

6.2 ACTIVE THERMAL CONTROL

6.2.1 Purge and Vent of Cargo Bay

The Orbiter shall provide a ground purge system which is comprised of a ground-system supplied, on-board duct network which distributes Air/GN₂. A representative purge flow distribution in the cargo bay without spigot flow is shown in Figure 6.2.1-1. As noted, cargo bay purge flow is lost to the lower mid-fuselage at the vent filters due to the slight cargo bay purge positive pressure. The actual flow rate distribution is a function of the manifold and spigot flow rates.

6.2.1.1 Cargo Bay Purge Characteristics

The cargo bay purge gas characteristics provided by the Orbiter to the payload and cargo bay, at the specific prelaunch and post-landing operations phase, shall be as specified in Table 6.2.1.1-1.

6.2.1.2 (DELETED)

6.2.1.3 (Reserved)

6.2.2 (Reserved)

6.3 (Reserved)

6.4 (DELETED)

TABLE 6.2.1.1-1 CARGO BAY PURGE GAS CHARACTERISTICS

Parameter	Pad	Portable Purge UNIT (PPU)	OPF
Gas Type	Air/GN ₂ (A)(C)	Air (B) (C) (H)	Air (C)
Temperature: (G) deg. C (deg. F) Selectable throughout range	7-37.8(45-100)	7-37.8(45-100)	7-37.8(45-100)
Humidity: grams H ₂ O/Kg (grains H ₂ O/lb) Ground controlled Not selectable			
Air (I)	≤ 5.29 (≤ 37)	≤ 5.29 (≤ 37)	≤ 5.29 (≤ 37)
	≤ 4.14 (≤ 29)	-----	-----
GN ₂	≤ 0.14 (≤ 1)	-----	-----
Flow Rate: Spigots Closed: (D) Kg/min (lb/min) Manifold	50.9 (112) min. 61.8 (136) nom. 109 (240) max.	50.9 (112) min. 61.8 (136) nom. 100 (220) max.	50.9 (112) min. 61.8 (136) nom. 109 (240) max.
Flow Rate with Maximum Total Cargo Bay Flow/Spigots Open: (D) Kg/min (lb/min) Manifold Spigots (E) (F)	54.5 (120) min. 68.2 (150) max.	50 (110) min. 61.4 (135) max.	54.5 (120) min. 68.2 (150) max.

NOTES: (Notes 1, 2 and 3 general: Notes A through I apply to specific table locations)

TABLE 6.2.1.1-1 CARGO BAY PURGE GAS CHARACTERISTICS
(CONTINUED)

Notes: (Continued)

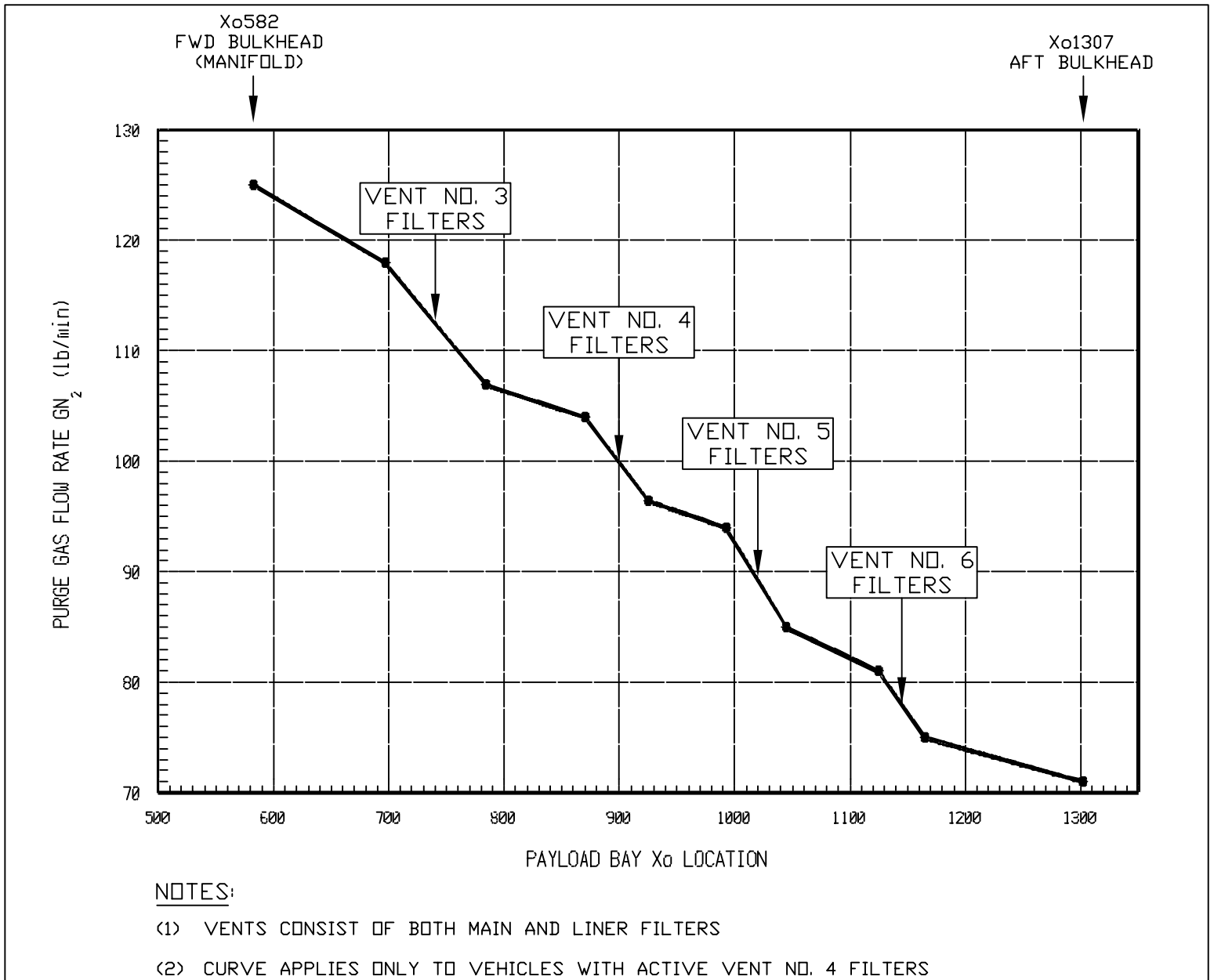
1. Flow rates in the table are lower than Vehicle/GSE interface flow rates due to flow distributed to Lower Mid Fuselage. Total Vehicle/GSE Interface flow rates at the Pad and OPF, range from 140 (lb/min) to 300 (lb/min), and all other locations specified in the table, range from 140 (lb/min) to 275 (lb/min).
 2. The cargo bay internal pressure shall not exceed .30 PSID above ambient.
 3. The cargo bay depressurization rate (on the ground) shall not exceed 0.18 PSI/sec. This dp/dt is associated with the prelaunch vent opening sequence at T-28 sec.
- (A) Initiation of GN₂ purge prior to CRYO Tanking for inerting Cargo Bay is defined in ICD-2-0A002 "Shuttle System Launch Pad and MLP".
- (B) Purge flow to be initiated within touchdown +45 minutes at primary landing site and touchdown +90 minutes at secondary landing site.
- (C) Purge will be provided to all payloads by mobile/facility equipment during closed payload bay door operations except during mobile GSE/facility/mobile GSE transfer, towing, orbiter mate/demate, orbiter test or purge system LRU replacement/test, or GSE periodic maintenance at the OPF, VAB, and Pad. Approximately 3-4 days are required for orbiter mate/demate operations in the VAB after OPF roll-out and 1.5 hours for mobile GSE/facility/mobile GSE transfer at the PAD
- (D) Measurement and accuracy of the flow rate is specified and controlled at the Orbiter/Facility interface within ± 5 percent.
- Starting no earlier than T-11 minutes, the cargo bay total flow rate (manifold plus spigot) is reduced to between 72.7-81.8 kg/min (160-180 lb/min) should the total flow rate be greater than this range. Spigot and manifold flow rates will decrease proportionally with the cargo bay total flow rate as a result of the flow reduction.
- (E) Maximum flow rate out of all three (3) spigots shall not exceed 68.2 kg/min (150 lb/min) or exceed 45.5 kg/min (100 lb/min) out of any single spigot. Nominal flow rate out each spigot is 22.7 kg/min (50 lb/min).
- (F) Maximum pressure downstream of purge spigots is 0.50 psig-measured above payload bay pressure.

TABLE 6.2.1.1-1 CARGO BAY PURGE GAS CHARACTERISTICS
(CONCLUDED)

Notes: (Continued)

- (G) Temperature is measured at the Orbiter/Facility interface. The nominal set point is 65°F controllable to ± 5°F. Temperature sensitive payloads may request the temperature be controlled to ± 2°F under steady flow conditions with excursions to ± 5°F for up to 1 hour in any 12 hour period. The following exception applies to all payloads:
 - (i) Allowable temperature variations during flowrate adjustment, air to GN₂ or GN₂ to air changeover are ± 15°F for the first 15 minutes after change.
- (H) Maximum total flow rate to purge circuits 1,2, and 3 and the crew module must be limited to 460 lb/min in order to provide full temperature range.
 - (i) The portable purge unit is used to support operations upon landing, in transit from the runway to the OPF or mate/demate device (MDD), in the VAB, in transit from the VAB to the Pad, and occasionally while the vehicle is in the OPF.
- (I) For final Orbiter pyro operations (electrical connect or disconnect) at the pad, the moisture content of the purge air is less than or equal to 37 grains per pound throughout a time period necessary to accommodate each pyro servicing event (approximately 24 hours).

FIGURE 6.2.1-1 CARGO BAY PURGE GAS FLOW DISTRIBUTION (TYPICAL LOW FLOW RATE PURGE, NO SPIGOT FLOW)



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