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## *03-Structural Cladding*

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# **1 Responsibility**

This Standard Technical Specification (STS) is the 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**

This Standard Technical Specification details the minimum technical requirements for design, execution and erection of single skin cladding.

### **2.2 Document Conflicts**

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

## **3 References and Definitions**

### **3.1 References**

All materials, workmanship, design calculation and tests shall be performed in compliance and read in conjunction with the NA-00-STS001 General Technical Standard and other relevant standards.

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

All materials intended for use at Norðurál shall be approved by the Owner. The following referenced documents should be considered for the application of this document.

Generally the latest edition of the referenced documents shall be used. Exception is for example when mandatory regulations stipulate the use of previous versions, where the edition stipulated shall be used.

If this standard specification references an outdated version the Owner shall be notified.

*Table 3.1- References / Standards*

Standard Nr.	Subject/Name
<b>Icelandic and European standards</b>	
ÍST EN 1990:2002	Eurocode 0 - Basis of structural design
ÍST EN 1991-1-1:2002	Eurocode 1: Actions on structures - Part 1-1: General actions - Densities, self-weight, imposed loads for buildings
ÍST EN 1991-1-2:2002	Eurocode 1: Actions on structures - Part 1-2: General actions - Actions on structures exposed to fire
ÍST EN 1991-1-3:2003	Eurocode 1: Actions on structures - Part 1-3: General actions - Snow loads
ÍST EN 1991-1-4:2005	Eurocode 1: Actions on structures - General actions - Part 1-4: Wind actions
ÍST EN 1991-1-5:2003	Eurocode 1: Actions on structures - Part 1-5: General actions - Thermal actions
ÍST EN 1991-1-6:2005	Eurocode 1: Actions on structures - Part 1-6: General actions - Actions during execution
ÍST EN 1991-1-7:2006	Eurocode 1 - Actions on structures - Part 1-7: General actions - Accidental actions
ÍST EN 1991-2:2003	Eurocode 1: Actions on structures - Part 2: Traffic loads on bridges
ÍST EN 1991-3:2006	Eurocode 1 - Actions on structures - Part 3: Actions induced by cranes and machinery
ÍST EN 1991-4:2006	Eurocode 1: Actions on structures - Part 4: Silos and tanks
ÍST EN 1993-1-1:2005	Eurocode 3: Design of steel structures - Part 1-1: General rules and rules for buildings
ÍST EN 1993-1-2:2005	Eurocode 3 - Design of steel structures - Part 1-2: General rules - Structural fire design
ÍST EN 1993-1-3:2006	Eurocode 3 - Design of steel structures - Part 1-3: General rules - Supplementary rules for cold-formed members and sheeting
ÍST EN 1993-1-4:2006	Eurocode 3 - Design of steel structures - Part 1-4: General rules - Supplementary rules for stainless steels
ÍST EN 1993-1-5:2006	Eurocode 3 - Design of steel structures - Part 1-5: Plated structural elements
ÍST EN 1993-1-6:2007	Eurocode 3: Design of steel structures - Part 1-6: Strength and Stability of Shell Structures
ÍST EN 1993-1-7:2007	Eurocode 3 - Design of steel structure - Part 1-7: Strength and stability of planar plated structures subject to out of plane loading
ÍST EN 1993-1-8:2005	Eurocode 3: Design of steel structures - Part 1-8: Design of joints
ÍST EN 1993-1-9:2005	Eurocode 3: Design of steel structures - Part 1-9: Fatigue
ÍST EN 1993-1-10:2005	Eurocode 3: Design of steel structures - Part 1-10: Material toughness and through-thickness properties
ÍST EN 1993-1-11:2006	Eurocode 3 - Design of steel structures - Part 1-11: Design of structures with tension components
ÍST EN 1993-1-12:2007	Eurocode 3 - Design of steel structures - Part 1-12: Additional rules for the extension of EN 1993 up to steel grades S 700
ÍST EN 1993-2:2006	Eurocode 3 - Design of steel structures - Part 2: Steel Bridges
ÍST EN 1993-3-1:2006	Eurocode 3 - Design of steel structures - Part 3-1: Towers, masts and chimneys - Tower and masts

ÍST EN 1999-1-1:2007	Design of aluminium structures - Part 1-1: General rules
ÍST EN 1999-1-2:2007	Design of aluminium structures - Part 1-2: Structural fire design
ÍST EN 1999-1-3:2007	Design of aluminium structures - Part 1-3: Structures susceptible to fatigue
ÍST EN 1999-1-4:2007	Design of aluminium structures - Part 1-4: Cold-formed structural sheeting
ÍST EN 1999-1-5:2007	Design of aluminium structures - Part 1-5: Shell structures
ÍST EN 1090-1	Execution of steel structures and aluminium structures - Part 1: Requirements for conformity assessment of structural components
IST EN 1090-2	Execution of steel structures and aluminium structures - Part 2: Technical requirements for the execution of steel structures
IST EN 1090-3	Execution of steel and aluminium structures - Part 3: Technical rules for execution of aluminium structures
ÍST EN 14782:2006	Self-supporting metal sheet for roofing, external cladding and internal lining
ISO/TS 8000	Data quality
ISO 8601:2004	Data elements and interchange formats
<b>Regulations</b>	
Byggingarreglugerð 112/2012	Building regulation of Iceland (Byggingareglugerð, nr. 112/2012)
<b>NA Standards</b>	
00/00/STS001	General Standard Technical Specification
00/02/TS002	Concrete Work
00/03/STS001	Surface treatment and painting
00/03/TS002	Structural Steel
<b>NA Guidelines/ Rules</b>	
NAG-HSE	Safety Rules

## 4 Design

All structural design shall be according to the Icelandic building regulation and the Icelandic Eurocodes with accompanying National Annexes.

### 4.1 Norðurál's specific requirements

Enclosed are Norðuráls specific requirements.

#### 4.1.1 Materials

Materials shall be new and of first class quality, free from defects and imperfections and shall fulfill the designated classification.

Members and sections requiring routine maintenance or exchange shall be from standard sections and are subject to prior approval by the Owner.

#### **4.1.2 Imposed loads**

If codes, regulations or design brief do not specify higher loads, the following loads shall be used as a minimum (live loads, characteristic values):

- |                                                                 |                       |
|-----------------------------------------------------------------|-----------------------|
| a) Vertical point load on roof                                  | 1,5 kN                |
| b) Vertical uniform loads on platforms, walkways and staircases | 3,0 kN/m <sup>2</sup> |
| c) Vertical point loads on platforms, walkways and staircases   | 2,0 kN                |

#### **4.1.3 Equipment load**

Equipment load and reactions (dead, static, dynamic, wind and earthquake loads e.t.c) shall be obtained from the equipment vendor. The loads shall be multiplied by impact/dynamic load factors when applicable.

Same applies to specific events like impact and explosions as relevant.

#### **4.1.4 Stability of members**

Sheet metal for exterior cladding shall not be considered as restraining the top flange of its supporting beam or used as diaphragm.

#### **4.1.5 Deformations**

The limits on maximum allowable deflection are based on the Icelandic building regulation (Byggingareglugerð/112, 2012).

#### **4.1.6 Safety lines on roofs**

Fastenings for safety lines shall be installed on all roofs. Type (point anchors or horizontal system), access and other requirements shall be agreed with the Owner.

#### **4.1.7 Symbols and units**

All measuring units shall be expressed in the metric system and shall be used in all information and communication. All documents, drawings, calculations shall use metric units.

- Units of the SI-System measurements are applied according to ISO/TS 8000
- Instruments shall be calibrated as per SI-System
- Numerical date representations shall comply with the ISO 8601 (EN 28601)
- A comma (,) is used as the decimal delimiter

Reference to other equivalent national and international Standards is subject to prior approval by the Owner.

#### **4.1.8 Design**

The design working life of permanent structures, including structures supporting equipment is 50yrs. Shorter working life is subject to prior approval by the Owner.

## **5 Cladding Materials**

All cladding shall be of aluminum. Color of all materials shall be in accordance with NA Standard Specification 00/03/TS001.

#### **5.1.1 Wall and roof sheets, including rounded edges**

Aluminium specification:

- |                      |              |
|----------------------|--------------|
| a) Alloy             | AA 3005      |
| b) Hardness          | H14          |
| c) Minimum thickness | 1,0 mm       |
| d) Corrugation       | 55 mm, sinus |

Surface coating:

- a) External PVDF, minimum thickness 65 µm
- b) Internal PVDF, minimum thickness 45 µm

### 5.1.2 Cladding on roof ventilation

Aluminium specification:

- a) Alloy AA 3005
- b) Hardness H14
- c) Minimum thickness 1,0 mm
- d) Corrugation 55 mm, sinus

Surface coating:

- a) External PVDF, minimum thickness 65 µm
- b) Internal PVDF, minimum thickness 65 µm

### 5.1.3 Gutters

Aluminium specification:

- a) Alloy AA 3005
- b) Hardness H14
- c) Minimum thickness 2,0 mm

Where there is a risk of snow and/or ice falling off a roof and onto gutters, the gutters shall be reinforced.

### 5.1.4 Flashings

Aluminium specification:

- a) Alloy AA 3005
- b) Hardness H14
- c) Minimum thickness 1,25 mm

Surface coating:

- a) External PVDF, minimum thickness 65 µm
- b) Internal PVDF, minimum thickness 45 µm

### 5.1.5 Translucent wall cladding

Translucent wall cladding shall be of a standard fabrication, of hardened PVC or another approved material, with chemical, mechanical and ageing resistance suitable for the intended use.

- a) Minimum thickness 1,2 mm
- b) Corrugation Sinus, height 55 mm (same as roof and wall cladding).

### 5.1.6 Fasteners

Fasteners for aluminum sheets flashings and translucent sheets shall be of austenitic stainless steel / aluminum with appropriate washers and shims, ensuring corrosion resistance due to galvanic currents see **Error! Reference source not found., Error! Reference source not found..**

Fastener heads shall have the same color as the external cladding.

### **5.1.7 Mastic tape**

Tape to be used between the cladding and the underlying purlins and girts shall be of an approved fabrication and suitable for the intended use. It shall be none moisture absorbing and extend the contact surface of the purlin/girt and cladding by 5mm on each side.

### **5.1.8 Filler blocks**

Filler blocks shall be of hard-pressed flexible PVC foam or another approved material. Glue for filler blocks shall be according to the supplier's recommendation.

### **5.1.9 Testing of materials**

The Contractor shall submit test certificates type 3.1 according to EN 10204 or other satisfactory evidence that all material intended for use in the Work conforms to the requirements designated.

### **5.1.10 Durability**

Cladding shall be classified in atmospheric-corrosivity category according to NA-03-STS001, Surface Treatment and Painting (outdoors C5-M and indoors C3). Inside of buildings may be classified in outdoor class (C5-M).

The design working life of cladding, c.f.4.1.8 Design, applies to finished installed surface, i.e. cladding, screws, tape, etc. shall be selected so that design working life is reached.

Real life of cladding can vary within different parts of buildings due to e.g. dust, moisture and gasses. This needs to be considered and risk of corrosion reduced if possible (by means of detailing, ventilation etc.)

The cladding shall be so designed that part of a cladded surface can be "easily" replaced without removing other parts e.g. supporting structure (purlins/girts)

## **6 Execution and Erection**

Execution (procurement, preparation and assembly, welding, mechanical fastening, transportation, surface treatment, inspection and documentation) and erection of cladding work shall be according to ÍST EN1090-1, ÍST EN1090-2, ÍST EN 1090-3 and NA-00-03-STS002 Structural Steel.