

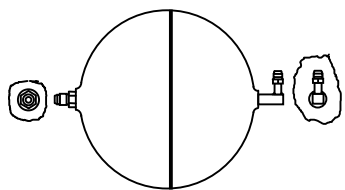
9.41-inch DIAMETER DIAPHRAGM TANK

The 9.41-inch diameter diaphragm tank was originally developed in 1970 using an EPT-10 elastomeric diaphragm. The same diaphragm mold used to make the EPT-10 diaphragm is capable of producing the newer AF-E-332 diaphragm. However, as spacecraft grew bigger and their propellant needs increase, the demand for these small tanks diminished. PSI has not, as yet, had the opportunity to build a 9.41-inch diameter diaphragm tank with the newer AF-E-332 diaphragm. A summary of the 9.41-inch diaphragm tanks is presented below in Table A1. It should be noted that the listed weight is maximum design weight. The actual tank weight is below the design weight.

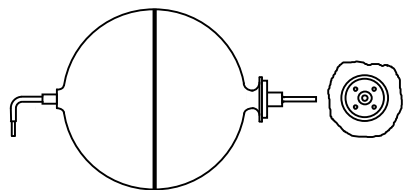
TABLE A1, 9.41-inch diameter diaphragm tanks

PSI P/N	Year	Size & Mounting	Qty	Design Wt (lb)	Internal Volume (in ³)	MEOP, Proof, Burst Press. (psi)	Program	Propellant Management	Tank Shell Material	Heritage/History/Usage
80156-1	1970	9.41" Ø, polar bosses	6	2.91	415	610,915,1220	AEROS	Positive expulsion EPT-10 diaphragm	STA 6Al-4V Ti	80156-1 is the first diaphragm tank of this size. The tank was qualified by test. This tank carries hydrazine.
80222-1	1974	9.41" Ø, polar bosses	9	2.85	415	400,600,800	IUE	Positive expulsion EPT-10 diaphragm	STA 6Al-4V Ti	This hydrazine tank is a derivative of 80156-1. Tank shell & the mounting bosses were modified. The tank was qualified by test.
80252-1	1976	9.41" Ø, polar bosses	1	2.85	415	400,600,800	HCMM	Positive expulsion EPT-10 diaphragm	STA 6Al-4V Ti	This hydrazine tank is a derivative of 80222-1. Tank shell was not changed and only the inlet/outlet bosses were slightly modified. Qualification was by similarity.
80258-1	1977	9.41" Ø, polar bosses	2	2.85	415	400,600,800	SCATHA	Positive expulsion EPT-10 diaphragm	STA 6Al-4V Ti	This hydrazine tank is also a derivative of 80222-1. Tank shell was not changed and only the inlet/outlet bosses were slightly modified. This tank was delivered with a thermal blanket installed as shown in the sketch below. Qualification was by similarity.
80278-1	1979 thru. 1987	9.41" Ø, polar bosses	10	3.25	415	100,600,800	Space Shuttle	Positive expulsion EPT-10 diaphragm	STA 6Al-4V Ti	This water tank has the same internal configuration as above tanks. The tank shell was re-designed to meet Shuttle requirements. The tank was qualified by test.
80467-1	2003	9.41" Ø, polar bosses	1	2.85	415	400,600,800	SPIDR	Positive expulsion AF-E-332 diaphragm	STA 6Al-4V Ti	This hydrazine tank is a derivative of 80222-1. The bosses were modified to incorporate 1/4" tubing. The acceptance test included vibration testing.

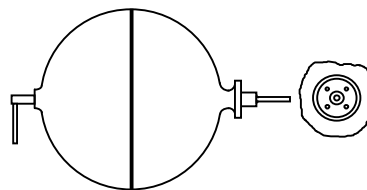
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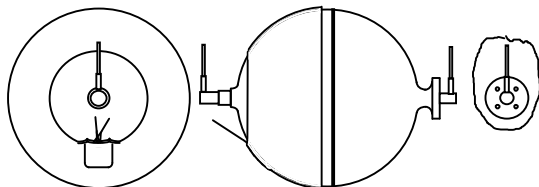
80222-1



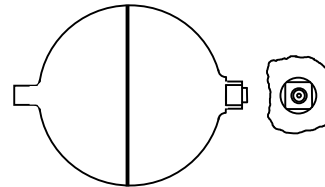
80252-1



80258-1



80278-1



12.88-inch DIAMETER DIAPHRAGM TANK

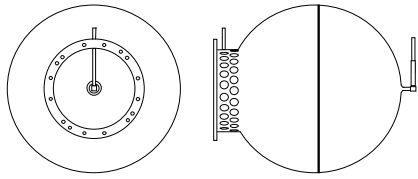
The 12.88-inch diameter diaphragm tank was originally developed in 1972 using the EPT-10 elastomeric diaphragm. The diaphragm material was changed to AF-E-332 in 1974. There are three basic configurations: sphere/pedestal mount, sphere/girth lug mount, and spherical/elliptical pedestal mount. A summary of the 12.88-inch diaphragm tanks is presented below in Table A2. It should be noted that the listed weight is maximum design weight. The actual tank weight is below the design weight.

TABLE A2, 12.88-inch diameter diaphragm tanks

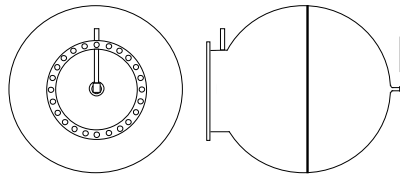
PSI P/N	Year	Size & Mounting	Qty	Design Wt (lb)	Internal Volume (in ³)	MEOP,Proof, Burst Press. (psi)	Program	Propellant Management	Tank Shell Material	Heritage/History/Usage
80187-1	1972	12.88" Ø, pedestal	8	5.2	1080	396,594,792	CTS	Positive expulsion EPT-10 diaphragm	STA 6Al-4V Ti	80187-1 is the first diaphragm tank of this size. The tank was qualified by test. This tank carries hydrazine.
80208-1	1974	12.88" Ø, pedestal	2	5.2	1080	396,594,792	OTS	Positive expulsion AF-E-332 diaphragm	STA 6Al-4V Ti	This hydrazine tank is a derivative of 80187-1. The tank shell was not changed and only the inlet and outlet tubes and the mounting flange were modified. Qualification was by similarity to 80187-1.
80216-1	1975 thru. 1980	12.88" Ø, pedestal	26	6.0	1080	396,594,792	GPS	Positive expulsion AF-E-332 diaphragm	STA 6Al-4V Ti	This hydrazine tank is a derivative of 80208-1. Although the pressure requirements were the same, the customer funded a stress analysis and a qualification test program. The tank shell and the inlet/outlet bosses were modified.
80238-1	1975 thru. 1978	12.88" Ø, pedestal	2	6.0	1080	396,594,792	NTS-1, Clementine	Positive expulsion AF-E-332 diaphragm	STA 6Al-4V Ti	This hydrazine tank is a derivative of 80216-1. Only the inlet and outlet tubes were modified. Qualification was by similarity to 80216-1. One of the tanks was later used, after almost 20 years in storage, on the Clementine program that surveyed the moon.
80266-1	1978	12.88" Ø, pedestal	10	4.9	1080	396,594,792	APPLE	Positive expulsion AF-E-332 diaphragm	STA 6Al-4V Ti	This hydrazine tank is a derivative of 80187-1. Only the pressurant inlet tube was modified. Qualification was by similarity to 80187-1.
80282-1	1979	12.88" Ø, girth lugs	1	5.6	1080	396,594,792	ITV	Positive expulsion AF-E-332 diaphragm	STA 6Al-4V Ti	This hydrazine tank has the same internal configuration as the above tanks. The tank shell was re-designed to include six girth lugs and the inlet port near the girth plane. This tank was the qualification tank for the subsequent 80290-1 tanks.
80290-1	1980	12.88" Ø, girth lugs (6)	13	5.6	1080	396,594,792	ITV	Positive expulsion AF-E-332 diaphragm	STA 6Al-4V Ti	This hydrazine tank is a derivative of 80282-1. The propellant port was modified. This tank was qualified based on similarity to 80282-1.
80342-1, -101,-201, -301	1887 thru. 1999*	12.88" Ø, pedestal	32	6.0	920	480,720,960	DMSF, TIROS, Geosat, MSTI, SSTI, World View	Positive expulsion AF-E-332 diaphragm	STA 6Al-4V Ti	This hydrazine tank is a derivative of 80216-1. The pressurant head went from hemispherical to elliptical to permit diaphragm reversal. The tank was qualified by test.

*In production

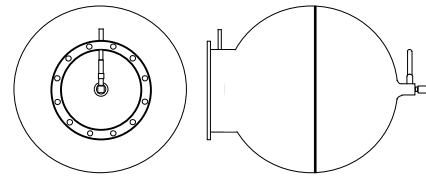
80187-1



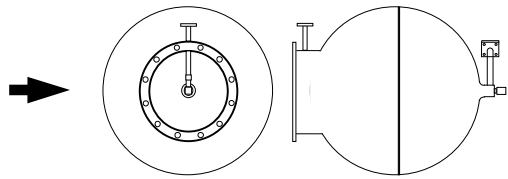
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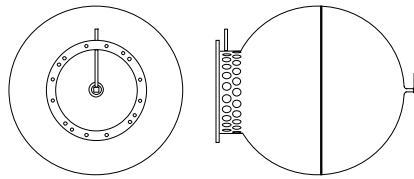
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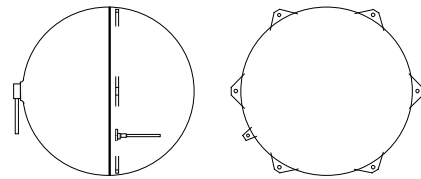
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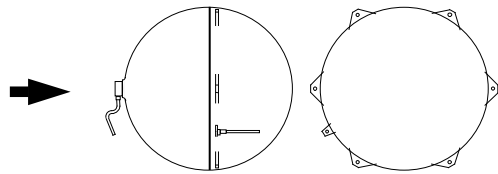
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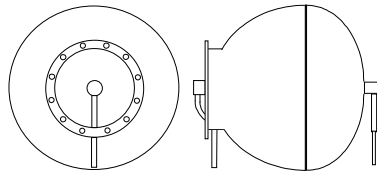
80282-1



80290-1



80342-1



15.38-inch DIAPHRAGM TANK

The 15.38-inch diameter diaphragm tank was originally developed in 1974. PSI did not get an opportunity to build a derivative tank until 1995. A summary of the 15.38-inch diaphragm tanks is presented below in Table A3. It should be noted that the listed weight is maximum design weight. The actual tank weight is below the design weight.

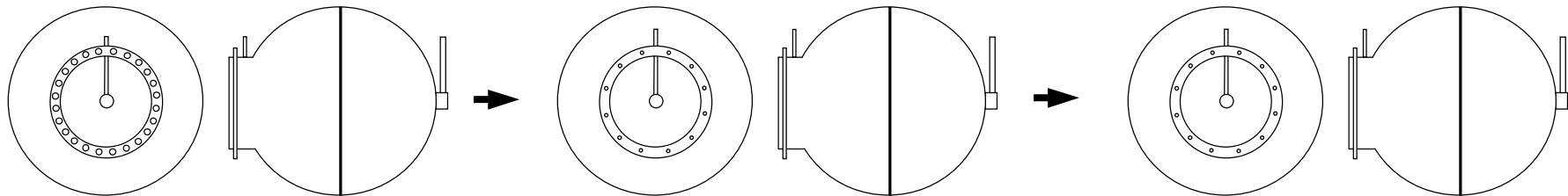
TABLE A3, 15.38-inch diameter diaphragm tanks

PSI P/N	Year	Size & Mounting	Qty	Design Wt (lb)	Internal Volume (in ³)	MEOP, Proof, Burst Press. (psi)	Program	Propellant Management	Tank Shell Material	Heritage/History/Usage
80225-1	1974 thru 1979	15.38" Ø, pedestal	11	8.16	1865	319,511,682	OTS, MARECS	Positive expulsion AF-E-332 diaphragm	STA 6Al-4V Ti	80225-1 is the first diaphragm tank of this size. The tank was qualified by test.
80389-1	1995 thru 1997	15.38" Ø, pedestal	3	8.20	1865	320,510,640	STEP IV, EO-1	Positive expulsion AF-E-332 diaphragm	STA 6Al-4V Ti	This hydrazine tank is a derivative of 80225-1. The inlet and outlet tubes and the pedestal mount were modified. This tank was qualified by similarity.
80468-1	2003	15.38" Ø, pedestal	1	8.20	1865	320,510,640	Classified	Positive expulsion AF-E-332 diaphragm	STA 6Al-4V Ti	This hydrazine tank is a derivative of 80389-1. The inlet and outlet tubes were modified to incorporate 1/4" tubing. This tank was qualified by similarity.

80225-1

80389-1

80468-1



16.5-inch DIAMETER DIAPHRAGM TANK

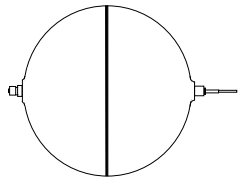
The 16.5-inch diameter diaphragm tank was originally developed in 1967 using the EPT-10 elastomeric diaphragm. The diaphragm material was changed to AF-E-332 in the 1970's. This product line has tanks with many mounting features, including tabs, lugs, flange, and pedestal mount. A summary of the 16.5-inch diaphragm tanks is presented below in Table A4. It should be noted that the listed weight is maximum design weight. The actual tank weight is below the design weight, and in some cases well below the design weight.

TABLE A4, 16.5-inch diameter diaphragm tanks

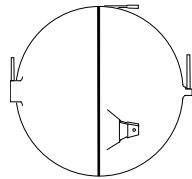
PSI P/N	Year	Size & Mounting	Qty	Design Wt (lb)	Internal Volume (in ³)	MEOP,Proof, Burst Press. (psi)	Program	Propellant Management	Tank Shell Material	Heritage/History/Usage
80081-1,-3	1967 thru 1974	16.5" Ø, polar bosses	17	----	2300	650,975,----	RRC	Positive expulsion EPT-10 diaphragm	STA 6Al-4V Ti	This is one of the first diaphragm tanks designed by PSI, using the EPT-10 diaphragm. The tank was built to customer requirements and qualification testing was not performed by PSI.
80157-1	1970	16.5" Ø, girth tabs (3)	8	10.8	2300	535,815,1070	PIONEER	Positive expulsion EPT-10 diaphragm	STA 6Al-4V Ti	This hydrazine tank is a derivative of the 80081-1 tank. The tank shell was modified to include mounting tabs. Qualification was by qualification testing. This tank contains bosses for radioisotope heaters. Several tanks of this configuration are onboard PIONEER 10 and 11, heading toward the outer Solar System and beyond.
80177-1,-3	1971	16.5" Ø, girth tabs (3)	8	10.2	2300	400,600,----	ATS	Positive expulsion EPT-10 diaphragm	STA 6Al-4V Ti	This hydrazine tank is a derivative of the 80157-1 tank. The tank shell has mounting tabs similar to 80157-1. The polar bosses and inlet and outlet tubes were modified. Qualification was based on similarity.
80189-1,-101	1971	16.5" Ø, girth tabs (3)	6	----	2300	380,1580,----	MARINER	Positive expulsion EPT-10 diaphragm	STA 6Al-4V Ti	This hydrazine tank is a derivative of the 80157-1 tank. The tank shell also has mounting tabs similar to 80177-1. The polar bosses and inlet and outlet tubes were modified. Only a forging qualification program was performed. There was no tank level qualification. This tank visited the inner planets such as Mercury, Venus, and Mars.
80207-1,-3	1973 thru 1978	16.5" Ø, continuous girth flange	4	11.5	2300	535, 805,----	NOVA	Positive expulsion EPT-10 diaphragm & AF-E-332 diaphragm	STA 6Al-4V Ti	This hydrazine tank is a derivative of the 80157-1 tank. The first tank contained EPT-10 diaphragm, but later converted to using AF-E-332 diaphragm. The tank shell was modified to contain a continuous girth flange. Qualification was by similarity.
80214-1,-3	1974	16.5" Ø, girth lugs (4)	5	7.9	2300	400,600,815	BSE	Positive expulsion EPT-10 diaphragm & AF-E-332 diaphragm	STA 6Al-4V Ti	This hydrazine tank retained the inner dimensions of previous tanks. The tank shell was redesigned to incorporate girth lugs. The -1 configuration used EPT-10 diaphragm, but -3 was revised to use AF-E-332 diaphragm. This tank was qualified by test.
80253-1	1976	16.5" Ø, girth lugs (4)	2	8.5	2300	350,640,----	SEASAT	Positive expulsion AF-E-332 diaphragm	STA 6Al-4V Ti	This hydrazine tank is a derivative of 80214-1. Only the polar bosses and the inlet and outlet tubes were modified. Qualification was by similarity.
80271-1, 80271-3	1978 thru 1988	16.5" Ø, girth lugs (3)	14	11.4	2280	300,900,1200	MMS, TOPEX	Positive expulsion AF-E-332 diaphragm	STA 6Al-4V Ti	This hydrazine tank was completely redesigned for a new tank shell. Qualification was by test.

PSI P/N	Year	Size & Mounting	Qty	Design Wt (lb)	Internal Volume (in ³)	MEOP, Proof, Burst Press. (psi)	Program	Propellant Management	Tank Shell Material	Heritage/History/Usage
80275-1	1979 thru 1994	16.5" Ø, girth lugs (4)	14	12.7	2300	435,653,1740	P80, Mars Pathfinder	Positive expulsion AF-E-332 diaphragm	STA 6Al-4V Ti	This tank uses the 80271 diaphragm and the 80214 tank shell. A complete qualification program was conducted for this classified program. Four residual tanks of this configuration were on the spacecraft on the highly successful Mars Pathfinder Mission.
80276-1	1979	16.5" Ø, pedestal	22	9.5	2300	320,478,682	ECS	Positive expulsion AF-E-332 diaphragm	STA 6Al-4V Ti	This tank was redesigned for a pedestal mount. A full qualification was conducted for this European program.
80303-1	1982 thru 1983	16.5" Ø, girth lugs (4)	59	13	2300	340,792,1584	GPS	Positive expulsion AF-E-332 diaphragm	STA 6Al-4V Ti	This GPS tank has a tank shell similar to 80275-1 and 80214-1. A full qualification was conducted for this Government program.
80316-1	1983	16.5" Ø, girth lugs (4)	2	12.5	2300	330,594,----	CRRES	Positive expulsion AF-E-332 diaphragm	STA 6Al-4V Ti	This tank is a derivative of 80303-1. The polar bosses and the inlet and outlet tubes were modified. This tank was qualified by similarity.
80319-1	1984	16.5" Ø, girth lugs (4)	4	13.2	2300	425,740,1000	TOS	Positive expulsion AF-E-332 diaphragm	STA 6Al-4V Ti	This tank is a derivative of 80275-1. The polar bosses and the inlet and outlet tubes were modified. This tank was qualified by similarity.
80337-1	1986 thru 1988	16.5" Ø, girth lugs (4)	28	14.0	2300	435,870,870	TITAN II	Positive expulsion AF-E-332 diaphragm	STA 6Al-4V Ti	This tank is a derivative of 80275-1. The polar bosses and the inlet and outlet tubes were modified. Qualification was by similarity, and a QBS report was generated for this tank.
80358-1	1989	16.5" Ø, girth lugs (4)	3	13.0	2300	396,792,1212	LANDSAT	Positive expulsion AF-E-332 diaphragm	STA 6Al-4V Ti	This tank is a derivative of 80303-1 tank. The polar bosses and the inlet and outlet tubes were modified. This tank was qualified by similarity.
80384-1	1995 thru 1996	16.5" Ø, girth lugs (4)	4	13.0	2300	350,600,800	AXAF, SMTS	Positive expulsion AF-E-332 diaphragm	STA 6Al-4V Ti	This tank is a derivative of 80303-1 tank. The polar bosses and the inlet and outlet tubes were modified. . Qualification was by similarity, and a QBS report was generated for this tank.
80397-1	1996	16.5" Ø, pedestal	2	10.0	2300	450,495,675	MARS '98 LANDER	Positive expulsion AF-E-332 diaphragm	STA 6Al-4V Ti	This tank is similar to the 80276-1 tank. The modification included mounting and inlet and outlet tubes. A protoflight acceleration test was conducted on one tank ² . This tank is currently en route to Mars.

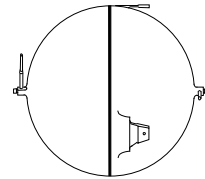
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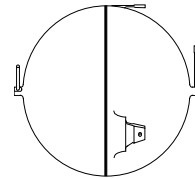
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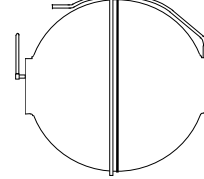
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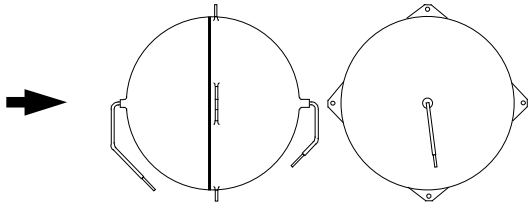
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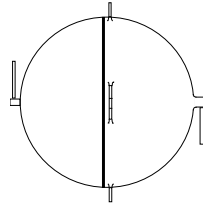
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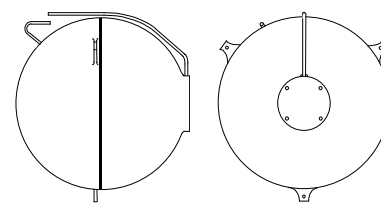
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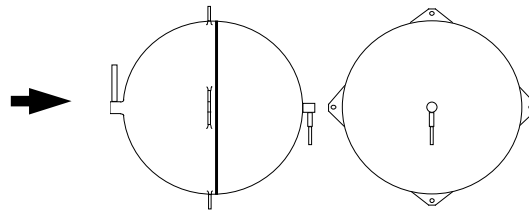
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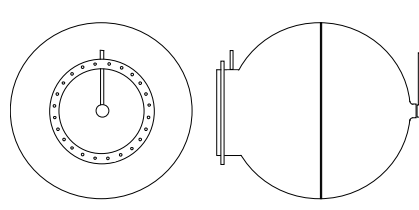
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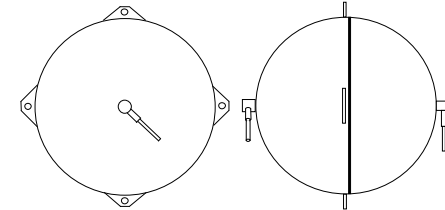
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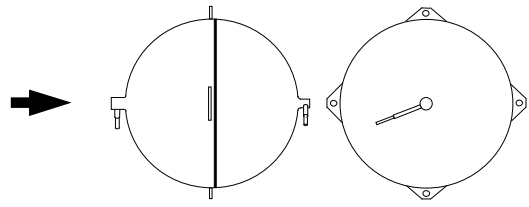
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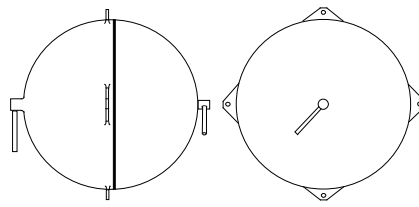
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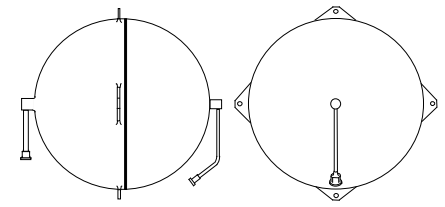
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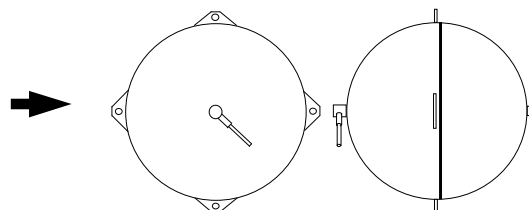
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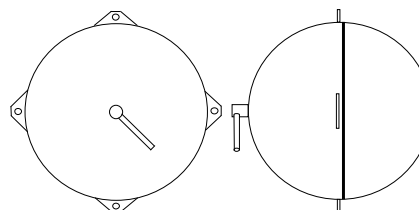
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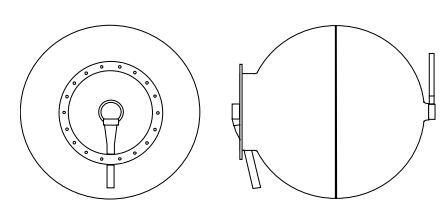
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80384-1



80397-1



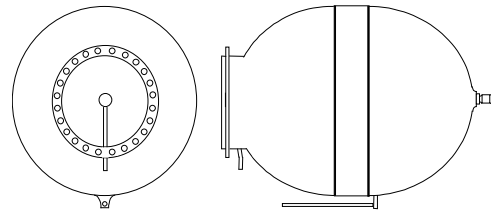
16.5-inch DIAMETER STRETCH DIAPHRAGM TANK

The 16.5-inch diameter stretch diaphragm tank added a cylindrical center section to the existing 16.5-inch hemispherical heads. A new elongated AF-E-332 diaphragm was developed for this tank configuration, allowing the diaphragm to be fully reversed. A summary of the 16.5-inch stretch tanks is presented below in Table A5. It should be noted that the listed weight is maximum design weight. The actual tank weight is below the design weight.

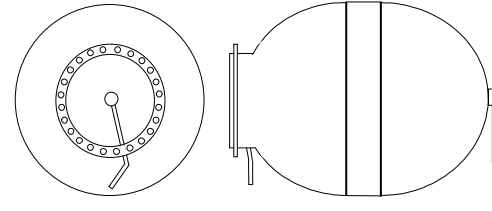
TABLE A5, 16.5-inch diameter stretch diaphragm tanks

PSI P/N	Year	Size & Mounting	Qty	Design Wt (lb)	Internal Volume (in ³)	MEOP, Proof, Burst Press. (psi)	Program	Propellant Management	Tank Shell Material	Heritage/History/Usage
80288-1	1980	16.5" Ø x 20" long, pedestal	14	12.43	2996	330,660,690	TELECOM 1	Positive expulsion AF-E-332 diaphragm	STA 6Al-4V Ti	This tank has an elongated diaphragm developed specifically for this tank. A complete qualification program was conducted.
80308-1, -101	1983 thru 1997	16.5" Ø x 20" long, pedestal	18	12.4	2996	320,480,640	SYKNET, NATO IV	Positive expulsion AF-E-332 diaphragm	STA 6Al-4V Ti	This tank is internally identical to the 80288-1 tank. The tank shell was modified to move the pressurant port to the inlet boss. The outlet boss and outlet tube were also slightly modified. This tank was qualified by qualification testing.
80392-1	1995	16.5" Ø x 20" long, pedestal	2	12.4	2996	320,480,640	CRSS	Positive expulsion AF-E-332 diaphragm	STA 6Al-4V Ti	This tank is similar to 80308-101. Modification was made to the pedestal mount and the inlet and outlet tubes. A QBS report was generated for this tank.
80455-1	2002	16.5" Ø x 20" long, pedestal	4	12.4	2996	320,480,640	STEREO	Positive expulsion AF-E-332 diaphragm	STA 6Al-4V Ti	This tank is similar to 80392-1. The transition tubes were replaced with titanium tubes. QBS was performed by the customer (Aerojet - Redmond WA)

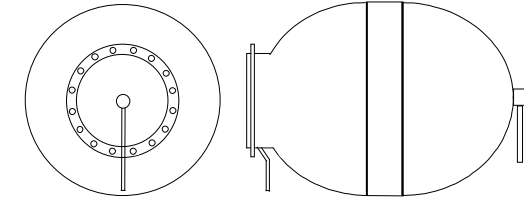
80288-1



80308-1



80392-1



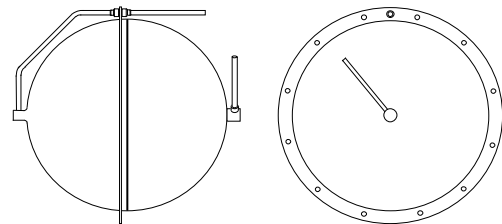
17.4-inch DIAMETER DIAPHRAGM TANK

The 17.4-inch diameter diaphragm tank was developed in 1980 for the Ulysses Solar Mission. A new 17.4-inch diameter diaphragm was developed for this tank configuration. A summary of this product line is presented below in Table A6. It should be noted that the listed weight is maximum design weight. The actual tank weight is below the design weight.

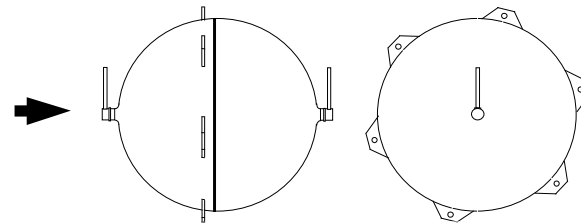
TABLE A6, 17.4-inch diameter stretch diaphragm tanks

PSI P/N	Year	Size & Mounting	Qty	Design Wt (lb)	Internal Volume (in ³)	MEOP, Proof, Burst Press. (psi)	Program	Propellant Management	Tank Shell Material	Heritage/History/Usage
80285-1	1980	17.4" Ø, girth flange	5	15.43	2705	319,970,1057	Ulysses	Positive expulsion AF-E-332 diaphragm	STA 6Al-4V Ti	This tank was developed specifically for the Ulysses program. A complete qualification program was conducted.
80359-1	1989	17.4" Ø, girth lugs	4	15.43	2705	377,566,754	SAX	Positive expulsion AF-E-332 diaphragm	STA 6Al-4V Ti	This tank is a derivative of 80285-1. Modification was made to the change the mounting feature from flange to lugs. The inlet and outlet tubes were also modified. This tank was qualified by similarity.
80401-1	1997	17.4" Ø, girth flange	2	15.43	2705	319,970,1057	Quickbird	Positive expulsion AF-E-332 diaphragm	STA 6Al-4V Ti	This tank is a derivative of 80285-1. Modification was made to the bosses, flange, and the inlet and outlet tubes. This tank was qualified by similarity.

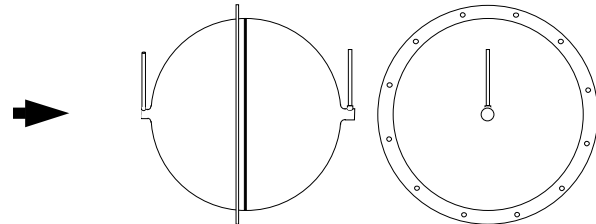
80285-1



80359-1



80401-1



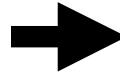
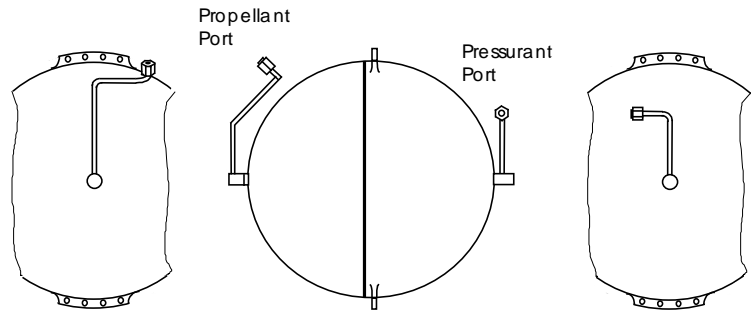
19.06-inch DIAMETER DIAPHRAGM TANK

The 19.06 inch diameter diaphragm tank was originally developed in 1978 using the AF-E-332 elastomeric diaphragm. Since that time there were numerous inquiries regarding this tank, but 20 years elapsed before development of a derivative tank. A summary of the 19.06-inch diaphragm tanks is presented below in Table A7. It should be noted that the listed weight is maximum design weight. The actual tank weight is below the design weight.

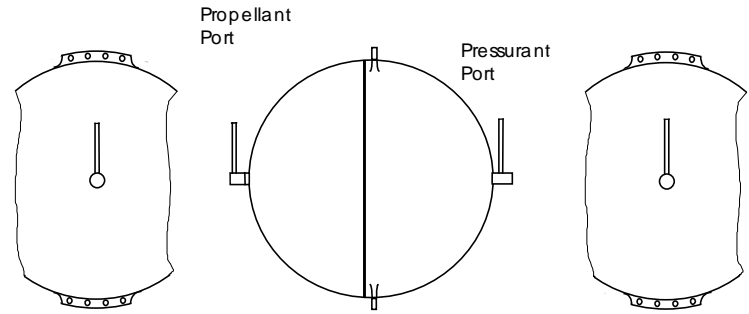
TABLE A7, 19.06-inch diameter diaphragm tanks

PSI P/N	Year	Size & Mounting	Qty	Design Wt (lb)	Internal Volume (in ³)	MEOP, Proof, Burst Press. (psi)	Program	Propellant Management	Tank Shell Material	Heritage/History/Usage
80274-1	1978	19.06" Ø, girth lugs (2)	3	13.25	3660	377,566,754	EXOSAT	Positive expulsion AF-E-332 diaphragm	STA 6Al-4V Ti	This hydrazine tank was original developed for the European EXOSAT program. Qualification was by qualification testing.
80379-1	1994	19.06" Ø, girth lugs (2)	2	10.7	3660	280,525,---	NEAR	Vortex suppressor	STA 6Al-4V Ti	This oxidizer tank is a derivative of 80274 tank. A side port was added, the diaphragm and diaphragm retaining features were removed, and a vortex suppressor was added above the side port. Qualification was based on similarity.
80274-101	1998 thru 1999	19.06" Ø, girth lugs (2)	3	13.25	3660	377,566,754	ORBVIEW-3, VCL	Positive expulsion AF-E-332 diaphragm	STA 6Al-4V Ti	This hydrazine tank is a derivative of the 80274-1. The tank shell was not changed and only the inlet and outlet tubes were modified. Qualification was by similarity to 80274-1. However, an additional slosh test was performed to qualify the tank. The development of this tank is detailed in the Reference 3 AIAA paper.
80460-1	2003	19.06" Ø, girth lugs (2)	1	13.25	3660		GEMINI	Positive expulsion AF-E-332 diaphragm	STA 6Al-4V Ti	This hydrazine tank is a derivative of the 80274-101 tank. The mounting tabs and interface tubes were modified for the program.
80461-1	2003	19.06" Ø, girth lugs (2)	1	10.7	3660		GEMINI	None	STA 6Al-4V Ti	This tank is a derivative of P/N 80379-1. The tank was built using residual parts from the NEAR program. Qualification was by similarity. The tank is used for liquid ammonia.
80464-1	2003	19.06" Ø, girth lugs (2)	3	TBD	TBD	TBD	GEMINI	TBD	STA 6Al-4V Ti	This tank is a derivative of P/N 80379-1. Qualification was by similarity. The tank is used for liquid ammonia.

80274-1



80274-101



22.1-inch DIAMETER DIAPHRAGM TANK

The 22.1-inch diameter diaphragm tank was developed in 1968 for a classified program. This size tank has evolved to become PSI's most popular product line. A summary of the 22.1-inch diaphragm tanks is presented below in Table A8. It should be noted that the listed weight is maximum design weight. The actual tank weight is below the design weight, sometimes considerably below.

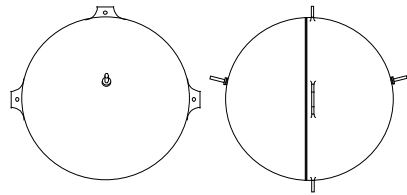
TABLE A8, 22.1-inch diameter diaphragm tanks

PSI P/N	Year	Size & Mounting	Qty	Design Wt (lb)	Internal Volume (in ³)	MEOP,Proof, Burst Press. (psi)	Program	Propellant Management	Tank Shell Material	Heritage/History/Usage
80112-1	1968 thru 1972	22.1" Ø, girth lugs (3)	26	14.35	5580	350,555,720	P-95	Positive expulsion EPT-10 diaphragm	STA 6Al-4V Ti	This hydrazine tank was developed for a classified program. There were significant amounts of documentation activities for this tank, including diaphragm testing. This tank includes a thermal management system. The tank was qualified by test.
80193-1	1972	22.1" Ø, girth lugs (4)	12	18.0	5565	365,655,-----	Viking deorbit	Positive expulsion EPT-10 diaphragm	STA 6Al-4V Ti	This tank used the diaphragm developed for 80112-1. Several PSI standard process and procedures were also developed under this program. This tank includes a thermal management system. The tank was qualified by test, including diaphragm verification testing.
80200-1	1973	22.1" Ø, girth lugs (3)	2	17.25	5580	350,555,720	P-95	Positive expulsion AF-E-332 diaphragm	STA 6Al-4V Ti	The hydrazine tank is a derivative of 80112-1. The inlet and outlet tubes were modified. This tank was qualified by test.
80203-1	1973	22.1" Ø, girth lugs (4)	4	16.7	5555	350,655,-----	FltSatCom	Positive expulsion AF-E-332 diaphragm	STA 6Al-4V Ti	This hydrazine tank is a derivative of 80193-1. The inlet and outlet tubes were modified. This tank includes a thermal management system. Diaphragm modifications were made to improve moldability. The tank was qualified by test.
80226-1	1974	22.1" Ø, girth lugs (4)	7	15.7	5555	350,655,-----	HEAO	Positive expulsion AF-E-332 diaphragm	STA 6Al-4V Ti	This hydrazine tank shell & connections are identical to 80203-1. However, the thermal management system is removed. The tank was qualified by similarity.
80241-1	1974 thru 1982	22.1" Ø, girth lugs (4)	16	16.5	5555	355,655,770	FltSatCom	Positive expulsion AF-E-332 diaphragm	STA 6Al-4V Ti	This hydrazine tank is a derivative of 80203-1. The tank shell & connections are identical to 80203-1 & a modification to the thermal management system is incorporated. This tank was qualified by similarity.
80259-1, -101	1977 thru 1984	22.1" Ø, girth lugs (4)	43	14.0	5555	375,650,750	DSCS	Positive expulsion AF-E-332 diaphragm	STA 6Al-4V Ti	This hydrazine tank is a derivative of 80241-1. The hemispheres were etched to reduce weight, requiring a complete qualification program.
80298-1, -101, -201, -301, -401	1981 thru 1999*	22.1" Ø, girth lugs (3)	138	21.0	5555	485,805,950	RADARSAT, CENTAUR, DELTA III, QuickSat, STEP 0 & 1, GENESIS,	Positive expulsion AF-E-332 diaphragm	STA 6Al-4V Ti	This hydrazine tank is one of the most popular tanks manufactured by PSI. It is used on satellites, launch vehicles and upper stages. The -1 tank was qualified by test for the Centaur program. All the derivative tanks were qualified by similarity.
80362-1	1991	22.1" Ø, girth lugs (4)	2	16.2	5555	350,525,700	TOMS-EP	Positive expulsion AF-E-332 diaphragm	STA 6Al-4V Ti	This hydrazine tank is a derivative of 80241-1, 80259-1 and 80298-1. The inlet and outlet tubes were modified. This tank was qualified by similarity and a QBS report was generated.
80378-1	1994	22.1" Ø, girth lugs (4)	3	16.2	5555	280,525,700	NEAR	Positive expulsion AF-E-332 diaphragm	STA 6Al-4V Ti	This hydrazine tank is a derivative of 80362-1. The mounting lugs and the inlet and outlet tubes were modified. This tank was qualified by similarity. The development of this tank is detailed in the reference 3 AIAA paper.

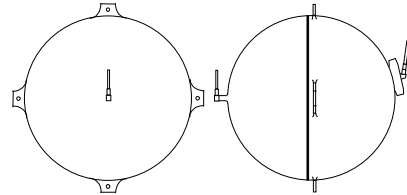
PSI P/N	Year	Size & Mounting	Qty	Design Wt (lb)	Internal Volume (in ³)	MEOP, Proof, Burst Press. (psi)	Program	Propellant Management	Tank Shell Material	Heritage/History/Usage
80385-1	1995	22.1" Ø, girth lugs (4)	2	16.2	5555	350,525,700	ROCSAT	Positive expulsion AF-E-332 diaphragm	STA 6Al-4V Ti	This hydrazine tank is a derivative of 80362-1. The inlet and outlet tubes were modified. Qualification was by similarity.
80388-1	1995 thru 1999	22.1" Ø, girth lugs (4)	2	15.5	5555	350,525,700	KOMPSAT	Positive expulsion AF-E-332 diaphragm	STA 6Al-4V Ti	This hydrazine tank is a derivative of 80262-1 and 80388-1. Qualification was by similarity.
80409-1	1998	22.1" Ø, girth lugs (2)	6	21.0	5555	475,795,950	ATLAS IIIB	Positive expulsion AF-E-332 diaphragm	STA 6Al-4V Ti	This hydrazine tank is a derivative of 80298-1 tank. The inlet and outlet tubes were modified. Qualification was by similarity.
80453-1	2002	22.1" Ø, girth lugs (4)	1	15.5	5555	350,525,700	Orbital Express	Positive expulsion AF-E-332 diaphragm	STA 6Al-4V Ti	This hydrazine tank is a derivative of 80388-1. Qualification was by similarity.

*In production.

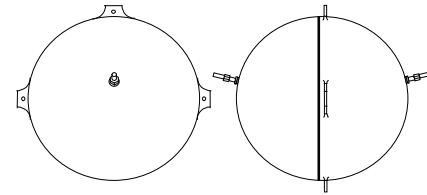
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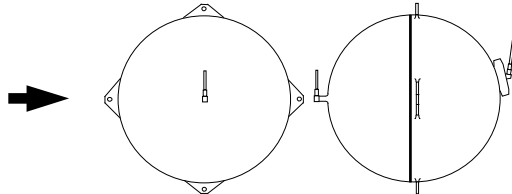
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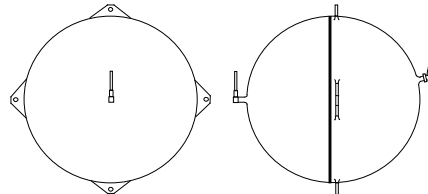
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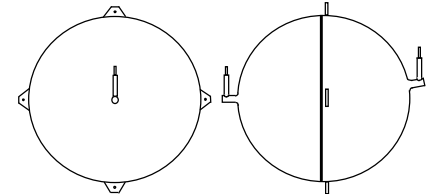
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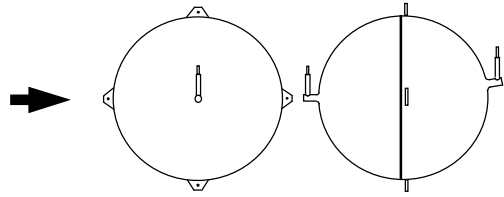
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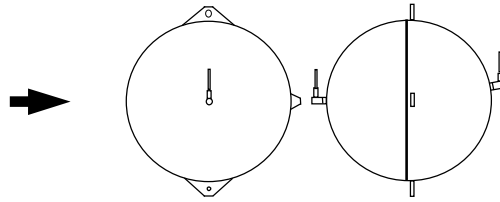
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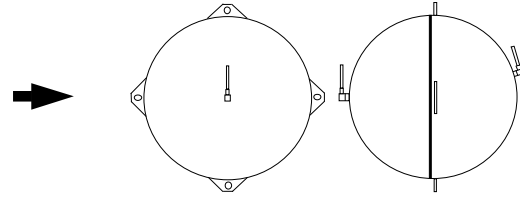
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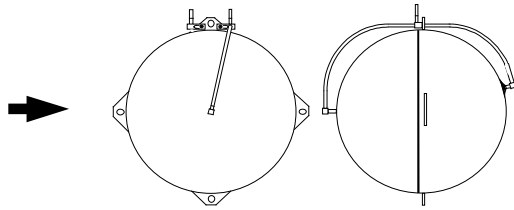
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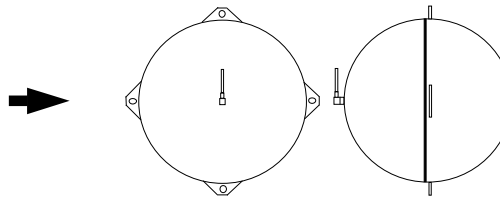
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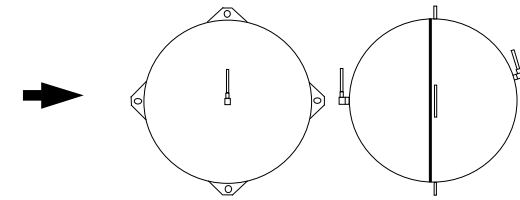
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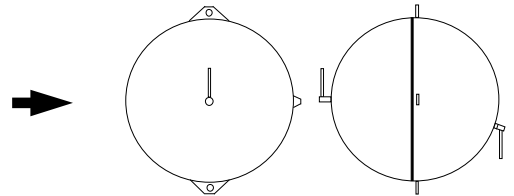
80385-1



80388-1



80409-1



23.13-inch DIAMETER x 25.7-inch Long DIAPHRAGM TANK

The 23.1-inch diameter diaphragm tank was developed in 1984 for a classified program. This size tank has evolved to become PSI's most popular product line. A summary of the 22.1-inch diaphragm tanks is presented below in Table A8. It should be noted that the listed weight is maximum design weight. The actual tank weight is below the design weight, sometimes considerably below.

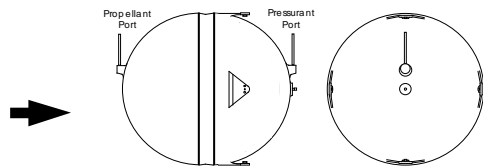
TABLE A8, 22.1-inch diameter diaphragm tanks

PSI P/N	Year	Size & Mounting	Qty	Design Wt (lb)	Internal Volume (in ³)	MEOP, Proof, Burst Press. (psi)	Program	Propellant Management	Tank Shell Material	Heritage/History/Usage
80323-1	1984	23.1" Ø x 25.7 Long, girth lugs (4)	8	31.5	7261	551,667,827	EURECA (MBB/ERNO)	Positive expulsion AF-E-332 diaphragm	STA 6Al-4V Ti	This hydrazine tank was developed for an European program. The tank was qualified by test.
80428-1	1999	23.1" Ø x 25.7 Long, girth lugs (4)	1	29.0	7261 (250 lbm Hydrazine)	417,625,1000	CORIOLIS (Primex)	Positive expulsion AF-E-332 diaphragm	STA 6Al-4V Ti	This tank is similar to 80323-1. The off-axis ports were eliminated, replaced by polar ports. Stress and fracture mechanics analyses were performed to analyze the tank shell. The tank was qualified by similarity.
80447-1	2000	23.1" Ø x 25.7 Long, girth lugs (4)	5				Deep Impact (Ball)	Positive expulsion AF-E-332 diaphragm	STA 6Al-4V Ti	This tank is a derivative of 80428-1.
80450-1	2002	23.1" Ø x 25.7 Long, girth lugs (4)	5				Sarlupe (RTG)	Positive expulsion SIFA diaphragm	STA 6Al-4V Ti	This tank is a derivative of 80428-1.

80323-1

80428-1

80447-1



28.0-inch DIAPHRAGM TANK

The 28.0-inch diameter diaphragm tank was originally developed in 1975 for the highly successful Voyager program. A series of derivative tanks were developed because of its attractive size. All the derivative tanks are related to the Space Shuttle APU tank, which was tested extensively. A summary of the 28.0-inch diaphragm tanks is presented below in Table A9.

TABLE A9, 28.0-inch diameter diaphragm tanks

PSI P/N	Year	Size & Mounting	Qty	Design Wt (lb)	Internal Volume (in ³)	MEOP, Proof, Burst Press. (psi)	Program	Propellant Management	Tank Shell Material	Heritage/History/Usage
80227-1	1975	28.0" Ø, off-axis lugs (4)	8	----	11350	450,1020,N/A	Voyager	Positive expulsion AF-E-332 diaphragm	STA 6Al-4V Ti	This tank was designed by PSI for JPL with JPL performing analysis and qualification test functions. The design incorporates a unique diaphragm anti-slosh baffle. This hydrazine tank has the singular distinction of being the farthest propellant tank ever traveled from earth.
80228-1	1975	28.0" Ø, polar bosses	27	44.0	11350	355,533,1070	Space Shuttle APU	Positive expulsion AF-E-332 diaphragm	STA 6Al-4V Ti	This hydrazine tank program utilized the diaphragm developed for 80227-1 but undertook a complete redesign of the tank shell for the man-rated Space Shuttle. This tank was qualified by test. Numerous tests conducted by PSI and NASA makes this PSI's most tested tank.
80287-1	1980 thru 1988	28.0" Ø, polar boss and off-axis lugs	5	42.0	11350	300,810,1200	ATK-MMS, UARS, TOPEX	Positive expulsion AF-E-332 diaphragm	STA 6Al-4V Ti	This hydrazine tank is a derivative of 80228-1. The tank shell was modified to incorporate the off-axis lugs and an off-axis pressurant boss. The outlet boss was modified to include a radial outlet tube. Qualification was by similarity.
80297-1	1981	28.0" Ø, polar bosses	3	43.0	11350	380,632,-----	ERBS	Positive expulsion AF-E-332 diaphragm	STA 6Al-4V Ti	This hydrazine tank is a derivative of 80228-1. The tank was modified to including new bosses and added pressurant and propellant tubes. This tank was qualified by test. However, there was no burst test.
80325-1, -101, -201, -301	1984 thru 1999	28.0" Ø, polar bosses	6	44.0	11350	450,675,900	MAGELLAN, CASSINI, INDOSTAR USERS	Positive expulsion AF-E-332 diaphragm	STA 6Al-4V Ti	This hydrazine tank is a derivative of 80228-1. Only the bosses were modified. Qualification was by similarity. This tank visited Venus on MAGALLAN and is on its way to Saturn aboard CASSINI.
80348-1	1987	28.0" Ø, polar bosses	4	43.0	11350	435,870,1088	TITAN III	Positive expulsion AF-E-332 diaphragm	STA 6Al-4V Ti	This hydrazine tank is a derivative of 80228-1. The bosses were modified and inlet and outlet tubes were added. Qualification was by similarity.

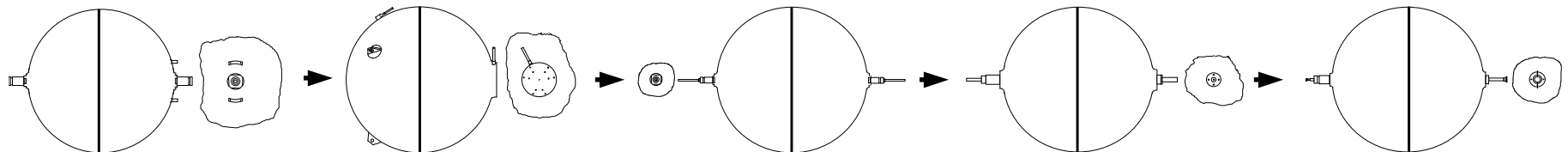
80228-1

80287-1

80297-1

80325-1

80348-1



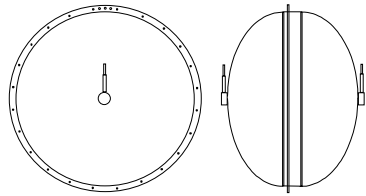
40.0-inch DIAMETER DIAPHRAGM TANK

The 40.0-inch diameter diaphragm tank was originally developed in 1977. A series of derivative tanks were developed because of its attractive size. A summary of the 40.0-inch diaphragm tanks is presented below in Table A10.

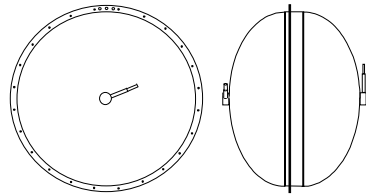
TABLE A10, 40.0-inch diameter diaphragm tanks

PSI P/N	Year	Size & Mounting	Qty	Design Wt (lb)	Internal Volume (in ³)	MEOP,Proof, Burst Press. (psi)	Program	Propellant Management	Tank Shell Material	Heritage/History/Usage
80263-1, -101, -201	1977 thru 1998	40.0" Ø, continuous girth flange	20	76	28144	338,525,676	TDRSS, SOHO, EOS-COMMON	Positive expulsion AF-E-332 diaphragm	STA 6Al-4V Ti	This tank was originally designed as the TDRSS hydrazine tank. The different dash numbers are for different tube wall thicknesses and different customers. The -1 tank was qualified by test, the follow-on tanks (-101, etc.) are qualified by similarity. The -201 tank was vibration tested on a customer structure.
80318-1	1983	40.0" Ø, continuous girth flange	3	76	28144	338,545,721	P-80	Positive expulsion AF-E-332 diaphragm	STA 6Al-4V Ti	This hydrazine tank program utilized the diaphragm developed for 80263-1. The inlet and outlet ports were modified, and the outlet port was rotated 65 degrees. A supplemental qualification program was conducted to include acceleration testing. This tank was qualified by test and similarity.
80329-1	1985	40.0" Ø, continuous girth flange	2	76	28144	338,507,---	COBE	Positive expulsion AF-E-332 diaphragm	STA 6Al-4V Ti	This hydrazine tank is a derivative of 80263-1. The inlet and outlet ports were modified, and the outlet port was rotated 60 degrees. The mounting flange hole pattern was slightly modified. This tank was qualified by similarity.
80370-1	1992	40.0" Ø, continuous girth flange	2	76	28144	338,525,676	TRMM	Positive expulsion AF-E-332 diaphragm	STA 6Al-4V Ti	This hydrazine tank is a derivative of 80263-1. The inlet and outlet ports and the mounting flange hole pattern were modified. Additionally, this tank has fracture critical heads that meets modern fracture mechanics requirements. This tank was qualified by similarity.
80376-1	1993	40.0" Ø, continuous girth flange	1	76	28144	338,525,676	EOS-AM	Positive expulsion AF-E-332 diaphragm	STA 6Al-4V Ti	This hydrazine tank is a derivative of 80370-1. The inlet and outlet ports and the mounting flange hole pattern were modified. A protoflight test was conducted for this NASA program. Qualification was by similarity.
80382-1	1994	40.0" Ø, continuous girth flange	1	76	28144	338,525,676	ETS-VII	Positive expulsion AF-E-332 diaphragm	STA 6Al-4V Ti	This hydrazine tank is a derivative of 80376-1. The inlet and outlet ports were modified. Qualification was by similarity.
80407-1	1998 thru 1999	40.0" Ø, continuous girth flange	3	76	28144	338,525,676	X-38	Positive expulsion AF-E-332 diaphragm	STA 6Al-4V Ti	This hydrazine tank is a derivative of 80370-1. This tank is still in the design phase. The inlet and outlet ports will be modified. Qualification will be by similarity.
80451-1	2002	40.0" Ø, continuous girth flange					P909 (LM)	Positive expulsion AF-E-332 diaphragm	STA 6Al-4V Ti	This tank has an 8" cylinder extension and an internal diaphragm support. Qualification is by similarity.
80463-1	2003	40.0" Ø, continuous girth flange	1	76	28144	338,525,676	NPP	Positive expulsion AF-E-332 diaphragm	STA 6Al-4V Ti	This tank is a derivative of 80376-1. Transition tubes were added to existing interface tubes. Qualification was based on similarity.

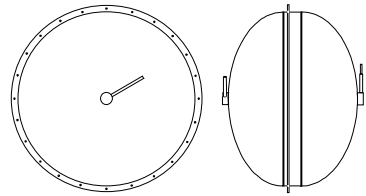
80263-1



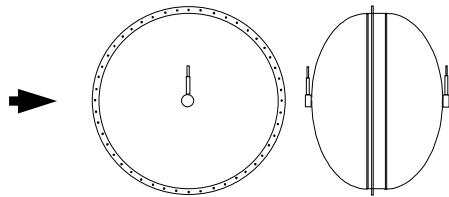
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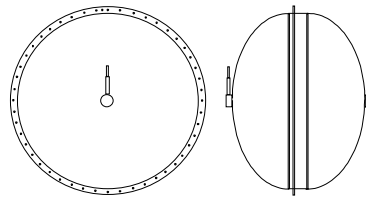
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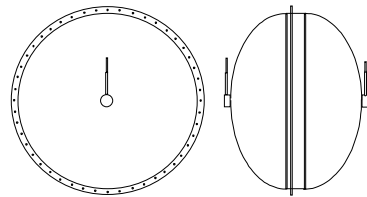
80370-1



80376-1



80382-1



80451-1

80XXX-1

80XXX-1