Sacrificial Anode Mass and Number for a Design Life

Net anode mass for a mean protection current over a design life from the anode's electrochemical capacity and utilisation factor, and the number of anodes.

Method: Anode mass M = I_m t/(ε u) (cathodic protection design practice, DNV-RP-B401 form)

Input parameters

Unit system: SI

Parameter	Value	Unit
Mean current demand	2.5000	A
Design life	20.000	a
Electrochemical capacity (A·h/kg) From the anode maker for the alloy and environment (zinc about 780, magnesium about 1100–1230, aluminium about 2000–2500).	1,100.0	
Utilisation factor	85.000	%
Net mass of one anode	14.500	kg

Calculated results

Parameter	Value	Unit
Total anode mass	468.77	kg
Number of anodes (rounded up)	33.000	

Notes for this case

- Also check that the anodes can deliver the initial and final currents (anode resistance), which this mass check does not cover.

Formula and method

$$M = \frac{I_m\, t}{\varepsilon\, u}$$

Variables

I_m	Mean current demand	A
t	Design life	s
ε	Electrochemical capacity (A·h/kg)	-
u	Utilisation factor	-
m_a	Net mass of one anode	kg
M	Total anode mass	kg
N	Number of anodes (rounded up)	-

Method and standards

Charge balance.

Assumptions and limits

- Mean current over life.

References

- Anode mass M = I_m t/(ε u) (cathodic protection design practice, DNV-RP-B401 form)

Report details

Report reference	FCC-AT2N-2HZC (the same inputs always give the same reference)
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Release checks	2 reference cases of this calculator, computed independently, are checked on every release

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

This calculator online

https://calc.firecad.com/materials/corrosion/sacrificial-anode-mass

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.