

# S4 Non-Rotating Protector High Temperature Performance

## Casing Protection for Geothermal Wells

A geothermal operator planned on re-entering a vertical well that was drilled in 1988. The operator needed to protect its casing throughout a bit run of 6,000ft. The bottom hole temperature was estimated to be 400°F.

## S4 NRP Design Improvements

With the field-verified SS3 Non-Rotating Protectors (NRPs) and 25 years of evolving elastomer products, the S4 NRP was designed with similar load ratings and assembly configuration as the SS3 model. Though the S4 can withstand elevated temperatures around 275°F (design temp.) while still maintaining effective torque reduction and open hole capability.

## S4 NRP Protects the Casing

The S4 was run for 50 rotating hours maximizing at 280°F in water-based mud. The S4 NRP was at 3,300ft TVD when the bit reached TD of 6,011ft (~5,500ft TVD). The majority of the time the S4 was in open hole. There were no problems throughout the job. Radial and axial wear were observed from the S4 body, however, the interior of the protector showed minimal wear. Overall, the S4 NRP performed extremely well under increased temperature and open hole conditions while providing torque reduction and casing protection throughout the job.



**Location:** California  
**Well Type:** Geothermal  
**Objective:** Casing Protection  
**Solution:** S4 NRPs  
**Benefit Seen:** Durability in high temperatures and open hole.

