

# 低周波電磁波シールド向け電気めっき用添加剤

Electroplating additives for low-frequency electromagnetic shielding

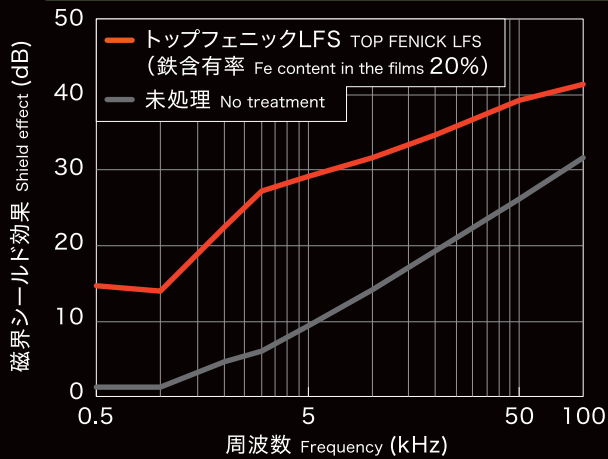
# トップフェニックLFS

## TOP FENICK LFS

- ニッケル-鉄合金めっきで100kHz以下の低周波(磁界)対策  
Nickel-iron alloy plating films can prevent low frequency waves of 100kHz or less (magnetic field)
- 添加剤で3価鉄の発生を抑制し、浴の安定性が向上  
Reduce occurrence of iron(iii) with additives, improve bath stability
- 幅広い電流密度で安定した鉄合金比率が得られる  
Maintain standard iron content in the deposition films at wide current density areas

### 低周波シールド効果が向上

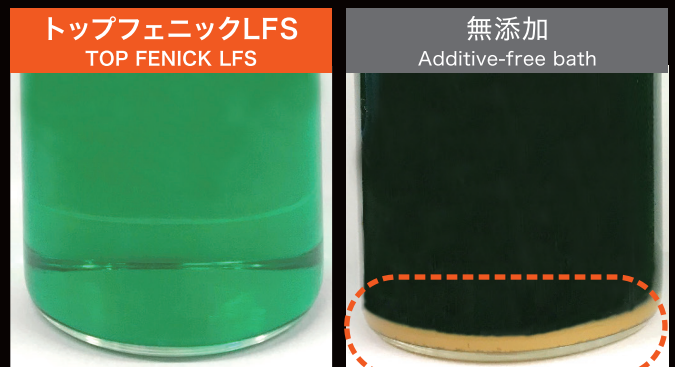
Improve shield effect to low frequency waves



シールド材試験方法: KEC法  
Shield material test method: KEC method

めっき膜厚: 15 $\mu$ m(両面) 素材: 銅板(板厚0.3mm)  
Film thickness: 15 $\mu$ m(Both sides) Substrate: Copper plate (thickness 0.3mm)

### 優れた浴安定性 Great bath stability



沈殿なし  
No precipitation

沈殿あり  
Precipitation

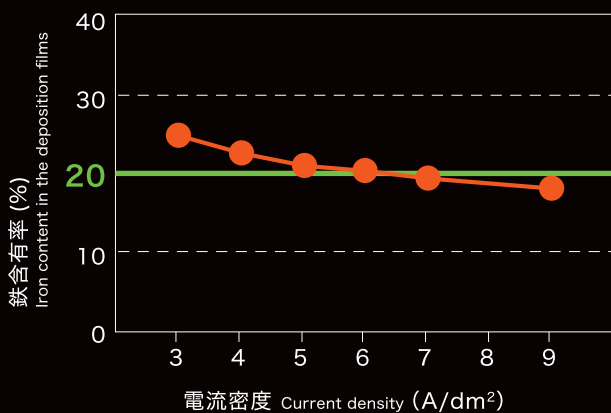
めっき液外観の比較

Comparison of solution appearance

浴安定性に優れ、管理が容易  
Great bath stability, easy bath control

### 安定した鉄合金比率

Stable iron content in the deposition films



幅広い電流密度で

鉄合金比率20%前後を維持

Maintain about 20% by weight iron content in the deposition films at wide current density areas

### 標準条件 Standard condition

引っ張り応力: 48MPa 電流効率: 97%  
Tensile stress Current efficiency

硫酸ニッケル六水和物 Nickel (II) sulfate hexahydrate	180g/L
塩化ニッケル六水和物 Nickel (II) chloride hexahydrate	45g/L
硫酸第一鉄七水和物 Iron(II) sulfate heptahydrate	40g/L
ホウ酸 Boric acid	40g/L
トップフェニックLFS-S TOP FENICK LFS-S	5ml/L
トップフェニックLFS-G TOP FENICK LFS-G	40ml/L
アクナH (ピット防止剤) ACNA H (Pit preventing agent)	3ml/L
陰極電流密度 Cathode current density	6A/dm <sup>2</sup>
pH	2.2
浴温 Bath temperature	40°C

皮膜の鉄含有率: 20% Iron content in the deposition films