EXIDE INDUSTRIAL

POWERSAFE NXT

Deep discharge
Fast recharge

Longer hours | Faster recovery | 3 year warranty

Technical note on Exide Powersafe NXT Range of VRLA Batteries

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Vision

Simultaneous to providing credible value addition to customers, employees and shareholders; being recognized by society as a responsible corporate citizen. In addition achieving operational excellence along with caring for environmental protection.

Introduction

Powersafe is a Valve Regulated Lead Acid (VRLA) battery. While this type of battery requires no topping up and is hence very convenient, all VRLA batteries are limited by their inability to cycle as well as conventional flooded batteries. The Absorbent Glass Mat (AGM) technology employed in modern VRLA batteries also has concerns of how to 'manage' the water-loss to the minimum, which leads to several constraints in terms of setting recharge voltages.

The net result has been a rather 'slow charging' of VRLAs which makes them unsuitable for conditions where recharge times are short. In such situations, VRLA batteries suffer shorter life span and sometimes even premature failures.

Exide Industries, in close collaboration with technology partner, The Shin Kobe Electric Machinery Company of Japan, have been working for the past 15 years to make the AGM technology better suited for India where long and frequent power outages are common.

'**Powersafe-NXT**' range is an outcome of this intensive collaboration, particularly over the last five years or so, in which the last two years have been spent on field validation of the performance claims. **It is truly a next generation VRLA battery, adapted for tough Indian operating conditions**.

Technical Background

Poor recharge due to limitation of voltage and time leads to 'passivation' at Grid-Active material interface, a prime cause for reducing battery life. This passivation may be delayed or overcome by:

■ Improvements to grid alloy ■ Improvements to paste characteristics ■ Improvements to plate curing process ■ Use of special additives in positive active material ■ Use of special additives in electrolyte

While the first three points had been addressed by Exide earlier, the focus of past few years has been on the issues of additives in the paste and the electrolyte. **Now these limitations too have been successfully addressed and, since January 2010, Exide has introduced the new technology across the range of the 'Powersafe' products**. This is expected to significantly help in the charge acceptance of the products, even under adverse settings, thereby providing a solution to difficult field conditions.

'***Exide Powersafe NXT***' is therefore a revolutionary VRLA product with unmatched characteristics in terms of:

Enhanced deep cycling capability : *twice that of concentional AGM*

Suited for fast recharge : *5 hours after a 70% D.O.D.*
(without any adverse effect on the life of the product.)

Exide Powersafe NXT
The next generation AGM product range!

SCIENTIFIC TEST RESULTS

Some of the outstanding features of the new Exide Powersafe and Powersafe-NXT product performance features are given in the following monograph.

IMPROVED DEEP CYCLIC CAPABILITY OF POWERSAFE VRLA

TYPE OF BATTERY : 12V - 100AH Exide "**Powersafe**" BATTERY (WITH PASTE ADDITIVES)

TEST SEQUENCE : DISCHARGE : 50A TO 10.50V

CHARGE : 14.1V/25A

DISCHARGE/CHARGE CYCLE : 24 HOURS

Objective: To assess improvement of deep cyclic capability of the new version of Exide 'Powersafe' battery with special additives in the positive paste vis-á-vis the standard version.

Experiment: Two samples of the test batteries were picked up at random and subjected to the charge-discharge parameters as described above. The patterns of available back-up from the samples were studied vis-á-vis the previously tested data available for standard Exide products.

Results: The back-up profiles of improved version battery (Figure-1) showed significant improvement vis-á-vis the earlier version. While expectedly there was a slow decline with increasing number of cycles, the rate of drop was far lower as compared to the earlier benchmark. Although this test is yet to be concluded, it is evident that it will outlast the earlier version in terms of number of cycles till the available back-up drops to below 50% of the original value. A projection of the existing slope indicates that the total number of cycles available should be somewhere around 250.

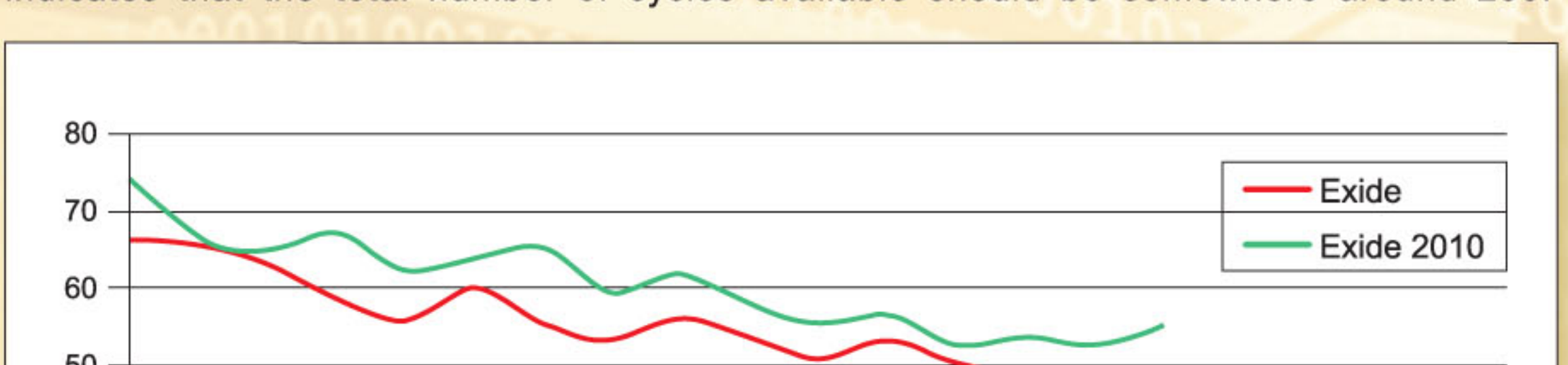


Figure 1

Inference: The new version of Exide Powersafe product significantly improves upon its deep cyclic capability and on a bench test equals or improves upon the international competition in this class of products.

DEEP CYCLIC CAPABILITY OF 'NXT' RANGE OF VRLA BATTERIES

TYPE OF BATTERY : 12V - 65AH Exide "**Powersafe NXT**" BATTERY

TEST SEQUENCE : DISCHARGE: 200W AC LOAD TO 10.50V
CHARGE: THROUGH STANDARD UPS
DISCHARGE/CHARGE CYCLE : 24 HOURS

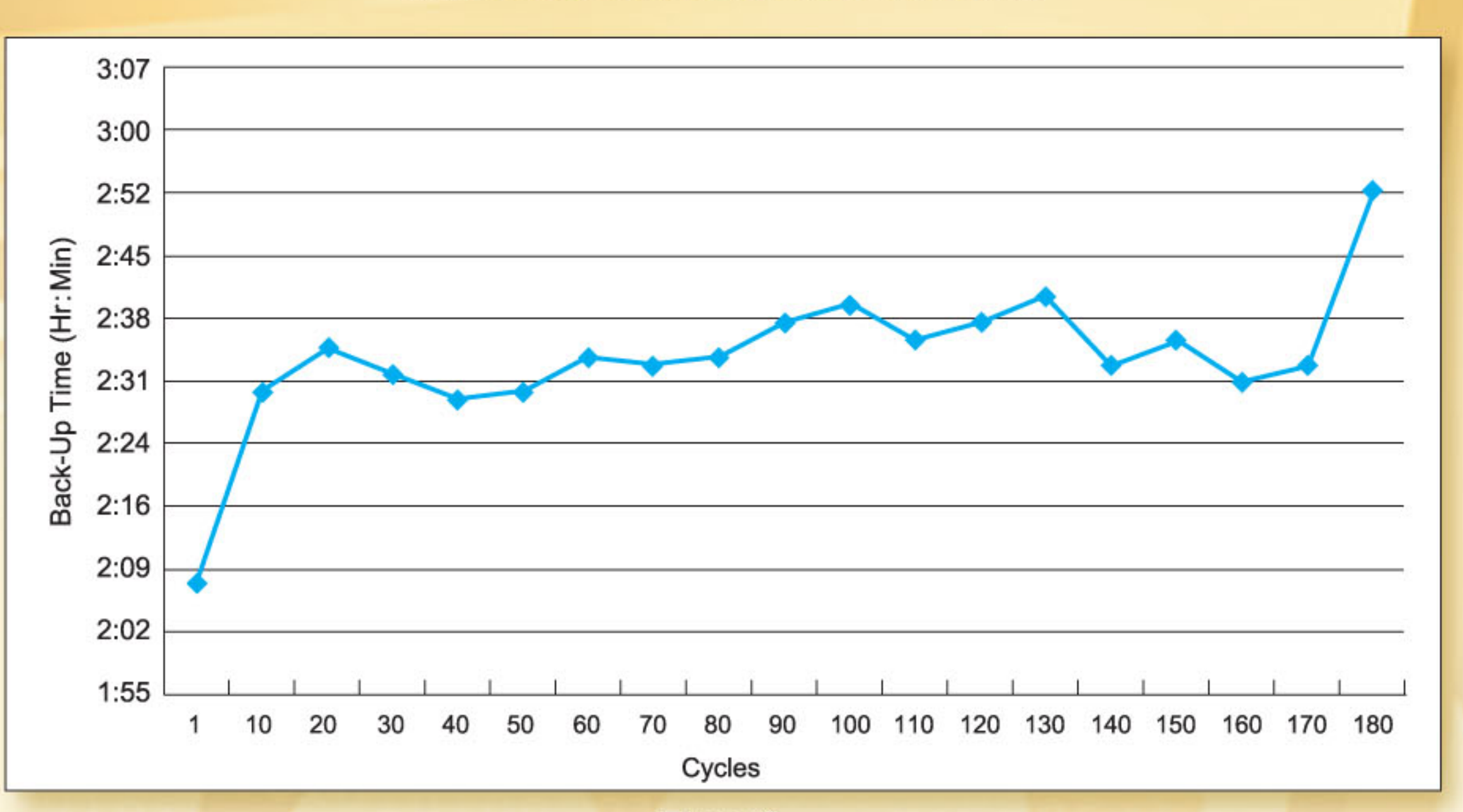


Figure 2

Objective: To ascertain the pattern of back up time by subjecting the batteries to deep discharges (at least 70% DOD) followed by recharging through any of the commercial UPS available in Industry, on a daily basis over a period of 6 months.

Experiment: A bank of 65Ah VRLA batteries was daily subjected to 70% depth of discharge (at C20 rate) and recharged through a standard UPS popularly used in the Indian market. The available back-up to reach 10.5V, per 12V monobloc, over consecutive cycles was taken as a measure of the capability of the battery design to sustain deep cyclic application requirements.

Results: Over a span of 180 consecutive cycles (equivalent of six months of field operation) there was no decline in the available back-up. The battery bank could provide this back up without the administration of any intermediate-boost/equalization charge (Figure-2). The data also reveals that 'NXT' batteries, at the beginning of their service life, take a few cycles of deep discharges, say 8 – 10, to achieve full capacity.

The sharp rise in back-up time available in the 180th discharge was however purely because of administration of a boost/equalization charge, at that point of time.

Inference: 'Powersafe NXT' design has significantly enhanced deep cycliing capability. Typically the 'NXT' range is projected to have at least 500 – 600 cycles at 70 – 80% D.O.D. and certainly more than 1200 cycles at 50% D.O.D. This is approximately twice the capability of currently available standard UPS range of VRLA products.

"FAST RECHARGE" CAPABILITY OF 'NXT' RANGE OF VRLA BATTERIES

TYPE OF BATTERY: 12V - 26Ah Exide "**Powersafe-NXT**" BATTERY

TEST SEQUENCE:

Discharge : 5.6amps for 03hrs (70%DOD @ C10)

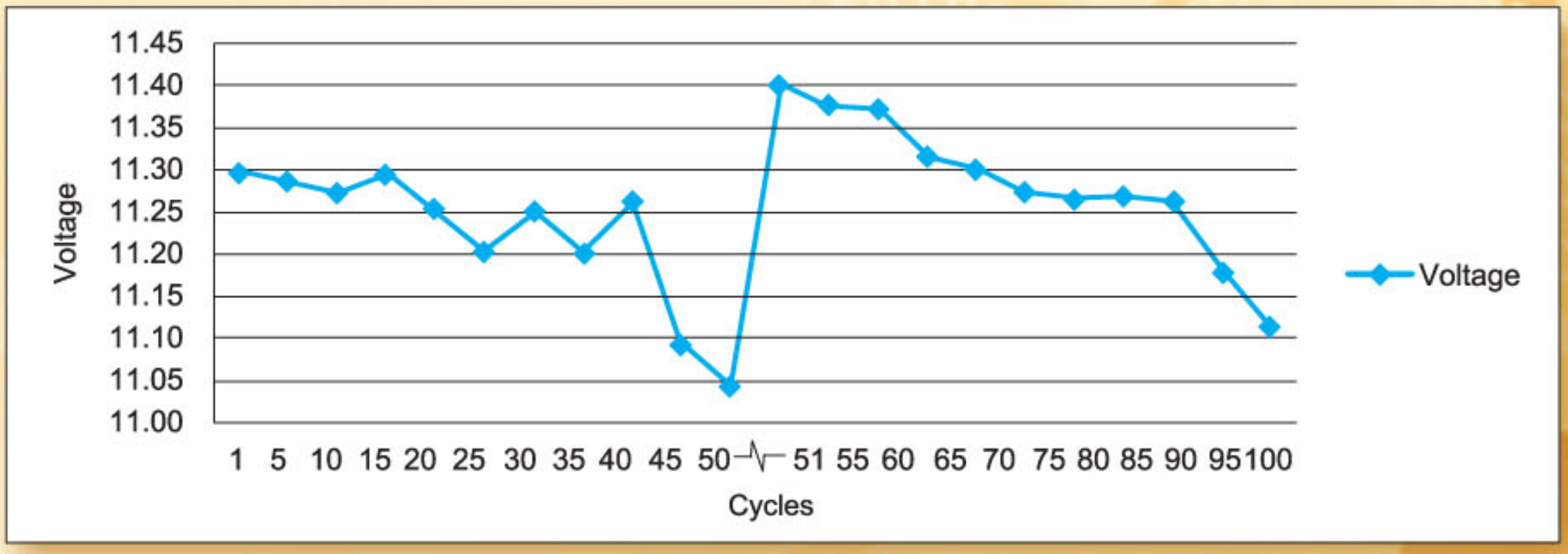
Charge1 : 7.2amps /14.5V

Charge2 : 2.4amps/14.5V

Charge3 : 1.2amps /14.5V

Charge 4 : 0.5amps/14.5V

CUMULATIVE CHARGE DURATION COMPRISING OF 4 STEPS: 5 HOURS



Objective: To ascertain the pattern of available back up by subjecting a 'NXT' range battery to deep discharge followed by 'first' 5 hour recharge schedule over a number of cycles for a period of one month.

Experiment: A bank of 26Ah 'NXT' range was subjected to a calculated deep discharge of approximately 70% depth and recharged through a laboratory charger programmed to generate the recharge profile, as given above, on a continuous basis. The average discharge end voltage on the basis of a 12V bloc was taken as the indicator of the recharge acceptance of the product.

An equalization charge was administered when the average end voltage declined by more than 0.2V per 12V monobloc with respect to the initial cycle values. The equalization charge comprised 12-14 hours of uninterrupted charging at the specified recharge voltage level only. After each equalization charge, water loss was measured.

Results: With just 5 hours of recharge after a 70% depth of discharge, the battery bank continued to cycle well within the acceptable range for 40 to 50 cycles. After each equalization charge, the battery bank recovered fully to get back to the performance of the initial cycles. Water losses were measured and observed to be less than 0.3% of total electrolyte in each equalization cycle of operation (typically 40 – 50 discharges).

Inference: Powersafe-NXT products can be fast recharged without any adverse affect on its deliverable service life. A periodic equalization, at the rate of once every 40 to 50 deep discharges, will be enough to retain its full performance during its entire service life.

Hosur Plant for VRLA Batteries

Plate Manufacturing

Battery Assembly Line

Finish Product

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INDUSTRIAL

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