

Cv Calculation Sheet

No: 1	TAG NO:	FV-3313	CASE:	MAX
Flow rate:	13868 l/h	Fluid state:	FLASH	
Inlet Pressure:	25.5 barA	Model:	AGVM	
Outlet pressure:	2.65 barA	Valve size:	1-1/2	inch
Diff. pressure	bar	Line size In/Out:	3	3 inch
Temperature:	-178.3 degC	Pipe Sch/ Thick:	10S	3.05 mm
Sp.Gr. (liq.):	0.739 water=1	Saturated temp.:	degC	
Sp.Gr. (gas,vapor):	1.25 air=1	KC:	0.9	
Viscosity:	cP	Velocity:	3.38	m/s
Vapor pressure:	barA	S.P.L.:	72	dba
Critical pressure:	barA	Calc. Cv:	3.309	
CP/CV , Z:	⋮	Travel:	58	%
Flash:	5.04 %			

$$Cv(Liq) = \frac{11.56 \times 13.17m^3/h \times Sqr(0.739)}{Sqr(2285kPa)} = 2.738$$

$$Cv(Gas) = \frac{339.3m^3/h[S] \times Sqr(1.25 \times 94.8degK)}{2.538 \times 2550kPaA} = 0.5708$$

No: 1	TAG NO:	FV-3313	CASE:	NOR
Flow rate:	13497 l/h	Fluid state:	FLASH	
Inlet Pressure:	25.5 barA	Model:	AGVM	
Outlet pressure:	2.65 barA	Valve size:	1-1/2	inch
Diff. pressure	bar	Line size In/Out:	3	3 inch
Temperature:	-178.3 degC	Pipe Sch/ Thick:	10S	3.05 mm
Sp.Gr. (liq.):	0.739 water=1	Saturated temp.:	degC	
Sp.Gr. (gas,vapor):	1.25 air=1	KC:	0.9	
Viscosity:	cP	Velocity:	3.29	m/s
Vapor pressure:	barA	S.P.L.:	72	dba
Critical pressure:	barA	Calc. Cv:	3.219	
CP/CV , Z:	⋮	Travel:	57	%
Flash:	5.03 %			

$$Cv(Liq) = \frac{11.56 \times 12.82m^3/h \times Sqr(0.739)}{Sqr(2285kPa)} = 2.665$$

$$Cv(Gas) = \frac{329.5m^3/h[S] \times Sqr(1.25 \times 94.8degK)}{2.538 \times 2550kPaA} = 0.5544$$

No: 1	TAG NO:	FV-3313	CASE:	MIN
Flow rate:	8711 l/h	Fluid state:	FLASH	
Inlet Pressure:	25.5 barA	Model:	AGVM	
Outlet pressure:	2.65 barA	Valve size:	1-1/2	inch
Diff. pressure	bar	Line size In/Out:	3	3 inch
Temperature:	-178.3 degC	Pipe Sch/ Thick:	10S	3.05 mm
Sp.Gr. (liq.):	0.739 water=1	Saturated temp.:	degC	
Sp.Gr. (gas,vapor):	1.25 air=1	KC:	0.9	
Viscosity:	cP	Velocity:	2.12	m/s
Vapor pressure:	barA	S.P.L.:	70	dba
Critical pressure:	barA	Calc. Cv:	2.078	
CP/CV , Z:	⋮	Travel:	48	%
Flash:	5.04 %			

$$Cv(Liq) = \frac{11.56 \times 8.272m^3/h \times Sqr(0.739)}{Sqr(2285kPa)} = 1.72$$

$$Cv(Gas) = \frac{213.1m^3/h[S] \times Sqr(1.25 \times 94.8degK)}{2.538 \times 2550kPaA} = 0.3585$$

Cv Calculation Sheet

No: 2	TAG NO:	FV-3314	CASE:	MAX
Flow rate:	17208 l/h	Fluid state:	FLASH	
Inlet Pressure:	24.8 barA	Model:	AGVM	
Outlet pressure:	2.65 barA	Valve size:	1-1/2	inch
Diff. pressure	bar	Line size In/Out:	3	3 inch
Temperature:	-178.3 degC	Pipe Sch/ Thick:	10S	3.05 mm
Sp.Gr. (liq.):	0.739 water=1	Saturated temp.:	degC	
Sp.Gr. (gas,vapor):	1.25 kg/m3[N]	KC:	0.89	
Viscosity:	cP	Velocity:	4.19	m/s
Vapor pressure:	barA	S.P.L.:	73	dba
Critical pressure:	barA	Calc. Cv:	4.278	
CP/CV , Z:	⋮	Travel:	63	%
Flash:	5.04 %			

$$Cv(Liq) = \frac{11.56 \times 16.34 \text{m}^3/\text{h} \times \text{Sqr}(0.739)}{\text{Sqr}(2215 \text{kPa})} = 3.45$$

$$Cv(Gas) = \frac{544.3 \text{m}^3/\text{h}[\text{S}] \times \text{Sqr}(0.9667 \times 94.8 \text{degK})}{2.538 \times 2480 \text{kPaA}} = 0.8281$$

No: 2	TAG NO:	FV-3314	CASE:	NOR
Flow rate:	15172 l/h	Fluid state:	FLASH	
Inlet Pressure:	24.8 barA	Model:	AGVM	
Outlet pressure:	2.65 barA	Valve size:	1-1/2	inch
Diff. pressure	bar	Line size In/Out:	3	3 inch
Temperature:	-178.3 degC	Pipe Sch/ Thick:	10S	3.05 mm
Sp.Gr. (liq.):	0.739 water=1	Saturated temp.:	degC	
Sp.Gr. (gas,vapor):	1.25 kg/m3[N]	KC:	0.89	
Viscosity:	cP	Velocity:	3.69	m/s
Vapor pressure:	barA	S.P.L.:	72	dba
Critical pressure:	barA	Calc. Cv:	3.771	
CP/CV , Z:	⋮	Travel:	60	%
Flash:	5.03 %			

$$Cv(Liq) = \frac{11.56 \times 14.41 \text{m}^3/\text{h} \times \text{Sqr}(0.739)}{\text{Sqr}(2215 \text{kPa})} = 3.042$$

$$Cv(Gas) = \frac{478.9 \text{m}^3/\text{h}[\text{S}] \times \text{Sqr}(0.9667 \times 94.8 \text{degK})}{2.538 \times 2480 \text{kPaA}} = 0.7286$$

No: 2	TAG NO:	FV-3314	CASE:	MIN
Flow rate:	8297 l/h	Fluid state:	FLASH	
Inlet Pressure:	24.8 barA	Model:	AGVM	
Outlet pressure:	2.65 barA	Valve size:	1-1/2	inch
Diff. pressure	bar	Line size In/Out:	3	3 inch
Temperature:	-178.3 degC	Pipe Sch/ Thick:	10S	3.05 mm
Sp.Gr. (liq.):	0.739 water=1	Saturated temp.:	degC	
Sp.Gr. (gas,vapor):	1.25 kg/m3[N]	KC:	0.89	
Viscosity:	cP	Velocity:	2.02	m/s
Vapor pressure:	barA	S.P.L.:	70	dba
Critical pressure:	barA	Calc. Cv:	2.063	
CP/CV , Z:	⋮	Travel:	48	%
Flash:	5.04 %			

$$Cv(Liq) = \frac{11.56 \times 7.879 \text{m}^3/\text{h} \times \text{Sqr}(0.739)}{\text{Sqr}(2215 \text{kPa})} = 1.664$$

$$Cv(Gas) = \frac{262.4 \text{m}^3/\text{h}[\text{S}] \times \text{Sqr}(0.9667 \times 94.8 \text{degK})}{2.538 \times 2480 \text{kPaA}} = 0.3993$$

Cv Calculation Sheet

No: 3	TAG NO:	FV-3331B	CASE:	MAX
Flow rate:	4738	m3/h[N]	Fluid state:	GAS
Inlet Pressure:	27.33	barA	Model:	AGVM
Outlet pressure:	2.6	barA	Valve size:	2 inch
Diff. pressure		bar	Line size In/Out:	2 4 inch
Temperature:	11.6	degC	Pipe Sch/ Thick:	10S 3 mm
Sp.Gr. (liq.):		water=1	Saturated temp.:	degC
Sp.Gr. (gas,vapor):	1.25	kg/m3[N]	KC:	0.9
Viscosity:		cP	Velocity:	0.76 Mach
Vapor pressure:		barA	S.P.L.:	97 dBA
Critical pressure:		barA	Calc. Cv:	11.98
CP/CV , Z:			Travel:	76 %
Flash:	5.04	%		

$$Cv(\text{Gas}) = \frac{5008 \text{ m}^3/\text{h}[\text{S}] \times \text{Sqr}(0.9667 \times 284.8 \text{ degK}) \times 1}{2.538 \times 2733 \text{ kPaA}} = 11.98$$

No: 3	TAG NO:	FV-3331B	CASE:	MIN
Flow rate:	460	m3/h[N]	Fluid state:	GAS
Inlet Pressure:	27.33	barA	Model:	AGVM
Outlet pressure:	2.6	barA	Valve size:	2 inch
Diff. pressure		bar	Line size In/Out:	2 4 inch
Temperature:	5.5	degC	Pipe Sch/ Thick:	10S 3 mm
Sp.Gr. (liq.):		water=1	Saturated temp.:	degC
Sp.Gr. (gas,vapor):	1.25	kg/m3[N]	KC:	0.9
Viscosity:		cP	Velocity:	0.07 Mach
Vapor pressure:		barA	S.P.L.:	78 dBA
Critical pressure:		barA	Calc. Cv:	1.151
CP/CV , Z:			Travel:	28 %
Flash:	5.04	%		

$$Cv(\text{Gas}) = \frac{486.2 \text{ m}^3/\text{h}[\text{S}] \times \text{Sqr}(0.9667 \times 278.7 \text{ degK}) \times 1}{2.538 \times 2733 \text{ kPaA}} = 1.151$$

No: 4	TAG NO:	FV-3350	CASE:	MAX
Flow rate:	2679	l/h	Fluid state:	LIQUID
Inlet Pressure:	25.15	barA	Model:	AGVM
Outlet pressure:	4.19	barA	Valve size:	1 inch
Diff. pressure		bar	Line size In/Out:	1 1 inch
Temperature:	-144.7	degC	Pipe Sch/ Thick:	10S 2.77 mm
Sp.Gr. (liq.):	0.397	water=1	Saturated temp.:	degC
Sp.Gr. (gas,vapor):		kg/m3[N]	KC:	0.83
Viscosity:		cP	Velocity:	1.46 m/s
Vapor pressure:		barA	S.P.L.:	72 dBA
Critical pressure:		barA	Calc. Cv:	0.4262
CP/CV , Z:			Travel:	77 %
Flash:		%		

$$Cv(\text{Liq}) = \frac{11.56 \times 2.679 \text{ m}^3/\text{h} \times \text{Sqr}(0.397) \times 1}{\text{Sqr}(2096 \text{ kPa})} = 0.4262$$

Cv Calculation Sheet

No: 4	TAG NO:	FV-3350	CASE:	MIN
Flow rate:	1072 l/h	Fluid state:	LIQUID	
Inlet Pressure:	25.15 barA	Model:	AGVM	
Outlet pressure:	4.19 barA	Valve size:	1	inch
Diff. pressure	bar	Line size In/Out:	1	1 inch
Temperature:	-144.7 degC	Pipe Sch/ Thick:	10S	2.77 mm
Sp.Gr. (liq.):	0.397 water=1	Saturated temp.:	degC	
Sp.Gr. (gas,vapor):	kg/m3[N]	KC:	0.83	
Viscosity:	cP	Velocity:	0.58	m/s
Vapor pressure:	barA	S.P.L.:	68	dba
Critical pressure:	barA	Calc. Cv:	0.1706	
CP/CV , Z:	█	Travel:	53	%
Flash:	%			

$$Cv(Liq) = \frac{11.56 \times 1.072 \text{m}^3/\text{h} \times \text{Sqr}(0.397) \times 1}{\text{Sqr}(2096 \text{kPa})} = 0.1706$$

No: 5	TAG NO:	FV-3401	CASE:	MAX
Flow rate:	28343 l/h	Fluid state:	LIQUID	
Inlet Pressure:	24.7 barA	Model:	AGVM	
Outlet pressure:	24.43 barA	Valve size:	3	inch
Diff. pressure	bar	Line size In/Out:	3	3 inch
Temperature:	-180 degC	Pipe Sch/ Thick:	10S	3.05 mm
Sp.Gr. (liq.):	0.455 water=1	Saturated temp.:	degC	
Sp.Gr. (gas,vapor):	kg/m3[N]	KC:	0.01	
Viscosity:	cP	Velocity:	1.72	m/s
Vapor pressure:	barA	S.P.L.:	49	dba
Critical pressure:	barA	Calc. Cv:	42.53	
CP/CV , Z:	█	Travel:	67	%
Flash:	%			

$$Cv(Liq) = \frac{11.56 \times 28.34 \text{m}^3/\text{h} \times \text{Sqr}(0.455) \times 1}{\text{Sqr}(27 \text{kPa})} = 42.53$$

No: 5	TAG NO:	FV-3401	CASE:	NOR
Flow rate:	27477 l/h	Fluid state:	LIQUID	
Inlet Pressure:	24.7 barA	Model:	AGVM	
Outlet pressure:	24.43 barA	Valve size:	3	inch
Diff. pressure	bar	Line size In/Out:	3	3 inch
Temperature:	-180 degC	Pipe Sch/ Thick:	10S	3.05 mm
Sp.Gr. (liq.):	0.455 water=1	Saturated temp.:	degC	
Sp.Gr. (gas,vapor):	kg/m3[N]	KC:	0.01	
Viscosity:	cP	Velocity:	1.67	m/s
Vapor pressure:	barA	S.P.L.:	49	dba
Critical pressure:	barA	Calc. Cv:	41.23	
CP/CV , Z:	█	Travel:	66	%
Flash:	%			

$$Cv(Liq) = \frac{11.56 \times 27.48 \text{m}^3/\text{h} \times \text{Sqr}(0.455) \times 1}{\text{Sqr}(27 \text{kPa})} = 41.23$$

Cv Calculation Sheet

No: 5	TAG NO:	FV-3401	CASE:	MIN
Flow rate:	19840 l/h	Fluid state:	LIQUID	
Inlet Pressure:	24.7 barA	Model:	AGVM	
Outlet pressure:	24.43 barA	Valve size:	3	inch
Diff. pressure	bar	Line size In/Out:	3	3 inch
Temperature:	-180 degC	Pipe Sch/ Thick:	10S	3.05 mm
Sp.Gr. (liq.):	0.455 water=1	Saturated temp.:	degC	
Sp.Gr. (gas,vapor):	kg/m3[N]	KC:	0.01	
Viscosity:	cP	Velocity:	1.2	m/s
Vapor pressure:	barA	S.P.L.:	47	dba
Critical pressure:	barA	Calc. Cv:	29.77	
CP/CV , Z:	⋮	Travel:	60	%
Flash:	%			

$$Cv(Liq) = \frac{11.56 \times 19.84 \text{m}^3/\text{h} \times \text{Sqr}(0.455) \times 1}{\text{Sqr}(27\text{kPa})} = 29.77$$

No: 6	TAG NO:	FV-3503	CASE:	MAX
Flow rate:	2064 l/h	Fluid state:	FLASH	
Inlet Pressure:	25 barA	Model:	AGVM	
Outlet pressure:	2.65 barA	Valve size:	1	inch
Diff. pressure	bar	Line size In/Out:	1-1/2	1-1/2 inch
Temperature:	-180 degC	Pipe Sch/ Thick:	10S	2.77 mm
Sp.Gr. (liq.):	0.739 water=1	Saturated temp.:	degC	
Sp.Gr. (gas,vapor):	1.25 kg/m3[N]	KC:	0.89	
Viscosity:	cP	Velocity:	1.13	m/s
Vapor pressure:	barA	S.P.L.:	65	dba
Critical pressure:	barA	Calc. Cv:	0.4812	
CP/CV , Z:	⋮	Travel:	56	%
Flash:	3.15 %			

$$Cv(Liq) = \frac{11.56 \times 1.999 \text{m}^3/\text{h} \times \text{Sqr}(0.739)}{\text{Sqr}(2235\text{kPa})} = 0.4202$$

$$Cv(Gas) = \frac{40.8 \text{m}^3/\text{h}[\text{S}] \times \text{Sqr}(0.9667 \times 93.1 \text{degK})}{2.538 \times 2500\text{kPaA}} = 0.06103$$

No: 6	TAG NO:	FV-3503	CASE:	MIN
Flow rate:	1274 l/h	Fluid state:	FLASH	
Inlet Pressure:	25 barA	Model:	AGVM	
Outlet pressure:	2.65 barA	Valve size:	1	inch
Diff. pressure	bar	Line size In/Out:	1-1/2	1-1/2 inch
Temperature:	-180 degC	Pipe Sch/ Thick:	10S	2.77 mm
Sp.Gr. (liq.):	0.739 water=1	Saturated temp.:	degC	
Sp.Gr. (gas,vapor):	1.25 kg/m3[N]	KC:	0.89	
Viscosity:	cP	Velocity:	0.69	m/s
Vapor pressure:	barA	S.P.L.:	64	dba
Critical pressure:	barA	Calc. Cv:	0.2971	
CP/CV , Z:	⋮	Travel:	43	%
Flash:	3.16 %			

$$Cv(Liq) = \frac{11.56 \times 1.234 \text{m}^3/\text{h} \times \text{Sqr}(0.739)}{\text{Sqr}(2235\text{kPa})} = 0.2593$$

$$Cv(Gas) = \frac{25.27 \text{m}^3/\text{h}[\text{S}] \times \text{Sqr}(0.9667 \times 93.1 \text{degK})}{2.538 \times 2500\text{kPaA}} = 0.03779$$

Cv Calculation Sheet

No: 7	TAG NO:	FV-3535	CASE:	MAX
Flow rate:	11833 l/h	Fluid state:	LIQUID	
Inlet Pressure:	3.17 barA	Model:	AGVM	
Outlet pressure:	3.05 barA	Valve size:	2	inch
Diff. pressure	bar	Line size In/Out:	3	3 inch
Temperature:	-182.2 degC	Pipe Sch/ Thick:	10S	3.05 mm
Sp.Gr. (liq.):	0.739 water=1	Saturated temp.:	degC	
Sp.Gr. (gas,vapor):	kg/m3[N]	KC:	0.04	
Viscosity:	cP	Velocity:	1.62	m/s
Vapor pressure:	barA	S.P.L.:	48	dba
Critical pressure:	barA	Calc. Cv:	33.95	
CP/CV , Z:	█	Travel:	80	%
Flash:	%			

$$Cv(Liq) = \frac{11.56 \times 11.83 \text{m}^3/\text{h} \times \text{Sqr}(0.739) \times 1}{\text{Sqr}(12\text{kPa})} = 33.95$$

No: 7	TAG NO:	FV-3535	CASE:	NOR
Flow rate:	10370 l/h	Fluid state:	LIQUID	
Inlet Pressure:	3.24 barA	Model:	AGVM	
Outlet pressure:	3.05 barA	Valve size:	2	inch
Diff. pressure	bar	Line size In/Out:	3	3 inch
Temperature:	-182.2 degC	Pipe Sch/ Thick:	10S	3.05 mm
Sp.Gr. (liq.):	0.739 water=1	Saturated temp.:	degC	
Sp.Gr. (gas,vapor):	kg/m3[N]	KC:	0.06	
Viscosity:	cP	Velocity:	1.42	m/s
Vapor pressure:	barA	S.P.L.:	49	dba
Critical pressure:	barA	Calc. Cv:	23.64	
CP/CV , Z:	█	Travel:	72	%
Flash:	%			

$$Cv(Liq) = \frac{11.56 \times 10.37 \text{m}^3/\text{h} \times \text{Sqr}(0.739) \times 1}{\text{Sqr}(19\text{kPa})} = 23.64$$

No: 7	TAG NO:	FV-3535	CASE:	MIN
Flow rate:	7575 l/h	Fluid state:	LIQUID	
Inlet Pressure:	3.24 barA	Model:	AGVM	
Outlet pressure:	3.05 barA	Valve size:	2	inch
Diff. pressure	bar	Line size In/Out:	3	3 inch
Temperature:	-182.2 degC	Pipe Sch/ Thick:	10S	3.05 mm
Sp.Gr. (liq.):	0.739 water=1	Saturated temp.:	degC	
Sp.Gr. (gas,vapor):	kg/m3[N]	KC:	0.06	
Viscosity:	cP	Velocity:	1.03	m/s
Vapor pressure:	barA	S.P.L.:	48	dba
Critical pressure:	barA	Calc. Cv:	17.27	
CP/CV , Z:	█	Travel:	66	%
Flash:	%			

$$Cv(Liq) = \frac{11.56 \times 7.575 \text{m}^3/\text{h} \times \text{Sqr}(0.739) \times 1}{\text{Sqr}(19\text{kPa})} = 17.27$$

Cv Calculation Sheet

No: 8	TAG NO:	FV-3560	CASE:	MAX
Flow rate:	14536 l/h	Fluid state:	LIQUID	
Inlet Pressure:	2.71 barA	Model:	AGVM	
Outlet pressure:	2.65 barA	Valve size:	3	inch
Diff. pressure	bar	Line size In/Out:	3	3 inch
Temperature:	-148.3 degC	Pipe Sch/ Thick:	10S	3.05 mm
Sp.Gr. (liq.):	0.403 water=1	Saturated temp.:	degC	
Sp.Gr. (gas,vapor):	kg/m3[N]	KC:	0.02	
Viscosity:	cP	Velocity:	0.88	m/s
Vapor pressure:	barA	S.P.L.:	45	dBA
Critical pressure:	barA	Calc. Cv:	43.55	
CP/CV , Z:	█	Travel:	68	%
Flash:	%			

$$Cv(Liq) = \frac{11.56 \times 14.54 \text{m}^3/\text{h} \times \text{Sqr}(0.403) \times 1}{\text{Sqr}(6\text{kPa})} = 43.55$$

No: 8	TAG NO:	FV-3560	CASE:	NOR
Flow rate:	9676 l/h	Fluid state:	LIQUID	
Inlet Pressure:	2.73 barA	Model:	AGVM	
Outlet pressure:	2.63 barA	Valve size:	3	inch
Diff. pressure	bar	Line size In/Out:	3	3 inch
Temperature:	-148.3 degC	Pipe Sch/ Thick:	10S	3.05 mm
Sp.Gr. (liq.):	0.403 water=1	Saturated temp.:	degC	
Sp.Gr. (gas,vapor):	kg/m3[N]	KC:	0.04	
Viscosity:	cP	Velocity:	0.58	m/s
Vapor pressure:	barA	S.P.L.:	45	dBA
Critical pressure:	barA	Calc. Cv:	22.45	
CP/CV , Z:	█	Travel:	54	%
Flash:	%			

$$Cv(Liq) = \frac{11.56 \times 9.676 \text{m}^3/\text{h} \times \text{Sqr}(0.403) \times 1}{\text{Sqr}(10\text{kPa})} = 22.45$$

No: 8	TAG NO:	FV-3560	CASE:	MIN
Flow rate:	2225 l/h	Fluid state:	LIQUID	
Inlet Pressure:	2.79 barA	Model:	AGVM	
Outlet pressure:	2.67 barA	Valve size:	3	inch
Diff. pressure	bar	Line size In/Out:	3	3 inch
Temperature:	-148.3 degC	Pipe Sch/ Thick:	10S	3.05 mm
Sp.Gr. (liq.):	0.403 water=1	Saturated temp.:	degC	
Sp.Gr. (gas,vapor):	kg/m3[N]	KC:	0.04	
Viscosity:	cP	Velocity:	0.13	m/s
Vapor pressure:	barA	S.P.L.:	40	dBA
Critical pressure:	barA	Calc. Cv:	4.714	
CP/CV , Z:	█	Travel:	22	%
Flash:	%			

$$Cv(Liq) = \frac{11.56 \times 2.225 \text{m}^3/\text{h} \times \text{Sqr}(0.403) \times 1}{\text{Sqr}(12\text{kPa})} = 4.714$$

Cv Calculation Sheet

No: 9	TAG NO:	FV-3715	CASE:	NOR
Flow rate:	15323 l/h	Fluid state:	LIQUID	
Inlet Pressure:	25.53 barA	Model:	AGVM	
Outlet pressure:	2.68 barA	Valve size:	2	inch
Diff. pressure	bar	Line size In/Out:	4	4 inch
Temperature:	-144.7 degC	Pipe Sch/ Thick:	10S	3.05 mm
Sp.Gr. (liq.):	0.554 water=1	Saturated temp.:	degC	
Sp.Gr. (gas,vapor):	kg/m3[N]	KC:	0.9	
Viscosity:	cP	Velocity:	2.1	m/s
Vapor pressure:	barA	S.P.L.:	81	dba
Critical pressure:	barA	Calc. Cv:	2.758	
CP/CV , Z:	█	Travel:	56	%
Flash:	%			

$$Cv(Liq) = \frac{11.56 \times 15.32 \text{m}^3/\text{h} \times \text{Sqr}(0.554) \times 1}{\text{Sqr}(2285 \text{kPa})} = 2.758$$

No: 10	TAG NO:	FV-3725	CASE:	NOR
Flow rate:	15323 l/h	Fluid state:	LIQUID	
Inlet Pressure:	25.53 barA	Model:	AGVM	
Outlet pressure:	2.68 barA	Valve size:	2	inch
Diff. pressure	bar	Line size In/Out:	4	4 inch
Temperature:	-144.7 degC	Pipe Sch/ Thick:	10S	3.05 mm
Sp.Gr. (liq.):	0.554 water=1	Saturated temp.:	degC	
Sp.Gr. (gas,vapor):	kg/m3[N]	KC:	0.9	
Viscosity:	cP	Velocity:	2.1	m/s
Vapor pressure:	barA	S.P.L.:	81	dba
Critical pressure:	barA	Calc. Cv:	2.758	
CP/CV , Z:	█	Travel:	56	%
Flash:	%			

$$Cv(Liq) = \frac{11.56 \times 15.32 \text{m}^3/\text{h} \times \text{Sqr}(0.554) \times 1}{\text{Sqr}(2285 \text{kPa})} = 2.758$$

No: 11	TAG NO:	FV-3883	CASE:	MAX
Flow rate:	13614 l/h	Fluid state:	FLASH	
Inlet Pressure:	25.4 barA	Model:	AGVM	
Outlet pressure:	2.65 barA	Valve size:	1-1/2	inch
Diff. pressure	bar	Line size In/Out:	3	3 inch
Temperature:	-180 degC	Pipe Sch/ Thick:	10S	3.05 mm
Sp.Gr. (liq.):	0.739 water=1	Saturated temp.:	degC	
Sp.Gr. (gas,vapor):	1.25 kg/m3[N]	KC:	0.9	
Viscosity:	cP	Velocity:	3.31	m/s
Vapor pressure:	barA	S.P.L.:	72	dba
Critical pressure:	barA	Calc. Cv:	3.143	
CP/CV , Z:	█	Travel:	64	%
Flash:	3.15 %			

$$Cv(Liq) = \frac{11.56 \times 13.19 \text{m}^3/\text{h} \times \text{Sqr}(0.739)}{\text{Sqr}(2275 \text{kPa})} = 2.747$$

$$Cv(Gas) = \frac{269.1 \text{m}^3/\text{h}[\text{S}] \times \text{Sqr}(0.9667 \times 93.1 \text{degK})}{2.538 \times 2540 \text{kPaA}} = 0.3962$$

Cv Calculation Sheet

No: 11	TAG NO:	FV-3883	CASE:	MIN
Flow rate:	10246 l/h	Fluid state:	FLASH	
Inlet Pressure:	25.4 barA	Model:	AGVM	
Outlet pressure:	2.65 barA	Valve size:	1-1/2	inch
Diff. pressure	bar	Line size In/Out:	3	3 inch
Temperature:	-180 degC	Pipe Sch/ Thick:	10S	3.05 mm
Sp.Gr. (liq.):	0.739 water=1	Saturated temp.:	degC	
Sp.Gr. (gas,vapor):	1.25 kg/m3[N]	KC:	0.9	
Viscosity:	cP	Velocity:	2.49	m/s
Vapor pressure:	barA	S.P.L.:	71	dBA
Critical pressure:	barA	Calc. Cv:	2.366	
CP/CV , Z:	⋮	Travel:	58	%
Flash:	3.16 %			

$$Cv(Liq) = \frac{11.56 \times 9.922m^3/h \times Sqr(0.739)}{Sqr(2275kPa)} = 2.067$$

$$Cv(Gas) = \frac{203.2m^3/h[S] \times Sqr(0.9667 \times 93.1degK)}{2.538 \times 2540kPaA} = 0.2991$$

No: 12	TAG NO:	HV-3381	CASE:	MAX
Flow rate:	6000 m3/h[N]	Fluid state:	GAS	
Inlet Pressure:	27.07 barA	Model:	AGVM	
Outlet pressure:	2.85 barA	Valve size:	2	inch
Diff. pressure	bar	Line size In/Out:		inch
Temperature:	-139.5 degC	Pipe Sch/ Thick:	10S	mm
Sp.Gr. (liq.):	water=1	Saturated temp.:	degC	
Sp.Gr. (gas,vapor):	1.25 kg/m3[N]	KC:	0.89	
Viscosity:	cP	Velocity:	0.6	Mach
Vapor pressure:	barA	S.P.L.:	dBA	
Critical pressure:	barA	Calc. Cv:	10.49	
CP/CV , Z:	⋮	Travel:	73	%
Flash:	3.15 %			

$$Cv(Gas) = \frac{6342m^3/h[S] \times Sqr(0.9667 \times 133.7degK) \times 1}{2.538 \times 2707kPaA} = 10.49$$

No: 12	TAG NO:	HV-3381	CASE:	NOR
Flow rate:	3000 m3/h[N]	Fluid state:	GAS	
Inlet Pressure:	27.07 barA	Model:	AGVM	
Outlet pressure:	2.85 barA	Valve size:	2	inch
Diff. pressure	bar	Line size In/Out:		inch
Temperature:	-139.5 degC	Pipe Sch/ Thick:	10S	mm
Sp.Gr. (liq.):	water=1	Saturated temp.:	degC	
Sp.Gr. (gas,vapor):	1.25 kg/m3[N]	KC:	0.89	
Viscosity:	cP	Velocity:	0.3	Mach
Vapor pressure:	barA	S.P.L.:	dBA	
Critical pressure:	barA	Calc. Cv:	5.246	
CP/CV , Z:	⋮	Travel:	59	%
Flash:	%			

$$Cv(Gas) = \frac{3171m^3/h[S] \times Sqr(0.9667 \times 133.7degK) \times 1}{2.538 \times 2707kPaA} = 5.246$$

Cv Calculation Sheet

No: 12	TAG NO:	HV-3381	CASE:	MIN
Flow rate:	900 m3/h[N]	Fluid state:	GAS	
Inlet Pressure:	27.07 barA	Model:	AGVM	
Outlet pressure:	2.85 barA	Valve size:	2	inch
Diff. pressure	bar	Line size In/Out:		inch
Temperature:	-139.5 degC	Pipe Sch/ Thick:	10S	mm
Sp.Gr. (liq.):	water=1	Saturated temp.:		degC
Sp.Gr. (gas,vapor):	1.25 kg/m3[N]	KC:	0.89	
Viscosity:	cP			
Vapor pressure:	barA	Velocity:	0.09	Mach
Critical pressure:	barA	S.P.L.:		dba
CP/CV , Z:	█	Calc. Cv:	1.574	
Flash:	%	Travel:	34	%

$$Cv(\text{Gas}) = \frac{951.3 \text{m}^3/\text{h}[\text{S}] \times \text{Sqr}(0.9667 \times 133.7 \text{degK}) \times 1}{2.538 \times 2707 \text{kPaA}} = 1.574$$

No: 13	TAG NO:	HV-3428	CASE:	MAX
Flow rate:	8062 l/h	Fluid state:	FLASH	
Inlet Pressure:	23.85 barA	Model:	AGVM	
Outlet pressure:	8.11 barA	Valve size:	1-1/2	inch
Diff. pressure	bar	Line size In/Out:	3	1-1/2 inch
Temperature:	-180 degC	Pipe Sch/ Thick:		2.77 mm
Sp.Gr. (liq.):	0.627 water=1	Saturated temp.:		degC
Sp.Gr. (gas,vapor):	1 kg/m3[N]	KC:	0.66	
Viscosity:	cP			
Vapor pressure:	barA	Velocity:	1.96	m/s
Critical pressure:	barA	S.P.L.:	67	dba
CP/CV , Z:	█	Calc. Cv:	2.032	
Flash:	3.04 %	Travel:	48	%

$$Cv(\text{Liq}) = \frac{11.56 \times 7.817 \text{m}^3/\text{h} \times \text{Sqr}(0.627)}{\text{Sqr}(1574 \text{kPa})} = 1.804$$

$$Cv(\text{Gas}) = \frac{163.1 \text{m}^3/\text{h}[\text{S}] \times \text{Sqr}(0.7734 \times 93.1 \text{degK})}{2.538 \times 2385 \text{kPaA}} = 0.2287$$

No: 13	TAG NO:	HV-3428	CASE:	MIN
Flow rate:	1613 l/h	Fluid state:	FLASH	
Inlet Pressure:	23.85 barA	Model:	AGVM	
Outlet pressure:	8.11 barA	Valve size:	1-1/2	inch
Diff. pressure	bar	Line size In/Out:	3	1-1/2 inch
Temperature:	-180 degC	Pipe Sch/ Thick:		2.77 mm
Sp.Gr. (liq.):	0.629 water=1	Saturated temp.:		degC
Sp.Gr. (gas,vapor):	1 kg/m3[N]	KC:	0.66	
Viscosity:	cP			
Vapor pressure:	barA	Velocity:	0.39	m/s
Critical pressure:	barA	S.P.L.:	62	dba
CP/CV , Z:	█	Calc. Cv:	0.4134	
Flash:	3.57 %	Travel:	15	%

$$Cv(\text{Liq}) = \frac{11.56 \times 1.555 \text{m}^3/\text{h} \times \text{Sqr}(0.629)}{\text{Sqr}(1574 \text{kPa})} = 0.3594$$

$$Cv(\text{Gas}) = \frac{38.45 \text{m}^3/\text{h}[\text{S}] \times \text{Sqr}(0.7734 \times 93.1 \text{degK})}{2.538 \times 2385 \text{kPaA}} = 0.05391$$

Cv Calculation Sheet

No: 14	TAG NO:	HV-3540	CASE:	NOR
Flow rate:	9578 l/h	Fluid state:	FLASH	
Inlet Pressure:	5.5 barA	Model:	AGVM	
Outlet pressure:	4.2 barA	Valve size:	1-1/2	inch
Diff. pressure	bar	Line size In/Out:	1-1/2	1-1/2 inch
Temperature:	-178 degC	Pipe Sch/ Thick:	10S	2.77 mm
Sp.Gr. (liq.):	0.718 water=1	Saturated temp.:	degC	
Sp.Gr. (gas,vapor):	1.25 kg/m3[N]	KC:	0.24	
Viscosity:	cP	Velocity:	2.33	m/s
Vapor pressure:	barA	S.P.L.:	52	dba
Critical pressure:	barA	Calc. Cv:	12.79	
CP/CV , Z:	⋮	Travel:	70	%
Flash:	10 %			

$$Cv(Liq) = \frac{11.56 \times 8.62m^3/h \times Sqr(0.718)}{Sqr(130kPa)} = 7.406$$

$$Cv(Gas) = \frac{584m^3/h[S] \times Sqr(0.9667 \times 95.1degK)}{2.930 \times Sqr(130kPa \times (550kPaA + 420kPaA))} = 5.384$$

No: 15	TAG NO:	LV-3316	CASE:	MAX
Flow rate:	31890 l/h	Fluid state:	LIQUID	
Inlet Pressure:	3.73 barA	Model:	AGVM	
Outlet pressure:	2.65 barA	Valve size:	3	inch
Diff. pressure	bar	Line size In/Out:	6	6 inch
Temperature:	-182.2 degC	Pipe Sch/ Thick:	10S	3.4 mm
Sp.Gr. (liq.):	0.739 water=1	Saturated temp.:	degC	
Sp.Gr. (gas,vapor):	kg/m3[N]	KC:	0.29	
Viscosity:	cP	Velocity:	1.94	m/s
Vapor pressure:	barA	S.P.L.:	61	dba
Critical pressure:	barA	Calc. Cv:	30.49	
CP/CV , Z:	⋮	Travel:	66	%
Flash:	%			

$$Cv(Liq) = \frac{11.56 \times 31.89m^3/h \times Sqr(0.739) \times 1}{Sqr(108kPa)} = 30.49$$

No: 15	TAG NO:	LV-3316	CASE:	NOR
Flow rate:	29760 l/h	Fluid state:	LIQUID	
Inlet Pressure:	3.73 barA	Model:	AGVM	
Outlet pressure:	2.65 barA	Valve size:	3	inch
Diff. pressure	bar	Line size In/Out:	6	6 inch
Temperature:	-182.2 degC	Pipe Sch/ Thick:	10S	3.4 mm
Sp.Gr. (liq.):	0.739 water=1	Saturated temp.:	degC	
Sp.Gr. (gas,vapor):	kg/m3[N]	KC:	0.29	
Viscosity:	cP	Velocity:	1.81	m/s
Vapor pressure:	barA	S.P.L.:	61	dba
Critical pressure:	barA	Calc. Cv:	28.46	
CP/CV , Z:	⋮	Travel:	65	%
Flash:	%			

$$Cv(Liq) = \frac{11.56 \times 29.76m^3/h \times Sqr(0.739) \times 1}{Sqr(108kPa)} = 28.46$$

Cv Calculation Sheet

No: 15	TAG NO:	LV-3316	CASE:	MIN
Flow rate:	18331 l/h	Fluid state:	LIQUID	
Inlet Pressure:	3.73 barA	Model:	AGVM	
Outlet pressure:	2.36 barA	Valve size:	3	inch
Diff. pressure	bar	Line size In/Out:	6	6 inch
Temperature:	-182.2 degC	Pipe Sch/ Thick:	10S	3.4 mm
Sp.Gr. (liq.):	0.739 water=1	Saturated temp.:	degC	
Sp.Gr. (gas,vapor):	kg/m3[N]	KC:	0.37	
Viscosity:	cP	Velocity:	1.11	m/s
Vapor pressure:	barA	S.P.L.:	61	dba
Critical pressure:	barA	Calc. Cv:	15.56	
CP/CV , Z:	█	Travel:	53	%
Flash:	%			

$$Cv(Liq) = \frac{11.56 \times 18.33 \text{m}^3/\text{h} \times \text{Sqr}(0.739) \times 1}{\text{Sqr}(137 \text{kPa})} = 15.56$$

No: 16	TAG NO:	LV-3420	CASE:	MAX
Flow rate:	32932 l/h	Fluid state:	FLASH	
Inlet Pressure:	23.85 barA	Model:	AGVM	
Outlet pressure:	10.82 barA	Valve size:	3	inch
Diff. pressure	bar	Line size In/Out:	6	3 inch
Temperature:	-180 degC	Pipe Sch/ Thick:	3.05	mm
Sp.Gr. (liq.):	0.626 water=1	Saturated temp.:	degC	
Sp.Gr. (gas,vapor):	1 kg/m3[N]	KC:	0.55	
Viscosity:	cP	Velocity:	2	m/s
Vapor pressure:	barA	S.P.L.:	71	dba
Critical pressure:	barA	Calc. Cv:	9.01	
CP/CV , Z:	█	Travel:	52	%
Flash:	2.98 %			

$$Cv(Liq) = \frac{11.56 \times 31.95 \text{m}^3/\text{h} \times \text{Sqr}(0.626)}{\text{Sqr}(1303 \text{kPa})} = 8.096$$

$$Cv(Gas) = \frac{652.2 \text{m}^3/\text{h}[\text{S}] \times \text{Sqr}(0.7734 \times 93.1 \text{degK})}{2.538 \times 2385 \text{kPaA}} = 0.9145$$

No: 16	TAG NO:	LV-3420	CASE:	NOR
Flow rate:	26485 l/h	Fluid state:	FLASH	
Inlet Pressure:	23.86 barA	Model:	AGVM	
Outlet pressure:	9.42 barA	Valve size:	3	inch
Diff. pressure	bar	Line size In/Out:	6	3 inch
Temperature:	-180 degC	Pipe Sch/ Thick:	3.05	mm
Sp.Gr. (liq.):	0.613 water=1	Saturated temp.:	degC	
Sp.Gr. (gas,vapor):	0.98 kg/m3[N]	KC:	0.61	
Viscosity:	cP	Velocity:	1.61	m/s
Vapor pressure:	barA	S.P.L.:	71	dba
Critical pressure:	barA	Calc. Cv:	6.829	
CP/CV , Z:	█	Travel:	46	%
Flash:	2.88 %			

$$Cv(Liq) = \frac{11.56 \times 25.72 \text{m}^3/\text{h} \times \text{Sqr}(0.613)}{\text{Sqr}(1444 \text{kPa})} = 6.127$$

$$Cv(Gas) = \frac{506.5 \text{m}^3/\text{h}[\text{S}] \times \text{Sqr}(0.7579 \times 93.1 \text{degK})}{2.538 \times 2386 \text{kPaA}} = 0.7028$$

Cv Calculation Sheet

No: 16	TAG NO:	LV-3420	CASE:	MIN
Flow rate:	6571 l/h	Fluid state:	FLASH	
Inlet Pressure:	23.85 barA	Model:	AGVM	
Outlet pressure:	7.22 barA	Valve size:	3	inch
Diff. pressure	bar	Line size In/Out:	6	3 inch
Temperature:	-180 degC	Pipe Sch/ Thick:	3.05	mm
Sp.Gr. (liq.):	0.630 water=1	Saturated temp.:	degC	
Sp.Gr. (gas,vapor):	1 kg/m3[N]	KC:	0.7	
Viscosity:	cP	Velocity:	0.4	m/s
Vapor pressure:	barA	S.P.L.:	67	dba
Critical pressure:	barA	Calc. Cv:	1.642	
CP/CV , Z:	⋮	Travel:	17	%
Flash:	3.5 %			

$$Cv(Liq) = \frac{11.56 \times 6.341 \text{m}^3/\text{h} \times \text{Sqr}(0.63)}{\text{Sqr}(1663 \text{kPa})} = 1.427$$

$$Cv(Gas) = \frac{153.8 \text{m}^3/\text{h}[\text{S}] \times \text{Sqr}(0.7734 \times 93.1 \text{degK})}{2.538 \times 2385 \text{kPaA}} = 0.2157$$

No: 17	TAG NO:	LV-3421	CASE:	MAX
Flow rate:	40971 l/h	Fluid state:	FLASH	
Inlet Pressure:	24.11 barA	Model:	AGVM	
Outlet pressure:	10.18 barA	Valve size:	3	inch
Diff. pressure	bar	Line size In/Out:	6	4 inch
Temperature:	-177.1 degC	Pipe Sch/ Thick:	3.05	mm
Sp.Gr. (liq.):	0.536 water=1	Saturated temp.:	degC	
Sp.Gr. (gas,vapor):	0.85 kg/m3[N]	KC:	0.58	
Viscosity:	cP	Velocity:	2.49	m/s
Vapor pressure:	barA	S.P.L.:	72	dba
Critical pressure:	barA	Calc. Cv:	9.864	
CP/CV , Z:	⋮	Travel:	54	%
Flash:	2.18 %			

$$Cv(Liq) = \frac{11.56 \times 40.08 \text{m}^3/\text{h} \times \text{Sqr}(0.536)}{\text{Sqr}(1393 \text{kPa})} = 9.088$$

$$Cv(Gas) = \frac{597.9 \text{m}^3/\text{h}[\text{S}] \times \text{Sqr}(0.6574 \times 96 \text{degK})}{2.538 \times 2411 \text{kPaA}} = 0.7764$$

No: 17	TAG NO:	LV-3421	CASE:	NOR
Flow rate:	40382 l/h	Fluid state:	FLASH	
Inlet Pressure:	24.11 barA	Model:	AGVM	
Outlet pressure:	9.18 barA	Valve size:	3	inch
Diff. pressure	bar	Line size In/Out:	6	4 inch
Temperature:	-176.9 degC	Pipe Sch/ Thick:	3.05	mm
Sp.Gr. (liq.):	0.539 water=1	Saturated temp.:	degC	
Sp.Gr. (gas,vapor):	0.86 kg/m3[N]	KC:	0.62	
Viscosity:	cP	Velocity:	2.46	m/s
Vapor pressure:	barA	S.P.L.:	72	dba
Critical pressure:	barA	Calc. Cv:	9.458	
CP/CV , Z:	⋮	Travel:	53	%
Flash:	2.24 %			

$$Cv(Liq) = \frac{11.56 \times 39.48 \text{m}^3/\text{h} \times \text{Sqr}(0.539)}{\text{Sqr}(1493 \text{kPa})} = 8.671$$

$$Cv(Gas) = \frac{601.8 \text{m}^3/\text{h}[\text{S}] \times \text{Sqr}(0.6651 \times 96.3 \text{degK})}{2.538 \times 2411 \text{kPaA}} = 0.7869$$

Cv Calculation Sheet

No: 17	TAG NO:	LV-3421	CASE:	MIN
Flow rate:	26422 l/h	Fluid state:	FLASH	
Inlet Pressure:	24.13 barA	Model:	AGVM	
Outlet pressure:	6.97 barA	Valve size:	3	inch
Diff. pressure	bar	Line size In/Out:	6	4 inch
Temperature:	-174.8 degC	Pipe Sch/ Thick:	3.05	mm
Sp.Gr. (liq.):	0.51 water=1	Saturated temp.:	degC	
Sp.Gr. (gas,vapor):	0.82 kg/m3[N]	KC:	0.71	
Viscosity:	cP	Velocity:	1.61	m/s
Vapor pressure:	barA	S.P.L.:	71	dba
Critical pressure:	barA	Calc. Cv:	5.66	
CP/CV , Z:	⋮	Travel:	43	%
Flash:	2.29 %			

$$Cv(Liq) = \frac{11.56 \times 25.82 \text{m}^3/\text{h} \times \text{Sqr}(0.51)}{\text{Sqr}(1716 \text{kPa})} = 5.145$$

$$Cv(Gas) = \frac{399.5 \text{m}^3/\text{h}[\text{S}] \times \text{Sqr}(0.6342 \times 98.3 \text{degK})}{2.538 \times 2413 \text{kPaA}} = 0.5152$$

No: 18	TAG NO:	LV-3422	CASE:	MAX
Flow rate:	7829 l/h	Fluid state:	FLASH	
Inlet Pressure:	25.6 barA	Model:	AGVM	
Outlet pressure:	2.65 barA	Valve size:	1-1/2	inch
Diff. pressure	bar	Line size In/Out:	2	3 inch
Temperature:	-178.3 degC	Pipe Sch/ Thick:	10S	3.05 mm
Sp.Gr. (liq.):	0.739 water=1	Saturated temp.:	degC	
Sp.Gr. (gas,vapor):	0.966 kg/m3[N]	KC:	0.9	
Viscosity:	cP	Velocity:	1.9	m/s
Vapor pressure:	barA	S.P.L.:	70	dba
Critical pressure:	barA	Calc. Cv:	1.957	
CP/CV , Z:	⋮	Travel:	54	%
Flash:	5.04 %			

$$Cv(Liq) = \frac{11.56 \times 7.434 \text{m}^3/\text{h} \times \text{Sqr}(0.739)}{\text{Sqr}(2295 \text{kPa})} = 1.542$$

$$Cv(Gas) = \frac{320.4 \text{m}^3/\text{h}[\text{S}] \times \text{Sqr}(0.7471 \times 94.8 \text{degK})}{2.538 \times 2560 \text{kPaA}} = 0.4152$$

No: 18	TAG NO:	LV-3422	CASE:	NOR
Flow rate:	7974 l/h	Fluid state:	FLASH	
Inlet Pressure:	25.6 barA	Model:	AGVM	
Outlet pressure:	2.65 barA	Valve size:	1-1/2	inch
Diff. pressure	bar	Line size In/Out:	2	3 inch
Temperature:	-178.3 degC	Pipe Sch/ Thick:	10S	3.05 mm
Sp.Gr. (liq.):	0.739 water=1	Saturated temp.:	degC	
Sp.Gr. (gas,vapor):	0.966 kg/m3[N]	KC:	0.9	
Viscosity:	cP	Velocity:	1.94	m/s
Vapor pressure:	barA	S.P.L.:	70	dba
Critical pressure:	barA	Calc. Cv:	1.993	
CP/CV , Z:	⋮	Travel:	54	%
Flash:	5.03 %			

$$Cv(Liq) = \frac{11.56 \times 7.573 \text{m}^3/\text{h} \times \text{Sqr}(0.739)}{\text{Sqr}(2295 \text{kPa})} = 1.571$$

$$Cv(Gas) = \frac{325.7 \text{m}^3/\text{h}[\text{S}] \times \text{Sqr}(0.7471 \times 94.8 \text{degK})}{2.538 \times 2560 \text{kPaA}} = 0.422$$

Cv Calculation Sheet

No: 18	TAG NO:	LV-3422	CASE:	MIN
Flow rate:	3733 l/h	Fluid state:	FLASH	
Inlet Pressure:	25.6 barA	Model:	AGVM	
Outlet pressure:	2.65 barA	Valve size:	1-1/2	inch
Diff. pressure	bar	Line size In/Out:	2	3 inch
Temperature:	-178.3 degC	Pipe Sch/ Thick:	10S	3.05 mm
Sp.Gr. (liq.):	0.739 water=1	Saturated temp.:	degC	
Sp.Gr. (gas,vapor):	0.966 kg/m3[N]	KC:	0.9	
Viscosity:	cP	Velocity:	0.91	m/s
Vapor pressure:	barA	S.P.L.:	68	dBA
Critical pressure:	barA	Calc. Cv:	0.9333	
CP/CV , Z:	⋮	Travel:	39	%
Flash:	5.04 %			

$$Cv(Liq) = \frac{11.56 \times 3.545m^3/h \times Sqr(0.739)}{Sqr(2295kPa)} = 0.7353$$

$$Cv(Gas) = \frac{152.8m^3/h[S] \times Sqr(0.7471 \times 94.8degK)}{2.538 \times 2560kPaA} = 0.198$$

No: 19	TAG NO:	LV-3423A	CASE:	MAX
Flow rate:	44056 l/h	Fluid state:	LIQUID	
Inlet Pressure:	7.1 barA	Model:	AGVM	
Outlet pressure:	2.65 barA	Valve size:	3	inch
Diff. pressure	bar	Line size In/Out:	6	6 inch
Temperature:	-180 degC	Pipe Sch/ Thick:	3.4	mm
Sp.Gr. (liq.):	0.572 water=1	Saturated temp.:	degC	
Sp.Gr. (gas,vapor):	kg/m3[N]	KC:	0.63	
Viscosity:	cP	Velocity:	2.68	m/s
Vapor pressure:	barA	S.P.L.:	80	dBA
Critical pressure:	barA	Calc. Cv:	18.26	
CP/CV , Z:	⋮	Travel:	67	%
Flash:	%			

$$Cv(Liq) = \frac{11.56 \times 44.06m^3/h \times Sqr(0.572) \times 1}{Sqr(445kPa)} = 18.26$$

No: 19	TAG NO:	LV-3423A	CASE:	NOR
Flow rate:	41845 l/h	Fluid state:	LIQUID	
Inlet Pressure:	8.09 barA	Model:	AGVM	
Outlet pressure:	2.65 barA	Valve size:	3	inch
Diff. pressure	bar	Line size In/Out:	6	6 inch
Temperature:	-180 degC	Pipe Sch/ Thick:	3.4	mm
Sp.Gr. (liq.):	0.577 water=1	Saturated temp.:	degC	
Sp.Gr. (gas,vapor):	kg/m3[N]	KC:	0.67	
Viscosity:	cP	Velocity:	2.55	m/s
Vapor pressure:	barA	S.P.L.:	81	dBA
Critical pressure:	barA	Calc. Cv:	15.75	
CP/CV , Z:	⋮	Travel:	64	%
Flash:	%			

$$Cv(Liq) = \frac{11.56 \times 41.85m^3/h \times Sqr(0.577) \times 1}{Sqr(544kPa)} = 15.75$$

Cv Calculation Sheet

No: 19	TAG NO:	LV-3423A	CASE:	MIN
Flow rate:	22339 l/h	Fluid state:	LIQUID	
Inlet Pressure:	7.94 barA	Model:	AGVM	
Outlet pressure:	2.65 barA	Valve size:	3	inch
Diff. pressure	bar	Line size In/Out:	6	6 inch
Temperature:	-180 degC	Pipe Sch/ Thick:	3.4	mm
Sp.Gr. (liq.):	0.55 water=1	Saturated temp.:	degC	
Sp.Gr. (gas,vapor):	kg/m3[N]	KC:	0.67	
Viscosity:	cP	Velocity:	1.36	m/s
Vapor pressure:	barA	S.P.L.:	78	dba
Critical pressure:	barA	Calc. Cv:	8.327	
CP/CV , Z:	█	Travel:	51	%
Flash:	%			

$$Cv(Liq) = \frac{11.56 \times 22.34 \text{m}^3/\text{h} \times \text{Sqr}(0.55) \times 1}{\text{Sqr}(529 \text{kPa})} = 8.327$$

No: 20	TAG NO:	LV-3423B	CASE:	MAX
Flow rate:	27190 l/h	Fluid state:	LIQUID	
Inlet Pressure:	7.99 barA	Model:	AGVM	
Outlet pressure:	2.8 barA	Valve size:	2	inch
Diff. pressure	bar	Line size In/Out:	3	3 inch
Temperature:	-180 degC	Pipe Sch/ Thick:	3.05	mm
Sp.Gr. (liq.):	0.594 water=1	Saturated temp.:	degC	
Sp.Gr. (gas,vapor):	kg/m3[N]	KC:	0.65	
Viscosity:	cP	Velocity:	3.72	m/s
Vapor pressure:	barA	S.P.L.:	79	dba
Critical pressure:	barA	Calc. Cv:	10.63	
CP/CV , Z:	█	Travel:	66	%
Flash:	%			

$$Cv(Liq) = \frac{11.56 \times 27.19 \text{m}^3/\text{h} \times \text{Sqr}(0.594) \times 1}{\text{Sqr}(519 \text{kPa})} = 10.63$$

No: 20	TAG NO:	LV-3423B	CASE:	NOR
Flow rate:	22583 l/h	Fluid state:	LIQUID	
Inlet Pressure:	8.6 barA	Model:	AGVM	
Outlet pressure:	2.8 barA	Valve size:	2	inch
Diff. pressure	bar	Line size In/Out:	3	3 inch
Temperature:	-180 degC	Pipe Sch/ Thick:	3.05	mm
Sp.Gr. (liq.):	0.577 water=1	Saturated temp.:	degC	
Sp.Gr. (gas,vapor):	kg/m3[N]	KC:	0.67	
Viscosity:	cP	Velocity:	3.09	m/s
Vapor pressure:	barA	S.P.L.:	78	dba
Critical pressure:	barA	Calc. Cv:	8.234	
CP/CV , Z:	█	Travel:	61	%
Flash:	%			

$$Cv(Liq) = \frac{11.56 \times 22.58 \text{m}^3/\text{h} \times \text{Sqr}(0.577) \times 1}{\text{Sqr}(580 \text{kPa})} = 8.234$$

Cv Calculation Sheet

No: 20	TAG NO:	LV-3423B	CASE:	MIN
Flow rate:	10794 l/h	Fluid state:	LIQUID	
Inlet Pressure:	8.42 barA	Model:	AGVM	
Outlet pressure:	2.8 barA	Valve size:	2	inch
Diff. pressure	bar	Line size In/Out:	3	3 inch
Temperature:	-180 degC	Pipe Sch/ Thick:	3.05	mm
Sp.Gr. (liq.):	0.55 water=1	Saturated temp.:	degC	
Sp.Gr. (gas,vapor):	kg/m3[N]	KC:	0.67	
Viscosity:	cP	Velocity:	1.48	m/s
Vapor pressure:	barA	S.P.L.:	75	dBA
Critical pressure:	barA	Calc. Cv:	3.903	
CP/CV , Z:	█	Travel:	45	%
Flash:	%			

$$Cv(Liq) = \frac{11.56 \times 10.79 \text{m}^3/\text{h} \times \text{Sqr}(0.55) \times 1}{\text{Sqr}(562 \text{kPa})} = 3.903$$

No: 21	TAG NO:	PV-3406A	CASE:	MAX
Flow rate:	1680 m3/h[N]	Fluid state:	GAS	
Inlet Pressure:	8.5 barA	Model:	AGVM	
Outlet pressure:	2.71 barA	Valve size:	1	inch
Diff. pressure	bar	Line size In/Out:	2	2 inch
Temperature:	-176.5 degC	Pipe Sch/ Thick:	2.77	mm
Sp.Gr. (liq.):	water=1	Saturated temp.:	degC	
Sp.Gr. (gas,vapor):	0.35 kg/m3[N]	KC:	0.68	
Viscosity:	cP	Velocity:	0.32	Mach
Vapor pressure:	barA	S.P.L.:	70	dBA
Critical pressure:	barA	Calc. Cv:	4.21	
CP/CV , Z:	█	Travel:	77	%
Flash:	%			

$$Cv(Gas) = \frac{1776 \text{m}^3/\text{h}[\text{S}] \times \text{Sqr}(0.2707 \times 96.6 \text{degK}) \times 1}{2.538 \times 850 \text{kPaA}} = 4.21$$

No: 21	TAG NO:	PV-3406A	CASE:	NOR
Flow rate:	1509 m3/h[N]	Fluid state:	GAS	
Inlet Pressure:	9.1 barA	Model:	AGVM	
Outlet pressure:	2.71 barA	Valve size:	1	inch
Diff. pressure	bar	Line size In/Out:	2	2 inch
Temperature:	-176.5 degC	Pipe Sch/ Thick:	2.77	mm
Sp.Gr. (liq.):	water=1	Saturated temp.:	degC	
Sp.Gr. (gas,vapor):	0.34 kg/m3[N]	KC:	0.7	
Viscosity:	cP	Velocity:	0.28	Mach
Vapor pressure:	barA	S.P.L.:	69	dBA
Critical pressure:	barA	Calc. Cv:	3.482	
CP/CV , Z:	█	Travel:	72	%
Flash:	%			

$$Cv(Gas) = \frac{1595 \text{m}^3/\text{h}[\text{S}] \times \text{Sqr}(0.263 \times 96.6 \text{degK}) \times 1}{2.538 \times 910 \text{kPaA}} = 3.482$$

Cv Calculation Sheet

No: 21	TAG NO:	PV-3406A	CASE:	MIN
Flow rate:	741	m3/h[N]	Fluid state:	GAS
Inlet Pressure:	8.9	barA	Model:	AGVM
Outlet pressure:	2.71	barA	Valve size:	1 inch
Diff. pressure		bar	Line size In/Out:	2 2 inch
Temperature:	-174.3	degC	Pipe Sch/ Thick:	2.77 mm
Sp.Gr. (liq.):		water=1	Saturated temp.:	degC
Sp.Gr. (gas,vapor):	0.35	kg/m3[N]	KC:	0.7
Viscosity:		cP		
Vapor pressure:		barA	Velocity:	0.14 Mach
Critical pressure:		barA	S.P.L.:	63 dBA
CP/CV , Z:			Calc. Cv:	1.794
Flash:		%	Travel:	54 %

$$Cv(\text{Gas}) = \frac{783.2 \text{m}^3/\text{h}[\text{S}] \times \text{Sqr}(0.2707 \times 98.8 \text{degK}) \times 1}{2.538 \times 890 \text{kPaA}} = 1.794$$

No: 22	TAG NO:	PV-3406B	CASE:	NOR
Flow rate:	15593	m3/h[N]	Fluid state:	GAS
Inlet Pressure:	12	barA	Model:	AGVM
Outlet pressure:	1.2	barA	Valve size:	4 inch
Diff. pressure		bar	Line size In/Out:	4 6 inch
Temperature:	-166.6	degC	Pipe Sch/ Thick:	3.4 mm
Sp.Gr. (liq.):		water=1	Saturated temp.:	degC
Sp.Gr. (gas,vapor):	1.25	kg/m3[N]	KC:	0.9
Viscosity:		cP		
Vapor pressure:		barA	Velocity:	0.83 Mach
Critical pressure:		barA	S.P.L.:	104 dBA
CP/CV , Z:			Calc. Cv:	54.92
Flash:		%	Travel:	61 %

$$Cv(\text{Gas}) = \frac{16482 \text{m}^3/\text{h}[\text{S}] \times \text{Sqr}(0.9667 \times 106.5 \text{degK}) \times 1}{2.538 \times 1200 \text{kPaA}} = 54.92$$

No: 23	TAG NO:	PV-3531A	CASE:	MAX
Flow rate:	16899	m3/h[N]	Fluid state:	GAS
Inlet Pressure:	4	barA	Model:	HTS
Outlet pressure:	1.2	barA	Valve size:	6 inch
Diff. pressure		bar	Line size In/Out:	6 10 inch
Temperature:	-150	degC	Pipe Sch/ Thick:	10S 4 mm
Sp.Gr. (liq.):		water=1	Saturated temp.:	degC
Sp.Gr. (gas,vapor):	0.96	kg/m3[N]	KC:	0.7
Viscosity:		cP		
Vapor pressure:		barA	Velocity:	0.38 Mach
Critical pressure:		barA	S.P.L.:	102 dBA
CP/CV , Z:			Calc. Cv:	168.2
Flash:		%	Travel:	83 %

$$Cv(\text{Gas}) = \frac{17862 \text{m}^3/\text{h}[\text{S}] \times \text{Sqr}(0.7425 \times 123.1 \text{degK}) \times 1}{2.538 \times 400 \text{kPaA}} = 168.2$$

Cv Calculation Sheet

No: 23	TAG NO:	PV-3531A	CASE:	NOR
Flow rate:	14088	m3/h[N]	Fluid state:	GAS
Inlet Pressure:	4	barA	Model:	HTS
Outlet pressure:	1.2	barA	Valve size:	6 inch
Diff. pressure		bar	Line size In/Out:	6 10 inch
Temperature:	-150	degC	Pipe Sch/ Thick:	10S 4 mm
Sp.Gr. (liq.):		water=1	Saturated temp.:	degC
Sp.Gr. (gas,vapor):	0.93	kg/m3[N]	KC:	0.7
Viscosity:		cP		
Vapor pressure:		barA	Velocity:	0.31 Mach
Critical pressure:		barA	S.P.L.:	100 dBA
CP/CV , Z:			Calc. Cv:	138
Flash:		%	Travel:	76 %

$$Cv(\text{Gas}) = \frac{14891 \text{m}^3/\text{h}[\text{S}] \times \text{Sqr}(0.7193 \times 123.1 \text{degK}) \times 1}{2.538 \times 400 \text{kPaA}} = 138$$

No: 23	TAG NO:	PV-3531A	CASE:	MIN
Flow rate:	6765	m3/h[N]	Fluid state:	GAS
Inlet Pressure:	4	barA	Model:	HTS
Outlet pressure:	1.2	barA	Valve size:	6 inch
Diff. pressure		bar	Line size In/Out:	6 10 inch
Temperature:	-150	degC	Pipe Sch/ Thick:	10S 4 mm
Sp.Gr. (liq.):		water=1	Saturated temp.:	degC
Sp.Gr. (gas,vapor):	0.88	kg/m3[N]	KC:	0.7
Viscosity:		cP		
Vapor pressure:		barA	Velocity:	0.14 Mach
Critical pressure:		barA	S.P.L.:	94 dBA
CP/CV , Z:			Calc. Cv:	64.48
Flash:		%	Travel:	55 %

$$Cv(\text{Gas}) = \frac{7151 \text{m}^3/\text{h}[\text{S}] \times \text{Sqr}(0.6806 \times 123.1 \text{degK}) \times 1}{2.538 \times 400 \text{kPaA}} = 64.48$$

No: 24	TAG NO:	SV-3640	CASE:	MAX
Flow rate:	4738	m3/h[N]	Fluid state:	GAS
Inlet Pressure:	27.33	barA	Model:	HTS
Outlet pressure:	27.14	barA	Valve size:	3 inch
Diff. pressure		bar	Line size In/Out:	3 3 inch
Temperature:	11.6	degC	Pipe Sch/ Thick:	10S 3 mm
Sp.Gr. (liq.):		water=1	Saturated temp.:	degC
Sp.Gr. (gas,vapor):	1.25	kg/m3[N]	KC:	0.01
Viscosity:		cP		
Vapor pressure:		barA	Velocity:	0.03 Mach
Critical pressure:		barA	S.P.L.:	59 dBA
CP/CV , Z:			Calc. Cv:	88.15
Flash:		%	Travel:	81 %

$$Cv(\text{Gas}) = \frac{5008 \text{m}^3/\text{h}[\text{S}] \times \text{Sqr}(0.9667 \times 284.8 \text{degK}) \times 1}{2.930 \times \text{Sqr}(19 \text{kPa} \times (2733 \text{kPaA} + 2714 \text{kPaA}))} = 88.15$$

Cv Calculation Sheet

No: 24	TAG NO:	SV-3640	CASE:	NOR
Flow rate:	3635	m3/h[N]	Fluid state:	GAS
Inlet Pressure:	27.33	barA	Model:	HTS
Outlet pressure:	20.26	barA	Valve size:	3 inch
Diff. pressure		bar	Line size In/Out:	3 3 inch
Temperature:	-5.8	degC	Pipe Sch/ Thick:	10S 3 mm
Sp.Gr. (liq.):		water=1	Saturated temp.:	degC
Sp.Gr. (gas,vapor):	1.25	kg/m3[N]	KC:	0.26
Viscosity:		cP		
Vapor pressure:		barA	Velocity:	0.03 Mach
Critical pressure:		barA	S.P.L.:	74 dBA
CP/CV , Z:			Calc. Cv:	11.49
Flash:		%	Travel:	25 %

$$Cv(\text{Gas}) = \frac{3842 \text{m}^3/\text{h}[\text{S}] \times \text{Sqr}(0.9667 \times 267.3 \text{degK}) \times 1}{2.930 \times \text{Sqr}(707 \text{kPa} \times (2733 \text{kPaA} + 2026 \text{kPaA}))} = 11.49$$

No: 24	TAG NO:	SV-3640	CASE:	MIN
Flow rate:	2850	m3/h[N]	Fluid state:	GAS
Inlet Pressure:	27.33	barA	Model:	HTS
Outlet pressure:	16.2	barA	Valve size:	3 inch
Diff. pressure		bar	Line size In/Out:	3 3 inch
Temperature:	5.5	degC	Pipe Sch/ Thick:	10S 3 mm
Sp.Gr. (liq.):		water=1	Saturated temp.:	degC
Sp.Gr. (gas,vapor):	1.25	kg/m3[N]	KC:	0.41
Viscosity:		cP		
Vapor pressure:		barA	Velocity:	0.03 Mach
Critical pressure:		barA	S.P.L.:	78 dBA
CP/CV , Z:			Calc. Cv:	7.666
Flash:		%	Travel:	20 %

$$Cv(\text{Gas}) = \frac{3012 \text{m}^3/\text{h}[\text{S}] \times \text{Sqr}(0.9667 \times 278.7 \text{degK}) \times 1}{2.930 \times \text{Sqr}(1113 \text{kPa} \times (2733 \text{kPaA} + 1620 \text{kPaA}))} = 7.666$$

No: 25	TAG NO:	TDV-3510	CASE:	MAX
Flow rate:	1400	m3/h[N]	Fluid state:	GAS
Inlet Pressure:	5.5	barA	Model:	HTS
Outlet pressure:	1.27	barA	Valve size:	1-1/2 inch
Diff. pressure		bar	Line size In/Out:	1-1/2 1-1/2 inch
Temperature:	-178	degC	Pipe Sch/ Thick:	10S 2.8 mm
Sp.Gr. (liq.):		water=1	Saturated temp.:	degC
Sp.Gr. (gas,vapor):	1.25	kg/m3[N]	KC:	0.77
Viscosity:		cP		
Vapor pressure:		barA	Velocity:	0.47 Mach
Critical pressure:		barA	S.P.L.:	72 dBA
CP/CV , Z:			Calc. Cv:	10.17
Flash:		%	Travel:	82 %

$$Cv(\text{Gas}) = \frac{1480 \text{m}^3/\text{h}[\text{S}] \times \text{Sqr}(0.9667 \times 95.1 \text{degK}) \times 1}{2.538 \times 550 \text{kPaA}} = 10.17$$

Cv Calculation Sheet

No: 25	TAG NO:	TDV-3510 (Liquid+Gas Calculation)	CASE:	MAX
Flow rate:	2435 l/h	Fluid state:	FLASH	
Inlet Pressure:	5.5 barA	Model:	HTS	
Outlet pressure:	1.27 barA	Valve size:	1-1/2	inch
Diff. pressure	bar	Line size In/Out:		inch
Temperature:	-178 degC	Pipe Sch/ Thick:		mm
Sp.Gr. (liq.):	0.803 water=1	Saturated temp.:		degC
Sp.Gr. (gas,vapor):	1.25 kg/m3[N]	KC:	0.77	
Viscosity:	cP	Velocity:	0.59	m/s
Vapor pressure:	barA	S.P.L.:	57	dBA
Critical pressure:	barA	Calc. Cv:	3.069	
CP/CV , Z:	≡	Travel:	50	%
Flash:	18.1 %			

$$Cv(Liq) = \frac{11.56 \times 1.994 \text{m}^3/\text{h} \times \text{Sqr}(0.803)}{\text{Sqr}(423\text{kPa})} = 1.004$$

$$Cv(Gas) = \frac{300.6 \text{m}^3/\text{h}[\text{S}] \times \text{Sqr}(0.9667 \times 95.1 \text{degK})}{2.538 \times 550 \text{kPaA}} = 2.065$$