

*Results and Method of the **EXIDE** test.*

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Battery Equaliser Report

1) Introduction

- 1 1 Battery Equaliser is an additive which makes claims to improving battery performance especially life expectancy.
- 1 2 The additive claims to “equalize the voltages in each of the battery cells” and reduce water loss.
- 1 3 Battery Equaliser claims that the product is currently being used by truck haulage companies to improve performance of batteries which are near the end of life.
- 1 4 After discussions with Battery Equaliser we decided to carry out a series of investigation to test their claims. We were supplied with a quantity of the Battery Equaliser for tests.

2) Investigations

- 2 1 We have carried out several tests on battery type 085 using standard (without equaliser) and test (equaliser) samples for investigation. The batteries with equaliser were “doped” with 15ml of equaliser per cell.
- 2 2 The investigation carried out were –
 - 1) Shelf life
 - 2) Initial performance
 - 3) J240 life test (40 deg C and 75 deg C)
 - 4) Ford Cycle Life Test
 - 5) Charging characteristics
 - 6) Deep discharge test

3) Results

3 1 Shelf Life

- 3 1 1 Two standard batteries and two test batteries were left for 90 days at ambient temperature. The results indicated no difference in shelf life.

| | |
|-----------|---------------------|
| Standard: | 2.23mV loss per day |
| Test : | 2.46mV loss per day |

3 2 Initial Performance

3 2 1 Three standard and three test batteries were tested to reserve capacity, twenty hour and SAE high rate discharge performance. The mean of the values were –

| Item | Standard S D | Test S D |
|---------------------|---------------|---------------|
| Reserve Capacity | 73 0 (2 3) | 72 3 (2 4) |
| Twenty hour (Ah) | 44 0 (1 10) | 43 5 (1 05) |
| SAE 360A – 18 deg C | | |
| Volts 10 sec | 8 10 (0 09) | 8 08 (0 06) |
| 30 sec | 7 70 (0 11) | 7 67 (0 09) |
| Secs to GV | 63 8 (5 9) | 62 5 (6 1) |

The results indicate no difference in initial performance.

3 3 J240 Cycle Life

3 3 1 J240 Cycle Life 40 deg C

One of both standard and test were tested to the J240 cycle life test at 40 deg C.

| Item | Standard | Test |
|----------------------|--------------|--------------|
| Initial Voltage | 8 75V | 9 03V |
| Number of units | 7 | 9 |
| Water loss @ 7 units | 759g | 430g |
| Unit 5 input | 98 amps/mins | 91 amps/mins |
| Current at 10 mins | 2 7 A | 1 9 A |

Although the test sample performed better then the standard, the initial test voltage of the standard was lower and the difference in “units completed” was probably due to batteries rather than the equaliser.

An interesting difference was the charge input difference current reading which indicated for the same charge potential of 14.8 volts a lower current.

3.3.2 J240 Cycle Life (75 deg C)

One of both standard and test were checked to the J240 cycle life test at 75 deg C.

| Item | Standard | Test |
|--------------------|---------------|---------------|
| Initial Voltage | 9.26V | 9.19V |
| Number of units | 4 | 4 |
| Water loss 4 units | 870g | 720g |
| Unit 5 input | 153 amps/mins | 122 amps/mins |
| Current at 10 mins | 9.7 A | 4.7 A |

We see no difference in units completed but again the charge input and current on the test sample is significantly lower than standard which reduces overcharge and water loss.

3.4 Ford Cycle Life Test

Two standard and two test batteries were subject to the Ford Cycle Life Test at 40 deg C.

| Item | Standard | Test |
|---------------------|-----------|-----------|
| Unit 6 unit 1 ratio | 68% | 90% |
| Current @ unit 4 | 0.80 amps | 0.55 amps |
| Unit 9 unit 1 ratio | 41% | 77% |

These results are very interesting in that the test samples at unit 6 still have 90% of the duration to 7.2 V as at unit 1. (Requirement is 75%)

In fact even unit 9 we still meet Ford requirements. However, the standard the standard product fails at unit 6.

Again the current input at unit 4 which must exceed 0.3 amps is much lower with the test than with the standard.

3.5 Charge Characteristics

From the initial performance samples we checked the charging characteristics of the batteries from computer files.

| Item | Standard | Test |
|------------------------------------|-----------|-----------|
| 15.8 volts recharge T.O.C. Amps | 0.32 Amps | .067 Amps |
| 3 Amp constant | 16.93 V | 16.36 V |

Here we can see that during re-charge acceptance of the test samples is twice that of the standards at top of charge (at 15.8 volts).

The mixing charge of 3 amps constant current supports this as the potential to supply is much higher with the standards.

3 6 Deep Discharge test

This test regime was as follows on 2 batteries of each group.

- (i) Initial 20 hour
- (ii) Discharge at 20 hour rate 10.5V
- (iii) Re-charge for 1 hour at 14.4 V
- (iv) Repeat 20 hour cycle

The test was completed after 50 cycles.

| Item | Standard | | | Test | |
|-----------------|----------|-------|-------|-------|-------|
| | 1 | 2 | Mean | 1 | 2 |
| Initial 20 hour | 38.37 | 36.16 | 37.3 | 39.59 | 35.54 |
| Final 20 hour | 12.42 | 12.31 | 12.37 | 13.01 | 13.14 |
| % of initial | 32.4 | 34.0 | 33.2 | 32.86 | 36.56 |
| Final R. C mins | 46 | 45 | 45.5 | 51 | 48 |

The batteries from both groups were torn down and the plates visually inspected. Both showed brittle bowed positives and mushy negatives.

4. Discussions

Both shelf life and initial electrical performance do not appear to be affected by “Equaliser”.

With the shallow cycle J240 life tests there is not a significant difference in performance in terms of units completed. However the “charge current” in the equaliser batteries is lower and this results in lower water loss figures.

With the deeper Ford cycles life test there is a distinct improvement with the equaliser again the over charge is reduced.

The charging characteristics indicate that at the higher potentials the level of overcharge is reduced with equaliser.

The “Deep discharge test” did not show any significant difference in performance of the two groups.

5. Summary

Equaliser appears to reduce overcharge current and subsequent water loss on the test we have conducted.

The results of Ford cycle life tests are quite significant, however, there was no indication in any of the other tests carried out that supported the improvement found with the Ford test.

