

HYDRAULISCHE CALCULATIE

Install.nr. : 00103
Projectnaam : Morssinkhof Silo Park
Projectnummer : 42.238.082
Hydr. Gebied : Ongunstig gebied 2
Bijbehorende tek. nrs. : S021

Bestandsnaam : 42_238_082.sdf
Datum : 25-10-2023

- ONTWERP-GEGEVENS -

GEHANTEERDE VOORSCHRIFTEN : N.F.P.A. 15, 2022

DOEL : Beheersing van vrachtwagenbrand

SPROEIDICHTHEID : 10,2 mm/min/m²

SPROEIVLAK / SYSTEEM : Max. 2 Secties (475m²)

SPROEIVLAK / SPRINKLER : 6.6 m²

AANTAL SPRINKLERS IN SPROEIVLAK : 72 Sprinklers


NOMINALE SPRINKLER DOORLAAT : 15 mm

K FACTOR : K = 80

BEREKENDE K-FACTOREN : K = 279 (Strang met 4 Spr.)

BENODIGDE FLOW EN DRUK : 5826 l.p.m. bij 4.0 bar

ONTWORPEN/BEREKEND DOOR : A. Saris

GECONTROLEERD : M. Schulte 

STATUS VAN DE BEREKENING : Ter Goedkeuring

LET-OP!! : Silo park is opgedeeld in 3 secties met
uitgangspunt van 2 secties max. tegelijk in
werking

De Groot Installatiegroep Brandbeveiliging

Hengelo Opaalstraat 22, Postbus 156
Emmen Navigatiestraat 3
Ridderkerk Legendijk 267-269
Elburg De Rietkraag 21, Postbus 84
Den Bosch Rietveldenweg 12

7550 AD Hengelo
7826 TD Emmen
2988 AA Ridderkerk
8080 AB Elburg
5222 AR Den Bosch

T (074) 240 48 00
T (0591) 51 46 19
T (0180) 42 92 33
T (0525) 65 96 66
T (073) 203 90 00

E sprinklerhengelo@degrootgroep.nl
E sprinkleremmen@degrootgroep.nl
E sprinkleridderkerk@degrootgroep.nl
E sprinklerelburg@degrootgroep.nl
E sprinklerdenbosch@degrootgroep.nl

DATE: 10/25/2023RAAIJENSTRAAT\DELUGE PROTECTION\DN40 STRANG - 10.2 MM.SDF
 JOB TITLE: 42.198.079 Morssinkhof Silo Park - DN40 Strang - 10 mm/min /m2

WATER SUPPLY DATA

SOURCE NODE TAG	STATIC PRESS. (BAR)	RESID. PRESS. (BAR)	FLOW @ (LPM)	AVAIL. PRESS. (BAR)	TOTAL DEMAND (LPM)	REQ'D PRESS. (BAR)
SOURCE	(N/A)	0.00	(N/A)	0.000	277.4	0.991

AGGREGATE FLOW ANALYSIS:

TOTAL FLOW AT SOURCE	277.4 LPM
TOTAL HOSE STREAM ALLOWANCE AT SOURCE	0.0 LPM
OTHER HOSE STREAM ALLOWANCES	0.0 LPM
TOTAL DISCHARGE FROM ACTIVE SPRINKLERS	277.4 LPM

NODE ANALYSIS DATA

NODE TAG	ELEVATION (M)	NODE TYPE	PRESSURE (BAR)	DISCHARGE (L/MIN)
1.1	9.30	K=80.00	0.722	68.0
1.2	9.30	K=80.00	0.729	68.3
1.3	9.30	K=80.00	0.752	69.4
1.4	9.30	K=80.00	0.802	71.7
SOURCE	9.00	SOURCE	0.991	277.4

$$k = \frac{Q}{\sqrt{P}}$$

$$k = \frac{277.4}{\sqrt{0.991}}$$

$$k = 279$$

DATE: 10/25/2023RAAIJENSTRAAT\DELUGE PROTECTION\DN40 STRANG - 10.2 MM.SDF
 JOB TITLE: 42.198.079 Morssinkhof Silo Park - DN40 Strang - 10 mm/min /m2

PIPE DATA

PIPE TAG	END	ELEV.	NOZ.	PT	DISC.	Q(LPM)	DIA(MM)	LENGTH	PRESS.
	NODES	(M)	(K)	(BAR)	(LPM)	VEL(MPS)	HW(C)	(M)	SUM.
						FL/M			(BAR)
Pipe: 1						277.4	41.80	PL	1.15
SOURCE		9.00	SRCE	0.991	(N/A)	3.37	120	FTG	TL
1.4		9.30	80.0	0.802	71.7		0.0363	TL	4.39
									PV
Pipe: 2						205.7	41.80	PL	2.40
1.4		9.30	80.0	0.802	71.7	2.50	120	FTG	----
1.3		9.30	80.0	0.752	69.4		0.0209	TL	2.40
									PV
Pipe: 3						136.3	41.80	PL	2.40
1.3		9.30	80.0	0.752	69.4	1.66	120	FTG	----
1.2		9.30	80.0	0.729	68.3		0.0097	TL	2.40
									PV
Pipe: 4						68.0	41.80	PL	2.40
1.2		9.30	80.0	0.729	68.3	0.83	120	FTG	----
1.1		9.30	80.0	0.722	68.0		0.0027	TL	2.40
									PV

NOTES (HASS):

- Calculations were performed by the HASS 2023 D computer program in accordance with (2022) under license no. 64625757 granted by HRS Systems, Inc. 208 Southside Square Petersburg, TN 37144 (931) 659-9760
- The system has been calculated to provide an average imbalance at each node of 0.0010 lpm and a maximum imbalance at any node of 0.0010 lpm.
- Total pressure at each node is used in balancing the system. Maximum water velocity is 3.37 m/sec at pipe 1.
- Items listed in bold print on the cover sheet are automatically transferred from the calculation report.

(5) PIPE FITTINGS TABLE

User Pipe Table Name: VICTAULIC

PAGE: A	MATERIAL: Staal		HWC: 120						
Diameter	Equivalent Fitting Lengths in Meters								
(mm)	E	T	L	C	B	G	J	D	H
	Ell	Tee	LngEll	ChkVlv	BfyVlv	GatVlv	modelJ	DelVlv	HlfLgE

	R	F							
	Ril	ModelF							
41.80	1.22	2.44	0.80	0.00	0.00	0.00	0.00	0.00	0.40
	0.30	0.00							

DATE: 10/25/2023\SILOEST KRAAIJENSTRAAT\DELUGE PROTECTION\42_238_082.SDF
JOB TITLE: 00103.MAN_23Z1-2

WATER SUPPLY DATA

SOURCE NODE TAG	STATIC PRESS. (BAR)	RESID. PRESS. (BAR)	FLOW @ (LPM)	AVAIL. PRESS. (BAR)	TOTAL @ DEMAND (LPM)	REQ'D PRESS. (BAR)
SOURCE	(N/A)	0.00	(N/A)	0.000	5826.2	0.049

AGGREGATE FLOW ANALYSIS:

TOTAL FLOW AT SOURCE	5826.2 LPM
TOTAL HOSE ALLOWANCE AT SOURCE	0.0 LPM
OTHER HOSE STREAM ALLOWANCES	0.0 LPM
TOTAL DISCHARGE FROM ACTIVE SPRINKLERS	5826.2 LPM

NODE ANALYSIS DATA

NODE TAG	ELEVATION (M)	NODE TYPE	PRESSURE (BAR)	DISCHARGE (L/MIN)
1	6.90	- - - -	1.430	- - -
2	6.90	- - - -	1.430	- - -
3	6.90	- - - -	1.430	- - -
4	6.90	- - - -	1.430	- - -
5	6.90	- - - -	1.430	- - -
6	6.90	- - - -	1.430	- - -
7	6.90	- - - -	1.430	- - -
8	6.90	- - - -	1.430	- - -
9	6.90	- - - -	1.430	- - -
10	6.90	- - - -	1.430	- - -
11	6.90	K=279.00	1.174	302.3
12	6.90	K=279.00	1.174	302.3
13	6.90	K=279.00	1.175	302.4
14	6.90	K=279.00	1.176	302.6
15	6.90	K=279.00	1.178	302.8
16	6.90	K=279.00	1.181	303.2
17	6.90	K=279.00	1.185	303.7
18	6.90	K=279.00	1.191	304.5
19	6.90	K=279.00	1.198	305.3
20	6.90	K=279.00	1.207	306.6
21	9.30	K=279.00	1.038	284.2
22	9.30	K=279.00	1.010	280.4
23	9.30	K=279.00	1.005	279.6
24	9.30	K=279.00	0.999	278.9
25	9.30	K=279.00	0.996	278.5
26	9.30	K=279.00	0.993	278.1
27	9.30	K=279.00	0.992	277.8
28	9.30	K=279.00	0.991	277.7
29	9.30	K=279.00	0.990	277.6
30	9.30	K=279.00	0.990	277.6
AK23Z5	1.50	- - - -	1.869	- - -
AK23Z6	1.50	- - - -	1.854	- - -
AK23Z7	1.50	- - - -	1.959	- - -
MAN23Z1-5	0.60	- - - -	2.048	- - -
A001	-1.20	- - - -	3.341	- - -
A004	-1.20	- - - -	3.312	- - -
A009	-1.20	- - - -	3.335	- - -
A010	-1.20	- - - -	3.476	- - -
A014	-1.20	- - - -	3.522	- - -

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 JOB TITLE: 00103.MAN_23Z1-2

NODE ANALYSIS DATA

NODE TAG	ELEVATION (M)	NODE TYPE	PRESSURE (BAR)	DISCHARGE (L/MIN)
A016	-1.20	- - - -	3.585	- - -
A018	-1.20	- - - -	3.569	- - -
A020	-1.20	- - - -	3.553	- - -
A044	-1.20	- - - -	3.541	- - -
A047	-1.20	- - - -	3.541	- - -
A049	-1.20	- - - -	3.542	- - -
A061	-1.20	- - - -	3.843	- - -
A063	-1.20	- - - -	3.763	- - -
A068	-1.20	- - - -	3.868	- - -
A070	-1.20	- - - -	3.339	- - -
A079	-1.20	- - - -	3.532	- - -
A087	-1.20	- - - -	3.539	- - -
S001	-1.20	- - - -	3.457	- - -
S002	-1.20	- - - -	3.298	- - -
S003	-1.20	- - - -	3.258	- - -
S004	-1.20	- - - -	3.143	- - -
S005	-1.20	- - - -	2.911	- - -
S006	-1.20	- - - -	3.265	- - -
S008	-1.20	- - - -	3.540	- - -
S011	-1.20	- - - -	3.541	- - -
S012	-1.20	- - - -	3.541	- - -
S025	-1.20	- - - -	3.340	- - -
S029	-1.20	- - - -	3.532	- - -
G1	-1.20	- - - -	4.053	- - -
G2	-1.20	- - - -	3.890	- - -
G4	-1.20	- - - -	3.823	- - -
G5	-1.20	- - - -	3.732	- - -
G6	-1.20	- - - -	3.178	- - -
G10	-1.20	- - - -	3.540	- - -
G11	-1.20	- - - -	3.541	- - -
G12	-1.20	- - - -	3.542	- - -
G13	-1.20	- - - -	3.541	- - -
H11	-1.20	- - - -	3.096	- - -
H13	-1.20	- - - -	3.183	- - -
H23	9.30	- - - -	1.038	- - -
PERS	0.50	- - - -	3.971	- - -
ZUIG	0.50	- - - -	-0.001	- - -
SOURCE	0.00	SOURCE	0.049	5826.2

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JOB TITLE: 00103.MAN_23Z1-2

PIPE DATA

PIPE TAG	END	ELEV.	NOZ.	PT	DISC.	Q (LPM)	DIA (MM)	LENGTH	PRESS.
NODES		(M)	(K)	(BAR)	(LPM)	VEL (MPS)	HW (C)	(M)	SUM.
							FL/M		(BAR)
Pipe: 1									
1		6.90	0.0	1.430	0.0	0.00	160.30	PL	PF 0.000
2		6.90	0.0	1.430	0.0	0.00	120	FTG	---- PE 0.000
		6.90	0.0	1.430	0.0	0.0000	0.0000	TL	PV 2.75
Pipe: 2									
2		6.90	0.0	1.430	0.0	0.00	160.30	PL	PF 0.000
3		6.90	0.0	1.430	0.0	0.00	120	FTG	---- PE 0.000
		6.90	0.0	1.430	0.0	0.0000	0.0000	TL	PV 2.25
Pipe: 3									
3		6.90	0.0	1.430	0.0	0.00	160.30	PL	PF 0.000
4		6.90	0.0	1.430	0.0	0.00	120	FTG	---- PE 0.000
		6.90	0.0	1.430	0.0	0.0000	0.0000	TL	PV 2.75
Pipe: 4									
4		6.90	0.0	1.430	0.0	0.00	160.30	PL	PF 0.000
5		6.90	0.0	1.430	0.0	0.00	120	FTG	---- PE 0.000
		6.90	0.0	1.430	0.0	0.0000	0.0000	TL	PV 2.25
Pipe: 5									
5		6.90	0.0	1.430	0.0	0.00	160.30	PL	PF 0.000
6		6.90	0.0	1.430	0.0	0.00	120	FTG	---- PE 0.000
		6.90	0.0	1.430	0.0	0.0000	0.0000	TL	PV 2.75
Pipe: 6									
6		6.90	0.0	1.430	0.0	0.00	160.30	PL	PF 0.000
7		6.90	0.0	1.430	0.0	0.00	120	FTG	---- PE 0.000
		6.90	0.0	1.430	0.0	0.0000	0.0000	TL	PV 2.25
Pipe: 7									
7		6.90	0.0	1.430	0.0	0.00	160.30	PL	PF 0.000
8		6.90	0.0	1.430	0.0	0.00	120	FTG	---- PE 0.000
		6.90	0.0	1.430	0.0	0.0000	0.0000	TL	PV 2.75
Pipe: 8									
8		6.90	0.0	1.430	0.0	0.00	160.30	PL	PF 0.000
9		6.90	0.0	1.430	0.0	0.00	120	FTG	---- PE 0.000
		6.90	0.0	1.430	0.0	0.0000	0.0000	TL	PV 2.25
Pipe: 9									
9		6.90	0.0	1.430	0.0	0.00	160.30	PL	PF 0.000
10		6.90	0.0	1.430	0.0	0.00	120	FTG	---- PE 0.000
		6.90	0.0	1.430	0.0	0.0000	0.0000	TL	PV 2.75
Pipe: 10									
10		6.90	0.0	1.430	0.0	0.00	160.30	PL	PF 0.000
AK23Z7		1.50	0.0	1.959	0.0	0.00	120	FTG	6L PE 0.529
		1.50	0.0	1.959	0.0	0.0000	0.0000	TL	PV 53.00
Pipe: 11									
11		6.90	279.0	1.174	302.3	-302.3 0.25	160.30	PL	PF 0.000
12		6.90	279.0	1.174	302.3	0.25	120	FTG	---- PE 0.000
		6.90	279.0	1.174	302.3	0.0001	0.0001	TL	PV 2.75
Pipe: 12									
12		6.90	279.0	1.174	302.3	-604.7 0.50	160.30	PL	PF 0.000
13		6.90	279.0	1.175	302.4	0.50	120	FTG	---- PE 0.000
		6.90	279.0	1.175	302.4	0.0002	0.0002	TL	PV 2.25
Pipe: 13									
13		6.90	279.0	1.175	302.4	-907.1 0.75	160.30	PL	PF 0.001
14		6.90	279.0	1.176	302.6	0.75	120	FTG	---- PE 0.000
		6.90	279.0	1.176	302.6	0.0005	0.0005	TL	PV 2.75
Pipe: 14									
14		6.90	279.0	1.176	302.6	-1209.6 1.00	160.30	PL	PF 0.002
15		6.90	279.0	1.178	302.8	1.00	120	FTG	---- PE 0.000
		6.90	279.0	1.178	302.8	0.0008	0.0008	TL	PV 2.25

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JOB TITLE: 00103.MAN_23Z1-2

PIPE TAG	END	ELEV.	NOZ.	PT	DISC.	Q(LPM)	DIA(MM)	LENGTH	PRESS.
NODES	NODES	(M)	(K)	(BAR)	(LPM)	VEL(MPS)	HW(C)	(M)	SUM.
						FL/M			(BAR)
Pipe: 15						-1512.4	160.30	PL	2.75 PF 0.003
15		6.90	279.0	1.178	302.8	1.25	120	FTG	----- PE 0.000
16		6.90	279.0	1.181	303.2		0.0012	TL	2.75 PV
Pipe: 16						-1815.6	160.30	PL	2.25 PF 0.004
16		6.90	279.0	1.181	303.2	1.50	120	FTG	----- PE 0.000
17		6.90	279.0	1.185	303.7		0.0017	TL	2.25 PV
Pipe: 17						-2119.3	160.30	PL	2.75 PF 0.006
17		6.90	279.0	1.185	303.7	1.75	120	FTG	----- PE 0.000
18		6.90	279.0	1.191	304.5		0.0022	TL	2.75 PV
Pipe: 18						-2423.8	160.30	PL	2.25 PF 0.006
18		6.90	279.0	1.191	304.5	2.00	120	FTG	----- PE 0.000
19		6.90	279.0	1.198	305.3		0.0029	TL	2.25 PV
Pipe: 19						-2729.1	160.30	PL	2.75 PF 0.010
19		6.90	279.0	1.198	305.3	2.25	120	FTG	----- PE 0.000
20		6.90	279.0	1.207	306.6		0.0036	TL	2.75 PV
Pipe: 20						-3035.7	160.30	PL	9.00 PF 0.118
20		6.90	279.0	1.207	306.6	2.51	120	FTG	6L PE 0.529
AK23Z6		1.50	0.0	1.854	0.0		0.0044	TL	27.00 PV
Pipe: 21						-284.2	160.30	PL	1.20 PF 0.000
21		9.30	279.0	1.038	284.2	0.23	120	FTG	T PE 0.000
H23		9.30	0.0	1.038	0.0		0.0001	TL	8.80 PV
Pipe: 21A						-2506.2	160.30	PL	1.55 PF 0.028
22		9.30	279.0	1.010	280.4	2.07	120	FTG	T PE 0.000
H23		9.30	0.0	1.038	0.0		0.0031	TL	9.15 PV
Pipe: 22						2225.8	160.30	PL	2.25 PF 0.006
22		9.30	279.0	1.010	280.4	1.84	120	FTG	----- PE 0.000
23		9.30	279.0	1.005	279.6		0.0025	TL	2.25 PV
Pipe: 23						1946.2	160.30	PL	2.75 PF 0.005
23		9.30	279.0	1.005	279.6	1.61	120	FTG	----- PE 0.000
24		9.30	279.0	0.999	278.9		0.0019	TL	2.75 PV
Pipe: 24						1667.3	160.30	PL	2.25 PF 0.003
24		9.30	279.0	0.999	278.9	1.38	120	FTG	----- PE 0.000
25		9.30	279.0	0.996	278.5		0.0014	TL	2.25 PV
Pipe: 25						1388.8	160.30	PL	2.75 PF 0.003
25		9.30	279.0	0.996	278.5	1.15	120	FTG	----- PE 0.000
26		9.30	279.0	0.993	278.1		0.0010	TL	2.75 PV
Pipe: 26						1110.8	160.30	PL	2.25 PF 0.002
26		9.30	279.0	0.993	278.1	0.92	120	FTG	----- PE 0.000
27		9.30	279.0	0.992	277.8		0.0007	TL	2.25 PV
Pipe: 27						832.9	160.30	PL	2.75 PF 0.001
27		9.30	279.0	0.992	277.8	0.69	120	FTG	----- PE 0.000
28		9.30	279.0	0.991	277.7		0.0004	TL	2.75 PV

PIPE TAG	END	ELEV.	NOZ.	PT	DISC.	Q (LPM)	DIA (MM)	LENGTH	PRESS.
NODES	(M)	(K)	(BAR)	(LPM)	VEL (MPS)	HW (C)	FL/M	(M)	SUM.
									(BAR)
28	Pipe: 27A				555.2	160.30	PL	2.75	PF 0.001
	9.30	279.0	0.991	277.7	0.46	120	FTG	----	PE 0.000
	9.30	279.0	0.990	277.6		0.0002	TL	2.75	PV
29	Pipe: 27B				277.6	160.30	PL	2.75	PF 0.000
	9.30	279.0	0.990	277.6	0.23	120	FTG	----	PE 0.000
	9.30	279.0	0.990	277.6		0.0001	TL	2.75	PV
H23	Pipe: 28				-2790.4	160.30	PL	9.00	PF 0.067
	9.30	0.0	1.038	0.0	2.30	120	FTG	3L	PE 0.764
	AK23Z5	1.50	0.0	1.869	0.0	0.0037	TL	18.00	PV
AK23Z7	Pipe: 29				0.0	160.30	PL	1.50	PF 0.000
	1.50	0.0	1.959	0.0	0.00	120	FTG	T2BD	PE 0.088
	MAN23Z1-5	0.60	0.0	2.048	0.0	0.0000	TL	24.20	PV
AK23Z6	Pipe: 30				-3035.7	160.30	PL	1.50	PF 0.105
	1.50	0.0	1.854	0.0	2.51	120	FTG	T2BD	PE 0.088
	MAN23Z1-5	0.60	0.0	2.048	0.0	0.0044	TL	24.20	PV
AK23Z5	Pipe: 31				-2790.4	160.30	PL	1.50	PF 0.090
	1.50	0.0	1.869	0.0	2.30	120	FTG	T2BD	PE 0.088
	MAN23Z1-5	0.60	0.0	2.048	0.0	0.0037	TL	24.20	PV
MAN23Z1-5	Pipe: 32				-5826.2	163.30	PL	30.00	PF 0.687
	0.60	0.0	2.048	0.0	4.64	140	FTG	2TLG	PE 0.176
	S005	-1.20	0.0	2.911	0.0	0.0100	TL	68.75	PV
S029	Pipe: 33				0.0	160.30	PL	220.00	PF 0.000
	-1.20	0.0	3.532	0.0	0.00	120	FTG	2T7LG	PE 0.000
	A079	-1.20	0.0	3.532	0.0	0.0000	TL	257.35	PV
S004	Pipe: 34				2958.1	207.90	PL	40.00	PF 0.047
	-1.20	0.0	3.143	0.0	1.45	120	FTG	----	PE 0.000
	H11	-1.20	0.0	3.096	0.0	0.0012	TL	40.00	PV
H11	Pipe: 35				2958.1	163.60	PL	54.00	PF 0.185
	-1.20	0.0	3.096	0.0	2.35	140	FTG	2LG	PE 0.000
	S005	-1.20	0.0	2.911	0.0	0.0028	TL	65.39	PV
S005	Pipe: 36				-2868.1	163.60	PL	92.00	PF 0.272
	-1.20	0.0	2.911	0.0	2.27	140	FTG	2L	PE 0.000
	H13	-1.20	0.0	3.183	0.0	0.0027	TL	101.77	PV
H13	Pipe: 37				-2868.1	207.90	PL	66.00	PF 0.082
	-1.20	0.0	3.183	0.0	1.41	120	FTG	2L	PE 0.000
	S006	-1.20	0.0	3.265	0.0	0.0011	TL	74.00	PV
S006	Pipe: 38				-2868.1	207.90	PL	46.00	PF 0.070
	-1.20	0.0	3.265	0.0	1.41	120	FTG	4LG	PE 0.000
	A009	-1.20	0.0	3.335	0.0	0.0011	TL	63.50	PV
G1	Pipe: 39				3204.6	207.90	PL	110.00	PF 0.163
	-1.20	0.0	4.053	0.0	1.57	120	FTG	T	PE 0.000
	G2	-1.20	0.0	3.890	0.0	0.0014	TL	120.10	PV

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PIPE TAG	END	ELEV.	NOZ.	PT	DISC.	Q (LPM)	DIA (MM)	LENGTH	PRESS.
NODES	NODES	(M)	(K)	(BAR)	(LPM)	VEL (MPS)	HW (C)	(M)	SUM.
						FL/M			(BAR)
Pipe: 54									
A004		-1.20	0.0	3.312	0.0	0.59	160.30	PL 50.00	PF 0.015
S002		-1.20	0.0	3.298	0.0		120	FTG ----	PE 0.000
							0.0003	TL 50.00	PV
Pipe: 55									
S002		-1.20	0.0	3.298	0.0	0.59	160.30	PL 130.00	PF 0.040
S003		-1.20	0.0	3.258	0.0		120	FTG LG	PE 0.000
							0.0003	TL 134.15	PV
Pipe: 56									
S003		-1.20	0.0	3.258	0.0	0.59	160.30	PL 250.00	PF 0.080
G6		-1.20	0.0	3.178	0.0		120	FTG T4LG	PE 0.000
							0.0003	TL 270.75	PV
Pipe: 57									
A010		-1.20	0.0	3.476	0.0	0.79	160.30	PL 90.00	PF 0.046
A014		-1.20	0.0	3.522	0.0		120	FTG ----	PE 0.000
							0.0005	TL 90.00	PV
Pipe: 58									
A014		-1.20	0.0	3.522	0.0	0.47	207.90	PL 57.00	PF 0.010
A079		-1.20	0.0	3.532	0.0		120	FTG TG	PE 0.000
							0.0001	TL 68.60	PV
Pipe: 59									
A079		-1.20	0.0	3.532	0.0	0.47	207.90	PL 322.00	PF 0.053
A016		-1.20	0.0	3.585	0.0		120	FTG 2T5LG	PE 0.000
							0.0001	TL 363.70	PV
Pipe: 60									
A016		-1.20	0.0	3.585	0.0	0.50	309.70	PL 150.00	PF 0.016
A018		-1.20	0.0	3.569	0.0		120	FTG L	PE 0.000
							0.0001	TL 156.10	PV
Pipe: 61									
A018		-1.20	0.0	3.569	0.0	0.50	309.70	PL 150.00	PF 0.015
A020		-1.20	0.0	3.553	0.0		120	FTG G	PE 0.000
							0.0001	TL 152.00	PV
Pipe: 62									
A020		-1.20	0.0	3.553	0.0	0.16	207.90	PL 545.00	PF 0.011
A049		-1.20	0.0	3.542	0.0		120	FTG T2LG	PE 0.000
							0.0000	TL 564.60	PV
Pipe: 63									
A020		-1.20	0.0	3.553	0.0	0.43	309.70	PL 180.00	PF 0.014
A087		-1.20	0.0	3.539	0.0		120	FTG L2G	PE 0.000
							0.0001	TL 190.10	PV
Pipe: 64									
A087		-1.20	0.0	3.539	0.0	0.07	309.70	PL 138.00	PF 0.000
G10		-1.20	0.0	3.540	0.0		120	FTG T2L	PE 0.000
							0.0000	TL 165.40	PV
Pipe: 65									
A010		-1.20	0.0	3.476	0.0	1.28	2613.0	PL 150.00	PF 0.141
A009		-1.20	0.0	3.335	0.0		120	FTG G	PE 0.000
							0.0009	TL 151.50	PV
Pipe: 66									
S004		-1.20	0.0	3.143	0.0	1.45	207.90	PL 30.00	PF 0.035
G6		-1.20	0.0	3.178	0.0		120	FTG ----	PE 0.000
							0.0012	TL 30.00	PV
Pipe: 67									
G6		-1.20	0.0	3.178	0.0	1.10	207.90	PL 460.00	PF 0.361
A087		-1.20	0.0	3.539	0.0		120	FTG 3T4L4G	PE 0.000
							0.0007	TL 512.30	PV

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PIPE TAG				Q (LPM)		DIA (MM)		LENGTH		PRESS.	
END	ELEV.	NOZ.	PT	DISC.	VEL (MPS)	HW (C)		(M)		SUM.	
NODES	(M)	(K)	(BAR)	(LPM)		FL/M				(BAR)	
Pipe: 68											
G10	-1.20	0.0	3.540	0.0	-215.7	0.11	207.90	PL	124.00	PF	0.001
A047	-1.20	0.0	3.541	0.0			120	FTG	T2G	PE	0.000
							0.0000	TL	137.10	PV	
Pipe: 69											
A047	-1.20	0.0	3.541	0.0	22.3	0.01	207.90	PL	70.00	PF	0.000
S011	-1.20	0.0	3.541	0.0			120	FTG	TG	PE	0.000
							0.0000	TL	81.60	PV	
Pipe: 70											
S011	-1.20	0.0	3.541	0.0	22.3	0.02	160.30	PL	205.00	PF	0.000
A044	-1.20	0.0	3.541	0.0			120	FTG	T2G	PE	0.000
							0.0000	TL	214.90	PV	
Pipe: 71											
A044	-1.20	0.0	3.541	0.0	110.0	0.05	207.90	PL	80.00	PF	0.000
S008	-1.20	0.0	3.540	0.0			120	FTG	T	PE	0.000
							0.0000	TL	90.10	PV	
Pipe: 72											
S008	-1.20	0.0	3.540	0.0	110.0	0.05	207.90	PL	326.00	PF	0.001
G10	-1.20	0.0	3.540	0.0			120	FTG	3LG	PE	0.000
							0.0000	TL	342.50	PV	
Pipe: 73											
A047	-1.20	0.0	3.541	0.0	-238.0	0.12	207.90	PL	34.00	PF	0.001
G11	-1.20	0.0	3.541	0.0			120	FTG	TL	PE	0.000
							0.0000	TL	48.10	PV	
Pipe: 74											
G11	-1.20	0.0	3.541	0.0	35.5	0.03	160.30	PL	278.00	PF	0.000
G13	-1.20	0.0	3.541	0.0			120	FTG	LG	PE	0.000
							0.0000	TL	282.15	PV	
Pipe: 75											
G13	-1.20	0.0	3.541	0.0	87.8	0.07	160.30	PL	40.00	PF	0.000
A044	-1.20	0.0	3.541	0.0			120	FTG	TLG	PE	0.000
							0.0000	TL	51.75	PV	
Pipe: 76											
G11	-1.20	0.0	3.541	0.0	-273.5	0.13	207.90	PL	47.00	PF	0.001
A049	-1.20	0.0	3.542	0.0			120	FTG	2TG	PE	0.000
							0.0000	TL	68.70	PV	
Pipe: 77											
A049	-1.20	0.0	3.542	0.0	52.3	0.03	207.90	PL	180.00	PF	0.000
G12	-1.20	0.0	3.542	0.0			120	FTG	T	PE	0.000
							0.0000	TL	190.10	PV	
Pipe: 78											
G12	-1.20	0.0	3.542	0.0	52.3	0.04	160.30	PL	386.00	PF	0.001
S012	-1.20	0.0	3.541	0.0			120	FTG	LG	PE	0.000
							0.0000	TL	390.15	PV	
Pipe: 79											
S012	-1.20	0.0	3.541	0.0	52.3	0.04	160.30	PL	100.00	PF	0.000
G13	-1.20	0.0	3.541	0.0			120	FTG	T	PE	0.000
							0.0000	TL	107.60	PV	
Pipe: 80											
G1	-1.20	0.0	4.053	0.0	-5826.2	1.80	261.80	PL	27.00	PF	0.085
PERS	0.50	0.0	3.971	0.0			120	FTG	3LC2G	PE	-0.167
							0.0013	TL	63.60	PV	
Pipe: 81											
				FIRE PUMP	Rating: 11500.0 lpm @ 7.3 bar						
ZUIG	0.5	0.0	-0.0	0.0	Avail.: 5826.1 lpm @ 8.3 bar						
PERS	0.5	0.0	4.0	0.0	Req'd.: 5826.1 lpm @ 4.0 bar						
User Defined Pump Curve:				lpm	bar	lpm	bar				
				0.0	8.85	18000.0	6.23				

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PIPE TAG	Q(LPM)	DIA(MM)	LENGTH	PRESS.
END ELEV. NOZ. PT DISC. VEL(MPS) HW(C) (M) SUM.				
NODES (M) (K) (BAR) (LPM) FL/M (BAR)				
	5000.0	8.46	22700.0	5.84
	11500.0	7.32		
Pipe: 82	-5826.2	261.80	PL	1.00 PF 0.001
ZUIG 0.50 0.0 -0.001 0.0 1.80 120 FTG				----- PE 0.049
SOURCE 0.00 SRCE 0.049 (N/A) 0.0013 TL				1.00 PV

NOTES (HASS):

- (1) Calculations were performed by the HASS 2023 D computer program in accordance with (2022) under license no. 64625757 granted by HRS Systems, Inc.
 208 Southside Square
 Petersburg, TN 37144
 (931) 659-9760
- (2) The system has been calculated to provide an average imbalance at each node of 0.0010 lpm and a maximum imbalance at any node of 0.0186 lpm.
- (3) Total pressure at each node is used in balancing the system. Maximum water velocity is 4.64 m/sec at pipe 32.
- (4) The Minimum pump suction pressure under maximum calculated demand is -0.00 (bar)
- (5) Items listed in bold print on the cover sheet are automatically transferred from the calculation report.

(6) PIPE FITTINGS TABLE

User Pipe Table Name: VICTAULIC

PAGE: A	MATERIAL: Staal		HWC: 120						
Diameter	Equivalent Fitting Lengths in Meters								
(mm)	E	T	L	C	B	G	J	D	H
	Ell	Tee	LngEll	ChkVlv	BfyVlv	GatVlv	modelJ	DelVlv	HlfLgE

	R	F							
	Ril	ModelF							
160.30	4.30	7.60	3.00	11.00	2.50	1.15	6.00	10.10	1.50
	0.30	14.94							
207.90	5.67	10.10	4.00	13.00	3.40	1.50	7.00	17.50	1.50
	0.30	0.00							
261.80	7.42	12.50	5.20	17.00	3.70	2.00	0.00	0.00	2.50
	0.30	0.00							
309.70	0.00	15.20	6.10	0.00	4.30	0.00	0.00	0.00	3.00
	0.30	0.00							

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PAGE: *
 Diameter
 (mm)

MATERIAL: Custom

Equivalent Fitting Lengths in Meters

E	T	L	C	B	G	A	D	N
Ell	Tee	LngEll	ChkVlv	BfyVlv	GatVlv	AlmChk	DPVlv	NP Tee
<hr/>								
F								
F45Ell								
163.30	5.67	12.14	3.64	12.95	4.05	1.21	11.33	12.14
	2.83							
163.60	5.72	12.25	3.67	13.07	4.09	1.22	11.43	12.25
	2.85							