USING VORTAB FLOW CONDITIONERS TO IMPROVE THERMAL DISPERSION FLOWMETER PERFORMANCE

The following is a summary of tests that were conducted to explore the effects of using a VORT AB Flow Conditioner upstream from a Thermal Dispersion Flowmeter. The tests were conducted in air at ambient conditions in a 4” line at the calibration lab of Fluid Components Intl. (FCI). All equipment used in the test are traceable to N.I.S.T. standards. Two FCI GF90 Thermal Dispersion Insertion Flowmeters were selected for the tests. Specimen #1 is a standard GF90 and specimen #2 is a GF90 with a Turbulator attached. The Turbulator is a design modification to the standard GF90 in which a small section of .093” stainless steel weld rod is placed in front of the sensor element to trip the flow into a turbulent state.

Specimen #1 was calibrated without a VORTAB Flow Conditioner installed. The first test run labeled “No Disturbance” on figure #1 is the calibrated GF90 with no upstream flow disturbances. This specimen falls within the GF90 accuracy specification represented by the dashed green lines. When a single elbow, double out of plane elbow, or half open gate valve piping configuration is introduced 8 diameters upstream from the GF90, the accuracy of the flowmeter fails to stay within the GF90 accuracy specification with errors of up to 18% at the higher flow rates.

A VORTAB Flow Conditioner is then installed 3 diameters upstream from the GF90 sensor head. Prior testing has shown three diameters of settling distance between the VORTAB Flow Conditioner and a Thermal Dispersion flowmeter is the optimum distance. Specimen #1 is then re-calibrated with this VORTAB Flow Conditioner as a matched pair. The tests are then repeated and the results are presented on figure #2. The same tests were then repeated with specimen #2 and the results presented on figures 3 and 4.

The data shows the VORT AB Flow Conditioner’s ability to eliminate flow irregularities due to non ideal upstream piping configurations. When matched up with the VORT AB Flow conditioner the GF90 stayed within the accuracy specifications as published for all the tested piping configurations. For the benefit of FCI, the GF90 with the Turbulator, specimen #2, repeated better than specimen #1 showing the benefits of utilizing the Turbulator over this flow range.

Donald Lundberg, Staff Engineer
VORTAB Company

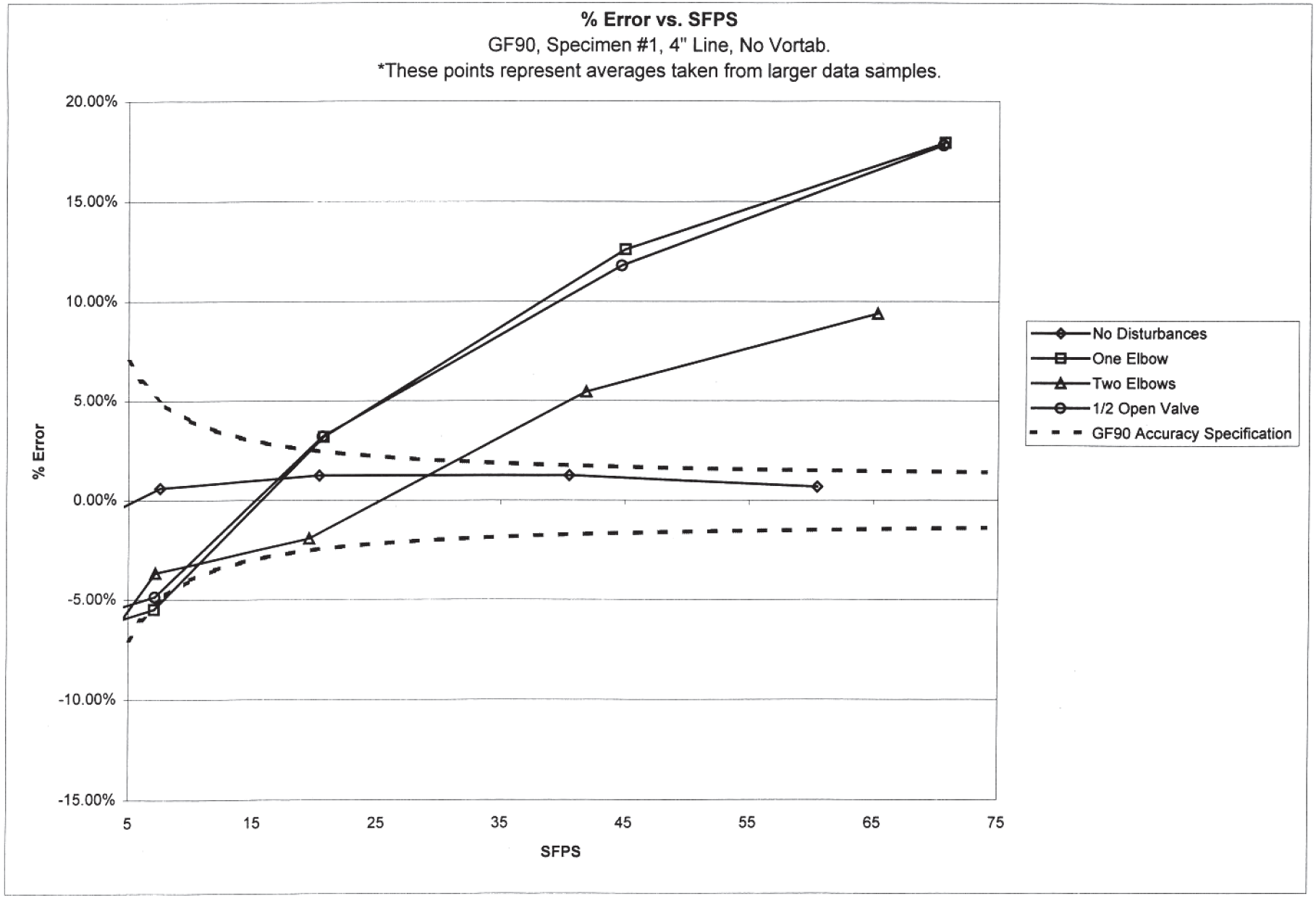
% Error vs. SFPS
GF90, Specimen #1, 4" Line, No Vortab.
*These points represent averages taken from larger data samples.
20.00%
15.00%
10.00%
5.00%
0.00%
-5.00%
-10.00%
-15.00%
% Error
5
15
25
35
45
55
65
75
SFPS
No Disturbances
One Elbow
Two Elbows
1/2 Open Valve
GF90 Accuracy Specification

FIGURE 1

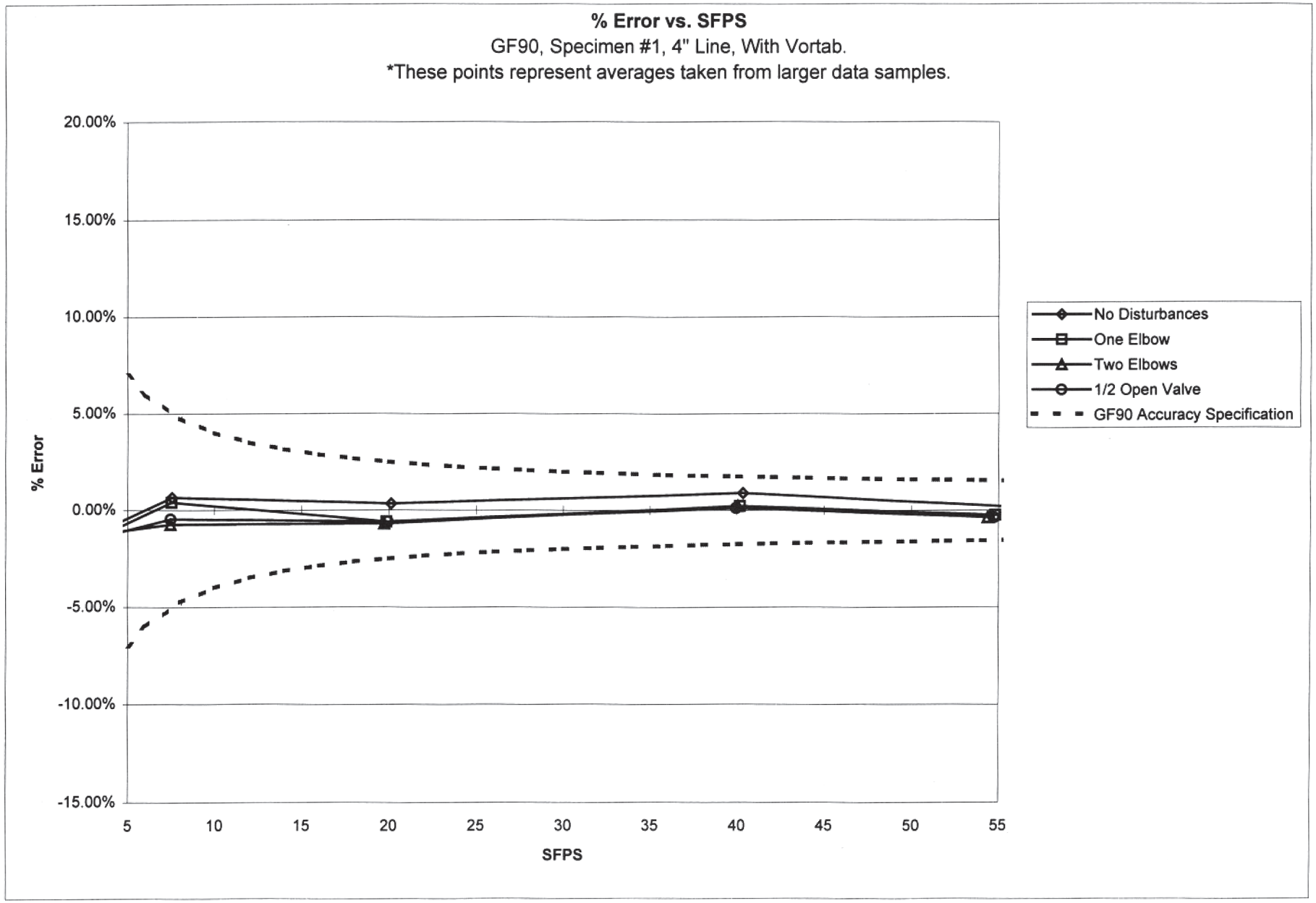
% Error vs. SFPS
GF90, Specimen #1, 4" Line, With Vortab.
*These points represent averages taken from larger data samples.
20.00%
15.00%
10.00%
5.00%
0.00%
-5.00%
-10.00%
-15.00%
% Error
5
10
15
20
25
30
35
40
45
50
55
SFPS
No Disturbances
One Elbow
Two Elbows
1/2 Open Valve
GF90 Accuracy Specification

FIGURE 2

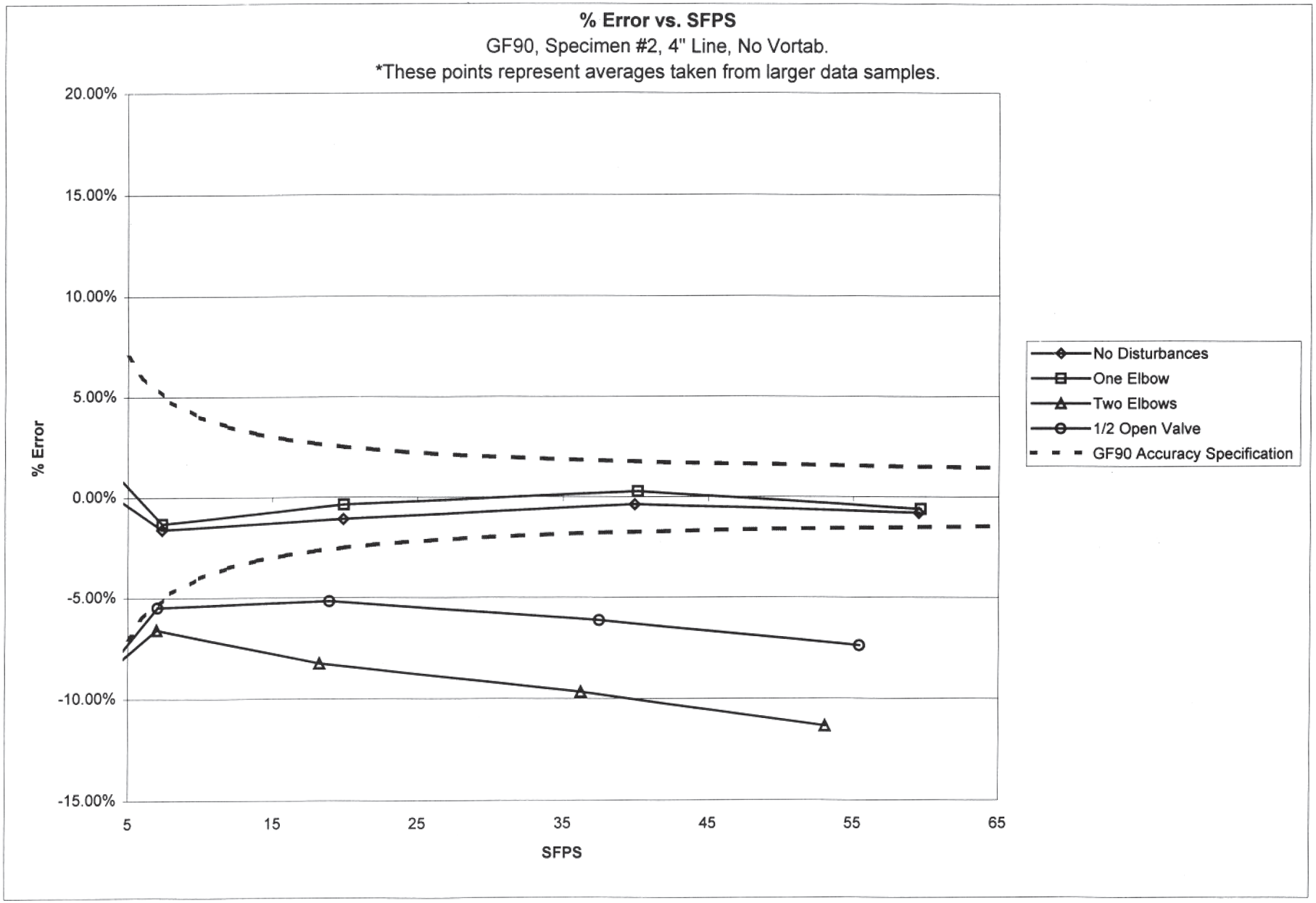
% Error vs. SFPS
GF90, Specimen #2, 4" Line, No Vortab.
*These points represent averages taken from larger data samples.
20.00%
15.00%
10.00%
5.00%
0.00%
-5.00%
-10.00%
-15.00%
% Error
5
15
25
35
45
55
65
SFPS
No Disturbances
One Elbow
Two Elbows
1/2 Open Valve
GF90 Accuracy Specification

FIGURE 3

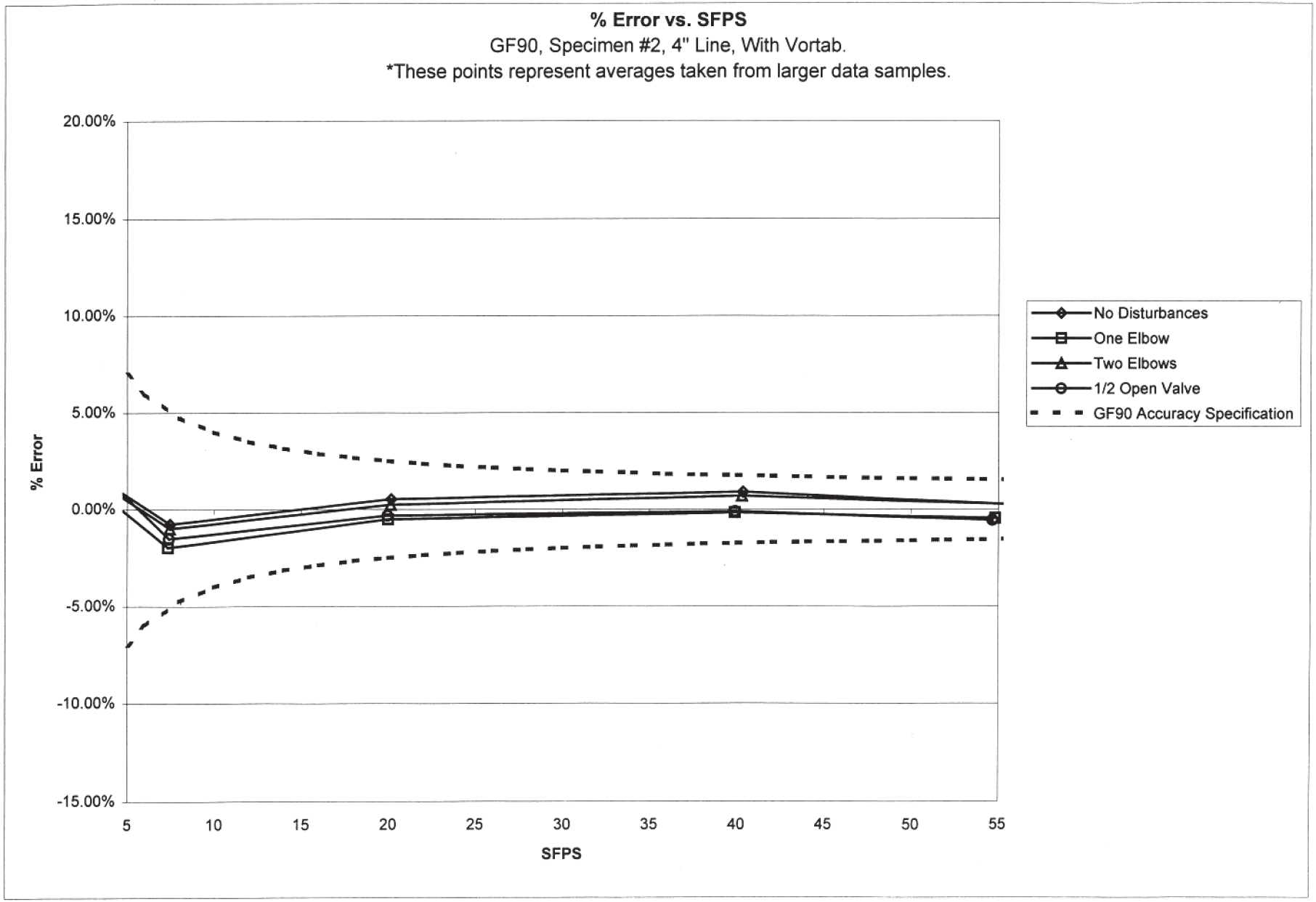
% Error vs. SFPS
GF90, Specimen #2, 4" Line, With Vortab.
*These points represent averages taken from larger data samples.
20.00%
15.00%
10.00%
5.00%
0.00%
-5.00%
-10.00%
-15.00%
% Error
5
10
15
20
25
30
35
40
45
50
55
SFPS
No Disturbances
One Elbow
Two Elbows
1/2 Open Valve
GF90 Accuracy Specification

FIGURE 4

Visit Vortab on the Worldwide Web: www.vortab.com/flow
1755 La Costa Meadows Drive, San Marcos, California 92069-5187 • Phone: 800-854-9959 • 760-736-6114 • Fax: 760-736-6250