

A Reliable Solution for Halogen-Free Cable Applications

Innovation in Environmentally Friendly Flame Retardants

Magnesium hydroxide (MDH) is a high purity, mineral-based flame retardant designed for halogen-free cable compounds. Its exceptional purity ensures consistent performance, low residue, and compatibility with demanding polymer systems, offering a safe and effective alternative to halogenated solutions. Its endothermic decomposition and water release at elevated temperatures help suppress fire propagation while minimizing smoke and toxic gas emissions. **Hidromag MDH** is suitable polyolefin-based formulations and other polymers, making it ideal for jacketing and insulation layers in halogen free flame retardant (HFFR) cable applications.

In addition to its flame retardant properties, Hidromag MDH contributes to thermal stability, electrical insulation, and mechanical integrity. Its mineral nature also supports low toxicity, environmental safety, and compliance with international fire safety standards.

Given the wide variety of formulations used in the halogen-free cable industry, we offer Hidromag MDH grades with different particle sizes and surface treatments tailored to each application. Our technical team works closely with customers to identify the most suitable grade and develop customized solutions that meet specific performance and processing requirements.

Product Grade	Mean Particle Size D50 (µm)	Surface Area (m ² /g)
Ly0	0.6 - 0.9	11
Ly1	1.3 - 1.7	10
Ly2	2.0 - 2.4	9

Product Line	Description	Compatibility Examples
Hidromag Ly	Standard MDH Grade	General Purpose Thermoplastics
Hidromag Ly SV	Silane Coated MDH Grade	PE, EVA, XLPE, etc.
Hidromag Lq	New Generation MDH	PE, EVA, EPDM, XLPE, etc.

Hidromag Ly

Reliable Performance in High-Loading Formulations

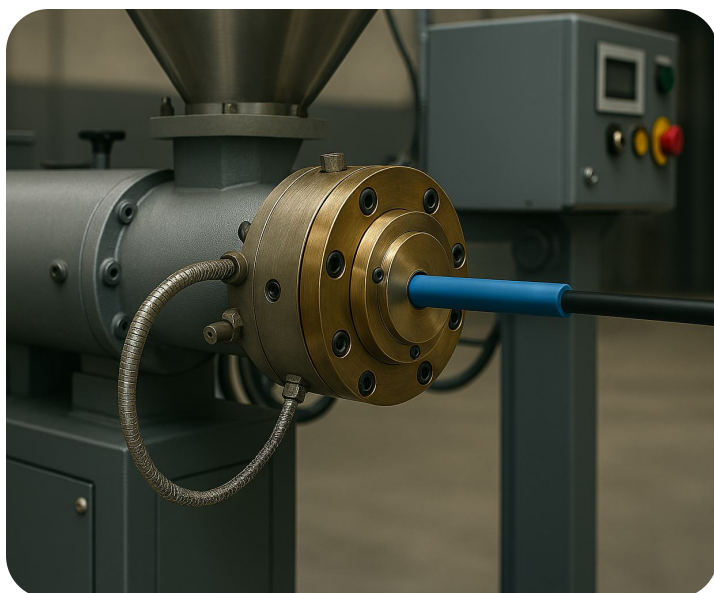
Halogen-free cable compounds typically require high filler loadings to achieve the desired flame retardancy. This can negatively impact rheological behavior, mechanical properties, and process stability. The **Hidromag Ly** product line has been engineered to address these challenges.

A representative formulation using EVA and LLDPE, commonly employed in cable insulation and jacketing, was developed and processed in a co-rotating twin-screw extruder to simulate industrial compounding conditions. The performance of **Hidromag Ly0**, **Ly1**, and **Ly2** was evaluated under these conditions.



Hidromag Ly grades demonstrate:

- ✓ Good flowability and ease of processing, with Ly0 showing the most favorable melt flow behavior.
- ✓ Solid mechanical performance, where smaller particle sizes contribute to better reinforcement within the polymer matrix.
- ✓ Consistent flame retardant behavior and reliable electrical insulation, making all grades suitable for a wide range of halogen-free cable applications.



Component	Quantity (phr)
EVA	70
LLDPE	20
LLDPEgMAh	10
Additives	2
Hidromag Ly / Ly SV	149

Hidromag Ly Series Performance

Property	Standard	Units	Hidromag Ly0	Hidromag Ly1	Hidromag Ly2
Melt Flow Index 190°C/21.6Kg	ISO-133	g/10 min	10.3	9.7	9.2
Tensile Strength	IEC 60811	MPa	12.0	11.6	10.6
Elongation at Break	IEC 60811	%	248.0	225.0	187.0
Oxygen Index	ASTM D2863	%	32.0	32.0	32.5
Volume Resistivity	ASTM D257	ohms-cm	6.2×10^{14}	4.8×10^{14}	4.9×10^{14}

The Hidromag Ly line offers a range of options to balance mechanical, flame retardant, and electrical properties:

This versatility allows compounders to select the most appropriate grade based on the specific requirements of their cable formulation.

In addition to their performance in the compound, **Hidromag Ly** grades exhibit improved powder flowability, which facilitates handling during transport and feeding. Enhanced flow index and reduced particle friction contribute to operational continuity in compounding lines, minimizing feed interruptions and improving the consistency of the final product.

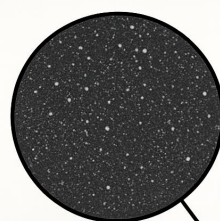
The high degree of compound homogeneity achieved with **Hidromag Ly** also results in improved surface appearance, mechanical consistency, and electrical performance in the finished cable.

- ✓ **Hidromag Ly0** is ideal for applications requiring high mechanical strength and electrical insulation.
- ✓ **Hidromag Ly1** provides a middle ground with good overall performance in electrical insulation applications.
- ✓ **Hidromag Ly2** is best suited for applications prioritizing flame retardancy in jacket compounds.

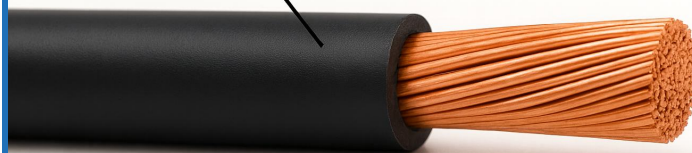
Hidromag Ly SV

Enhanced Compatibility for Demanding Applications

For more demanding halogen-free cable formulations, **Hidromag Ly SV** offers an advanced solution. These grades are surface treated with silane, which improves compatibility with polymer matrices and delivers multiple performance advantages.



Compatibility between magnesium hydroxide and the polymer matrix



Advantages

- ✓ Improved melt flow index, enabling easier extrusion and higher throughput.
- ✓ Higher volume resistivity, enhancing electrical insulation performance.
- ✓ Better mechanical flexibility, even with larger particle sizes.
- ✓ Superior flame retardancy, suitable for applications with strict fire safety requirements.

Hidromag Ly SV

To demonstrate these benefits, **Hidromag Ly SV** grades were evaluated using the same EVA/LLDPE formulation and compounding conditions as the Ly grades. **Hidromag Ly SV** consistently shows better processability, with smoother extrusion behavior and more stable flow characteristics.

In terms of mechanical performance, **Hidromag Ly SV** maintains high elongation values, indicating that the silane treatment helps preserve flexibility across different particle sizes. Flame retardant behavior is also strong across all grades.

Hidromag Ly Series Performance

Property	Standard	Units	Hidromag Ly0 SV	Hidromag Ly1 SV	Hidromag Ly2 SV
Melt Flow Index 190°C/21.6Kg	ISO-133	g/10 min	11.7	10.3	12.1
Tensile Strength	IEC 60811	MPa	12.0	11.0	11.0
Elongation at Break	IEC 60811	%	242.0	210.0	234.0
Oxygen Index	ASTM D2863	%	33.0	32.0	33.0
Volume Resistivity	ASTM D257	ohms-cm	1.1×10^{15}	4.9×10^{14}	1.2×10^{15}



OTHER
MDH



HIDROMAG
LY SV

Enhanced Compatibility for Demanding Applications

Electrical insulation is notably improved in **Hidromag Ly SV** grades, particularly in those with smaller and larger particle sizes, making them especially suitable for insulation layers in cable applications.

The silane treatment enhances dispersion within the polymer matrix, increasing interfacial cohesion and reducing moisture sensitivity. This leads to greater long-term stability, better compound uniformity, and enhanced overall performance in Low Smoke Zero Halogen (LSZH) cable systems.

Comparative Study: Hidromag Ly SV

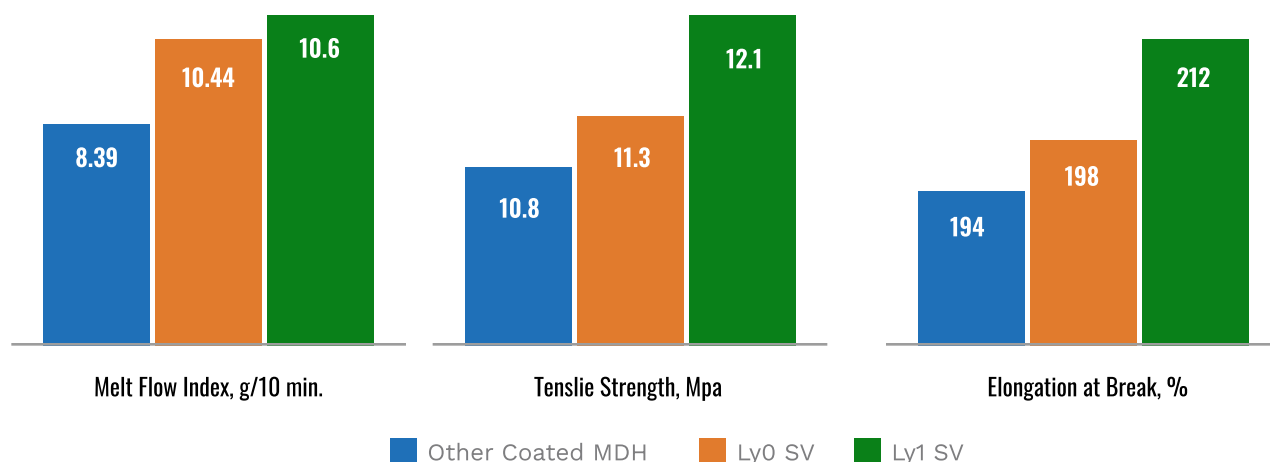
To further validate these benefits, a comparative study was conducted using an EVA/LLDPE formulation processed in an internal mixer. The performance of *Hidromag Ly0 SV* and *Ly1 SV* was evaluated against another commercially available MDH of similar particle size distribution and treated with silane, under identical conditions.



Key Results

- ✓ **Processability:** *Hidromag Ly SV* grades exhibited smoother integration and improved flow behavior during mixing, supporting efficient processing and stable extrusion.
- ✓ **Mechanical Properties:** *Hidromag Ly SV* grades showed enhanced tensile strength and elongation at break, confirming their ability to reinforce the polymer matrix while maintaining flexibility.
- ✓ **Electrical Insulation:** Both grades delivered consistent volume resistivity, supporting their use in insulation layers where dielectric stability is essential.

Comparative Study. Integration at an internal mixer. EVA/LLDPE Formulation.



Hidromag Lq

Next-Generation Magnesium Hydroxide

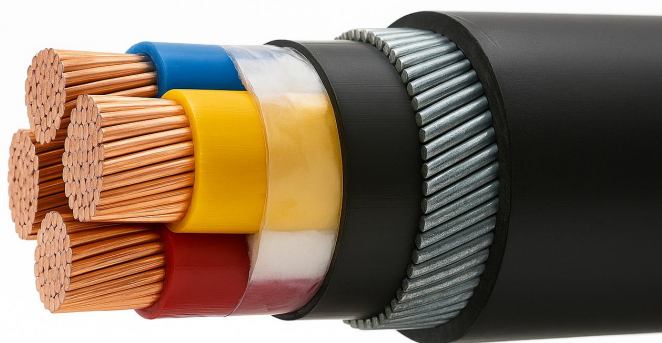
Hidromag Lq represents a new generation of magnesium hydroxide developed by Química del Rey, specifically designed to enhance the processability of halogen-free cable compounds during extrusion. This innovative product line has been tested in T3 and T4 automotive cable formulations, demonstrating excellent feeding stability and extrusion continuity—key factors for achieving high production speeds without interruptions.

Thanks to its optimized morphology and surface characteristics, **Hidromag Lq** integrates efficiently with polymer matrices.



Resulting in:

- ✓ Improved rheological behavior, with significantly higher melt flow index (MFI).
- ✓ Enhanced compound homogeneity, contributing to smoother pellet appearance and visibly whiter color.
- ✓ Stable electrical insulation properties, suitable for demanding cable applications.



Comparative Study: Hidromag Lq

To validate its performance, a comparative study was conducted using a **T3-class** automotive cable formulation. **Hidromag Lq0** and **Lq1** were evaluated against other commercially available MDH grades with similar particle size distribution. All compounds were processed under identical conditions to ensure consistency.

Hidromag Lq0 Performance in T3-Class Formulation

Property	Standard	Units	Reference MDH	Hidromag Lq0
Melt Flow Index 190°C/21.6Kg	ISO-133	g/10 min	6.4	15.8
Tensile Strength	IEC 60811	MPa	14.2	13.4
Elongation at Break	IEC 60811	%	163.0	175.0
Volume Resistivity	ASTM D257	ohms-cm	4.86×10^{15}	2.71×10^{15}

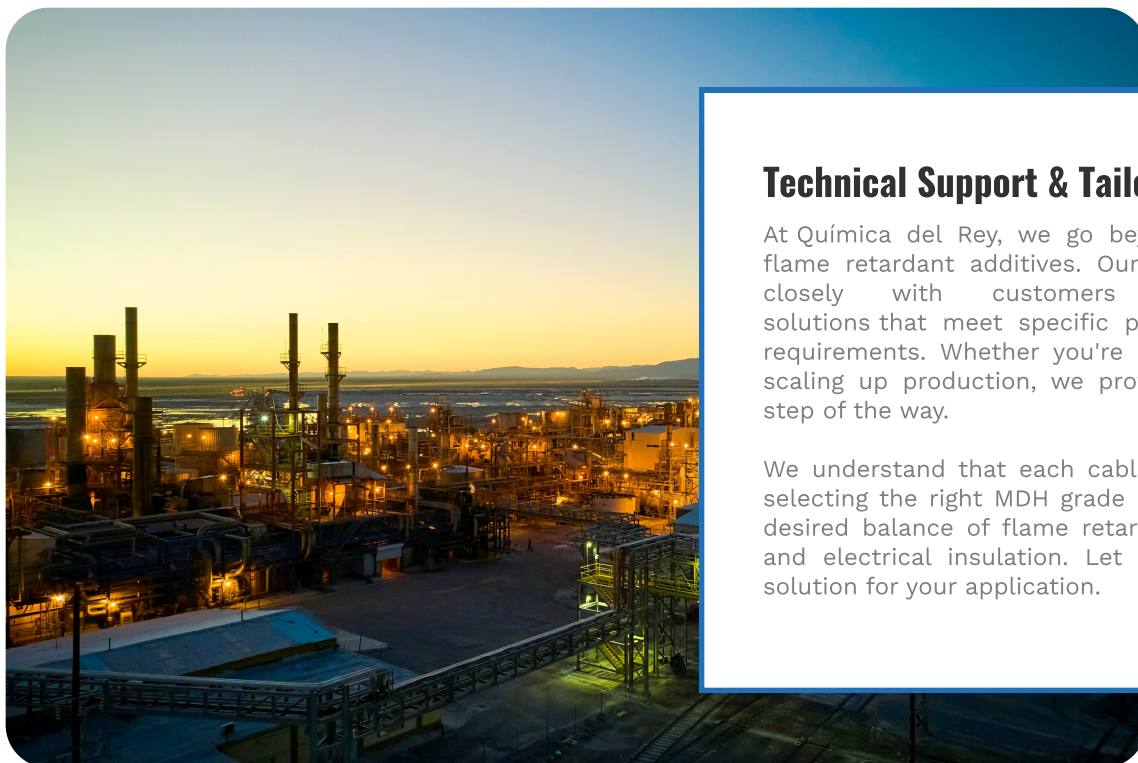
Hidromag Lq1 Performance in T3-Class Formulation

Property	Standard	Units	Reference MDH	Hidromag Lq1
Melt Flow Index 190°C/21.6Kg	ISO-133	g/10 min	6.6	15.5
Tensile Strength	IEC 60811	MPa	16.4	13.3
Elongation at Break	IEC 60811	%	257.0	236.0
Volume Resistivity	ASTM D257	ohms-cm	3.31×10^{15}	2.89×10^{15}

Key Results

- ✓ **Processability:** Both Hidromag Lq0 and Lq1 showed a substantial increase in MFI compared to the reference MDH grades, confirming their superior flow behavior and extrusion efficiency.
- ✓ **Mechanical Properties:** Hidromag Lq grades maintained good elongation at break, supporting flexibility and durability in cable applications.
- ✓ **Electrical Insulation:** Volume resistivity values for Lq0 and Lq1 were consistent and reliable, confirming their suitability for insulation layers in halogen-free cable systems.

These results position **Hidromag Lq** as a high-performance solution for compounders seeking greater extrusion speed, stable processing, and enhanced compound quality in automotive and industrial cable applications.



Technical Support & Tailor-Made Solutions

At Química del Rey, we go beyond supplying high-quality flame retardant additives. Our team of specialists works closely with customers to develop tailor-made solutions that meet specific processing and performance requirements. Whether you're optimizing a formulation or scaling up production, we provide technical support every step of the way.

We understand that each cable compound is unique, and selecting the right MDH grade is essential to achieving the desired balance of flame retardancy, mechanical strength, and electrical insulation. Let us help you find the best solution for your application.

For inquiries, technical support, or to discuss customized solutions, please contact us:



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