

# Engineering Chlor-Alkali Process



## Description

KnitMesh Technologies® manufactures knitted nickel wire mesh rolls that can be used as the resilient elastic element in zero-gap ion exchange membrane (IEM) electrolytic cells, utilised in the industrial chlor-alkali process.

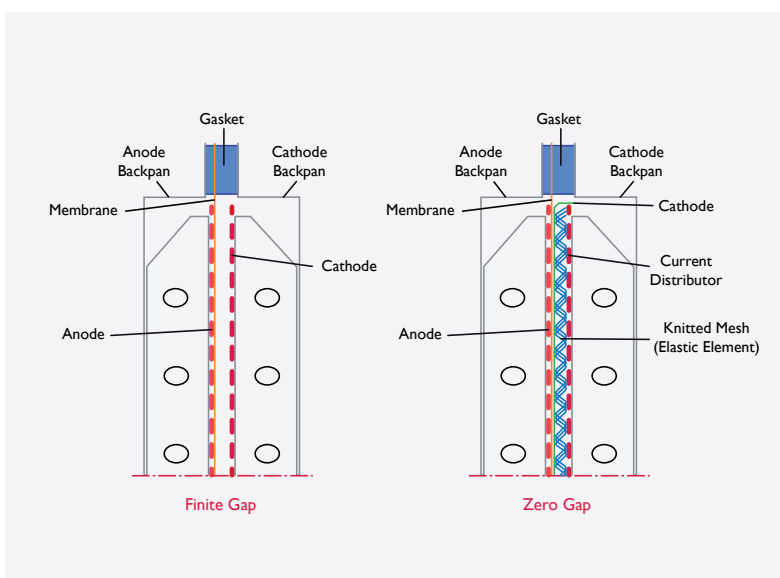
These tailored meshes can be installed in new IEM zero gap cells, or retrofitted into finite-gap cells to help lower cell voltages and improve energy efficiency.



## Application

The chlor-alkali industrial process is the production of chlorine, caustic soda solution and hydrogen from an aqueous solution of alkaline chlorides by the application of a direct current (electrolysis). The three most common methods used are: the amalgam process, the diaphragm process and the membrane process. The membrane process is becoming the predominant process based on reduced energy consumption, lower investment costs, and lower environmental risk.

## IEM Cell Layouts: Finite-Gap vs Zero-Gap



In the design of a membrane cell, minimisation of the voltage drop across the electrolyte is accomplished by bringing the electrodes close together (finite gap). However, when the gap is very small, the voltage increases because of the entrapment of gas bubbles between the electrodes and the membrane. A non-uniformity in current distribution can also occur because of localised narrowing of the anode/cathode gap due to electrode profile variations. By pushing the anode and cathode against the membrane (zero gap), the operating voltage can be minimised and the current distribution made uniform. This is achieved by inserting an elastic element (knitted nickel wire mesh) between the cathode and the current distributor.

Tel: +44 (0) 1352 717 600

Email: [sales@knitmeshtechnologies.com](mailto:sales@knitmeshtechnologies.com)

Fax: +44 (0) 1352 714 909

Coast Road, Greenfield, Flintshire, CH8 9DP United Kingdom



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## How the Knitted Mesh Elastic Works

The design of the elastic element plays a fundamental role in the operation of a zero-gap membrane cell. It is composed of a complex array of nickel wires, profiled in a precise shape to create the required elastic response needed for a good electrical contact.

Construction characteristics are tailored to fit different available gaps, aiming to deliver a constant mechanical pressure onto the membrane with no damage to its mechanical integrity. The elastic properties of the mesh are selected in order to optimise both electrical contact and good resistance to pressure fluctuations or reverse pressure.

The metallic wire patterns act as a hydraulic pathway, not preventing the mass transfer of NaOH and allowing the discharge of H<sub>2</sub> gas bubbles, and hence not disturbing the control of caustic soda concentration gradient onto the membrane surface.

## Product Features

Knitted mesh elastic elements in membrane electrolysis cells are usually made from nickel or nickel-based alloy wires. In order to satisfy the requirements of differing cell configurations and designs, KnitMesh is able to offer the following product features:

- Wide range of wire diameters
- Single or dual-layer (sock) standard mesh
- Single or multi-filament knitting
- Lay-flat or crimped mesh
- Mesh widths up to 2m
- Post-knitting inspection
- Mattress/Pad assembly
- Compression testing
- Custom packaging

## Ordering

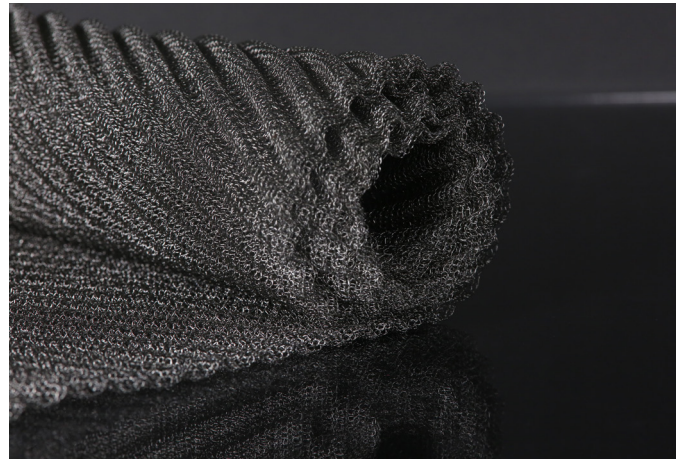
To request a quotation, please contact our Customer Support Team, including as much detail as possible regarding your process or application: desired material, mesh area, thickness, elastic response and any special processing, shipping or packing requirements.

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## Mesh Manufacture

KnitMesh Technologies is the acknowledged technical leader in the design and manufacture of innovative mesh solutions for an extensive range of industrial applications and environmental conditions.

Since 1957, we have worked closely with customers from a wide range of sectors to solve some of industry's most challenging manufacturing problems using industrial knitted products.

Producing consistent knitted mesh to our exacting high standards requires a level of technical expertise and experience gained in over 60 years of manufacturing and processing knitted wire mesh.

Wire knitting requires not only the correct machines, cylinder heads, needles and spools, but specific material science knowledge and experience to ensure product performance and quality.

## Quality Assurance

KnitMesh Technologies® is accredited to:  
ISO 9001:2015, ISO 14001:2015, ISO 45001:2018, PAS  
99:2012, IATF 16949:2016.

