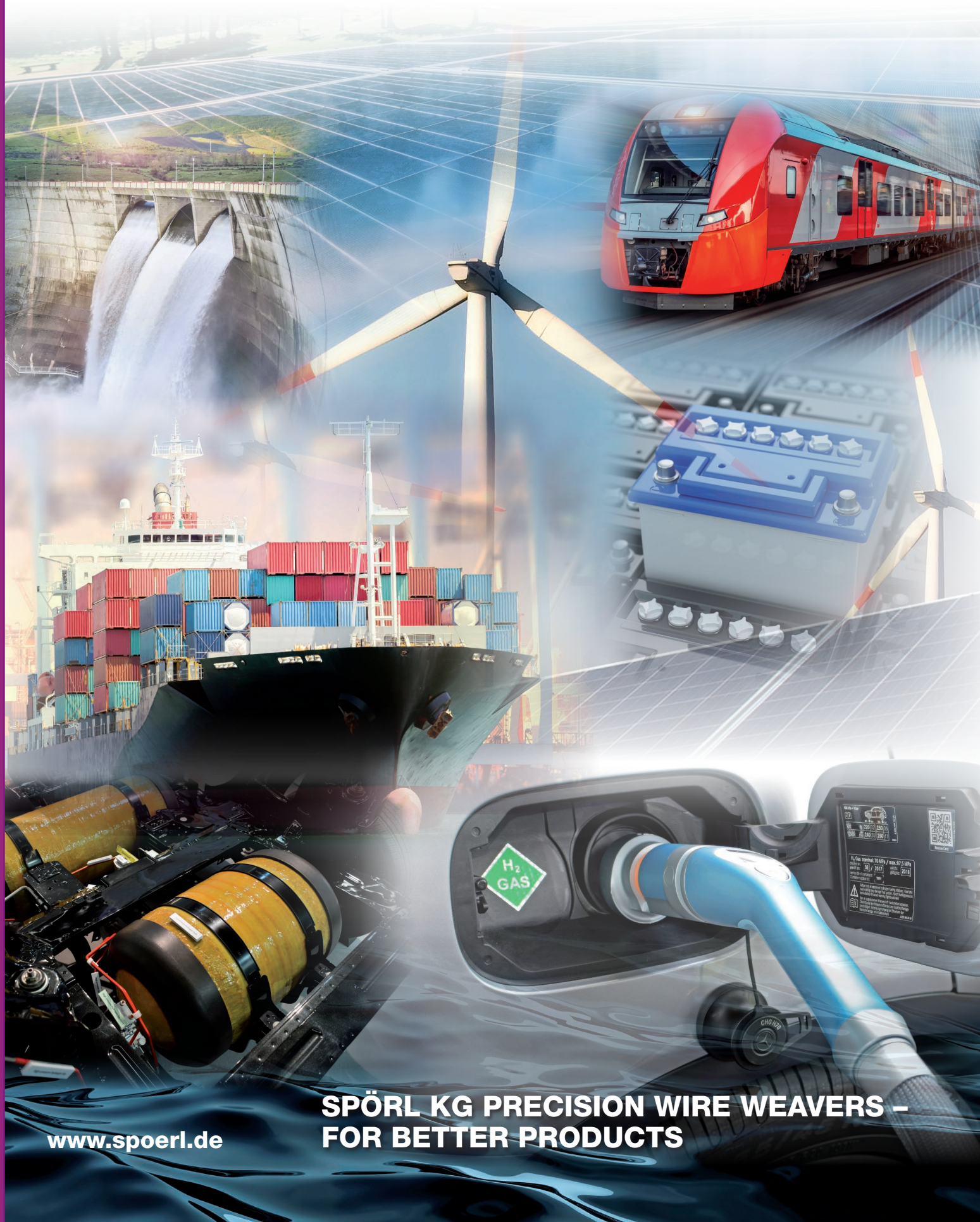
SPÖRL HYDROGEN



SPÖRL KG PRECISION WIRE WEAVERS – FOR BETTER PRODUCTS

www.spoerl.de

SPÖRL – World Leaders in High-Tech Meshes

SPÖRL KG Sigmaringendorf

SPÖRL KG, based in Sigmaringendorf, Germany, is one of the world's leading manufacturers of precision woven wire cloths and filter parts made from them. Founded in 1956, we have transformed ourselves from a pure manufacturer of woven wire cloths to a complete system provider producing costumer-specific assembled filter elements in fully automated production processes.

Close cooperation with countless customers in diverse fields including filtration, sieving, chemical industries and design means that we can offer a valuable and comprehensive range of experience in every sphere. This knowledge and experience, based on practical applications, trials and improvements, has resulted in convincing solutions for many different projects and has had a lasting effect on many processes.

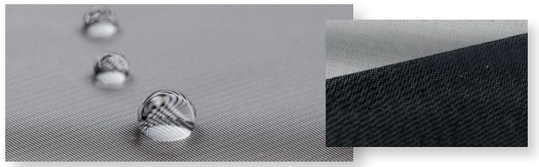
SPÖRL – Additional Services

As well as enjoying an international reputation for the highest quality mesh products, SPÖRL also specialises in further processing its materials. Mesh is fabricated into finished components to individual customer specifications, which can then be integrated directly into your own manufacturing processes.

Coatings

Our coatings are designed to enhance performance whilst protecting against other external influences.

- Hydrophobic and oleophobic with HC8
  - Angle of contact up to 145°
  - Temperature resistance up to 200° C



Thermal Treatments

Using the processes listed below, mechanical material characteristics such as hardness, elasticity and formability can be optimised for further processing.

- Optimised processability
- Variable degrees of hardness and formability
- No loose wires
- Stress relieved annealing

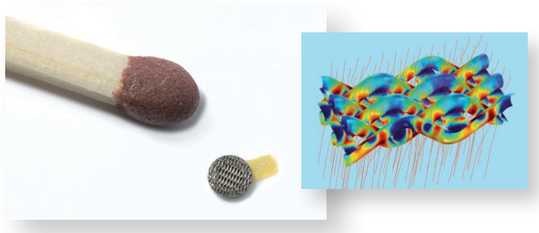
Calendering

- Strips or entire rolls
- Surface structure properties
- Customer-specific realization

Partnerships

We can carry out further processing in partnership with various reputable converters worldwide known for work including:

- Insert molding
- Pressure sensitive adhesive strips
- Component assembly
- ...and many others



As manufacturers of precision woven mesh, SPÖRL offers a comprehensive portfolio of products for businesses operating across the entire hydrogen circuit, covering generation of renewables, electrolysis, transport and storage through to fuel cells.

Today, we offer more than a decade of experience and knowledge in the most diverse sectors around the theme of hydrogen, and are established providers of comprehensive solutions. We now deliver many finished products manufactured to individual customer requirements, integrated directly into the manufacturing process, rather than simple rolls of material.

Our engineering department is always pleased to advise on the right choice of material together with component design, using prototypes to carry out detailed analyses to optimise the end product. Where required, we can also provide you with external expertise and certifications.

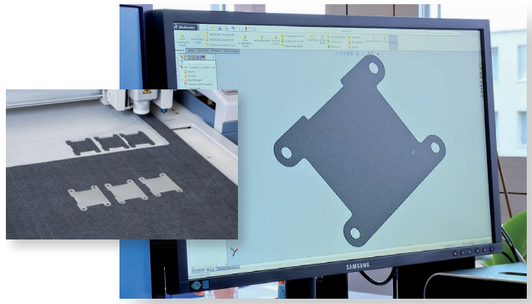
We primarily weave and produce using the following materials. Other options are available on request.

- Stainless steel DIN 1.4301 and 1.4401
- Stainless steel DIN 1.4306 and 1.4404
- Hastelloy
- Nickel
- Aluminium
- Titanium
- Avesta
- Copper
- Bronze

Engineering

We are happy to provide assistance with selecting the right mesh specification in terms of material properties, geometric form and component design using:

- Demand analyses
- Materials recommendations
- Design suggestions
- Technical drawings
- Cost calculations
- Production engineering

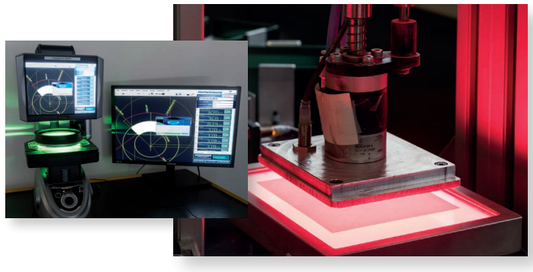


Fabrication

- Precision cutting & die cutting
  - Perfectly cut edges and angles
- Forming, bending, drawing and edge binding
- Welding, soldering, bonding
- Prototypes, one-offs
- Efficient volume production
- Process orientated packaging
- Pleating

Quality Control and Measurement

- Customer-specific quality checks
- Production of measurement protocols
- Certification, records

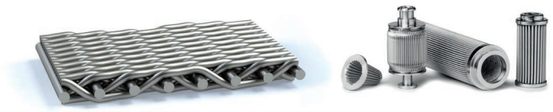


SPÖRL – Products

SPÖRL manufactures a comprehensive range of fine wire meshes incorporating specific properties for the most diverse applications. For more challenging filtration applications, we sinter multiple layers of mesh using heat and pressure to provide multilayer filter laminates.

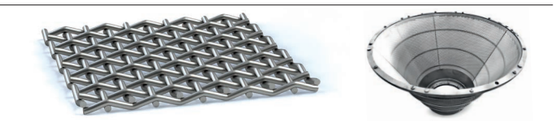
Our precision woven steel meshes are supplied in roll form or as fabricated products manufactured to individual customer specifications.

Twilled dutch weave
Specialist meshes for filtration with five pore levels



Betamesh-PLUS
The premier choice for traditional filtration applications

Square Weave Mesh
First class flow rates with minimal pressure loss

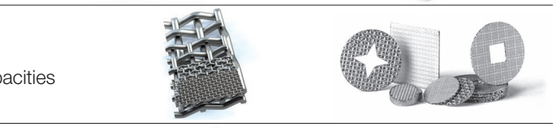


Robusta
Our solution for challenging mechanical demands

Duplex
Good flow rates and enhanced wear resistance

Plain Dutch Weave
Our balanced all rounder for diverse applications

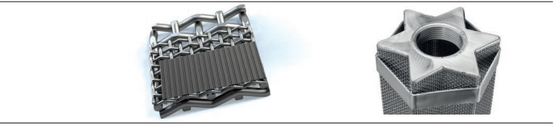
Absolta
An extremely porous filter laminate developed for high flow capacities



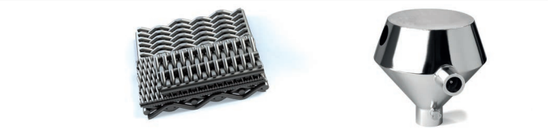
Poremet
A five layer filter medium with exceptional filter fineness

Topmesh 2
Increased stability due to a combination with a support layer

Topmesh 3
Three mesh layers for harsh industrial applications



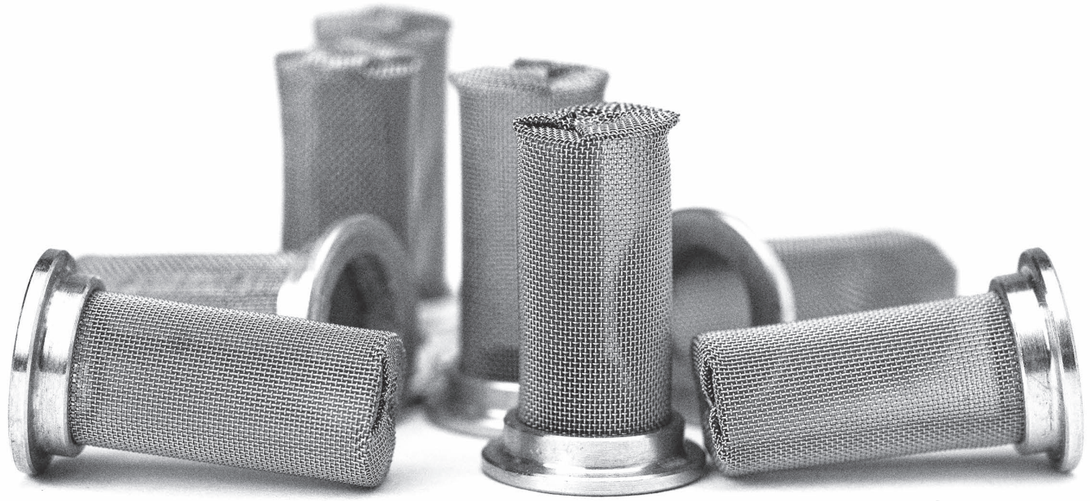
Poreflo
Exceptional performance for fluidisation applications



The key to performance filtration: choosing the right mesh

We divide our meshes into single layer and multi-layer materials.
Each individual product has its own unique strengths.

		Separation effect	Low pressure loss	High flow rates	Backwashability	Stability	Loadbearing	Porosity	Spot welding	Roll seam welding	TIG plasma welding	Resistance welding	Annealing	Stamping	Cutting	Bend radius	Pleating
Single layer filter meshes	Twilled Dutch weave	++	O	O	+	+	-	-	++	++	O		++	++	++	++	++
	Plain Dutch weave	++	+	++	++	++	-	O	++	++	-		++	++	+	++	++
	Betamesh-PLUS	+++	+++	++++	+++	O	-	++	++	++	-		++	++	++	++	++
	Betamesh R	+	++	+++	+++	O	O	++	++	++	-		++	++	++	+	O
	Robusta	+	+	++	++	++	O	O	++	++	-		++	++	+	+	O
	Duplex	++	+	+	++	++	O	O	++	++	-		++	++	++	++	+
	Square weave mesh	O	++++	++++	++++	-	-	++	++	++	-		++	++	++	++++	+++
Multi-layer laminates	Poremet	++	-	-	O	++++	++++	-	++		++	++			O	O	-
	Absolta	++	O	O	+	+++	++++	O	++		+	-			O	-	-
	Topmesh 2	++	+	+	++	++	+	+	++		O	++			O	+	++
	Topmesh 3	++	+	+	++	++	++	+	++		+	-			O	O	+
	Poreflo	++	-	-	-	+++	+++	-	++		++	++			O	+	-



Seven good reasons to choose SPÖRL

The power to innovate at SPÖRL is based on decades of experience. Alongside exceptional product characteristics in the most diverse sectors, we also excel in terms of fundamental attributes and qualities.

1 Quality

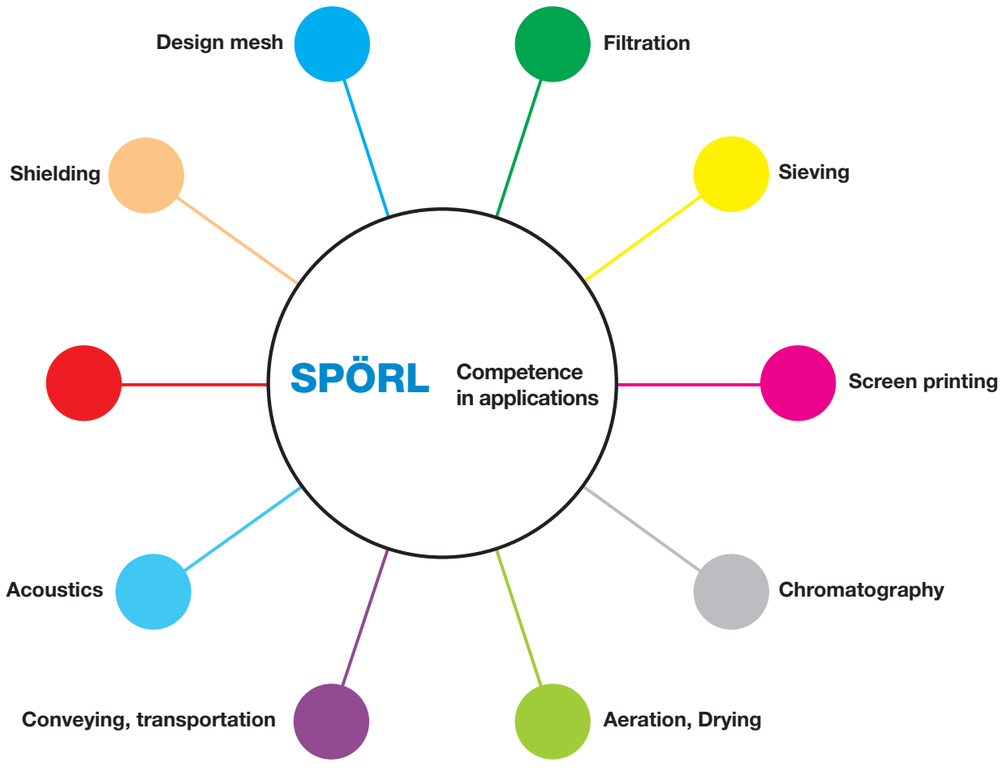
We always maintain strict compliance with industry specific weaving standards. What's more, we have created our own in-house standards alongside each of these, which demand far more than the officially accepted values in terms of challenges and tolerances.

2 Experience

Thanks to in-house research and development and valuable feedback from our customers in diverse industrial sectors, we have acquired an enormous wealth of experience, which is used in consultancy as well as product development.

3 Cost Efficiency

We continue to find new ways to increase our production efficiencies with a simultaneous increase in quality standards.



4 Reproducibility

We maintain a process orientated approach to ensure optimum reproducibility.

5 In-house Wire Drawing

We are the only fine wire weavers to operate our own fine wire drawing plant. This means we can ensure reliable delivery schedules and maintain quality procedures totally independent of third party input.

6 Security

We manufacture in a trade-friendly and commercially stable environment, and are therefore able to guarantee above average levels of product availability, supported by extensive stockholding. In addition, the BOPP Group operates three separate production facilities, providing higher levels of process security in the supply chain.

7 Protecting the Environment

Our manufacturing plant complies with modern standards in terms of energy use and environmental sustainability. We are active participants in programmes to improve energy efficiency, and a member of Cleantech organisations.

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The BOPP Group

- SPÖRL KG
- Headquarter BOPP
- Subsidiaries BOPP
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