A FLASKED PRESSURE HOUSING

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

[0001] Not Applicable.

BACKGROUND

[0002] To form an oil or gas well, a bottom hole assembly (BHA), including components such as a motor, steering assembly, one or more drill collars, and a drill bit, are coupled to a length of drill pipe to form a drill string. Tools including electronic instrumentation are typically positioned on the BHA to obtain measurements of the downhole environment while drilling. Once assembled, the drill string is then inserted downhole, where drilling and data collection by the tools commence.

[0003] The downhole tools and their associated electronic instrumentation must be able to operate near the surface as well as many thousands of feet below. Since temperature within a wellbore tends to increase with increasing depth, the tools may be subjected to severe thermal loads, depending on the depth of the wellbore. Moreover, during drilling, the tools experience vibrational loads due to operation of the drill bit and pressure loads from drilling mud passing through and around the drill string. In some circumstances, the tools are exposed to wellbore temperatures and pressures exceeding 200°C (473°K) and 20,000 psi (approximately 138,000 kPa).

[0004] The maximum operating temperature limit of electronic instrumentation in the downhole tools can be significantly less than the surrounding wellbore temperature, depending on wellbore depth, and may be no more than 125°C (398°K). As a consequence, prolonged exposure of the downhole tools to the severe thermal environment of the wellbore may cause the temperatures of the electronic instrumentation to exceed their maximum operating limit, thereby resulting in reduced service life and perhaps failure of the tools.

[0005] Servicing or replacement of the downhole tools necessitates the drill string be pulled from the wellbore. Once the tools are repaired or replaced, the drill string is then run into the wellbore again, and drilling may resume. Given the costs associated with interrupting drilling and pulling the drill string from the wellbore, apparatus which prolong the service life of electronic instrumentation included within the downhole tools are particularly desirable.

SUMMARY

[0006] In a first aspect, there is provided a system for containing electronics positioned in a downhole tubular, the system comprising: a pressure housing supported within the downhole tubular; a rigid end piece and a compliant end piece, each fixedly coupled within opposing ends of the pressure housing; an inner tubular member disposed within the pressure housing, the inner tubular member including opposing ends, wherein one of the opposing ends is coupled to the rigid end piece and the other of the opposing ends is free to move relative to the compliant end pieces; one or more annular standoffs disposed between the inner tubular member and the pressure housing, each standoff including at least one radially extending portion compressed between the inner tubular member and the pressure housing; and a chassis disposed within the inner tubular member, the chassis housing the electronics.

[0006a] In a second aspect, there is provided a system for containing electronics positioned in a downhole tubular, the system comprising: a pressure housing supported within the downhole tubular; a rigid end piece and a compliant end piece, each sealingly engaged within opposing ends of the pressure housing; a thin-walled tubular member disposed within the pressure housing, the inner tubular member including opposing ends, one end sealingly engaged with the rigid end piece and the other end sealingly engaged with the compliant end piece; and a chassis disposed within the inner tubular member, the chassis housing the electronics.

[0006b] In a third aspect, there is provided a system comprising: a drill string suspended into a wellbore; a drill collar positioned within the drill string, the drill collar including a bore through which a drilling fluid flows; a mounting plate disposed within the bore of the drill collar; and a flasked pressure housing coupled to the mounting plate and suspended within the bore of the drill collar, the flasked pressure housing comprising: an outer housing; a rigid end piece and a compliant end piece, each fixedly coupled within opposing ends of the pressure housing; a thin-walled inner tubular member disposed within the pressure housing, the inner tubular member including opposing ends, wherein one of the opposing ends is coupled to and in sealing engagement with the rigid end piece and the other of the opposing ends is sealingly engaged with the compliant end but free to move relative to the compliant end piece; one or more annular standoffs disposed between the inner tubular member and the pressure housing, each standoff including at least one radially extending portion compressed between the inner tubular member and the pressure housing; and a chassis disposed within the inner tubular member, the chassis housing electronics.

[0006c] A system for containing electronics positioned in a downhole tubular is disclosed. In some embodiments, the system includes a pressure housing, a rigid end piece, a compliant end