

# Best Practice # 216

**Facility:** Multiple

**Best Practice:** Filler Material Control – Receipt, Storage, and Issue

**Point of Contact:** Gary Cannell, Manager, Welding Director, FLUOR (509-392-5897); gary.cannell@fluor.com) representing the EFCOG Engineering Practices Welding Task Team

**Brief Description of Best Practice:** In January 2005, the first EFCOG alert was issued addressing concerns with the lack of Weld Filler Material (WFM) control. The alert identified this issue as a high priority; lack of proper WFM control can affect the performance of welded Systems Structures and Components and more importantly impact safety.

**Recommended Practice:** This best practice provides a general outline and information for the control of WFM receipt, storage and issue.

## 1) Filler Material Procurement

- a) Strategy: The end use of the weldment must be considered when procuring WFM. Requirements will vary, depending on the application.
  - Nuclear Applications – WFM requirements may include ASME Section III, 10CFR50 appendix B, NQA-1, Price Anderson Amendment, or 10CFR Part 21 criteria. Level 1 is likely the most stringent, requiring either NQA-1 audited and approved vendors or a site-specific Commercial Grade Dedication (CGD) program.
  - Non-Nuclear Code Applications – WFM requirements may include commercial grade criteria or criteria specified in the ASME B31 Piping Codes, the Section VIII Pressure Vessel Code, or AWS D1 Structural welding Codes. These requirements include actual MTR / CMTR for WFM and may require impact testing depending on the application.
  - Incidental Welding - WFM requirements consist of commercial grade criteria without any special test. Documentation should include proper package labeling from the manufacturer and CoC's as a minimum.
  - As a note, the "Code" requirements for manufacturing and packaging of the filler materials are typically found in AWS A5.XX specifications and/or ASME Section II Part C (SFA) of the ASME Boiler & Pressure Vessel Code.
- b) In addition to the above quality requirements, some facilities may require that actual weldability testing be performed on new brands of WFM as part of the acceptance and approval process.
- c) It is highly recommended that relevant specifications be included in the Terms and Conditions of procurement (e.g. specific Destructive/Nondestructive and chemical testing).

## 2) Receipt

- a) Perform receipt inspection of all WFM to confirm requirements of the Purchase Order. Inspect the condition of the container(s) for dents, broken seals, and overall damage; ensure markings are legible and meet specified criteria. Review documented test reports (CMTR / MTR's, etc.) against the PO, the SFA, and AWS classification requirements for required test results and chemistry ranges.

**Note:** Definitions for CoC, MTR and CMTR are per AWS A5.01

### 3) Storage

- a) Electrodes, particularly low hydrogen, have very specific storage conditions, temperatures, and rebaking requirements.
- b) Storage ovens should be clearly labeled to trace the specific heat and lot information; labeling media may see temperatures above 350°F during storage.
- c) WFM should be stored in temperature and humidity-controlled facilities. Segregation within storage and issue facilities should be maintained. Segregation of CS from SS is essential. Alloyed WFM should also be clearly identified and segregated from other materials and alloys. Container separation is usually adequate or acceptable.
- d) When control of WFM is lost, it must be taken out of service and salvaged / scrapped.

### 4) Issue

- a) WFM issue should be tracked with information such as job number, heat, AWS class, welder name, welder ID, date, quantity, and WPS to be used.
- b) The WFM issue system must include verification review of the welder range of qualification and expiration date before issuing WFM. Some programs may permit issuance of several different types and grades of WFM (of matching material) to a welder who may be performing multi-process welds, e.g., GTAW root, SMAW fill & cap. This is acceptable only when permitted by the WPS.

**Note:** Issue of multiple filler materials (classifications) to the welder is generally not allowed.

- c) Low hydrogen electrodes should either be issued in heated rod caddies or the amount of time they are out of a heated oven should be controlled. Welders are given an "issue ticket" with all applicable information regarding the WFM. Training for issuers, welders and procurement / receipt inspectors is essential for maintaining an acceptable WFM control program.

### 5) Return

- a) WFM that is damaged or where control has been lost must be discarded / scrapped. Stubs must be controlled to prevent unauthorized use. Some programs may issue WFM and upon return, account for or validate the amount used / returned. WFM may be placed back into storage if in good usable condition and traceability has been maintained. Low hydrogen electrodes may require segregation and re-baking before being placed in controlled issue locations.

**Why the best practice was used:** Use of this best practice can ensure the quality of weldments, the appropriate qualification of welders performing the work, and verify the correct WPS was followed. Using the checks and balances of a good WFM control program can prevent failed welds, the need for weld repair, additional testing, and considerable impact to project cost and

schedule. In addition, failure to implement and follow such a program can lead to safety and health concerns to the worker, public and/or environment.

**What problems / issues associated with not using the Best Practice:** A piping facility under construction had an incident where there were 2 heats of the same grade of WFM issued to make the welds. Approximately 80, 14-16 inch diameter, full penetration valve attachment welds were made that resulted in an indeterminate status. Nearing completion of the facility, a review determined that the 80 welds were made with WFM that met the required grade and classification, but had not received required impact testing. Fortunately, WFM from the same heat of material was available and with subsequent testing, the welds were found acceptable for use. By not following proper WFM controls the project was delayed, impacting both cost and schedule.

**How the success of the Best Practice was measured:** Using WFM controls that are commensurate with the requirements and expectations of the customer and are aligned with various quality levels required for the application, will provide the expected quality outcomes.

**Description of process experience using the Best Practice:** WFM control is important to ensuring quality work. Criticality of system levels drives the graded approach described in this best practice. Each site should establish the level of WFM control that best suits their particular needs and that meet specified quality requirements. The steps identified above, when properly implemented, will provide confidence that WFM is properly controlled (receipt, storage and issue) and will result in weldments meeting all design requirements and criteria.