



STANDARD SPECIFICATION NO. 323

SPECIFICATION OF WORK TO BE DONE AND MATERIALS TO BE USED FOR
YELLOW JACKET UNDERGROUND PIPEWORK FOR LPG INSTALLATIONS

GENERAL:

This specification shall be read in conjunction with Specification Number 304 and the Drawings supplied.

All yellow jacket pipe shall be supplied by Shell Oil New Zealand Limited.

All underground pipe joints shall remain unwrapped until testing is complete. After testing joints shall be covered using "Sulco" Polyken application system.

"SULCO" POLYKEN APPLICATION

Preparing Surface of Pipe

Remove all rust, dirt, grease, loose paint and all particles on the surface and ensure surface is scrupulously clean. The surface must be free, as far as possible, from any chemicals.

Sandblasting of pipe is the ideal situation, however, if this is not possible the following must be adhered to. Use wire brush or cup brush machine non-spark units must be used if you are working in an inflammable area.

To clean off all loose particles, use air hose by using a duster gun, air pressure 90 p.s.i.

The pipeline should now be ready for the first application.

Polyken 927 primer, this comes in 1 US gallon tins. This should be stirred well and 1 litre should be poured into a receptacle and lid should be replaced on the tin. When applying to pipe, do not load brush, apply evenly.

Drying Time

This is 4 - 5 minutes. Primers must be applied to all parts which are to be wrapped.

Polyken 930/35 Inner Wrap Black

This tape is to be wrapped when the Primer 927 is tacky to dry; this will give the tape the best possible adhesion to the pipe. If for any reason the tape has to be re-wrapped, the pipe must be re-brushed with the Polyken Primer 927.

Polyken 931 Filler Tape

This must be used by placing one insertion around the welds. Then following up by using Polyken 930/35 black and Outer Wrap 955/15.

Flanges

Where flanges are used in a pipeline, this must have the same priority in cleanliness as previously mentioned.

The flange must be primed with Polyken 927 primer and all bolts, bolt head and nuts must be covered with 931 filler tape. Then 930/35 black tape should be used to cover the flanges. In some instances a cigarette joint must be used, finish off with 955/15 white.

Valves

Clean thoroughly as above, apply primer to base of valve stem, apply 931 where necessary, then use 930/35 black inner wrap and 955/15 overwrap. In some instances cigarette wrap will have to be used to make perfect joint.

Information on Tape and Primer

Tension when hand wrapping 10/20 ft/lbs, overlaps 25%, i.e. 1" in every 4".

When wrapping valves, flanges etc., a 2" x 100 tape should be used or where 4" is not practical.

Polyken Primer 927

This primer is a flammable mixture, store away from heat, use away from flame or heaters.

Polyken 930/35 Black

This is known as the inner wrap and has excellent elasticity, particularly when used for wrapping valves and flanges.

Holiday Detector Test

This test is made only on the inner wrap and the voltage should not exceed 7500 volts per square centimetre x 1 second pulse.

Polyken 95515 White

This is known as the outer wrap and is designed to protect the inner wrap from heat, soil erosion and soil corrosion. Do not prime over the inner wrap. Once you have laid your inner wrap on the pipe, no more adhesion is required; the overwrap itself has enough adhesion to have a firm fixture on the wrapping.

Hand Wrapping Machine

A hand wrapping machine may be hired. No charge will take place until the machine has arrived at the railhead or the bus depot of the town stated.

How to Operate the Machine

A short trail run will confirm if the adjustments on the wheels are correct. By adjusting the wing nut it will allow movement of the wheel up or down which confirms how much overlaps is required. In the centre of the machine is a knurled nut which if turned clockwise will increase tension on the roll and if turned anti-clockwise will reduce the tension. The roll must always start towards the operator and finish in the same manner.

To Replace Rolls in Machine

There are only two nuts to undo for this operation. One is the knurl nut which must be completely undone and also the handle nut. By doing this operation the side of the machine will come apart completely and the new roll can be inserted. Reverse procedure when replacing this unit. Tension required 25 ft/lbs.

SPECIFICATION NO. 316A

LPG INSTALLATIONS EMERGENCY SHUT DOWN CONTROL (DOUBLE ACTING ACTUATORS)

1.00 DESCRIPTION OF SYSTEM

Each LPG installation is fitted with air operated valves in the product lines of the system. The exact position will be nominated by the Company's Engineer. Normally, however, the air operated valves are at the tank on the main liquid outlet and on the liquid and vapour lines at the dispenser(s) on the forecourt.

In case of emergency, a pushbutton "Emergency Stop" located in a readily accessible position can be depressed closing all the air operated valves, isolating any product flow and turning off the pumps.

2.00 SCOPE OF WORKS

Installation and commissioning of the system consists of electrical work and pneumatic work.

Both trades shall work together to facilitate installation.

The works, and the contractor responsible for the work is listed below:

<u>Item</u>	<u>Contractor</u>
1. Installation of control box	Mechanical
2. Supply and installation of air supply lines from compressor to control box	Mechanical
3. Supply and installation of air lines from control box to pneumatic actuators	Mechanical
4. Installation of pneumatic actuators	Mechanical
5. Supply and install electric cable from switchboard to "Emergency Stop" pushbutton	Electrical
6. Installation of "Emergency Stop" pushbutton and identification label	Electrical
7. Supply and installation of electric cable from "Emergency Stop" pushbutton to control box	Electrical
8. Supply and installation of electric cable from pressure switch in control box to control motor contactor	Electrical
9. Setting of Pressure switch.	Mechanical

3.00 MATERIAL SUPPLY

The Company will supply:

(a) Source of Compressed Air.

(b) The Control Box.

(c) The Emergency Stop Push Button (2)

(d) The air actuated valves.

The mechanical contractor will supply all other materials necessary for the complete functioning of his section of the works including any supports or brackets.

The electrical contractor is responsible for the supply of all other materials necessary for the complete functioning of his section of the works.

4.00 MATERIAL STANDARD

All airline shall be black nylon tubing (Nylon Type II) 8^{mm} O.D.

Underground, it shall be run in 25mm Alkaline ^{water} tube or equivalent 50mm-min PVC conduit.

Aboveground, it shall be neatly clipped to the pipework.

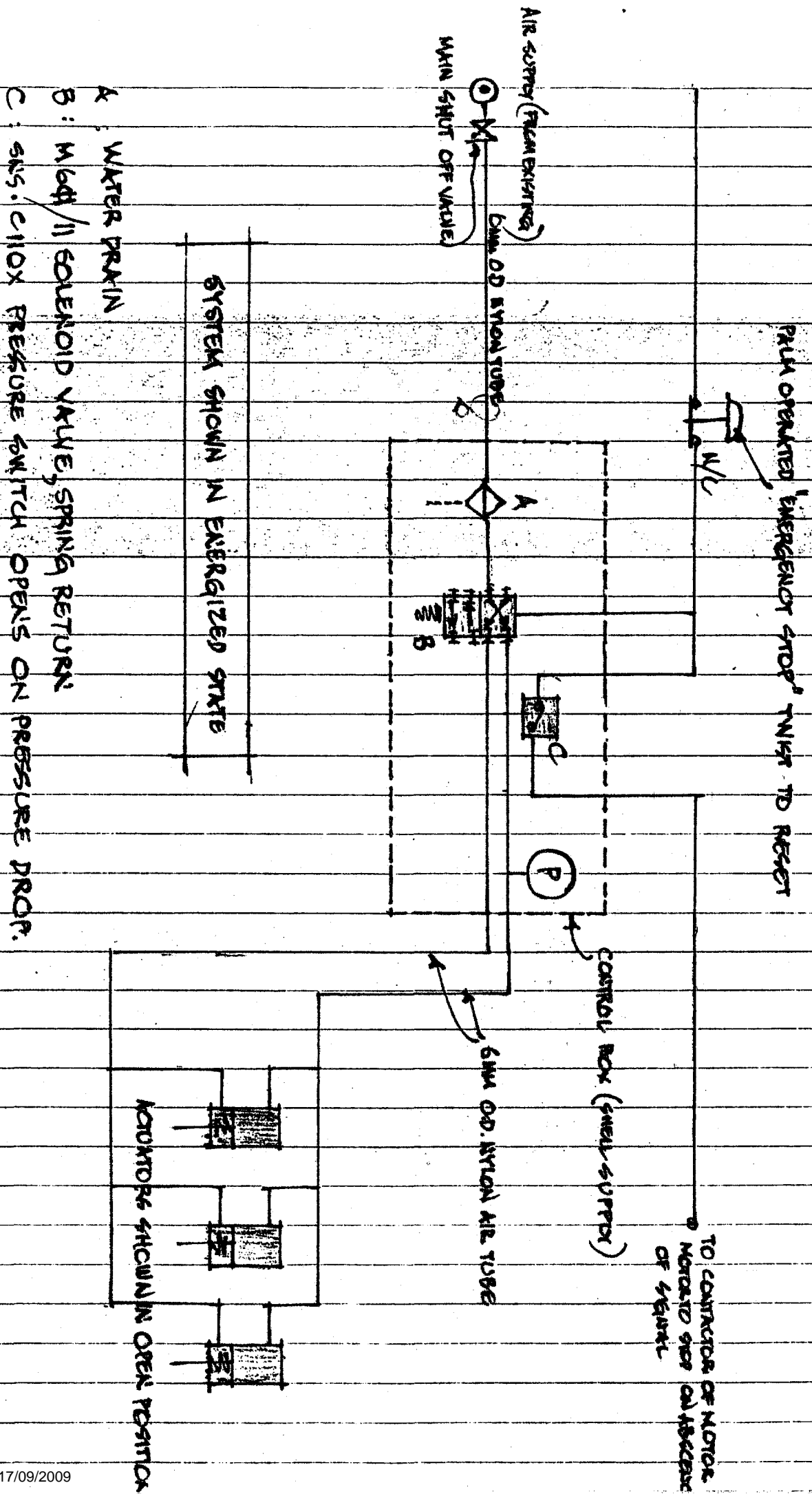
All electrical cable shall be installed in a neat and workmanlike manner and shall conform to the relevant N.Z. Standards and be to the satisfaction of the local electrical authority.

5.00 CIRCUIT DIAGRAM

The attached sketch shows both pneumatic and electrical circuitry.

Contractor shall satisfy himself as to the suitable location of the push buttons that is to make sure that Flammable Non Flammable equipment is situated in safe areas

Ken Langford



SCHEMATIC OF LPG EMERGENCY STOP

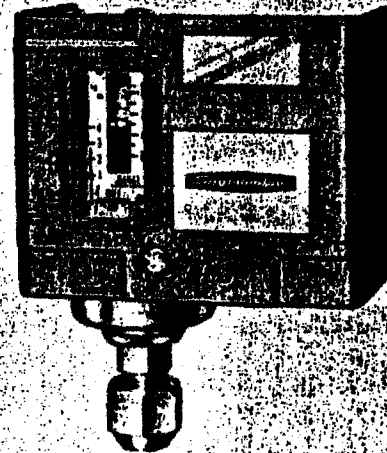
SHELL OIL N.2 3.7.04

TYPE SNS & HNS

SINGLE FUNCTION PRESSURE CONTROLS

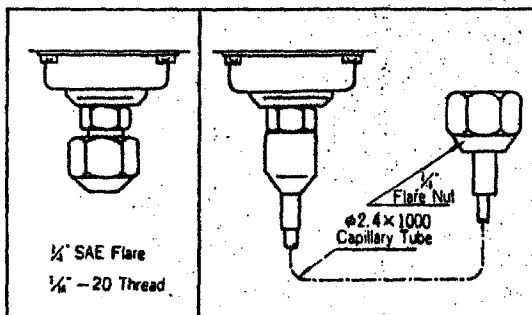
1. GENERAL DESCRIPTION

- For use with non-corrosive refrigerants as well as with air and water. (Allowable Fluid Temp.: -10~120°C)
- Double snap-action contact mechanism ensures reliable switching.
- Type SNS for universal application.
- Type HNS for high pressure safety cut-out.
- Several models available in drip-proof enclosure for marine application or in explosion-proof enclosure for special application.
- Mounting bracket supplied as standard.
- With SPDT contact mechanism.



Type SNS

2. PRESSURE CONNECTORS



Standard

Available upon request

3. ELECTRICAL RATINGS

Motor Rating	125/250V AC
Running Current	10A
Locked Rotor Ampere	60A
Non-Inductive Ampere	10A

4. CONTACT FUNCTIONS

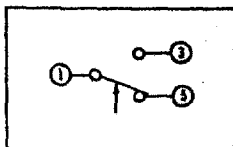


Diagram 1

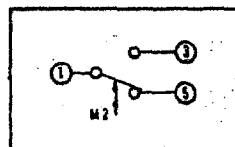


Diagram 2

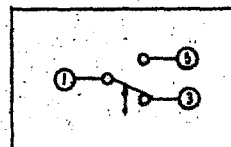


Diagram 3

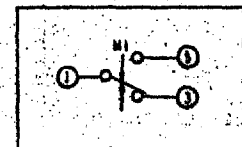


Diagram 4

Diagram 1 & 2

1	Common Terminal
3	Close on Pressure Increase
5	Close on Pressure Decrease

Diagram 3 & 4

1	Common Terminal
3	Open on Pressure Increase
5	Open on Pressure Decrease

TYPE SNS & HNS

SINGLE FUNCTION PRESSURE CONTROLS

5. TYPE NUMBER SELECTION (SPECIFICATIONS)

(a) Type SNS – Automatic Reset Type

Unit: kg/cm²

Catalog No.	Range		Differential		Factory Setting		Max. Bellows Pressure	Contact Function	Wt. (kg)
	Min.	Max.	Min.	Max.	OFF(ON)	ON(OFF)			
SNS-C101X	50cmHgV.	1	0.15	0.5	0.25 ± 0.1	0.5 ± 0.1	3.3	Diagram 1	0.53
SNS-C102X	20cmHgV.	2	0.25	1.5	0.25 ± 0.1	0.5 ± 0.1	5.5		
SNS-C103X	50cmHgV.	3	0.35	2	0.5 ± 0.1	1.5 ± 0.1	11		
SNS-C106X	50cmHgV.	6	0.5	3	2 ± 0.2	3 ± 0.2	16.5		0.44
SNS-C110X	50cmHgV.	10	0.5	3	2 ± 0.2	3 ± 0.2	16.5		
SNS-C130X	5	30	3	10	20 ± 0.5	25 ± 0.5	40		

(b) Type SNS – Manual Reset Type

Unit: kg/cm²

Catalog No.	Range		Manual Reset	Factory Setting*		Max. Bellows Pressure	Contact Function	Wt. (kg)
	Min.	Max.		OFF	ON			
SNS-C102XM2	20cmHgV.	2	Automatic operation on pressure decrease, and manual reset.	0.25 ± 0.1	manual reset	5.5	Diagram 2	
SNS-C106XM2	50cmHgV.	6		2 ± 0.2		16.5		0.44
SNS-C130XM2	5	30		20 ± 0.5		40		

* Based on the 1 – 3 terminal connection.

(c) Type HNS – Automatic Reset Type

Unit: kg/cm²

Catalog No.	Range		Differential	Factory Setting*		Max. Bellows Pressure	Contact Function	Wt. (kg)
	Min.	Max.		OFF	ON			
HNS-C130X	8	30	approx. 4 fixed	20 ± 0.5	15 ± 1.5	40	Diagram 3	0.38

* Based on the 1 – 3 terminal connection.

(d) Type HNS – Manual Reset Type

Unit: kg/cm²

Catalog No.	Range		Manual Reset	Factory Setting*		Max. Bellows Pressure	Contact Function	Wt. (kg)
	Min.	Max.		OFF	ON			
HNS-C130XM1	8	30	Automatic operation on pressure increase, and manual reset	20 ± 0.5	manual reset	40	Diagram 4	0.38

* Based on the 1 – 3 terminal connection.

(e) Drip Proof Models: Available upon request. (Refer to page S-10, S-11.)

(f) Ammonia Models: Available upon request.

(g) UL Listed Models: Available upon request.

MacEwans 'MAC'® M/600 Series Valves

4-Way, Direct Solenoid,
Individual and Stacking Body
(Individual Inlets).

Port size:
1/8" BSP

Pressure range:
Vac to 150psig (min. and max. safe
working pressures)

Flow constant:
Sol. Opr. 0.13 (Cv. Average all ports)

Fluids:
Air or inert gases

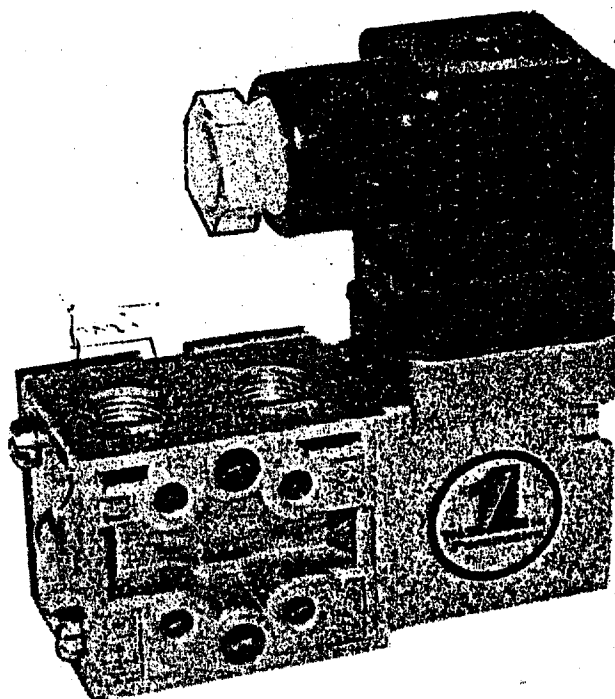
Lubrication:
Not required, but if lubrication is used, a
medium range aniline oil is
recommended.

Ambient temperature range:
0° to 120°F (-18° to 50°C) Consult
MacEwans outside this range.

Electrical:
1. AC 120/60
Inrush 13.2 Volt-amps (0.11 amps)
Seal 8.4 Volt-amps (0.07 amps)
2. DC 24 Volts — 2.4 Watts
3. Above coils — General Purpose Class
'A', continuous duty, encapsulated.

***NEW PRODUCTS**

M/600



DIRECT SOLENOID FEATURES:

- The patented 'MACSOLENOID®' with its non-burn out feature on AC service.
- Non-lubricated or lubricated service.

GENERAL

CONFIGURATIONS AVAILABLE

The M/600 Series is the smallest of the 'MAC' Inline 4-way valves. This series provides fast response, long life and a high flow in an extremely small package and is available in the following configurations.

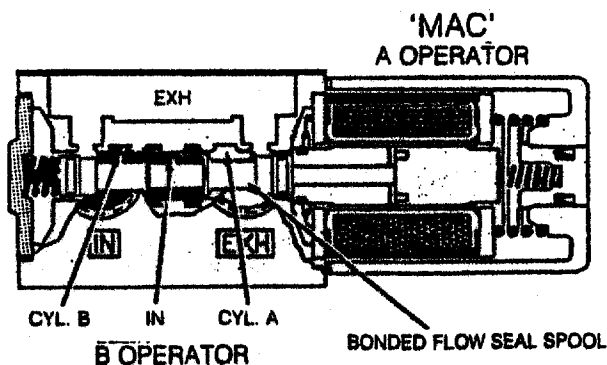
- 2-Pos., single or double operators
- Individual or stacking body.
- Single pressure.

SPECIAL APPLICATIONS

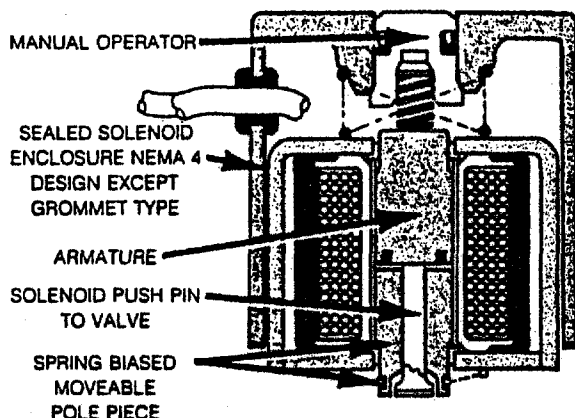
On all models, energising the 'MAC' operator supplies pressure to cylinder port 'A' and energising the 'B' operator supplies pressure to cylinder port 'B'. For the following special applications, additional piping considerations are required.

VACUUM APPLICATIONS — Connect the vacuum source to the Exhaust port with the Inlet open to atmosphere. Use models without flow controls only.

SELECTOR APPLICATIONS — When using as a selector valve, connect the higher pressure to the Inlet port and the lower pressure to the Exhaust port.



'MAC' DESIGN FEATURES



VIRTUALLY—BURN-OUT PROOF 'MACSOLENOID®'

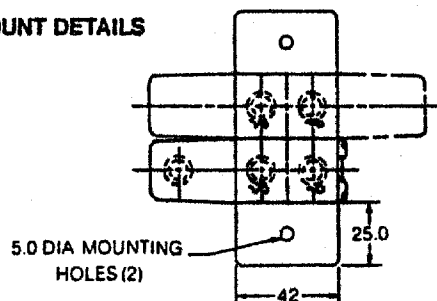
The patented spring biased floating pole piece 'MACSOLENOID®' is independent and isolated from the valve body. When a voltage is applied to the coil, the pole piece is held down by the bias spring so that the magnetic attraction between the pole piece and armature results in the armature moving down against the push pin. After the push pin has shifted, the pole piece moves upward, compressing the bias spring only enough to assure the magnetic sealing of the pole piece and armature. If the push pin sticks and fails to move initially, preventing the armature from moving down, the pole piece is magnetically drawn upward, compressing the bias spring, allowing the pole piece and armature to magnetically seal and subjecting the valve to maximum shifting forces. Thus the two most common causes of solenoid valve failure, failure to shift when energised, and coil burnout on AC service are practically eliminated.

DIMENSIONS

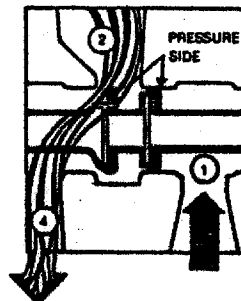
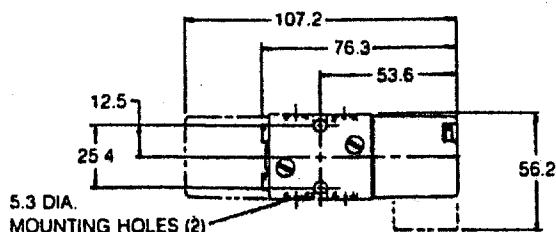
DIMENSIONS IN METRIC (mm)

STACKING VALVES

MOUNT DETAILS



Note: Flow Regulator Assembly cannot be used in stacking valves.



SPOOLS

All 'MAC' spools are of a balanced design therefore they are not affected by back pressure or restrictions in the exhaust. Flow seals are bonded to an aluminium spool, machine ground to a very close tolerance, and chemically surface hardened assuring long, stick-free consistent operation and making them relatively unaffected by airline contaminants.

Further, the use of two seals, as illustrated, one for exhaust and one for the inlet, provides for a short stroke and high flow in a small envelope size.

BODIES

All valves utilise one piece die cast aluminium bodies. The die casting technique used provides large, smooth and direct flow paths for low pressure drop. The bore of the bodies is finished to a close tolerance, work hardened, polished, and suffers virtually no wear.

NON-LUBE SERVICE

All direct operated M/600 Series valves can be operated with or without lubrication. This is made possible through the use of the unique solenoid pilot operator, the spring return, the spool and bore designs and close tolerances and MacEwans 'MAC' prelubrication procedure.

MODELS AVAILABLE

How to order

Single Solenoid Models

MODEL	VOLTAGE	
M/611/11	240V	50HZ
M/611/4	110V	50HZ
M/611/5	24V	50HZ
M/611/10	24V	DC

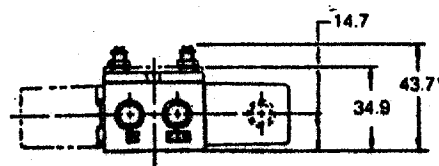
Double Solenoid Models

MODEL	VOLTAGE	
M/621/11	240V	50HZ
M/621/4	110V	50HZ
M/621/5	24V	50HZ
M/621/10	24V	DC

EXTRAS TO ABOVE

Flow Restrictor Blocks
Stacking Tierods (order 2 per valve)
Mount Bracket (for stacking)

MAC 6002
MAC 140/7
MAC 140/15



* Height with Flow Regulator Assembly.

SPECIFICATION NO. 312

L.P.G. CUSTOMER INSTALLATIONS - TANK COMMISSIONING

1.0 SCOPE

This specification covers the commissioning of completely fitted out LPG tanks on site.

2.0 GENERAL

Commissioning an LPG storage vessel consists of testing it for leaks complete with all its fittings, clearing it of air, water and other extraneous matter, introducing LPG, and finally checking for satisfactory operation.

3.0 LEAK TEST

Raise the tank pressure to 350 kPa (50 psi) with air from a compressor. Soap test all tank joints, nozzles, manholes and fittings.

After testing return the tank to atmospheric pressure. Repair any leaks and repeat as necessary.

4.0 PURGING

Displacement of air by water and water by LPG vapour is a recommended safe method of commissioning, as it avoids the formation of air/gas mixtures either in the system or at drain or bleed points.

When it is not safe to fill the vessel completely with water owing to weight restrictions, a safe method of clearing is to replace the air by nitrogen, and then to replace the nitrogen in turn with LPG vapour.

4.1 DISPLACING AIR WITH WATER

Attach a hose to the tank fill connection. Open all purge valves on the top of the tank. Ensure that all other tank valves are closed. Fill tank with water until it overflows.

Allow about 4 litres of water to drain through the tank drain connection. Close all valves and detach water hose. Connect a nitrogen cylinder to the fill connection. Slowly raise the tank pressure to 1400 kPa (200 psi). Do not exceed this pressure as the relief valves will lift at 1550 kPa (225 psi). Soap test all tank joints, nozzles, manholes and fittings.

Reduce the tank pressure to atmospheric by opening the tank drain.

Repair any leaks and repeat test as necessary.

Remove nitrogen equipment and overtop the tank with water.

Close all valves.

4.2 DISPLACING WATER WITH LPG VAPOUR

Ensure that vent pipes are fitted and that pressure relief valves were tested before fitting to the vessel shell.

Check that pressure gauges, liquid-level gauges, etc., are fitted and have been tested.

Connect vapour connection on the vessel to vapour source. Leave vapour valve on vessel shell closed.

Ensure that the drain connection on the vessel is fitted with an extension line to discharge water safely into controlled drainage. Check that both valves are closed.

Ensure that all other valves on the vessel are closed.

Re-check the area to ensure that it is safe to proceed with commissioning.

Raise pressure in vapour connecting (tank fill) line to above atmospheric by opening necessary valves.

Maintaining a positive pressure of 35 to 100 kPa ga (5 to 15 psig) on the vapour inlet line, open the valve on the vessel shell to pressurise the vessel, and then open the drain valves and drain water from the vessel slowly, maintaining a positive pressure in the vessel.

Note: If inlet pressure falls too low, close drain valves immediately and restore pressure by connecting to an alternative source or allowing sufficient time for recovery.

Continue to displace water slowly with LPG vapour until the vessel is water free, i.e. vapour emerges from the drain pipe. Minimise vapour escape but ensure that pressure within the vessel remains positive.

Close vessel drain valves, re-check that there is a positive pressure on the inlet, and close vapour inlet valves.

Purge connecting lines of air or water through bleed valves at high points, and drain valves at low points using vessel or alternative LPG vapour source.

Introduce 15 litres of IPA into the tank through the tank fill valve.

With the vessel and its connecting lines full of vapour (low pressure), LPG liquid may be transferred. This must be done slowly as the low pressure will cause the liquid to flash to vapour, resulting in metal chilling. Flash vaporisation can be minimised by raising the pressure in the receiving lines and vessel as high as is practicable before introducing any liquid.

Liquid should be passed to the vessel in small quantities (2 or 3 batches are normally sufficient) allowing sufficient time between each batch for the pipework and vessel to recover heat where chilled by the evaporating liquid. As soon as the pressure in the receiving vessel approaches that in the delivery vessel, liquid may be transferred freely but at a velocity not exceeding 1 m/sec (3 ft/sec) until the maximum safe level has been reached. Then close inlet valve on vessel, stop pump etc.

Check bleed valves for release of air or LPG vapour on opening.

Check drain valves for release of LPG or water on opening. Continue at intervals until no further water is released. Then drain daily until no water appears on successive days.

Check that all vessel fittings are free from leaks and gauges, etc, are working freely.

4.3 DISPLACING AIR WITH INERT GAS FOLLOWED BY LPG (VAPOUR OR LIQUID)

The procedure is as follows:

Conveniently site the storage vessel or other source from which the inert gas (N_2) to be used for commissioning will be supplied. If liquid (refrigerated) product is used as the source of the inert gas, to prevent excessive chilling of the vessel ensure that only inert gas enters the vessel (no liquid).

Connect the inert gas source to a suitable connection (e.g. drain) on bottom of vessel to be commissioned. Ensure that the line is left full of inert gas and fitted with a conveniently located pressure/vacuum gauge and adjustable pressure control valve. Leave valves on the vessel closed.

Ensure that the liquid filling/outlet valves on the vessel shell are closed and secured and that bleed valves are closed.

Ensure that the liquid filling/outlet valves on the vessel shell are closed and secured and that bleed valves are closed.

Ensure that vent pipes are fitted and that pressure relief valves were tested before fitting to the vessel shell.

Check that pressure gauges, liquid-level gauges, etc., are fitted and have been tested.

Raise pressure in the inert gas inlet line to just above atmospheric using the inert gas.

Maintaining slight positive pressure in the inert gas line, slowly open the drain valves on the vessel shell, and following immediately by the top vapour line valve. Purge air from the vessel maintaining positive pressure on the inert gas inlet.

Continue to displace air slowly with inert gas until the vessel is air free (volume of inert gas required can be calculated, and increased to cover contingencies), paying close attention to ensure that a positive inlet pressure is maintained.

Note: By introducing the inert gas at a low velocity and a high rate (i.e. through a large aperture), mixing of inert gas and air is minimised and the quantity of inert gas required is reduced.

Close vapour outlet valve, re-check that there is a positive pressure on the inlet and close inert-gas inlet valves.

Re-check area to ensure that it is safe to vent inert gas and LPG vapour.

Raise pressure in tank to 1380 kPa (200 psi). Do not exceed this pressure as the relief valves will lift at 1550 kPa (225 psi). Soap test all tank joints, nozzles, manholes and fittings.

Reduce pressure to 35 to 100 kPa (5 to 15 psig).

Connect source of LPG vapour to bottom connection (drain line) and introduce LPG vapour into vessel slowly and steadily, maintaining a positive pressure of 35 to 100 kPa ga (5 - 15 psig) while inert gas is bled-off from a top connection.

Note: As the replacement of inert gas with LPG proceeds, some mixing will occur. At certain stages the vented mixture will therefore be flammable when mixed with air. The full safety precautions necessary when venting large quantities of LPG must therefore be applied.

When replacement of inert gas with LPG vapour is complete, close the inert gas vent valve and continue to introduce LPG vapour to pressurise the vessel.

Small quantities of LPG liquid may be introduced into the vessel and allowed to vaporise - allowing time between each liquid batch for cooled vessel plates and lines to warm up.

Once the pressure in the vessel approaches the vapour pressure of the LPG source, LPG liquid may be pumped in until the maximum liquid level is reached.

During filling, check that all fittings on the vessel shell are free from leaks and working correctly.

Continue until maximum safe liquid-level is reached, then immediately close inlet valve on vessel shell.

Make a temporary connection to a bleed valve on top of vessel shell, and fit apparatus to establish whether all air, inert gas, and inert gas/LPG vapour mixtures have been removed from the vessel.

Draw vapour samples through the testing apparatus and check for presence of air and/or inert gas.

Disconnect temporary vapour sampling connection and connect vapour line to the normal operational vapour-return system, ensuring that the line is purged of air and other contaminants and left full of LPG vapour.

Carry out a drain check for water and other heavy contaminants which may have been introduced with the LPG.

Disconnect product inlet line from bottom of vessel shell is not a part of the normal operational system (i.e. liquid product outlet-line). Purge line of air and any other contaminants.

Leave line full of LPG liquid.

5.0 Supply of Test Materials

All test materials shall be supplied by the contractor except air/inert gas tester.

6.0 Commissioning Supervision

The Engineer shall supervise each stage of the commissioning.

STANDARD SPECIFICATION NUMBER 302D

Specification of electrical services for an LPG automotive dispensing facility

This specification is to be read in conjunction with the appropriate Shell drawing and electrical schematic.

Scope

This specification is for the supply, delivery to site, assembly and installation of the whole of the materials required and all work necessary for the complete and satisfactory working of the installation as set out in this specification and the accompanying drawings.

Regulations and Standards

The installation and all materials used therein shall comply with all relevant statutory regulations including the following:-

- (a) Electrical wiring in hazardous locations MP6105: 1976 Class 1 Zone 1.
- (b) Appropriate N.Z. or British Standard Specifications.
- (c) Relevant statutes.
- (d) N.Z. electrical wiring regulations.
- (e) Local supply authority regulations.
- (f) N.Z. radio interference regulations and interference notices (radio and television).

Tests on Completion

On the completion of the installation the electrical contractor shall carry out all commissioning and tests in accordance with the specification and local authority requirements.

All apparatus, measuring instruments or meters, etc. required for the inspections or tests to be carried out shall be calibrated to the satisfaction of the Shell Engineer, and be provided and arranged for by and at the expense of the electrical contractor.

NOTE: It is essential, in order to prevent damage to the LPG pump from dry running that it must not be run even momentarily to check for correct direction of rotation.

Completion

This work shall not be deemed complete until passed by the Local Authority.

Technical Specification

All equipment other than that used on the main switchboard shall be S.A.E. Industrial flameproof equipment to AS C98 c C99 (weatherproof equipment to ASC302) for Class 1 zone 1 hazardous locations.

3 phase outlet	FNO-5 4 pin 20 amp
3 phase isolating switch	FNS-51-1 (pump)
1 phase isolating switch	FNS-15-1 (control)
3 phase changeover switch	FSC-02302

This equipment is available from: A.R. Harris & Co. Ltd,
291-301 Blenheim Road,
Christchurch 4.

Alternatively the following Crouse-Hinds equipment may be used:

three phase isolating switch	DSA9 - A203
one phase isolating switch	DSA9 - 169
stop/start station	DSA12

The equipment also requires base DSAB1010.

Note 1 - Generally this equipment will be supplied to the contractor free of charge by the Shell Company as indicated on the electrical drawing.

Note 2 - MP6105 requires the neutral to be isolated along with the line conductors (Shell Co. preferred method) or removable link on the neutral.

Cable

All cable shall be light duty (600V class) PVC Served Pyrotenax mineral insulated. All glands shall be Pyrotenax flame proof type installed strictly in accordance with the manufacturers instructions. Particular attention shall be paid to meggering the sheath and conductors both before and after installing seals.

Cables shall be as shown on the drawing, and shall be sized to suit run lengths and electrical loads in accordance with the Electrical Wiring Regulations.

Alternative Cable

Where local authorities permit an alternative to MIMS cable, then steel wired armour cable of the following type may be used.

PVC insulated conductors
PVC bedding
Steel wire armour
PVC outer sheath (PVC PVC SWA PVC)

Protection of Underground Wiring

All underground wiring shall be protected as shown in the table below (Taken from EWR Information Circular 1983/1).

Earthing

All earthed electrical components, pipework and the tank shall be electrically bonded together and earthed. The resistance to earth shall not exceed 10 ohms. The Earth Electrode shall comply with clause 157(1)(a) or clause 157(1)(b) of the Electrical Wiring Regulations.

Hose Electrical Continuity

The electrical resistance measured between the couplings with approved equipment must not exceed 0.5ohm per 300mm length. Achievement of continuity is either with a conductive hose or with a flexible conductor loosely wrapped around the hose, clipped to the couplings at each end.

REGULATION 65 - PROTECTION OF UNDERGROUND CABLES

Type of Cable	Minimum depth of 600mm	At not less than 450mm	Under concrete floor, footpath, or driveway	In rock Minimum depth 225mm
Neutral-screened	No further protection	Timber, galvanised steel pipe, PVC conduit, or alkathene pipe	At such a depth that if the concrete is broken-up, damage to the cable is unlikely	Timber and 50 mm concrete
Armoured	No further protection			As above
M.I.M.S.	No further protection	Timber		50mm concrete
PVC insulated and sheathed	Timber, galvanised steel pipe, PVC conduit, or alkathene pipe	Galvanised steel pipe or PVC conduit	As above	Timber, or galvanise steel pipe, or PVC conduit, and 50 mm concrete
PVC insulated (conduit wire)	Galvanised steel pipe or PVC conduit	Galvanised steel pipe or PVC conduit	Galvanised steel pipe or PVC conduit	Galvanised steel pipe, or PVC conduit, and 50 mm concrete

In addition all wiring buried underground shall be identified with a commercial plastic signal strip placed immediately below seal or concrete as appropriate or between 300 & 450 below the surface.

SHELL OIL NEW ZEALAND LIMITED
96 THE TERRACE, WELLINGTON

SPECIFICATION NO. 314

Painting of LPG Customer Installations

September 1982

SPECIFICATION FOR THE PAINTING OF SHELL

LPG CUSTOMER INSTALLATIONS

1.0 Scope

This Specification covers the painting of LPG Customer Installation Tanks and associated above-ground pipework, pumps, valves, pipe supports and dispensers.

2.0 General

- 2.1 Before commencing work on the site, the painting Contractor shall give prior warning and obtain permission from the LPG Installation Site Proprietor, who will check to see that the area is safe to enter; i.e. free from possible LPG leaks. The Contractor shall take care to avoid any disruption to the normal operations of the installation.
- 2.2 The Contractor shall observe all applicable safety precautions especially "No Smoking" or any source of ignition.
- 2.3 The site is to be left in a clean and tidy condition.
- 2.4 Any work not meeting the approval of the Company shall be made good at the Contractor's expense.
- 2.5 The Contractor shall supply complete details of the paint system proposed. This must be by a Shell approved manufacturer.

3.0 Materials

The Company will supply self adhesive signs and dispenser advertising panels as required.

The Contractor is to supply the paint as specified together with other materials necessary for the proper execution of the work.

4.0 Pipework Painting

Method for the painting of aboveground pipelines, pumps, valves and pipe supports is as follows:

4.1 Surface Preparation

Remove all grease and dirt from the existing paintwork and clean off surface rust using wire brushes and emery cloth to sound metal. (Note other preparation methods, e.g. sandblasting is not permitted)

4.2 Painting Pipework

4.2.1 Alternative Application

Following the Manufacturer's instructions, spot prime all base metal with two coats of alkyd metallic lead by conventional spray or brush paying particular attention to threads and sharp edges to achieve an approximate dry film thickness of 50 microns per coat, allow to dry 2 hours between coats.

Apply one coat of silicone industrial enamel (white) over all pipework by conventional spray refer 2.2 or brush to achieve an approximate dry film thickness of 50 microns.

Note:

Pay particular attention not to paint over valve spindles, nameplates, bleed valves and pipeline relief valves.

4.2.2 Alternative Application

1st Coat

To all bare areas apply RED OXIDE VINYL ETCH PRIMER. Allow 4 hours drying.

2nd Coat

Apply to total area WHITE ISOMERIZED RUBBER at a spreading rate of 10 square metres per litre to achieve a film build of 75µm wet 33µm dry. Allow overnight drying.

3rd Coat

Apply WHITE as conditions apply for 2nd Coat.

5.0 Tank Painting

5.1 Preparation

Grind down welds and other sharp areas and remove all weld splatter.

Degrease as necessary using proprietary detergent.

Abrasive blast to minimum Swedish Standard S.A. 2^{1/2}, to give anchor pattern between 40µm - 75µm.

Blow down with compressed air before coating.

Coat blasted surfaces within 4 hours maximum. If rash rusting is in evidence, re-blast affected area.

5.2 Painting

Following the manufacturers instructions, apply an inorganic zinc silicate primer to give a dry film thickness of 75mu. Allow 12 hours drying.

Apply 1 coat high solids epoxy to give a dry film thickness of 100mu. Allow 36 hours drying.

Apply 1 white recoatable urethane enamel top coat to give a dry film thickness of 50mu. Allow 24 hours drying.

SPECIFICATION NO. 312

L.P.G. CUSTOMER INSTALLATIONS - TANK COMMISSIONING

1.0 SCOPE

This specification covers the commissioning of completely fitted out LPG tanks on site.

2.0 GENERAL

Commissioning an LPG storage vessel consists of testing it for leaks complete with all its fittings, clearing it of air, water and other extraneous matter, introducing LPG, and finally checking for satisfactory operation.

3.0 LEAK TEST

Raise the tank pressure to 350 kPa (50 psi) with air from a compressor. Soap test all tank joints, nozzles, manholes and fittings.

After testing return the tank to atmospheric pressure. Repair any leaks and repeat as necessary.

4.0 PURGING

Displacement of air by water and water by LPG vapour is a recommended safe method of commissioning, as it avoids the formation of air/gas mixtures either in the system or at drain or bleed points.

When it is not safe to fill the vessel completely with water owing to weight restrictions, a safe method of clearing is to replace the air by nitrogen, and then to replace the nitrogen in turn with LPG vapour.

4.1 DISPLACING AIR WITH WATER

Attach a hose to the tank fill connection. Open all purge valves on the top of the tank. Ensure that all other tank valves are closed. Fill tank with water until it overflows.

Allow about 4 litres of water to drain through the tank drain connection. Close all valves and detach water hose. Connect a nitrogen cylinder to the fill connection. Slowly raise the tank pressure to 1400 kPa (200 psi). Do not exceed this pressure as the relief valves will lift at 1550 kPa (225 psi). Soap test all tank joints, nozzles, manholes and fittings.

Reduce the tank pressure to atmospheric by opening the tank drain.

Repair any leaks and repeat test as necessary.

Remove nitrogen equipment and overtop the tank with water.

Close all valves.

4.2 DISPLACING WATER WITH LPG VAPOUR

Ensure that vent pipes are fitted and that pressure relief valves were tested before fitting to the vessel shell.

Check that pressure gauges, liquid-level gauges, etc., are fitted and have been tested.

Connect vapour connection on the vessel to vapour source. Leave vapour valve on vessel shell closed.

Ensure that the drain connection on the vessel is fitted with an extension line to discharge water safely into controlled drainage. Check that both valves are closed.

Ensure that all other valves on the vessel are closed.

Re-check the area to ensure that it is safe to proceed with commissioning.

Raise pressure in vapour connecting (tank fill) line to above atmospheric by opening necessary valves.

Maintaining a positive pressure of 35 to 100 kPa ga (5 to 15 psig) on the vapour inlet line, open the valve on the vessel shell to pressurise the vessel, and then open the drain valves and drain water from the vessel slowly, maintaining a positive pressure in the vessel.

Note: If inlet pressure falls too low, close drain valves immediately and restore pressure by connecting to an alternative source or allowing sufficient time for recovery.

Continue to displace water slowly with LPG vapour until the vessel is water free, i.e. vapour emerges from the drain pipe. Minimise vapour escape but ensure that pressure within the vessel remains positive.

Close vessel drain valves, re-check that there is a positive pressure on the inlet, and close vapour inlet valves.

Purge connecting lines of air or water through bleed valves at high points, and drain valves at low points using vessel or alternative LPG vapour source.

Introduce 15 litres of IPA into the tank through the tank fill valve.

With the vessel and its connecting lines full of vapour (low pressure), LPG liquid may be transferred. This must be done slowly as the low pressure will cause the liquid to flash to vapour, resulting in metal chilling. Flash vaporisation can be minimised by raising the pressure in the receiving lines and vessel as high as is practicable before introducing any liquid.

Liquid should be passed to the vessel in small quantities (2 or 3 batches are normally sufficient) allowing sufficient time between each batch for the pipework and vessel to recover heat where chilled by the evaporating liquid. As soon as the pressure in the receiving vessel approaches that in the delivery vessel, liquid may be transferred freely but at a velocity not exceeding 1 m/sec (3 ft/sec) until the maximum safe level has been reached. Then close inlet valve on vessel, stop pump etc.

Check bleed valves for release of air or LPG vapour on opening.

Check drain valves for release of LPG or water on opening. Continue at intervals until no further water is released. Then drain daily until no water appears on successive days.

Check that all vessel fittings are free from leaks and gauges, etc, are working freely.

4.3 DISPLACING AIR WITH INERT GAS FOLLOWED BY LPG (VAPOUR OR LIQUID)

The procedure is as follows:

Conveniently site the storage vessel or other source from which the inert gas (N_2) to be used for commissioning will be supplied. If liquid (refrigerated) product is used as the source of the inert gas, to prevent excessive chilling of the vessel ensure that only inert gas enters the vessel (no liquid).

Connect the inert gas source to a suitable connection (e.g. drain) on bottom of vessel to be commissioned. Ensure that the line is left full of inert gas and fitted with a conveniently located pressure/vacuum gauge and adjustable pressure control valve. Leave valves on the vessel closed.

Ensure that the liquid filling/outlet valves on the vessel shell are closed and secured and that bleed valves are closed.

Ensure that the liquid filling/outlet valves on the vessel shell are closed and secured and that bleed valves are closed.

Ensure that vent pipes are fitted and that pressure relief valves were tested before fitting to the vessel shell.

Check that pressure gauges, liquid-level gauges, etc., are fitted and have been tested.

Raise pressure in the inert gas inlet line to just above atmospheric using the inert gas.

Maintaining slight positive pressure in the inert gas line, slowly open the drain valves on the vessel shell, and following immediately by the top vapour line valve. Purge air from the vessel maintaining positive pressure on the inert gas inlet.

Continue to displace air slowly with inert gas until the vessel is air free (volume of inert gas required can be calculated, and increased to cover contingencies), paying close attention to ensure that a positive inlet pressure is maintained.

Note: By introducing the inert gas at a low velocity and a high rate (i.e. through a large aperture), mixing of inert gas and air is minimised and the quantity of inert gas required is reduced.

Close vapour outlet valve, re-check that there is a positive pressure on the inlet and close inert-gas inlet valves.

Re-check area to ensure that it is safe to vent inert gas and LPG vapour.

Raise pressure in tank to 1380 kPa (200 psi). Do not exceed this pressure as the relief valves will lift at 1550 kPa (225 psi). Soap test all tank joints, nozzles, manholes and fittings.

Reduce pressure to 35 to 100 kPa (5 to 15 psig).

Connect source of LPG vapour to bottom connection (drain line) and introduce LPG vapour into vessel slowly and steadily, maintaining a positive pressure of 35 to 100 kPa ga (5 - 15 psig) while inert gas is bled-off from a top connection.

Note: As the replacement of inert gas with LPG proceeds, some mixing will occur. At certain stages the vented mixture will therefore be flammable when mixed with air. The full safety precautions necessary when venting large quantities of LPG must therefore be applied.

When replacement of inert gas with LPG vapour is complete, close the inert gas vent valve and continue to introduce LPG vapour to pressurise the vessel.

Small quantities of LPG liquid may be introduced into the vessel and allowed to vaporise - allowing time between each liquid batch for cooled vessel plates and lines to warm up.

Once the pressure in the vessel approaches the vapour pressure of the LPG source, LPG liquid may be pumped in until the maximum liquid level is reached.

During filling, check that all fittings on the vessel shell are free from leaks and working correctly.

Continue until maximum safe liquid-level is reached, then immediately close inlet valve on vessel shell.

Make a temporary connection to a bleed valve on top of vessel shell, and fit apparatus to establish whether all air, inert gas, and inert gas/LPG vapour mixtures have been removed from the vessel.

Draw vapour samples through the testing apparatus and check for presence of air and/or inert gas.

Disconnect temporary vapour sampling connection and connect vapour line to the normal operational vapour-return system, ensuring that the line is purged of air and other contaminants and left full of LPG vapour.

Carry out a drain check for water and other heavy contaminants which may have been introduced with the LPG.

Disconnect product inlet line from bottom of vessel shell is not a part of the normal operational system (i.e. liquid product outlet-line). Purge line of air and any other contaminants.

Leave line full of LPG liquid.

5.0 Supply of Test Materials

All test materials shall be supplied by the contractor except air/inert gas tester.

6.0 Commissioning Supervision

The Engineer shall supervise each stage of the commissioning.

STANDARD SPECIFICATION NO. 241B

SPECIFICATION OF WORK TO BE DONE AND
MATERIALS TO BE USED IN CONJUNCTION
WITH THE ERECTION OF SECURITY FENCE
AND GATES AT LPG SITES FOR THE SHELL
COMPANIES IN NEW ZEALAND LIMITED

GENERAL:

This Specification shall be read in conjunction with Plans supplied.

The Contractor shall inspect the site and ascertain from his own observation the nature and extent of work to be carried out.

The Contractor shall supply all materials and erect fences and gates as shown in plans and described in this Specification.

The whole of the workmanship and material shall be to the entire approval of the Company's Engineer.

LIST OF PLANS:

Standard Security Fence and Gates.

WIRE - CENTRE AND BOTTOM:

Plain wire shall be 8 gauge dia., heavy galvanised wire. Galvanised coating to be 290 gm/m².

LACING:

2.0 mm Heavy galvanised wire through every diamond.

CHAIN MESH:

Shall be 2.5 mm dia., heavy galvanised wire. The diagonal mesh size shall be 50 mm x 2000 mm wide.

SCOPE OF FENCING WORK:

The fencing shall be erected, along the boundary and with gates in the position indicated on Plan No.

M.S. PIPE POSTS AND FOOTING BLOCKS:

M.S. pipe posts shall be as shown on Plan. Concrete footing blocks shall be placed around all posts as shown in Plan and shall finish with slight weathering away from the post and trowelled smooth.

SETTING POSTS:

The Contractor shall dig the post holes of sufficient diameter to allow the material placed around the posts when set to be firmly tamped.

Posts shall be set so that the fence is level to even grades throughout.

All local bumps along the fence line shall be levelled off and small hollows filled so that the bottom of wire netting shall finish not more than 25 mm above finished ground surface.

SPECIFICATION NO. 324

LPG DISPENSERS FOR RESELLER USE

Shell Oil New Zealand Limited
July 1984

SPECIFICATION NO. 324.

LPG DISPENSERS FOR RESELLER USE

1.0 SCOPE

This specification relates to the requirements of dispensers for the resale of dangerous goods class 2d products (i.e. L.P.G.).

2.0 MODIFICATION AND INSPECTION

At any stage during the manufacturing or testing process facilities are to be made available to the Company to inspect the dispensers. Any new model or design alteration is to be notified to the Company and agreed to by the Company prior to manufacture.

3.0 DISPENSING PUMP PERFORMANCE

3.1 The dispensers are to be capable of a product flow rate under factory test conditions of 45-50 litres per minute. Each dispensers shall be flow tested before despatch to ensure compliance with this requirement. The Company is to be advised of the flow rate for each dispensing pump.

4.0 PRESSURE TESTING

4.1 Maximum Test Pressures

The manufacturer shall forward to the Company's Engineer the maximum test pressure information of the hydraulic system piping, components and hose.

4.2 Shop Test

The completed dispensing pump is to be leak tested at 2700 kPa and any leaks rectified.

5.0 CABINET

The cabinet is to be weatherproof and consist of a mild steel frame covered with a minimum of 18g mild steel sheet panels with suitable dial glasses to view the display units. The dial glasses, and front and rear panels are to be removable and lock secured.

Note: Alternative cabinet systems will be considered.

6.0 PAINTING

6.1 Paint System

The paint system to be used is to be nominated by the tenderer. The following is an example of a typical paint system.

6.1.1. Components

Etch primer and air dry enamel.

6.1.2. Frame

Etch primer and air dry enamel.

6.1.3 Inside Cabinet

Etch primer with stoving enamel top coat.

- 6.1.4. Outside Cabinet
Etch primer followed with polyurethane primer and stoving enamel top coat.

All paint is to be applied according to the paint manufacturers specification with particular attention given to cut edges and corners.

- 6.2 Colour Scheme
The outside cabinet is to be painted white.

7.0 MECHANICAL REQUIREMENTS

- 7.1 Pump Base
The configuration of the dispensing pump at the base is to conform with Appendix I.
- 7.2 Vapour Eliminator
The dispensing pump is to be fitted with a suitable vapour eliminator vented into the vapour return line.
- 7.3 Hose
The dispensing pump is to be fitted with 15mm diameter hose 4 metres long. The hose shall be conductive or have a flexible conductor loosely wrapped around it and clipped to the couplings at each end.
- 7.4 Nozzle
The nozzle is to be threaded 1 3/4" Acme Female and incorporate a rapid shut off valve.
- 7.5 Nozzle Holster
Lockable nozzle holster to be fitted.
- 7.6 Weights & Measures Connection
A 1 3/4" Acme Male threaded coupling shall be fitted in the vapour return line. This shall have an integral excess flow valve.
- 7.7 Shear Valve
The hose shall be fitted with a shear valve which shuts off flow from the dispenser and hose when actuated.
- 7.8 Meter
Positive displacement meter with adjustable calibration.
- 7.9 Pressure Gauge

A pressure gauge shall be fitted indicating liquid pressure.
- 7.10 Relief Valve

A relief valve with a minimum setting of 2140 kpa shall be fitted.
- 7.11 Liquid In

The liquid line shall terminate in a Ø25 ASA 300 flange orientated as Appendix I.

7.12 Vapour Out

The vapour line shall terminate in a Ø20 ASA 300 flange orientated as Appendix 1.

8.0 ELECTRICAL REQUIREMENTS

8.1 Switch

A switch shall be fitted to operate the remote pump starter.

8.2 Illumination

Flameproof lighting to be provided to illuminate the dial faces.
Lights to operate the total time the pump is operating.

8.3 Mains Supply Connection

A flameproof junction box shall be fitted.

9.0 ELECTRONIC COMPUTER AND DISPLAYS

Register to be of electronic type and capable of interfacing with the "micro'M" self service console.

9.1 Read Out Display

To be clearly visible in artificial light and bright sunlight on both sides of the dispenser

litres	0 - 999.99 litres	characters	25mm minimum
dollars	0 - 999.99 dollars	"	18mm "
price per litre	0 - 999.9 cents/litre	"	13mm "

9.2 Volume Totalizator

Electro-mechanical up to 9,999,999 litres.

9.3 Price Adjustor

Electrical-Mechanical operation readily accessible and adjustable at the display head.

9.4 Self Diagnosis Function

Readout to be located in the display head with test circuitry to monitor and to readily identify faults.

9.5 Power Failure

In the event of power failure, data shall be kept in the electronic computer. The length of time such storage is available is to be nominated by the tenderer.

10.0 MAINTENANCE

10.1 Electronic Component

The electronic computing head components shall be designed so that removal and replacement on site can be achieved quickly and easily.

10.2 Warranty

The dispensers supplied under this specification are to be covered with a 180 day parts and labour warranty with a further 185 days parts warranty.

10.3 Spares Availability

The manufacturer shall supply spares such that orders will be despatched within 24 hours from time of receipt of order. Such spares shall be made available for 15 years from the date of supply of the dispensers.

11.0 OPTIONS

11.1 Mechanical Computer

Incorporation of Veeder Root model 2002 AE mechanical computer in place of the electronic computer and displays. Dual sided display with automatic reset.

12.0 COMPLIANCE WITH STATUTES

The dispensers are to comply with all relevant Acts, Regulations, and other legal or statutory requirements. Evidence as to compliance with the following is to be supplied by the manufacturer:

Dangerous Goods Act
Electrical Wiring Regulations
Weights and Measures Regulations

13.0 GENERAL

13.1 Property Plate, Shell Emblem

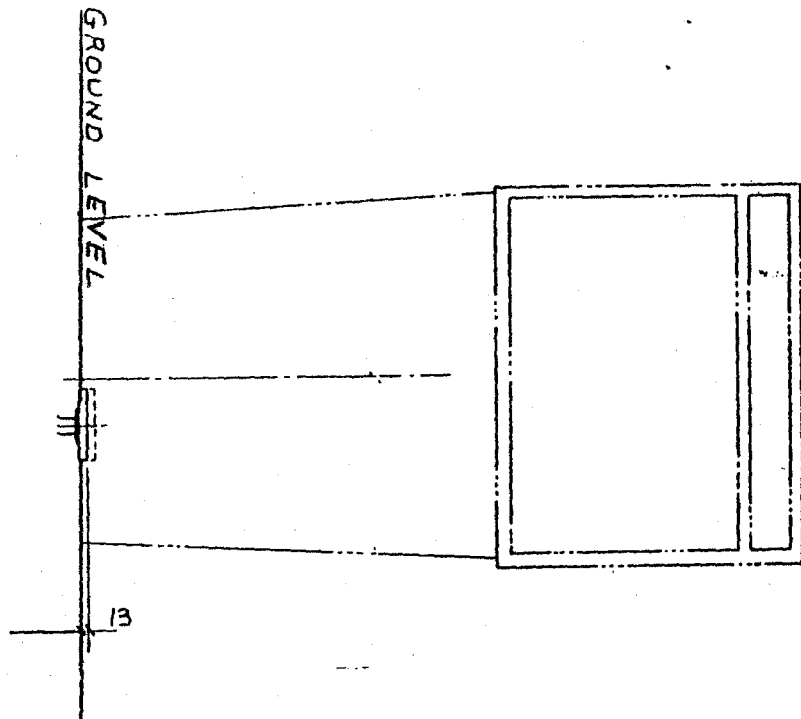
The Company will provide one property plate, to be serial number stamped by the manufacturer, two Shellgas emblems and operating instructions to be fitted to each dispenser by the manufacturer.

13.2 Grade Plates

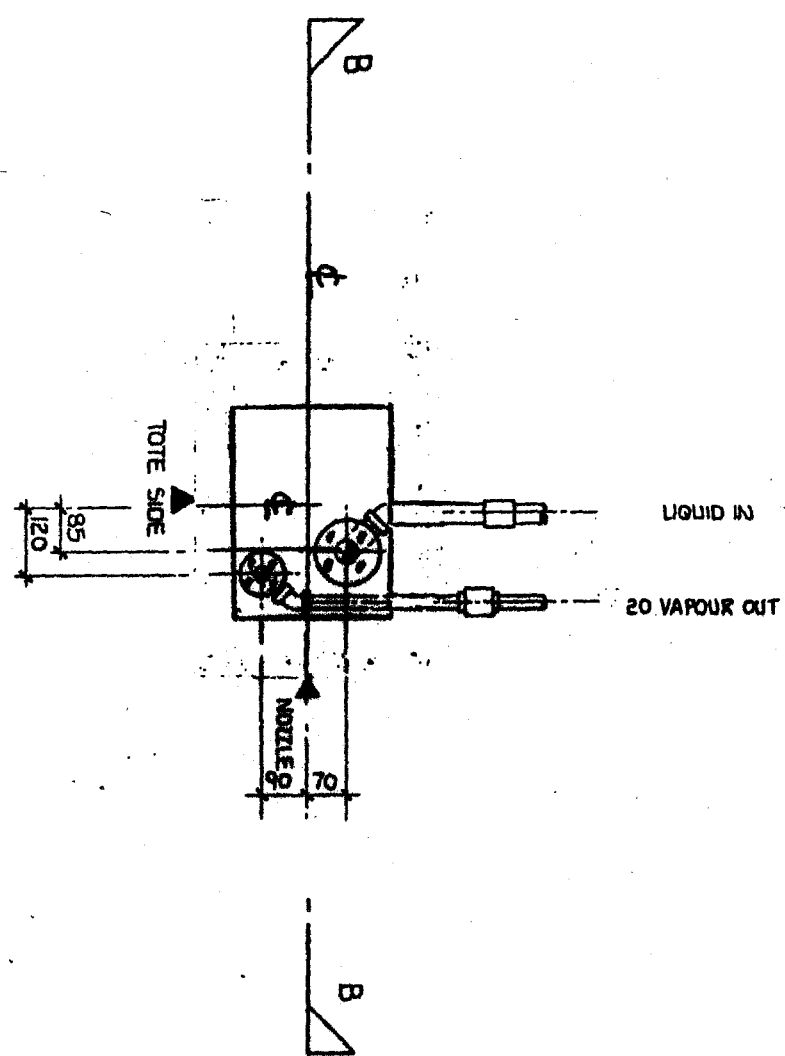
The manufacturer is to supply and fit grade plates to the front and rear of the dispenser. The advertising panel colours and wording is to be determined by the Company.

13.3 Accessibility

Every effort is to be made to enable the volume totaliser, and other items requiring access, accessible from the same side of the dispenser.



SECTION B-B



APPENDIX I

PLAN

DISPENSING PUMP BASE