

SCOPE

- I 1.1 This practice addresses the need for, and performance of, postweld heat treatment for the prevention of alkaline embrittlement of all welded carbon steel equipment.
- I 1.2 An asterisk (*) indicates that a decision by the Purchaser is required or that additional information is furnished by the Purchaser.

SUMMARY OF ADDITIONAL REQUIREMENTS

- I ↗ 2.1 Table 1 lists the codes and standard, which shall be used with this practice.

TABLE 1

CODES AND STANDARD	
ASME Codes	
Section VIII	Pressure Vessels, Division 1
B31.3	Process Piping
API Standard	
945	Avoiding Environmental Cracking in Amine Units

DEFINITIONS

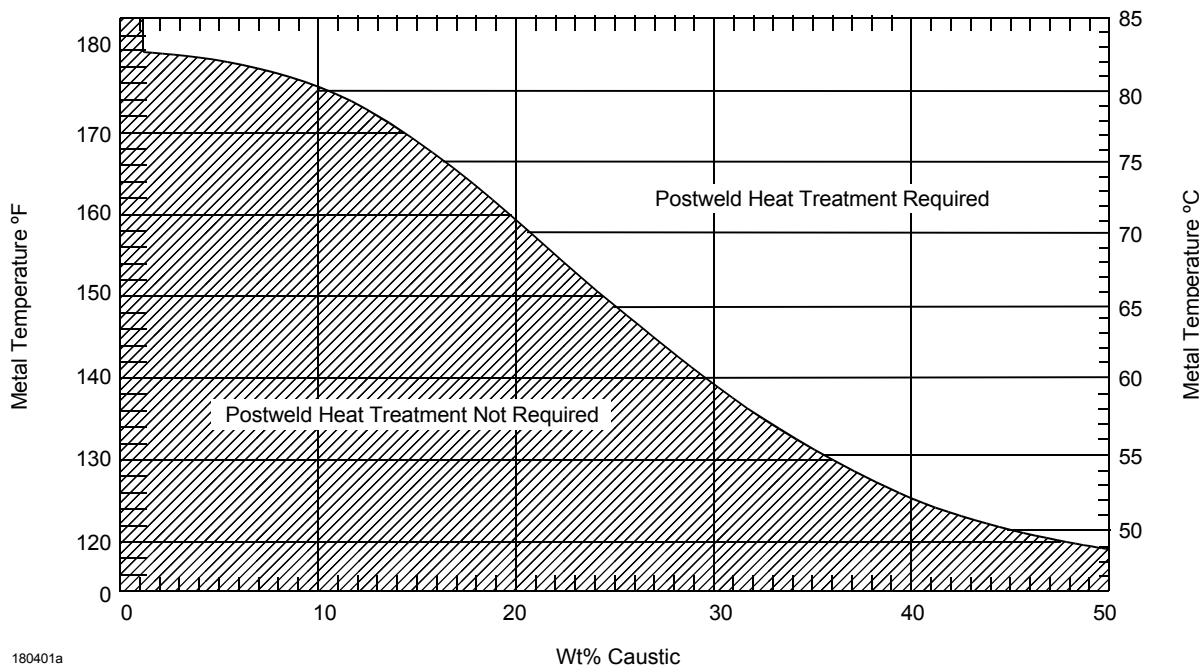
- I 3.1 **Metal temperature** used herein for the purpose of determining postweld heat treatment (PWHT) requirements, shall take into account all heat sources, e.g., process, heat tracing, solar radiation, and all operating conditions including transient conditions such as steaming out.
- I 3.2 **Alkaline solutions** referred to herein shall be specified as:
 - a. Caustics defined as all alkali metal hydroxides such as sodium hydroxide and potassium hydroxide
 - b. Amines defined as solutions for acid gas absorption or removal of acidic components (i.e., H₂S, CO₂) from hydrocarbons and hydrogen streams. These include monoethanolamine (MEA), diethanolamine (DEA), methyl diethanolamine (MDEA) and FLEXSORB amines.
 - c. Potassium carbonate.
 - d. Ammonium carbonate/bicarbonate defined as the mixture formed from ammonia and CO₂ in process stream.

EQUIPMENT SUBJECT TO HEAT TREATMENT

- S ↗ *4.1 The following **equipment for handling of caustic solutions** shall be **postweld heat treated**:
 - a. All equipment provided with heat tracing, with the exception of piping that is heat traced for winterization purposes using temperature controlled electrical tracing that will not cause the pipe metal temperature to increase beyond the limits shown in Figure 1 in the event of controller or tracing malfunction.
 - b. All equipment containing heating coils not provided with high temperature alarms.
 - c. All equipment for handling solutions which have coincident metal temperature and concentration per Figure 1.
- I *4.2 **Postweld heat treatment is not required** for **equipment handling caustic solutions** in concentrations of 1.5% (by weight) or less, or when solutions of any concentration are at atmospheric temperatures.
- I *4.3 **All equipment handling potassium carbonate, except Catacarb solution or FLEXSORB HP solvent each containing vanadium inhibitor**, having a concentration greater than 2% (by weight) shall be postweld heat treated if:
 - a. The metal temperature exceeds 200°F (93°C), or
 - b. The equipment contains a heating coil not provided with high temperature alarms.

If the potassium carbonate solution will be generated in situ from potassium hydroxide, then the equipment shall be postweld heat treated per the guidelines for caustic given in Par. 4.1.

**FIGURE 1
CAUSTIC SOLUTIONS REQUIRING POSTWELD HEAT TREATMENT**



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- R * 4.4 Amine treating. All equipment handling amine solutions such as MEA, MDEA, DEA and FLEXSORB amines, in concentrations greater than 2% (by weight) shall be postweld heat treated, with the following **exemption**:
- Atmospheric storage tanks are exempt from this requirement if metal temperature does not exceed 100°F (38°C), and:
 - The tank does not contain a heating coil, or
 - The tank contains a heating coil and is provided with a high temperature alarm set at 100°F (38°C) or less.
- R * 4.5 Coker and cracker light ends equipment handling ammonium carbonate/bicarbonate mixtures, excluding piping, shall be postweld heat treated regardless of metal temperature.
- I * 4.6 This practice shall apply for equipment that may be exposed to alkaline solutions as a result of operational upsets.

PROCEDURES

- I ♦ * 5.1 For all equipment except field fabricated tanks and piping, the postweld heat treatment procedure outlined in the **ASME Code Section VIII**, Par. UW-40, UW-49, and UCS-56, shall be followed, except as specified below:
- All thicknesses** shall be heat treated and the **minimum heat treating temperature** shall be 1100°F (595°C).
 - The holding time** at the **minimum postweld heat treatment temperature** shall be 1 hour/inch, minimum of 1 hour.
 - If government codes and regulations require higher postweld heat treating temperatures or longer holding times for appropriate thicknesses, they shall govern.
- R 5.2 PWHT is required for equipment handling both wet H₂S and amine solutions, and the **minimum PWHT temperature** shall be 1150°F (621°C).