

NUMBER: 60-77

TITLE: WELDING AND BRAZING PROCEDURE APPROVAL  
SCOPE: REQUIREMENTS FOR MILITARY AND COMMERCIAL WELDING AND  
BRAZING

ACRONYMS:

ACN (ADVANCE CHANGE NOTICE)  
BPS (BRAZING PROCEDURE SPECIFICATION OR BRAZING PROCEDURE)  
NDT (NON-DESTRUCTIVE TESTING)  
PQR (PROCEDURE QUALIFICATION RECORD)  
RT (RADIOGRAPHIC TEST)  
SPARS VES (SHIPBUILDING PARTNERS AND SUPPLIERS VIRTUAL ENTERPRISE  
SERVER)  
VIR (VENDOR INFORMATION REQUEST)  
VPAR (VENDOR PROCEDURE APPROVAL REQUEST)  
VT (VISUAL TEST)  
WPQ (WELDER PERFORMANCE QUALIFICATION RECORDS)  
WPS (WELDING PROCEDURE SPECIFICATION OR WELD PROCEDURE)

CLAUSE: THE REQUIREMENTS CONTAINED HEREIN APPLY TO PROCEDURES  
USED IN FULFILLING THE REQUIREMENTS OF THIS PURCHASE ORDER. THE  
REQUIREMENTS ARE APPLICABLE TO BOTH SUPPLIERS AND THEIR  
SUBCONTRACTOR(S).

EFFECTIVITY: THIS STANDARD CLAUSE REVISION IS APPLICABLE TO  
PURCHASE ORDERS INITIATED FROM 05/31/2019 FORWARD. ANY PURCHASE  
ORDERS DATED PRIOR TO 05/31/2019 MAY UTILIZE REVISION 20 OF THIS  
STANDARD CLAUSE.

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I) GENERAL REQUIREMENTS:

A) WRITTEN PROCEDURES SHALL BE APPROVED BY THE BUYER PRIOR TO PERFORMANCE OF WELDING OR BRAZING AND SHALL BE SUBMITTED FOR APPROVAL WITHIN THIRTY (30) DAYS OF SUPPLIER'S RECEIPT OF A PURCHASE ORDER. THE PRIME SUPPLIER WILL BE RESPONSIBLE FOR SUBMITTING FOR APPROVAL THEIR SUBCONTRACTOR'S WRITTEN PROCEDURES AND ONCE APPROVED BY EB, THE APPROVAL DOCUMENT SHALL BE FLOWED DOWN TO THE SUBCONTRACTOR.

B) FOR CASES WHERE THE SUPPLIER IS NOT ABLE TO SUBMIT PROCEDURES WITHIN THE THIRTY DAY REQUIREMENT, THE SUPPLIER IS REQUIRED TO NOTIFY THE BUYER AND PROVIDE A SCHEDULE FOR WHEN THE PROCEDURES WILL BE SUBMITTED FOR APPROVAL.

C) FOR PURCHASE ORDERS THAT ORIGINATE FROM HUNTINGTON INGALLS INDUSTRIES NEWPORT NEWS SHIPBUILDING (HII-NNS) SEE SECTION XI OF THIS STANDARD CLAUSE.

D) \*\*WARNING \*\* MATERIAL WELDED OR BRAZED WITH UNAPPROVED PROCEDURES OR UNAPPROVED PROCEDURE REVISIONS IS SUBJECT TO REJECTION AT THE SUPPLIER'S EXPENSE. SUPPLIERS MUST WORK TO THE MOST RECENT APPROVED REVISION OF THEIR PROCEDURE LISTED IN THE CORRECTIVE ACTION BLOCK FOR ELECTRONIC VPARS OR BLOCK 13 OF THE PAPER VERSION. EACH VPAR APPROVAL FOR A NEW PROCEDURE REVISION SUPERSEDES THE PREVIOUS REVISION APPROVAL.

E) \*\* WARNING\*\* PROCEDURES SHALL BE SUBMITTED TO THE BUYER ELECTRONICALLY THROUGH THE SPARS VPAR SYSTEM OR A PROPERLY COMPLETED VENDOR PROCEDURE APPROVAL REQUEST (VPAR), (EB FORM 84-01-2974) WHEN REQUIRED BY SECTION I.G. SUBMITTAL SHALL INCLUDE AT A MINIMUM ITEMS IN SECTION I.K BELOW.

F) COMMERCIAL WELDING AND BRAZING:

1) WHEN THIS STANDARD CLAUSE IS INVOKED ON APPLICATIONS PERMITTING COMMERCIAL WELDING AND BRAZING, WPS AND BPS SHALL BE SUBMITTED ON A VPAR IN ACCORDANCE WITH THE REQUIREMENTS OF THIS CLAUSE.

G) WPS OR BPS AND SUPPORTING PQR(S) SHALL BE SUBMITTED WHEN ANY OF THE FOLLOWING APPLIES:

- 1) IT IS A NEW PROCEDURE OR A PROCEDURE WHICH HAS NOT BEEN PREVIOUSLY APPROVED.
- 2) IT IS A PREVIOUSLY APPROVED PROCEDURE THAT IS REVISED. SUBMITTAL IS REQUIRED FOR ADMINISTRATIVE ONLY REVISION.
- 3) IT IS A PROCEDURE PREVIOUSLY APPROVED SPECIFICALLY FOR A SINGLE PURCHASE ORDER OR SINGLE APPLICATION, AS DEFINED IN THE CORRECTIVE ACTION BLOCK FOR ELECTRONIC VPARS (OR BLOCK 13 OF THE PAPER VPAR), THAT WILL BE USED ON A DIFFERENT PURCHASE ORDER OR APPLICATION.
- 4) IF THE PROCEDURE APPROVAL IS ONLY FOR A DRAWING NUMBER, IF A REVISION IS MADE TO THAT DRAWING AFFECTING THE WELDING OR BRAZING ON THAT DRAWING.
- 5) FOR EB-PURCHASED MATERIAL, IT IS A PROCEDURE PREVIOUSLY APPROVED BY AN ORGANIZATION OTHER THAN EB BUT NOT BY EB. FOR NNS-PURCHASED MATERIAL, IT IS A PROCEDURE APPROVED BY AN ORGANIZATION OTHER THAN NNS BUT NOT BY NNS.

I. TO EXPEDITE APPROVAL, THE SUBMITTAL SHALL CONTAIN THE SUPPORTING QUALIFICATION DATA AND COPIES OF ALL APPROVAL DOCUMENTATION FROM OTHER ORGANIZATIONS. FOR EXAMPLE: A NAVSEA LETTER OF APPROVAL, AN AUTHORIZED REPRESENTATIVE LETTER OF APPROVAL, NNS FORM 9014.

H) PROCEDURES ARE NOT REQUIRED TO BE SUBMITTED FOR THE FOLLOWING CASES:

- 1) PROCEDURES WHICH HAVE PREVIOUSLY RECEIVED THE BUYER'S WRITTEN APPROVAL ON A VPAR NEED NOT BE RESUBMITTED PROVIDED THAT THE PROCEDURE, INCLUDING REVISION AND DATE, IS THE SAME AS THAT LISTED ON THE PREVIOUSLY APPROVED VPAR AND THE APPROVAL IS NOT FOR SPECIFIC APPLICATIONS AS LISTED IN SECTION II.B
- 2) WHEN SPECIFICALLY EXEMPTED BY NAVSEA APPROVED SPECIFICATIONS, DRAWINGS; AS ALLOWED BY FABRICATION DOCUMENTS; OR AS OTHERWISE APPROVED BY EB.

I) FOR HARDWARE INVOLVING WELDING/BRAZING, WHERE THE WPS/BPS REQUIRES APPROVAL, THE SUPPLIER SHALL ATTACH A PHOTOCOPY OF THE APPROVED VPAR FOR EACH WPS/BPS USED TO THE FOLLOWING:

- 1) THE PACKING SLIP
- 2) THE WELD OR BRAZE RECORDS, WHEN RECORDS ARE REQUIRED

J) ONLY ONE WELDING/BRAZING PROCEDURE (INCLUDING SUPPORTING QUALIFICATION DATA, TEST REPORTS AND PREVIOUS APPROVAL INFORMATION) PER VPAR SHALL BE SUBMITTED. RECORDS FOR MORE THAN ONE SUPPORTING QUALIFICATION TEST MAY BE SUBMITTED WITH A VPAR, AS NECESSARY, IN SUPPORT OF A SINGLE WELDING/BRAZING PROCEDURE.

K) VPAR DETAIL REQUIREMENTS: VPAR SUBMITTAL FOR INITIAL PQR/WPS/BPS APPROVAL SHALL INCLUDE THE FOLLOWING DOCUMENTS (SEE SECTIONS V, VI AND VII FOR DETAILED REQUIREMENTS FOR WPS, BPS AND PQR).

- 1) WPS OR BPS
- 2) SUPPORTING PQR(S). FOR PQRS WHICH HAVE NOT BEEN PREVIOUSLY APPROVED, ALSO INCLUDE:

I. SUPPORTING TEST LAB REPORTS

II. MATERIAL CERTIFICATIONS FOR DUAL-CERTIFIED FILLER MATERIAL

III. APPROVED RT VPAR (SEE SECTION VI.D.4), FOR QUALIFICATIONS REQUIRING RT.

- 3) NAVSEA OR NAVSEA AUTHORIZED REPRESENTATIVE APPROVAL DOCUMENTATION FOR PREVIOUSLY APPROVED PQR(S), WHEN APPLICABLE.

L) IN CASES WHERE WELDING OR BRAZING PROCEDURES CONSIST OF A MAIN OR GENERAL PROCEDURE AND A SUPPLEMENTAL TECHNIQUE SHEET, AND ESSENTIAL WELDING/BRAZING PROCEDURE ELEMENTS ARE CONTAINED IN BOTH DOCUMENTS, BOTH DOCUMENTS SHALL BE SUBMITTED. NOTE THAT IN SOME CASES, A WELDING OR BRAZING PROCEDURE IS CALLED A SCHEDULE; SCHEDULES SHALL BE SUBMITTED FOR REVIEW AND APPROVAL AS WELL. GENERAL PROCEDURES WRITTEN TO BOTH MILITARY AND COMMERCIAL SPECIFICATIONS WILL NOT BE ACCEPTED.

II) VPAR APPROVAL LIMITATIONS:

A) WPS OR BPS WRITTEN IN ACCORDANCE WITH NAVSEA TECHNICAL PUBLICATIONS (I.E. NAVSEA T9074-AD-GIB-010/1688 OR S9074-AR-GIB-010/278) OR MILITARY STANDARDS (I.E. MIL-STD-278) ARE TYPICALLY APPROVED FOR GENERAL USE WITHOUT RESTRICTION.

B) APPROVAL OF WPS OR BPS FOR NON-CRITICAL APPLICATIONS (AS DEFINED BY PARAGRAPH 4.2 OF SEAWOLF PPD 802-6335694 AND/OR PARAGRAPH 4.2.1.1 OF MIL-STD-278 OR NAVSEA S9074-AR-GIB-010/278), MINOR STRUCTURE (AS DEFINED IN PARAGRAPH 3.33.3.1 OF NAVSEA T9074-AD-GIB-010/1688) OR TO COMMERCIAL OR OTHER SPECIFICATIONS, IS LIMITED TO ONE OF THE FOLLOWING:

- 1) A SINGLE PURCHASE ORDER.
- 2) SINGLE APPLICATION. SINGLE APPLICATION APPROVAL IS BASED ON DRAWING NUMBER AND PART NUMBER.

C) LIMITED APPROVAL MAY ALSO BE DUE TO NAVSEA APPROVAL OF SPECIAL WELD PROCEDURES WHERE SPECIFIC APPLICATION APPROVAL IS REQUIRED BY MIL-STD-278 / NAVSEA S9074-AR-GIB-010/278, PARAGRAPH 6.2.

D) EACH VPAR APPROVAL IS ISSUED FOR A SPECIFIC SINGLE WPS OR BPS REVISION AND DATE.

1) SUPPLIERS SHALL WORK TO THE MOST RECENT APPROVED REVISION OF THEIR PROCEDURE LISTED IN THE CORRECTIVE ACTION BLOCK FOR ELECTRONIC VPARS (OR BLOCK 13 OF THE PAPER VPAR) ONCE APPROVAL IS GRANTED.

2) EACH NEW VPAR APPROVAL FOR A NEW PROCEDURE REVISION SUPERSEDES THE PREVIOUS REVISION APPROVAL.

I. THE USE OF EARLIER REVISIONS OF A PROCEDURE IS PROHIBITED UNLESS USE IS SPECIFICALLY APPROVED. REQUESTS TO DO SO SHALL BE SUBMITTED ON A VIR.

II. THE VIR SUBMITTAL SHALL IDENTIFY WHAT APPLICATION THE EARLIER REVISION OF THE PROCEDURE WILL BE USED ON.

III. THE VIR SHALL PROVIDE JUSTIFICATION FOR USING THAT REVISION OF THE PROCEDURE.

3) IF A VPAR APPROVAL IS RESCINDED, USE OF A PREVIOUSLY APPROVED REVISION OF THE PROCEDURE IS NOT AUTHORIZED.

III) FABRICATION AND QUALIFICATION DOCUMENT APPLICABILITY:

A) WELDING AND BRAZING SHALL BE PERFORMED IN ACCORDANCE WITH ELECTRIC BOAT SPECIFICATION 5341 (EB-5341).

B) THE EFFECTIVE DOCUMENT AND REVISION, INCLUDING MODIFICATIONS THERTO, OF WELDING AND BRAZING SPECIFICATIONS AND STANDARDS SHALL BE AS SPECIFIED BY EB-5341.

C) THE APPLICABLE FABRICATION AND QUALIFICATION SPECIFICATION AND REVISION LEVEL SHALL BE EXPLICITLY LISTED IN FULL ON THE REQUIRED DOCUMENTATION (WELDING OR BRAZING PROCEDURES, PROCEDURE QUALIFICATION RECORDS, AND CERTIFICATIONS) E.G. WRITING "NAVSEA S9074-AQ-GIB-010/248" AS "248" IS NOT ACCEPTABLE.

IV) USE OF UNLISTED BASE OR FILLER MATERIALS:

A) WELDING OR BRAZING OF UNLISTED BASE MATERIALS OR WITH UNLISTED FILLER MATERIAL/ELECTRODE IS PROHIBITED EXCEPT AS SPECIFIED BELOW:

1) WELDING: ALL BASE METALS (SPECIFICATION, TYPE AND CLASS OR GRADE) THAT ARE NOT LISTED S-GROUP NUMBERS IN NAVSEA S9074-AQ-GIB-010/248 TABLE I OR NAVSEA S9074-AR-GIB-010/278 TABLE I MUST HAVE NAVSEA OR NAVSEA AUTHORIZED REPRESENTATIVE APPROVAL PRIOR TO WELDING.

2) BRAZING: ALL BASE METALS (SPECIFICATION, TYPE AND CLASS OR GRADE) THAT ARE NOT LISTED P-GROUP NUMBERS IN NAVSEA 0900-LP-001-7000 TABLE 4-4 OR NAVSEA S9074-AQ-GIB-010/248 TABLE XIII MUST HAVE NAVSEA OR NAVSEA AUTHORIZED REPRESENTATIVE APPROVAL PRIOR TO BRAZING.

3) FILLER MATERIAL/ELECTRODE SPECIFICATION AND TYPE: ALL FILLER MATERIALS/ELECTRODES THAT ARE NOT LISTED A-/F-GROUP NUMBERS IN NAVSEA S9074-AR-GIB-010/278 TABLE II, NAVSEA T9074-AD-GIB-010/1688 TABLES 10-1, 10-2, 10-3, 10-4, NAVSEA S9074-AQ-GIB-010/248 TABLE II OR TABLE XIV, OR NAVSEA 0900-LP-001-7000 TABLE 4-2 MUST HAVE NAVSEA OR NAVSEA AUTHORIZED REPRESENTATIVE APPROVAL PRIOR TO WELDING OR BRAZING.

B) IF THE SUPPLIER DOES NOT HAVE AN APPROVAL FOR A BASE OR FILLER MATERIAL/ELECTRODE, THE SUPPLIER MUST REQUEST APPROVAL VIA A VIR. THE VIR MUST PROVIDE THE MATERIAL SPECIFICATION, TYPE, CONDITION, AND APPLICATION WHERE THE MATERIAL IS BEING USED.

C) IN ADDITION, IF A LISTED MATERIAL SPECIFICATION IS FOUND TO BE OBSOLETE AND POINTS TO A REPLACEMENT SPECIFICATION, THE REPLACEMENT SPECIFICATION SHALL NOT BE USED UNLESS THAT MATERIAL SPECIFICATION IS APPROVED AS AN S-/P-/A-/F-GROUP MATERIAL.

D) THE NAVWELD SOFTWARE, DISCUSSED IN SECTION VIII, CONTAINS A LISTING OF MATERIALS APPROVED TO BE LISTED, BY GROUP NUMBERS.

NOTE: APPROVAL TO CLASSIFY A MATERIAL TO AN S-, P-, A-, OR F-GROUP DOES NOT CONSTITUTE APPROVAL TO USE THAT MATERIAL FOR A PARTICULAR APPLICATION OR TO AUTHORIZE SUBSTITUTION OF A MATERIAL ON A DRAWING.

V) PREPARATION OF WELDING OR BRAZING PROCEDURES:

A) WPS, BPS AND SUPPORTING PQRS SHALL BE WRITTEN IN ACCORDANCE WITH THE APPLICABLE NAVSEA TECHNICAL PUBLICATION OR APPLICABLE COMMERCIAL REQUIREMENTS AND REQUIREMENTS IN THIS PURCHASE ORDER.

B) VPAR WELD PROCEDURE INSTRUCTION BROCHURE OFFERS GUIDANCE FOR PREPARATION AND CAN BE FOUND BY GOING TO THE EB WEB SITE [HTTP://WWW.GDEB.COM](http://www.gdeb.com). THESE INSTRUCTIONS OFFER A GUIDE TO PREPARING AND PRESENTING THE QUALIFICATION AND WELDING PROCEDURE INFORMATION SUCH THAT IT WILL CONFORM TO THE REQUIREMENTS OF SPECIFICATIONS LISTED IN EB-5341. IN ADDITION, USE OF NAVWELD (SEE SECTION VIII) WILL GREATLY AID SUPPLIERS IN PREPARING AND PRESENTING QUALIFICATION AND WELDING PROCEDURE INFORMATION.

C) WPS, BPS AND PQR SHALL BE WRITTEN USING ONE OF THE FOLLOWING FORMATS:

1) PREFERRED: NAVWELD SOFTWARE. IT IS RECOMMENDED THAT BOTH NEW SUPPLIERS AND, FOR STANDARDIZATION PURPOSES, EXISTING SUPPLIERS USE THE NAVWELD SYSTEM IN PREPARING PROCEDURES AND QUALIFICATION DATA. ADDITIONAL INFORMATION IS PRESENTED IN SECTION VIII.

2) SUPPLIER'S OWN EXISTING FORMAT.

VI) WPS, BPS AND PQR REQUIREMENTS:

A) THE FOLLOWING SECTION PROVIDES CLARIFICATION OF SPECIFICATION REQUIREMENTS AS WELL AS ADDITIONAL REQUIREMENTS INVOKED BY THE BUYER.

B) ALL NEW WELDING PROCEDURES SHALL BE LIMITED TO ONE FABRICATION SPECIFICATION. WELDING PROCEDURES WRITTEN AND QUALIFIED TO MULTIPLE SPECIFICATIONS WILL NOT BE ACCEPTED. THE EXCEPTION TO THIS IS WHEN NAVSEA S9074-AR-GIB-010/278 AND NAVSEA T9074-AD-GIB-010/1688 PROCEDURES HAVE BEEN QUALIFIED TO NAVSEA S9074-AQ-GIB-010/248.

C) PROCEDURES WRITTEN TO BOTH MILITARY AND COMMERCIAL SPECIFICATIONS WILL NOT BE ACCEPTED.

D) SPECIFIC REQUIREMENTS FOR NEW PQRs:

1) EACH PQR (TEST ASSEMBLY AND WRITTEN DOCUMENTS) SHALL BE IDENTIFIED BY A UNIQUE PQR NUMBER. WHERE MULTIPLE TEST ASSEMBLIES ARE PERFORMED, THEY SHALL BE UNIQUELY IDENTIFIED.

I. THE UNIQUE PQR NUMBER SHALL BE DIFFERENT FROM THE WELDING OR BRAZING PROCEDURE NUMBER OR ANOTHER PQR NUMBER, E.G. WPS-123 AND PQR-123 WOULD BE ACCEPTABLE.

II. THE UNIQUE PQR NUMBER SHALL APPEAR ON ALL QUALIFICATION SUPPORTING DOCUMENTS, INCLUDING TEST LAB REPORTS.

III. THE UNIQUE PQR NUMBER REQUIREMENT APPLIES TO BOTH MILITARY AND COMMERCIAL WELDING AND BRAZING.

IV. REPLACEMENT PQR FOR A FAILED PQR SHALL HAVE ITS OWN UNIQUE NUMBER.

2) THE UNIQUE PQR NUMBER(S) SHALL BE LISTED ON THE WPS OR BPS WHICH IT SUPPORTS.

3) BOTH THE PQR AND THE TEST LAB REPORTS SHALL IDENTIFY THE FOLLOWING AS APPLICABLE OR BE SUBJECT TO REJECTION:

I. THE NDT PERFORMANCE STANDARD AND REVISION (E.G. NAVSEA T9074-AS-GIB-010/271, ACN 1)

II. NDT ACCEPTANCE STANDARD AND REVISION (E.G. MIL-STD-2035, REVISION A, CLASS 1)

III. DESTRUCTIVE TEST PERFORMANCE STANDARD AND REVISION (E.G. AWS B4.0, 2007)

IV. DESTRUCTIVE TEST ACCEPTANCE CRITERIA (STANDARD, PARAGRAPH, AND SUBPARAGRAPH IF APPLICABLE) (E.G. MACROS IN ACCORDANCE WITH (IAW) NAVSEA S9074-AQ-GIB-010/248, PARAGRAPH 4.5.2.6.B)

V. BEND TESTS SHALL REPORT BEND ANGLE, THICKNESS, AND BEND RADIUS, AS A MINIMUM OF INFORMATION

VI. ALL CHANGES TO LAB REPORTS SHALL BE ACCOMPLISHED BY THE COGNIZANT LAB, WITHOUT EXCEPTIONS.

4) RADIOGRAPHY (RT) OF PQRS FOR WPS IN ACCORDANCE WITH NAVSEA TECHNICAL PUBLICATIONS OR MILITARY STANDARDS, FOR WHICH RT INSPECTION OF TEST ASSEMBLY FINAL WELD IS REQUIRED AND WHERE THE PQR HAS NOT BEEN PREVIOUSLY APPROVED, SHALL REQUIRE SUBMITTAL OF THE RT FILM AND RT DATA FOR REVIEW AND APPROVAL ON A VPAR SEPARATE FROM THE WELDING PROCEDURE VPAR IN ACCORDANCE WITH THE FOLLOWING:

I. THE RT VPAR SHALL BE APPROVED PRIOR TO SUBMITTAL OF THE WPS VPAR.

II. PQR TEST ASSEMBLIES TO BE QUALIFIED WITH POST WELD HEAT TREATMENT (PWHT) SHALL RECEIVE PWHT AFTER WELDING AND PRIOR TO FINAL RT INSPECTION, WHEN THE PWHT INVOLVES QUENCHING IN A LIQUID MEDIUM.

III. VISUAL INSPECTION (VT) SHALL BE CONDUCTED AND FOUND SATISFACTORY BEFORE PERFORMING FINAL RT OF THE TEST ASSEMBLY.

IV. THE RT FILM WITH ASSOCIATED SET-UP (TECHNIQUE) AND READER'S SHEET SHALL BE SUBMITTED ON THE VPAR.

V. THE RT VPAR SHALL CONTAIN THE FOLLOWING ITEMS IN THE VPAR DESCRIPTION OF DOCUMENT BLOCK FOR ELECTRONIC VPARS (OR BLOCK 13 FOR THE PAPER VPAR) OR BE SUBJECT TO REJECTION:

A. THE STATEMENT: "RT FILM AND DATA FOR WELDING PROCEDURE QUALIFICATION"

B. PQR NUMBER

C. WELDING PROCEDURE NUMBER

D. THE STATEMENT: "VISUAL INSPECTION (VT) WAS CONDUCTED AND THE WELD FOUND TO BE SATISFACTORY."

E. RT PROCEDURE IDENTIFIED BY: PERFORMING ACTIVITY, NUMBER, REVISION, AND DATE (AND ANY ADDENDA)

F. JOINT TYPE I.E. BUTT, SINGLE BEVEL, DOUBLE BEVEL, BACKING BAR, ETC.

G. STATEMENT IF BACKING BAR WAS REMOVED OR LEFT ON DURING SHOOTING

H. BASE MATERIAL TYPE

I. FILLER MATERIAL TYPE

J. JOINT THICKNESS

K. JOINT FORM (PLATE/ PIPE)

L. IF THE TEST ASSEMBLY RECEIVED PWHT, THE RT VPAR SHALL IDENTIFY IF PWHT WAS PERFORMED BEFORE OR AFTER RT.

VI. THE RT PERFORMANCE STANDARD AND ACCEPTANCE CRITERIA SHALL BE LISTED IN THE CORRECTIVE ACTION BLOCK FOR ELECTRONIC VPARS (OR BLOCK 13 OF THE PAPER VPAR) PER A. OR B. BELOW:

A. FOR NAVSEA TECHNICAL PUBLICATION QUALIFICATIONS THE RT PERFORMANCE STANDARD SHALL BE NAVSEA T9074-AS-GIB-010/271; ACCEPTANCE TO MIL-STD-2035A CLASS I.

B. FOR MIL-STD AND PPD QUALIFICATIONS THE PERFORMANCE STANDARD SHALL BE NAVSEA T9074-AS-GIB-010/271 OR MIL-STD-271F; ACCEPTANCE TO MIL-STD-2035A CLASS I.

VII. THE RT FILM AND ASSOCIATED DATA SHOULD BE SUBMITTED FOR REVIEW AND APPROVAL PRIOR TO SECTIONING THE QUALIFICATION TEST ASSEMBLY FOR DESTRUCTIVE TESTING. DOING SO MAY AVOID HAVING TO WELD ADDITIONAL TEST ASSEMBLIES SHOULD THE FILM RESULTS BE DISPUTED.

VIII. A COPY OF THE VPAR THAT APPROVED THE RT PROCEDURE SHALL BE ATTACHED TO THE PQR RT VPAR SUBMITTAL. SEE SECTION VI.D.5.

5) PRIOR TO RT OF A PQR TEST ASSEMBLY, ANY ACTIVITY PERFORMING THE RT EVALUATION OF WELDING PQR TEST ASSEMBLIES SHALL HAVE THEIR RT PROCEDURE APPROVED BY THE BUYER'S NON-DESTRUCTIVE TEST (NDT) ENGINEERING. THE SUBMITTAL OF A VPAR FOR AN RT PROCEDURE FOR APPROVAL OR EXTENDING A PREVIOUS APPROVAL SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF STANDARD CLAUSE 60-67.

I. FOR PQRS IN ACCORDANCE WITH NAVSEA TECHNICAL PUBLICATIONS, RT PROCEDURES SHALL BE WRITTEN TO NAVSEA T9074-AS-GIB-010/271

II. FOR PQRS IN ACCORDANCE WITH MILITARY STANDARDS, RT PROCEDURES SHALL BE WRITTEN TO NAVSEA T9074-AS-GIB-010/271 OR MIL-STD-271F.

6) RADIOGRAPHIC FILMS SUBMITTED FOR REVIEW SHOULD CONTAIN, AT A MINIMUM, 2 FILMS PER VIEW IN THE CASE THAT AN ARTIFACT IS FOUND WHICH IMPAIRS FILM INTERPRETATION.

VII) WPS, BPS, PQR REVISION CONTROL:

A) WHEN REVISIONS ARE REQUIRED TO CORRECT DISCREPANCIES TO WPS, BPS AND/OR PQR/SUPPORTING DOCUMENTATION, THE FOLLOWING SHALL APPLY:

1) WPS OR BPS THAT HAVE BEEN PREVIOUSLY ISSUED FOR PRODUCTION SHALL REQUIRE BOTH A CHANGE IN THE REVISION LEVEL AND THE DATE. PROCEDURES THAT HAVE NOT BEEN PREVIOUSLY ISSUED FOR PRODUCTION NEED NOT CHANGE THE REVISION LEVEL, BUT SHALL HAVE THE DATE CHANGED.

2) PQR/SUPPORTING DOCUMENTS SHALL LIST THE ORIGINAL DATE THAT THE TEST ASSEMBLY WAS WELDED/BRAZED. THE CORRECTIONS SHALL IDENTIFY

WHAT ITEMS WERE CORRECTED AND THE DATE. PQR DATE AND A NEW CERTIFICATION DATE SHALL BE APPLIED WHEN CORRECTIONS ARE MADE.

VIII) USE OF NAVWELD FOR WELDING/BRAZING PROCEDURES AND QUALIFICATION RECORDS

A) NAVWELD ([HTTP://WWW.NAVWELD.COM](http://www.navweld.com)) IS A SECURE, INTERNET-BASED APPLICATION THAT ASSISTS THE USER IN DEVELOPING PQRS, WPS, BPS, AND WELDER PERFORMANCE QUALIFICATION RECORDS (WPQ) THAT MEET THE REQUIREMENTS OF VARIOUS U.S. NAVY SPECIFICATIONS.

B) ALTHOUGH USE OF NAVWELD IS NOT A PURCHASE ORDER REQUIREMENT, GDEB AND HII-NNS STRONGLY RECOMMEND SUPPLIERS UTILIZE THIS SOFTWARE, AS IT HAS BEEN SHOWN TO DRAMATICALLY REDUCE THE NUMBER OF ERRORS IN SUPPLIER SUBMITTALS. THIS SIGNIFICANTLY REDUCES APPROVAL CYCLE TIME. THE CREATION OF DETAILED WELDING/BRAZING PROCEDURES OR QUALIFICATION RECORDS REQUIRING CUSTOMER APPROVAL IS AN AREA WHERE SUPPLIERS, ESPECIALLY THOSE WITH LITTLE OR NO EXPERIENCE, HAVE DIFFICULTIES OBTAINING APPROVAL. DELAYS IN RECEIVING APPROVAL CAN RESULT IN DELAYS TO THE START OF FABRICATION OR HARDWARE DELIVERY BY THE SUPPLIER.

C) THERE IS NO COST TO THE SUPPLIERS OF GDEB OR HII-NNS FOR USE OF NAVWELD. THIS INCLUDES BOTH DIRECT SUPPLIERS AND SUB-TIER SUPPLIERS.

D) TO OBTAIN ACCESS TO NAVWELD, CONTACT TROY PASKELL AT [PASKELL@WELDQC.COM](mailto:PASKELL@WELDQC.COM) OR 614-487-7207 TO OBTAIN A USER-AGREEMENT. ONCE THE USER-AGREEMENT IS RETURNED, A USER-NAME AND PASSWORD IS PROVIDED.

E) NAVWELD CONTAINS THE REQUIREMENTS FOR ARC WELDING, STUD WELDING, BRAZING AND RESISTANCE WELDING ACCORDING TO THE FOLLOWING SPECIFICATIONS:

- 1) NAVSEA S9074-AQ-GIB-010/248
- 2) NAVSEA S9074-AR-GIB-010/278
- 3) MIL-STD-1689A
- 4) NAVSEA T9074-AD-GIB-010/1688
- 5) ABS/ NVR - 2007
- 6) NAVSEA 0900-LP-001-7000
- 7) AMERICAN WELDING SOCIETY D17.2

F) NAVWELD AUTOMATICALLY DETERMINES:

- 1) ESSENTIAL ELEMENTS FOR PQR, WPS/BPS & WPQ
- 2) NON-DESTRUCTIVE TESTS FOR PQR & WPQ
- 3) DESTRUCTIVE TESTS FOR PQR & WPQ
- 4) QUALIFIED RANGES OF THE ESSENTIAL ELEMENTS FOR PQR & WPQ

- 5) REQUIREMENTS OF THE FABRICATION DOCUMENT FOR PQR & WPS/BPS
- 6) PREHEAT & INTERPASS TEMPERATURES
- 7) BASE & FILLER COMBINATIONS

G) ADDITIONAL FEATURES INCLUDE:

- 1) LOCATIONS FOR ENTRIES ARE MARKED "AS REQUIRED" OR "OPTIONAL", AND DOCUMENTS ARE MARKED AS "COMPLETE" OR "INCOMPLETE".
- 2) NAVWELD AUTOMATICALLY CREATES A WPS/BPS BASED ON THE QUALIFIED RANGES OF A PQR.
- 3) PROVIDES THE ABILITY TO TRACK VISION TESTS, WORKMANSHIP TRAINING AND WELDING/BRAZING HISTORY FOR PERSONNEL.
- 4) PROVIDES THE ABILITY TO SEARCH FOR WELDERS & BRAZERS BASED ON THEIR QUALIFICATIONS.

IX) CLARIFICATION OF REQUIREMENTS FOR SINGLE PASS WELD QUALIFICATION, BUTTERING UNDER HARDFACING OR CLADDING, SUBMERGED ARC WELDING OF HY-MATERIALS, AND REPAIR OF BASE MATERIALS

A) SINGLE PASS WELD QUALIFICATION:

- 1) MULTI PASS WELD QUALIFICATIONS CAN QUALIFY SINGLE PASS WELDING FOR THE FOLLOWING CONDITIONS, PROVIDED THE REQUIREMENTS OF NAVSEA S9074-AQ-GIB-010/248 ARE MET:

I. FILLET WELDS

II. BUILD UP OR REPAIR WELDING

III. JOINT DESIGNS LISTED IN MIL-STD-22 WHICH ARE RESTRICTED TO BASE MATERIAL THICKNESSES LESS THAN 1/4- INCH E.G. B1S.1, B1S.2, C1S.1, ETC.

B) BUTTERING UNDER HARDFACING OR CLADDING (SOME DRAWINGS REFER TO THIS AS A BUFFER LAYER):

- 1) IF A PROCEDURE IS QUALIFIED WITHOUT BUTTERING, THE ADDITION OF BUTTERING SHALL REQUIRE REQUALIFICATION.
- 2) THE MINIMUM QUALIFIED THICKNESS OF THE BUTTERING LAYER IS T (THE THICKNESS USED FOR THE QUALIFICATION WELD). THE MAXIMUM QUALIFIED THICKNESS OF THE BUTTERING LAYER IS 2T.
- 3) THE MINIMUM QUALIFIED NUMBER OF BUTTERING LAYERS IS EQUAL TO THE NUMBER OF BUTTERING LAYERS UTILIZED FOR THE QUALIFICATION TEST ASSEMBLY (RECORD NUMBER OF LAYERS ON PQR).
- 4) ELIMINATION OF BUTTERING SHALL REQUIRE REQUALIFICATION.
- 5) THE FINAL BUTTERING LAYER SURFACE SHALL BE VT AND PT INSPECTED IN ACCORDANCE WITH NAVSEA S9074-AQ-GIB-010/248 BEFORE HARDFACING OR CLADDING.
- 6) IF A BUTTER LAYER IS APPLIED BY ITSELF (I.E. IT FORMS THE FINAL WELD SURFACE) THEN IT IS A PAD AND SHALL REQUIRE

QUALIFICATION BY A BUTT WELD AS SPECIFIED IN NAVSEA S9074-AQ-GIB-010/248.

C) REPAIR OF BASE MATERIALS:

WELD REPAIR OF BASE MATERIALS SHALL BE CONDUCTED IN ACCORDANCE WITH THE REQUIREMENTS OF EB-4186.

1) WHEN REQUIRED BY EB-4186, PERMISSION TO PERFORM REPAIR WELDING SHALL BE REQUESTED VIA A PROPERLY COMPLETED VIR SUBMITTED BY THE SUPPLIER ELECTRONICALLY USING THE APPROVED SPARS VES (VIRTUAL ENTERPRISE SERVER). THE SUPPLIER SHALL SEND THESE DOCUMENTS TO THE BUYER DESIGNATED ON THE PURCHASE ORDER. WHERE PERMISSION TO PERFORM REPAIRS IS REQUIRED, BUYER AUTHORIZATION SHALL BE OBTAINED PRIOR TO PERFORMING THE REPAIRS

D) SUBMERGED ARC WELDING OF HY-80/100 AND HSLA-80 STEELS:

1) ADDITIONAL PREHEAT/INTERPASS, HEAT SOAKING AND FLUX HANDLING REQUIREMENTS FOR SUBMERGED ARC WELDING OF HY-80/100 AND HSLA-80 STEELS ARE SPECIFIED IN EB-4906. CONTACT THE BUYER FOR COPIES OF ELECTRIC BOAT SPECIFICATIONS.

X) WELDER WORKMANSHIP TRAINING (WWT) APPLICABLE TO NAVSEA TECHNICAL PUBLICATION OR MILITARY STANDARD FABRICATION DOCUMENTS

A) WELDER WORKMANSHIP TRAINING SHALL COMPLY WITH EB-4186 APPENDIX A OR APPENDIX B, AS APPLICABLE. IF REQUESTED, THE BUYER CAN PROVIDE ADDITIONAL DOCUMENTATION TO THE SUPPLIER TO SUPPORT THIS TRAINING. COMPLIANCE WITH EB 4186 APPENDIX A OR APPENDIX B IS NOT APPLICABLE TO FABRICATORS THAT HAVE WELDER WORKMANSHIP PROCEDURES THAT ARE PREVIOUSLY APPROVED BY NAVSEA OR A NAVSEA AUTHORIZED REPRESENTATIVE.

B) NAVNDT CAN BE USED TO ASSIST IN CREATING A WELDER WORKMANSHIP TRAINING PROGRAM. THE COGNIZANT NDT LEVEL III MUST STILL VERIFY AND CERTIFY THAT THE PROGRAM IS IN ACCORDANCE WITH EB-4186, APPENDICES A OR B, AS APPLICABLE. FOLLOW SECTION VIII.D OF THIS STANDARD CLAUSE TO OBTAIN ACCESS TO NAVNDT.

XI) HUNTINGTON INGALLS SHIPBUILDING NEWPORT NEWS SHIPBUILDING SUBMITTALS:

A) FOR PURCHASE ORDERS THAT ORIGINATE FROM NEWPORT NEWS SHIPBUILDING, REFER TO STANDARD CLAUSE 38-4 FOR SUBMITTAL OF ALL UNAPPROVED PURCHASE ORDER SOFTWARE DELIVERABLES.

B) SOFTWARE DELIVERABLES PREVIOUSLY APPROVED SHALL BE PROVIDED AS PART OF THE HARDWARE DELIVERABLES.

XII) COMMERCIAL WELDING / BRAZING:

A) COMMERCIAL WELDING / BRAZING SHALL BE PERFORMED IN ACCORDANCE WITH WRITTEN PROCEDURES APPROVED BY THE BUYER PRIOR TO THE START OF PRODUCTION. THIS REQUIREMENT DOES NOT APPLY WHERE SUBMITTAL / APPROVAL OF SUCH PROCEDURES IS EXPLICITLY EXEMPTED BY THE PURCHASE ORDER, PART DATA, OR PROCUREMENT SPECIFICATION, OR IS OTHERWISE SPECIFICALLY WAIVED BY THE BUYER VIA VIR.

B) COMMERCIAL STANDARD WELDING / BRAZING: DEFINED AS WELDING / BRAZING PERFORMED TO AN ESTABLISHED COMMERCIAL STANDARD, SUCH AS ABS, AWS, ASME BOILER & PRESSURE VESSEL CODE, ETC.

1) WHERE COMMERCIAL STANDARD WELDING / BRAZING IS SPECIFIED OR AUTHORIZED, ALL APPLICABLE REQUIREMENTS OF THE STANDARD SHALL BE MET.

2) COMMERCIAL STANDARD WELDING / BRAZING PROCEDURES AND SUPPORTING QUALIFICATION DATA (IF REQUIRED) SHALL STATE THE STANDARD AND REVISION USED.

3) PRE-QUALIFIED PROCEDURES ARE NOT EXEMPTED FROM THE SUBMITTAL AND APPROVAL REQUIREMENTS SPECIFIED IN SECTION XII.A.

4) THE SUPPLIER IS ADVISED THAT COMMERCIAL STANDARD PROCEDURES USED FOR WELDING OF TUBULAR JOINTS MAY REQUIRE ADDITIONAL QUALIFICATION.

5) FOR APPLICATIONS WHERE A DRAWING SPECIFIES WELD JOINT DESIGNS IN ACCORDANCE WITH MIL-STD-22, BUT AWS PRE-QUALIFIED WELDING PROCEDURES ARE TO BE USED, THE SUPPLIER SHALL SUBMIT A VIR TO THE BUYER TO OBTAIN VERIFICATION THAT THE PRE-QUALIFIED JOINT DESIGNS ARE EQUIVALENT TO THOSE SPECIFIED ON THE DRAWING. A COPY OF THE APPROVED VIR SHALL BE SUBMITTED WITH THE VPAR FOR THE PRE-QUALIFIED PROCEDURE.

C) COMMERCIAL BEST PRACTICE WELDING / BRAZING: DEFINED AS WELDING /BRAZING PERFORMED WITHOUT DIRECTION FROM ANY PARTICULAR SPECIFICATION, BASED ON SUPPLIER'S KNOWLEDGE AND EXPERIENCE.

1) COMMERCIAL BEST PRACTICE WELDING / BRAZING PROCEDURES SHALL DEFINE ALL PARAMETERS NECESSARY TO PRODUCE A SOUND WELD, INCLUDING CLEANING PRIOR TO WELDING / BRAZING, AND WORKMANSHIP EXAMINATION REQUIREMENTS.

2) THE BUYER RESERVES THE RIGHT TO REQUEST TESTING IN ORDER TO PROVIDE OBJECTIVE QUALITY EVIDENCE THAT THE PROCEDURE WILL PRODUCE SATISFACTORY RESULTS.

D) WHERE COMMERCIAL STANDARD OR COMMERCIAL BEST PRACTICE WELDING /BRAZING IS SPECIFIED OR AUTHORIZED, THE SUPPLIER SHALL, AT A MINIMUM, ENSURE THAT BASE MATERIALS ARE CLEANED TO BRIGHT METAL FREE OF GREASE, PAINT, OIL, DIRT, RUST, OR OTHER CONTAMINANTS PRIOR TO WELDING / BRAZING, AND THAT A WORKMANSHIP EXAMINATION OF COMPLETED WELDS /BRAZES IS PERFORMED TO ENSURE FREEDOM FROM

CRACKS, EXCESSIVE POROSITY, POOR FUSION, OR OTHER CONDITIONS DETRIMENTAL TO THE OPERATION OF THE HARDWARE, AND THAT ANY DRAWING-SPECIFIED WELD / BRAZE SIZE REQUIREMENTS ARE MET.

E) SUPPLIERS THAT ARE UNSURE OF WHETHER COMMERCIAL STANDARD OR COMMERCIAL BEST PRACTICE WELDING / BRAZING IS ALLOWED FOR A PARTICULAR APPLICATION SHOULD SUBMIT A VIR, THROUGH THE BUYER, TO THE COGNIZANT ELECTRIC BOAT COMPONENT ENGINEER FOR APPROVAL. WHERE APPROVED, A COPY OF THE VIR SHALL BE SUBMITTED WITH THE WELDING / BRAZING PROCEDURE VPAR.

#### XIII) EB TRANSFER OF WPS OR PQR ALLOWANCE

A) FOR EB PURCHASED MATERIAL, IF THE SUPPLIER IS IN NEED OF A WPS, UNDER LIMITED CONDITIONS A QUALIFIED PQR/WPS PACKAGE FROM ELECTRIC BOAT CAN BE TRANSFERRED TO THE SUPPLIER. THESE TRANSFERRED PQR/WPS WILL BE MANAGED ON A CASE BY CASE BASIS AND THE SUPPLIER SHOULD REQUEST THE BUYER TO PROVIDE EB SPECIFICATION 5877 FOR SPECIFIC GUIDANCE ON THE TRANSFER AND USE OF ELECTRIC BOAT TRANSFERRED PROCEDURES.

#### XIV) USE OF AWS NAVSEA SWPS-N PROCEDURES

A) FOR EB PURCHASED MATERIAL, NAVAL SEA SYSTEMS COMMAND (NAVSEA) CURRENTLY ALLOWS THE USE OF AMERICAN WELDING SOCIETY (AWS)-NAVSEA STANDARD WELDING PROCEDURE SPECIFICATIONS FOR NAVAL APPLICATIONS (SWPS-NS) FOR SHIP CONSTRUCTION IN LIEU OF FULL NAVSEA TECHNICAL PUBLICATION S9074-AQ-GIB-010/248 QUALIFICATION. EB HAS BEEN GIVEN PERMISSION TO ALLOW SUPPLIERS TO UTILIZE AWS-NAVSEA SWPS-NS. AWS AND NAVSEA MAINTAIN A PROCEDURE LIBRARY OF PUBLISHED AWS-NAVSEA SWPS-NS. THEY CAN BE FOUND BY SEARCHING "AWS-NAVSEA" AT THE AWS ONLINE BOOKSTORE [HTTP://PUBS.AWS.ORG](http://pubs.aws.org). NEW "AWS-NAVSEA" PROCEDURES CONTINUE TO BE ADDED, THEREFORE, THIS WEBSITE SHOULD BE CHECKED OFTEN FOR NEW PROCEDURES. THE SUPPLIER SHOULD REQUEST THE BUYER TO PROVIDE EB SPECIFICATION EB-5877 FOR SPECIFIC GUIDANCE ON THE USE OF AWS NAVSEA SWPS-N PROCEDURES FOR THESE PRE-QUALIFIED WELDING PROCEDURES.

#### XV) COMPLIANCE REQUIREMENT STATEMENT

A) THE ABOVE REQUIREMENTS DO NOT RELIEVE THE SUPPLIER OF ITS RESPONSIBILITY TO COMPLY WITH THE REQUIREMENTS OF THE PURCHASE ORDER. ANY DEVIATIONS FROM OR REQUESTS FOR WAIVERS TO THE PURCHASE ORDER REQUIREMENTS MUST BE CLEARLY IDENTIFIED AND JUSTIFIED AS SUCH BY THE SUPPLIER AND MUST BE SUBMITTED FOR APPROVAL VIA A VIR AND APPROVED AS SOON AS POSSIBLE PRIOR TO THE START OF PRODUCTION.

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dlocked0 Light Grid Accent 6;Medium Shading 1 Accent 6;Medium Shading 2 Accent 6;Medium List 1 Accent 6;Medium List 2 Accent 6;Medium Grid 1 Accent 6;Medium Grid 2 Accent 6;Medium Grid 3 Accent 6;Dark List Accent 6;Colorful Shading Accent 6;Colorful List Accent 6;Colorful Grid Accent 6;Subtle Emphasis;Intense Emphasis;Subtle Reference;Intense Reference;Book Title;Bibliography;TOC Heading;Plain Table 1;Plain Table 2;Plain Table 3;Plain Table 4;Plain Table 5;Grid Table Light;Grid Table 1 Light;Grid Table 2;Grid Table 3;Grid Table 4;Grid Table 5 Dark;Grid Table 6 Colorful;Grid Table 7 Colorful;Grid Table 1 Light Accent 1;Grid Table 2 Accent 1;Grid Table 3 Accent 1;Grid Table 4 Accent 1;Grid Table 5 Dark Accent 1;Grid Table 6 Colorful Accent 1;Grid Table 7 Colorful Accent 1;Grid Table 1 Light Accent 2;Grid Table 2 Accent 2;Grid Table 3 Accent 2;Grid Table 4 Accent 2;Grid Table 5 Dark Accent 2;Grid Table 6 Colorful Accent 2;Grid Table 7 Colorful Accent 2;Grid Table 1 Light Accent 3;Grid Table 2 Accent 3;Grid Table 3 Accent 3;Grid Table 4 Accent 3;Grid Table 5 Dark Accent 3;Grid Table 6 Colorful Accent 3;Grid Table 7 Colorful Accent 3;Grid Table 1 Light Accent 4;Grid Table 2 Accent 4;Grid Table 3 Accent 4;Grid Table 4 Accent 4;Grid Table 5 Dark Accent 4;Grid Table 6 Colorful Accent 4;Grid Table 7 Colorful Accent 4;Grid Table 1 Light Accent 5;Grid Table 2 Accent 5;Grid Table 3 Accent 5;Grid Table 4 Accent 5;Grid Table 5 Dark Accent 5;Grid Table 6 Colorful Accent 5;Grid Table 7 Colorful Accent 5;Grid Table 1 Light Accent 6;Grid Table 2 Accent 6;Grid Table 3 Accent 6;Grid Table 4 Accent 6;Grid Table 5 Dark Accent 6;Grid Table 6 Colorful Accent 6;Grid Table 7 Colorful Accent 6;List Table 1 Light;List Table 2;List Table 3;List Table 4;List Table 5 Dark;List Table 6 Colorful;List Table 7 Colorful;List Table 1 Light Accent 1;List Table 2 Accent 1;List Table 3 Accent 1;List Table 4 Accent 1;List Table 5 Dark Accent 1;List Table 6 Colorful Accent 1;List Table 7 Colorful Accent 1;List Table 1 Light Accent 2;List Table 2 Accent 2;List Table 3 Accent 2;List Table 4 Accent 2;List Table 5 Dark Accent 2;List Table 6 Colorful Accent 2;List Table 7 Colorful Accent 2;List Table 1 Light Accent 3;List Table 2 Accent 3;List Table 3 Accent 3;List Table 4 Accent 3;List Table 5 Dark Accent 3;List Table 6 Colorful Accent 3;List Table 7 Colorful Accent 3;List Table 1 Light Accent 4;List Table 2 Accent 4;List Table 3 Accent 4;List Table 4 Accent 4;List Table 5 Dark Accent 4;List Table 6 Colorful Accent 4;List Table 7 Colorful Accent 4;List Table 1 Light Accent 5;List Table 2 Accent 5;List Table 3 Accent 5;List Table 4 Accent 5;List Table 5 Dark Accent 5;List Table 6 Colorful Accent 5;List Table 7 Colorful Accent 5;List Table 1 Light Accent 6;List Table 2 Accent 6;List Table 3 Accent 6;List Table 4 Accent 6;List Table 5 Dark Accent 6;List Table 6 Colorful Accent 6;List Table 7 Colorful Accent 6;