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Joseph H. Ruf, David M. McDaniels, Andrew M. Brown

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# Details of Side Load Test Data and Analysis for a Truncated Ideal Contour Nozzle and a Parabolic Contour Nozzle

Joseph H. Ruf<sup>†</sup>, David M. McDaniels<sup>‡</sup> Andrew M. Brown<sup>"</sup> NASA Marshall Space Flight Center, Huntsville, Alabama 35812

#### Abstract

Two cold flow subscale nozzles were tested for side load characteristics during simulated nozzle start transients. The two test article contours were a truncated ideal and a parabolic. The current paper is an extension of a 2009 AIAA JPC paper on the test results for the same two nozzle test articles. The side load moments were measured with the strain tube approach in MSFC's Nozzle Test Facility. The processing techniques implemented to convert the strain gage signals into side load moment data are explained. Nozzle wall pressure profiles for separated nozzle flow at many NPRs are presented and discussed in detail. The effect of the test cell diffuser inlet on the parabolic nozzle's wall pressure profiles for separated flow is shown. The maximum measured side load moment was 45% of that of the parabolic contour. The calculated side load moments, via mean-plus-three-standard-deviations at each nozzle pressure ratio, reproduced the characteristics and absolute values of measured maximums for both contours. The effect of facility vibration on the measured side load moments is quantified and the effect on uncertainty is calculated. The nozzle contour designs are discussed and the impact of a minor fabrication flaw in the nozzle contours is explained.

#### Nomenclature

FSS	= Free Shock Separation
NPR	= Nozzle Pressure Ratio, $P_c/P_{amb}$
NTF	= Nozzle Test Facility
Pc	= Nozzle Total Pressure
Pw	= Nozzle Wall Pressure
Pamb	= Ambient Pressure
P <sub>sep</sub>	= Separation Pressure Ratio, $P_w/P_{amb}$
PÁR	= Parabolic
qRSS	= quasi-Restricted Shock Separation
r*	= Nozzle Throat Radius
RSS	= Restricted Shock Separation
TIC	= Truncated Ideal Contour
х	= Axial Station

 $\sigma$  = Standard Deviation

## I. Introduction

NOZZLE side loads are lateral forces induced by asymmetric pressure distribution in a nozzle. The most severe nozzle side loads occur during the engine start and shutdown transients as the location of the nozzle flow separation moves from the throat region to the end of the nozzle (start) and vice-versa (shutdown). Two common engine failure modes due to side loads are nozzle wall high-cycle fatigue and over loading the engine thrust vector control actuator. Most liquid rocket engines have, at one time or another, had issues due to nozzle side loads. The J-

<sup>&</sup>lt;sup>†</sup> Aerospace Engineer, ER42/Fluid Dynamics Branch, AIAA Member

<sup>&</sup>lt;sup>‡</sup> Aerospace Engineer, ER42/Fluid Dynamics Branch

<sup>&</sup>quot; Lead Aerospace Engineer, ER41/Propulsion Structural & Dynamics Analysis Branch, AIAA Senior Member

2S had excessive side loads such that an entire engine was ripped from its gimbal structure. The Space Shuttle Main Engine had side load induced nozzle coolant line (the "steer-horn") fatigue cracks. More recently, the Japanese LE-7A engine had problems due to nozzle side loads during development.<sup>2</sup>

The European liquid rocket engine, the Vulcain, experiences significant side loads as well<sup>3</sup>. In the 1990's several European organizations joined together as the Flow Separation Control Devices research group to address nozzle side loads. Several experimental and analytical programs were completed that provided new and valuable insight into the nozzle fluid dynamics that are responsible for nozzle side loads<sup>4,5</sup>. However, in the U.S., there was no organized program addressing liquid rocket nozzle side loads.

The work described in this paper are results from an MSFC internally research and development (IRAD) effort begun in 2004 to develop, within the U.S., a nozzle side load test capability including the experience and knowledge base to support future liquid rocket nozzle development. The specific objective of this cold flow test campaign was to determine the relative magnitude of nozzle side loads for two test articles; a truncated ideal contour (TIC) nozzle and a thrust optimized contour, specifically a parabolic (PAR), nozzle. The side load of interest was the net throat bending moment (figure 1) during start and shutdown transients.

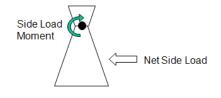


Figure 1. Throat bending moment due to side load.

Ref. 1 was the first paper on the TIC and PAR nozzle tests. This second paper significantly expands the depth of the test data presented. The current paper provides a description of the nozzle test article aerodynamic design. The nozzle wall pressure data presented in Ref. 1 is expanded on and a facility interaction is discussed. A minor fabrication flaw in the nozzle contours and its affect is discussed. The maximum measured side loads for the two nozzle start transients are compared and the magnitude of the side loads calculated via the mean-plus-three-standard-deviations is also presented. The effect of facility vibrations on the measured side load magnitude is explained and assessed.

# **II.** Nozzle Fluid Dynamics

A brief and very basic explanation of the nozzle fluid dynamics that contribute to nozzle side loads follows. Several of the references provide a fuller explanation of nozzle fluid dynamics during start and shutdown. The reader is directed specifically to Refs. 5 through 9.

The key difference between the TIC and PAR nozzles is the presence of an internal shock (see figure 2) in the PAR due to the non-ideal nozzle wall curvature just downstream of the throat. At low nozzle pressure ratio (NPR), P<sub>c</sub>/P<sub>amb</sub>, this internal shock interacts with the separation induced shock (NPR 16, figure 2) and then, as NPR increases, it interacts with the Mach disk (starting at NPR 20 in figure 2). If the internal shock is strong, its interaction with the Mach disk can cause the annular jet of supersonic flow to deflect outward and reattach to the nozzle wall (NPR 21, figure 2). The reattachment results in a recirculation bubble, "restricted", between the separation location and the reattachment location. This transition to reattached flow, i.e., from free shock separation (FSS) to restricted shock separation (RSS), will invariably be asymmetric and is, therefore, a source of potentially large nozzle side loads. A second source, usually the largest, develops when the RSS reattachment location nears the end of the nozzle. The nozzle flow may flip back and forth between FSS and RSS because the nozzle end effects can change the pressure in the reciculating flow (at the wall) in time. Thus, the separation location varies in time, perhaps enough to cause the flow to switch modes.

Conversely, the TIC flow remains in FSS throughout the nozzle start transient (except at very low NPRs) as indicated in the images on the left hand side of figure 2. This continuous FSS flow in a TIC produces significantly lower side loads than the FSS-to-RSS-to-FSS transitions that are possible in a thrust optimized contoured nozzle.

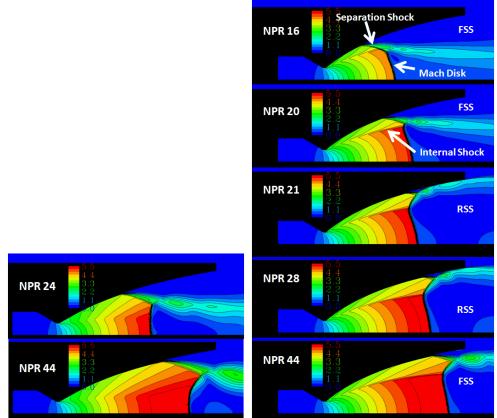


Figure 2. Computational fluid dynamic solutions for the TIC test article (left) at two NPRs and the PAR test article (right) at five NPRs.

# **III.** Experimental Approach

The test approach implemented here was proposed by Dumonv<sup>10</sup> and further developed by Frey, et al<sup>11</sup>. The relatively thick walled nozzle test articles were mounted on a flexible, easy-to-characterize "strain tube" (figure 3). Moments due to off-axis forces were measured with strain gages near the rigidly mounted end of the tube. Two pairs of full-bridges were applied to measure strain in both the horizontal and vertical directions. The nozzle test articles were designed to be relatively stiff so that their throat bending and nozzle ovalization fundamental frequencies were well above the expected excitation frequency range from side loads.

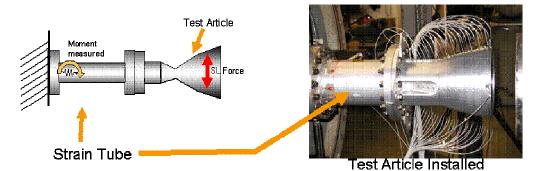


Figure 3. Schematic of the strain tube approach and a picture of the strain tube and a test article installed.

### A. Running Tests

The MSFC Nozzle Test Facility (NTF), figure 4, was designed to measure nozzle thrust performance of a range of simulated altitudes. The nozzle working gas is heated dry air at pressures up to 20 atm. Typical run conditions are nozzle total pressure of 10.2 atm (150 psia) at 66° C (150° F). The NTF's two stage ejector system can pull the test cell pressure down to simulated altitudes greater than 30 km (100,000 ft).

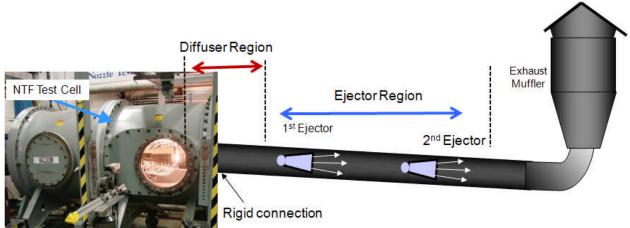


Figure 4. The NTF test cell with a nozzle test article installed and a schematic of the diffuser and ejector system.

For side load testing the axial thrust measurement system was replaced with a 51 mm (2 in) thick steel plate (figure 5) to provide a rigid, "fixed-end" mount for the strain tube.

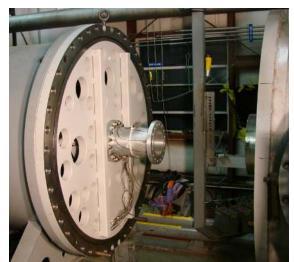


Figure 5. Stiffener plate added to the NTF shown with the strain tube attached.

Typical operating procedure in this test series was to bring the nozzle test article total conditions to set point, 10.2 atm (150 psia), 66° C (150° F), without the ejectors running. This set point was maintained throughout the test. The NPR, prior to the ejectors being turned on, was about 10 which resulted in the nozzle flow separating just downstream of the throat. The red line in figure 6 illustrates a typical NPR time history from one test in which 35 nozzle start transients were simulated. The low-speed data system recorded continuously through the test. High frequency data was recorded during the simulate nozzle start transients and for about 15 seconds at the constant NPR set points.

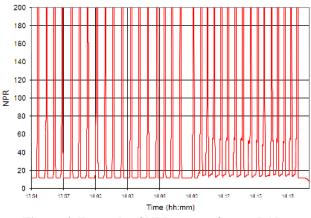


Figure 6. Example of NPR ramps from a PAR test.

To produce the simulated nozzle start transients the ejector drive gas was turned on to lower  $P_{amb}$  enough to induce the nozzle test article to flow full. The ejector drive gas flow was then reduced, the test cell returned to near atmospheric pressure and the nozzle flow was again separated just downstream of the throat. This cycle could be repeated, as many as 35 times in one "test", until the ejector drive gas supply ran low. A test could run as long as 40 minutes.

This constant  $P_c$  with decreasing  $P_{amb}$  approach to simulating a nozzle start transient is the inverse to a typical engine start transient where  $P_c$  increases and, if not in a closed test cell,  $P_{amb}$  is constant. This approach was used in the NTF because reaching a set point for the test article total conditions has a longer time constant than the ejector system. By using the ejector system to create the dNPR/dt, the NPR ramp rates were better controlled and realistic (absolute, but not scaled) time scales for filling the nozzle were obtained.

The NPR time histories of simulated start transients are shown in figure 7 on a finer time scale. A variety of simulated start NPR ramp rates was achieved by varying the timing of the start commands for the two ejectors and rate at which their drive gas was increased. Both figures 6 and 7 are plotted from the low-speed (¼ s time-averaged) data system. The time histories in figure 7 provide insight to the general trends for NPR for each nozzle transient. The NPR time history for each start transient had to be evaluated with the high frequency data as well to ensure that an interaction with the diffuser inlet did not influence the side load data.

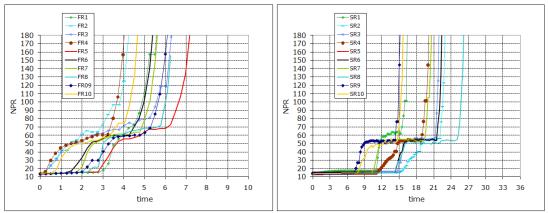


Figure 7. Example NPR ramps rates achieved for the same PAR test.

Figures 6 and 7 were generated from data recorded on the low-speed data system. The low-speed system recorded all facility conditions and test article data continuously over the length of a test run at 4 Hz. The static pressures were sampled at 600 Hz, averaged over approximately <sup>1</sup>/<sub>4</sub> second intervals and recorded at 4 Hz. The high-speed data system, recorded at 20,480 Hz, was turned on to capture each simulated nozzle start transient and constant NPR set point. The high-speed system recorded the test article total pressure, test cell pressure, nozzle wall dynamic pressure and the strain gage signals.

The test article exits were relatively close to the diffuser inlet sleeve. The diffuser inlet sleeve can just be seen in the right hand side of the test cell window in figure 4 and in the right and image in figure 3. During the start transients, there were times when the  $P_{amb}$  was increasing, instead of decreasing as desired, due to interactions between the nozzle flow, the diffuser inlet and the two ejectors downstream. Increasing  $P_{amb}$  (or decreasing NPR in this test approach) meant that a net mass flow was coming into the test cell through the diffuser pipe, instead of going out. This mass flow, referred to as diffuser "backwash" here, buffeted the test article producing a load source other than those from nozzle flow separation. The approach taken to filter out potential backwash-corrupted side load data is addressed, briefly, in section IV F.

Nozzle shutdown transients require decreasing NPR. For this test approach, with constant nozzle  $P_c$ , the  $P_{amb}$  would have had to increase. Due to the phenomena just discussed, testing in the NTF could not properly simulate the nozzle shutdown transients.

The testing was conducted over a period of 15 months. The nozzle wall pressure data was recorded in the earlier tests. The side load moment measurement technique took longer to refine, therefore, that data was obtained in the later test series. The side load moment data discussed in this paper was obtained in two tests of 35 simulated nozzle starts for both the TIC and PAR nozzle test articles, resulting in a total of 70 simulated starts for each nozzle

#### **B.** Nozzle Test Article Design

The TIC and PAR contours and as-designed nozzle wall pressures are shown in figure 8. The TIC test article contour was developed by first calculating a full length ideal contour with an ideal bell nozzle code<sup>12</sup>. That contour was then evaluated with TDK02<sup>13</sup> to verify the nozzle's design objectives had been met and to obtain higher resolution of the contour geometry. It was then truncated at 79% length of an equivalent 15° conical nozzle of the same area ratio (AR). The truncation length was chosen so the desired nozzle wall pressure ratio,  $P_w/P_c = 0.0025$ , existed at the exit. This nozzle wall exit pressure ratio was desired because it would result in nozzle flow separations over a range for which the NTF test cell pressure was easy to control.

The PAR nozzle contour was developed using the skewed parabola option in the TDK02<sup>13</sup>. The throat expansion angle, 40°, was chosen higher than might otherwise be typical for a thrust optimized nozzle. Being the first, and possibly only, thrust optimized contour test article to be fabricated it was desired that the PAR test article definitely have the transition to RSS. The high initial throat angle would ensure this IRAD task was able to measure and compare side loads of a TIC nozzle contour without the FSS-to-RSS transition to side loads of a thrust optimized nozzle contour with FSS-to-RSS transition.

The PAR length and contour exit angle were adjusted so that the transition to RSS would occur at an NPR that was neither too low nor too high. This last judgment was subjective. Computational fluid dynamic simulations performed during the test article design phase indicated the transition to RSS would occur at about NPR 24.

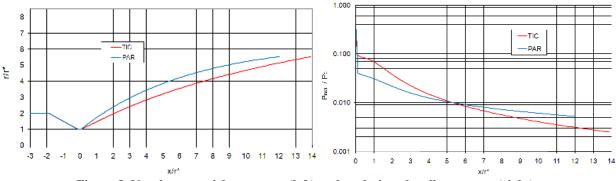
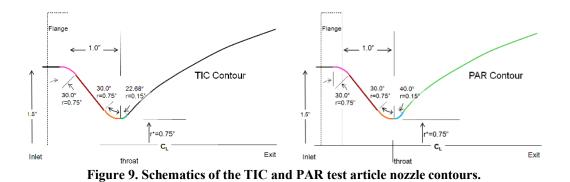


Figure 8. Nozzle test article contours (left) and as-designed wall pressures (right).

The schematics of the test article contours (figure 9) show that the convergent portions and throat diameters were the same. The radius of the initial divergence downstream of the throat was the same as well. However, the total angle of that initial divergence was different. The perfect nozzle code designed the TIC initial expansion of 22.68° and, as discussed above, the PAR initial expansion of 40° was iterated to.



The radius of this initial expansion was chosen as 20% of the throat radius or 3.8 mm (0.15 in). The result was that this critical portion of the nozzle contour had high wall slope gradients. Only after completion of fabrication was it realized that the machining tolerances specified for this region were insufficient to replicate the desired contours. The result of this design oversight is that the test articles both have a small contour discontinuity in the region of the throat. The discontinuities are raised bumps just perceptible to a finger running along the nozzle contour. They are estimated to be between 0.025 and 0.08 mm (1/1000<sup>th</sup> and 3/1000<sup>th</sup> in). These bumps feel like they are just downstream of the throat and that they are consistent in shape and size in azimuth. The bump in the TIC nozzle feels slightly more prominent than the one in the PAR nozzle. After some additional testing effort, it was concluded that these contour flaws did not alter the separation characteristics of the nozzle flows. This conclusion was later borne out by a similar set of test articles that did not have this contour flaw.

The test articles (figure 10) were fabricated from aluminum. They both have an AR of 30.5, with a throat diameter of 38.1 mm (1.5 in). The test articles have the same mass and center of gravity so that the strain tube and nozzle system has the same response with either nozzle. Two rows of static pressure ports were machined into the nozzles staggered slightly about the 0° and 180° azimuths. The axial spacing of the static pressure ports was 8.6 mm (0.34 in). The high frequency pressure ports were in line at the 90° and 270° azimuths with an axial pitch of 17.3 mm (0.62 in).

The PAR nozzle is physically shorter than the TIC nozzle. The axial pitch between that static and dynamic pressure ports was kept the same for both nozzles; therefore, the PAR has slightly fewer measurements. In the test articles there were approximately 30 static pressures in each azimuthal row and approximately 14 high frequency pressure ports in each azimuthal row.

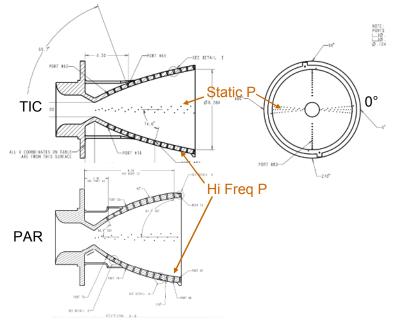


Figure 10. Cross-sections of the TIC and PAR nozzle test articles.

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#### C. Calibration of the Strain Gages and Filtering

Calibration of the strain gages was achieved by hanging weights from a system of knife edges and pulleys designed such that pure horizontal and vertical static loads were applied. These loads produced a moment and a measureable strain at the strain gage location. A full factorial experimental design was used, providing every combination of loads in a 2-factor, 5-level matrix. Strain tube temperature was carefully maintained with a small flow of temperature controlled air through the strain tube during the calibration process. This calibration data (a response surface using multiple linear regressions) was then used to calculate the moment in both directions as a function of the strain gage measurements.

The TIC and PAR test articles were designed to have the same masses and centers of gravity so that when mounted on the strain tube the strain tube/nozzle system would have the same fundamental frequencies. The fundamental frequency for the strain tube/TIC nozzle system was 207.5 Hz and for the strain tube/PAR nozzle system it was 215 Hz. Note that these frequencies were within the range of expected side load excitation frequencies. This was a design compromise made early on to ensure the strain induced in the tube was sufficiently large to be measured accurately. The effect on the strain gage frequency domain is shown in figure 11. The black lines show peaks due to resonance at their respective fundamental frequencies.

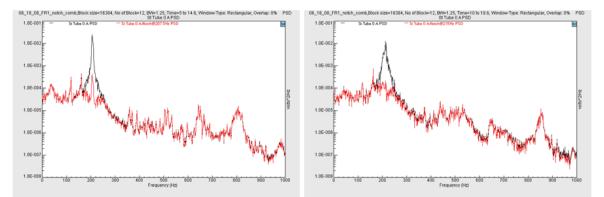


Figure 11. Frequency content of the strain gage signal of TIC (left) and PAR (right) before (black) and after (red) filtering.

The strain gage measurements reflect the equivalent, instantaneous static load on the tube. Since the actual load is extremely dynamic and excites the resonant frequency of the strain tube/nozzle system, the strain gage measurement, without a correction, would have been a largely inaccurate measurement of the applied load. It was determined that if the system resonance effect was filtered out, the remaining part of the strain gage signal was essentially equal to the static loading due to the aerodynamic side load forces<sup>14</sup>. To further reduce the impact of system dynamics on the conclusions drawn from the test data the filtered side load moments were normalized by the maximum measured moment (from the filtered data). This normalizing of the data determines the relative magnitude of side load moments for the two nozzle contours over their start transients.

The filter applied to remove the effect of the resonance from the strain gage signal was a "notch" filter, 45 Hz wide, with 1023. The width of the filter was selected by examining the response power spectral densities. The value of  $\pm 22.5$  Hz around the resonant peak spanned the region in which the response appeared to be magnified by the resonance. The red lines in figure 9 show the effect of the 45 Hz-wide notch filter on the strain gage signal. Further details of the effort to determine the true value of the aerodynamic force (the side load) from the test data can be found in Ref. 14.

The strain gage signals,  $P_c$  and  $P_{amb}$  were recorded at 20,480 Hz. After filtering of the strain gage signal these three measurements were imported into MATLAB. The calibration equations were applied to the strain gage signals to convert them to engineering units of side load moment. The NPR was calculated for each data point from a running average over 128 of the  $P_c$  and  $P_{amb}$ . The  $P_c$  signal was very steady and the averaging of it was not really necessary, however, the  $P_{amb}$  value varied about a small but non-trivial amount continuously.

To make the volume of data more manageable the data was grouped into different "bins" of NPR (Table 1). Depending on the rate of change of NPR the bins for a single simulated nozzle start could have between a few hundred and several hundred thousand data points. For each of these bins of data the maximum, minimum, mean and standard deviation ( $\sigma$ ) of nozzle side load moment were calculated.

bin		bin	bin		bin
minimum	bin center	maximum	minimum	bin center	maximum
12.0	13.0	14.0	61.0	62.5	64.0
14.0	15.0	16.0	64.0	66.0	68.0
16.0	17.0	18.0	68.0	70.0	72.0
18.0	19.0	20.0	72.0	74.0	76.0
20.0	21.0	22.0	76.0	78.0	80.0
22.0	23.0	24.0	80.0	82.0	84.0
24.0	25.0	26.0	84.0	86.0	88.0
26.0	27.0	28.0	88.0	90.0	92.0
28.0	29.0	30.0	92.0	94.0	96.0
30.0	31.0	32.0	96.0	98.0	100.0
32.0	33.0	34.0	100.0	102.5	105.0
34.0	35.0	36.0	105.0	107.5	110.0
36.0	37.0	38.0	110.0	112.5	115.0
38.0	39.0	40.0	115.0	117.5	120.0
40.0	41.5	43.0	120.0	122.5	125.0
43.0	44.5	46.0	125.0	127.5	130.0
46.0	47.5	49.0	130.0	132.5	135.0
49.0	50.5	52.0	135.0	137.5	140.0
52.0	53.5	55.0	140.0	142.5	145.0
55.0	56.5	58.0	145.0	147.5	150.0
58.0	59.5	61.0	150.0	152.5	155.0

Table 1. Bins of NPR

# **IV.** Results

# A. Nozzle Wall Pressure

Nozzle wall pressures ( $P_w$ ) were recorded at 4 Hz in the low-speed data system. To obtain the  $P_w$  profiles the NPR was held constant or the ramp rate was sufficiently slow that valid static pressure data was recorded. The pressure measurements presented previously<sup>1</sup> were recorded in tests with the diffuser inlet approximately 76 mm (3 in) downstream of the TIC nozzle exit plane and 127 mm (5 in) downstream of the PAR nozzle exit plane (figure 12.) At this distance downstream it appears the diffuser inlet had no or minimal effect on  $P_w$ . This data is presented in further detail the current paper.

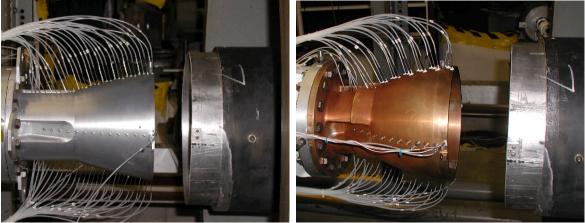


Figure 12. Diffuser inlet position with test articles installed; TIC (left) and PAR (right).

At the time those  $P_w$  datasets were recorded the side load measurements technique was still being refined. Subsequent facility modifications and changes to the test approach improved the side load measurements. One of the changes made was to move the diffuser inlet closer to the nozzle exit plane in an attempt to reduce plume spillage and enable better control of the test cell pressure (i.e.,  $P_{amb}$  for the test articles). The side load data reported in Ref. 1 and in further detail in this paper was recorded with the diffuser inlet approximately 32 mm (1.25 in) downstream of the nozzle exit plane. Unfortunately, the time available to perform these tests was limited and the pressure instrumentation was not hooked up. Therefore,  $P_w$  datasets do not exist for the tests in which side load moment data was recorded.

However, in between those two test series, PAR  $P_w$  was recorded with the diffuser approximately 51 mm (2 in) downstream of the nozzle exit plane. In this test series, the close proximity of the diffuser inlet induced a different behavior of nozzle flow separation vs. NPR. This "with diffuser effect" PAR  $P_w$  dataset is presented after the PAR data with the diffuser inlet at 127 mm downstream (i.e., no or minimal diffuser inlet effect on the data). The diffuser inlet effect did not change the shape of  $P_w$  profiles. It did, however, move the separation location downstream for a given NPR.

The TIC nozzle was not tested with the diffuser inlet close to the nozzle exit other than in the tests in which side loads were recorded. Hence, no TIC  $P_w$  data with diffuser inlet effect is available. Table 2 lists the tests, diffuser inlet positions and data just discussed.

		Wall	Diffuser Dist.			
		Pressure	Downstream	Diffuser Effect	Good Side	
Nozzle	Test Date	Data	(mm)	on Nozzle Flow	Load Data	Notes
TIC	Early Spring '07	Yes	76	minimal to none	No	Subset of $P_w 1^{st}$ presented in "Ruf, AIAA JPC 2009". Presented in finer detail here.
PAR	Spring '07	Yes	127	minimal to none	No	Subset of $P_w 1^{st}$ presented in "Ruf, AIAA JPC 2009". Presented in finer detail here.
PAR	Fall '07	Yes	51	yes	No	New data, P <sub>w</sub> presented here.
TIC	Summer '08	No	32	likely	Yes	Side Load Moments 1 <sup>st</sup> presented "Ruf, AIAA JPC 2009". Presented in finer detail here.
PAR	Summer '08	No	32	likely	Yes	Side Load Moments 1 <sup>st</sup> presented "Ruf, AIAA JPC 2009". Presented in finer detail here.

Table 2. Nozzle tests and data presented the current paper.

10 American Institute of Aeronautics and Astronautics The remainder of this subsection on  $P_w$  presents the TIC and then the PAR  $P_w$  recorded in the spring of 2007. As mentioned above, these  $P_w$  appear to have been unaffected by the diffuser inlet effect. The PAR  $P_w$  recorded in fall of 2007 follow. The two sets of PAR  $P_w$  are then compared to illustrate the diffuser inlet effect.

#### 1. TIC Nozzle Wall Pressures

The TIC  $P_w$  data presented here is from the same dataset presented in 2009<sup>1</sup>. The diffuser inlet was located 76 mm downstream of the nozzle exit plane. As discussed above it is believed the diffuser inlet did not significantly alter the nozzle flow separation characteristics.

Figure 13a compares the measured full flowing  $P_w$  to the as-designed  $P_w$ . Figure 13b presents the difference between the measured and the as-designed  $P_w$ . The differences are non-trivial for the first half of the nozzles and likely result from the aberrations of the as-built throat contour.

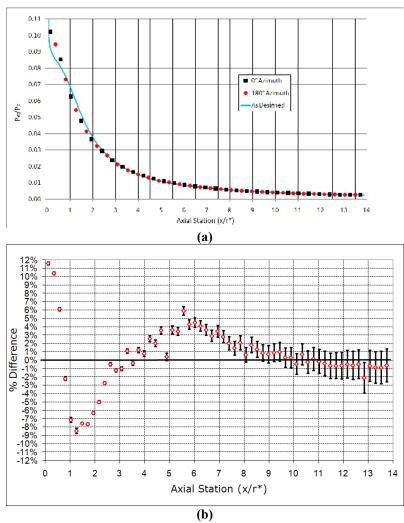


Figure 13. TIC normalized P<sub>w</sub> compared to the as-designed.

Figures 14 and 15 present the TIC test article's  $P_w$  data for the 0° and 180° azimuth measurements, respectively, in two nondimensional forms. The profiles show the typical FSS characteristics of a TIC nozzle; a sharp rise in the wall pressure at the separation point, a plateau pressure close to  $P_{amb}$  and then disappearance of the plateau as the separation location approaches the nozzle exit plane.

The NPRs plotted were chosen to document the  $P_w$  profile that existed when the separation location was at each pressure measurement location. The NPRs plotted in figure 14 are different than those in figure 15 because the measurements were at different axial stations on the two azimuths. The NPRs above 11 were recorded during the main part of a test when the nozzle's  $P_c$  was constant at the set point. Those data are from times when the nozzle test

11 American Institute of Aeronautics and Astronautics conditions were stationary (no significant changes in the NPR in time). The NPRs below 11 were recorded at the end of a test, after the ejectors were turned off, while the nozzle  $P_c$  was decreasing. The change in the NPR and the  $P_w$  was slow enough to obtain reasonably accurate static pressure measurements. Therefore, although the test conditions were not stationary, the five  $P_w$  profiles below NPR 11 (three on the 0° azimuth and two on the 180° azimuth) are effectively stationary data.

The maximum NPR in the  $P_w/P_c$  plots of figures 14 and 15 are 380.4 and 164.2, for the 0° and 180° azimuths, respectively. At those NPRs the last measurement location,  $x/r^*=13.733$  and 13.507, on the respective azimuths, became insensitive to  $P_{amb}$ . The  $x/r^*=13.507$  behaved similar to the rest of the pressure measurements in that its value was affected by the separated flow until the flow separation location moved downstream of it, at which time it then became a constant value. The  $x/r^*=13.733$  measurement, however, behaved different from the other  $P_w$  measurements because it was essentially at the nozzle exit plane. The nozzle exit was at  $x/r^*=13.812$ , only 0.079  $x/r^*$  units (1.5 mm or 0.059 in) downstream of the  $x/r^*=13.733$  measurement. Close inspection of the  $x/r^*=13.733$  data indicates that up to an NPR of about 175 that measurement location was affected by flow separation. Above approximately 175 and up to 380.4 the pressure did not become a constant value (as the other  $P_w$  measurements had) but tracked  $P_{amb}$  closely. This measurement was close enough to the nozzle exit plane for the  $P_{amb}$  to communicate upstream through the subsonic part of the nozzle's boundary layer.

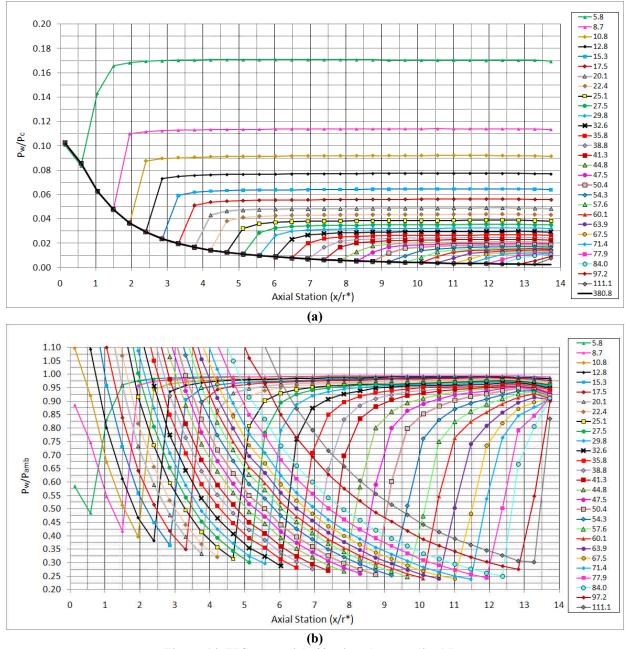


Figure 14. TIC test article 0° azimuth normalized P<sub>w</sub>.

The decrease seen in the  $P_w/P_{amb}$  profiles at the last three measurements was due to local flow acceleration as ambient air was pulled into the recirculation region downstream of the nozzle flow separation. The normalized profiles for full flowing nozzles are included in the  $P_w/P_c$  plots, however, they are omitted from the  $P_w/P_{amb}$  plots because the full flowing nozzle  $P_w$  profiles, when normalized by  $P_{amb}$ , provide no insight to the nozzle flow separation location. The values plotted in figures 14 and 15 are presented in tabular form in Appendix A of this paper (tables A1a through A2b).

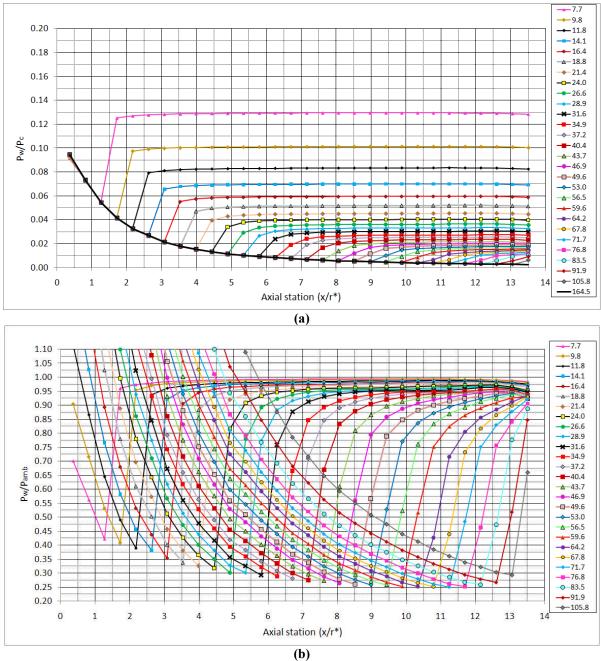


Figure 15. TIC test article 180° azimuth normalized P<sub>w</sub>.

The separation pressure ratio ( $P_{sep}$ ) is the ratio of  $P_w/P_{amb}$  at which, for a given location, the flow will just remain attached. At a slightly lower ratio (either due to lower  $P_w$  or higher  $P_{amb}$ ) the flow would separate from the nozzle wall at that location. The NPRs plotted in figures 14 and 15 were chosen such that when  $P_w$  was normalized by  $P_{amb}$  as in 14(b) and 15(b) the  $P_{sep}$  is evident for each  $P_w$  measurement location. These  $P_{sep}$ , as a function of axial station, for both azimuths are presented in figure 16. The two curves agree down to x/r\* of about 8 at which point they diverge up to a maximum difference of about 1% of  $P_{amb}$ . This difference may have resulted from asymmetries in the nozzle hardware. However, it also could have been the result of instrumentation effects. The pressures on the two azimuths were measured via separate, independent modules. The values plotted in figure 16 are the red colored, bold text in Tables A1band A2b in Appendix A.

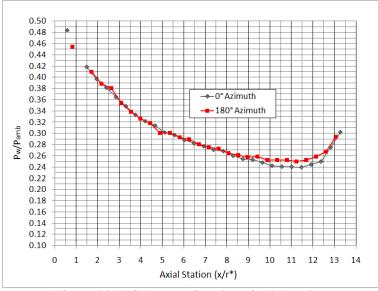


Figure 16. TIC P<sub>sep</sub> as a function of axial station.

Pressure was measured at four circumferential locations on the nozzle base (the downstream facing surface at the nozzle exit plane) as indicated in figure 17. Those four pressures were averaged (called " $P_{base}$ ") and normalized by  $P_{amb}$  (figure 18).

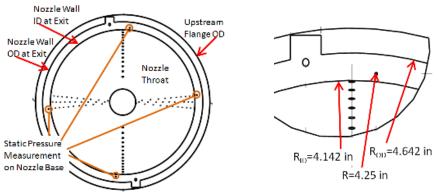


Figure 17. View of nozzle looking upstream (left) and an enlargement (right).

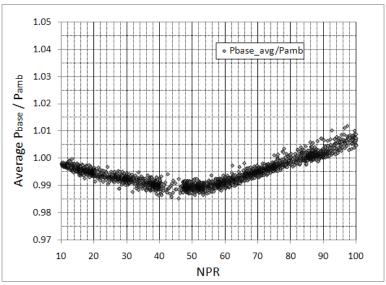


Figure 18. TIC average P<sub>base</sub>. Diffuser inlet 76 mm downstream.

The variation of the  $P_{base}/P_{amb}$  curve with NPR was caused by the decrease in  $P_{base}$  due to the acceleration of the test cell air over the nozzle aft lip. The acceleration was induced by the less-than- $P_{amb}$  pressure that developed in the recirculation zone downstream of the separation location.

#### 2. PAR Nozzle Wall Pressures

Figures 19 through 24 present the PAR test article  $P_w$  recorded in the first test series when the diffuser inlet was approximately 127 mm (5 in) downstream of the nozzle exit plane. This  $P_w$  data is from the same set of test data presented in the 2009 paper<sup>1</sup>. In this test series the diffuser inlet effect did not appear to have a significant effect on the separation characteristics of the nozzle flow. As discussed previously, the side load moment measurement technique was not yet refined when this  $P_w$  data was obtained. Therefore, good side load moment data does not exist for the PAR nozzle when unaffected by the diffuser inlet.

Figure 19a compares the PAR nozzle normalized  $P_w$  at full flowing condition to the as-designed curve and figure 19b presents the differences between them. The measured values were slightly higher than the as-designed curve over most of the length of the nozzle.

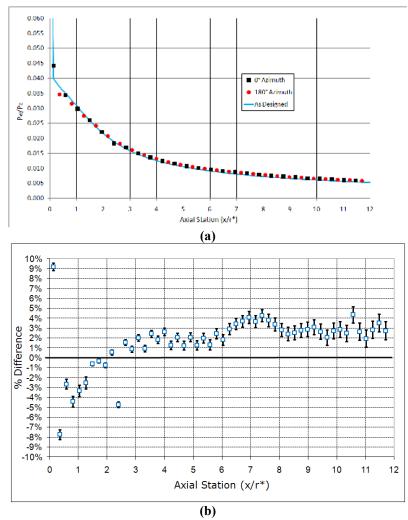


Figure 19. PAR normalized Pw compared to the as-designed from the Spring '07 test series

Figures 20 and 21 present the normalized wall pressures for the  $0^{\circ}$  and  $180^{\circ}$  azimuths. The NPRs plotted were chosen based on the P<sub>sep</sub> for each pressure measurement location. The NPRs are slightly different for the two azimuths in figures 20 and 21 because the pressure measurements were at different axial locations.

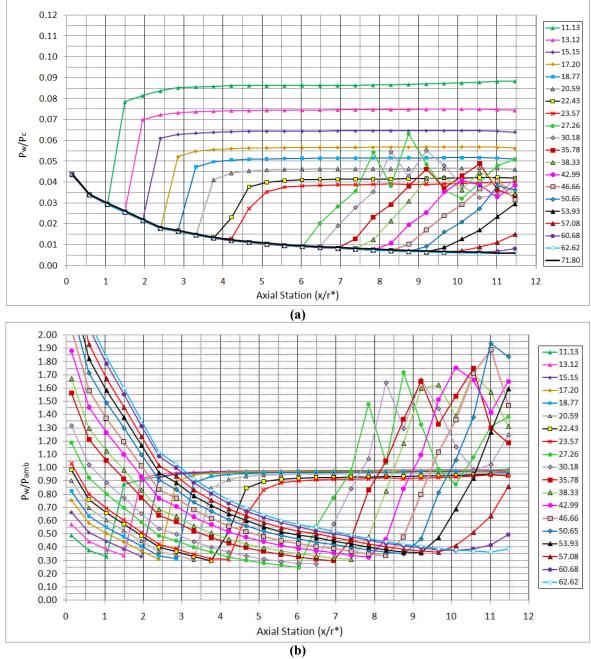


Figure 20. PAR test article 0° azimuth normalized P<sub>w</sub> for increasing NPR.

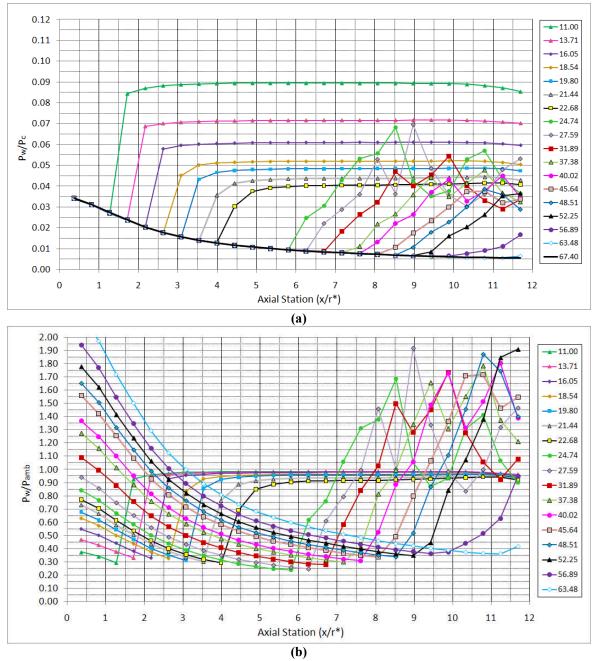


Figure 21. PAR test article 180° azimuth normalized P<sub>w</sub> for increasing NPR.

The first eight NPRs in figure 20 (and first seven in figure 21) indicate that nozzle flow was in FSS. When NPR was slowly increased the flow became noticeably more unsteady starting at NPR 23.1 and increasing until complete transition to full RSS occurred at 23.6. In the transition the separation location jumped downstream from  $x/r^*=4.21$  (NPR 23.57 in figure 20) between  $x/r^*=5.57$  and 5.80.

In RSS the annular jet of supersonic flow reattaches to the nozzle wall inducing a local high pressure region. From this high pressure region most of the flow expands downstream and, depending on the downstream flow, it may separate again. Because the reattached flow creates higher pressure than that immediately upstream of it, some of the flow reciculates, forward, along the nozzle wall. This reattaching and separating of the nozzle flow can occur multiple times. For example, in figure 20(b), the NPR 27.26  $P_w$  profile had three reattached regions at approximately x/r\*=7.8, 8.7 and 11.5. Upstream of each of these was a separated, reciculating region trapped between the nozzle wall and the annular jet of supersonic flow. The RSS flow was highly dynamic even though the NPR was relatively constant. The static measurement instrumentation averages the highly variable instantaneous pressures. Care was taken to present the best representative  $P_w$  profiles.

The flow remained in RSS with reattached flow around the full circumference up to an NPR of about 55. Above NPR 55 the flow was no longer fully attached around the nozzles circumference but had changed to an oscillatory partial reattachment. This change in flow structure is visible in the difference between the  $P_w$  profiles for NPR 53.93 and 57.08 in figure 20(b) (and between NPR 52.25 and 56.89 in 21(b)). The flow was visibly oscillatory at a high frequency at these NPRs. This transition from fully attached RSS to the partial and intermittently attached RSS was the source of the highest side loads moment for the PAR nozzle. As the NPR increased the intermittent flow reattachment occurred less and this is reflected in the decreasing pressure at NPR 60.68 and 62.62. Between NPR 62 and 70 the nozzle flow became steady.

The flow did not transition from RSS to FSS before flowing full, as is often seen in TOC nozzles. Instead, as just described, it transitioned from RSS to a partial-RSS then snapped to a full flowing condition.

The values plotted in figures 20 and 21 are provided in tabular form in Appendix A (tables A3a through A4b).

With decreasing NPR the nozzle flow exhibited a hysteresis in the transition between FSS and RSS. As mentioned above, the transition from FSS to RSS with increasing NPR occurred between 23.1 and 23.6, but when NPR was decreasing, the transition from RSS back to FSS did not occur until an NPR of about 12.7. Figures 22 and 23 present the  $P_w$  profiles on the two azimuths for NPRs within this hysteresis regime: that is, profiles that existed while the NPR decreased from 23.3 to 12.8. The values plotted in figures 22 and 23 are provided in tabular form in Appendix A (tables A5a through A6b).

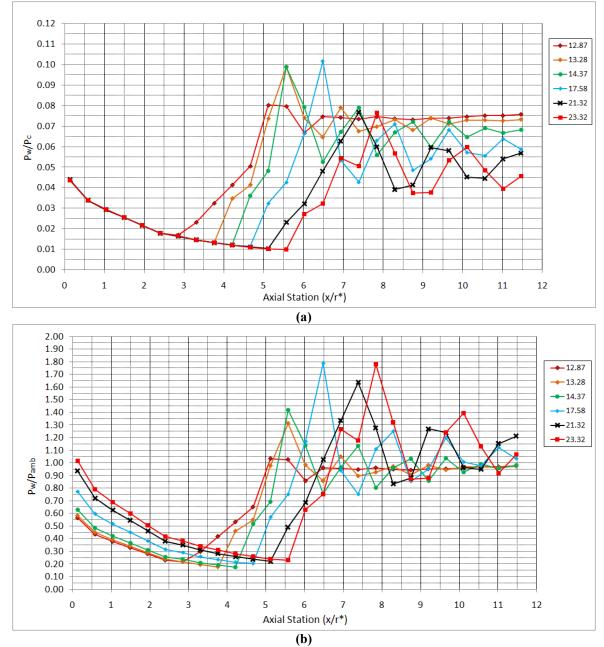


Figure 22. PAR test article 0° azimuth normalized P<sub>w</sub> within the RSS-to-FSS hysteresis regime.

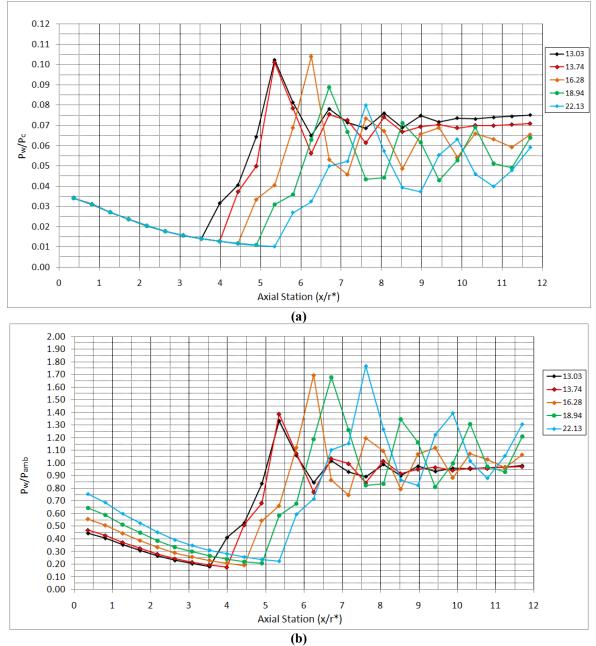


Figure 23. PAR test article 180° azimuth normalized P<sub>w</sub> within the RSS-to-FSS hysteresis regime.

Figure 24 plots the  $P_{sep}$  for the PAR test article. The solid symbols are  $P_{sep}$  for increasing NPR and the open symbols are the  $P_{sep}$  from the hysteresis regime during decreasing NPR. The two azimuths have similar values with the only significant difference being between x/r\*=1.0 and 4.5. Some of those differences are attributed to instrumentation effects as the next test series had better agreement in this region.

The values plotted in figure 24 are the red, bold values in Tables A3b, A4b, A5b and A6b.

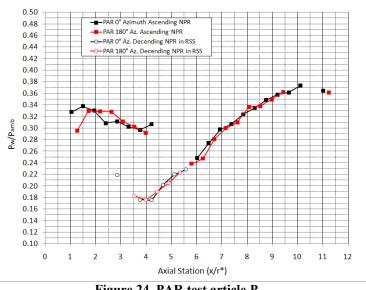


Figure 24. PAR test article P<sub>sep</sub>.

Figure 25 compares the  $P_{sep}$  for the two test articles.

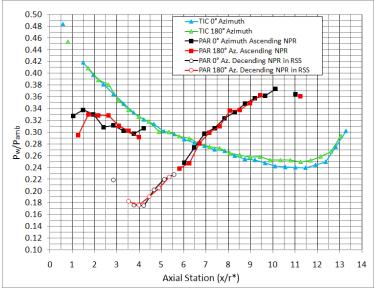


Figure 25. Comparison of TIC and PAR test article P<sub>sep</sub>.

Figure 26 presents the PAR test article's normalized average  $P_{base}$  variation with NPR. The  $P_{base}$  was responding to the nozzle wall static pressure just upstream of the nozzle exit plane. Between NPR 10 and 20 the  $P_{base}$  decreased, similarly to that of the TIC's  $P_{base}$ , as flow was pulled over the nozzle base into the less-than- $P_{amb}$  in the recirculation downstream of the (FSS) separation location. After transition to RSS the  $P_{base}$  varied as the  $P_w$  near the nozzle exit varied with the pressure recovered via the recompressions. The hysteresis incurred in decreasing NPR is evident in  $P_{base}$  as well.

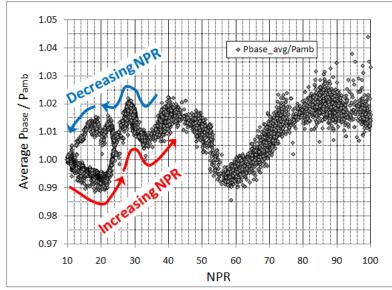


Figure 26. PAR test article P<sub>base</sub> without diffuser inlet effect. Diffuser inlet at 51 mm in downstream.

#### 3. PAR Nozzle Wall Pressures when in "Diffuser Inlet Effect"

Figure 27 compares the PAR nozzle normalized  $P_w$  for a full flowing nozzle to the as-designed curve. Note that these full flowing  $P_w$  values were unaffected by the diffuser inlet effect. The comparison between the measured and as-designed values for the initial expansion of the flow, between x/r\*=0 and about 3, is similar to that in figure 19a. However, downstream of x/r\*=3.0 the data agrees well with the as-designed curve. This second set of  $P_w$  data is shifted slightly downward relative to the first set of PAR test data, (figure 19a) resulting in an improved  $P_w$  agreement with the as-designed values (comparing figures 27b and 19b).

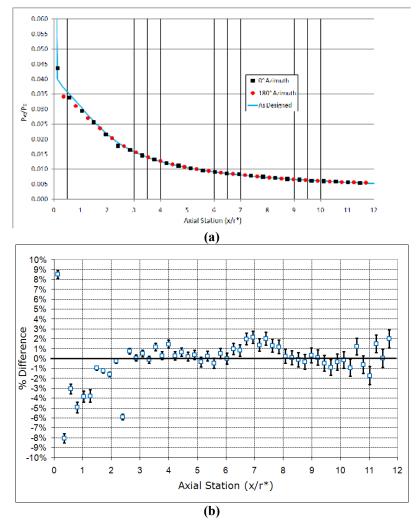


Figure 27. PAR test article normalized P<sub>w</sub> compared to the as-designed for the Fall '07 test series.

Figures 28 to 32 present the PAR test article normalized  $P_w$  recorded in Fall '07 test series where the diffuser inlet was approximately 51 mm (2 in) downstream of the nozzle exit plane. This test data shows that the proximity of the diffuser inlet to the nozzle exit plane changed the NPR at which the nozzle flow would separate at a given location. This PAR  $P_w$  data with "diffuser inlet effect" is presented because the test series in which nozzle side load moments were measured, in all likelihood, experienced a similar affect on the separation locations due to the diffuser inlet. The side load moments were measured in tests with the diffuser at 32 mm (1.25 in) downstream.

Figures 28 and 29 present the normalized wall pressures for the 0° and 180° azimuths, respectively. The NPRs plotted were, again, chosen based on the  $P_{sep}$  for each pressure measurement location. The FSS  $P_w$  profiles for FSS up to transition to RSS were unaffected by the diffuser inlet. The transition to RSS was NPR 23.8, essentially unaltered from that of the tests with the diffuser further downstream.

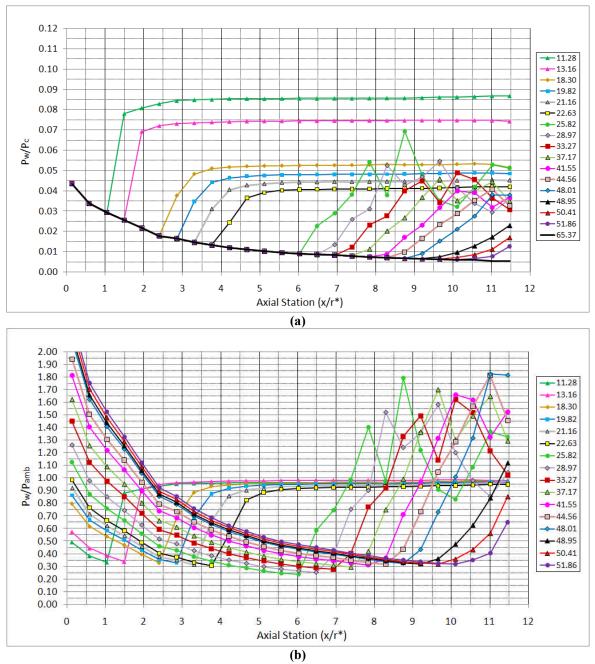


Figure 28. PAR test article 0° azimuth normalized P<sub>w</sub>, for increasing NPR, when in diffuser inlet effect.

With the diffuser closer to the nozzle exit the flow remained in RSS with complete axisymmetric reattachment up to NPR 48 (w/the diffuser further downstream, it was NPR 52). Above NPR 48 the RSS reattachment was not fully attached around the nozzles circumference but had become intermittently and/or partially attached. The pressure profile for NPR 48.95 (figure 28(b)) indicates a large change in the (average)  $P_w$  from those of NPR 48. The flow was visibly oscillatory at a high frequency at these NPRs. As the NPR increased the flow reattachment occurred less and this is reflected in the decreasing  $P_w$  at NPR 50.41 and 51.86. Between NPR 52 and 53 the nozzle

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flowed full and the flow became steady. It is this transition from full flowing RSS at NPR 48 to partial and intermittent RSS up through about NPR 53 that was the source of the highest side loads measured for the PAR nozzle.

The flow did not appear to transition from RSS to FSS before flowing full. Instead, as just described, it transitioned from RSS to a partial-RSS then snapped to a full flowing condition.

The values plotted in figures 28 and 29 are provided in tabular form in Appendix A (tables A7a through A8b).

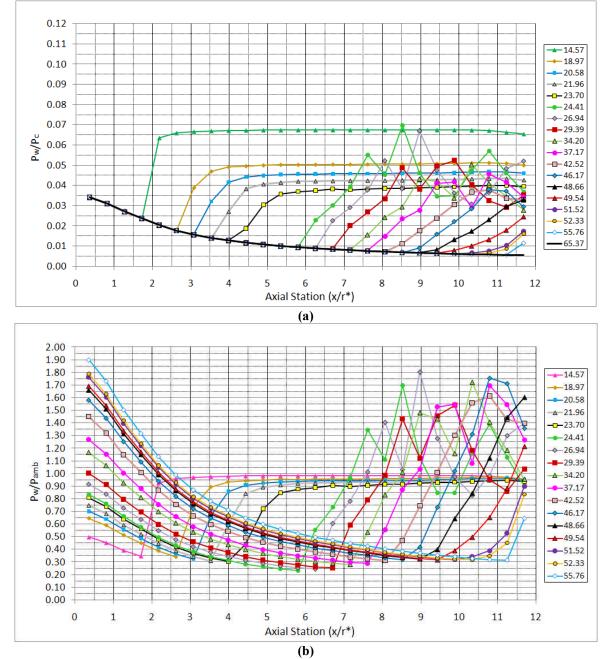


Figure 29. PAR test article 180° azimuth normalized Pw, for increasing NPR, when in diffuser inlet effect.

The hysteresis of the transition between RSS and FSS at low NPR when NPR was decreasing appeared to be unaffected by the diffuser inlet being closer to the nozzle exit. Figures 30 and 31 present the  $P_w$  profiles on the two azimuths for NPRs within the hysteresis regime for the tests with the diffuser inlet near the nozzle exit. They do not appear different than with the diffuser inlet further downstream (figures 22 and 23). The values plotted in figures 30 and 31 are provided in tabular form in Appendix A (tables A9a through A10b).

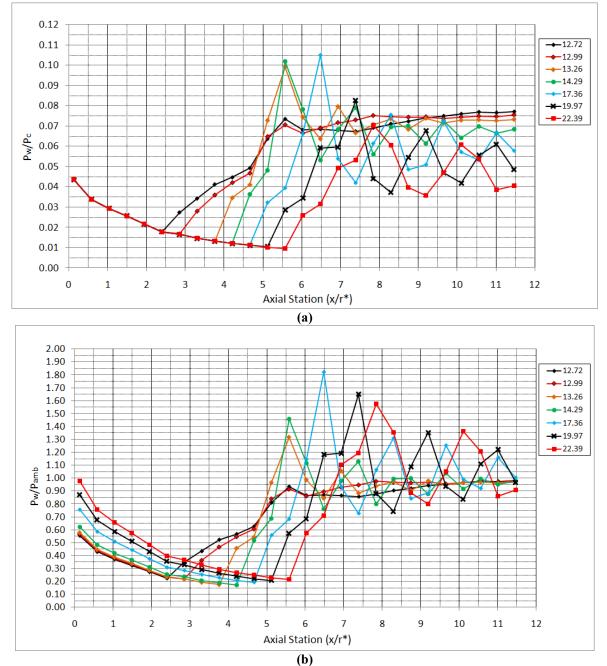


Figure 30. PAR test article 0° azimuth normalized P<sub>w</sub> that existed during the RSS-to-FSS hysteresis during decreasing NPR with the diffuser inlet near the nozzle exit.

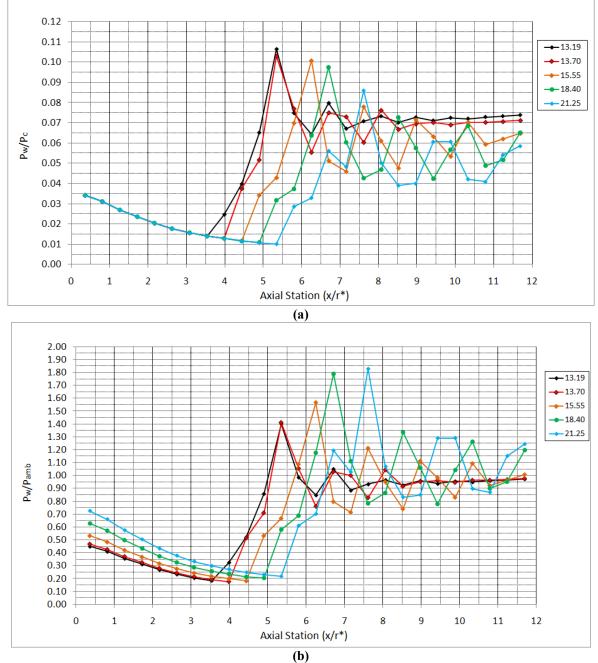


Figure 31. PAR test article 180° azimuth normalized P<sub>w</sub> that existed during the RSS-to-FSS hysteresis during decreasing NPR with the diffuser inlet near the nozzle exit.

Figure 32 plots the  $P_{sep}$  of the PAR nozzle for both test series. The solid symbols are for increasing NPR and the open symbols are from the hysteresis regime during decreasing NPR. The agreement between the azimuths for  $x/r^*=1.0$  to 4.0 in the second set of data is improved relative to that in the first set of test data. This indicates that that some of the disagreement for these measurements in the first data set was due to measurement error. Over the remainder of the nozzle the agreement in the azimuths was similar.

The two sets of data appear the same in the hysteresis regime ( $x/r^*=3.5$  to 5.6). From  $x/r^*=6.0$  to about 8.0 the slopes of the curves for the without and with diffuser inlet effect are similar but the diffuser inlet affected P<sub>sep</sub> was consistently lower. From  $x/r^*=8.0$  to the end of the nozzle the differences in the two datasets increase with axial station indicating an increasing effect of the diffuser inlet. The values plotted in figure 34 are the red, bold values in Tables A7b, A8b, A9b and A10b.

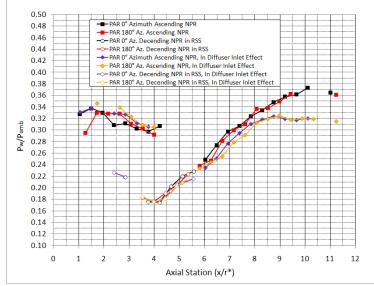


Figure 32. PAR P<sub>sep</sub> as a function of axial station for without and with diffuser inlet effect.

Figure 33 plots a subset of the normalized  $P_w$  from the datasets shown in figures 20 and 32. The  $P_w$  profiles shown were chosen based on the location of the nozzle flow separation. The open symbols are from the first test series when the nozzle flow was not affected by the diffuser inlet. The filled symbols are from the second test series when the diffuser inlet did have an effect on the nozzle flow. These profiles show that the  $P_w$  profile shapes were, in fact, similar for the two tests when compared based on  $P_{sep}$  location. These plots show that the diffuser effect did not change the nozzle fluid dynamics but did alter the NPR at which specific flow structures occurred. Note that the NPRs differed between the pairs of Pw profiles as the separation location moved toward the nozzle exit. This is consistent with the trends in figure 32.

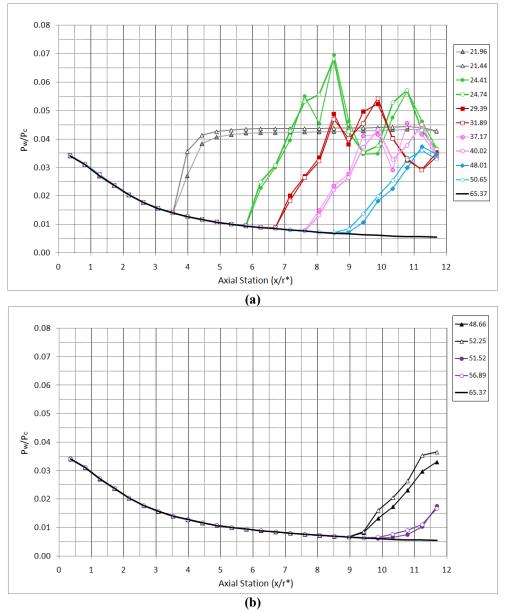


Figure 33. Comparison of P<sub>w</sub> profiles for the two PAR test series. Open symbols are first test series, when not in diffuser inlet effect. Filled symbols are the second test series, when in diffuser inlet effect.

The NPR quoted throughout this paper is a global NPR. That is, the  $P_{amb}$  is the test cell pressure which was measured well away from the nozzle exit plane. The supersonic annular nozzle flow exiting the nozzle and flowing into the diffuser induced a local pressure (near the nozzle exit) that was lower than the farfield  $P_{amb}$  used in the NPR.

Figure 34(b) plots the average base pressure for the diffuser inlet affected set of test data which shows that the base pressure, once it transitioned to RSS, no longer varied significantly with NPR. That is the base pressure was no longer showed a strong dependence on  $P_w$  at the nozzle exit, as in figure 34(a) but, was dominated by the diffuser inlet effect.

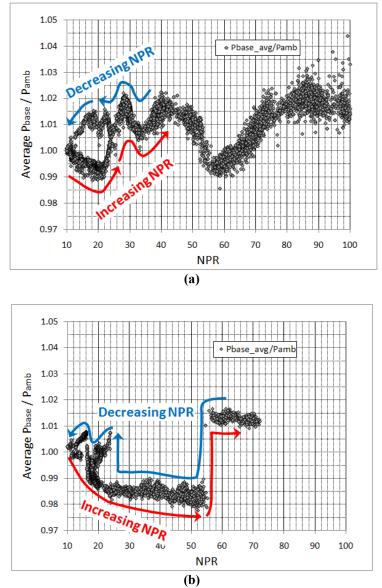


Figure 34. PAR average nozzle base pressure, normalized, from the two test series. Without diffuser inlet effect (a) and in diffuser inlet effect (b).

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#### **B.** Side Load Moments Unscaled

The side load data presented here was recorded near the end of the test campaign after the best testing approach, for obtaining good side load data, had been determined. As discussed previously, the 20,480 Hz strain gage data was filtered and converted to a moment and collected in bins of NPR (Table 1) for each simulated nozzle start transient. The maximum side load moment in each NPR bin over the approximate 70 starts for the two nozzles is plotted in figure 35. This data was normalized by the peak magnitude of side load moment measured for the PAR nozzle.

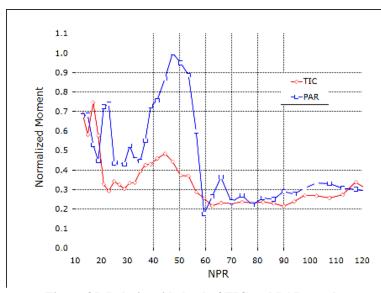


Figure 35. Relative side load of TIC and PAR nozzles.

Both nozzles had two peaks in side load moment: one at low NPR and one at a mid-range NPR. The maximum side load moment of the PAR nozzle, at NPR 47.5, was significantly higher than either of the peak moments from the TIC nozzle. The maximum moment of the PAR nozzle occurred as the last RSS separation bubble reached the end of the contour. Highly oscillatory flow existed as the nozzle flow transitioned back and forth rapidly between RSS and FSS. Conversely, the maximum side load moments of the TIC nozzle at NPRs in the mid-40s were due only to FSS separation line oscillation. This conclusion was drawn from observations of the Schlieren video and high frequency pressure measurements made in another test series on these same test articles. After the nozzles flowed full, above NPRs of about 60, the side load moments of both decreased significantly. The moments present at the higher NPRs on figure 13 were similar to those obtained from a reference, sonic nozzle. The sonic nozzle produced no aerodynamic side loads; therefore, the moments measured during the sonic nozzle tests were a measure of the facility effects (i.e., random noise) in the test data.

The peaks in side load moment at low NPRs for the two nozzles were very similar in magnitude. However, the low NPR peaks were, in part, due to different fluid dynamics. The PAR nozzle had two peaks at low NPR. The first, at NPR 13, was probably due to transition from FSS to a flow state called "quasi-RSS"<sup>15</sup> (qRSS). qRSS is a short-lived asymmetric flow reattachment that can occur as the plume expands just past the throat. The second low NPR peak for the PAR nozzle, at NPRs 21 and 23, was a result of the nozzle flow's transition from FSS-to-RSS transition. The peak in the TIC's side load moments at NPR 17 was most likely due to FSS-to-qRSS-FSS flow transitions.

#### C. Facility Vibration Effects On Measured Nozzle Side Loads

When running, the NTF vibrates due to the ejector system. These facility vibrations caused the cantilevered test article to move with respect to the facility, producing a fluctuating strain in the strain tube. This vibration is a facility induced random noise embedded in the side load test data. There is no explicit method to distinguish the vibration induced strains from nozzle side load induced strains. To quantify this facility noise the Sonic nozzle was run in the same manner as the TIC and PAR. The Sonic nozzle has the same mass and center of gravity as the TIC and PAR test articles. The significant difference between the Sonic nozzle and the TIC and PAR is that it did not have nozzle flow separation within a diverging nozzle, as sketched in figure 36. Therefore, any apparent side loads were due only to the facility vibrations.

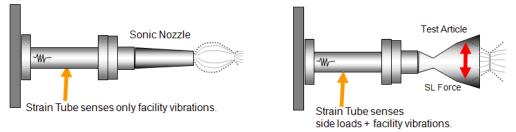


Figure 36. Comparison of the Sonic nozzle to a converging-diverging nozzle.

Figure 37 plots the  $\sigma$  and the mean + 3 $\sigma$  of the measured moment in each NPR bin for the nine NPR transients performed with the Sonic nozzle. This  $\sigma$  is a statistical measure of the magnitude, but not the direction of the vibration induced moments. As indicated in figure 38, this vibration induced moment could occur in any direction. The mean +3 $\sigma$  is the level of vibration induced moment that one can, statistically, be fairly sure will not be exceeded during nozzle tests.

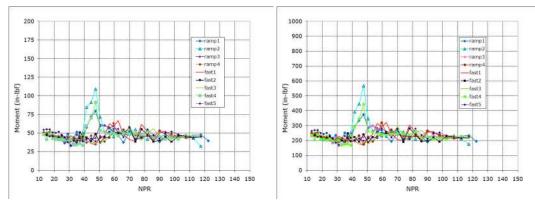


Figure 37. Sonic nozzle's  $\sigma$  (left) and mean + 3 $\sigma$  (right) of vibration induced moments.



Noise, statistically, could be in <u>any direction</u>.

Figure 38. The vibration induce moment could be in any direction.

Now, if one considers a specific side load event, unaffected by facility vibrations, such as sketched on the left in figure 39, it is a unique data point with a specific direction and magnitude. However, in the MSFC NTF the strain measured at any time was the combination of the side load and facility noise strains. That is, as indicated in figure

35 American Institute of Aeronautics and Astronautics 39, the strain measured was the vector summation of the two such that the vibration strain could have increased or decreased the measured side load magnitude. This means that the facility induced vibrations can be quantified as an uncertainty on the magnitude of the measured maximum side loads.

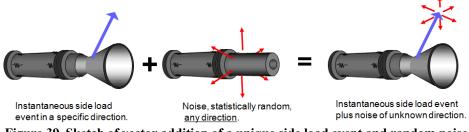


Figure 39. Sketch of vector addition of a unique side load event and random noise.

Figure 40 plots the TIC and PAR maximum side loads with bands of  $2\sigma$  of the facility vibrations on either side of the curves. The  $\sigma$  magnitude applied is the average of the Sonic nozzle's  $\sigma$  in each NPR bin for the nine transients run (figure 38). Above NPR 120 the magnitude of the  $\sigma$  at NPR 120 was applied.

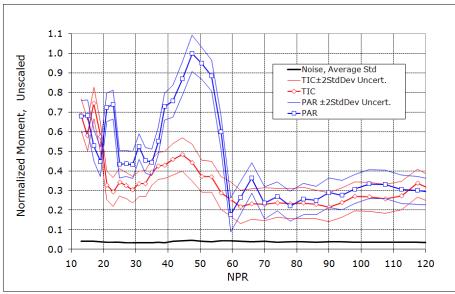


Figure 40. Maximum nozzle side load moment and uncertainty, unscaled.

#### **D.** Scaling for Ambient Pressure

In this test the  $P_c$  was held constant and the test cell was evacuated to increase the NPR, thereby, inducing the nozzles to flow full. In doing so, test cell pressure,  $P_{amb}$  for the nozzles, dropped from near atmospheric to below 0.5 psia. As a result the magnitude of the aerodynamic force produced by any asymmetric flow separation decreased with increasing NPR. Therefore, a relationship was required to scale the measured side load moments to the more normal operating procedure for nozzle transients, where  $P_c$  is increased against a constant  $P_{amb}$ . As it turns out that relationship is rather simple as shown in equation 1.

$$MomentCorrected_{NPR} = \frac{MomentMeasured_{NPR}}{p_{amb_{NPR}}}$$
(1)

where the NPR subscript indicates those values at a given NPR and  $P_{amb}$  is expressed as a fraction of an atmosphere. Ref. 2 contains the full derivation of equation 1. With equation 1, the moments measured in the MSFC NTF were scaled back to  $P_{amb}$  of 1 atm. Since side load moments were grouped by NPR bins, the moments in each NPR bin were scaled by the  $P_{amb}$  that corresponds to the bin center NPR (table 1).

#### E. Side Load Moments After Scaling

Figure 41 presents the normalized side load moments after they were scaled for the effect of  $P_{amb}$  per relationship derived in Ref. 1. The PAR's peak maximum side load moment, after scaling, was at NPR 50.5 and the TIC's was at NPR 44.5. The  $\pm 2\sigma$  uncertainty for the PAR's side load at NPR 50.5 was 8.6% and for the TIC's side load at NPR 44.5 it was 17.7%. The magnitude of the TIC's peak maximum side load moment was 45% of the PAR nozzle's peak maximum moment. The low NPR side load moments, when scaled, were significantly lower than their respective maximum side loads at the mid-range NPRs. Note that the side load moments induced by the PAR nozzle's FSS-to-RSS transition and the TIC nozzle's FSS-to-qRSS-to-FSS are still apparent.

The scaling factor was not applied to the measured side load moments for the PAR and TIC nozzles above NPRs 66 and 86, respectively. In another test series, high frequency pressure measurements were obtained near the nozzle exit planes. NPRs 66 and 86 were the highest NPRs in which the high frequency wall pressure indicated any rise in the wall pressure (due to flow separation). Above these NPRs the nozzles were flowing completely full and any measured moment was not due to separated flow, and therefore, scaling should not be applied.

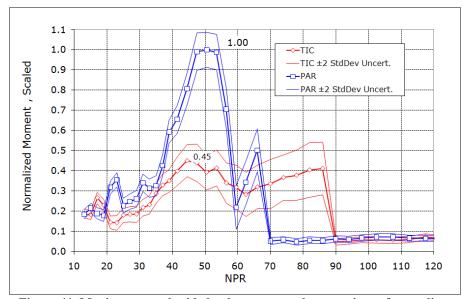


Figure 41. Maximum nozzle side load moment and uncertainty after scaling.

#### F. Population of Maximum Side Load Moment Data Points

Figures 42 and 43 present the population of the maximum side load data points, after scaling, for the TIC and PAR, respectively. Each data point is the maximum side load within an NPR bin during a specific nozzle start transient. The maximum values in each bin are on the red and blue lines for the TIC and PAR, respectively. These maximum data points are the same as those shown in figures 35 and 41. Figures 42 and 43 contain a solid black line which is the maximum of the Sonic nozzle's mean  $+3\sigma$  values for each bin. This curve was included to provide a reference for the extent of the facility vibrations effect on the TIC and PAR side load data. The Sonic nozzle mean  $+3\sigma$  line represents the near maximal levels one would expect, from a statistical standpoint, for facility vibration induced moments. Figures 42 and 43 show that the facility vibrations fall in the lower range of the side load data and, therefore, did not significantly affect the TIC and PAR peak side load magnitudes.

Note in figure 43 that the number of valid measurements at NPR bins 53.5 and 56.5 were three and two, respectively. This sparseness results from filtering the test data to remove those bins of data potentially corrupted by adverse dNPR/dt (increasing NPR). (During periods of increasing NPR there would have been diffuser backwash.) Most of the data in these bins had to be discarded because the direction of the NPR ramp changed from increasing to decreasing, if only for a moment. This filtering is discussed further in Ref. 16.

Note that in the NPR bins at which the peak maximum side load occurred for the nozzles (44.5 and 50.5) there were a reasonable number of valid data points. None-the-less, the sparseness of valid measurements for PAR maximum side load in NPR bins 53.5 and 56.5, potentially high side load NPRs, was a concern because the absolute peak PAR nozzle side loads may have been filtered out.

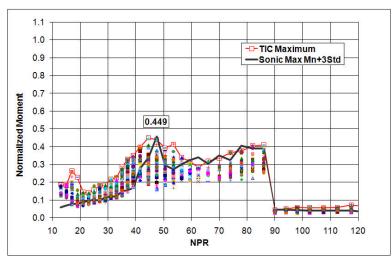


Figure 42. TIC nozzle's population of maximum nozzle side load data after removal of those potentially affected by diffuser backwash.

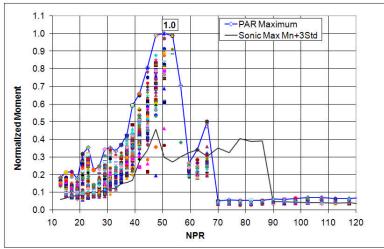


Figure 43. PAR nozzle's population of maximum nozzle side load data after removal of those potentially affected by diffuser backwash.

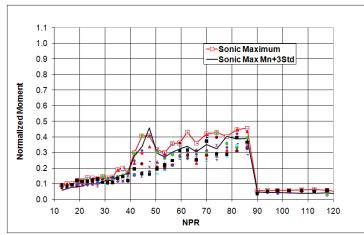


Figure 44. Sonic nozzle's population of maximum nozzle side load data after removal of those potentially affected by diffuser backwash.

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#### G. Mean + 3<sub>5</sub> for Maximum Side Load Moments

Figures 44 and 45 present the side load mean  $+3\sigma$  for all NPR bins for the TIC and PAR nozzles. No filtering for the diffuser backwash was applied here; that is, all data points in all of the NPR bins are shown. The magnitude of these mean  $+3\sigma$  side loads was normalized by the peak maximum from the PAR data (just as done for figures 42 and 43). The general shape and distributions in figures 45 and 46 appear similar to those in figures 42 and 43, respectively. Also, the ratio of the TIC to PAR peak side loads from the mean  $+3\sigma$  of the dataset was surprisingly similar to that from the valid maximum side loads curves; 0.443 (0.423/0.956) for the mean  $+3\sigma$  compared to 0.449 (see figure 42).

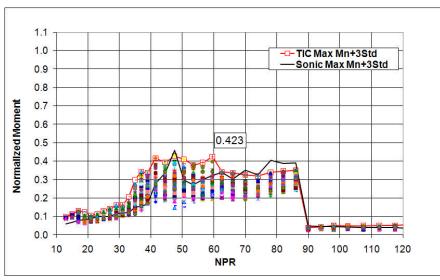


Figure 45. TIC nozzle's mean  $+ 3\sigma$  nozzle side loads.

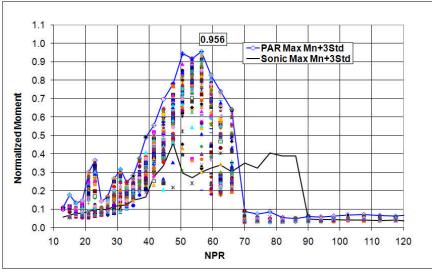


Figure 46. PAR nozzle's mean  $+ 3\sigma$  nozzle side loads.

The mean  $+3\sigma$  distributions do have a broader range, in NPR, of high side loads than those of figures 43 and 44. Also, the peak magnitude for both the TIC and PAR nozzles shifted to slightly higher NPRs. For the TIC nozzle the range of high side loads in figure 45 is approximately from NPR 40 to 60 with the peak magnitude at NPR 60, compared to a range of 40 to 54 and peak magnitude in figure 42. For the PAR nozzle the range of high side load NPRs in figures 43 and 46 were both three NPR bins wide but the mean  $+ 3\sigma$  distribution shifted up to NPR bins 50.5 to 56.5. It is also much fuller on the right hand side of the peak magnitude NPRs. The fact that these maximums of the mean  $+3\sigma$  are so similar to the (backwash effect filtered) valid maximal curves (figures 42 and 43) indicates that the diffuser backwash did not have a statically significant impact on the side loads. Therefore, the mean  $+3\sigma$  side load datasets provide a correct representation of the nozzle side load distributions and relative magnitudes. The reader is reminded that each data point shown represents 100s up to 10,000 strain measurements because the data was sampled at 20,480 Hz.

#### V. Conclusions

The strain tube side load measurement approach was successfully implemented in MSFC's Nozzle Test Facility for nozzle start transients. Two cold flow nozzle test articles were developed, a truncated ideal and a parabolic contour, which produced the desired types of nozzle flows. The truncated ideal contour test article's wall pressures and side load moments exhibited FSS behavior expected for truncated ideal nozzles. The parabolic contoured nozzle test article's wall pressures and side load moments indicated transitional nozzle flow behavior, FSS-to-RSS-to-FSS, typical of thrust optimized contours. The P<sub>w</sub> distributions first presented in 2009<sup>1</sup> were further post processed to provide an extensive P<sub>w</sub> dataset for separated nozzle flows. The P<sub>w</sub> distributions presented in 2009 and here (in finer detail) were unaffected by the diffuser inlet's proximity to the nozzle exit plane.

A second set of  $P_w$  data for the PAR nozzle that was affected by the presence of the diffuser inlet was presented and compared to the  $P_w$  dataset unaffected by the diffuser inlet. The  $P_w$  profiles for the nozzle flow separated at a given location were similar for both datasets, i.e., without and with the diffuser inlet effect. However, the diffuser inlet effect did lower the NPR at which the nozzle flow, at given axial station, would separate. That is, the diffuser inlet caused the nozzle to flow full at a lower NPR. The diffuser inlet effect appeared to be limited to the last third of the nozzle length.

During simulated nozzle start transients, the maximum side load magnitude of the TIC test article was 45% of that of the PAR test article. The effect of facility vibrations on the measured side loads was explained and quantified. The effect of the backwash from the diffuser was described and affected data was filtered out to create a dataset for the maximum side loads. The population of this maximum side load data points was presented. The magnitude of side loads was presented using the mean  $+3\sigma$  for the full population of test points. The mean  $+3\sigma$  data were similar to that of the maximum side loads. Therefore, the mean  $+3\sigma$  side load datasets provide a correct representation of the nozzle side load distributions and relative magnitudes.

The nozzle side load data was obtained with the diffuser inlet in close proximity to the nozzle exit plane. It is likely that the side load data presented here was affected by the diffuser inlet effect.

#### Acknowledgments

The authors would like to thank the cold flow nozzle test team (figure 47) for their contribution to this task. The authors would also like to thank Roberto Garcia and Bruce Tiller, both of MSFC, for their continual support of this task during its formative stages.



Figure 47. The NTF nozzle side load team. Front row, left to right, Tim Karigan, Joe Ruf, Andy Brown, Al Mayer, Martin Cousins, Back Row, Jim Sieja, Doug Counter and Dave McDaniels. Not pictured: Kris McDougal and Dick Branick.

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#### Appendix A

## Table A1a. TIC 0° Azimuth normalized (by Pc) wall pressures as presented in figure 14a. Diffuser inlet 76 mm downstream.

							]	mm d	ownst	ream.								
										x/r*, 0"	Azimuth							
NPR	Nozzle P <sub>rotel</sub> (poro)	P <sub>ant</sub> , Vacuum Chamber Pressure, psia	0.1333	0.5867	1.0400	1.4933	1.9467	2.4000	2.8533	3.3067	3.7600	4.2133	4.0607	6.1200	5.6733	6.0267	6.4800	6.9333
5.8	79 208 114,198	13 6595 13.0925	1 007E-01 1.015L 01	8 341F-02 8.561L 02	1 434F-01 6.268L 02	1.657E-01 4.759L-102	1 684F-01 1.100L 01	1.696E-01 1.116E-01	1 699E-01 1.123E-01	1 703E-01 1.127L 01	1 705E-01 1.100E-01	1 707E-01 1.130E-01	1 709E-01 1.104E-01	1 709F-01 1.135L 01	1 708F-01 1.136L 01	1 709E-01 1.136L 01	1 709E-01 1.10/E-01	1 709E-01 1.130E-01
10.8	137 722	12 7940	1 019E-01	8 5537-02	6 268E-02	4 777E-02	3 688E-02	8 753F-02	8 953E-02	9 020E-02	9 063E-02	9 101F-02	9 119E-02	9 1245-02	9 134E-02	9 145E-02	9 155E-02	9 161E-02
12.8	150,365	11.7500 9.8250	1.025E-01 1.025E-01	8.545L 02 8.542E-02	6.264E-02 6.264E-02	4.780L 02 4.781E-02	3.654E-02	2.981L 02 2.936E-02	7.314L 02 2.385E-02	7.501L 02 5.919E-02	6 192E-02	7.623L 02 6.279F-02	7.649L 02 6.323E-02	7.661L 02 6 345E-02	6.365E-02	7.681L 02 6.376E-02	6.384E-02	7.699L 02 6.392F-02
17.5	160.24	0.5710	1.021L 01	8.644L 02	6.266L 02	4.770L 02	0.656L 02	2.936L 02	2.377L 02	1.9871-02	5.118L-02	6.077L-02	5.456L 02	6.499L 02	5.522L 02	6.640L 02	5.652L 02	6.950L 02
20-1 22,4	150 095 150,153	7 4855 6.7110	1 025E-01 1.022L 01	8 540F-02 8,552L 02	6 263E-02 6.209L 02	4 782F-02 4.779L 02	3 652F-02 3.652L 02	2 934F-02 2.933L 02	2.375E-02 2.376E-02	1 973E-02 1.973E-02	1 661E-02 1.652L 02	4 321E-02 1.434 - 112	4 636F-02 3.801L 02	4 721E-02 4.105L 02	4 770F-02 4 201L 02	4 798F-02 4.250L 02	4 816F-02 4 277E 02	4 828F-02 4.297L 02
25.1	150 179	5 9890	1 022E-01	8 550E-02	6 270E-02	4 7805-02	3 654E-02	2 934E-02	2.376E-02	1.973E-02	1 652E-02	1 427E-02	1.252E-02	3 221E-02	3.597E-02	3 706E-02	3 763E-02	3 793F-02
27.5	150,376	5.4735	1.025L 01 1.021E-01	8.540L 02 8.550F-02	6.200L 02 6.270E-02	4.781E-02 4.781E-02	3.653E-02	2.933L 02	2.376E-02 2.376E-02	1.972L 02 1.974E-02	1.651L 02 1.652E-02	1.427L 02 1.426E-02	1.249L 02 1.249E-02	1.0970-02	2.864L-02 9.971E-03	3.254L 02 2.657E-02	2.981E-02	3.091E-02
32.6	160.002	4,6040	1.02/L 01	8.5501 02	6.263L 02	4.760L 02	3.650L 02	2.934L 02	2.377L 02	1.970L-02	1.652L 02	1.427L 02	1.249L 02	1.090_ 02	9.921L 00	8.0351_03	2.328L 02	2.6/9L 02
30.8	150-155 160.37	4 1970 0.8005	1 021E-01 1.025E 01	8 543F-02 8.544L 02	6 270F-02 6 265L 02	4 782F-02 4.782L 02	3 656F-02 3.652L 02	2 936F-02 2.933L 02	2.376E-02 2.376E-02	1 973E-02 1.973E-02	1 653F-02 1.652L 02	1 427E-02 1.420L 02	1.249E-02 1.249L-02	1.050E-02 1.059L-02	9.910F-03 9.916L 00	8 744F-03 8 730L 03	7 885E-03 7.847E-00	1 950E-02 7.142L 03
41.3	150.324 150.065	3 6405 0.3470	1 025F-01 1.027L 01	8 544F-02 8.550L 02	6.264E-02 6.266L-02	4 781E-02 4.779L 02	3 653E-02 0.652L 02	2 934E-02 2.939L 02	2.376E-02 2.376E-02	1 973E-02 1.973E-02	1.652E-02 1.652L-02	1 426E-02 1,427L 02	1.249E-02 1.249L-02	1.059E-02 1.050L_02	9.912E-03 9.922L 00	8 741E-03 8 750L 03	7 843F-03 7.857E 00	7 131E-03 7.137E-03
44.8	149.255	3 1395	1 025E-01	8 538F-02	6 261E-02	4 778E-02	3 653E-02	2 936E-02	2.377E-02	1.974E-02	1 652E-02	1 426E-02	1 249E-02	1.0505-02	9 916E-03	8 743E-03	7 846F-03	7 1295-03
<u> </u>	149.354	2.9615	1.022L 01 1.023E-01	8.549L 02 8.547E-02	6.2/0L 02 6.269E-02	4.781L-02 4.780E-02	3.652E-02	2.934L 02 2.935E-02	2.376E-02 2.376E-02	1.974L 02 1.973E-02	1.652L-02 1.653E-02	1.420L 02 1.426E-02	1.249L 02 1.249E-02	1.089L_02	9.916L 03 9.917E-03	8.744L-03 8.746E-03	7.847E-03	7.131L 03 7.135E-03
57.6	160,106	2,6080	1.022L 01	8.551L 02	6.270L 02	4.782L.02	0.653L 02	2.934L 02	2.377L 02	1.970L-02	1.652L 02	1.427L 02	1.250L-02	1.0901, 02	9.911L-00	8.746L-03	7.846L 00	7.134L-03
60 1 60.9	150.344 160.212	2 5015 2.3515	1 024F-01 1.022L 01	8 547E-02 8.545L 02	6 265E-02 6.267L 02	4 781E-02 4.781L 02	3 652F-02 3.654L 02	2 934E-02 2.936E 02	2.377E-02 2.377E-02	1.974E-02 1.974E-02	1 653F-02 1.652L 02	1 (27E-02 1.427L 02	1.249E-02 1.250L-02	1.050E-02 1.050L_02	9.917E-03 9.919L 00	8 747F-03 8 740L 03	7 849F-03 7.849L 00	7 137E-03 7.137E-03
67.5	150 285	2 2250	1 022E-01	8 548F-02	6 268E-02	4 781E-02	3 654E-02	2 935E-02	2.377E-02	1.974E-02	1 653E-02	1 427E-02	1.249E-02	1.050E-02	9.914E-03	8 743E-03	7 852E-03	7 133E-03
77.9	150.437	2,1060	1.025L 01 1.025E-01	8.542L 02 8.541E-02	6.264L 02 6.260E-02	4.781L 02 4.779E-02	3.653E-02 3.653E-02	2.936L 02 2.934E-02	2.377E-02 2.377E-02	1.974L 02 1.973E-02	1.652E-02 1.652E-02	1.427L 02 1.427E-02	1.249L-02 1.248E-02	1.050L 02 1.050E-02	9.918L-00 9.919E-03	8.740L 03 8.749E-03	7.850E-00 7.851E-03	7.1335-03
84.0 97.2	150.395	1.7905	1.025E.01 1.022E-01	8.545L 02 8.546E-02	6.265E-02	4.781L-02 4.781E-02	3.652L.02	2.934L 02	2.377E-02	1.973L 02 1.975E-02	1.652L.02 1.653E-02	1.427L 02 1.427E-02	1.249L 02 1.249E-02	1.090L_02	9.914L-00 9.917E-03	8.744L-03 8.746E-03	7.846L-03 7.854E-03	7.134L 03 7.135E-03
111.1	160.39	1.3535	1.025L 01	8.539L 02	6.266L 02	4.780L 02	0.664L 02	2.936L 02	2.377L 02	1.974L-02	1.652L 02	1.426L 02	1.249L-02	1.0901, 02	9.921L-00	8.744L-03	7.853L 00	7.136L-03
380.8	150 223	0.3945	1 022E-01	8 549E-02	6 268E-02	4 7805-02	3 653E-02	2 934E-02	2.376E-02	1 973E-02	1 652E-02	14275-02	1.249E-02	1.050E-02	9 912E-03	8 747E-03	7 855E-03	7 136E-03
											, O° Azim							
NPR	Nozzie P <sub>iere</sub> (psia)	P <sub>rest</sub> , Vacuum Chamber Pressure, pala		7.3867	/.8400	8.2933	8.7467	9.2000	9.6533				11.4667	11.9200	12.3/33	12.8267	13.2800	13./333
6.0	P <sub>64.4</sub> (psis) 79.200	Chamber Pressure, psia 13.6595		1.7091-01	7.8400 1.709L 01	8.2933 1.700L 01	1.707L 01	9.2000 1.706L 01	9.6533 1.706L 01	x/m 10.1067 1.7651 01	, 0° Azim 10.6600 1.7005 01	uth 11.0133 1.7041 01	11.4667 1.704E.01	11.9200 1.700L 01	12.3/33 1./04L 01	12.8267 1.705L 01	1.704L-01	13./333 1.694L 01
6.0 8 7 10.8	Psas (psis) 79.200 114-198 137.722	Chamber Pressure, paia 13.6096 13.0525 12.7940		1.709L 01 1.138E-01 9.169L 02	7.8400 1.709L 01 1.139F-01 9.174L 02	8.2933 1.700L 01 1.139F-01 9.176L 02	1.707E 01 1.140F-01 9.105E 02	9.2000 1.706L 01 1.140F-01 9.190L 02	9.6533 1.706L 01 1.140F-01 9.193L 02	x/r <sup>-</sup> 10.1067 1.7060 01 1.1405-01 9.1960 02	, 0° Azim 10.5600 1.705L 01 1.140F-01 9.198L 02	uth 11.0133 1.704 <u>L 01</u> 1.140F-01 9.200L 02	11.4667 1.704E 01 1.140F-01 9.201E 02	11.9200 1.700L 01 1.140F-01 9.190L 02	12.3/33 1./04L 01 1.139F-01 9.192L 02	12.8267 1.766L 01 1.138F-01 9.176L 02	1.704L 01 1.137F-01 9.159L 02	13./333 1.694L 01 1.134F-01 9.137L 02
0.0 8 7 10.8 12 8	Page (psis) 79,200 114 198 137,722 150 365	Chamber Pressure, paia 13,6595 13,0925 12,7940 11,7580		1.709L 01 1.138F-01 9.169L 02 7.707F-02	7.8400 1.708L 01 1.139F-01 9.174L 02 7.712F-02	8.2933 1.700_01 1.139F-01 9.176_02 7.716F-02	1.707E 01 1.140F-01 9.105E 02 7.731F-02	9.2000 1.706L 01 1.140F-01 9.190L 02 7.735F-02	9.6533 1.705L 01 1.140F-01 9.193L 02 7.740F-02	x/m 10.1067 1.705L-01 1.140F-01 9.150L-02 7.740F-02	, 0° Azim 10.5600 1.705L 01 1.140F-01 9.198L 02 7.742F-02	uth 11.0133 1.704_01 1.140F-01 9.200_02 7.742F-02	11.4667 1.704E 01 1.140F-01 9.201E 02 7.704F-02	11.9200 1.700L 01 1.140F-01 9.190L 02 7.743F-02	12.3733 1.704L 01 1.135F-01 9.192L 02 7.735F-02	12.8267 1.705L 01 1.138F-01 9.176L 02 7.730F-02	1.704L 01 1.137F-01 9.159L 02 7.717F-02	13./333 1.694L 01 1.154F-01 9.137L 02 7.699F-02
5.0 8 7 10.8 12 8 15.3 17 5	Peak (psix) 79,200 114 198 137,722 150,365 160,236 150,24	Chamber Pressure, pola 13,0595 12,7940 11,7580 9,8260 8,5710		1.709L 01 1.138F-01 9.169L 02 7.707F-02 6.409L 02 5.555F-02	7.8400 1.709L 01 1.139F-01 9.174L 02 7.712F-02 6.412L 02 5.574F-02	8.2933 1.700_01 1.139F41 9.176_02 7.716F42 6.417_02 5.581F40	1.707E 01 1.140F-01 9.105E 02 7.731F-02 6.402E 02 5.592F-02	9.2000 1.706L 01 1.140F-01 9.150L 02 7.735F-02 6.437L 02 5.500F-02	9.6533 1.705L 01 1.40F-01 9.193L 02 7.740F-02 6.444L 02 5.604F-02	x/m 10.1067 1.705L 01 1.140F-01 9.155L 02 7.740F-02 6.440L 02 5.608F-02	0° Azim 10.5600 1.705L 01 1.105F-01 9.195L 02 7.795L 02 6.445E-02 5.612F-02	11.0133 1.704_01 1.140F-01 9.200_02 7.7402-02 5.615F-02	11.4667 1.704E 01 1.405-01 9.201E 02 7.7645-02 6.405E 02 5.8005-02	11.9200 1.700L 01 1.140F-01 9.190L 02 7.743F-02 6.467L 02 5.622F-02	12.3/33 1.704L 01 1.135F-01 9.192L 02 7.735F-02 6.454L 02 5.821F-02	12.8267 1.705L 01 1.138F-01 9.176L 02 7.730F-02 5.449L 02 5.600F-02	1.704L 01 1.137F-01 9.155L 02 7.717F-02 6.400L 02 5.592F-02	13./333 1.694_ 01 1.134F-01 9.137_ 02 7.699F-02 6.391_ 02 5.555F-02
0.0 8 7 10.8 12 8 15 3	Pass (prix) 79,200 114 198 137.722 150.365 160.236	Chamber Pressure, pola 13,6595 13,0525 12,7940 11,7580 9,8260		1,709L 01 1,138F-01 9,169L 02 7,707F-02 6,405L 02 5,555F-02 4,035L 02	7.8400 1.709L 01 1.139F-01 9.174L 02 7.719F-02 6.412L 02	8.2933 1.700L 01 1.1395-01 9.176L 02 7.7165-02 6.417L 02 5.5815-02 4.049L 02	1.707L 01 1.140F-01 9.105L 02 7.731F-02 6.402L 02 5.502F-02 4.854L 02	9.2000 1.706L 01 1.140=01 9.190L 02 7.735=02 6.437L 02 5.595=02 4.050L 02	9.6533 1.705L 01 1.140F-01 9.192L 02 7.740F-02 6.444L 02 5.504F-02 4.876L 02	x/m 10.1057 1.7050 01 1.140=01 9.1950 02 7.740=02 6.4460 02 5.608=02 4.0750 02	, 0° Azim 10.6600 1.705L 01 1.140F-01 9.195L 02 7.767-02 6.445L 02 5.812F-02 4.801L 02	uth 11.0133 1.405-01 9.200_02 7.7495-02 6.402_02 5.6155-02 5.6155-02 0.4050_02	11.4667 1.704E 01 1.100F-01 9.201E 02 7.704F-02 6.450E 02 5.850F-02 4.891E 02	11.9200 1.700L 01 1.1407-01 9.190L 02 7.7437-02 6.407L 02 5.6292-02 4.099L 02	12.3/33 1.704L 01 1.135F-01 9.192L 02 7.735F-02 6.454L 02 5.821F-02 4.897L 02	12.8267 1.705L 01 1.138F-01 9.170L 02 7.730F-02 6.445L 02 5.609F-02 4.085L 02	1.704L 01 1.137F-01 9.159L 02 7.717F-02 6.400L 02	13./333 1.694L 01 1.134F-01 9.137L 02 7.659F-02 6.391L 02 5.555F-02 4.041L 02
5.0 8 7 10.8 15 3 16 3 17 5 20.1 20.1 20.1	Page (prix) 79,200 114,198 107,722 150,365 100,276 150,24 150,24 150,25 150,153 150,179	Chamber Pressure, pois 13,0925 12,7940 11,7580 9,8250 8,5710 6,7110 5,8050		1,709L 01 1,138F-01 9,169L 02 7,707F-02 6,406L 02 5,555F-02 4,013L 02 4,013L 02 0,013L 02	7.8400 1.709L 01 1.139F-01 9.174L 02 7.719F-02 6.412L 02 5.574F-02 4.631L 02 4.314F-02 9.127L 02	8.2933 1.700_01 1.130F-01 9.170_02 7.718F-02 4.417_02 5.581F-02 4.040_02 4.040_02 4.019F-02 1.030F-02	1.707L 01 1.140F-01 9.105L 02 7.731F-02 6.402L 02 5.502F-02 4.854L 02 4.323F-02 0.807L 02	9.2000 1.706L 01 1.140F-01 9.150L 02 7.735F-02 6.437L 02 5.599F-02 4.065L 02 4.30F-02 1.347L 02	9.6533 1.705L 01 1.10F-01 9.191L 02 7.740F-02 6.444L 02 5.604F-02 4.30F-02 9.84F-02 9.84F-02 9.84F-02	x/r <sup>+</sup> 10.1067 1.705L 01 1.140F-01 <u>9.159L 02</u> 7.740F-02 5.608F-02 4.075L 02 4.075L 02 4.045E-02	10.6600 1.705L 01 1.105-01 1.105-01 9.195L 02 7.767-02 6.445L 02 6.445L 02 4.307E-02 9.305L 02 4.357E-02 9.305L 02	11.0133 1.704_01 1.10F-01 <u>9.200_02</u> 7.742F-02 <u>5.615F-02</u> <u>4.059_02</u> <u>4.357F-02</u> <u>1.072_02</u>	11.4667 1.704L 01 1.100F-01 9.201L 02 7.704F-02 6.455L 02 5.820F-02 4.89L 02 4.89L 02 0.360F-02 0.360F-02 0.360L 02	11.9200 1.405_01 1.1405_01 9.150_02 7.7435_02 6.457_02 5.6225_02 4.059_02 4.3705_02 1.065_02	12.3/33 1./04L 01 1.139F-01 9.192L 02 7.739F-02 6.454L 02 5.821F-02 4.897L 02 4.897L 02 4.374F-02 3.891L 02	12.8267 1.705L 01 1.138F-01 <u>9.170L 02</u> 7.738F-02 <u>5.609F-02</u> <u>4.085L 02</u> 4.382F-02 <u>1.085L 02</u>	1.704L 01 1.137F-01 9.156L 02 7.717F-02 6.400L 02 5.502F-02 4.870L 02 4.845F-02 0.865L 02	13./333 1.694_01 1.134F-01 9.137_02 7.669F-02 4.991_02 5.565F-02 4.041_02 4.316F-02 1.0130_02
6.0 87 10.8 128 16.3 17.5 20.1 22.4 25.1 27.5	Passa (psia) 79.200 114 198 107.722 150.365 100.296 150.24 100.096 150.153	Chamber Pre-soure, poin 12,0595 12,7940 117,780 9,8250 8,5710 7,4005 6,7110		1,709L 01 1,138F-01 9,169L 02 7,707F-02 6,406L 02 5,565F-02 4,010L 02 4,308F-02	7.8400 1.705L 01 1.135F-01 9.174L 02 7.712F-02 6.412L 02 5.574F-02 4.838L 02 4.314F-02	8.2933 1.700L 01 1.139F-01 9.176L 02 7.716F-02 6.417L 02 5.581F-02 4.049L 02 4.310F-02	1.707L 01 1.140F-01 9.105L 02 7.731F-02 6.402L 02 5.502F-02 4.854L 02 4.323F-02	9.2000 1.706L 01 1.140F-01 9.150L 02 7.735F-02 6.437L 02 5.505F-02 4.350F-02 4.330F-02	9.6533 1.705L 01 1.107F-01 9.190L 02 6.444L 02 5.604F-02 4.870L 02 4.870L 02 9.845L 02 9.845L 02 9.845L 02 9.845L 02 9.845L 02 9.845L 02	x/m 10.1067 1.7051.01 1.1405-01 5.1501.02 7.7405-02 6.4401.02 5.5685-02 4.3455-02	0° Azim 10.5600 1.705L 01 1.105F-01 9.198L 02 7.747F-02 6.445L 02 4.801L 02 4.357F-02 9.865L 02 3.516F-02	uth 11.0133 1.704_01 1.105-01 <u>9.200_02</u> 7.7425-02 <u>6.4125_02</u> <u>4.055_02</u> <u>4.3575-02</u>	11.4667 1.704E 01 1.405-01 9.201E 02 7.704E-02 6.405E 02 4.892E 02 4.364E-02	11.9200 1.709±01 1.1405-01 9.190±02 7.7435-02 6.457±02 4.6925-02 4.3705-02	12.3/33 1.704L 01 1.135F-01 9.192L 02 7.735F-02 6.454L 02 5.521F-02 4.397L 02 4.397L 02	12.8267 1.705L 01 1.138F-01 9.476L 02 7.730F-02 6.446L 02 5.605F-02 4.050F-02 4.050F-02 1.054L 02 3.538F-02 3.538F-02 3.538F-02 3.250L 02	1.704L 01 1.137F-01 9.155L 02 7.717F-02 6.400L 02 5.502F-02 4.870L 02 4.345F-02	13./333 1.694_01 1.134F-01 9.13/L.02 7.659F-02 6.391L.02 5.555F-02 4.041L.02 4.316F-02
5.0 8 7 10.8 12 8 15.3 17 5 20.1 22 4 25.1 27 5 29.5 32 8	Pass (pris) 75,200 114,198 107,722 150,365 100,296 150,24 100,096 150,153 100,179 150,378 100,273 150,378	Chamber Prieskun, pola 13.0395 12.7540 11.7580 9.0260 8.5710 7.4055 6.7110 5.6050 5.4735 5.0465 4.6040		1.709L 01 1.138-01 9.169L 02 7.707E-02 6.409L 02 5.565E-02 4.030L 02 4.308E-02 3.455E-02 3.441L 02 2.785E-02	7.8400 1.709L 01 1.139F-01 9.174L 02 7.719F-09 6.412L 02 4.538L 02 4.538L 02 4.538L 02 3.473F-09 3.4	8.2933 1.400_01 1.139=41 8.176_02 7.716=42 6.417_02 4.319=42 4.319=42 3.487=42 3.487=42 3.487=42 2.479_02 2.878=42	1.707L 01 1.140F-01 9.105L 02 7.731F-02 6.405L 02 5.507F-02 4.854L 02 4.323F-02 3.497F-02 3.497F-02 9.208F-02 2.08F-02	9.2000 1.405_01 1.405_01 1.405_01 1.405_02 7.7355_02 6.437_02 4.305_02 4.305_02 1.041_02 3.5005_02 1.041_02 3.5005_02 1.210_02 2.92115_02	9.6533 1.705L 01 1.107-01 9.192L 02 7.707-09 5.604-09 4.870L 02 4.870L 02 3.837-09 3.845L 02 3.845L	x/r 10.1067 1.705L 01 1.140F-01 1.140F-01 1.140F-02 0.446L 02 7.740F-02 0.446L 02 7.740F-02 0.446L 02 3.508F-02 1.016L 02 3.509F-02 1.224L 02 2.035F-02	0° Azim 10.5600 1.705L 01 1.107-01 9.196L 02 7.745F-02 6.445L 02 4.801L 02 4.807F-02 9.801L 02 3.516F-02 9.365L 02 9.365L 02 9.355L 02 9	uth 11.0133 1.704_01 1.140F-01 9.200_02 7.749F-02 6.4102_02 4.059L_02 4.059L_02 3.57F-02 3.57F-02 3.57F-02 3.57F-02 3.57F-02 3.57F-02 3.57F-02 3.57F-02	11.4667 1.704L 01 1.106F-01 9.201L 02 7.704F-02 6.465L 02 4.892L 02 4.892L 02 3.802F-02 3.802F-02 3.802F-02 3.832F-02 9.244L 02 9.2547F-02	11.9200 1.400_01 1.400=01 9.450_02 7.743=40 6.457_02 4.059_02 4.059_02 4.059_02 3.540=40 3.540=4	12.3733 1.704L 01 1.135F-01 9.192L 02 7.735F-02 6.464L 02 4.897L 02 4.897L 02 3.845F-02 3.845F-02 9.265L 02 9.265L 02 9.265L 02	12.8267 1.7051 01 1.138F-01 9.1701 02 7.739F-02 6.4451 02 4.0851 02 4.0851 02 3.538F-02 3.538F-02 3.538F-02 3.538F-02 3.538F-02	1.704L 01 1.137F-01 9.168L 02 7.717F-02 6.403L 02 5.502F-02 4.870L 02 4.870L 02 4.345F-02 9.865L 02 3.519F-02 9.2519F-02 9.250L 02 9.250L 02	13./333 1.654_01 1.134F-01 9.130_02 7.659F-02 6.391L.02 7.659F-02 4.341F-02 4.341F-02 3.659F-02 3.659F-02 3.659F-02 3.259L.02 2.209L.02
5.0 8.7 10.8 12.8 15.3 17.5 20.1 22.4 22.4 25.1 27.5 29.8	Pass (pris) 79,200 114 198 127,722 150 24 100,295 150 24 100,295 150 153 100,179 150 378 100,273 150 082 150 082 150 375	Chamber Frieskun, pola 13,0095 13,0095 12,7940 11,7580 9,0260 8,5710 7,4005 6,7110 5,6060 5,4755 5,0465		1.709L 01 1.138F-01 9.609L 02 7.7076-02 6.409L 02 5.585F-02 4.039L 02 4.308F-02 3.05F-02 3.657F-02 3.457E-02 3	/.8400 1.709L 01 1.339F-01 9.174L 02 7.770F-02 6.574F-02 2.574F-02 9.827L 02 9.827L 02 9.827L 02 9.827L 02 9.84F-02 2.501L 02 9.344F-02 2.501L 02 9.145F-02 9.145F-02 9.145F-02 9.145F-02 9.145F-02 9.145F-02 9.145F-02 9.145F-02	8.2933 1.700_01 1.139F-01 9.176L02 7.716F-02 6.417_02 4.319F-02 4.319F-02 3.437F-02 3.437F-02 3.437F-02 3.437F-02 3.437F-02	1.707L 01 1.140F-01 9.102L 02 7.731F-02 6.402L 02 5.507F-02 4.854L 02 4.353F-02 9.807L 02 9.205L 02 9.205E-02 2.605E-02 2.605E-02 9.347F-02	9.2000 1.700_01 1.407-01 1.407-01 1.500_02 7.735-07 6.4370_02 5.509-07 1.4050_02 2.5509-07 1.410_02 2.5509-07 2.626_02 2.855-07 2.855-07 2.855-07 2.855-07	9.6533 1.705L 01 1407E-01 9.190L 02 7.767E-02 6.44EF-02 6.44EF-02 9.84EF-02 9.845E-020	x/r 10.1057 1.705-01 1.409-01 1.919-01 1.919-02 5.608-07 1.005-02 5.608-07 1.005-02 2.650-07 2.055-07 2.055-02 2.425-07 2.455-07 2.	, 0° Azim 10.6000 1.705.01 1.405.01 1.405.01 1.405.02 5.6175.02 2.6175	uth 11.0133 1.004_01 1.406-01 <u>5.200_02</u> 7.749-02 <u>5.6155-02</u> <u>4.090_02</u> <u>4.090_02</u> <u>4.090_02</u> <u>4.090_02</u> <u>2.036-02</u> <u>2.036-02</u> <u>2.036-02</u> <u>2.0485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4485-02</u> <u>9.4455-02</u> <u>9.4455-02</u> <u>9.4455-02</u> <u>9.4455-02</u> <u>9.455-02</u> <u>9.455-02</u> <u>9.455-02</u> <u>9.455-02</u> <u>9.455-02</u> <u>9.455-02</u> <u>9.455-02</u> <u>9.455-02</u> <u>9.455-02</u> <u>9.455-02</u> <u>9.455-02</u> <u>9.455-02</u> <u>9.455-02</u> <u>9.455-02</u> <u>9.455-02</u> <u>9.455-02</u> <u>9.455-02</u> <u>9.455-02</u> <u>9.455-02</u> <u>9.455-02</u> <u>9.455-02</u> <u>9.455-02</u> <u>9.455-02</u> <u>9.455-02</u> <u>9.455-02</u> <u>9.455-02</u> <u>9.455-02</u> <u>9.455-02</u> <u>9.455-02</u> <u>9.455-02</u> <u>9.455-02</u> <u>9.455-02</u> <u>9.455-02</u> <u>9.455-02</u> <u>9.455-02</u> <u>9.455-02</u> <u>9.455-02</u> <u>9.455-02</u> <u>9.455-02</u> <u>9.455-02</u> <u>9.455-02</u> <u>9.455-02</u> <u>9.455-02</u> <u>9.455-02</u> <u>9.455-02</u> <u>9.455-02</u> <u>9.455-02</u> <u>9.455-02</u> <u>9.455-02</u> <u>9.455-02</u> <u>9.455-02</u> <u>9.455-02</u> <u>9.455-02</u> <u>9.455-02</u> <u>9.455-02</u> <u>9.455-02</u>	11.4667 1.7044_01 1.405-01 9.2014_02 5.6205-02 4.8914_02 5.6205-02 4.8914_02 5.6205-02 4.8914_02 5.6205-02 4.8914_02 9.8055-02 9.8	11.9200 1.402_01 1.407_01 1.407_01 1.407_01 1.407_02 5.622F_02 1.034_02 2.5622F_02 1.034_02 2.5622F_02 2.034_02 2.035F_0	12.3/33 1.704L 01 1.335-01 9.132L 02 5.6245-02 5.6245-02 5.6245-02 9.895L 02 9.895L 02 9.855-02 9.855-02 9.655-	12.8267 1.705L 01 1.138F-01 9.476L 02 7.730F-02 6.446L 02 5.605F-02 4.050F-02 4.050F-02 1.054L 02 3.538F-02 3.538F-02 3.538F-02 3.250L 02	1.704L_01 1.137F-01 9.195L_02 7.717F-02 6.407L_02 5.507F-02 4.876L_02 4.876L_02 4.876L_02 9.166L_02 9.205L_02 9.48F-02 9.205L_02 9.48F-02 9.48F-02 9.48F-02 9.48F-02 9.48F-02 9.48F-02	13./333 1.654_01 1.134F-01 9.134F-01 9.134F-01 9.134F-02 1.555F-02 4.041_02 4.041_02 4.041_02 4.041_02 1.030_02 2.030_02 2.010F-02 2.010F-02 2.010F-02 2.010F-02
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1.0         8.7           10.8         7.7           10.1         10.2           10.2         1.1           10.3         10.2           10.4         20.1           20.4         20.1           20.7         20.4           20.8         20.8           20.8         20.8           20.8         20.8           20.4         4.4           4.4         4.7           50.6         50.7           50.7         50.1	Page (priv) 9:220 114:105 115:025 150:24 150:24 150:25	Chamber Pre-sum, poin (1.009)		1,729,01 1,338,01 1,338,01 1,338,01 1,338,00 1,338,00 1,338,00 1,338,00 1,338,00 1,338,00 1,338,00 1,340,00 2,378,	7,8400 1,09L 01 1,33E-01 9,34E-02 9,34E-02 9,34E-02 4,030L 02 5,354E-02 4,030L 02 5,34E-02 1,42L 02 5,34E-02 1,42E	8.2933 1.700_01 1.337-01 5.770_02 5.5174_02 5.5174_02 5.5174_02 1.3474_02 5.5174_02 1.3474_02 1.3474_02 2.550_02 2	1.707L 01 1.140F-01 9.102L 02 9.731F-02 6.432L 02 6.432L 02 6.432L 02 9.432L 02 9.432L 02 9.547F-02 9.547F-02 9.547F-02 9.547F-02 9.547F-02 1.242L 02 1.242L 02 6.502E-02 9.502E-02	9.2000 1.706_01 1.910-01 9.790_02 9.590_02 9.590_02 9.590_02 9.590_02 9.590_02 9.590_02 9.590_02 9.590_02 1.200_02 9.590_02	9,05533 1,705L 01 1,145E-01 9,192L 02 7,745E-20 6,444L 02 5,504E-20 4,97L 02 5,504E-20 1,242L 02 2,242L 02 2,245E-20 1,242L 02 2,245E-20 2,245E-20 2,245E-20 2,245E-20 1,244E-20 1,244E-20 4,305E-20 1,244E-20 4,305E-20 1,244E-20 4,305E-20 1,244E-20 4,305E-20 1,244E-20 4,305E-20 1,244E-20 4,305E-20 1,244E-20 4,305E-20 1,244E-20 1,2	x/r 10.1057 1.4057 1.4057 1.4057 1.4057 2.405	, 0° Azim 10.6600 1.76L 01 1.465-21 9.198L 02 7.767-29 6.442L 02 6.8575-29 3.642L 02 4.001L 02 6.8575-29 3.642L 02 9.3875-29 3.2615-29 2.2651-29 2.3855-29 2.2651-29 2.3855-29 1.395L 02 1.395L 02 1.395	uth 11.0133 1.762_01 1.140F-01 5.200_02 7.749F-02 5.615F-02 4.0397_02 5.615F-02 4.0397_02 5.615F-02 4.0397_02 1.2700_02 2.050_02 2.0	11.4667 1.704L 01 1.4067-01 9.201L 02 5.920F-02 4.991L 02 5.920F-02 4.991L 02 5.920F-02 4.991L 02 5.947F-03 1.244L 02 2.465F-02 1.967L 02 2.465F-02 1.967L 02 2.465F-02 1.967L 02 2.465F-02 1.967L 02 2.465F-02 1.967L 02 1.967L 02 1.	11.9200 1.709_01 1.709_01 1.709_01 1.709_02 7.743=02 5.750_02 4.376=42 4.376=42 4.376=42 1.002_02 4.376=42 1.002_02 2.055=40 2.055=4	12.3/33 1.704L c1 1.335-61 9.335-62 7.335-62 6.3454-62 5.6245-62 5.6245-62 9.354-62 9.3	12.8267 1.705_01 1.338-01 1.378-01 5.470_02 4.389-02 4.389-02 4.389-02 4.389-02 4.389-02 4.389-02 4.389-02 2.090_02 2.090_02 2.090_02 2.090_02 2.090_02 1.722_02 1.722_02 1.722_02 1.722_02 1.521_0	1.704L 01 1.137F-01 9.155L 02 7.717F-05 6.370L 02 6.850F-02 9.657L 02 2.850F-02 9.365L 02 2.850F-02 9.365L 02 2.857F-02 9.257E-02 2.957L 02 2.957L 02 1.957L 02	13./333 1.054_01 1.35741 1.35741 7.659140 2.059140 2.059140 2.059440 2.059440 2.059440 2.059440 2.059400 2.059400 2.059400 2.059400 2.059400 2.059400 2.05940 2.059400 2.059400 2.059400 2.059400 2.059400 2.059400 2.059400 2.059400 2.059400 2.059400 2.059400 2.059400 2.059400 2.059400 2.059400 2.059400 2.059400 2.059400 2.059400000000000000000000000000000000000
1.0         8.7           8.7         19.8           19.8         19.8           19.8         19.7           20.1         17.8           20.4         29.4           20.5         29.8           29.8         29.8           39.8         39.8           44.8         44.0           44.8         44.0           57.8         50.4           60.1         83.9           67.0         10.1	Para (prin) 78,220 78,220 141 (195 150,355 150,355 150,255 150,255 150,255 150,255 150,375 150,255 150,257	Chemical Provides and Chemical Processing and Chemical Processing and Chemical Processing Procesing Processing Processing Processing Processing		1,709,01 1,358-01 1,358-01 1,358-01 5,000,02 5,000,02 4,000,02 4,000,02 1,3558-07 2,765-07 2,765-07 2,765-07 2,765-07 2,765-07 2,765-07 2,765-07 5,059	7,8100 1,792,61 1,135,61 1,135,61 1,135,62 1,135,62 1,142,62 5,574,62 5,574,62 2,144,62 2,144,62 2,144,62 2,144,62 2,144,62 2,144,62 2,144,62 2,144,62 5,514,63 5,515,63	8.2933 1.700_01 1.337_01 1.337_01 2.437_00 2.4317_00 2.4317_00 2.4317_00 2.4317_00 2.4317_00 2.4317_00 2.4317_00 2.4317_00 2.4317_00 2.4317_00 2.4317_00 2.4317_00 2.4327_00 2.4427_00 5.4437_00 5.4437_03 5.4457_03 5.4457_03 5.4457_03 5.4457_03 5.4457_03 5.4457_	1.707L 01 1.142F-01 9.102L 02 9.102L 02 9.3734F-02 9.3734F-02 9.597F-02 9.397F-02	9.2000 1.702.01 1.402.01 1.402.02 7.7554.02 5.502.02 4.5374.02 5.5374.02 5.5374.02 5.5374.02 2.43374.02 2.43374.02 2.4354.02 2.4354.02 1.525	9.6553 1.0613 1.161-51 9.1921-52 6.441-52 6.441-52 6.441-52 6.441-52 6.441-52 7.358-528-52 7.358-528-52 7.358-528-528-528-528-528-528-528-528-528-5	x/r 10.1067 1.620_01 1.460_01 5.160_02 5.460_02 5.	, D* Azim 10.6600 1.002 01 1.102-01 1.102-01 1.102-01 1.102-01 0.102-	uth 11.0133 1.022,01 1.407-01 5.019-07 5.	11.4667 1.084_01 1.0757 1.05577 1.05577 1.05577 1.05577 1.05577 1.05577 1.05577 1.05577 1.05577 1.05577 1.05577 1.05577	11.9200 1.702_01 1.402_0	12.3733 1.004_01 1.336_01 1.336_01 5.036_010000000000000000000000000000000000	12.8267 1.750_01 1.388_0	1.704L 01 1.137F-01 9.154L 02 7.17F-02 6.302L 02 5.507F-02 9.457L 02 2.517F-02 9.457L-02 2.547F-02 2.547F-02 2.547F-02 2.547F-02 2.547F-02 2.547F-02 2.547F-02 1.997L 02 1.597L 02 1	13./333 1.0562.01 1.1376.01 1.1376.01 2.1376.02 2.5557.02 2.5557.02 2.5557.02 2.5577.02 2.5577.02 2.5577.02 1.
$\begin{array}{c} 1.0\\ 8.7\\ 10.8\\ 7\\ 10.5\\ 12.8$	Page (print) 75,220 141 (105) 151 (127,22) 150 (25) 150 (25)	Chorney Fue-star, peri 10,059 (2,129) (2,129) (2,120) (2,120) (3,1750) (2,120) (3,1750) (3,17		1,7294,01 1,387-01 3,7094,02 7,7077-07 4,4204,02 5,5587-07 4,43054,02 1,4414,02 3,4597-07 1,4414,02 3,4597-07 1,4414,02 3,4597-07 1,4414,02 3,4597-07 6,6420,02 5,44174,03 6,44174,03	7,8400 1,735,01 1,335,02 3,142,02 3,142,02 5,314,02 4,342,02 4,344,02 4,444,02	8.2933 1.400_01 1.139F-40 2.470_02 7.148F-40 5.551F-40 4.343F-40 1.345F-40 2.555F-40 4.343F-40 2.555	1.707L 01 1.143F-21 9.102L 02 9.102L 02 9.102L 02 4.540F-20 9.550F-20 9.550F-20 9.202L 02 9.560F-20 9.202L 02 9.560F-20 9.202L 02 9.567F-20 9.202L 02 9.567F-20 9.202L 02 9.567F-20 9.577F-20	9.2000 1.422,01 1.446-41 1.446-41 1.446-41 1.5420,02 1.5520,	9.6533 1.7662.01 1.467-01 9.1921.02 9.1921.02 8.5016-29 2.8676-29	x/r 10.1057 1.407-01 1.407-01 1.407-02 1.525-02 7.507-07 1.407-02 1.	, 0° Azim 10.6600 1.001 c1 1.005 c1 1.005 c1 1.005 c1 1.005 c1 1.005 c1 1.005 c1 1.005 c1 1.005 c2 1.005	uth 11.0133 1.762_01 1.140F-01 5.200_02 7.749F-02 5.615F-02 4.0397_02 5.615F-02 4.0397_02 5.615F-02 4.0397_02 1.2700_02 2.050_02 2.0	11.4667 1.0467-02 1.047-02 1.047-02 1.047-02 1.047-02 1.0491	11.9200 1.402_01 1.407_01 1.407_02 1.500_02 7.7437_02 6.5297_02 4.3707_02 1.3707	12.3/33 1.04L -01 1.35F-31 3.152L -02 7.73FF-39 0.454L -02 5.521F-32 4.374F-32 2.65F-29 2.65F-29 2.65F-29 2.65F-29 2.65F-29 2.65F-29 2.65F-29 2.65F-29 2.65F-29 2.65F-29 1.65F	12.8267 1.62247 1.62247 1.6247 1.6247 1.6247 1.6447 1.6	1.704L 01 1.137E-01 9.156L 02 6.432L 02 6.432L 02 6.432L 02 6.434E-02 3.45E-02 3.45E-02 3.45E-02 3.45E-02 3.45E-02 3.45E-02 3.45E-02 3.45E-02 3.45E-02 1.45E-02 1.45E-02 1.45E-02 1.42E-02	13./333 13./333 11.35-41 11.35-41 11.35-41 11.35-41 11.35-41 1
$\begin{array}{c} 1.0\\ 8.7\\ 10.8\\ 10.8\\ 12.8\\ 12.8\\ 12.8\\ 17.8\\ 20.1\\ 20.1\\ 17.8\\ 22.1\\ 2$	Pairs (prin) 75220 114 105 115 055 115 055 110 025 110 025	Chemistry of Parents of the state of 10,05% (10,05%		1.75%_011 1.75%_011 1.75%_02 5.75%_02 5.55%_02 4.050_02 4.050_02 1.010_02 7.55%_02 1.010_02 7.55%_02 1.010_02 7.55%_02 1.010_02 7.55%_02 1.010_02 5.45%_02\\5.45%_02\\5.45%_02\\5.45%_02\\5.45%_02\\5.45%_02\\5.45%_02\\5	7.8100 1.709L 01 1.339F-01 9.174L 02 7.379F-05 9.174L 02 5.374F-05 9.174L 02 1.329L 02 4.334F-05 9.124L 02 2.01L 02 2.445F-05 5.347F-05 5.34	8.2993 1.305-01 1.305-01 1.305-01 1.305-01 1.305-01 1.305-01 1.305-01 1.305-02 1.305-02 1.305-02 1.305-02 2.335-02 2.355-02 2.355-02 2.355-02 2.355-02 2.355-02 2.355-02 2.355-02 2.355-02 2.355-02	1.707L 01 1.143F-01 9.103L 02 9.103L 02 9.550F-03 9.550F-03 9.550F-03 9.530F-03	9.2000 1.700_01 1.407-01 1.407-01 1.407-01 1.407-01 1.407-01 1.407-01 1.407-02	$\begin{array}{c} 9.0533\\ \hline 1.705U29\\ \hline 1.405U29\\ \hline 1.405U29\\ \hline 3.1405U29\\ \hline 5.504U29\\ \hline $	x/r 10.1057 1.765-01 1.407-01 1.407-01 1.407-02 1.407-02 1.407-02 1.407-02 1.407-02 1.407-02 1.555-07 2.455-07 2.	, D* Azim 10.6009 1.00L 21 1.40E 21 1.40E 21 1.40E 21 5.199L 22 5.499L	uth 11.01233 1.024_01 1.140F-01 1.240F-01 5.250_00 5.252_00 5.252_00 1.252_00 1.252_00 1.252_00 2.435F-07 1.252_00 2.435F-07 1.252_00 2.435F-07 1.252_00 1.252_	11.4667 1.704107 1.4667 1.46777 1.46777 1.46777 1.46777 1.46777 1.46777 1.46777 1.467777 1.46777 1.4677777 1.46777777 1.46777777	11.9200 1.020_01 1.402_0	12.3733 1.704.01 1.337.01 9.192.02 7.337.02 6.344.02 6.344.02 6.344.02 4.374.02 2.391.0	12.8267 1.735-01 1.735-01 1.735-01 1.735-01 1.735-01 1.735-01 1.735-02 1.735-02 1.735-02 1.735-02 1.755-02 1.755-02 2.755-02 2.755-02 2.755-02 2.755-02 2.755-02 2.755-02 1.8755-02	1.704L 01 1.132F-01 9.164L 02 9.164L 02 1.712F-02 9.164L 02 1.712F-02 1.712F-02 1.712F-02 1.712F-02 1.712F-02 1.712F-02 1.712F-02 1.712F-02 1.724F-02	13./333 13./333 11.35-01 11.35-01 11.35-01 11.35-01 1.
1.0         8.7           8.7         12.8           10.8         12.8           10.8         17.8           10.9         17.8           20.1         20.4           20.3         29.8           20.8         20.8           20.4         20.4           20.4         20.4           20.4         20.4           20.4         20.4           20.4         20.4           20.4	Para (prin) 75.220 14.105 10.722 150.355 150.255 150.255 150.155 150.055 150.055 150.055 150.055 150.055 150.055 150.055 150.055 150.055 150.055 150.254 150.255 150.254 150.255 15	Chemiser Theorem, para Tal. 1995 12.		1.75%_01 1.55%_01 2.55%_01 5.55%_02 4.050_02 5.55%_02 1.010_02 2.55%_02 2.55%_02 2.55%_02 5.55%_	7,8100 1,791,01 1,131,62 1,131,62 1,131,62 1,131,62 1,131,62 1,131,62 1,131,62 1,141,02	8.2933 1.700_01 1.337-01 1.337-01 1.337-02	1.707L 01 1.142F-01 9.102L 02 0.7334F-02 7.734F-02 4.944L 02 4.944L 02 2.957F-02 2.957F-02 2.957F-02 2.957F-02 2.957F-02 2.957F-02 2.957F-02 3.407F-02 3.407F-02 3.557F-02 3.457F-02 3.557F-02 3.457F-02 3.557F-02 3.457F-02 3.557F-02 3.557F-02 3.557F-02 3.557F-02 3.557F-02 3.557F-02 3.557F-02 3.557F-02 3.557F-02 5.557F-02 5.557F-03	9.2000 1.702.01 1.402.01 1.402.02 7.7554.02 5.5074.02 5.5074.02 5.5074.02 5.5074.02 5.5074.02 5.5074.02 2.403.02 7.5584.02 2.404.02 7.5584.02 7.5584.02 1.5074.02 7.5584.02 1.5074.0	9.65533 1.0024 54 9.1924 52 5.1457-51 5.1457-51 5.1457-52 5.	x/r 10.1067 1.602-01 1.408-01 1.408-02 1.	, D* Azim 10.6600 1.002 01 1.102-01 1.102-01 1.102-01 1.102-01 0.102-	uth 11.0133 1.022,01 1.407-01 5.019-07 5.	11.4667 1.084_01 1.075_1405_01 5.075_1625 5.075_16	11.9200 1.702_01 1.406-01 1.406-01 1.406-01 1.406-01 1.406-01 1.406-01 1.406-01 1.406-02 1.545-0	12.37/33 1.084_01 1.385_01 1.385_01 1.385_01 1.385_01 1.385_01 1.385_01 1.385_01 1.385_01 1.385_01 1.385_01 1.385_01 2.455_01 2.455_01 2.455_01 2.455_01 2.455_01 1.391_02 1.555_01 1.391_02 1.555_01 1.391_02 1.555_01 1.391_02 1.555_01 1.391_02 1.555_01 1.391_02 1.555_01 1.391_02 1.555_02 1.5	12.8267 1.750_01 1.388_0	1.704L 01 1.137F-01 9.164L 02 7.177F-02 7.177F-02 4.6405L 02 4.67L 02 4.67L 02 4.67L 02 4.67L 02 4.67L 02 2.946F-02 2.946F-02 2.946F-02 2.946F-02 2.946F-02 2.946F-02 2.946F-02 2.946F-02 2.946F-02 2.946F-02 1.99L 02 1.69F-02	13./333 1.0562.01 1.1376.01 1.1376.01 1.1376.01 1.1376.01 1.1376.01 1.1376.01 1.1376.01 1.1376.01 1.022 1.0250.02 2.1017.02 2.1017.02 2.1017.02 2.1017.02 2.1017.02 2.1017.02 2.1017.02 2.1017.02 1.1377.01 1.5377.01 1.5377.01 1.5377.02 1.5377

							m	m dov	vnstre	eam.								
										x/r*, 0°	Azimuth	1						
		P <sub>amb</sub> , Vacuum																
NPR	Nozzle P <sub>total</sub> (psia)	Chamber Pressure, psia	0.1333	0.5867	1.0400	1.4933	1.9467	2.4000	2.8533	3.3067	3.7600	4.2133	4.6667	5.1200	5.5733	6.0267	6.4800	6.9333
5.8	79.208	13.6595	0.5840	0.4837	0.8314	0.9611	0.9762	0.9832	0.9850	0.9876	0.9893	0.9899	0.9910	0.9907	0.9905	0.9908	0.9907	0.9910
8.7	114.198	13.0925	0.8857	0.7467	0.5467	0.4186	0.9594	0.9733	0.9796	0.9834	0.9860	0.9883	0.9895	0.9899	0.9906	0.9913	0.9919	0.9923
10.8	137.722	12.7940 11.7580	1.0972	0.9207	0.6747	0.5142	0.3970 0.4671	0.9422	0.9637 0.9353	0.9710	0.9756	0.9797 0.9748	0.9816 0.9782	0.9822	0.9833 0.9810	0.9844 0.9822	0.9855 0.9834	0.9862
12.8 15.3	150.365 150.236	9.8260	1.3113	1.0928	0.8011	0.6113 0.7310	0.4671	0.3812 0.4489	0.9355	0.9593	0.9686	0.9746	0.9762	0.9798	0.9610	0.9622	0.9634	0.9645
17.5	150.24	8.5710	1.7905	1.4976	1.0984	0.8376	0.6406	0.5144	0.4166	0.3484	0.8971	0.9425	0.9564	0.9631	0.9679	0.9711	0.9732	0.9742
20.1	150.096	7.4855	2.0561	1.7124	1.2559	0.9588	0.7323	0.5883	0.4763	0.3957	0.3330	0.8663	0.9297	0.9466	0.9564	0.9621	0.9657	0.9680
22.4 25.1	150.153 150.179	6.7110 5.9890	2.2859 2.5622	1.9134 2.1439	1.4026	1.0693 1.1987	0.8172 0.9163	0.6562 0.7358	0.5315 0.5958	0.4414 0.4947	0.3697 0.4143	0.3216 0.3578	0.8504 0.3139	0.9185 0.8076	0.9399 0.9020	0.9508	0.9569 0.9436	0.9614 0.9512
25.1	150.376	5.4735	2.8159	2.1439	1.7197	1.3136	1.0032	0.8057	0.6528	0.4947	0.4143	0.3921	0.3431	0.3015	0.9020	0.8939	0.9436	0.9512
29.8	150.233	5.0465	3.0409	2.5453	1.8666	1.4232	1.0875	0.8737	0.7074	0.5875	0.4918	0.4247	0.3719	0.3244	0.2968	0.7908	0.8875	0.9202
32.6	150.082	4.6040	3.3464	2.7871	2.0417	1.5582	1.1898	0.9563	0.7748	0.6431	0.5384	0.4650	0.4070	0.3553	0.3234	0.2880	0.7589	0.8732
35.8 38.8	150.156 150.37	4.1970 3.8805	3.6536	3.0565 3.3107	2.2433 2.4275	1.7107 1.8531	1.3078 1.4150	1.0503	0.8501	0.7060	0.5914 0.6401	0.5104 0.5528	0.4470	0.3898 0.4221	0.3545	0.3128 0.3386	0.2821 0.3041	0.7084
41.3	150.324	3.6405	4.2307	3.5278	2.5867	1.9742	1.5086	1.2116	0.9812	0.8147	0.6820	0.55889	0.5156	0.4221	0.4093	0.3609	0.3239	0.2945
44.8	150.065	3.3470	4.6050	3.8336	2.8094	2.1428	1.6376	1.3158	1.0651	0.8847	0.7407	0.6397	0.5599	0.4888	0.4449	0.3923	0.3523	0.3200
47.5	149.255	3.1395	4.8743	4.0592	2.9766	2.2714	1.7366	1.3958	1.1301	0.9384	0.7855	0.6781	0.5937	0.5182	0.4714	0.4157	0.3730	0.3389
50.4 54.3	149.354 150.247	2.9615 2.7680	5.1518 5.5506	4.3113 4.6391	3.1622 3.4021	2.4109 2.5947	1.8430 1.9823	1.4797 1.5928	1.1984	0.9954	0.8334 0.8970	0.7192 0.7742	0.6301 0.6781	0.5494 0.5918	0.5001 0.5383	0.4410 0.4747	0.3957 0.4259	0.3596 0.3873
57.6	150.136	2.6080	5.8808	4.9225	3.6097	2.7527	2.1028	1.6890	1.3681	1.1357	0.9509	0.8213	0.7193	0.6273	0.5706	0.5035	0.4253	0.4107
60.1	150.344	2.5015	6.1563	5.1369	3.7653	2.8735	2.1947	1.7633	1.4287	1.1865	0.9934	0.8575	0.7507	0.6552	0.5960	0.5257	0.4717	0.4289
63.9	150.212	2.3515	6.5282	5.4582	4.0034	3.0538	2.3338	1.8750	1.5186	1.2609	1.0555	0.9118	0.7982	0.6962	0.6336	0.5588	0.5014	0.4559
67.5 71.4	150.286 150.437	2.2260 2.1080	6.8976 7.3150	5.7709 6.0958	4.2318 4.4701	3.2278 3.4118	2.4668 2.6072	1.9816 2.0949	1.6047 1.6964	1.3324 1.4089	1.1159	0.9636	0.8432 0.8914	0.7358 0.7780	0.6694	0.5903 0.6243	0.5301 0.5602	0.4816
77.9	150.437	1.9310	7.9814	6.6535	4.8762	3.7229	2.8457	2.2859	1.8519	1.4003	1.2869	1.1113	0.9726	0.8488	0.7727	0.6815	0.6116	0.5557
84.0	150.396	1.7905	8.6127	7.1773	5.2628	4.0162	3.0673	2.4647	1.9966	1.6576	1.3873	1.1985	1.0489	0.9154	0.8327	0.7344	0.6590	0.5993
97.2	150.242	1.5455	9.9340	8.3073	6.0945	4.6477	3.5522	2.8541	2.3112	1.9198	1.6066	1.3873	1.2145	1.0599	0.9641	0.8502	0.7635	0.6936
111.1 380.8	150.39 150.223	1.3535 0.3945	11.3905 38.9125	9.4880 32.5551	6.9612 23.8682	5.3107 18.2028	4.0606 13.9113	3.2612 11.1736	2.6413 9.0494	2.1936 7.5133	1.8352	1.5848 5.4322	1.3875 4.7554	1.2117 4.1521	1.1023 3.7744	0.9716 3.3308	0.8726 2.9911	0.7928 2.7174
		0.0040	30.3125	32.9991	23.0002	10.2020	13.3113	11.1750	3.0434	7.5135	6.2915	5.4322	4.7004	4.1521	J.1144	3.3300	2.3311	2.1114
		0.0040	30.5125	32.3551	23.0002	10.2020	13.3113	11.1730	5.0454		0° Azin		4.7004	4.1521	5.1144	3.3300	2.5511	2.1114
		P <sub>amb</sub> , Vacuum	30.9125							x/r*,	, 0° Azin	nuth						
NDP	Nozzle	P <sub>amb</sub> , Vacuum Chamber	30.9123	7.3867	7.8400	8.2933	8.7467	9.2000	9.6533					11.9200	12.3733	12.8267	13.2800	
NPR	Nozzle P <sub>total</sub> (psia)	P <sub>amb</sub> , Vacuum Chamber Pressure, psia	30.9129	7.3867	7.8400	8.2933	8.7467	9.2000	9.6533	x/r*, 10.1067	0° Azin	nuth 11.0133	11.4667	11.9200	12.3733	12.8267	13.2800	########
NPR 5.8 8.7	Nozzle	P <sub>amb</sub> , Vacuum Chamber	30.3123							x/r*,	, 0° Azin	nuth						
5.8 8.7 10.8	Nozzle P <sub>total</sub> (psia) 79.208 114.198 137.722	P <sub>amb</sub> , Vacuum Chamber Pressure, psia 13.6595 13.0925 12.7940	30.9123	7.3867 0.9907 0.9929 0.9870	7.8400 0.9909 0.9932 0.9875	8.2933 0.9902 0.9933 0.9878	8.7467 0.9899 0.9940 0.9887	9.2000 0.9893 0.9943 0.9892	9.6533 0.9892 0.9944 0.9896	x/r*, 10.1067 0.9885 0.9944 0.9898	0° Azin 10.5600 0.9887 0.9945 0.9901	nuth 11.0133 0.9883 0.9945 0.9903	11.4667 0.9884 0.9945 0.9905	11.9200 0.9876 0.9942 0.9901	12.3733 0.9883 0.9935 0.9894	12.8267 0.9885 0.9928 0.9877	13.2800 0.9883 0.9918 0.9859	######## 0.9822 0.9893 0.9836
5.8 8.7 10.8 12.8	Nozzle P <sub>total</sub> (psia) 79.208 114.198 137.722 150.365	P <sub>amb</sub> , Vacuum Chamber Pressure, psia 13.6595 13.0925 12.7940 11.7580	30.3123	7.3867 0.9907 0.9929 0.9870 0.9856	7.8400 0.9909 0.9932 0.9875 0.9862	8.2933 0.9902 0.9933 0.9878 0.9867	8.7467 0.9899 0.9940 0.9887 0.9887	9.2000 0.9893 0.9943 0.9892 0.9891	9.6533 0.9892 0.9944 0.9896 0.9899	x/r*, 10.1067 0.9885 0.9944 0.9898 0.9898	0° Azin 10.5600 0.9887 0.9945 0.9901 0.9901	nuth 11.0133 0.9883 0.9945 0.9903 0.9900	11.4667 0.9884 0.9945 0.9905 0.9904	11.9200 0.9876 0.9942 0.9901 0.9902	12.3733 0.9883 0.9935 0.9894 0.9896	12.8267 0.9885 0.9928 0.9877 0.9885	13.2800 0.9883 0.9918 0.9859 0.9868	######## 0.9822 0.9893 0.9836 0.9833
5.8 8.7 10.8 12.8 15.3	Nozzle P <sub>total</sub> (psia) 79.208 114.198 137.722 150.365 150.236	P <sub>amb</sub> , Vacuum Chamber Pressure, psia 13.6595 13.0925 12.7940 11.7580 9.8260	30.3123	7.3867 0.9907 0.9929 0.9870 0.9856 0.9792	7.8400 0.9909 0.9932 0.9875 0.9862 0.9804	8.2933 0.9902 0.9933 0.9878 0.9867 0.9811	8.7467 0.9899 0.9940 0.9887 0.9887 0.9834	9.2000 0.9893 0.9943 0.9892 0.9891 0.9841	9.6533 0.9892 0.9944 0.9896 0.9899 0.9852	x/r*, 10.1067 0.9885 0.9944 0.9898 0.9898 0.9895	0° Azin 10.5600 0.9887 0.9945 0.9901 0.9901 0.9901	nuth 11.0133 0.9883 0.9945 0.9903 0.9900 0.9865	11.4667 0.9884 0.9945 0.9905 0.9904 0.9870	11.9200 0.9876 0.9942 0.9901 0.9902 0.9872	12.3733 0.9883 0.9935 0.9894 0.9896 0.9868	12.8267 0.9885 0.9928 0.9877 0.9885 0.9853	13.2800 0.9883 0.9918 0.9859 0.9868 0.9831	######################################
5.8 8.7 10.8 12.8 15.3 17.5	Nozzle P <sub>total</sub> (psia) 79.208 114.198 137.722 150.365 150.236 150.24	P <sub>amb</sub> , Vacuum Chamber Pressure, psia 13.6595 13.0925 12.7940 11.7580 9.8260 8.5710	30.3123	7.3867 0.9907 0.9929 0.9870 0.9856 0.9792 0.9755	7.8400 0.9909 0.9932 0.9875 0.9862 0.9804 0.9770	8.2933 0.9902 0.9933 0.9878 0.9867 0.9811 0.9783	8.7467 0.9899 0.9940 0.9887 0.9887 0.9884 0.9834	9.2000 0.9893 0.9943 0.9892 0.9891 0.9841 0.9814	9.6533 0.9892 0.9944 0.9896 0.9899 0.9852 0.9852	x/r*, 10.1067 0.9885 0.9944 0.9898 0.9898 0.9898 0.9855 0.9830	0° Azin 10.5600 0.9887 0.9945 0.9901 0.9901 0.9861 0.9838	nuth 11.0133 0.9883 0.9945 0.9903 0.9900 0.9865 0.9842	11.4667 0.9884 0.9945 0.9905 0.9904 0.9870 0.9852	11.9200 0.9876 0.9942 0.9901 0.9902 0.9872 0.9854	12.3733 0.9883 0.9935 0.9894 0.9896 0.9868 0.9868 0.9853	12.8267 0.9885 0.9928 0.9877 0.9885 0.9853 0.9853	13.2800 0.9883 0.9918 0.9859 0.9868 0.9831 0.9802	######################################
5.8 8.7 10.8 12.8 15.3 17.5 20.1 22.4	Nozzle P <sub>total</sub> (psia) 79.208 114.198 137.722 150.365 150.236 150.236 150.24 150.096 150.153	Pamb, Vacuum Chamber Pressure, psia 13.6595 13.0925 12.7940 11.7580 9.8260 8.5710 7.4855 6.7110	30.3123	7.3867 0.9907 0.9929 0.9870 0.9856 0.9792 0.9755 0.9691 0.9639	7.8400 0.9909 0.9932 0.9875 0.9862 0.9804 0.9770 0.9700 0.9653	8.2933 0.9902 0.9933 0.9878 0.9867 0.9811 0.9783 0.9715 0.9663	8.7467 0.9899 0.9940 0.9887 0.9887 0.9834 0.9834 0.9803 0.9733 0.9672	9.2000 0.9893 0.9943 0.9892 0.9891 0.9841 0.9814 0.9751 0.9689	9.6533 0.9892 0.9944 0.9896 0.9899 0.9852 0.9852 0.9823 0.9766 0.9708	x/r*, 10.1067 0.9885 0.9944 0.9898 0.9898 0.9895 0.9830 0.9775 0.9723	0° Azin 10.5600 0.9887 0.9945 0.9901 0.9901 0.9861 0.9838 0.9787 0.9736	nuth 11.0133 0.9883 0.9945 0.9903 0.9900 0.9865 0.9842 0.9795 0.9748	11.4667 0.9884 0.9945 0.9905 0.9904 0.9870 0.9852 0.9811 0.9763	11.9200 0.9876 0.9942 0.9901 0.9872 0.9854 0.9854 0.9823 0.9778	12.3733 0.9883 0.9935 0.9894 0.9896 0.9868 0.9853 0.9819 0.9787	12.8267 0.9885 0.9928 0.9877 0.9885 0.9853 0.9853 0.9832 0.9795 0.9760	13.2800 0.9883 0.9918 0.9859 0.9868 0.9831 0.9802 0.9764 0.9721	//////////////////////////////////////
5.8 8.7 10.8 12.8 15.3 17.5 20.1 22.4 25.1	Nozzle P <sub>total</sub> (psia) 79.208 114.198 137.722 150.365 150.236 150.236 150.24 150.096 150.153 150.179	Pamb, Vacuum Chamber Pressure, psia 13,6595 13,0925 12,7940 11,7580 9,8260 8,5710 7,4855 6,7110 5,9890	30.5123	7.3867 0.9907 0.9929 0.9870 0.9856 0.9792 0.9755 0.9691 0.9639 0.9563	7.8400 0.9909 0.9932 0.9875 0.9862 0.9804 0.9770 0.9700 0.9653 0.9596	8.2933 0.9902 0.9933 0.9878 0.9867 0.9811 0.9783 0.9715 0.9663 0.9619	8.7467 0.9899 0.9940 0.9887 0.9887 0.9834 0.9803 0.9733 0.9672 0.9623	9.2000 0.9893 0.9943 0.9892 0.9891 0.9814 0.9814 0.9751 0.9689 0.9633	9.6533 0.9892 0.9944 0.9896 0.9899 0.9852 0.9823 0.9766 0.9766 0.9708 0.9651	x/r*, 10.1067 0.9885 0.9944 0.9898 0.9898 0.9898 0.9855 0.9830 0.9775 0.9775 0.9723 0.9669	0° Azin 10.5600 0.9887 0.9945 0.9901 0.9861 0.9838 0.9787 0.9736 0.9736	nuth 11.0133 0.9883 0.9945 0.9900 0.9865 0.9842 0.9795 0.9748 0.9709	11.4667 0.9884 0.9945 0.9905 0.9904 0.9870 0.9852 0.9811 0.9763 0.9730	11.9200 0.9876 0.9942 0.9901 0.9902 0.9872 0.9854 0.9823 0.9778 0.9746	12.3733 0.9883 0.9935 0.9894 0.9896 0.9868 0.9853 0.9819 0.9787 0.9763	12.8267 0.9885 0.9928 0.9877 0.9885 0.9853 0.9832 0.9795 0.9760 0.9740	13.2800 0.9883 0.9918 0.9859 0.9868 0.9831 0.9802 0.9764 0.9764 0.9721 0.9691	######### 0.9822 0.9893 0.9836 0.9833 0.9771 0.9755 0.9707 0.9656 0.9613
5.8 8.7 10.8 12.8 15.3 17.5 20.1 22.4 25.1 27.5	Nozzle Ptoiai (psia) 79.208 114.198 137.722 150.365 150.236 150.24 150.096 150.153 150.179 150.376	P <sub>amb</sub> , Vacuum Chamber Pressure, psia 13.6595 12.7940 11.7580 9.8260 8.5710 7.4855 6.7110 5.9890 5.4735	30.5123	7.3867 0.9907 0.9870 0.9870 0.9856 0.9752 0.9631 0.9639 0.9659 0.9659	7.8400 0.9909 0.9932 0.9875 0.9862 0.9804 0.9770 0.9700 0.9653 0.9559 0.9554	8.2933 0.9902 0.9933 0.9878 0.9867 0.9867 0.9811 0.9763 0.9715 0.9663 0.9619 0.9679	8.7467 0.9899 0.9940 0.9887 0.9834 0.9803 0.9733 0.9672 0.9623 0.9606	9.2000 0.9893 0.9893 0.9892 0.9891 0.9891 0.9841 0.9814 0.9751 0.9689 0.9633 0.9615	9.6533 0.9892 0.9944 0.9896 0.9899 0.9852 0.9823 0.9766 0.9708 0.9651 0.9661	x/r*, 10.1067 0.9885 0.9944 0.9898 0.9898 0.9855 0.9830 0.9775 0.9723 0.9659 0.9669	0° Azin 10.5600 0.9887 0.9945 0.9901 0.9861 0.9838 0.9787 0.9736 0.9691 0.9659	nuth 11.0133 0.9883 0.9903 0.9903 0.9900 0.9865 0.9842 0.9795 0.9748 0.9748 0.9799 0.9681	11.4667 0.9884 0.9905 0.9904 0.9870 0.9852 0.9811 0.9763 0.9730 0.9705	11.9200 0.9876 0.9942 0.9901 0.9902 0.9872 0.9854 0.9823 0.9778 0.9746 0.9725	12.3733 0.9883 0.9935 0.9894 0.9894 0.9868 0.9863 0.9863 0.9819 0.9767 0.9767 0.9770	12.8267 0.9885 0.9928 0.9885 0.9885 0.9885 0.9883 0.9853 0.9832 0.9795 0.9760 0.9740 0.9740	13.2800 0.9883 0.9918 0.9859 0.9865 0.9865 0.9831 0.9802 0.9764 0.9721 0.9691 0.9667	######### 0.9822 0.9893 0.9833 0.9771 0.9755 0.9707 0.9656 0.9613 0.96593
5.8 8.7 10.8 12.8 15.3 17.5 20.1 22.4 25.1	Nozzle P <sub>total</sub> (psia) 79.208 114.198 137.722 150.365 150.236 150.236 150.24 150.096 150.153 150.179	Pamb, Vacuum Chamber Pressure, psia 13,6595 13,0925 12,7940 11,7580 9,8260 8,5710 7,4855 6,7110 5,9890		7.3867 0.9907 0.9929 0.9870 0.9856 0.9792 0.9755 0.9691 0.9639 0.9563	7.8400 0.9909 0.9932 0.9875 0.9862 0.9804 0.9770 0.9700 0.9653 0.9596	8.2933 0.9902 0.9933 0.9878 0.9867 0.9811 0.9783 0.9715 0.9663 0.9619	8.7467 0.9899 0.9940 0.9887 0.9887 0.9834 0.9803 0.9733 0.9672 0.9623	9.2000 0.9893 0.9943 0.9892 0.9891 0.9814 0.9814 0.9751 0.9689 0.9633	9.6533 0.9892 0.9944 0.9896 0.9899 0.9852 0.9823 0.9766 0.9766 0.9708 0.9651	x/r*, 10.1067 0.9885 0.9944 0.9898 0.9898 0.9898 0.9855 0.9830 0.9775 0.9775 0.9723 0.9669	0° Azin 10.5600 0.9887 0.9945 0.9901 0.9861 0.9838 0.9787 0.9736 0.9736	nuth 11.0133 0.9883 0.9945 0.9900 0.9865 0.9842 0.9795 0.9748 0.9709	11.4667 0.9884 0.9945 0.9905 0.9904 0.9870 0.9852 0.9811 0.9763 0.9730	11.9200 0.9876 0.9942 0.9901 0.9902 0.9872 0.9854 0.9823 0.9778 0.9746	12.3733 0.9883 0.9935 0.9894 0.9896 0.9868 0.9853 0.9819 0.9787 0.9763	12.8267 0.9885 0.9928 0.9877 0.9885 0.9853 0.9832 0.9795 0.9760 0.9740	13.2800 0.9883 0.9918 0.9859 0.9868 0.9831 0.9802 0.9764 0.9764 0.9721 0.9691	######### 0.9822 0.9893 0.9836 0.9833 0.9771 0.9755 0.9707 0.9656 0.9613
5.8 8.7 10.8 12.8 15.3 17.5 20.1 22.4 25.1 27.5 29.8 32.6 35.8	Nozzle Ptotal (psia) 79.208 114.198 137.722 150.365 150.236 150.153 150.179 150.153 150.179 150.233 150.082	Pamb, Vacuum Chamber Pressure, psia 13.6595 13.0925 12.7940 11.7580 9.8260 8.5710 7.4855 6.7110 5.9890 5.4735 5.0465 4.6040 4.1970		7.3867 0.9907 0.9829 0.9870 0.9755 0.9691 0.9639 0.9563 0.96639 0.96639 0.9563 0.9484 0.9351 0.9079 0.8492	7.8400 0.9909 0.9932 0.9875 0.9862 0.9864 0.9770 0.9653 0.9556 0.9554 0.9554 0.9554 0.9554 0.9554 0.9554 0.9554 0.9554 0.9554 0.9554 0.9554 0.9555 0.9554 0.9555 0.9554 0.95550 0.95550 0.95550 0.95550 0.95550000000000	8.2933 0.9902 0.9933 0.9878 0.9867 0.9861 0.9763 0.9715 0.9663 0.9619 0.9579 0.9506 0.9381 0.9380	8.7467 0.9899 0.9840 0.9887 0.9887 0.9834 0.9733 0.9672 0.9623 0.9606 0.9553 0.96481 0.9309	9.2000 0.9893 0.9943 0.9892 0.9891 0.9814 0.9814 0.9683 0.9615 0.9679 0.9579 0.9529 0.9330	9.6533 0.9892 0.9944 0.9896 0.9896 0.9823 0.9823 0.9766 0.9708 0.9628 0.9628 0.9628 0.96593 0.95593	x/r*, 10.1067 0.9885 0.9944 0.9898 0.9898 0.9855 0.9855 0.9853 0.9669 0.9663 0.9663 0.96597 0.9550	0° Azin 10.5600 0.9887 0.9945 0.9901 0.9861 0.9888 0.9787 0.9786 0.9659 0.9607 0.9572 0.9572	nuth 11.0133 0.9883 0.9945 0.9903 0.9865 0.9865 0.9882 0.9709 0.9681 0.9709 0.9681 0.9630 0.9581	11.4667 0.9884 0.9945 0.9905 0.9870 0.9870 0.9870 0.9870 0.9881 0.9730 0.9730 0.9705 0.9656 0.9665 0.9665	11.9200 0.9876 0.9942 0.9901 0.9872 0.9872 0.9872 0.9872 0.9746 0.9778 0.9746 0.9778 0.9746 0.9725 0.9682 0.9682 0.9554	12.3733 0.9883 0.9935 0.9894 0.9896 0.9863 0.9863 0.9863 0.9763 0.9763 0.9764 0.9764	12.8267 0.9885 0.9928 0.9877 0.9885 0.9863 0.9853 0.9760 0.9740 0.9740 0.9740 0.9740 0.9740 0.9764 0.9664	13.2800 0.9883 0.9918 0.9859 0.9868 0.9859 0.9881 0.9802 0.9764 0.9721 0.9607 0.9667 0.9664 0.9664 0.9624 0.9552	######## 0.9822 0.9893 0.9833 0.9771 0.9755 0.9707 0.9653 0.9613 0.9643 0.9593 0.9541 0.9483
5.8 8.7 10.8 12.8 15.3 17.5 20.1 22.4 25.1 27.5 29.8 32.6 35.8 38.8	Nozzle Ptetal (psia) 79.208 114.198 137.722 150.365 150.24 150.096 150.179 150.376 150.376 150.376 150.231 150.082 150.156 150.376	Pamb, Vacuum Chamber Pressure, psia 13,6595 12,7940 9,8250 8,5710 7,4855 6,7110 5,9890 5,4735 5,0465 4,6040 3,8805		7.3867 0.9907 0.9829 0.9856 0.9792 0.9633 0.9663 0.9663 0.9663 0.9464 0.9351 0.9484 0.9351	7.8400 0.9909 0.9932 0.9875 0.9862 0.9804 0.9700 0.9653 0.9596 0.9541 0.9545 0.9546 0.9546 0.9541 0.9545 0.9546 0.9541 0.9541 0.9541 0.9541 0.9545 0.9545 0.9545 0.95566 0.95566 0.9556 0.9556 0.95566 0.95566 0.95566 0.95566 0.9	8.2933 0.9902 0.9933 0.9877 0.9811 0.9715 0.9663 0.9619 0.9579 0.9506 0.9381 0.9506 0.9381 0.9583	8.7467 0.9899 0.9940 0.9887 0.9887 0.9833 0.9733 0.9603 0.9672 0.9623 0.9662 0.9553 0.9481 0.9509 0.9481	9.2000 0.9893 0.9893 0.9891 0.9891 0.9841 0.9751 0.9751 0.9689 0.9633 0.9615 0.9679 0.9522 0.9390 0.9224	9.6533 0.9892 0.9896 0.9899 0.9852 0.9823 0.9766 0.9708 0.9766 0.9708 0.9651 0.9651 0.9653 0.9568 0.9563 0.9568	x/r*, 10.1067 0.9885 0.9898 0.9898 0.9855 0.9830 0.9773 0.9773 0.9773 0.97669 0.9773 0.9568 0.9597	0° Azin 10.5600 0.9887 0.9901 0.9901 0.9861 0.9861 0.9787 0.9736 0.97691 0.96591 0.96691 0.9667 0.9672 0.9572	nuth 11.0133 0.9883 0.9903 0.9900 0.9865 0.9842 0.9795 0.9748 0.9799 0.9795 0.9748 0.9709 0.9630 0.9651 0.9630 0.9651 0.9528	11.4667 0.9884 0.9945 0.9904 0.9870 0.9852 0.9811 0.9763 0.9730 0.9705 0.9656 0.9607 0.9535	11.9200 0.9876 0.9902 0.9902 0.9872 0.9854 0.9725 0.9823 0.9778 0.9746 0.9725 0.9682 0.9633 0.9554	12.3733 0.9883 0.9935 0.9896 0.9868 0.9863 0.987 0.9763 0.9763 0.9740 0.9740 0.9746 0.9674	12.8267 0.9885 0.9828 0.9885 0.9885 0.9853 0.9760 0.9760 0.9740 0.9720 0.9720 0.9720 0.9720 0.9720 0.9684 0.9679 0.9666	13.2800 0.9883 0.9918 0.9865 0.9865 0.9831 0.9802 0.9764 0.9721 0.9691 0.9661 0.9624 0.9611 0.9652	####### 0.9822 0.9893 0.9833 0.9771 0.9756 0.9707 0.9656 0.9613 0.9707 0.9659 0.9641 0.9487 0.9487 0.9487 0.9354
5.8 8.7 10.8 12.8 15.3 17.5 20.1 22.4 25.1 27.5 29.8 32.6 35.8 38.8 41.3	Nozzle Ptetal (psia) 79.208 114.198 137.722 150.365 150.24 150.096 150.153 150.153 150.179 150.376 150.082 150.156 150.37	P <sub>amb</sub> , Vacuum Chamber Pressure, psia 13.6595 12.7940 9.8260 8.5710 7.4855 6.7110 5.9890 5.4735 5.0465 4.6040 4.1970 3.8805 3.6405		7.3867 0.9907 0.9929 0.9870 0.9856 0.9792 0.9755 0.9639 0.9663 0.9663 0.9663 0.9663 0.9663 0.9663 0.9361 0.9351 0.9079 0.8482 0.6466 0.2706	7.8400 0.9909 0.9932 0.9875 0.9862 0.9804 0.9770 0.9653 0.9653 0.9596 0.9541 0.9448 0.9272 0.8956 0.8324 0.6366	8.2933 0.9902 0.9878 0.9867 0.9811 0.9763 0.9715 0.9663 0.9619 0.96579 0.9506 0.9381 0.9381 0.9386 0.9381 0.9380 0.9383 0.93839 0.8345	8.7467 0.9899 0.9940 0.9887 0.9887 0.9834 0.9803 0.9733 0.9672 0.9623 0.96653 0.9653 0.9481 0.9481 0.9480 0.9481 0.9481 0.9481 0.9481 0.9481 0.9481 0.9481 0.9481 0.9481 0.9481 0.9481 0.9481 0.9481 0.9481 0.9481 0.9594 0.9481 0.9481 0.9594 0.95954 0.95957 0.9555 0.9555 0.9555 0.95957 0.95957 0.9555 0.95957 0.9555 0.959577 0.959577 0.95957 0.959577 0.959577 0.959577 0.959577 0.9595777 0.95957777 0.95957777777777777777777777777777777777	9.2000 0.9893 0.9943 0.9892 0.9891 0.9841 0.9751 0.9689 0.9615 0.9675 0.9675 0.9675 0.9522 0.9390 0.9241 0.9045	9.6533 0.9892 0.9944 0.9896 0.9859 0.9852 0.9766 0.9768 0.9768 0.9768 0.9651 0.9628 0.9593 0.9568 0.9457 0.9344 0.9210	x/r*, 10.1067 0.9885 0.9898 0.9859 0.9859 0.9859 0.9839 0.9775 0.9723 0.9639 0.96639 0.96639 0.96639 0.9560 0.9560 0.95600 0.95600 0.9401 0.9301	0° Azin 10.5600 0.9887 0.9945 0.9901 0.9861 0.9838 0.9787 0.9736 0.9659 0.9667 0.9659 0.9657 0.9572 0.9576 0.9576	nuth 11.0133 0.9945 0.9945 0.9900 0.9862 0.9709 0.9862 0.9709 0.9681 0.9630 0.9581 0.9528 0.9486 0.9486	11.4667 0.9884 0.9945 0.9905 0.9904 0.9870 0.9852 0.9730 0.9763 0.9730 0.9765 0.9656 0.9665 0.9667 0.9535 0.9504 0.9479	11.9200 0.9876 0.9942 0.9901 0.9862 0.9854 0.9726 0.9786 0.9746 0.9725 0.9682 0.9746 0.9754 0.9654 0.9554	12.3733 0.9883 0.9935 0.9894 0.9896 0.9868 0.9853 0.9819 0.9767 0.9767 0.9767 0.97740 0.9767 0.9764 0.9600 0.96582	12.8267 0.9885 0.9928 0.9877 0.9885 0.9853 0.9756 0.9760 0.9740 0.9740 0.9720 0.9644 0.9679 0.9616 0.9566	13.2800 0.9883 0.9918 0.9869 0.9869 0.9869 0.9802 0.9764 0.9607 0.9667 0.9664 0.9661 0.9664 0.9611 0.9652 0.9552	#######           0.9822           0.9836           0.9836           0.9751           0.9771           0.9763           0.9707           0.9633           0.9707           0.9613           0.9593           0.9613           0.9643           0.9437           0.9433           0.9287
5.8 8.7 10.8 12.8 15.3 17.5 20.1 22.4 25.1 27.5 29.8 32.6 35.8 38.8	Nozzle Ptetal (psia) 79.208 114.198 137.722 150.365 150.24 150.096 150.096 150.37 150.179 150.33 150.082 150.37 150.324 150.324	Pamb, Vacuum Chamber Pressure, psia 13,6595 12,7940 9,8250 8,5710 7,4855 6,7110 5,9890 5,4735 5,0465 4,6040 3,8805		7.3867 0.9907 0.9829 0.9856 0.9792 0.9633 0.9663 0.9663 0.9663 0.9464 0.9351 0.9484 0.9351	7.8400 0.9909 0.9932 0.9875 0.9862 0.9804 0.9700 0.9653 0.9596 0.9541 0.9545 0.9546 0.9545 0.9546 0.9541 0.9541 0.9541 0.9541 0.9541 0.9541 0.9541 0.9541 0.9545 0.95566 0.95566 0.9556 0.9556 0.95566 0.95566 0.95566 0.95566 0.9	8.2933 0.9902 0.9933 0.9876 0.9867 0.9811 0.9715 0.9663 0.9619 0.9579 0.9506 0.9381 0.9506 0.9381 0.9180 0.8839	8.7467 0.9899 0.9940 0.9887 0.9887 0.9833 0.9733 0.9672 0.9672 0.9623 0.96553 0.9461 0.9553 0.9461 0.9309 0.9309 0.9309 0.9309 0.9304 0.8795 0.8810	9.2000 0.9893 0.9893 0.9891 0.9891 0.9841 0.9751 0.9751 0.9689 0.9633 0.9615 0.9679 0.9522 0.9390 0.9224	9.6533 0.9892 0.9896 0.9899 0.9852 0.9823 0.9766 0.9708 0.9766 0.9708 0.9651 0.9651 0.9653 0.9568 0.9563 0.9568	x/r*, 10.1067 0.9885 0.9898 0.9898 0.9855 0.9830 0.9773 0.9773 0.9773 0.97669 0.9773 0.9568 0.9597	0° Azin 10.5600 0.9887 0.9901 0.9901 0.9861 0.9861 0.9787 0.9736 0.97691 0.96591 0.96691 0.9667 0.9672 0.9572	nuth 11.0133 0.9883 0.9903 0.9900 0.9865 0.9842 0.9795 0.9748 0.9799 0.9795 0.9748 0.9709 0.9630 0.9651 0.9630 0.9651 0.9528	11.4667 0.9884 0.9945 0.9904 0.9870 0.9852 0.9811 0.9763 0.9730 0.9705 0.9656 0.9607 0.9535	11.9200 0.9876 0.9902 0.9902 0.9872 0.9854 0.9725 0.9823 0.9778 0.9746 0.9725 0.9682 0.9633 0.9554	12.3733 0.9883 0.9954 0.9896 0.9896 0.9868 0.9868 0.9863 0.9863 0.9767 0.9767 0.9767 0.9764 0.9776 0.9764 0.9764 0.9658 0.9658 0.9558 0.9558	12.8267 0.9885 0.9828 0.9885 0.9885 0.9853 0.9760 0.9795 0.9795 0.97760 0.9740 0.9720 0.9720 0.9684 0.9679 0.9664	13.2800 0.9883 0.9918 0.9865 0.9865 0.9831 0.9802 0.9764 0.9721 0.9691 0.9661 0.9624 0.9611 0.9652	######################################
5.8 8.7 10.8 12.8 15.3 17.5 20.1 22.4 25.1 27.5 29.8 32.6 35.8 38.8 41.3 44.8 47.5 50.4	Nozzle Ptotat (psia) 79.208 114.198 137.722 150.236 150.236 150.236 150.179 150.371 150.023 150.056 150.37 150.056 150.37 150.233 150.065 149.255	Pamb, Vacuum Chamber Pressure, psia 13,6595 13,0925 12,7940 11.7580 9,8260 8,5710 7,4855 6,0465 4,6040 4,1970 3,8805 3,6405 3,3470 3,1395 2,9615		7.3867 0.9907 0.9829 0.9870 0.9755 0.9755 0.9633 0.9663 0.9663 0.9663 0.9484 0.9351 0.9484 0.9351 0.8492 0.8492 0.8492 0.2892 0.3061 0.3248	7.8400 0.9909 0.9932 0.9875 0.9864 0.9864 0.9770 0.9663 0.9566 0.9541 0.9541 0.9448 0.9272 0.8556 0.8324 0.8956 0.8324 0.6966 0.2683 0.2813 0.2813	8.2933 0.9902 0.9933 0.9878 0.9861 0.9861 0.9715 0.9663 0.9619 0.9579 0.9506 0.9180 0.9180 0.9180 0.8345 0.5811 0.25811	8.7467 0.9899 0.9840 0.9887 0.9887 0.9887 0.9834 0.9803 0.9672 0.9623 0.9662 0.9553 0.9461 0.9309 0.9309 0.9094 0.8795 0.8010 0.5905	9.2000 0.9893 0.9943 0.9892 0.9891 0.9881 0.9884 0.9751 0.9663 0.9615 0.9679 0.9625 0.9615 0.9529 0.9330 0.9241 0.9045 0.8617 0.8008 0.6014	9.6533 0.9892 0.9944 0.9886 0.9889 0.9852 0.9766 0.9768 0.9628 0.9653 0.9653 0.9568 0.9457 0.9344 0.9210 0.8339 0.8638 0.7368	x/r*, 10.1067 0.9885 0.9944 0.9898 0.9855 0.9830 0.9773 0.9669 0.9773 0.9669 0.9773 0.9669 0.9500 0.9500 0.9500 0.9500 0.9500 0.9500 0.9500 0.9500 0.9301 0.9301 0.9301 0.9301 0.9303	0° Azin 10.5600 0.9887 0.9945 0.9901 0.9861 0.9861 0.9787 0.9736 0.9691 0.9657 0.9657 0.9516 0.9516 0.9516 0.9516 0.9235 0.9078 0.9235	nuth 11.0133 0.9883 0.9945 0.9903 0.9865 0.9842 0.9795 0.9748 0.9795 0.9748 0.9799 0.9681 0.96830 0.96830 0.9588 0.9428 0.9428 0.9438 0.9328 0.9228	11.4667 0.9884 0.9945 0.9905 0.9870 0.9882 0.9811 0.9763 0.9705 0.9656 0.9535 0.9504 0.9535 0.9504 0.9479 0.9479 0.9402 0.9320	11.9200 0.9876 0.9942 0.9901 0.9872 0.9854 0.9785 0.9725 0.9682 0.9725 0.9682 0.9554 0.9554 0.9554 0.9564 0.9564 0.9564 0.9564 0.9564 0.9564 0.9565400000000000000000000000000000000000	12.3733 0.9883 0.9935 0.9894 0.9868 0.9863 0.9869 0.9763 0.9763 0.9776 0.9763 0.9776 0.9763 0.9706 0.9600 0.9652 0.9600 0.9658 0.9658 0.9498 0.9498	12.8267 0.9885 0.9928 0.9877 0.9885 0.9853 0.9750 0.9760 0.9740 0.9770 0.9684 0.9766 0.9664 0.9664 0.9666 0.9666 0.9666 0.9566 0.9545 0.9550 0.95430	13.2800 0.9883 0.9918 0.9859 0.9863 0.9861 0.9764 0.9721 0.9691 0.9661 0.9624 0.9624 0.9652 0.9552 0.9552 0.9482 0.9435 0.94460 0.9424	######################################
5.8 8.7 10.8 15.3 17.5 20.1 22.4 25.1 27.5 29.8 32.6 35.8 38.8 41.3 44.8 47.5 50.4	Nozzle Ptetat (psia) 79 208 114.198 137.722 150.365 150.236 150.234 150.053 150.153 150.0376 150.376 150.376 150.376 150.376 150.324 150.055 149.255 149.354	Pamb, Vacuum Chamber Pressure, psia 13,6595 12,7940 9,8250 8,5710 7,4855 6,7110 5,9890 5,4735 5,0465 4,6040 4,1970 3,8805 3,3470 3,1395 2,9615 2,7680		7.3867 0.9907 0.9829 0.9870 0.9755 0.9631 0.9663 0.9663 0.9663 0.9663 0.9663 0.9351 0.9351 0.9351 0.9351 0.9351 0.9464 0.2892 0.2892 0.3061 0.2288 0.3483	7.8400 0.9909 0.9932 0.9875 0.9862 0.9804 0.9770 0.9653 0.9596 0.9541 0.94480000000000000000000000000000000000	8.2933 0.9902 0.9933 0.9878 0.9867 0.9783 0.9763 0.9663 0.9669 0.9506 0.9506 0.9506 0.9506 0.9506 0.9583 0.9510 0.9584 0.9584 0.9584 0.8839 0.8839 0.88345 0.5811 0.2559 0.2745 0.2955	8.7467 0.9899 0.9940 0.9887 0.9887 0.9834 0.9733 0.9672 0.962 0.9623 0.9666 0.9481 0.9481 0.9309 0.9481 0.9481 0.9309 0.9481 0.9309 0.9481 0.9309 0.9481 0.9505 0.2543 0.2243	9.2000 0.9893 0.9943 0.9892 0.9891 0.9814 0.9651 0.9633 0.9675 0.9679 0.9522 0.9579 0.9522 0.9241 0.9045 0.9638 0.9241 0.9045 0.8617 0.8008 0.6014 0.2529	9.6533 0.9892 0.9944 0.9896 0.9889 0.9852 0.9766 0.9766 0.9766 0.9651 0.9623 0.9568 0.9568 0.9568 0.9568 0.9457 0.9344 0.9210 0.8833 0.8633 0.7989 0.65116	x/r*, 10.1067 0.9885 0.9944 0.9898 0.9886 0.9830 0.9723 0.9669 0.9723 0.9669 0.9507 0.9568 0.9507 0.9500 0.9401 0.9301 0.9301 0.9310 0.9519 0.9519 0.7608	0° Azin 10.5600 0.9887 0.9945 0.9901 0.9861 0.9787 0.9787 0.9787 0.9659 0.9659 0.9659 0.9659 0.9572 0.9576 0.9577 0.9576 0.9576 0.9577 0.9576 0.9577 0.9576 0.9577 0.9576 0.9577 0.9576 0.9577 0.9576 0.9577 0.9576 0.9577 0.9576 0.9577 0.9576 0.9577 0.9576 0.9577 0.9576 0.9577 0.9576 0.9577 0.9576 0.9577 0.9576 0.9577 0.9576 0.9577 0.9576 0.9577 0.9576 0.9577 0.9577 0.9576 0.9577 0.9577 0.9576 0.9577 0.95	nuth 11.0133 0.9883 0.9945 0.9900 0.9865 0.9865 0.9865 0.9748 0.9795 0.9681 0.9681 0.9681 0.9681 0.9528 0.9486 0.9486 0.9486 0.9428 0.9428 0.9228 0.93228 0.93228	11.4667 0.9884 0.9945 0.9905 0.9870 0.9852 0.9763 0.9763 0.9763 0.9765 0.9666 0.9667 0.9655 0.9504 0.9535 0.9504 0.9402 0.9320 0.9402 0.9320 0.9171 0.88916	11.9200 0.9876 0.9942 0.9901 0.9862 0.9854 0.9778 0.9778 0.9762 0.9633 0.9554 0.9663 0.9663 0.9654 0.9663 0.9554 0.9604 0.9651 0.9564 0.9453 0.9377 0.9262 0.9075	12.3733 0.9883 0.9935 0.9894 0.9866 0.9863 0.9863 0.9787 0.9763 0.9776 0.9764 0.9764 0.9764 0.9764 0.9764 0.9658 0.9658 0.9658 0.9488 0.9486 0.9486	12.8267 0.9885 0.9928 0.9885 0.9885 0.9883 0.9883 0.9785 0.9760 0.9740 0.9760 0.9740 0.9644 0.9679 0.9646 0.9526 0.9526 0.9526 0.9530 0.9472 0.9371	13.2800 0.9883 0.9918 0.9859 0.9868 0.9802 0.9721 0.9691 0.9624 0.9622 0.9622 0.9622 0.9622 0.9482 0.9482 0.9482 0.9482 0.9482	#######           0.9822           0.9833           0.9833           0.9771           0.9755           0.9666           0.96613           0.95933           0.95933           0.96563           0.95413           0.95413           0.9534           0.92354           0.92354           0.92354           0.9227           0.91948           0.9148
$\begin{array}{c} 5.8\\ 8.7\\ 10.8\\ 12.8\\ 15.3\\ 20.1\\ 22.4\\ 25.1\\ 27.5\\ 29.6\\ 32.6\\ 35.8\\ 41.3\\ 44.8\\ 47.5\\ 50.4\\ 54.5\\ 57.6\\ 57.6\\ \end{array}$	Nozzle Ptsai (psia) 79 208 114.198 137.722 150.365 150.236 150.23 150.179 150.37 150.082 150.082 150.082 150.082 150.082 150.082 150.082 150.082 150.37 150.082 150.233 150.082 150.233 150.082 150.233 150.082 150.235 150.245 150.255 150.245 150.255 150.245 150.25	Pamb, Vacuum Chamber Pressure, psia 13.6595 13.0925 12.7940 11.7580 9.8260 8.5710 7.4855 6.4135 5.0465 4.6040 3.6405 3.6405 3.3470 3.1395 2.9615 2.7680		7.3867 0.9907 0.9829 0.9870 0.9856 0.9792 0.9755 0.9639 0.96639 0.96639 0.96639 0.9484 0.9351 0.9484 0.9351 0.9484 0.9079 0.8492 0.6466 0.2706 0.2892 0.3061 0.3248 0.3248 0.3708	7.8400 0.9909 0.9932 0.9875 0.9864 0.9770 0.9663 0.9596 0.9596 0.9596 0.9596 0.9596 0.9596 0.9596 0.9596 0.9596 0.9596 0.8324 0.6966 0.2683 0.22683 0.22082 0.3206	8.2933 0.9902 0.9933 0.9878 0.9861 0.9715 0.9663 0.9679 0.9506 0.9579 0.9506 0.9579 0.9506 0.9579 0.9506 0.8345 0.8345 0.8345 0.8345 0.8345 0.2745 0.2745 0.2745	8.7467 0.9899 0.9840 0.9887 0.9834 0.9834 0.9623 0.9662 0.9662 0.9665 0.9481 0.9553 0.9481 0.9553 0.9481 0.9309 0.9094 0.8795 0.8795 0.8101 0.5905 0.8101 0.2543 0.2243 0.2710 0.2872	9 2000 0.9893 0.9943 0.9882 0.9882 0.98841 0.9841 0.9841 0.9751 0.9689 0.9615 0.9679 0.9625 0.9522 0.9390 0.9241 0.9452 0.9390 0.9241 0.9455 0.9522 0.9390 0.9241 0.9657 0.9522 0.9390 0.9522 0.9390 0.9521 0.9522 0.9522 0.9525 0.9525 0.9525 0.9557 0.955	9.6533 0.9892 0.9944 0.9896 0.9859 0.9852 0.9862 0.9766 0.9766 0.9766 0.9768 0.9653 0.9658 0.9658 0.9457 0.9344 0.9210 0.8533 0.8239 0.8638 0.92477	x/r*, 10.1067 0.9885 0.9944 0.9898 0.9898 0.9898 0.9898 0.9898 0.9898 0.9975 0.9773 0.9773 0.9663 0.9663 0.9663 0.9663 0.9560 0.9560 0.9500 0.9500 0.9500 0.9401 0.9301 0.9301 0.9301 0.9301 0.9301 0.9685 0.9401 0.9659 0.9568 0.9569 0.95600000000000000000000000000000000000	0° Azin 10.5600 0.9887 0.9945 0.9901 0.9861 0.9888 0.9901 0.9861 0.9888 0.9659 0.9659 0.9657 0.9572 0.9576 0.9447 0.9576 0.9447 0.9576 0.9576 0.9447 0.9576 0.9576 0.9447 0.9576 0.9576 0.9447 0.9576 0.9776 0.9777 0.9776 0.9776 0.9776 0.9776 0.9776 0.97	nuth 11.0133 0.9883 0.9945 0.9903 0.9865 0.9785 0.9748 0.9795 0.9748 0.9795 0.9748 0.9630 0.9681 0.9658 0.9458 0.95888 0.95888 0.9588 0.9588 0.9588 0.9588 0.9588 0.9588 0	11.4667 0.9884 0.9945 0.9905 0.9904 0.9870 0.9882 0.9763 0.9763 0.9763 0.9705 0.9656 0.9656 0.9604 0.9473 0.9479 0.9402 0.9471 0.9422 0.9320 0.93171 0.8916	11.9200 0.9876 0.9942 0.9901 0.9872 0.9884 0.9725 0.9786 0.9725 0.9765 0.9755 0.9662 0.9554 0.9554 0.9554 0.9564 0.9557 0.9662 0.9055 0.9075 0.9075	12.3733 0.9883 0.9935 0.9894 0.9868 0.9868 0.9863 0.9767 0.9760 0.97740 0.97740 0.9766 0.97740 0.9766 0.9769 0.9766 0.9532 0.9532 0.9488 0.9532 0.9488 0.9532 0.9488 0.9532 0.9488 0.9552 0.9488 0.9552 0.95750 0.95750 0.95750 0.95750000000000000000000000000000000000	12.8267 0.9885 0.9928 0.9877 0.9885 0.9883 0.9883 0.9785 0.9760 0.9760 0.9770 0.9760 0.9720 0.9760 0.9720 0.9674 0.9566 0.9566 0.9566 0.9566 0.9566 0.9525 0.9525 0.9537 0.9537 0.9371 0.9268	13.2800 0.9883 0.9918 0.9859 0.9869 0.9868 0.9881 0.9862 0.9764 0.9761 0.9667 0.9667 0.9667 0.9662 0.9667 0.9652 0.9462 0.9466 0.9445 0.9445 0.9446 0.9424 0.9397 0.9387	#######           0.9822           0.9836           0.9836           0.9771           0.9656           0.9661           0.96593           0.9541           0.9433           0.9433           0.9433           0.9541           0.9272           0.9238           0.9274           0.9274           0.9138           0.9144           0.9134
$\begin{array}{c} 5.6\\ 8.7\\ 10.8\\ 12.8\\ 16.3\\ 17.5\\ 20.1\\ 22.4\\ 25.1\\ 27.5\\ 29.6\\ 32.6\\ 336.8\\ 38.8\\ 41.3\\ 44.8\\ 47.5\\ 50.4\\ 54.3\\ 57.6\\ 60.1\\ \end{array}$	Nozzle Ptotai (psia) 79 208 114 198 137.722 150.365 150.236 150.236 150.24 150.096 150.153 150.096 150.153 150.082 150.153 150.082 150.153 150.082 150.153 150.082 150.153 150.082 150.153 150.082 150.153 150.082 150.153 150.082 150.153 150.082 150.153 150.082 150.153 150.082 150.153 150.082 150.153 150.082 150.153 150.153 150.153 150.153 150.153 150.153 150.153 150.153 150.153 150.153 150.153 150.153 150.153 150.153 150.153 150.153 150.153 150.153 150.153 150.255 150.153 150.255 150.153 150.255 150	Pamb, Vacuum Chamber Pressure, psia 13,6595 13,0925 12,7940 11,7580 9,8260 8,5710 7,4855 6,7110 5,9890 5,4735 5,0465 4,6040 4,1970 3,8805 3,6405 3,3470 3,1395 2,9615 2,7680 2,6080 2,5015		7.3867 0.9907 0.9829 0.9876 0.9752 0.9661 0.9755 0.9661 0.9663 0.9663 0.9663 0.9361 0.9361 0.9364 0.9364 0.9364 0.9364 0.9364 0.6466 0.2892 0.3061 0.2892 0.3248 0.3493 0.3708 0.3708	7.8400 0.9909 0.9932 0.98762 0.9862 0.9862 0.9770 0.9770 0.9553 0.9554 0.9554 0.9554 0.9544 0.9272 0.8956 0.8324 0.8324 0.8324 0.8324 0.2883 0.2813 0.2283 0.3208 0.3208 0.3405	8.2933 0.9902 0.9873 0.9876 0.9867 0.9867 0.9763 0.9763 0.9775 0.9663 0.9663 0.9663 0.9506 0.9381 0.9506 0.9384 0.9508 0.8339 0.8339 0.8345 0.2545 0.2559 0.2255 0.3133 0.3270	8.7467 0.9899 0.9940 0.9887 0.9887 0.9834 0.9623 0.9623 0.9623 0.9623 0.96553 0.9481 0.9555 0.9481 0.9309 0.9094 0.8795 0.8010 0.5905 0.2710 0.2710 0.22710 0.2372	9.2000 0.9893 0.9943 0.9892 0.9881 0.9841 0.9633 0.9615 0.9675 0.9579 0.9522 0.9390 0.9241 0.9045 0.9241 0.9045 0.8617 0.86617 0.86617 0.86617	9.6533 0.9892 0.9944 0.9896 0.9896 0.9862 0.9766 0.9768 0.9768 0.9768 0.9768 0.9623 0.9623 0.9651 0.9628 0.9457 0.9458 0.9458 0.9458 0.9458 0.9458 0.9458 0.9458 0.9458 0.9441 0.9210 0.8339 0.8339 0.8638 0.7989 0.5116 0.2477 0.2582	x/r*, 10.1067 0.9885 0.9944 0.9898 0.9855 0.9855 0.9853 0.96639 0.96639 0.96639 0.9567 0.9568 0.9507 0.9568 0.9401 0.9568 0.9570 0.9568 0.9570 0.9568 0.9570 0.97700 0.97700 0.97700 0.97700 0.97700 0.97700 0.9770000000000	0° Azin 10.5600 0.9887 0.9945 0.9901 0.9861 0.9659 0.9659 0.9659 0.9659 0.9659 0.9659 0.9659 0.9647 0.94	nuth 11.0133 0.9945 0.9945 0.9903 0.9865 0.9748 0.9795 0.9748 0.9795 0.9748 0.9798 0.9681 0.9628 0.9628 0.9486 0.9795 0.9886 0.9795 0.9886 0.9795 0.9748 0.9795 0.9486 0.9795 0.9748 0.9795 0.9748 0.9795 0.9748 0.9795 0.9487 0.9795 0.9748 0.9795 0.9748 0.9795 0.9748 0.9795 0.9748 0.9795 0.9748 0.9795 0.9748 0.9748 0.9795 0.9748 0.9795 0.9748 0.9795 0.9748 0.9795 0.9748 0.9795 0.9748 0.9748 0.9795 0.9748 0.9795 0.9748 0.9748 0.9748 0.9795 0.9748 0.9728 0.9748 0.9728 0.9778 0.9778 0.07788 0.07788 0.977888 0.977888 0.977888 0.977888 0.977888 0.977888 0.977888 0.977888 0.97788888 0.977888 0.977888888 0.977888 0.977888888 0.977888 0.9778	11.4667 0.9884 0.9945 0.9904 0.9870 0.98870 0.98870 0.9862 0.98811 0.9763 0.9730 0.9730 0.9750 0.9667 0.9667 0.9607 0.9504 0.9504 0.9504 0.9504 0.9504 0.9504 0.9402 0.9320 0.9171 0.8916 0.8916 0.8916 0.8916 0.8916 0.8916 0.8916 0.8916 0.8916 0.8916 0.8916 0.8916 0.8916 0.8916 0.8243 0.9170 0.9504 0.9505 0.9504 0.9504 0.9505 0.9504 0.9504 0.9505 0.9504 0.9505 0.9504 0.9505 0.95040000000000000000000000000000000000	11.9200 0.9876 0.9942 0.9902 0.9854 0.9862 0.9778 0.9725 0.9763 0.9765 0.9663 0.95517 0.9664 0.95517 0.9664 0.9377 0.9664 0.9377 0.9262 0.9377 0.9262 0.9377 0.9264 0.9377 0.9265 0.9377 0.9377 0.9265 0.93777 0.93777 0.93777 0.937777 0.9377777 0.93777777777777777777777777777777777777	12.3733 0.9883 0.9935 0.9894 0.9886 0.9868 0.9868 0.9763 0.9763 0.97740 0.97740 0.97740 0.9674 0.9558 0.9558 0.9558 0.9558 0.9458 0.9466 0.9327 0.9230 0.9230 0.9230 0.9230	12.8267 0.9885 0.9928 0.9877 0.98853 0.98853 0.9760 0.9760 0.9760 0.9760 0.9760 0.9686 0.9525 0.9566 0.9525 0.9530 0.9525 0.95330 0.9472 0.9571 0.9268	13.2800 0.9883 0.9918 0.9869 0.9869 0.9869 0.9802 0.9764 0.9621 0.9667 0.9621 0.9622 0.9667 0.9622 0.9622 0.9452 0.9452 0.9452 0.9452 0.9452 0.9452 0.9452 0.9452 0.9452 0.9452 0.9452 0.9455 0.9455 0.9455 0.9455 0.9455 0.9455 0.9455 0.9455 0.9455 0.9455 0.9552 0.9455 0.9552 0.9455 0.9552 0.9455 0.9552 0.95550 0.95550 0.95550 0.95550000000000	######################################
$\begin{array}{c} 5.8\\ 8.7\\ 10.8\\ 12.8\\ 15.3\\ 20.1\\ 22.4\\ 25.1\\ 27.5\\ 29.6\\ 32.6\\ 35.8\\ 41.3\\ 44.8\\ 47.5\\ 50.4\\ 54.5\\ 57.6\\ 57.6\\ \end{array}$	Nozzle Ptsai (psia) 79 208 114.198 137.722 150.365 150.236 150.23 150.179 150.37 150.082 150.082 150.082 150.082 150.082 150.082 150.082 150.082 150.37 150.082 150.233 150.082 150.233 150.082 150.233 150.082 150.235 150.245 150.255 150.245 150.255 150.245 150.25	Pamb, Vacuum Chamber Pressure, psia 13.6595 13.0925 12.7940 11.7580 9.8260 8.5710 7.4855 6.4135 5.0465 4.6040 3.6405 3.6405 3.3470 3.1395 2.9615 2.7680		7.3867 0.9907 0.9829 0.9870 0.9856 0.9792 0.9755 0.9639 0.96639 0.96639 0.96639 0.9484 0.9351 0.9484 0.9351 0.9484 0.9079 0.8492 0.6466 0.2706 0.2892 0.3061 0.3248 0.3248 0.3708	7.8400 0.9909 0.9932 0.9875 0.9864 0.9770 0.9663 0.9596 0.9596 0.9596 0.9596 0.9596 0.9596 0.9596 0.9596 0.9596 0.9596 0.9272 0.8956 0.8324 0.6966 0.2683 0.2282 0.2282 0.2282 0.3206	8.2933 0.9902 0.9933 0.9878 0.9861 0.9861 0.9715 0.9663 0.9679 0.9506 0.9579 0.9506 0.9579 0.9506 0.9381 0.9180 0.8345 0.8345 0.8345 0.8345 0.2745 0.2745 0.2745	8.7467 0.9899 0.9840 0.9887 0.9834 0.9834 0.9623 0.9662 0.9662 0.9665 0.9481 0.9553 0.9481 0.9553 0.9481 0.9309 0.9094 0.8795 0.8795 0.8101 0.5905 0.8101 0.2543 0.2243 0.2710 0.2872	9 2000 0.9893 0.9943 0.9882 0.9882 0.98841 0.9841 0.9841 0.9751 0.9689 0.9615 0.9679 0.9625 0.9522 0.9390 0.9241 0.9452 0.9390 0.9241 0.9455 0.9522 0.9390 0.9241 0.9657 0.9522 0.9390 0.9522 0.9390 0.9521 0.9525 0.9525 0.9525 0.9525 0.9525 0.9557 0.955	9.6533 0.9892 0.9944 0.9896 0.9859 0.9852 0.9862 0.9766 0.9766 0.9766 0.9768 0.9653 0.9658 0.9658 0.9457 0.9344 0.9210 0.8533 0.8239 0.8638 0.92477	x/r*, 10.1067 0.9885 0.9944 0.9898 0.9898 0.9898 0.9898 0.9898 0.9898 0.9975 0.9773 0.9773 0.9663 0.9663 0.9663 0.9663 0.9560 0.9560 0.9500 0.9500 0.9500 0.9401 0.9301 0.9301 0.9301 0.9301 0.9301 0.9685 0.9401 0.9659 0.9568 0.9569 0.95600000000000000000000000000000000000	0° Azin 10.5600 0.9887 0.9945 0.9901 0.9861 0.9888 0.9901 0.9861 0.9888 0.9659 0.9659 0.9657 0.9572 0.9576 0.9447 0.9576 0.9447 0.9576 0.9576 0.9447 0.9576 0.9576 0.9447 0.9576 0.9576 0.9447 0.9576 0.9776 0.9777 0.9776 0.9776 0.9776 0.9776 0.9776 0.97	nuth 11.0133 0.9883 0.9945 0.9903 0.9865 0.9785 0.9748 0.9795 0.9748 0.9795 0.9748 0.9630 0.9681 0.9658 0.9458 0.95888 0.95888 0.9588 0.9588 0.9588 0.9588 0.9588 0.9588 0	11.4667 0.9884 0.9945 0.9905 0.9904 0.9870 0.9882 0.9763 0.9763 0.9763 0.9705 0.9656 0.9656 0.9604 0.9473 0.9479 0.9402 0.9471 0.9422 0.9320 0.93171 0.8916	11.9200 0.9876 0.9942 0.9901 0.9872 0.9884 0.9725 0.9786 0.9725 0.9765 0.9755 0.9662 0.9554 0.9554 0.9554 0.9564 0.9557 0.9662 0.9055 0.9075 0.9075	12.3733 0.9883 0.9935 0.9894 0.9868 0.9868 0.9863 0.9767 0.9760 0.97740 0.97740 0.97740 0.9766 0.97740 0.9600 0.9552 0.9552 0.9488 0.9552 0.9488 0.9552 0.9488 0.9552 0.9488 0.9552 0.95750 0.95750 0.95750 0.957500000000000000000000000	12.8267 0.9885 0.9928 0.9877 0.9885 0.9885 0.9885 0.9785 0.9760 0.9760 0.9770 0.9760 0.9720 0.9760 0.9720 0.9674 0.9566 0.9566 0.9566 0.9566 0.9566 0.9525 0.9525 0.9537 0.9537 0.9371 0.9268	13.2800 0.9883 0.9918 0.9859 0.9869 0.9868 0.9881 0.9862 0.9764 0.9761 0.9667 0.9667 0.9667 0.9662 0.9667 0.9652 0.9462 0.9466 0.9445 0.9445 0.9446 0.9424 0.9397 0.9387	#######           0.9822           0.9836           0.9836           0.9771           0.9656           0.9661           0.96593           0.9541           0.9433           0.9433           0.9433           0.9541           0.9272           0.9238           0.9274           0.9274           0.9138           0.9144           0.9134
$\begin{array}{c} 5 \\ 8 \\ 8 \\ 7 \\ 10.8 \\ 12.8 \\ 15.3 \\ 17.5 \\ 20.1 \\ 22.4 \\ 25.1 \\ 27.5 \\ 29.8 \\ 32.6 \\ 35.8 \\ 38.8 \\ $	Nozzle Ptetat (psia) 79 208 114.198 137.722 150.365 150.236 150.236 150.153 150.0376 150.153 150.376 150.376 150.376 150.376 150.324 150.055 149.255 149.354 150.324 150.324 150.212	Pamb, Vacuum Chamber Pressure, psia 13,6595 12,7940 11,7580 9,8250 8,5710 7,4855 6,7110 5,9890 5,4735 5,0465 4,6040 4,1970 3,8805 3,3470 3,1395 2,9615 2,7680 2,5015 2,3515 2,3515 2,25015 2,3515 2,25015 2,25015 2,2505		7.3867 0.9907 0.9929 0.9870 0.9856 0.9752 0.9691 0.9639 0.96639 0.96639 0.96639 0.9079 0.8492 0.3061 0.3248 0.3248 0.3248 0.3248 0.3248 0.3708 0.3453 0.3708	7.8400 0.9909 0.9932 0.9875 0.9865 0.9804 0.9770 0.9653 0.9596 0.9556 0.9541 0.9272 0.8356 0.9272 0.8356 0.8324 0.8324 0.6966 0.2813 0.2883 0.2883 0.2883 0.2883 0.2883 0.3208 0.3208 0.3208 0.3276 0.3776 0.3954 0.3776 0.3954	8.2933 0.9902 0.9933 0.9878 0.9867 0.9811 0.9778 0.9779 0.9779 0.9631 0.9780 0.9381 0.9381 0.9381 0.93845 0.2399 0.2745 0.2955 0.3133 0.2955 0.3270 0.3270 0.3279 0.3275 0.3375	8,7467 0,9899 0,9940 0,9887 0,9887 0,9834 0,9733 0,9672 0,9666 0,9733 0,9672 0,962 0,962 0,9481 0,9309 0,9481 0,9309 0,9481 0,9309 0,9481 0,9309 0,9481 0,9309 0,9481 0,9555 0,94550 0,94550 0,94550000000000000000000000000000000000	9.2000 0.9893 0.9943 0.9882 0.9881 0.9881 0.9751 0.9689 0.9751 0.9639 0.9615 0.96579 0.9579 0.9579 0.9522 0.9300 0.9241 0.9045 0.8617 0.8008 0.6014 0.2529 0.2676 0.2790 0.22968 0.3316	9.6533 0.9892 0.9944 0.9886 0.9889 0.9852 0.9766 0.9766 0.9766 0.9628 0.9663 0.9568 0.9457 0.9568 0.9457 0.9344 0.9210 0.9344 0.9210 0.9344 0.9345 0.9345 0.9344 0.9210 0.9344 0.9210 0.9344 0.9210 0.9344 0.9210 0.9344 0.9210 0.9344 0.9210 0.9344 0.9210 0.9345 0.9344 0.9210 0.9457 0.9477 0.9458 0.9457 0.9457 0.9457 0.9457 0.9477 0.94580 0.9457 0.94570 0.94770 0.94580 0.94570 0.94570 0.94770 0.94580 0.94770 0.94580 0.94770 0.94580 0.94770 0.94580 0.94770 0.94580 0.94770 0.94580 0.94570 0.94580 0.94570 0.94580 0.94570 0.945700 0.9457000000000000000000000000000000000000	x/r*, 10.1067 0.9885 0.9944 0.9899 0.9855 0.9775 0.9723 0.9639 0.96639 0.9557 0.9568 0.9500 0.9557 0.9568 0.9500 0.9501 0.9501 0.9501 0.9501 0.9501 0.95110 0.9510 0.95110 0.95110 0.95110 0.95110 0.95110 0.95110 0.95110 0.95110 0.95110 0.95110 0.95110 0.95110000000000000000000000000000000000	0° Azin 10.5600 0.9887 0.9945 0.9901 0.9861 0.9861 0.9787 0.9787 0.9787 0.9787 0.9787 0.9787 0.9659 0.9659 0.9659 0.9659 0.9659 0.9657 0.9572 0.9576 0.9576 0.9572 0.9576 0.9576 0.9576 0.9576 0.9577 0.9576 0.9576 0.9577 0.9576 0.9576 0.9577 0.9576 0.9577 0.9576 0.9577 0.9576 0.9577 0.9576 0.9577 0.9576 0.9577 0.9576 0.9577 0.9576 0.9577 0.9576 0.9577 0.9576 0.9577 0.9576 0.9577 0.9576 0.9577 0.9576 0.9577 0.9576 0.9577 0.9576 0.9577 0.9576 0.9577 0.9576 0.9577 0.9577 0.9576 0.9577 0.95	nuth 11.0133 0.9883 0.9945 0.9903 0.9865 0.9795 0.9748 0.9709 0.9681 0.9581 0.9581 0.9581 0.9581 0.9582 0.9228 0.9238 0.9228 0.9238 0.9249 0.9258 0.9238 0.9249 0.9258	11.4667 0.9884 0.9945 0.9905 0.9905 0.9870 0.9870 0.9870 0.9852 0.9851 0.9730 0.9705 0.9607 0.9479 0.9607 0.9479 0.9479 0.9479 0.9479 0.9479 0.9479 0.9479 0.9407 0.9479 0.9407 0.9479 0.9407 0	11.9200 0.9876 0.9942 0.9901 0.9872 0.9854 0.9778 0.9725 0.9633 0.9554 0.9663 0.9663 0.9654 0.9663 0.9564 0.9664 0.9453 0.9377 0.9262 0.9377 0.9262 0.9075 0.8877 0.88795 0.8877 0.88595 0.8080 0.7354	12.3733 0.9883 0.9935 0.9894 0.9886 0.9868 0.9868 0.9767 0.97787 0.97740 0.9767 0.97740 0.9674 0.9674 0.9674 0.9552 0.9552 0.9458 0.9458 0.9458 0.9458 0.9458 0.9458 0.9230 0.9084 0.9237 0.9084 0.9237 0.9084 0.9237 0.9084 0.9237 0.9237 0.9237 0.9246 0.9237 0.9257 0.9458 0.9257 0.9458 0.9257 0.9458 0.9456 0.9457 0.9457 0.9457 0.9457 0.9457 0.9457 0.9457 0.9457 0.9457 0.9457 0.9457 0.9457 0.9577 0.97770 0.97770 0.97770 0.97770 0.97770 0.97770 0.97770 0.97770 0.97770 0.977700 0.97770000000000	12.8267 0.9885 0.9928 0.9877 0.98853 0.97853 0.97860 0.97860 0.97950 0.9740 0.9770 0.9664 0.9679 0.9666 0.9525 0.9525 0.9525 0.9525 0.9525 0.9525 0.9525 0.9525 0.9525 0.9523 0.9472 0.9533 0.9472 0.9533 0.9472 0.9533 0.9472 0.9533 0.95750 0.95750 0.95750 0.95750 0.95750 0.95750 0.95750 0.95750000	13.2800 0.9883 0.9918 0.9869 0.9869 0.9764 0.9764 0.9764 0.9667 0.9667 0.9667 0.96611 0.9652 0.9462 0.9522 0.9462 0.9423 0.9460 0.9424 0.9424 0.9424 0.9352 0.9452 0.9552 0.9452 0.9552	#######           0.9822           0.9836           0.9836           0.9755           0.9771           0.9767           0.9763           0.9763           0.9764           0.9771           0.9765           0.9763           0.9764           0.9764           0.9238           0.9237           0.9133           0.9054           0.9066           0.9066           0.9066
$\begin{array}{c} \begin{array}{c} 5 & 8 \\ 8 & 7 \\ 10 & 8 \\ 12 & 8 \\ 15 & 3 \\ 17 & 5 \\ 20 & 1 \\ 22 & 4 \\ 25 & 7 \\ 29 & 8 \\ 32 & 6 \\ 38 & 8 \\ 38 & 8 \\ 38 & 8 \\ 47 & 5 \\ 50 & 4 \\ 44 & 8 \\ 47 & 5 \\ 50 & 4 \\ 56 & 3 \\ 60 & 1 \\ 63 & 9 \\ 67 & 5 \\ 71 & 4 \\ 77 & 9 \end{array}$	Nozzle Ptsai (psia) 79 208 114 198 137 722 150 365 150 236 150 236 150 096 150 153 150 153 150 153 150 037 150 376 150 376 150 376 150 376 150 325 150	Pamb, Vacuum Chamber Pressure, psia 13,6595 12,7940 11,7580 9,8260 8,5710 7,4855 6,0465 4,6040 4,1970 3,8805 3,6405 3,6405 3,3470 3,1395 2,9615 2,7680 2,5015 2,2515 2,2515 2,2515 2,2501 2,21080		7.3867 0.9907 0.9829 0.9856 0.9752 0.9681 0.9755 0.9681 0.9633 0.9653 0.9484 0.9351 0.9361 0.9361 0.9361 0.9361 0.9361 0.9361 0.2892 0.3244 0.3248 0.33480 0.33480 0.33480000000000000000000000000000000000	7.8400 0.9909 0.9932 0.9862 0.9862 0.9804 0.9770 0.9770 0.9750 0.9556 0.9541 0.9448 0.9448 0.9448 0.9448 0.9448 0.9448 0.9448 0.9448 0.2683 0.2883 0.2883 0.2883 0.2883 0.2883 0.2883 0.2883 0.2862 0.3405 0.3554 0.33944 0.33944 0.33944	8.2933 0.9902 0.9933 0.9867 0.9867 0.9811 0.9679 0.9619 0.9669 0.9619 0.9509 0.9509 0.9506 0.9381 0.95811 0.2745 0.2745 0.2745 0.2745 0.2745 0.2745 0.3313 0.3270 0.3675 0.3675 0.3885	8.7467 0.9899 0.9940 0.9887 0.9887 0.9834 0.9803 0.9623 0.9662 0.9653 0.9481 0.9553 0.9481 0.9553 0.9481 0.9553 0.9481 0.9309 0.9094 0.8795 0.8010 0.8795 0.8010 0.2543 0.2710 0.2872 0.3006 0.3374 0.3374 0.3376	9.2000 0.9893 0.9841 0.9891 0.9841 0.9683 0.96519 0.9653 0.9615 0.96519 0.9522 0.9579 0.9524 0.9541 0.9545 0.0545 0.9545 0.0555 0.05555 0.05555 0.05555 0.05555 0.05555 0.05555 0.05555 0.05555 0.05	9.6533 0.9892 0.9896 0.9899 0.9852 0.9766 0.9651 0.9653 0.9568 0.9568 0.9568 0.9457 0.9344 0.9210 0.8939 0.8638 0.7989 0.8939 0.8638 0.7989 0.2477 0.2562 0.2743 0.2682 0.2682 0.2683 0.2683 0.2683 0.2682 0.2683 0.2783 0.2683 0.27830 0.27830 0.2783000000000000000000000000000000000000	x/r*, 10.1067 0.9885 0.9898 0.9886 0.9886 0.9886 0.9830 0.9775 0.9669 0.9637 0.9569 0.9507 0.9507 0.9509 0.9501 0.9500 0.9501 0.95000 0.95000 0.95000 0.95000 0.95000 0.950000000000	0° Azin 10.5600 0.9887 0.9945 0.9901 0.9887 0.9901 0.9881 0.9787 0.9691 0.9651 0.9651 0.9657 0.9657 0.9657 0.9657 0.9516 0.9516 0.9516 0.9520 0.9235 0.9078 0.9235 0.9078 0.9235 0.9078 0.9235 0.9256 0.9256 0.9256 0.9256 0.9255 0.9256 0.9255 0.92	nuth 11.0133 0.9883 0.9905 0.9900 0.9865 0.9900 0.9865 0.9748 0.9795 0.9681 0.9748 0.9795 0.9681 0.9528 0.9488 0.9528 0.9458 0.9458 0.9228 0.9228 0.9228 0.9228 0.9035 0.8232 0.7635 0.5035 0.2403 0.2200	11.4667 0.9884 0.9945 0.9904 0.9870 0.98870 0.9763 0.9763 0.9763 0.9667 0.9667 0.96535 0.9504 0.9535 0.9504 0.9479 0.9479 0.9472 0.9535 0.9554 0.9554 0.9554 0.9554 0.9554 0.9554 0.95750 0.95750 0.95750 0.95750 0.95750 0.95750000000000000000000000000000000000	11.9200 0.9876 0.9942 0.9902 0.9872 0.9854 0.9823 0.9872 0.9662 0.9662 0.9653 0.9662 0.9654 0.9554 0.9554 0.9453 0.9455 0.945	12.3733 0.9883 0.9935 0.9896 0.9896 0.9868 0.9877 0.9763 0.9776 0.97776 0.9776 0.9776 0.9776 0.9776 0.9776 0.9776 0.9776 0.9776 0.9776	12.8267 0.9885 0.9928 0.9885 0.9885 0.9885 0.9885 0.9785 0.9786 0.9795 0.9740 0.9740 0.9679 0.9684 0.9664 0.9664 0.9568 0.9568 0.95530 0.9548 0.9525 0.95337 0.9548 0.9525 0.9472 0.9371 0.9268 0.9472 0.9474 0.9274 0.9474 0.9284 0.9443 0.9443 0.9443 0.9443 0.9444 0.8711 0.97100 0.97100000000000000000000000000000000000	13.2800 0.9883 0.9985 0.9868 0.9868 0.9868 0.9764 0.9601 0.9621 0.9624 0.9652 0.9462 0.9462 0.9462 0.9462 0.9442 0.9442 0.9442 0.9442 0.9442 0.9442 0.9455 0.9462 0.9455 0.9462 0.94550 0.94550 0.94550 0.94550 0.94550 0.94550000000000000000000000000000000000	#######           0.9822           0.9833           0.9833           0.9755           0.9771           0.9765           0.9663           0.9613           0.9554           0.9554           0.9272           0.9287           0.9287           0.9287           0.9287           0.9218           0.9219           0.9133           0.9091           0.9066           0.9060           0.9080
$\begin{array}{c} 5.6\\ 8.7\\ 10.8\\ 12.8\\ 16.3\\ 17.5\\ 20.1\\ 22.4\\ 25.1\\ 27.5\\ 29.8\\ 32.6\\ 32.6\\ 33.8\\ 41.3\\ 44.8\\ 47.5\\ 50.4\\ 54.3\\ 57.6\\ 60.1\\ 63.9\\ 57.5\\ 71.4\\ 77.9\\ 84.0 \end{array}$	Nozzle Ptetat (psia) 79 208 114 198 137.722 150.365 150.236 150.236 150.24 150.053 150.073 150.376 150.376 150.376 150.376 150.376 150.324 150.324 150.324 150.324 150.324 150.255 149.354 150.324 150.255 150.245 150.245 150.254 150.255 150.254 150.2555 150.2555 150.2555 150.25555 150.25	Pamb, Vacuum Chamber Pressure, psia 13, 6595 13, 0925 12, 7940 11, 7580 9, 8260 8, 5710 7, 4855 6, 7110 5, 9890 5, 4735 5, 0465 4, 6040 4, 1970 3, 8805 3, 3470 3, 1395 2, 9615 2, 27680 2, 5015 2, 3515 2, 2260 2, 1080 1, 9310 1, 7305		7.3867 0.9907 0.9829 0.9870 0.9850 0.9752 0.9691 0.9695 0.9691 0.9695 0.9691 0.9695 0.9484 0.9361 0.9079 0.8492 0.3061 0.2892 0.3061 0.22962 0.3061 0.32493 0.3493 0.3708 0.3493 0.3493 0.34708 0.3493 0.34708 0.3493 0.34708 0.3493 0.5456 0.3493 0.34	7.8400 0.9909 0.9932 0.9875 0.9862 0.9862 0.9700 0.9653 0.9554 0.9554 0.9554 0.9544 0.9272 0.8956 0.9544 0.9272 0.8956 0.8324 0.8324 0.8324 0.8324 0.2813 0.2813 0.2813 0.2820 0.3208 0.	8.2933 0.9902 0.9933 0.9876 0.9867 0.9811 0.9763 0.9715 0.9663 0.9779 0.9506 0.9381 0.9506 0.9381 0.9508 0.8339 0.8339 0.2745 0.2559 0.2755 0.2555 0.3133 0.2555 0.3270 0.3479 0.3675 0.3885 0.3885	8.7467 0.9899 0.9940 0.9887 0.9887 0.9834 0.9733 0.9672 0.9623 0.9623 0.9623 0.96553 0.9481 0.9305 0.9481 0.9305 0.9954 0.9904 0.8905 0.2710 0.2710 0.2710 0.2710 0.2710 0.3374 0.3372 0.3372 0.3300	9.2000 0.9893 0.9943 0.9892 0.9881 0.9841 0.9751 0.9683 0.9615 0.9657 0.9579 0.9579 0.9522 0.9579 0.9522 0.9241 0.9045 0.9241 0.9045 0.8617 0.8607 0.2529 0.2676 0.2290 0.22968 0.3316 0.3316 0.3320	9.6533 0.9892 0.9944 0.9886 0.9886 0.9882 0.9852 0.9766 0.9768 0.9623 0.9663 0.9653 0.9454 0.9454 0.9454 0.9454 0.9454 0.9344 0.9454 0.9344 0.9454 0.9344 0.9454 0.9344 0.9210 0.5116 0.2477 0.2743 0.2743 0.2683 0.3069 0.3351	x/r*, 10.1067 0.9885 0.9944 0.9898 0.9855 0.9839 0.9855 0.9775 0.9723 0.9663 0.96639 0.96639 0.9567 0.9567 0.9568 0.9507 0.9401 0.9400 0.9401 0.9401 0.9401 0.9401 0.9400 0.9401 0.9400 0.9401 0.9400 0.9401 0.9400 0.9401 0.9400 0.9401 0.9400 0.7608 0.24233 0.24237 0.3340 0.3340 0.3401 0.	0° Azin 10.5600 0.9887 0.9945 0.9901 0.9861 0.9963 0.9787 0.9787 0.9787 0.9767 0.9569 0.9659 0.9659 0.9659 0.9659 0.9672 0.9572 0.9572 0.9572 0.9978 0.9447 0.9370 0.9447 0.9370 0.9447 0.9235 0.9078 0.9235 0.9078 0.8810 0.8306 0.7492 0.5481 0.2520 0.2661 0.2520 0.2661 0.2520 0.2661 0.2520 0.2661 0.2520 0.2661 0.2520 0.2661 0.2520 0.2661 0.2520 0.2661 0.2520 0.2661 0.2520 0.2661 0.2520 0.2661 0.2520 0.2661 0.2520 0.2661 0.2520 0.2561 0.2520 0.2561 0.2520 0.2561 0.2520 0.2561 0.2520 0.2561 0.2520 0.2561 0.2520 0.2561 0.2520 0.559 0.9787 0.9787 0.9787 0.9787 0.9787 0.9787 0.9572 0.9447 0.9235 0.9245 0.9245 0.9247 0.9255 0.92788 0.92788 0.92788 0.92788 0.92788 0.92788 0.92788 0.92788 0.92788 0.92788 0.92788 0.92788 0.92788 0.92788 0.92788 0.92788 0.92788 0.92788 0.92788 0.92788 0	nuth 11.0133 0.9883 0.9945 0.9903 0.9865 0.9709 0.9862 0.9709 0.9862 0.9709 0.9681 0.9768 0.9768 0.9681 0.9581 0.9486 0.9428 0.9428 0.9428 0.9428 0.9428 0.9428 0.9428 0.9428 0.9428 0.9428 0.0448 0.04480000000000	11.4667 0.9884 0.9904 0.9870 0.98870 0.98870 0.98870 0.9852 0.98870 0.9763 0.9763 0.9763 0.9765 0.9666 0.9607 0.9504 0.9504 0.9504 0.9504 0.9320 0.9402 0.9320 0.9402 0.9320 0.8946 0.8946 0.8946 0.8243 0.7408 0.8243 0.7408 0.8243 0.7408 0.8245 0.8245 0.8245 0.8245 0.8245 0.8245 0.8245 0.8245 0.8245 0.8245 0.8245 0.8245 0.8245 0.8256 0.8256 0.8256 0.2256 0.2256 0.2276 0.2276 0.2276 0.2276 0.2276 0.2276 0.2256 0.2276 0.9550 0.9550 0.9550 0.9550 0.9550 0.9550 0.9550 0.9570 0.9550 0.9570 0.9570 0.9550 0.95700 0.95700 0.95700 0.95700 0.95700 0.95700000000000000000000000000000000000	11.9200 0.9876 0.9942 0.9901 0.9862 0.9864 0.9862 0.9778 0.9786 0.9768 0.9768 0.9768 0.9768 0.9768 0.9768 0.9663 0.9564 0.9577 0.9664 0.9377 0.9265 0.9077 0.9265 0.90735 0.90755 0.90735 0.907555 0.907555 0.907555 0.907555 0.9	12.3733 0.9883 0.9935 0.9894 0.9886 0.9868 0.9868 0.9763 0.9763 0.9763 0.9763 0.9764 0.9767 0.9764 0.9558 0.9558 0.9558 0.9408 0.9408 0.9408 0.9408 0.9230 0.9230 0.9230 0.9230 0.9230 0.9237 0	12.8267 0.9885 0.9928 0.9877 0.98853 0.98853 0.97863 0.97863 0.9740 0.9770 0.9614 0.9744 0.9679 0.9666 0.9526 0.9525 0.9530 0.9472 0.9526 0.9527 0.9471 0.9268 0.9371 0.9371 0.9268 0.9371 0.9371 0.9412 0.9371 0.9575 0.9472 0.9576 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9576 0.9577 0.9577 0.9577 0.9577 0.9577 0.9576 0.9577 0.9576 0.9576 0.9577 0.9576 0.9577 0.9576 0.9577 0.9577 0.9577 0.9577 0.9576 0.9577 0.9576 0.9576 0.9576 0.9577 0.9576 0.9577 0.9577 0.9576 0.95770 0.95770 0.95770 0.95770 0.95770000000000000000000000000000000000	13.2800 0.9883 0.9918 0.98659 0.98659 0.98659 0.98629 0.9764 0.9764 0.9621 0.9667 0.9624 0.9667 0.9624 0.9667 0.9622 0.9462 0.9452 0.9452 0.9452 0.9452 0.9452 0.9452 0.9452 0.9452 0.9452 0.9452 0.9452 0.9455 0.9455 0.9455 0.9455 0.9455 0.9455 0.9455 0.9455 0.9455 0.9455 0.9455 0.9455 0.9455 0.9455 0.9455 0.9455 0.9455 0.9455 0.9455 0.95550 0.95550 0.95550 0.95550 0.95550000000000	#######           0.9822           0.9893           0.9833           0.9775           0.9775           0.9771           0.9613           0.9541           0.9487           0.9354           0.9354           0.9287           0.9235           0.9272           0.9133           0.9054           0.9054           0.9054           0.9054           0.9054           0.9060           0.9060           0.9061
$\begin{array}{c} \begin{array}{c} 5 & 8 \\ 8 & 7 \\ 10 & 8 \\ 12 & 8 \\ 15 & 3 \\ 17 & 5 \\ 20 & 1 \\ 22 & 4 \\ 25 & 7 \\ 29 & 8 \\ 32 & 6 \\ 38 & 8 \\ 38 & 8 \\ 38 & 8 \\ 47 & 5 \\ 50 & 4 \\ 44 & 8 \\ 47 & 5 \\ 50 & 4 \\ 56 & 3 \\ 60 & 1 \\ 63 & 9 \\ 67 & 5 \\ 71 & 4 \\ 77 & 9 \end{array}$	Nozzle Ptsai (psia) 79 208 114 198 137 722 150 365 150 236 150 236 150 096 150 153 150 153 150 153 150 037 150 376 150 376 150 376 150 376 150 325 150	Pamb, Vacuum Chamber Pressure, psia 13,6595 12,7940 11,7580 9,8260 8,5710 7,4855 6,0465 4,6040 4,1970 3,8805 3,6405 3,6405 3,3470 3,1395 2,9615 2,7680 2,5015 2,2515 2,2515 2,2515 2,2501 2,21080		7.3867 0.9907 0.9829 0.9856 0.9752 0.9681 0.9755 0.9681 0.9633 0.9653 0.9484 0.9351 0.9361 0.9361 0.9361 0.9361 0.9361 0.9361 0.2892 0.3244 0.3248 0.33480 0.33480 0.33480000000000000000000000000000000000	7.8400 0.9909 0.9932 0.9862 0.9862 0.9804 0.9770 0.9770 0.9750 0.9556 0.9541 0.9448 0.9448 0.9448 0.9448 0.9448 0.9448 0.9448 0.9448 0.2683 0.2883 0.2883 0.2883 0.2883 0.2883 0.2883 0.2883 0.2862 0.3405 0.3554 0.33944 0.33944 0.33944	8.2933 0.9902 0.9933 0.9867 0.9867 0.9811 0.9679 0.9619 0.9669 0.9619 0.9509 0.9509 0.9506 0.9381 0.95811 0.2745 0.2745 0.2745 0.2745 0.2745 0.2745 0.3313 0.3270 0.3675 0.3675 0.3885	8.7467 0.9899 0.9940 0.9887 0.9887 0.9834 0.9803 0.9623 0.9662 0.9653 0.9481 0.9553 0.9481 0.9553 0.9481 0.9553 0.9481 0.9309 0.9094 0.8795 0.8010 0.8795 0.8010 0.2543 0.2710 0.2872 0.3006 0.3374 0.3374 0.3376	9.2000 0.9893 0.9841 0.9891 0.9841 0.9683 0.96519 0.9653 0.9615 0.96519 0.9522 0.9579 0.9524 0.9541 0.9545 0.0545 0.05555 0.05555 0.05555 0.05555 0.05555 0.05555 0.0555	9.6533 0.9892 0.9896 0.9899 0.9852 0.9766 0.9651 0.9653 0.9568 0.9568 0.9568 0.9457 0.9344 0.9210 0.8939 0.8638 0.7989 0.8939 0.8638 0.7989 0.2477 0.2562 0.2743 0.2682 0.2682 0.2683 0.2683 0.2683 0.2682 0.2683 0.2783 0.2683 0.27830 0.27830 0.2783000000000000000000000000000000000000	x/r*, 10.1067 0.9885 0.9898 0.9886 0.9886 0.9886 0.9830 0.9775 0.9669 0.9637 0.9569 0.9507 0.9507 0.9509 0.95010000000000000000000000000000000000	0° Azin 10.5600 0.9887 0.9945 0.9901 0.9887 0.9901 0.9881 0.9787 0.9691 0.9651 0.9651 0.9657 0.9657 0.9657 0.9657 0.9516 0.9516 0.9516 0.9520 0.9235 0.9078 0.9235 0.9078 0.9235 0.9078 0.9235 0.9256 0.9256 0.9256 0.9256 0.9255 0.9256 0.9255 0.92	nuth 11.0133 0.9883 0.9905 0.9900 0.9865 0.9900 0.9865 0.9748 0.9795 0.9681 0.9748 0.9795 0.9681 0.9528 0.9488 0.9528 0.9458 0.9458 0.9228 0.9228 0.9228 0.9228 0.9035 0.8232 0.7635 0.5035 0.2403 0.2200	11.4667 0.9884 0.9945 0.9904 0.9870 0.98870 0.9763 0.9763 0.9763 0.9667 0.9667 0.96535 0.9504 0.9535 0.9504 0.9479 0.9479 0.9472 0.9535 0.9554 0.9554 0.9554 0.9554 0.9554 0.9554 0.95750 0.95750 0.95750 0.95750 0.95750 0.95750 0.95750000000000000000000000000000000000	11.9200 0.9876 0.9942 0.9902 0.9872 0.9854 0.9823 0.9872 0.9662 0.9662 0.9653 0.9662 0.9654 0.9554 0.9554 0.9453 0.9455 0.945	12.3733 0.9883 0.9935 0.9896 0.9896 0.9868 0.9877 0.9763 0.9776 0.97776 0.9776 0.9776 0.9776 0.9776 0.9776 0.9776 0.9776 0.9776 0.9776	12.8267 0.9885 0.9928 0.9885 0.9885 0.9885 0.9885 0.9785 0.9786 0.9795 0.9740 0.9740 0.9679 0.9684 0.9664 0.9664 0.9568 0.9568 0.95530 0.9548 0.9525 0.95337 0.9548 0.9525 0.9472 0.9371 0.9268 0.9472 0.9474 0.9274 0.9474 0.9284 0.9443 0.9443 0.9443 0.9443 0.9444 0.8711 0.97100 0.97100000000000000000000000000000000000	13.2800 0.9883 0.9985 0.9868 0.9868 0.9868 0.9764 0.9601 0.9621 0.9624 0.9652 0.9462 0.9462 0.9462 0.9462 0.9442 0.9442 0.9442 0.9442 0.9442 0.9442 0.9455 0.9462 0.9455 0.9462 0.94550 0.94550 0.94550 0.94550 0.94550000000000000000000000000000000000	#######           0.9822           0.9833           0.9833           0.9755           0.9771           0.9765           0.9661           0.9613           0.9554           0.9554           0.9272           0.9287           0.9287           0.9287           0.9287           0.9218           0.9219           0.9133           0.9091           0.9066           0.9060           0.9080
$\begin{array}{c} 5.8\\ 8.7\\ 10.8\\ 12.8\\ 15.3\\ 17.5\\ 20.1\\ 17.5\\ 20.1\\ 22.4\\ 25.1\\ 27.5\\ 29.8\\ 32.6\\ 35.8\\ 36.8\\ 36.8\\ 36.8\\ 36.8\\ 36.8\\ 36.8\\ 36.8\\ 36.8\\ 36.8\\ 37.6\\ 60.1\\ 63.9\\ 67.5\\ 71.4\\ 77.9\\ 84.0\\ 97.2\\ 97.2\\ \end{array}$	Nozzle Ptesi (psia) 79 208 114, 198 150 365 150 236 150 236 150 150 365 150 150 31 150 150 31 150 150 31 150 150 31 150 150 31 150 082 150 326 150 33 150 065 149 354 150 247 150 247 150 344 150 247 150 344 150 247 150 344 150 247 150 344 150 344 150 344 150 344 150 345 150 345 150 345 150 346 150 346	Pamb, Vacuum Chamber Pressure, psia 13 6595 13 0925 12 7940 9 8260 9 826		7.3867 0.9907 0.9829 0.9876 0.9752 0.9681 0.9639 0.9653 0.9639 0.9484 0.9351 0.9079 0.8492 0.8492 0.8492 0.3248 0.3248 0.3248 0.3248 0.3248 0.3248 0.3370 0.3412 0.3370 0.3412 0.3370 0.3412 0.3370 0.3412 0.3370 0.3412000000000000000000000000000000000000	7.8400 0.9909 0.9932 0.9875 0.9862 0.9804 0.9770 0.9770 0.9750 0.9554 0.9541 0.9448 0.9272 0.3405 0.8354 0.2883 0.2982 0.3208 0.3405 0.3405 0.3554 0.3376 0.3376 0.3394 0.3376 0.3394 0.3776 0.3394 0.3776 0.3394 0.3776 0.3394 0.3776 0.3394 0.3776 0.3394 0.3776 0.3394 0.3776 0.3394 0.3776 0.3776 0.3394 0.3376 0.3394 0.3376 0.3394 0.3376 0.3394 0.3376 0.3377 0.3376 0.3377 0.33776 0.337776 0.337776 0.337776 0.337776 0.3377777777777777777777777777777777777	8.2933 0.9902 0.9933 0.9867 0.9811 0.9763 0.9765 0.9619 0.9506 0.9381 0.9506 0.9381 0.9508 0.9514 0.8345 0.8345 0.2745 0.2745 0.2955 0.3133 0.2776 0.38270 0.3479 0.3675 0.3826 0.3429 0.3675 0.3826 0.34241 0.4241 0.4569 0.5293	8.7467 0.9899 0.9840 0.9887 0.9834 0.9834 0.9673 0.9623 0.9672 0.9623 0.9662 0.96553 0.9481 0.95553 0.9481 0.95553 0.9481 0.95553 0.9481 0.9505 0.9481 0.9505 0.9481 0.9505 0.9309 0.9094 0.9505 0.9309 0.9094 0.9505 0.9481 0.9374 0.3714 0.3374 0.3374 0.35905 0.3900 0.33902 0.3902 0.3902 0.3902 0.3902 0.3902 0.3902 0.33902 0.33902 0.3902 0.3902 0.3902 0.3902 0.33902 0.33902 0.33902 0.33902 0.3405 0.3405 0.33902 0.33902 0.3405 0.3405 0.3405 0.3502 0.4255	9.2000 0.9893 0.9943 0.9891 0.9891 0.9841 0.9751 0.9629 0.9633 0.9579 0.9527 0.9527 0.9527 0.9527 0.9527 0.9527 0.9527 0.9541 0.9542 0.9541 0.9541 0.2579 0.9541 0.2579 0.9541 0.2579 0.9541 0.2579 0.9541 0.2579 0.9541 0.2579 0.9542 0.2579 0.9541 0.2579 0.2579 0.9542 0.2579 0.9542 0.2579 0.9542 0.25790 0.2579000000000000000000000000000000000000	9.6533 0.9892 0.9844 0.9896 0.9829 0.9852 0.9766 0.9651 0.9653 0.9663 0.9663 0.9663 0.9653 0.9668 0.9457 0.9457 0.9457 0.9451 0.9451 0.9210 0.8939 0.5116 0.2477 0.2562 0.2743 0.2898 0.3351 0.3351 0.3614 0.3614	x/r*, 10.1067 0.9885 0.9898 0.9885 0.9855 0.9723 0.9669 0.9723 0.9669 0.9507 0.9566 0.9507 0.9566 0.9507 0.9566 0.9507 0.9507 0.9568 0.9507 0.9506 0.9501 0.9501 0.9501 0.9501 0.9501 0.9301 0.9301 0.4732 0.2539 0.2686 0.3097 0.3303	0° Azin 10.5600 0.9887 0.9945 0.9901 0.9861 0.9861 0.9736 0.9631 0.9659 0.96572 0.96572 0.96572 0.96572 0.96572 0.96574 0.96572 0.96574 0.96572 0.96574 0.96574 0.96572 0.96574 0.96572 0.9572 0.5739 0.9572 0.2520 0.2520 0.2505 0.2505 0.3139 0.3539 0.3	nuth 11.0133 0.9883 0.9945 0.9900 0.9865 0.9900 0.9845 0.9745 0.9748 0.9779 0.9681 0.9681 0.9528 0.9438 0.9528 0.9438 0.9328 0.9036 0.9036 0.9036 0.9038 0.9036 0.9036 0.9038 0.9036 0.9038 0.9036 0.9038 0.9036 0.9038 0.9036 0.9038 0.90580 0.90580 0.90580 0.90580 0.90580 0.90580 0.90	11.4667 0.9884 0.9945 0.9905 0.9904 0.9873 0.9730 0.9763 0.9656 0.9607 0.9656 0.9607 0.9656 0.9607 0.9535 0.9504 0.9479 0.9479 0.9479 0.9472 0.9479 0.9472 0.9320 0.9171 0.8916 0.8612 0.2563 0.22563 0.22563 0.2720	11.9200 0.9876 0.9942 0.9901 0.9902 0.9872 0.9862 0.9682 0.9663 0.9663 0.9663 0.9654 0.9654 0.9654 0.9654 0.9654 0.9655 0.9075 0.88877 0.9262 0.9075 0.9262 0.9075 0.9354 0.9262 0.9374 0.9262 0.9375 0.9262 0.9375 0.9262 0.9375 0.9262 0.9375 0.9262 0.9375 0.9262 0.9375 0.9262 0.9355 0.9262 0.9262 0.9355 0.9262 0.9355 0.9262 0.9262 0.9262 0.9355 0.9262 0.92	12.3733 0.9883 0.9935 0.9894 0.9896 0.9868 0.9868 0.9869 0.9787 0.9763 0.9763 0.9764 0.9764 0.97674 0.97658 0.97674 0.96074 0.95582 0.9498 0.945888 0.945888 0.945888 0.945888 0.945888 0.945888 0.945888 0.945888 0.9458888 0.94588888 0.945888888888888888888888888888888888888	12.8267 0.9885 0.9828 0.9853 0.9853 0.9756 0.9760 0.9760 0.9760 0.9760 0.9684 0.9679 0.9684 0.96679 0.9548 0.9548 0.95586 0.9548 0.9554 0.95472 0.95472 0.9778 0.97788 0.9	13.2800 0.9883 0.9918 0.9869 0.9869 0.9869 0.9869 0.9869 0.9721 0.96611 0.96611 0.96624 0.96624 0.96624 0.96522 0.94620 0.9462 0.9462 0.9462 0.9462 0.9424 0.9387 0.9452 0.9452 0.9452 0.9452 0.9452 0.9452 0.94550000000000000000000000000000000000	#######           0.9822           0.9833           0.9755           0.9771           0.9765           0.97613           0.95641           0.9541           0.9437           0.9541           0.9433           0.9541           0.9433           0.9287           0.9238           0.9238           0.9134           0.9056           0.9056           0.9066           0.9066           0.9066           0.90440           0.9140           0.9140           0.9140

## Table A1b. TIC 0° Azimuth normalized (by Pamb) wall pressures as presented in figure 14b. Diffuser inlet 76mm downstream.

							]	mm d	ownst	ream.								
										x/r*, 180	" Azimuth	1						
NPR	Nozzle P <sub>ical</sub> (psia)	P <sub>ant</sub> , Vacuum Chamber Pressure, psia	0.3600	0.8133	1.2067	1./200	2.1733	2.6267	3.0800	3.5333	3.9867	4.4400	4.8933	5.3467	5.8000	6.2533	6.7067	7.1000
	101.817	13.2675	9.143L 02 9.245E-02	7.327L 02	6.490 <u>1</u> 02	1.252L 01 4 182E-02	1.270L 01 9 755E-02	1.277L-01 9.915E-02	1.282L-01 9.984E-02	1.266L 01	1.250L 01	1.289L-01	1.291L-01 1.008E-01	1.292L-01	1.292L-01	1.290L-01	1.254L 01 1.011E-01	1.294L 01
11.8	149.501	12.6375	9.426L 02	7.017L-02	6.444L-02	4.141L-02	3.2861 02	7.919L 02	8.119L-02	8.190L 02	8.220L 02	8.256L 02	8.276L 02	8.280L 02	8.292L 02	8.004L 02	8.011L-02	8.010L-02
14-1 16,4	150 289 160.216	10 6950 9,1570	9 442E-02 9.420L 02	7 310E-02 7.017L 02	5 446E-02 5.442L 02	4 142E-02 4.143L 02	3 246E-02 3.246E-02	2 709F-02 2.670L 02	6 557E-02 2.161L 02	6 779E-02 5.510L 02	6 853F-02 6 767L 02	6.894F-02 6.034L-02	6 925E-02 5.075E-02	6.037E-02 6.090L-02	6 949E-02 5.910L 02	6 957E-02 6.921L 02	6.965F-02 6.925L-02	6 973E-02 5.931L 02
18.8	150 267	7 9800	9 431E-02	7.315E-02	5 446E-02	4 142E-02	3 245E-02	2 673E-02	2 1335-02	17655-02	4 691E-02	4 954E-02	5 0505-02	5 052E-02	5 122E-02	5 140E-02	5 146E-02	5 149E-02
21.4	150,191	6.2530	9.424L 02 9.411E-02	7.321L 02 7.315E-02	5.440L 02 5.442E-02	4.142L 02 4.143E-02	3.247L 02 3.246E-02	2.671L 02 2.673E-02	2.133L 02 2.134E-02	1.775E-02 1.775E-02	1.520L 02 1.514E-02	3.947L 02 1.325E-02	4.286L 02 3 396F-02	4.060L 02 3.750E-02	4.429L 02 3 856F-02	4.450L 02 3.938E-02	4.476L 02 3.956E-02	4.486L 02 3.984E-02
26.6	150.304	5.6635	9.461L-02	7.0201 02	6.461L-02	4.139L 02	3.244L 02	2.6/4L 02	2.132L 02	1.779L-02	1.514L 02	1.017L 02	1.133E-02	2,9301, 02	3.357L 02	3.476L 02	3.534L 02	3.561L-02
28.9 31.6	150.365 150.394	5 1970 4.7625	9 459F-02 9,450L 02	7 319E-02 7.010L 02	5 452E-02 6,444L 02	4 139E-02 4.140L 02	3 244E-02 3.244L 02	2 675E-02 2.676L 02	2 132E-02 2.132L 02	1 775E-02 1.779E-02	1 514E-02 1.515E-02	1.316E-02 1.317L-02	1 129E-02 1.120L 02	1.038E-02 1.029L_02	2 673E-02 9 2/0 - 03	3 052E-02 2.090L 02	3 167E-02 2.779L 02	3 219E-02 2.050L 02
34.9	150.362	4.3145	9 451E-02	7 312E-02	5 (47E-02	4 141E-02	3 242E-02	2.674E-02	2 132E-02	1 774E-02	1.514E-02	1 317E-02	1 1295-02	1.0295-02	9 191E-03	8 300F-03	1 905E-02	2 426E-02
<u>- 37.2</u> 40.4	150.43	4.0420	9,4461,02	7.316E-02	5.446L 02 5.443E-02	4.140E-02	3.244L 02	2.674L 02 2.672E-02	2.132L 02	1.774L 02 1.775E-02	1.514L 02 1.515E-02	1.317E-02	1.1201_02	1.029L 02	9,194L 03	8.283L-03 8.283E-03	7.520L 03 7.424E-03	1.907L 02 6 812E-03
43.7	160.265	0.4400	9.440L 02	7.014L 02	6.440L 02	4.141L 02	3.240L 02	2.670L 02	2.131L-02	1.774L-02	1.514L 02	1.017L-02	1.129L 02	1.0291_02	9.190L 03	8.286L 03	7.427L 03	6.779L-03
46.9 49.6	149,316 149,404	3 1855 3.0150	9 456E-02 9.436L 02	7 316F-02 7.321L 02	5 450E-02 5.447L 02	4 140E-02 4.142L 02	3 243F-02 3.246L 02	2 674E-02 2.673L 02	2 132E-02 2 132E-02	1 775E-02 1.775E-02	1 514E-02 1.515E-02	1.317E-02 1.317L 02	1 129E-02 1.120L 02	1.029E-02 1.029L_02	9 202E-03 9.210L 03	8 284F-03 8.266L 03	7 421E-03 7.430E-03	6 771E-03 6 780L 03
53.0	149 973	2 8310	9 422E-02	7 321E-02	5 (42E-02	4 142E-02	3 247E-02	2 672E-02	2 134E-02	1 776E-02	1 515E-02	1.318E-02	1 128E-02	1.0305-02	9 215E-03	8 288F-03	7 (21E-03	6 775E-03
<u>59.6</u>	150,101	2.6575	9.437L 02 9.425E-02	7.314L 02 7.318E-02	5.444L 02 5.442E-02	4.142L 02	3.246L 02 3.247E-02	2.674L 02 2.673E-02	2.133E-02	1.776E-02 1.776E-02	1.514L 02 1.515E-02	1.3185-02	1.1290.02	1.0291_02	9.194L 03 9.221E-03	8.280L 03 8.282E-03	7.420L 03 7.424E-03	6.779E-03 6.779E-03
64.2	160.268	2.3410	9.423L 02	7.009L 02	6.442L 02	4.142L 02	3.246L 02	2.670L 02	2.134L 02	1.779L-02	1.515L 02	1.0100.02	1.129L 02	1.0291_02	9.217L-03	8.286L 03	7.427L-03	6.781L-03
67.8 /1./	150 278 150 249	2 2155 2.0960	9 428E-02 9.416L 02	7 311E-02 7.010L 02	5 440E-02 5.441L 02	4 141E-02 4.143L 02	3 245E-02 3.245E-02	2 672E-02 2.672L 02	2 133E-02 2.133L 02	1 775E-02 1.776L 02	1 515E-02 1.515E-02	1 318F-02 1.010L 02	1 129E-02 1.120L 02	1.029E-02 1.030L_02	9 216E-03 9 211L 03	8 285F-03 8 286L 03	7 426E-03 7.420L 03	6 781F-03 6 779L 03
76.8	150.37	1 9590	9464E-02	7 319E-02	5 454E-02	4 140E-02	3 245E-02	2 675E-02	2 131E-02	1 775E-02	1 515E-02	1 317E-02	1 1295-02	1.0305-02	9 191F-03	8 286F-03	7 (28E-03	6 777E-03
80.5	150.397	1.8005	9,4631,02	7.317L 02 7.318E-02	5.440L 02 5.443E-02	4.136L 02 4.141E-02	3 245E-02	2.674L 02 2.672E-02	2.132L 02 2.133E-02	1.776E-02 1.776E-02	1.515E-02	1.3185-02	1.1290.02	1.0291_02	9,1890,03	8.285L 03 8.288E-03	7.4270.03	6.779E-03 6.778E-03
105.8	150,303	1,4205	9.449L 02	7.012L 02	6.446L 02	4.141L 02	3.246L 02	2.6/6L 02	2.132L 02 2.131E-02	1.779L-02	1.5161 02	1.017L 02	1.129L 02	1.030_ 02	9.196L 03	8.280L 03	7.429L 03	6.773L-03
164.5	150 297	0 9135	9 (51E-02	7 3135-02	5 447E-02	4 1405-02	3 244E-02	2 674E-02	2.1211-412	1 774E-02	1 514E-02	1 317E-02	1 1285-02	1.0295-02	9 182F-03	8 284F-03	7 (255-03	6 767F-03
										x/r*, 180	° Azimuth	1						
NPR	Nozzie P <sub>esa</sub> (psis)	P <sub>lant</sub> , Vacuum Chamber Pressure, paia		7.6133	8.0067	8.5200	8.9733	9.4267	9.8800	10.3333	10.7867	11.2400	11.0933	12,1467	12.0000	13.0533	13.5067	
77	101 817	13 2675		1,294E-01	1.294E-01	1.294E-01	1.294E-01	12955-01	12955-01	12355-01	12355-01	12945-01	1294E-01	12535-01	1 291E-01	1 2885-01	1.284E-01	
9.0	126.511	12,9350		1.012L-01	1.012L-01	1.0101.01	1.0101.01	1.0101.01	1.014L 01	1.014L 01	1.014L 01	1.014L 01	1.014L 01	1.0101.01	1.011L-01	1.009L-01	1.000L 01	
11.8	149.531 150.209	12 6375 10.0950		8 322F-02 6.981L 02	8 327F-02 6.960L 02	8 331F-02 6.960L 02	8 334F-02 6.985L 02	8 339F-02 6.994L 02	8 343F-02 6.997L 02	8 345F-02 7.001L 02	8 345F-02 7.000L 02	8 347F-02 7.001L 02	8 344E-02 7.002L 02	8 341E-02 7.000L 02	8 327F-02 6.983L 02	8 297F-02 6.957L 02	8 250F-02 6.912L 02	
16.4	150 216	9 1570		5 9397-02	5 946E-02	5 951E-02	5 955E-02	5 961E-02	5 965E-02	5 971E-02	5 973E-02	5 977E-02	5 979E-02	5 977E-02	5 954E-02	5 936E-02	5 893E-02	
10.8	150.267	7.9000 7.0035		4.458E-02	6.169L 02 4.490E-02	4.495E-02	6.170L 02 4 502E-02	4.510E-02	4.516E-02	6.189L 02 4.521E-02	4.526E-02	6.190L 02 4.530E-02	6.200L 02 4 536E-02	4.542E-02	4.536E-02	6.167L 02 4 510E-02	6.125L 02 4.462E-02	
24.0	160,157	6.2530		3.997L 02	4.001L 02	4,002L 02	4.0021.02	4.000L 02	4.016L 02	4.024L 02	4.020L 02	4.034L 02	4.040L 02	4.040L 02	4.046L 02	4.019L 02	3.967L 02	
26.6 20.9	150.384 150.365	5 6635 5,1970		3 583F-02 3.255L 02	3 596F-02 3.276L 02	3 601E-02 3.287L 02	3 600E-02 3.290L 02	3 603F-02 3.296L 02	3 607E-02 3.294L 02	3 615E-02 3.290L 02	3 621E-02 3.000L 02	3 631E-02 3.012L 02	3 639F-02 3.322L 02	3 647E-02 3.034L 02	3 641E-02 3.332L 02	3 617E-02 3.307L 02	3 576F-02 3.264L 02	
31.6	150.394	4 7625		2 946E-02	2 978E-02	2 997E-02	3 007E-02	3 017E-02	3 017E-02	3 017E-02	3 016E-02	3 023E-02	3 0335-02	3 0495-02	3 051E-02	3 037E-02	2 995F-02	
34.9	150.362	4.3145		2.560L 02 2.273E-02	2.626L 02 2.393E-02	2.669L 02 2.450E-02	2.6801.02	2.704L 02 2.509E-02	2.710L 02 2.524E-02	2.710L 02 2.535E-02	2,719L 02	2.710L 02 2.541E-02	2.(20L 02 2.541E-02	2.730L 02 2.551E-02	2,745L 02	2.736L 02 2.553E-02	2.090L 02 2.507E-02	
40.4	160,107	3.7210		1.659L 02	2.061L-02	2.170L 02	2.241L-02	2.270L 02	2.001L-02	2.019L 02	2.032L 02	2.039L 02	2.342L 02	2.3461, 02	2.352L 02	2.042L-02	2.280L 02	
43.7 46.9	150 265 149,316	3 4400 3,1065		6 242E-03 6.121L 03	1 393E-02 A 646 - 03	1 852E-02 1.195L 02	1 981E-02 1.697L 02	2 052E-02 1.030L 02	2 059F-02 1.050L 02	2 114E-02 1.936L 02	2 136E-02 1.962L 02	2 149E-02 1.962L 02	2 160F-02 1.990L 02	2 170E-02 2.016L 02	2 171E-02 2.023L 02	2 161F-02 2.017L 02	2 114E-02 1.960L 02	
49.6	149 404	3 0150		6 118F-03	5 602E-03	5.2588-03	1 141E-02	1 591E-02	1.711E-02	17805-02	1 817E-02	1 846E-02	1 855F-02	1 8835-02	1 902E-02	1 904E-02	1 859E-02	
<u></u>	149.973	2,8010		6.114L 03 6.123F-03	6.604L.03	6.194L-03	4.060L 03 4.803E-03	9.955L 03 4 570E-03	1.466L 02 9.250E-03	1.579L 02 1.348E-02	1.646L 02	1.6501.02	1.710L 02	1.741L-02 1.617E-02	1.761L.02	1.779L-02 1.652E-02	1.750L 02 1.648E-02	
	150 101	2 6575																
69.6	150-101 160.317	2 6575 2.5210		6.120L 03	5.610E-03 5.601L_03	5 203F-03 6.196L 03	4.0101.03	4,484L_03	4.231L 03	8.655L 03	1.2501, 02	1.362L 02	1.450L 02	1.490L 02	1.525L 02	1.550L 02	1.561L 02	
<u>69.6</u> 64.2	150.317 150.268	2.5210 2.3410		6.120L 03 6.122E-03	5.601L-03	5.190L 03	4.010L 03	4.464L-03 4.465E-03	4 1595-03	3 9335-03	6.648E-03	1 116E-02	1 254E-02	1 332E-02	1 378E-02	1 (21E-02	1.561L-02 1.454E-02	
64.2 67.8 71.7	160.317 150.268 160.278 150.249	2.5210 2.3410 2.2165 2.0950		6.120L 03 6.122F-03 6.122L 03 6.123F-03	5.601L 03 5.603E-03 5.603L 03 5.604E-03	6.196L 03 5.197E-03 6.197L 03 5.198E-03	4.010L 03 4.805F-03 4.004L 03 4.812F-03	4.464L 03 4.465E-03 4.465L 03 4.465E-03	4 159E-03 4.169E-03 4 160E-03	3 933E-03 3.099L 03 3 894E-03	6.648E-03 3.720E-03 3.634E-03	1 116E-02 6.460L 03 3 481E-03	1 254E-02 1.079L 02 6 742E-03	1 332E-02 1.204L 02 1 046E-02	1 378E-02 1.274L 02 1 156E-02	1 421E-02 1.324L 02 1 223E-02	1.561L 02 1.454E-02 1.371L 02 1.266E-02	
69.6 64.2 67.8 71.7 76.8	160.317 150.268 160.278 150.249 160.37	2.6210 2.3410 2.2166 2.0950 1.9590		6.120L 03 6.122F-03 6.122L 03	6.604L 03 5.603F-03 6.600L 03 5.604F-03 6.610L 03	6.196L 03 5.197F-03 6.197L 03 5.198F-03 6.201L 03	4.010L 03 4.805F-03 4.004L 03 4.812F-03 4.001L 03	4,484L 03 4,485F-03 4,485E-03 4,485E-03 4,482L 03	4 159E-03 4.109E 03 4 160E-03 4.106E 03	3 933E-03 3 999L 03 3 894E-03 3 994L 03	6.648E-03 1.720L 03 3.634E-03 3.634E-03	1 116E-02 6.460L 03	1 254E-02 1.079L 02 6 742E-03 1.286L 03	1 332E-02 1.204L 02 1 046E-02 6.025L 03	1 378F-02 1.2/4L 02 1 156F-02 9.042L 03	1 421E-02 1.324L 02 1 223E-02 1.096L 02	1.561L 02 1.454E-02 1.371L 02 1.286E-02 1.180L 02	
69.6 67.8 71.7 76.8 83.5 91.9	160.317 150.268 160.278 150.249 160.37 150.307 160.309	2.6210 2.3410 2.2165 2.0050 1.9560 1.8005 1.6055		6.120L 03 6.122F-03 6.122L 03 6.122L 03 6.123F-03 6.110L 03 6.124F-03 6.120L 03	5.601L 03 5.603F-03 6.600L 03 5.604F-03 6.610L 03 5.612F-03 6.607L 03	6.196L 03 5 197F-03 6.197L 03 5 198F-03 6.201L 03 5 206F-03 6.202L 03	4.010L 03 4.805F-03 4.004L 03 4.812F-03 4.001L 03 4.807F-03 4.009L 03	4,484L 03 4 485F-03 4,485F-03 4 486F-03 4,482L 03 4 488F-03 4,482L 03	4 150F-03 4.159L 03 4 160F-03 4.156L 03 4 162F-03 4.157L 03	3 9335-03 3 8945-03 3 8945-03 3 9040 03 3 9035-03 3 9035-03	6.648E-03 3.634E-03 3.634E-03 3.634E-03 3.634E-03 3.637E-03 3.632E-03	1 1165-02 6.460L 03 3 4815-03 3.405L 03 3 4115-03 3.412L 03	1 254E-02 1.079L 02 6 742E-03 1.285L 01 3 205E-03 0.199L 03	1 332F-02 1.204L 02 1 046F-02 6.025L 03 3 038F-03 3.039L 03	1 3785-02 1.274L 02 1 1565-02 9.042L 03 5 6725-03 2.907L 03	1 421E-02 1.024E 02 1 223E-02 1.096E 02 9 280E-03 6.641E 03	1.561L 02 1.654E-02 1.374L 02 1.266E-02 1.180L 02 1.051E-02 9.219L 03	
69.6 64.2 67.8 71.7 76.8 83.5	160.317 150.268 160.278 150.249 160.37 150.397	2.6210 2.3410 2.2466 2.0660 1.9590 1.8005		6.120L 03 6.122F-03 6.122L 03 6.123F-03 6.110L 03 6.124F-03	6.601L 03 5.603F-03 6.600L 03 5.604F-03 6.610L 03 5.612F-03	6.196L 03 5.197F-03 6.197L 03 5.198F-03 6.201L 03 5.206F-03	4.010L 03 4.805F-03 4.004L 03 4.812F-03 4.807L 03 4.807F-03	4.454L 03 4.455F-03 4.455F-03 4.456F-03 4.452L 03 4.452L 03	4 159F-03 4 159F-03 4 160F-03 4 160F-03 4 162F-03	3 933F-03 3.099L 03 3.894F-03 3.904L 03 3.903F-03	6 648E-03 3.720E 03 3.634E-03 3.634E-03 3.634E-03	1 116E-02 6.460L 03 3 481E-03 3.409L 03 3 411E-03	1 254E-02 1.079L 02 6 742E-03 3.286L 03 3 205E-03	1 332E-02 1.204L 02 1 046E-02 6.025L 03 3 038E-03	1 378F-02 1.274L 02 1 156F-02 9.042L 03 5 672F-03	1 421E-02 1.024L 02 1.223E-02 1.096L 02 9 280E-03	1.561L 02 1.454E-02 1.371L 02 1.286E-02 1.180L 02 1.081E-02	

### Table A2a. TIC 180° Azimuth normalized (by Pc) wall pressures as presented in figure 15a. Diffuser inlet 76mm downstream.

							/6 I	nm ac	ownst	ream.								
									X	/r*, 180	° Azimu	th						
NPR	Nozzle P <sub>total</sub> (psia)	P <sub>amb</sub> , Vacuum Chamber Pressure, psia	0.3600	0.8133	1.2667	1.7200	2.1733	2.6267	3.0800	3.5333	3.9867	4.4400	4.8933	5.3467	5.8000	6.2533	6.7067	7. <b>1</b> 600
7.7	101.817	13.2675	0.7016	0.5623	0.4219	0.9611	0.9743	0.9799	0.9838	0.9865	0.9883	0.9893	0.9905	0.9911	0.9918	0.9925	0.9927	0.9930
9.8	126.511	12.9350	0.9042	0.7158	0.5320	0.4090	0.9541	0.9698	0.9765	0.9804	0.9830	0.9847	0.9861	0.9869	0.9878	0.9886	0.9890	0.9895
11.8	149.531	12.6375	1.1153	0.8658	0.6442	0.4900	0.3888	0.9371	0.9606	0.9690	0.9736	0.9769	0.9792	0.9801	0.9811	0.9826	0.9833	0.9842
14.1 16.4	150.289 150.216	10.6950 9.1570	1.3269	1.0272 1.2003	0.7652 0.8928	0.5820 0.6797	0.4561 0.5323	0.3807 0.4380	0.9214 0.3545	0.9526	0.9630	0.9688	0.9732 0.9637	0.9748 0.9672	0.9764	0.9777 0.9714	0.9787 0.9719	0.9799
18.8	150.216	7.9800	1.5455	1.3774	1.0256	0.8797	0.5325	0.4380	0.3345	0.3052	0.8833	0.9348	0.9637	0.9589	0.9644	0.9714	0.9689	0.9695
21.4	150.191	7.0035	2.0210	1.5699	1.1684	0.8883	0.6962	0.5729	0.4573	0.3807	0.3260	0.8464	0.9191	0.9394	0.9498	0.9561	0.9598	0.9618
24.0	150.157	6.2530	2.2600	1.7566	1.3069	0.9949	0.7795	0.6419	0.5124	0.4264	0.3637	0.3181	0.8154	0.9077	0.9332	0.9456	0.9523	0.9567
26.6 28.9	150.384 150.365	5.6635 5.1970	2.5096 2.7368	1.9437 2.1176	1.4473 1.5774	1.0990	0.8613 0.9386	0.7100	0.5661 0.6169	0.4713 0.5136	0.4020	0.3496	0.3009	0.7801 0.3004	0.8913	0.9229 0.8830	0.9376 0.9163	0.9455 0.9315
31.6	150.394	4.7625	2.9841	2.3093	1.7191	1.3073	1.0245	0.8451	0.6732	0.5604	0.4783	0.4157	0.3563	0.3250	0.2929	0.7574	0.8764	0.9119
34.9	150.362	4.3145	3.2938	2.5484	1.8983	1.4433	1.1297	0.9317	0.7428	0.6181	0.5275	0.4589	0.3933	0.3586	0.3203	0.2893	0.6640	0.8455
37.2	150.43	4.0420	3.5153	2.7192	2.0270	1.5418	1.2073	0.9951	0.7934	0.6603	0.5636	0.4901	0.4198	0.3830	0.3422	0.3083	0.2806	0.7098
40.4	150.187 150.265	3.7210 3.4400	3.8092	2.9530	2.1967	1.6708	1.3101 1.4166	1.0785	0.8608	0.7165	0.6114	0.5316	0.4553	0.4155	0.3717	0.3343	0.2997	0.2749
46.9	149.316	3.1865	4.4312	3.4282	2.5536	1.9397	1.5198	1.2528	0.9989	0.8316	0.7096	0.6173	0.5291	0.4823	0.4312	0.3882	0.3477	0.3173
49.6	149.404	3.0150	4.6760	3.6279	2.6992	2.0524	1.6086	1.3244	1.0567	0.8796	0.7506	0.6527	0.5592	0.5101	0.4564	0.4106	0.3682	0.3360
53.0	149.973	2.8310	4.9912	3.8781	2.8827	2.1943	1.7199	1.4158	1.1303	0.9407	0.8025	0.6980	0.5977	0.5454	0.4882	0.4391	0.3931	0.3589
56.5 59.6	150.101 150.317	2.6575 2.5210	5.3302 5.6196	4.1313 4.3633	3.0751 3.2447	2.3394 2.4701	1.8333 1.9361	1.5104 1.5938	1.2045	1.0024	0.8553	0.7439 0.7858	0.6378 0.6727	0.5814 0.6140	0.5193 0.5498	0.4681 0.4939	0.4196	0.3827
64.2	150.268	2.3410	6.0487	4.6916	3.4930	2.6587	2.0833	1.7155	1.3695	1.1397	0.9722	0.8458	0.7245	0.6608	0.5916	0.5318	0.4767	0.4353
67.8	150.278	2.2155	6.3949	4.9592	3.6899	2.8088	2.2009	1.8127	1.4471	1.2042	1.0273	0.8937	0.7655	0.6983	0.6251	0.5619	0.5037	0.4599
71.7	150.249	2.0960	6.7500	5.2443	3.9003	2.9699	2.3259	1.9156	1.5291	1.2729	1.0859	0.9447	0.8087	0.7381	0.6603	0.5940	0.5324	0.4857
76.8 83.5	150.37 150.397	1.9590 1.8005	7.2644 7.8961	5.6177 6.1122	4.1863 4.5510	3.1776 3.4552	2.4911 2.7092	2.0536	1.6360	1.3624	1.1628	1.0107 1.0997	0.8668	0.7907	0.7055	0.6360	0.5702 0.6204	0.5202
91.9	150.339	1.6355	8.6677	6.7270	5.0034	3.8062	2.9832	2.4561	1.9609	1.6325	1.3928	1.2113	1.0376	0.9465	0.8468	0.7618	0.6824	0.6231
105.8	150.303	1.4205	9.9979	7.7367	5.7614	4.3816	3.4333	2.8314	2.2562	1.8782	1.6037	1.3932	1.1946	1.0898	0.9729	0.8765	0.7856	0.7166
164.5	150.297	0.9135	15.5501	12.0317	8.9622	6.8112	5.3377	4.3996	3.5063	2.9195	2.4915	2.1664	1.8566	1.6935	1.5107	1.3629	1.2217	1.1133
									x	/r*. 180	° Azimu	th						
NPR	Nozzle P <sub>total</sub> (psia)	P <sub>amb</sub> , Vacuum Chamber Pressure, psia		7.6133	8.0667	8.5200	8.9733	9.4267	X 9.8800	/r*, 180 10.3333	° Azimu 10.7867		11.6933	12.1467	12.6000	13.0533	13.5067	
	P <sub>total</sub> (psia)	Chamber Pressure, psia							9.8800	10.3333	10.7867	11.2400						
NPR 7.7 9.8		Chamber		7.6133 0.9933 0.9899	8.0667 0.9933 0.9903	8.5200 0.9933 0.9905	8.9733 0.9933 0.9907	9.4267 0.9936 0.9912		Ĺ			11.6933 0.9927 0.9913	12.1467 0.9923 0.9909	12.6000 0.9908 0.9893	13.0533 0.9886 0.9865	13.5067 0.9854 0.9814	
7.7 9.8 11.8	P <sub>total</sub> (psia) 101.817 126.511 149.531	Chamber Pressure, psia 13.2675 12.9350 12.6375		0.9933 0.9899 0.9847	0.9933 0.9903 0.9852	0.9933 0.9905 0.9857	0.9933 0.9907 0.9861	0.9936 0.9912 0.9867	9.8800 0.9936 0.9914 0.9871	10.3333 0.9936 0.9916 0.9874	10.7867 0.9935 0.9915 0.9874	11.2400 0.9932 0.9914 0.9877	0.9927 0.9913 0.9873	0.9923 0.9909 0.9869	0.9908 0.9893 0.9852	0.9886 0.9865 0.9818	0.9854 0.9814 0.9762	
7.7 9.8 11.8 14.1	P <sub>total</sub> (psia) 101.817 126.511 149.531 150.289	Chamber Pressure, psia 13.2675 12.9350 12.6375 10.6950		0.9933 0.9899 0.9847 0.9810	0.9933 0.9903 0.9852 0.9817	0.9933 0.9905 0.9857 0.9820	0.9933 0.9907 0.9861 0.9816	0.9936 0.9912 0.9867 0.9828	9.8800 0.9936 0.9914 0.9871 0.9832	10.3333 0.9936 0.9916 0.9874 0.9837	10.7867 0.9935 0.9915 0.9874 0.9836	11.2400 0.9932 0.9914 0.9877 0.9838	0.9927 0.9913 0.9873 0.9839	0.9923 0.9909 0.9869 0.9836	0.9908 0.9893 0.9852 0.9813	0.9886 0.9865 0.9818 0.9777	0.9854 0.9814 0.9762 0.9713	
7.7 9.8 11.8 14.1 16.4	P <sub>total</sub> (psia) 101.817 126.511 149.531 150.289 150.216	Chamber Pressure, psia 13.2675 12.9350 12.6375 10.6950 9.1570		0.9933 0.9899 0.9847 0.9810 0.9743	0.9933 0.9903 0.9852 0.9817 0.9754	0.9933 0.9905 0.9857 0.9820 0.9763	0.9933 0.9907 0.9861 0.9816 0.9768	0.9936 0.9912 0.9867 0.9828 0.9779	9.8800 0.9936 0.9914 0.9871 0.9832 0.9786	10.3333 0.9936 0.9916 0.9874 0.9837 0.9795	10.7867 0.9935 0.9915 0.9874 0.9836 0.9798	11.2400 0.9932 0.9914 0.9877 0.9838 0.9806	0.9927 0.9913 0.9873 0.9839 0.9809	0.9923 0.9909 0.9869 0.9836 0.9806	0.9908 0.9893 0.9852 0.9813 0.9784	0.9886 0.9865 0.9818 0.9777 0.9738	0.9854 0.9814 0.9762 0.9713 0.9667	
7.7 9.8 11.8 14.1 16.4 18.8 21.4	Ptotal (psia) 101.817 126.511 149.531 150.289 150.216 150.267 150.191	Chamber Pressure, psia 13.2675 12.9350 12.6375 10.6950 9.1570 7.9800 7.0035		0.9933 0.9899 0.9847 0.9810 0.9743 0.9707 0.9625	0.9933 0.9903 0.9852 0.9817 0.9754 0.9716 0.9628	0.9933 0.9905 0.9857 0.9820 0.9763 0.9732 0.9639	0.9933 0.9907 0.9861 0.9816 0.9768 0.9742 0.9655	0.9936 0.9912 0.9867 0.9828 0.9779 0.9754 0.9672	9.8800 0.9936 0.9914 0.9871 0.9832 0.9786 0.9763 0.9685	10.3333 0.9936 0.9916 0.9874 0.9837 0.9795 0.9772 0.9695	10.7867 0.9935 0.9915 0.9874 0.9836 0.9798 0.9778 0.9705	11.2400 0.9932 0.9914 0.9877 0.9838 0.9806 0.9788 0.9715	0.9927 0.9913 0.9873 0.9839 0.9809 0.9792 0.9728	0.9923 0.9909 0.9869 0.9836 0.9806 0.9796 0.9741	0.9908 0.9893 0.9852 0.9813 0.9784 0.9776 0.9727	0.9886 0.9865 0.9818 0.9777 0.9738 0.9731 0.9671	0.9854 0.9814 0.9762 0.9713 0.9667 0.9650 0.9568	
7.7 9.8 11.8 14.1 16.4 18.8 21.4 24.0	P <sub>total</sub> (psia) 101.817 126.511 149.531 150.289 150.216 150.267 150.191 150.157	Chamber Pressure, psia 13.2675 12.9350 12.6375 10.6950 9.1570 7.9800 7.0035 6.2530		0.9933 0.9899 0.9847 0.9810 0.9743 0.9707 0.9625 0.9599	0.9933 0.9903 0.9852 0.9817 0.9754 0.9716 0.9628 0.9608	0.9933 0.9905 0.9857 0.9820 0.9763 0.9732 0.9639 0.9611	0.9933 0.9907 0.9861 0.9816 0.9768 0.9742 0.9655 0.9611	0.9936 0.9912 0.9867 0.9828 0.9779 0.9754 0.9672 0.9624	9.8800 0.9936 0.9914 0.9871 0.9832 0.9783 0.9763 0.9685 0.9645	10.3333 0.9936 0.9916 0.9874 0.9837 0.9795 0.9772 0.9695 0.9663	10.7867 0.9935 0.9915 0.9874 0.9836 0.9798 0.9778 0.9705 0.9674	11.2400 0.9932 0.9914 0.9877 0.9838 0.9806 0.9788 0.9715 0.9688	0.9927 0.9913 0.9873 0.9839 0.9809 0.9792 0.9728 0.9703	0.9923 0.9909 0.9869 0.9836 0.9806 0.9796 0.9741 0.9720	0.9908 0.9893 0.9852 0.9813 0.9784 0.9776 0.9727 0.9717	0.9886 0.9865 0.9818 0.9777 0.9738 0.9731 0.9671 0.9651	0.9854 0.9814 0.9762 0.9713 0.9667 0.9650 0.9568 0.9527	
7.7 9.8 11.8 14.1 16.4 18.8 21.4 24.0 26.6	P <sub>total</sub> (psia) 101.817 126.511 149.531 150.289 150.216 150.267 150.191 150.157 150.384	Chamber Pressure, psia 13.2675 12.9350 12.6375 10.6950 9.1570 7.9800 7.0035 6.2530 5.6635		0.9933 0.9899 0.9847 0.9810 0.9743 0.9707 0.9625 0.9599 0.9515	0.9933 0.9903 0.9852 0.9817 0.9754 0.9716 0.9628 0.9608 0.9549	0.9933 0.9905 0.9857 0.9820 0.9763 0.9732 0.9639 0.9611 0.9563	0.9933 0.9907 0.9861 0.9816 0.9768 0.9742 0.9655 0.9611 0.9559	0.9936 0.9912 0.9867 0.9828 0.9779 0.9754 0.9672 0.9624 0.9567	9.8800 0.9936 0.9914 0.9871 0.9832 0.9786 0.9763 0.9685 0.9685 0.9645 0.9579	10.3333 0.9936 0.9916 0.9874 0.9837 0.9795 0.9772 0.9695 0.9663 0.9598	10.7867 0.9935 0.9915 0.9874 0.9836 0.9798 0.9778 0.9705 0.9674 0.9614	11.2400 0.9932 0.9914 0.9877 0.9838 0.9806 0.9788 0.9715 0.9688 0.9642	0.9927 0.9913 0.9873 0.9839 0.9809 0.9792 0.9728 0.9703 0.9662	0.9923 0.9909 0.9869 0.9836 0.9806 0.9796 0.9741 0.9720 0.9683	0.9908 0.9893 0.9852 0.9813 0.9784 0.9776 0.9727 0.9717 0.9667	0.9886 0.9865 0.9818 0.9777 0.9738 0.9731 0.9671 0.9651 0.9604	0.9854 0.9814 0.9762 0.9713 0.9667 0.9650 0.9568 0.9527 0.9496	
7.7 9.8 11.8 14.1 16.4 18.8 21.4 24.0 26.6 28.9	Ptotal (psia) 101.817 126.511 149.531 150.289 150.216 150.267 150.191 150.157 150.384 150.365	Chamber Pressure, psia 13.2675 12.9350 12.6375 10.6950 9.1670 7.9800 7.0035 6.2530 5.6635 5.1970		0.9933 0.9899 0.9847 0.9810 0.9743 0.9707 0.9625 0.9599 0.9515 0.9419	0.9933 0.9903 0.9852 0.9817 0.9754 0.9754 0.9628 0.9608 0.9549 0.9479	0.9933 0.9905 0.9857 0.9820 0.9763 0.9639 0.9611 0.9563 0.9511	0.9933 0.9907 0.9861 0.9816 0.9768 0.9742 0.9655 0.9651 0.9559 0.9527	0.9936 0.9912 0.9867 0.9828 0.9779 0.9754 0.9672 0.9672 0.9624 0.9567	9.8800 0.9936 0.9914 0.9871 0.9832 0.9786 0.9763 0.9685 0.9645 0.9645 0.9579 0.9530	10.3333 0.9936 0.9916 0.9874 0.9837 0.9795 0.9772 0.9695 0.9663 0.9598 0.9542	10.7867 0.9935 0.9915 0.9874 0.9836 0.9798 0.9778 0.9705 0.9674 0.9614 0.9556	11.2400 0.9932 0.9914 0.9877 0.9838 0.9806 0.9788 0.9715 0.9688 0.9642 0.9582	0.9927 0.9913 0.9873 0.9839 0.9809 0.9792 0.9728 0.9703 0.9662 0.9611	0.9923 0.9909 0.9869 0.9836 0.9806 0.9796 0.9741 0.9720 0.9683 0.9646	0.9908 0.9893 0.9852 0.9813 0.9784 0.9776 0.9727 0.9717 0.9667 0.9640	0.9886 0.9865 0.9818 0.9777 0.9738 0.9731 0.9671 0.9651 0.9604 0.9567	0.9854 0.9814 0.9762 0.9713 0.9667 0.9650 0.9568 0.9527 0.9496 0.9444	
7.7 9.8 11.8 14.1 16.4 18.8 21.4 24.0 26.6	P <sub>total</sub> (psia) 101.817 126.511 149.531 150.289 150.216 150.267 150.191 150.157 150.384	Chamber Pressure, psia 13.2675 12.9350 12.6375 10.6950 9.1570 7.9800 7.0035 6.2530 5.6635		0.9933 0.9899 0.9847 0.9810 0.9743 0.9707 0.9625 0.9599 0.9515	0.9933 0.9903 0.9852 0.9817 0.9754 0.9716 0.9628 0.9608 0.9549	0.9933 0.9905 0.9857 0.9820 0.9763 0.9732 0.9639 0.9611 0.9563	0.9933 0.9907 0.9861 0.9816 0.9768 0.9742 0.9655 0.9611 0.9559	0.9936 0.9912 0.9867 0.9828 0.9779 0.9754 0.9672 0.9624 0.9567	9.8800 0.9936 0.9914 0.9871 0.9832 0.9786 0.9763 0.9685 0.9685 0.9645 0.9579	10.3333 0.9936 0.9916 0.9874 0.9837 0.9795 0.9772 0.9695 0.9663 0.9598	10.7867 0.9935 0.9915 0.9874 0.9836 0.9798 0.9778 0.9775 0.9674 0.9614	11.2400 0.9932 0.9914 0.9877 0.9838 0.9806 0.9788 0.9715 0.9688 0.9642	0.9927 0.9913 0.9873 0.9839 0.9809 0.9792 0.9728 0.9703 0.9662	0.9923 0.9909 0.9869 0.9836 0.9806 0.9796 0.9741 0.9720 0.9683	0.9908 0.9893 0.9852 0.9813 0.9784 0.9776 0.9727 0.9717 0.9667	0.9886 0.9865 0.9818 0.9777 0.9738 0.9731 0.9671 0.9651 0.9604	0.9854 0.9814 0.9762 0.9713 0.9667 0.9650 0.9568 0.9527 0.9496	
7.7 9.8 11.8 14.1 16.4 18.8 21.4 24.0 26.6 28.9 31.6 34.9 37.2	Ptotal (psia) 101.817 126.511 149.531 150.289 150.216 150.267 150.191 150.157 150.384 150.365 150.394 150.362 150.43	Chamber Pressure, psia 13.2675 12.9350 12.6375 10.6950 9.1570 7.9800 7.0035 6.2530 5.6635 5.1970 4.7625 4.3145 4.0420		0.9933 0.9899 0.9847 0.9810 0.9743 0.9707 0.9625 0.9599 0.9515 0.9419 0.9302 0.8923 0.8461	0.9933 0.9903 0.9852 0.9817 0.9754 0.9754 0.9768 0.9608 0.9608 0.9608 0.9549 0.9409 0.9479 0.9409 0.94151 0.8906	0.9933 0.9905 0.9857 0.9820 0.9763 0.9639 0.9611 0.9563 0.9511 0.9466 0.9287 0.9119	0.9933 0.9907 0.9861 0.9768 0.9742 0.9655 0.9611 0.9559 0.9527 0.9497 0.9368 0.9248	0.9936 0.9912 0.9867 0.9828 0.9779 0.9754 0.9672 0.9624 0.9567 0.9536 0.9527 0.9424 0.9339	9.8800 0.9936 0.9914 0.9871 0.9822 0.9763 0.9685 0.9645 0.9645 0.9579 0.9530 0.9529 0.9529 0.9456 0.9334	10.3333 0.9936 0.9916 0.9874 0.9837 0.9755 0.9775 0.9663 0.9663 0.9558 0.9552 0.95527 0.9542 0.9527 0.9473 0.943	10.7867 0.9935 0.9915 0.9874 0.9886 0.9798 0.9778 0.9705 0.9674 0.9674 0.9656 0.9556 0.9524 0.9475	11.2400 0.9932 0.9914 0.9877 0.9838 0.9806 0.9768 0.9768 0.9682 0.9682 0.9562 0.9545 0.9475	0.9927 0.9913 0.9873 0.9839 0.9809 0.9792 0.9728 0.9703 0.9662 0.9611 0.9579 0.9491 0.9458	0.9923 0.9909 0.9869 0.9866 0.9796 0.9741 0.9720 0.9683 0.9646 0.9627 0.9542 0.9493	0.9908 0.9893 0.9852 0.9813 0.9776 0.9777 0.9717 0.9667 0.9640 0.9636 0.9568 0.9525	0.9886 0.9865 0.9818 0.9777 0.9738 0.9731 0.9671 0.9651 0.9604 0.9567 0.9590 0.9531 0.9503	0.9854 0.9814 0.9762 0.9713 0.9667 0.9568 0.9527 0.9496 0.9444 0.9459 0.9373 0.9332	
7.7 9.8 11.8 14.1 16.4 18.8 21.4 24.0 26.6 28.9 31.6 34.9 37.2 40.4	Ptotal (psia) 101.817 126.511 149.531 150.289 150.267 150.191 150.157 150.384 150.365 150.394 150.362 150.433	Chamber Pressure, psia 13.2675 12.9350 9.1570 7.9800 7.0035 6.2530 5.6635 5.1970 4.7625 4.3145 4.0420 3.7210		0.9933 0.9897 0.9847 0.9743 0.9707 0.9625 0.9599 0.9515 0.9419 0.9302 0.8923 0.8461 0.8667	0.9933 0.9903 0.9852 0.9852 0.9877 0.9754 0.9716 0.9628 0.9608 0.9608 0.9608 0.9549 0.9403 0.94151 0.9403 0.9151 0.8906 0.8320	0.9933 0.9905 0.9857 0.9820 0.9763 0.9732 0.9639 0.9611 0.9563 0.9511 0.9466 0.9287 0.9119 0.8791	0.9933 0.9907 0.9861 0.9816 0.9768 0.9655 0.9651 0.9559 0.9527 0.9497 0.9368 0.9248 0.9248	0.9936 0.9912 0.9867 0.9828 0.9779 0.9754 0.9672 0.9624 0.9667 0.9567 0.9536 0.9527 0.9536 0.9527 0.9424 0.9339 0.9339 0.93196	9.8800 0.9936 0.9914 0.9871 0.9783 0.9763 0.9763 0.9765 0.9645 0.9645 0.9533 0.9529 0.9529 0.9456 0.9394 0.9328	10.3333 0.9936 0.9916 0.9874 0.9837 0.9772 0.9663 0.9594 0.9542 0.9527 0.9527 0.9473 0.9433 0.9360	10.7867 0.9935 0.9915 0.9874 0.9788 0.9778 0.9778 0.9705 0.9674 0.9674 0.9556 0.9524 0.9556 0.9524 0.9453 0.9453	11.2400 0.9932 0.9914 0.9877 0.9838 0.9705 0.9708 0.9775 0.9688 0.9715 0.9688 0.9745 0.9682 0.9545 0.9545 0.9443 0.9454 0.9441	0.9927 0.9913 0.9873 0.9839 0.9809 0.9732 0.9728 0.9728 0.9703 0.9662 0.9661 0.96579 0.9451	0.9923 0.9869 0.9869 0.9886 0.9806 0.9796 0.9741 0.9720 0.9683 0.9646 0.9627 0.9646 0.9627 0.9542 0.9542 0.9542	0.9908 0.9893 0.9852 0.9813 0.9776 0.9777 0.9777 0.9667 0.9667 0.96667 0.9663 0.9668 0.9568 0.9525 0.9525	0.9886 0.9865 0.9877 0.9778 0.9771 0.9671 0.9667 0.9654 0.9654 0.9550 0.9553 0.9553 0.9553	0.9854 0.9814 0.9762 0.9713 0.9667 0.9650 0.9567 0.9567 0.9496 0.9444 0.9459 0.9373 0.9332 0.9332	
7.7 9.8 11.8 14.1 16.4 18.8 21.4 24.0 26.6 28.9 31.6 34.9 37.2 40.4 43.7	P <sub>total</sub> (psia) 101.817 126.511 149.531 150.289 150.216 150.267 150.384 150.384 150.384 150.362 150.43 150.394 150.362	Chamber Pressure, psia 13.2675 12.9350 12.6375 10.6950 9.1570 7.9800 7.0035 6.2530 6.635 5.1970 4.7625 4.3145 4.0420 3.7210 3.4400		0.9933 0.9899 0.9847 0.9810 0.9743 0.9625 0.9599 0.9515 0.9419 0.9302 0.8923 0.8923 0.8461 0.6697 0.2727	0.9933 0.9903 0.9852 0.9817 0.9754 0.9628 0.9608 0.9649 0.9479 0.9473 0.9403 0.9443 0.9403 0.9451 0.8420 0.8420 0.8320 0.6084	0.9933 0.9905 0.9867 0.9820 0.9763 0.9732 0.9639 0.9611 0.9563 0.9511 0.9466 0.9287 0.9119 0.8791 0.8791	0.9933 0.9907 0.9861 0.9816 0.9762 0.9655 0.9651 0.9655 0.9651 0.9529 0.9529 0.9497 0.9368 0.94497 0.9368 0.9248 0.9043 0.8651	0.9936 0.9912 0.9867 0.9759 0.9754 0.9672 0.9667 0.9664 0.95567 0.9526 0.9527 0.9424 0.9539 0.9527 0.9424 0.9339 0.9196 0.8962	9.8800 0.9936 0.9914 0.9871 0.9785 0.9785 0.9763 0.9685 0.9645 0.9645 0.9645 0.9645 0.9645 0.96529 0.9456 0.9394 0.9285 0.9128	10.3333 0.9936 0.9916 0.9874 0.9795 0.9772 0.9695 0.9655 0.9656 0.9598 0.9527 0.9423 0.9433 0.9433 0.9360	10.7867 0.9935 0.9915 0.9874 0.9786 0.9778 0.9778 0.9674 0.9674 0.9674 0.9674 0.9654 0.9524 0.9453 0.9453 0.9411 0.9331	11.2400 0.9932 0.9914 0.9877 0.9888 0.9788 0.9788 0.9788 0.9682 0.9682 0.9682 0.9682 0.9642 0.9545 0.9473 0.9456 0.9445	0.9927 0.9913 0.9873 0.9839 0.9809 0.9792 0.9728 0.9703 0.9662 0.96579 0.96454 0.9458 0.9458 0.9456	0.9923 0.9909 0.9869 0.9836 0.9796 0.9796 0.9741 0.9720 0.9683 0.9645 0.9642 0.9642 0.9642 0.9642 0.9433 0.9477	0.9908 0.9893 0.9852 0.9813 0.9776 0.9777 0.9717 0.9667 0.9667 0.9666 0.9668 0.9568 0.9558 0.9555 0.9492 0.9485	0.9886 0.9865 0.9818 0.9777 0.9738 0.9671 0.9651 0.9604 0.9567 0.9590 0.9590 0.9503 0.9503 0.9503	0.9854 0.9814 0.9762 0.9713 0.9667 0.9668 0.9568 0.9527 0.9496 0.9459 0.9373 0.9332 0.9332 0.9233	
7.7 9.8 11.8 14.1 16.4 18.8 21.4 24.0 26.6 28.9 31.6 34.9 37.2 40.4	Ptotal (psia) 101.817 126.511 149.531 150.289 150.267 150.191 150.157 150.384 150.365 150.394 150.362 150.433	Chamber Pressure, psia 13.2675 12.9350 9.1570 7.9800 7.035 6.2530 5.6635 5.1970 4.7625 4.0420 3.7210 3.4400 3.1865		0.9933 0.9897 0.9847 0.9743 0.9707 0.9625 0.9599 0.9515 0.9419 0.9302 0.8923 0.8461 0.8667	0.9933 0.9903 0.9852 0.9852 0.9877 0.9754 0.9716 0.9628 0.9608 0.9608 0.9608 0.9549 0.9403 0.94151 0.9403 0.9151 0.8906 0.8320	0.9933 0.9905 0.9857 0.9820 0.9763 0.9732 0.9639 0.9611 0.9563 0.9511 0.9466 0.9287 0.9119 0.8791	0.9933 0.9907 0.9861 0.9768 0.9768 0.9742 0.9655 0.9655 0.9655 0.9655 0.9559 0.9559 0.9559 0.9527 0.9497 0.9368 0.9248 0.9043 0.8964 0.9043	0.9936 0.9912 0.9867 0.9828 0.9779 0.9754 0.9672 0.9624 0.9667 0.9567 0.9536 0.9527 0.9536 0.9527 0.9424 0.9339 0.9339 0.93196	9.8800 0.9936 0.9914 0.9871 0.9783 0.9763 0.9763 0.9765 0.9645 0.9645 0.9533 0.9529 0.9529 0.9456 0.9394 0.9328	10.3333 0.9936 0.9916 0.9874 0.9837 0.9772 0.9663 0.9594 0.9542 0.9527 0.9527 0.9473 0.9433 0.9360	10.7867 0.9935 0.9915 0.9874 0.9788 0.9778 0.9778 0.9705 0.9674 0.9674 0.9556 0.9524 0.9556 0.9524 0.9453 0.9453	11.2400 0.9932 0.9914 0.9877 0.9838 0.9705 0.9708 0.9775 0.9688 0.9715 0.9688 0.9745 0.9682 0.9545 0.9545 0.9443 0.9454 0.9445	0.9927 0.9913 0.9873 0.9839 0.9809 0.9732 0.9728 0.9728 0.9703 0.9662 0.9661 0.96579 0.9451	0.9923 0.9869 0.9869 0.9886 0.9806 0.9796 0.9741 0.9720 0.9683 0.9646 0.9627 0.9646 0.9627 0.9542 0.9542 0.9542	0.9908 0.9893 0.9852 0.9813 0.9776 0.9777 0.9777 0.9667 0.9667 0.96667 0.9663 0.9668 0.9568 0.9525 0.9525	0.9886 0.9865 0.9877 0.9778 0.9771 0.9671 0.9667 0.9654 0.9654 0.9550 0.9553 0.9553 0.9553	0.9854 0.9814 0.9762 0.9713 0.9667 0.9650 0.9567 0.9567 0.9496 0.9444 0.9459 0.9373 0.9332 0.9332	
7.7 9.8 11.8 14.1 16.4 24.0 26.6 28.9 31.6 34.9 37.2 40.4 43.7 46.9 49.6 53.0	P <sub>total</sub> (psia) 101.817 126.511 149.531 150.289 150.267 150.191 150.267 150.384 150.365 150.365 150.33 150.362 150.43 150.180 150.265 149.316 149.973	Chamber Pressure, psia 13 2675 12 9350 12 6375 10 6950 9 1570 7 9800 7 0035 6 2530 5 6635 5 1970 4 7625 4 3145 4 0420 3 7210 3 1865 3 0150 2 8310		0.9933 0.9839 0.9847 0.9810 0.9743 0.9707 0.9625 0.9559 0.9559 0.9559 0.9559 0.9559 0.9559 0.9559 0.9559 0.9559 0.9559 0.9559 0.9520 0.8923 0.8923 0.8923 0.8923 0.8923 0.8923 0.8923 0.8923 0.8925 0.905 0.905 0.905 0.905 0.905 0.905 0.955 0.	0.9933 0.9903 0.9852 0.9817 0.9754 0.9764 0.9628 0.9608 0.9608 0.9608 0.9608 0.9403 0.9151 0.8906 0.8320 0.6084 0.2646 0.2767	0.9933 0.9905 0.9857 0.9857 0.9763 0.9753 0.9639 0.9611 0.9563 0.9561 0.9466 0.9287 0.9119 0.8791 0.8090 0.5602 0.2752	0.9933 0.9907 0.9861 0.9768 0.9762 0.9655 0.9655 0.9655 0.9655 0.9655 0.9655 0.9655 0.9655 0.9487 0.9487 0.9486 0.9248 0.9048 0.9248 0.9248 0.9248 0.9248 0.9248 0.9552 0.9552 0.95550 0.95550 0.95550 0.95550 0.95550 0.95550 0.95550 0.95550 0.95550000000000	0.9936 0.9912 0.9867 0.9828 0.9779 0.9754 0.9672 0.9624 0.9667 0.95236 0.9527 0.9424 0.9339 0.9196 0.8962 0.8962 0.8967 0.8962 0.8962	9.8800 0.9936 0.9914 0.9871 0.9872 0.9786 0.9685 0.9645 0.9653 0.9653 0.9653 0.9579 0.9530 0.9529 0.9456 0.9394 0.9288 0.9394 0.9288 0.9122 0.8478 0.8478	10.3333 0.9936 0.9916 0.9874 0.9837 0.9795 0.9663 0.9598 0.9598 0.9558 0.9558 0.9542 0.9527 0.9473 0.9433 0.9443 0.9443 0.9433 0.9360 0.9235 0.9070 0.8223 0.8823	10.7867 0.9935 0.9915 0.9874 0.9836 0.9786 0.9778 0.9705 0.9674 0.9674 0.9656 0.9624 0.9475 0.9453 0.94453 0.94453 0.94453 0.9411 0.9331 0.9195 0.9022 0.8716	11.2400 0.9932 0.9914 0.9877 0.9838 0.9788 0.9788 0.9788 0.9788 0.9682 0.9682 0.9682 0.9645 0.9456 0.9441 0.9456 0.9441 0.9387 0.9289 0.9148 0.9384	0.9927 0.9913 0.9873 0.9839 0.9792 0.9728 0.9703 0.9662 0.9661 0.96579 0.9454 0.9458 0.9458 0.9458 0.9454 0.9458 0.9456 0.9454 0.9458 0.9456 0.94588 0.94588 0.94588 0.94588 0.94588 0.94588 0.94588 0.94588 0.9458	0.9923 0.9909 0.9869 0.9869 0.9806 0.9796 0.9720 0.9683 0.9646 0.9720 0.9627 0.9542 0.9452 0.9454 0.9454 0.9457 0.9477 0.9440 0.9333 0.9223	0.9908 0.9893 0.9852 0.9813 0.9776 0.9774 0.9677 0.9667 0.9640 0.9635 0.9525 0.9492 0.9492 0.9485 0.9481 0.9483 0.9423	0.9886 0.9865 0.9818 0.9777 0.9731 0.9671 0.9661 0.9664 0.9550 0.9550 0.9553 0.9452 0.9439 0.9449 0.9449 0.9449	0.9854 0.9814 0.9762 0.9667 0.9660 0.9567 0.9496 0.9527 0.9496 0.9373 0.9332 0.9233 0.9227 0.9228	
$\begin{array}{c} \hline 7.7\\ 9.8\\ 11.8\\ 14.1\\ 16.4\\ 18.8\\ 21.4\\ 24.0\\ 26.6\\ 28.9\\ 31.6\\ 34.9\\ 37.2\\ 40.4\\ 43.7\\ 40.4\\ 43.7\\ 46.9\\ 49.6\\ 53.0\\ 56.5\\ \end{array}$	P <sub>total</sub> (psia) 101.817 126.511 149.531 150.216 150.2216 150.267 150.384 150.384 150.384 150.362 150.394 150.362 150.487 150.265 149.316 149.316 149.316 149.316 149.316 149.316 149.316 149.316 149.316 149.316 150.265 149.316 150.265 150.265 150.265 150.265 150.267 150.384 150.267 150.384 150.362 150.364 150.362 150.362 150.364 150.362 150.364 150.362 150.362 150.364 150.362 150.364 150.362 150.364 150.362 150.364 150.362 150.364 150.362 150.362 150.362 150.362 150.362 150.362 150.362 150.362 150.362 150.362 150.362 150.362 150.362 150.362 150.362 150.362 150.362 150.362 150.365 150.365 150.365 150.365 150.365 150.365 150.362 150.365 150	Chamber Pressure, psia 13.2675 12.9350 9.1570 7.9800 7.9800 5.6635 5.1970 4.7625 4.3145 4.0420 3.7210 3.1865 3.0150 2.8310 2.6575		0.9933 0.9839 0.9847 0.9810 0.9743 0.9707 0.9625 0.9515 0.9419 0.9515 0.9419 0.8923 0.8461 0.6697 0.2727 0.2868 0.3032 0.3239	0.9933 0.9903 0.9852 0.9817 0.9754 0.9754 0.9608 0.9549 0.9479 0.9403 0.9151 0.8906 0.8320 0.6084 0.2776 0.2967 0.3168	0.9933 0.9905 0.9867 0.9820 0.9763 0.9732 0.9633 0.9611 0.9663 0.9511 0.9466 0.9287 0.9411 0.8791 0.8791 0.8791 0.8602 0.5602 0.5602 0.5610 0.2752 0.2935	0.9933 0.9907 0.9861 0.9768 0.9768 0.9768 0.9655 0.9655 0.9655 0.9527 0.9497 0.9368 0.9248 0.9043 0.9643 0.92649 0.9243 0.7952 0.5655 0.2579 0.22713	0.9936 0.9912 0.9867 0.9754 0.9779 0.9754 0.9672 0.9622 0.9536 0.9536 0.9536 0.9535 0.9527 0.9424 0.9339 0.9196 0.8962 0.8577 0.7884 0.5274 0.2584	9.8800 0.9936 0.9914 0.9871 0.9832 0.9763 0.9763 0.9645 0.9645 0.9645 0.9645 0.9579 0.9529 0.9456 0.9288 0.9125 0.9394 0.9288 0.9125 0.8872 0.8872 0.8872 0.8878	10.3333 0.9936 0.9916 0.9874 0.9837 0.9795 0.9772 0.9695 0.9588 0.9542 0.9558 0.9542 0.9528 0.9524 0.9523 0.9523 0.9433 0.9360 0.9235 0.9360 0.9235 0.9077 0.8823 0.8823 0.8865	10.7867 0.9935 0.9915 0.9874 0.9874 0.9788 0.9778 0.9778 0.9778 0.9774 0.9674 0.9674 0.9674 0.9524 0.9475 0.9453 0.9415 0.9415 0.9415 0.9415 0.9415 0.9415 0.9415 0.9415 0.9415 0.9415 0.9415 0.9453 0.9415 0.9453 0.9453 0.9453 0.9455 0.9475 0.9455 0.9455 0.9455 0.9455 0.9455 0.9475 0.9455 0.9475 0.9475 0.9455 0.9475 0.9455 0.9475 0.9455 0.9475 0.9455 0.947	11.2400 0.9932 0.9914 0.9877 0.9838 0.9768 0.9768 0.9768 0.9768 0.9642 0.9642 0.9642 0.9642 0.9545 0.9454 0.9454 0.9454 0.9454 0.9441 0.9387 0.9289 0.9148 0.9289 0.9148	0.9927 0.9913 0.9873 0.9873 0.9809 0.9722 0.9728 0.9703 0.9662 0.9611 0.9657 0.9454 0.9454 0.9454 0.9456 0.9365 0.9244 0.9103 0.8226	0.9923 0.9909 0.9869 0.9869 0.9741 0.9720 0.9720 0.9683 0.9646 0.9627 0.9642 0.9642 0.9642 0.9493 0.9441 0.9427 0.9441 0.9441 0.9423 0.9423	0.9908 0.9893 0.9852 0.9813 0.9776 0.9777 0.9777 0.9777 0.9667 0.9667 0.96667 0.9665 0.9665 0.9405 0.9525 0.9492 0.9485 0.9485 0.9485 0.9485	0 9886 0 9865 0 9818 0 9777 0 9778 0 97731 0 9671 0 9661 0 9567 0 9565 0 9565 0 9563 0 9452 0 9452 0 94439 0 94439 0 94439 0 94439	0.9854 0.9814 0.9762 0.9667 0.9660 0.9568 0.9568 0.9446 0.9446 0.94459 0.93459 0.9332 0.9237 0.9233 0.9237 0.9223 0.9272 0.9260 0.9272	
$\begin{array}{c} 7.7\\ 7.8\\ 9.8\\ 11.8\\ 14.1\\ 16.4\\ 18.8\\ 21.4\\ 24.0\\ 26.6\\ 31.6\\ 34.9\\ 37.2\\ 40.4\\ 43.7\\ 46.9\\ 37.2\\ 40.4\\ 43.7\\ 53.6\\ 53.0\\ 56.6\\ 59.6\\ 59.6\\ \end{array}$	P <sub>total</sub> (psia) 101.817 126.511 149.531 150.289 150.216 150.267 150.365 150.394 150.394 150.394 150.394 150.394 150.394 150.265 149.316 149.973 150.101 150.316 150.316 150.316 150.265 149.516 149.516 150.265 149.516 150.265 149.516 150.265 149.516 150.265 149.005 150.107 150.265 150.	Chamber Pressure, psia 13.2675 12.9350 12.6375 10.6950 9.1570 7.9800 7.0035 6.2530 5.6635 5.1970 4.7625 4.3145 4.0420 3.7210 3.1865 3.0150 2.8310 2.6575 2.5210		0.9933 0.9839 0.9847 0.9743 0.9707 0.9625 0.9559 0.9515 0.9419 0.9302 0.8923 0.8461 0.6697 0.2727 0.2868 0.30239 0.3239 0.3458	0.9933 0.9903 0.9852 0.9754 0.9754 0.9765 0.9628 0.9608 0.9649 0.9479 0.9403 0.9403 0.9403 0.9403 0.9403 0.9403 0.9451 0.8320 0.6084 0.2776 0.2967 0.2967 0.3168	0.9933 0.9905 0.9857 0.9820 0.9763 0.9732 0.9633 0.9613 0.9663 0.9466 0.9287 0.9466 0.9466 0.9287 0.9466 0.9466 0.9287 0.9119 0.8791 0.8791 0.8791 0.8791 0.8791 0.8791 0.8791 0.8791 0.8791 0.9262 0.2752 0.2393 0.3038	0.9933 0.9907 0.9861 0.9768 0.9655 0.9655 0.9655 0.9655 0.9655 0.9659 0.9559 0.9559 0.9559 0.9497 0.9497 0.9485 0.9248 0.9043 0.8651 0.7952 0.5665 0.56655 0.2579 0.22713 0.22679	0.9936 0.9912 0.9867 0.9828 0.9779 0.9754 0.9672 0.9567 0.95567 0.9527 0.9424 0.9339 0.9196 0.89527 0.9424 0.9339 0.8577 0.7884 0.5274 0.25274	9.8800 0.9936 0.9914 0.9871 0.9871 0.9685 0.9685 0.9645 0.9679 0.9529 0.9529 0.9456 0.9529 0.9456 0.9458 0.9458 0.9458 0.9458 0.9458 0.9288 0.9125 0.8478 0.8478 0.7708 0.5230 0.2523	10.3333 0.9936 0.9974 0.9837 0.9795 0.9695 0.9663 0.9568 0.95642 0.9562 0.9524 0.9523 0.9473 0.9433 0.9235 0.9070 0.9235 0.9070 0.8823 0.8865 0.7612 0.5161	10.7867 0.9935 0.9915 0.9874 0.9836 0.9738 0.9778 0.9762 0.9674 0.9614 0.9556 0.9524 0.9475 0.9453 0.94411 0.9453 0.9475 0.9453 0.9471 0.9453 0.9471 0.9331 0.9195 0.9378 0.9355 0.9475 0.9453 0.9475 0.9453 0.9475 0.9453 0.9475 0.9453 0.9475 0.9453 0.9475 0.9453 0.9475 0.9453 0.9455 0.95555 0.95555 0.95555 0.955555 0.95555 0.95555 0.95555 0.95555 0.955555 0.9555555	11.2400 0.9932 0.9914 0.9877 0.9838 0.9806 0.9715 0.9688 0.9642 0.9582 0.9582 0.9585 0.9545 0.9545 0.9441 0.9456 0.9441 0.9387 0.9289 0.93845 0.9345 0.93840 0.9387 0.9289 0.9314 0.93840 0.93840 0.93840 0.93840 0.93840 0.93840 0.93840 0.93840 0.93840 0.93840 0.93840 0.93840 0.9385 0.94441 0.93850 0.93840 0.93850 0.94441 0.93850 0.94441 0.93850 0.93850 0.94441 0.93850 0.94441 0.93850 0.94441 0.93850 0.94441 0.93850 0.94441 0.93850 0.94441 0.93850 0.94441 0.93850 0.94441 0.93850 0.94441 0.93850 0.94441 0.93850 0.94450 0.94450 0.94450 0.94450 0.94450 0.945500 0.95500 0.95500 0.95500 0.9550000000000	0.9927 0.9913 0.9873 0.9809 0.9792 0.9720 0.9703 0.9662 0.9657 0.96579 0.9491 0.9454 0.9456 0.9456 0.9454 0.9456 0.9245 0.9257 0.9457 0.9573 0.9579 0.9457 0.9457 0.9457 0.9457 0.9457 0.9457 0.9457 0.9457 0.9457 0.9456 0.9457 0.94566 0.94566 0.94566 0.94566 0.94566 0.94566 0.94566 0.94566 0.94566 0.94566 0.94566 0.94566 0.94566 0.94566 0.94566 0.94566 0.94566 0.94566 0.945666 0.945666 0.94566 0.9456	0.9923 0.9909 0.9869 0.9806 0.9796 0.9720 0.9720 0.9643 0.9642 0.9642 0.9642 0.9649 0.9647 0.9642 0.9493 0.9477 0.9440 0.9333 0.9223 0.9133 0.8901	0.9908 0.9803 0.9852 0.9776 0.9777 0.9667 0.9717 0.9667 0.9663 0.9568 0.9568 0.9558 0.9485 0.9485 0.9485 0.9481 0.9423 0.9329 0.9249	0.9886 0.9865 0.9818 0.9773 0.9773 0.9671 0.9661 0.9664 0.9560 0.9550 0.9553 0.9452 0.9439 0.9449 0.9439 0.9449 0.9424 0.9385	0.9854 0.9814 0.9762 0.9667 0.9667 0.9660 0.9568 0.9496 0.9496 0.9449 0.9373 0.9373 0.9237 0.9233 0.92277 0.9220 0.9227 0.9221 0.9221	
$\begin{array}{c} 7.7\\ 9.8\\ 11.8\\ 14.1\\ 16.4\\ 18.8\\ 21.4\\ 24.0\\ 26.6\\ 28.9\\ 34.9\\ 37.2\\ 40.4\\ 43.7\\ 40.4\\ 43.7\\ 46.9\\ 53.0\\ 56.5\\ 59.6\\ 59.6\\ 64.2 \end{array}$	P <sub>total</sub> (psia) 101.817 126.511 149.531 150.289 150.216 150.289 150.216 150.384 150.384 150.384 150.384 150.384 150.394 150.394 150.394 150.394 150.394 150.394 150.394 150.394 150.394 150.267 150.394 150.317 150.216 149.317 150.187 150.287 150.287 150.287 150.394 150.394 150.394 150.394 150.394 150.394 150.394 150.394 150.394 150.394 150.394 150.394 150.394 150.394 150.394 150.394 150.394 150.395 150.391 150.317 150.316 150.317 150.316 150.316 150.317 150.316 150.317 150.316 150.317 150.317 150.265 150.317 150.265 150.317 150.265 150.317 150.265 150.317 150.265 150.317 150.265 150.317 150.265 150.317 150.265 150.317 150.265 150.317 150.265 150.317 150.265 150.317 150.265 150.317 150.265 150.255 150.	Chamber Pressure, psia 13 2675 12 9350 12 6375 10 6950 9 1670 7 .9800 7 .0035 6 2530 5 6633 5 6633 5 6633 5 6633 5 6633 5 6633 4 .7625 4 .0420 3 .7210 3 .4400 3 .1865 2 .8310 2 .6675 2 .5210 2 .3410		0.9933 0.9899 0.9847 0.9743 0.9707 0.9625 0.9599 0.9515 0.9419 0.9302 0.8461 0.6697 0.22868 0.3032 0.3239 0.3458 0.3458	0.9933 0.9903 0.9852 0.9877 0.9754 0.9754 0.9628 0.9608 0.9549 0.9479 0.9403 0.9479 0.9403 0.9479 0.9403 0.94549 0.8906 0.8320 0.6084 0.22646 0.2776 0.3168 0.3340 0.33597	0.9933 0.9905 0.9867 0.9820 0.9763 0.9763 0.9639 0.9611 0.9561 0.9561 0.9511 0.9466 0.9511 0.9466 0.9287 0.9287 0.9287 0.9287 0.9287 0.8290 0.5602 0.2752 0.22939 0.3098	0.9933 0.9907 0.9861 0.9768 0.9768 0.9655 0.9655 0.9655 0.9659 0.9527 0.9437 0.9248 0.9248 0.9248 0.9248 0.9248 0.9248 0.9248 0.9248 0.2579 0.2713 0.2865	0.9936 0.9912 0.9867 0.9754 0.9754 0.9624 0.9557 0.95527 0.9424 0.9339 0.9196 0.85677 0.88677 0.88677 0.88677 0.88677 0.5274 0.5274 0.5274 0.2281	9.8800 0.9936 0.9944 0.9871 0.9882 0.9763 0.9645 0.9645 0.9653 0.9645 0.9653 0.9629 0.9456 0.9394 0.9288 0.9324 0.9384 0.03847 0.03847 0.02672 0.02672 0.02672 0.02672 0.02672 0.02672 0.02672 0.02672 0.02672 0.02672 0.02672 0.02672 0.02672 0.02672 0.02672 0.02720 0.02720 0.02720 0.02720000000000	10.3333 0.9936 0.9976 0.9976 0.9772 0.9695 0.9772 0.9695 0.9655 0.9542 0.9542 0.9542 0.9542 0.9542 0.9542 0.9542 0.9542 0.9542 0.9542 0.9542 0.9542 0.9545 0.9545 0.9255 0.9433 0.9360 0.9235 0.9071 0.8365 0.7612 0.57161 0.5255	10.7867 0.9935 0.9975 0.9874 0.9874 0.9788 0.9778 0.9778 0.9614 0.9656 0.9624 0.9455 0.9453 0.9453 0.9453 0.9455 0.9453 0.9455 0.9455 0.9556 0.9556 0.9557 0.9574 0.9555 0.9574 0.9555 0.9557 0.9557 0.9557 0.9557 0.9574 0.9555 0.9574 0.9557 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.955	11.2400 0.9932 0.9914 0.9877 0.9838 0.9768 0.9768 0.9642 0.9642 0.9642 0.95642 0.95642 0.9456 0.9456 0.9456 0.9458 0.9458 0.9458 0.9458 0.9458 0.9289 0.9441 0.9382 0.9441 0.9385 0.9441 0.9385 0.9441 0.9385 0.9441 0.9386 0.9441 0.9386 0.9289 0.9441 0.9386 0.9289 0.9289 0.9441 0.9289 0.9289 0.9289 0.9288 0.9441 0.9289 0.9288 0.9288 0.9441 0.9289 0.9288 0.9288 0.9442 0.9441 0.9289 0.9288 0.9288 0.9288 0.9442 0.9441 0.9289 0.9288 0.9288 0.9288 0.9442 0.9441 0.9289 0.9288 0.9288 0.9288 0.9442 0.9288 0.9442 0.92888 0.92888 0.92888 0.92888 0.92888 0.92888 0.92888 0.92888 0.92888 0.92888 0.92888 0.928888 0.92888 0.92888 0.92888 0.92888 0.928888 0.928888 0.9288	0.9927 0.9913 0.9873 0.9873 0.9809 0.9728 0.9728 0.9728 0.9611 0.9661 0.9451 0.9451 0.9458 0.9454 0.9456 0.9457 0.9456 0.9457 0.94566 0.94566 0.94566 0.94566 0.94566 0.94566 0.94566 0.94566 0.94566 0.94566 0.94566 0.94566 0.94566 0.94566 0.94566 0.94566 0.9456	0.9923 0.9909 0.9869 0.9836 0.9836 0.9741 0.9720 0.9646 0.9642 0.9642 0.9642 0.9642 0.9493 0.9471 0.9440 0.9333 0.9440 0.9223 0.9133 0.8901	0.9908 0.9803 0.9852 0.9784 0.9776 0.9777 0.9717 0.9667 0.9667 0.9663 0.9663 0.9568 0.9565 0.9492 0.9481 0.9481 0.9481 0.9329 0.9249 0.9249 0.9022	0.9886 0.9865 0.9818 0.9777 0.9773 0.9671 0.9661 0.9667 0.9569 0.9563 0.9503 0.9452 0.9459 0.9459 0.9452 0.9452 0.9452 0.9452 0.9452 0.9452 0.9452 0.9452 0.9452 0.9455 0.9455 0.9455 0.9455 0.9455 0.9455 0.9455 0.9455 0.9455 0.9455 0.9455 0.9455 0.9455 0.9455 0.9577 0.9577 0.9577 0.9577 0.9577 0.9577 0.9577 0.9577 0.9577 0.9577 0.9577 0.9577 0.9577 0.9577 0.9550 0.9577 0.95500 0.95500 0.95500 0.95500 0.9550000000000	0.9854 0.9814 0.9762 0.9713 0.9667 0.9650 0.9568 0.9527 0.9496 0.9444 0.9459 0.9373 0.9237 0.9237 0.9237 0.9227 0.9272 0.9272 0.9210 0.9272	
$\begin{array}{c} 7.7\\ 7.8\\ 9.8\\ 11.8\\ 14.1\\ 16.4\\ 18.8\\ 21.4\\ 24.0\\ 26.6\\ 31.6\\ 34.9\\ 37.2\\ 40.4\\ 43.7\\ 46.9\\ 37.2\\ 40.4\\ 43.7\\ 53.6\\ 53.0\\ 56.6\\ 59.6\\ 59.6\\ \end{array}$	P <sub>total</sub> (psia) 101.817 126.511 149.531 150.289 150.216 150.267 150.365 150.394 150.394 150.394 150.394 150.394 150.394 150.265 149.316 149.973 150.101 150.316 150.316 150.316 150.265 149.516 149.516 150.265 149.516 150.265 149.516 150.265 149.516 150.265 149.005 150.107 150.265 150.	Chamber Pressure, psia 13.2675 12.9350 12.6375 10.6950 9.1570 7.9800 7.0035 6.2530 5.6635 5.1970 4.7625 4.3145 4.0420 3.7210 3.1865 3.0150 2.8310 2.6575 2.5210		0.9933 0.9839 0.9847 0.9743 0.9707 0.9625 0.9559 0.9515 0.9419 0.9302 0.8923 0.8461 0.6697 0.2727 0.2868 0.30239 0.3239 0.3458	0.9933 0.9903 0.9852 0.9754 0.9754 0.9765 0.9628 0.9608 0.9649 0.9479 0.9403 0.9403 0.9403 0.9403 0.9403 0.9403 0.9451 0.8320 0.6084 0.2776 0.2967 0.2967 0.3168	0.9933 0.9905 0.9857 0.9763 0.9763 0.9763 0.9639 0.9663 0.9466 0.9287 0.9466 0.9287 0.9466 0.9287 0.9466 0.9287 0.9466 0.9262 0.2752 0.2393 0.3088	0.9933 0.9907 0.9861 0.9768 0.9655 0.9655 0.9655 0.9655 0.9655 0.9659 0.9559 0.9559 0.9559 0.9497 0.9497 0.9485 0.9248 0.9043 0.8651 0.7952 0.5665 0.56655 0.2579 0.22713 0.22679	0.9936 0.9912 0.9867 0.9828 0.9779 0.9754 0.9672 0.9567 0.95567 0.9527 0.9424 0.9339 0.9196 0.89527 0.9424 0.9339 0.8962 0.8577 0.7884 0.5274 0.25274	9.8800 0.9936 0.9914 0.9871 0.9871 0.9685 0.9685 0.9645 0.9679 0.9529 0.9529 0.9456 0.9529 0.9456 0.9458 0.9458 0.9458 0.9458 0.9458 0.9288 0.9125 0.8478 0.8478 0.7708 0.5230 0.2523	10.3333 0.9936 0.9974 0.9837 0.9795 0.9695 0.9663 0.9596 0.95642 0.9524 0.9524 0.9523 0.9473 0.9433 0.9235 0.9235 0.9070 0.8823 0.8865 0.7612 0.5161	10.7867 0.9935 0.9915 0.9874 0.9836 0.9738 0.9778 0.9762 0.9674 0.9614 0.9556 0.9524 0.9475 0.9453 0.94411 0.9453 0.9475 0.9453 0.9471 0.9453 0.9475 0.9453 0.9471 0.9331 0.9195 0.9002 0.8718 0.9002 0.8718 0.9335 0.9002 0.8718 0.9355 0.9455 0.95555 0.95555 0.95555 0.955555 0.95555 0.95555 0.95555 0.95555 0.955555555	11.2400 0.9932 0.9914 0.9877 0.9838 0.9806 0.9715 0.9688 0.9642 0.9582 0.95642 0.95645 0.95455 0.9441 0.9456 0.9441 0.9456 0.9441 0.9387 0.9289 0.93845 0.93845 0.93845 0.93845 0.93845 0.93845 0.93845 0.93845 0.93845 0.93845 0.93845 0.9385 0.9385 0.9385 0.9385 0.9385 0.9441 0.9385 0.9441 0.9455 0.95550 0.95550 0.95550 0.95550000000000	0.9927 0.9913 0.9873 0.9809 0.9792 0.9720 0.9703 0.9662 0.9657 0.96579 0.9491 0.9454 0.9456 0.9456 0.9454 0.9456 0.9245 0.9257 0.9457 0.9573 0.9579 0.9457 0.9457 0.9457 0.9457 0.9457 0.9457 0.9457 0.9457 0.9457 0.9456 0.9457 0.94566 0.94566 0.94566 0.94566 0.94566 0.94566 0.94566 0.94566 0.94566 0.94566 0.94566 0.94566 0.94566 0.94566 0.94566 0.94566 0.94566 0.94566 0.945666 0.945666 0.94566 0.9456	0.9923 0.9909 0.9869 0.9806 0.9796 0.9720 0.9720 0.9643 0.9642 0.9642 0.9642 0.9649 0.9647 0.9642 0.9493 0.9477 0.9440 0.9333 0.9223 0.9133 0.8901	0.9908 0.9803 0.9852 0.9776 0.9777 0.9667 0.9717 0.9667 0.9663 0.9568 0.9568 0.9558 0.9462 0.9485 0.9485 0.9481 0.9423 0.9329 0.9249	0.9886 0.9865 0.9818 0.9773 0.9773 0.9671 0.9661 0.9664 0.9560 0.9550 0.9553 0.9452 0.9439 0.9449 0.9439 0.9449 0.9424 0.9385	0.9854 0.9814 0.9762 0.9667 0.9667 0.9660 0.9568 0.9496 0.9496 0.9449 0.9373 0.9373 0.9237 0.9233 0.92277 0.9220 0.9227 0.9221 0.9221	
7.7         9.8           11.8         14.1           16.4         18.8           21.4         24.0           26.9         31.6           33.4.9         33.4.9           37.2         40.4           43.7         46.9           55.0         59.6           64.2         67.6           77.7         76.8	P <sub>total</sub> (psia) 101.817 126.511 149.531 150.285 150.216 150.267 150.157 150.365 150.365 150.365 150.365 150.362 150.362 150.362 150.317 150.265 149.316 149.301 150.216 149.316 149.316 149.317 150.228 150.278 150.278 150.249 150.245 150.245 150.245 150.245 150.245 150.245 150.245 150.245 150.255 150.	Chamber Pressure, psia 12 2675 12 9350 12 6375 10 6950 9 1570 7,9800 7,9800 6 2530 6 2530 5 6635 5 1970 4,7625 4,3145 4,0420 3,1665 3,0150 2,8310 2,8575 2,5210 2,3410 2,2155 2,0960 1,9590		0.9933 0.9899 0.9840 0.9810 0.9707 0.9625 0.9515 0.9419 0.9505 0.9302 0.8923 0.8461 0.6697 0.2727 0.2868 0.3032 0.3239 0.3458 0.3649 0.3930 0.4153 0.44389	0.9933 0.9903 0.9852 0.9817 0.9754 0.97764 0.9628 0.9608 0.9549 0.9403 0.9151 0.8906 0.8320 0.6084 0.2776 0.2967 0.3166 0.3340 0.3340 0.3597 0.3800 0.4308	0.9933 0.9905 0.9867 0.9820 0.9763 0.9639 0.9651 0.9651 0.9466 0.9267 0.9466 0.9267 0.9466 0.87919 0.87919 0.87919 0.87919 0.87919 0.87919 0.87919 0.87919 0.87919 0.87920 0.2610 0.2752 0.2939 0.3098 0.3355 0.3525 0.3726	0.9933 0.9907 0.9861 0.9768 0.9776 0.9655 0.9655 0.9655 0.9655 0.9659 0.9559 0.9248 0.9248 0.9043 0.9043 0.9043 0.9043 0.9044 0.9043 0.9044 0.2773 0.2579 0.3086 0.2773 0.3086 0.3259 0.3449 0.3686	0.9936 0.9912 0.9867 0.9628 0.9779 0.9624 0.9672 0.9624 0.9567 0.95536 0.95536 0.9527 0.9424 0.9339 0.9196 0.8577 0.7884 0.6274 0.2587 0.2674 0.2674 0.2674 0.2674 0.2267	9.8800 0.9936 0.9914 0.9871 0.9763 0.9763 0.9685 0.9645 0.9657 0.9579 0.9530 0.9529 0.9456 0.9456 0.9457 0.9457 0.9457 0.9447 0.9288 0.9125 0.8478 0.8478 0.8478 0.8478 0.2523 0.2670 0.2821 0.2821	10.3333 0.9936 0.9916 0.9874 0.9795 0.9795 0.9772 0.9795 0.9663 0.9598 0.9598 0.9598 0.9598 0.9542 0.9527 0.9473 0.9473 0.9473 0.9473 0.9473 0.9473 0.9473 0.9473 0.9473 0.9558 0.2555555 0.255555 0.255555 0.255555555 0.2555555555555 0.255	10.7867 0.9935 0.9915 0.9874 0.9738 0.9778 0.9778 0.9708 0.9705 0.9674 0.9654 0.9556 0.9524 0.9453 0.94453 0.94453 0.94453 0.94453 0.94453 0.902 0.9253 0.22523 0.25523 0.25523 0.25523 0.25523 0.25523 0.25523 0.25523 0.25523 0.25523 0.25523 0.25523 0.25523 0.25523 0.25523 0.25523 0.25555 0.25555 0.25555 0.25555 0.25555 0.255555 0.2555555 0.2555	11.2400 0.9932 0.9914 0.9877 0.9806 0.9778 0.9688 0.9715 0.9682 0.9642 0.9642 0.9642 0.9642 0.9642 0.9443 0.9445 0.9445 0.9445 0.9445 0.9444 0.9387 0.9444 0.9387 0.9444 0.9387 0.9445 0.9146 0.914 0.9289 0.914 0.9445 0.9445 0.9445 0.914 0.9289 0.914 0.94450.9455 0.94550000000000000000000000000000000000	0.9927 0.9913 0.9873 0.9809 0.9728 0.9728 0.9702 0.9662 0.9661 0.96579 0.9491 0.9454 0.9454 0.9454 0.9454 0.9454 0.9454 0.9454 0.9454 0.9454 0.9454 0.9454 0.9454 0.9454 0.9454 0.9454 0.9365 0.9244 0.9103 0.8826 0.962 0.9718 0.962 0.94577 0.94577 0.94577 0.94577 0.945777 0.945777777777777777777777777777777777777	0 9923 0 9909 0 9869 0 9869 0 9741 0 9720 0 9646 0 9646 0 9627 0 9642 0 9493 0 9477 0 9447 0 9447 0 9447 0 9447 0 9449 0 9333 0 9223 0 9133 0 8901 0 8552 0 8165 0 7500 0 4625	0.9908 0.9893 0.9863 0.9874 0.9774 0.9777 0.9667 0.9667 0.9666 0.96568 0.96568 0.9492 0.9492 0.9485 0.9492 0.9485 0.9492 0.9485 0.9492 0.9485 0.9423 0.9329 0.9485 0.9249 0.9092 0.9485 0.9249 0.9092 0.9485 0.9249 0.9092 0.9485 0.9249 0.9249 0.9248 0.9249 0.9248 0.9249 0.9248 0.9248 0.94588 0.94588 0.94588 0.94588 0.94588 0.94588 0.94588 0.94588 0.94588 0.94588 0.94588 0.94588 0.94588 0.94588 0.94588 0.9458	0.9886 0.9865 0.9877 0.9773 0.9671 0.9661 0.9664 0.9657 0.9653 0.9452 0.9452 0.9459 0.9449 0.9439 0.9442 0.9443 0.9442 0.9443 0.9442 0.9443 0.9442 0.9443 0.9444 0.9445 0.9444 0.9385 0.9262 0.9262 0.9120 0.83962 0.83764 0.8412	0.9854 0.9762 0.9762 0.9773 0.9667 0.9667 0.9650 0.9456 0.9456 0.9456 0.9456 0.9459 0.9373 0.9323 0.9237 0.9233 0.9237 0.9223 0.9227 0.92260 0.9277 0.9260 0.9277 0.9260 0.9277 0.9260 0.9272 0.9310 0.9334 0.9336 0.9336 0.9336 0.9336 0.9336 0.9336 0.9336 0.9336 0.9336 0.9336 0.9336 0.9336 0.9337 0.9336 0.9337 0.9336 0.9337 0.9336 0.9337 0.9336 0.9337 0.9336 0.9337 0.9336 0.9337 0.9336 0.9337 0.9336 0.9337 0.9336 0.9336 0.9336 0.9337 0.9336 0.9336 0.9337 0.9336 0.9327 0.9326 0.9327 0.9227 0.9227 0.9227 0.9227 0.9227 0.9227 0.9227 0.9227 0.9227 0.9226 0.9327 0.9326 0.9327 0.9326 0.9327 0.9326 0.9326 0.9327 0.9326 0.9327 0.9326 0.9326 0.9326 0.9326 0.9327 0.9226 0.9326 0.9336 0.9336 0.9336 0.9326 0.9326 0.9336 0.9336 0.9336 0.9336 0.9336 0.9336 0.9336 0.9336 0.9336 0.9336 0.9336 0.9336 0.9337 0.9336 0.9237 0.9336 0.9337 0.9336 0.93566 0.93566 0.93566 0.93566 0.93566 0.93566 0.93566 0.93566 0.9356	
$\begin{array}{c} 7.7\\ 7.8\\ 9.8\\ 11.8\\ 14.1\\ 16.4\\ 18.8\\ 21.4\\ 24.0\\ 26.6\\ 28.9\\ 31.6\\ 34.9\\ 37.2\\ 40.4\\ 37.2\\ 40.4\\ 37.2\\ 40.4\\ 37.2\\ 40.4\\ 37.2\\ 40.4\\ 37.2\\ 6.5\\ 53.0\\ 56.6\\ 53.0\\ 56.6\\ 57.6\\ 64.2\\ 67.8\\ 71.7\\ 76.8\\ 83.5\\ \end{array}$	P <sub>total</sub> (psia) 101.817 126.511 149.531 150.289 150.216 150.216 150.191 150.384 150.362 150.344 150.362 150.341 150.362 149.316 149.316 149.404 149.973 150.101 150.268 150.249 150.249 150.37	Chamber Pressure, psia 13.2675 12.9350 12.6375 10.6950 9.1570 7.9800 7.0035 6.2530 5.6635 5.1970 4.7625 4.3145 4.0420 3.7210 3.4400 3.1865 3.0150 2.8310 2.6575 2.5210 2.3410 2.2155 2.0960 1.9590 1.8590		0.9933 0.9899 0.9847 0.9847 0.9810 0.9707 0.9625 0.9509 0.9519 0.9302 0.9302 0.8461 0.6697 0.2266 0.3239 0.3458 0.3649 0.3239 0.3458 0.3649 0.3239 0.3458 0.36456 0.4153	0.9933 0.9962 0.9862 0.98754 0.9754 0.9754 0.9628 0.9668 0.9668 0.9479 0.9479 0.9403 0.9151 0.8320 0.6084 0.2276 0.23646 0.2276 0.2340 0.3340 0.3340 0.3340 0.3380 0.3340 0.3380 0.4017 0.4308	0.9933 0.9905 0.9867 0.98620 0.9752 0.9639 0.96639 0.96639 0.9661 0.9466 0.9287 0.9466 0.9287 0.9466 0.9466 0.9467 0.9466 0.9467 0.9466 0.9467 0.9466 0.9466 0.9467 0.95602 0.2752 0.2939 0.3256 0.372	0 9933 0 9907 0 9861 0 9861 0 9742 0 9655 0 9559 0 9559 0 9559 0 9527 0 9529 0 9437 0 95497 0 95497 0 9549 0 9943 0 9943 0 9943 0 9943 0 7952 0 2713 0 2866 0 3084 0 3259 0 3084 0 3259 0 3449 0 3449 0 36666	0.9936 0.9972 0.9867 0.9867 0.9754 0.9672 0.9627 0.9624 0.95567 0.95567 0.95567 0.95567 0.9527 0.9557 0.95770 0.95770 0.95770 0.95770 0.95770 0.957700 0.95770000000000000000000000000000000000	9.8800 0.9936 0.9914 0.9871 0.9821 0.9763 0.9763 0.9685 0.9645 0.96579 0.9530 0.9530 0.9530 0.9456 0.9394 0.9288 0.9125 0.8478 0.8478 0.7708 0.5230 0.62533 0.2670 0.2821 0.2821 0.2821 0.2823	10.3333 0.9936 0.9916 0.9974 0.9874 0.9837 0.9795 0.9695 0.9695 0.9663 0.9598 0.9542 0.9542 0.9542 0.9433 0.9433 0.9433 0.9360 0.9235 0.9070 0.8823 0.8365 0.7612 0.5161 0.2525 0.2791 0.2996 0.3260	10.7867 0.9935 0.9915 0.9874 0.9874 0.9786 0.9778 0.9778 0.9674 0.9614 0.9556 0.9556 0.9475 0.9453 0.94453 0.94453 0.94453 0.94453 0.9475 0.9453 0.9475 0.9453 0.9475 0.9475 0.9475 0.9475 0.9453 0.9475 0.9475 0.9475 0.9475 0.9475 0.9475 0.9475 0.9475 0.9475 0.9475 0.9453 0.9475 0.9453 0.9475 0.9455 0.9475 0.9455 0.9475 0.9455 0.9475 0.9455 0.9475 0.9455 0.9475 0.9455 0.9475 0.9455 0.9475 0.9455 0.9475 0.9455 0.9475 0.9455 0.9475 0.9455 0.9475 0.9455 0.9475 0.9455 0.9475 0.9455 0.9475 0.9455 0.9475 0.9455 0.95555 0.95555 0.95555 0.95555 0.95555 0.95555 0.95555555 0.95555	11.2400 0.9932 0.9914 0.9877 0.9838 0.9806 0.9715 0.9688 0.9642 0.9562 0.9562 0.95645 0.94545 0.9441 0.9456 0.9441 0.9456 0.9441 0.9387 0.9289 0.9456 0.9441 0.9387 0.9289 0.9144 0.88940 0.8692 0.05144 0.8243 0.7164 0.4387 0.2495 0.2614 0.2614	0.9927 0.9913 0.9873 0.9809 0.9728 0.9728 0.9728 0.9702 0.9662 0.9662 0.9661 0.9579 0.9451 0.9454 0.9454 0.9454 0.9454 0.9454 0.9454 0.9103 0.9456 0.9103 0.9454 0.9103 0.9454 0.9103 0.9454 0.9103 0.9454 0.9103 0.9454 0.9103 0.9454 0.9103 0.9454 0.9103 0.94540 0.94540 0.94540000000000000000000000000000000000	0.9923 0.9909 0.9869 0.9863 0.9741 0.9720 0.9663 0.9663 0.9663 0.9627 0.9642 0.9642 0.9463 0.9463 0.9463 0.9427 0.9440 0.9437 0.94471 0.94471 0.94471 0.94471 0.94471 0.94471 0.94471 0.94471 0.94471 0.94471 0.9552 0.88001 0.8552 0.81655 0.815555 0.815555 0.8155550 0.8155550 0.81555500000000000000000000000000000000	0.9908 0.9893 0.9862 0.9862 0.9764 0.9777 0.9667 0.9717 0.9667 0.9667 0.9663 0.96568 0.9525 0.9492 0.9422 0.9481 0.9423 0.9481 0.9423 0.9249 0.9450 0.9250 0.9450 0.9550 0.9450 0.9550 0.9450 0.9550 0.9450 0.9550 0.9450 0.9550 0.9550 0.9450 0.9550 0.9550 0.9450 0.9550 0.9450 0.9550 0.9450 0.9550 0.9550 0.9550 0.9450 0.9550 0.9550 0.9450 0.9550 0.9450 0.9550 0.9450 0.9550 0.9550 0.9450 0.95500 0.95500 0.95500 0.95500 0.9550000000000	0 9886 0 9886 0 9877 0 9778 0 9777 0 9738 0 9671 0 9661 0 9664 0 9567 0 9563 0 9452 0 9459 0 9449 0 9449 0 9449 0 9449 0 9424 0 9385 0 9422 0 9120 0 8982 0 9120 0 8982 0 8784 0 9785 0 9777 0 97777 0 9777 0 9777 0 9777 0 9777 0 9777 0 9777 0 977	0.9854 0.9874 0.9762 0.9762 0.9667 0.96667 0.96568 0.9459 0.9459 0.9459 0.9433 0.9237 0.9237 0.9237 0.9237 0.9231 0.9227 0.92310 0.92218 0.9334 0.9334 0.9334 0.9334 0.9335 0.9218 0.9256 0.9356 0.9218 0.9256 0.9218 0.9256	
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7.7         9.8           111.8         14.1           14.1         18.4           18.2         14.4           24.0         26.6           28.9         31.6           33.4.9         37.2           40.4         43.7           43.7         26.6           53.0         56.5           59.6         59.6           67.8         71.7           76.8         83.5	P <sub>total</sub> (psia) 101.817 126.511 149.531 150.289 150.216 150.216 150.191 150.384 150.362 150.344 150.362 150.341 150.362 149.316 149.316 149.316 149.973 150.101 150.268 150.249 150.249 150.37	Chamber Pressure, psia 13.2675 12.9350 12.6375 10.6950 9.1570 7.9800 7.0035 6.2530 5.6635 5.1970 4.7625 4.3145 4.0420 3.7210 3.4400 3.1865 3.0150 2.8310 2.6575 2.5210 2.3410 2.2155 2.0960 1.9590 1.8590		0.9933 0.9899 0.9847 0.9847 0.9810 0.9707 0.9625 0.9509 0.9519 0.9302 0.9302 0.8461 0.6697 0.2266 0.3239 0.3458 0.3649 0.3239 0.3458 0.3649 0.3239 0.3458 0.36456 0.4153	0.9933 0.9962 0.9862 0.98754 0.9754 0.9754 0.9628 0.9668 0.9668 0.9479 0.9479 0.9403 0.9151 0.8320 0.6084 0.2276 0.23646 0.2276 0.2340 0.3340 0.3340 0.3340 0.3380 0.3340 0.3380 0.4017 0.4308	0.9933 0.9905 0.9867 0.9867 0.9620 0.9752 0.9639 0.9663 0.9663 0.9466 0.9267 0.9466 0.9466 0.9466 0.9466 0.9467 0.9467 0.9467 0.9466 0.9466 0.9466 0.9467 0.9467 0.9467 0.9467 0.9510 0.9752 0.9467 0.9454 0.9752 0.9563 0.9752 0.9466 0.9454 0.9752 0.9454 0.9454 0.9752 0.9456 0.9752 0.94566 0.94566 0.94566 0.94566 0.94566 0.94566 0.94566 0.94566 0	0 9933 0 9907 0 9861 0 9861 0 9742 0 9655 0 9559 0 9559 0 9559 0 9527 0 9529 0 9437 0 95497 0 95497 0 9549 0 9943 0 9943 0 9943 0 9943 0 7952 0 2713 0 2866 0 3084 0 3259 0 3084 0 3259 0 3449 0 3449 0 36666	0.9936 0.9972 0.9867 0.9867 0.9754 0.9672 0.9627 0.9624 0.95567 0.95567 0.95567 0.95567 0.9527 0.9557 0.95770 0.95770 0.95770 0.95770 0.95770 0.957700 0.95770000000000000000000000000000000000	9.8800 0.9936 0.9914 0.9871 0.9821 0.9763 0.9763 0.9685 0.9645 0.96579 0.9530 0.9530 0.9530 0.9456 0.9394 0.9288 0.9125 0.8478 0.8478 0.7708 0.5230 0.62533 0.2670 0.2821 0.2821 0.2821 0.2823	10.3333 0.9936 0.9916 0.9974 0.9874 0.9837 0.9795 0.9695 0.9695 0.9663 0.9598 0.9542 0.9542 0.9542 0.9543 0.9433 0.9433 0.9360 0.9235 0.9070 0.8823 0.8365 0.7612 0.5161 0.2525 0.2791 0.2996 0.3260	10.7867 0.9935 0.9915 0.9874 0.9874 0.9786 0.9778 0.9778 0.9674 0.9614 0.9556 0.9556 0.9475 0.9453 0.94453 0.94453 0.94453 0.94453 0.9475 0.9453 0.9475 0.9453 0.9475 0.9475 0.9475 0.9475 0.9453 0.9475 0.9475 0.9453 0.9475 0.9453 0.9475 0.9475 0.9453 0.9475 0.9453 0.9475 0.9453 0.9475 0.9453 0.9475 0.9453 0.9475 0.9453 0.9475 0.9453 0.9475 0.9453 0.9475 0.9453 0.9455 0.9475 0.9455 0.9475 0.9455 0.9475 0.9455 0.9475 0.9455 0.9475 0.9455 0.9475 0.9455 0.9475 0.9455 0.9475 0.9455 0.9475 0.9455 0.9475 0.9455 0.95555 0.95555 0.95555 0.95555 0.95555 0.95555 0.955555 0.9555555	11.2400 0.9932 0.9914 0.9877 0.9838 0.9806 0.9715 0.9688 0.9642 0.9562 0.9562 0.95645 0.9441 0.9456 0.9441 0.9456 0.9441 0.9456 0.9441 0.9387 0.9289 0.9456 0.9441 0.8243 0.9164 0.8243 0.7164 0.8243 0.7164 0.8245 0.2495 0.2614 0.2614	0.9927 0.9913 0.9873 0.9809 0.9728 0.9728 0.9728 0.9702 0.9662 0.9662 0.9661 0.9579 0.9451 0.9454 0.9454 0.9454 0.9454 0.9454 0.9454 0.9103 0.9456 0.9103 0.9454 0.9103 0.9454 0.9103 0.9454 0.9103 0.9454 0.9103 0.9454 0.9103 0.9454 0.9103 0.9454 0.9103 0.94540 0.94540 0.94540000000000000000000000000000000000	0.9923 0.9909 0.9869 0.9863 0.9741 0.9720 0.9663 0.9663 0.9663 0.9627 0.9642 0.9642 0.9463 0.9463 0.9463 0.9427 0.9440 0.9437 0.94471 0.94471 0.94471 0.94471 0.94471 0.94471 0.94471 0.94471 0.94471 0.94471 0.9552 0.88001 0.8552 0.81655 0.815555 0.815555 0.8155550 0.8155550 0.81555500000000000000000000000000000000	0.9908 0.9893 0.9862 0.9862 0.9764 0.9777 0.9667 0.9717 0.9667 0.9667 0.9663 0.96568 0.9525 0.9492 0.9422 0.9481 0.9423 0.9481 0.9423 0.9249 0.9450 0.9250 0.9450 0.9550 0.9450 0.9550 0.9450 0.9550 0.9450 0.9550 0.9450 0.9550 0.9450 0.9550 0.9450 0.9550 0.9450 0.9550 0.9450 0.9550 0.9450 0.9550 0.9450 0.9550 0.9550 0.9450 0.9550 0.9450 0.9550 0.9450 0.9550 0.9450 0.9550 0.9450 0.9550 0.9450 0.9550 0.9550 0.9450 0.9550 0.9450 0.9550 0.9450 0.9550 0.9450 0.9550 0.9450 0.9550 0.9450 0.9550 0.9450 0.95500 0.95500 0.95500 0.95500 0.955000 0.9550000000000	0 9886 0 9886 0 9877 0 9778 0 9777 0 9738 0 9671 0 9661 0 9664 0 9567 0 9563 0 9452 0 9459 0 9449 0 9449 0 9449 0 9449 0 9424 0 9385 0 9422 0 9120 0 8982 0 9120 0 8982 0 9777 0 9573 0 9563 0 9563 0 9563 0 9452 0 9565 0 9565	0.9854 0.9874 0.9762 0.9762 0.9667 0.96667 0.96568 0.9459 0.9459 0.9459 0.9433 0.9237 0.9237 0.9237 0.9233 0.9237 0.9227 0.9230 0.9231 0.9227 0.9210 0.9304 0.9334 0.9334 0.9334 0.9334 0.9334 0.93056 0.9218 0.9266	

## Table A2b. TIC 180° Azimuth normalized (by Pamb) wall pressures as presented in figure 15b. Diffuser inlet76 mm downstream.

							r	nm do	ownsti	ream.								
										x/r*, 0°	Azimuth							
NPR	Nozzle P <sub>total</sub> (psia)	P <sub>amb</sub> , Vacuum Chamber Pressure, psia	0.1333	0.5867	1.0400	1.4933	1.9467	2.4000	2.8533	3.3067	3.7600	4.2133	4.6667	5.1200	5.5733	6.0267	6.4800	6.9333
11.1	142.926	12.8370	4.384E-02	3.379E-02	2.944E-02	7.846E-02	8.142E-02	8.364E-02	8.516E-02	8.564E-02	8.581E-02	8.620E-02	8.629E-02	8.621E-02	8.627E-02	8.635E-02	8.639E-02	8.635E-02
13.1	150.081	11.4430	4.378E-02	3.382E-02	2.929E-02	2.575E-02	7.002E-02	7.225E-02	7.327E-02	7.371E-02	7.395E-02	7.414E-02	7.429E-02	7.431E-02	7.437E-02	7.446E-02	7.455E-02	7.459E-02
15.2	150.078	9.9045		3.378E-02	2.933E-02	2.551E-02	2.178E-02	6.095E-02	6.280E-02	6.346E-02	6.383E-02		6.427E-02		6.434E-02		6.446E-02	
17.2	150.124	8.7265	4.383E-02	3.377E-02	2.932E-02	2.551E-02	2.164E-02	1.793E-02	5.212E-02	5.482E-02	5.557E-02	5.605E-02	5.629E-02	5.637E-02	5.645E-02	5.651E-02	5.657E-02	5.663E-02
18.8	150.184 150.166	8.0000 7.2935	4.378E-02 4.380E-02	3.373E-02 3.378E-02	2.930E-02 2.930E-02	2.552E-02 2.553E-02	2.163E-02 2.164E-02	1.783E-02 1.782E-02	1.659E-02 1.641E-02	4.725E-02 1.467E-02	4.971E-02 4.099E-02	5.055E-02 4.418E-02	5.094E-02 4.535E-02	5.110E-02 4.580E-02	5.126E-02 4.605E-02	5.132E-02 4.618E-02	5.136E-02 4.626E-02	5.142E-02 4.628E-02
20.6	150.166	6.6945	4.386E-02	3.378E-02	2.930E-02 2.935E-02	2.553E-02 2.553E-02	2.164E-02 2.164E-02	1.762E-02 1.781E-02	1.641E-02 1.640E-02	1.467E-02 1.460E-02	4.099E-02 1.325E-02	2.312E-02	4.535E-02 3.774E-02	4.560E-02 3.988E-02		4.010E-02 4.105E-02	4.626E-02 4.124E-02	
23.6	150.150	6.3730		3.386E-02	2.935E-02 2.941E-02			1.786E-02	1.647E-02	1.460E-02	1.323E-02	1.301E-02	2.730E-02		3.759E-02		3.847E-02	
27.3	150.24	5.5140	4.366E-02	3.387E-02	2.941E-02	2.561E-02	2.165E-02	1.787E-02	1.647E-02	1.460E-02	1.323E-02	1.199E-02	1.106E-02	1.027E-02	9.615E-03	9.109E-03	2.029E-02	2.824E-02
30.2	150.343	4.9820	4.363E-02	3.386E-02	2.941E-02	2.560E-02	2.164E-02	1.786E-02	1.650E-02	1.462E-02	1.324E-02	1.200E-02	1.106E-02	1.027E-02	9.611E-03	9.099E-03	9.073E-02	1.905E-02
35.8	150.299	4.2005		3.387E-02	2.941E-02	2.559E-02		1.788E-02	1.648E-02	1.460E-02	1.324E-02	1.199E-02	1.105E-02	1.027E-02	9.608E-03		8.669E-03	8.310E-03
38.3	150.217	3.9190	4.363E-02		2.940E-02	2.562E-02	2.166E-02	1.788E-02	1.649E-02	1.462E-02	1.326E-02	1.200E-02	1.106E-02		9.619E-03		8.661E-03	
43.0	150.362	3.4975		3.388E-02	2.940E-02			1.788E-02	1.649E-02	1.462E-02	1.325E-02	1.199E-02	1.106E-02		9.617E-03		8.679E-03	
46.7	150.273	3.2205	4.366E-02	3.387E-02	2.940E-02	2.562E-02	2.167E-02	1.788E-02	1.648E-02	1.461E-02	1.325E-02	1.200E-02	1.107E-02	1.027E-02	9.622E-03	9.103E-03	8.651E-03	8.298E-03
50.7	150.235	2.9660	4.364E-02	3.383E-02	2.940E-02	2.563E-02	2.165E-02	1.788E-02	1.648E-02	1.460E-02	1.325E-02	1.200E-02	1.106E-02	1.028E-02	9.625E-03	9.106E-03	8.660E-03	8.300E-03
53.9	150.18	2.7845	4.384E-02	3.376E-02	2.932E-02		2.163E-02	1.783E-02	1.641E-02	1.462E-02	1.324E-02	1.207E-02	1.114E-02		9.588E-03	9.109E-03	8.789E-03	
57.1	150.195	2.6315	4.385E-02	3.384E-02	2.929E-02	2.551E-02	2.165E-02	1.781E-02	1.641E-02	1.460E-02	1.323E-02	1.207E-02	1.113E-02	1.026E-02	9.588E-03	9.102E-03	8.782E-03	
60.7	150.338	2.4775	4.368E-02	3.388E-02	2.940E-02	2.561E-02		1.787E-02	1.648E-02	1.460E-02	1.325E-02	1.200E-02	1.106E-02	1.027E-02	9.618E-03	9.099E-03	8.647E-03	8.301E-03
62.6	150.217	2.3990		3.375E-02	2.929E-02	2.553E-02		1.782E-02	1.642E-02	1.461E-02	1.324E-02	1.208E-02	1.114E-02	1.027E-02	9.586E-03		8.781E-03	8.275E-03
71.8	150.27	2.0930	4.411E-02	3.428E-02	2.983E-02	2.603E-02	2.207E-02	1.828E-02	1.690E-02	1.502E-02	1.366E-02	1.240E-02	1.147E-02	1.071E-02	1.004E-02	9.530E-03	9.084E-03	8.724E-03
								x/r*, 0°	Azimuth									
		Pamb, Vacuum			r		-	, v										
NPR	Nozzle P <sub>total</sub> (psia)	Chamber Pressure, psia		7.3867	7.8400	8.2933	8.7467	9.2000	9.6533	10.1067	10.5600	11.0133	11.4667					
11.1	142.926	12.8370		8.640E-02	8.653E-02	8.662E-02	8.681E-02	8.700E-02	8.732E-02	8.755E-02	8.791E-02	8.825E-02	8.838E-02					
13.1	150.081	11.4430		7.462E-02	7.469E-02	7.474E-02	7.475E-02	7.482E-02	7.487E-02	7.492E-02	7.491E-02	7.473E-02	7.433E-02					
15.2	150.078	9.9045		6.452E-02	6.457E-02	6.459E-02	6.460E-02	6.465E-02	6.469E-02	6.470E-02	6.465E-02	6.440E-02	6.396E-02					
17.2	150.124	8.7265		5.665E-02	5.670E-02	5.673E-02	5.675E-02	5.679E-02	5.685E-02	5.687E-02	5.685E-02	5.667E-02	5.623E-02					
18.8	150.184	8.0000		5.144E-02	5.148E-02	5.150E-02		5.159E-02		5.169E-02	5.168E-02	5.146E-02						
20.6	150.166	7.2935		4.630E-02	4.640E-02	4.642E-02	4.642E-02	4.648E-02	4.651E-02	4.660E-02	4.669E-02	4.665E-02	4.606E-02					
22.4	150.158	6.6945		4.136E-02	4.147E-02	4.150E-02	4.160E-02	4.171E-02	4.184E-02	4.198E-02	4.216E-02	4.224E-02	4.183E-02					
23.6	150.24	6.3730		3.875E-02	3.884E-02	3.922E-02	3.883E-02	3.896E-02	3.917E-02	3.939E-02	3.975E-02	4.001E-02	3.984E-02					
27.3	150.289	5.5140		3.559E-02	5.418E-02	3.804E-02	6.305E-02	4.857E-02	3.612E-02	3.212E-02	3.954E-02	4.799E-02						
30.2	150.343	4.9820		2.787E-02	3.536E-02	5.440E-02	4.291E-02	5.511E-02	4.790E-02	3.837E-02	3.253E-02	3.395E-02						
35.8	150.299	4.2005		1.289E-02	2.321E-02	2.929E-02	3.808E-02	4.609E-02	3.711E-02	4.299E-02	4.883E-02	3.630E-02	3.315E-02					
38.3	150.217	3.9190 3.4975		8.002E-03 7.894E-03	1.247E-02 7.528E-03	2.148E-02	3.088E-02	4.171E-02	4.237E-02	3.631E-02 4.080E-02	4.466E-02 3.864E-02	4.097E-02 3.291E-02	3.424E-02 3.840E-02					
42.0				1.094E-03	1.326E-03	1.066E-02	1.955E-02	2.551E-02	3.518E-02 2.390E-02	4.080E-02 2.919E-02	3.864E-02 3.669E-02	3.291E-02 4.050E-02						
43.0	150.362			7 2005 02	7 4626 02	7 1675 02												
46.7	150.273	3.2205		7.899E-03	7.453E-03	7.167E-03	1.021E-02	1.708E-02										
46.7 50.7	150.273 150.235	3.2205 2.9660		7.901E-03	7.455E-03	7.116E-03	6.876E-03	9.139E-03	1.603E-02	2.087E-02	2.725E-02	3.820E-02	3.629E-02					
46.7 50.7 53.9	150.273 150.235 150.18	3.2205 2.9660 2.7845		7.901E-03 7.844E-03	7.455E-03 7.444E-03	7.116E-03 7.052E-03	6.725E-03	9.139E-03 6.632E-03	1.603E-02 8.750E-03	2.087E-02 1.277E-02	2.725E-02 1.704E-02	3.820E-02 2.347E-02	3.629E-02 2.954E-02					
46.7 50.7 53.9 57.1	150.273 150.235 150.18 150.195	3.2205 2.9660 2.7845 2.6315		7.901E-03 7.844E-03 7.843E-03	7.455E-03 7.444E-03 7.437E-03	7.116E-03 7.052E-03 7.051E-03	6.876E-03 6.725E-03 6.725E-03	9.139E-03 6.632E-03 6.505E-03	1.603E-02 8.750E-03 6.332E-03	2.087E-02 1.277E-02 7.211E-03	2.725E-02 1.704E-02 8.988E-03	3.820E-02 2.347E-02 1.115E-02	3.629E-02 2.954E-02 1.505E-02					
46.7 50.7 53.9 57.1 60.7	150.273 150.235 150.18 150.195 150.338	3.2205 2.9660 2.7845 2.6315 2.4775		7.901E-03 7.844E-03 7.843E-03 7.896E-03	7.455E-03 7.444E-03 7.437E-03 7.457E-03	7.116E-03 7.052E-03 7.051E-03 7.077E-03	6.876E-03 6.725E-03 6.725E-03 6.811E-03	9.139E-03 6.632E-03 6.505E-03 6.545E-03	1.603E-02 8.750E-03 6.332E-03 6.233E-03	2.087E-02 1.277E-02 7.211E-03 6.153E-03	2.725E-02 1.704E-02 8.988E-03 6.386E-03	3.820E-02 2.347E-02 1.115E-02 6.858E-03	3.629E-02 2.954E-02 1.505E-02 8.175E-03					
46.7 50.7 53.9 57.1	150.273 150.235 150.18 150.195	3.2205 2.9660 2.7845 2.6315		7.901E-03 7.844E-03 7.843E-03	7.455E-03 7.444E-03 7.437E-03	7.116E-03 7.052E-03 7.051E-03 7.077E-03 7.043E-03	6.876E-03 6.725E-03 6.725E-03 6.811E-03	9.139E-03 6.632E-03 6.505E-03 6.545E-03 6.511E-03	1.603E-02 8.750E-03 6.332E-03 6.233E-03 6.184E-03	2.087E-02 1.277E-02 7.211E-03 6.153E-03 6.045E-03	2.725E-02 1.704E-02 8.988E-03 6.386E-03 5.911E-03	3.820E-02 2.347E-02 1.115E-02 6.858E-03 5.818E-03	3.629E-02 2.954E-02 1.505E-02 8.175E-03 6.198E-03					

### Table A3a. PAR 0° Azimuth normalized (by P<sub>c</sub>) wall pressures as presented in figure 20a. Diffuser inlet 127 mm downstream.

 Table A3b. PAR 0° Azimuth normalized (by P<sub>amb</sub>) wall pressures as presented in figure 20b. Diffuser inlet 127 mm downstream.

									viisti (									
										x/r^, 0°	Azimuth	<u> </u>						
		P <sub>amb</sub> , Vacuum																
	Nozzle	Chamber	0.1333	0.5867	1.0400	1,4933	1.9467	2,4000	2.8533	3.3067	3,7600	4.2133	4.6667	5.1200	5.5733	6.0267	6,4800	6.9333
NPR	Ptotal (psia)	Pressure, psia																
11.13	142,926	12.8370	0.4881	0.3762	0.3278	0.8736	0.9065	0.9312	0.9481	0.9535	0.9554	0.9597	0.9607	0.9598	0.9605	0.9614	0.9618	0.9614
13.12	150.081	11.4430	0.5742	0.4435	0.3842	0.3377	0.9183	0.9476	0.9609	0.9667	0.9699	0.9724	0.9743	0.9747	0.9754	0.9766	0.9777	0.9783
15.15	150.078	9,9045	0.6642	0.5118	0.4444	0.3866	0.3301	0.9236	0.9516	0.9616	0.9672	0.9716	0.9738	0.9743	0.9749	0.9757	0.9767	0.9771
17.20	150.124	8.7265	0.7540	0.5810	0.5044	0.4389	0.3722	0.3085	0.8967	0.9431	0.9561	0.9642	0.9684	0.9698	0.9712	0.9722	0.9732	0.9742
18.77	150.184	8.0000	0.8219	1/20/10			0.4060	0.3348	0.3115	0.8870	0.9333	0.9490	0.9563	0.9593	0.9624	0.9635	0.9643	0.9653
20.59	150.166	7.2935	0.9019		nd 4/3 data		0.4455	0.3669	0.3378	0.3020	0.8439	0.9097	0.9337	0.9429	0.9481	0.9507	0.9525	0.9528
22.43	150.158	6.6945	0.9838				0.4853	0.3996	0.3678	0.3274	0.2971	0.5185	0.8465	0.8946	0.9115	0.9208	0.9249	0.9258
23.57	150.240	6.3730	1.0306	THIS IS THE	0deg azimi	uth data —	0.5101	0.4212	0.3884	0.3443	0.3119	0.3066	0.6435	0.8323	0.8861	0.8996	0.9070	0.9124
27.26	150.289	5.5140	1.1899	THis shee	t was used	to move ro	ows around	to get into	correct ord	erforco/p	aste into sh	eed to the l	eft 014	0.2800	0.2621	0.2483	0.5531	0.7697
30.18	150.343	4.9820	1.3165	1.92.11	0.0017	0.1120	0.0000	0.0000	0.1010	V.7714	0.0000	0.0021	0.0338	0.3101	0.2900	0.2746	0.2738	0.5749
35.78	150.299	4.2005	1.5629	1.2120	1.0525	0.9156	0.7742	0.6397	0.5897	0.5226	0.4738	0.4290	0.3954	0.3676	0.3438	0.3254	0.3102	0.2973
38.33	150.217	3.9190	1.6724	1.2965	1.1271	0.9819	0.8301	0.6854	0.6320	0.5603	0.5083	0.4598	0.4241	0.3940	0.3687	0.3491	0.3320	0.3182
42.99	150.362	3.4975	1.8802	1.4568	1.2640	1.1005	0.9310	0.7685	0.7088	0.6284	0.5695	0.5155	0.4755	0.4417	0.4134	0.3911	0.3731	0.3565
46.66	150.273	3.2205	2.0373	1.5805	1.3718	1.1955	1.0110	0.8343	0.7688	0.6816	0.6182	0.5599	0.5164	0.4794	0.4490	0.4248	0.4037	0.3872
50.65	150.235	2.9660	2.2107	1.7138	1.4892	1.2980	1.0968	0.9056	0.8348	0.7397	0.6713	0.6079	0.5604	0.5206	0.4875	0.4612	0.4386	0.4204
53.93	150.180	2.7845	2.3645	1.8208	1.5816	1.3776	1.1668	0.9614	0.8853	0.7883	0.7143	0.6511	0.6008	0.5538	0.5171	0.4913	0.4741	0.4464
57.08	150.195	2.6315	2.5028	1.9316	1.6717	1.4558	1.2358	1.0165	0.9367	0.8334	0.7551	0.6890	0.6354	0.5856	0.5472	0.5195	0.5012	0.4724
60.68	150.338	2.4775	2.6507	2.0561	1.7841	1.5540	1.3138	1.0846	0.9998	0.8860	0.8040	0.7282	0.6712	0.6232	0.5837	0.5522	0.5247	0.5037
62.62	150.217	2.3990	2.7445	2.1134	1.8341	1.5986	1.3547	1.1159	1.0279	0.9150	0.8291	0.7561	0.6974	0.6432	0.6003	0.5702	0.5498	0.5181
71.80	150.270	2.0930	3,1667	2.4611	2.1414	1.8686	1.5848	1.3125	1.2136	1.0784	0.9809	0.8906	0.8237	0.7688	0.7210	0.6842	0.6522	0.6264
										1.0101	0.0000	0.0000						
											0.0000	0.0000						
								x/r*, 0°			0.0000	0.0000						
		P <sub>amb</sub> , Vacuum									0.0000	0.0000						
	Nozzle	Chamber		7.3867	7.8400	8.2933						11.0133						
NPR	Nozzle P <sub>total</sub> (psia)							x/r*, 0°	Azimuth	1								
NPR		Chamber						x/r*, 0°	Azimuth	1								
	P <sub>total</sub> (psia)	Chamber Pressure, psia		7.3867	7.8400	8.2933	8.7467	x/r*, 0° 9.2000	Azimuth 9.6533	10.1067	10.5600	11.0133	11.4667					
11.1	P <sub>total</sub> (psia) 142.926	Chamber Pressure, psia 12.8370		7.3867	7.8400	8.2933 0.9644	8.7467 0.9666	x/r*, 0° 9.2000 0.9687	Azimuth 9.6533 0.9722	10.1067 0.9748	10.5600	11.0133	11.4667					
11.1 13.1	P <sub>total</sub> (psia) 142.926 150.081	Chamber Pressure, psia 12.8370 11.4430		7.3867 0.9620 0.9787	7.8400 0.9634 0.9796	8.2933 0.9644 0.9802	8.7467 0.9666 0.9804	x/r*, 0° 9.2000 0.9687 0.9813	Azimuth 9.6533 0.9722 0.9819	10.1067 0.9748 0.9826	10.5600 0.9787 0.9825	11.0133 0.9826 0.9801	11.4667 0.9840 0.9749					
11.1 13.1 15.2	P <sub>total</sub> (psia) 142.926 150.081 150.078	Chamber Pressure, psia 12.8370 11.4430 9.9045		7.3867 0.9620 0.9787 0.9776	7.8400 0.9634 0.9796 0.9783	8.2933 0.9644 0.9802 0.9786	8.7467 0.9666 0.9804 0.9788	x/r*, 0° 9.2000 0.9687 0.9813 0.9796	Azimuth 9.6533 0.9722 0.9819 0.9802	10.1067 0.9748 0.9826 0.9804	10.5600 0.9787 0.9825 0.9796	11.0133 0.9826 0.9801 0.9758	11.4667 0.9840 0.9749 0.9692					
11.1 13.1 15.2 17.2	P <sub>total</sub> (psia) 142.926 150.081 150.078 150.124	Chamber Pressure, psia 12.8370 11.4430 9.9045 8.7265		7.3867 0.9620 0.9787 0.9776 0.9745	7.8400 0.9634 0.9796 0.9783 0.9754	8.2933 0.9644 0.9802 0.9786 0.9759	8.7467 0.9666 0.9804 0.9788 0.9763	9.2000 0.9687 0.9813 0.9796 0.9770	Azimuth 9.6533 0.9722 0.9819 0.9802 0.9779	10.1067 0.9748 0.9826 0.9804 0.9783	10.5600 0.9787 0.9825 0.9796 0.9779	11.0133 0.9826 0.9801 0.9758 0.9748	11.4667 0.9840 0.9749 0.9692 0.9674					
11.1 13.1 15.2 17.2 18.8 20.6 22.4	P <sub>total</sub> (psia) 142.926 150.081 150.078 150.124 150.184	Chamber Pressure, psia 12.8370 11.4430 9.9045 8.7265 8.0000		7.3867 0.9620 0.9787 0.9776 0.9745 0.9656	7.8400 0.9634 0.9796 0.9783 0.9754 0.9664	8.2933 0.9644 0.9802 0.9759 0.9669 0.9556 0.9556 0.9309	8.7467 0.9666 0.9804 0.9788 0.9763 0.9676	9.2000 0.9687 0.9813 0.9796 0.9770 0.9685	Azimuth 9.6533 0.9722 0.9819 0.9802 0.9779 0.9699	10.1067 0.9748 0.9826 0.9804 0.9783 0.9704	10.5600 0.9787 0.9825 0.9796 0.9779 0.9701	11.0133 0.9826 0.9801 0.9758 0.9748 0.9661	11.4667 0.9840 0.9749 0.9692 0.9674 0.9568					
11.1 13.1 15.2 17.2 18.8 20.6	P <sub>total</sub> (psia) 142.926 150.081 150.078 150.124 150.184 150.166	Chamber Pressure, psia 12.8370 11.4430 9.9045 8.7265 8.0000 7.2935		7.3867 0.9620 0.9787 0.9776 0.9745 0.9656 0.9533	7.8400 0.9634 0.9796 0.9783 0.9754 0.9664 0.9552	8.2933 0.9644 0.9802 0.9786 0.9759 0.9669 0.9556	8.7467 0.9666 0.9804 0.9788 0.9763 0.9676 0.9558	x/r*, 0° 9.2000 0.9687 0.9813 0.9796 0.9770 0.9685 0.9570	Azimuth 9.6533 0.9722 0.9819 0.9802 0.9779 0.9699 0.9576	10.1067 0.9748 0.9826 0.9804 0.9783 0.9704 0.9593	10.5600 0.9787 0.9825 0.9796 0.9779 0.9701 0.9614	11.0133 0.9826 0.9801 0.9758 0.9748 0.9661 0.9604	11.4667 0.9840 0.9749 0.9692 0.9674 0.9568 0.9482 0.9382 0.9391					
11.1 13.1 15.2 17.2 18.8 20.6 22.4 23.6 27.3	P <sub>total</sub> (psia) 142.926 150.081 150.078 150.124 150.184 150.166 150.158 150.240 150.289	Chamber Pressure, psia 12.8370 11.4430 9.9045 8.7265 8.0000 7.2935 6.6945 6.3730 5.5140		7.3867 0.9620 0.9787 0.9776 0.9745 0.9656 0.9533 0.9276 0.9135 0.9701	7.8400 0.9634 0.9796 0.9783 0.9754 0.9664 0.9552 0.9302 0.9157 1.4766	8.2933 0.9644 0.9802 0.9786 0.9759 0.9669 0.9556 0.9309 0.9245 1.0368	8.7467 0.9666 0.9804 0.9763 0.9676 0.9558 0.9330 0.9154 1.7184	x/r*, 0° 9.2000 0.9687 0.9813 0.9796 0.9770 0.9685 0.9570 0.9355 0.9184 1.3237	Azimuth 9.6533 0.9722 0.9819 0.9802 0.9779 0.9699 0.9576 0.9384 0.9234 0.9844	10.1067 0.9748 0.9826 0.9804 0.9783 0.9704 0.9593 0.9415 0.9286 0.8756	10.5600 0.9787 0.9825 0.9796 0.9779 0.9701 0.9614 0.9457 0.9371 1.0778	11.0133 0.9826 0.9801 0.9758 0.9748 0.9661 0.9604 0.9475 0.9432 1.3079	11.4667 0.9840 0.9749 0.9692 0.9674 0.9568 0.9482 0.9382 0.9382 0.9391 1.3828					
11.1 13.1 15.2 17.2 18.8 20.6 22.4 23.6 27.3 30.2	Ptotal (psia) 142.926 150.081 150.078 150.124 150.184 150.166 150.166 150.240 150.240 150.289	Chamber Pressure, psia 12.8370 11.4430 9.9045 8.7265 8.0000 7.2935 6.6945 6.3730 5.5140 4.9820		7.3867 0.9620 0.9787 0.9776 0.9656 0.9653 0.9276 0.9135 0.9701 0.8410	7.8400 0.9634 0.9796 0.9784 0.9664 0.9552 0.9302 0.9157 1.4766 1.0670	8.2933 0.9644 0.9802 0.9786 0.9759 0.9669 0.9556 0.9309 0.9245 1.0368 1.6415	8.7467 0.9666 0.9804 0.9788 0.9763 0.9676 0.9558 0.9330 0.9154 1.7184 1.2949	x/r*, 0° 9.2000 0.9687 0.9790 0.9770 0.9685 0.9570 0.9355 0.9355 1.3237 1.6630	Azimuth 9.6533 0.9722 0.9819 0.9802 0.9779 0.9699 0.9576 0.9384 0.9234 1.4454	10.1067 0.9748 0.9826 0.9704 0.9783 0.9704 0.9593 0.9415 0.9286 0.8756 1.1580	10.5600 0.9787 0.9825 0.9796 0.9779 0.9701 0.9614 0.9457 0.9371 1.0778 0.9817	11.0133 0.9826 0.9801 0.9758 0.9748 0.9661 0.9604 0.9475 0.9432 1.3079 1.3079	11.4667 0.9840 0.9749 0.9692 0.9674 0.9568 0.9482 0.9382 0.9382 0.9382 1.3828 1.2467					
11.1 13.1 15.2 17.2 18.8 20.6 22.4 23.6 27.3 30.2 35.8	Ptotal (psia) 142.926 150.081 150.078 150.124 150.166 150.166 150.168 150.240 150.240 150.289 150.343	Chamber Pressure, psia 12.8370 11.4430 9.9045 8.7265 8.0000 7.2935 6.6345 6.3730 5.5140 4.9820 4.2005		7.3867 0.9620 0.9787 0.9745 0.9656 0.9533 0.9276 0.9135 0.9270 0.9135 0.9701 0.8410 0.4611	7.8400 0.9634 0.9796 0.9783 0.9754 0.9664 0.9552 0.9302 0.9157 1.4766 1.0670 0.8304	8.2933 0.9644 0.9802 0.9769 0.9669 0.9556 0.9309 0.9245 1.0368 1.6415	8.7467 0.9666 0.9804 0.9763 0.9676 0.9558 0.9330 0.9154 1.7184 1.2949 1.3625	x/r*, 0° 9.2000 0.9687 0.9770 0.9685 0.9770 0.9365 0.9570 0.9355 0.9184 1.3237 1.6630 1.6491	Azimuth 9.6533 0.9722 0.9819 0.9802 0.9779 0.9676 0.9384 0.9234 0.9234 0.9234 1.4454 1.3279	10.1067 0.9276 0.9826 0.9804 0.9783 0.9704 0.9593 0.9415 0.9286 0.8756 1.1580	10.5600 0.9787 0.9825 0.9796 0.9779 0.9719 0.9614 0.9457 0.9371 1.0778 0.9371 1.7472	11.0133 0.9826 0.9801 0.9758 0.9748 0.9604 0.9475 0.9432 1.3079 1.0245 1.2989	11.4667 0.9840 0.9749 0.9692 0.9674 0.9682 0.9382 0.9382 0.9381 1.3828 1.2467 1.1863					
11.1 13.1 15.2 17.2 18.8 20.6 22.4 23.6 27.3 30.2 35.8 38.3	P <sub>total</sub> (psia) 142.926 150.081 150.078 150.124 150.184 150.166 150.158 150.240 150.289 150.343 150.299 150.217	Chamber Pressure, psia 12.8370 11.4430 9.9045 8.7265 8.0000 7.2935 6.6945 6.3730 5.5140 4.9820 4.2005 3.9190		7.3867 0.9620 0.9787 0.9776 0.9656 0.9656 0.9533 0.9276 0.9135 0.9135 0.9135 0.9135 0.9101 0.8410 0.4611	7.8400 0.9634 0.9796 0.9763 0.9664 0.9652 0.9302 0.9157 1.4766 1.0670 0.8304 0.4779	8.2933 0.9644 0.9802 0.9766 0.9659 0.9659 0.9245 1.0368 1.6415 1.0482 0.8232	8.7467 0.9666 0.9804 0.9768 0.9676 0.9658 0.9350 0.9154 1.7184 1.2949 1.3625 1.1837	x/r*, 0° 9.2000 0.9687 0.9813 0.9796 0.9685 0.9670 0.9685 0.9670 0.9184 1.3237 1.6630 1.6491 1.5989	Azimuth 9.6533 0.9722 0.9819 0.9699 0.9576 0.9384 0.9234 0.9234 0.9234 0.9234 1.4454 1.3279 1.6241	10.1067 0.9748 0.9826 0.9804 0.9704 0.9704 0.9593 0.9415 0.9226 0.8756 1.1580 1.5384 1.3917	10.5600 0.9787 0.9825 0.9796 0.9771 0.9614 0.9457 0.9371 1.0778 0.9317 1.7472 1.7472	11.0133 0.9826 0.9801 0.9758 0.9661 0.9661 0.9604 0.9452 1.3079 1.0245 1.2989 1.5703	11.4667 0.9840 0.9749 0.9662 0.9668 0.9462 0.9362 0.9361 1.3828 1.2467 1.1863 1.3123					
11.1 13.1 15.2 17.2 18.8 20.6 22.4 23.6 27.3 30.2 36.8 38.3 43.0	Ptotal (psia) 142.926 150.081 150.078 150.124 150.166 150.166 150.158 150.240 150.240 150.343 150.247 150.321 150.217	Chamber Pressure, psia 12.8370 11.4430 9.9045 8.7265 8.0000 7.2935 6.6945 6.3730 5.5140 4.9820 4.2005 3.9190 3.4975		7.3867 0.9620 0.9787 0.9776 0.9656 0.9656 0.9656 0.9656 0.9276 0.9135 0.9276 0.9701 0.8410 0.36411 0.3394	7.8400 0.9634 0.9796 0.9783 0.9654 0.9654 0.9652 0.9302 0.9157 1.4766 1.0670 0.8304 0.4779 0.3237	8.2933 0.9644 0.9802 0.9786 0.9556 0.9309 0.9245 1.0368 1.6415 1.0482 0.8232 0.4583	8.7467 0.9666 0.9804 0.9768 0.9676 0.9676 0.9558 0.9330 0.9154 1.7184 1.2949 1.3625 1.1837 0.8406	x/r*, 0° 9.2000 0.9687 0.9706 0.9706 0.9685 0.9570 0.9355 0.9355 1.3237 1.6630 1.6491 1.5989 1.0965	Azimuth 9.6533 0.9722 0.9819 0.9802 0.9576 0.9384 0.9234 1.4454 1.3279 1.6241 1.5122	10.1067 0.9748 0.9826 0.9804 0.9783 0.9704 0.9704 0.9593 0.9415 0.9286 0.8756 1.1580 1.1580 1.3814 1.3917 1.7541	10.5600 0.9787 0.9825 0.9796 0.9701 0.9614 0.9457 0.9371 1.0778 0.9817 1.7472 1.7119	11.0133 0.9826 0.9801 0.9758 0.9661 0.9664 0.9475 0.9432 1.3079 1.0245 1.2989 1.5703 1.4150	11.4667 0.9840 0.9692 0.9674 0.9568 0.9482 0.9382 0.9391 1.3828 1.2467 1.1863 1.3123 1.6509					
11.1 13.1 15.2 17.2 18.8 20.6 22.4 23.6 27.3 30.2 35.8 38.3 43.0 46.7	P <sub>total</sub> (psia) 142.926 150.081 150.078 150.124 150.184 150.166 150.158 150.240 150.249 150.343 150.299 150.247 150.362 150.273	Chamber Pressure, psia 12.8370 11.4430 9.9045 8.7265 8.0000 7.2935 6.6945 6.63730 5.5140 4.9620 4.2005 3.9190 3.4975 3.2205		7.3867 0.9620 0.9787 0.9776 0.9745 0.9666 0.9533 0.9276 0.9276 0.9135 0.9276 0.9135 0.9276 0.9135 0.9276 0.9276 0.9135 0.9276 0.9135 0.9276 0.9135 0.9276 0.9145 0.9260 0.9761 0.9762 0.9761 0.9762 0.9765 0.9762 0.9765 0.9762 0.9762 0.9765 0.9762 0.9765 0.9762 0.9776 0.	7.8400 0.9634 0.9796 0.9784 0.9664 0.9664 0.9302 0.9157 1.4766 1.0670 0.8304 0.8304 0.4779 0.3237	8 2933 0.9644 0.9802 0.9756 0.9556 0.9556 0.9309 0.9245 1.0368 1.6415 1.0482 0.8232 0.4583 0.3344	8.7467 0.9666 0.9804 0.9788 0.9763 0.9676 0.9558 0.9330 0.9330 0.9330 0.93154 1.7184 1.2949 1.3625 1.1837 0.8406 0.4766	x/r*, 0° 9.2000 0.9687 0.9813 0.9796 0.9685 0.9570 0.9365 0.9355 0.9184 1.3237 1.6639 1.6491 1.5989 1.0965 0.7971	Azimuth 9.6533 0.9722 0.9819 0.9699 0.9579 0.9699 0.9384 0.9234 0.9234 0.9234 1.3279 1.6241 1.5122 1.1150	10.1067 0.9748 0.9826 0.9804 0.9704 0.9704 0.9793 0.9704 0.9415 0.9286 0.8756 1.15804 1.5384 1.3917 1.7541 1.3619	10.5600 0.9787 0.9825 0.9796 0.9779 0.9701 0.9614 0.9457 0.9371 1.0778 0.9371 1.7778 0.9317 1.7472 1.7119 1.6612	11.0133 0.9826 0.9801 0.9758 0.9768 0.9661 0.9604 0.9475 0.9475 0.9432 1.3079 1.0245 1.2989 1.5703 1.4150 1.8898	11.4667 0.9840 0.9749 0.9674 0.9568 0.9482 0.9382 0.9382 0.9382 1.2465 1.3828 1.2465 1.3123 1.1863 1.3123					
11.1 13.1 15.2 17.2 18.8 20.6 22.4 23.6 27.3 30.2 35.8 38.3 43.0 46.7 50.7	P <sub>total</sub> (psia) 142.926 150.081 150.078 150.124 150.184 150.168 150.158 150.240 150.289 150.243 150.299 150.217 150.362 150.273 150.273	Chamber Pressure, psia 12,8370 11,4430 9,9045 8,7265 8,0000 7,2935 6,6945 6,6345 6,6345 6,6345 4,9820 4,2005 3,9190 3,4975 3,2205 2,9660		7 3867 0.9620 0.9787 0.9776 0.9776 0.9775 0.9775 0.9533 0.9276 0.9135 0.9276 0.9135 0.9276 0.9135 0.9276 0.9105 0.9201 0.8410 0.3686 0.3394 0.3686	7.8400 0.9634 0.9796 0.9783 0.9754 0.9664 0.9552 0.9157 1.4766 1.0670 0.8304 0.8304 0.8304 0.83776 0.3237	8 2933 0.9644 0.9802 0.9765 0.9566 0.9309 0.9245 1.0368 1.6415 1.04832 0.8232 0.4583 0.3344	8.7467 0.9666 0.9788 0.9763 0.9676 0.9558 0.9330 0.9154 1.7184 1.2949 1.3625 1.11837 0.8406 0.4766 0.43483	x/r*, 0° 9.2000 0.9687 0.9736 0.9736 0.9770 0.9685 0.9750 0.9570 0.9557 0.9184 1.3237 1.66391 1.3237 1.56891 1.9965 0.7971 0.4629	Azimuth 9.6533 0.9722 0.9819 0.9602 0.9779 0.9699 0.9576 0.9384 0.9234 0.9234 0.9234 0.9234 0.9234 0.9234 1.4454 1.3279 1.6241 1.5122 1.1150 0.8119	10.1067 0.9748 0.9826 0.9804 0.9783 0.9704 0.9793 0.9415 0.9286 0.8756 1.1580 1.5384 1.3917 1.541 1.3619 1.3670	10.5600 0.9787 0.9825 0.9796 0.9779 0.9614 0.9457 0.9371 1.0778 0.9817 1.7472 1.7472 1.7472 1.7119 1.6612 1.3803	11.0133 0.9826 0.9758 0.9748 0.9661 0.9475 0.9432 1.3079 1.0245 1.2903 1.5703 1.5703 1.5703	11.4667 0.9840 0.9749 0.9692 0.9674 0.9482 0.9382 0.9391 1.3828 1.2467 1.1863 1.3123 1.6509 1.4659 1.8382					
11.1 13.1 15.2 17.2 18.8 20.6 22.4 23.6 27.3 30.2 36.8 38.3 43.0 46.7 50.7 53.9	P <sub>total</sub> (psia) 142.926 150.081 150.078 150.124 150.184 150.166 150.240 150.289 150.343 150.299 150.343 150.299 150.343 150.299 150.343 150.273 150.273 150.273	Chamber Pressure, psia 12,8370 11,4430 9,9045 8,7265 8,0000 7,2335 6,6345 6,3730 5,5140 4,9820 4,2005 3,9190 3,4975 3,2205 2,9660 2,7845		7.3867 0.9620 0.9787 0.9776 0.9745 0.9666 0.9656 0.9135 0.9135 0.9136 0.9136 0.9136 0.9136 0.9136 0.9136 0.9410 0.3686 0.4002 0.4231	7.8400 0.9634 0.9796 0.9783 0.9754 0.9664 0.9552 0.9302 0.9157 1.4766 0.8304 0.4779 0.3237 0.3478 0.3778	8.2933 0.9644 0.9802 0.9765 0.9759 0.9669 0.9309 0.9245 1.03669 1.6415 1.6415 1.6415 0.8232 0.4563 0.3344 0.3603	8.7467 0.9666 0.9804 0.9763 0.9763 0.9558 0.9330 0.9154 1.7184 1.2949 1.3625 1.1837 0.8406 0.4766 0.3483 0.3627	x/r*, 0° 9.2000 0.9687 0.9813 0.9796 0.9796 0.9770 0.9685 0.9184 1.3237 1.6630 1.6630 1.66491 1.5989 1.0965 0.7971 0.4629 0.3577	Azimuth 9.6533 0.9722 0.9819 0.9809 0.9576 0.9384 0.9384 0.9384 0.9384 0.9384 1.4454 1.3279 1.6241 1.5122 1.1150 0.8119 0.4719	10.1067 0.9748 0.9804 0.9783 0.9704 0.9593 0.9415 0.9286 0.8756 0.8756 0.8756 0.8756 1.1580 1.1580 1.1584 1.3917 1.7541 1.3619 1.06770 0.6888	10.5600 0.9787 0.9825 0.9796 0.9779 0.9701 0.9614 0.9457 0.9371 1.0778 0.9817 1.7472 1.7119 1.6612 1.7122 1.3803 0.9130	11.0133 0.9826 0.9801 0.9758 0.9748 0.9661 0.9475 0.9432 1.3079 1.0245 1.2089 1.5703 1.4150 1.4150 1.4150 1.8898	11.4667 0.9840 0.9792 0.9692 0.9674 0.9482 0.9382 0.9382 1.3828 1.2467 1.1863 1.3123 1.3123 1.6509 1.4659 1.4659 1.4659					
11.1 13.1 15.2 17.2 18.8 20.6 22.4 23.6 27.3 30.2 35.8 38.3 43.0 46.7 50.7 53.9 57.1	P <sub>total</sub> (psia) 142.926 150.081 150.078 150.124 150.184 150.168 150.240 150.289 150.240 150.289 150.217 150.227 150.273 150.235 155.180	Chamber Pressure, psia 12.8370 11.4430 9.9045 8.7265 8.0000 7.2935 6.6345 6.6345 6.6345 6.3730 4.9820 4.2005 3.4975 3.29190 3.4975 3.2205 2.9660 2.7845 2.6315		7.3867 0.9620 0.9776 0.9776 0.9533 0.9276 0.9533 0.9276 0.9135 0.9135 0.9135 0.9135 0.9135 0.9135 0.9111 0.3666 0.4611 0.3666 0.3666 0.4002 0.4231 0.4471	7.8400 0.9634 0.9796 0.9783 0.9754 0.9652 0.9302 0.9157 1.4766 1.0670 0.8304 0.8304 0.4779 0.3237 0.3478 0.3478 0.3478	8.2933 0.9644 0.9802 0.9786 0.9759 0.9556 0.9309 0.9245 1.0368 1.6415 1.0462 0.8232 0.4583 0.3604 0.3304 0.3604	8.7467 0.9666 0.9804 0.9783 0.9763 0.9558 0.9330 0.9154 1.7184 1.2949 1.3625 1.1837 0.8406 0.4766 0.3483 0.3627 0.3838	x/r*, 0° 9.2000 0.9687 0.9796 0.9796 0.9770 0.9685 0.9657 0.9355 0.9570 0.9355 0.9184 1.3237 1.6630 1.3237 1.6630 1.3237 1.6491 1.5989 1.0965 0.7971 0.4629 0.3713	Azimuth 9.6533 0.9722 0.9819 0.9802 0.9576 0.9384 0.9576 0.9384 0.9234 0.9234 0.9234 0.9234 0.9234 0.9244 1.4454 1.3279 1.6241 1.5122 1.1150 0.8119 0.4719 0.3614	10.1067 0.9748 0.9826 0.9804 0.9703 0.9704 0.9593 0.9415 0.9286 0.8756 1.1580 1.5384 1.3917 1.7541 1.3619 1.0570 0.6888 0.4116	10.5600 0.9787 0.9825 0.9796 0.9779 0.9614 0.9614 0.9371 1.0778 0.9817 1.7472 1.7119 1.6612 1.7129 1.7422 1.7129 1.3803 0.9190 0.5130	11.0133 0.9826 0.9758 0.9748 0.9604 0.9604 0.9452 1.3079 1.0245 1.2989 1.5703 1.4150 1.8898 1.9349 1.2656 0.6365	11.4667 0.9840 0.9749 0.9692 0.9674 0.9482 0.9382 0.9381 1.3828 1.2467 1.3828 1.3423 1.4659 1.8382 1.4859 1.8382					
11.1 13.1 15.2 17.2 18.8 20.6 22.4 23.6 27.3 30.2 35.8 38.3 43.0 46.7 50.7 53.9 57.1 60.7	$\begin{array}{c} {\sf P}_{\rm wetal} \left( {\sf psia} \right) \\ {\sf 142,926} \\ {\sf 150,081} \\ {\sf 150,078} \\ {\sf 150,124} \\ {\sf 150,124} \\ {\sf 150,146} \\ {\sf 150,168} \\ {\sf 150,240} \\ {\sf 150,210} \\ {\sf 150,210} \\ {\sf 150,210} \\ {\sf 150,210} \\ {\sf 150,195} \\ {\sf 150,195} \\ {\sf 150,315} \\ {\sf 150,195} \\ {\sf 150,315} \\ {\sf 150,315} \\ {\sf 150,315} \\ {\sf 150,315} \\ {\sf 150,195} \\ {\sf 1$	Chamber Pressure, psia 12.8370 11.4430 9.9045 8.7265 8.0000 7.2935 6.6945 6.3730 5.5140 4.9820 4.2005 3.9190 3.4975 3.2205 2.9660 2.7845 2.6315 2.6315		7 3867 0 9620 0 9787 0 9776 0 9745 0 9533 0 9276 0 9135 0 9276 0 9135 0 9276 0 9135 0 9276 0 3344 0 3666 0 3394 0 3394 0 4002 0 4231 0 4477 0 4477	7.8400 0.9634 0.9796 0.9783 0.9654 0.9652 0.9302 0.9157 1.4766 1.0670 0.8304 0.4779 0.3237 0.3478 0.3776 0.4015 0.4245	8 2933 0.9644 0.9802 0.9786 0.9766 0.9556 0.9245 1.0368 1.6415 0.8232 0.4583 0.3344 0.3803 0.3604 0.3803 0.4024	8.7467 0.9666 0.9804 0.9788 0.9763 0.9676 0.9558 0.9330 0.9154 1.7184 1.3625 1.1837 0.8406 0.4766 0.3483 0.3627 0.3838 0.3627	x/r*, 0° 9.2000 0.9687 0.9813 0.9796 0.9706 0.9685 0.9570 0.9355 0.9184 1.3237 1.6630 1.6630 1.66491 1.5989 0.39771 0.39713 0.3577	Azimuth 9.6533 0.9722 0.9819 0.9802 0.9699 0.9576 0.9234 0.9844 1.3279 1.6241 1.5122 1.1150 0.8119 0.4719 0.3782	10.1067 0.9748 0.9826 0.9804 0.9704 0.9793 0.9704 0.9286 0.8756 1.15804 1.3917 1.7541 1.3619 1.0570 0.6888 0.4116 0.6888	10.5600 0.9787 0.9825 0.9796 0.9701 0.9614 0.9371 1.0778 0.93371 1.7472 1.7472 1.7472 1.7612 1.6612 1.3803 0.9190 0.5130 0.3875	11.0133 0.9826 0.9801 0.9758 0.9661 0.9661 0.9642 1.0245 1.2989 1.5703 1.4150 1.4150 1.4150 1.4566 0.6365 0.4161	11.4667 0.9840 0.9749 0.9692 0.9668 0.9482 0.9382 0.9382 0.9382 0.9382 0.9383 1.3828 1.2467 1.1863 1.3123 1.6609 1.4659 1.4659 1.48582 1.5931 0.85881 0.4961					
11.1 13.1 15.2 17.2 18.8 20.6 22.4 23.6 27.3 30.2 35.8 38.3 43.0 46.7 50.7 53.9 57.1	P <sub>total</sub> (psia) 142.926 150.081 150.078 150.124 150.184 150.168 150.240 150.289 150.240 150.289 150.217 150.227 150.273 150.235 155.180	Chamber Pressure, psia 12.8370 11.4430 9.9045 8.7265 8.0000 7.2935 6.6345 6.6345 6.6345 6.3730 4.9820 4.2005 3.4975 3.29190 3.4975 3.2205 2.9660 2.7845 2.6315		7.3867 0.9620 0.9776 0.9776 0.9533 0.9276 0.9533 0.9276 0.9135 0.9135 0.9135 0.9135 0.9135 0.9135 0.9111 0.3666 0.4611 0.3666 0.3666 0.4002 0.4231 0.4471	7.8400 0.9634 0.9796 0.9783 0.9754 0.9652 0.9302 0.9157 1.4766 1.0670 0.8304 0.8304 0.4779 0.3237 0.3478 0.3478 0.3478	8.2933 0.9644 0.9802 0.9786 0.9759 0.9556 0.9309 0.9245 1.0368 1.6415 1.0462 0.8232 0.4583 0.3604 0.3304 0.3604	8.7467 0.9666 0.9804 0.9783 0.9763 0.9558 0.9330 0.9154 1.7184 1.2949 1.3625 1.1837 0.8406 0.4766 0.3483 0.3627 0.3838	x/r*, 0° 9.2000 0.9687 0.9796 0.9796 0.9770 0.9685 0.9657 0.9355 0.9570 0.9355 0.9184 1.3237 1.6630 1.3237 1.6630 1.3237 1.6491 1.5989 1.0965 0.7971 0.4629 0.3713	Azimuth 9.6533 0.9722 0.9819 0.9802 0.9576 0.9384 0.9576 0.9384 0.9234 0.9234 0.9234 0.9234 0.9234 0.9244 1.4454 1.3279 1.6241 1.5122 1.1150 0.8119 0.4719 0.3614	10.1067 0.9748 0.9826 0.9804 0.9703 0.9704 0.9593 0.9415 0.9286 0.8756 1.1580 1.5384 1.3917 1.7541 1.3619 1.0570 0.6888 0.4116	10.5600 0.9787 0.9825 0.9796 0.9779 0.9614 0.9614 0.9371 1.0778 0.9817 1.7472 1.7119 1.6612 1.7129 1.7422 1.7129 1.3803 0.9190 0.5130	11.0133 0.9826 0.9758 0.9748 0.9604 0.9604 0.9452 1.3079 1.0245 1.2989 1.5703 1.4150 1.8898 1.9349 1.2656 0.6365	11.4667 0.9840 0.9749 0.9692 0.9674 0.9482 0.9382 0.9381 1.3828 1.2467 1.3828 1.3423 1.4659 1.8382 1.4859 1.8382					

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								um uu	W 115U	cam.								
									,	dr*, 180	" Azimutl	h						
NPR	Nozzle P <sub>ixel</sub> (psia)	Pané, Vacuum Chamber Pressure, psia	0 3600	0.8133	1 2687	17200	2 1733	2 8287	3 0800	3 5333	3 9667	4 4400	4 8933	5 3487	5 8000	6 2533	6 7087	7 1600
11.0	141.393	12 8490	3 407F-02	3 107E-02	2.687E-02	8 441E-02	8 706F-02	8 830E-02	8 880F-02	8 913F-02	8 933E-02	8 944E-02	8 948F-02	8 946E-02	8 951E-02	8 951E-02	8 947E-02	8 952E-02
19.7	150.262	10.9565	3.420L 02	3.110L 02	2.751L-02	2,404L-02	6.070L 02	7.007L 02	7.0601, 02	7.0961.02	7.110L 02	7.130L 02	7.144L 02	7.1401_02	7.152L 02	7.154L 02	7.167L-02	7.159L 02
16.0	150 255	9.3635	3 414E-02	3 116E-02	2 747E-02	2 375E-02	2.047E-07	5 783E-02	5 951E-02	6-006E-02	6.038E-02	6 057E-02	6.072E-02	6.079E-02	6.084E-02	6 086E-02	6.0595-02	6.092E-02
10.5	150,105	0.1005	3.403L 02	3.101L 02	2.700L 02	2.064L 02	2.033L 02	1.770L-02	4.517L 02	5.012L 02	5.106L 02	5.146L 02	6.169L 02	5.182L 02	5.187L 02	5.191L 02	5.193L 02	5.195L 02
19.8	150.285	7 5895	3 4205-02	3 113E-02	2 747E-02	2 374E-02	2.032E-02	1 771E-02	1.570E-02	4 3295-02	4 652E-02	4 7495-02	4 792E-02	4 815E-02	4 829E-02	4 831E-02	4 831E-02	4 835E-02
21.4	160.316	7.0105	3.400L 02	3.105L 02	2.704L 02	2.365L 02	2.034L 02	1.770L-02	1.570L 02	1.409L-02	3.559L 02	4.139L 02	4.250L 02	4.016L 02	4.354L-02	4.061L-02	4.060L 02	4.370L 02
22.7	150 246	6 6260	3 4065-02	3 1065-02	2 708F-02	2 365E-02	2.0355-02	1 7695-02	1 571E-02	1402E-02	1.785E-02	3.043E-02	3 7555-02	3 915E-02	3 985E-02	4 017E-02	4.024E-02	4.0405-02
24.7	160.290	6.0745	3.401L 02	3.101L 02	2.701L-02	2.067L-02	2.030L 02	1.769L 02	1.572L 02	1.402L 02	1.271L 02	1.160L 02	1.070L 02	1.002L 02	9.628L-03	2.469L 02	3.066L 02	4.270L 02
27.6	150 240	5 4455	3414E-02	3 106F-02	2 7105-02	2 366F-02	2.031E-02	1 770E-02	1 559E-02	1402E-02	1 271E-02	1 1595-02	1.074E-02	1.002E-02	9 412E-03	8.956F-03	2 214E-02	2.879E-02
31.9	160.338	4.7140	3.416L 02	3.114L 02	2.752L-02	2.373L 02	2.031L 02	1.771L-02	1.566L 02	1.402L 02	1.276L 02	1.160L 02	1.079L 02	1.005L 02	9.469L 03	8.910L 03	0.807L-03	1.022L 02
37.4	150.321	4 0210	3 407E-02	3 101E-02	2 710E-02	2 365E-02	2.0297-02	1 772E-02	1 572E-02	14035-02	1 273E-02	1 150E-02	1.074E-02	1.003E-02	9 413E-03	8 894E-03	8 4555-03	8.010F-03
40.0	160.209	3,7550	3.414L 02	3.117L 02	2.749L 02	2.375L 02	2.034L 02	1.773L-02	1.560L 02	1.401L 02	1.277L 02	1.164L 02	1.079L 02	1.005L 02	9.462L-03	8.916L 03	8.477L-03	8.0581, 03
45.6	150 299	3 2935	3417E-02	3 112E-02	2 752E-02	2 375E-02	2.032E-02	1 771E-02	1 556E-02	1401E-02	1 277E-02	1 164E-02	1.079E-02	1.005E-02	9 (61F-03	8 916E-03	8 476E-03	8 057E-03
40.5	160.221	3.0965	3.404L 02	3.105L 02	2.710L-02	2.067L 02	2.034L 02	1.772L-02	1.572L 02	1.402L 02	1.270L 02	1.160L 02	1.074L 02	1.000L 02	9.419L-03	8.094L 03	8.464L 03	8.000L 03
52.2	150 295	2 8765	3 403F-02	3 107E-02	2 707E-02	2 3595-02	2.034E-02	1 770E-02	1 572E-02	1401E-02	1 271E-02	1 1605-02	1.074E-02	1.002E-02	9 415E-03	8 8895-03	8 4505-03	8 011E-03
56.9	160.220	2.6405	3.412L 02	3.109L 02	2.715L-02	2.067L 02	2.035L 02	1.769L 02	1.570L 02	1.401L-02	1.272L 02	1.169L 02	1.074L 02	1.000L 02	9.410L-03	8.094L 03	8.464L 03	8.000L 03
63.5	150 282	2.3675	3 412E-02	3 105E-02	2 708E-02	2 366F-02	2.036E-02	1 772E-02	1 572E-02	1 (03F-02	1 273E-02	1 1605-02	1.074E-02	1.003E-02	9 416E-03	8 850F-03	8 (51E-03	8.012E-03
67.4	150.295	2,2300	3,4201, 02	3.110L 02	2.752L-02	2.077L-02	2.035L 02	1.770L-02	1.5601, 02	1.402L 02	1.270L 02	1.164L 02	1.081L 02	1.006L 02	9.461L-03	8.922L 03	8.490L 03	8.0541_03

### Table A4a. PAR 180° Azimuth normalized (by Pc) wall pressures as presented in figure 21a. Diffuser inlet 127 mm downstream.

10.5	150,108	0.1005	5.194L 02	5.194L 02	6.199L 02	5.200L 02	5.206L 02	5.211L 02	5.219L 02	6.199L 02	5.137L 02	6.041L-02	
19.8	150.285	7.5895	4 8395-02	4 843E-02	4 843E-02	4 843E-02	4 850E-02	4 853E-02	4 854E-02	4 851E-02	4 826E-02	4 737E-02	
21,4	160.316	7.0105	4.070L 02	4.072L 02	4.060L 02	4.080L-02	4.092L 02	4.407L 02		4.430L 02	4.400L 02		
22.7	150 246	6 6260	4.045E-02	4.0495-02	4.055E-02	4.075E-02	4.051E-02	4 1105-02	4 135E-02	4 159E-02	4 158E-02	4.0595-02	
24.7	150,290	6.0745	6.000L 02	5.565L 02	6.011L-02	4.257L 02	3.517L 02	3.769L-02	5.285L 02	5.707L 02	4.010L 02	3.642L 02	
27.6	150 240	5 4455	3 6097-02	5 289F-02	3.627E-02	6 951E-02	4 8495-02	3 558F-02	3 032E-02	3 622E-02	4 784E-02	5 312E-02	
31.9	150.338	4.7140	2.636L 02	3.223L 02	4.694L 02	4.012L 02	4.544L 02	6.436L 02	4.004L 02		2.099L 02	3.376L 02	
37.4	150.321	4 0210	1 102E-02	2 175E-02	2.6505-02	3 586F-02	4 431E-02	3 (95E-02	4 1495-02	4 770E-02	3 671E-02	3 238F-02	
40.0	160.209	0.7550	7.7456-03	1.010L 02	2.210L 02	2.637L 02	3.715L-02		3.270L 02				
45.6	150 299	3 2935	7 691E-03	7.372E-03	1.071E-02	1 7495-02	2 335F-02	2 958F-02	3 741E-02	3 764F-02	3 204E-02	3 3875-02	
40.5	160.221	0.0965	7.622L-03	7.216L 03	6.963L-03	1.0701_02						2.085L 02	
52.2	150 295	2 8765	7.6255-03	7 219E-03	6.900F-03	6.687E-03	8 537F-03	1.611E-02	2.0535-02	2 6395-02		3 6535-02	
66.9	160.220	2.6405	7.622L-03	7.223L 03	6.900L 03			6.590L 03		9,0501,03		1.660L 02	
63.5	150 282	2.3675	7 6195-03	7 220E-03	6 834F-03	6.634F-03	6 348F-03	6 115E-03	5 876E-03	5 723E-03	5.689F-03	6 554F-03	
67.A	160.295	2.2300	7.690L 03	7.292L 03	6.940L 03	6.667L 03	6.407L-03	6.161L.03	6.936L 03	6.736L-03	6.689L 03	6.549L 03	

x/r\*, 180" Azimuth

7 6133 8 0887 8 5200 8 9733 9 4287 9 8600 10 3333 10 7867 11 2400 11 8933

7.160L 02 7.109L 02 7.109L 02 7.169L 02 7.167L 02 7.169L 02 7.169L 02 7.167L 02 7.171L 02 7.07.1 02 7.019L 02 8 0555-02 8 0555

8.042E-02 8.037E-02 8.031E-02 8.021E-02 8.854E-02 8.836E-02 8.713E-02 8.542E-02

P<sub>ant</sub>, Vacuum Chamber Pressure, psia

2 8490

0.9565

8 945E-02 8 942E-02

Nozzle

ear (poi) 141,393

50.262

NPR

Table A4b. PAR 180° Azimuth normalized (by Pamb) wall pressures as presented in figure 21b. Diffuser inlet127 mm downstream.

							14/	mm a	owns	ream	•							
									X	/r*, 180	° Azimu	th						
NPR	Nozzle P <sub>total</sub> (psia)		0.3600	0.8133	1.2667	1.7200	2.1733	2.6267	3.0800	3.5333	3.9867	4.4400	4.8933	5.3467	5.8000	6.2533	6.7067	7.1600
11.00	141.393	12.8490	0.3749	0.3419	0.2951	0.9289	0.9581	0.9717	0.9772	0.9808	0.9830	0.9842	0.9847	0.9844	0.9850	0.9850	0.9846	0.9851
13.71	150.262	10.9565	0.4690	0.4276	0.3773	0.3298	0.9422	0.9610	0.9683	0.9731	0.9761	0.9779	0.9797	0.9802	0.9809	0.9811	0.9815	0.9818
16.05	150.255	9.3635	0.5479	0.5000	0.4408	0.3812	0.3284	0.9280	0.9550	0.9637	0.9689	0.9720	0.9744	0.9755	0.9762	0.9766	0.9771	0.9776
18.54	150.188	8.1005	0.6309	0.5749	0.5006	0.4382	0.3769	0.3281	0.8375	0.9292	0.9466	0.9541	0.9583	0.9608	0.9618	0.9625	0.9628	0.9633
19.80	150.285	7.5895	0.6771	0.6165	0.5440	0.4701	0.4024	0.3506	0.3108	0.8572	0.9232	0.9404	0.9489	0.9534	0.9562	0.9566	0.9567	0.9575
21.44	150.315	7.0105	0.7306	0.6659	0.5798	0.5071	0.4361	0.3794	0.3366	0.3021	0.7631	0.8874	0.9135	0.9255	0.9329	0.9350	0.9355	0.9370
22.68	150.246	6.6260	0.7724	0.7042	0.6141	0.5364	0.4615	0.4011	0.3562	0.3178	0.2916	0.6900	0.8515	0.8877	0.9037	0.9110	0.9125	0.9161
24.74	150.290	6.0745	0.8416	0.7673	0.6684	0.5857	0.5023	0.4377	0.3890	0.3469	0.3144	0.2871	0.2655	0.2479	0.2382	0.6157	0.7584	1.0564
27.59 31.89	150.240 150.338	5.4455 4.7140	0.9419	0.8569	0.7478	0.6526	0.5603	0.4883 0.5649	0.4330	0.3867	0.3506	0.3197	0.2962	0.2766	0.2597	0.2472 0.2843	0.6110	0.7944 0.5810
37.38	150.330	4.0210	1.0095	1.1594	1.0129	0.7567	0.6479	0.6623	0.4996	0.4470	0.4071	0.4337	0.3441	0.3205	0.3519	0.2043	0.3161	0.5610
40.02	150.321	3.7550	1.3664	1.1594	1.1004	0.0041	0.7505	0.0023	0.5677	0.5245	0.4760	0.4557	0.4014	0.3746	0.3519	0.3569	0.3393	0.3225
40.02	150.209	3.2935	1.5594	1.4201	1.2558	1.0840	0.9273	0.8083	0.7144	0.6394	0.5827	0.4050	0.4925	0.4588	0.4318	0.4069	0.3368	0.3225
45.64	150.233	3.0965	1.6515	1.5062	1.3163	1.1481	0.9869	0.8597	0.7628	0.6801	0.6175	0.5626	0.4325	0.4366	0.4570	0.4005	0.4101	0.3885
52.25	150.295	2.8765	1.7779	1.6232	1.4146	1.2376	1.0627	0.9247	0.8211	0.7321	0.6643	0.6059	0.5611	0.5236	0.4919	0.4645	0.4415	0.4186
56.89	150.220	2.6405	1.9413	1.7686	1.5448	1.3463	1.1577	1.0066	0.8930	0.7972	0.7237	0.6593	0.6109	0.5703	0.5355	0.5060	0.4410	0.4100
63.48	150.282	2.3675	2.1656	1.9709	1.7187	1.5020	1.2925	1.1248	0.9977	0.8904	0.8080	0.7362	0.6817	0.6365	0.5977	0.5643	0.5364	0.5086
67.40	150.295	2.2300	2.3049	2.0978	1.8547	1.6018	1.3717	1.1946	1.0570	0.9448	0.8614	0.7843	0.7283	0.6780	0.6377	0.6013	0.5722	0.5435
							X	/r*, 180	° Azimu	th								
NPR	Nozzle P <sub>total</sub> (psia)	P <sub>amb</sub> , Vacuum Chamber Pressure, psia		7.6133	8.0667	8.5200	8.9733	9.4267	9.8800	10.3333	10.7867	11.2400	11.6933					
11.0	141.393	12.8490		0.9844	0.9840	0.9840	0.9834	0.9828	0.9816	0.9787	0.9724	0.9588	0.9400					
13.7	150.262	10.9565		0.9820	0.9819	0.9818	0.9830	0.9833	0.9824	0.9816	0.9780	0.9706	0.9621					
16.0	150.255	9.3635		0.9781	0.9779	0.9782	0.9784	0.9788	0.9784	0.9779	0.9741	0.9664	0.9554					
18.5	150.188	8.1005		0.9630	0.9630	0.9639	0.9641	0.9650	0.9661	0.9676	0.9640	0.9524	0.9346					
19.8	150.285	7.5895		0.9583	0.9590	0.9590	0.9591	0.9604	0.9611	0.9632	0.9626	0.9557	0.9380					
21.4	150.315	7.0105		0.9370	0.9375	0.9392	0.9399	0.9417	0.9449	0.9486	0.9506	0.9440	0.9190					
22.7	150.246	6.6260		0.9171	0.9181	0.9217	0.9239	0.9276	0.9319	0.9375	0.9431	0.9428	0.9226					
24.7	150.290	6.0745		1.3132	1.3769	1.6851	1.0533	0.8702	0.9316	1.3076	1.4120	1.0682	0.9010					
27.6	150.240	5.4455		0.9957	1.4592	1.0006	1.9177	1.3378	0.9845	0.8367	0.9992	1.3198	1.4656					
31.9	150.338	4.7140		0.8407	1.0280	1.4970	1.2796	1.4493	1.7336	1.2768	1.0554	0.9245	1.0768					
37.4	150.321	4.0210		0.4121	0.8132	0.9945	1.3405	1.6563	1.3066	1.5511	1.7834	1.3725	1.2106					
40.0	150.289	3.7550		0.3100	0.5257	0.8844	1.0554	1.4868	1.7302	1.3119	1.5116	1.8040	1.3870					
45.6	150.299	3.2935		0.3510	0.3364	0.4888	0.7982	1.0657	1.3636	1.7070	1.7176	1.4623	1.5455					
48.5	150.221	3.0965		0.3698	0.3501	0.3378	0.5190	0.8684	1.1077	1.4549	1.8711	1.7429	1.3996					
52.2	150.295	2.8765		0.3984	0.3772	0.3605	0.3494	0.4460	0.8420	1.0728	1.3788	1.8456	1.9086					
56.9	150.220	2.6405		0.4336	0.4109	0.3927	0.3772	0.3624	0.3749	0.4389	0.5151	0.6287	0.9487					
63.5	150.282	2.3675		0.4836	0.4583	0.4376	0.4211	0.4030	0.3882	0.3730	0.3633	0.3611	0.4161					
67.4	150.295	2.2300		0.5188	0.4915	0.4677	0.4493	0.4318	0.4152	0.4000	0.3865	0.3834	0.3740					

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#### Table A5a. PAR 0° Azimuth normalized (by P<sub>c</sub>) wall pressures as presented in figure 22a. Diffuser inlet 127 mm downstream.

										x/r*, 0°	Azimuth							
NPR	Nozzle P <sub>total</sub> (psia)	P <sub>amb</sub> , Vacuum Chamber Pressure, psia	0.1333	0.5867	1.0400	1.4933	1.9467	2.4000	2.8533	3.3067	3.7600	4.2133	4.6667	5.1200	5.5733	6.0267	6.4800	6.9333
12.9	150.207	11.6750	4.382E-02	3.379E-02	2.929E-02	2.553E-02	2.167E-02	1.783E-02	1.697E-02	2.313E-02	3.244E-02	4.134E-02	5.047E-02	8.024E-02	7.966E-02	6.657E-02	7.462E-02	7.423E-02
13.3	150.200	11.3110		3.379E-02	2.930E-02	2.552E-02	2.164E-02	1.781E-02	1.640E-02	1.460E-02	1.326E-02	3.467E-02	4.130E-02	7.358E-02	9.885E-02	7.397E-02	6.452E-02	
14.4	150.173	10.4535	4.386E-02	3.377E-02	2.932E-02	2.552E-02	2.166E-02	1.784E-02	1.641E-02	1.462E-02	1.325E-02	1.218E-02	3.604E-02	4.824E-02	9.887E-02	7.920E-02	5.263E-02	
17.6 21.3	150.111 150.078	8.5365 7.0395	4.390E-02 4.383E-02	3.385E-02 3.381E-02	2.934E-02 2.930E-02	2.552E-02 2.552E-02	2.163E-02 2.165E-02	1.781E-02 1.781E-02	1.640E-02 1.640E-02	1.460E-02 1.461E-02	1.323E-02 1.324E-02	1.206E-02 1.207E-02	1.148E-02 1.114E-02	3.240E-02 1.031E-02	4.265E-02 2.302E-02	6.647E-02 3.216E-02	1.017E-01 4.807E-02	5.335E-02 6.261E-02
21.5	150.078	6.4470	4.363E-02 4.360E-02	3.385E-02	2.930E-02 2.943E-02	2.552E-02 2.562E-02	2.165E-02 2.165E-02	1.781E-02	1.640E-02	1.461E-02	1.324E-02 1.323E-02	1.207E-02	1.114E-02	1.027E-02	9.793E-02	2.701E-02	3.216E-02	
23.3	130.312	0.4470	4.3002-02	3.303E-02	2.3436-02	2.3021-02	2.1056-02	1.7002-02	1.0402-02	1.4012-02	1.3236-02	1.2002-02	1.1002-02	1.02712-02	3.133L-03	2.7012-02	3.210L-02	3.420L*02
								x/r*, 0°	Azimuth									
NPR	Nozzle P <sub>total</sub> (psia)	P <sub>amb</sub> , Vacuum Chamber Pressure, psia		7.3867	7.8400	8.2933	8.7467	9.2000	9.6533	10.1067	10.5600	11.0133	11.4667					
12.9	150.207	11.6750		7.349E-02	7.460E-02	7.372E-02	7.316E-02	7.390E-02	7.394E-02	7.463E-02	7.516E-02	7.518E-02	7.581E-02					
13.3	150.200	11.3110		6.740E-02	6.965E-02	7.313E-02	6.803E-02	7.390E-02	7.106E-02	7.295E-02	7.286E-02	7.254E-02	7.320E-02					
14.4	150.173	10.4535		7.894E-02	5.593E-02	6.684E-02	7.198E-02	5.976E-02	7.216E-02	6.452E-02	6.893E-02	6.658E-02	6.821E-02					
17.6	150.111	8.5365		4.268E-02	6.304E-02	7.111E-02	4.856E-02	5.421E-02	6.818E-02	5.721E-02	5.554E-02	6.379E-02	5.877E-02					
21.3	150.078	7.0395		7.678E-02	5.994E-02	3.909E-02	4.127E-02	5.952E-02	5.808E-02	4.516E-02	4.452E-02	5.405E-02	5.686E-02					
23.3	150.312	6.4470		5.051E-02	7.641E-02	5.658E-02	3.738E-02	3.774E-02	5.320E-02	5.982E-02	4.837E-02	3.942E-02	4.569E-02					

## Table A5b. PAR 0° Azimuth normalized (by P<sub>amb</sub>) wall pressures as presented in figure 22b. Diffuser inlet 127 mm downstream.

										x/r*, 0°	Azimuth	ı						
NPR	Nozzle P <sub>total</sub> (psia)	P <sub>amb</sub> , Vacuum Chamber Pressure, psia	0.1333	0.5867	1.0400	1.4933	1.9467	2.4000	2.8533	3.3067	3.7600	4.2133	4.6667	5.1200	5.5733	6.0267	6.4800	6.9333
12.9	150.207	11.6750	0.5638	0.4348	0.3768	0.3285	0.2788	0.2294	0.2183	0.2976	0.4173	0.5319	0.6493	1.0323	1.0249	0.8565	0.9600	0.9550
13.3	150.200	11.3110	0.5819	0.4488	0.3891	0.3389	0.2874	0.2365	0.2178	0.1939	0.1761	0.4604	0.5484	0.9771	1.3127	0.9823	0.8568	1.0485
14.4	150.173	10.4535	0.6301	0.4851	0.4212	0.3667	0.3112	0.2563	0.2358	0.2101	0.1904	0.1750	0.5177	0.6931	1.4203	1.1377	0.7560	0.9647
17.6	150.111	8.5365	0.7720	0.5953	0.5160	0.4488	0.3804	0.3131	0.2884	0.2567	0.2326	0.2121	0.2020	0.5698	0.7500	1.1689	1.7888	0.9382
21.3	150.078	7.0395	0.9344	0.7208	0.6248	0.5441	0.4615	0.3797	0.3497	0.3115	0.2823	0.2573	0.2375	0.2199	0.4908	0.6857	1.0248	1.3348
23.3	150.312	6.4470	1.0164	0.7892	0.6861	0.5973	0.5049	0.4168	0.3842	0.3406	0.3085	0.2797	0.2579	0.2395	0.2283	0.6298	0.7498	1.2655
								x/r*, 0°	Azimuth	1								
NPR	Nozzle P <sub>total</sub> (psia)	P <sub>amb</sub> , Vacuum Chamber Pressure, psia		7.3867	7.8400	8.2933	8.7467	9.2000	9.6533	10.1067	10.5600	11.0133	11.4667					
12.9	150.207	11.6750		0.9454	0.9598	0.9484	0.9412	0.9508	0.9513	0.9602	0.9670	0.9673	0.9753					
13.3	150.200	11.3110		0.8951	0.9249	0.9711	0.9034	0.9813	0.9436	0.9687	0.9676	0.9633	0.9721					
14.4	150.173	10.4535		1.1340	0.8035	0.9602	1.0341	0.8586	1.0367	0.9269	0.9903	0.9565	0.9800					
17.6	150.111	8.5365		0.7504	1.1085	1.2504	0.8539	0.9533	1.1989	1.0060	0.9766	1.1218	1.0334					
21.3	150.078	7.0395		1.6369	1.2778	0.8334	0.8799	1.2690	1.2382	0.9629	0.9491	1.1522	1.2122					
23.3	150.312	6.4470		1.1776	1.7816	1.3191	0.8714	0.8799	1.2404	1.3948	1.1278	0.9190	1.0653					

### Table A6a. PAR 180° Azimuth normalized (by P<sub>c</sub>) wall pressures as presented in figure 23a. Diffuser inlet 127 mm downstream.

									1	x/r*, 180	" Azimuth	1						
NPR	Nozzle P <sub>ical</sub> (psia)	P <sub>ant</sub> , Vacuum Chamber Pressure, psia	0.3600	0.8133	1.2067	1./200	2.1733	2.6267	3.0800	3.5333	3.9867	4.4400	4.8933	6.3467	5.8000	6.2533	6.7067	7.1000
13 03	150 199	11 5275	3 (11E-02	3 1105-02	2 712E-02	2 358F-02	2.044E-02	1 770E-02	1 571E-02	1.401E-02	3 154E-02	4.045E-02	6.427E-02	1.023E-01	8 133E-02	6 (89F-02	7 808F-02	7 133E-02
13.74	150,178	10.9320	3.414L 02	3.100L 02	2.709L 02	2.365L 02	2.041L 02	1.771L-02	1.571L 02	1.400L 02	1.201L-02	3.719L 02	4.977L 02	1.010_01	7.030L 02	5.610L 02	7.5401 02	
16.28	150 217	9.2250	3 412E-02	3 108E-02	2 7165-02	2 357E-02	2.042E-02	1 771E-02	1 571E-02	1 403E-02	1 273E-02	1.168E-02	3 341E-02	4.049E-02	6 882E-02	1.0405-01	5 310E-02	4 5805-02
18.94	150,124	7.9270	3.3991.02	3.103L 02	2,7061,02	2.060L 02	2.042L 02	1.770_02	1.570± 02	1,400L 02	1.274L 02	1.161L 02	1.004L-02	3.085L 02	3,5901,02	6.270L 02		6.6601, 02
22.13	150 133	6 7850	3 4095-02	3 106E-02	2 708F-02	2 356F-02	2.044E-02	1.771E-02	1 572E-02	1 401E-02	1 274E-02	1 160E-02	1.074E-02	1.010F 02	2 658E-02	3 235E-02	4 956F-02	5 211E-02
							1	dr`, 180	° Azimut	'n								
NPR	Nozzie P <sub>iese</sub> (psis)	P <sub>rest</sub> , Vacuum Chamber Pressure, paia		7.6133	8.0067	8.5200	8.9733	9.4267	9.8800	10.3333	10.7867	11.2400	11.0933					
13.03	160,199	11.5275		6.052L 02	7.596L 02	6.090L 02	7.460L 02	7.166L 02	7.3501.02	7.010L 02	7.069L 02	7.439L 02						
13.74	150 178	10 9320		6 131E-02	7 3595-02	6.673E-02	6 923F-02	7.0305-02	6 856F-02	6 991E-02	6 972E-02	7.031E-02	7 078E-02					
16.28	150.217	9,2250		7.041L 02	6.722L 02	4.050L 02	6.560L 02	6.081L 02	6.410L 02	6.591L 02	6.017L 02		6.541L 02					
18.94	150 124	7 9270		4 351E-02	4 417E-02	7 103E-02		4 287E-02	5 267E-02	6 896E-02	5 128E-02	4 913E-02	6 3935-02					
22.13	160,133	6.7050		7.984L 02	<ol> <li>(22) 02</li> </ol>	3.917L 02	3 (24) 112	4.520 112	6 1021 112	4.6911-02	1.9/12 112	4 (21) 112	A 9014 112	1				

# Table A6b. PAR 180° Azimuth normalized (by P<sub>amb</sub>) wall pressures as presented in figure 23b. Diffuser inlet 127 mm downstream.

									X	/r*, 180	° Azimut	th						
NPR	Nozzle P <sub>total</sub> (psia)	P <sub>amb</sub> , Vacuum Chamber Pressure, psia	0.3600	0.8133	1.2667	1.7200	2.1733	2.6267	3.0800	3.5333	3.9867	4.4400	4.8933	5.3467	5.8000	6.2533	6.7067	7.1600
13.0	150.199	11.5275	0.4444	0.4052	0.3534	0.3085	0.2663	0.2307	0.2047	0.1826	0.4110	0.5270	0.8375	1.3328	1.0596	0.8455	1.0174	0.9294
13.7	150.178	10.9320	0.4690	0.4263	0.3721	0.3249	0.2804	0.2433	0.2159	0.1927	0.1760	0.5103	0.6838	1.3876	1.0761	0.7710	1.0358	0.9953
16.3	150.217	9.2260	0.5556	0.5060	0.4422	0.3854	0.3325	0.2884	0.2558	0.2285	0.2072	0.1901	0.5439	0.6592	1.1205	1.6927	0.8645	0.7457
18.9	150.124	7.9270	0.6437	0.5876	0.5124	0.4485	0.3867	0.3352	0.2978	0.2657	0.2413	0.2199	0.2052	0.5843	0.6798	1.1890	1.6791	1.2614
22.1	150.133	6.7850	0.7543	0.6873	0.5993	0.5235	0.4522	0.3919	0.3478	0.3101	0.2819	0.2566	0.2377	0.2234	0.5947	0.7158	1.1033	1.1531
							x	/r*, 180	° Azimu	th								
NPR	Nozzle P <sub>total</sub> (psia)	P <sub>amb</sub> , Vacuum Chamber Pressure, psia		7.6133	8.0667	8.5200	8.9733	9.4267	9.8800	10.3333	10.7867	11.2400	11.6933					
13.0	150.199	11.5275		0.8928	0.9897	0.8981	0.9746	0.9337	0.9588	0.9525	0.9627	0.9692	0.9786					
13.7	150.178	10.9320		0.8423	1.0164	0.9167	0.9511	0.9657	0.9432	0.9604	0.9578	0.9659	0.9724					
16.3	150.217	9.2260		1.1952	1.0944	0.7925	1.0690	1.1203	0.8822	1.0732	1.0285	0.9642	1.0650					
18.9	150.124	7.9270		0.8240	0.8365	1.3451	1.1637	0.8119	0.9975	1.3059	0.9712	0.9305	1.2107					
22.1	150.133	6.7850		1.7665	1.2660	0.8666	0.8233	1.2230	1.3945	1.0158	0.8799	1.0562	1.3066					

							r	nm do	ownsti	ream.								
										x/r*, 0° /	Azimuth							
NPR	Nozzle P <sub>total</sub> (psia)	P <sub>amb</sub> , Vacuum Chamber Pressure, psia	0.1333	0.5867	1.0400	1.4933	1.9467	2.4000	2.8533	3.3067	3.7600	4.2133	4.6667	5.1200	5.5733	6.0267	6.4800	6.9333
11.3	143.859	12.7550	4.352E-02	3.376E-02	2.934E-02	7.803E-02							8.549E-02			8.555E-02	8.555E-02	8.559E-02
13.2	150.606	11.4455	4.367E-02	3.378E-02		2.566E-02	6.923E-02		7.310E-02		7.385E-02	7.410E-02	7.428E-02	7.431E-02		7.445E-02		7.455E-02
18.3	150.603	8.2310	4.355E-02	3.373E-02	2.936E-02	2.563E-02	2.163E-02				5.101E-02	5.164E-02	5.206E-02	5.224E-02		5.242E-02		5.258E-02
19.8	150.609	7.5970	4.351E-02	3.374E-02	2.935E-02	2.565E-02	2.163E-02	1.780E-02			4.411E-02	4.639E-02	4.718E-02	4.759E-02		4.793E-02		4.809E-02
21.2	150.69	7.1200	4.357E-02	3.379E-02	2.935E-02	2.564E-02	2.163E-02	1.780E-02	1.646E-02		3.106E-02			4.338E-02	4.400E-02	4.414E-02	4.422E-02	4.440E-02
22.6	150.55 150.627	6.6540 5.8335	4.355E-02	3.381E-02 3.374E-02	2.935E-02	2.565E-02 2.563E-02	2.161E-02 2.162E-02	1.780E-02 1.779E-02	1.646E-02		1.352E-02		3.647E-02 1.113E-02		4.022E-02 9.560E-03		4.070E-02 2.273E-02	4.088E-02 2.892E-02
25.8 29.0	150.627	5.8335	4.353E-02 4.355E-02	3.374E-02 3.373E-02	2.932E-02 2.937E-02	2.563E-02 2.563E-02	2.162E-02 2.163E-02	1.779E-02 1.780E-02	1.646E-02 1.647E-02	1.461E-02 1.462E-02	1.320E-02 1.321E-02	1.204E-02 1.205E-02	1.113E-02 1.112E-02	1.026E-02 1.026E-02				2.892E-02 1.343E-02
33.3	150.652	4.5260	4.355E-02 4.360E-02	3.373E-02 3.379E-02	2.937E-02 2.933E-02	2.562E-02	2.163E-02 2.161E-02	1.779E-02	1.647E-02 1.646E-02	1.462E-02 1.460E-02	1.321E-02 1.320E-02	1.205E-02 1.205E-02	1.112E-02	1.026E-02	9.572E-03 9.583E-03	9.061E-03 9.079E-03	8.634E-03	1.343E-02 8.315E-03
37.2	150.573	4.0500	4.365E-02	3.380E-02	2.935E-02	2.560E-02	2.161E-02	1.779E-02		1.460E-02	1.319E-02	1.205E-02	1.112E-02	1.025E-02	9.585E-03	9.080E-03	8.642E-03	8.283E-03
41.5	150.588	3.6245	4.363E-02	3.377E-02	2.936E-02	2.562E-02	2.161E-02	1.780E-02			1.320E-02	1.205E-02	1.112E-02	1.026E-02				8.281E-03
44.6	150.653	3.3810	4.356E-02	3.375E-02	2.935E-02	2.563E-02	2.162E-02	1.780E-02	1.647E-02	1.462E-02	1.320E-02	1.204E-02	1.111E-02	1.026E-02	9.578E-03		8.636E-03	8.277E-03
48.0	150.388	3.1325	4.358E-02	3.383E-02	2.936E-02	2.563E-02	2.162E-02	1.779E-02	1.647E-02	1.461E-02	1.320E-02	1.204E-02	1.112E-02	1.026E-02	9.582E-03	9.077E-03	8.644E-03	8.279E-03
48.9	150.391	3.0725	4.363E-02	3.387E-02		2.561E-02		1.779E-02	1.648E-02		1.319E-02	1.204E-02	1.111E-02	1.025E-02				8.278E-03
50.4	150.496	2.9855	4.369E-02			2.560E-02		1.778E-02	1.646E-02	1.461E-02	1.320E-02	1.204E-02	1.111E-02	1.025E-02		9.077E-03	8.638E-03	8.273E-03
51.9	150.402	2.9000	4.366E-02	3.382E-02	2.939E-02	2.560E-02	2.161E-02	1.778E-02	1.645E-02	1.462E-02	1.320E-02	1.203E-02	1.112E-02	1.026E-02	9.581E-03	9.082E-03	8.644E-03	8.278E-03
								x/r*, 0° /	Azimuth									
NPR	Nozzle P <sub>total</sub> (psia)	P <sub>amb</sub> , Vacuum Chamber Pressure, psia		7.3867	7.8400	8.2933	8.7467	9.2000	9.6533	10.1067	10.5600	11.0133	11.4667					
11.3	143.859	12.7550		8.560E-02	8.564E-02	8.575E-02	8.576E-02	8.588E-02			8.649E-02	8.674E-02	8.680E-02	l				
13.2	150.606	11.4455		7.459E-02	7.463E-02	7.466E-02	7.468E-02	7.472E-02	7.478E-02	7.478E-02	7.476E-02	7.468E-02	7.422E-02	i				
18.3	150.603 150.609	8.2310 7.5970		5.264E-02	5.271E-02 4.814E-02	5.298E-02 4.820E-02	5.278E-02 4.828E-02	5.282E-02 4.838E-02		5.307E-02 4.866E-02	5.326E-02	5.305E-02 4.886E-02	5.152E-02	1				
19.8 21.2	150.609	7.5970		4.809E-02 4.439E-02	4.814E-02 4.442E-02	4.820E-02 4.457E-02	4.828E-02 4.461E-02				4.882E-02 4.522E-02			1				
21.2	150.69	6.6540	1	4.439E-02 4.091E-02	4.442E-02 4.098E-02	4.457E-02 4.116E-02	4.461E-02 4.118E-02	4.469E-02 4.126E-02			4.522E-02 4.182E-02	4.541E-02 4.205E-02	4.513E-02 4.191E-02	l .				
25.8	150.627	5.8335	1	3.825E-02	5.427E-02	3.779E-02	6.946E-02				4.102E-02 4.206E-02	5.294E-02	5.127E-02	1				
29.0	150.652	5.2010		2.594E-02	3.111E-02	5.249E-02	4.285E-02	4.695E-02			3.375E-02	2.949E-02	3.598E-02	i i				
33.3	150.573	4.5260		1.208E-02	2.310E-02	2.764E-02	3.993E-02				4.559E-02	3.649E-02	3.079E-02	l I				
37.2	150.552	4.0500		7.931E-03	1.129E-02	2.017E-02	2.667E-02		4.575E-02		4.015E-02	4.434E-02	3.483E-02					
41.5	150.588	3.6245		7.849E-03	7.471E-03	8.805E-03	1.707E-02			3.996E-02		3.189E-02						
44.6	150.653	3.3810		7.846E-03	7.434E-03	7.142E-03	9.698E-03	1.650E-02										
48.0	150.388	3.1325		7.846E-03	7.434E-03	7.042E-03	6.743E-03				2.744E-02	3.800E-02	3.783E-02	(				
48.9	150.391	3.0725		7.846E-03	7.434E-03	7.042E-03	6.709E-03	6.523E-03	7.341E-03	9.688E-03	1.276E-02	1.718E-02	2.283E-02	l				
	150,496	2,9855	1	7.847E-03	7.435E-03	7.043E-03	6.711E-03	6.485E-03	6.293E-03	7.083E-03	8.585E-03	1.114E-02	1.692E-02	1				
50.4 51.9	150.402	2.9000		7.846E-03	7.440E-03	7.041E-03		6.489E-03			6.769E-03	7.832E-03	1.252E-02					

## Table A7a. PAR 0° Azimuth normalized (by Pc) wall pressures as presented in figure 28a. Diffuser inlet 51 mm downstream.

Table A7b. PAR 0° Azimuth normalized (by Pamb) wall pressures as presented in figure 28b. Diffuser inlet 51mm downstream.

			x/r*, 0° Azimuth															
										x/r*, 0°	Azimuth	1						
NPR	Nozzle P <sub>total</sub> (psia)	P <sub>amb</sub> , Vacuum Chamber Pressure, psia	0.1333	0.5867	1.0400	1.4933	1.9467	2.4000	2.8533	3.3067	3.7600	4.2133	4.6667	5.1200	5.5733	6.0267	6.4800	6.9333
11.3	143.859	12,7550	0.4909	0.3808	0.3309	0.8800	0.9121	0.9354	0.9525	0.9574	0.9590	0.9637	0.9642	0.9635	0.9646	0.9649	0.9649	0.9653
13.2	150.606	11.4455	0.5746	0.4445	0.3857	0.3377	0.9109	0.9477	0.9619	0.9664	0.9717	0.9751	0.9774	0.9779	0.9788	0.9796	0.9804	0.9810
18.3	150.603	8,2310	0.7969	0.6172	0.5371	0.4690	0.3958	0.3286	0.6878	0.8835	0.9333	0.9448	0.9525	0.9559	0.9575	0.9592	0.9610	0.9620
19.8	150.609	7.5970	0.8626	0.6688	0.5819	0.5085	0.4287	0.3529	0.3271	0.6883	0.8746	0.9196	0.9352	0.9434	0.9484	0.9501	0.9517	0.9534
21.2	150.69	7.1200	0.9221	0.7152	0.6211	0.5427	0.4577	0.3767	0.3483	0.3117	0.6574	0.8587	0.9042	0.9181	0.9312	0.9343	0.9358	0.9396
22.6	150.55	6.6540	0.9853	0.7650	0.6641	0.5803	0.4890	0.4028	0.3724	0.3305	0.3058	0.5481	0.8251	0.8853	0.9100	0.9182	0.9209	0.9249
25.8	150.627	5.8335	1.1240	0.8712	0.7572	0.6617	0.5583	0.4594	0.4251	0.3773	0.3408	0.3110	0.2873	0.2648	0.2469	0.2349	0.5868	0.7467
29.0	150.652	5.2010	1.2615	0.9769	0.8506	0.7424	0.6264	0.5157	0.4770	0.4234	0.3826	0.3490	0.3221	0.2973	0.2773	0.2630	0.2509	0.3890
33.3	150.573	4.5260	1.4505	1.1242	0.9757	0.8524	0.7190	0.5919	0.5475	0.4856	0.4390	0.4008	0.3699	0.3411	0.3188	0.3020	0.2872	0.2766
37.2	150.552	4.0500	1.6227	1.2565	1.0911	0.9516	0.8032	0.6612	0.6114	0.5427	0.4904	0.4479	0.4133	0.3815	0.3563	0.3375	0.3212	0.3079
41.5	150.588	3.6245	1.8127	1.4032	1.2200	1.0644	0.8978	0.7397	0.6840	0.6070	0.5485	0.5005	0.4619	0.4263	0.3981	0.3772	0.3589	0.3440
44.6	150.653	3.3810	1.9408	1.5037	1.3076	1.1420	0.9633	0.7930	0.7341	0.6516	0.5883	0.5365	0.4951	0.4570	0.4268	0.4046	0.3848	0.3688
48.0	150.388	3.1325	2.0923	1.6239	1.4097	1.2303	1.0381	0.8540	0.7907	0.7014	0.6337	0.5781	0.5338	0.4926	0.4600	0.4358	0.4150	0.3974
48.9	150.391	3.0725	2.1357	1.6579	1.4382	1.2534	1.0581	0.8710	0.8065	0.7151	0.6457	0.5894	0.5439	0.5019	0.4690	0.4443	0.4225	0.4052
50.4	150.496	2.9855	2.2023	1.7062	1.4808	1.2906	1.0889	0.8963	0.8297	0.7362	0.6652	0.6069	0.5600	0.5168	0.4830	0.4575	0.4354	0.4170
51.9	150.402	2.9000	2.2641	1.7541	1.5241	1.3276	1.1207	0.9221	0.8531	0.7583	0.6845	0.6241	0.5766	0.5321	0.4969	0.4710	0.4483	0.4293

							x/r*, 0° .	Azimuth	۱ I			
		P <sub>amb</sub> , Vacuum										
	Nozzle	Chamber	7.3867	7.8400	8.2933	8.7467	9.2000	9.6533	10.1067	10.5600	11.0133	11.4667
NPR	P <sub>total</sub> (psia)	Pressure, psia										
11.3	143.859	12.7550	0.9655	0.9659	0.9672	0.9673	0.9686	0.9711	0.9733	0.9755	0.9784	0.9790
13.2	150.606	11.4455	0.9814	0.9820	0.9824	0.9827	0.9832	0.9841	0.9840	0.9838	0.9827	0.9766
18.3	150.603	8.2310	0.9631	0.9644	0.9694	0.9657	0.9665	0.9684	0.9710	0.9745	0.9706	0.9427
19.8	150.609	7.5970	0.9534	0.9543	0.9555	0.9572	0.9591	0.9620	0.9646	0.9678	0.9687	0.9606
21.2	150.69	7.1200	0.9395	0.9402	0.9434	0.9442	0.9459	0.9504	0.9528	0.9570	0.9611	0.9551
22.6	150.55	6.6540	0.9256	0.9271	0.9313	0.9316	0.9334	0.9381	0.9411	0.9462	0.9513	0.9483
25.8	150.627	5.8335	0.9877	1.4014	0.9757	1.7934	1.2212	0.9080	0.8302	1.0860	1.3669	1.3237
29.0	150.652	5.2010	0.7514	0.9012	1.5205	1.2411	1.3599	1.5816	1.2000	0.9777	0.8543	1.0423
33.3	150.573	4.5260	0.4019	0.7684	0.9196	1.3285	1.4929	1.1414	1.6226	1.5168	1.2141	1.0243
37.2	150.552	4.0500	0.2948	0.4198	0.7496	0.9914	1.3637	1.7007	1.3040	1.4926	1.6481	1.2946
41.5	150.588	3.6245	0.3261	0.3104	0.3658	0.7093	0.9629	1.3155	1.6601	1.6201	1.3249	1.5249
44.6	150.653	3.3810	0.3496	0.3313	0.3182	0.4321	0.7353	1.0458	1.2860	1.5676	1.8125	1.4540
48.0	150.388	3.1325	0.3767	0.3569	0.3381	0.3237	0.4326	0.7294	1.0088	1.3175	1.8241	1.8161
48.9	150.391	3.0725	0.3841	0.3639	0.3447	0.3284	0.3193	0.3593	0.4742	0.6246	0.8407	1.1177
50.4	150.496	2.9855	0.3956	0.3748	0.3550	0.3383	0.3269	0.3172	0.3571	0.4328	0.5617	0.8531
51.9	150.402	2.9000	0.4069	0.3859	0.3652	0.3483	0.3366	0.3221	0.3200	0.3510	0.4062	0.6493

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							1	nn uu	w iisti	cam.								
									1	x/r*, 180	" Azimut	h						
NPR	Nozzie Pasa (psis)	P <sub>onte</sub> , Vacuum Chamber Pressure, paia		0.8133	1.2067	1./200	2.1733	2.6267	3.0800	3.5333	3.9867	4.4400	4.8933	6.3467	5.8000	6.2533	6.7067	7.1600
14.6	150,663	10.0400								6.696L 02								
19.0	150 662	7 9420 7.3205	3 396F-02	3 105F-02	2 656E-02	2 365F-02	2 035F-02	1.786F 07		4 7005-02					5.0235-02			5 042E4
20.6	150,640	6.8570	3.409L 02 3.408E-02	3.105E-02 3.105E-02	2.700L 02 2.697E-02	2.366E-02			1.506L-02 1.559E-02	1.404E 02	2 705F-02	4.411L 02 3.832E-02	4.4690.02		4.909L 02		4.9790.02	4,969L
23.7	150.641	6,3550								1.097L-02								
24.4	150 400	6 1610	3 (235-02	3 1135-02	2 712E-02	2 364E-02				1.358F-02					9.568F-03	2 274E-02	3 002F-02	3 946E-
26.9	150,620	5.5905		3.107L 02						1.099L-02					9.401L-03	9.003L-03	2.240L 02	2.901L
29.4	150,569	5 1235	3 408E-02	3 104E-02	2.659E-02	2 352F-02	2.035F-02	1 773E-02	1 552E-02	1400F-02	1 275E-02	1 161E-02	1.073E-02	1.001E-02	9404E-03	8 8805-03	8.647F-03	2 008E4
34.Z	150,613	4,4035								1.400L 02						8.084L 03	8.472L-03	0.140L-
37.2	150 617	4 0520				2 365F-02				1 400E-02								
42.5	150.623	3.2565								1,400L 02 1,399E-02						8.080L 03		8.007L /
40.7	150,561	3,0940								1.099L-02								
49.5	150,590	3 0395								1.3595-02								
61.5	160,462	2,9200	3.419L 02	3.114L 02	2.707L-02	2.066L 02	2.035L 02	1.772L-02	1.560L 02	1.0901, 02	1.275L 02	1.160L 02	1.070L-02	1.001L 02	9.090L 03	8.087L 03	8.460L 03	8.000L
52.3	150.375	2 8735	3 (17E-02	3 1105-02	2 711E-02	2 364E-02	2.034E-02	1773E-02	1 5595-02	13595-02	1 275E-02	1 160E-02	1.0735-02	1.001E-02	9 (03F-03	8 884F-03	8 472E-03	8 007F4
55.8	150 627	2 7015	3407E402	3 105E-02	2.697E-02	2 352E-02	2.033E-02	1 772E-02	1 561E-02	1400E-02	1 276E-02	1 160E-02	1.073E-02	1.001E-02	9401E-03	8 883F-03	8471E403	8 007E4
65.4	150,515	2,3025	3.419L 02	3.106L 02	2.701L-02	2.364L 02	2.032L 02	1.771L-02	1.559L 02	1.099L-02	1.275L 02	1.161L 02	1.0701-02	1.001L 02	9.400L 03	8.0601,00	8.471L-03	8.0061.0
								x/r*, 180	. A minor at					1				
		-						NE, 100	Azimuu									
NPR	Nozzie P <sub>iese</sub> (peis)	P		7.6133	8.0067	8.5200	8.9733	9.4267	9.8800	10.3333	10.7867	11.2400	11.0933					
14.6	160,663	10.0400		6.744L 02	6.744L-02	6.746L 02	6.746L 02	6.747L 02	6.740L 02	6.730L 02	6.714L-02	6.636L 02	6.546L 02					
19.0	150 662	7 9420		5.047E-02	5 054E-02	5 054E-02	5 056E-02	5 050E-02	5 086E-02	5 109E-02	5 123E-02	5 036E-02	5.002E402					
20.6	150,640	7.3205								4.655L 02								
22.0	150.553	6 8570			4 244E-02	4 256E-02			4 258E-02	4 318F-02	4 337E-02							
23.7	150,641	6.3550		5.500E-02	4.5395-02	5.956E-02	4.614E-02	3.911L 02 3.470E-02	3.4785-02	1.950L 02 4.749E-02	5.693E-02	1.994L 02 4.612E-02						
26.9	150,620	5,5905								3.071L-02								
20.5	150,569	5 1235		2.6525-02	3.3455-02	4.8735-02	3.814E-02	4.9555-02	5.237E-02	4.0275-02	3.2425-02	2.9245-02	3.5255-02					
34.2	150,613	4.4035		1.9601-02	2,429, 02	2,9491, 02	4.323 02	4.182L 02	3,380, 02	5.029L 02	4,10002	3,4501, 02	2,786, 02					
37.2	150 617	4.0520		7.821E-03	1 (91E-02	2.348E-02	2 781E-02	4 106E-02	4 162E-02	2 907E-02	4 550E-02	4 152E-02	3 4095-02					
42.5	150,623	0.6420				1.102L 02				3.662L 02								
46.2	150.359	3 2565		7.622E-03	7 216E-03	6.917E-03	8 958F-03	1 SESE-02	2 207E-02	2 840E-02	3 7595-02	3 707F-02	2 939F-02					
40.7	150.561	0.0940								1.732L 02								
49.5	150 590	3 0395				6 886F-03	6.627F-03	6.408F 03	7 876E-03	1.003E-02	1.319E-02	1 784F-02						
52.3	150,452	2.9200			7.2225-03		6.630E-03	6.334E-03	6.201E-03 6.145E-03	6.627L 03 6.091E 03		8.618E-03						
55.8	150 627	2 7015								5 856E-03								
65.4	150,515	2,3025								5.050L 03								
100	1000000	2.20E2		1.02.02	1.0100-00	0.00000.000	0.0202.05		0.00002-000	2.00002.00	2101-021-02	2002/02/02	2.0012.02	1				

### Table A8a. PAR 180° Azimuth normalized (by Pc) wall pressures as presented in figure 29a. Diffuser inlet 51mm downstream.

 Table A8b. PAR 180° Azimuth normalized (by P<sub>amb</sub>) wall pressures as presented in figure 29b. Diffuser inlet 51 mm downstream.

							511	IIIII uu	ownsu	ream.								
									X	/r*, 180	° Azimu	th						
NPR	Nozzle P <sub>total</sub> (psia)	P <sub>amb</sub> , Vacuum Chamber Pressure, psia	0.3600	0.8133	1.2667	1.7200	2.1733	2.6267	3.0800	3.5333	3.9867	4.4400	4.8933	5.3467	5.8000	6.2533	6.7067	7.1600
14.6	150.663	10.3400	0.4965	0.4519	0.3925	0.3456	0.9258	0.9608	0.9710	0.9756	0.9786	0.9805	0.9815	0.9817	0.9824	0.9828	0.9830	0.9829
19.0	150.662	7.9420	0.6443	0.5890	0.5115	0.4486	0.3860	0.3388	0.7375	0.8916	0.9324	0.9406	0.9484	0.9533	0.9529	0.9548	0.9567	0.9564
20.6	150.640	7.3205	0.7015	0.6390	0.5556	0.4870	0.4181	0.3638	0.3222	0.6605	0.8570	0.9077	0.9237	0.9335	0.9381	0.9398	0.9415	0.9435
22.0	150.553	6.8570	0.7483	0.6818	0.5922	0.5195	0.4460	0.3884	0.3423	0.3083	0.5938	0.8413	0.8918	0.9097	0.9224	0.9250	0.9265	0.9296
23.7	150.641	6.3550	0.8082	0.7364	0.6389	0.5610	0.4818	0.4190	0.3693	0.3312	0.3046	0.4412	0.7204	0.8466	0.8757	0.8881	0.9043	0.8957
24.4	150.400	6.1610	0.8356	0.7599	0.6621	0.5770	0.4963	0.4326	0.3806	0.3412	0.3112	0.2832	0.2620	0.2444	0.2336	0.5551	0.7328	0.9633
26.9	150.620	5.5905	0.9158	0.8371	0.7269	0.6370	0.5479	0.4772	0.4211	0.3769	0.3434	0.3129	0.2889	0.2697	0.2533	0.2442	0.6057	0.7815
29.4	150.569	5,1235	1.0015	0.9121	0.7932	0.6943	0.5980	0.5211	0.4591	0.4114	0.3747	0.3412	0.3152	0.2941	0.2764	0.2610	0.2541	0.5902
34.2	150.613	4.4035	1.1654	1.0626	0.9240	0.8087	0.6965	0.6066	0.5341	0.4787	0.4362	0.3972	0.3670	0.3425	0.3216	0.3038	0.2898	0.2784
37.2	150.617	4.0520	1.2683	1.1530	1.0044	0.8791	0.7562	0.6589	0.5800	0.5202	0.4746	0.4314	0.3988	0.3722	0.3495	0.3302	0.3147	0.2974
42.5	150.623	3.5420	1.4503	1.3216	1.1482	1.0056	0.8656	0.7538	0.6637	0.5951	0.5423	0.4935	0.4562	0.4257	0.3998	0.3778	0.3602	0.3405
46.2	150.359	3.2565	1.5802	1.4371	1.2520	1.0907	0.9394	0.8187	0.7201	0.6458	0.5887	0.5352	0.4956	0.4622	0.4342	0.4103	0.3909	0.3694
48.7	150.561	3.0940	1.6590	1.5120	1.3142	1.1506	0.9903	0.8630	0.7595	0.6807	0.6206	0.5650	0.5223	0.4871	0.4577	0.4324	0.4121	0.3895
49.5	150.590	3.0395	1.6914	1.5381	1.3377	1.1709	1.0074	0.8781	0.7732	0.6932	0.6317	0.5748	0.5317	0.4961	0.4655	0.4402	0.4195	0.3964
51.5	150.452	2.9200	1.7616	1.6045	1.3949	1.2188	1.0483	0.9130	0.8038	0.7205	0.6572	0.5976	0.5531	0.5158	0.4842	0.4579	0.4363	0.4123
52.3	150.375	2.8735	1.7881	1.6276	1.4185	1.2372	1.0642	0.9278	0.8161	0.7319	0.6675	0.6069	0.5617	0.5241	0.4921	0.4649	0.4434	0.4190
55.8	150.627	2.7015	1.8997	1.7313	1.5040	1.3170	1.1334	0.9880	0.8703	0.7807	0.7115	0.6470	0.5982	0.5582	0.5242	0.4953	0.4723	0.4464
65.4	150.515	2.3025	2.2324	2.0304	1.7659	1.5453	1.3286	1.1579	1.0193	0.9142	0.8334	0.7587	0.7014	0.6545	0.6150	0.5807	0.5537	0.5233
							X	<u>/r*, 180</u>	° Azimut	th								
		P <sub>amb</sub> , Vacuum																
	Nozzle	Chamber		7.6133	8.0667	8.5200	8.9733	9.4267	9.8800	10.3333	10.7867	11.2400	11.6933					
NPR	P <sub>total</sub> (psia)	Pressure, psia																
14.6	150.663	10.3400		0.9827	0.9827	0.9828	0.9830	0.9831	0.9825	0.9817	0.9782	0.9669	0.9539					
19.0	150.662	7.9420		0.9574	0.9587	0.9587	0.9610	0.9636	0.9649	0.9693	0.9718	0.9668	0.9489					
20.6	150.640	7.3205		0.9434	0.9443	0.9462	0.9480	0.9505	0.9529	0.9579	0.9614	0.9607	0.9476					
22.0	150.553	6.8570		0.9306	0.9319	0.9344	0.9371	0.9393	0.9437	0.9481	0.9523	0.9511	0.9364					
23.7	150.641	6.3550		0.9053	0.9141	0.9155	0.9218	0.9270	0.9300	0.9383	0.9438	0.9468	0.9356					
24.4	150.400	6.1610		1.3426	1.1079	1.6981	1.1264	0.8471	0.8491	1.1592	1.3897	1.1258	0.8958					
26.9	150.620	5.5905		1.0130	1.4052	1.0310	1.8038	1.2777	0.9743	0.8273	0.9827	1.2997	1.3993					
29.4	150.569	5.1235		0.7883	0.9831	1.4320	1.1207	1.4560	1.5390	1.1836	0.9527	0.8592	1.0358					
34.2	150.613	4.4035		0.5346	0.8293	1.0072	1.4786	1.4302	1.1559	1.7202	1.4050	1.1827	0.9529					
37.2	150.617	4.0520		0.2907	0.5540	0.8727	1.0338	1.5262	1.5471	1.0805	1.6950	1.5432	1.2673					
42.5	150.623	3.5420		0.3241	0.3117	0.4687	0.7473	1.0059	1.2995	1.5573	1.6141	1.4266	1.3953					
46.2	150.359	3.2565		0.3519	0.3332	0.3194	0.4155	0.7318	1.0192	1.3112	1.7540	1.7117	1.3570					
48.7	150.561	3.0940		0.3707	0.3513	0.3352	0.3245	0.3975	0.6429	0.8429	1.1222	1.4438	1.6034					
49.5	150.590	3.0395		0.3774	0.3576	0.3412	0.3283	0.3175	0.3902	0.4971	0.6534	0.8840	1.2157					
51.5	150.452	2.9200		0.3928	0.3719	0.3548	0.3418	0.3264	0.3195	0.3414	0.3884	0.5277	0.8990					
52.3	150.375	2.8735		0.3988	0.3779	0.3602	0.3470	0.3313	0.3216	0.3188	0.3477	0.4510	0.8356					
		0.7045					0.0001	0.0504					0.6448					
55.8 65.4	150.627 150.515	2.7015 2.3025		0.4246	0.4027	0.3839	0.3694 0.4330	0.3531 0.4139	0.3402	0.3265	0.3161 0.3709	0.3146 0.3666	0.6448					

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### Table A9a. PAR 0° Azimuth normalized (by P<sub>c</sub>) wall pressures as presented in figure 30a. Diffuser inlet 51 mm downstream.

				x/r⁺, 0° Azimuth														
										x/r^, 0° /	Azimuth							
		P <sub>amb</sub> , Vacuum																
	Nozzle	Chamber	0.1333	0.5867	1.0400	1.4933	1.9467	2.4000	2.8533	3.3067	3,7600	4.2133	4.6667	5,1200	5.5733	6.0267	6,4800	6.9333
NPR	P <sub>total</sub> (psia)	Pressure, psia																
12.7	150.582	11.8370	4.363E-02	3.382E-02	2.936E-02	2.560E-02	2.160E-02	1.778E-02	2.743E-02	3.423E-02	4.121E-02	4.464E-02	4.926E-02	6.366E-02	7.341E-02	6.802E-02	6.843E-02	6.798E-02
13.0	150.6	11.5960	4.369E-02	3.380E-02	2.938E-02	2.560E-02	2.159E-02	1.778E-02	1.681E-02	2.803E-02	3.600E-02	4.208E-02	4.672E-02	6.471E-02	7.050E-02	6.641E-02	6.896E-02	7.161E-02
13.3	150.602	11.3590	4.356E-02	3.376E-02	2.934E-02	2.564E-02	2.161E-02	1.778E-02	1.647E-02	1.461E-02	1.321E-02	3.450E-02	4.096E-02	7.275E-02	9.923E-02	7.437E-02	6.358E-02	7.959E-02
14.3	150.614	10.5370	4.357E-02	3.378E-02	2.935E-02	2.562E-02	2.160E-02	1.777E-02	1.647E-02	1.461E-02	1.319E-02	1.218E-02	3.624E-02	4.816E-02	1.019E-01	7.815E-02	5.320E-02	6.831E-02
17.4	150.609	8.6775	4.360E-02	3.376E-02	2.934E-02	2.558E-02	2.161E-02	1.779E-02	1.646E-02	1.462E-02	1.321E-02	1.204E-02	1.119E-02	3.222E-02	3.939E-02	6.610E-02	1.050E-01	5.387E-02
20.0	150.617	7.5415	4.361E-02	3.380E-02	2.935E-02	2.561E-02	2.160E-02	1.779E-02	1.646E-02	1.461E-02	1.319E-02	1.204E-02	1.111E-02	1.046E-02	2.868E-02	3.441E-02	5.914E-02	5.967E-02
22.4	150.539	6.7225	4.360E-02	3.381E-02	2.936E-02	2.563E-02	2.162E-02	1.780E-02	1.647E-02	1.461E-02	1.319E-02	1.204E-02	1.111E-02	1.024E-02	9.619E-03	2.575E-02	3.165E-02	4.930E-02
								x/r*, 0°	Azimuth									
		P <sub>amb</sub> , Vacuum																
	Nozzle	Chamber		7.3867	7.8400	8.2933	8.7467	9.2000	9.6533	10.1067	10.5600	11.0133	11.4667					
NPR	P <sub>total</sub> (psia)	Pressure, psia																
12.7	150.582	11.8370		6.731E-02	6.908E-02	7.100E-02	7.224E-02	7.403E-02	7.492E-02	7.593E-02	7.689E-02	7.656E-02	7.704E-02					
13.0	150.6	11.5960		7.297E-02	7.511E-02	7.455E-02	7.430E-02	7.446E-02	7.367E-02	7.440E-02	7.487E-02	7.467E-02	7.546E-02					
13.3	150.602	11.3590		6.657E-02	7.077E-02	7.351E-02	6.831E-02	7.378E-02	7.139E-02	7.282E-02	7.305E-02	7.265E-02	7.320E-02					
14.3	150.614	10.5370		7.911E-02	5.600E-02	6.960E-02	6.999E-02	6.127E-02	7.254E-02	6.418E-02	6.973E-02	6.649E-02	6.845E-02					
17.4	150.609	8.6775		4.192E-02	6.139E-02	7.553E-02	4.856E-02	5.096E-02	7.229E-02	5.713E-02	5.312E-02	6.684E-02	5.779E-02					
20.0	150.617	7.5415		8.258E-02	4.413E-02	3.720E-02	5.452E-02	6.768E-02	4.688E-02	4.184E-02	5.559E-02	6.108E-02	4.849E-02					
22.4	150.539	6.7225		5.325E-02	7.029E-02	6.052E-02	3.964E-02	3.573E-02	4.695E-02	6.091E-02	5.381E-02	3.850E-02	4.057E-02					

#### Table A9b. PAR 0° Azimuth normalized (by P<sub>amb</sub>) wall pressures as presented in figure 30b. Diffuser inlet 51 mm downstream.

							1111	m uov	viistit	am.								
										x/r*, 0°	Azimuth	1						
NPR	Nozzle P <sub>total</sub> (psia)	P <sub>amb</sub> , Vacuum Chamber Pressure, psia	0.1333	0.5867	1.0400	1.4933	1.9467	2.4000	2.8533	3.3067	3.7600	4.2133	4.6667	5.1200	5.57 <mark>3</mark> 3	6.0267	6.4800	6.9333
12.7	150.582	11.8370	0.5550	0.4302	0.3735	0.3257	0.2747	0.2262	0.3489	0.4355	0.5243	0.5679	0.6267	0.8098	0.9339	0.8653	0.8706	0.8647
13.0	150.6	11.5960	0.5674	0.4390	0.3815	0.3324	0.2804	0.2309	0.2184	0.3641	0.4675	0.5465	0.6068	0.8405	0.9157	0.8625	0.8957	0.9301
13.3	150.602	11.3590	0.5775	0.4477	0.3889	0.3399	0.2865	0.2358	0.2183	0.1937	0.1752	0.4574	0.5431	0.9646	1.3156	0.9860	0.8430	1.0553
14.3	150.614	10.5370	0.6228	0.4828	0.4196	0.3662	0.3088	0.2541	0.2354	0.2089	0.1886	0.1741	0.5181	0.6883	1.4570	1.1171	0.7604	0.9764
17.4	150.609	8.6775	0.7567	0.5859	0.5092	0.4440	0.3751	0.3088	0.2857	0.2538	0.2293	0.2089	0.1943	0.5591	0.6836	1.1473	1.8223	0.9351
20.0	150.617	7.5415	0.8710	0.6751	0.5862	0.5114	0.4315	0.3552	0.3287	0.2917	0.2635	0.2405	0.2220	0.2090	0.5728	0.6871	1.1811	1.1917
22.4	150.539	6.7225	0.9764	0.7572	0.6575	0.5739	0.4840	0.3985	0.3689	0.3271	0.2953	0.2695	0.2489	0.2294	0.2154	0.5767	0.7088	1.1041
								x/r*, 0°	Azimutł	ו								
NPR	Nozzle P <sub>total</sub> (psia)	P <sub>amb</sub> , Vacuum Chamber Pressure, psia		7.3867	7.8400	8.2933	8.7467	9.2000	9.6533	10.1067	10.5600	11.0133	11.4667					
12.7	150.582	11.8370		0.8563	0.8788	0.9033	0.9190	0.9418	0.9530	0.9660	0.9781	0.9739	0.9801					
13.0	150.6	11.5960		0.9477	0.9755	0.9682	0.9649	0.9671	0.9568	0.9663	0.9723	0.9697	0.9801					
13.3	150.602	11.3590		0.8826	0.9383	0.9746	0.9056	0.9782	0.9465	0.9655	0.9686	0.9632	0.9705					
14.3	150.614	10.5370		1.1308	0.8005	0.9948	1.0005	0.8758	1.0368	0.9173	0.9968	0.9504	0.9785					
17.4	150.609	8.6775		0.7275	1.0655	1.3110	0.8428	0.8845	1.2546	0.9916	0.9220	1.1601	1.0029					
20.0	150.617	7.5415		1.6493	0.8813	0.7430	1.0888	1.3517	0.9363	0.8356	1.1103	1.2199	0.9685					
22.4	150.539	6.7225		1.1924	1.5740	1.3553	0.8878	0.8001	1.0514	1.3641	1.2051	0.8622	0.9086					

### Table A10a. PAR 180° Azimuth normalized (by Pc) wall pressures as presented in figure 31a. Diffuser inlet 51mm downstream.

										√r*, 180'	" Azimutl	1						
NPR	Nozzie Pasa (psia)	P <sub>rest</sub> , Vacuum Chamber Pressure, paia	0.3600	0.8133	1.2067	1./200	2.1733	2.6267	3.0800	3.5333	3.9867	4.4400	4.8933	5.3467	5.8000	6.2533	6.7067	7.1000
13,19	150,594	11.4100	3.409L 02 3.410E-02	3.104L 02	2.6991_02	2.365E-02	2.033L 02	1.772E-02 1.772E-02	1.561L 02 1.550E-02	1.399L-02	2.4621_02	3.9/1L 02	6.506L 02	1.0532.01	7.475L 02 7.702E-02	6.427L 02 5.547E-02	7.965L 02 7.502E-02	6.705L 0
15.55	150,560	9.6035	3.419L 02	3.10/1_02	2.701L UZ	2,363L-02	2.032L 02	1.7721.02	1.5601, 02	1.0901, 02	1.276E 02	1.105L-02	3.410L 02	4.284L 02	6.985L 02	1.0001_01	6.120L 02	4,5801, 0
18.40 21,25	150 620 160,609	8 1845 7.0085	3 4 13E-02 3 400 - 02	3 105F-02 3.104L 02	2 700E-02 2 /02 - 02	2 354E-02 2 16 0 - 02	2 035F-02 2 034L 02	1 773E-02 1.773E-02	1 550E-02 1.560E-02	1 399F-02 1.099L 02	1 275E-02 1 2794 - 02	1 161E-02 1.161L 02	1.099E 07	3 163F-02 1 016LUD	3 733E-02 2.066L 02	6 380F-02 1 294 - 02	9 724F-02 4 612L 02	6.032E-02 4.020_00
							;	√r*, 180'	" Azimutl	h								
NPR	Nozzie Post (pris)	Pt. Vacuum Chamber Pressue, paia		7.6133	8.0667	8.5200	3	v/r*, 180 9.4267	" Azimuti 9.8800	h 10.3333	10.7867	11.2400	11.0933					
13.19	Peak (josis) 160.694	Chamber Pressure, paia 11.4100		7.071L-02	7.0100-02	7.0061.02	8.9733 7.259L 02	9.4267 7.109L 02	9.8800 7.241L 02	10.3333 7.197L 02	7.2801, 02	7.022L-02	7.9770-02					
NPR 12.19 13.70 15.55	$P_{\rm base}({\rm psis})$	Chamber Pressure, pala		7.071L 02 6.036F-02			8.9733	9.4267	9.8800	10.3333			7.077L 02 7.1205-02					
13.19	Pasa (josis) 160.694 150.594	Chamber Pressure, paia 11,4100 10,9920		7.071L 02 6.036F-02 7.760L 02 4.264F-02	7.010L 02 7.618E-02 6.101L 02 4.697E-02	7.000L 02 6.650F-02	8.9733 7.259L 02 5.948F-02 7.144L 02 5.747F-02	9.4267 7.100± 02 7.020=42 6.010± 02 4.226=42	9.8800 7.241L 02 6.900F-02 6.935L 02 5.655F-02	10.3333 7.197L 02 7.0265-02	7.250L 02 7.028E-02 6.931L 02 4.891E-02	7.022L 02 7.055E-02 6.200L 02 5.175E-02	7.077L 02 7.120E-02 6.469L 02 6.518E-02					

## Table A10b. PAR 180° Azimuth normalized (by Pamb) wall pressures as presented in figure 31b. Diffuser inlet51 mm downstream.

							-											
									X	/r*, 180 <sup>.</sup>	° Azimut	th						
NPR	Nozzle P <sub>total</sub> (psia)	P <sub>amb</sub> , Vacuum Chamber Pressure, psia	0.3600	0.8133	1.2667	1.7200	2.1733	2.6267	3.0800	3.5333	3.9867	4.4400	4.8933	5.3467	5.8000	6.2533	6.7067	7.1600
13.19	150.594	11.4130	0.4498	0.4096	0.3561	0.3120	0.2682	0.2338	0.2060	0.1845	0.3249	0.5240	0.8585	1.4023	0.9863	0.8481	1.0510	0.8848
13.70	150.594	10.9920	0.4672	0.4253	0.3698	0.3240	0.2787	0.2428	0.2138	0.1917	0.1754	0.5143	0.7087	1.4109	1.0551	0.7599	1.0277	1.0004
15.55	150.560	9.6835	0.5315	0.4831	0.4200	0.3674	0.3160	0.2755	0.2425	0.2174	0.1982	0.1811	0.5314	0.6661	1.0860	1.5647	0.7960	0.7133
18.40	150.620	8.1845	0.6280	0.5713	0.4968	0.4350	0.3745	0.3262	0.2871	0.2574	0.2346	0.2136	0.2023	0.5821	0.6870	1.1740	1.7896	1.1100
21.25	150.609	7.0885	0.7238	0.6595	0.5740	0.5029	0.4322	0.3767	0.3315	0.2972	0.2710	0.2467	0.2281	0.2158	0.6089	0.7000	1.1924	1.0256
							X	/r*, 180	° Azimu	th								
NPR	Nozzle P <sub>total</sub> (psia)	P <sub>amb</sub> , Vacuum Chamber Pressure, psia		7.6133	8.0667	8.5200	8.9733	9.4267	9.8800	10.3333	10.7867	11.2400	11.6933					
13.19	150.594	11.4130		0.9330	0.9656	0.9244	0.9579	0.9372	0.9554	0.9496	0.9606	0.9661	0.9734					
13.70	150.594	10.9920		0.8270	1.0438	0.9151	0.9520	0.9617	0.9453	0.9626	0.9628	0.9680	0.9754					
15.55	150.560	9.6835		1.2109	0.9485	0.7397	1.1108	0.9823	0.8296	1.0920	0.9221	0.9640	1.0057					
18.40	150.620	8.1845		0.7848	0.8644	1.3367	1.0576	0.7777	1.0407	1.2620	0.9001	0.9524	1.1995					
21.25	150.609	7.0885		1.8263	1.0682	0.8304	0.8495	1.2890	1.2901	0.8958	0.8680	1.1505	1.2431					