Base Load Power Hub (BLPH)

SIZING CALCULATION SHEET (INCLUDING NOISE LEVEL DATA SHEETS, CONTROL VALVE CURVES)

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CROSSWIND	HOLLANDSE KUST NOORD WIND PARK Project Contract No. CW-I-WP4-2023-05	ROSETTI MARINO
Document Title:	SIZING CALCULATION SHEET (INCLUDING NOISE LEVEL DATA SHEETS, CONTROL VALVE CURVES)	Sh. 2 of 41 Date: 03/09/2024 Rev. 03

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5	Sizing Calculation Sheet (including Noise Level Data Sheets, Control Valve Curves)	X	X	X	X				

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Revision / Change Log

Rev.	Description
00	ISSUE FOR REVIEW (IFR)
01	ISSUE FOR REVIEW (IFR)
02	ACCEPTED FOR CONSTRUCTION (AFC)
03	ACCEPTED FOR CONSTRUCTION (AFC)

HOLDS LIST

No.	Description
1.	
2.	
3.	
4.	

Tags numbers list

Item	Tag	Serial Number	P&ID Number	Sheet Number for Calculations	Sheet Number for Curves
1	25-FV-031	2400583	123A90-DDL-PR-PID-80015	10	26
2	25-FV-032	2400584	123A90-DDL-PR-PID-80016	11	27
3	25-FV-033	2400585	123A90-DDL-PR-PID-80017	12	28
4	25-FV-034	2400586	123A90-DDL-PR-PID-80018	13	29
5	25-FV-036	2400587	123A90-DDL-PR-PID-80020	14	30
6	25-FV-038	2400588	123A90-DDL-PR-PID-80019	15	31
7	25-PV-035	2400589	123A90-DDL-PR-PID-80015	16	32
8	25-PV-037	2400590	123A90-DDL-PR-PID-80016	17	33
9	25-PV-040	2400591	123A90-DDL-PR-PID-80017	18	34
10	25-PV-043	2400592	123A90-DDL-PR-PID-80018	19	35
11	25-PV-046	2400593	123A90-DDL-PR-PID-80019	20	36
12	25-PV-049	2400594	123A90-DDL-PR-PID-80020	21	37
13	25-PV-055A	2400595	123A90-DDL-PR-PID-80014	22	38
14	25-PV-055B	2400596	123A90-DDL-PR-PID-80014	23	39
15	64-PV-031A	2400597	123A90-DDL-PR-PID-80027	24	40
16	64-PV-031B	2400598	123A90-DDL-PR-PID-80027	25	41

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Customer: ROSETTI MARINO

Plant / Site: HOLLANDSE KUST NOORD WIND PARK Prj.

Quotation Ref./Job Ref.: OV2301646/CV2400221

DSH REV. 2 - 04/06/2024 - 0

Final Installation: NL

1	Item	10	49	Q.ty	6
2	Valve tag / S.No	25-FV-031÷034/036/038 / 2400583 ÷ 2400588	50	Valve Service	NITROGEN FROM NITROGEN SYSTEM (A-64000) TO HYDROGEN STORAGE VESSEL (V-25001A÷F)

PIPING AND DESIGN CONDITIONS

PIPING

3	Piping Size / Ext.Diam	1"	
4	Schedule / Thickness	40	
5	Pipe Insulation	No	
6	Installation Location	Outdoor	

AMBIENCE AND DESIGN CONDITIONS

51	Inlet / Outlet Design Pressure	40	bar g
52	Inlet / Outlet Design Temperature	100	°C
53	Tmin / Tmax	-8.4 / +25	°C
54	Certification / Classific.Area	PED+ATEX / Zone 2	

VALVE CONSTRUCTION

VALVE CHARACTERISTICS

7	Valve Model	CV-8407	
8	Valve Type	Globe	
9	Valve Layout	Straight	
10	Bonnet type	Bolted	
11	Guiding Type	Top Guided	
12	No.Ports	1	
13	Flow direction	to Open	
14	Trim Type	Contoured Plug	
15	Port Size	1/4"	Inch
16	CV / Characteristics	0.85 / Equal%	
17	Body Size	1"	
18	Rating Standard	ASME B16.34	
19	Pressure Class	300#	
20	End Connection Standard	ASME B16.5	
21	End Connection Type	RF	
22	End Connection Finishing	-	
23	Stroke	13	mm
24	Shut-off Direction	Direct	
25	Leakage Class	VI - IEC 60534-4	
26	Shut-off pressure	40	bar g

MATERIALS

55	Body Material	A351 CF3M
56	Bonnet Material	A479 316L
57	Boltings	A193 B8M Cl. 2 / A194 8M
58	Bellows Material	-
59	Plug / Vane Material	A479 316L+PTFE
60	Seat Material	A479 316L
61	Cage Material	-
62	Guide Material	-
63	Stem Material	A 479 316L
64	VE-CO LT Material	-
65	Seating Type	Metallic
66	Balancing Material	-

PACKING

67	Packing Material	PTFE
68	Live Loading	-
69	Stem Flushing	-

DEVICES

70	Inlet Device	-
71	Inlet Device Size	-
72	Outlet Device	-
73	Outlet Device Size	-
74	Body Heating	-

ACTUATOR AND ACCESSORIES

ACTUATOR

27	Fail Position	Closed	
28	Actuation Type / Model	Pneumatic Diaphragm	
29	Actuator Action	Reverse	
30	Actuator Size	SD11R	
31	Spring Range	15-30 psi	
32	Supply	50- psi	
33	Design Supply	11 barg	
34	Handwheel	-	
35	Mechanical Stop	-	
36	Throttling Time	<10	s
37	Quick Stroking Time	-	s
38	Yoke Material	CS	
39	Pneumatic Tubing Material	AISI 316	
40	Pneumatic Fittings	AISI 316 Double Ferrule	
41	Pneumatic Connection Size	1/4" NPT-F	

POSITIONER

42	Positioner Model	TISSIN TS900
43	Type	Smart Digital
44	Input Signal / Protocol	4-20 mA HART
45	Fail Safety	Fail safe
46	Output Signal	4-20 mA
47	Prot. Class / Encl. Material / El. Classif.	IP66 / AISI 316 / Eexd \ C T4-T6
48	El.Conn. / Pn.Conn.	M20x1.5 \ 1/4" NPT-F

FILTER REGULATOR

75	Fr. Model	FR04411S00SSNB2
76	Pn.Conn. / Body Material	1/4" NPT-F / S.Steel

BOOSTER

77	Booster Model	-
78	Pn.Conn. / Body Material	-

SOLENOID VALVE

79	SOV Model	-
80	Body Material	-
81	Prot. Class / El. Classif.	-
82	El.Conn. / Pn.Conn.	-
83	Supply	-
84	Power Consumption	-

PNEUMATIC VALVE

85	Pneumatic Discharge Model	-
86	Pn.Conn. / Body Material	-

LOCK UP VALVE

87	Lock Up Model	-
88	Pn.Conn. / Body Material	-

LIMIT SWITCH

89	Limit Switch Model	1 x GDSN0LIS2MS290 EISENBAU
90	Type	SPDT
91	Contact Type	-
92	Encl.Material	316SS
93	El.Connection	M20x1,5
94	Prot. Class / El. Classif.	IP66 / MIN. Ex-d IIC (or IIB+H2) T1

NOTES

N.1	n°1 PSV installed downstream the air filter regulator, size 1/4", st.ast., set 6 barg (CE)	N.4	
N.2		N.5	
N.3		N.6	
		N.7	

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Customer: ROSETTI MARINO

Plant / Site: HOLLANDSE KUST NOORD WIND PARK Prj.

Quotation Ref./Job Ref.: OV2301646/CV2400221

DSH REV. 2 - 04/06/2024 - 0

Final Installation: NL

1	Item	**20**	49	Q.ty	6
2	Valve tag / S.No	**25-PV-035/037/040/043/046/049 / 2400589 ÷ 2400594**	50	Valve Service	HYDROGEN FROM STORAGE VESSEL (V-25001A÷F) TO HYDROGEN VENT HEADER

PIPING AND DESIGN CONDITIONS

		PIPING			***AMBIENCE AND DESIGN CONDITIONS***	
3	Piping Size / Ext.Diam	3"	51	Inlet / Outlet Design Pressure	40	bar g
4	Schedule / Thickness	10S	52	Inlet / Outlet Design Temperature	80	°C
5	Pipe Insulation	No	53	Tmin / Tmax	-8.4 / +25	°C
6	Installation Location	Outdoor	54	Certification / Classific.Area	PED+ATEX / Zone 2	

VALVE CONSTRUCTION

		VALVE CHARACTERISTICS			***MATERIALS***	
7	Valve Model	CV-8407	55	Body Material	A351 CF3M	
8	Valve Type	Globe	56	Bonnet Material	A479 316L	
9	Valve Layout	Straight	57	Boltings	A193 B8M Cl. 2 / A194 8M	
10	Bonnet type	Bolted	58	Bellows Material	-	
11	Guiding Type	Top Guided	59	Plug / Vane Material	A479 316L+PTFE	
12	No.Ports	1	60	Seat Material	A479 316L	
13	Flow direction	to Open	61	Cage Material	-	
14	Trim Type	Contoured Plug	62	Guide Material	-	
15	Port Size	1" Inch	63	Stem Material	A 479 316L	
16	CV / Characteristics	13 / Equal%	64	VE-CO LT Material	-	
			65	Seating Type	Metallic	
17	Body Size	2"	66	Balancing Material	-	
18	Rating Standard	ASME B16.34			***PACKING***	
19	Pressure Class	300#	67	Packing Material	GRAPHITE - VF1	
20	End Connection Standard	ASME B16.5	68	Live Loading	-	
21	End Connection Type	RF	69	Stem Flushing	-	
22	End Connection Finishing	-			***DEVICES***	
			70	Inlet Device	-	
23	Stroke	25 mm	71	Inlet Device Size	-	
24	Shut-off Direction	Direct	72	Outlet Device	-	
25	Leakage Class	VI - IEC 60534-4	73	Outlet Device Size	-	
26	Shut-off pressure	40 bar g	74	Body Heating	-	

ACTUATOR AND ACCESSORIES

		ACTUATOR			***FILTER REGULATOR***	
27	Fail Position	Closed	75	Fr. Model	FR04411S00SSNB2	
28	Actuation Type / Model	Pneumatic Diaphragm	76	Pn.Conn. / Body Material	1/4" NPT-F / S.Steel	
29	Actuator Action	Reverse			***BOOSTER***	
30	Actuator Size	SD13R	77	Booster Model	-	
31	Spring Range	20-44 psi	78	Pn.Conn. / Body Material	-	
32	Supply	50- psi			***SOLENOID VALVE***	
33	Design Supply	11 barg	79	SOV Model	-	
34	Handwheel	-	80	Body Material	-	
35	Mechanical Stop	-	81	Prot. Class / El. Classif.	-	
36	Throttling Time	<15 s	82	El.Conn. / Pn.Conn.	-	
37	Quick Stroking Time	- s	83	Supply	-	
38	Yoke Material	CS	84	Power Consumption	-	
39	Pneumatic Tubing Material	AISI 316			***PNEUMATIC VALVE***	
40	Pneumatic Fittings	AISI 316 Double Ferrule	85	Pneumatic Discharge Model	-	
41	Pneumatic Connection Size	1/4" NPT-F	86	Pn.Conn. / Body Material	-	
					LOCK UP VALVE	
		POSITIONER	87	Lock Up Model	-	
42	Positioner Model	TISSIN TS900	88	Pn.Conn. / Body Material	-	
43	Type	Smart Digital			***LIMIT SWITCH***	
44	Input Signal / Protocol	4-20 mA HART	89	Limit Switch Model	1 x GDSN0LIS2MS290 EISENBAU	
45	Fail Safety	Fail safe	90	Type	SPDT	
46	Output Signal	4-20 mA	91	Contact Type	-	
47	Prot. Class / Encl. Material / El. Classif.	IP66 / AISI 316 / Eexd \ C T4-T6	92	Encl.Material	316SS	
48	El.Conn. / Pn.Conn.	M20x1.5 \ 1/4" NPT-F	93	El.Connection	M20x1,5	
			94	Prot. Class / El. Classif.	IP66 / MIN. Ex-d IIC (or IIB+H2) T1	

NOTES

N.1	n°1 PSV installed downstream the air filter regulator, size 1/4", st.ast., set 6 barg (CE)
N.2	HYDROGEN SERVICE - PACKING ISO 15848-1
N.3	
N.4	
N.5	
N.6	
N.7	

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Quotation Ref./Job Ref.: OV2301646/CV2400221

Customer: ROSETTI MARINO

Plant / Site: HOLLANDSE KUST NOORD WIND PARK Prj.

DSH REV. 2 - 04/06/2024 - 0

Final Installation: NL

1	Item	**30**	49	Q.ty	1
2	Valve tag / S.No	**25-PV-055A / 2400595**	50	Valve Service	HYDROGEN FROM STORAGE VESSEL TO FUEL CELL PACKAGE

PIPING AND DESIGN CONDITIONS

PIPING

3	Piping Size / Ext.Diam	1 1/2"	
4	Schedule / Thickness	40	
5	Pipe Insulation	No	
6	Installation Location	Outdoor	

AMBIENCE AND DESIGN CONDITIONS

51	Inlet / Outlet Design Pressure	40	bar g
52	Inlet / Outlet Design Temperature	100	°C
53	Tmin / Tmax	-8.4 / +25	°C
54	Certification / Classific.Area	PED+ATEX / Zone 2	

VALVE CONSTRUCTION

VALVE CHARACTERISTICS

7	Valve Model	CV-8407	
8	Valve Type	Globe	
9	Valve Layout	Straight	
10	Bonnet type	Bolted	
11	Guiding Type	Top Guided	
12	No.Ports	1	
13	Flow direction	to Open	
14	Trim Type	Contoured Plug	
15	Port Size	1"	Inch
16	CV / Characteristics	13 / Equal%	
17	Body Size	1 1/2"	
18	Rating Standard	ASME B16.34	
19	Pressure Class	300#	
20	End Connection Standard	ASME B16.5	
21	End Connection Type	RF	
22	End Connection Finishing	-	
23	Stroke	20	mm
24	Shut-off Direction	Direct	
25	Leakage Class	VI - IEC 60534-4	
26	Shut-off pressure	40	bar g

MATERIALS

55	Body Material	A351 CF3M
56	Bonnet Material	A479 316L
57	Boltings	A193 B8M Cl. 2 / A194 8M
58	Bellows Material	-
59	Plug / Vane Material	A479 316L+PTFE
60	Seat Material	A479 316L
61	Cage Material	-
62	Guide Material	-
63	Stem Material	A 479 316L
64	VE-CO LT Material	-
65	Seating Type	Metallic
66	Balancing Material	-

PACKING

67	Packing Material	GRAPHITE - VF1
68	Live Loading	-
69	Stem Flushing	-

DEVICES

70	Inlet Device	-
71	Inlet Device Size	-
72	Outlet Device	-
73	Outlet Device Size	-
74	Body Heating	-

ACTUATOR AND ACCESSORIES

ACTUATOR

27	Fail Position	Closed	
28	Actuation Type / Model	Pneumatic Diaphragm	
29	Actuator Action	Reverse	
30	Actuator Size	SD11R	
31	Spring Range	20-44 psi	
32	Supply	50- psi	
33	Design Supply	11 barg	
34	Handwheel	-	
35	Mechanical Stop	-	
36	Throttling Time	<10	s
37	Quick Stroking Time	-	s
38	Yoke Material	CS	
39	Pneumatic Tubing Material	AISI 316	
40	Pneumatic Fittings	AISI 316 Double Ferrule	
41	Pneumatic Connection Size	1/4" NPT-F	

POSITIONER

42	Positioner Model	TISSIN TS900
43	Type	Smart Digital
44	Input Signal / Protocol	4-20 mA HART
45	Fail Safety	Fail safe
46	Output Signal	4-20 mA
47	Prot. Class / Encl. Material / El. Classif.	IP66 / AISI 316 / Eexd \ C T4-T6
48	El.Conn. / Pn.Conn.	M20x1.5 \ 1/4" NPT-F

FILTER REGULATOR

75	Fr. Model	FR04411S00SSNB2
76	Pn.Conn. / Body Material	1/4" NPT-F / S.Steel

BOOSTER

77	Booster Model	-
78	Pn.Conn. / Body Material	-

SOLENOID VALVE

79	SOV Model	-
80	Body Material	-
81	Prot. Class / El. Classif.	-
82	El.Conn. / Pn.Conn.	-
83	Supply	-
84	Power Consumption	-

PNEUMATIC VALVE

85	Pneumatic Discharge Model	-
86	Pn.Conn. / Body Material	-

LOCK UP VALVE

87	Lock Up Model	-
88	Pn.Conn. / Body Material	-

LIMIT SWITCH

89	Limit Switch Model	1 x GDSN0LIS2MS290 EISENBAU
90	Type	SPDT
91	Contact Type	-
92	Encl.Material	316SS
93	El.Connection	M20x1,5
94	Prot. Class / El. Classif.	IP66 / MIN. Ex-d IIC (or IIB+H2) T1

NOTES

N.1	n°1 PSV installed downstream the air filter regulator, size 1/4", st.ast., set 6 barg (CE)	N.4	
N.2	HYDROGEN SERVICE - PACKING ISO 15848-1	N.5	
N.3		N.6	
		N.7	

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Customer: ROSETTI MARINO

Plant / Site: HOLLANDSE KUST NOORD WIND PARK Prj.

Quotation Ref./Job Ref.: OV2301646/CV2400221

DSH REV. 2 - 04/06/2024 - 0

Final Installation: NL

1	Item	**40**	49	Q.ty	2
2	Valve tag / S.No	**64-PV-031A/B / 2400597 ÷ 2400598**	50	Valve Service	NITROGEN FROM NITROGEN SYSTEM (A-64000) TO HEADER

PIPING AND DESIGN CONDITIONS

PIPING

3	Piping Size / Ext.Diam	1"	
4	Schedule / Thickness	80	
5	Pipe Insulation	No	
6	Installation Location	Outdoor	

AMBIENCE AND DESIGN CONDITIONS

51	Inlet / Outlet Design Pressure	10	bar g
52	Inlet / Outlet Design Temperature	100	°C
53	Tmin / Tmax	-8.4 / +25	°C
54	Certification / Classific.Area	PED+ATEX / Zone 2	

VALVE CONSTRUCTION

VALVE CHARACTERISTICS

7	Valve Model	CV-8407	
8	Valve Type	Globe	
9	Valve Layout	Straight	
10	Bonnet type	Bolted	
11	Guiding Type	Top Guided	
12	No.Ports	1	
13	Flow direction	to Open	
14	Trim Type	Contoured Plug	
15	Port Size	3/8"	Inch
16	CV / Characteristics	1.9 / Equal%	
17	Body Size	1"	
18	Rating Standard	ASME B16.34	
19	Pressure Class	150#	
20	End Connection Standard	ASME B16.5	
21	End Connection Type	RF	
22	End Connection Finishing	-	
23	Stroke	13	mm
24	Shut-off Direction	Direct	
25	Leakage Class	V - IEC 60534-4	
26	Shut-off pressure	10	bar g

MATERIALS

55	Body Material	A350 LF2
56	Bonnet Material	A350 LF2
57	Boltings	A193 B8M Cl. 2 / A194 8M
58	Bellows Material	-
59	Plug / Vane Material	A479 316L + CoCr-A
60	Seat Material	A479 316L + CoCr-A
61	Cage Material	-
62	Guide Material	-
63	Stem Material	A 479 316L
64	VE-CO LT Material	-
65	Seating Type	Metallic
66	Balancing Material	-

PACKING

67	Packing Material	PTFE
68	Live Loading	-
69	Stem Flushing	-

DEVICES

70	Inlet Device	-
71	Inlet Device Size	-
72	Outlet Device	-
73	Outlet Device Size	-
74	Body Heating	-

ACTUATOR AND ACCESSORIES

ACTUATOR

27	Fail Position	Closed	
28	Actuation Type / Model	Pneumatic Diaphragm	
29	Actuator Action	Reverse	
30	Actuator Size	SD11R	
31	Spring Range	15-30 psi	
32	Supply	50- psi	
33	Design Supply	11 barg	
34	Handwheel	-	
35	Mechanical Stop	-	
36	Throttling Time	<10	s
37	Quick Stroking Time	-	s
38	Yoke Material	CS	
39	Pneumatic Tubing Material	AISI 316	
40	Pneumatic Fittings	AISI 316 Double Ferrule	
41	Pneumatic Connection Size	1/4" NPT-F	

POSITIONER

42	Positioner Model	TISSIN TS900
43	Type	Smart Digital
44	Input Signal / Protocol	4-20 mA HART
45	Fail Safety	Fail safe
46	Output Signal	4-20 mA
47	Prot. Class / Encl. Material / El. Classif.	IP66 / AISI 316 / Eexd \ C T4-T6
48	El.Conn. / Pn.Conn.	M20x1.5 \ 1/4" NPT-F

FILTER REGULATOR

75	Fr. Model	FR04411S00SSNB2
76	Pn.Conn. / Body Material	1/4" NPT-F / S.Steel

BOOSTER

77	Booster Model	-
78	Pn.Conn. / Body Material	-

SOLENOID VALVE

79	SOV Model	-
80	Body Material	-
81	Prot. Class / El. Classif.	-
82	El.Conn. / Pn.Conn.	-
83	Supply	-
84	Power Consumption	-

PNEUMATIC VALVE

85	Pneumatic Discharge Model	-
86	Pn.Conn. / Body Material	-

LOCK UP VALVE

87	Lock Up Model	-
88	Pn.Conn. / Body Material	-

LIMIT SWITCH

89	Limit Switch Model	1 x GDSN0LIS2MS290 EISENBAU
90	Type	SPDT
91	Contact Type	-
92	Encl.Material	316SS
93	El.Connection	M20x1,5
94	Prot. Class / El. Classif.	IP66 / MIN. Ex-d IIC (or IIB+H2) T1

NOTES

N.1	n°1 PSV installed downstream the air filter regulator, size 1/4", st.ast., set 6 barg (CE)	N.4	
N.2		N.5	
N.3		N.6	
		N.7	

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Customer: ROSETTI MARINO

Plant / Site: HOLLANDSE KUST NOORD WIND PARK Prj.

Quotation Ref./Job Ref.: OV2301646/CV2400221

DSH REV. 3 - 04/06/2024 - 0

Final Installation: NL

1	Item	**50**	49	Q.ty	1
2	Valve tag / S.No	**25-PV-055B / 2400596**	50	Valve Service	HYDROGEN FROM STORAGE VESSEL TO FUEL CELL PACKAGE

PIPING AND DESIGN CONDITIONS

PIPING

3	Piping Size / Ext.Diam	1 1/2"	
4	Schedule / Thickness	40	
5	Pipe Insulation	No	
6	Installation Location	Outdoor	

AMBIENCE AND DESIGN CONDITIONS

51	Inlet / Outlet Design Pressure	40	bar g
52	Inlet / Outlet Design Temperature	100	°C
53	Tmin / Tmax	-8.4 / +25	°C
54	Certification / Classific.Area	PED+ATEX / Zone 2	

VALVE CONSTRUCTION

VALVE CHARACTERISTICS

7	Valve Model	CV-8407	
8	Valve Type	Globe	
9	Valve Layout	Straight	
10	Bonnet type	Bolted	
11	Guiding Type	Top Guided	
12	No.Ports	1	
13	Flow direction	to Open	
14	Trim Type	Contoured Plug	
15	Port Size	5/32"	Inch
16	CV / Characteristics	0.45 / Equal%	
17	Body Size	1 1/2"	
18	Rating Standard	ASME B16.34	
19	Pressure Class	300#	
20	End Connection Standard	ASME B16.5	
21	End Connection Type	RF	
22	End Connection Finishing	-	
23	Stroke	13	mm
24	Shut-off Direction	Direct	
25	Leakage Class	VI - IEC 60534-4	
26	Shut-off pressure	40	bar g

MATERIALS

55	Body Material	A351 CF3M
56	Bonnet Material	A479 316L
57	Boltings	A193 B8M Cl. 2 / A194 8M
58	Bellows Material	-
59	Plug / Vane Material	A479 316L+PTFE
60	Seat Material	A479 316L
61	Cage Material	-
62	Guide Material	-
63	Stem Material	A 479 316L
64	VE-CO LT Material	-
65	Seating Type	Metallic
66	Balancing Material	-

PACKING

67	Packing Material	GRAPHITE - VF1
68	Live Loading	-
69	Stem Flushing	-

DEVICES

70	Inlet Device	-
71	Inlet Device Size	-
72	Outlet Device	-
73	Outlet Device Size	-
74	Body Heating	-

ACTUATOR AND ACCESSORIES

ACTUATOR

27	Fail Position	Closed	
28	Actuation Type / Model	Pneumatic Diaphragm	
29	Actuator Action	Reverse	
30	Actuator Size	SD11R	
31	Spring Range	20-44 psi	
32	Supply	50- psi	
33	Design Supply	11 barg	
34	Handwheel	-	
35	Mechanical Stop	-	
36	Throttling Time	<10	s
37	Quick Stroking Time	-	s
38	Yoke Material	CS	
39	Pneumatic Tubing Material	AISI 316	
40	Pneumatic Fittings	AISI 316 Double Ferrule	
41	Pneumatic Connection Size	1/4" NPT-F	

POSITIONER

42	Positioner Model	TISSIN TS900
43	Type	Smart Digital
44	Input Signal / Protocol	4-20 mA HART
45	Fail Safety	Fail safe
46	Output Signal	4-20 mA
47	Prot. Class / Encl. Material / El. Classif.	IP66 / AISI 316 / Eexd \ C T4-T6
48	El.Conn. / Pn.Conn.	M20x1.5 \ 1/4" NPT-F

FILTER REGULATOR

75	Fr. Model	FR04411S00SSNB2
76	Pn.Conn. / Body Material	1/4" NPT-F / S.Steel

BOOSTER

77	Booster Model	-
78	Pn.Conn. / Body Material	-

SOLENOID VALVE

79	SOV Model	-
80	Body Material	-
81	Prot. Class / El. Classif.	-
82	El.Conn. / Pn.Conn.	-
83	Supply	-
84	Power Consumption	-

PNEUMATIC VALVE

85	Pneumatic Discharge Model	-
86	Pn.Conn. / Body Material	-

LOCK UP VALVE

87	Lock Up Model	-
88	Pn.Conn. / Body Material	-

LIMIT SWITCH

89	Limit Switch Model	1 x GDSN0LIS2MS290 EISENBAU
90	Type	SPDT
91	Contact Type	-
92	Encl.Material	316SS
93	El.Connection	M20x1,5
94	Prot. Class / El. Classif.	IP66 / MIN. Ex-d IIC (or IIB+H2) T1

NOTES

N.1	n°1 PSV installed downstream the air filter regulator, size 1/4", st.ast., set 6 barg (CE)
N.2	HYDROGEN SERVICE - PACKING ISO 15848-1
N.3	
N.4	
N.5	
N.6	
N.7	

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CALCULATION FORM FOR CONTROL VALVES

Customer	ROSETTI MARINO SPA	*QUOTE*	CV2400221
Order	1724000740 123A90A	*Sheet*	1
Plant	Hollandse Kust Noord Wind Park Pr.	*Created By*	RC

PIPELINE DATA

	INLET	OUTLET
Nominal diameter	1"	1"
Schedule	40	40
External Diameter, mm	33.40	33.40
Internal Diameter, mm	26.6	26.6
Thickness, mm	3.4	3.4

VALVE DATA

Valve TAG	**25-FV-031**
Serial AST	**2400583**
AST Ref.	10
Upstream Fluid State	GAS

VALVE DATA: BODY

Valve Family	CV-8400
Valve Model	CV-8407
Valve Description	Globe - Straigth way - Contoured Plug
Unit	NPS
Body Size	1"
Fluid	NITROGEN

VALVE DATA: TRIM

Trim Configuration	CP-E
Stroke, mm	13
Port Size, Inch	1/4"
Flow Characteristic	Equal%
Flow Action	FTO
Selected Flow Coefficient	0.85

PROCESS DATA

		Units	*#1*	*#2*	*#3*	*#4*	*NOTES*
Fluid	-	-	GAS	GAS			
Flow Rate	Q/W	Nm³/h	40.00	40.00			
Inlet Temperature	T1	°C	15.00	15.00			
Inlet Pressure	P1	bar (g)	7.000	7.000			
Outlet Pressure	P2		0.000	3.000			
Differential Pressure	ΔP	-	7.000	4.000			
Fluid density at P1 and T1	ρ1	kg/m³	9.460	9.460			
Dynamic Viscosity	μ	cP					
Molecular Weight	MW	kg/kmol	28.000	28.000			
Specific Heat Ratio (cp/cv)	γ	-	1.400	1.400			
Compressibility Factor	Z	-	0.990	0.990			
Critical Pressure	Pcrit	bar (A)					
Vapor pressure	Pvap	bar (A)					
Calculated Flow Coefficient	**C**	**-**	**0.3678**	**0.3846**			
Selected Flow Coefficient	**Cv**	-	0.85	0.85			
Calculated / Selected	C/Cv	%	43.27	45.25			
Pressure Recovery Factor	F_L	-	0.9357	0.9353			
Valve Style Modifier	F_d	-	0.2143	0.2211			
Pressure Differential Ratio Factor	X_T	-	0.7355	0.7349			
Stroke %		**%**	**74.2**	**75.6**			
Predicted Noise SPL	-	dB	77.27	<75			
Valve Outlet Velocity	v2	m/s	20.82	5.256			
Valve Outlet Mach Number	M2	-	0.06015	0.01519			
Downstream Pipe Fluid Velocity	vP2	m/s	20.82	5.256			
Flow Regime	-	-	Choked	Normal			
Upstream Fluid State	-	-	Gaseous	Gaseous			
Downstream Fluid State	-	-	Gaseous	Gaseous			

NOTES

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CALCULATION FORM FOR CONTROL VALVES

Customer	ROSETTI MARINO SPA	*QUOTE*	CV2400221
Order	1724000740 123A90A	*Sheet*	2
Plant	Hollandse Kust Noord Wind Park Pr.	*Created By*	RC

PIPELINE DATA

	INLET	OUTLET
Nominal diameter	1"	1"
Schedule	40	40
External Diameter, mm	33.40	33.40
Internal Diameter, mm	26.6	26.6
Thickness, mm	3.4	3.4

VALVE DATA

Valve TAG	**25-FV-032**
Serial AST	**2400584**
AST Ref.	20
Upstream Fluid State	GAS

VALVE DATA: BODY

Valve Family	CV-8400
Valve Model	CV-8407
Valve Description	Globe - Straigth way - Contoured Plug
Unit	NPS
Body Size	1"
Fluid	NITROGEN

VALVE DATA: TRIM

Trim Configuration	CP-E
Stroke, mm	13
Port Size, Inch	1/4"
Flow Characteristic	Equal%
Flow Action	FTO
Selected Flow Coefficient	0.85

PROCESS DATA

		Units	*#1*	*#2*	*#3*	*#4*	*NOTES*
Fluid	-	-	GAS	GAS			
Flow Rate	Q/W	Nm^3/h	40.00	40.00			
Inlet Temperature	T1	°C	15.00	15.00			
Inlet Pressure	P1	bar (g)	7.000	7.000			
Outlet Pressure	P2		0.000	3.000			
Differential Pressure	ΔP	-	7.000	4.000			
Fluid density at P1 and T1	ρ1	kg/m^3	9.460	9.460			
Dynamic Viscosity	μ	cP					
Molecular Weight	MW	kg/kmol	28.000	28.000			
Specific Heat Ratio (cp/cv)	γ	-	1.400	1.400			
Compressibility Factor	Z	-	0.990	0.990			
Critical Pressure	Pcrit	bar (A)					
Vapor pressure	Pvap	bar (A)					
Calculated Flow Coefficient	**C**	**-**	**0.3678**	**0.3846**			
Selected Flow Coefficient	**Cv**	-	0.85	0.85			
Calculated / Selected	C/Cv	%	43.27	45.25			
Pressure Recovery Factor	F_L	-	0.9357	0.9353			
Valve Style Modifier	F_d	-	0.2143	0.2211			
Pressure Differential Ratio Factor	X_T	-	0.7355	0.7349			
Stroke %		**%**	**74.2**	**75.6**			
Predicted Noise SPL	-	dB	77.27	<75			
Valve Outlet Velocity	v2	m/s	20.82	5.256			
Valve Outlet Mach Number	M2	-	0.06015	0.01519			
Downstream Pipe Fluid Velocity	vP2	m/s	20.82	5.256			
Flow Regime	-	-	Choked	Normal			
Upstream Fluid State	-	-	Gaseous	Gaseous			
Downstream Fluid State	-	-	Gaseous	Gaseous			

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CALCULATION FORM FOR CONTROL VALVES

Customer	ROSETTI MARINO SPA	*QUOTE*	CV2400221
Order	1724000740 123A90A	*Sheet*	3
Plant	Hollandse Kust Noord Wind Park Pr.	*Created By*	RC

PIPELINE DATA

	INLET	OUTLET
Nominal diameter	1"	1"
Schedule	40	40
External Diameter, mm	33.40	33.40
Internal Diameter, mm	26.6	26.6
Thickness, mm	3.4	3.4

VALVE DATA

Valve TAG	**25-FV-033**
Serial AST	**2400585**
AST Ref.	30
Upstream Fluid State	GAS

VALVE DATA: BODY

Valve Family	CV-8400
Valve Model	CV-8407
Valve Description	Globe - Straigth way - Contoured Plug
Unit	NPS
Body Size	1"
Fluid	NITROGEN

VALVE DATA: TRIM

Trim Configuration	CP-E
Stroke, mm	13
Port Size, Inch	1/4"
Flow Characteristic	Equal%
Flow Action	FTO
Selected Flow Coefficient	0.85

PROCESS DATA

		Units	#1	#2	#3	#4	NOTES
Fluid	-	-	GAS	GAS			
Flow Rate	Q/W	Nm³/h	40.00	40.00			
Inlet Temperature	T1	°C	15.00	15.00			
Inlet Pressure	P1	bar (g)	7.000	7.000			
Outlet Pressure	P2		0.000	3.000			
Differential Pressure	ΔP	-	7.000	4.000			
Fluid density at P1 and T1	ρ1	kg/m³	9.460	9.460			
Dynamic Viscosity	μ	cP					
Molecular Weight	MW	kg/kmol	28.000	28.000			
Specific Heat Ratio (cp/cv)	γ	-	1.400	1.400			
Compressibility Factor	Z	-	0.990	0.990			
Critical Pressure	Pcrit	bar (A)					
Vapor pressure	Pvap	bar (A)					
Calculated Flow Coefficient	**C**	**-**	**0.3678**	**0.3846**			
Selected Flow Coefficient	**Cv**	-	0.85	0.85			
Calculated / Selected	C/Cv	%	43.27	45.25			
Pressure Recovery Factor	F_L	-	0.9357	0.9353			
Valve Style Modifier	F_d	-	0.2143	0.2211			
Pressure Differential Ratio Factor	X_T	-	0.7355	0.7349			
Stroke %		**%**	**74.2**	**75.6**			
Predicted Noise SPL	-	dB	77.27	<75			
Valve Outlet Velocity	v2	m/s	20.82	5.256			
Valve Outlet Mach Number	M2	-	0.06015	0.01519			
Downstream Pipe Fluid Velocity	vP2	m/s	20.82	5.256			
Flow Regime	-	-	Choked	Normal			
Upstream Fluid State	-	-	Gaseous	Gaseous			
Downstream Fluid State	-	-	Gaseous	Gaseous			

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CALCULATION FORM FOR CONTROL VALVES

Customer	ROSETTI MARINO SPA	*QUOTE*	CV2400221
Order	1724000740 123A90A	*Sheet*	4
Plant	Hollandse Kust Noord Wind Park Pr.	*Created By*	RC

PIPELINE DATA

	INLET	OUTLET
Nominal diameter	1"	1"
Schedule	40	40
External Diameter, mm	33.40	33.40
Internal Diameter, mm	26.6	26.6
Thickness, mm	3.4	3.4

VALVE DATA

Valve TAG	**25-FV-034**
Serial AST	**2400586**
AST Ref.	40
Upstream Fluid State	GAS

VALVE DATA: BODY

Valve Family	CV-8400
Valve Model	CV-8407
Valve Description	Globe - Straigth way - Contoured Plug
Unit	NPS
Body Size	1"
Fluid	NITROGEN

VALVE DATA: TRIM

Trim Configuration	CP-E
Stroke, mm	13
Port Size, Inch	1/4"
Flow Characteristic	Equal%
Flow Action	FTO
Selected Flow Coefficient	0.85

PROCESS DATA

		Units	*#1*	*#2*	*#3*	*#4*	*NOTES*
Fluid	-	-	GAS	GAS			
Flow Rate	Q/W	Nm³/h	40.00	40.00			
Inlet Temperature	T1	°C	15.00	15.00			
Inlet Pressure	P1	bar (g)	7.000	7.000			
Outlet Pressure	P2		0.000	3.000			
Differential Pressure	ΔP	-	7.000	4.000			
Fluid density at P1 and T1	ρ1	kg/m³	9.460	9.460			
Dynamic Viscosity	μ	cP					
Molecular Weight	MW	kg/kmol	28.000	28.000			
Specific Heat Ratio (cp/cv)	γ	-	1.400	1.400			
Compressibility Factor	Z	-	0.990	0.990			
Critical Pressure	Pcrit	bar (A)					
Vapor pressure	Pvap	bar (A)					
Calculated Flow Coefficient	**C**	**-**	**0.3678**	**0.3846**			
Selected Flow Coefficient	**Cv**	-	0.85	0.85			
Calculated / Selected	C/Cv	%	43.27	45.25			
Pressure Recovery Factor	F_L	-	0.9357	0.9353			
Valve Style Modifier	F_d	-	0.2143	0.2211			
Pressure Differential Ratio Factor	X_T	-	0.7355	0.7349			
Stroke %		**%**	**74.2**	**75.6**			
Predicted Noise SPL	-	dB	77.27	<75			
Valve Outlet Velocity	v2	m/s	20.82	5.256			
Valve Outlet Mach Number	M2	-	0.06015	0.01519			
Downstream Pipe Fluid Velocity	vP2	m/s	20.82	5.256			
Flow Regime	-	-	Choked	Normal			
Upstream Fluid State	-	-	Gaseous	Gaseous			
Downstream Fluid State	-	-	Gaseous	Gaseous			

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CALCULATION FORM FOR CONTROL VALVES

Customer	ROSETTI MARINO SPA	*QUOTE*	CV2400221
Order	1724000740 123A90A	*Sheet*	5
Plant	Hollandse Kust Noord Wind Park Pr.	*Created By*	RC

PIPELINE DATA

	INLET	OUTLET
Nominal diameter	1"	1"
Schedule	40	40
External Diameter, mm	33.40	33.40
Internal Diameter, mm	26.6	26.6
Thickness, mm	3.4	3.4

VALVE DATA

Valve TAG	**25-FV-036**
Serial AST	**2400587**
AST Ref.	50
Upstream Fluid State	GAS

VALVE DATA: BODY

Valve Family	CV-8400
Valve Model	CV-8407
Valve Description	Globe - Straigth way - Contoured Plug
Unit	NPS
Body Size	1"
Fluid	NITROGEN

VALVE DATA: TRIM

Trim Configuration	CP-E
Stroke, mm	13
Port Size, Inch	1/4"
Flow Characteristic	Equal%
Flow Action	FTO
Selected Flow Coefficient	0.85

PROCESS DATA

		Units	*#1*	*#2*	*#3*	*#4*	*NOTES*
Fluid	-	-	GAS	GAS			
Flow Rate	Q/W	Nm^3/h	40.00	40.00			
Inlet Temperature	T1	°C	15.00	15.00			
Inlet Pressure	P1	bar (g)	7.000	7.000			
Outlet Pressure	P2		0.000	3.000			
Differential Pressure	ΔP	-	7.000	4.000			
Fluid density at P1 and T1	ρ1	kg/m^3	9.460	9.460			
Dynamic Viscosity	μ	cP					
Molecular Weight	MW	kg/kmol	28.000	28.000			
Specific Heat Ratio (cp/cv)	γ	-	1.400	1.400			
Compressibility Factor	Z	-	0.990	0.990			
Critical Pressure	Pcrit	bar (A)					
Vapor pressure	Pvap	bar (A)					
Calculated Flow Coefficient	**C**	**-**	**0.3678**	**0.3846**			
Selected Flow Coefficient	**Cv**	-	0.85	0.85			
Calculated / Selected	C/Cv	%	43.27	45.25			
Pressure Recovery Factor	F_L	-	0.9357	0.9353			
Valve Style Modifier	F_d	-	0.2143	0.2211			
Pressure Differential Ratio Factor	X_T	-	0.7355	0.7349			
Stroke %		**%**	**74.2**	**75.6**			
Predicted Noise SPL	-	dB	77.27	<75			
Valve Outlet Velocity	v2	m/s	20.82	5.256			
Valve Outlet Mach Number	M2	-	0.06015	0.01519			
Downstream Pipe Fluid Velocity	vP2	m/s	20.82	5.256			
Flow Regime	-	-	Choked	Normal			
Upstream Fluid State	-	-	Gaseous	Gaseous			
Downstream Fluid State	-	-	Gaseous	Gaseous			

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CALCULATION FORM FOR CONTROL VALVES

Customer	ROSETTI MARINO SPA	*QUOTE*	CV2400221
Order	1724000740 123A90A	*Sheet*	6
Plant	Hollandse Kust Noord Wind Park Pr.	*Created By*	RC

PIPELINE DATA

	INLET	OUTLET
Nominal diameter	1"	1"
Schedule	40	40
External Diameter, mm	33.40	33.40
Internal Diameter, mm	26.6	26.6
Thickness, mm	3.4	3.4

VALVE DATA

Valve TAG	**25-FV-038**
Serial AST	**2400588**
AST Ref.	60
Upstream Fluid State	GAS

VALVE DATA: BODY

Valve Family	CV-8400
Valve Model	CV-8407
Valve Description	Globe - Straigth way - Contoured Plug
Unit	NPS
Body Size	1"
Fluid	NITROGEN

VALVE DATA: TRIM

Trim Configuration	CP-E
Stroke, mm	13
Port Size, Inch	1/4"
Flow Characteristic	Equal%
Flow Action	FTO
Selected Flow Coefficient	0.85

PROCESS DATA

		Units	*#1*	*#2*	*#3*	*#4*	*NOTES*
Fluid	-	-	GAS	GAS			
Flow Rate	Q/W	Nm^3/h	40.00	40.00			
Inlet Temperature	T1	°C	15.00	15.00			
Inlet Pressure	P1	bar (g)	7.000	7.000			
Outlet Pressure	P2		0.000	3.000			
Differential Pressure	ΔP	-	7.000	4.000			
Fluid density at P1 and T1	ρ1	kg/m^3	9.460	9.460			
Dynamic Viscosity	μ	cP					
Molecular Weight	MW	kg/kmol	28.000	28.000			
Specific Heat Ratio (cp/cv)	γ	-	1.400	1.400			
Compressibility Factor	Z	-	0.990	0.990			
Critical Pressure	Pcrit	bar (A)					
Vapor pressure	Pvap	bar (A)					
Calculated Flow Coefficient	**C**	**-**	**0.3678**	**0.3846**			
Selected Flow Coefficient	**Cv**	-	0.85	0.85			
Calculated / Selected	C/Cv	%	43.27	45.25			
Pressure Recovery Factor	F_L	-	0.9357	0.9353			
Valve Style Modifier	F_d	-	0.2143	0.2211			
Pressure Differential Ratio Factor	X_T	-	0.7355	0.7349			
Stroke %		**%**	**74.2**	**75.6**			
Predicted Noise SPL	-	dB	77.27	<75			
Valve Outlet Velocity	v2	m/s	20.82	5.256			
Valve Outlet Mach Number	M2	-	0.06015	0.01519			
Downstream Pipe Fluid Velocity	vP2	m/s	20.82	5.256			
Flow Regime	-	-	Choked	Normal			
Upstream Fluid State	-	-	Gaseous	Gaseous			
Downstream Fluid State	-	-	Gaseous	Gaseous			

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CALCULATION FORM FOR CONTROL VALVES

Customer	ROSETTI MARINO SPA	*QUOTE*	CV2400221
Order	1724000740 123A90A	*Sheet*	7
Plant	Hollandse Kust Noord Wind Park Pr.	*Created By*	RC

PIPELINE DATA

	INLET	OUTLET
Nominal diameter	3"	3"
Schedule	10S	10S
External Diameter, mm	88.90	88.90
Internal Diameter, mm	82.8	82.8
Thickness, mm	3.1	3.1

VALVE DATA

Valve TAG	**25-PV-035**
Serial AST	**2400589**
AST Ref.	70
Upstream Fluid State	GAS

VALVE DATA: BODY

Valve Family	CV-8400
Valve Model	CV-8407
Valve Description	Globe - Straigth way - Contoured Plug
Unit	NPS
Body Size	2"
Fluid	NITROGEN/HYDROGEN

VALVE DATA: TRIM

Trim Configuration	CP-E
Stroke, mm	25
Port Size, Inch	1"
Flow Characteristic	Equal%
Flow Action	FTO
Selected Flow Coefficient	13

PROCESS DATA

		Units	*#1*	*#2*	*#3*	*#4*	*NOTES*
Fluid	-	-	GAS	GAS	GAS	GAS	
Flow Rate	Q/W	Nm^3/h	40.00	40.00	500.00	500.00	
Inlet Temperature	T1	°C	15.00	15.00	15.00	15.00	
Inlet Pressure	P1	bar (g)	4.000	1.000	4.000	1.000	
Outlet Pressure	P2		3.300	0.300	3.300	0.300	
Differential Pressure	ΔP	-	0.700	0.700	0.700	0.700	
Fluid density at P1 and T1	ρ1	kg/m^3	5.859	2.353	0.418	0.168	
Dynamic Viscosity	μ	cP					
Molecular Weight	MW	kg/kmol	28.000	28.000	2.000	2.000	
Specific Heat Ratio (cp/cv)	γ	-	1.300	1.300	1.300	1.300	
Compressibility Factor	Z	-	1.000	1.000	1.000	1.000	
Critical Pressure	Pcrit	bar (A)					
Vapor pressure	Pvap	bar (A)					
Calculated Flow Coefficient	**C**	**-**	**0.9689**	**1.719**	**3.241**	**5.772**	
Selected Flow Coefficient	**Cv**	-	13	13	13	13	
Calculated / Selected	C/Cv	%	7.453	13.22	24.93	44.4	
Pressure Recovery Factor	F_L	-	0.9339	0.9318	0.9275	0.9204	
Valve Style Modifier	F_d	-	0.08551	0.1113	0.1638	0.251	
Pressure Differential Ratio Factor	X_T	-	0.7327	0.7294	0.7228	0.7118	
Stroke %		**%**	**38.8**	**52.1**	**66.9**	**80.8**	
Predicted Noise SPL	-	dB	<75	<75	<75	83.01	
Valve Outlet Velocity	v2	m/s	1.169	3.84	14.61	48	
Valve Outlet Mach Number	M2	-	0.003506	0.01151	0.01171	0.03846	
Downstream Pipe Fluid Velocity	vP2	m/s	0.5114	1.68	6.392	20.99	
Flow Regime	-	-	Normal	Normal	Normal	Normal	
Upstream Fluid State	-	-	Gaseous	Gaseous	Gaseous	Gaseous	
Downstream Fluid State	-	-	Gaseous	Gaseous	Gaseous	Gaseous	

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CALCULATION FORM FOR CONTROL VALVES

Customer	ROSETTI MARINO SPA	*QUOTE*	CV2400221
Order	1724000740 123A90A	*Sheet*	8
Plant	Hollandse Kust Noord Wind Park Pr.	*Created By*	RC

PIPELINE DATA

	INLET	OUTLET
Nominal diameter	3"	3"
Schedule	10S	10S
External Diameter, mm	88.90	88.90
Internal Diameter, mm	82.8	82.8
Thickness, mm	3.1	3.1

VALVE DATA

Valve TAG	**25-PV-037**
Serial AST	**2400590**
AST Ref.	80
Upstream Fluid State	GAS

VALVE DATA: BODY

Valve Family	CV-8400
Valve Model	CV-8407
Valve Description	Globe - Straigth way - Contoured Plug
Unit	NPS
Body Size	2"
Fluid	NITROGEN/HYDROGEN

VALVE DATA: TRIM

Trim Configuration	CP-E
Stroke, mm	25
Port Size, Inch	1"
Flow Characteristic	Equal%
Flow Action	FTO
Selected Flow Coefficient	13

PROCESS DATA

		Units	*#1*	*#2*	*#3*	*#4*	*NOTES*
Fluid	-	-	GAS	GAS	GAS	GAS	
Flow Rate	Q/W	Nm^3/h	40.00	40.00	500.00	500.00	
Inlet Temperature	T1	°C	15.00	15.00	15.00	15.00	
Inlet Pressure	P1	bar (g)	4.000	1.000	4.000	1.000	
Outlet Pressure	P2		3.300	0.300	3.300	0.300	
Differential Pressure	ΔP	-	0.700	0.700	0.700	0.700	
Fluid density at P1 and T1	ρ1	kg/m^3	5.859	2.353	0.418	0.168	
Dynamic Viscosity	μ	cP					
Molecular Weight	MW	kg/kmol	28.000	28.000	2.000	2.000	
Specific Heat Ratio (cp/cv)	γ	-	1.300	1.300	1.300	1.300	
Compressibility Factor	Z	-	1.000	1.000	1.000	1.000	
Critical Pressure	Pcrit	bar (A)					
Vapor pressure	Pvap	bar (A)					
Calculated Flow Coefficient	**C**	**-**	**0.9689**	**1.719**	**3.241**	**5.772**	
Selected Flow Coefficient	**Cv**	-	13	13	13	13	
Calculated / Selected	C/Cv	%	7.453	13.22	24.93	44.4	
Pressure Recovery Factor	F_L	-	0.9339	0.9318	0.9275	0.9204	
Valve Style Modifier	F_d	-	0.08551	0.1113	0.1638	0.251	
Pressure Differential Ratio Factor	X_T	-	0.7327	0.7294	0.7228	0.7118	
Stroke %		**%**	**38.8**	**52.1**	**66.9**	**80.8**	
Predicted Noise SPL	-	dB	<75	<75	<75	83.01	
Valve Outlet Velocity	v2	m/s	1.169	3.84	14.61	48	
Valve Outlet Mach Number	M2	-	0.003506	0.01151	0.01171	0.03846	
Downstream Pipe Fluid Velocity	vP2	m/s	0.5114	1.68	6.392	20.99	
Flow Regime	-	-	Normal	Normal	Normal	Normal	
Upstream Fluid State	-	-	Gaseous	Gaseous	Gaseous	Gaseous	
Downstream Fluid State	-	-	Gaseous	Gaseous	Gaseous	Gaseous	

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CALCULATION FORM FOR CONTROL VALVES

Customer	ROSETTI MARINO SPA	*QUOTE*	CV2400221
Order	1724000740 123A90A	*Sheet*	9
Plant	Hollandse Kust Noord Wind Park Pr.	*Created By*	RC

PIPELINE DATA

	INLET	OUTLET
Nominal diameter	3"	3"
Schedule	10S	10S
External Diameter, mm	88.90	88.90
Internal Diameter, mm	82.8	82.8
Thickness, mm	3.1	3.1

VALVE DATA

Valve TAG	**25-PV-040**
Serial AST	**2400591**
AST Ref.	90
Upstream Fluid State	GAS

VALVE DATA: BODY

Valve Family	CV-8400
Valve Model	CV-8407
Valve Description	Globe - Straigth way - Contoured Plug
Unit	NPS
Body Size	2"
Fluid	NITROGEN/HYDROGEN

VALVE DATA: TRIM

Trim Configuration	CP-E
Stroke, mm	25
Port Size, Inch	1"
Flow Characteristic	Equal%
Flow Action	FTO
Selected Flow Coefficient	13

PROCESS DATA

		Units	*#1*	*#2*	*#3*	*#4*	*NOTES*
Fluid	-	-	GAS	GAS	GAS	GAS	
Flow Rate	Q/W	Nm^3/h	40.00	40.00	500.00	500.00	
Inlet Temperature	T1	°C	15.00	15.00	15.00	15.00	
Inlet Pressure	P1	bar (g)	4.000	1.000	4.000	1.000	
Outlet Pressure	P2		3.300	0.300	3.300	0.300	
Differential Pressure	ΔP	-	0.700	0.700	0.700	0.700	
Fluid density at P1 and T1	ρ1	kg/m^3	5.859	2.353	0.418	0.168	
Dynamic Viscosity	μ	cP					
Molecular Weight	MW	kg/kmol	28.000	28.000	2.000	2.000	
Specific Heat Ratio (cp/cv)	γ	-	1.300	1.300	1.300	1.300	
Compressibility Factor	Z	-	1.000	1.000	1.000	1.000	
Critical Pressure	Pcrit	bar (A)					
Vapor pressure	Pvap	bar (A)					
Calculated Flow Coefficient	**C**	**-**	**0.9689**	**1.719**	**3.241**	**5.772**	
Selected Flow Coefficient	**Cv**	-	13	13	13	13	
Calculated / Selected	C/Cv	%	7.453	13.22	24.93	44.4	
Pressure Recovery Factor	F_L	-	0.9339	0.9318	0.9275	0.9204	
Valve Style Modifier	F_d	-	0.08551	0.1113	0.1638	0.251	
Pressure Differential Ratio Factor	X_T	-	0.7327	0.7294	0.7228	0.7118	
Stroke %		**%**	**38.8**	**52.1**	**66.9**	**80.8**	
Predicted Noise SPL	-	dB	<75	<75	<75	83.01	
Valve Outlet Velocity	v2	m/s	1.169	3.84	14.61	48	
Valve Outlet Mach Number	M2	-	0.003506	0.01151	0.01171	0.03846	
Downstream Pipe Fluid Velocity	vP2	m/s	0.5114	1.68	6.392	20.99	
Flow Regime	-	-	Normal	Normal	Normal	Normal	
Upstream Fluid State	-	-	Gaseous	Gaseous	Gaseous	Gaseous	
Downstream Fluid State	-	-	Gaseous	Gaseous	Gaseous	Gaseous	

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CALCULATION FORM FOR CONTROL VALVES

Customer	ROSETTI MARINO SPA	*QUOTE*	CV2400221
Order	1724000740 123A90A	*Sheet*	10
Plant	Hollandse Kust Noord Wind Park Pr.	*Created By*	RC

PIPELINE DATA

	INLET	OUTLET
Nominal diameter	3"	3"
Schedule	10S	10S
External Diameter, mm	88.90	88.90
Internal Diameter, mm	82.8	82.8
Thickness, mm	3.1	3.1

VALVE DATA

Valve TAG	**25-PV-043**
Serial AST	**2400592**
AST Ref.	100
Upstream Fluid State	GAS

VALVE DATA: BODY

Valve Family	CV-8400
Valve Model	CV-8407
Valve Description	Globe - Straigth way - Contoured Plug
Unit	NPS
Body Size	2"
Fluid	NITROGEN/HYDROGEN

VALVE DATA: TRIM

Trim Configuration	CP-E
Stroke, mm	25
Port Size, Inch	1"
Flow Characteristic	Equal%
Flow Action	FTO
Selected Flow Coefficient	13

PROCESS DATA

		Units	*#1*	*#2*	*#3*	*#4*	*NOTES*
Fluid	-	-	GAS	GAS	GAS	GAS	
Flow Rate	Q/W	Nm^3/h	40.00	40.00	500.00	500.00	
Inlet Temperature	T1	°C	15.00	15.00	15.00	15.00	
Inlet Pressure	P1	bar (g)	4.000	1.000	4.000	1.000	
Outlet Pressure	P2		3.300	0.300	3.300	0.300	
Differential Pressure	ΔP	-	0.700	0.700	0.700	0.700	
Fluid density at P1 and T1	ρ1	kg/m^3	5.859	2.353	0.418	0.168	
Dynamic Viscosity	μ	cP					
Molecular Weight	MW	kg/kmol	28.000	28.000	2.000	2.000	
Specific Heat Ratio (cp/cv)	γ	-	1.300	1.300	1.300	1.300	
Compressibility Factor	Z	-	1.000	1.000	1.000	1.000	
Critical Pressure	Pcrit	bar (A)					
Vapor pressure	Pvap	bar (A)					
Calculated Flow Coefficient	**C**	**-**	**0.9689**	**1.719**	**3.241**	**5.772**	
Selected Flow Coefficient	**Cv**	-	13	13	13	13	
Calculated / Selected	C/Cv	%	7.453	13.22	24.93	44.4	
Pressure Recovery Factor	F_L	-	0.9339	0.9318	0.9275	0.9204	
Valve Style Modifier	F_d	-	0.08551	0.1113	0.1638	0.251	
Pressure Differential Ratio Factor	X_T	-	0.7327	0.7294	0.7228	0.7118	
Stroke %		**%**	**38.8**	**52.1**	**66.9**	**80.8**	
Predicted Noise SPL	-	dB	<75	<75	<75	83.01	
Valve Outlet Velocity	v2	m/s	1.169	3.84	14.61	48	
Valve Outlet Mach Number	M2	-	0.003506	0.01151	0.01171	0.03846	
Downstream Pipe Fluid Velocity	vP2	m/s	0.5114	1.68	6.392	20.99	
Flow Regime	-	-	Normal	Normal	Normal	Normal	
Upstream Fluid State	-	-	Gaseous	Gaseous	Gaseous	Gaseous	
Downstream Fluid State	-	-	Gaseous	Gaseous	Gaseous	Gaseous	

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CALCULATION FORM FOR CONTROL VALVES

Customer	ROSETTI MARINO SPA	*QUOTE*	CV2400221
Order	1724000740 123A90A	*Sheet*	11
Plant	Hollandse Kust Noord Wind Park Pr.	*Created By*	RC

PIPELINE DATA

	INLET	OUTLET
Nominal diameter	3"	3"
Schedule	10S	10S
External Diameter, mm	88.90	88.90
Internal Diameter, mm	82.8	82.8
Thickness, mm	3.1	3.1

VALVE DATA

Valve TAG	**25-PV-046**
Serial AST	**2400593**
AST Ref.	110
Upstream Fluid State	GAS

VALVE DATA: BODY

Valve Family	CV-8400
Valve Model	CV-8407
Valve Description	Globe - Straigth way - Contoured Plug
Unit	NPS
Body Size	2"
Fluid	NITROGEN/HYDROGEN

VALVE DATA: TRIM

Trim Configuration	CP-E
Stroke, mm	25
Port Size, Inch	1"
Flow Characteristic	Equal%
Flow Action	FTO
Selected Flow Coefficient	13

PROCESS DATA

		Units	*#1*	*#2*	*#3*	*#4*	*NOTES*
Fluid	-	-	GAS	GAS	GAS	GAS	
Flow Rate	Q/W	Nm^3/h	40.00	40.00	500.00	500.00	
Inlet Temperature	T1	°C	15.00	15.00	15.00	15.00	
Inlet Pressure	P1	bar (g)	4.000	1.000	4.000	1.000	
Outlet Pressure	P2		3.300	0.300	3.300	0.300	
Differential Pressure	ΔP	-	0.700	0.700	0.700	0.700	
Fluid density at P1 and T1	ρ1	kg/m^3	5.859	2.353	0.418	0.168	
Dynamic Viscosity	μ	cP					
Molecular Weight	MW	kg/kmol	28.000	28.000	2.000	2.000	
Specific Heat Ratio (cp/cv)	γ	-	1.300	1.300	1.300	1.300	
Compressibility Factor	Z	-	1.000	1.000	1.000	1.000	
Critical Pressure	Pcrit	bar (A)					
Vapor pressure	Pvap	bar (A)					
Calculated Flow Coefficient	**C**	**-**	**0.9689**	**1.719**	**3.241**	**5.772**	
Selected Flow Coefficient	**Cv**	-	13	13	13	13	
Calculated / Selected	C/Cv	%	7.453	13.22	24.93	44.4	
Pressure Recovery Factor	F_L	-	0.9339	0.9318	0.9275	0.9204	
Valve Style Modifier	F_d	-	0.08551	0.1113	0.1638	0.251	
Pressure Differential Ratio Factor	X_T	-	0.7327	0.7294	0.7228	0.7118	
Stroke %		**%**	**38.8**	**52.1**	**66.9**	**80.8**	
Predicted Noise SPL	-	dB	<75	<75	<75	83.01	
Valve Outlet Velocity	v2	m/s	1.169	3.84	14.61	48	
Valve Outlet Mach Number	M2	-	0.003506	0.01151	0.01171	0.03846	
Downstream Pipe Fluid Velocity	vP2	m/s	0.5114	1.68	6.392	20.99	
Flow Regime	-	-	Normal	Normal	Normal	Normal	
Upstream Fluid State	-	-	Gaseous	Gaseous	Gaseous	Gaseous	
Downstream Fluid State	-	-	Gaseous	Gaseous	Gaseous	Gaseous	

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CALCULATION FORM FOR CONTROL VALVES

Customer	ROSETTI MARINO SPA	*QUOTE*	CV2400221
Order	1724000740 123A90A	*Sheet*	12
Plant	Hollandse Kust Noord Wind Park Pr.	*Created By*	RC

PIPELINE DATA

	INLET	OUTLET
Nominal diameter	3"	3"
Schedule	10S	10S
External Diameter, mm	88.90	88.90
Internal Diameter, mm	82.8	82.8
Thickness, mm	3.1	3.1

VALVE DATA

Valve TAG	**25-PV-049**
Serial AST	**2400594**
AST Ref.	120
Upstream Fluid State	GAS

VALVE DATA: BODY

Valve Family	CV-8400
Valve Model	CV-8407
Valve Description	Globe - Straigth way - Contoured Plug
Unit	NPS
Body Size	2"
Fluid	NITROGEN/HYDROGEN

VALVE DATA: TRIM

Trim Configuration	CP-E
Stroke, mm	25
Port Size, Inch	1"
Flow Characteristic	Equal%
Flow Action	FTO
Selected Flow Coefficient	13

PROCESS DATA

		Units	*#1*	*#2*	*#3*	*#4*	*NOTES*
Fluid	-	-	GAS	GAS	GAS	GAS	
Flow Rate	Q/W	Nm^3/h	40.00	40.00	500.00	500.00	
Inlet Temperature	T1	°C	15.00	15.00	15.00	15.00	
Inlet Pressure	P1	bar (g)	4.000	1.000	4.000	1.000	
Outlet Pressure	P2		3.300	0.300	3.300	0.300	
Differential Pressure	ΔP	-	0.700	0.700	0.700	0.700	
Fluid density at P1 and T1	ρ1	kg/m^3	5.859	2.353	0.418	0.168	
Dynamic Viscosity	μ	cP					
Molecular Weight	MW	kg/kmol	28.000	28.000	2.000	2.000	
Specific Heat Ratio (cp/cv)	γ	-	1.300	1.300	1.300	1.300	
Compressibility Factor	Z	-	1.000	1.000	1.000	1.000	
Critical Pressure	Pcrit	bar (A)					
Vapor pressure	Pvap	bar (A)					
Calculated Flow Coefficient	**C**	**-**	**0.9689**	**1.719**	**3.241**	**5.772**	
Selected Flow Coefficient	**Cv**	-	13	13	13	13	
Calculated / Selected	C/Cv	%	7.453	13.22	24.93	44.4	
Pressure Recovery Factor	F_L	-	0.9339	0.9318	0.9275	0.9204	
Valve Style Modifier	F_d	-	0.08551	0.1113	0.1638	0.251	
Pressure Differential Ratio Factor	X_T	-	0.7327	0.7294	0.7228	0.7118	
Stroke %		**%**	**38.8**	**52.1**	**66.9**	**80.8**	
Predicted Noise SPL	-	dB	<75	<75	<75	83.01	
Valve Outlet Velocity	v2	m/s	1.169	3.84	14.61	48	
Valve Outlet Mach Number	M2	-	0.003506	0.01151	0.01171	0.03846	
Downstream Pipe Fluid Velocity	vP2	m/s	0.5114	1.68	6.392	20.99	
Flow Regime	-	-	Normal	Normal	Normal	Normal	
Upstream Fluid State	-	-	Gaseous	Gaseous	Gaseous	Gaseous	
Downstream Fluid State	-	-	Gaseous	Gaseous	Gaseous	Gaseous	

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CALCULATION FORM FOR CONTROL VALVES

Customer	ROSETTI MARINO SPA	*QUOTE*	CV2400221
Order	1724000740 123A90A	*Sheet*	13
Plant	Hollandse Kust Noord Wind Park Pr.	*Created By*	RC

PIPELINE DATA

	INLET	OUTLET
Nominal diameter	1 1/2"	1 1/2"
Schedule	40	40
External Diameter, mm	48.30	48.30
Internal Diameter, mm	40.9	40.9
Thickness, mm	3.7	3.7

VALVE DATA

Valve TAG	**25-PV-055A**
Serial AST	**2400595**
AST Ref.	130
Upstream Fluid State	GAS

VALVE DATA: BODY

Valve Family	CV-8400
Valve Model	CV-8407
Valve Description	Globe - Straigth way - Contoured Plug
Unit	NPS
Body Size	1 1/2"
Fluid	HYDROGEN

VALVE DATA: TRIM

Trim Configuration	CP-E
Stroke, mm	20
Port Size, Inch	1"
Flow Characteristic	Equal%
Flow Action	FTO
Selected Flow Coefficient	13

PROCESS DATA

		Units	*#1*	*#2*	*#3*	*#4*	*NOTES*
Fluid	-	-	GAS	GAS			
Flow Rate	Q/W	kg/h	106.00	106.00			
Inlet Temperature	T1	°C	15.00	15.00			
Inlet Pressure	P1	bar (g)	30.000	4.500			
Outlet Pressure	P2		3.500	3.500			
Differential Pressure	ΔP	-	26.500	1.000			
Fluid density at P1 and T1	ρ1	kg/m³	2.563	0.456			
Dynamic Viscosity	μ	cP					
Molecular Weight	MW	kg/kmol	2.000	2.000			
Specific Heat Ratio (cp/cv)	γ	-	1.420	1.420			
Compressibility Factor	Z	-	1.010	1.010			
Critical Pressure	Pcrit	bar (A)					
Vapor pressure	Pvap	bar (A)					
Calculated Flow Coefficient	**C**	**-**	**0.7563**	**6.271**			
Selected Flow Coefficient	**Cv**	-	13	13			
Calculated / Selected	C/Cv	%	5.817	48.24			
Pressure Recovery Factor	F_L	-	0.9345	0.919			
Valve Style Modifier	F_d	-	0.07612	0.2445			
Pressure Differential Ratio Factor	X_T	-	0.7336	0.7097			
Stroke %		**%**	**32.7**	**82.4**			
Predicted Noise SPL	-	dB	84.95	76.25			
Valve Outlet Velocity	v2	m/s	59.96	59.96			
Valve Outlet Mach Number	M2	-	0.04597	0.04597			
Downstream Pipe Fluid Velocity	vP2	m/s	59.96	59.96			
Flow Regime	-	-	Choked	Normal			
Upstream Fluid State	-	-	Gaseous	Gaseous			
Downstream Fluid State	-	-	Gaseous	Gaseous			

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CALCULATION FORM FOR CONTROL VALVES

Customer	ROSETTI MARINO SPA	*QUOTE*	CV2400221
Order	1724000740 123A90A	*Sheet*	14
Plant	Hollandse Kust Noord Wind Park Pr.	*Created By*	RC

PIPELINE DATA

	INLET	OUTLET
Nominal diameter	1 1/2"	1 1/2"
Schedule	40	40
External Diameter, mm	48.30	48.30
Internal Diameter, mm	40.9	40.9
Thickness, mm	3.7	3.7

VALVE DATA

Valve TAG	**25-PV-055B**
Serial AST	**2400596**
AST Ref.	140
Upstream Fluid State	GAS

VALVE DATA: BODY

Valve Family	CV-8400
Valve Model	CV-8407
Valve Description	Globe - Straigth way - Contoured Plug
Unit	NPS
Body Size	1 1/2"
Fluid	HYDROGEN

VALVE DATA: TRIM

Trim Configuration	CP-E
Stroke, mm	13
Port Size, Inch	5/32"
Flow Characteristic	Equal%
Flow Action	FTO
Selected Flow Coefficient	0.45

PROCESS DATA

		Units	*#1*	*#2*	*#3*	*#4*	*NOTES*
Fluid	-	-	GAS	GAS			
Flow Rate	Q/W	kg/h	3.24	3.24			
Inlet Temperature	T1	°C	-8.40	25.00			
Inlet Pressure	P1	bar (g)	30.000	5.000			
Outlet Pressure	P2		4.000	4.000			
Differential Pressure	ΔP	-	26.000	1.000			
Fluid density at P1 and T1	ρ1	kg/m³	2.790	0.480			
Dynamic Viscosity	μ	cP					
Molecular Weight	MW	kg/kmol	2.000	2.000			
Specific Heat Ratio (cp/cv)	γ	-	1.420	1.420			
Compressibility Factor	Z	-	1.010	1.010			
Critical Pressure	Pcrit	bar (A)					
Vapor pressure	Pvap	bar (A)					
Calculated Flow Coefficient	**C**	**-**	**0.02151**	**0.1841**			
Selected Flow Coefficient	**Cv**	-	0.45	0.45			
Calculated / Selected	C/Cv	%	4.781	40.92			
Pressure Recovery Factor	F_L	-	0.9626	0.956			
Valve Style Modifier	F_d	-	0.08647	0.2092			
Pressure Differential Ratio Factor	X_T	-	0.7784	0.7677			
Stroke %		**%**	**18.4**	**75.6**			
Predicted Noise SPL	-	dB	<75	<75			
Valve Outlet Velocity	v2	m/s	1.516	1.707			
Valve Outlet Mach Number	M2	-	0.001213	0.001287			
Downstream Pipe Fluid Velocity	vP2	m/s	1.516	1.707			
Flow Regime	-	-	Choked	Normal			
Upstream Fluid State	-	-	Gaseous	Gaseous			
Downstream Fluid State	-	-	Gaseous	Gaseous			

NOTES

Rev Index.	1			RC / RC / RC
	Rev.	**Date**	**Reason For Issue**	**EM / CK / APP**

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CALCULATION FORM FOR CONTROL VALVES

Customer	ROSETTI MARINO SPA	*QUOTE*	CV2400221
Order	1724000740 123A90A	*Sheet*	15
Plant	Hollandse Kust Noord Wind Park Pr.	*Created By*	RC

PIPELINE DATA

	INLET	OUTLET
Nominal diameter	1"	1"
Schedule	80	80
External Diameter, mm	33.40	33.40
Internal Diameter, mm	24.3	24.3
Thickness, mm	4.6	4.6

VALVE DATA

Valve TAG	**64-PV-031A**
Serial AST	**2400597**
AST Ref.	150
Upstream Fluid State	GAS

VALVE DATA: BODY

Valve Family	CV-8400
Valve Model	CV-8407
Valve Description	Globe - Straigth way - Contoured Plug
Unit	NPS
Body Size	1"
Fluid	NITROGEN

VALVE DATA: TRIM

Trim Configuration	CP-E
Stroke, mm	13
Port Size, Inch	3/8"
Flow Characteristic	Equal%
Flow Action	FTO
Selected Flow Coefficient	1.9

PROCESS DATA

		Units	*#1*	*#2*	*#3*	*#4*	*NOTES*
Fluid	-	-	GAS	GAS	GAS		
Flow Rate	Q/W	Nm^3/h	60.00	10.00	7.00		
Inlet Temperature	T1	°C	15.00	15.00	15.00		
Inlet Pressure	P1	bar (g)	8.000	8.000	8.000		
Outlet Pressure	P2		7.500	7.000	7.000		
Differential Pressure	ΔP	-	0.500	1.000	1.000		
Fluid density at P1 and T1	ρ1	kg/m^3	10.640	10.640	10.640		
Dynamic Viscosity	μ	cP					
Molecular Weight	MW	kg/kmol	28.000	28.000	28.000		
Specific Heat Ratio (cp/cv)	γ	-	1.400	1.400	1.400		
Compressibility Factor	Z	-	0.990	0.990	0.990		
Critical Pressure	Pcrit	bar (A)					
Vapor pressure	Pvap	bar (A)					
Calculated Flow Coefficient	**C**	**-**	**1.22**	**0.1474**	**0.1032**		
Selected Flow Coefficient	**Cv**	-	1.9	1.9	1.9		
Calculated / Selected	C/Cv	%	64.23	7.757	5.429		
Pressure Recovery Factor	F_L	-	0.9232	0.944	0.9449		
Valve Style Modifier	F_d	-	0.289	0.09789	0.09001		
Pressure Differential Ratio Factor	X_T	-	0.7162	0.7487	0.75		
Stroke %		**%**	**88.4**	**33.9**	**24.7**		
Predicted Noise SPL	-	dB	<75	<75	<75		
Valve Outlet Velocity	v2	m/s	4.467	0.791	0.5537		
Valve Outlet Mach Number	M2	-	0.01291	0.002285	0.0016		
Downstream Pipe Fluid Velocity	vP2	m/s	4.467	0.791	0.5537		
Flow Regime	-	-	Normal	Normal	Normal		
Upstream Fluid State	-	-	Gaseous	Gaseous	Gaseous		
Downstream Fluid State	-	-	Gaseous	Gaseous	Gaseous		

NOTES

Rev Index.	0			RC / RC / RC
	Rev.	**Date**	**Reason For Issue**	**EM / CK / APP**

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CALCULATION FORM FOR CONTROL VALVES

Customer	ROSETTI MARINO SPA	*QUOTE*	CV2400221
Order	1724000740 123A90A	*Sheet*	16
Plant	Hollandse Kust Noord Wind Park Pr.	*Created By*	RC

PIPELINE DATA

	INLET	OUTLET
Nominal diameter	1"	1"
Schedule	80	80
External Diameter, mm	33.40	33.40
Internal Diameter, mm	24.3	24.3
Thickness, mm	4.6	4.6

VALVE DATA

Valve TAG	**64-PV-031B**
Serial AST	**2400598**
AST Ref.	160
Upstream Fluid State	GAS

VALVE DATA: BODY

Valve Family	CV-8400
Valve Model	CV-8407
Valve Description	Globe - Straigth way - Contoured Plug
Unit	NPS
Body Size	1"
Fluid	NITROGEN

VALVE DATA: TRIM

Trim Configuration	CP-E
Stroke, mm	13
Port Size, Inch	3/8"
Flow Characteristic	Equal%
Flow Action	FTO
Selected Flow Coefficient	1.9

PROCESS DATA

		Units	*#1*	*#2*	*#3*	*#4*	*NOTES*
Fluid	-	-	GAS	GAS	GAS		
Flow Rate	Q/W	Nm^3/h	60.00	10.00	7.00		
Inlet Temperature	T1	°C	15.00	15.00	15.00		
Inlet Pressure	P1	bar (g)	8.000	8.000	8.000		
Outlet Pressure	P2		7.500	7.000	7.000		
Differential Pressure	ΔP	-	0.500	1.000	1.000		
Fluid density at P1 and T1	ρ1	kg/m^3	10.640	10.640	10.640		
Dynamic Viscosity	μ	cP					
Molecular Weight	MW	kg/kmol	28.000	28.000	28.000		
Specific Heat Ratio (cp/cv)	γ	-	1.400	1.400	1.400		
Compressibility Factor	Z	-	0.990	0.990	0.990		
Critical Pressure	Pcrit	bar (A)					
Vapor pressure	Pvap	bar (A)					
Calculated Flow Coefficient	**C**	**-**	**1.22**	**0.1474**	**0.1032**		
Selected Flow Coefficient	**Cv**	-	1.9	1.9	1.9		
Calculated / Selected	C/Cv	%	64.23	7.757	5.429		
Pressure Recovery Factor	F_L	-	0.9232	0.944	0.9449		
Valve Style Modifier	F_d	-	0.289	0.09789	0.09001		
Pressure Differential Ratio Factor	X_T	-	0.7162	0.7487	0.75		
Stroke %		**%**	**88.4**	**33.9**	**24.7**		
Predicted Noise SPL	-	dB	<75	<75	<75		
Valve Outlet Velocity	v2	m/s	4.467	0.791	0.5537		
Valve Outlet Mach Number	M2	-	0.01291	0.002285	0.0016		
Downstream Pipe Fluid Velocity	vP2	m/s	4.467	0.791	0.5537		
Flow Regime	-	-	Normal	Normal	Normal		
Upstream Fluid State	-	-	Gaseous	Gaseous	Gaseous		
Downstream Fluid State	-	-	Gaseous	Gaseous	Gaseous		

NOTES

Rev Index.	0			RC / RC / RC
	Rev.	**Date**	**Reason For Issue**	**EM / CK / APP**

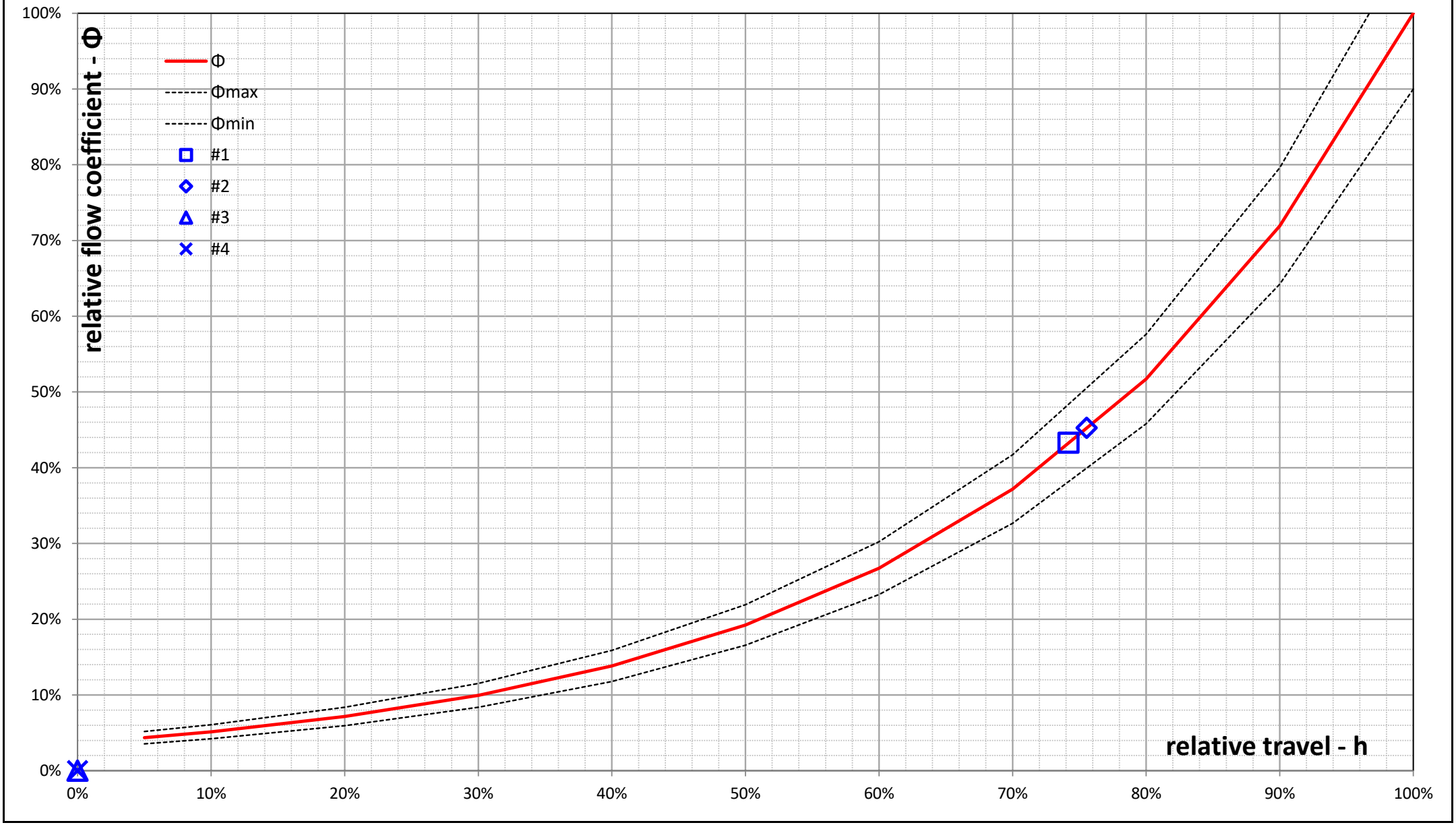
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Control Valve Division

CONTROL VALVE FLOW CHARACTERISTIC

Valve Model: CV-8407

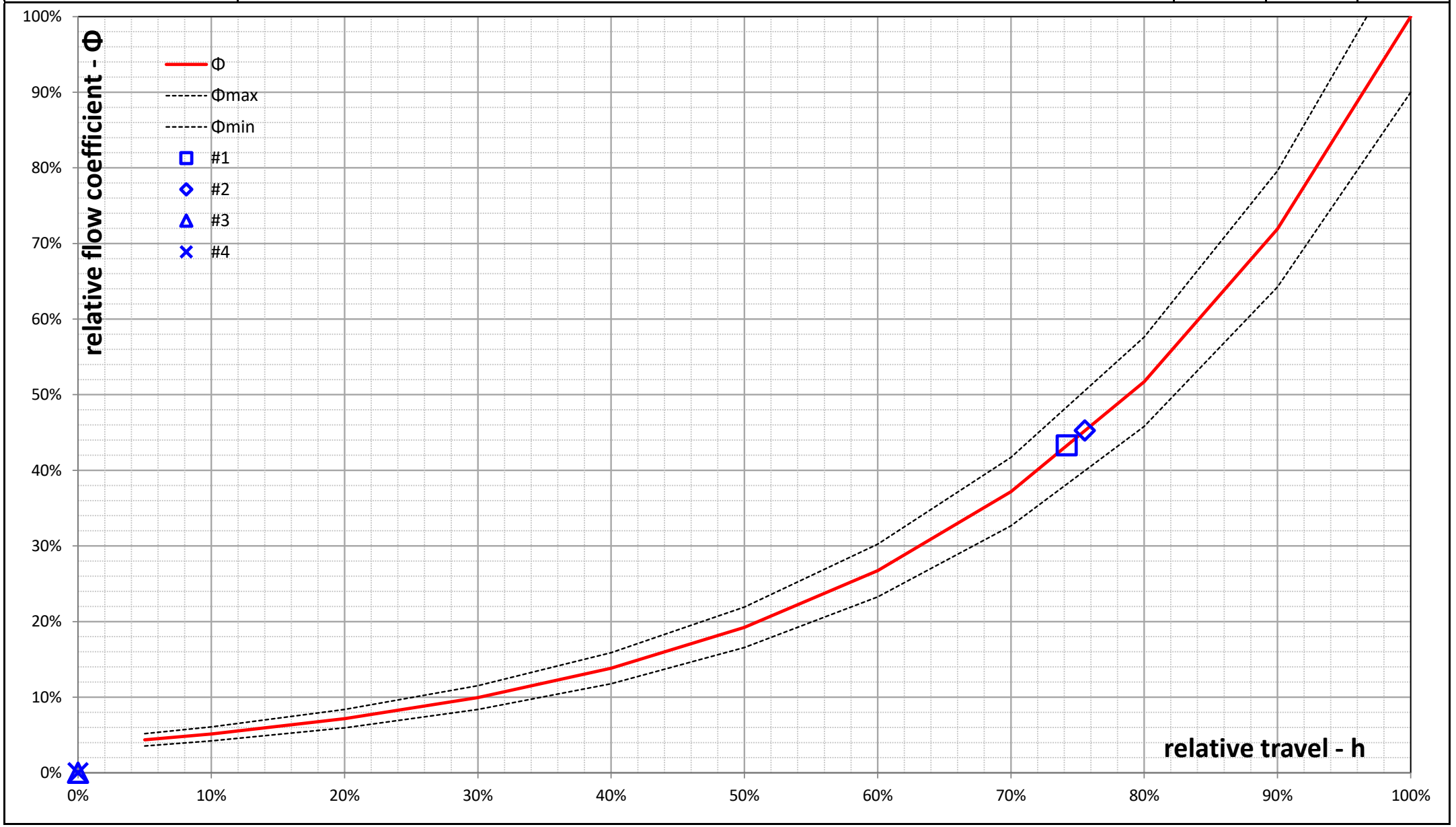
Customer :	ROSETTI MARINO SPA	**Offer :**	CV2400221	**Tag :**	25-FV-031	**DWG :**				**Rev. 1**
Plant :	Hollandse Kust Noord Wind Park Pr.	**S/N :**	2400583	**DN :**	1"	**Port:**	1/4"	Prep.	Check.	Appr.
Date :		**Service :**		**Nominal Travel :**	13 mm	**Rated Cv :**	0.8500	**Cv min :**	0.0371	



Control Valve Division

CONTROL VALVE FLOW CHARACTERISTIC

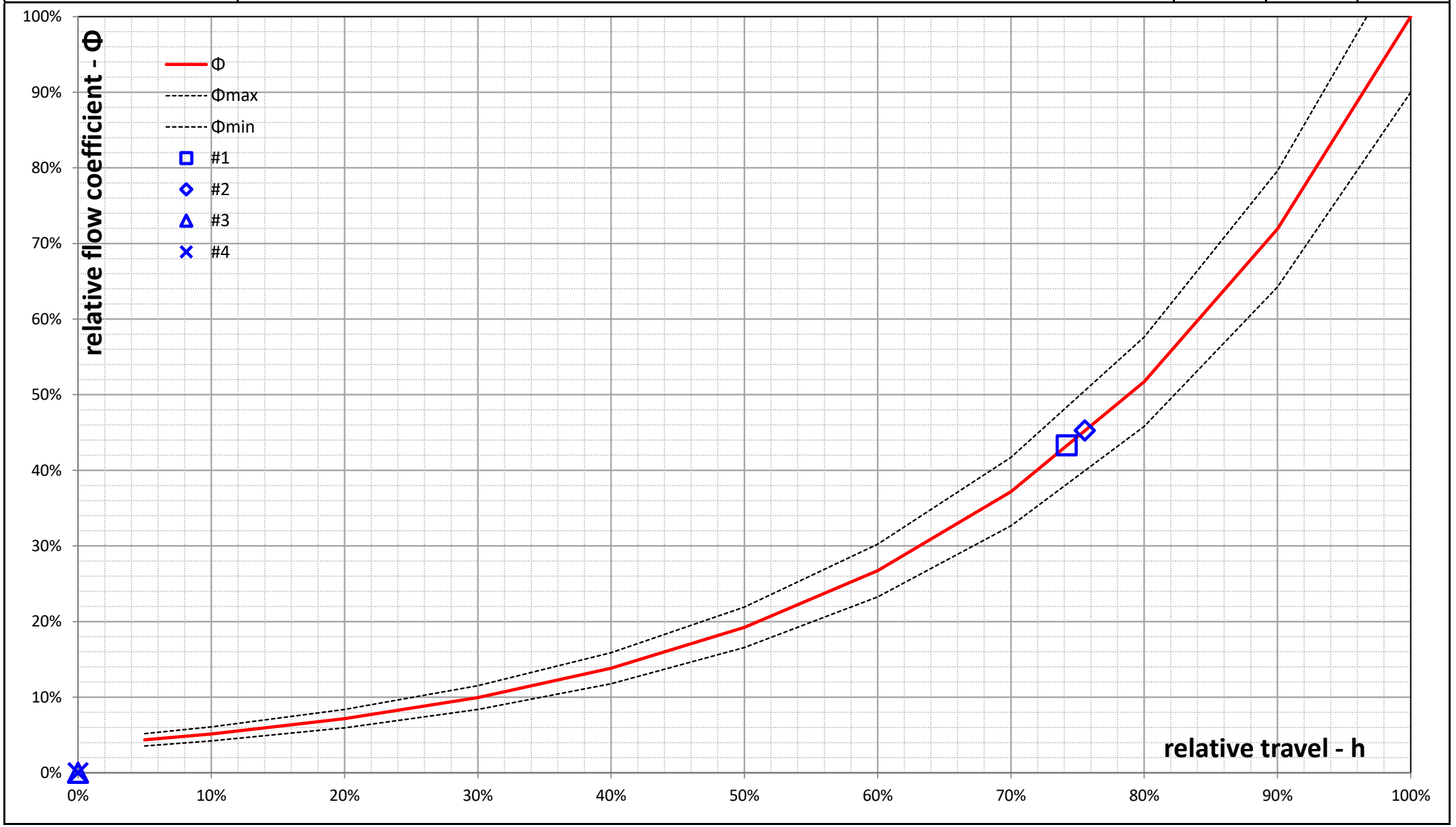
Valve Model:	**CV-8407**								
Customer :	ROSETTI MARINO SPA	*Offer :*	CV2400221	*Tag :*	25-FV-032	*DWG :*		*Rev. 1*	
Plant :	Hollandse Kust Noord Wind Park Pr.	*S/N :*	2400584	*DN :*	1"	*Port:*	1/4"	Prep.	Check.	Appr.
Date :		*Service :*		*Nominal Travel :*	13 mm	*Rated Cv :*	0.8500	*Cv min :*	0.0371			



Control Valve Division

CONTROL VALVE FLOW CHARACTERISTIC

Valve Model:	**CV-8407**								
Customer :	ROSETTI MARINO SPA	*Offer :*	CV2400221	*Tag :*	25-FV-033	*DWG :*		*Rev. 1*	
Plant :	Hollandse Kust Noord Wind Park Pr.	*S/N :*	2400585	*DN :*	1"	*Port:*	1/4"	Prep.	Check.	Appr.
Date :		*Service :*		*Nominal Travel :*	13 mm	*Rated Cv :*	0.8500	*Cv min :*	0.0371			

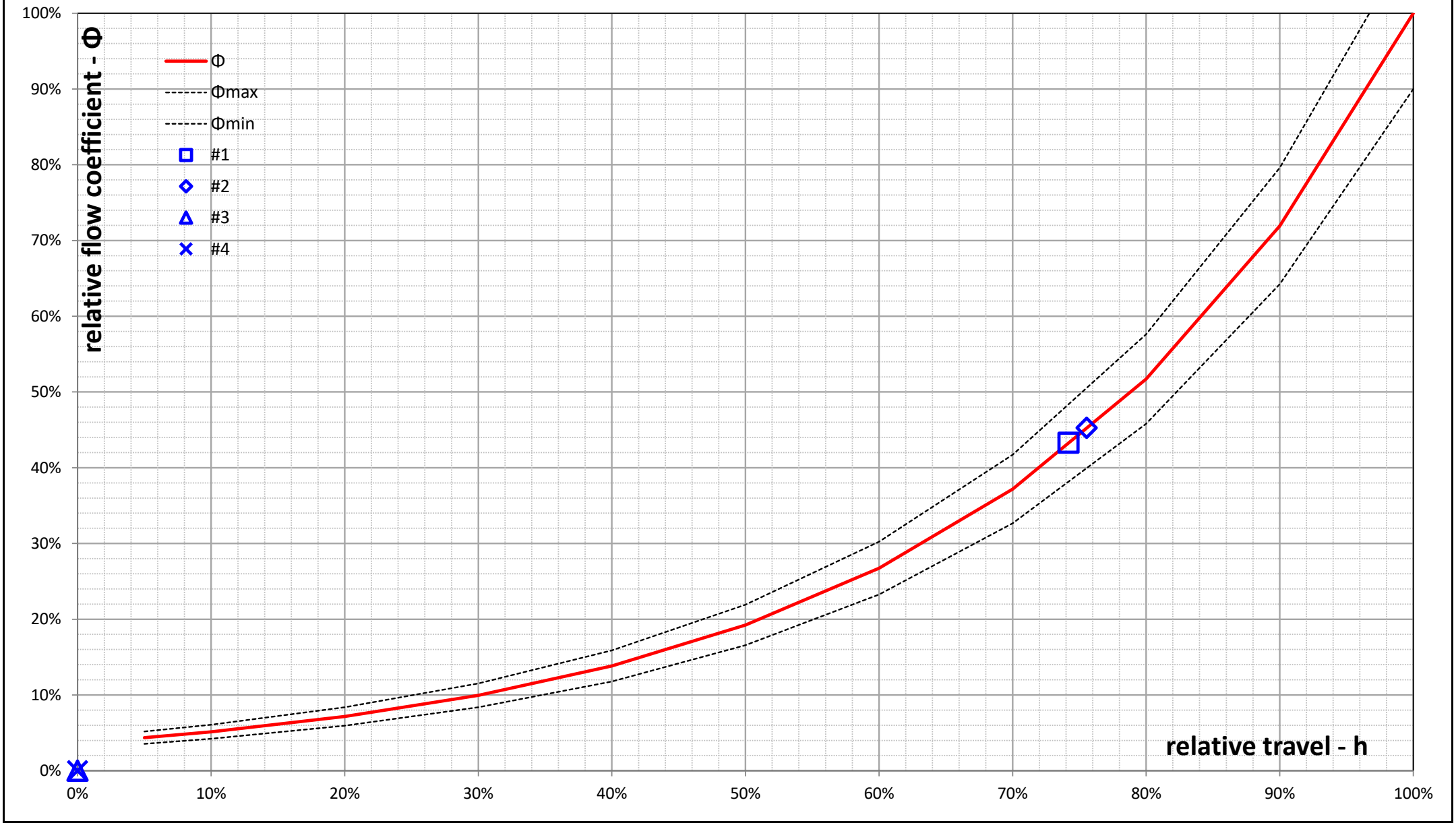


Control Valve Division

CONTROL VALVE FLOW CHARACTERISTIC

Valve Model: CV-8407

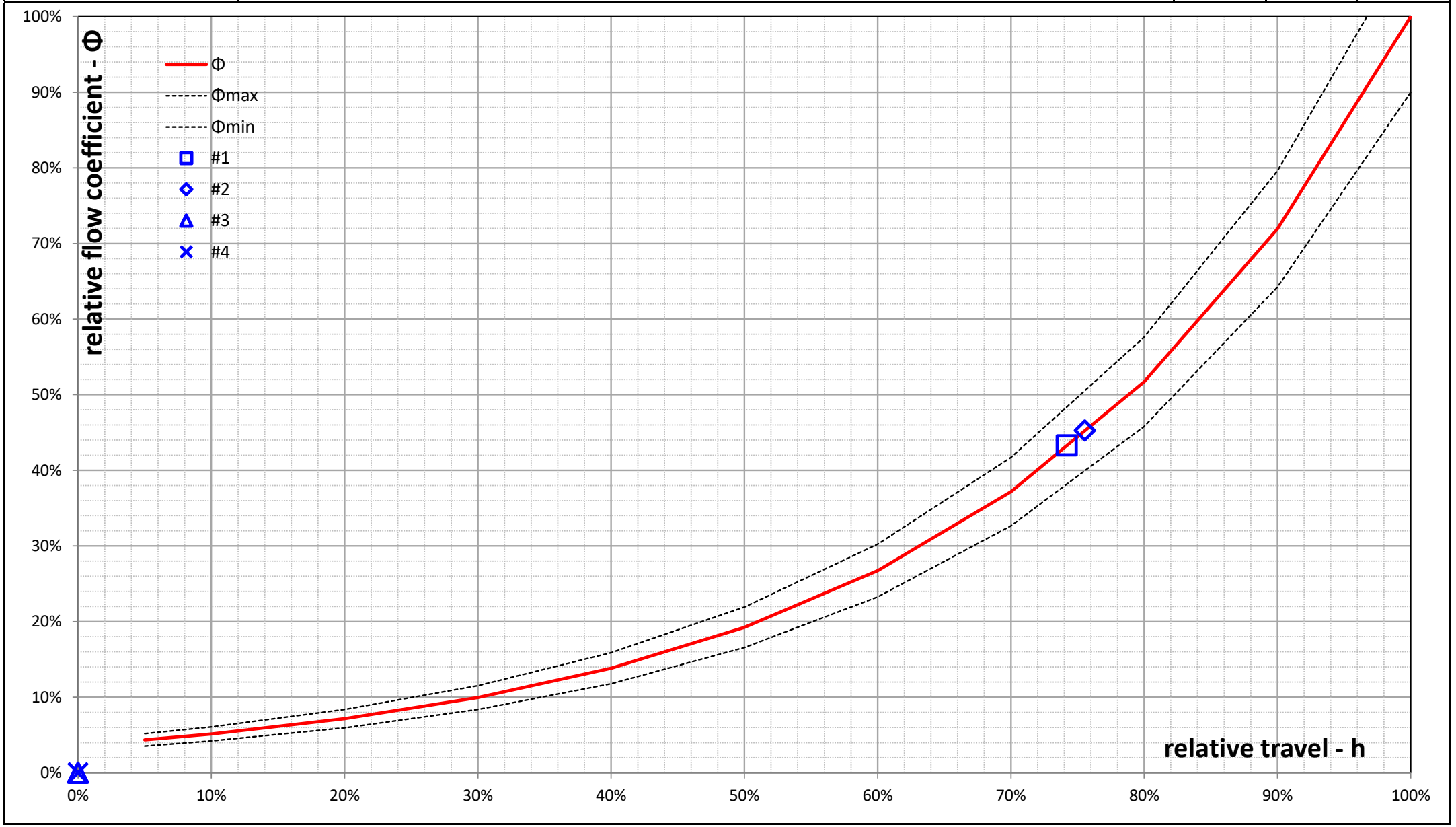
Customer :	ROSETTI MARINO SPA	**Offer :**	CV2400221	**Tag :**	25-FV-034	**DWG :**			**Rev. 1**	
Plant :	Hollandse Kust Noord Wind Park Pr.	**S/N :**	2400586	**DN :**	1"	**Port:**	1/4"	Prep.	Check.	Appr.
Date :		**Service :**		**Nominal Travel :**	13 mm	**Rated Cv :**	0.8500	**Cv min :**	0.0371	



Control Valve Division

CONTROL VALVE FLOW CHARACTERISTIC

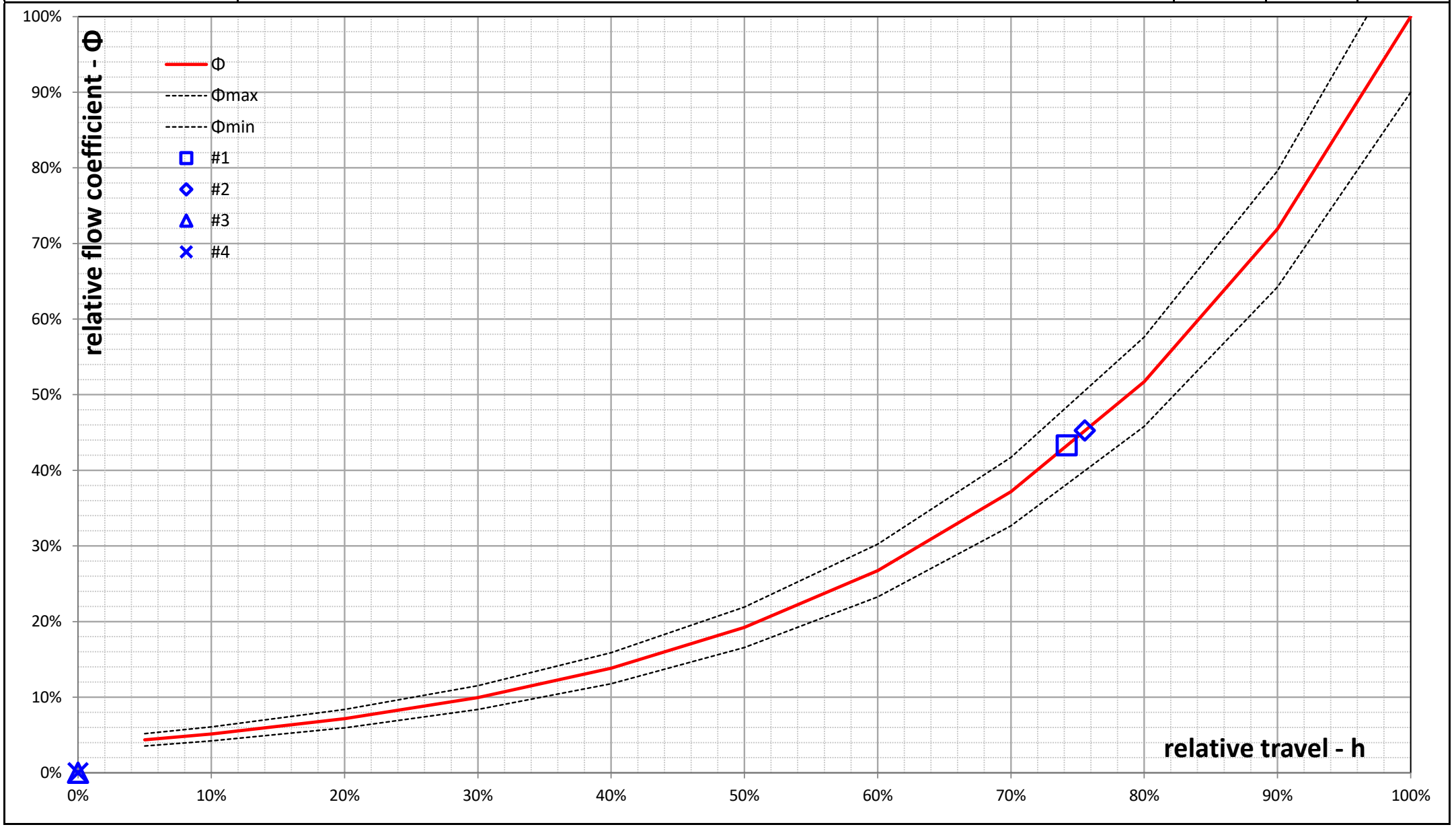
Valve Model:	**CV-8407**								
Customer :	ROSETTI MARINO SPA	*Offer :*	CV2400221	*Tag :*	25-FV-036	*DWG :*		*Rev. 1*	
Plant :	Hollandse Kust Noord Wind Park Pr.	*S/N :*	2400587	*DN :*	1"	*Port:*	1/4"	Prep.	Check.	Appr.
Service :		*Nominal Travel :*	13 mm	*Rated Cv :*	0.8500	*Cv min :*	0.0371			
Date :									



Control Valve Division

CONTROL VALVE FLOW CHARACTERISTIC

Valve Model:	**CV-8407**								
Customer :	ROSETTI MARINO SPA	*Offer :*	CV2400221	*Tag :*	25-FV-038	*DWG :*		*Rev. 1*	
Plant :	Hollandse Kust Noord Wind Park Pr.	*S/N :*	2400588	*DN :*	1"	*Port:*	1/4"	Prep.	Check.	Appr.
Service :		*Nominal Travel :*	13 mm	*Rated Cv :*	0.8500	*Cv min :*	0.0371			
Date :									

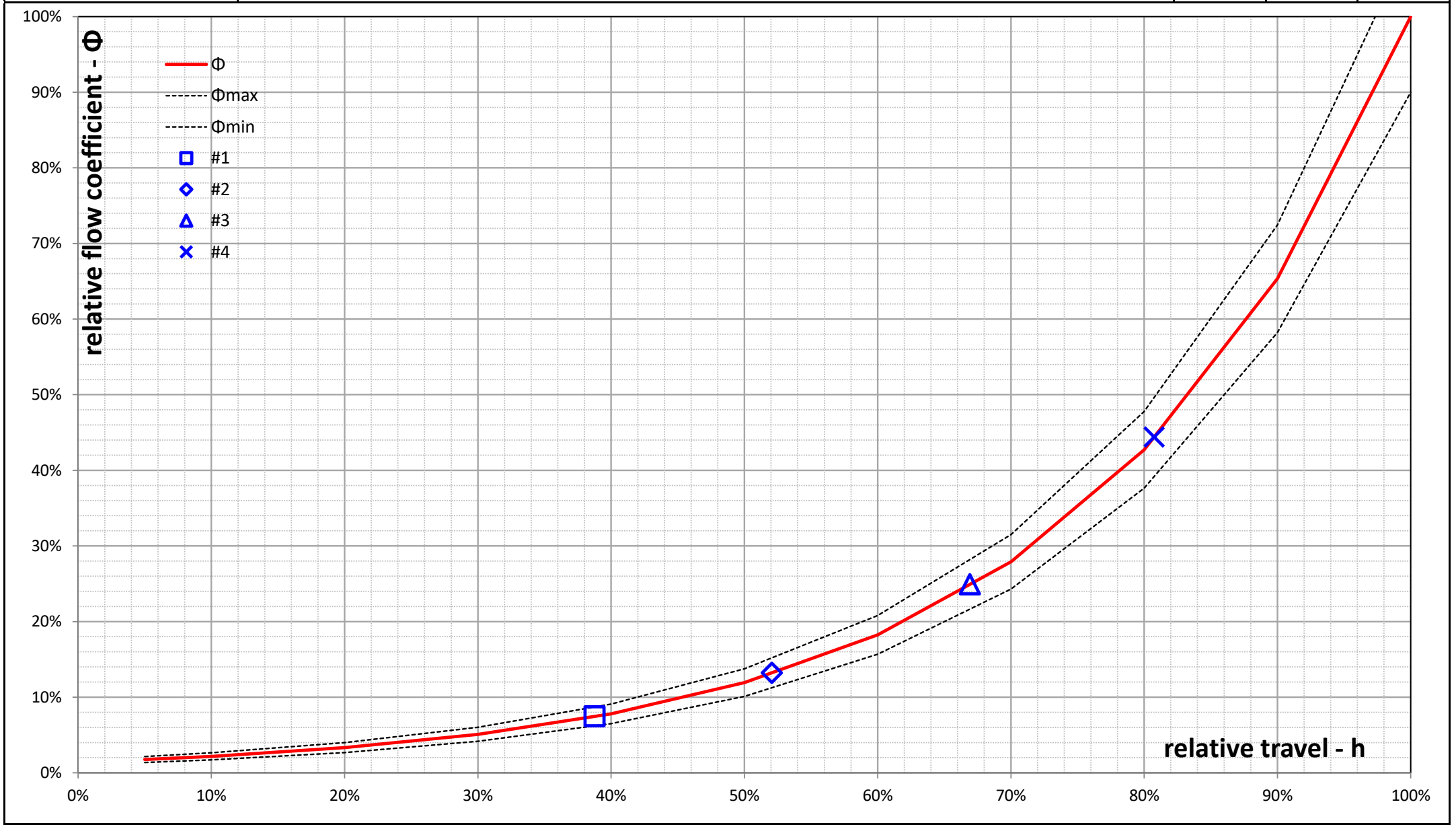


Control Valve Division

CONTROL VALVE FLOW CHARACTERISTIC

Valve Model: CV-8407

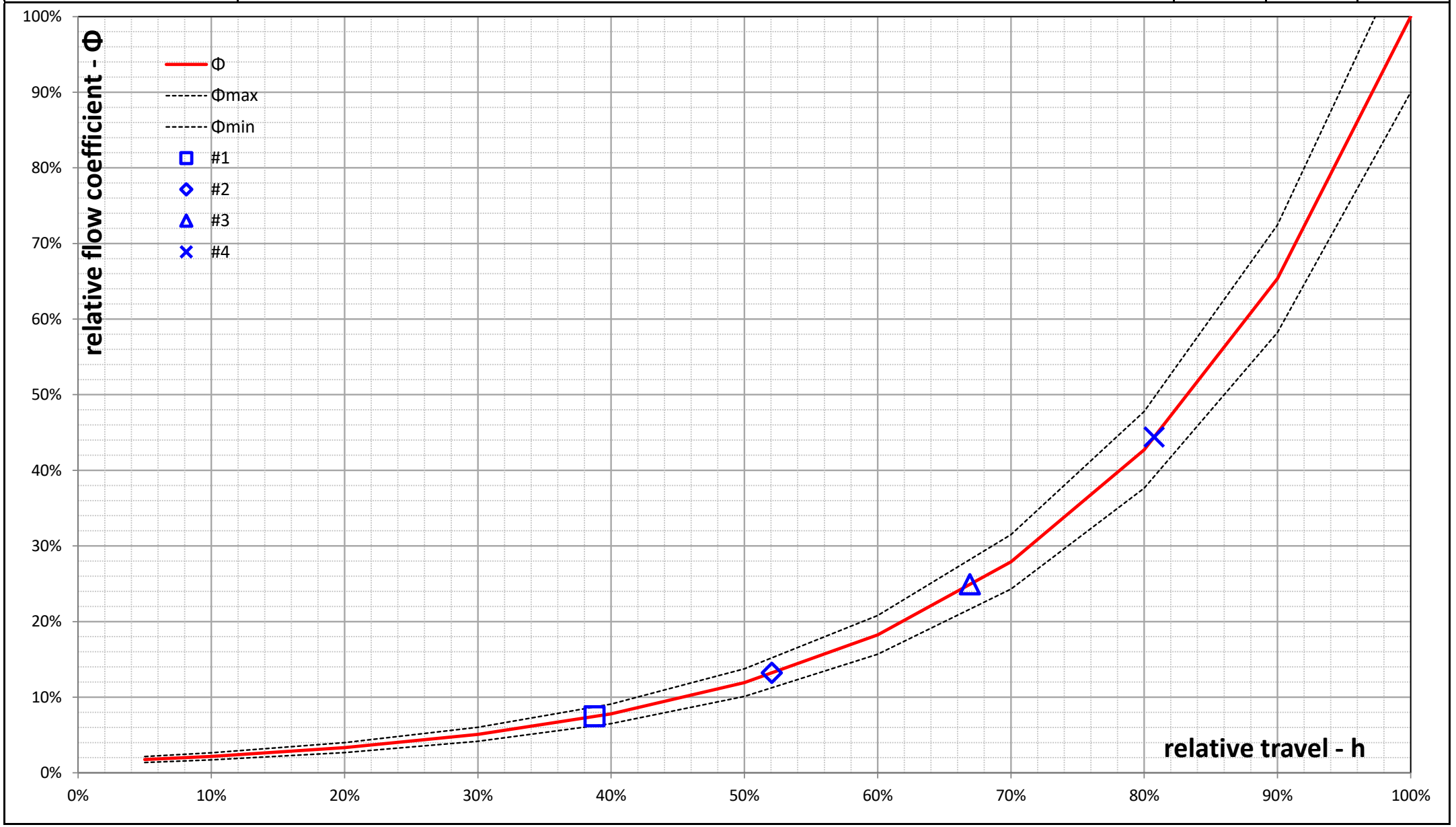
Customer :	ROSETTI MARINO SPA	**Offer :**	CV2400221	**Tag :**	25-PV-035	**DWG :**			**Rev. 1**	
Plant :	Hollandse Kust Noord Wind Park Pr.	**S/N :**	2400589	**DN :**	2"	**Port:**	1"	Prep.	Check.	Appr.
Service :		**Nominal Travel :**	25 mm	**Rated Cv :**	13.0000	**Cv min :**	0.2284			
Date :										



Control Valve Division

CONTROL VALVE FLOW CHARACTERISTIC

Valve Model:	**CV-8407**								
Customer :	ROSETTI MARINO SPA	*Offer :*	CV2400221	*Tag :*	25-PV-037	*DWG :*		*Rev. 1*	
Plant :	Hollandse Kust Noord Wind Park Pr.	*S/N :*	2400590	*DN :*	**2"**	*Port:*	**1"**	Prep.	Check.	Appr.
Service :		*Nominal Travel :*	**25 mm**	*Rated Cv :*	**13.0000**	*Cv min :*	**0.2284**			
Date :										

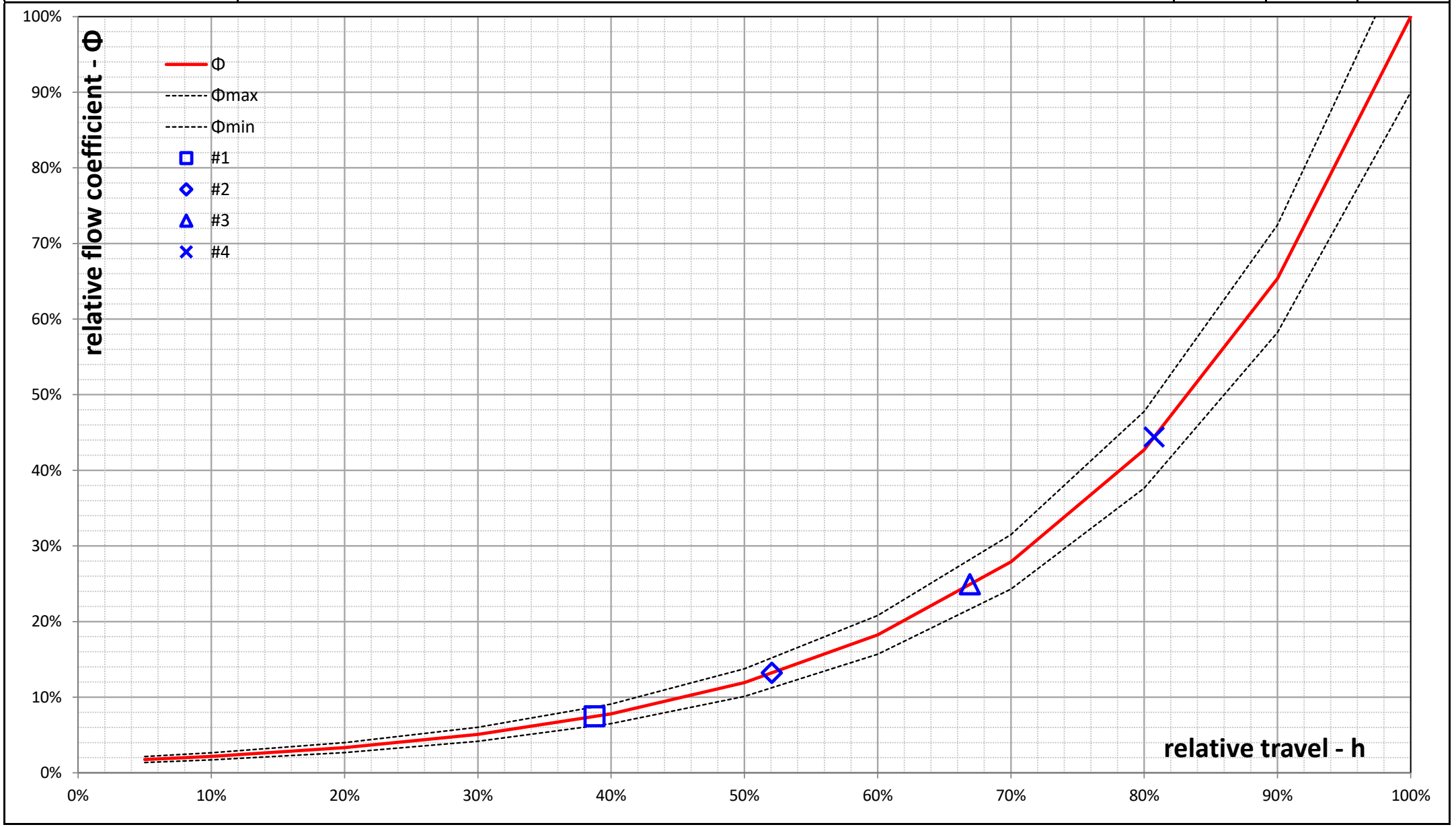


Control Valve Division

CONTROL VALVE FLOW CHARACTERISTIC

Valve Model: CV-8407

Customer :	ROSETTI MARINO SPA	**Offer :**	CV2400221	**Tag :**	25-PV-040	**DWG :**		**Rev. 1**	
Plant :	Hollandse Kust Noord Wind Park Pr.	**S/N :**	2400591	**DN :**	2"	**Port:**	1"	Prep.	Check.	Appr.
Date :		**Service :**		**Nominal Travel :**	25 mm	**Rated Cv :**	13.0000	**Cv min :**	0.2284			

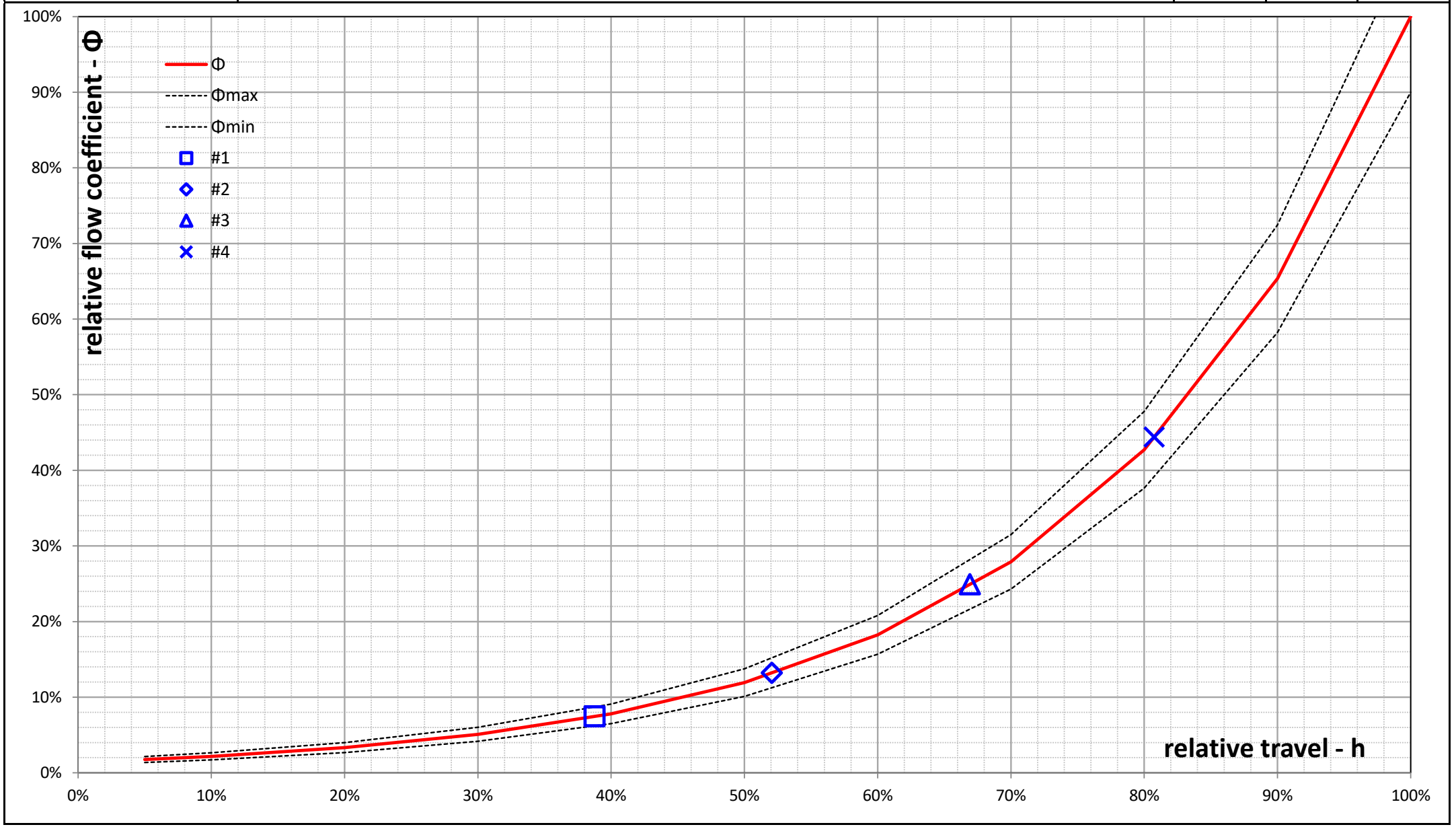


Control Valve Division

CONTROL VALVE FLOW CHARACTERISTIC

Valve Model: CV-8407

Customer :	ROSETTI MARINO SPA	**Offer :**	CV2400221	**Tag :**	25-PV-043	**DWG :**			**Rev. 1**	
Plant :	Hollandse Kust Noord Wind Park Pr.	**S/N :**	2400592	**DN :**	2"	**Port:**	1"	Prep.	Check.	Appr.
Service :		**Nominal Travel :**	25 mm	**Rated Cv :**	13.0000	**Cv min :**	0.2284			
Date :										

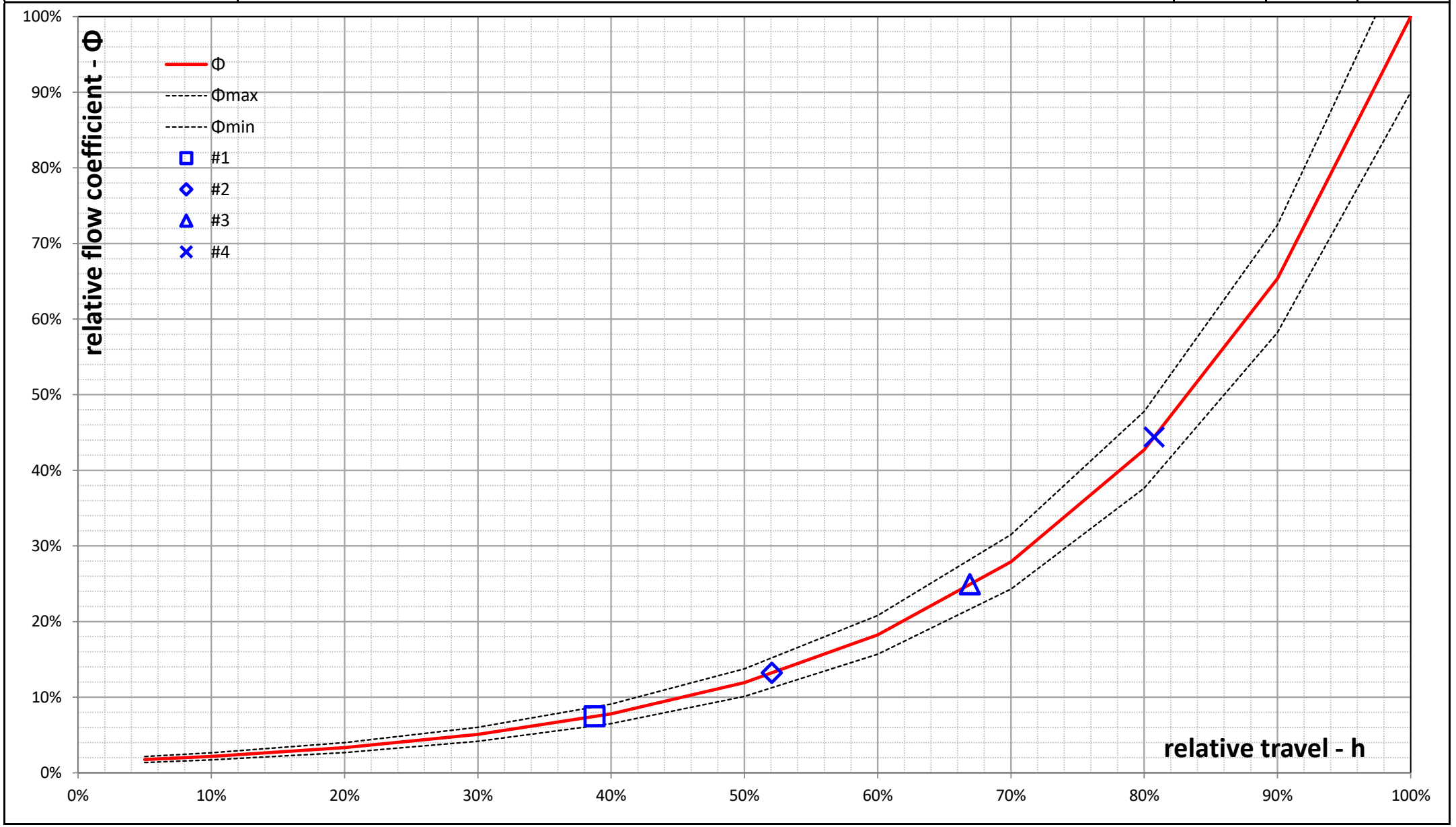


Control Valve Division

CONTROL VALVE FLOW CHARACTERISTIC

Valve Model: CV-8407

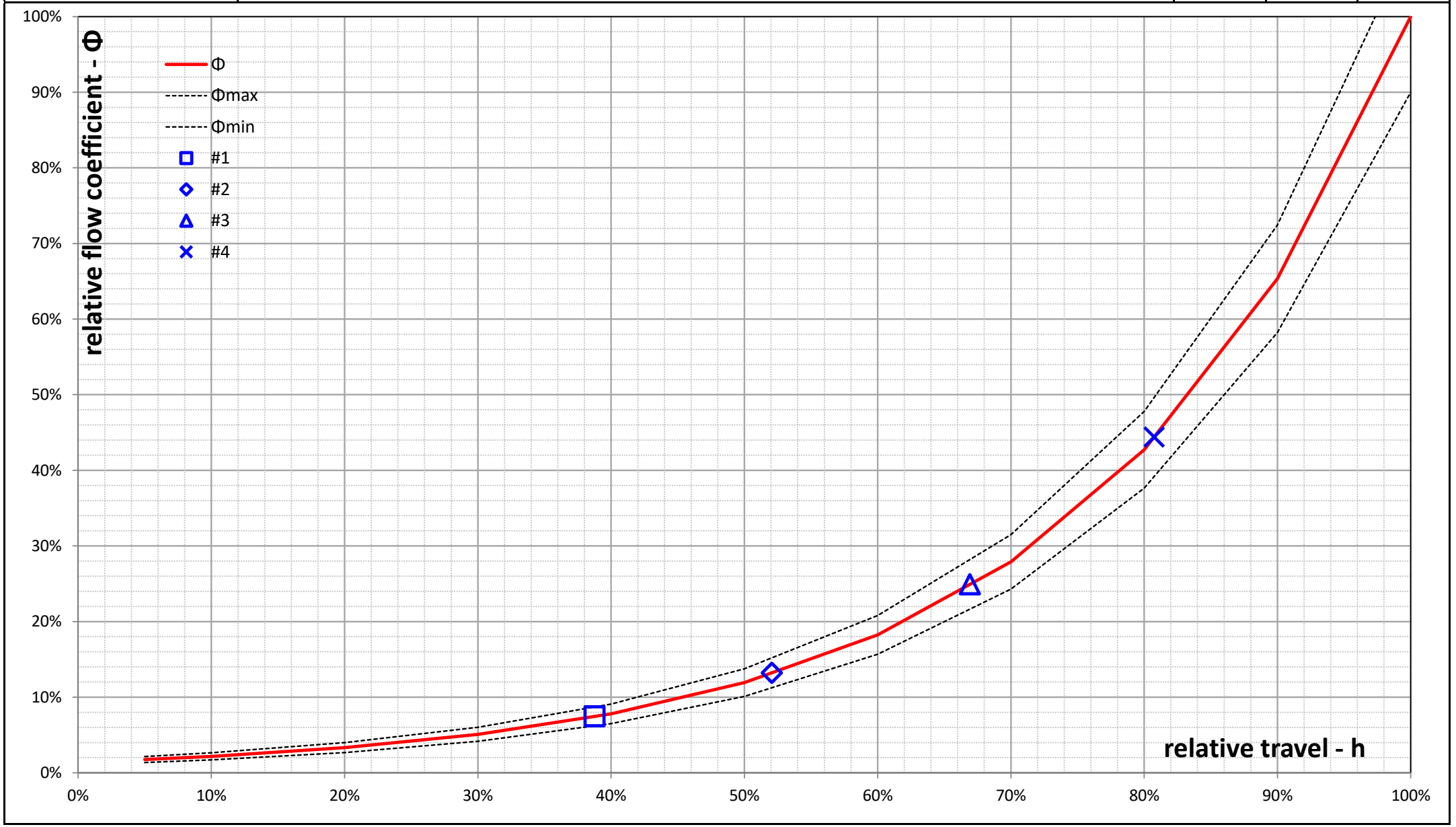
Customer :	ROSETTI MARINO SPA	**Offer :**	CV2400221	**Tag :**	25-PV-046	**DWG :**			**Rev. 1**	
Plant :	Hollandse Kust Noord Wind Park Pr.	**S/N :**	2400593	**DN :**	2"	**Port:**	1"	Prep.	Check.	Appr.
Service :		**Nominal Travel :**	25 mm	**Rated Cv :**	13.0000	**Cv min :**	0.2284			
Date :										



Control Valve Division

CONTROL VALVE FLOW CHARACTERISTIC

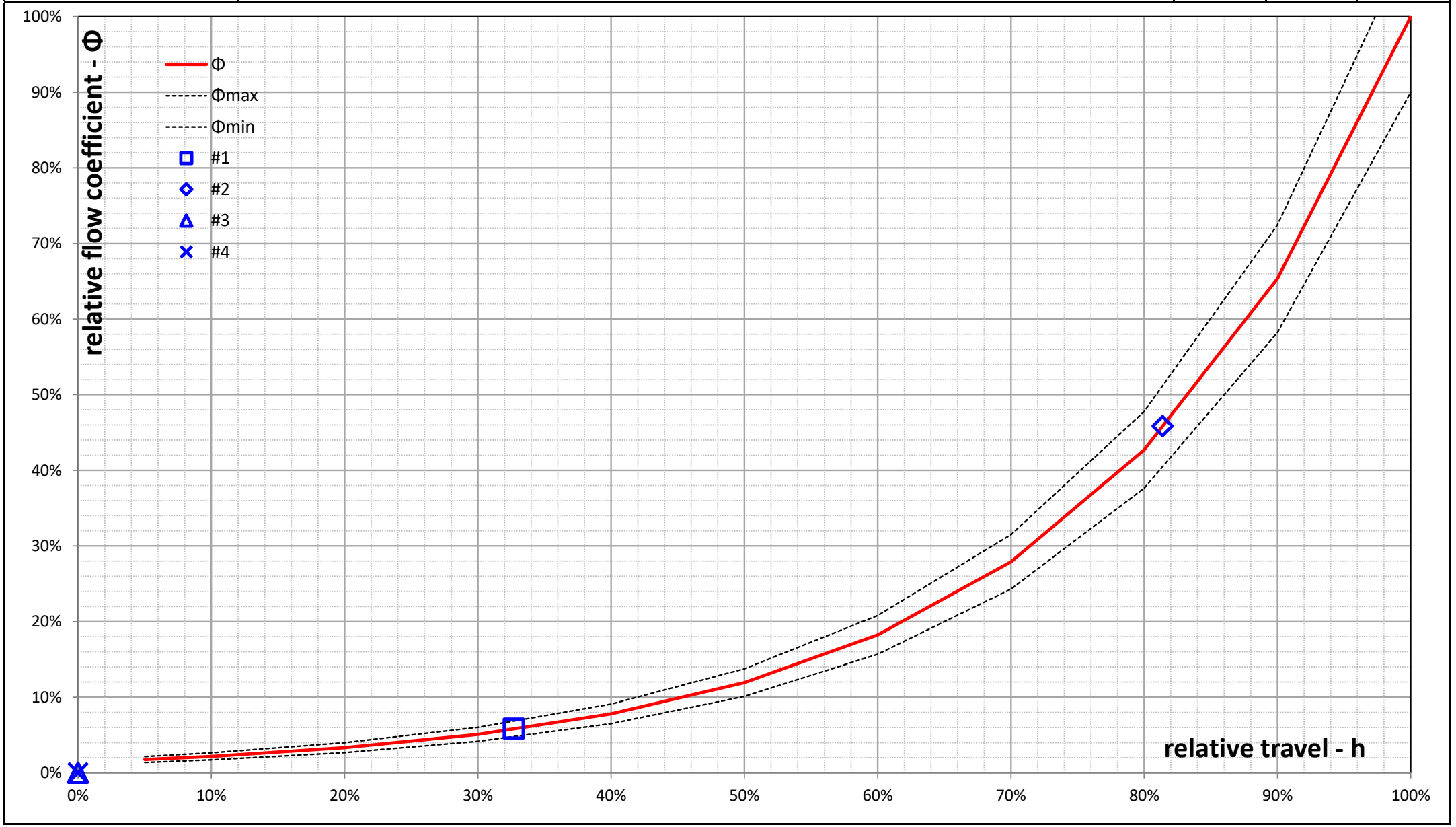
Valve Model:	**CV-8407**								
Customer :	ROSETTI MARINO SPA	*Offer :*	CV2400221	*Tag :*	25-PV-049	*DWG :*		*Rev. 1*	
Plant :	Hollandse Kust Noord Wind Park Pr.	*S/N :*	2400594	*DN :*	**2"**	*Port:*	**1"**	Prep.	Check.	Appr.
Service :		*Nominal Travel :*	**25 mm**	*Rated Cv :*	**13.0000**	*Cv min :*	**0.2284**			
Date :										



Control Valve Division

CONTROL VALVE FLOW CHARACTERISTIC

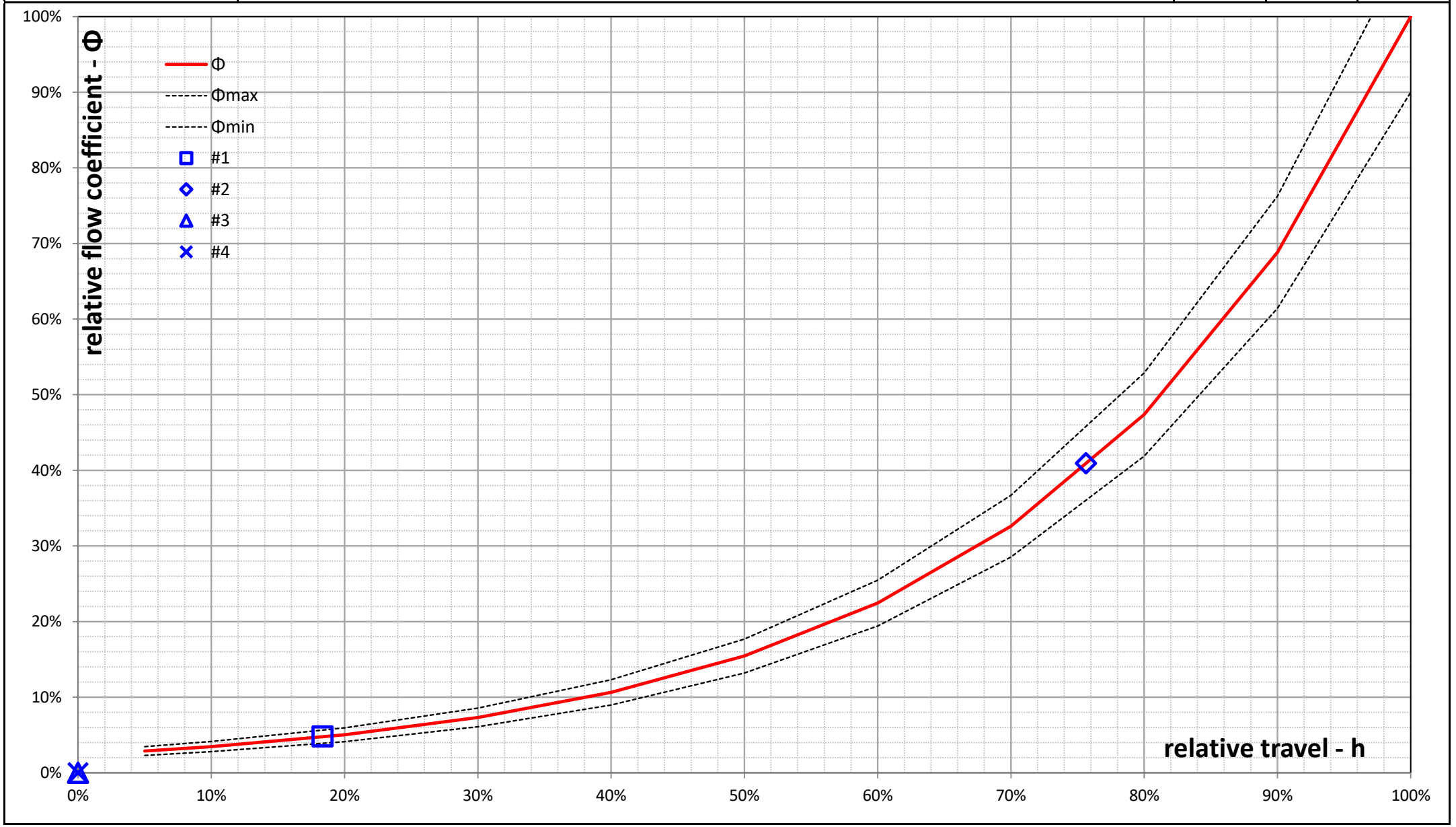
Valve Model:	**CV-8407**								
Customer :	ROSETTI MARINO SPA	*Offer :*	CV2400221	*Tag :*	25-PV-055A	*DWG :*		*Rev. 1*	
Plant :	Hollandse Kust Noord Wind Park Pr.	*S/N :*	2400595	*DN :*	1 1/2"	*Port:*	1"	Prep.	Check.	Appr.
Date :		*Service :*		*Nominal Travel :*	20 mm	*Rated Cv :*	13.0000	*Cv min :*	0.2284			



Control Valve Division

CONTROL VALVE FLOW CHARACTERISTIC

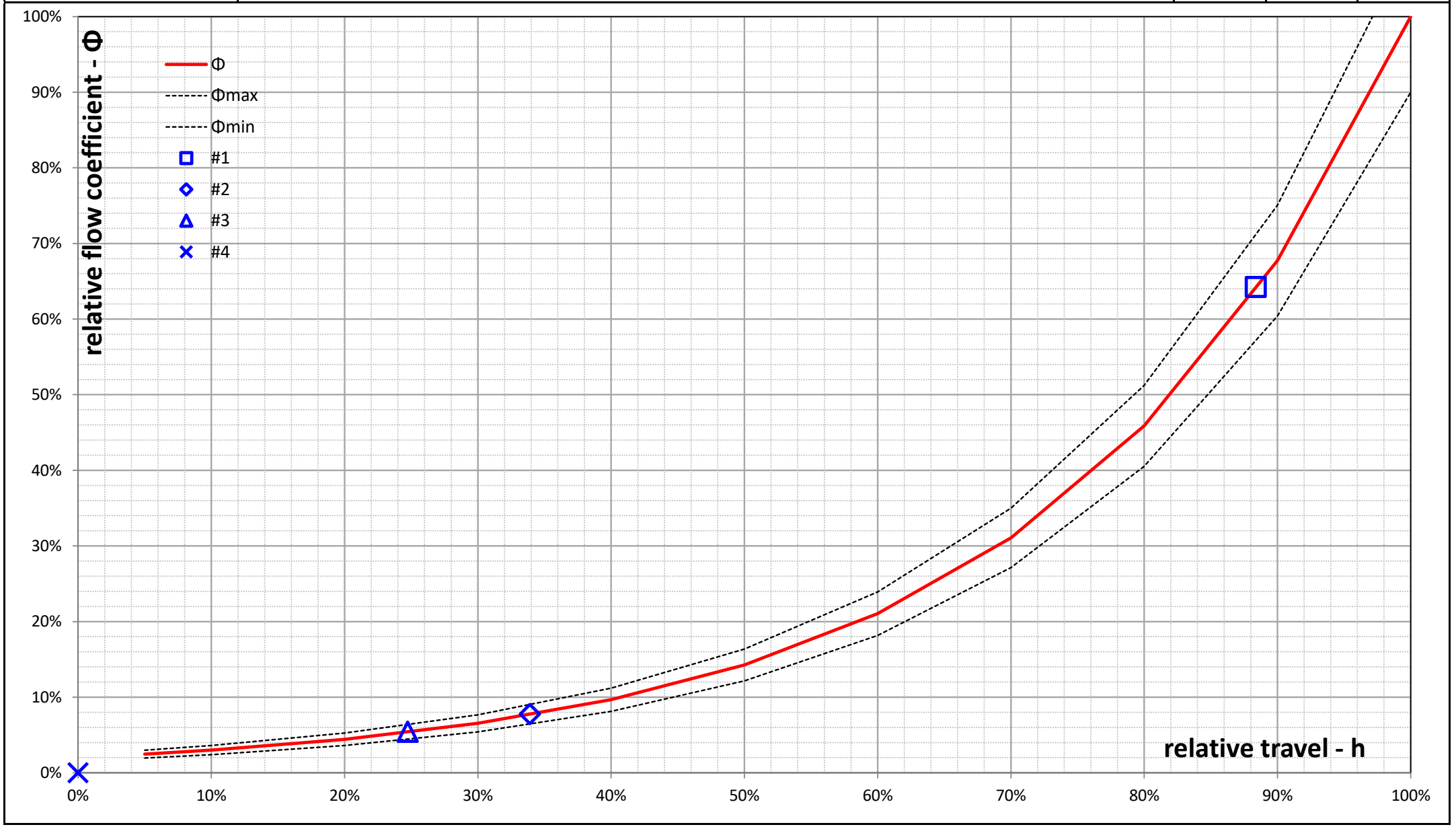
Customer :	ROSETTI MARINO SPA	*Offer :*	CV2400221	*Tag :*	25-PV-055B	*Valve Model:*	CV-8407			
Plant :	Hollandse Kust Noord Wind Park Pr.	*S/N :*	2400596	*DN :*	1 1/2"	*Port:*	5/32"	*DWG :*		*Rev. 1*
Service :		*Nominal Travel :*	13 mm	*Rated Cv :*	0.4500	*Cv min :*	0.0129	Prep.	Check.	Appr.
Date :										



Control Valve Division

CONTROL VALVE FLOW CHARACTERISTIC

Valve Model:	**CV-8407**									
Customer :	ROSETTI MARINO SPA	*Offer :*	CV2400221	*Tag :*	64-PV-031A	*DWG :*			*Rev. 1*	
Plant :	Hollandse Kust Noord Wind Park Pr.	*S/N :*	2400597	*DN :*	**1"**	*Port:*	**3/8"**	Prep.	Check.	Appr.
Service :		*Nominal Travel :*	**13 mm**	*Rated Cv :*	**1.9000**	*Cv min :*	**0.0469**			
Date :										



Control Valve Division

CONTROL VALVE FLOW CHARACTERISTIC

Valve Model:	**CV-8407**									
Customer :	ROSETTI MARINO SPA	*Offer :*	CV2400221	*Tag :*	64-PV-031B	*DWG :*			*Rev. 1*	
Plant :	Hollandse Kust Noord Wind Park Pr.	*S/N :*	2400598	*DN :*	**1"**	*Port:*	**3/8"**	Prep.	Check.	Appr.
Service :		*Nominal Travel :*	**13 mm**	*Rated Cv :*	**1.9000**	*Cv min :*	**0.0469**			
Date :										

