

### **3.13S Threaded Fasteners - ASME Code Class 1, 2, and 3**

The design considerations, inspection requirements, and quality records in this section apply to all threaded fasteners utilized, as applicable, for portions of the plant that are beyond the scope of the reference ABWR certified design.

#### **3.13S.1 Design Considerations**

##### **3.13S.1.1 Material Selection**

Material used for threaded fasteners complies with the requirements of ASME Boiler and Pressure Vessel (B&PV) Code Section III NB-2000, NC-2000, ND-2000 or NF-2000 as appropriate. Fracture toughness testing is performed in accordance with ASME B&PV Code Section III NB-2300, NC-2300 or ND-2300, as appropriate. For verification of conformance to the applicable Code requirements, a chemical analysis is required for each heat of material and testing for mechanical properties is required on samples representing each heat of material and, where applicable, each heat treat lot.

The criteria of ASME B&PV Code Section III NB-2200, NC-2200 or ND-2200 rather than the material specification criteria applicable to the mechanical testing shall be applied if there is a conflict between the two sets of criteria.

##### **3.13S.1.2 Special Materials Fabrication Processes and Special Controls**

The design of threaded fasteners complies with EPRI NP-6316, "Guidelines for Threaded-Fastener Application in Nuclear Power Plants," as well as ASME B&PV Code Section III NB-3000, NC-3000 or ND-3000, as appropriate. Fabrication of threaded fasteners complies with EPRI NP-6316, as well as ASME B&PV Code Section III NB-4000, NC-4000 or ND-4000, as appropriate. Lubricants with deliberately added halogens, sulfur, or lead are not used for any reactor coolant pressure boundary components or other components in contact with reactor water. Lubricants containing molybdenum sulfide (disulfide or polysulfide) are not to be used for any safety-related application. For ferritic steel threaded fasteners, conversion coatings, such as the parkerizing process are suitable and may be used. If fasteners are plated, low melting point materials, such as zinc, tin, cadmium, etc., are not used.

##### **3.13S.1.3 Fracture Toughness Requirements for Threaded Fasteners Made of Ferritic Materials**

Fracture toughness testing is performed and Certified Material Test Reports (CMTRs) are generated when ferritic material is purchased in accordance with the project's detail design specifications. Fracture toughness testing is performed in accordance with NB-2300, NC-2300 or ND-2300, as appropriate.

### **3.13S.2 Inservice Inspection Requirements**

Inservice inspection is performed in accordance with ASME Code, Section XI. For fasteners specifically, the requirements for pressure retaining Class 1 bolting are addressed as Category B-G-1 for bolting greater than 2 inches in diameter and B-G-2 for bolting with diameters 2 inches and less. The Class 1 pressure retaining bolting sample is limited to the bolting on the heat exchangers, piping, pumps, and valves that are selected for examination in the ISI program. Category B-G-1 includes volumetric and/or surface examination of the bolt or stud depending on whether the bolt is examined in-place or removed. Category B-G-2 requires visual, VT-1, examination of the selected bolting. For Class 2 and 3 systems (as well as the Class 1 systems), the bolted connections are examined for leakage (VT-2) during the system pressure tests required by ASME Section XI. Fasteners that are part of component supports are visually examined (VT-3) as part of the inservice examination of the component support.

### **3.13S.3 Quality Records**

Certified Material Test Reports (CMTRs) will be retained in accordance with the requirements of the Quality Assurance Program. The CMTRs will identify the material specification and the associated material properties tests and inspection that apply to the material specification.