Welding of Pipelines and Related Facilities
API STANDARD 1104
TWENTY-SECOND EDITION

A Summary of the Updated Qualification Requirements
Why?
How?
What?
WHY – Feedback from previous editions

- Oversight scrutiny
  - Desire to be more like a specification than a guidance document

- Interpretation of requirements
  - Gathered from requests for interpretations
    - Better differentiation of essential variables
    - Better definition of qualification ranges

- Technical relevance
  - Update to more current industry practices and issues
**HOW** – Task groups from the 2017 committee meeting

- **Section 5.4 Task Group** – Update WPS essential variables
- **Section 6 Task Group** – Update welder qualification requirements
- **Section 12 Task Group** – Make mechanized welding stand-alone
- **Section 10 Task Group** – Update repair welding qualification requirements
- **Editorial Task Group** – Align the document
HOW - Section 5.4 Task Group

- Established definition of essential variable
- Split into multiple sub-task groups and assigned leads
  - Compared with other welding standards
  - Proposed recommended variables
- Task group meetings to finalize proposed changes
- Alignment with the section 10 and section 12 task groups
- Drafted revised essential variable table
- Identified required changes to section 5.3 and the sample forms
- Presented and debated proposed changes at 2019 2018 committee meeting
- Finalized draft of twenty-second edition section 5.3 and 5.4
- Review and address ballot comments
HOW - Section 6 Task Group

- Clause by clause review and update
- Focus on specific concerns gathered from subcommittee meetings and requests for interpretations
- Drafted revised section
- Presented and debated proposed changes at 2019 committee meeting
- Finalized draft of twenty-second edition
- Review and address ballot comments
WHAT

- WPS Essential Variable Definition - *a variable that when changed will potentially impact the mechanical properties of the weld*
- If not essential by definition but valuable then still required to be specified
- Identified two classifications of WPS essential variables
  1. Standard
  2. When hardness and/or toughness is a design concern
- Presented WPS essential variables in tabular format
- Provided clearer ranges for essential variables based on what was demonstrated during qualification
- Defined split between 5 and 12 – Moved SAW
WHAT actually – Section 5.4

- Clarified application to mean manual or semi-auto
- No more material strength groupings – actual SMYS is max
- Actual base material thickness ranges
  - based on qualification thickness “t”
- Further defined joint type
  - groove gets branch, fillet but not vice versa
  - listed major joint types – clarified change to compound is not major
- Addressed backing material
- Updated filler metal table and moved notes into essential variables where appropriate
- Further defined shielding gases
  - Change in AWS classification
  - Addressed backing gas
WHAT actually – Section 5.4 continued

- Addressed waveform controlled welding – a change to or from
- Removed speed of travel as essential
- Addition of heat input range when hardness or toughness is a design concern ($\pm 20\%$)
- Removed time between passes as essential
- Separation between preheat and interpass temperature
  - specified preheat based on qualification – any decrease
  - addressed when no preheat applied – lesser of 60°F or actual
  - addressed when interpass is intentionally lower
  - creation of maximum interpass
- Added pass sequence for temper bead technique
WHAT actually – Section 5.4 continued

- Addressed deliberate cooling methods
  - addition or deletion
  - change in method
  - increase in maximum temperature at application

- Addressed post heating for hydrogen diffusion
  - elimination
  - reduction in temperature
  - reduction of time at temperature
Comments and Questions