



I&O Manual

Valen 2V EnduroGel Batteries

Version: 6.0

TO BE INSTALLED BY A SUITABLY QUALIFIED ELECTRICIAN ONLY



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SECTION 1 GENERAL INFORMATION

1.1 VALEN ENDUROGEL 2V Battery

The VALEN 2V ENDUROGEL Battery with Catalyst is a sealed, valve regulated lead acid re-combinant, low maintenance battery designed for stationary or cyclic applications. This type of battery has no special ventilation or handling requirements. Since the electrolyte in the battery is immobilised, the batteries are considered dry and can be handled and shipped accordingly.

SECTION 2 SAFETY INFORMATION

2.1 General Information

Lead acid batteries require care in installation and maintenance. Unsafe installation or maintenance procedures can cause severe injury or death. Electrical shock or burns, acid burns and fire can result if proper safety precautions are not followed. The following precautions apply to all battery installation and maintenance work. For more information, see the following sections.

- Disconnect all power before attempting to install, remove or perform maintenance work on batteries. When on-charge float voltages must be measured, be particularly careful because shorting a battery at this time can cause not only personal injury, but severe equipment failure as well.
- Do not tamper with any parts of the battery, including cover, vents, terminal covers, etc.
- Keep batteries clean and dry. Use ½kg of baking soda in 4L of water to neutralise any possible acid. Do not use cleaners or solvents on any part of the battery. Do not allow excessive dust to accumulate on the battery or cabling.
- Keep battery connectors clean, greased and tight. A loose connection can reduce battery standby time and cause battery fires.

WARNING! Do not turn batteries upside down or tilt to the front more than 30° as this will 'wet' the vent with electrolyte which will be vented when the cell is charged.

2.2 Sulphuric Acid

The VALEN 2V ENDUROGEL Battery is a lead acid battery and contains sulphuric acid in diluted form. Since the electrolyte is immobilised, in the event of a container rupture, no liquid acid will leak or run from the battery. However, if the

internal components of the battery are touched or handled, contact with the acid will result.

CAUTION! Sulphuric acid can cause burns and serious injury if it comes in contact with your skin or eyes. In the event of contact with sulphuric acid, flush thoroughly with water and neutralise any residual acid with baking soda (1kg in 4L of water). Seek medical attention immediately. Do not handle batteries if the container has been ruptured except while wearing rubber gloves. Do not try to disassemble a cell.

2.3 Gassing

All lead acid batteries emit some gases during charging and float operation. Conventional flooded batteries release all the gases produced to the environment, whereas sealed, valve-regulated batteries recombine most of the gases internally, releasing very little to the environment. Compared to a flooded battery of equal capacity, a VALEN 2V ENDUROGEL Battery releases a gas volume of 1% or less than the flooded battery.

Due to this characteristic, no special ventilation is required under normal usage conditions. Since some gas is released from lead acid batteries, never charge or use batteries in an unventilated space. This gas consists of mostly hydrogen gas and can explode if ignited in a confined area or space. Keep all ignition sources (including smoking materials) away from batteries.

CAUTION! Hydrogen gas can explode and cause serious injuries and fire. Do not allow any flame or ignition source near batteries. Always allow some ventilation around operating batteries. Contact VALEN if there are any questions regarding gassing or ventilation.

2.4 Electrical Shock

Batteries store large amounts of electrical energy. Even a discharged battery can deliver a high short circuit current. Keep all metallic objects away from the battery terminals. Multi-cell systems attain lethal voltages. Remove all jewellery before working on batteries. Cover all tools with vinyl electrical tape to minimise the possibility of shorting a battery during installation. Never lay tools or other metallic objects on batteries. Do not allow construction work over batteries to proceed unless the battery is protected by insulating rubber mats.

CAUTION! Shorting a battery can cause serious injury, fire or explosion. Do not attempt to work on a battery unless you are familiar with battery installation procedures and have adequate safety information and equipment. Read this manual thoroughly before attempting to install the battery. If there are any questions about safety, contact VALEN before installing the batteries. Remember, safety is always the prime concern.

SECTION 3 RECEIPT OF EQUIPMENT

3.1 Delivery Inspection

Immediately upon delivery, inspect the modules for damage caused in transit. Damaged pallets could indicate rough, improper handling in transit. Describe in detail (take photographs of the batteries still on the pallet) any damage on the delivery receipt before signature. If any damage is found, contact the courier immediately, request an inspection and file a damage claim.

3.2 Hidden Damage

Within 10 days of receipt, measure and record open circuit voltages (OCV's). If any damage is found, request an inspection by the courier and file a hidden damage claim. Do not delay this step as it may result in a loss of right of reimbursement for hidden damages.

SECTION 4 STORAGE

4.1 General

Do not store batteries outside, exposed to the elements. Store indoors in a cool, dry location. Do not store batteries in temperatures over 30°C. The recommended storage temperature is 20°C or less. Do not stack pallets or allow any other material to be stored on top of the pallets or possible damage may occur. Do not store where the possibility of metallic objects falling on the battery may occur.

4.2 Short Term Storage

VALEN 2V ENDUROGEL Batteries are shipped fully charged from the factory. If the batteries are to be stored 6 months or less at 20-25°C or less before being put into service, nothing need be done at this time. If the batteries are to be stored longer than 6 months, at temperatures greater than 25°C, or installation is delayed beyond expected time, a storage charge may be required.

A storage charge is an equalising charge applied to a battery that is stored in open circuit (not float charging) condition.

If the storage temperature is 5°C to 30°C, VALEN 2V ENDUROGEL Batteries must be charged at least every 6 months while in storage. If stored at ambient temperatures above 30°C, charge the batteries every 4 months. Storage of batteries beyond the recommended temperatures or storage times, without charging, can result in loss of capacity, cell shorting and loss of float life. It can also void the battery's warranty. Keep careful records of battery time of arrival, storage time and when last charged.

SECTION 5 INSTALLATION PROCEDURES

CAUTION! Before attempting to install VALEN 2V ENDUROGEL Batteries, study this section and the section on safety thoroughly. Failure to do so could result in personal injury and battery or equipment damage.

5.1 Battery Location

5.1.1 Temperature

Battery location is very important in determining life and performance of the battery. The ideal environment would be a dry, indoors, temperature regulated area. The ideal operational temperature is 20°C. Operation at temperatures below this will result in a loss of battery performance and may result in a larger, more costly battery being needed. Operation at temperatures above 30°C will result in loss of battery operational life. For every 8°C rise in battery temperature above 30°C, the life expectancy of the battery will be seriously impacted. For example, the VALEN 2V ENDUROGEL Battery is designed for a 20 year float service life at 30°C.

5.1.2 Temperature Variation

Maintaining temperature balance across the string is very important for max. battery life. The difference between the max. and min. cell temperature in a series string should not be more than 3°C. Excessive temperature variation will result in the need for equalisation and may result in loss of battery operational life. Sources of battery temperature variation can be placement of the battery system near a heat source such as radiators, power equipment, windows or heating



vents. It is recommended that the battery location be designed, engineered and monitored to minimise temperature variations.

5.1.3 Ventilation

Proper ventilation of VALEN 2V ENDUROGEL Batteries is important for 2 reasons:

1. To minimise battery temperature variation
2. to minimise build-up of potentially explosive hydrogen gas.

5.1.3.1 Battery Temperature Variation

Recombinant batteries such as VALEN 2V ENDUROGEL Batteries give off a small amount of heat during charging and float operations. Proper ventilation is important to remove this heat and to prevent temperature differences from arising in the string. Sufficient air circulation should be present to prevent temperature layering effects. In an improperly designed room, there can easily be a 5°C difference in temperature between the floor and the ceiling. If this difference exists in a series string, it will result in a need for equalisation and in reduced battery life.

5.1.3.2 Ventilation & Gassing

As noted, lead acid batteries emit small amounts of gas during normal charging and floating. The gas composition, while on float, is approx. 80% by volume hydrogen with the remainder being oxygen.

CAUTION! Hydrogen gas can be explosive. Never install batteries in an air tight space. Ventilation must be provided to remove this hydrogen gas. Allow about 1L/hour/cell of air exchange to prevent hydrogen accumulation.

NOTE! In virtually all cases, the amount of air circulation required for battery cooling and temperature variation maintenance will far exceed the amount of air circulation required to prevent gas build up. However, ensure some air exchange is present in the ventilation.

5.1.4 Floor Loading

Before installing the modules, it should be ascertained that the floor has the capability to support the weight of the battery and related equipment. The total system weight will be the sum of the modules plus 5% for the battery connectors and other components. It is the responsibility of the installer to ensure adequate floor load carrying capabilities.

5.1.5 Seismic Considerations

VALEN 2V ENDUROGEL Batteries are capable of withstanding seismic events of UBC Zone 4 magnitude in horizontal stacks of up to 9 modules high and when properly installed. When seismic capability is desired, suitable floor anchoring should be provided. Proper floor anchoring is the responsibility of the installer. Ensure that the anchors used are of sufficient strength to withstand the max. seismic load foreseeable.

5.2 Unpacking

VALEN 2V ENDUROGEL Batteries are shipped on pallets with cells/modules in the horizontal position. All of the accessories needed for installation and use are packed in boxes and shipped on top of the modules or on a separate pallet. Unpack all items carefully and note the quantities received.

5.3 Installation

5.3.1 General

NOTE! The lifting slings/straps provided are designed to lift one module at a time. Never attempt to lift more than one module at a time or you will damage the module.

VALEN 2V ENDUROGEL Batteries module types are designed to be stacked in the horizontal position. Modules are configured to provide the terminals at the top of the battery while providing the shortest possible connections. When a system requires fewer cells than are needed to completely fill all modules, the extra spaces will be filled with dummy cell(s). Place the modules with the dummy cell(s) at the top of the stack. VALEN 2V ENDUROGEL Batteries, when mounted in the vertical position, may be placed end-to-end or side-by-side or a combination of the two. Note that standard horizontal configuration will be supplied unless specified differently at time of order. Also note, that when modules are vertically mounted, they do not meet seismic Zone 4 qualifications.

NOTE! Handle/lift modules by the lifting slings hooked diagonally in front and rear mounting channels only. Do not lift the battery/module by the cells because damage to the cells will result.

5.3.2 Location Layout

Ensure that sufficient space is available for handling and placement of the modules. Do not locate the battery system near a source of heat

or in direct sunlight. Locate and mark the position of the battery system. Leave a space of at least 900mm between the front of the battery and any adjacent equipment.

5.3.3 Horizontal Module Installation

Hook the two lifting straps diagonally across the top module on the pallet. Then, by removing 3 front bolts, unbolt the module from the module below and lift one module at a time from the pallet using a crane or forklift. When all the modules have been lifted off the pallet, unbolt the base support from the wooden pallet.

Place the base support in position and drill the anchors bolt holes down into the floor then remove the base plate and increase the size of the bolt holes in the floor to suit the size of the anchor bolts. Bolt down the base plate on a level floor and check with a spirit level. On an uneven or sloping floor, it may be necessary to use shims. Bolt down the base support and check the level again in both directions. Using the wiring diagram supplied, identify the bottom module and lift with diagonal hooked straps/slings. Lift the module with the crane or forklift and gently lower into place on top of the bolted down base plate. Locate the three pins at the back of the module and push back into place. Then bolt loosely from the front to the base plate using the 3xM10 bolts supplied. Repeat the lifting procedure with the next module and lower in place on top of the bottom module. Engaging the three location pins push back into place then bolt the second module to the module below using the 3xM10 bolts provided. Repeat this procedure until all the modules are in place. Ensure that the module stack is plumb and level as the modules are being assembled. Then torque the bolts to 100ft/lbs (11.4Nm) when the modules are fully assembled and aligned. Then, using the wiring diagram, fit the bus bars between the cells and the top terminal plates. When connected, check the battery voltage to ensure that the cells are connected in the correct polarity. Then torque all the terminal bolts to 11ft-lbs (11.4Nm). Fit the cell numbers starting at the positive post with №1. Check the cell voltages and record with the cell ID. Fit the clear insulating cell covers. The clear terminal plate covers must be filled when the terminal cables are being connected.

If the battery system consists of multiple stacks, the stacks are positioned 12mm apart next to

each other side-by-side. The base plates are bolted together between mounted stacks. The uppermost modules of the adjacent stacks must be bolted back and front together using the tie plates provided. The tie plates with captive nuts are designed to fit in the module channels and be bolted through the module mounting channel holes. The tie plate must be placed in the channel before the adjacent modules are fitted, then slid into the adjacent module and bolted.

5.3.4 Vertical Module Installation

When modules are installed in the vertical position, the modules are bolted to the base plate through the bottom/back channel of the module. Attach the hooks in the slings to the channels. Repeat this procedure with the remaining modules. The modules must be bolted together with 3xM10 bolts/module. When assembling modules end-to-end, bolt the modules together using the tie plates supplied. It is always highly recommended to attach the battery system to the floor using suitable floor anchors.

NOTE! Modules installed in a vertical position do not meet seismic zone 4 qualifications.

WARNING! Do not turn batteries upside down or tilt to the front more than 30° as this will 'wet' the vent with electrolyte which will be vented when the cell is charged.

5.4 Electrical Connections

Proper battery electrical connections are very important for the best battery performance and utility. Improper battery connections can cause a loss of standby time or even a battery fire. Follow the electrical connection instructions carefully and review section 2.4 thoroughly before working on the battery. Make sure all terminals and interconnects are cleaned and are covered with No-Oxide grease provided.

CAUTION! Remove all jewellery before installing the connections on the batteries. Ensure that all tools are insulated with vinyl electrical tape to prevent shorting. Do not reach or lean across batteries. Remember, hazardous voltages may be present. Be aware of what you are touching at all times. Do not hurry, take your time.

5.4.1 Cabling Recommendations

Battery ratings are specified at the terminals of the battery. The cabling used to connect the battery terminals to the load has a voltage drop (when the battery is discharging) that is depen-



dent on cable length and conductor size. The longer the cable run, the greater the voltage drops. The smaller the cable wire diameter, the greater the voltage drop.

Therefore, to get the best performance from the battery short, heavy cables are recommended. Do not size the cables based on current carrying capacity only. A general rule of thumb is to allow no more than a 20-30mV of voltage drop/metre of cable run. As an example, if it is 10m from the battery to the load, the cable should be sized to allow no more than $2 \times 10 \times 0.030 = 0.3V$ drop. In order to help select cable sizes for load connections, the following table should be consulted:

Area Size	mm ²	Max. Amps 30mV drop/m
8 AWG	8.4	15
6	13.3	23
4	21.2	37
2	33.6	59
1	42.4	74
0	53.5	93
00	67.4	117
000	85.0	148
0000	107.2	187
250MCM	126.7	221
350 MCM	177.4	309
400 MCM	202.4	353
500 MCM	253.4	442

Use 1.74A/mm² for other cable sizes.

5.4.2 Terminal Preparation

Gently clean the contact surface of the terminals with a brass bristle brush or a Scotch Brite pad. Immediately after this cleaning, apply a thin layer of No-Ox-Id 'A' or NCP-2 antioxidant grease to the contact areas. A petroleum jelly such as 'Vaseline' may also be used.

5.4.3 Connector Installation

The VALEN 2V ENDUROGEL Batteries are supplied with intercell busbars or cables sized for the specified discharge time. The busbars are plated with a tin-lead alloy and should require little or no cleaning prior to installation. If the tin-plated busbars need to be cleaned, carefully use a Scotch Brite pad or a soft brass bristle brush to clean to

brighten metal. Take care to ensure the plating is not removed. Lightly grease the contact surfaces of the busbars before installation. Following the supplied wiring diagram, install the intermodule/ interstack connections carefully using the supplied M8 and M10 bolts and washers supplied and tighten the hardware finger tight.

CAUTION! Use extreme care not to short the battery connections. VALEN 2V ENDUROGEL Batteries are capable of very high short circuit currents containing a very high energy level. Before the final tightening of the intercell connections, visually check that the connections are properly made and in the correct sequence. See section 5.5.4 for the correct procedure for checking string voltage. When proper connection has been verified, torque all intercell connections to 100 in-lbs (11.4Nm) including the factory-made connections. Install the terminal plates by attaching the plastic strip to the front of the top module channel using the supplied hardware. Attach the terminal plates to the cell terminals and to the plastic support. Torque hardware to 100 in-lbs (11.4Nm).

When installing the battery load cabling, attach the load cabling to the wall or the cable tray so that the weight of the cable is not on the battery terminal plate. Is using a stiff cable, pre-bend the cable so no 'spring' force is placed on the terminal plate. Failure to support the cable weight could result in premature failure and loss of battery integrity. Fit the terminal plate insulating cover over the cable before bolting to the terminal plate.

5.5.4 Voltage Checks

Visually check that all connections are properly made (positive to negative) and are tight. Measure string voltage, check that this is about 2.14 x no. of cells.

CAUTION! High voltage may be present. The total string voltage should be approx. 2.13 to 2.15V multiplied by the no. of cells in the string (for 24 cell batteries 51.12 to 51.6V). If the measured string voltage is not close to the calculated value, recheck the battery connections to ensure proper polarity sequence and measure the individual cell voltages. Calculate the average cell voltage and use this value to recalculate the string voltage. If the recalculated and measured string voltages do not match reasonably well, contact VALEN for further instructions.

5.4.5 Battery to Charger Connection

Ensure that the charger is disconnected from the power line. If a battery disconnect is installed, open it.

NOTE! The positive terminal of the battery bank should be connected to the positive terminal of the charger and the negative terminal of the battery bank should be connected to the negative terminal of the charger.

5.4.6 Paralleling of Batteries

When greater capacity is desired than available from a single cell or string, paralleling of batteries becomes necessary. Batteries must be properly paralleled in order to get the best system performance and longest battery life. The battery strings must be treated as equally as possible. This means equal length cabling to a common collection point for the load cables, uniform temperature between the strings and equal strings of batteries. Do not parallel flooded batteries with valve-regulated batteries if the charge voltages differ between the batteries.

Ask VALEN for advice on paralleling flooded and VRLA batteries. To check the proper paralleling of the strings, connect the strings in the final form and place a load on the battery. Measure the load cable voltage drops. The voltage drops should match within 10%.

SECTION 6 OPERATION

6.1 Initial Charge

The initial charge on the battery is essentially an equalisation charge of the battery. Always perform this charge on the battery when it is first installed. Failure to do so could result in uneven float voltages and low initial capacity.

The equalisation or initial charge voltage in this case, for the VALEN 2V ENDUROGEL Battery is 2.35VPC at 20°C to 25°C. Calculate the initial charge voltage for your installation, based on the no. of cells in the string. Turn on the charger and raise the charger output voltage (using the equalisation control) to the calculated value (for 24 cell batteries this is 56.4V). Leave the string charging at this level for 12 hours to a max. of 24 hours (check after 3 hours that the string voltage has not changed). At the end of this time, reduce the charger output voltage to the float voltage (2.25VPC at 20°C to 25°C). See section

6.2 just prior to reducing the string voltage to the float voltage, measure and record the individual cell voltages and cell ID's. If the charger output voltage cannot be raised to the calculated initial charge voltage or the load cannot tolerate a charge voltage this high, raise the charger output voltage to the max. permissible level. Measure the charger output voltage and calculate the voltage per cell. Use the following as a guideline:

Max. Voltage Obtained (25°C)	Charge Time (hrs) min./max.
2.32-2.33VPC	36/48
2.29-2.31VPC	48/60

At voltages below 2.29VPC, adequate equalisation will not be obtained. Contact VALEN for additional details on procedures to equalise a battery under these conditions. If the ambient temperature is not in the range of 20°C to 25°C, the initial charge voltage will have to be temperature compensated. TC = Temperature Compensation is the process whereby the charge voltage is changed as the function of the battery temperature. The temperature correction factor (TCF) for VALEN 2V ENDUROGEL Batteries is -0.003V/°C from a 20°C baseline temperature. This means that as the battery temperature rises (falls) above (beneath) 20°C, the charge voltage must be reduced (raised) the TCF amount for every degree of change. The formula to calculate the temperature corrected voltage is:

$$TCV = CV(20^\circ C) - [T - 20^\circ C] \times (-0.003VPC)$$

As an example, if the initial charge was going to be performed at 28°C the temperature corrected charge voltage would be:

$$TCV = 2.35 - (28 - 20) \times (-0.003VPC) = 2.31VPC$$

6.2 Float Voltage

The float voltage is sometimes known as the continuous charge voltage. It is very important that it be calculated and set properly for max. battery life and performance. The purpose of the float voltage is to provide enough float voltage and current to the battery to compensate for self-discharge and maintain the battery in a fully charged condition of readiness.

FAILURE to properly follow float voltage recommendations can result in loss of warranty and premature battery failure.



6.2.1 Float Voltage Requirements

The allowable float voltage range for VALEN 2V ENDUROGEL Batteries is 2.27-2.23VPC at 20°C to 25°C. The recommended float voltage setting is 2.23-2.25VPC at 25°C or 2.25-2.27VPC at 20°C. The average recommended setting being 2.25VPC.

6.2.2 Float Temperature Compensation

The float voltage temperature compensation factor is -0.003V/Cell/°C from a 20°C-25°C baseline (the same as the equalisation TCF). For temperatures around 25°C, use the table:

Temperature (°C)	Float Charge VPC
-5	2.350
0	2.330
5	2.310
10	2.290
15	2.270
20	2.250
25	2.250
30	2.230
35	2.210

For temperatures outside of this range, see section 6.1 for the equation used for calculating the temperature corrected float voltage.

6.3 Maximum Charge Current

The max. charge current is limited to prevent the possibility of charging the batteries at a higher rate than they can efficiently accept. Greater than recommended max. charge currents can result in excessive battery heating and gassing and a shortened battery life. The max. normal charge current is the C5 rate in Amps. If a very rapid recharge is desired, please contact VALEN for more instructions.

6.4 Recharge

Recharge batteries immediately or as soon as possible after a discharge. Do not wait more than 24 hours to initiate the recharge after the batteries have been discharged. Failure to follow this recommendation could result in a permanent loss of capacity due to plate sulphation. The approx. recharge time can be calculated as follows:

Ah Discharged	x F = no. of hrs charge
Avail. Charge Current	

Where F = 3 if the batteries are charged at the float voltage and F = 2 if an equalisation voltage is needed.

6.5 Equalisation Charge

The equalisation charge voltage of the VALEN 2V ENDUROGEL Battery is 2.35VPC at 20°C-25°C. While equalisation is not required by the VALEN 2V ENDUROGEL Battery under normal operating conditions, it is possible to operate the battery in such a way that equalisation would be needed.

These conditions would include:

- Temperature variation in the string greater than 3°C
- Low float voltage
- Low operational temperature without temperature compensation
- Frequent deep discharges
- Rapid recharge required
- Long delay in recharging the battery after a discharge
- Unevenly paralleled string balance

Equalisation should be performed on an 'as needed' basis. The standard equalisation would be 12-24 hours max. at a constant voltage of 2.35VPC at 20°C-25°C. For equalisation at voltages and temperatures other than the above, see section 6.1 for methods to compensate.

SECTION 7 STORAGE

When installed VALEN 2V ENDUROGEL Batteries will not be used (floated) for a period of time, the following procedure should be followed:

1. Equalise charge the battery (refer to section 6.5).
2. Disconnect the battery from all loads. Do not allow any loads, no matter how small, to remain connected.
3. Equalise charge the battery every 6 months when the storage temperature is 20°C-25°C or less. For every 8°C rise in storage temperature, reduce the equalisation interval by half.
4. Perform an equalisation charge on the battery prior to returning to service.

During the storage time, particularly if it is extended, it is recommended to continue to monitor and record battery voltage levels. Measure

and record the battery open circuit voltage and cell ID's just before equalisation and then record the on-charge voltage and current just prior to completing the charge. Refer to section 4 for more information.

SECTION 8 MAINTENANCE & RECORDS

Maintenance and record keeping is critical to battery life and warranty continuance. Proper maintenance will ensure that the batteries are being correctly used and will be available when needed. Proper record keeping will ensure that, if there is a problem with a battery, the customer can demonstrate the batteries were correctly used and so maintain the warranty.

8.1 General Maintenance

General maintenance of the battery means keeping the battery and surrounding area clean and dry. Since VALEN 2V ENDUROGEL Batteries are of low maintenance design, there is no addition of water or specific gravity checks needed for the life of the battery. The only required maintenance action is an annual retorque of the battery connections to 100 in-lbs (11.4Nm). Review section 2.4 on electrical shock before performing this action.

CAUTION! Always use insulated tools.

Do not use any solvents or strong cleaners on or around the batteries. A dry brush may be used to remove any dust accumulations. If required, a solution of 1kg of baking soda in 4L of water may be used as a multipurpose cleaner if more stubborn stains or dirt accumulations are present.

8.2 General Records

8.2.1 Installation Records

When the battery is received, record such things as:

- Date of receipt
- Condition of the modules
- Open circuit voltages (if measured)
- Date of installation
- Original PO number
- Installer(s)
- Equalisation time and voltage
- Any unusual storage conditions

8.2.2 Maintenance Records

At least twice per year, record the following:

- Cell float voltage
- String voltage
- Float current

- Ambient temperature
- Battery temperature
- Battery conditions

Any unusual charges or discharges – 6 months
Keep the above records in a safe place for review by maintenance personnel. Remember, these records are mandatory for any warranty claim on the battery.

SECTION 9- BATTERY REPORT



VALEN 2V ENDUROGEL BATTERY REPORT

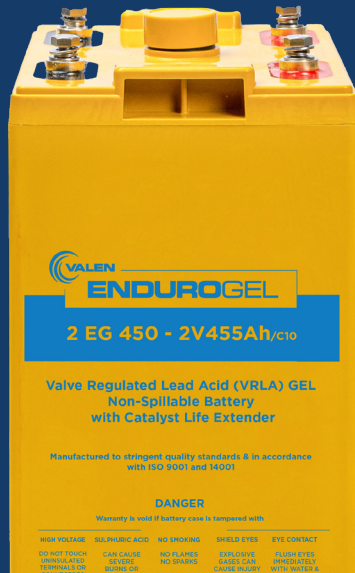
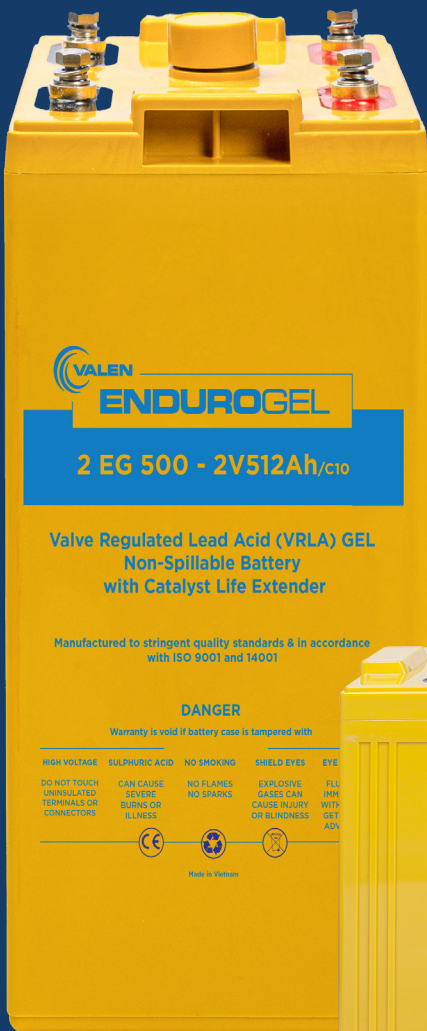
Installed By:		Representative	
Operating Company		Date:	Time:
Battery Information			
Type of Battery:		№ of Cells/String:	String Float Voltage:
Installation Date:		№ of Strings/Battery:	
Battery Charge Current:		Battery Code:	Float Current:
Charging Equipment:		Ambient Temp.:	Bloc Temp.:
Battery Charger Information			
Make:		Type:	Current Rating:
Model:		Year of Mfg.	Charging Voltage

INDIVIDUAL CELL READINGS

Cell №	Cell ID	Float Volts	Cell №	Cell ID	Float Volts	Cell №	Cell ID	Float Volts	Cell №	Cell ID	Float Volts	Cell №	Cell ID	Float Volts
1			26			51			76			101		
2			27			52			77			102		
3			28			53			78			103		
4			29			54			79			104		
5			30			55			80			105		
6			31			56			81			106		
7			32			57			82			107		
8			33			58			83			108		
9			34			59			84			109		
10			35			60			85			110		
11			36			61			86			111		
12			37			62			87			112		
13			38			63			88			113		
14			39			64			89			114		
15			40			65			90			115		
16			41			66			91			116		
17			42			67			92			117		
18			43			68			93			118		
19			44			69			94			119		
20			45			70			95			120		
21			46			71			96			121		
22			47			72			97			122		
23			48			73			98			123		
24			49			74			99			124		
25			50			75			100			125		

Remarks and Recommendations:

Signed:



Powering Potential

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