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00-General Drawings

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This standard technical specification is subject to change without prior notice. The most current issue will at all times be located on the Norðurál web site, www.nordural.is.

Table of contents

1	Responsibility	3
2	Scope and Field of Application	3
2.1	Scope Definition	3
2.2	Document Conflicts.....	3
3	References and Definitions	3
3.1	References	3
3.2	Abbreviations	4
4	Requirements	4
4.1	Types of drawings	5
4.1.1	Sketches	5
4.1.2	Preliminary drawings	5
4.1.3	Approved for Engineering.....	6
4.1.4	Approved for Tender Purpose	6
4.1.5	Approved for Construction.....	6
4.1.6	As Built Drawings	6
4.2	Drawing Submission Details	7
4.3	Stamps and Signatures by Licensed Engineer	7
5	Method of Application of the Standard	8
5.1	Title Blocks	8
5.1.1	Drawing Sheets	8
5.2	Drawing Numbering System	8
5.2.1	Multi-page Drawings.....	8
5.3	Drawing Revisions – Revision clouds	8
5.4	Drawing Holds	9
5.4.1	Copyright and Confidentiality Statement.....	9
5.5	Key Plan and North orientation	9
5.6	Drawing Controls	9
5.6.1	Instructions for completing the Vendor Data List.....	10
6	Reviews and Resubmittal of Drawings	10
	Appendix I-Norðurál Drawing Title Block	12

1 Responsibility

This Standard Technical Specification (STS) is of responsibility of the Owner. The revision and date of issue are on the front page.

All deviations from the specifications must be approved in writing by the Owner.

2 Scope and Field of Application

2.1 Scope Definition

To define the requirements for preparation, work, review, approval and control of drawings. It establishes the minimum requirements.

This Standard Technical Specification details the minimum technical requirements including but not limited to:

- Sketches,
- Preliminary design drawings,
- Technical and engineering drawings (collectively drawings)
- Reference drawings.
- Construction Drawings.
- As-Built Drawings.

The provision of this Standard Technical Specification applies to the production area of Norðurál aluminum smelter.

2.2 Document Conflicts

Eventual conflicts between referenced documents shall be reported, without delay, to the Owner in writing for resolution.

3 References and Definitions

3.1 References

All drawings shall be created in compliance and read in conjunction with the standard technical specification *General Technical Standard* (NA-00-STS001) and other relevant standards.

Building related drawings must comply with all relevant requirements set by the Icelandic Building Code, copy of current issue can be found at:

<http://www.mannvirkjastofnun.is/byggingar/byggingarreglugerd/>.

The relevance order of standards shall be according to NA-00-STS001.

The following referenced standards shall be considered for the application of this document. For dated references, only the edition cited applies. For all references, dated and undated, the latest edition of the referenced document (including any amendments) applies.

Table 1 - references/Standards

Standard Nr.	Subject/Name
ISO 128	Technical Drawings – General Principles of Presentation
ISO 129-1:2004	Technical Drawings – Indication of dimensions and tolerances
ISO 216:2007	Writing Paper and Certain Classes of Printed Matter-Trimmed Sizes-A & B Series, and indication of Machine Direction
ISO 406:1987	Technical Drawings – Tolerancing of linear and angular dimensions
ISO 3098/2:2000	Technical Drawings – Lettering - Part I: Currently Used Characters
ISO 4172:1991	Technical Drawings – Construction drawings -- Drawings for the assembly of prefabricated structures
ISO 5455:1979	Technical Drawings – Scales
ISO 5457:1999	Technical product documentation – Sizes and layout of drawing sheets
ISO 6410-1:1993	Technical drawings – Screw threads and threaded parts—Part 1: General conventions
ISO 6412-1:1989	Technical drawings – Simplified representation of pipelines -- Part 1: General rules and orthogonal representation
ISO 6433:1981	Technical drawings – Item references
ISO 7200:1984	Technical drawings – Title blocks
ISO 7437:1990	Technical drawings – Construction drawings -- General rules for execution of production drawings for prefabricated structural components
ISO 7519:1991	Technical drawings – Construction drawings -- General principles of presentation for general arrangement and assembly drawings
ISO 8048:1984	Technical drawings – Construction drawings -- Representation of views, sections and cuts
ISO 8560:1986	Technical drawings – Construction drawings -- Representation of modular sizes, lines and grids
ISO 10209-1:1992	Technical product documentation – Vocabulary – Part 1: Terms relating to technical drawings: general and types of drawings
IST EN ISO 5456-3	Technical drawings – Projection methods – Part 3: Axonometric representations

This list shall be considered representative of the quality of the drawings to be produced. It is not exhaustive.

3.2 Abbreviations

- ÍST Prefix for European Standards adopted by the Icelandic Standard Institute
- IFC Document issued for construction purposes
- IFU Document issued for use

4 Requirements

Manual annotation of drawings with numeric revision is not allowed. Detailed original engineering drawings pertaining to Contracts shall be in English or Icelandic only. However, standard drawings may be submitted with texts in both the native language and correct interpretation in the English language directly below the native text.

An exception to language requirements is relevant when preparing drawings bound by clauses of the Icelandic Building Code to be submitted to the Icelandic Building Authorities and/or CE marking standard requirements, in those cases all parts of the relevant drawings are to be in the Icelandic language.

Dimensions on drawings shall be based on the SI standard unit system. CAD files shall be based on the millimeter as the smallest length unit.

Vendor shall not submit unchecked drawings for review. Such drawings may be subject to return without review or revision by Owner.

Documents not meeting the above requirements will be rejected for resubmittal and any costs incurred by Owner as a result of poor documents will be back charged to Vendor.

Paper copies of all drawings shall be completely legible. Supplied copies shall be clear enough to serve as masters for subsequent reproduction. They shall depict the material as shipped and installed.

Drawings issued as part of a single project are to be grouped by discipline and the following setup implemented:

All electrical-, and control drawings shall include at least the following drawings.

1. Front page.
2. Drawing list that includes: Header, revisions, number of sheets, object title, drawing title 1, drawing title 2 and date.
3. Schematic that explain symbols and markings.
4. General arrangement drawing displaying all new equipment and list of all new AKS coding for new equipment.
5. Block diagram for control.
6. Network diagram.
7. Cabinet layout.
8. PLC layout.
9. Power distribution 400 VAC, 110 VAC, 24 VDC.
10. PLC control. Digital and analog.
11. Cable list.
12. Terminal list.
13. Items list.
14. Electrical layout drawings.

Drawings of all other disciplines shall include at least the following drawings.

1. Front page.
2. Registration table (in cases of architectural drawings to be submitted to the Building Authorities).
3. Drawing list that includes: Header, revisions, number of sheets, object title, drawing title 1, drawing title 2 and date.
4. General arrangement drawing displaying all new equipment and list of all new AKS coding for new equipment.
5. Schematic that explain symbols and markings.
6. Block diagrams, all disciplines.
7. P&ID diagrams.
8. Parts list.

4.1 Types of drawings

The drawing categories are defined as follows:

4.1.1 Sketches

Presentation of design concepts or study alternatives and shall not be used for fabrication or construction purposes. They should be drawn using standard drawing format with a title block and an assigned number.

Sketches are identified with the status letter S within the designated revision box of the Norðurál standard drawing template.

Revisions to sketches shall be identified with numerical designators: 1, 2, 3, etc.

Example: First issue sketch receives status S1 within the revision box in the bottom right corner of the Norðurál drawing header template.

4.1.2 Preliminary drawings

Design drawings not ready to be issued for construction or for procurement of goods. They may be issued as preliminary design drawings for purposes such as: Internal coordination and Owner's Project review.

Preliminary drawings are identified with the status letter P within the designated revision box of the Norðurál standard drawing template.

Revisions to preliminary drawings shall be identified with numerical designators: 1, 2, 3, etc.

Example: First issue preliminary drawing receives status P1 within the revision box in the bottom right corner of the Norðurál drawing header template.

4.1.3 Approved for Engineering

Approved for Engineering are drawings that are issued for purposes such as: Soliciting Vendor budgetary quote or contractor budgetary quote; purchasing purpose or part of a contract; fabrication and construction or general use.

Approved for Engineering drawings are identified with the status letter A within the designated revision box of the Norðurál standard drawing template.

Revisions to engineering drawings shall be identified with numerical designators: 1, 2, 3, etc.

Example: First issue engineering drawing receives status A1 within the revision box in the bottom right corner of the Norðurál drawing header template.

4.1.4 Approved for Tender Purpose

Approved for Tender purpose drawings are drawings that are issued for purpose of soliciting Vendor firm bids.

Approved for Tender Purpose drawings are identified with the status letter B within the designated revision box of the Norðurál standard drawing template.

Revisions to tender drawings shall be identified with numerical designators: 1, 2, 3, etc.

Example: First issue tender drawing receives status B1 within the revision box in the bottom right corner of the Norðurál drawing header template.

4.1.5 Approved for Construction

Construction drawings are drawings that are issued for purpose of physical construction and/or installation work.

Construction drawings are identified with the status letter C within the designated revision box of the Norðurál standard drawing template.

Revisions to construction drawings shall be identified with numerical designators: 1, 2, 3, etc.

Example: First issue construction drawing receives status C1 within the revision box in the bottom right corner of the Norðurál drawing header template.

4.1.6 As Built Drawings

These drawings are the “As Built” document representing the as-built and commissioned status of the equipment.

As construction of various facilities is completed, Vendor shall revise all Construction drawings to reflect “as-built” status based on mark-ups provided by the Construction and the Preoperational Verification teams.

Updating the drawings to “as-built” status must be done in the correct sequence to prevent old data from over-writing the new or most recent.

All notes and items directly related to the construction for which the drawing is being “as-built” shall be removed. Words such as “existing” and “for field verification” shall be removed. If a draftsperson is not sure of what to keep or remove on a drawing, a more senior person of the particular discipline is to be consulted.

As-built drawings are identified with the status letter D within the designated revision box of the Norðurál standard drawing template.

Revisions to as-built drawings shall be identified with numerical designators: 1, 2, 3, etc.

Example: First issue as-built drawing receives status D1 within the revision box in the bottom right corner of the Norðurál drawing header template.

4.2 Drawing Submission Details

Method of transferring electronic files shall be consulted with Owner.

The following table describes the submission details for Drawings and the five types of drawings applicable for submission to Owner:

Table 2 - Submission details for drawings

Type	Content Requirements	Media Format and Copies
Sketches	Drawings containing e.g. preliminary General Arrangement and are submitted as part of a Solution Analysis report.	Electronic file-PDF format
Preliminary	These drawings require the necessary detail to define equipment/construction and also allow Owner's engineering/design to proceed.	Electronic file-PDF format
Approved for Engineering	These are the first submittal of requested drawings and will contain information relevant to the Drawing requested	Electronic file-PDF format
Approved for Tender Purpose	Bid drawings should include indicative equipment arrangements and data to permit Owner to complete the bid analysis process.	Electronic file-PDF format
Construction Drawings	Final design drawings.	Electronic file-PDF format and 2 x Original paper copy
As-Built Drawings	These drawings are the "As Built" document representing the as-shipped status of the equipment.	Electronic file-pdf, native file, CAD format and 2 x Original paper copy

As-Built Drawings are to be submitted to Owner in CAD format in addition to the software format they are prepared in. Drawings to be submitted to Owner in CAD format, shall be of AutoCAD version 2015 or younger.

In addition, all drawings are submitted to Owner in PDF format.

4.3 Stamps and Signatures by Licensed Engineer

When required by the Icelandic Building Code, CE requirements or other relevant Standard requirements, drawings and/or data, ready for issue, shall be stamped and/or signed on paper or electronic medium by a professional, licensed engineer.

His signature shall imply explicitly and implicitly that the engineer is licensed to sign such drawings and data, that the engineer is responsible for the engineering and/or the architectural work or he has been supervised to do so. By the engineer's statement Norðurál expressly assumes that the following statement is being made by the engineer signing the drawing:

I hereby certify that the drawing was prepared or approved by the undersigned, and that I as the undersigned am a duly licensed professional engineer under applicable laws to sign this drawing.

5 Method of Application of the Standard

5.1 Title Blocks

Drawing title block shall be in accordance with instruction in Appendix I. Copies of the title blocks are available in AutoCAD, DWG, format from Norðurál's Document Control.

5.1.1 Drawing Sheets

The accepted sizes for drawings are as follows, all defined in ISO 216:2007.

Table 3- Accepted sizes for drawings

A4:	210 mm × 297 mm
A3:	297 mm × 420 mm
A2:	420 mm × 594 mm
A1:	594 mm × 841 mm
A0:	841 mm × 1189 mm (However, before submitting A0 document, prior and expressed agreement of the Owner is required).

When a specific drawing sheet size is not outlined by either the Icelandic Building Code and/or European Norms, the Owner is to be consulted with regards to preferred sheet sizes.

5.2 Drawing Numbering System

Drawing numbers are issued by Owner to Vendor following Vendor submitted request.

5.2.1 Multi-page Drawings

All pages of a multi-page design drawing shall have the same drawing number and pages of the drawing be numbered sequentially. Text box no. 10 on Norðurál's standard drawing header template shall be used to number of each page of a multi-page drawing. Refer to appendix I of this Standard. All sheets shall bear the same revision designator, upon initial issue.

Each sheet of a multi-page drawing to be issued shall be signed by the originator, the checker, and the responsible engineer.

The Vendor shall take care and insert the correct number of sheets in the Vendor Document List, refer to section 5.6 of this Standard.

The document management system does not allow individual pages of a drawing to be reissued as a stand-alone document at later revisions; thus, the Vendor shall resubmit the collection of pages with each new revision and resubmittal. This applies even though only some of the sheets need revision. Pages not receiving modifications shall retain the current revision number.

When submitting drawings to Owner in native drawing software format, each file submitted shall include only one page of one drawing. If drawing submitted is single page, the file shall solely include the single drawing. Drawings submitted in native drawing software format are to be clean of all excess information and are to reflect the formal published paper original in every way.

5.3 Drawing Revisions – Revision clouds

The drawing revision shall be clearly identified by placing a Revision Triangle and Revision Letter or Number, in the revised area of the drawing. A brief but informative statement of the revision made, and where applicable the appropriate, project or other reference code, shall be shown in each revision block.

To highlight a revision, revision "cloud" shall be placed around the revision area and the Revision Triangle placed within or adjacent to the cloud.

If the drawing is revised again at a later date, the previous revision "clouds" and revision triangle shall be removed. Details in the revision block shall remain.

AVOID THE USE OF THE WORDS "GENERAL REVISION" since it leads to Contractor interpretation problems, and is used as reason to request an "extra".

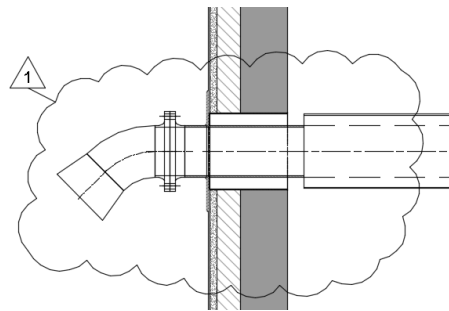


Figure 1 - Typical Revision Cloud

5.4 Drawing Holds

When details of a pending drawing change have not been finalized, but issue of the drawing is required for other purposes, the area of the drawing not finalized shall be clearly circled and identified as “HOLD”. The details to which the hold applies shall be circled with HOLD “clouds” (Effectively reversed version of the concave shape of the standard revision “cloud”). HOLD clouds shall be used to segregate tentative information so that any drawing can be issued for tender or construction prior to the drawing being completed. The word “HOLD” and the reason for the hold shall be shown inside the cloud. Clouds shall not be drawn through text or detailed information where legibility of the information will be compromised.

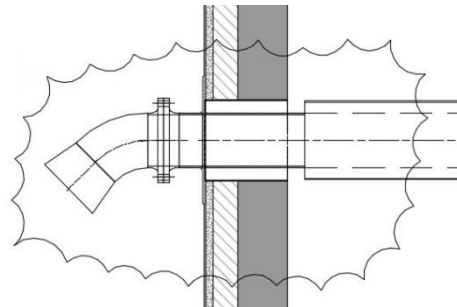


Figure 2 - Typical Hold Cloud

Upon removal of a “HOLD” cloud, the design drawing revision number shall be updated.

5.4.1 Copyright and Confidentiality Statement

All drawings produced by the Vendor shall bear the following note in the Title Block:

“This drawing is confidential and legal title to and copyright in this drawing is and remains vested in Norðurál hf. It must not be copied, used or disclosed to third parties without the prior written permission of Norðurál hf and must be returned upon request.”

In addition, the derived drawings containing Technology Licensor Information shall be controlled as per Norðuráls express directions.

5.5 Key Plan and North orientation

All arrangement drawings produced by the Vendor shall bear the following information:

- 1) A general key plan of the project that identified the part cover by the drawing
- 2) A north arrow that is pointing up or to the right.

5.6 Drawing Controls

All Drawings shall be recorded and monitored through an electronic list of deliverables, the VDL (Vendor Data List).

5.6.1 Instructions for completing the Vendor Data List

Vendor shall complete columns one (1) through eight (8). The following depicts a sample and explanation of each of the VDL columns.

Table 4-Example of Vendor Data List (VDL)

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8
Norðurál Drawing No.	Vendor Doc No	Rev No	Title	Number of sheets	Document Type DOC, DWG, PDF, etc.	Scheduled Submittal Date/Actual Submittal Date	Submittal number

Explanation of each column:

Table 5 - Explanation of each column in the VDL

Column	Column Title	Instruction
1	Drawing No	Enter Norðurál Drawing number
2	Vendor Doc No	Enter Vendor document number
3	Rev No	Enter document revision – i.e. 01, 02, 03....
4	Title	Enter document title
5	Number of sheets	Enter number of sheets in the drawing set. Enter “1” if only one sheet.
6	Document type	Enter the document type – i.e. DOC, DWG, PDF etc..
7	Scheduled Submittal Date/Actual Submittal Date	For each submittal, enter the initially agreed, contractual submittal date followed by the actual submittal date, the two dates separated by a slash (/).
8	Submittal number	Enter the relevant number of submittal for the specific package, i.e. if relevant document is a part of Vendors initial document submittal for the package, the submittal number is 01 and so forth.

Each row in the template represents one (1) Vendor Document. Use only one row per document and do not skip any rows. For each row, all cells in columns one (1) through eight (8) must be populated with the required data.

Vendor shall electronically submit the EXCEL file to the Owner.

Owner requires ten (10) working days at project office to review and comment on drawings. Vendor shall revise (as necessary) drawings with comments and resubmit to Owner within ten (10) working days of receipt of reviewed drawings.

6 Reviews and Resubmittal of Drawings


Vendors drawings will be reviewed only as to overall compatibility and conformance with interface requirements and related documentation and such review shall not be construed to relieve Vendor’s responsibility for accuracy or adequacy and suitability of materials and/or equipment represented thereon.

Vendors drawings submitted for review by Owner will be returned to Vendor with markups of comments if applicable and instructions on whether work can proceed prior to resubmittal of documents by Vendor.

Drawings returned to Vendor for revision shall be resubmitted within ten (10) working days after receipt. Resubmittals shall retain the original document number and be clearly marked with revision triangles enclosing the revision number and a description of the revision in the drawing title block.

Drawings with multiple sheets must be resubmitted as a complete document. Revised single sheets will not be acceptable.

Appendix I-Norðurál Drawing Title Block

(12)	COPYRIGHT This drawing is confidential and legal title to and copyright in this drawing is and remains vested in Norðurál hf. It must not be copied, used or disclosed to third parties without the prior written permission of Norðurál hf and must be returned upon request.				ENVIRONMENTAL AND ENGINEERING DEPARTMENT				
	Project: (13)				Part of Project - AKS code (1)		Object (9)		
	Des. (14)	Dr. (17)			Type of work (2)		Page (10)		
	Chk. (15)	Date (18)			Description 1 (3)		Next Page (11)		
Appr. (16)		Date	Appr.	Scale (5)	Vendor Doc. number (6)	Drawing number (7)	Revision (8)		
REFERENCES (24)		Dwg. No. (25)	No. (19)	Date (20)	REVISION (21)		Des. (22)	Chk. (23)	Appr.

Explanation of title block components:

- 1) Area Code followed by AKS-code
- 2) General design type (e.g. ventilation, dust collection, structural design, piping etc.)
- 3) Description of drawing content (e.g. foundations, inlet air system, process water piping etc.)
- 4) Description of drawing type (e.g. general arrangement, section, flow diagram etc.)
- 5) Scale
- 6) Vendor's doc/drawing number

- 7) **Norðurál's project drawing number provided by owner**
- 8) **Revision number**
- 9) **Object (used when drawing content displays an object forming a part of a bigger system or apparatus, e.g. motor within an dust collector).**
- 10) **Page number**
- 11) **Next page**
- 12) **Vendor's logo/info**
- 13) **Vendor's project number**
- 14) **Designer**
- 15) **Checked by**
- 16) **Approver's wet signature**
- 17) **Drafted by**
- 18) **Date of first issue**
- 19) **Revision issue**
- 20) **Date**
- 21) **Revision text**
- 22) **Designer**
- 23) **Checked by**
- 24) **For external use in case of references**
- 25) **For external use in case of references**