NAV22 - WELDING/WELD REPAIR AUDIT CHECKLIST

This Process Guideline is divided into eight (8) sections. In most cases, all sections will not apply at one facility. Sections applicable to all types of welding and should be completed in all cases are: I, II, VII and VIII. These sections along with the applicable type process being audited should complete the review.

SECTION 1 GENERAL

A 1.	Does supplier have the necessary welding/welding repair controls and procedures in place to perform on existing contracts?	___Sat ___Unsat ___N/A
A 2	a. Weld Processes Used (check applicable boxes):	

	Stick S M A _____	MIG G M A W _____	TIG GTAW _____	Sub Arc SAW _____	Spot Resistance _____	Other _____	
	Define Other:						
	b. Weld Procedure Qualifications (check applicable boxes):						
	A S M E _____	MIL-STD-248 Revision _____	Navy Approved _____	Customer Approved _____	Other _____		
	Define Other:						
	c. Materials Welded/Weld Repaired (check applicable boxes):						
	HY100 _____	HY80 _____	HSLA100 _____	HY100 _____	HY80 _____		

	Stainless/ Ferrous _____	Material Requiring Preheat/Interpass Temp. Control _____	Pipe/Mach _____	Other _____	
	Define Other:				
A 3.	Applicable Weld Process Specifications (check applicable boxes):				
	MIL-STD-1689 _____	MIL-STD-1681 _____	MIL-STD-1688 _____		
	A S M E _____	MIL-STD-278 _____	PPD694 _____		
	PPD720 _____	PPD689 _____			
	S9074-AD-GIB-010/278 _____	T9074-AD-GIB-010/1688 _____	Other _____		
	Define Other:				
A 4.	Procedure Parameters/ Approvals:				

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	Proc Number	Materials to be welded	Required filler material	Approval No:	
A 5.	a. Is there a procedure in place to assure compliance with welding procedures and fabrication documents and are they readily available?				___Yes ___ No ___N/A
	b. Is there a QA audit/surveillance procedure in place to weld procedures and fabrication documents?				___Yes ___ No ___N/A
A 6.	Do travelers/work instructions give detailed welding instructions or refer the welder to applicable documents?				___Yes ___ No ___N/A
A 7.	Does the supplier invoke all Customer contract/purchase order requirements for welding to his sub tier suppliers?				___Yes ___ No ___N/A
SECTION II PROCEDURAL:					___Sat ___Unsat ___N/A
A 1.	Is there a system to assure that welding (including Tack and Temporaries) is only performed by operators qualified in the procedure and position?				___Yes ___ No ___N/A
A 2.	Is there a system to assure qualifications are maintained? (MIL-STD-248 Quarterly) (S9074-AR-GIB-010/248)				___Yes ___ No ___N/A
	a. Is there evidence of annual vision tests?				___Yes ___ No ___N/A

A 3.	Does the Traveler/Process Sheet/Other Instruction identify each required inspection and NDT?	___Yes ___ No ___N/A
A 4.	Are contractual records maintained?	___Sat ___Unsat
	a. Performance of inspections	___Yes ___ No ___N/A
	b. Records of defects found	___Yes ___ No ___N/A
	c. Welder identification where required	___Yes ___ No ___N/A
	d. Electrodes/Flux Test Report	___Yes ___ No ___N/A
	e. Qualification and Vision Test	___Yes ___ No ___N/A
A 5.	Explain/describe records reviewed in regards to clarify, accountability and specification compliance:	

A 6.	Are there records to assure that electrodes are purchased and issued to the required military specifications?	___Yes ___ No ___N/A
	a. Is the weld wire verified for conformance by reviewing certifications for compliance to the applicable Wire Specifications?	___Yes ___ No ___N/A
	b. Are ferritic filler materials chemically analyzed for compliance to applicable Wire Specifications?	___Yes ___ No ___N/A
A 7.	Are weld consumables adequately identified, segregated and controlled?	___Yes ___ No ___N/A
	a. In Wire Room and Ovens?	___Yes ___ No ___N/A
	b. While issued to Production?	___Yes ___ No ___N/A
A 8.	Is a Wire Chit system in use?	___Yes ___ No ___N/A
A 9.	Are electrodes returned to the issuance point?	___Yes ___ No ___N/A
A 10.	Does the supplier bake electrodes?	___Yes ___ No ___N/A

	a. Are controls in accordance with applicable specification requirements?	___Yes ___ No ___N/A
A 11.	Are Baking/Holding ovens properly used? (Flux and covered electrodes)	___Yes ___ No ___N/A
A 12.	Are electrode moisture tests performed?	___Yes ___ No ___N/A
A 13.	Are Baking/Holding ovens adequately maintained?	___Yes ___ No ___N/A
A 14.	Does system control compatibility of wire/flux combination to the base material?	___Yes ___ No ___N/A
A 15.	Is a written procedure in effect describing weld quality and completeness requirements?	___Yes ___ No ___N/A
A 16.	To what extent is welding process monitoring being done?	___Sat ___Unsat ___N/A
	a. Are all welding attributes and controls reviewed? Are records kept? Explain:	___Yes ___ No ___N/A
A 17.	Are workmanship* inspections documented?	___Yes ___ No ___N/A

	a. Are detailed records or a more generalized record of accomplishment used? Explain	___Yes ___ No ___N/A
A 18.	Are weld repair operations, including required evaluations and approvals, properly documented and traceable to the completed material? Explain documentation:	___Yes ___ No ___N/A
*Workmanship attributes include: weld joint prep, backgouge/grind roots, repair excavation contours, arc strikes, spatter, fabrication scars, alignment and fairness, tapers, snipes, intersecting butts, etc.		
SECTION III FABRICATION WELDING:		___Sat ___Unsat
A 1.	Qualification:	
	a. Procedure approved?	___Yes ___ No ___N/A
	b. Welder qualified to this process/method/position?	___Yes ___ No ___N/A
A 2.	Weld processes used:	
A 3.	Joint Preparation and Configuration:	___Sat ___Unsat

	a. Evidence of correct configuration to plans, drawing, fabrication document prior to welding?	___Yes ___ No ___N/A
A 4.	Material to be welded positively identified (traveler, stamped, paint stick, other)?	___Yes ___ No ___N/A
A 5.	Filler material properly identified on work traveler, production Records IAW approved procedure?	___Yes ___ No ___N/A
A 6.	Tack Welding	___Sat ___Unsat
	a. Evidence of NDT of tack weld if applicable (i.e. MT)	___Yes ___ No ___N/A
A 7.	Preheat used?	___Sat ___Unsat
	a. Method of preheat (strip heaters, radiant/infrared, torch-gas/air, oxygen-fuel)	___Yes ___ No ___N/A
	b. Were preheat temperatures monitored?	___Yes ___ No ___N/A
A 8.	Control of Heating:	___Sat ___Unsat

	a. Welding performed within building?	___Yes ___ No ___N/A
	b. Welding performed outdoors?	___Yes ___ No ___N/A
	c. Ambient temperature recorded?	___Yes ___ No ___N/A
A 9.	Control of Minimum Temperatures:	___Sat ___Unsat
	a. Was a minimum temperature established?	___Yes ___ No ___N/A
	b. Was MT required due to loss of minimum temperature?	___Yes ___ No ___N/A
	c. Was MT performed?	___Yes ___ No ___N/A
A 10.	Control of Maximum Temperatures:	___Sat ___Unsat

	a. Was a maximum temperature established?	___Yes ___ No ___N/A
	b. Evidence of maximum temperature monitoring?	___Yes ___ No ___N/A
A 11.	Temperature Checks:	___Sat ___Unsat
	a. Was interpass temperature checked?	___Yes ___ No ___N/A
	b. Method of temperature checks?	___Yes ___ No ___N/A
	c. Was surveillance of preheat temperature checks performed?	___Yes ___ No ___N/A
A 12.	Weld Repairs for Cracks:	___Sat ___Unsat
	a. Excavation heat soaking shall be performed after excavation and prior to repair welding. Soaking shall be 350(F minimum for 12 hours minimum. (Applicable to HY100 fabrication welding per PPD8026335720 Rev B, [MIL-STD-1668 Rev B] Section 13, Welding Requirements T9074-AD-GIB-010/1688)	___Yes ___ No ___N/A
A 13.	Repairs by Grinding:	___Sat ___Unsat

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	a. Were defects repaired by grinding?	___Yes ___ No ___N/A
	b. Was minimum design thickness verified after grinding?	___Yes ___ No ___N/A
A 14.	Repairs by Welding:	___Sat ___Unsat
	a. If yes, was all original weld processes and procedures utilized?	___Yes ___ No ___N/A
	b. Filler material used for repair:	
A 15.	Was arc stud welding utilized?	___Yes ___ No ___N/A
	a. Method of stud welding:	
	b. Equipment used:	
SECTION IV MIL-STD-278 WELDING		___Sat ___Unsat ___N/A

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A 1.	Is the classification of MIL-STD-278 type weld identified? (Para. 3.3.2 of MIL-STD-278).	___Yes ___ No ___N/A
	___Class M	
	___Piping Class P-1	
	___Machinery _____	
	___Other Class P S\(specify) _____	
	___Pressure vessels and tanks - Class A _____	
	___Steam turbines - Class T _____	
A 2.	Is the welding procedure for the type/classification of weld approved?	___Yes ___ No ___N/A
A 3.	Does the filler materials used conform to the requirements of Table III of MIL-STD-278?	___Yes ___ No ___N/A

A 4.	For Class P thin wall tubing, was the shield metal arc process used? (MIL-STD-278 para 6.2.2 specifies that the process may be used for wall thickness of 0.109 inch or over when welded on board ship or over when welded in the shop. Other welding processes will be permitted for thinner walls on the basis of welding procedure qualification tests) List other processes:	___Yes ___ No ___N/A
A 5.	Does the preheat and interpass temperature for welded ferrous alloys conform to Table IV of MIL-STD-278?	___Yes ___ No ___N/A
	Review records, travelers, and documentation. Specify sample size.	
A 6.	Does the preheat and interpass temperature for welded non-ferrous alloys conform to Table V of MIL-STD-278? Review records, travelers, and documentation. Specify sample size.	___Yes ___ No ___N/A
A 7.	a. For ferrous alloys, was the post heat requirements of Table VI of MIL-STD-278 complied with?	___Yes ___ No ___N/A
	b. Was post weld heat treatment performed?	___Yes ___ No ___N/A

	c. If performed, do the records, documentation conform to the requirement of Paragraph 8.2 of MIL-STD-278 for special requirements?	___Yes ___ No ___N/A
A 8.	Do records indicate the type of NDT performed?	___Yes ___ No ___N/A
	a. Verify the NDT method used is correct for the type/class of welding in accordance with the requirements of MIL-STD-278. RT, MT, PT, UT, VT	___Yes ___ No ___N/A
A 9.	Do records indicate that persons performing NDT are qualified?	___Yes ___ No ___N/A
	a. Is the NDT procedure utilized approved by EB, NNS, other? (as specified in the contract?)	___Yes ___ No ___N/A
	b. List approval documentation reference numbers:	
SECTION V PLATE WELD REPAIRS (A) HY100 PLATE WELD REPAIRS		
A 1.	a. Is the suppliers utilizing MIL-S-11018 filler material to perform weld repairs?	___Yes ___ No ___N/A
	b. Is the suppliers utilizing automatic/semi-automatic wire (e.g. 100S electrode) to perform weld repairs?	___Yes ___ No ___N/A

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A 2.	a. Does the supplier procure/utilize precertified MIL-S-1018 filler material?			___Yes ___ No ___N/A
	b. Does the supplier certify any weld metals?			___Yes ___ No ___N/A
A 3.	Is the supplier aware of the repair size limitations (area and depth)?			___Yes ___ No ___N/A
A 4.	Is the supplier aware that minor repairs defined as any excavation less than or equal to 1/8" or 10% of the plate thickness to a maximum of 0.25" (whichever is greater) and less than 16 square inches?			___Yes ___ No ___N/A
A 5.	Are notations made in plate inspection records for areas repair welded or requiring weld repair? (E.g. size, depth, location).			___Yes ___ No ___N/A
A 6.	Are minimum and maximum preheat and interpass Temperature requirements being complied with?			___Yes ___ No ___N/A
		Minimum Preheat Interpass	Maximum Preheat Interpass	
	1-1/8 and over	200	300	
	>1/2 < 1-1/8	125	300	
	1/2 or less	60	300	
A 7.	Does the supplier submit Waiver Requests for defects, which exceed the size limits defined above?			___Yes ___ No ___N/A

SECTION V PLATE WELD REPAIRS (B) MS, HTS. HY80, MHSLA80, HSLA100 Plate WELD REPAIRS		___Sat ___Unsat ___N/A
A 1.	Is the supplier utilizing the appropriate filler material?	___Yes ___ No ___N/A
A 2.	a. Does the supplier procure/utilize precertified filler material?	___Yes ___ No ___N/A
	b. Does the supplier certify any weld metals?	___Yes ___ No ___N/A
A 3.	Is the supplier aware of the repair size limitations? (Area and depth)	___Yes ___ No ___N/A
A 4.	Is the supplier aware of the definition of minor repairs?	___Yes ___ No ___N/A
A 5.	Are notations made in plate inspection records for areas repair welded or requiring repair? (E.g. size, depth, location)	___Yes ___ No ___N/A
A 6.	Are minimum and maximum preheat and interpass temperature requirements of the fabrication specification being complied with?	___Yes ___ No ___N/A
A 7.	Does the supplier submit Waiver Requests for defects, which exceed the size limits defined above?	___Yes ___ No ___N/A

SECTION VI. CASTING REPAIRS: (A) HY100 CASTING REPAIRS		___Sat ___Unsat ___N/A
A 1.	a Is the supplier utilizing MIL-S-11018 filler to perform weld repairs?	___Yes ___ No ___N/A
	b Is the supplier utilizing automatic/semiautomatic wire (e.g. 100S electrode) to perform weld repairs?	___Yes ___ No ___N/A
A2.	a. Does the supplier procure/utilize precertified MIL-S-11018 filler material?	___Yes ___ No ___N/A
	b. Does the supplier certify any welds?	___Yes ___ No ___N/A
A 3.	Is the MIL-S-11018 filler material utilized by the supplier maintained and controlled by the supplier IAW T9074 AD-GIB-010/1688?	___Yes ___ No ___N/A
A 4.	Does the supplier have a workmanship procedure?	___Yes ___ No ___N/A
A 5.	Is the supplier aware of the repair size limitations (area and depth) as denoted in the applicable specification and described below:	___Yes ___ No ___N/A

	Parameters: Weld repairs in castings shall be interpreted to the Class III standards of NAVSEA 0900-LP-003-9000 (Section 2 does not apply). Minor Repairs - Repairs of surface defects for which the excavations do not exceed the following: The maximum depth does not exceed 1/2 inch or 20 percent of the casting thickness, whichever is less, or individual repair areas do not involve more than 2 percent of the casting surface, or the total repair area does not exceed 10 percent of the casting surface. Nominal Repairs - Repairs which exceed the limitations stated above for minor repairs but do not exceed 2 inches or half the casting thickness in depth, whichever is less. The total accumulated volume of weld metal involved shall not exceed 4 percent of the volume of metal in the casting. Adjacent nominal repairs shall be separated by a distance equivalent to the maximum dimension of the smaller repair or 3/4 inch, whichever is less. If this requirement is not met, the repairs shall be jointed. Special Repairs - Repairs are those which exceed the limitations stated above for nominal repairs. These repairs are only permitted with prior approval on a case basis. These repairs may include excavations completely through the wall of the casting.			
A 6.	Are minimum and maximum preheat and interpass temperature requirements as stated below being complied with?			___Yes ___ No ___N/A
		Minimum Preheat Interpass	Maximum Preheat Interpass	
	1-1/8 and over	200	300	
	>1/2 < 1-1/8	125	300	
	1/2 or less	60	300	
A 7.	Are weld repairs documented properly? (E.g. size, depth, location, etc.)			___Yes ___ No ___N/A
SECTION VI. CASTING REPAIRS: (B) FERROUS AND NONFERROUS CASTING REPAIRS:(OTHER THAN HY100)				___Sat ___Unsat ___N/A
A 1.	Is the supplier using the appropriate filler material to perform the weld repair?			___Yes ___ No ___N/A
A 2	a. Does the supplier procure/utilize precertified filler material?			___Yes ___ No ___N/A
	b. Does the supplier certify any weld metal?			___Yes ___ No ___N/A

A 3.	Does the supplier have a workmanship procedure?	___Yes ___ No ___N/A
A 4	Is the supplier aware of the repair size limitations (area and depth) as denoted in the applicable fabrication specification?	___Yes ___ No ___N/A
	Castings: Minor Repairs - Maximum depth does not exceed 20 percent of the casting thickness or 1 inch depth, whichever is less, and individual repair areas do not involve more than 4 percent of the casting surface. Weld build up for correction of casting dimensions or machining discrepancies not exceeding 10 percent of the total area of the casting may be made at the discretion of the contractor or when the weld build up is within the following: 3/16 inch maximum build up for wall thickness 1 inch and under or 20 percent of wall thickness maximum build up for wall thickness over 1 inch but not to exceed 3/8 inch. Nominal Repairs - Nominal repairs are repair welds in excess of the above but which do not exceed 1/2 the casting thickness. Special Repairs - Special repairs are those repairs for which excavations of defects are more extensive than those classified as nominal repairs or those that extend through the thickness of the casting or for which the use case inserts may be desired: Repair of weld defects - All visual evidence of arc-strikes, weld or MT prod, shall be removed by grinding and repaired. Discoloration on metal surfaces due to MT inspection shall be disregarded. Excavations resulting from defect removal shall not require repair welding unless the depth and extent of the excavation exceeds the allowable depth and extent of acceptable weld undercut allowed by NAVSEA 0900-LP-003-8000 for the class of welding, or unless any portion of the excavation reduces the remaining metal thickness below the minimum design thickness for the part or weldment.	
A 5.	Are minimum and maximum preheat and interpass temperature requirements of the fabrication specification being complied with?	___Yes ___ No ___N/A
A 6.	Are weld repairs documented properly? (E.g. size, depth, location, etc).	___Yes ___ No ___N/A
A 7.	Does the supplier submit Waiver Requests for defects, which exceed the size limits above?	___Yes ___ No ___N/A
SECTION VII WELDER WORKMANSHIP TRAINING MIL-STD-248D (para 5.2.3.1), and/or: S9074-AQ-GIB-010/248		___Sat ___Unsat ___N/A
A 1.	Is there a written procedure covering all aspects of training and associated responsibility?	___Yes ___ No ___N/A

A 2.	Is there evidence of approval by the authorized representative as required by Technical Manual S9074-AQ-GIB-010-/248, paragraph 5.2.3.1.a of this training procedure?	___Yes ___ No ___N/A
A 3.	Is there evidence of training in workmanship and detailed visual inspection requirements of all fabrication documents to which welding is performed?	___Yes ___ No ___N/A
A 4.	Have all welders passed written examinations covering detailed workmanship and visual inspection requirements with a grade of 75 percent or greater?	___Yes ___ No ___N/A
A 5.	Is there evidence of approval of Items 1, 3 and 4 above by a Level III examiner or other NAVSEA approved individual? (MIL-STD-248, paragraph 5.2.3.1.d)	___Yes ___ No ___N/A
A 6.	Do examination records for each welder include: name, fabrication/acceptance standards covered, date of test, and certifying signature of test administrator?	___Yes ___ No ___N/A
A 7.	Is each welder retested every 3 years?	___Yes ___ No ___N/A
A 8.	Is the entire training program audited by the Level III Examiner or other NAVSEA approved individual (MIL-STD-248, paragraph 5.2.3.1.d) at least once every 2 years to assure adequacy?	___Yes ___ No ___N/A
SECTION VIII PERFORMANCE A DETAILED OBSERVATION OF WELDERS		___Sat ___Unsat ___N/A

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	(Complete one section for each welder observed) NOTE: If determined to be N/A, provide explanation	
	a. Welder Identification (name, badge or clock #, shift): _____ _____ ____ _____	___Yes ___ No ___N/A
	b. Wire Chit on file (in-house system):	___Yes ___ No ___N/A
	b. Welding Process observed:	___Yes ___ No ___N/A
	c. Base Material(s) being welded:	___Yes ___ No ___N/A
	e. Is the welder qualified for observed welding procedure?	___Yes ___ No ___N/A
	f. Is the welder familiar with details of the procedure?	___Yes ___ No ___N/A
	g. Is procedure/technique sheet readily available?	___Yes ___ No ___N/A

	h. Procedure Number:	___Yes ___ No ___N/A
	i. Electrode/Filler Wire/Flux in use: 1. Type 2. Specification	___Yes ___ No ___N/A
	j. Material Identification: On records _____ On hardware _____	
	k. Parameters:	
	1. Current	___Yes ___ No ___N/A
	2. Voltage	___Yes ___ No ___N/A
	3. Travel Speed	___Yes ___ No ___N/A

	4. Wire Size	___Yes ___ No ___N/A
	l. Joint Preparation, Fitup and Clean	___Sat ___Unsat ___N/A
	m. Visual Weld Quality and Workmanship	___Yes ___ No ___N/A
	n. Is preheat/interpass required?	___Yes ___ No ___N/A
	1. Is preheat temperature compliance checked?	___Yes ___ No ___N/A
	2. Is interpass temperature range confirmed?	___Yes ___ No ___N/A
	o. Overall, is operator complying with procedure and specifications?	___Yes ___ No ___N/A
	p. Are required documents organized in an orderly manner? (e.g. procedure and mods, Approval documents, etc., in one accessible location)?	___Yes ___ No ___N/A

Additional Comments/Concerns: