Attachment A: Materials (Documentation & Marking for Structural Shapes, Plates, Bars, Pipe, Fittings, Fasteners, and Processed Materials Which Do Not Require Welding)

1. *Standard Procurement Requirements:*

1.1. The following requirements shall be included as applicable for purchase orders for commodity items including plate, structural shapes, piping, fittings, fasteners, etc., including rolling or forming of structural materials where such processing does not include welding.

1.1.1. **New Items:** All item(s) provided on this purchase order shall be supplied in the new condition (not used or refurbished in any way) unless provision for other than new condition is established in writing by PSS.

1.1.2. **Condition:** All purchased materials shall meet the requirements of the standard referenced in the purchasing documents. Except as permitted in writing by PSS, each bundle of material shall only contain one heat of material unless separate heats are clearly marked so that each piece can be readily tied to its corresponding MTR.

1.1.3. **Material Identification:** Each item shall be marked with the item identification required by the standard to which they are purchased.

- For structural materials this shall include material type and grade at a minimum.
- Fasteners shall be in containers and identified by type, grade, size, and lot number(s).
- Thes items of identification shall be marked legibly on the material, bundle, and/or container in a way that it will not be destroyed, damaged, or effaced by weather, shipping, handling, etc. If required processing (e.g. cutting, forming, rolling) removes, effaces, or separates the identification marking applied, it shall be completely replaced on each piece affected (including remnants) at the time of processing.

1.1.4. **Material Marking:** Banded or packaged items may have required material identification affixed to the bundle or package. Loose items shall be individually marked. Marking shall be such as to not damage the product. Items arriving without markings required or incorrect markings may be rejected and returned at supplier's expense.

1.1.5. **Special Handling:** Items which have special handling and/or shelf-life limitations shall be clearly identified accordingly.

1.1.6. **MTRs:** MTRs shall be required for all piping and structural materials unless otherwise stated in the purchasing documents. The material test reports shall be in English and shall include actual results of chemical analysis, tests, examinations, and treatments required by the material specification and this purchase order. The MTR shall be legible, reference applicable specification number and year of edition, and be traceable to the material furnished by heat or lot number. If the purchasing order specifies that the MTR must be certified, it is to be signed by the supplier's authorized representative responsible for quality, noting name, signature, and title.

1.1.7. **Approval:** If approval of MTRs is specified in the purchasing documents, all MTRs must be approved by PSS representative and/or our customer prior to fulfillment of the order. Only material with approved MTRs will be accepted for the order. Any material received which does not have an approved MTR is subject to be rejected and returned at the supplier's expense.

1.1.8. **COC:** If a certificate of conformance/compliance is specified in the purchasing documents, the supplier shall provide a legible and reproducible COC. The COC shall be a written statement that items furnished under the purchase order are genuine (i.e. not counterfeit) and match the quality, test reports, markings, and/or fitness for use required by the purchase order. The COC shall identify the supplier (e.g. company letterhead), the purchase order and revision that it refers to, and the unique identification of the item or service (e.g. heat #, report #). The supplier's authorized representative responsible for quality shall sign the COC. Additional COC requirements which pertain to FCM are identified below.

1.1.9. All documentation specified by this purchase order (e.g. MTR, COC, Product Data Sheet) is required at time of delivery of the product unless other arrangements have been agreed upon by PSS. Incomplete and/or inaccurate documentation may be cause for rejection of the delivery and be returned at the supplier's expense.

1.1.10. **Fracture Critical Materials (FCM)-** The following items are required for procurement of FCM to the extent they are applicable.

- Fine-Grain Practice. Mill orders shall specify killed fine-grain practice for steel used in FCMs.
- Prohibition of Mill Repairs. Mill order shall stipulate that no welded repairs shall be performed by the producing mill.
- Base Metal Identification. When heat numbers and other identification markings are applied by die stamping, low-stress dies shall be used.
- In addition to the applicable COC requirements noted above, procurement document for FCM shall specify conformance with the requirements of *AASHTO M 160/160M (ASTM A6/A6M)- Standard Specification for General Requirements for Steel Plates, Shapes, Sheet Piling, and Bars for Structural Use as applicable.*

Attachment B: Non-Destructive Testing

1. *Standard Procurement Requirements:*

The following requirements shall be included as appropriate for purchase orders for NDT services.

1.1. Procedures: All NDE shall be accomplished according to written procedures which have been reviewed and approved by a Level III in the method being approved. Procedures shall be submitted to PSS and/or PSS's customer for approval prior to use under this purchase order. Controlled copies of approved NDE procedures shall be made available to personnel who are conducting NDE operations.

1.2. **Qualification:** NDE services for PSS shall be conducted by individuals who are certified as NDT Level I, II, or III in accordance with a subcontractor written practice which conforms to SNT-TC-1A (latest edition unless otherwise specified). The subcontractor shall employ or contract an NDE Level III that holds a Level III Endorsement and/or current ASNT Level III certificate for the NDE process in which he/she is certifying individuals and approving procedures.

1.3. **Personnel Records:** Certification records of NDE personnel shall be made available to PSS for review prior to them performing any NDE work for PSS. As a minimum, records shall include Employer's name, Name of certified individual, Level of certification & method, Basis for qualification (i.e. education, experience, training, examination results, and composite grades), visual acuity test results per SNT-TC-1A (latest edition unless otherwise specified), signature of Level III certifying authority, and dates of certification and recertification.

1.4. **Calibration:** Where procedures required periodic calibration of NDE equipment, documentation of current calibration certification shall be made available for review by authorized PSS personnel. If procedures require calibration or verification of calibration of NDE equipment prior to use or periodically during use, evidence of required activities shall be documented in NDE reports or other equivalent means.

1.5. **Operation:** Personnel who conduct NDE operations shall operate only within the limits of their certification as provided by SNT-TC-1A (latest edition unless otherwise specified).

1.6. **Examination Results:** Examination results shall be provided to PSS in a written report and/or electronic report and shall include as a minimum the name of the person conducting the testing and/or interpreting the test results and their respective levels of certification, the procedure and revision that the testing was performed to, the location of testing as established by PSS identification markings, weld maps, and/or other representation provided by the NDE supplier which accurately represents the location examined, the results of the examination indicating satisfactory or unsatisfactory inspection or examination, any

discontinuities identified (whether acceptable or rejectable), weld data (e.g. size, thickness, material), and the name and signature of the authorized approver. Customer specifications may require additional information to be included in the report.

1.7. **Removal:** The Quality Control Manager has the authority to remove NDE personnel from a project if there are unresolved questions about the individual's skill, qualification, and/or certification.

Attachment C: Detailing Standard

1. *Purpose*

1.1. This attachment provides requirements for detailing (preparation of shop drawings) to PSS departments and/or subcontractors for the development of drawings used by PSS to fabricate and/or erect structural steel.

2. *Scope*

2.1. These instructions apply to part, assembly, erection drawings, and computer numerical control (CNC) files generated for fabrication and assembly of structural steel items by PSS. This attachment is mandatory for all contracts controlled by the AISC Quality Management System but is acceptable for use by all other PSS QMS Programs.

3. *Procurement Requirements*

3.1. Detailing shall conform to the latest edition of the following standards unless otherwise specified by contract. Deviation from these standards, except as noted herein, shall be agreed upon in writing prior to adoption.

- ANSI/AISC 360- Specification for Structural Steel Buildings
- ANSI/AISC 303- Code of Standard Practice for Steel Buildings and Bridges
- AISC/NISD- Detailing for Steel Construction
- ANSI/AWS A2.4- Standard Symbols for Welding, Brazing, and Nondestructive Examination
- ANSI/AWS A3.0- Standard Welding Terms and Definitions

3.2. The customer's contract/design drawings and specifications are generally the governing documents. Conflict between the design and industry standards shall be brought to the customer's attention for resolution.

3.3. PSS shop detail and erection drawings shall be prepared as required in compliance with the contract/design drawings and specifications and in accordance with these detailing standards.

3.4. Detail drawings shall include

- Necessary and complete dimensional information.
- Detailing of connections and joints.
- Size and type of bolts required.
- Standard AWS welding symbols which indicate location, type, size, joint preparation, and extent of welds. Symbols should be complete enough to be unambiguous. General notes should indicate, "CJP bevels may be on either side of the part unless noted otherwise".
- Standard AWS NDE symbols when NDE is specified by the design.
- Material specifications, including types and/or grades.

3.5. Section views shall use alphabetical references such as Section A-A, B-B, etc. (see figure 1).

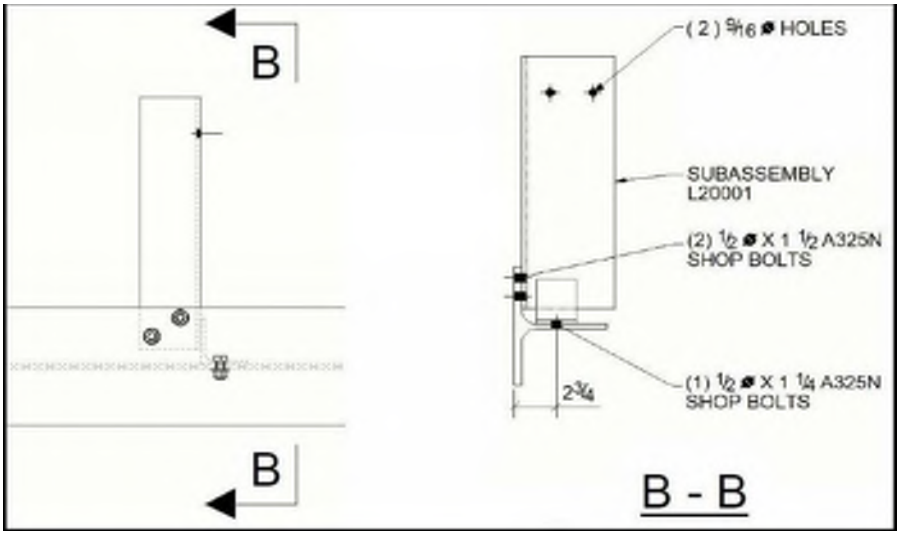

Figure 1: Section View

3.6. Drawings shall contain sufficient documented information to directly reference the design drawings they are sourced from.

3.7. Electronic drawing files shall be provided in portable document file (i.e. PDF) format.

3.8. Multi-sheet drawings shall be combined into a single drawing file for submittal.

3.9. "Turn-of-Nut" pre-tensioning shall be specified for high-strength bolted connections unless otherwise specified by PSS.

3.10. Abbreviations:

3.10.1. Welding process abbreviations shall be in accordance with AWS A3.0.

3.10.2. All other abbreviations shall be in accordance with Table 2: Standard Abbreviations.

3.11. Drawing Revisions:

3.11.1. Revision levels shall be documented above the drawing title block to track progression and in the bottom right corner of the title block in the rev. box.

- Prior to approval for fabrication (i.e. draft drawings) revision levels shall be tracked alphabetically starting with "A".
- Upon issue for fabrication (i.e. on initial approval), revision levels shall be tracked numerically starting with "0".

3.11.2. Revised areas of a drawing shall be bound by a cloud mark with revision level noted in a corresponding revision triangle adjacent to the cloud. Cloud marks shall be used for any other purpose other than revision tracking.

3.11.3. On subsequent revision, remove previous revision cloud marking. Drawing shall only have cloud marks around areas impacted by the current revision.

3.12. 3D Modeling Software:

3.12.1. Integrity of electronic modeling shall be maintained as revisions are made to drawings. This includes at least the following:

- Where models are included in the deliverables to PSS, every change which impacts the model requires an updated model to be supplied to PSS.
- Production control software outputs (e.g. KSS files, DXF files, IFC files) from models shall be generated from the original model file. Output from copies of the model is not acceptable.

3.12.2. When using 3D modeling detailing software, production control output files are to be provided when required by the contract.

3.12.3. Files in proprietary formats are to be included when required by the contract. The following shall be included as applicable:

- Advance Bill of Materials
- Bill of Materials parts list or assembly parts list
- Drawing List
- Drawing Revision List
- Bolt List

3.12.4. When preparing the KSS, or other proprietary files, the assembly list and bolt list files shall only document the assemblies contained in the submittal package. On the other hand, the drawing list and drawing revision list files shall cumulatively document all drawings so far issued.

3.13. Control of Drawing File Documents

3.13.1. Drawing file document titles

- Drawing file titles shall conform as closely as possible to the following format.
  - XXXX_Y.EXT
- Where:
  - 'XXXX' = the complete, unique drawing number indicated in the title block
  - '_' = underscore
  - Y = revision level of drawing (i.e. A, B, C, 1, 2, 3; note: use the least number of digits possible. Revision 1 is 1, not 001).
  - EXT = the applicable file execution extension (e.g. 'pdf' for portable document file)

3.13.2. Drawings shall be completed and checked to the greatest extent possible prior to submitting for approval.

3.13.3. Drawings shall be submitted to the Shop Manager or his designee for distribution, logging, and processing.

3.13.4. Each submittal to the Shop Manager or his designee shall be combined in a package which includes the following as applicable:

- A completed transmittal from which lists the number, revision, and description of the documents being transmitted.
- Drawing files.

- Bill of Materials (BOM) import files (e.g. KSS)
- CNC files as applicable (generally only included when drawings are being issued for fabrication):
  - DXF files for plates
  - NC1 files for shapes
- Bolt Reports

3.13.5. Each submittal package shall be combined in a single zip file folder.

- Transmittal zip file folder organization shall be as follows:
  - CNC Data
  - Erection
  - Fabrication
  - Parts
  - Additional folders may be added as needed.

3.13.6. Transmittal zip files should be labeled in the format: TXXX-YYY, or in a similar identifying label that is clearly understood and agreed upon by the PSS representative receiving the files.

- T= transmittal abbreviated
- XXX = a sequential transmittal number
- YYY = status as indicated as follows: IFA = Issued for Approval, IFF = Issue for Fabrication, RFA = Revised for Approval, RFF = Revised for Fabrication
- For example: T001-IFA is transmittal #001 which has been issued for approval

3.14. Shop/Fabrication Drawings

3.14.1. Best practice for assembly drawings, including those for small and single part "assemblies" is to depict no more than one assembly per sheet. Use multiple sheets to depict complex assemblies, as necessary.

3.14.2. Assembly drawing numbers shall be prefixed as noted in Table 1 unless otherwise specified by PSS Shop Manager or his designee.

3.14.3. Drawing numbers should contain the assembly type and assembly number (e.g. AB1001). Use a numeric suffix with a dash separator to distinguish the drawing numbers of multiple sheet assemblies (e.g. AB1001-1).

3.14.4. Assembly drawings should include grid location tables for columns similar to figure 2 unless otherwise specified.

GRID LOCATION	BOTTOM ELEVATION
L/7	-1'-6"
D/3	-1'-6"
H/5	-1'-0"

Figure 2: Grid Location Table

3.14.5. The standard shop drawing sheet size is 11" x 17". Larger assemblies may be depicted on 24" x 36" if needed.

3.14.6. Special testing criteria should be documented on the drawings. Information should be requested from the Shop Manager.

3.14.7. A title block similar to Figure 3 shall be in the lower right-hand corner of the drawing. At a minimum, it shall document the PSS job number, drawing number, current revision, revision history (which includes drawing status), the names or initials of those who drew and checked the drawings along with the dates, and the company who performed the detailing.

Figure 3: Title Block

REV.	DATE	DESCRIPTION	BY

PSS	PROCESS SERVICE SPECIALISTS, LLC		
	1219 S. PURPERA AVE GONZALEZ, LA 70737	37318 CORNERVIEW RD. GEISMAR, LA 70734	1101 JAMES SUDDUTH PARKWAY LAKE CHARLES, LA 70615
DESCRIPTION:			DETAILED BY:
PROJECT NAME:			
DRAWN BY:	DATE:	JOB #	
CHECKED BY:	DATE:	DRAWING #	REV:

3.14.8. Surface preparation, coating application (including galvanizing or painting), and "no paint" areas shall be specified on the drawings to the applicable ASTM Standard or as specified in the contract documents.

3.14.9. A BOM similar to Figure 4 shall be used as appropriate to identify materials, parts, components, etc.

- The BOM shall identify ship marks, part marks, quantity, weight, material description (including material specification, type, grade, and/or class), length, and remarks as needed.
- Provide processing notes as required, including the following, in the REMARKS column of the BOM:
  - Miters of bevel cuts
  - Camber (camber shall also be included under the part title on the drawings)
  - Rolled
  - Formed
  - Bent
  - Machined
  - Paint color / Specification
  - No Paint

BILL OF MATERIAL

MARK	QTY	SPEC.	DESCRIPTION	LENGTH	WEIGHT	REMARKS
B1	3		BEAM			
B1	3	A992	W21X44 C=1/2"	14' - 5" 11/16	1921	GREY PRIMER
a1	6	A36	L4X3 – 1/2 X 3/8	11" 1/2	52	
a5	6	A36	L4X3 – 1/2 X 3/8	11" 1/2	52	
	12	A325 Type 1	3/4∅ BOLT	2" 1/4	7	
	33		3/4∅ SHEAR CONNECTOR	4"	44	
B2	1		BEAM ON HOLD			
B2	1	A572 Gr. 50	W21X44	13' - 9" 3/4	611	NO PAINT
a10	2	A36	L4X3 – 1/2 X 3/8	11" 1/2	17	
p19	1	A36	PL318X3"318	8" 1/2	3	
t1	1	A500 Gr. B	HSS10X10X.250	12' - 10" 15/16	394	

Figure 4: Bill of Material (BOM)

3.14.10. Running dimensions shall be left to right along members and bottom to top on columns.

3.14.11. Zero points shall be from the end of the beam, not the angle clips.

3.14.12. Shop bolts and field bolts shall be called out in the BOM and above the member which includes them and/or reported on a bolt report.

3.14.13. When possible, short slots shall be in angle clips rather than in beam webs. Long slots shall be in beam webs.

3.14.14. Copes shall have a radius unless otherwise noted.

3.14.15. Camber for Girders

- Shop assembly diagrams or blocking diagrams for girder section fabrication shall supply the necessary information and dimensions to achieve the correct cambered shape. The information shall consist of vertical offsets from a baseline to any field splice, bearing point, and at mid-span.
- In the case of horizontally curved bridges, required information would also include horizontal offsets at the same points.

3.15. Erection Drawings

3.15.1. Sheets shall be numbered using "E" as a prefix.

3.15.2. Erection drawings shall reference associated shop drawing number(s).

3.15.3. Plan views should include a North arrow.

3.15.4. Sheets with plan views should include a key plan of the entire area, providing a shaded indication of the area covered by the drawing.

3.15.5. Include as many section and detail views as necessary to see each field connection condition. Field welds and bolts shall be identified.

3.15.6. Standard sheet size is 11" x 17" but 24" x 36" can be used if required.

3.15.7. Field welds and field bolts shall be identified on the erection drawings with the appropriate symbol or call-out. Alternatively, field bolts may be called out on a bolt report.

3.15.8. When shipping sequence is to be specified on detail drawings it shall be designated as SEQ 001, etc.

3.16. Part Drawings

3.16.1. Single-part sheets should be on 8.5" x 11" paper. Multi-part sheets may be on 11" x 17"

3.16.2. A Part drawing title block similar to Figure 5A shall be used for typical applications. For more complex contracts, the title block shall be similar to Figure 5B. The Shop Manager of his designee shall determine which will be required.

Figure 5A

Figure 5B

3.16.3. Parts shall be numbered sequentially for each part type, with types indicated as follows:

- For tanks and vessels part types shall be designated as follows:
  - For shapes, use an 's' prefix (e.g. s123)
  - For flats, use a 'p' prefix (e.g. p12)

- For fittings, use an 'h' prefix (e.g. h12)
- For miscellaneous items, use an 'm' prefix (e.g. m123)

- For structural projects, use the item prefixed in Table 1 unless otherwise specified by the PSS Shop Manager or Engineer

Table 1: Detailing Prefixes

Item	Part	Assembly
Angle	a	**
Channel	m	**
HSS	t	**
Pipe	p	**
Plate	pl	**
Flat Bar	fb	**
W	w	**
WT	wt	**
Misc.	m	M
Beams	*	B
Columns	*	C
Frames	*	FR
Braces	*	BR
Girts	*	G
Ladders	*	L
Railing	*	R
Ship-Loose	*	M
Stairs	*	S

* Value varies according to item part type

** Value may be "M" but is discretionary if the item is not of the named assembly types

3.16.4. Part numbers shall differ from assembly numbers. Upper- and lower-case letter distinction is not sufficient (e.g. m101 & M101 are not distinct numbers for filenames). This can be accomplished by using more or fewer characters (e.g. M305 for assembly and m3005 for part).

Table 2: Standard Abbreviations (in order by abbreviation)

ABBR	DESCRIPTION
#	Number
@	At (Spacing)
AB	Anchor bolt
ABBR	Abbreviation
AESS	Architecturally Exposed Structural Steel
AISC	American Institute of Steel Construction
APPROX	Approximately, Approximate
ASME	American Society of Mechanical Engineers
ASSY	Assembly
ASTM	ASTM Int'l (formerly American Society for Testing and Materials)
AWS	American Welding Society
B1E	Bevel One End
B2E	Bevel Two Ends
BCD	Bolt Circle Diameter
BHN	Brinell Hardness Number
BOM	Bill of Materials
BOTT	Bottom
BPVC	Boiler & Pressure Vessel Code
BRG	Bearing
C	Camber (as in C = 2")
CAD	Computer Aided Design
CAM	Computer Aided Manufacturing
CG	Center of Gravity
CJP	Complete Joint Penetration
CL	Centerline
CNC	Computer Numerical Control

ABBR	DESCRIPTION
COL	Column
CONN	Connection
DBA	Deformed bar anchor
DBL	Double
DCW	Demand-Critical Weld
DEG	Degrees
DESC	Description
DIA or Ø	Diameter
DIM	Dimension
DTL	Detail
DWG	Drawing
EA	Each
EL	Elevation
EQ	Equal
EXIST	Existing
FB	Flat Bar
FL	Floor Level
FS	Far Side
FTG	Fitting
GA	Gauge
GALV	Galvanize
GR	Grade
H/T	Hardened & Tempered
HA	Headed Anchor
HDG	Hot-dip Galvanized
HHCS	Hex Head Cap Screw

Table 1 Continued: Standard Abbreviations

ABBR	DESCRIPTION
HORIZ	Horizontal
HRA	Hardness, Rockwell A scale
HRB	Hardness, Rockwell B scale
HRC	Hardness, Rockwell C scale
HT	Heat Treat
IAW	In Accordance With
ID	Inside diameter
IFA	Issue for Approval
IFF	Issue for Fabrication
INFO	Information
LH	Left Hand
LLBB	Long Leg Back-to-back
LLH	Long Leg Horizontal
LLO	Long Leg Outstanding
LLV	Long Leg Vertical
MACH	Machined
MAJ	Major
MAX	Maximum
MIN	Minimum or Minor
MISC	Miscellaneous
MT	Magnetic Particle Testing
N/T	Normalized & Tempered
NDE	Nondestructive Examination or Nondestructive Testing
NIC	Not in Contract
NOM	Nominal
NPT	National Pipe Taper
NS	Near Side
NTS	Not to Scale
OAL	Overall Length
OC	On Center

ABBR	DESCRIPTION
OD	Outside Diameter
OH	Opposite Hand
OPP	Opposite
P/N	Part Number
PC	Piece
PCS	Pieces
PD	Pitch Diameter
PJP	Partial Joint Penetration
PRELIM	Preliminary
PSI	Pounds per Square Inch
PT	Dye Penetrant Testing
QA	Quality Assurance
QC	Quality Control
QTY	Quantity
R	Radius
RD	Running Dimension(s)
REF	Reference
REQD	Required
REV	Revision
RFA	Revised for Approval
RFF	Revised for Fabrication
RH	Right Hand
RMS	Root Mean Square
RT	Radiographic Testing
S1E	Saw One End
S2E	Saw Two Ends
SEQ	Sequence
SHCS	Socket Head Cap Screw
SLBB	Short Leg Back-to-back
SLO	Short Leg Outstanding

Table 1 Continued: Standard Abbreviations

ABBR	DESCRIPTION
SLV	Short Leg Vertical
SPEC	Specification
SS	Stainless Steel
SSPC	Society for Protective Coatings
STIFF	Stiffener
SYMM	Symmetrical
THK	Thickness
THRD	Thread, Threaded
TOL	Tolerance
TOS	Top of Steel

ABBR	DESCRIPTION
TYP	Typical
UNC	Unified National Coarse
UNEF	Unified National Extra Fine
UNF	Unified National Fine
UNO	Unless Noted Otherwise
UT	Ultrasonic Testing
VERT	Vertical
VT	Visual Examination or Visual Testing
W/	With
W/O	Without

Attachment D: Sub-Fabricator Standard Procurement Requirements

Before a sub-fabricator can be issued a purchase order, a prequalification form is required to have been submitted and a sub-fabricator audit checklist completed and deemed acceptable by PSS Quality Control Representative. If this has not been completed, stop and contact PSS Quality Control Representative for further actions. If these have been completed and accepted, a PSS Representative shall be designated as the Sub-Fabricator Coordinator (hereafter referenced as the 'coordinator') for this purchase order. The below requirements shall be included as applicable for purchase orders for sub-fabrication activities.

Note: At the end of these standard procurement requirements, there are requirements which will require data input from the coordinator. Assistance may be required from other departments as required.

1. Standard Procurement Requirements

1.1. **Documentation:** Any documentation identified and required by PSS shall be maintained current with the processes and personnel being documented throughout the fabrication process. All documentation shall remain legible and suitable for copying. It shall be determined during the audit process whether PSS will require the sub-fabricator to utilize PSS documents or the sub-fabricator to utilize their own company documents that are deemed equivalent to PSS documents and document all required information. These include, but are not limited to, weld logs, travelers, I&TPs, weld maps, spool tracker, etc.

1.2. **Updates:** Weekly progress updates shall be required to be submitted to the coordinator. The required information for each update will vary depending on the contract documents, timeframes of the project, and criticality of the project. The information required for each update and the update schedule shall be established and agreed upon prior to fabrication commencement. The required information may include, but is not limited to, schedule, spools completed, welds completed, material status, spools coated, etc. If any schedule deviations are anticipated, the coordinator shall be notified immediately for resolution.

1.3. **QMS:** When specified by the purchase order, work is to be performed under and controlled by the indicated Quality Management System (QMS).

1.4. **Certification:** Certifications of accreditation must be current, valid, and available to PSS personnel for review prior to commencement of fabrication activities.

1.5. **Materials:** To the extent required by this purchase order, all materials and welding consumables shall be traceable to Material Test Records (MTRs) or other documentation (e.g. COC) which is provided to confirm that materials meet specification requirements.

1.6. **Welder Qualifications:** Welders and welding operators shall be qualified in accordance with the standard noted in this purchase order. If no standard is noted, welders may be qualified to either AWS D1.1 or ASME Section IX. In any case, welders shall only be allowed to weld within the limits established by the code to which they qualified. Welding performance qualifications shall be made available for review by PSS personnel upon request. PSS reserves the right to require a welder to be re-qualified and/or to be removed from the project at the request of authorized PSS personnel.

1.7. **Welding Procedures:** Welding procedures shall be qualified (or prequalified where allowed) by the manufacturer as required by the governing code. The welding procedures and the supporting qualifications (if required) shall be submitted to PSS (and PSS's customer, if required) for review and approval prior to the start of any welding.

1.8. **Calibration:** Welding machines, wire feeders, and other equipment used to control essential variables of special processes shall be calibrated to confirm that the processes are operating within procedural parameters. Calibration records shall be maintained which uniquely identify the equipment to which they apply and the method of calibration. Alternately, calibrated instruments may be used to confirm parameters during fabrication provided equipment is calibrated against a reference that is traceable to a national standard (e.g. NIST). The calibrated equipment shall be within its calibration period, and the records of calibration shall be available to the authorized PSS personnel for review and approval upon request. If calibrated instruments are used, readings which demonstrate the equipment is operating with the parameters of the approved procedure shall be logged at least once each shift. These records shall be maintained during the time the work is being performed, shall be made available for review, and shall be submitted to PSS upon request.

1.9. **Rights of Access:** Areas and documentation of fabrication shall be made available to PSS personnel or other authorized personnel with adequate notice. Surveillance requirements shall be determined on a case-by-case basis depending on factors such as delivery schedule, criticality of the scope, complexity of the project, etc.

1.10. **Inspection and Tests:** Inspection and testing which is required as part of this purchase order shall be performed in conformance with a written Inspection & Test Plan (I&TP) when required, which has been reviewed and approved by PSS. Alternatively, PSS can provide an Inspection and Test Plan which shall be followed. The plan, whether provided by the sub-fabricator or PSS, shall indicate the procedure by which inspection and/or testing is to be accomplished, the acceptance criteria to be applied, and the identification of the written report of inspection or test results. These inspections and tests shall be performed to a written procedure which shall be reviewed and approved by PSS personnel upon request.

1.11. **Hold/Witness Points:** If fabrication, inspection, and/or testing instructions indicate a Hold or Witness point for PSS, PSS's customer, and/or other authorized personnel; the PSS coordinator is to be notified in writing two business days prior to the inspection or test. For identified Hold points, no testing or inspection may proceed without authorized and required witnesses. For identified Witness points, notification is to be made but production may proceed beyond the point unless written notification otherwise is provided by the PSS coordinator.

1.12. **Subcontracting:** Subcontracting of work shall not be permitted except by PSS's written approval. These same requirements shall also apply to sub-tier subcontractors.

1.13. **COC:** If required, the supplier shall provide a legible/reproducible Certification of Conformance (COC). The COC shall be a written statement that items furnished under this purchase order were controlled by the specified QMS. Any nonconformances documented during this processing must be listed on the COC. If there are no nonconformances generated in processing the requirements of the purchase order, a statement of that effect is required on the COC. The COC shall identify the supplier (e.g. company letterhead) the purchase order and revision it refers to, and the unique identification of the item and/or service (e.g. heat #, report #). The supplier's authorized representative responsible for quality shall sign the COC.

1.14. **Final Delivery Release:** PSS shall be notified prior to releasing any fabrication for final delivery to end user. A representative from both parties shall be present at the exchange of custody and perform an overall visual inspection of product. The shipping documents shall be reviewed and agreed upon. Both parties shall provide signatures on shipping documents, releasing the product for final delivery. If required by contract, the customer may also attend for final inspections of product. The supplier assumes all responsibility for the fabrication under this purchase order to meet all requirements of the purchase order. Inspections by PSS personnel do not relieve the supplier of any liability for supplying a product that meets all required specifications and code requirements referenced.

2. Standard Welding Requirements

2.1. All welding shall conform to an approved WPS and shall be reviewed by the welder.

2.2. Prior to welding, base material shall have a reasonably smooth surface and shall be free from sharp notches or other harmful irregularities. Inspect all preps and fits before welding.

2.3. Oil, grease, dirt, rust, mill scale, or other foreign material shall be removed from surfaces of the joint and adjacent base material within one inch from the edge of the joint.

2.4. Preheat temperature, interpass temperature, and post weld heat treatment shall be complied with in accordance with specifications of the WPS and project requirements.

2.5. Storage and handling of welding consumables shall conform to guidelines of the manufacturer.

2.6. All shielded electrodes shall be maintained in a rod oven with the exception of E60 series electrodes.

2.7. Wind breaks and shelters shall be required in work areas to ensure a good welding environment for the best results. Inside buildings and shop areas are exempt, unless necessary due to high wind speeds inside of the shop.

2.8. All welds that are 2" and below shall be welded with GTAW process unless otherwise approved by PSS Quality Manager.

2.9. All socket welds shall have a 2-pass minimum.

2.10. All welds shall be identified with the individual welder's identification stencil.

2.11. Nothing shall be placed inside of piping at any time. Filler metals shall never be placed inside the end of pipe or fittings. This includes but is not limited to purging dams. Purge dams shall not be utilized unless removal process is in place and approved by PSS Quality Manager.

2.12. All weld beads shall be visually inspected. The final pass shall be essentially free, of course ripples, non-uniform bead patterns, excess reinforcement, and deep ridges. Filing of the toe of the weld is prohibited. An ugly weld is a rejectable weld by PSS standards.

3. Project Specific Requirements

3.1. **Scope of Work:** _____

3.2. **PSS Coordinator Contact Info:** _____

3.3. **Schedule & Duration:** _____

3.4. **Delivery Location:** _____

3.5. **Code of Construction:** _____

3.6. **Qualifications & Certifications Required:** _____

3.7. **Submittals Required:** _____

3.8. **Materials (AML):** _____

3.9. **Welding Processes:** _____

3.10. **NDE Requirements:** _____

3.11. **Passivation Requirements:** _____

3.12. **Coating Requirements:** _____

3.13. **Additional Requirements:** _____

Attachment E: Calibration Service Requirements

1. *Standard Procurement Requirements*

The following requirements should be included as applicable for purchase orders for calibration services

1.1. **Certification:** Calibration is to be accomplished by qualified personnel operating under a QMS which has been accredited by a body which is acceptable PSS. Certifications of accreditation must be current, valid, and available to PSS personnel for review upon request.

1.2. **Scope:** Calibration shall only be conducted within the scope of certification noted above. If PSS requests calibration outside the accredited scope, the service provider shall notify the personnel identified on the purchase order prior to conducting any calibration operations. If requests for calibration services by this purchase order are outside of the identified code requirements, industry standards, and/or known best practices, the calibration service provider is to identify this issue to PSS prior to proceeding.

1.3. **Recalibration Schedule:** The service provider may provide a recommended recalibration schedule if one is not identified by PSS. The recalibration schedule should be based on manufacturer's recommendations, best industry practice, and the service provider's experience.

1.4. **Identification:** The unique identification of the equipment being calibrated shall be maintained throughout the time it is in the possession of the service provider. The equipment shall be labeled by the service provider with the unique identification number, the calibration date, and the recalibration date. Labeling may be affixed to the equipment container provided the relationship of the calibrated item to the marked container is clear and unambiguous.

1.5. **Reference Standard:** Calibration shall be against and traceable to certified equipment or reference standards having known valid relationships to nationally recognized standards (e.g. NIST), or to international standards known to be equivalent to corresponding nationally recognized standards. Where no such standards exist, the basis for calibration shall be defined.

1.6. **Accuracy:** Reference standards shall have a minimum accuracy four times greater than that of the measuring and test equipment being calibrated to ensure that the reference standards contribute no more than one-fourth of the allowable calibration tolerance. Where this 4:1 ratio cannot be maintained, the basis for selection of the standard in question shall be technically justified and stated in the calibration report.

1.7. **As Found:** Equipment submitted for calibration shall be initially evaluated to determine its "as found" calibration status prior to any calibration adjustments being made. Where equipment is found to be out of calibration on receipt, the personnel identified on this PO shall be notified and calibration efforts shall cease until direction has been given by PSS. Any direction to proceed shall be given in writing before calibration efforts proceed.

1.8. **Damaged or Worn Equipment:** When, in the opinion of the service provider, equipment to be calibrated appears to be damaged or is approaching the end of its usable life, PSS shall be notified of the condition when it's discovered. Further calibration efforts shall cease until direction is provided by PSS.

1.9. **Reporting:** Documentation of calibration shall include the following in a written or electronic report:

- Date of calibration.
- Certification that calibration was done in accordance with, within the scope of, and by personnel qualified to a current, certified QMS which has been approved by PSS.
- Identification of the reference standard to which the equipment is being calibrated.
- The ratio of the accuracy of the reference standard to equipment being calibrated.
- Unique identification of calibrated equipment.
- Before (As Found) and after (After Calibration) readings.
- The acceptance criteria.
- Calibration results (i.e. satisfactory or unsatisfactory).
- Identification of calibration technician.
- Signature of authorized approver.

Attachment F: Laboratory Service Requirements

1. *Standard Procurement Requirements*

The following requirements should be included as applicable for purchase orders for laboratory services

1.1. **Certification**: Laboratory testing is to be accomplished by qualified personnel operating under a QMS which has been accredited by a body which is acceptable PSS. Certifications of accreditation must be current, valid, and available to PSS personnel for review upon request.

1.2. **Scope:** Testing shall only be conducted within the scope of certification noted above. If PSS requests calibration outside the accredited scope, the service provider shall notify the personnel identified on the purchase order prior to conducting any calibration operations. If requests for laboratory services by this purchase order are outside of the identified code requirements, industry standards, and/or best practices, the calibration service provider is to identify this issue to PSS prior to proceeding.

1.3. **Specification**: Testing shall be conducted in accordance with the national standard and year or specification and revision identified on this purchase order or to written test instructions provided with this purchase order. If the service provider takes exception to any specified requirements and/or recognized a technical issue which will affect the accuracy or validity of the test results, it shall be brought to the attention of the personnel identified in this purchase order. No exception shall be allowed to the requirements specified apart from written permission by authorized PSS personnel.

1.4. **Test Specimens:** Traceability between test specimens and test results shall be maintained. Where required and specified on this purchase order, test specimens shall be returned to PSS. Returned specimens shall be clearly marked to correspond to the reported test results.

1.5. **Reporting:** Results of testing shall be provided in a written or electronic format and shall include the following:

- Certification that testing was done in accordance with, within the scope of, and by personnel qualified to a current, certified QMS which has been approved by PSS.
- Date of testing.
- Identification of the reference standard and year by which the testing was accomplished.
- Environmental conditions which pertain to the test (e.g. test temperature of specimen).
- Results of all testing required by the standard, including failures and allowed retests which are clearly marked as such.
- The acceptance criteria indicated by the standard.
- Identification of the test technician.

- Name / title / signature / responsibility of any witnesses to the testing.
- Signed by authorized approver.

Attachment G: Blasting and Coating Requirements

1. *Standard Procurement Requirements*

The following requirements should be included as applicable for purchase orders for coating and blasting services

1.1. General

1.1.1. Blasting and/or coating areas and documentation of surface prep and coating shall be made available to PSS personnel or other authorized personnel with adequate notice.

1.1.2. Coating materials provided by the supplier shall be furnished in the manufacturer's sealed containers. Coating materials (excluding metallic coating) shall be identified on the container by, at a minimum, color (pigment description and federal standard number, or manufacturer's number), lot/batch number, ID/stock number, quantity coating in container, date of manufacture, date of expiration, and manufacturer's name and address.

1.1.3. Storage conditions shall be as specified by the manufacturer's data sheets and MSDS for each product. This information shall be available at the job site.

1.1.4. Overspray areas, non-paint areas, production equipment, and machinery shall be protected from damage or fouling from abrasives, solvents, paint spray, or water.

1.1.5. If requests for blasting and/or coating by this purchase order are outside of the identified code requirements, industry standards, and/or known best practices, the blasting/coating service provider is to identify this issue to PSS prior to proceeding.

1.2. Environment

1.2.1. Abrasive blasting shall not be performed when the steel surface temperature and/or the ambient temperature are less than 5° F above the dew point. Humidity and dew point readings shall be taken with calibrate instruments and documented per required specification.

1.2.2. Coating shall only be applied within manufacturer's specified and/or recommended atmospheric and coating surface temperature, humidity, and/or dew point. Exceptions shall only be by written approval from authorized PSS personnel.

1.3. **Surface Preparation**

1.3.1. Abrasive blast all surfaces to be coated to the specified finish in accordance with SSPC. Any required primer shall be applied on the same day as the surface preparation before rust develops.

1.3.2. When blasting is performed, the vendor shall prevent any damage to neighboring equipment, intact coatings, etc., by abrasive grains or dross.

1.3.3. Blast abrasives shall be clean, dry, and free of any material likely to stimulate corrosion. When requested, vendor shall obtain certification from the abrasive supplier regarding the composition of the abrasive. A copy of the certification shall be available to PSS personnel for review.

1.3.4. Size of abrasive particles for blast cleaning shall be such that the anchor profile is in accordance with the requirements for the applicable coating system. Reclamation and reuse of blast media shall not compromise surface cleanliness or surface profile. Verify anchor profile depth. Record measured profile for each item blasted.

1.3.5. Visual inspection per SSPC-VIS-1 of all abrasive blast cleaned surfaces for compliance with applicable SSPC Surface Preparation Specification requirements shall be performed.

1.3.6. Determination of blast profile shall be performed at the start of each shift and after any change in nozzle pressure, abrasive type and/or size.

1.3.7. All surfaces to be coated shall be dry, clean, and free of grease, oil, dust blasting media, or any other contaminant. Surfaces shall be free of moisture before application of coating materials unless otherwise permitted by the coating manufacturer in writing.

1.4. **Equipment & Mixing**

1.4.1. Blast air and paint spray supply air shall be free of oil and water. Air pressure shall be 85 – 100 psi (6-7 bar) at the nozzle.

1.4.2. Contractor shall perform a blotter test at least daily by directing a strong stream of compressed air at a clean white absorbent material and at a smooth plastic or metal surface. No oil, water, or discoloration is to be visible in either case. Test the air at a point downstream of oil traps and dryers.

1.4.3. Coatings shall be mixed, catalyzed, thinned, and applied in accordance with the coating manufacturer's data sheets, recommendations, and specifications. Catalyzed materials shall be used within the manufacturer's recommended time limit.

1.5. **Application**

1.5.1. When specified, coatings shall not be applied before the surface has been inspected and the preparatory work approved.

1.5.2. Coating shall be applied to prepared surfaces before flash rusting occurs.

1.5.3. Each coat of paint shall be compatible with the coat of paint that it will cover, including the pre-construction primers that are retained as part of the final coating system.

1.5.4. Successive coating applications shall be of noticeably different colors to aid in the inspection process.

1.5.5. Allow each coat to cure for the length of time specified and/or recommended by the manufacturer before application of a succeeding coat. The succeeding coats shall be applied within the recoat time period recommended by the manufacturer.

1.5.6. Pot life shall not exceed the limits specified by the manufacturer. When the limit is reached, the material must be discarded and new material mixed.

1.5.7. Prior to the application of any coating, damage to the previous coat shall be sanded to a " feather edge" and touched up with the corresponding coating. Damaged areas less than ten square feet shall be repaired per SSPC-SP-3. Damaged areas more than ten square feet shall be re-blasted, edges sanded to a "feather edge", and given a full coating system.

1.6. **Inspection**

1.6.1. The following inspection methods shall be employed:

- Surface cleanliness- SSPC-VIS-1.
- Surface profile- Profile replication tape (e.g. testex), calibrated digital surface profile gauge, or approved equivalent.
- Wet film thickness- Commercial wet film thickness gauge. Wet film thickness shall be determined by painters during application to ensure that dry film thickness (computed as wet film thickness times volume percent coating solids) will be as specified.
- Visual inspection- Holidays, pinholes, runs, sags, drips, cracks, dry spray, overspray, entrained trash, and blisters are not allowed.
- Dry film thickness as noted below.

1.6.2. Dry film thickness shall be measured in accordance with SSPC-PA-2 and ASTM D7091. The surface shall be dry to handle, clean, and free of dry spray and overspray before measurements are taken. Mikrotest (magnetic coating thickness gauge), Positector (digital coating thickness gauge), or equal is an acceptable instrument.

1.6.3. Dry film thickness gauges shall be calibrated using a National Institute of Standards and Technology (NIST) certified calibration standards for coating thicknesses on steel. Calibrate the gauge to the thickness range of the coating being measured. Record coating thickness measurements in the inspection records for each item coated. If more than ten readings are required per SSPC-PA-2 for the items being measured, a minimum of ten readings shall be reported on the inspection report, along with the average reading of all measurements taken.

1.7. **Reporting**

1.7.1. Vendor shall provide a written or electronic report of the following coating preparation and application information performed daily:

- Type(s) of abrasive(s) used for surface preparation.
- Results of blotter test performed.
- Determination of surface preparation cleanliness, and surface profile measurements of abrasive blasted surfaces.
- Ambient temperature and surface temperature of item(s) being coated (environmental data shall be recorded at a minimum every 3 hours unless otherwise specified)
- Dew point measurements during coating.
- Wet film thickness readings.
- Dry film thickness readings.
- Results of visual inspection, holiday testing, and any other tests performed on coating.
- Name/Signature & date of person providing inspection results.

Attachment H: Post-Weld Heat Treatment Requirements

1. *Standard Procurement Requirements*

The following requirements should be included as applicable for purchase orders for PWHT services

1.1. General

1.1.1. PWHT, including heat/cooling rates, holding time/temperature, shall be in accordance with the code and/or specifications identified on this purchase order. Exceptions shall be approved in writing by PSS prior to start of PWHT process. If requests for PWHT services by this purchase order are outside of the identified code requirements, industry standards, and/or known best practices, the PWHT service provider is to identify this issue to PSS prior to proceeding.

1.1.2. Only resistance, induction, furnace, or quartz lamp heating methods are permitted. Exothermic heat treatment shall require prior written authorization by the purchaser.

1.1.3. Item(s) shall be adequately supported during the PWHT to prevent distortion.

1.1.4. When specified by the governing code and/or specifications, PWHT shall be done by personnel qualified as specified. When required by this purchase order, personnel qualification records shall be submitted to and receive documented approval from PSS prior to beginning the PWHT process. If documented approval of personnel qualifications has not been specified, documentation of qualifications shall be made available upon request.

1.1.5. PWHT shall be monitored by controlled equipment that is calibrated according to a documented procedure. The procedure shall address identification and control of controlled equipment, as well as accuracy and frequency of calibration. Chart recorders and other temperature measuring equipment used to determine and control temperature, heating/cooling rates and time shall be calibrated against a reference that is traceable to a national standard (e.g. NIST). The controlled equipment procedure shall be available for PSS review and/or approval as established in contract documents. When approval by PSS is required, documented approval shall be received prior to PWHT activities. The calibrated equipment shall be within its calibration period, and the records of calibration shall be available to authorized PSS personnel for review.

1.1.6. PWHT shall be performed to written procedures. When required by this purchase order, procedures shall be submitted to and receive documented approval from PSS prior to beginning any PWHT activities. If documented approval of procedures has not been specified, procedures are to be made available to PSS for review upon request.

1.1.7. Welding shall not be permitted on the item(s) for attachment of thermocouples or for any other purpose without written permission from PSS which references this purchase order which indicates the scope of that permission and that the requirements of PSS fabrication for welding have been met (e.g. qualified and approved welding procedures and personnel).

1.1.8. Where specified by PSS, access shall be given for PSS personnel, PSS's customer, and/or 3rd party inspector(s) to inspect the heat-treating equipment, thermocouple location, equipment calibration records, and witness heat treatment process itself.

1.2. **Furnace PWHT**

1.2.1. During the heating and holding periods, the furnace atmosphere shall be controlled in such a manner to avoid excessive surface oxidation of the item subject to PWHT. The furnace shall be of such design as to prevent direct impingement of the flame on the vessel.

1.2.2. The temperature of the furnace shall not exceed 800° F (427° C) at the time the item is placed in it.

1.3. **Local PWHT**

1.3.1. If the number and/or location of thermocouples are not specified by this purchase order, a sufficient number shall be used to accurately indicate the temperature of the work and detect uneven heating. Variation in temperature throughout the item subjected to PWHT shall be limited as stated in this purchase order or in the code or specification identified by this purchase order.

1.3.2. Thermocouples shall be attached directly to the item being heat-treated. If specified by this purchase order, the attachment method shall be approved in writing by PSS prior to attachment.

1.4. **Reporting**

1.4.1. A written or electronic report of the PWHT process shall be provided and shall include:

- Identification of the item(s) which was PWHT.
- Procedure and revision which was used in the PWHT process.
- Identification and serial numbers of calibrated equipment used to control the PWHT process.
- A record (e.g. chart recorder chart) of the PWHT process including number of thermocouples, nominal heating rate, holding temperature(s), time(s) at temperature, nominal cooling rate, and maximum variation between thermocouple readings.
- Name of the PWHT technician.

1.4.2. If requested, the service provider shall provide a Certificate of Conformance (COC) that the requirements of this purchase order and attachment(s) have been fulfilled as specified. The COC shall be signed by the company representative responsible for quality and his title shall be given.

Attachment I: Engineering / Design Requirements

1. *Standard Procurement Requirements*

The following requirements should be included as applicable for purchase orders for engineering/design services

1.1. Design shall be developed in accordance with a documented design procedure which has been reviewed and approved by PSS prior to the commencement of the design process.

1.2. The design team shall be identified, and their training, experience, certifications, and capabilities documented. The documents supporting qualification of design team members shall be made available for review by authorized PSS personnel.

1.3. There shall be documented evidence that the design has been reviewed and approved by more than one member of the design team (i.e. review shall not be the work of one person).

1.4. If required, design must be stamped by a Registered Professional Engineer.

1.5. If required, drawings and/or calculations must be stamped by a Registered Professional Engineer.

Attachment J: Welding Consumables Requirements

1. *Standard Procurement Requirements*

The following requirements should be included as applicable for purchase orders for welding consumables

1.1. **Standards & Condition:** Welding consumables shall be provided in accordance with the standard specified. If a particular year is not specified for the standard the latest published year shall be assumed. All items(s) provided in this purchase order shall be supplied in new condition (i.e. not used or refurbished in any way) unless provision for other than new conditions is established by PSS in writing.

1.2. Special Handling: PSS shall be informed of any shelf-life or other special handling requirements for materials prior to delivery and such requirements shall be clearly marked on the material packaging and documentation.

1.3. **Packaging:** Consumables shall be provided in the original packaging supplied by the manufacturer. Consumables which have been re-packaged are not acceptable and will be returned to the supplier. All packaging shall be such as maintaining the consumable in a usable condition for a minimum of six months after receipt where storage is maintained as required by the manufacturer. Additionally,

- Low-Hydrogen SMAW electrodes shall be supplied in hermetically sealed containers.
- FCAW spools shall be enclosed in plastic bags or other methods that provide equivalent protection from moisture absorption.

1.4. **Marking:** Packaging shall be clearly marked with the standard to which they have been produced, indicating specification, classification, and size. The package shall also indicate the heat/lot number of the items contained. Additionally,

- SMAW electrodes shall be marked with their classification on the electrode coating. Marking shall indicate supplementary classification information such as hydrogen designators, moisture resistance, impact properties, etc.

- GTAW filler metal shall have the classification marked on each piece by flagging, color coding, stamping, or some other designator which maintains the identification of the material on each piece.

- Spooled filler metal shall have the specification, classification, heat number, and size marked on or in the spool in such a way that is legible and readily maintained in a shop environment until it is consumed.

1.5. **Identification & Certification:** All items shall be received with documentation stating the PSS purchase order number along with the item(s) description. The weld consumables shall be provided with certification.

- **Welding Filler Metal:** Unless specified otherwise, typical chemical and mechanical properties may be reported on the Material Test Reports (MTRs) provided the manufacturer certifies that the consumables were manufactured under a quality program which has been approved by the agency that established the standard to which it was produced. Where actual properties are specified, the actual test results of all testing which is required by the material standard shall be provided.

- **Shielding Gas:** The supplier shall provide certification (COC) that the gas or mixture conforms to the requirements of the latest edition of AWS A5.32/A5.32M, *Specification for Welding Shielding Gases* when requested. The supplier shall furnish the gas manufacturer's certification that the gas or gas mixture is suitable for welding applications and meets the minimum purity, maximum moisture, and dew point requirements of the specification.

1.6. **Fracture Critical (FC) Welding Consumables-**

- **Heat or Lot Testing:** All welding consumables shall be heat or lot tested by the manufacturer to determine conformance with the requirements of this *PSS-QP 4.F.0.0 Fracture Control Plan* (FCP) and this document. Certified copies of test results shall be provided to the engineer. Heat and lot shall be as defined in the latest edition of AWS A5.01, *Procurement Guidelines for Consumables*.

- Consumables shall be tested by welding as specified in the appropriate AWS filler metal specifications. All tests required by AWS A5.01, Schedule J, shall be performed and reported.

- During welding consumable testing, materials of the same specification and manufacture, but not necessarily the same heat or lot to be combined during production welding shall be used. For example, a specific heat or lot of FCAW filler metal need not be tested with eh specific lot of FCAW filler metal that will be used in production welding, provided both meet all other requirements of the FCP and are representative of the consumables to be furnished.

- **Exemptions:** Welding consumables produced under continuing quality assurance programs audited and approved by one or more of the following agencies shall be exempt from the heat and lot testing requirements of AWS D1.5, Clause 12.6.1. A COC shall be required.

  - American Bureau of Shipping (ABS)
  - Lloyd's Register of Shipping
  - American Society of Mechanical Engineers (ASME)

- **Testing:** For weld consumables for processes other than SMAW, tests shall be conducted on welds produced during classification testing to determine the amount of diffusible hydrogen per 100 g of weld metal. Diffusible hydrogen tests shall be performed under mercury or by the gas chromatography method as specified in AWS A4.3, *Standard Methods for Determination of the Diffusible Hydrogen Content of Martensitic, Bainitic, and Ferritic Steel Weld Metal Produced by Arc Welding*. Testing shall be done by heat and lot of welding consumable as described in the latest edition of AWS A5.01, *Procurement Guidelines for Consumables*.

- When welding consumables are produced and accepted under an approved, certified QMS, heat and lot testing may be waived, provided the certificate of conformance lists diffusible hydrogen or coating moisture content test results, as appropriate, obtained during classification testing.

- **Special Requirements:** Filler metal manufacturers shall specify any special precautions in excess of those contained in this FCP that are necessary to ensure the deposited weld metal shall meet the diffusible hydrogen limits of the specified classification when the consumables are removed from protective packaging and used without delay. Special storage provisions, maximum storage life, and special handling and WPS's, if any, shall be completely described.

- **Diffusible Hydrogen:** All FCAW and GMAW (metal cored) electrodes used to weld base metal with minimum specified yield strength (SMYS) of 345 MPa (50 ksi) or less shall conform to the diffusible hydrogen requirements of the AWS filler metal specifications optional supplemental designator H4, H8, or H16. All FCAW and GMAW (metal cored) electrodes used to weld base metal with a SMYS greater than 345 MPa (50 ksi) shall conform to the diffusible hydrogen requirements of the AWS filler metal specifications optional supplemental designator of H4 or H8.

- **Electrode Packaging:** FCAW and GMAW (metal cored) electrodes shall be received in moisture resistant packages that are undamaged. They shall be protected against contamination and injury during shipment and storage. Electrode packages shall remain effectively sealed against moisture until the electrode is required for use. When removed from protective packaging and installed on machines, care shall be taken to protect the electrodes and coatings, if present, from deterioration and damage. No one shall modify or lubricate an electrode after manufacture for any reason except that drying may be used when recommended by the manufacturer.

Attachment K: Auditor / Auditing Requirements

1. *Standard Procurement Requirements*

The following requirements should be included as applicable for purchase orders for auditor/auditing services

1.1. **Qualification and Certification:** A resume or other documentation which identifies training, experience, and references which support auditing capabilities, including recent similar assessments, shall be made available to PSS personnel for review. Auditing certifications which are current and valid shall also be forwarded as directed by PSS.

1.2. **Scope and Plan:** PSS will provide relevant information necessary to prepare for the assessment, including QA Manual, program procedures, and resumes for key personnel within the scope of the audit. The auditor will provide an audit plan/checklist within two weeks of the receipt of this request. PSS will review and return the checklist with comments within one week. The comments shall be resolved, and the checklist finalized and resubmitted within one week of receipt of comments.

1.3. **Assessment:** Perform and assessment within six weeks of checklist finalization. The assessment shall consist of:

- Review of PSS's QA manual and process procedures vs. the applicable standard in a compliance sense.
- Review representative examples of work completed to the quality program for compliance and for opportunities for process improvement to more effectively comply with the requirements of the standard.
- Observe work in progress for program compliance and opportunities for improvement.
- Interview key personnel at each organization level to assess understanding of the expectations of the quality program.

1.4. **Report:** A report shall be prepared containing the following:

- Completed checklist with evidence reviewed and personnel interviewed.
- Statements of conclusions for area reviewed, with examples and logic supporting the conclusions.
- Recommendations for improvement.

Attachment L: Hot-Dipped Galvanizing Requirements

1. *Standard Procurement Requirements*

The following requirements should be included as applicable for purchase orders for hot-dipped galvanizing services

1.1. **General**

1.1.1. Unless otherwise specified by this purchase order, work shall be done to the latest editions of ASTM A123 *Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products* and/or ASTM A780 *Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings*, as applicable.

1.1.2. Written procedures shall be provided upon requests to PSS, and if required, work shall not proceed until PSS has provided written approval of procedure(s). Some information may not be able to be disclosed due to proprietary obligations.

1.1.3. If procedures, industry standards, specifications, or this purchase order indicate that personnel who control the galvanizing process must be qualified and/or certified, written evidence of qualification/certification shall be made available to PSS upon request.

1.1.4. If the item to be galvanized or the galvanizing process indicates the potential for distortion or other negative impact upon the item, PSS personnel are to be notified prior to proceeding with the galvanizing process.

1.1.5. Item(s) to be galvanized shall be adequately supported during all stages of the galvanizing process to prevent distortion. However, no welding of bracing or other support structure to the item may be done prior to receiving written authorization from authorized PSS personnel which references this purchase order, which indicates the scope of that permission, and that the requirements of PSS for welding have been met (e.g. qualified and approved welding procedures and personnel).

1.1.6. Measurement and Test Equipment (M&TE) used in the galvanizing process or inspection of the galvanized coating shall be calibrated against a reference that is traceable to a national standard (e.g. NIST). The calibrated equipment shall be within its calibration period and the records of calibration shall be available to authorized PSS personnel for review.

1.1.7. The galvanizing process shall proceed according to written procedures that are available to personnel who control the galvanizing operation.

1.1.8. Where specified by PSS, access shall be given for PSS personnel, PSS's customer, and/or 3rd party inspector(s) to inspect the galvanizing equipment, procedures, personnel qualifications, M&TE calibration records, and to witness the galvanizing process itself.

1.1.9. The service provider shall provide a Certificate of Conformance (COC) indicating that galvanizing was done in accordance with ASTM 123, required repairs were done in accordance with ASTM A780, and that all the requirements of this purchase order have been fulfilled as specified. The COC shall be signed by the company representative responsible for quality and his title shall be given.

Attachment M: Machining

Standard Procurement Requirements

The following requirements should be included as applicable for purchase orders for hot-dipped galvanizing services

1.0. **General**

1.1. Access shall be given as required to PSS personnel, PSS's customer, and/or 3rd party inspector(s) to inspect the equipment, procedures, personnel qualification, M&TE calibration records, and to witness the mechanical services processes themselves, as well as subsequent inspection and testing.

1.2. The following is provided for general reference to specification requirements. This information supplements the information provided on approved shop drawings. Where there is conflict between this information and approved shop drawings, the shop drawings shall govern.

2.0. **Material**

2.1. Castings

2.1.1. Steel castings must be free of cracks, cold shuts, shrink holes, blow holes, and porosity in accordance with required testing.

2.1.2. Castings which require repair shall be tagged and/or segregated as nonconforming conditions. They shall be brought to PSS's attention for disposition prior to any repair activities. Welded repair of castings will not be acceptable without prior written approval.

2.1.3. Castings must be cleaned, free of loose scale and sand, fins, seams, gates, risers, and other irregularities. Unfinished edges of castings must be neatly cast with rounded corners, and all inside angles must have ample fillets.

2.1.4. Castings which are not part of the standard catalog of a commercial manufacturer are tested in accordance with the following:

- Perform ultrasonic testing in conformance with ASTM A609, Procedure A, Quality Level 3. Castings that do not pass this test may be rejected.
- Submit test results, whether positive or negative, to PSS. Test records meeting Quality Level 4 may be considered for weld repair, provided the fabricator submits a procedure to PSS for review and approval. Include a means to qualify the repair in the procedures.

- Reject castings with test records meeting Quality Level 5 or higher. Weld repair is not allowed for these.
- Visual inspection in conformance with ASTM A802, Level II. Castings that do not pass this test may be rejected. Submit test results, whether positive or negative, to PSS. Test records meeting Level III may be considered for weld repair. Submit a repair procedure to PSS for review and approval. Include a means to qualify the repair in the procedures.
- Perform magnetic particle testing in conformance with ASTM E125. The following levels of discontinuities will be acceptable:

Type I	Cracks/Hot Tears	¼" Maximum
Type II	Shrink	Degree 3
Type III	Inclusions	Degree 3
Type IV	Chaplets	Degree 2
Type V	Porosity	Degree 1

- Submit test results, whether positive or negative, to PSS. All surface discontinuities may be considered for weld repairs. Provide welding procedure and qualification for both procedure and welder for submittal to PSS for review and approval. Include a means to qualify the repair in the procedures. No welding shall be done prior to documented receipt of an approved welding procedure from PSS.
- Perform weld repairs prior to all heat treatment so no weld repairs are necessary after machining. Also remove surface defects by machining prior to heat treatment.

2.2. Forgings

2.2.1. Forgings for machinery parts and shafts must be ASTM A668 unless specified otherwise.

2.2.2. All forgings must be reduced to size from a single bloom or ingot until perfect homogeneity is secured.

2.2.3. The blooms or ingots from which shafts or pins are to be made must have a cross-sectional area at least 3 times that required after finishing.

2.2.4. No forging must be done at less than a red heat.

2.2.5. All steel forgings must be finished all over.

2.3. Shafting and Pins

2.3.1. All shafts and pins must be accurately finished, round, smooth, and straight and, when turned to different diameters, must have rounded fillets at the shoulders.

2.3.2. All shafts must conform to tolerances in ASTM A29 unless otherwise indicated. Turned, ground and polished shafting straightness tolerances must be 0.002 inch/foot for shafts up to and including 1 ½" in diameter and 0.003 inch/foot for shafts over 1 ½" in diameter.

2.3.3. Stepped shafts must have fillets blended in smoothly to adjacent surfaces without tool marks or scratches.

2.3.4. All shafts must be free from chamber and must run without vibration, noise, or chatter at all speeds up to and including the maximum rated speed.

2.4. Pin Connections

2.4.1. Pins must be:

- Turned to dimensions shown.
- Straight, smooth, and free from flaws.
- Have the final surface produced by a finishing cut.

2.4.2. In pins more than 9 inches in diameter, bore a full-length hole at least 1 7/8 inches in diameter along the pin.

2.4.3. Holes for pins must be:

- True to the diameter specified.
- At right angles to the member axis.
- Parallel with each other except for pins where nonparallel holes are required.
- Smooth and straight with the final surface produced by a finishing cut.

2.4.4. Coat machined surfaces of pins and holes with an easily removed rust inhibitor.

2.4.5. The distance between holes for pins must not vary by more than 1/32" from that shown when measured outside-to-outside for tension members and inside-to-inside for compression members.

2.4.6. The diameter of holes for pins must not exceed the pin diameter by more than 1/50" for pins 5 inches or less in diameter or 1/32" inch for larger pins.

2.4.7. Bore holes for pins in built-up members after assembly. If authorized, you may bore holes before assembly if the same degree of accuracy is achieved as boring after assembly.

2.4.8. Bore pin-connected hanger plates in pairs or in stacks bolted or clamped together such that each pair of hanger plates is matched.

2.4.9. Use pilot and driving nuts for driving pins. Drive pins such that the members will field assembly, use a positive locking device to tighten and secure pins.

2.5. Bolt Holes

2.5.1. Bolt holes must be one of the following:

- Punched full size.
- Drilled full size.
- Sub-punched and reamed.
- Sub-drilled and reamed.

2.5.2. Where new steel is attached to the existing structure through existing fastener holes, bolt holes in new steel must be either:

- Sub-punched or sub-drilled ¼" less in diameter than that of the finished hole and field reamed to fit existing holes.
- Drilled full size through steel templates which have been made to match the existing holes.

2.5.3. Where shown, holes must be drilled in the existing steel for connecting new steel.

2.5.4. Finished holes for bolts must be:

- Cylindrical and perpendicular to the plane of the connection.
- At most 1/16" larger than the nominal bolt diameter.
- Clean cut without torn or ragged edges.
- Without irregularities that prevent solid seating.

2.5.5. Holes punched full size, sub-punched, or sub-drilled must pass a pin, 1/8" smaller than the nominal hole size, without drifting in at least 75 percent of the holes for each connection after assembling and before any reaming.

2.5.6. All holes must pass a pin 3/16" smaller in diameter than the nominal hole size.

2.5.7. Do not correct mispunched or misdrilled holes by welding unless authorized.

3.0. **Processing**

3.1. Punching

3.1.1. Do not punch or sub-punch ASTM A36/A36M structural steel thicker than 7/8" thick. Do no punch or sub-punch HS structural steel thicker than ¾" thick.

3.1.2. The diameter of the punching die must not exceed the punch diameter by more than 3/32".

3.1.3. Sub-punch holes to be reamed to a diameter ¼" smaller than the finished hole.

3.2. Drilling

3.2.1. Drill full-sized holes with parts assembled or to a steel template with hardened bushings. If authorized, you may drill full-sized holes with gang drill equipment.

Note: PSS may request a proof assembly to check the fit of major field connections.

3.2.2. Sub-drill holes to be reamed to a diameter ¼" smaller than the finished hole.

3.2.3. Drill through templates after the templates have been firmly clamped or bolted.

3.2.4. If members are drilled while assembled, hold parts together securely during drilling.

3.2.5. You may stack drill plates using gang drills if:

- Parts are firmly clamped during drilling.
- Drill bits remain perpendicular to the work during drilling.

3.3. Reaming

3.3.1. Perform reaming after built-up members are assembled and firmly bolted together or after templates are securely located over the member. Remove shavings between all plies and bolt holes with compressed air after reaming. Mark pieces reamed together so that they may reassembled in the same position. Do no interchange reamed parts.

3.3.2. Reaming templates must:

- Have hardened steel bushings.
- Have accurately dimensioned holes.
- Have reference lines for locating templates on members.
- Be firmly clamped or bolted in position.

3.3.3. Templates used for reaming of matching members or the opposite faces of one member must be exact duplicates.

3.3.4. For reaming holes in assembled material, do not mix full-sized holes with sub-punched or sub-drilled holes.

3.3.5. Where reamed holes exceed the specified bolt diameter by more than 1/16", provide and install the next larger size bolt or rod at your expense if approved, provided that spacing and edging distance requirements for the larger bolt are met and the net section is adequate.

3.4. Keys and Keyways

3.4.1. Keys and keyways must conform to the dimensions and tolerances for square and flat keys of ANSI Standard B17.1, Keys and Keyseats, unless otherwise specified. All keys must be effectively held in place, preferably by setting them into closed-end keyways milled into the shaft.

3.4.2. The ends of all such keys must be rounded to a half circle equal to the width of the key. Keyways must have a radius in the inside corners. Keyways must not extend into any bearing. Keys must have an ANSI Class 2 fit.

3.5. Flatness of Faying and Bearing Surfaces

3.5.1. Surfaces of bearing and base plates and other metal bearing surfaces that contact mortar, preformed fabric pads, or elastomeric bearing pads must be flat to within 1/8" in 12 inches and 3/16" overall.

3.5.2. Instead of machining, you may heat straighten steel not in contact with other metal bearing surfaces if the above tolerances are met and you obtain prior approval from PSS.

3.6. Cut Edge Roughness

3.6.1. All exposed edges and corners of plates, HSS and tubular members, and all structural steel shapes, shall be chamfered with a 1/16" minimum radius. Sharp edges or corners are not permitted. All burrs shall be removed.

3.6.2. Machine-guided edges must have a surface roughness value not exceeding 1000 µin, as defined in ANSI/ASME B46.1-1985.

3.6.3. Mechanically cut edges must be clean cut without torn or ragged edges. Hand-guided edges must have a roughness not exceeding 1/16".

3.6.4. All cut edges must be free of notches (V-shaped indentations) and reasonably free of gouges (grooves having a curved shape). Notches and gouges not more than 3/16" deep must be reamed by machining or grinding per AWS.

Note: For the following items, contact PSS prior to any weld repair. Qualified and documented welding procedures (WPS/PQR) and welders (WPQ) must be approved in writing by PSS prior to the start of the repair.

3.6.5. All notches and all gouges greater than 3/16" deep must be repaired per AWS D1.5.

3.6.6. Notches and gouges greater than 3/16" deep may be repaired by welding flush to the adjacent surface, in accordance with AWS D1.5, and using low-hydrogen electrodes not exceeding 5/32" in diameter.

3.6.7. All thermal cut edges must be blasted or ground to bright metal to remove flame hardened material.

3.6.8. All thermal, mechanical, and rolled edges must be rounded by grinding to a 1/16" nominal radius to allow proper bonding of paint.

3.6.9. If match marking is required, both the connection plate and connecting member will be marked with a unique identifier for reassembly in the field.

3.6.10. Neatly finish exposed parts of the work. Slightly round edges and sharp corners, including edges marred, cut, or roughened during the handling operation or erection.

4.0. **Shop Assembly**

4.1. Prepare and paint contact surfaces of HS bolted connection before assembly.

4.2. Thoroughly roughen all galvanized faying surfaces with a hand wire brush immediately prior to assembly.

4.3. Thoroughly clean all other surfaces of metal in contact to bare metal before assembly. Remove all rust, mill scale, and foreign material.

4.4. Preassemble completed subassemblies for structures or units of structures before erection to verify geometry and to verify or prepare field connections.

4.5. Bolted trusses, skew portals, skew connections, rigid frames, bents, and towers must be completely preassembled, adjusted to line and camber, and prepared for welding or checked for bolt fit before erection.

4.6. Prepare joints for welding or drill or ream holes for field connections during assembly. For holes previously drilled full size, check holes for bolt fit.

4.7. Drill or ream holes for field connections during preassembly.

4.8. Preassembly methods must be compatible with the erection methods used.

4.9. Preassemble all machinery completely. Fit bearings to the clearances and alignments specified. Gear reductions and line gears must have gear center distances set and the gears match marked.

4.10. Assemble parts into final positions without damage. Follow all match marks. Do not damage or distort members when hammering.

4.11. Drifting done during assembly must not enlarge bolt holes or distort the metal.

5.0. **Delivery, Storage, and Handling**

5.1. Mark the weight of any member weighing over 6,000 pounds on the member.

5.2. Do not bend, scrape, or overstress members during handling and shipping. PSS rejects bent or damaged members.

5.3. Keep material clean during loading, transporting, and unloading.

5.4. Store material above ground on supports. Keep material clean, drained, and protected from corrosion. Store material upright and shored. Support long members on skids placed to prevent deflection.