



## Cathodex stainless steel cathode plates

### Cathodex Technology

Cathodex manufactures permanent cathode plates, starter sheets and cathode plate maintenance equipment.

Our patented Cathodex technology and products are used by **copper, nickel and zinc refineries** all over the world.

New cathode plates are manufactured in Finland. Sales and maintenance services are also provided by our units in Chile, Germany, Zambia and Mexico.



### ***Characteristic properties***

**First class cathode sheet quality**

**Ultimate lifetime of edge strips**

**Prevention of corroding**

**Utmost electrical connectivity**

**Own maintenance equipment**

**Patented technology**

**Competitive pricing**

### **Cathode plate technology**

Cathodex Oy is a forerunner of new cathode plate technology. Its patented Cathodex innovations offer new-generation solutions for the manufacturing and maintenance of cathode plates.

Cathodex is the patent holder of permanent edge strip technology, most innovative developer of various hanger bar solutions and always reliable partner for cathode plate and maintenance equipment deliveries.

## Cathode Sheet



Cathodex Oy works in close cooperation with the world's leading sheet producers in order to offer its customers **first-class cathode plate blanks**. Our manufacturing process can be used for cathode plate blanks made of steel, titanium or aluminium.

The normal sheet thickness is 3.00–3.25 mm for steel and titanium sheets and 6–7 mm for aluminium sheets. We machine a V-groove at 45 or 90 degrees along with the required holes and lifting openings to the sheets.

EN	ASTM	C	N	Cr	Ni	Mo	Others	Condition
1.4162	S32101	0,03	0,22	21,5	1,5	0,3	5Mn	2E
1.4404	316L	0,02	-	17,2	10,1	2,1	-	2B

Austenitic steel such as EN1.4404 is in annealed condition the only non-magnetic steel with good to excellent corrosion resistance combined with good weldability and formability. Duplex stainless steel EN1.4162 has a high strength, good throughness and very good corrosion resistance, especially towards stress corrosion cracking and corrosion fatigue.

## Permanent Edge Strips



Significant cost benefits can be realised using permanent edge strips. The maintenance and replacement costs of edge strips are usually the most expensive cost incurred during the lifetime of cathode plates. A copper refinery replacing customary edge strips with Cathodex® edge strips can **save up to 60–75% of its annual edge strip costs**. The use of Cathodex technology not only

improves cost efficiency but also the quality of the product. The Cathodex® technology allows the production of high-quality, long-lasting edge strips for the copper, nickel and zinc industries. The technology is based on a patented manufacturing process in which the edge strip is manufactured directly on the edge of a preheated, perforated and brushed cathode plate.

Material	Melting point	Density
HE3470-LS	110-140 °C	0,9-1,0 g/cm <sup>3</sup>
BE60-7032	190-230 °C	0,905 g/cm <sup>3</sup>

### Prevention of corrosion underneath the strip

Thanks to the manufacturing method the common problems of conventional edge strips such as detachment of the edge strip, ingression of the electrolytic fluid onto the plate depositing metal underneath the edge protectors, or corrosion between the plate and the strip, can be avoided.

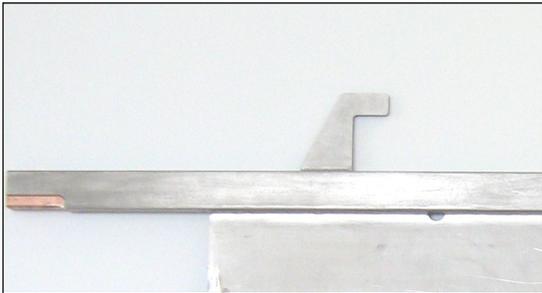
### Long life expectancy

The Cathodex® method provides a long operating life for the edge strips on cathode plates. Our copper refining customers have proven that cathode edge strips will perform for more than 5 years.

### High mechanical strength

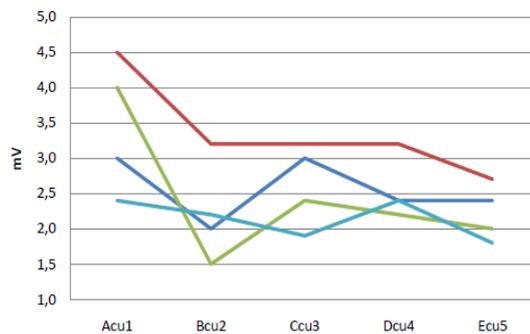
Perforation of the edge of the plate is commonly used for acid-proof and titanium plates to enhance the fastening of the permanent edge strip. The desired pull tension in the edge strip is then achieved by controlling the welding temperature for the edge strip and both the duration and the temperature for the cooling phase.

## Hanger Bar

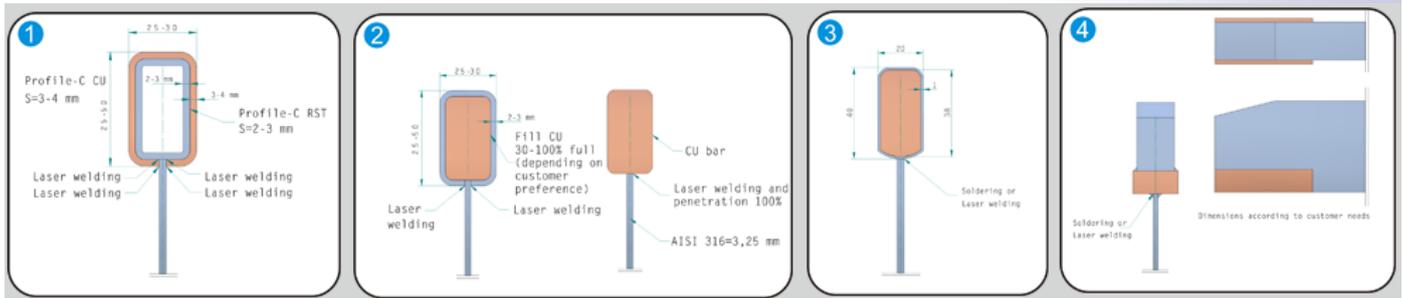


The hanger bar solutions offer **the best possible electrical conductivity**. Different methods are used for the production of hanger bars made of different metals. Soft solder or explosion welding can be used as the welding method. Alternatively, the copper of the hanger bar can be

laser welded directly to the plate, thereby removing resistance between the bar and the plate. The core can be expanded under the coating. Customised contact areas and lifting hooks can also be manufactured according to the customer's needs.

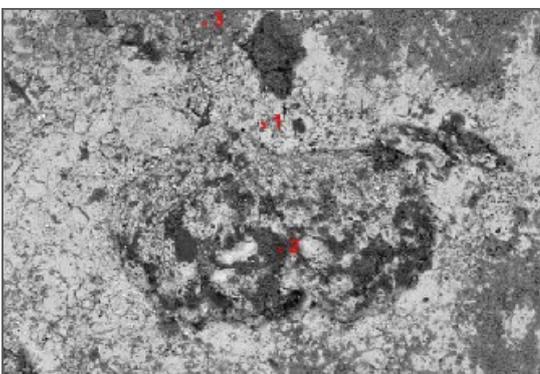


Resistance differences (mV) in different hanger bar designs that are measured between the hanger bar and top of the sheet (10 mm). Research of conductivity is done together with Tampere University of Technology.



Application number of hanger bar patent:20100364

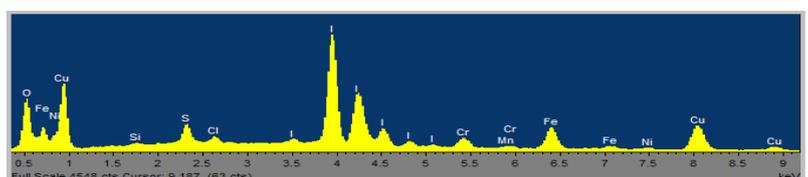
## Cathodex Research



Innovations do not come easy. The following case study was done for copper solvent-extraction electro-winning plant where the pitting and crevice corrosion problems with the cathode plate were related to too high chloride concentrations in the environment. First, SEM backscattering detector image of filled corrosion pit on sample plate is illustrated in the first picture where numbers mark the spots where EDX analyses were performed. EDX spectrum at spot 1

showing that a particle containing iodine has been analysed. Besides also hints on CuSO<sub>4</sub>, Cl and signals from the stainless steel background were detected.

A common strategy to avoid corrosion in a given process environment that should not be changed is to use a material and solutions with better corrosion resistance.



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*Cathodex Oy started its operations in 1996. At the end of 1990's, Cathodex Oy manufactured the first cathode plates based on its own edge strip technology. The company invested heavily in the development of cathode plate production technology during the following years. The edge strip production technology resulting from this development allows for a long lifetime for cathode plates as well as significant maintenance cost savings. The technology that was developed as a solution for the inevitable problems of conventional edge strips has been known as Cathodex since 2007. The company changed its name from Pro Mark Oy to Cathodex Oy in 2010.*



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