Thoughts on this repair method:

1) Interpass temperature is not a concern when making a repair unless impact testing is a requirement. In fact, *increasing* the interpass temperature decreases the cooling rate which results in a reduction in the tendency to form martensite which is a precursor to hydrogen cracking. The interpass temperature limits should be removed.
2) If the process or filler metal used introduces very little hydrogen, the preheat temperature can be reduced provided surfaces being welded are clean. GTAW does not introduce hydrogen into the weld (it's the nature of the process) and electrodes that exhibit low diffusible hydrogen (H4 or lower) also introduce little hydrogen.

Proposed modifications of this Method based on the above are shown below; strike-through words are deletions and underlined words are additions:

2.5.3.1 WELDING METHOD 1

When using this method, the following is required:
a) This method may be used when the applicable rules of the original code of construction did not require notch toughness testing;
b) The materials shall be limited to P-No. 1, Groups 1, 2, and 3 and to P-No. 3, Groups 1 and 2 (excluding Mn-Mo steels in Group 2), as permitted for welded construction by the applicable rules of the original code of construction;
c) The welding shall be limited to the Shielded Metal-Arc welding (SMAW), Gas Metal-Arc Welding (GMAW), Fluxcored Arc Welding (FCAW), and Gas Tungsten-Arc Welding (GTAW) processes;
d) The Welders and Welding Operators, Welding Procedures Specifications shall be qualified in accordance with the applicable rules of the original code of construction, except that no postweld heat treatment shall be applied to the test coupon;
e) The weld area shall be preheated and maintained at a minimum temperature of 300˚F (149˚C) during welding. Alternatively, for P-No. 1, Groups 1, 2 and 3 materials, the preheat may be reduced to 150°F (65°C) provided:

1) Surfaces on which welding will be done shall be in a dry condition during welding and be free of rust, mill scale, and hydrogen producing contaminants such as oil, grease, and other organic materials
2) The electrodes and filler metals are classified by the filler metal specification with a diffusible-hydrogen designator of H4 or lower.
3) When shielding gas is used, it shall have a dew point that is -60°F (-50°C) or lower.

f) The preheat ~~300˚F (149˚C)~~ temperature shall be checked to assure that 4 in. (102 mm) of the material or four times the material thickness (whichever is greater) on each side of the groove (or full thickness of joint for a groove weld) is maintained at the preheat ~~minimum~~ temperature during welding. ~~The maximum interpass temperature shall not exceed 450˚F (230˚C).~~ When the weld does not penetrate through the full thickness of the material, the ~~minimum~~ preheat ~~and maximum interpass temperatures~~ need only be maintained at a distance of 4 in. (102 mm) or four times the depth of the repair weld, whichever is greater, on each side of the joint.