

Work Shop Standard Minimum requirements

for

ANDRITZ Feed and Biofuel A/S



The present Work Shop Standard stipulates the basic requirements that are essential to manufacture a product in conformity with ANDRITZ Feed and Biofuel (FB) / ANDRITZ Feed and Biofuel A/S manufacturing standard.

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Objective

This Work Shop Standard is intended as a minimum requirement for deliveries to Andritz FB. Higher requirements can be stated in the appropriate purchase order with attached documents as drawings, BOM's etc. In case of doubt the stricter requirements always apply.

1 Scope

This Work Shop Standard is mandatory for all deliveries to Andritz FB.

2 Referenced Documents

R FB EX40 003/001 Packing Regulation.
AWN 112.203 Marking of supplied goods
AWN 112.204 Marking of supplied goods using Bar Code

3 Definitions and Abbreviations

FB Feed and Biofuel
DOP Declaration of Performance
WPS Welding Specification Procedure

4 General Remarks

4.1 Confidentiality of the documents

The provided documents have to be treated confidentially, and shall not be made available to third parties without FB express consent.

4.2 Statutory regulations/state of the art

Manufacture and delivery must comply with legal requirements, with relevant EN, DIN and OENORM standards and guidelines, with ANDRITZ Works Standards (AWN) if specified in the present delivery instructions, as well as with recognized engineering standards. In case of manufacture in the country of the purchaser, the standards of the purchaser's country can be applied if the purchaser or local manufacturer can prove the equivalence of the technical standards in advance.

For Steel Structures fabricated according to EN 1090 "Execution of steel structures and aluminium structures" a copy of CE mark and DOP must be following the delivery note.

4.3 Quality management and audits

Depending on the type of delivery, the supplier should maintain a quality management system equal to the international standard ISO 9001 Quality Management and for welding shops ISO 3834-2 "Quality requirements for fusion welding of metallic materials".

All manufactures must have a stated Health, Safety and Environment policy, as well as a Corporation Social Responsibility Statement.

FB shall be entitled to check the equipment and the measures taken by the supplier to achieve the required quality before commissioning, as well as to conduct quality spot check or audits and check progress during project execution at any time.

4.3.1 Personnel qualification

The supplier is responsible for providing sufficient, qualified and trained personnel for each task. Proof of qualification must be documented and submitted to FB on request.

Welding and NDT personnel must be qualified acc. To:

European Standards and Regulations	American Standards and Regulations
<i>Welding Coordination</i> ISO 14731	ASME – welding supervisor
<i>Qualification test of Welders – Fusion Welding</i> EN ISO 9606-1	ASME IX
Non-destructive Testing – qualification and certification of NDT-Personnel – General Principles EN ISO 9712	Recommended Practice No. ASNT-SNT – TC – 1A

4.4 Standards and Specifications

The supplier is responsible for the availability of all international standards. In each case the latest editions of the standards are considered valid.

The supplier is responsible for requesting missing or controversial documents and data from the purchaser.

4.5 Contact with FB's customer

The supplier shall refrain from making any contact with FB's customer or, its representative unless FB has given its express consent.

4.6 Unclear items in drawings/documents

The supplier must conduct a feasibility check on the received drawings/documents and document this feasibility check in a suitable form. If contradictions or errors are detected in the drawings/documentation provided, these must be reported immediately in written form (e-mail, notification form) to the FB responsible purchaser, together with a request of appropriate instructions, also in written form (e-mail, notification form).

All agreed changes must be documented on the final As-Built drawings, and returned to FB with the required documentation.

4.7 Free issue items

When receiving free issue materials or items from FB, the supplier is obligated to check that delivery is in according to order, and free from damage on arrival. Any deviations must be reported to the responsible purchaser of FB.

All FB free issue materials or items, must be marked as FB's property, and stored at designated area.

The supplier is responsible for materials and components do not deteriorate during storage.

4.8 Procedure for non-conformances

The responsible purchaser of FB must be notified immediately (e-mail, NCR-form) of any deviations from the purchase order documents.

Proposals regarding actions to take on non-conformance, must be made in written form, and forwarded for approval so that a mutually satisfactory solution can be promptly found. Remedy is not to be carried out before approved by FB.

The supplier is obliged to take all necessary measures, to permit reworking, repair or replacement, of rejected parts in good time, to avoid any delay in delivery, without regard to additional costs.

4.9 Stamps on physical items

Hard stamps are not permitted use low stress stamping or engraving.

Stamping on machined parts according to drawing if specified, for additional needs contact purchaser of FB.

4.10 Equipment

The supplier is responsible for using suitable and safe equipment for the work to be performed, if site work is a part of the contract, a list of equipment to be brought at site, must be forwarded to FB's site manager/project manager/purchaser latest 2 weeks before entering site.

All equipment must be inspected according to min. national law and regulations, and the equipment must be marked accordingly.

Copies of all inspection documents must be kept at site/workshop, FB have the right to stop work at any time due to use of unsuitable equipment.

Following equipment must be calibrated:

- Equipment used for final inspection
- Equipment used for filling in measure reports
- Welding machines used for welding according to WPS
- Furnace used for heat treatment

5 Welding

5.1 Inspection of weld seams

The weld seams must be inspected in accordance with the respective quality level, specified as follows:
All weld seams must be subjected to a 100% visual inspection by the manufacturer's welding supervisor.

5.2 Precision tolerances

Tolerances precision according to drawing. Use ISO 13920 "General tolerances for welded constructions" if nothing else stated.

5.3 Preparation of weld

Impurities such as grease, dirt, rust, paint and scales, must be removed from the weld seam area. Slag from flame cutting shall be removed from the welded seam area to the extent required by the welding technique selected. Corrosion protection which has been proven to have no negative effect on the quality of the welded seam is excluded from this requirement.

5.3.1 Filler Material

- Filler material must be with the min. of 2.2 certificate according to EN 10204 "Metallic products – Types of inspection documents"
- If nothing else stated on drawing or purchase order, welding to be performed with WPS as min. according to EN 15610 "Specification and qualification of welding procedures for metallic materials" for machine manufacturer.
- Electrodes and the work piece in the welding seam area must be dry. Coated welding rods or submerged arc welding powder are to be dried before use according to the manufacturer's instructions. Furnaces and quivers used for this purpose must have valid calibration. Bake off max. 2 times, each bake to be marked.
- Welding filler materials must generally be stored according to the manufacturer's instructions.
- Traceability to material certificate must be kept during storage and fabrication.
- Access to welding filler materials must be restricted to authorized and qualified personnel.

5.3.2 Welding

- Welding must be performed with validated welding equipment.
- For welding specified with WPS according to EN 15614 "Specification and qualification of welding procedures for metallic materials" welding equipment must be calibrated.
- Components shall be preheated if so required the type of material, the thickness of the work piece, the ambient temperatures and the state of the art. The measuring instruments used must have valid calibration. If a temperature measuring chalk is used, proof must be provided that the melting temperature is equal to the pre-heating temperature.
- Straightening must be performed without, damage of base material.
- The measuring instruments must be available at the workplace if necessary.
- Welding quality to be according to requirement on the drawing, and the Quality Plan. If deviation the stringiest requirement must be fulfilled.
- Weld spatter must be removed.
- Stainless steel welding's must be pickled.
- Aluminum welding's must be brushed.
- Damage to base material must be avoided.

6 Machining

6.1 Quality requirements

- It is the responsibility of the supplier that all measures are according to specifications supplied with the order.
- Some purchase orders will have additional specific quality requirements and protocols. The inspection protocol contains the minimum required measurements that need to be documented as part of the order. Suppliers are free to use any other format of inspection protocol implemented as part of their quality control. In this case the minimum content of such protocols is the minimum required measurements indicated in this protocol and according to specifications supplied with the order.
- Any additional requirements for quality documentation (material certificate, heat treatment, etc.) will be specified with the order and must be delivered accordingly.
- If specifications/drawings supplied with the order require individual marking/traceability of the supplied part, parts must be marked accordingly.
- If no specific requirements for marking: Sample items must be marked with permanent marking ensuring traceability between parts and supplied quality documentation.
- Order required quality documentation must be delivered together with the ordered parts.

6.2 General tolerances

- ISO 2768 "General tolerances" – m must be respected, if not stated otherwise on the drawing.
- Thread tolerances according to ISO 965-1&2 "ISO general purpose metric screw threads"

6.3 Surface quality

- The surface quality must comply with the machining markings in the drawings.
- The surface quality of threads must comply with DIN 267 "Fasteners; technical delivery conditions", part 2 product grades A and B.
- For through holes Ra25 is ideal depending on the process (up to Ra50 is also acceptable).
- All components must be de-burred and cleaned from chips with special attention to deep holes/lubrication channels.

7 Handling and storage

7.1 Handling

Handling hot-dip galvanized parts and hot-dip pre-galvanized, hereafter Galvanized sheets & parts

- Do not step or walk on Galvanized sheets & parts during processing, storage and handling.
- Never drag one sheet on top of any other material. Lift sheets to avoid scratches.
- Never grind on Galvanized sheets and parts
- Never grind near Galvanized parts/sheets
- No drilling in galvanized sheets & parts allowed
- Don't leave hand tools and power tools on the galvanized sheets & parts (don't use as table)
- If clamps are to be used, no direct contact between metal clamp feet and galvanized sheets or part (use wood or plastic feet)
- Stacking of Galvanized sheets without inlay is only allowed for same size and design cuts before bending
- During bending process take care not to scratch surfaces by dragging sheets over the bending bar. Alternatively cover the support for bending bar with non-scratch protection.
- Stacking of bended Galvanized sheets is only allowed with inlay or stacking backside (inside) towards each other and inlay between visual surfaces. When in doubt ask FB for advice.

7.2 Lifting

- Protect components against damage at the lifting points
- Lifting equipment must not be damaged
- Avoid lifting long components at one single point, use straddle carriers if necessary
- Bundle together light components that tend particularly to suffer from edge damage, twisting and rotation when handled as individual parts. Care must be taken in order to avoid local damage to non-reinforced edges at lifting points as a result of components touching one another or in other areas where a substantial part of the overall weight of the bundle can affect individual non-reinforced edges.

7.3 Storage

- Store welding filler materials according to supplier specification.
- Stainless and mild carbon steel grades must be stored separately
- In the warehouse age materials must be easy to identify (for example by means of material coding or color coding).
- Rubber O-rings, sealing's and gaskets must be stored according to the supplier's recommendation and marked with expiring date. (Most rubber O-rings and gaskets must be stored in ultraviolet protecting bags, marked with expiry date)
- Stack prefabricated components that are stored before transport or installation maintaining some clearance from the floor in order to keep the components clean.
- Support the stored components to avoid any permanent deformation

7.4 Stainless steel

- Lifting gear coming into contact with the components must be made of stainless steel and used for manufacturing of stainless components only (marking recommended).
- Handle and store stainless steel grades so that they are not contaminated by clamping or swing devices. Store stainless steel grades carefully so that surfaces are protected against damage and contamination.
- Apply a protective layer or another coating that remains as long as necessary
- Avoid storing in a saline damp atmosphere

- Protect storage racks with wooden, rubber or plastic strips or protective coverings in order to avoid contact with unalloyed steel, materials containing copper and lead, etc.
- Do not use markings containing chloride or sulfide.
- Protect stainless steel against direct contact with lifting gear or means of transport made of unalloyed steel, such as chains, hooks, belts and rolls, or the fork of a forklift truck by using a material to separate, light plywood, or suction cups. Use suitable tools for installation work in order to ensure a surface uncontaminated.
- Avoid contact with chemicals including dyes, adhesives, adhesive tape and large amounts of oil and grease.

NOTE: If it is necessary to use these substances, check which are suitable with the product manufacturer.

- Use separate manufacturing areas for unalloyed steel and stainless steel grades in order to prevent contamination with unalloyed steel. Use separate tools, particularly grinding wheels and wire brushes that are provided exclusively for treating stainless steel. Wire brushes and steel wool should be made of stainless steel, preferably austenitic steel.

7.5 Transport

- Use suitable measures to protect prefabricated steel structures during transport.
- Protect threads and close openings during storage and transport.

8 Requirements for surface treatment

The supplier is responsible for the quality of the surface treatment including correct and proper craftsmanship and fulfilment of required corrosion class.

All painting shall be carried out in accordance to the requirements in ISO 12944 "Paints and varnishes – Corrosion protection of steel structures by protective paint systems".

Corrosion class to be determined according to ISO 12944-5. "Paints and varnishes – Corrosion protection of steel structures by protective paint systems"

If no corrosion class is indicated on drawings. Class C2 shall be used.

The painting durability shall be at least medium (5-15 years) unless noted otherwise.

Low durability	2-5 years
Medium durability	5-15 years
High durability	<15 years

A 2-component (polyurethane) paint/paint system must be applied. The layer thickness must be minimum as written below (less layer thickness and other paint system requires written approval from Andritz Feed and Biofuel). Should a larger layer thickness be necessary to fulfil the required corrosion class, it is the responsibility of the supplier of the painted component. The paint system must be repairable (damages/defects) with common 1 and 2-component paint systems.

Gaps and fissures on finished constructions/machines (e.g. between discontinued welding's) must be sealed with a joint filler (not silicone) before surface treatment to prevent corrosion.

Tone (RAL-system), corrosion class and special customer requirements will be stated in the purchase order.

Gloss: Gloss level 70-80 (ISO 2813) for topcoat unless else is stated in tables below.

Color Tolerance to RAL code: CIE L*a*b*D65, Max Delta E =1,0 and L*±0,57, a*±0,57, b*±0,57(Only valid for top coating)

Paint system (example based on epoxy-polyurethane) and minimum requirements NDFT (Non Dry Film Thickness) for layer thickness:

Primer	Corr. Class C2	Corr. Class C3	Corr. Class C4	Corr. Class C5
Degreasing + removal of rust and iron scales. Shop primer (40 my)	Sand- or shot blast to SA 2½ 2-comp. primer (60 my) and topcoat (60 my), a total of 120 my	Sand- or shot blast to SA 2½ 2-comp. primer (60 my) and topcoat (100 my), a total of 160 my	Sand- or shot blast to SA 2½ 2-comp. primer (60 my) and topcoat (140 my), a total of 200 my	Sand- or shot blast to SA 2½ 2-comp. primer (60 my) and topcoat (200 my), a total of 260 my

The corrosion classes are according to the definition in ISO 12944-5: Annex C

8.1 Finish requirements:

Welding splashes, burrs etc. must be removed before painting starts.

Painted surfaces must be without, blowing's, blowholes, shrink holes, missing paint and drop-shaped pattern (result of too much paint) etc. The paint may not be polluted with remains from sandblasting and like impurities. There must be no visible shifts between feedings. In the event a repair is needed this must not be visible and paint must be sprayed on.

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8.2 Standard surface treatment for finished machines/equipment & parts: (if not specified otherwise in the purchase order)

Please note the below list is not complete.

If Machines/parts not listed below contact FB for further information.

Description	Corr. Class	Tone (Ral)	Remarks.
Internal wear surfaces			Primer coat paint
Machines and auxiliary equipment	2	1013, Pearl White	Gloss level 70-80
Motors and Gears	5	5015, Sky Blue	Corrosion class according to motor class.
Lifting brackets, tools, cranes	2	1018, Signal Yellow	Gloss level 70-80
Transport brackets, Locking devices	2	1018, Signal Yellow	Gloss level 70-80
Welded mild steel: Foundation for pellet mill Door trolley, door drive section etc.	2	9005, Jet black	Gloss level 70-80
Welded frame for M15, M30	2	9005, Jet black	Gloss 25
Guards in general, Manifolds, Oil coolers	2	9005, Jet black	Gloss level 70-80
Guards for: - FEX 25, 34, 42 - Crumblers GRM 121, 181, 201 - Extruders	2	1013, Pearl White	Gloss level 70-80
Welded mild steel: - Pellet mill frames, - Pellet Chambers	5	7035, Light Grey	Zinc –phosphate rust protection primer (Epoxide resin based) 60-80 my. Gloss level 25
Casted gearbox (outside surface only)	2	7035, Light Grey	Filling applied, sanded to regular smooth surface, and then primed 40-60my. Primer must be heat resistant to min. 110 °C and be oil resistant. Gloss level 25 NO Topcoat
Casted gearbox (inside surface only)	5	3003, Ruby Red or 3013, Tomato Red	Sand or shot blast to SA 2½ Zinc –phosphate rust protection primer (Epoxide resin based) 80-100 my Primer must be heat resistant to min. 110 °C and be oil resistant. Gloss level 30-40
Casted components (not stainless) outside: Pellet mill boxes, Bearing houses, Sleeves	2	3003, Ruby Red or 3013, Tomato Red	Shot blast to SA 3 Shop priming 25my Primer must be heat resistant to min. 110 °C and be oil resistant. Gloss level 15-25 NO Topcoat
Stainless Glass blown surfaces			Treat with paraffin oil immediately after glass blowing.

8.3 Excluded surfaces (not to be painted):

(Use grease, painter's tape, removable plastic plugs, or similar technique for avoiding paint on actual surfaces)

- Shaft ends (with/without keyways) where pulleys, couplings etc. typically will be mounted (use
- Internal/External threads
- Gears/splines
- Centering pins/holes
- Hinge holes and taps
- Machined surfaces in general, indicated with fine tolerance range on the measure
- Machined surfaces inside/outside the component where bearings, sealing's, etc. typically will be mounted
- Machined plane surfaces used as contact base plane between actual item and machine
- Other relevant surfaces – please contact Andritz order handler for clarification

8.4 Prohibited content

It is required that special precautions is taken to follow the regulation (EC) No 1907/2006 (REACH) Annex XVII. Annex XVII contains a listing of restricted substances where the use of those substances are either banned or limited to certain amounts. Violation of this requirement can lead to immediate termination of contractual agreements.

8.5 Temporary corrosive preventive treatments

(for transportation & storage purposes only)

By land: 8-15my Haughton Rust Veto 377HF, Shell Ensis fluid SX or oil based fluid with similar or better corrosive preventive characteristic

Overseas: - 40-100my Haughton Rust Veto 342, Shell Ensis 2462 or similar product with respect to corrosive preventive characteristic
- After corrosive protection layer a 100-250my water proof plastic foil cover must be applied (remember bottom side of machines)

9 Inspections

9.1 Self-inspection, reports where specifically required on PO

The supplier must conduct a full, internal inspection of the parts, components and/or plants and document the detailed test results, retain them for at least 5 years.

Measure reports:

- If measure report is requested in the order, the FB Inspection Protocol must be filled in.
- Calibrated measure equipment must be used.
- Sufficient measurements must be taken, and the middle no. calculated, and stated in the measure report.
- Identification no. of measure instrument must be written in the report.
- Date and name of measure inspector, to be stated on inspection protocol. If more than 1 inspector involved please state the name next to each measurement.

Final check list:

- If report is requested in order FB final check list must be filled in, the check list do not relive the supplier for a complete quality check of the entire unit.

9.2 Notification of readiness for inspection

- FB and/or its customer shall be entitled to conduct quality and progress inspections at any time.
- The final check list must be mailed to FB Purchaser stating readiness for FB inspection the min. of 7 days before packing.

9.3 Repeat tests

If deviations from nominal status are observed during schedule, progress and quality checks, the supplier must take all actions required to achieve the target status at its own expense. FB reserves the right to conduct repeat tests at the expense of the supplier.

9.4 Quality documentation where required on PO.

- The required certificates and quality documentation for each purchase order item must be sent in English to FB Purchaser as a pdf-file.
- A copy must follow delivery of the goods.
- Original to be kept by the supplier.
- FB performs the right to withhold payment, if supplier fails to deliver the required documentation.

10 Identification (Marking, Transport, Packing)

10.1 Identification (Marking)

All parts delivered must be marked with name of supplier, name of component, purchase order number and purchase order item number on a label tag.

10.2 Transport, Packing

The goods should be handled carefully in transport to avoid any transport damage.

Transport devices, reinforce, etc., may be necessary to avoid damaging the goods.

Attaching fittings should be provided by agreement with FB. All components must be packed appropriately guidelines provided in: R FB EX40 003/001 Packing Regulation for transport.

Individual purchase order item must be packed separately.

10.3 Delivery note

Purchase order number, the respective purchase order item numbers and the number of items are to be specified on the delivery note according to AWN 112.203 "Marking of supplied goods" and AWN 112.204 "Marking of supplied goods using Bar Code".

If dispatch documents or the information on the goods and packing have not been issued or appended in accordance with the purchase order, FB reserves the right to reject the consignment at the expense of the seller and/or against reimbursement of the additional costs incurred.

11 List of Revisions

Date	Revision	Revised Chapters	Type of Revision
21.12.15	First edition	-	-
05.01.17	2	8	Transport brackets added to table
18.12.2018	3	- 2 & 10 8.2	FBT → FB AVN112.101 → R FB EX40 003/001 Packing Regulation. New text added, Description and RAL codes updated.
16.06.2020	4	8 8,2 8.4	ISO12944-2 → Corrosion class, ISO 12944-5 Gloss level update. 8,4 Prohibited content, added.