



ESAB OK 92.55 Electrode for 9% Ni Tanks Becomes Preferred Choice in China for LNG

- ESAB electrodes used on nearly 2 million m³ of LNG tanks in 2019.
- Premium performance of OK 92.55 lowers overall costs, saves time, promotes quality.

Situation

China will soon become the world's largest importer of liquefied natural gas, with LNG quickly becoming the most vital way of trading this clean-burning fuel. According to Forbes magazine, LNG currently accounts for just 6 - 8% of energy use in China, so the growth potential is very large. China's LNG demand could almost double to 550 billion cubic meters by 2030.

Complication

Although LNG terminal and cargo tank contractors want to proceed at a rapid pace, they face five challenges:

- Conventional Stick (MMA) electrodes for 9% Ni are prone to generating weld defects such as porosity, cracking and slag inclusions.
- Less qualified operators are prone to higher defect rates; repairing weld defects takes time and can have a huge impact on the construction timeline.
- Finding qualified operators is a challenge; training someone to become a good welder takes time, which can increase project duration.
- Electrodes left exposed to the atmosphere need to be re-baked, increasing construction time.
- Ni alloy electrode waste is expensive. When the useful length of the electrode cannot be fully consumed, it forces operators to scrap long electrode stubs, negatively impacting project costs.

Solution

ESAB OK 92.55 electrodes [AWS ENiCrMo-6] have a long track record of success in 9% Ni LNG tank construction, ensuring on-time execution at each project milestone. Benefits include:

1. Higher productivity and all-positional flexibility
2. Proven savings
3. Lower defect rate and no need for special training
4. Guaranteed fresh - no re-baking: save time and no worries about porosity

OK 92.55 Success in China

OK 92.55 has global references going back to 1996, success in China since 2004 and more than 25 successful applications in China since 2016. Recent projects include:

- XinAo ZHouShan LNG Phase II
- CNOOC NingBo LNG Project
- CNOOC ZhangZhou LNG Project
- GuangHui QiDong Project



BENEFIT #1

Higher Productivity and Flexibility

The coating formulation and electrode wire metallurgy of OK 92.55 deliver key productivity assurances. The following are typical benefits:

- 6% higher deposition efficiency
- 10% greater real deposition rate
- 9% less electrodes used by weight

Conventional Ni-alloy electrodes are separated by two types depending on welding position usage, one type optimized for 1G, 2G and 3G positions and another type for the 4G position. However, OK 92.55 offers the full flexibility for use in all key positions applied at LNG storage tank construction (1G, 2G, 3G and 4G). As a result, contractors can use one electrode instead of two, reducing the risk of mixing up the types at site as well as stock keeping unit costs.

BENEFIT #2

Proven Savings in China

Scraping of an expensive Ni-alloy electrodes is the biggest share of an overall welding costs at LNG tank construction. OK 92.55 addresses this issue. The electrodes have a higher current carrying capacity, so operators can weld with almost the entire length of the electrode. Competitive nickel electrodes can get too hot toward the end of electrode, so operators must discard up to 15% more of an expensive electrode or risk degraded metallurgy.

9% Ni LNG TANK	ESAB OK 92.55 (4.0 mm diameter x 350 mm length)	COMPETITOR (4.0 mm diameter x 350 mm length)
Customer electrodes consumed per year	35,537 kg	39,000 kg
Deposition efficiency	67%	61%
Deposition rate	1.90 kg/hr	1.73 kg/hr
Welding speed	313 mm/min	285 mm/min
Total weld joint length	19,621 m	19,621 m
Total working hours	57,067	64,031
OK 92.55 savings – hours	6,964 hours saved	
OK 92.55 savings – filler	3,463 kg less fill used	

BENEFIT #3

Promotes Defect-free Welds

Welding 9Ni% steels with zero defect rate is a challenge. For more than 30 years, ESAB has been perfecting OK 92.55 electrode to support welders to take the challenge. ESAB manufactures this electrode in Perstorp, Sweden, adhering to the same quality assurance system used for nuclear industry electrodes. OK 92.55 is formulated to address porosity issues during arc starts, which can be a problem with competitors. It has good slag detachability, requires no special training and achieves best results with a tight arc and perpendicular orientation. This operator-friendly electrode provides greater confidence for producing defect-free welds.

OK 92.55 delivers mechanical strength and toughness levels needed for challenging cryogenic applications, exceeding all requirements.

Typical Tensile Strength

ISO As welded

Elongation	Tensile Strength	Yield Strength
40%	727 MPa	445 MPa

Charpy V-Notch

ISO

Condition	Impact Value	Testing Temperature
As Welded	91 J	-196 °C

Weld Metal Analysis

Weld Metal Analysis

Mn	Mo	C	Nb	Si	W	Ni	Cr	Fe
3.0%	6.2%	0.05%	1.3%	0.3%	1.6%	69.4%	12.9%	5.0%

BENEFIT #4

Guaranteed Fresh Electrodes

OK 92.55 comes in VacPac, a laminated, multi-layer aluminum foil that is hermetically sealed around a strong plastic inner box. They have unlimited shelf life and do not require special warehouse conditions. Upon opening, fresh and dry electrodes are guaranteed when the vacuum is confirmed, so users have no worries about porosity related to humidity.

VacPac size comes in convenient 1.2 kg packages (2.5 x 350 mm) and 2 kg packages (3.0 and 4.0 mm x 350 mm). VacPac is sized so operators will use electrodes while they remain fresh. VacPac reduces electrode scrap rate and eliminates delays caused by re-baking.

ESAB also offers a full portfolio of filler metal and equipment for LNG applications, including SAW systems for horizontal welds. Contact your ESAB sales representative to learn more, or visit esab.com/lng



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