

Pressure Vessel Engineering

Manufacturing, Evaluating, and Re-rating Pressure Vessels

DESIGN, FABRICATION, AND INSTALLATION OF NEW VESSELS

Stress Engineering Services, Inc. is a certified ASME Boiler and Pressure Vessel Code (BPVC) Code Stamp holder. We design, manufacture, and install pressure vessels around the world, and can issue Certificates of Authorization for:

- **ASME Section VIII, Division 1 Pressure Vessels (U)**
- **ASME Section VIII, Division 2 Pressure Vessels (U2)**
- **ASME Section VIII, Division 3 Pressure Vessels (U3)**



From table-top to large-diameter systems and vacuum conditions to internal pressures over 50,000 psi – our engineers can design pressure vessels rated and sized to your specific operational requirements. These services are backed by our skilled staff of designers, process engineers, and materials engineers, with years of manufacturing and design experience and equipped with the latest engineering tools and software.

For decades we have been assisting clients with specifying optimal design conditions, identifying damage mechanisms, selecting proper materials, designing vessels and components to ASME Codes, developing engineering drawings, manufacturing of new vessels, and conducting design reviews. We work with you throughout all stages of vessel development, from the creation of the User Design Specification (UDS) through the final Manufacturer's Design Report (MDR) that documents the engineering analysis.

Many of our pressure vessel engineers are active members on ASME code-writing committees. They also understand unique pressure vessel requirements and schedules. We can either work with your engineers to develop the right vessel for you, or we can supply a turn-key vessel to meet your needs.

- **Low or High Pressure Vessels**
- **Testing Vessels and Chambers**
- **Low or High Temperature Vessels**
- **R&D Test Vessels**
- **Vessels for Processing, Refining, and Manufacturing Processes**
- **Food Processing Vessels**
- **Processing/Refining/Manufacturing**
- **Consumer Products Vessels**



EVALUATION AND ASSESSMENT OF NEW VESSELS

Pressure vessel damage can come in many forms: local corrosion, local thin areas (LTA), general metal loss, cracks or crack-like flaws, pitting, creep, bulging, erosion, and environmental embrittlement to name a few. It is important to note that although significant damage may be present, the vessel may still be safe to operate. The API 579-1/ASME FFS-1 Fitness-for-Service standard is most commonly used to determine if a damaged vessel is suitable for continued operation. We specialize in these types of assessments and respond quickly.

Acquiring operational and vessel data is essential for developing a good understanding of the strength and condition of the vessel's material. It is also vital to understand the source of the damage so that future damage can be predicted or prevented. At Stress Engineering Services, we regularly evaluate pressure vessels in varying degrees of distress, with conditions including:

- Corrosion Mechanisms (pH, contents, temperatures, etc.)
- Vibration (fluid flow-induced, mechanical, etc.)
- Integrity Operating Windows (IOWs)
- Piping Analysis and Piping Systems Programs
- Structural Engineering



*Corroded vessel:
Corrosion Under Insulation (CUI)*



R-STAMPING OF EXISTING VESSELS

The majority of US States and Canadian Provinces require pressure vessels to be Code-stamped, which gives confidence that vessels are designed to operate safely. Subsequent changes to a vessel's operation require an engineering assessment to ensure that the changes will maintain a safe operating margin on all failure modes. Successful re-evaluation of a vessel results in a National Board Inspection Code (NBIC) R-Stamp. Common reasons that Stress Engineering Services R-Stamped vessels include:

- Changes to the operating parameters (design temperatures and/or design pressures need to be increased, etc.)
- Re-rating to a higher allowable stress. Over the years, with more experience, some allowable stresses have been increased.
- The vessel is undocumented or minimally documented. Often, an older vessel is discovered to have virtually no documentation proving that it is safe to operate. Our vessel certification program helps justify safe operation and can even apply an R-stamp, if conditions of applicability are met.

If a fitness-for-service (FFS) evaluation results in a Recommendation for Remediation, a Repair Plan may be necessary to properly complete the recommendations. Repair Plans are detailed, step-by-step documents for executing the repair and must comply with NBIC NB-23, even if no R-Stamp is being applied. They must be accompanied by close monitoring of the repair activity. The R-Stamp holder shares responsibility for the vessel, and a registered Professional Engineer (PE) must sign the Repair Plan.

We are an R-Stamp holder for Vessel Repair and Alteration. We are familiar with working with Authorized Inspectors (AI) to successfully complete the R-Stamp process to ensure that your vessels operate safely for years to come.



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