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1-Introduction

This Wash Cart is designed to be a portable, easy to use cleaning system which features heated tanks for enhanced cleaning. It is comprised of a rigid chassis on inflatable rubber tires with a steering/draw bar, two nitrogen cylinders, two pressure vessels, a storage chest, one selection valve and operator controls. These components are integrated to maximize safety and ease of use for the operator.

2-Cautions

1. Maximum tow speed is 5 mph.

3-Initial Setup

1. After uncrating the unit inspect it for any shipping damage that may have occurred.

2. Install the proper AC plug for the voltage and current ratings of your wash cart on the end of the 30' SO power cord. This information is located the engraved plate on the front of the electrical enclosure.

3. The stainless steel float must be installed in each of the sight glasses on the pressure vessels.

    a-Carefully remove the end cap located on the bottom of each sight glass.

    b-Insert the float assembly into the unit ensuring that the "TOP" indication mark on the float assembly is inserted first.

    c-Replace the old gasket or o-ring with a new one then re-assemble the end cap assembly. The bolts should be torqued to between 70 and 80 lb-inches.

4. Verify that the tire pressure is at the rating listed on the sidewall.

5. Charge the nitrogen cylinders as described in the procedure listed in this manual.

4-Functional Description

This system is designed to clean & rinse with heated solution to better remove deposits and buildup. After the pressure vessels are full and power is applied the heaters in each pressure vessel will automatically start and remain on until the desired temperature is achieved. They have individual temperature controls that operate independent of each other. Once they have reached the desired temperature the electrical power can be removed and the unit is ready for use.

Each pressure vessel is pressurized by the nitrogen charge from the nitrogen cylinders. The nitrogen tanks are connected in series to each pressure vessel. The pressure in each vessel is indicated by the gauge and controlled by the high-pressure regulator this pressure is maintained while the system is in use or as long as the nitrogen cylinders are charged.

The delivery hose can be connected to using the watertight quick connects and the nozzles connected to the hose ends in the same manner. To flow solution position the tank selection valve to the desired location (Wash or Rinse) then open the tank output valve for the desired tank, and the flow will begin immediately.

Be sure to connect the proper probe for the engine type being washed. Refer to the aircraft/engine publication for this information.

5-Turco Cleaning Solutions

#6783-10 Ready to Use

#6783-50 Concentrate

Mix one (1) Part of 6783-50 to four (4) parts distilled or de-mineralized water.

These cleaners are available from:

Aerosafe Products, Inc.
P.O. Box 4755
Marietta, GA 30001-4755
Phone 888.666.7885
Phone 770.590.8863
fax 770.429.1345
www.aerosafe.com

6-Operating Instructions

Introduction

The Procedures in this section are designed for the Dual 25 Gallon Aorosafe Wash Cart. For instructions and precautions pertaining to a particular engine you must refer to the engine manufacturers specification.

Preparing the Unit for Use

1-Verify that both nitrogen cylinders are fully charged to a maximum 2200 psi. I required charge the cylinders by following the procedure described in the section titled Nitrogen Cylinder Charging Procedure.

2-Verify that the valves on the nitrogen cylinders and the pressure vessel output ball valves are completely closed.

WARNING: Before proceeding to the next step be sure all pressure has been drained from the pressure vessels. If there is pressure in either of the tanks bleed it off by pulling the ring on the Pressure Vessel Safety Valve then wait until all pressure is relieved.

3-Lift the latch on each pressure vessel and remove the filler lid. Be sure not to damage the lid as this will destroy the integrity of the seal.

4-Fill the pressure vessels with the proper liquid to the full level indicated by the sight glass. Be sure to fill the Wash vessel with a solution of detergent and de-mineralized water and the Rinse vessel with de-mineralized water only.

5-Return the lids to their respective vessel and latch them in place.

6-Plug the 30’ power cord into a suitable outlet, position the power switch to on and allow the liquid to come up to temperature (125 Degrees F). Once both vessels are at temperature turn the power switch off, unplug and stow the power cord.

7-Tow the Wash Cart to a suitable workplace away from engine exhausts, detach it from the tow vehicle and place the tow bar in the vertical position to lock the cart in place.

8-Connect the appropriate hose to the appropriate fluid output quick connector and position the nozzles per the engine manufacturers specification.

9-Position the tank selection valve lever to the wash tank making sure to rotate the lever completely to allow for full flow rate.

Engine Preparation

1-Open the left and right thrust reversers on the engine being washed in accordance with the engine manufacturers specification.

2-Place the engine wash probes through the fan outlet guide vanes (OGV's) from the aft side at approximately the four and eight o'clock positions as follows:

a-Put the probes over the booster/fan splitter so that the tips point between the booster inlet guide vanes into the booster.

b-Check to be sure that the probes are secure and safely held in place.

Operating Procedure

1-Close the Vessel Outlet Valve on each of the pressure vessels.

2-Open the pressure inlet valves on each of the pressure vessels.

3-Open the valves on each nitrogen cylinder and allow the vessels to pressurize. Adjust the regulator to the pressure specified in the engine manufacturers publication.

4-Open the Vessel Outlet Valve on the wash vessel and the wash solution will begin to flow immediately. The engine should be washed with the wash solution then allow the solution to soak for a period of time. Close the vessel Outlet Valve on the wash tank to stop the flow of wash solution.

5-Open the Vessel Outlet Valve on the rinse vessel and the rinse water will begin to flow immediately. Close the Vessel Outlet Valve on the rinse tank to stop the flow of rinse solution.

After Use

1-Close the valve on each nitrogen cylinders.

2-Close both Pressure Supply Valves to the pressure vessels and allow the pressure in each tank to drain off. Each valve has a bleed valve on it that will allow pressure to bleed from the vessel once the valve is closed.

3-Close both Vessel Outlet Valves.

4-Remove the nozzles from the engine, disconnect all hoses and stow them for future use.

7-Maintenance

Before performing any maintenance be sure all pressure is bled from both pressure vessels.

Pressure Vessels

1-The pressure vessels should be inspected twice a year as required by country of use.

Nitrogen Cylinders

1-The nitrogen cylinders should be inspected as required by the country of use.

Gauges

1-All gauges should be calibrated once a year.

2- Inspect all gauges for leaks or cracks regularly and replace as required**.**

Chassis

1-Check wheels for freedom of rotation and grease the wheel bearings once a year or as required.

2-Inspect wheel bearings for wear and replace as required.

3-Grease the turntable once a year or as required.

4-Inspect the turntable for wear and or cracks and repair or replace as required.

5-Inspect paint for chipping or flaking and touch-up as required.

6-Inspect tires for cracks or damage and replace as required.

7-Inspect tires for wear, if tread depth is less than .080” they must be replaced.

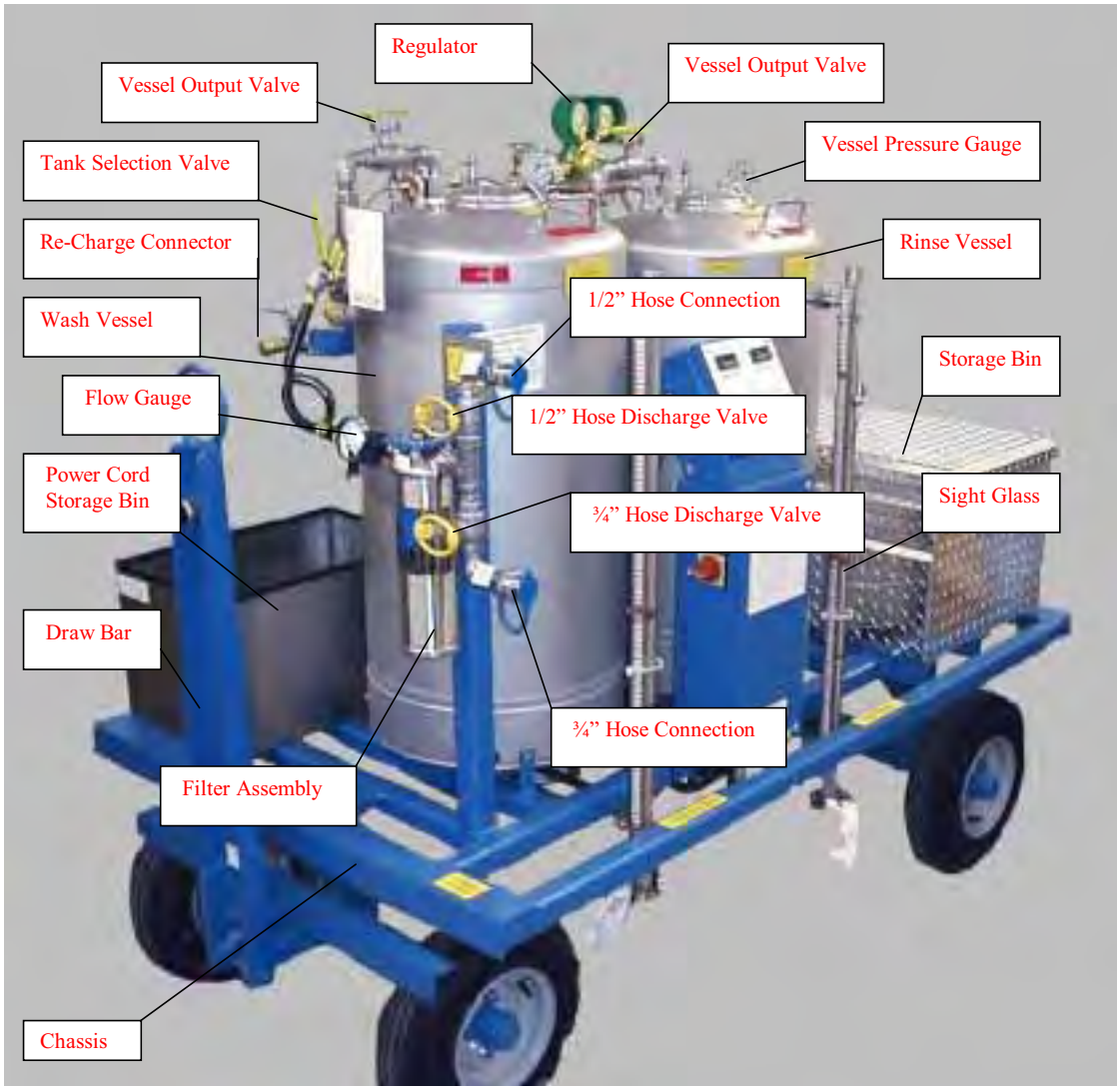
General

1-Inspect all hoses, fittings and valves regularly for cracks, splits or leaks and replace as required.

2-Inspect all nuts and bolts for tightness.

3-Inspect the Fluid Filter and clean or replace as required.

8-Controls Location Diagram



9-Electrical Controls

The electrical controls on the wash cart are used during the heating process. With the unit plugged in, the main power on and the vessels full with liquid the temperature controls will energize the heaters. The heaters will stay on until the setpoints (125 degrees F) are reached. Once a vessel has reached the setpoint the temperature control will turn the heater on and off as required to maintain that setpoint as long as the unit is electrically plugged into the supply and the vessel is full.

The temperature controls are pre-set at the factory and should not need to be adjusted however, if it becomes necessary to do so please refer to the CAL3200 Autotune Temperature Control operators manual supplied with the unit:

Level 1:
Tune=Park, bAnd = 5.0, int.t = 1.0, dEr.t = off, dAC = .5, CYC.t = on/off, ofSt=0, sPly=off, Set.2=0, bnd.2=0.1, CYC.2=on.oF
Level 2:
SP1.P = SSR, hand=oFF, PL.1=100, PL.2=100, SP2A=none, SP2B=none, diSP=1, hiSC=125, Lo.SC=Sensor Minimum, inPt=J, unit = F
Level 3:
SP1.d=SSd, SP2.d=none, burn=uP.SC, rEV.d=1r.2d, rEV.l=1n.2n, SPAn=0.0, Zero=0.0, ChEy=oFF, read=Var, dAtA=CtA, Ver=software version, rSET=none

10-Chassis

Function: Contains all elements of the wash cart and make the system portable.

Description: The chassis is a rigid construction with inflatable rubber tires solid axles in both front and rear and a drawbar connected to a turntable for steering. With the drawbar in the up position the brake is automatically applied to both front wheels.

11-Storage Bin

Function: Storage of power cord, hose assemblies, nozzles and fittings.

Description: There are two storage bins, one located on the rear of the chassis which is designed to store the hose assemblies, nozzles and probes. It is constructed of high grade Diamond Bright Aluminum that will never rust, pit or peel. The dome lid is reinforced and lined on the inside for superior strength and all seams are fully welded. Commercial gas struts assist with opening the lid. A rubber mat is installed to prevent metal-to-metal damage that might otherwise be caused while storing components. A second storage bin is located on the front left side; it is designed to store the power cable.

12-Pressure Vessels

Function: Storage of wash and rinse solutions under pressure.

Description: There are two 25 Gallon pressure vessels secured to the wash cart chassis, one for wash solution and one for rinsing. They are constructed of Stainless Steel, have a pressure type cover and a white pickle finish. Each vessel is fitted with a pressure gage, nitrogen fitting (compressed gas supply), relief valve and an outlet. The pressure gage indicates tank pressure, the nitrogen fitting is connected to the pressure source, the relief valve releases tank pressure if the tank pressure exceeds the valve setting and the outlet supplies the cleaning or rinse solution to the selection valve. At the bottom of each tank is a drain valve to completely empty the tank if needed.

13-Sight Glass

Function: Provide visual indication of the liquid level in each tank.

Description: A floating ball raises and lowers with the liquid level and flips the indicators between white and orange. Orange indicates liquid level height, white indicates no liquid. Each sight glass has a switch located at the full indication level. This switch allows the heaters to energize when it is closed or the vaessels are full, and not before. These switches are located at the factory and should not be adjusted without first consulting the manufacturer of this system. If they are re-positioned there is a danger that the immersion heaters will energize without being submerged, this will cause them to fail and/or reduce their life expectancy.

14-Nitrogen Cylinders

Function: Source of compressed gas which provides the pressure to the pressure vessels.

Description: This system employs two (2) nitrogen cylinders, which are secured to the wash cart chassis. They have a maximum pressure rating of 2500 PSI, a capacity of 122 Cubic Feet and are able to supply enough charge for two complete wash cycles.

Re-Charge Hose Assembly

15-Nitrogen Cylinder Charging Procedure

To re-charge the nitrogen cylinders follow these steps:

1-Close the valve on each nitrogen cylinder.

2-Close the pressure supply valves to each pressure vessel.

3-Remove the protective plug from the re-charge fitting and connect the re-charge hose.

4-Open both nitrogen cylinder valves.

5-Connect the other end of the re-charge hose to the supply.

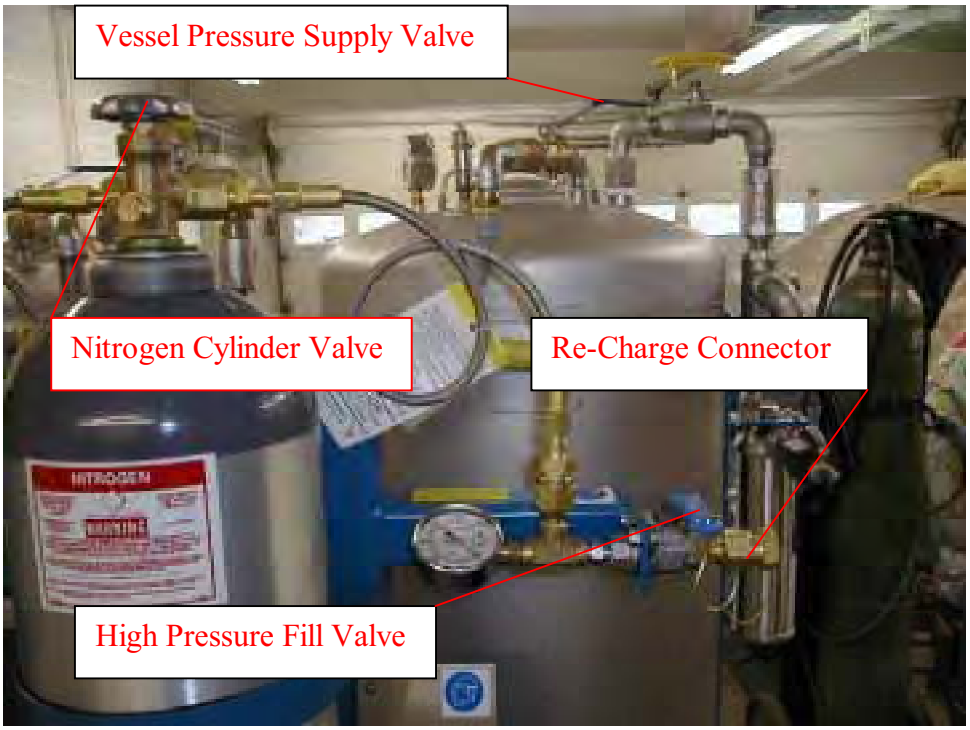
6-Open the high pressure fill valve on the wash cart.

7-Open the supply valve and allow the tanks to fill to 2200 psi.

8-Close the supply valve and the high pressure supply valve on the wash cart.

9-Close the valves on each of the nitrogen cylinders.

10-Disconnect the re-charge hose at both ends and stow for future use.



16-High Pressure Gauge

Function: Indicate the pressure (psi) in the nitrogen tanks.

Description: This liquid filled type 304 stainless steel case gauge has a 2 ½" dial for easy visual indication. The lens is polycarbonate, graduation marks are in increments of 50 psi and the range is 0-3000 psi. It should be re-calibrated or replaced once a year.

17-High Pressure Regulator

Function: Regulate the pressure to the pressure vessels.

Description: The pressure regulator reduces the nitrogen supply pressure to 90 PSI. It is preset at the factory and should never be adjusted. Both the input and output have gauges to indicate pressure; these gauges should be re-calibrated or replaced once a year.

18-Alternate Pressure Supply

Function: Input connection for source of compressed gas other than from the nitrogen tanks.

Description: A quick connect fitting is available as an alternate connection for the compressed gas. If so desired a compressor can be connected to this port, once the valve is opened the pressure vessels will be pressurized via compressed air.

Get Picture of connection location and insert here

19-Pressure Supply Check Valves

Function: Eliminate back flow from pressure vessels to the nitrogen tanks.

Description: These bronze spring loaded check valves have a maximum wirking pressure of 200 psi, a maximum temperature rating of 190 degrees F and a cracking pressure of 1-2 psi. They are located between each pressure vessel and the nitrogen tanks and allow flow in only one direction, into the pressure vessel.

20-Pressure Supply Ball Valve

Function: Open compressed gas flow into the pressure vessels.

Description: These vented brass ball valves have a lockable handle, a maximum pressure of 125 psi and a maximum temperature of 400 degrees F. When the valve is closed the pressure automatically vents to the atmosphere. They are located right after each vessels pressure supply check valves. Open these valves to allow the pressure vessels to pressurize, Close them when draining the pressure vessels or the nitrogen charge will bleed out.

21-Tank Pressure Gauges

Function: Indicate the pressure (psi) in the pressure vessels.

Description: This liquid filled type 304 stainless steel case gauge has a 2 ½" dial for easy visual indication. The lens is polycarbonate , graduation marks are in increments of 2 psi. Each pressure vessel has its own pressure gauge, They should be re-calibrated or replaced once a year.

22-Tank Drain Valves

Function: Purge the pressure vessels of liquids.

Description: These chrome plated brass ball valves have a maximum working pressure of 600 psi, a maxuimum temperature of 450 degrees F and a vacuum service of 29.92" Hg. The seats and seals are glass filled Teflon and the handle is steel with a vinyl grip. Each pressure vessel has a drain valve centered in the bottom of the tank. Be sure the high pressure supply ball valve is closed when opening this drain valve or the nitrogen tanks will drain to the atmosphere.

23-Tank Safety Valves

Function: Relieve pressure in tanks if 125 psi is exceeded.

Description: These pop safety valves are constructed of type 304 stainless steel, have a cracking pressure of 125 psi and a maximum temperature of 250 degrees F. Each valve has a pull ring for manual operation. These valves should be replaced once a year.

24-Tank Output Ball Valves

Function: Allow liquid to flow from pressure vessel.

Description: These type 316 stainless steel ball valves have a maximum working pressure of 1000 psi, a maximum temperature of 400 degrees F. All seats and seals are teflon and a vinyl covered oval handle makes for easy operation. Each pressure vessel has its own output ball valve located after the 90 degree elbow.

25-Tank Output Check Valves

Function: Prevent liquid from flowing back into the pressure vessel.

Description: These type 316 stainless steel check valves have a maximum working pressure of 400 psi, a maximum temperature of 325 degrees F. The ball cone is made of reinforced Teflon and it has a cracking pressure of ½ psi. Each pressure vessel has its own output check valve located after the output ball valve.

26-Fluid Immersion Heaters

Function: Provides a source of heat energy to the llliquid in the pressure vessels.

Description: Each pressure vessel has its own heater to heat the fluid to a desired temperature. The heaters are 240 volt AC and will not energize unless the tanks are full. The tanks will reach the setpoint (125 degrees F) within approximatelv ½ hour.

27-Three Way Diverting Valve

Function: Select the desired liquid for the process.

Description: This type 316 stainless steel ball valve has a maximum working pressure of 800 psi and maximum temperature of 350 degrees F. All seats and seals are glass reinforced Teflon. Position this valve to select a rinse or wash solution. Flow can be directed to either of the side ports at full flow or to both ports simultaneously at a reduced flow. The lever must be completely seated for proper selection.

28-Dial Indicating Flowmeter

Function: Indicate the approximate rate of flow to the delivery hose. This meter is intended for visual indication that fluid id flowing when the appropriate valve is open.

Description: This flowmeter has a magnetic movement that isolates the gauge from the flow stream. Flow is indicated on an easy to read 2 ½" dial. It indicates the rate of flow in GPM and should be replaced once a year.

29-Filter Assembly

Function: Filter particulate matter from the liquids.

Description: The stainless steel fluid filter cartridge is made of a single bolt one-piece shell construction to provide quick, spill free cartridge changes. It is furnished with vents, drains and gaskets and has a maximum pressure of 250 psi and a maximum temperature of 300 degrees F. The stainless steel filter cartridge is 100 microns and has a 20 gallon per minute flow rating. The maximum temperature is 250 degrees F and the maximum pressure differential is 60 psi.

30-3/8” Discharge Hose Valve

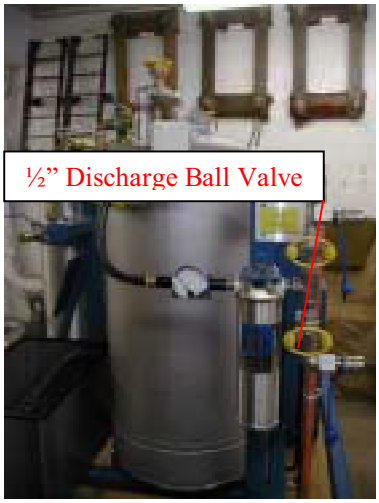
Function: Open flow to the 3/8” discharge Hose.

Description: This type 316 stainless steel ball valve has a maximum working pressure of 1000 psi, a maximum temperature of 400 degrees F. All seats and seals are Teflon and a vinyl covered oval handle makes for easy operation.

31-1/2” Discharge Hose Valve

Function: Open flow to the 1/2” discharge Hose.

Description: This type 316 stainless steel ball valve has a maximum working pressure of 1000 psi, a maximum temperature of 400 degrees F. All seats and seals are Teflon and a vinyl covered oval handle makes for easy operation.



32-1/2” Discharge Hose Assembly

Function: Transport liquid from wash cart to aircraft engine.

Description: This hose assembly is constructed of 1/2” ID rubber hose, stainless steel fittings and quick connect couplings on each end for ease of use.

33-3/4” Discharge Hose Assembly

Function: Transport liquid from wash cart to aircraft engine.

Description: This hose assembly is constructed of 3/4” ID rubber hose, stainless steel fittings and quick connect couplings on each end for ease of use.

34-Dual Hose Assembly

Function: Transport liquid from wash cart to aircraft engine.

Description: This hose assembly is constructed of 3/4” ID rubber hose, stainless steel fittings and quick connect couplings on each end for ease of use.

35-Accessories

The unit is supplied with the following:

2 – CF6 Washing Probes

2 – CFM56 Washing Probes

2 – JT8D Washing Probes

1 – Hand Spray Gun with 24” Wand Extension and 4 quick change nozzles

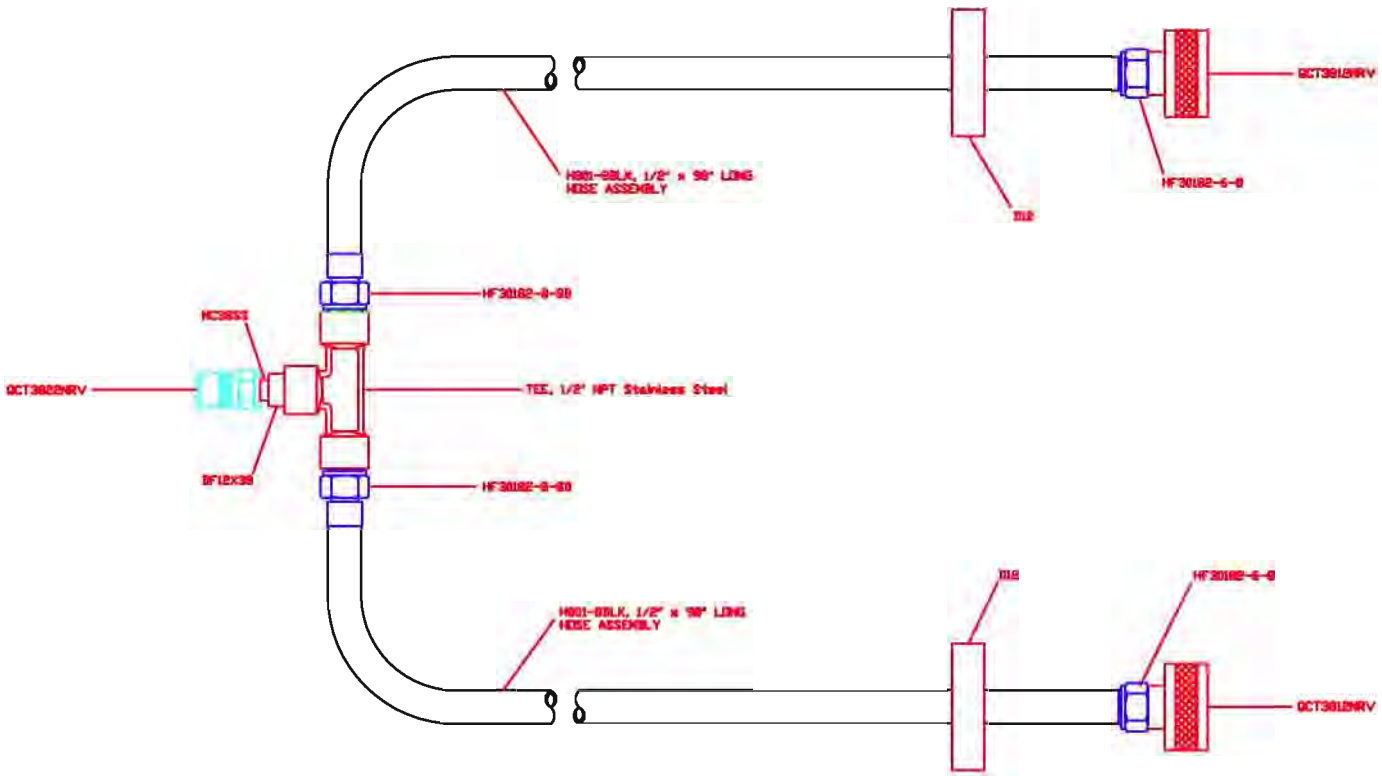
1 –Dual Hose Assembly

1 – 20’ x ½” Hose Assembly

1 – 20’ x ¾” Hose Assembly

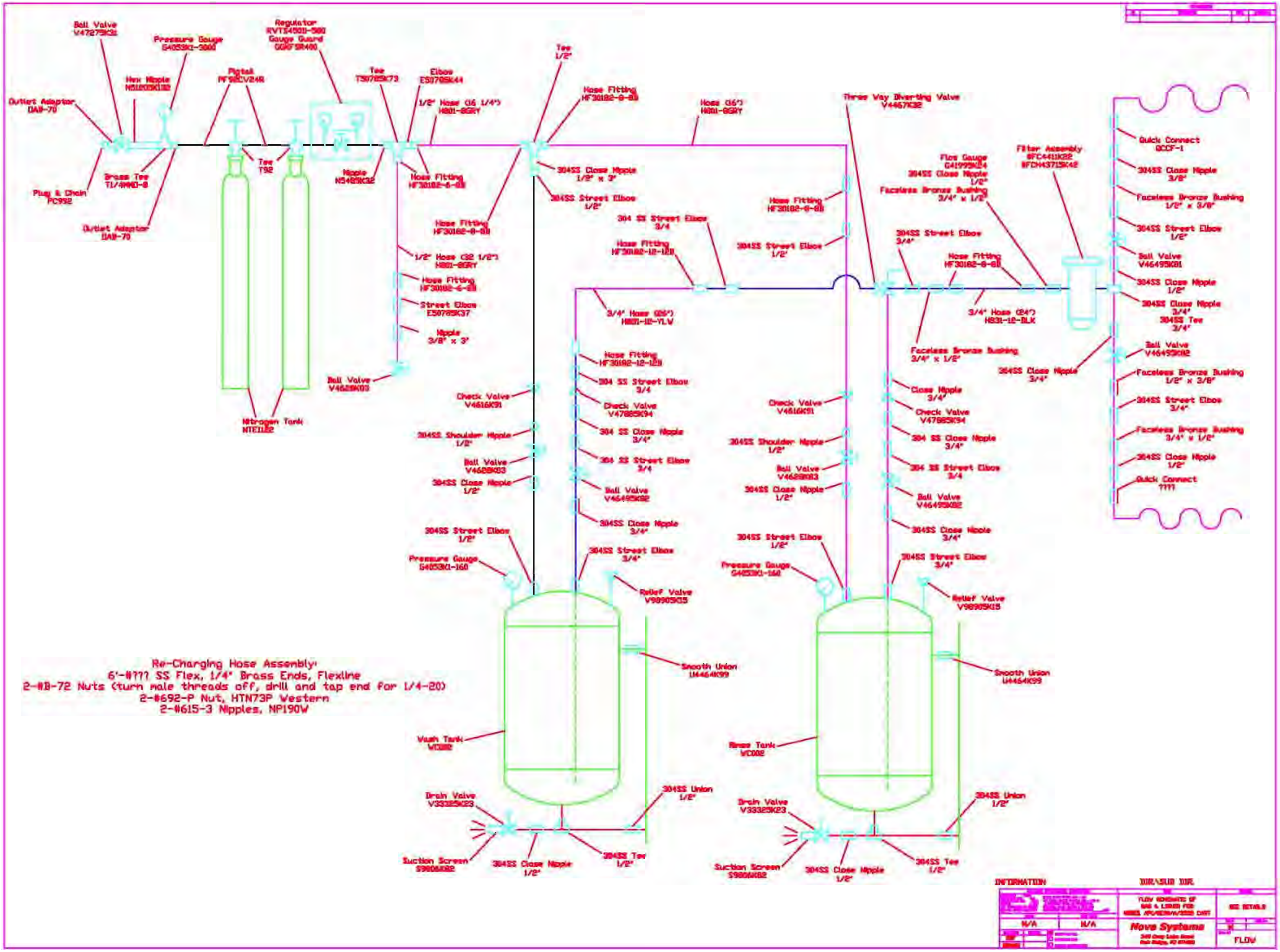
36-Options

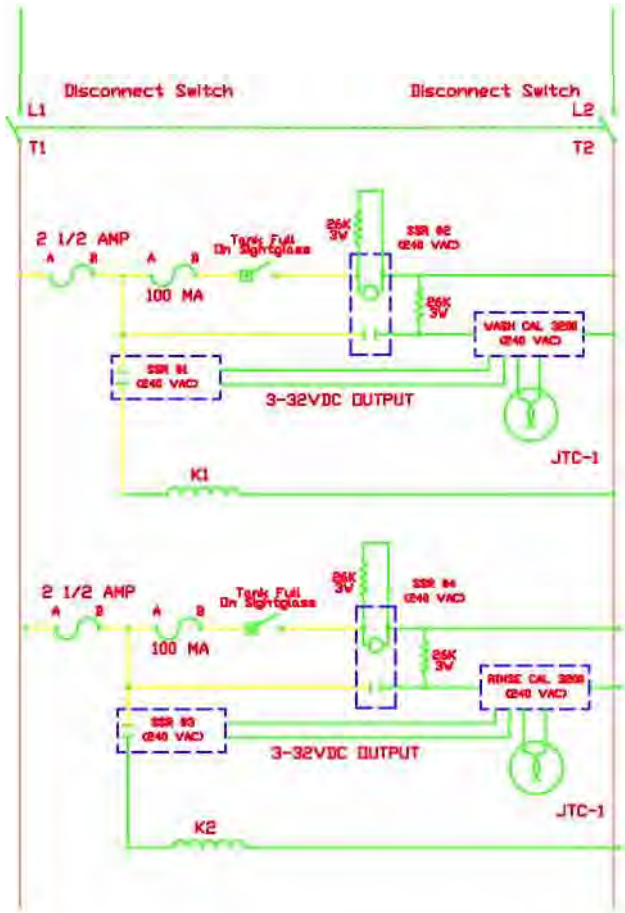
60’ x ¾” Hose Assembly

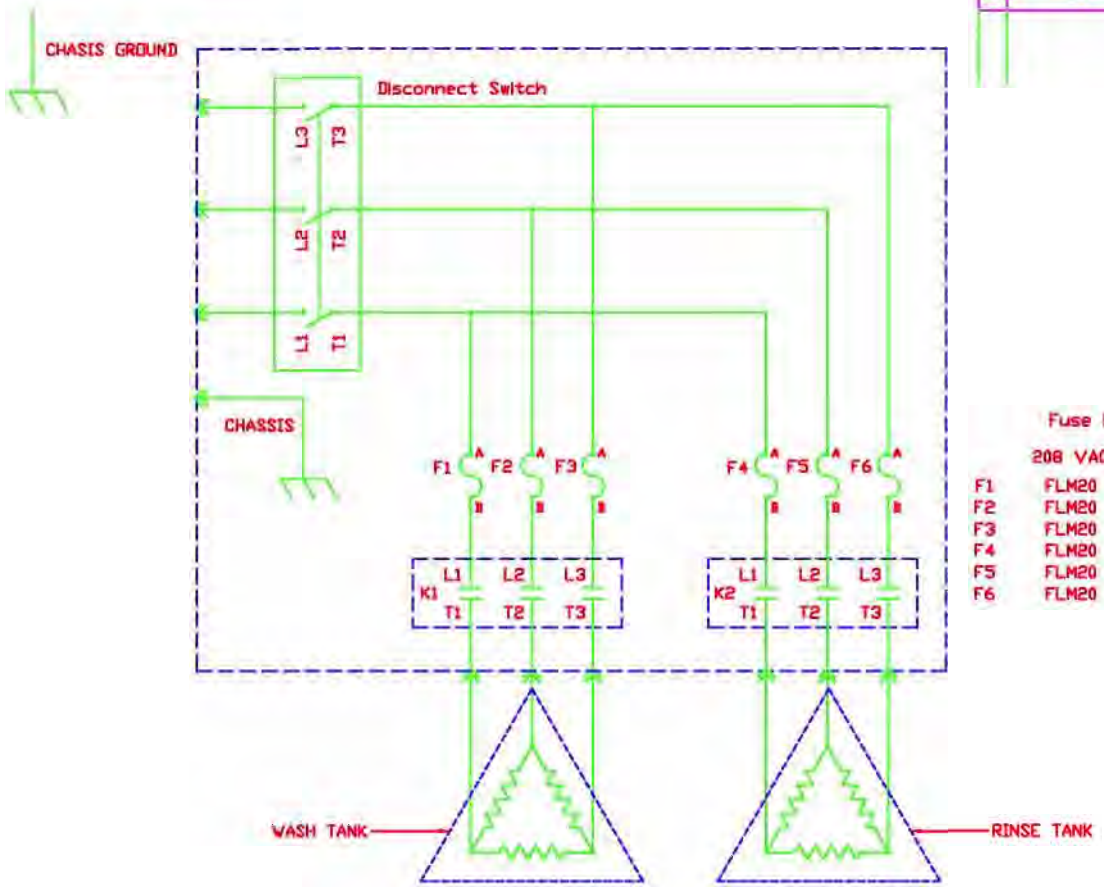


INFORMATION

		TWIN DELIVERY HOSE ASSEMBLY	N/A
NONE	NONE	Nova Systems	
			WC001


Ball Valve
V47275K31
Pressure Gauge
G4053K1-3000
Regulator
RVT34500-580
Gauge Guard
GGRF5R400
Hex Nipple
N51035K132
Pigtail
MF98CV24R
Outlet Adaptor
DAB-70
Brass Tee
T1/4MMD-8
Plug & Chain
PC992
Outlet Adaptor
DAB-70
Tee
T92
Nipple
N5485K32
Tee
T50785K73
Elbow
E50785K44
1/2" Hose (16 1/4")
H801-8GRY
Hose Fitting
HF30182-8-88
Tee
1/2"
Hose Fitting
HF30182-8-88
Hose (16")
H801-8GRY
Three Way Diverting Valve
V4467K32
304SS Close Nipple
1/2" x 3"
304SS Street Elbow
1/2"
Hose Fitting
HF30182-8-88
1/2" Hose (32 1/2")
H801-8GRY
Hose Fitting
HF30182-6-88
Street Elbow
E50785K37
Nipple
3/8" x 3"
Ball Valve
V4628K03
Nitrogen Tank
NTE1182
304 SS Street Elbow
3/4
Hose Fitting
HF30182-12-128
3/4" Hose (26")
H801-12-YLW
Hose Fitting
HF30182-8-88
304SS Street Elbow
1/2"
Flow Gauge
G41995K24
304SS Close Nipple
1/2"
Faceless Bronze Bushing
3/4" x 1/2"
304SS Street Elbow
3/4"
Hose Fitting
HF30182-8-88
3/4" Hose (24")
H831-12-BLK
Faceless Bronze Bushing
3/4" x 1/2"
Filter Assembly
BFC4411K32
BFCH43715K42
304SS Close Nipple
3/4"
Quick Connect
QCCF-1
304SS Close Nipple
3/8"
Faceless Bronze Bushing
1/2" x 3/8"
304SS Street Elbow
1/2"
Ball Valve
V46495K81
304SS Close Nipple
1/2"
304SS Close Nipple
3/4"
304SS Tee
3/4"
Ball Valve
V46495K82
Faceless Bronze Bushing
1/2" x 3/8"
304SS Street Elbow
3/4"
Faceless Bronze Bushing
3/4" x 1/2"
304SS Close Nipple
1/2"
Quick Connect
????
Hose Fitting
HF30182-12-128
304 SS Street Elbow
3/4
Check Valve
V4616K91
Check Valve
V47865K94
304SS Shoulder Nipple
1/2"
304 SS Close Nipple
3/4"
Ball Valve
V4628K03
304 SS Street Elbow
3/4
304SS Close Nipple
1/2"
Ball Valve
V46495K82
304SS Close Nipple
3/4"
304SS Street Elbow
1/2"
304SS Street Elbow
3/4"
Pressure Gauge
G4053K1-160
Relief Valve
V98905K15
Close Nipple
3/4"
Check Valve
V4616K91
Check Valve
V47865K94
304SS Shoulder Nipple
1/2"
304 SS Close Nipple
3/4"
Ball Valve
V4628K03
304 SS Street Elbow
3/4
304SS Close Nipple
1/2"
Ball Valve
V46495K82
304SS Close Nipple
3/4"
304SS Street Elbow
1/2"
304SS Street Elbow
3/4"
Pressure Gauge
G4053K1-160
Relief Valve
V98905K15
Re-Charging Hose Assembly:
6'-#??? SS Flex, 1/4" Brass Ends, Flexline
2-#B-72 Nuts (turn male threads off, drill and tap end for 1/4-20)
2-#692-P Nut, HTN73P Western
2-#615-3 Nipples, NP190W
Smooth Union
U4464K99
Smooth Union
U4464K99
Wash Tank
WC002
Rinse Tank
WC002
304SS Union
1/2"
304SS Union
1/2"
Drain Valve
V33325K23
Drain Valve
V33325K23
Suction Screen
S9806K82
304SS Close Nipple
1/2"
304SS Tee
1/2"
Suction Screen
S9806K82
304SS Close Nipple
1/2"
304SS Tee
1/2"
INFORMATION
DIR\SUB DIR
N/A
N/A
Nova Systems
FLOW





Fuse Ratings

	208 VAC	220 VAC
F1	FLM20	FLM25
F2	FLM20	FLM25
F3	FLM20	FLM25
F4	FLM20	FLM25
F5	FLM20	FLM25
F6	FLM20	FLM25

Functional Description:
Plug in AC - Applies voltage to L1, L2 and L3.
Turn disconnect on - Applies AC K1-L1, K1-L2, K1-L3, K2-L1, K2-L2, K2-L3 & CAL 3200's if respective tank is full.
CAL 3200's Energize-Pulls in respective SSR & contactor and heaters energize.
Tank Reaches setpoint - Cal 3200 output switches on and off to maintain setpoint until AC power is removed or tank level drops below full.

autographic business forms

Parts List

API/GE90/A/3535

Wash Cart System

2 x 25 Gallon Heated Tanks

Type	CAT	Inventory	IN
Revision		Build Item	
Status	U	User3	
Date	12/5/2000	User4	
By	SBF	User5	

Item	Qty Unit	Part Number	Type Rev	Title Detail	Reference
		Vendor		Vendor P/N / Inventory	User4
1	1 each	API/GE90/A/3535-CA	PL 0	Wash Cart Wagon	
		Nova Systems, Inc.		API/GE90/A/3535-CA IN	
2	1 each	API/GE90/A/3535-HP	PL 0	High Pressure Fittings & Plumbing	
		Nova Systems, Inc.		API/GE90/A/3535-HP IN	
3	1 each	API/GE90/A/3535-LP	PL 0	Low Pressure Fittings & Plumbing	
		Nova Systems, Inc.		API/GE90/A/3535-LP IN	
4	1 each	API/GE90/A/3535-PC	PL 0	Power Control Enclosure, Wash Cart 240 vac 3 Phase	
		Nova Systems, Inc.		API/GE90/A/3535-PC IN	
5	1 each	API/GE90/A/3535-RCH	PL 0	Re-Charging Hose Assembly, Nitrogen Tanks	
		Nova Systems, Inc.		API/GE90/A/3535-RCH IN	
6	1 each	API/GE90/A/3535-RP	PL 0	Remote Control Enclosure, Wash Cart 240 vac 1 Phase	
		Nova Systems, Inc.		API/GE90/A/3535-RP IN	
7	1 each	CF66	PL 0	Parts List, CF66 Probe	
		Nova Systems, Inc.		CF66 IN	
8	1 each	CFM565/5	PL 0	Parts List, CFM56/5 Probe	
		Nova Systems, Inc.		CFM565/5 IN	
9	1 each	DHA1	PL 0	Dual Hose Assembly, Quick Connect Reference Drawing WC001	
		Nova Systems, Inc.		DHA1 IN	
10	1 each	HA1	PL 0	Hose Assembly, Quick Connect 3/4" Hose x 20' Long, 1/2 x 3/8 Quick Connect	
		Nova Systems, Inc.		HA34X20 IN	
11	1 each	HA2	PL 0	Hose Assembly, Quick Connect 1/2" Hose x 20' Long, 3/8 x 3/8 Quick Connect	
		Nova Systems, Inc.		HA2 IN	

Parts List

API/GE90/A/3535-CA

Wash Cart Wagon

Type	PL	Inventory	IN
Revision	0	Build Item	Build Item
Status	U	User3	
Date	10/5/2000	User4	
By	SBF	User5	

Item	Qty Unit	Part Number	Type Rev	Title Detail	Reference
1	2 each	WC002	DWG 0	Pressure Vessel 35 Gallon	
2	2 each	CF-6	PS 0	Compression Fittong Stainless	
3	4 each	CF75145K72	PS 0	Conduit Fitting 90 Degree, 1/2" Black	
4	1 each	CONDUIT	PS 0	Conduit 1/2" Black	
5	1 each	F85175K59	PS 0	Foam Rubber Sheeting 1/2" Thick, 54" Wide, 2' Long, 4-5 Firm Rating	
6	2 each	HEATERS	PS 0	Immersion Heaters	
7	2 each	PCT13-1-A10-B120-J-Z15	PS 0	Thermocouple Probe 1/2" OD, 12" Long	
8	1 each	STORAGE CHEST	PS 0	Storage Chest	
9	2 each	SW 86567	PS 0	Switch Module Use on #WC007 Suresight	
10	1 each	TRAILER	PS 0	Wash Cart Chassis	
11	2 each	WC007	PS 0	Suresight Liquid Level Indicator M4, Side/Side/1/2" MNPT, Bottom Access,	

Parts List

API/GE90/A/3535-HP

High Pressure Fittings & Plumbing

Type	PL	Inventory	IN
Revision	0	Build Item	Build Item
Status	U	User3	
Date	12/6/2000	User4	
By		User5	

Item	Qty Unit	Part Number	Type Rev	Title Detail	Reference
1	1 each	G4053K1-3000	PS 0	Gauge, Liquid Filled Stainless Steel 0-3000 psi, Grade A, 1/4 NPT Male Brass	
2	1 each	GGKFSR400	PS 0	Gauge Guard 450 Regulator	
3	1 each	N51205K132	PS 0	Hex Nipple 316 SS, 1/4 x 1/4 Male, 6000 PSI	
4	2 each	NTE1122	PS 0	Nitrogen Tank 113 Cubic Feet of Nitrogen, 2216 psi Service	
5	1 each	OAB-70	PS 0	Outlet Adaptor 1/4 Male x 580 Female (gas standard)	
6	1 each	PC992	PS 0	Plug & Chain 580 Male (gas standard)	
7	2 each	PF92CV24R	PS 0	24" Pigtail Assembly With Check Valve	
8	1 each	RVTS450D-580	PS	Regulator	
9	1 each	T1/4MMO-8	PS 0	High Pressure Tee 580 (gas standard)	
10	2 each	T92	PS	Tee 580 (gas standard)	
11	1 each	V47275K31	PS 0	High Pressure Ball Valve 316 SS, 1/4", 4500 PSI	

Parts List

API/GE90/A/3535-LP

Low Pressure Fittings & Plumbing

Type	PL	Inventory	IN
Revision	0	Build Item	Build Item
Status	U	User3	
Date	12/6/2000	User4	
By	SBF	User5	

Item	Qty Unit	Part Number	Type Rev	Title Detail	Reference
1	2 each	BF12X38	PS 0	Bushing, Faceless, Bronze 1/2" x 3/8"	
2	3 each	BF34X12	PS 0	Bushing, Faceless, Bronze 3/4" x 1/2"	
3	1 each	E50785K37	PS 0	Elbow, Brass 3/8"	
4	1 each	E50785K44	PS 0	Street Elbow 90 Degree Brass, 3/8	
5	5 each	ES12SS	PS 0	Elbow, Street, Stainless Steel 1/2"	
6	8 each	ES34SS	PS 0	Elbow, Street, Stainless Steel 3/4"	
7	1 each	FC44275K33	PS 0	9 3/4" Filter Cartridge, 100 Micron Wound Acetate, 2 1/2" OD, 250 F Max, 304	
8	1 each	FCH43715K42	PS 0	Filter Cartridge Housing 304 Stainless Steel, 10" Cartridge, 10 GPM	
9	2 each	G4053K1-160	PS 0	Gauge, Liquid Filled Stainless Steel 0-160 psi, Grade A, 1/4 NPT Male Brass	
10	1 each	G41995K24	PS 0	Dial Indicating Multimount Flowmeter 0-10 GPM, Aluminum	
11	48 3/4" each	H801-8GRY	PS 0	General Purpose Hose 1/2" ID, 300 PSI, Gray, Use With Push-Lok	
12	24" each	H831-12BLK	PS 0	General Purpose Hose 3/4" ID, 300 PSI, Black, Use With Push-Lok	
13	26" each	H831-12YLW	PS 0	General Purpose Hose 3/4" ID, 300 PSI, Yellow, Use With Push-Lok	
14	2 each	HF30182-12-12B	PS 0	Push Lock Hose Fitting 3/4 NPT x 3/4 Hose	
15	3 each	HF30182-6-8B	PS 0	Push Lock Hose Fitting 3/8 NPT x 1/2 Hose	

Item	Qty Unit	Part Number	Type Rev	Title Detail	Reference
16	5 each	HF30182-8-8B	PS 0	Push Lock Hose Fitting 1/2 NPT x 1/2 Hose	
17	1 each	N12X3SS	PS 0	Nipple, Stainless Steel 1/2" x 3"	
18	1 each	N38X3SS	PS 0	Nipple, Stainless Steel 3/8"x 3" Long	
19	1 each	N5485K32	PS 0	Reducing Hex Nipple Brass, 1/4 Male x 3/8 Male	
20	7 each	NC12SS	PS 0	Nipple, Close, Stainless Steel 1/2"	
21	7 each	NC34SS	PS 0	Nipple, Close, Stainless Steel 3/4"	
22	1 each	NC38SS	PS 0	Nipple, Close, Stainless Steel 3/8"	
23	2 each	NS12SS	PS 0	Nipple, Shoulder, Stainless Steel 1/2"	
24	1 each	QCT3812NRV	PS 0	Coupling, Quick Connect Female 3/8 NPT, Stainless Steel	
25	1 each	QCT5012	PS 0	Coupling, Quick Connect, Female 1/2"NPT, Stainless, Female	
26	2 each	S9806K82	PS 0	Suction Screen with Nylon Base 40 Mesh, Male 1/2"NPT	
27	3 each	T12SS	PS 0	Tee, Stainless Steel 1/2"	
28	1 each	T34SS	PS 0	Tee, Stainless Steel 3/4"	
29	1 each	T50785K73	PS 0	Tee Brass, 3/8 Female	
30	2 each	U12SS	PS 0	Union 304 Stainless Steel, 1/2"NPT	
31	2 each	U4464K99	PS 0	Smooth Union 304 Stainless Steel, 1/2"NPT	
32	2 each	V33325K23	PS 0	Ball Valve, Chrome Plated Brass 1/2" Pipe, Female, 600 psi Max, Full Ports	
33	1 each	V4467K32	PS 0	Diverting Valve, 3 Way, Stainless 3/4" Pipe, 10-24 mount, 450 F Max,	

Item	Qty Unit	Part Number	Type Rev	Title Detail	Reference
34	2 each	V4616K91	PS 0	Check Valve, Bronze 1/2" Pipe, 400 psi Max, 100 F Max, 1-2 psi	
35	3 each	V4628K83	PS 0	Ball Valve, Vented, Brass 1/2" Pipe, Male x Male, 200 psi Max, 10-32	
36	1 each	V46495K81	PS 0	Ball Valve, Stainless 1/2" Pipe, 1000 psi Max, 450 F Max,	
37	3 each	V46495K82	PS 0	Ball Valve, Stainless 3/4" Pipe, 1000 psi Max, 450 F Max,	
38	2 each	V47885K94	PS 0	Check Valve, 316 Stainless Steel 3/4" Pipe, 400 psi Max, 325 F Max, .5psi	
39	2 each	V98905K15	PS 0	Safety Valve, 304 Stainless 1/4" NPT, 250 F Max, 125 PSI Max Check for 130 PSI cheaper valve	

Parts List

API/GE90/A/3535-PC

Power Control Enclosure, Wash Cart
240 vac 3 Phase

Type	PL	Inventory	IN
Revision	0	Build Item	Build Item
Status	U	User3	
Date	8/1/2000	User4	
By	SBF	User5	

Item	Qty Unit	Part Number	Type Rev	Title Detail	Reference
1	1 each	WC003	DWG 0	Control Enclosure Cutouts	
2	2 each	8910DPA43V09Y242	PS 0	Definite Purpose Contactor 40 Amp, 240 vac Coil	
3	2 each	9080FB3611M	PS 0	Fuse Block 3 Pole	
4	1 each	EKL1505	PS 0	Enclosure 500mm x 200mm x 120mm	
5	6 each	FLM25	PS 0	Fuse 25 Amp	
6	1 each	KCF2PZ	PS 0	Operators Handle Use With LSV4 Loadbreak Switch	
7	1 each	LSV4	PS 0	Loadbreak Switch 3 Pole, 63 Amp, Switch Body Only	
8	1 each	PKL1566	PS 0	Component Mounting Panel	
9	2 each	SSR-0001	PS 0	Solid State Relay 3-32 VDC Control Signal	

Parts List

API/GE90/A/3535-RCH

Re-Charging Hose Assembly, Nitrogen Tanks

Type	PL	Inventory	IN
Revision	0	Build Item	Build Item
Status	U	User3	
Date	2/14/2001	User4	
By	SBF	User5	

Item	Qty Unit	Part Number	Type Rev	Title Detail	Reference
1	2 each	AB-72	PS 0	Adaptor	
2	1 each	H1/4X6'SS	PS 0	Flexline Hose, 1/4" x 6' Long Flex	
3	3 each	N615-3	PS 0	Nipple	
4	2 each	N692-P	PS 0	Nut	

Parts List

API/GE90/A/3535-RP

Remote Control Enclosure, Wash Cart
240 vac 1 Phase

Type	PL	Inventory	IN
Revision	0	Build Item	Build Item
Status	U	User3	
Date	8/9/2000	User4	
By	SBF	User5	

Item	Qty Unit	Part Number	Type Rev	Title Detail	Reference
1	1 each	WC004	DWG 0	Operators Panel Cutouts & Overlay	
2	2 each	CAL3200	PS 0	Temperature Control 60-240 vac, 3-32 vdc output	
3	1 each	EKL1502	PS 0	Enclosure 200mm x 200mm x 120mm	
4	2 each	SSR-0001	PS 0	Solid State Relay 3-32 VDC Control Signal	

Parts List

CF66

Parts List, CF66 Probe

Type	PL	Inventory	IN
Revision	0	Build Item	Build Item
Status	U	User3	
Date	7/11/2000	User4	
By	SBF	User5	

Item	Qty Unit	Part Number	Type Rev	Title Detail	Reference
1	1 each	CF66-A	DOC 0	Assembly Diagram, CF66-A Probe	
2	1 each	CF66-1	DWG 0	Clamp, Rear, CF66-A Probe	
3	1 each	CF66-2	DWG 0	Clamp, Front, CF66-A Probe	
4	1 each	CF66-4M	DWG 0	Knob, Front/Rear Clamp, CF66-A Probe	
5	1 each	CF66-5M	DWG 0	Knob, Main Clamp, CF66-A Probe	
6	1 each	CFM565-3M	DWG 0	Clamp, Main, CFM 56/5 Probe	
7	1 each	92185A585	PS 0	Socket Head Cap Screw 316 Stainless Steel, 5/15-18 x 1 1/4" Long	
8	1 each	K60205K24	PS 0	Knob, Knurled 303 Stainless, 5/16-18 Thread	
9	1 each	K60205K26	PS 0	Knob, Knurled, Threaded 303 Stainless, 3/8-16 Thread	
10	1 each	QCT3822NRV	PS 0	Coupling, Quick Connect (Male, Nipple) 3/8" Male NPT, Stainless Steel, Unvalved	
11	1 each	RF-1	PS 0	Reflective Flag See Drawing # RF-1 for reference	
12	1 each	S95412A634	PS 0	Threaded Stud 18-8 Stainless, 3/8-16 Thread, 2 1/2" Long	
13	1 Feet	T51825K38	PS 0	PVC (Vinyl) Tubing 18 MM ID, 23 MM OD, 3' Long	

Parts List

CFM 565/5

Parts List, CFM 56/5 Probe

Type	PL	Inventory	IN
Revision	0	Build Item	Build Item
Status	U	User3	
Date	7/9/2000	User4	
By	SBF	User5	

Item	Qty Unit	Part Number	Type Rev	Title Detail	Reference
1	1 each	CFM 565-A	DOC 0	Assembly Diagram, CFM 56/5 Probe	
2	1 each	CFM 565-1	DWG 0	Clamp, Rear, CFM 56/5 Probe	
3	1 each	CFM 565-2	DWG 0	Clamp, Front, CFM 56/5 Probe	
4	1 each	CFM 565-3	PL 0	Clamp, Main, CFM 56/5 Probe	
5	1 each	CFM 565-4	PL 0	Knob, Front/Rear Clamp, CFM 56/5 Probe	
6	1 each	CFM 565-5	PL 0	Knob, Main Clamp, CFM 56/5 Probe	
7	1 each	CFM 565-6	PL 0	Nozzle, CFM 56/5 Probe	
8	1 each	QCT3822NRV	PS 0	Coupling, Quick Connect (Male, Nipple) 3/8" Male NPT, Stainless Steel, Unvalved	

Parts List

DHA1

Dual Hose Assembly, Quick Connect
Reference Drawing WC001

Type	PL	Inventory	IN
Revision	0	Build Item	Build Item
Status	U	User3	
Date	3/22/2001	User4	
By	SBF	User5	

Item	Qty Unit	Part Number	Type Rev	Title Detail	Reference
1	1 each	BF12X38	PS 0	Bushing, Faceless, Bronze 1/2" x 3/8"	
2	2 each	D12	PS 0	Protective Donut for 1/2" OD Hose	
3	17' each	H831-8BLK	PS 0	General Purpose Hose 1/2" ID, 300 PSI, Black, Use With Push-Lok	
4	2 each	HF30182-6-8B	PS 0	Push Lock Hose Fitting 3/8 NPT x 1/2 Hose	
5	2 each	HF30182-8-8B	PS 0	Push Lock Hose Fitting 1/2 NPT x 1/2 Hose	
6	1 each	NC38SS	PS 0	Nipple, Close, Stainless Steel 3/8"	
7	2 each	QCT3812NRV	PS 0	Coupling, Quick Connect Female 3/8 NPT, Stainless Steel	
8	1 each	QCT3822NRV	PS 0	Coupling, Quick Connect (Male, Nipple) 3/8" Male NPT, Stainless Steel, Unvalved	
9	1 each	T12SS	PS 0	Tee, Stainless Steel 1/2"	

Parts List

HA2

Hose Assembly, Quick Connect
1/2" Hose x 20' Long, 3/8 x 3/8 Quick Connect

Type	PL	Inventory	IN
Revision	0	Build Item	Build Item
Status	U	User3	
Date	2/18/2001	User4	
By	SBF	User5	

Item	Qty Unit	Part Number	Type Rev	Title Detail	Reference
1	20' each	H831-8BLK	PS 0	General Purpose Hose 1/2" ID, 300 PSI, Black, Use With Push-Lok	
2	2 each	HF30182-6-8B	PS 0	Push Lock Hose Fitting 3/8 NPT x 1/2 Hose	
3	2 each	QCT3822NRV	PS 0	Coupling, Quick Connect (Male, Nipple) 3/8" Male NPT, Stainless Steel, Unvalved	

ALLOY PRODUCTS CORP.

Stainless Steel Craftsmen Since 1929

1045 Perkins Avenue
P.O. Box 529
Waukesha, WI 53187-0529
(262)542-6603
(262)542-5421
www.alloyproductscorp.com

FACSIMILE TRANSMISSION SHEET

DATE: November 3, 2000	NOTES:
TO: Steve Frazier	Certs for your PO#
COMPANY: Nova Systems	5000905000
FROM: Sandy Kosmicki	Our # 136839
NUMBER OF PAGES INCLUDING COVER:	

IF FOR ANY REASON YOU HAVE A PROBLEM WITH THIS TRANSMISSION, CALL (262)542-6603

FORM U-3 MANUFACTURER'S CERTIFICATE OF COMPLIANCE COVERING PRESSURE VESSELS TO BE STAMPED WITH THE UM SYMBOL, SEE U-1(j)

As Required by the Provisions of the ASME Code Rules, Section VIII, Division 1

1. Manufactured and certified by ALLOY PRODUCTS CORP., 1045 PERKINS AVENUE, WAUKESHA, WISCONSIN 53186
(Name and address of Manufacturer)

2. Manufactured for NOVA SYSTEMS, 248 COZY LAKE ROAD, OAK RIDGE NJ 07438
(Name and address of Purchaser)

3. Location of installation NOT KNOWN
(Name and address)

4. Type VERT (Horiz., vert., or sphere) TANK (Tank, separator, etc.) 35 GAL (Capacity) SEE REMARKS (Mfg's serial No.)
NONE (CRN) C810-3597-00-B (Drawing No.) 2000 (Year built)

5. ASME Code, Section VIII, Div. 1 1998 A99 (Edition and Addenda (date)) NONE (Code Case No.)

6. Shell (a) No. of course(s) 1 (b) Overall length (ft & in.) 28.72"

Course(s)			Material	Thickness		Long. Joint (Cat. A)			Circum. Joint (Cat. A, B, & C)			Heat Treatment	
No.	Diameter, in.	Length, ft & in.	Spec./Grade or Type	Nom.	Corr.	Type	Full, Spot, None	Eff.	Type	Full, Spot, None	Eff.	Temp.	Time
1	18"	28.72"	SA240 304	[illegible]	0	1	NONE	[illegible]	1	NONE	[illegible]	-	
	-	-	-		-		-			-	-	-	
-		-	-										

7. Heads: (a) SA240 304 (Mat'l Spec. No., Grade or Type) (H.T. - Time & Temp.) (b) SA240 304 (Mat'l Spec. No., Grade or Type) (H.T. - Time & Temp.)

	Location (Top, Bottom, Ends)	Thickness Min.	Thickness Corr.	Radius Crown	Radius Knuckle	Elliptical Ratio	Conical Apex Angle	Hemispherical Radius	Flat Diameter	Side to Pressure Convex	Side to Pressure Concave	Category A Type	Category A Full, Spot, None	Category A Eff.
(a)	TOP	1/10"	0	18"	1.12"		-		-	-	X	1	NONE	[illegible]
(b)	BOTTOM	1/10"	0	18"	1.12"	-	-		-	-	X	1	NONE	[illegible]

If removable, bolts used (describe other fastening) NONE (Mat'l Spec. No., Grade, Size, No.)

8. Type of Jacket NONE Jacket Closure NONE (Describe as ogee & weld, bar, etc.)

[illegible] if tested describe or sketch NA

(Indicate yes or no and the component(s) impact tested)

11. Hydro., pneum., or combo test press. 169 Proof test BURST 800 PSIG 3/28/00

12. Nozzles: Inspection and safety valve openings:

Purpose (Inlet, Outlet, Drain, etc.)	No.	Diameter or Size	Flange Type	Material		Nozzle Thickness		Reinforcement Material	How Attached		Location (Insp. Open.)
				Nozzle	Flange	Nom.	Corr.		Nozzle	Flange	
INSPECTION	1	5x6"	FORMED	SA240 304	-	.096"	0	NONE	-	-	TOP HEAD
INLET	3	.25"	CPLG.	SA479 316L	-	.093"	0	NONE	WELD	-	-
OUTLET	1	.75"	CPLG.	SA479 316L	-	.140"	0	NONE	WELD	-	-
INLET	1	.50"	CPLG.	SA479 316L	-	.120"	0	NONE	WELD	-	-
INLET	2	.50"	PIPE	SA312 316L	-	.109"	0	NONE	WELD	-	-
DRAIN	1	2.50"	CPLG.	SA479 316L	-	.312"	0	NONE	WELD	-	-
-	-	-	-	-	-	-	-	-	-	-	-

13. Supports: Skirt YES (Yes or no) Lugs 0 (No.) Legs 0 (No.) Others NONE (Describe) Attached WELDED TO BOTTOM HD (Where and how)

14. Manufacturer's Partial Data Reports properly identified and signed by Commissioned Inspectors have been furnished for the following items of the report: (List name of part, item number, mfg's. name and identifying number)

15. Remarks: SOLD ON S/O 135838 SERIAL NO. 106742 - 001 THRU 004

*INTEGRAL PART OF TOP HEAD COVER SA240 316L .104"

CERTIFICATE OF SHOP COMPLIANCE

We certify that the statements made in this report are correct and that all details of design, material, construction, and workmanship of this vessel conform to the ASME Code for Pressure Vessels, Section VIII, Division 1.

U Certificate of Authorization No. 4430 Expires 3/28/2001

Date 11/3/2000 Name ALLOY PRODUCTS CORP (Manufacturer) Signed (Representative)

4 FIRST AID MEASURE

IF IN EYES, immediately flush with plenty of ... Get medical attention if irritation persists.

IF ON SKIN, immediately wash with soap and ...ty of water. Rem... ...inated clothin_ Get medical attention if symptoms occur. Was... ...lothing before r... ...ghly clean shoes before

IF SWALLOWED, d... NEVER GIVE ANYT... ING BY MO...

IF INHALED, remov... to fresh air ... oxygen. Get medic...

5 FIRE FIGHTING MEASURES

Fire and Explosive Properties

Auto-Ignition Temperature	NE		
Flash Point	> 230 F	Flash Point Method	
Flammable Limits- Upper	NE		
Lower	NE		

Extinguishing Media

Use water fog, carbon dioxide, dry chemical or foam

Fire Fighting Instructions

Use water spray to cool containers exposed to fire. Fire fighters and others who may be exposed to products of combustion should wear full fire fighting turn out gear (full Bunker G... apparatus (pressure demand NIOSH approved or equivalent). Fire fig... decontaminated after use.

Fire and Explosion Hazards

Avoid breathing fumes from fire exposed material.

6 ACCIDENTAL RELEASE MEASURES

In Case of Spill or Leak

Isolate hazard area and deny entry to unnecessary ... or earth. Clean up spill immediately, observing pre... Avoid runoff into storm sewers and ditches which le...

7

Handling

Do not get in eyes, on skin or clothing. Avoid breathing vapor or mist. Keep container closed. Use only with adequate ventilation. Wash thoroughly after handling. Use explosion proof equipment. Keep away from heat, sparks and flame. Empty container may contain hazardous residues.

Storage

Store in a cool, dry place. Avoid excessive heat. Store out of direct sunlight in a cool, well-ventilated place.

4 FIRST AID MEASURES

IF IN EYES, immediately flush with plenty of water. Get medical attention if irritation persists.

IF ON SKIN, immediately wash with soap and plenty of water. Remove contaminated clothing and shoes. Get medical attention if symptoms occur. Wash clothing before reuse. Thoroughly clean shoes before reuse.

IF SWALLOWED, do NOT induce vomiting. Give water to drink. Get medical attention immediately. NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON.

IF INHALED, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

5 FIRE FIGHTING MEASURES

Fire and Explosive Properties

Auto-Ignition Temperature	NE	
Flash Point	> 230 F	Flash Point Method
Flammable Limits- Upper	NE	
Lower	NE	

Extinguishing Media

Use water fog, carbon dioxide, dry chemical or foam

Fire Fighting Instructions

Use water spray to cool containers exposed to fire. Fire fighters and others who may be exposed to products of combustion should wear full fire fighting turn out gear (full Bunker Gear) and self-contained breathing apparatus (pressure demand NIOSH approved or equivalent). Fire fighting equipment should be thoroughly decontaminated after use.

Fire and Explosion Hazards

Avoid breathing fumes from fire exposed material.

6 ACCIDENTAL RELEASE MEASURES

In Case of Spill or Leak

Isolate hazard area and deny entry to unnecessary or unprotected personnel. Contain spilled liquid with sand or earth. Clean up spill immediately, observing precautions in the Personal Protection section of MSDS. Avoid runoff into storm sewers and ditches which lead to waterways.

7 HANDLING AND STORAGE

Handling

Do not get in eyes, on skin or clothing. Avoid breathing vapor or mist. Keep container closed. Use only with adequate ventilation. Wash thoroughly after handling. Use explosion proof equipment. Keep away from heat, sparks and flame. Empty container may contain hazardous residues.

Storage

Store in a cool, dry place. Avoid excessive heat. Store out of direct sunlight in a cool, well-ventilated place.

8 EXPOSURE CONTROLS / PERSONAL PROTECTION

Engineering Controls

Investigate engineering techniques to reduce exposures. Provide ventilation if necessary to minimize exposure. Dilution ventilation is acceptable, but local mechanical exhaust ventilation preferred, if practical, at sources of air contamination such as open process equipment. Consult ACGIH ventilation manual or NFPA Standard 91 for design of exhaust systems.

Eye / Face Protection

Where there is potential for eye contact, wear chemical goggles and have eye flushing equipment available.

Skin Protection

Neoprene or Nitrile gloves should be worn when handling this material. Wear face shield and chemical resistant clothing such as a rubber apron when splashing may occur. Wash contaminated clothing and clean protective equipment before reuse. Rinse contaminated skin promptly. Wash skin thoroughly after handling.

Respiratory Protection

Avoid breathing vapor or mist. Where airborne exposure is likely, use NIOSH approved respiratory protection equipment appropriate to the material and/or its components. If exposures cannot be kept at a minimum with engineering controls, consult respirator manufacturer to determine appropriate type equipment for given application. Observe respirator use limitations specified by NIOSH or the manufacturer. For emergency and other conditions where there may be a potential for significant exposure, use an approved full face positive-pressure, self-contained breathing apparatus or positive-pressure airline with auxiliary self-contained air supply. Respiratory protection programs must comply with 29 CFR § 1910.134.

Airborne Exposure Guidelines for Ingredients

The components of this product have no established Airborne Exposure Guidelines

-Only those components with exposure limits are printed in this section.
-Skin contact limits designated with a "Y" above have skin contact effect. Air sampling alone is insufficient to accurately quantitate exposure. Measures to prevent significant cutaneous absorption may be required.
-ACGIH Sensitizer designator with a value of "Y" above means that exposure to this material may cause allergic reactions.

9 PHYSICAL AND CHEMICAL PROPERTIES

Appearance/Odor	Clear liquid
pH	8.0
Specific Gravity	1.02
Vapor Pressure	NE
Vapor Density	NE
Melting Point	NA
Freezing Point	NE
Boiling Point	> 200 F
Solubility In Water	Soluble

10 STABILITY AND REACTIVITY

Stability
This material is chemically stable under normal and anticipated storage and handling conditions.

Hazardous Polymerization
Hazardous polymerization is not known to occur.

Incompatibility
Avoid contact with strong acids and oxidizers.

Hazardous Decomposition Products
Oxides of carbon, nitrogen compounds.

11 TOXICOLOGICAL INFORMATION

Toxicological Information
Data on this material and/or its components are summarized below.

Benzotriazole
Single exposure (acute) studies indicate that this material is slightly to moderately toxic to rats if swallowed (LD50 500 - 1,072 mg/kg), practically non-toxic to rabbits if absorbed through skin (LD50 > 10,000 mg/kg), slightly toxic to rats if inhaled (3-hr LC50 1.91 mg/l), moderately irritating to rabbit eyes and practically non-irritating to slightly irritating to rabbit skin. This material produced no genetic changes in bacterial and animal cells.

Diethylene glycol butyl ether
Single exposure (acute) studies indicate that this material is practically non-toxic to rats if swallowed (LD50 5,660-9,600 mg/kg), slightly toxic to rabbits if absorbed through skin (LD50 2,700-4,120 mg/kg), moderately irritating to rabbit eyes, and slightly irritating to rabbit skin. There was no evidence of effects on the nervous system of rats following repeated skin application (2000 mg/kg/day) for 90 days. Slight skin irritation and an increase in urinary occult blood were the primary effects. Following repeated exposure for 30 days to this material in drinking water, liver and kidney injury were noted in rats at 650 mg/kg, reduced food intake was noted at 94 mg/kg, while no treatment-related effects occurred at 51 mg/kg. No birth defects or any effects on the fetus were noted in rabbits exposed to 1000 mg/kg/day orally or by skin application during pregnancy, in rats given 1000 mg/kg/day orally during pregnancy or in mice given 500 mg/kg/day orally during pregnancy. No adverse effects were seen on the ability of male or female rats to reproduce when given this material orally for one-generation other than a reduction in mean body weight of offspring at 1000 mg/kg/day. This material has generally produced no genetic changes in many standard tests using fruit flies, animals, and animal cells or bacterial cells. This material is rapidly eliminated in the urine of rats following skin application.

Nonyl phenol ethoxylate, branched
Single exposure (acute) studies indicate that this material is practically non-toxic to rats if swallowed (LD50 >5,000 mg/kg) or rabbits if absorbed through skin (LD50 >5,000 mg/kg), severely irritating to rabbit eyes, and slightly irritating to rabbit skin. Inflammatory changes in the lungs of rabbits were observed in skin tests with this material.

12 ECOLOGICAL INFORMATION

12 ECOLOGICAL INFORMATION

Ecotoxicological Information

Data on this material and/or its components are summarized below.

Benzotriazole
This material is slightly toxic to bluegill sunfish 96-hr (TLM 25 ppm), minnow (TLM 28 ppm) and trout (12 ppm).

Diethylene glycol butyl ether
The toxicity of this material has been evaluated in several aquatic organisms. Representative values are presented below.

24-hr LC50 Daphnia magna: 2,850 mg/l, Practically Non-toxic
24-hr EC50 Goldfish: 2,700 mg/l, Practically Non-toxic
96-hr LC50 Bluegill sunfish: 1,300 mg/l, Practically Non-toxic
96-hr LC50 Tidewater silversides: 2,000 mg/l, Practically Non-toxic
IC50 Bacteria (Pseudomonas putida): 225 mg/l
EC50 Algae (Microcystic aeruginosa): 53 mg/l

Nonyl phenol ethoxylate, branched
48-hr LC50 Daphnia magna: 52 to 99 mg/l, Slightly Toxic

Chemical Fate Information

Data on this material and/or its components are summarized below.

Benzotriazole
There was no primary biodegradation with this material.

Diethylene glycol butyl ether
The biochemical oxygen demand (BOD) for this material is 0.25 g/g or 11% of the theoretical oxygen demand (THOD) which is 2.17 g/g. The chemical oxygen demand (COD) is 2.06 g/g or 98% of the THOD. The 5 day BOD is 5.95.

13 DISPOSAL CONSIDERATIONS

Waste Disposal

Recover, reclaim or recycle when practical. Dispose of in accordance with federal, state and local regulations. Note: Chemical additions to, processing of, or otherwise altering this material may make this waste management information incomplete, inaccurate, or otherwise inappropriate. Furthermore, state and local waste disposal requirements may be more restrictive or otherwise different from federal laws and regulations.

14 TRANSPORT INFORMATION

DOT Name	Not regulated by the DOT
DOT Technical Name	
DOT Hazard Class	
UN Number	
DOT Packing Group	PG
RQ	

15 REGULATORY INFORMATION

Hazard Categories Under Criteria of SARA Title IIII Rules (40 CFR Part 370)

Immediate (Acute) Health	Y	Fire	N
Delayed (Chronic) Health	N	Reactive	N
		Sudden Release of Pressure	N

The components of this product are all on the TSCA inventory list.

Ingredient Related Regulatory Information:

SARA Reportable Quantities	CERCLA RQ	SARA TPQ
Diethylene glycol butyl ether	NE	
Nonyl phenol ethoxylate, branched	NE	
Water	NE	
Benzotriazole	NE	

SARA Title III, Section 313

This product does contain chemical(s) which are defined as toxic chemicals under and subject to the reporting requirements of, Section 313 of Title III of the Superfund Ammendments and Reauthorization Act of 966 and 40 CFR Part 372. See Section 2

Diethylene glycol butyl ether

Massachusetts Right to Know

This product does contain the following chemicals(s), as indicated below, currently on the Massachusetts Right to Know Substance List.

Benzotriazole

New Jersey Right to Know

This product does contain the following chemical(s), as indicated below, currently on the New Jersey Right-to-Know Substances List.

Diethylene glycol butyl ether

Pennsylvania Environmental Hazard

This product does contain the following chemical(s), as indicated below, currently on the Pennsylvania Environmental Hazard List.

Diethylene glycol butyl ether

Pennsylvania Right to Know

This product does contain the following chemical(s), as indicated below, currently on the Pennsylvania Hazardous Substance List.

Diethylene glycol butyl ether

16 OTHER INFORMATION

Revision Information

Revision Date	16 JUN 2000	Revision Number 4
Supercedes Revision Dated	19-MAY-2000	

Revision Summary
The manufacturer has changed its name from Elf Atochem North America, Inc. to ATOFINA Chemicals, Inc.

Key
NE= Not Established NA= Not Applicable (R) = Registered Trademark

ATOFINA Chemicals, Inc. believes that the information and recommendations contained herein (including data and statements) are accurate as of the date hereof. NO WARRANTY OF FITNESS FOR ANY PARTICULAR PURPOSE, WARRANTY OF MERCHANTABILITY, OR ANY OTHER WARRANTY, EXPRESSED OR IMPLIED, IS MADE CONCERNING THE INFORMATION PROVIDED HEREIN. The information provided herein relates only to the specific product designated and may not be valid where such product is used in combination with any other materials or in any process. Further, since the conditions and methods of use are beyond the control of ATOFINA Chemicals, ATOFINA Chemicals expressly disclaims any and all liability as to any results obtained or arising from any use of the product or reliance on such information.

AIRCO

Material Safety Data Sheet NITROGEN	Page: 1 Rev. Date 08/15/94

Airco, Division of The BOC Group, Inc. Telephone: (201)464-8100
575 Mountain Avenue
Murray Hill, NJ 07974

Telephone Number: (201)464-8100

Emergency Contact: CHEMTREC
Emergency Phone Number: (800)424-9300

SECTION #1 - IDENTIFICATION

Product: NITROGEN

CAS Number: 7727-37-9
Product Code: MSDS CODE G-7
Chemical Family: Inert Gas
Chemical Formula: N2

Synonyms: G-7

Hazard Rating - Health: 1 Slight
- Fire: 0 Negligible
- Reactivity: 0 Negligible

SECTION #2 - CHEMICAL COMPONENTS

Component: NITROGEN
CAS Number: 7727-37-9 Percent of Mixture: 99.995 to 99.999
Simple Asphyxiant - maintain oxygen levels above 19.5 percent

SECTION #3 - PHYSICAL DATA

Boiling Point: -320.4°F -195.8°C
Melting Point: -345.9°F -209.9°C
Vapor Pressure: Above critical temp.
Vapor Density (Air=1): 0.97
Solubility (H2O): very slightly Soluble

SECTION #3 - PHYSICAL DATA Continued...

Appearance

A colorless gas

Odor

Odorless

SECTION #4 - FIRE FIGHTING & EXPLOSION DATA

Extinguishing Media

Nonflammable, inert gas

Special Fire Fighting Instructions

Electrical Classification: Nonhazardous

SECTION #5 - EXPOSURE and EFFECTS - INHALATION

Routes of Exposure - Inhalation

Nitrogen is a simple asphyxiant. Maintain oxygen levels above 19.5% at sea level.

Effects of overexposure to high concentrations so as to displace the oxygen in the air necessary for life may include any, all or none of the following:

- Loss of balance or dizziness;
- Tightness in the frontal area of the forehead;
- Tingling of the tongue, fingertips or toes;
- Weakened speech leading to the inability to utter sounds;
- Rapid reduction in the ability to perform movements;
- Reduced consciousness of surroundings;
- Loss of tactile sensations;
- Heightened mental activity;

Nitrogen is nontoxic but the liberation of a large amount in a confined area could displace the amount of oxygen in air necessary to support life. It should be recognized that it is possible that none of the above symptoms may occur in nitrogen asphyxia so that there may be no definite warning symptoms.

First Aid - Inhalation

PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASES OF OVEREXPOSURE. RESCUE

SECTION #5 - EXPOSURE and EFFECTS - INHALATION Continued...

First Aid - Inhalation

PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS.

Conscious persons should be assisted to an uncontaminated area and inhale fresh air. Quick removal from the contaminated area is most important. Unconscious persons should be moved to an uncontaminated area, given artificial resuscitation and supplemental oxygen. Further treatment should be symptomatic and supportive.

SECTION #5 - EXPOSURE and EFFECTS - SKIN

Routes of Exposure - Skin

Contact with liquid product may cause frostbite.

First Aid - Skin

For dermal contact or frostbite: Remove contaminated clothing and flush affected areas with lukewarm water. DO NOT USE HOT WATER. A physician should see the patient promptly if the cryogenic "burn" has resulted in blistering of the dermal surface or deep tissue freezing.

SECTION #5 - EXPOSURE and EFFECTS - EYES

Routes of Exposure - Eyes

Contact with liquid may cause tissue freezing.

First Aid - Eyes

Never introduce ointment or oil into the eyes without medical advice! In case of freezing or cryogenic "burns" caused by rapidly evaporating liquid, DO NOT WASH THE EYES WITH HOT OR EVEN TEPID WATER! Remove victim from the source of contamination. Open eyelids wide to allow liquid to evaporate. If pain is present, refer the victim to an ophthalmologist for treatment and follow up. If the victim cannot tolerate light, protect the eyes with a light bandage.

SECTION #6 - MISCELLANEOUS TOXICOLOGICAL INFORMATION

Carcinogenicity -- NTP: No IARC: No OSHA: No

SECTION #5 - EXPOSURE and EFFECTS - INHALATION Continued...

First Aid - Inhalation

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SECTION #5 - MISCELLANEOUS TOXICOLOGICAL INFORMATION

Carcinogenicity -- NTP: No IARC: No OSHA: No

SECTION #6 - REACTIVITY & POLYMERIZATION

Stability: Stable

Hazardous Polymerization: Will Not Occur

SECTION #7 - SPILL, LEAK, & DISPOSAL PROCEDURES

Steps to be Taken in The Event of Spills, Leaks, or Release

Evacuate all personnel from affected areas. Use appropriate protective equipment. If leak is in user's equipment, be certain to purge piping with an inert gas prior to attempting repairs. If leak is in container or container valve, contact CHEMTREC for emergency assistance or call your closest Airco location.

Waste Disposal Methods

Do not attempt to dispose of waste or unused quantities. Return in the shipping container PROPERLY LABELED, WITH ANY VALVE OUTLET PLUGS OR CAPS SECURED AND VALVE PROTECTION CAP IN PLACE to Airco for proper disposal. For emergency disposal, contact the closest Airco location or call the CHEMTREC number listed herein.

SARA Title III - Hazard Classes: Sudden Release of Pressure Hazard

SECTION #8 - SPECIAL PROTECTIVE MEASURES

Ventilation

Local exhaust to prevent accumulation of high concentrations so as to reduce the oxygen level in the air to less than 19.5 percent.

Eye Protection

Safety goggles or glasses.

Skin Protection

Protective gloves of any material

Respiratory Protection

Positive pressure air line with mask or self-contained breathing apparatus should be available for emergency use.

SECTION #8 - SPECIAL PROTECTIVE MEASURES Continued...

Other Protection

Safety shoes

SECTION #9 - SPECIAL PRECAUTIONS - STORAGE & HANDLING

Storage & Handling Conditions

Use only in well-ventilated areas. Valve protection caps must remain in place unless container is secured with valve protection outlet piped to use point. Do not drag, slide or roll cylinders. Use a suitable hand truck for cylinder movement. Use a pressure reducing regulator when connecting cylinder to lower pressure (<3000 psig) piping or systems. Do not heat cylinder by any means to increase the discharge rate of product from the cylinder. Use a check valve or trap in the discharge line to prevent hazardous back flow into the cylinder.

Protect cylinders from physical damage. Store in cool, dry, well-ventilated area of non-combustible construction away from heavily trafficked areas and emergency exits. Do not allow the temperature where cylinders are stored to exceed 125°F. Cylinders should be stored upright and firmly secured to prevent falling or being knocked over. Use a "first in-first out" inventory system to prevent full cylinders being stored for excessive periods of time.

For additional recommendations, consult Compressed Gas Association Pamphlet P-1.

Never carry a compressed gas cylinder or a container of a gas in cryogenic liquid form in an enclosed space such as a car trunk, van or station wagon. A leak can result in a fire, explosion, asphyxiation or a toxic exposure.

SECTION #10 - SHIPPING INFORMATION

Proper Shipping Name: Nitrogen or Nitrogen, Compressed

Hazard Class: Nonflammable Gas
DOT Identification Number: UN1006
DOT Shipping Label: Nonflammable Gas

SECTION #11 - MISC COMMENTS & REFERENCE DOCUMENTATION

Nitrogen is non-corrosive and may be used with any common structural material.

Compressed gas cylinders should not be refilled except by qualified producers of compressed gases. Shipments of a compressed gas cylinder, which has not been filled by the owner or with his (written) consent, is a violation of Federal Law (49CFR)

SECTION #11 - MISC COMMENTS & REFERENCE DOCUMENTATION Continued...

For additional recommendations, consult Compressed Gas Association Pamphlets P-1, P-14, P-9, and Safety Bulletin SB-2.

DISCLAIMER OF EXPRESSED AND IMPLIED WARRANTIES

Although reasonable care has been taken in the preparation of this document, we extend no warranties and make no representations as to the accuracy or completeness of the information contained therein, and assume no responsibility regarding the suitability of this information for the user's intended purposes or for the consequences of its use. Each individual should make a determination as to the suitability of the information for their particular purpose(s).

TECHNICAL

DATA

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ATO

BULLETIN NO. 222

TURCO PRODUCTS, INC. • 2700 TEMPLE AVENUE, SUITE B, LONG BEACH, CA 90806 • 562 981-8990

TURCO® 6783-50

TURBINE ENGINE COMPRESSOR CLEANER

DESCRIPTION:

TURCO 6783-50 is a concentrated aqueous compressor cleaner which effectively removes oil, salt and solid deposits from compressor blades, guide vanes and rotors of in-service turbine engines. TURCO 6783-50 is used at 20% by volume in distilled, demineralized or good drinking quality water. For cold weather (below 0°C) add 20% by volume isopropanol, ethanol or glycol.

FEATURES:

1. Meets MIL-C-85704B Type II and III
2. Nonflammable
3. Biodegradable
4. Non-abrasive
5. Safe on engine alloys
6. Removes engine soil

BENEFITS: As the graph at right illustrates, regular cleaning helps maintain engine efficiency. As engines are run, soils build up on vanes, blades, stators, and rotors. This buildup interferes with gas flow and may impact fuel/air mixing. Eventually, efficiency falls to an unacceptable level. Proper and regular cleaning corrects this. Daily cleaning is the most beneficial and keeps engines running at peak efficiency.

RECOMMENDED CLEANING PROCESSES

	On-Line	Off-Line
Amount	10 gal./min. 5 min.	2 gal./min. 2 min. (3 times)
Frequency	daily	Monthly (or as needed)
Pressure	75 to 85 psi	40 to 60 psi
Droplet Size	60-250μ	200-800μ
Nozzle Type	316 Stainless Steel	316 Stainless Steel
Rinse	Not Required	Recommended

CLEANING PROCEDURE:

PROCEDURE "A" - Rotating Engine With Starter ("Crank Wash")

1. Prepare engine in accordance with applicable maintenance manual.
2. Fill spray tank with TURCO 6783-50.
3. Inject TURCO 6783-50 into compressor air intake at 50 psi and at 4 gal per minute while rotating engine with starter for approx. 60 seconds. Observe starter motor limitations.
4. Permit cleaning solution to dwell for approx. 10 to 15 minutes.
5. Repeat #3
6. Repeat #4
7. Rinse with cold distilled, demineralized or good quality drinking water with starter motor running for approx. 60 seconds.
8. After 5 minutes, repeat Step #7 as necessary to flush out all residual cleaning solution and loosened soils.
9. After starter has cooled, run engine and test performance. Repeat cleaning if necessary.

PROCEDURE "B" - Running Wash

Equipment - Special cleaning rig consisting of pressure tank, pump, valves and supply hose as specified by Turbine Engine Manufacturer.

1. Prepare engine in accordance with applicable maintenance manual.
2. Fill spray tank with TURCO 6783-50. TURCO 6783-50 is used as received.
3. Make sure supply hose valve is closed, then pressurize tank to 100 PSI.
4. Connect supply hose to anti-icing fitting or as directed by engine manufacturer.
5. Start engine as directed in engine manual and run at RPM prescribed by manufacturer.
6. When engine has stabilized, turn on cleaning rig pressure pump and inject TURCO 6783-50 selected at 80 psi and at 10 gal. per minute for 5 minutes.
7. Clear all fluids from the engine increasing RPM to cruising for approx. 15 minutes.
8. Check engine operation and temperature. If performance is insufficient further washing may be necessary.

NOTE: The above procedures are typical, however the process recommended by the engine manufacturer must be followed.

DISPOSAL INFORMATION:

Dispose of soiled rags in approved safety container per local, state and regional regulations. Refer to TURCO MATERIAL SAFETY DATA SHEET for additional disposal information.

WARNING! Causes eye irritation. May cause skin irritation

TURCO 6783-50 contains diethylene glycol monobutyl ether. Avoid contact with eyes, skin and clothing. Do not take internally. Use with adequate (equivalent to outdoor) ventilation. Store in closed containers away from excessive heat or direct sunlight.

Before using this product refer to container label and TURCO MATERIAL SAFETY DATA SHEET for additional precautionary, handling and first aid information.

NOTICE:

The above information and recommendations concerning this product are based upon our laboratory tests and field use experience with these or similar products. However, since conditions of actual use are beyond our control, any recommendations or suggestions are made without warranty, express or implied. Manufacturer's and seller's sole obligation shall be to replace that portion of the product shown to be defective. Neither shall be liable for any loss, damage, or injury, direct or consequential, arising out of the use of this product.

Concepts for *Gas-Turbine* Cleaning

Quality is our standard,
Innovation our strategy.
Our action is commitment to the customer.

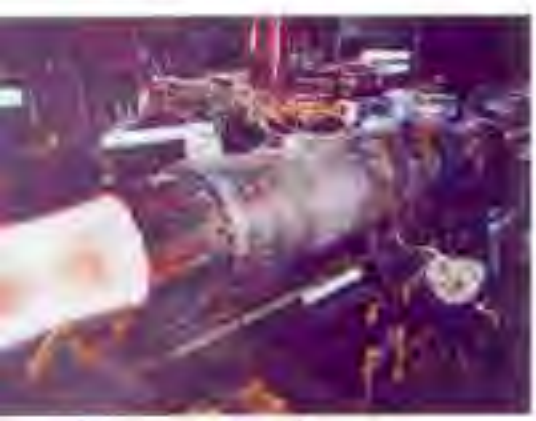
ATOFINA

Cleaning of gas turbine compressors

Gas-turbine power station

The compressor plays a key role in the optimum functioning of a gas turbine. Any impairment of compressor efficiency has significant consequences on operating costs and maintenance intervals. Depending on the working environment, soot, dust, salts, exhaust gas deposits, etc. are the major causes of reduced performance, higher fuel consumption and increased turbine wear. Therefore, compressor cleaning makes a significant contribution towards lower operating costs and maintaining the turbine's performance.

TURCO's innovative approach and the high quality standard of its products quickly made the company a worldwide market leader in the aviation industry, particularly in the area of products and processes for turbine cleaning and overhaul. Another pioneering achievement by the company was the introduction of modern, more environmentally-compatible cleaning agents for compressors. Based on this experience, together with competent know-how, TURCO can offer a complete range of products for gas turbine cleaning on an industrial scale.



Jet engine in test stand

TURCO's worldwide presence enables us to offer compressor cleaners in every market and for all current types of turbine. The product range includes cleaning agents of different compositions and for all classical cleaning methods such as abrasive, and on-line / off-line procedures. Practical tests have shown that TURCO's compressor cleaning agents are very effective in restoring a turbine's optimum performance. All cleaning agents contain non sticky inhibitors and passivators to protect the turbine and combat corrosion.

This brochure gives a brief survey of the various methods and our corresponding products.

Gas turbine

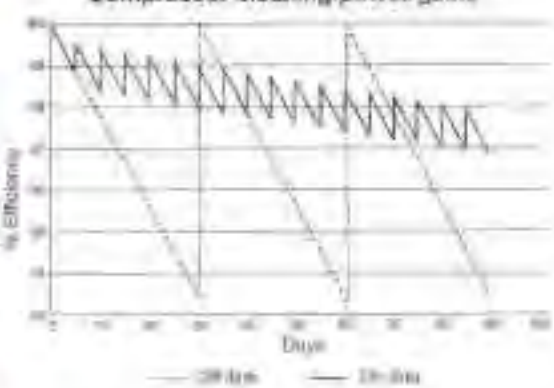
On-line cleaning – This method, also known as "running wash", can be carried out simply, quickly, efficiently and economically during operation, i. e. without down-time. On-line cleaning enables the maintenance intervals for off-line cleaning to be lengthened by multiples. Moreover, the performance curve remains at a considerably higher level over a much longer period, thus significantly reducing fuel costs.

The special composition of TURCO's cleaning agents ensures superior cleaning results in the high-temperature areas of the compressor. The cleaning agents burn without leaving a residue, thus avoiding turbine blade damage.

This product range has virtually zero salt or ash content, and can also be used for off-line cleaning.

Off-line cleaning – This method, also known as "crank wash", becomes necessary when the turbine's performance drops below approximately 94 % due to contamination. For off-line cleaning, it is possible to use other cleaners that are very effective but do not have the advantage of being biodegradable, as is the case with water-based products. While the on-line procedure is able to restore some 98% of a turbine's performance, off-line cleaning achieves close to 100 %. TURCO's compressor cleaner for off-line use (water or solvent-based) increases time between overhauls, reduces down-time and increases compressor life by reducing corrosion.

On-line / Off-line
Compressor cleaning power gains



Abrasive cleaning

This older method for compressor cleaning is still used by several gas-turbine operators.

Along with good cleaning results, the abrasive procedure should eliminate the danger of corrosion. Suitable abrasive media includes a range of granulated organic and inorganic substances, such as ground nut shells and fruit kernels that are still in use today.

Metal-working team

... everything at a glance

Product description	Type & form	Application	Suitability	Description/Features
Gas Turbine Compressor Cleaning				
On-line cleaner — water-based				
6783-series -0 -30 -10	Environmentally preferable, biodegradable, water based cleaner. super concentrate concentrated ready to use	Preferred dilution with distilled or demineralized water: dilution 1:9 dilution 1:4 undiluted	Meets requirements of low chloride, sulfur phosphorous and potassium. Suitable for aviation, stationary power units, marine and industrial turbines.	New generation of aqueous compressor cleaner. Effectively removes oil, soot, dust, salt and solid deposits. The product is nonflammable, non-toxic, and non corrosive. Meets military spec-MIL-PRF-85704, Type II and III RTU.
6960	Aqueous solution of the "Super-Cleaner" technology. Free of petroleum distillates – nonflammable. Exceptionally low levels of damaging trace elements. Extremely low ash-content.	Solution is injected into the air intake/plenum while engine is running at full speed under reduced load. dilution 1:4	Suitable for on-line and off-line washing. This product is not for use on aircraft engines or APU's. Excellent for micro-turbines.	Newest generation of compressor cleaner in gas turbine engines. Effective cleaning of oily residues as well as rapid removal of dry particulated soils. Most beneficial when performed on a regular, frequent basis—preferably daily.
Off-line cleaner — solvent-based				
5664	Liquid, concentrate for in-place cleaning. Noncorrosive to compressor engine metals. Sulfur, phenol free, comparatively free of chloride and ash.	1:1 up to 1:4 dilutable with demineralized water. Follow procedures outlined in engine manufacturer's instructions.	Suitable for aviation, marine, power units and industrial turbines.	Best Turco cleaner for organic soils. Excellent for removal of dirt and oils from aviation, marine and industrial turbines.
Off-line cleaner — water-based				
6783-series -0 -30 -10	Environmentally acceptable, biodegradable, water-based cleaner. high concentrated concentrated ready for use	Inject directly into compressor space while cranking engine. dilution 1:9 dilution 1:4 undiluted	Product series can be used for on- and off-line cleaning procedures. Suitable for aviation, marine, power units and pump-stations. Low ash, and salt content.	New generation of gas turbine compressor cleaner with environmentally preferable composition. The products are noncorrosive and safe on all materials used in a compressor engine. Meets military spec-MIL-PRF-85704, Type II and I RTU.
6980	Aqueous solution of the "Super-Cleaner" technology. Free of petroleum distillates – nonflammable. Exceptionally low levels of damaging trace elements. Extremely low ash-content.	Solution is injected to the compressor in a dilution of 1:4 in demineralized water.	Developed for power and industrial turbines. Not suitable for aviation jet engines or APUs.	Meets GE-D1042N and GEK-105029B. Lowest ash content of any Turco product.
Abrasive cleaning media				
Softblast	Natural product of ground and cleaned nut shells & fruit kernels. Available in various grain sizes.	Soft abrasive for the removal of tenacious contaminants. On gas turbine's compressors. Usable in all abrasive blasters.	Suitable for all metals used in turbine construction. No surface damage. Produces clean, bright metal surfaces.	Softblast removes tenacious atmospheric deposits such as dust, salts, or induced saline/oil gas deposits. This improves turbine performance and reduces fuel consumption.

More detailed information is provided in our technical specifications and safety data sheets.
Manufacturer acceptance certificates and military specifications are available.

The above data and recommendations concerning the products are based upon our laboratory tests and field use experience. However, since conditions of actual use are beyond our control, any recommendations or suggestions are made without warranty, express or implied. Manufacturer's and seller's sole obligation shall be to replace that portion of the product shown to be defective. Neither shall be liable for any loss, damage, or injury, direct or consequential, arising out of the use of the products.

Turco is one of the world's largest suppliers of chemicals to the aviation and aerospace industries and has been serving the U.S. military for over 70 years. We've led in the development of cleaners, paint strippers and carbon removers for use in aviation manufacturing, maintenance and overhaul. We provide a full line of environmentally advantaged products including paint strippers without phenol, chromates, methylene chloride or hazardous air pollutants of any kind. Turco products are available through a worldwide network of subsidiaries, licensees, and distributors.

- Acid cleaners/etchants
- Aircraft exterior cleaners
- Alkaline cleaners
- Chemical milling products
- Emulsion cleaners
- Methylene chloride-free paint strippers
- Non-chlorinated paint and carbon removers
- Penetrant inspection products
- Non-chlorinated solvents

For further information look us up at: www.turcoproducts.com

TURCO®

AEROSAFE PRODUCTS, INC.

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Distributed by:
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www.aerosafe.com

Gas Turbine Approvals	
Mil Spec MIL-PRF-85704 (Types I, II, III)	Pratt & Whitney
AlliedSignal	Solar
Allison	Centrax
Dresser-Rand	Kvaerner
GE Power Systems	Ruston
GE Aerospace	Siemens

ATOFINA

You can also find us in:

Australia • Brazil • Canada • Chile • China • Columbia • England • France • Germany Holland • Italy • Japan • Mexico • Philippines • Singapore • Spain • Taiwan