
C&D TECHNOLOGIES
Power Solutions

m·s· endur II

The True Long-Life Product™

The msEndur II has the long life and low float current characteristics of a flooded battery yet in a high density low maintenance VRLA design.

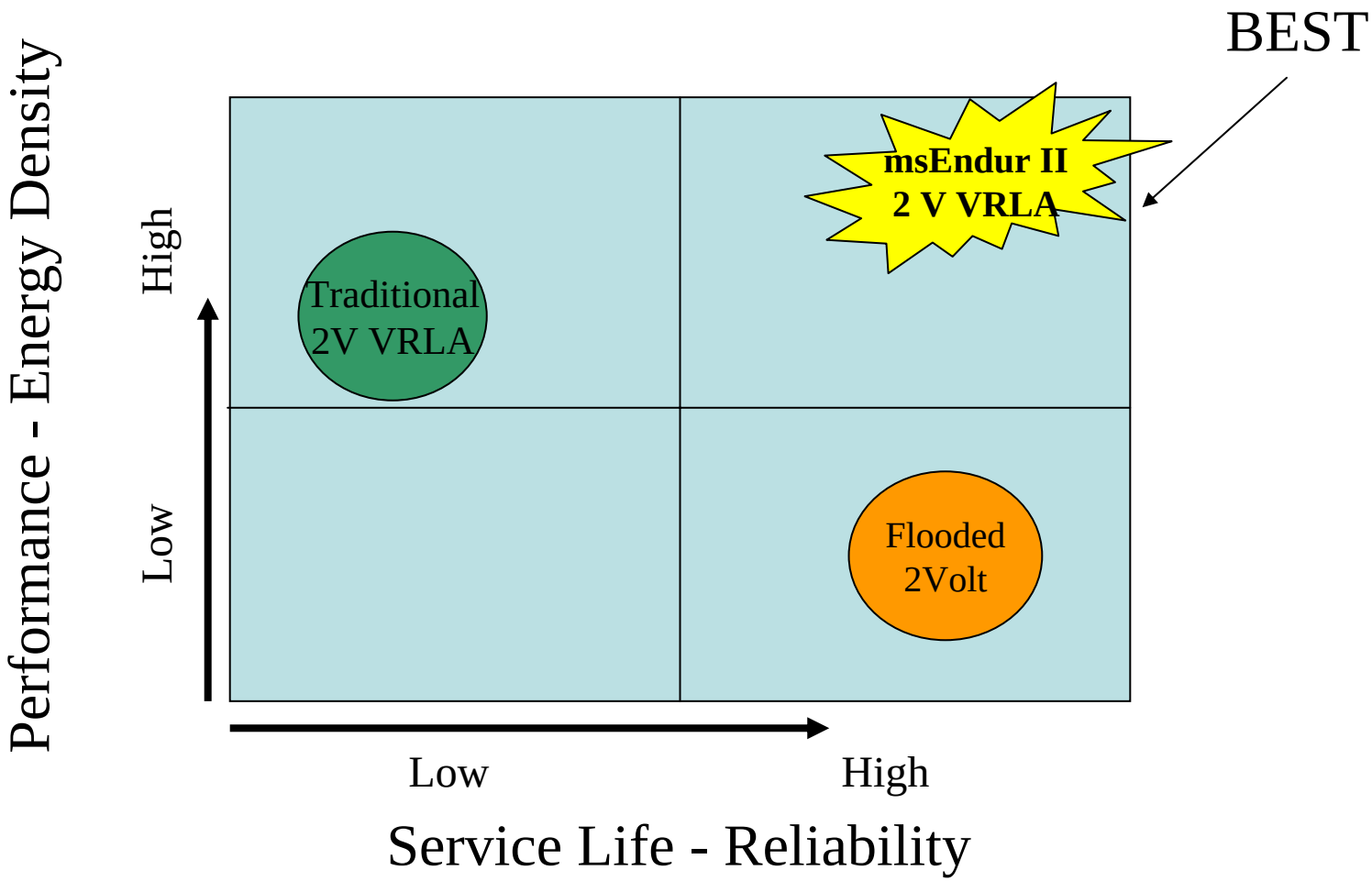
msEndur II Presentation Outline

- Brief history of Lead Acid Battery Solutions
- Low Float Current High Energy Density Advantage
- Vented Flooded Cell Chemistry
- VRLA Cell Recombination Reaction
- Traditional 2 volt VRLA Flawed Design
- msEndur II Balanced Design - Low Float Current
- msEndur II Customer Advantages

History of Lead Acid Solutions

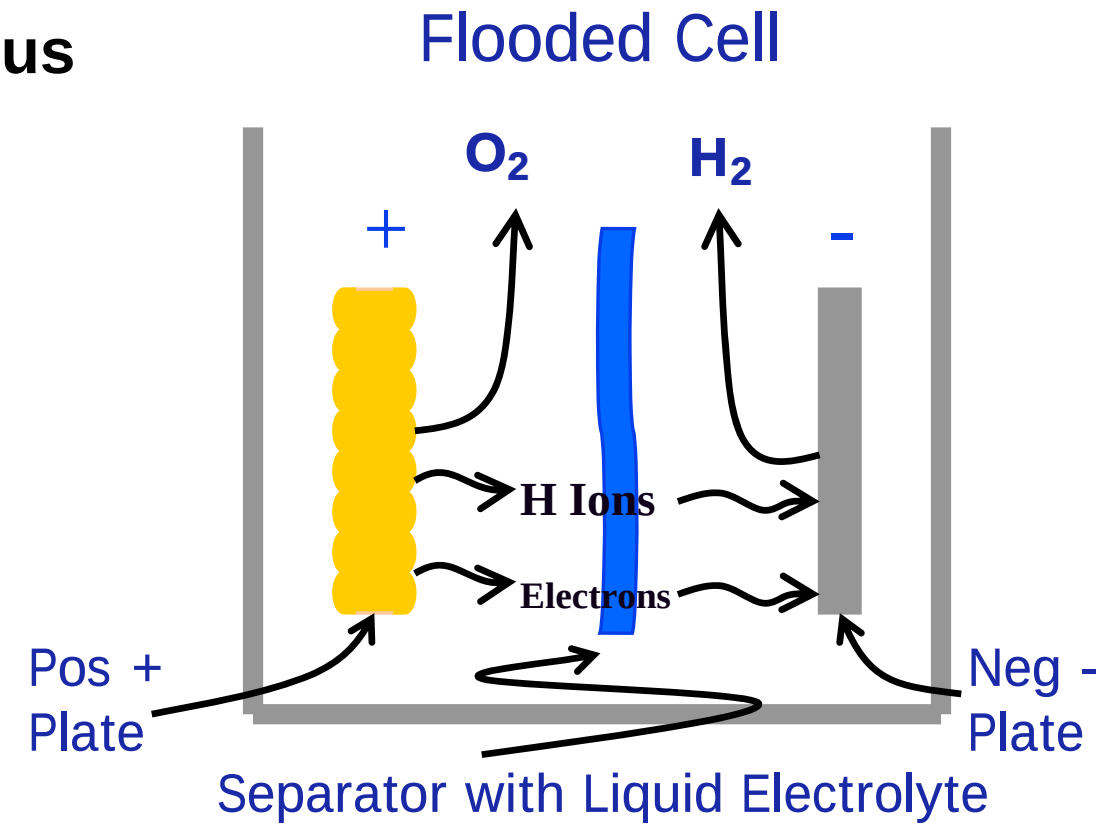
- **Flooded cell legacy**
  - **Prismatic & Round Cell**
  - **20 Year Service Life**
- **Initial Valve Regulated Lead Acid Designs**
  - **Cylindrical packs**
  - **Flat Plate Technology**
  - **Monoblock 10 Year Design Life**
- **Traditional 2 Volt VRLA flat plate**
  - **Presented as 20 Year Life Product**
  - **Achieve Short 5 – 10 Year Service Life**
- **UNTIL NOW….Introducing the NEW msEndur II**
  - ***The True Long-Life Battery*™ achieving 20 year Field Service Life!**

Battery Performance & Reliability



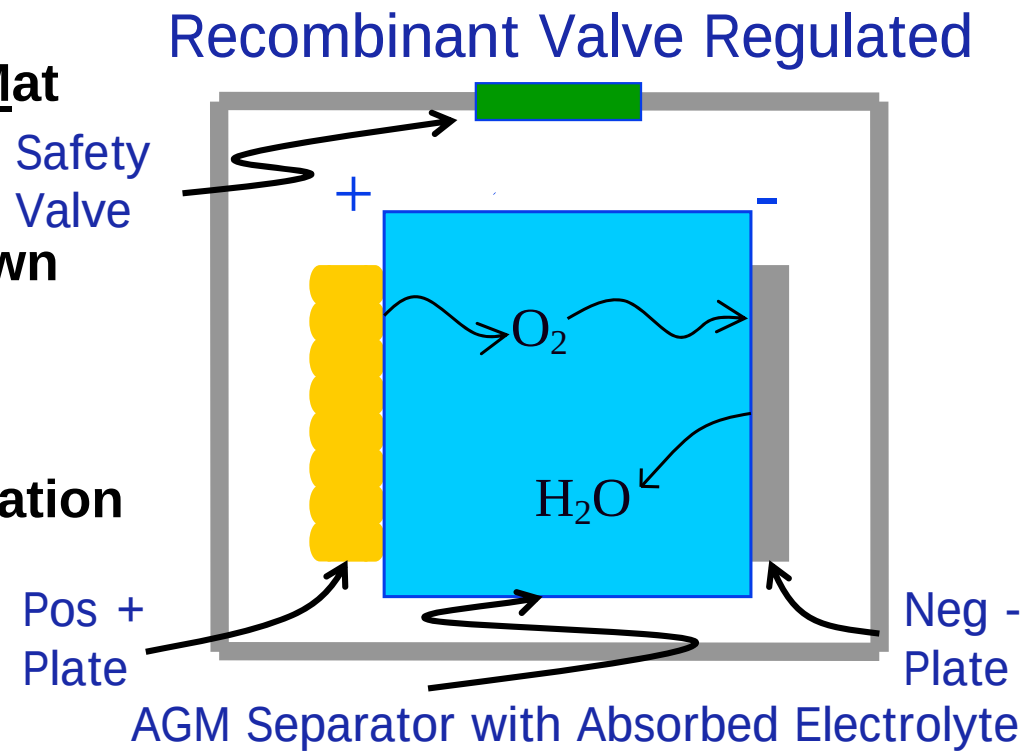
Vented Flooded Cell Float Reactions

- **Vent with flame arrestor**
- **Separator – Micro Porous**
  - **Isolate plates**
- **Positive Plate**
  - **Oxygen Gas**
  - **Hydrogen Ions**
  - **Electrons**
- **Negative Plate**
  - **H Ion + Electrons**
- **Electrolyte**
  - **Water Breakdown**
    - **Oxygen Gas**
    - **Hydrogen Gas**
  - **Water addition required**



VRLA Cell Recombination Reaction

- **Valve**
  - **Positive Cell Pressure**
- **Separator – Absorbent Glass Mat**
  - **Isolate plates / Acid reservoir**
  - **Porous with gas channels**
- **Positive Plate – water breakdown**
  - **Oxygen Gas**
  - **Hydrogen Ions**
  - **Electrons**
- **Negative Plate – Gas recombination**
  - **H Ion + Electrons**
- **Electrolyte**
  - **Water replenished**
- **Traditional issue**
  - **Negative plate discharge**
  - **High Float Current**



Traditional 2V VRLA - Flawed Design

- **Float Current is the amount of DC amperes required to maintain the battery at the fixed float voltage ensuring a full state of charge.**
- **Oxygen freely travels through separator**
- **Excess Oxygen reacts at the negative plate**
- **Reaction pushes negative toward discharge state**
- **Shifts excess potential to positive plate**
- **Increase voltage adds to positive grid deterioration**
- **Increases float current required to keep full charge**
- **Increases gassing and heat generation**
- **Leads to dry out and susceptibility to thermal runaway**

Key to designing a VRLA to last

- **Reduce the required amount of float current**
- **Design the VRLA cell to operate as if it was a flooded cell**
  - **Control positive & negative plate polarization (Control the recombination process)**
    - **Balanced pos & neg active materials process/design**
    - **Electrolyte design and control**
    - **Control oxygen transfer through separator**
    - **Engineered separator & plate porosity control**

Benefits of Low Float Current

- **Improved life characteristics by reducing the current required during float service**
- **<u>Slows grid corrosion & grid growth</u>**
  - **Eliminates negative plate discharge/sulfation**
  - **Reduces the rate of positive grid corrosion**
  - **Reduces the rate of cell dry out**
  - **Ensures consistent cell compression during service life.**
  - **Diminishes chances for thermal runaway**

msEndur II Low Float Current = Long Life

- **The msEndur II has drastically lower float current versus other 2 Volt VRLA batteries**
- **Low float current reduces grid corrosion and extends the service life of the battery**
- **The lower float current is a result of a proprietary plate process and cell design obtained without a Catalyst !**
- **No other battery has this low of a stable float current**
- **THIS IS A KEY FEATURE OF THE msEndur II**
- **It is easily measurable !**

Evolution of msEndur II

msEndur

- Modular racks
- High energy density
- 20 year service life
- SR-4228 Tested Verified Life
- AGM plate wrap
- Large terminal

MSE

- Proven Low float current design
- Durable FR V-0 Polypropylene container / cover
- High reliability seals
- Air Channel Jar construction
- Lean production processes

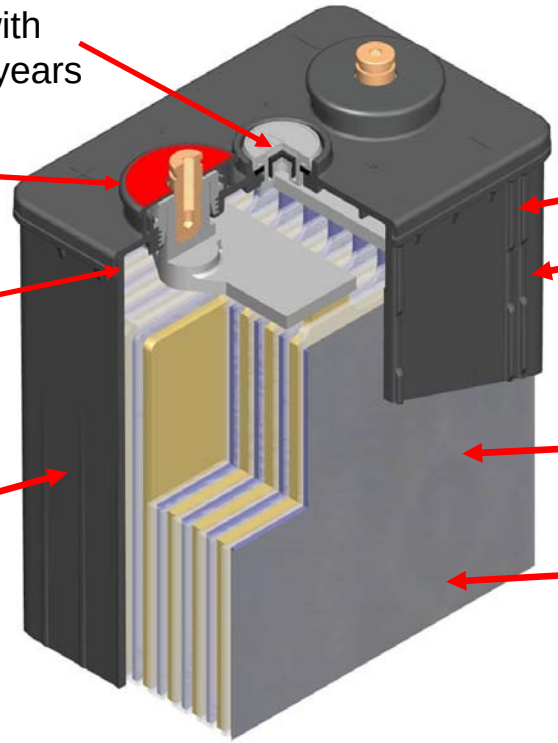
msEndur II Product Features

Pressure Release Vent UL tested with proven service in the field for over 15 years

Color coded terminal polarity

Thermal bonded case to cover seal

Flame Retardant Polypropylene container & cover - UL VO – 28 LOI



Interlocking Rib

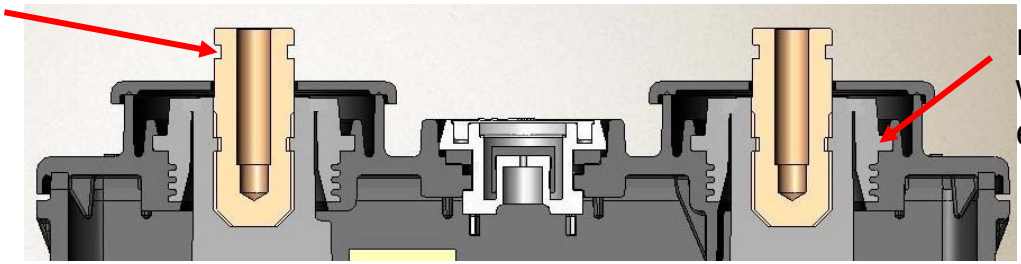
Molded in Heat Dissipation Channel

MSE / msEndur Active Material

Low Float Current Design

SR-4228 Tested

Outward protruding tin plated copper terminal with ohmic ring[tm]



Molded in Tin-lead bushing with multiple seal rings to ensure a leak free seal.

msEndur II Customer Advantages

- Improved Service Life / Reliability - 20 Years
  - Low Float Current = Long Service Life
- Optimized Performance / High Energy Density
  - Lower cost Battery Room - less floor space
  - Additional room for Revenue Generating Equipment
- Improved Ease of Maintenance
  - Installation & unique Ohmic Ring™
- Reduced Energy Consumption
  - Lower cost of operation
- All Equal Lower Total Cost of Ownership

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