



Seawater Injection Applications

Reservoirs are naturally losing pressure as oil and natural gas are extracted, causing a slowdown in the flow of fluids out of the well. To counteract this problem, operators commonly enlist a practice called seawater injection. They will drill wells to inject seawater into the reservoirs to help increase the pressure and keep wells producing at a higher rate for longer.

Corrosion is a concern in the presence of water, especially in an offshore seawater environment where there is a higher potential for oxygen contamination. Offshore seawater injection projects require careful planning and selection of materials to ensure the integrity of the well.

PREN stands for Pitting Resistance Equivalent Number. It provides a relative comparison of the resistance of alloys to localized corrosion based upon their chemical composition. Various empirical formulas have been developed for the calculation of the PREN. NACE MR0175 requires use of the following equation:

$$\text{PREN} = \text{CR}\% + 3.3 \times (\text{Mo}\% + 0.5 \times \text{W}\%) + 16 \times \text{N}\%$$

It is recommended that materials have a PREN > 40 for seawater injection applications. Such alloys include 25CR super duplex and CRA 2550E.

Alloy Family	Name	Nominal Composition					Typical PREN
		Cr	Ni	Mo	N	W	
Martensitic Stainless Steels	13 Cr	13	0.3				13
	Modified 13 Cr	13	5.0	0.7			15
	Super 13 Cr	13	5.5	2.3			20
Duplex Stainless Steels	22 Cr	22	5.5	3.0	0.14		34
	25 Cr	25	7.0	3.5	0.28		41
	Super 25 Cr	25	7.0	3.0	0.28	2.0	43
Cold Worked Nickel-Based Alloys	825	22	42	3.0			32
	2535	26	33	3.3			37
	28 Cr	27	31	3.5			39
	2550	25	50	7.5		1.5	52
	G-3	22	50	7.0		0.8	46
Precipitation Hardened Nickel Alloys	C276	16	60	16.0		3.8	75
	925	22	41	3.0			31
	718	19	53	3.1			29
	725 / 625 Plus	21	60	8.3			48