

TECHNICAL DATASHEET

SLI, Engine Starting Expanders PENOX PE110 & PE110HCA*

Main Battery Applications:

Engine starting for Automotive, Lawn and Garden Equipment, Recreational and Marine Vehicles.

Description:

PENOX Expander mixes are homogenous powder mixes of high purity raw materials which are added to the negative paste mix by the battery producer to improve the performance of the negative active material.

The selection of each single component of a PENOX Expander mix is intended to improve the lifetime performance of batteries. In addition to our standard grades we are able to produce tailor-made compositions upon customer's request.

PENOX Expander Mixes:

PE110 & PE110HCA*: recommended addition rate 1% of the lead oxide weight.

**HCA: (designed for improved) High Charge Acceptance*

Physical/Chemical Data:

Appearance: homogenous dry grey/black powder.

Loss On Ignition (LOI)	Typical Values
PE110	42-48 %
PE110HCA	35-41 %

Impurities, ICP	
Iron	< 50 ppm
Manganese	< 20 ppm
Copper	< 50 ppm
Nickel	< 5 ppm

All tests are carried out using DIN ISO methods.

Packaging:

In paper bags, weight upon request depending on the negative paste mix recipe.

This document provides general technical information. PENOX provides more accurate data with the individual certificates of analysis upon delivery.

PE110

PE110
HCA*

Customer
Recipe

Battery
Additives

TECHNICAL DATASHEET

Advanced Battery Expanders PENOX PE210

Main Battery Applications:

EFB, AGM and GEL batteries for automotive use (Stop-Start, Micro Hybrids).

Description:

PENOX Expander mixes are homogenous powder mixes of high purity raw materials which are added to the negative paste mix by the battery producer to improve the performance of the negative active material.

The selection of each single component of a PENOX Expander mix is intended to improve the lifetime performance of batteries. In addition to our standard grades we are able to produce tailor-made compositions upon customer's request.

PENOX Expander Mixes:

PE210: recommended addition rate 1% of the lead oxide weight.

Physical/Chemical Data:

Appearance: homogenous dry grey/black powder.

Loss On Ignition (LOI)	Typical Values
PE210	27-33 %

Impurities, ICP	
Iron	< 50 ppm
Manganese	< 20 ppm
Copper	< 50 ppm
Nickel	< 5 ppm

All tests are carried out using DIN ISO methods.

Packaging:

In paper bags, weight upon request depending on the negative paste mix recipe.

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PE210

Customer
Recipe

Battery
Additives

TECHNICAL DATASHEET

Advanced Battery Expanders PENOX PE220 series

PE220

Main Battery Applications:

EFB batteries for automotive use (Stop-Start, Micro Hybrids), with advanced carbon.

Description:

PENOX Expander mixes are homogenous powder mixes of high purity raw materials which are added to the negative paste mix by the battery producer to improve the performance of the negative active material.

The selection of each single component of a PENOX Expander mix is intended to improve the lifetime performance of batteries. In addition to our standard grades, we are able to produce tailor-made compositions upon customer's request.

PENOX Expander Mixes:

PE220xxx: recommended addition rate calculated on the lead oxide weight and depending on the battery performance.

Physical/Chemical Data:

Appearance: homogenous dry grey/black powder.

Customer
Recipe

Loss On Ignition (LOI)	Typical Values
PE220	44-68 %*

Impurities, ICP	
Iron	< 50 ppm
Manganese	< 20 ppm
Copper	< 50 ppm
Nickel	< 5 ppm

All tests are carried out using DIN ISO methods. *Depending on the carbon content

Packaging:

In paper bags, weight upon request depending on the negative paste mix recipe.

Battery
Additives

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TECHNICAL DATASHEET

Standby Power Expanders PENOX PE300 & PE310

Main Battery Applications:

Telecom, Energy storage, Uninterruptible Power Supply (UPS), Submarines.

Description:

PENOX Expander mixes are homogenous powder mixes of high purity raw materials which are added to the negative paste mix by the battery producer to improve the performance of the negative active material.

The selection of each single component of a PENOX Expander mix is intended to improve the lifetime performance of batteries. In addition to our standard grades we are able to produce tailor-made compositions upon customer's request.

PENOX Expander Mixes:

PE300 & PE310: recommended addition rate 1% of the lead oxide weight.

Physical/Chemical Data:

Appearance: homogenous dry grey/black powder.

Loss On Ignition (LOI)	Typical Values
PE300	15-21 %
PE310	18-24 %

Impurities, ICP	
Iron	< 50 ppm
Manganese	< 20 ppm
Copper	< 50 ppm
Nickel	< 5 ppm

All tests are carried out using DIN ISO methods.

Packaging:

In paper bags, weight upon request depending on the negative paste mix recipe.

This document provides general technical information. PENOX provides more accurate data with the individual certificates of analysis upon delivery.

PE300

PE310

Customer
Recipe

Battery
Additives

TECHNICAL DATASHEET

Motive Power Expanders PENOX PE410

Main Battery Applications:

Traction, Forklift, Golf cart, Mining vehicles.

Description:

PENOX Expander mixes are homogenous powder mixes of high purity raw materials which are added to the negative paste mix by the battery producer to improve the performance of the negative active material.

The selection of each single component of a PENOX Expander mix is intended to improve the lifetime performance of batteries. In addition to our standard grades we are able to produce tailor-made compositions upon customer's request.

PENOX Expander Mixes:

PE410: recommended addition rate 1% of the lead oxide weight.

Physical/Chemical Data:

Appearance: homogenous dry grey/black powder.

Loss On Ignition (LOI)	Typical Values
PE410	23-29 %

Impurities, ICP	
Iron	< 50 ppm
Manganese	< 20 ppm
Copper	< 50 ppm
Nickel	< 5 ppm

All tests are carried out using DIN ISO methods.

Packaging:

In paper bags, weight upon request depending on the negative paste mix recipe.

This document provides general technical information. PENOX provides more accurate data with the individual certificates of analysis upon delivery.

PE410

Customer
Recipe

Battery
Additives