

BRE Test Report

Measurement of the aerodynamic characteristics of 18 air vents - to BSEN 13141 Part-2:2010

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1 Introduction

Manthorpe requested BRE to test eighteen ventilation terminals to determine the aerodynamic characteristics under exhaust air flow conditions following Clause 4 of test standard:

EN 13141-2:2010. *Ventilation for buildings – Performance testing of components/products for residential ventilation – Part 2: Exhaust and supply air terminal devices.*

Manthorpe supplied eighteen air vents for testing. Manthorpe advised BRE that the name of the products submitted for testing were:

- GTV-DR Double Roman Tile Vent (Test with GTV-AD Mechanical Extraction Adaptor)**
- GTV-NP Non Profile Tile Vent (Test with GTV-AD Mechanical Extraction Adaptor)**
- GTV-CS Castellated Tile Vent (Test with GTV-AD Mechanical Extraction Adaptor)**
- GTV- DP Double Pantile Tile Vent (Test with GTV-AD Mechanical Extraction Adaptor)**
- GTV-TE Thin Leading Edge Tile Vent (Test with GTV-AD Mechanical Extraction Adaptor)**
- GTV-FE Flat Edge Tile Vent (Test with GTV-AD Mechanical Extraction Adaptor)**
- GTV-PT Plain Tile Vent (Test with GTV-AD Mechanical Extraction Adaptor)**
- GTP-IP Interlocking Plain Tile Vent (Test with GTV-AD Mechanical Extraction Adaptor)**
- GTV-MC Mini Castellated Tile Vent**
- GTV-SP Single Pantile Vent**
- CURV Cowled Universal Roof Vent - 4"**
- CURV Cowled Universal Roof Vent - 5"**
- CURV Cowled Universal Roof Vent - 6" oval**
- GILSV30-25**
- GILSV25-20**
- GRSV30-25 (Test with GRPA flexible pipe connected)**
- G940 Single Air Brick 4" Pipe**
- G941 Double Air Brick 4" Pipe**
- G942 Double Air Brick 5" Pipe**
- G943 Triple Air Brick 6" Pipe**

The air vents were received in the HVAC test lab at BRE on 16th March 2020 and the testing was undertaken on the 18th, 19th and 20th March 2020.

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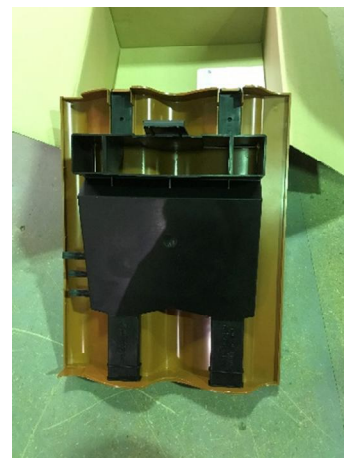
GTV-DR Double Roman Tile Vent (Tested with GTV-AD Mechanical Extraction Adaptor)



GTV-NP Non Profile Tile Vent (Tested with GTV-AD Mechanical Extraction Adaptor)



GTV-CS Castellated Tile Vent (Tested with GTV-AD Mechanical Extraction Adaptor)



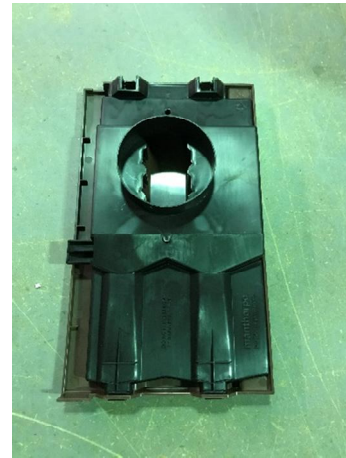
GTV-DP Double Pantile Tile Vent (Tested with GTV-AD Mechanical Extraction Adaptor)



GTV-TE Thin Leading Edge Tile Vent (Tested with GTV-AD Mechanical Extraction Adaptor)



GTV-FE Flat Edge Tile Vent (Tested with GTV-AD Mechanical Extraction Adaptor)



GTV-MC Mini Castellated Tile Vent



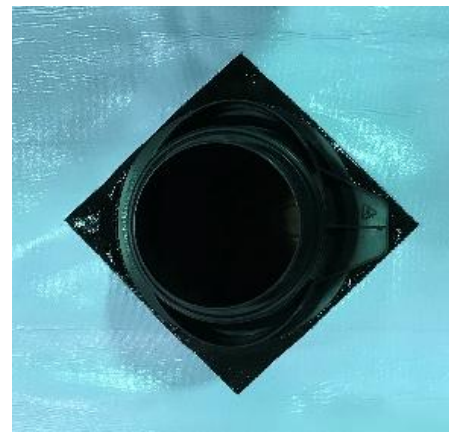
GTV-SP Single Pantile Vent



GTV-PT Plain Tile Vent (Tested with GTV-AD Mechanical Extraction Adaptor)



GTP-IP Interlocking Plain Tile Vent (Tested with GTV-AD Mechanical Extraction Adaptor)



CURV Cowled Universal Roof Vent - 4"



CURV Cowled Universal Roof Vent - 5"

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CURV Cowled Universal Roof Vent - 6" oval



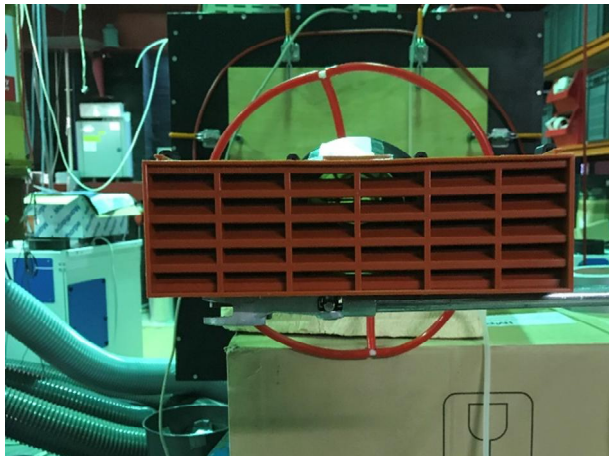
GILSV30-25



GILSV25-20



GRSV30-25 (Tested with GRPA flexible pipe connected)



G940 Single Air Brick 4" Pipe



G941 Double Air Brick 4" Pipe



G942 Double Air Brick 5" Pipe



G943 Triple Air Brick 6" Pipe

Figure 1 Vents supplied by the manufacturer



Figure 2 GRPA flexible pipe adaptor



Figure 3 GTV-AD Mechanical Extraction Adaptor

2 Configuration and installation instructions of products tested

The test layout is shown schematically in Figure 4.

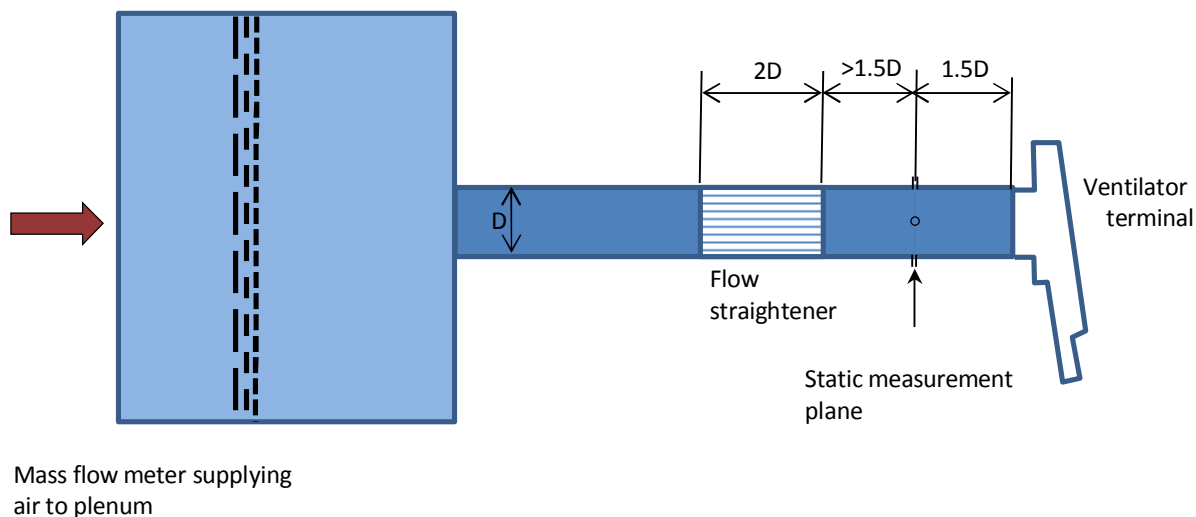


Figure 4 Test layout schematic



Figure 5 Ventilator terminal installed on test rig



3 Details of tests carried out

Test installation and conditions

The test apparatus used conformed to the requirements set out in BSEN 13141-2 2010 Clause 4.

Measurement	Test instrument	Calibration
Air temperature/ Humidity readings	Rotronic HygroPalm	BRE Calibration Services (UKAS)
Airflow rate readings	LS-6S Mass Flow Meter with Chell Display CMD100 Display	Chell (UKAS)
Airflow rate readings	LS-8S Mass Flow Meter with Chell Display CCD100 Display	Chell (UKAS)
Barometric pressure readings	Druck	BRE Calibration Services (UKAS)
Static pressure readings	MKS Baratron	BRE Calibration Services (UKAS)

Table 1 Test instruments used

Manthorpe requested that the aerodynamic characteristics under exhaust air flow conditions of all products were determined from 1 to 40 Pa. In addition to this Manthorpe requested that the static pressure pressure at a flow rate of 90 l/s be determined for the following products:

- CURV Cowled Universal Roof Vent - 4"
- CURV Cowled Universal Roof Vent - 5"
- CURV Cowled Universal Roof Vent - 6" oval
- G941 Double Air Brick 4" Pipe
- G942 Double Air Brick 5" Pipe
- G943 Triple Air Brick 6" Pipe



4 Test results

4.1 Aerodynamic characteristics

GTV-DP with GTV-AD Mechanical Extraction Adaptor	
Static pressure difference	Flow rate
[Pa]	[l/s]
1.02	5.42
2.06	7.70
4.01	10.73
8.22	15.26
15.40	20.97
20.73	24.25
30.72	29.78
40.02	34.33

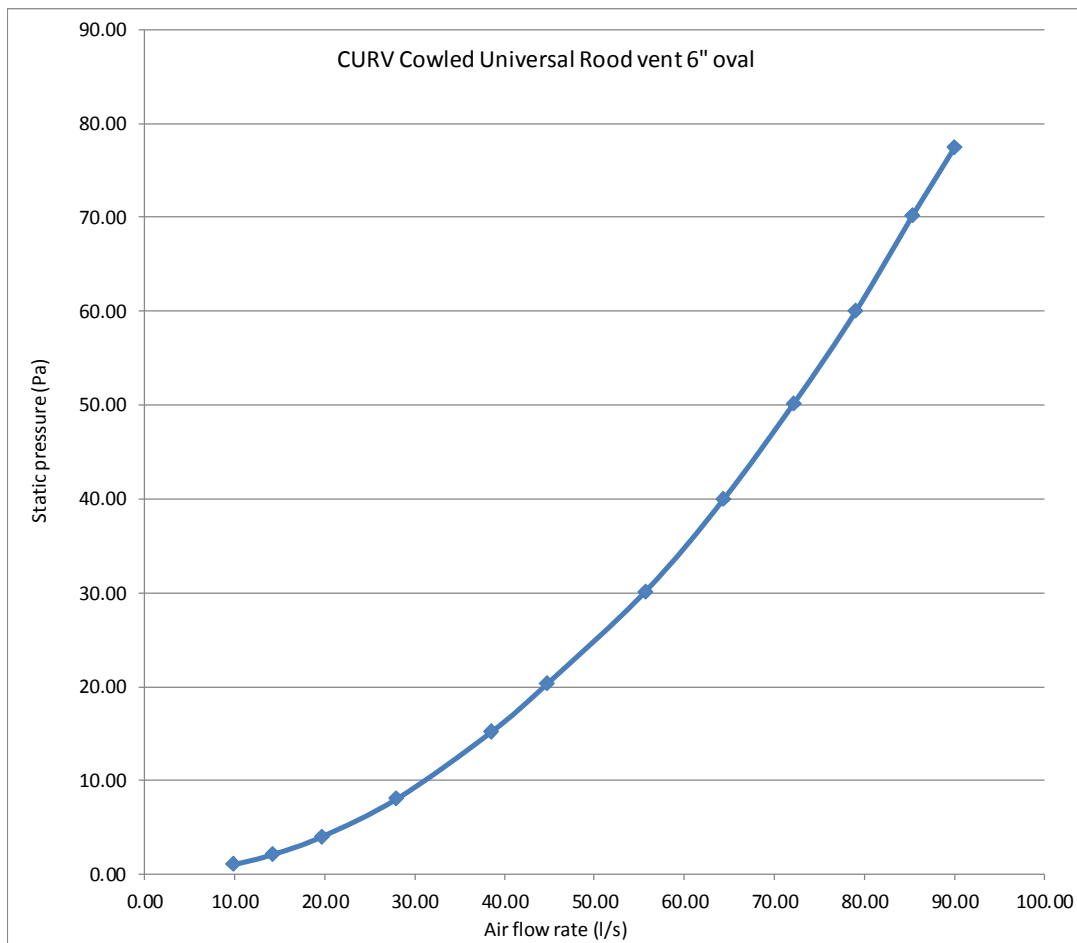


Figure 6 GTV-DP. Measured air flow rate/pressure characteristics, air discharged out of the terminal.



GTV-CS with GTV-AD Mechanical Extraction Adaptor	
Static pressure difference	Flow rate
[Pa]	[l/s]
1.02	5.35
2.03	7.49
4.02	10.62
8.04	15.02
15.06	20.72
20.04	23.92
30.05	29.42
40.09	33.98

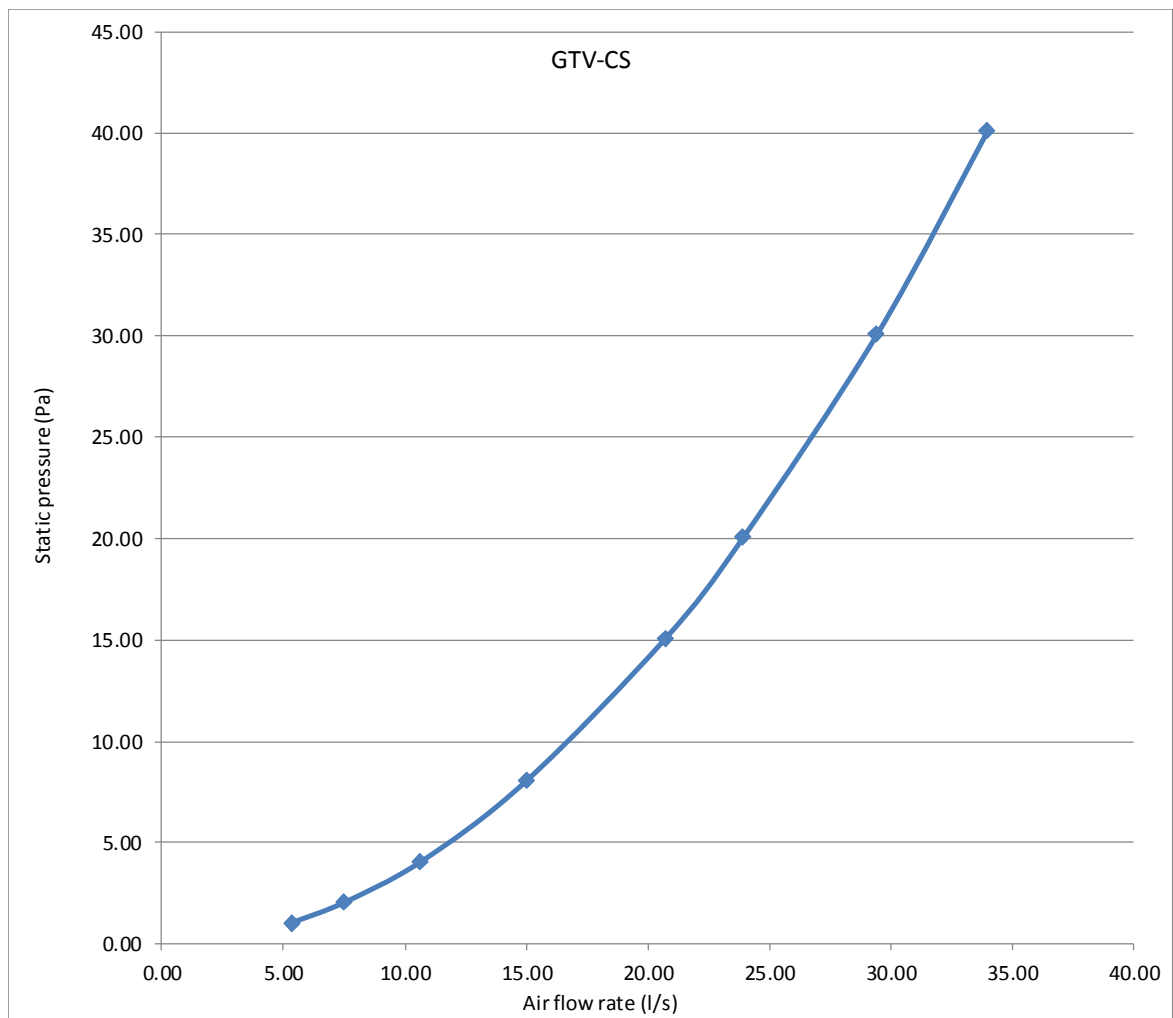


Figure 7 GTV-CS. Measured air flow rate/pressure characteristics, air discharged out of the terminal.



GTV-DR with GTV-AD Mechanical Extraction Adaptor	
Static pressure difference	Flow rate
[Pa]	[l/s]
0.99	5.25
2.02	7.50
4.03	10.56
6.02	14.03
15.08	20.62
20.01	23.81
30.01	29.28
40.16	33.84

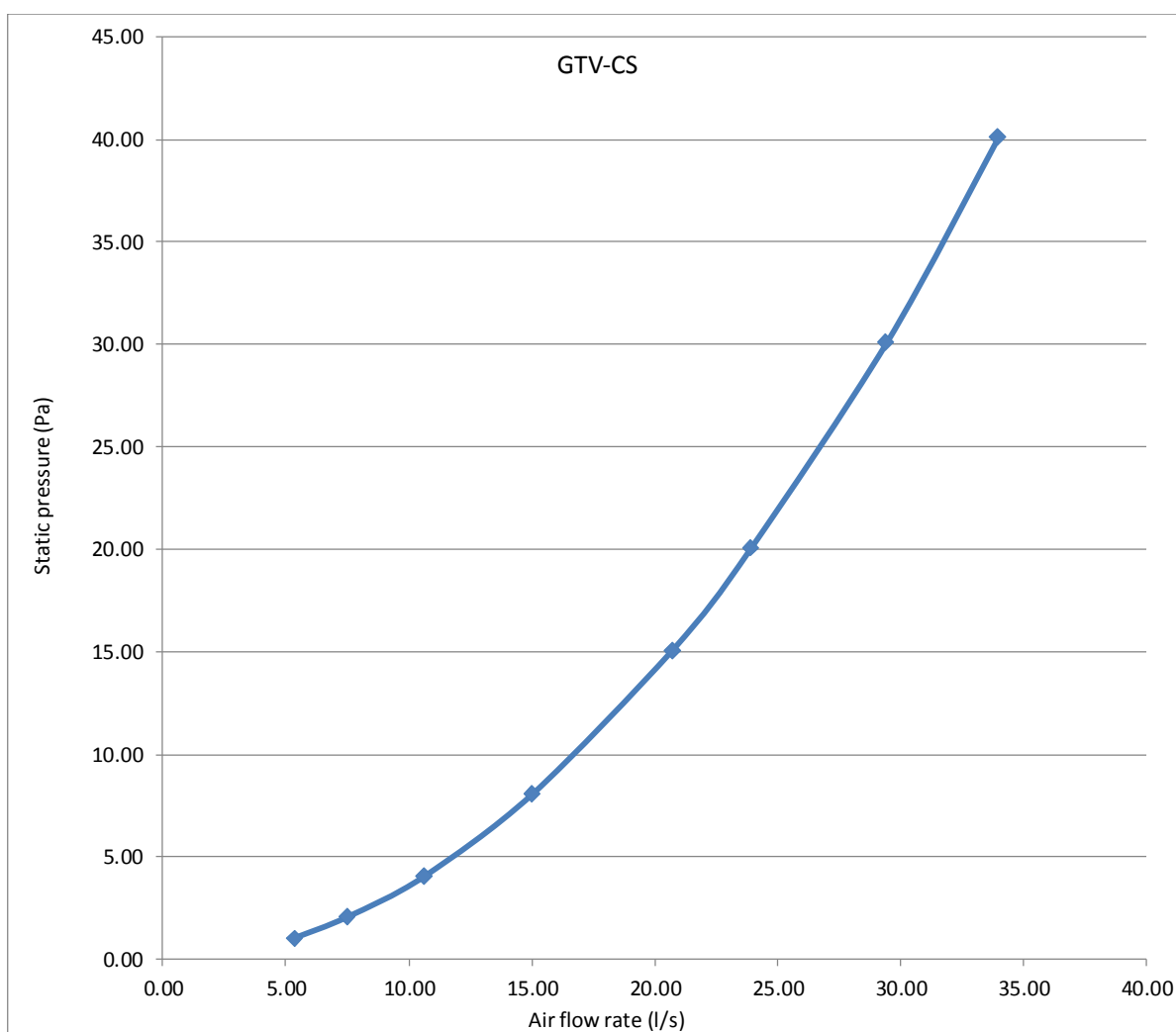


Figure 8 GTV-DR. Measured air flow rate/pressure characteristics, air discharged out of the terminal.



GTV-NP with GTV-AD Mechanical Extraction Adaptor	
Static pressure difference	Flow rate
[Pa]	[l/s]
1.01	5.19
2.01	7.34
4.01	10.40
8.04	14.78
15.02	20.30
20.15	23.62
30.05	28.94
40.04	33.42

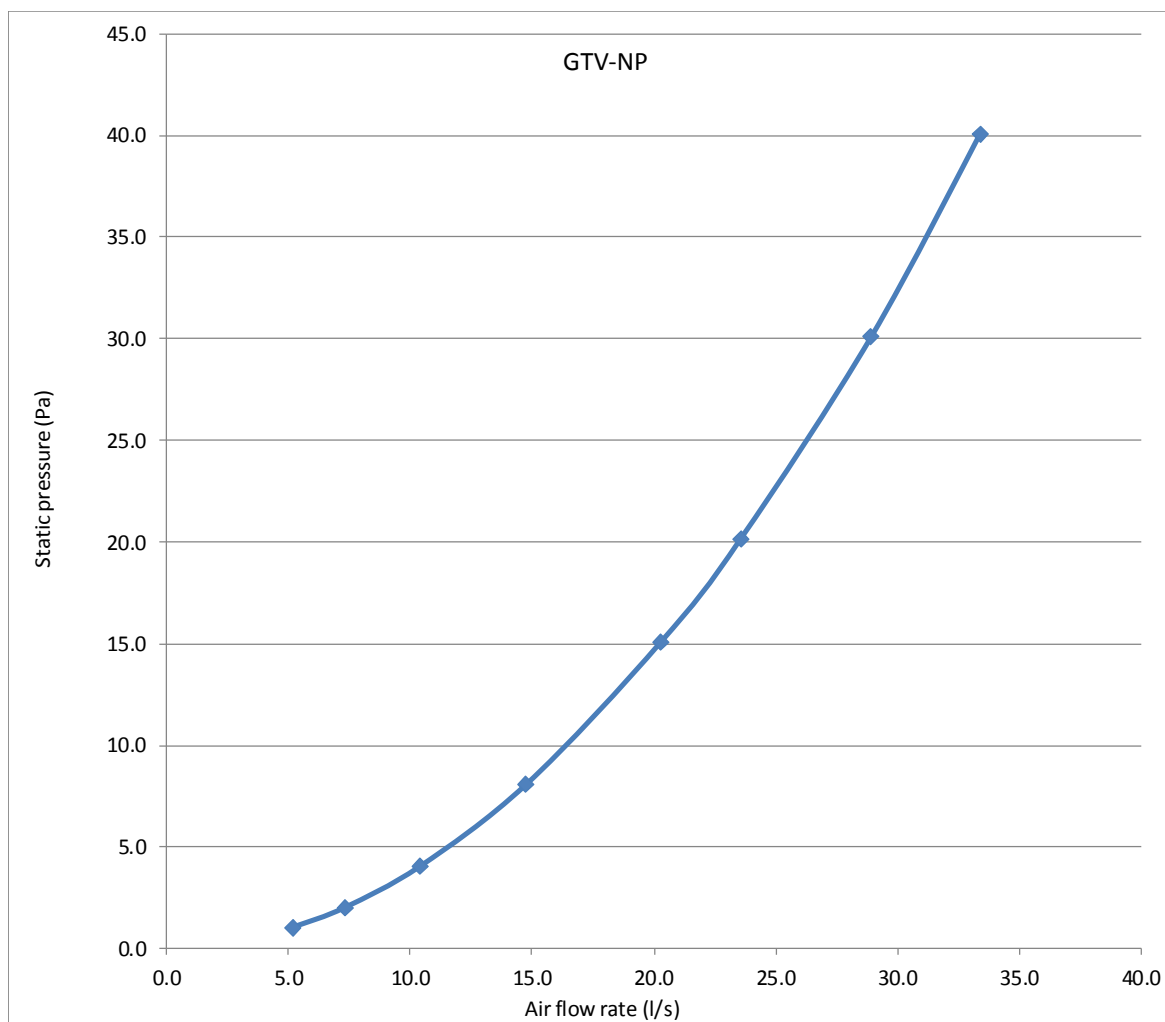


Figure 9 GTV-NP. Measured air flow rate/pressure characteristics, air discharged out of the terminal.



GTV-TE with GTV-AD Mechanical Extraction Adaptor	
Static pressure difference	Flow rate
[Pa]	[l/s]
1.01	5.45
2.02	7.75
4.03	10.87
8.06	15.43
15.01	21.20
20.07	24.62
30.03	30.19
40.04	34.89

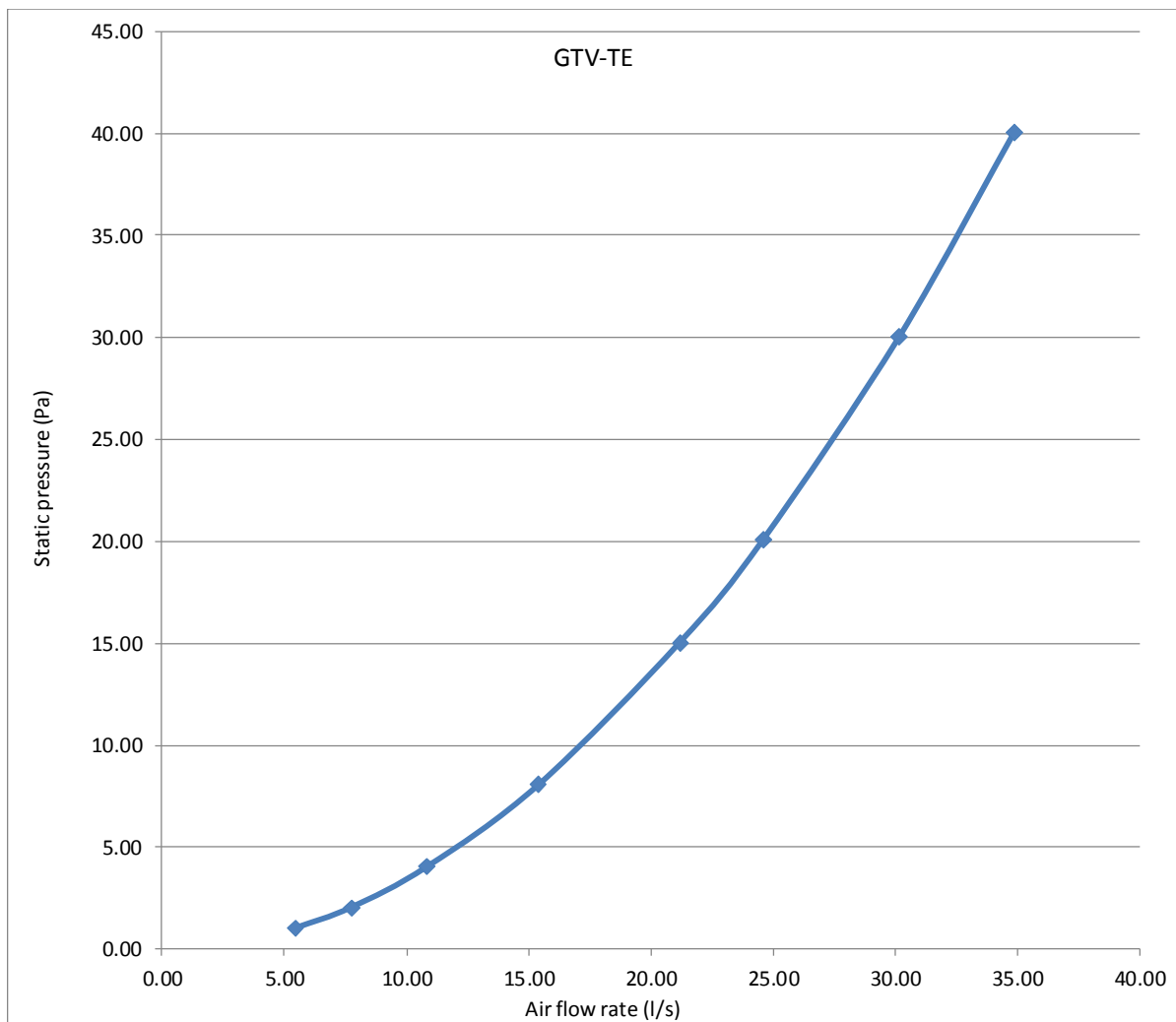


Figure 10 GTV-TE. Measured air flow rate/pressure characteristics, air discharged out of the terminal.



GTP-IP with GTV-AD Mechanical Extraction Adaptor	
Static pressure difference	Flow rate
[Pa]	[l/s]
1.02	2.46
2.07	3.65
4.05	5.27
8.00	7.64
15.03	10.64
20.14	12.44
30.08	15.39
40.12	17.95

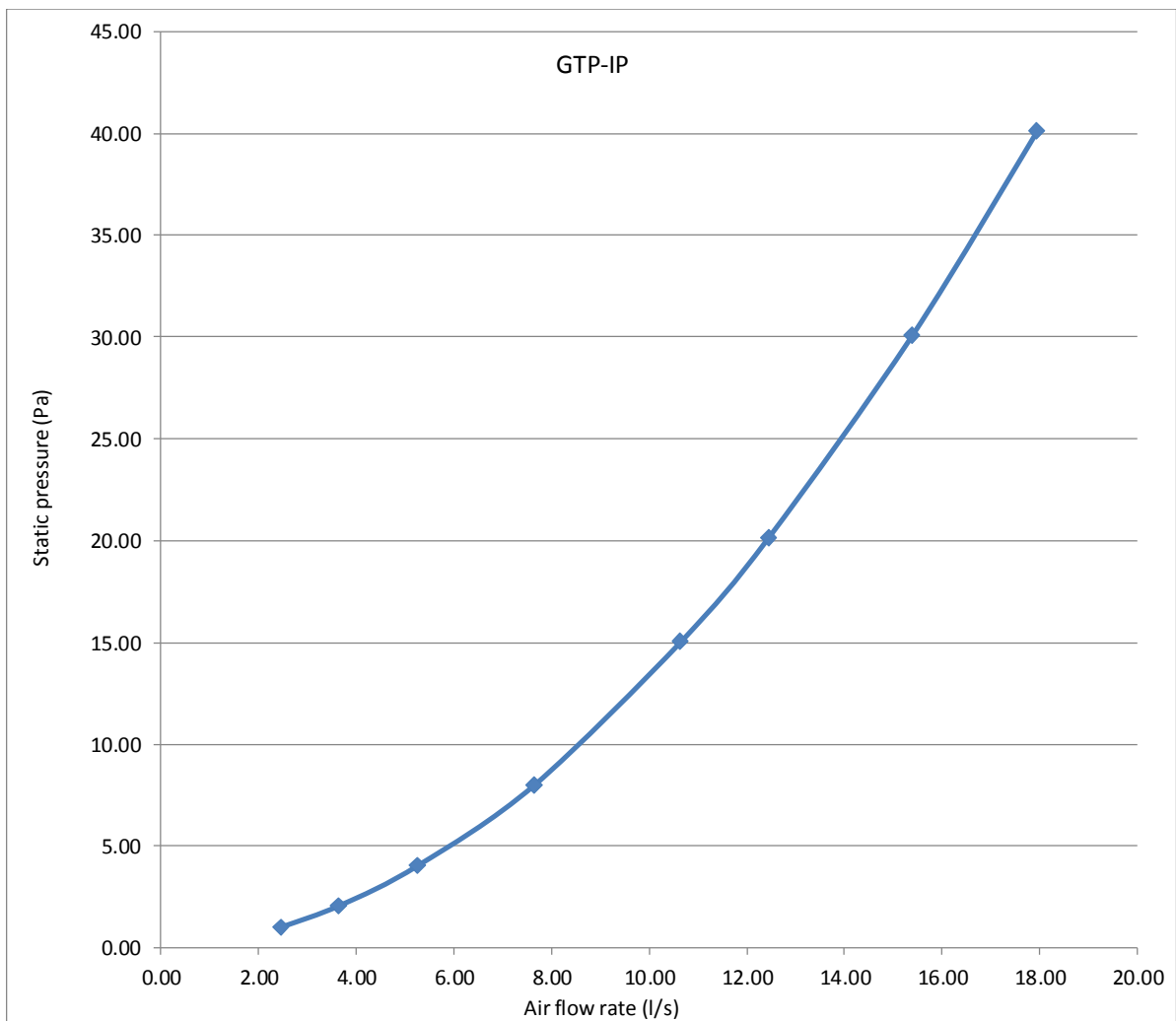


Figure 11 GTP-IP. Measured air flow rate/pressure characteristics, air discharged out of the terminal.



GTV-FE with GTV-AD Mechanical Extraction Adaptor	
Static pressure difference	Flow rate
[Pa]	[l/s]
1.07	5.61
2.03	7.83
4.20	11.12
8.02	15.83
15.20	21.78
20.09	25.28
30.92	31.05
40.03	35.87

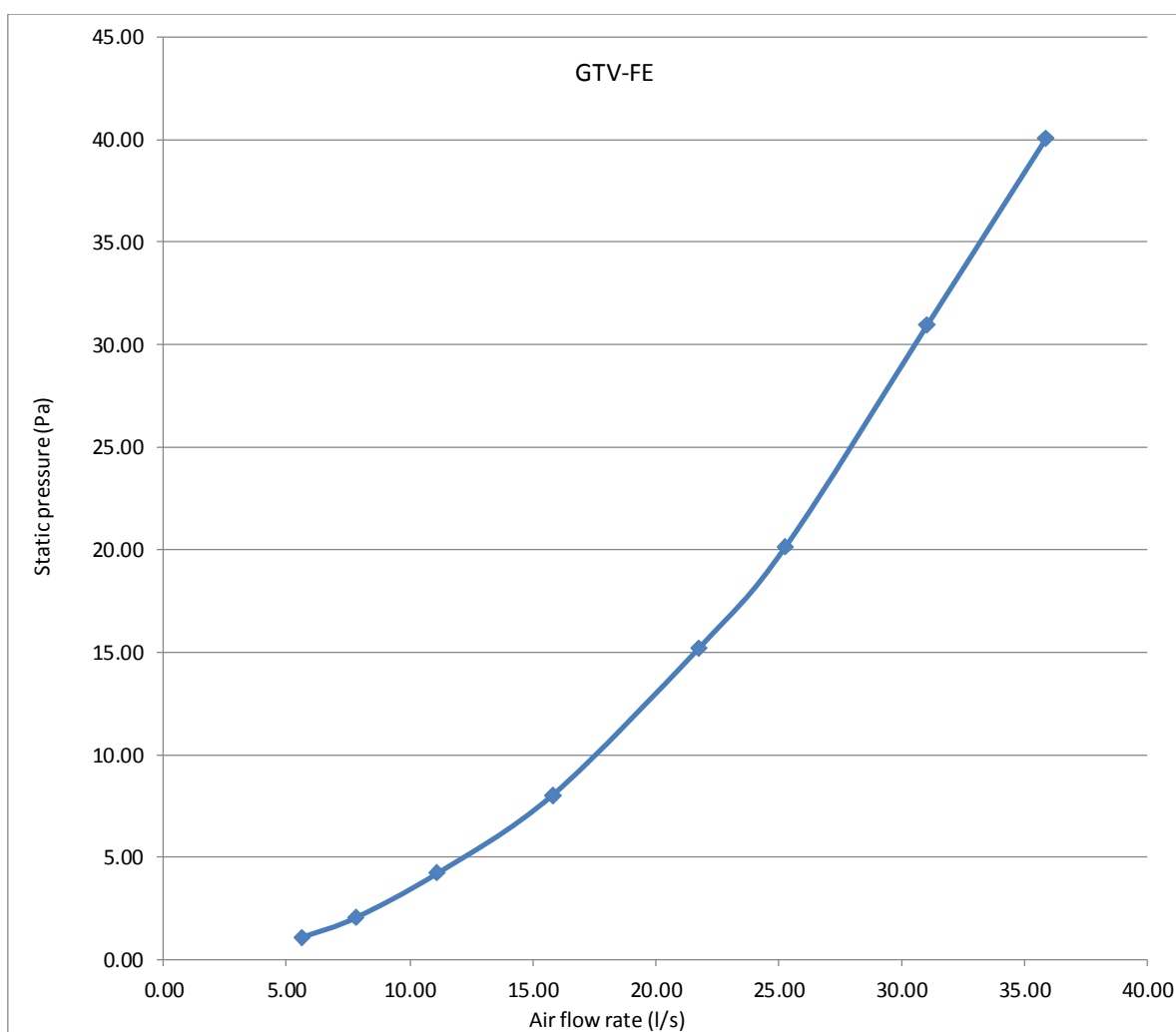


Figure 12 GTV-FE. Measured air flow rate/pressure characteristics, air discharged out of the terminal.



GTV-PT with GTV-AD Mechanical Extraction Adaptor	
Static pressure difference	Flow rate
[Pa]	[l/s]
1.05	5.16
2.01	7.26
4.02	10.42
8.06	15.01
15.04	20.84
20.09	24.24
30.14	29.89
40.06	34.50

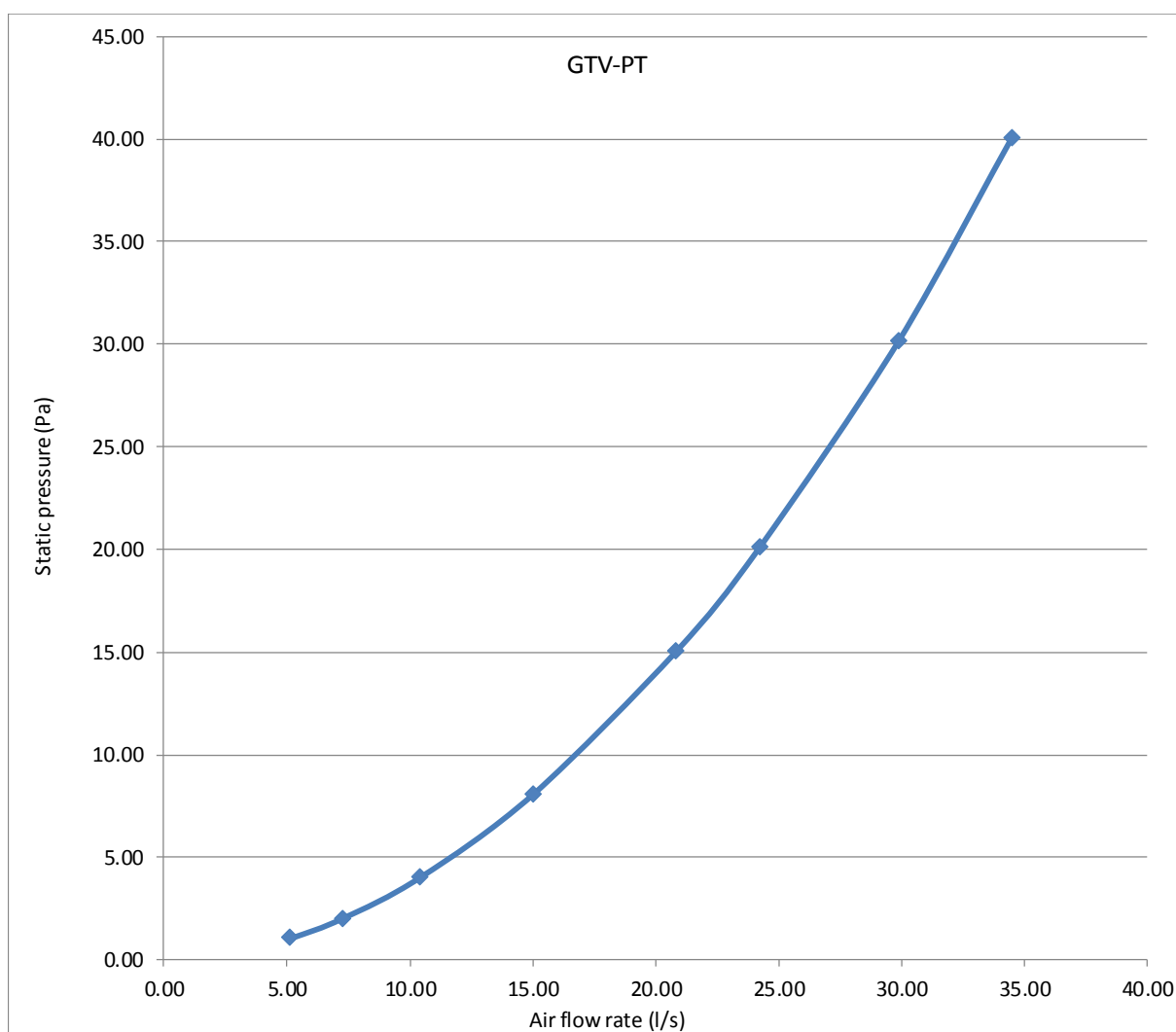


Figure 13 GTV-PT. Measured air flow rate/pressure characteristics, air discharged out of the terminal.



GTV-SP	
Static pressure difference	Flow rate
[Pa]	[l/s]
1.05	3.50
2.01	4.99
4.02	7.11
8.04	10.30
15.02	14.43
20.12	16.87
30.07	20.96
40.14	24.49

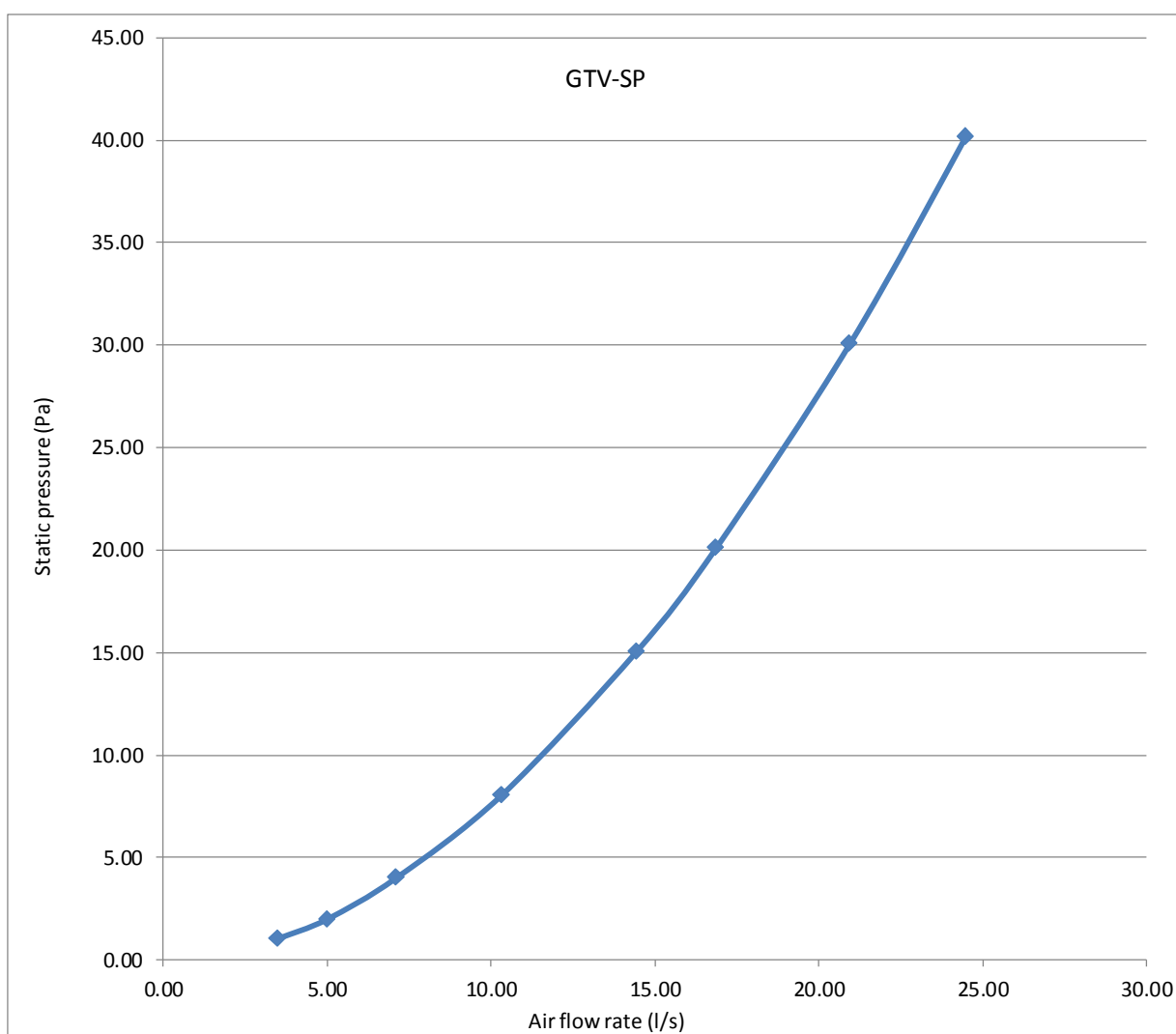


Figure 14 GTV-SP. Measured air flow rate/pressure characteristics, air discharged out of the terminal.



GTV-MC	
Static pressure difference	Flow rate
[Pa]	[l/s]
1.00	2.60
2.03	3.82
4.09	5.56
8.02	7.91
15.05	10.99
20.03	12.74
30.09	15.77
40.10	18.31

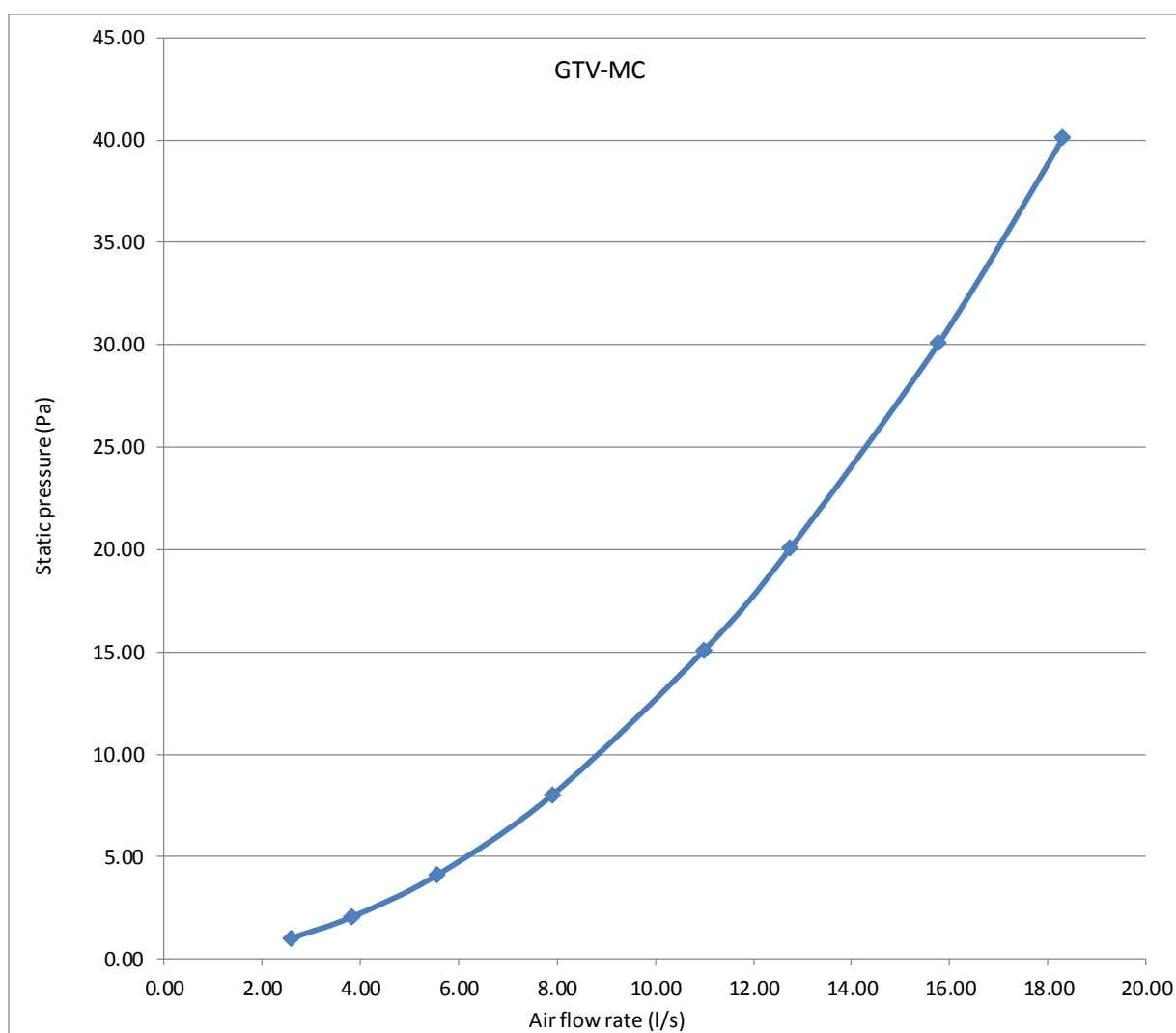


Figure 15 GTV-MC. Measured air flow rate/pressure characteristics, air discharged out of the terminal.



GILSV30-25	
Static pressure difference	Flow rate
[Pa]	[l/s]
1.04	4.37
2.03	6.27
4.07	8.97
8.08	12.80
15.03	17.65
20.05	20.50
30.16	25.31
40.14	29.37

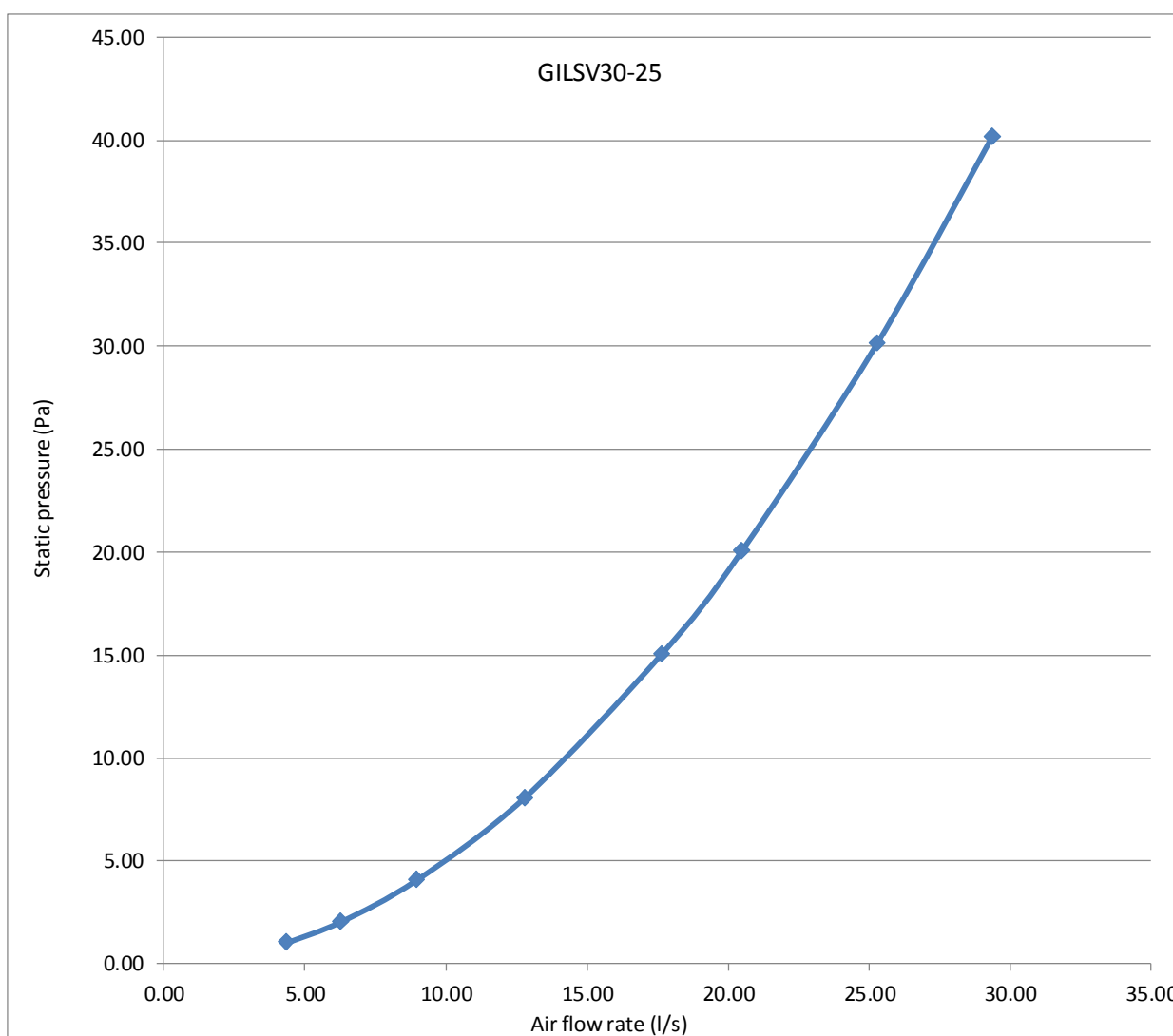


Figure 16 GILSV30-25. Measured air flow rate/pressure characteristics, air discharged out of the terminal.



GILSV25-20	
Static pressure difference	Flow rate
[Pa]	[l/s]
1.02	3.30
2.01	4.67
4.04	6.69
8.02	9.61
15.04	13.39
20.09	15.63
30.20	19.33
40.22	22.53

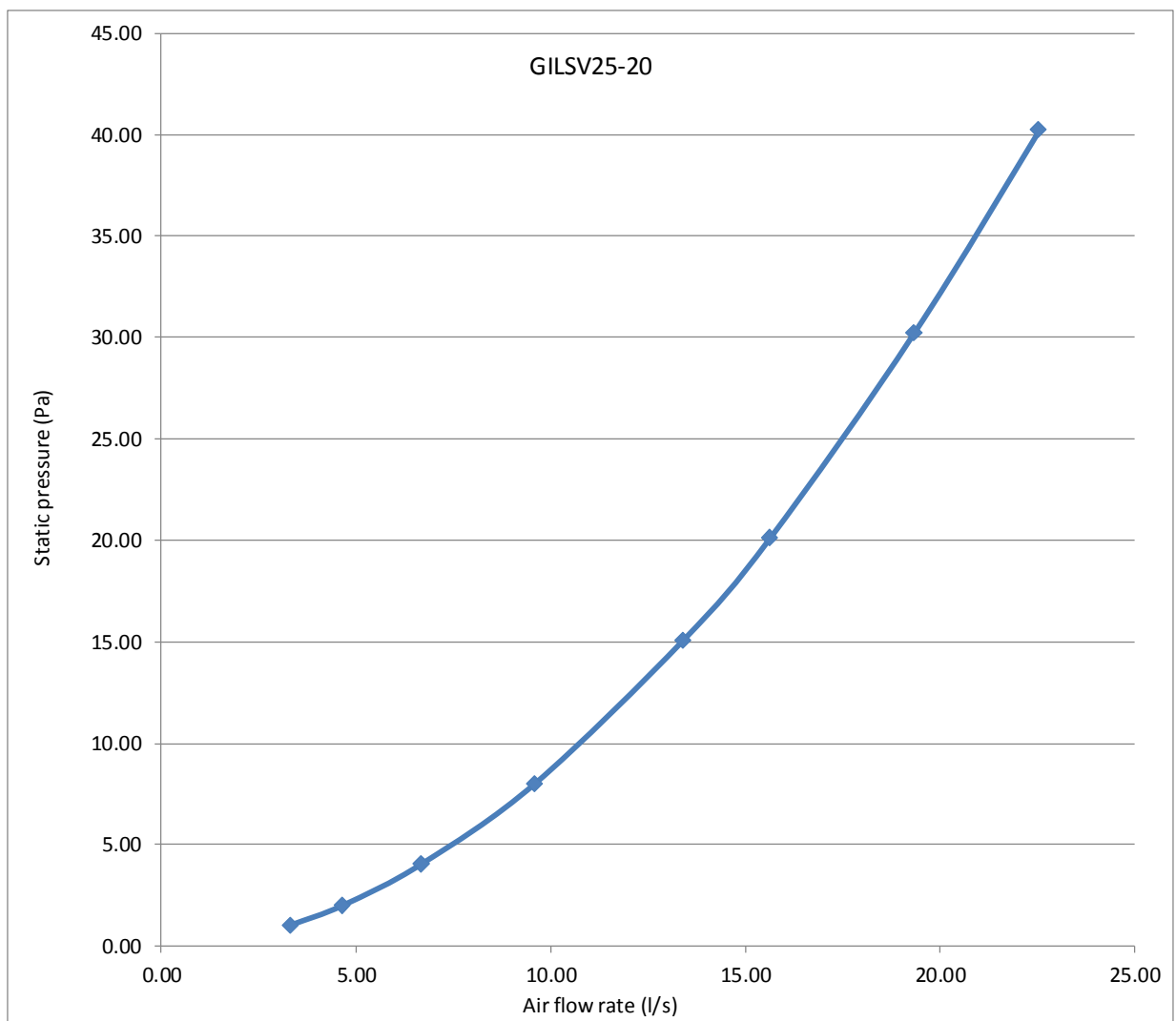


Figure 17 GILSV25-20. Measured air flow rate/pressure characteristics, air discharged out of the terminal.



GRSV30-25 +GRPA flexible pipe	
Static pressure difference	Flow rate
[Pa]	[l/s]
1.01	4.91
2.04	7.04
4.06	9.94
8.00	14.05
15.03	19.40
20.02	22.51
30.04	27.59
40.17	31.95

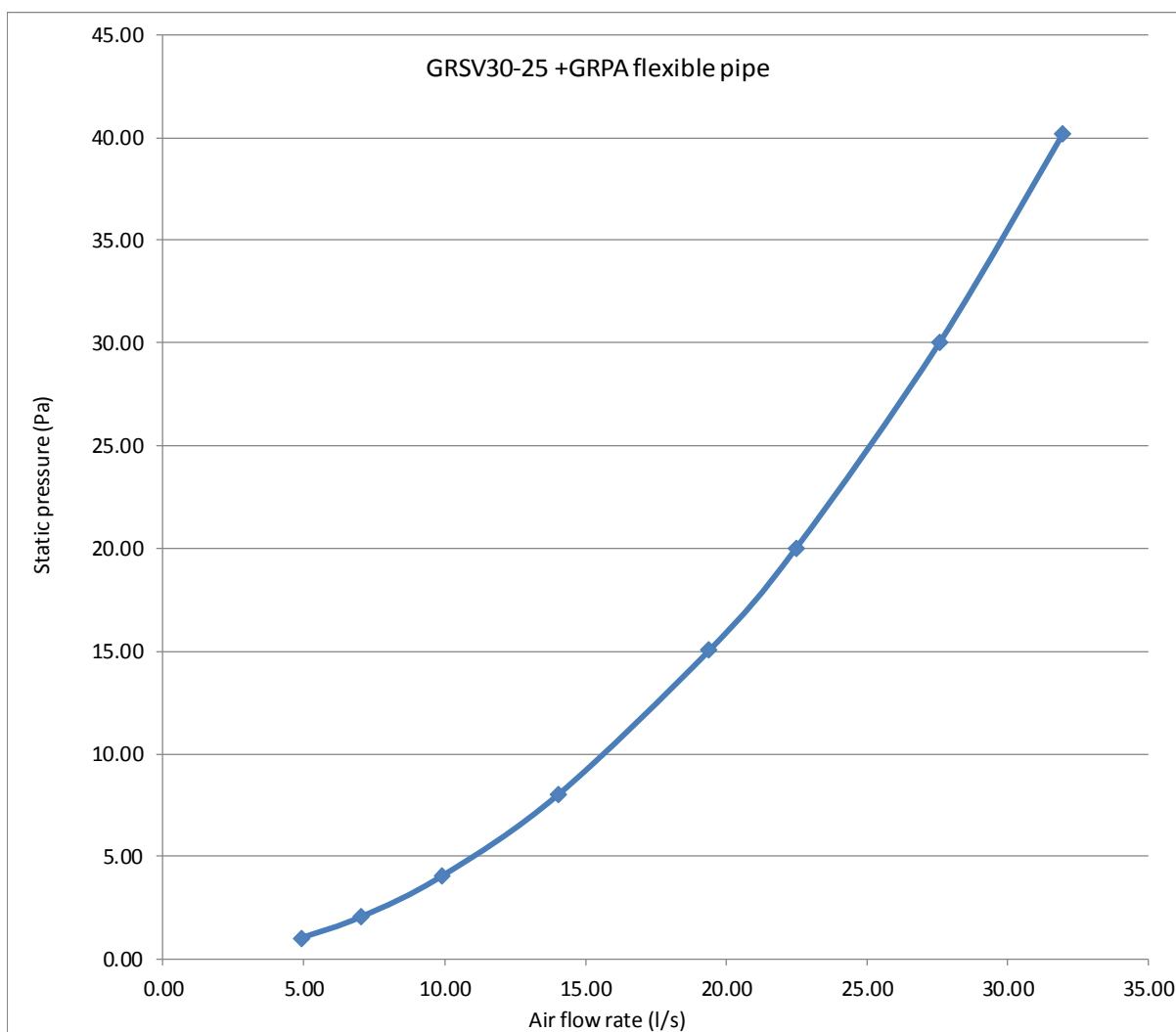


Figure 18 GRSV30-25 +GRPA flexible pipe. Measured air flow rate/pressure characteristics, air discharged out of the terminal.



G940	
Static pressure difference	Flow rate
[Pa]	[l/s]
1.01	6.66
2.01	9.40
4.02	13.37
8.07	19.10
15.07	26.32
20.08	30.54
30.91	37.49
40.04	43.50

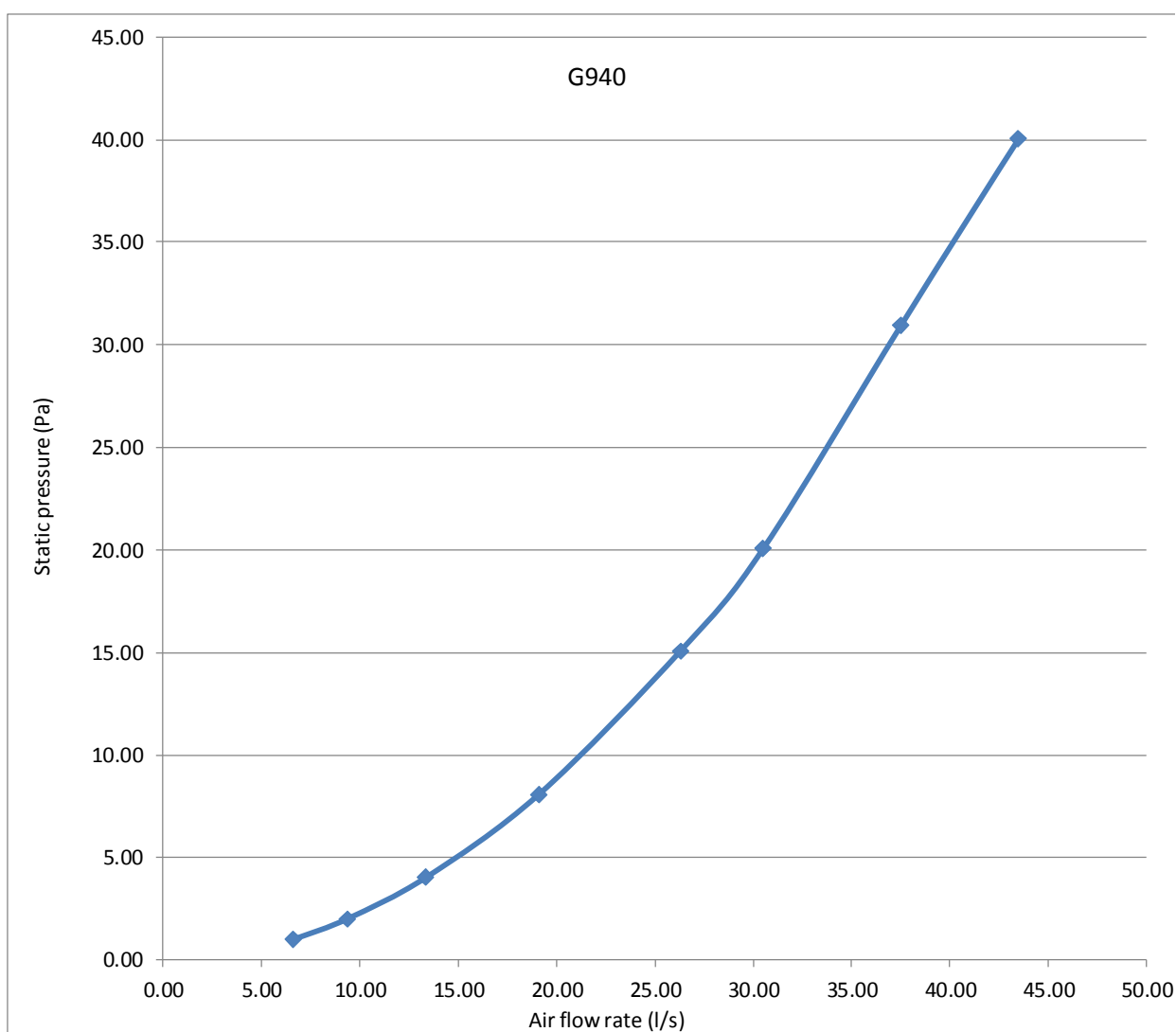


Figure 19 G940. Measured air flow rate/pressure characteristics, air discharged out of the terminal.



G941	
Static pressure difference	Flow rate
[Pa]	[l/s]
1.04	15.40
2.02	21.24
4.04	29.78
8.07	41.51
15.06	56.70
20.02	65.20
30.10	79.70
40.16	91.90

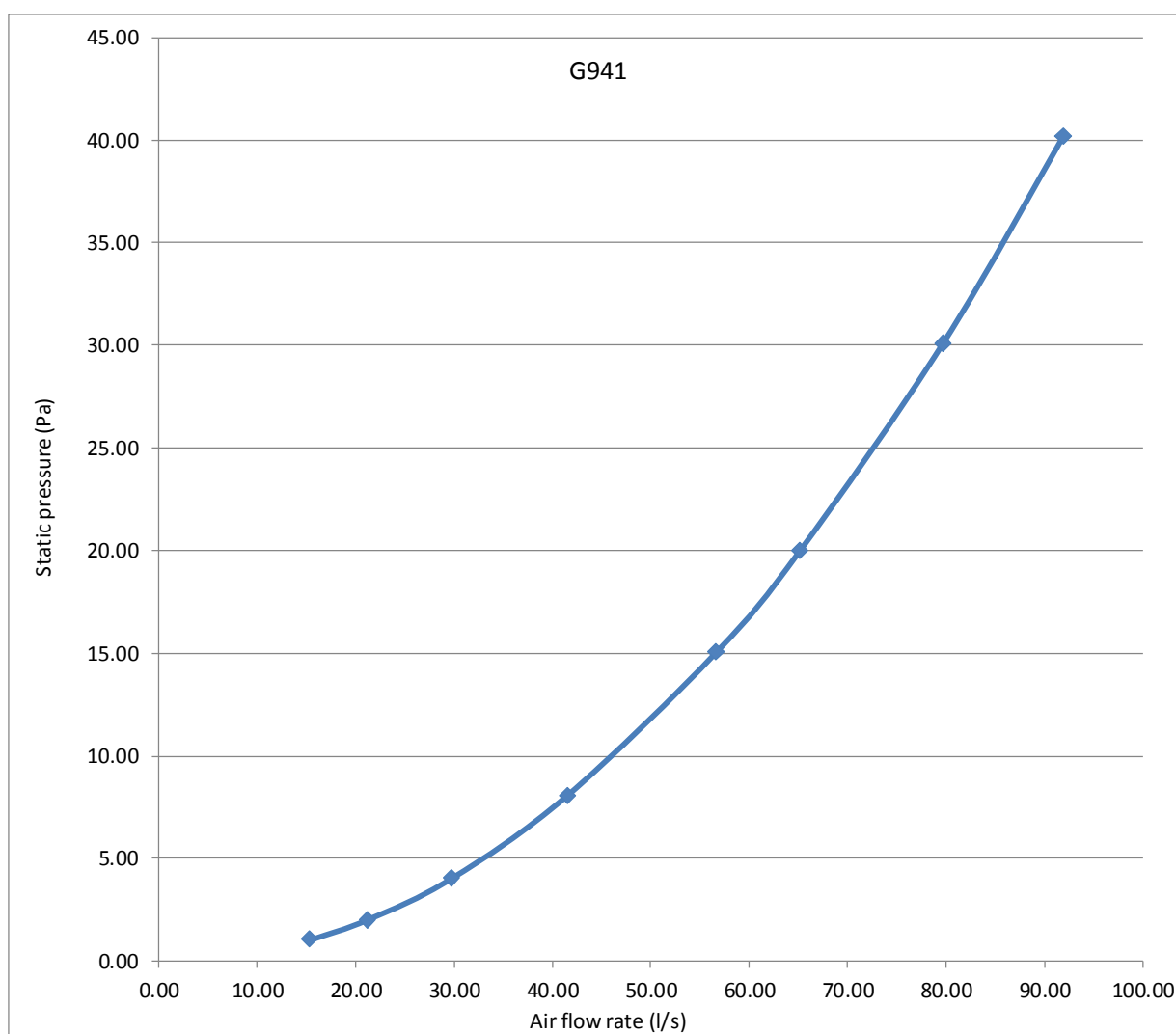


Figure 20 G941. Measured air flow rate/pressure characteristics, air discharged out of the terminal.



G942	
Static pressure difference	Flow rate
[Pa]	[l/s]
1.03	12.10
2.02	17.07
4.03	24.25
8.08	34.41
15.10	47.17
20.90	55.20
30.40	67.50
40.30	78.00
50.20	87.20
53.30	90.10

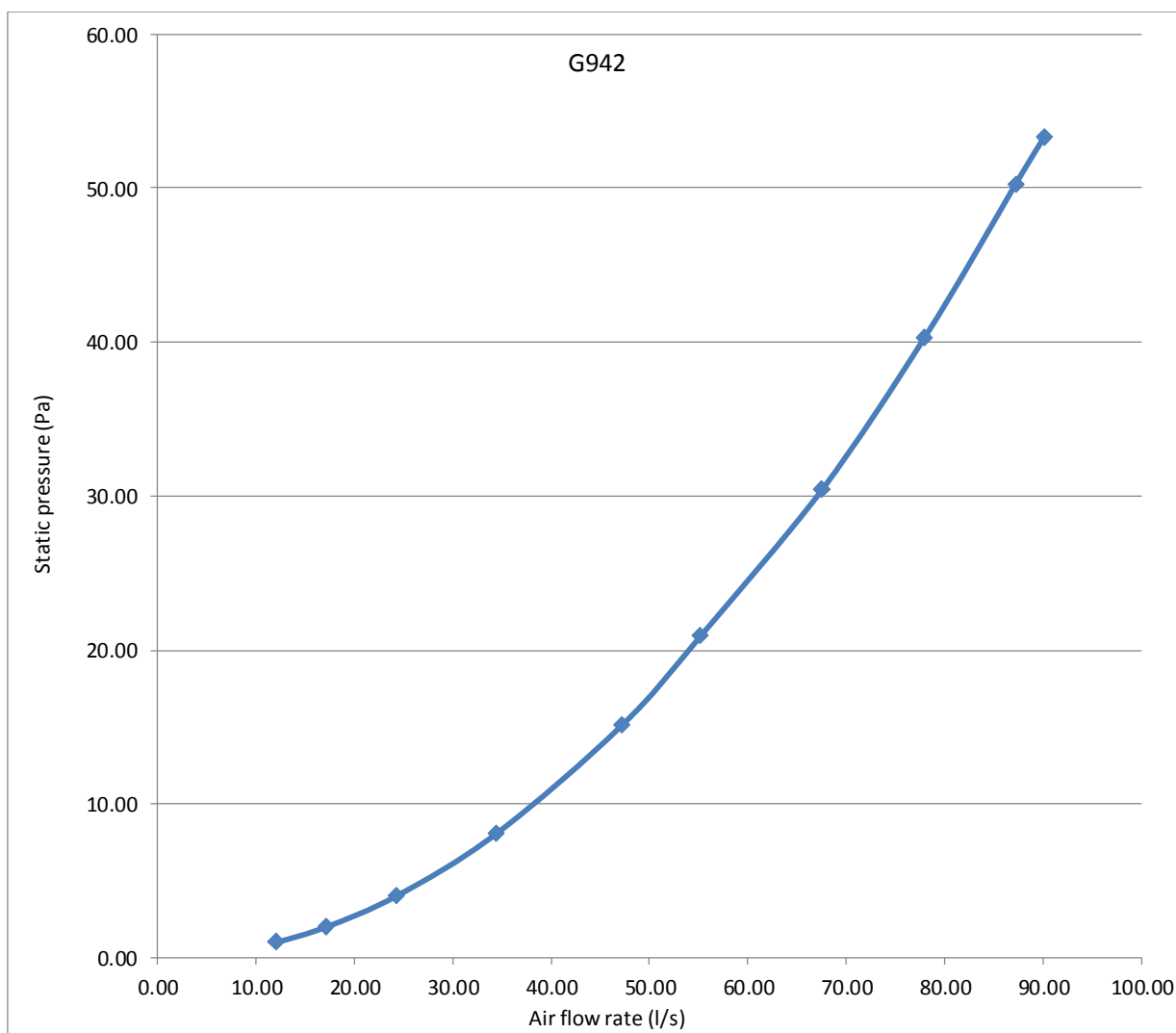


Figure 21 G942. Measured air flow rate/pressure characteristics, air discharged out of the terminal.



G943	
Static pressure difference	Flow rate
[Pa]	[l/s]
1.02	20.02
2.02	28.57
4.04	40.46
8.50	57.60
15.03	78.20
20.08	90.40
30.12	110.00

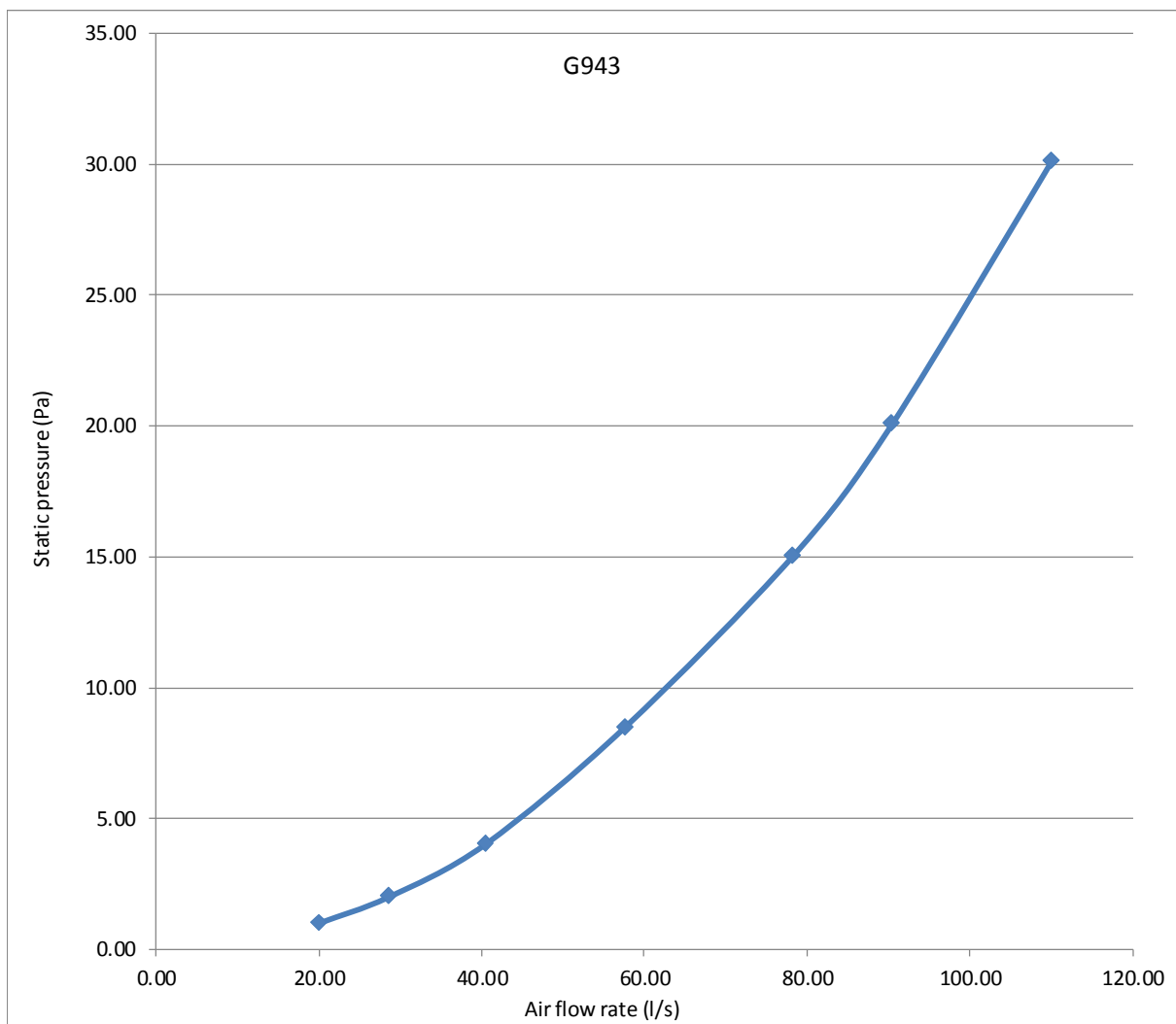


Figure 22 G943. Measured air flow rate/pressure characteristics, air discharged out of the terminal.



CURV Cowled Universal Roof vent 4"	
Static pressure difference	Flow rate
[Pa]	[l/s]
1.03	16.30
2.03	23.70
4.02	33.59
8.06	47.56
15.06	65.90
20.08	76.20
30.10	93.70
40.20	108.80

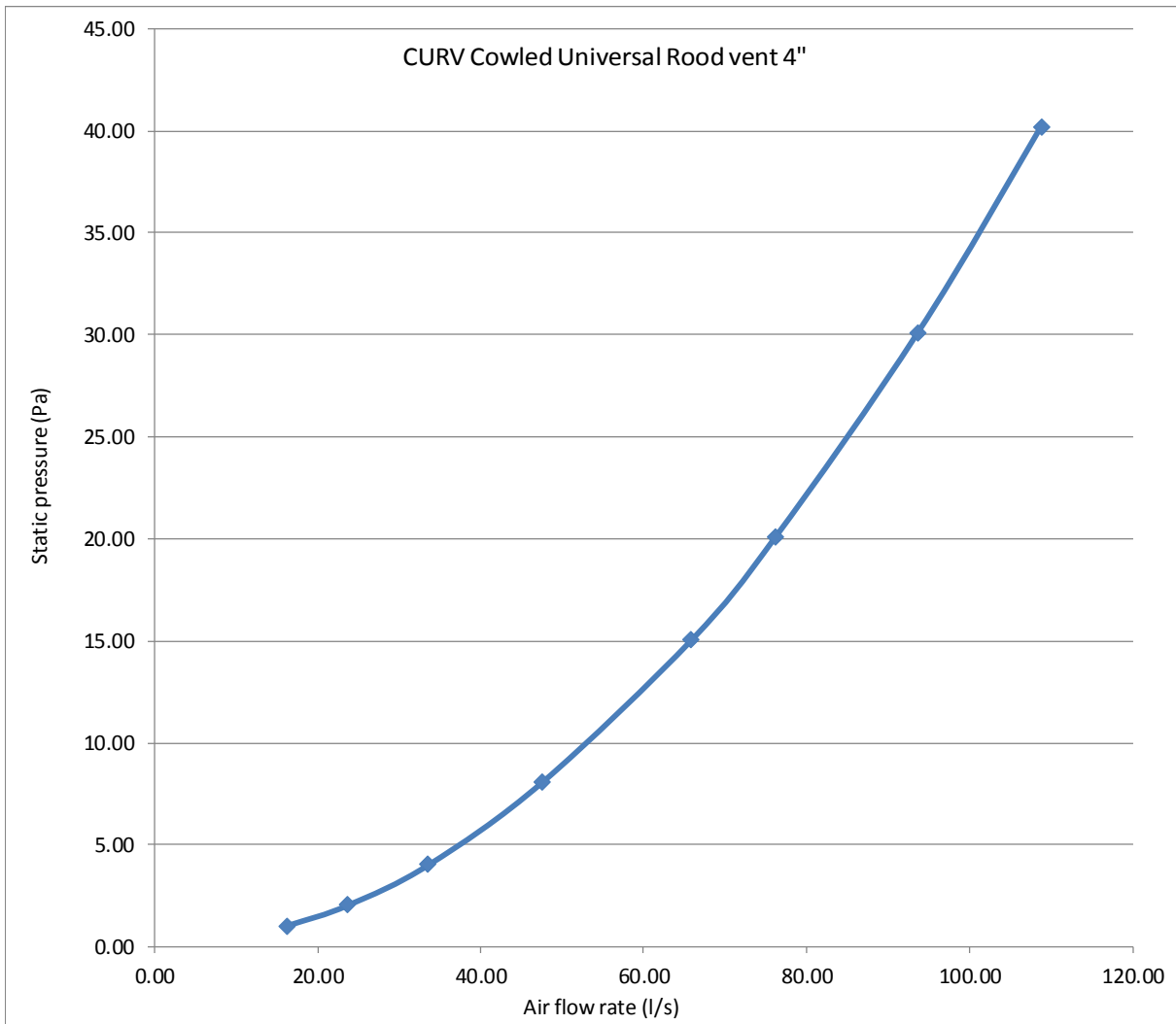


Figure 23 CURV Cowled Universal Roof Vent 4". Measured air flow rate/pressure characteristics, air discharged out of the terminal.



CURV Cowled Universal Roof vent 5"	
Static pressure difference	Flow rate
[Pa]	[l/s]
1.02	11.22
2.03	15.85
4.05	22.42
8.04	31.69
15.09	43.40
20.12	51.30
30.18	62.90
40.02	72.50
50.36	81.40
60.98	90.00

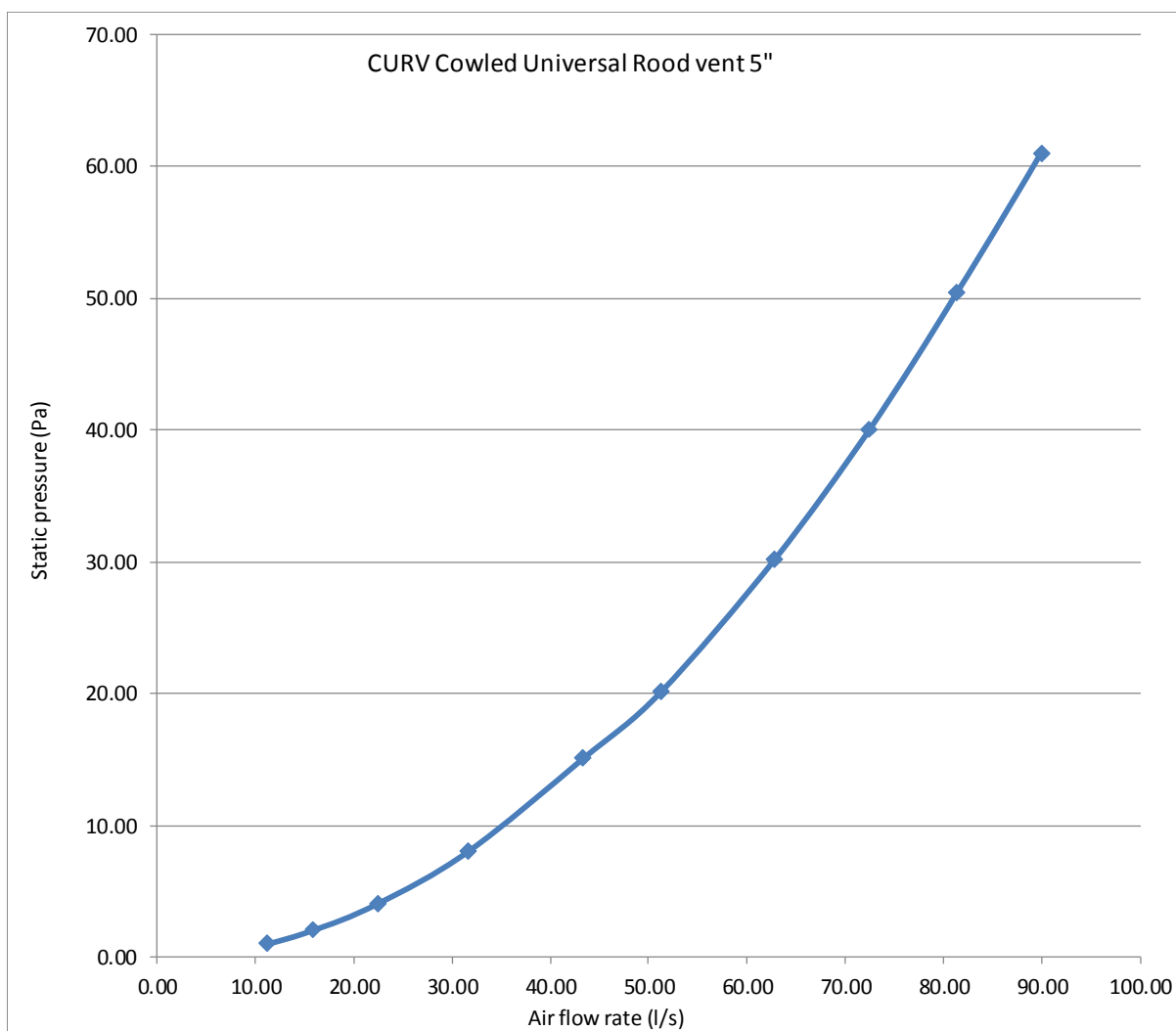


Figure 24 CURV Cowled Universal Roof Vent 5". Measured air flow rate/pressure characteristics, air discharged out of the terminal.



CURV Cowled Universal Roof vent 6" oval	
Static pressure difference	Flow rate
[Pa]	[l/s]
1.01	9.88
2.10	14.21
4.02	19.72
8.05	28.01
15.14	38.53
20.27	44.69
30.14	55.70
40.02	64.40
50.20	72.20
60.04	79.10
70.20	85.40
77.40	90.00

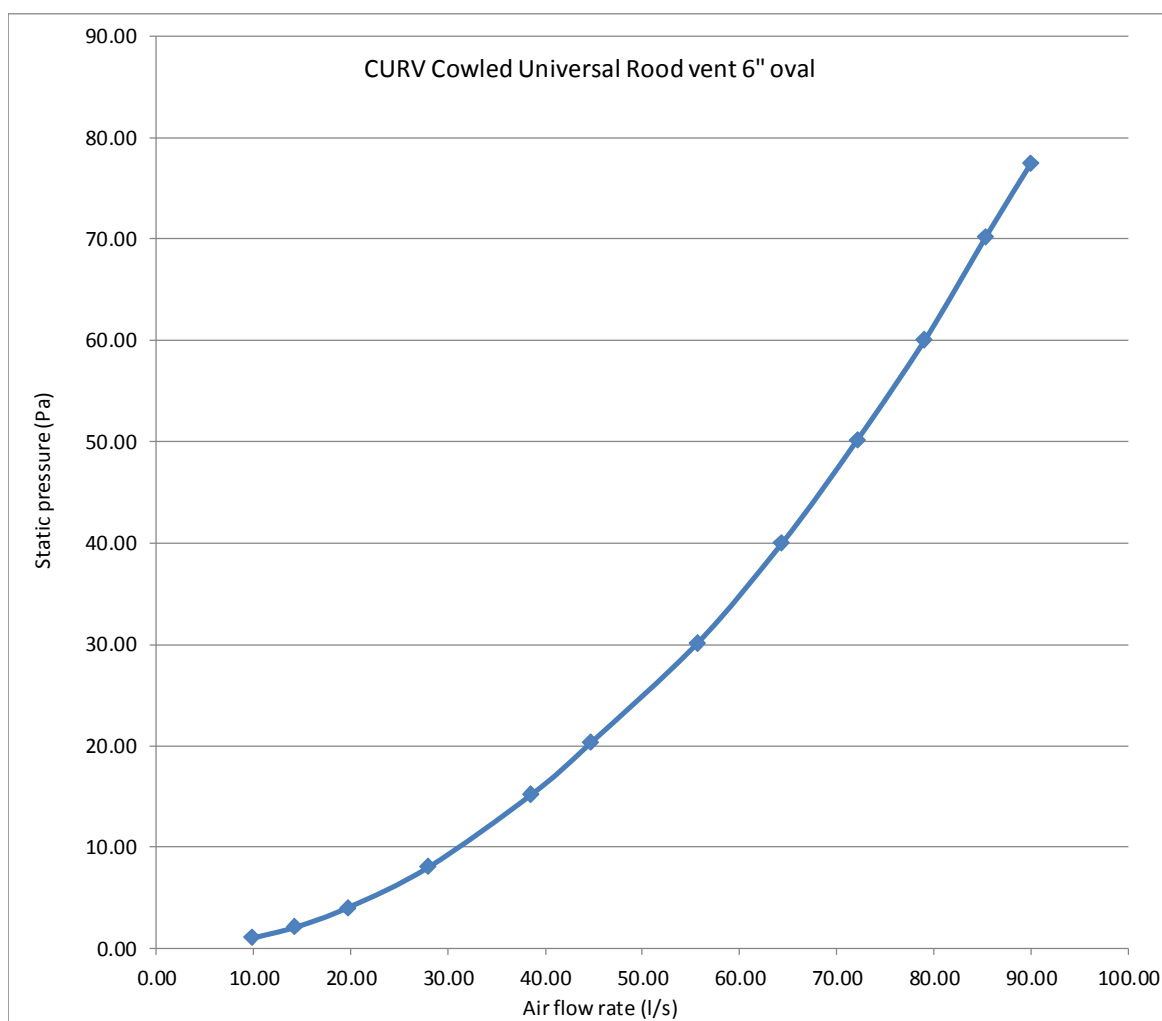


Figure 25 CURV Cowled Universal Roof Vent 6" oval. Measured air flow rate/pressure characteristics, air discharged out of the terminal.



Product	Static pressure at 90 l/s (Pa)
CURV Cowled Universal Roof Vent - 4"	27.8
CURV Cowled Universal Roof Vent - 5"	61.0
CURV Cowled Universal Roof Vent - 6" oval	77.4
G941 Double Air Brick 4" Pipe	38.5
G942 Double Air Brick 5" Pipe	53.2
G943 Triple Air Brick 6" Pipe	20.0

Table 2 Static pressure measured in duct at an exhaust air flow rate of 90 l/s

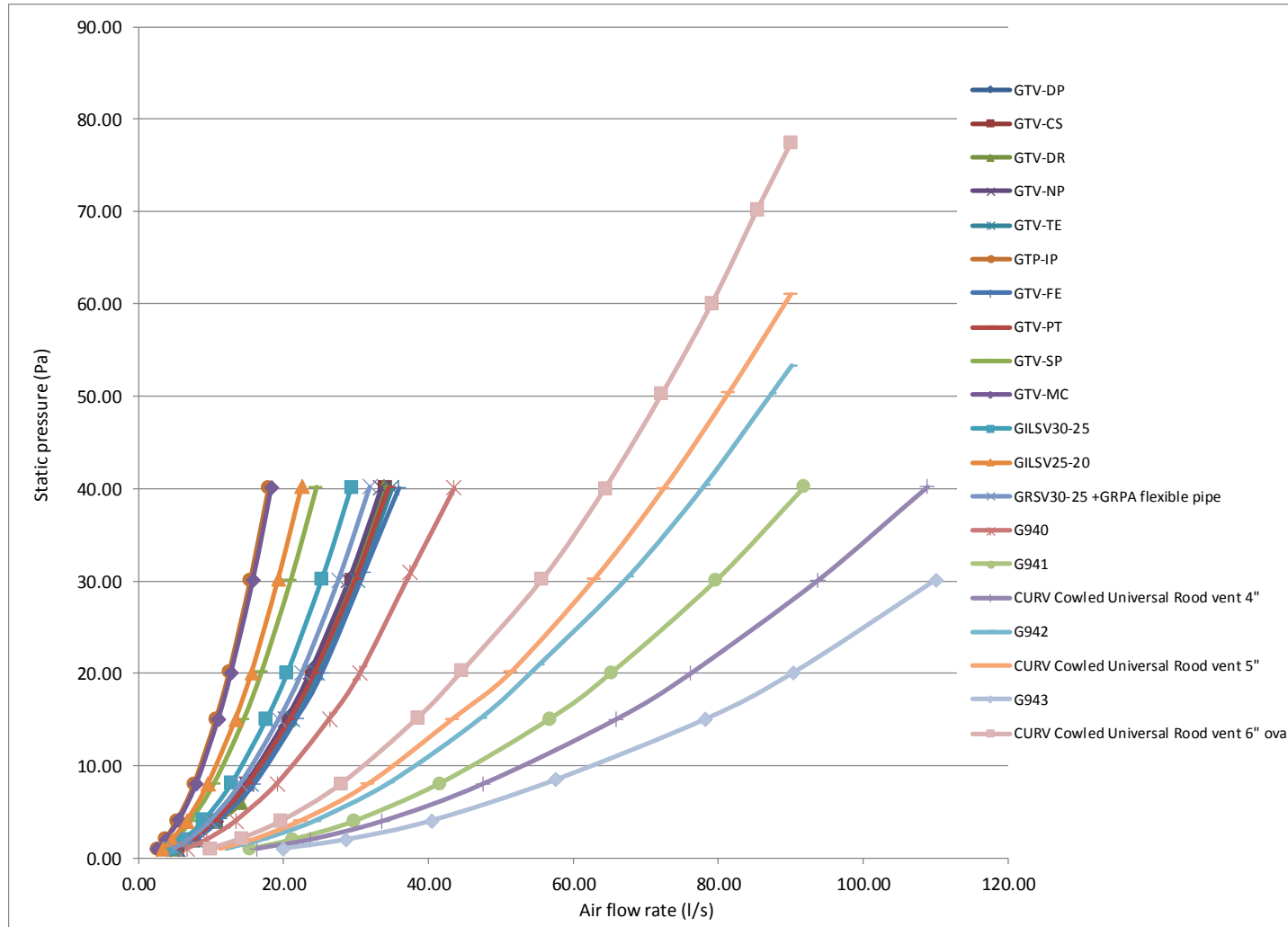


Figure 26 Pressure/flow curves for all products tested