



Where do Tank Owners go Wrong Using/Mis-using/Not Using SP031

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What is SP031?

- Standard for Repair of Shop Fabricated Aboveground Tanks for Storage of Flammable and Combustible Liquids
- It is intended to offer a process of repairing damage that occurs to shop built tanks
- This damage is often found during inspections
- Properly applied it can help address issues with the tank construction certification
- It does not address all forms of tank damage
- SP031 is not the only option, but it is usually the best option for UL listed shop built tanks

What gets Misunderstood with Repairs of shop-built tanks

- Not understanding the effects repairs may have on the tank certification process
- Failure to fully inspect the tank to identify all the issues the tank has
- Trying to repair damage, or a tank, outside the scope of SP031
- Not understanding the limits of repairs allowed in certain areas
- Failing to properly document and test repair
- Not getting a statement of suitability for use after the repair

Origin of SP031

- Followed the inspection standard SP001
- The original version came out in 2005 and was based heavily on the API 653 standard, which covers API 650 tanks
- Created by the shop-built tank industry to support the products they built, especially the designs that are not part of API 650
- Previously repairs were done using the API standards and good steel fabrication practice
- Due to costs associated with repairs it was only done to larger tanks, for smaller tanks replacement was the norm

AST Design Requirement per Fire code

- Per IFC: 5704.2.7 Design, fabrication and construction requirements for tanks. The design, fabrication and construction of tanks shall comply with NFPA 30. Each tank shall bear a permanent nameplate or marking indicating the standard used as the basis of design.
- Per NFPA 30: 21.4.2.1.1 Atmospheric tanks (storing flammable and combustible liquids) shall be designed and constructed in accordance with recognized engineering standards.

Tank Construction Requirements

- The tank storing the regulated liquid must be built and installed with the intent of storing the material being stored
- The tank owner must be able to provide documentation to the satisfaction of the AHJ to establish suitability.
- New tanks carry a certification tag (and have supporting documents) that say what the tank is intended to do
- Existing tanks should have a listing label and some supporting documentation, 3rd party inspection report

Shop built tanks

- Shop built tanks are built to a recognized standard at a dedicated fabrication facility
 - UL 80, 142, 142A, 2080, 2085
 - API 12 series or 650 Appendix J
- These shop facilities utilize equipment and techniques that are specific to the industry and are intended to allow for efficient construction, but can also make repairs challenging.
- The certification tags are placed by the builder and applies to the day of tank construction

Third Party Listing Options for Storage Tanks

- Underwriters Laboratory (UL) certification
- Southwest Research Institute (SwRI) certifications
- API certification
- ASME certification
- PE certification of specialty vessels
- Manufacturer Qualification of Vessel

Changes to a certified tank

- Any modifications or changes made to the shell of the tank can affect the status of the original certification
- Manufacturers can, in theory, make repairs and changes to tanks they built and maintain certification, to a point.
- Any modifications must be done in accordance with good engineering practice and must be accompanied by proper documentation to the satisfaction of the AHJ

Tanks that may not be possible to fix/modify

- UL 80 tanks, these are generally not repairable
- Protected/insulated tanks (UL 2080, 2085) as their design is specific to the UL file and only the manufacturer has access to the necessary information
- Concrete Encased ASTs : Usually protected tanks so only the original manufacturer could make change
- Non metallic tanks, see manufacturer

API Tanks

- API tanks are built to a published standard
- The tank builders must follow the standard, which includes qualifications of fabricators, materials to be used and standard of construction
- The tank will carry an API certification plate that can confirm construction
- An API certified individual must oversee construction and establish the tank meets the API standard
- A final report is prepared after the repair or modification to document what is done to confirm tank is suitable for use
- API has inspection and repair procedures for their tank designs

UL Listed Tanks

- UL has construction standard for various tanks
- Tank builder must follow construction standards and use approved procedures
- UL also performs 3rd party certification for tank builders
- UL standards applies only to new tanks and new tank manufactures
- UL does not have an inspection or repair standard (Ulc* does)
- UL will, for a fee, do a field recertification

*Ulc 676 STANDARD FOR REFURBISHING OF STORAGE TANKS FOR FLAMMABLE AND COMBUSTIBLE LIQUIDS

Where do you go wrong?

- Failure to fully assess the tank prior to making repair
 - Repair cost exceeding the cost of the tank
- Trying to repair damage beyond the scope of the standard
- Failure to properly document repairs
- Failure to comply with local regulations
- Using the standard on a tank not covered by the standard

SP031 is intended to address “ordinary” damage and modifications

- Address damage from corrosion, both exterior or interior
- Minor physical shell damage
- Minor shell replacement/patching
- Bottom/end replacement to address repairs at formed flange (knuckle)
- Allow for minor modification to meet changes in operation

SP031 is not intended to address “Extraordinary Damage”

- Things considered “other” damage per SP001 (10.3.6.2)
 - Fire damage
 - Natural Disaster
 - Excess Settlement
 - Overpressure
 - Damage from cracking in steel
- Significant physical modifications of tank
 - Increase in tank size
 - Reuse of a tank for purpose other than original intent

Other Extraordinary Damage

- Physical Damage
 - Collision during shipping/relocation
 - Mishandling tank
 - Vehicle Collision damage
 - Tank testing mishap
 - Other

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Inspection Before Repair

- The need for repair is usually identified during an inspection
- The Inspector should inspect the entire tank and identify all items that require repair
- This way the full scope of repair can be identified

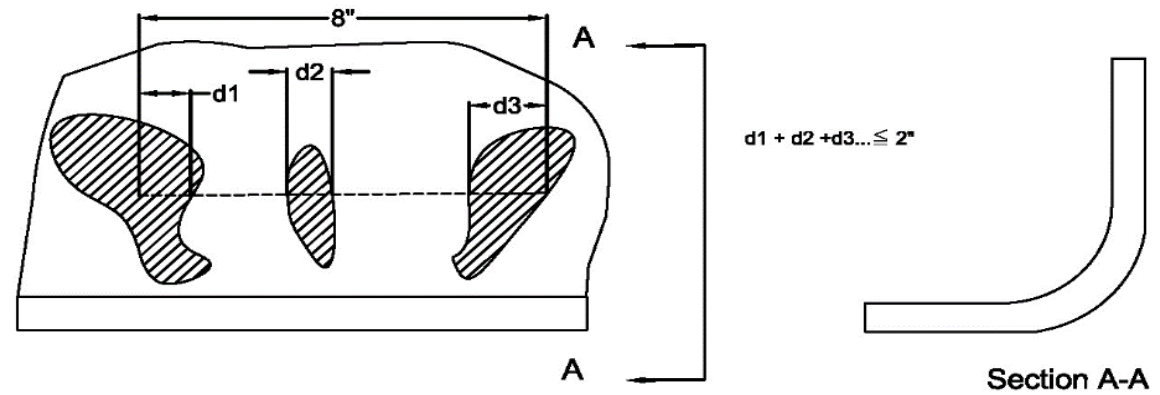
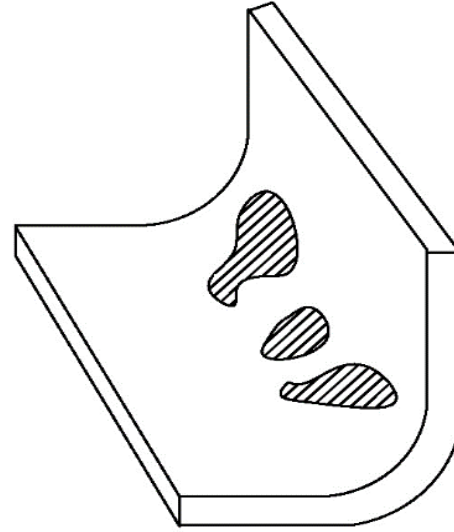
Repair at Tank Knuckle

- Shop built tanks use a formed flange on the tank end
- Bending in the flange induces some stresses in the tank end as the flange is formed
- Doing excessive repairs, cutting, welding, in that area can affect the plate strength
- Limited to 2 inches of repair for each 8 inches of knuckle area
- Knuckle extends from 3" in each direction
- If the knuckle area damage exceeds that limit the bottom/end must be replaced





Knuckle Area





Testing after Repair

- Visual inspection of repair
- Tank repairs must be tested, several options available
- If the repair is considered “Significant” then do an integrity test per R912 of the entire tank (pressure test, vacuum test on double wall)
- Document all tests and results

Documentation after Repair

- Should have original inspection with findings that triggered repair or description of modification
- Original certification
- Modification or Repair Report from SP031
- Summary of all repairs with results of Inspections
- Certifications of parties involved
- Results of any testing
- Depending on circumstances there must be a determination of suitability of service
- Any approvals required by AHJ

Questions?

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