

 CAMERON	DRAWN BY A. Konvicka	DATE 8/21/2006	REVISION B3	Drawing Engineering EB B3SD Page 1 of 1
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HIGH TEMPERATURE BOP ELASTOMERS (GENERAL GUIDELINES)

There is no industry-accepted method of formally rating BOP packers and seals. The following are estimates based on lab testing and field performance. Temperature ratings for elastomer components must take into account the environmental exposure history, the mechanical loading history, the chemical environment while at temperature, and other factors. Therefore, a single number rating can be misleading if all conditions are not understood.

PREVENTER/ELASTOMER TYPE	OPERATING RANGE	EXCURSIONS** (1 HOUR HIGH TEMP)
ANNULAR BOPs - Std. Temp.	70°F - 180°F	30°F - 200°F
VBR PACKERS - Std. Temp.	70°F - 180°F	30°F - 200°F
FLEXPACKERS - Std. Temp.	40°F - 180°F	30°F - 200°F
RAM BOPs' - High Temp.	50°F - 250°F	40°F - 350°F
RAM BOPs' - Std. Temp.	34°F - 220°F	30°F - 250°F

' All ram BOP elastomers except VBR packers
 ** May require an increased operating pressure to achieve extreme low end temps.

Studies performed by Cameron have determined that for high temperature subsea BOP stacks, the convection from the cold sea water keeps the majority of the Ram BOP from ever reaching the flowing temperature of the well. Therefore, for high temperature subsea stacks, the only elastomers that need to be changed to the high temperature variety are the ram packers and top seals. It is not necessary to change the bonnet seals or the connecting rod seals.

The same does not follow for high temperature surface stacks, since the air does not provide the same level of heat convection. On high temperature surface stacks, the entire BOP, including the operating system, should be assembled with high temperature elastomers.