150% of full load current
- Breaker or fuses set for:
 - 8 to 20 second trip time at 720% of full load current ($\approx$ locked rotor current)
 - 3 minute trip time at 300% of full load current ($\approx$ single phasing current)
 - No ground fault protection
- If more than one electric fire pump, ensure/test protection does not trip if multiple pumps start at the same time

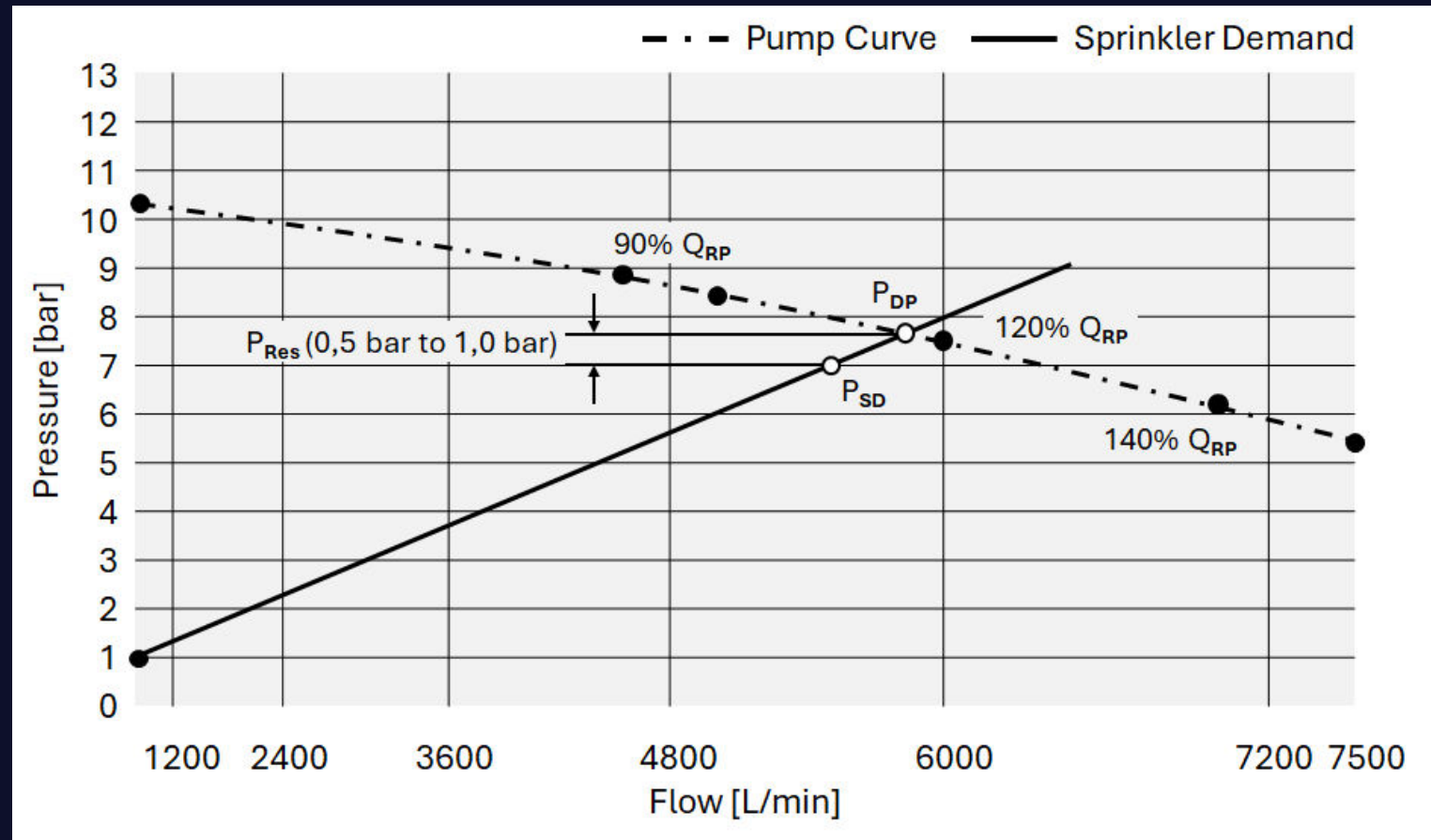




Adequacy

Adequacy

- Flow
- Pressure
- Duration



Pump Selection

- Pump churn pressure plus static suction pressure should not exceed 12 bar
- Usually no problem for a pump and tank system
- If sprinkler pressure demands are high, e.g., high-rise buildings or top-loading ASRS (K360, 12 heads at 8.3 bar) beware of excessive churn pressure

Patterson Pump Company - Ireland

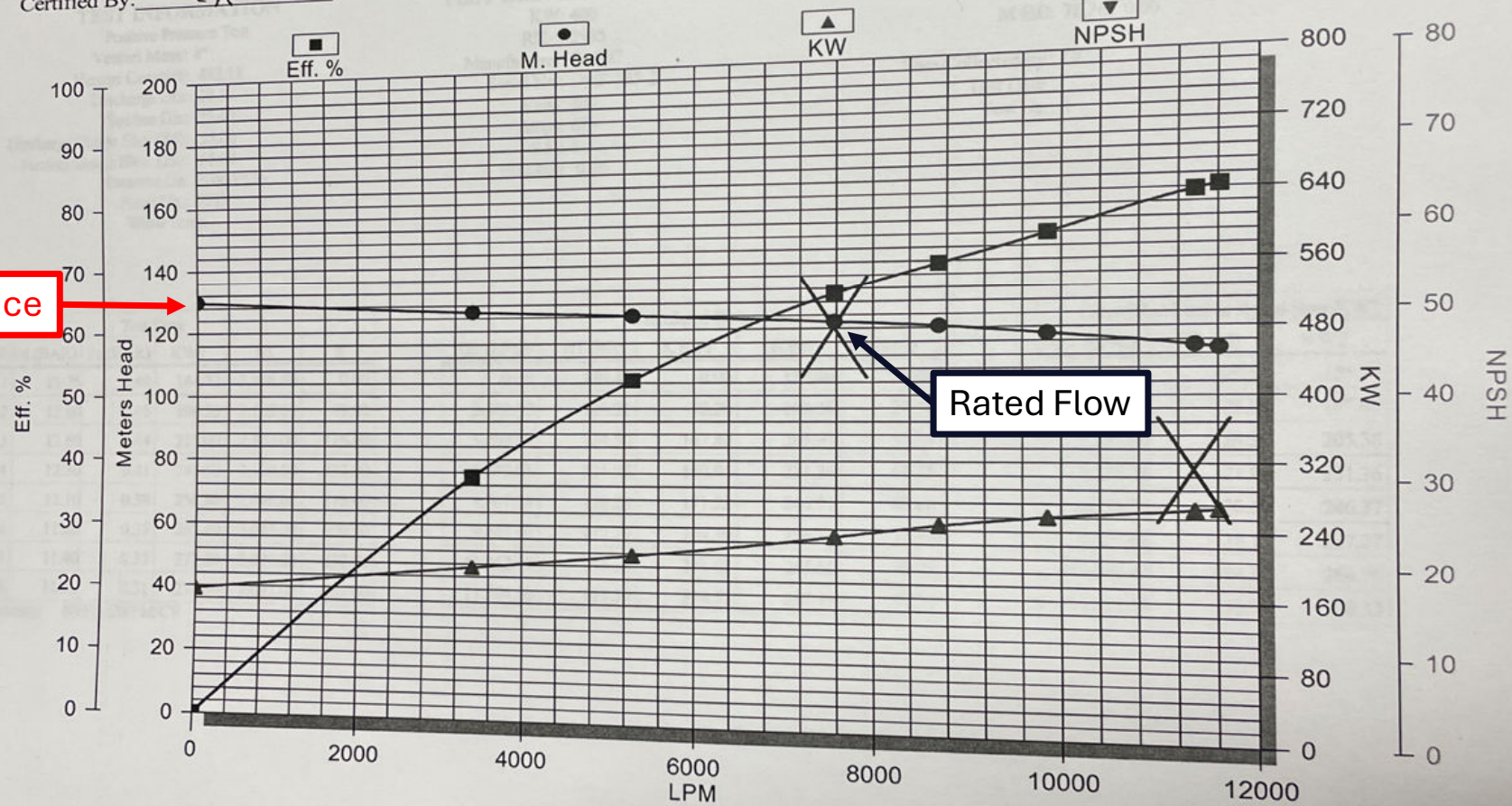
Serial No: IFP-C024114-001
 Pump Type: 10x8 M-H
 Imp Pattern: C-4070
 Imp Dia: 420
 Vane Tips: 12
 No. Stages: 1
 Certified By: CR

Test Driver: OMEC
 KW: 400
 Eff%: 0.958
 Test RPM: 2985
 Test Type: Performance Test
 Approved By: PS



LPM: 7570
 M. Head: 120.4
 Rated RPM: 2100
 Test Num: 1

Witnessed By: _____



PATTERSON PUMP COMPANY

PUMP DATA

Pump Size & Type: 10x8 M-H
Impeller Pattern: C-4070
Impeller Diameter: 420.00
Vane Tips: 12
Stages: 1.00

RATING (Design)

LPM: 7570
MHD: 120.4
RPM (N2): 2,100.00

TEST INFORMATION

Positive Pressure Test
Venturi Meter: 8"
Venturi Constant: 492.18
Discharge Dia: 20.32
Suction Dia: 25.40
Discharge Gauge Elev.(Zd): 55.00
Suction Gauge Elev. (Zs): 55.00
Pressure Ga: P106/P136
Panel No.: VFD
WaterTemp

TEST DRIVER INFORMATION

KW: 400
RPM: 2985
Manufacturer: OMEC
Serial No.: OMP-355-2
Volts: 400
Amps: 679
S.F.: 1
Eff.(.00): 0.96

SECONDARY RATINGS

LPM: 11,355.00, 0.00
MHD: 78.26, 0.00

Data Collected by : GC

Test Date :
Test No.: 1

Test Data					
No	Pd (BAR)	Ps (BAR)	KW1	N1	h
1	13.25	0.49	164.72	2,106.00	0.00
2	12.80	0.46	196.53	2,103.00	48.00
3	12.60	0.44	215.00	2,102.00	116.00
4	12.30	0.41	241.50	2,100.00	237.00
5	12.10	0.38	256.80	2,099.00	313.00
6	11.80	0.35	267.40	2,097.00	400.00
7	11.40	0.33	277.20	2,097.00	532.00
8	11.30	0.31	278.90	2,097.00	555.00

Comments: NFPA-0/FM/CE

Calculated Data				
Q1 (LPM)	H1 (M)	KWpu	KW0	npump
0.00	130.41	0.00	157.80	0.00
3,409.92	126.21	70.29	188.28	37.34
5,300.94	124.50	107.80	205.97	52.34
7,577.01	121.98	150.95	231.36	65.25
8,707.55	120.38	171.22	246.01	69.60
9,843.60	117.79	189.39	256.17	73.93
11,352.19	114.16	211.68	265.56	79.71
11,594.99	113.39	214.75	267.19	80.37

Plotted: Net RPM
Adjusted

Calculated Data at Rated Speed		
Q2 (LPM)	H2 (M)	KW2
0.00	129.67	156.46
3,405.06	125.85	187.47
5,295.90	124.26	205.38
7,577.01	121.98	231.36
8,711.70	120.50	246.37
9,857.68	118.13	257.27
11,368.43	114.49	266.70
11,611.58	113.72	268.33

Patterson Pump Company - Ireland

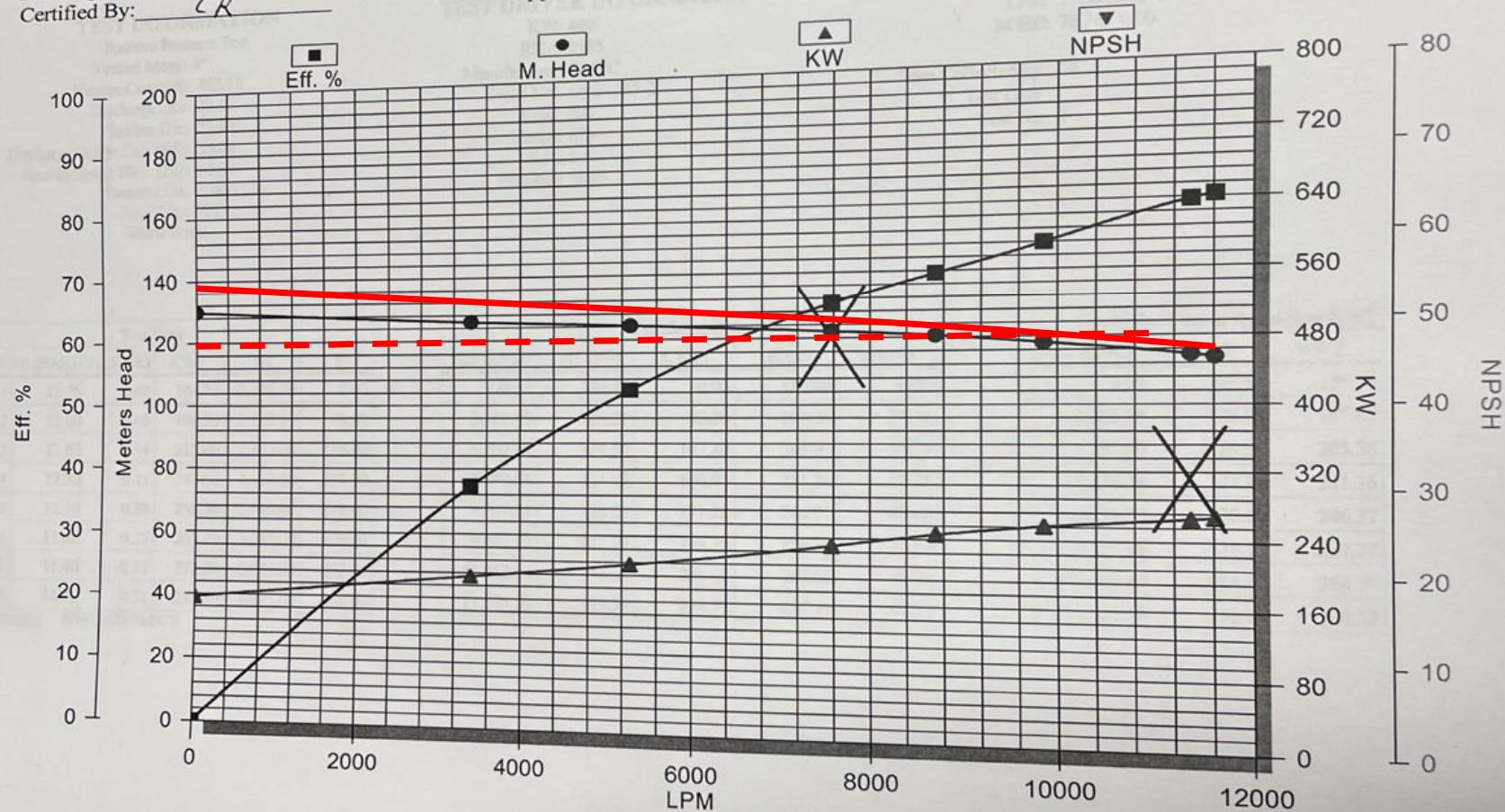
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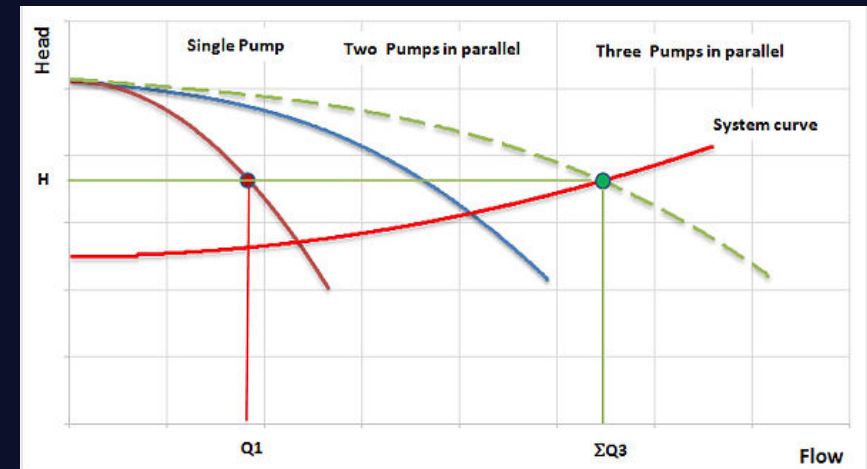
LPM: 7570
 M. Head: 120.4
 Rated RPM: 2100
 Test Num: 1

Witnessed By: _____



Pump Selection

- Do not use a pressure relief valve to manage high churn pressures
- Do not use pressure reducing valves
- Options for high pressure demands:
 - Diesel driver with FM Approved variable speed pressure limiting device
 - Electric motor with FM Approved variable speed electric fire pump controller
 - 3 x 50% pumps
- For high-rise buildings use a multi-stage pump or pumps on multiple floors



Suction Tanks

- Earthquake zone rated tanks available (see FM Approval Guide)
(Cannot normally be retrofitted)



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